Lasse Bockelie

MICROPROGRAMLISTING FOR ND-120/32 BIT VERSION K

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  1  A,Z           000000 000000 000000 000000 A-OP. IS 0. USED TO ADDR. ZERO REG., STATUS OR SCRATCH
  2  A,D           000000 000000 000000 010000 A-OP. IS 1. USED TO ADDR. THE D-REGISTER
  3  A,P           000000 000000 000000 020000 A-OP. IS 2. USED TO ADDR. THE P-REGISTER
  4  A,B           000000 000000 000000 030000 A-OP. IS 3. USED TO ADDR. THE B-REGISTER
  5  A,L           000000 000000 000000 040000 A-OP. IS 4. USED TO ADDR. THE L-REGISTER
  6  A,A           000000 000000 000000 050000 A-OP. IS 5. USED TO ADDR. THE A-REGISTER
  7  A,T           000000 000000 000000 060000 A-OP. IS 6. USED TO ADDR. THE T-REGISTER
  8  A,X           000000 000000 000000 070000 A-OP. IS 7. USED TO ADDR. THE X-REGISTER
  9  A,STS         000000 000000 000000 100000 A-OP. IS 10. USED TO ADDR. REG. 10, STATUS OR SCRATCH
 10  A,R1          000000 000000 000000 110000 A-OP. IS 11. USED TO ADDR. REG. 11, ADDR. OR SCRATCH
 11  A,R2          000000 000000 000000 120000 A-OP. IS 12. USED TO ADDR. REGISTER 12, SCRATCH
 12  A,R3          000000 000000 000000 130000 A-OP. IS 13. USED TO ADDR. REGISTER 13, SCRATCH
 13  A,R4          000000 000000 000000 140000 A-OP. IS 14. USED TO ADDR. REGISTER 14, SCRATCH
 14  A,R5          000000 000000 000000 150000 A-OP. IS 15. USED TO ADDR. REGISTER 15, SCRATCH
 15  A,R6          000000 000000 000000 160000 A-OP. IS 16. USED TO ADDR. REGISTER 16, SCRATCH
 16  A,R7          000000 000000 000000 170000 A-OP. IS 17. USED TO ADDR. REGISTER 17, SCRATCH
 17  A,PIL         000010 000000 000000 000000 A-OP. IS THE VALUE IN THE 'PIL'-REGISTER.
 18  A,REG         000020 000000 000000 000000 A-OP. 'INSTRUCTION BITS 3-6' LOADED BY LAST 'T,MAPJ'
 19  A,SRCE        000024 000000 000000 000000 A-OP. 'INTRUCTION BITS 3-5' LOADED BY LAST 'T,MAPJ'
 20  A,LC          000030 000000 000000 000000 A-OP. THE 'LOOP COUNTER' TWO MICROINSTRUCTIONS AGO
 21  PIC,RSTS      000000 000000 000000 060000 A-OP. IS 6. USED TO GIVE 'READ STATUS'-CMD. TO INTSYS
 22  PIC,MCL       000000 000000 000000 000000 A-OP. IS 0. USED TO GIVE 'MASTER CLEAR'-CMD. TO INTSYS
 23  PIC,MCLPID    000000 000000 000000 020000 A-OP. IS 2. TO GIVE 'MASKED CLEAR PID'-CMD. TO INTSYS
 24  PIC,RMSK      000000 000000 000000 070000 A-OP. IS 7. USED TO GIVE 'READ MASK'-CMD. TO INTSYS
 25  PIC,LOSTS     000000 000000 000000 110000 A-OP. IS 11. USED TO GIVE 'LOAD STATUS'-CMD. TO INTSYS
 26  PIC,LMSK      000000 000000 000000 160000 A-OP. IS 16. USED TO GIVE 'LOAD MASK'-CMD. TO INTSYS
 27  PIC,MCLMSK    000000 000000 000000 120000 A-OP. IS 12. TO GIVE 'MASKED CLEAR MASK'-CMD. TO INTSY
 28  PIC,IOF       000000 000000 000000 150000 A-OP. IS 15. USED TO GIVE 'IOF'-CMD. TO INTSYS
 29  PIC,ION       000000 000000 000000 170000 A-OP. IS 17. USED TO GIVE 'ION'-CMD. TO INTSYS
 30  PIC,MSTMSK    000000 000000 000000 130000 A-OP. IS 13. TO GIVE 'MASKED SET MASK'-CMD. TO INTSYS
 31  PIC,RVECT     000000 000000 000000 050000 A-OP. IS 5. USED TO GIVE 'READ-VECTOR'-CMD. TO INTSYS
 32  A,0           000000 000000 000000 000000 A-OP. IS 0
 33  A,1           000000 000000 000000 010000 A-OP. IS 1
 34  A,2           000000 000000 000000 020000 A-OP. IS 2
 35  A,3           000000 000000 000000 030000 A-OP. IS 3
 36  A,4           000000 000000 000000 040000 A-OP. IS 4
 37  A,5           000000 000000 000000 050000 A-OP. IS 5
 38  A,6           000000 000000 000000 060000 A-OP. IS 6
 39  A,7           000000 000000 000000 070000 A-OP. IS 7
 40  A,10          000000 000000 000000 100000 A-OP. IS 10
 41  A,11          000000 000000 000000 110000 A-OP. IS 11
 42  A,12          000000 000000 000000 120000 A-OP. IS 12
 43  A,13          000000 000000 000000 130000 A-OP. IS 13
 44  A,14          000000 000000 000000 140000 A-OP. IS 14
 45  A,15          000000 000000 000000 150000 A-OP. IS 15
 46  A,16          000000 000000 000000 160000 A-OP. IS 16
 47  A,17          000000 000000 000000 170000 A-OP. IS 17
 48  B,Z           000000 000000 000000 000000 B-OP. IS 0. USED TO ADDR. ZERO REG., STATUS OR SCRATCH
 49  B,D           000000 000000 000001 000000 B-OP. IS 1. USED TO ADDR. THE D-REGISTER
 50  B,P           000000 000000 000002 000000 B-OP. IS 2. USED TO ADDR. THE P-REGISTER
 51  B,B           000000 000000 000003 000000 B-OP. IS 3. USED TO ADDR. THE B-REGISTER
 52  B,L           000000 000000 000004 000000 B-OP. IS 4. USED TO ADDR. THE L-REGISTER
 53  B,A           000000 000000 000005 000000 B-OP. IS 5. USED TO ADDR. THE A-REGISTER
 54  B,T           000000 000000 000006 000000 B-OP. IS 6. USED TO ADDR. THE T-REGISTER
 55  B,X           000000 000000 000007 000000 B-OP. IS 7. USED TO ADDR. THE X-REGISTER
 56  B,STS         000000 000000 000010 000000 B-OP. IS 10. USED TO ADDR. REG. 10, STATUS OR SCRATCH
 57  B,R1          000000 000000 000011 000000 B-OP. IS 11. USED TO ADDR. REG. 11, ADDR. OR SCRATCH
 58  B,R2          000000 000000 000012 000000 B-OP. IS 12. USED TO ADDR. REGISTER 12, SCRATCH
 59  B,R3          000000 000000 000013 000000 B-OP. IS 13. USED TO ADDR. REGISTER 13, SCRATCH
 60  B,R4          000000 000000 000014 000000 B-OP. IS 14. USED TO ADDR. REGISTER 14, SCRATCH
 61  B,R5          000000 000000 000015 000000 B-OP. IS 15. USED TO ADDR. REGISTER 15, SCRATCH
 62  B,R6          000000 000000 000016 000000 B-OP. IS 16. USED TO ADDR. REGISTER 16, SCRATCH
 63  B,R7          000000 000000 000017 000000 B-OP. IS 17. USED TO ADDR. REGISTER 17, SCRATCH
 64  B,DEST        000001 000000 000000 000000 B-OP. IS THE 'INSTR. BITS 0-2' LOADED BY LAST 'T,MAPJ'
 65  B,SRCE        000002 000000 000000 000000 B-OP. IS THE 'INSTR. BITS 3-5' LOADED BY LAST 'T,MAPJ'
 66  B,LC          000003 000000 000000 000000 B-OP. IS THE THE 'LOOP COUNTER' TWO INSTRUCTIONS AGO
 67  B,0           000000 000000 000000 000000 B-OP. IS 0
 68  B,1           000000 000000 000001 000000 B-OP. IS 1
 69  B,2           000000 000000 000002 000000 B-OP. IS 2
 70  B,3           000000 000000 000003 000000 B-OP. IS 3
 71  B,4           000000 000000 000004 000000 B-OP. IS 4
 72  B,5           000000 000000 000005 000000 B-OP. IS 5
 73  B,6           000000 000000 000006 000000 B-OP. IS 6
 74  B,7           000000 000000 000007 000000 B-OP. IS 7
 75  B,10          000000 000000 000010 000000 B-OP. IS 10
 76  B,11          000000 000000 000011 000000 B-OP. IS 11
 77  B,12          000000 000000 000012 000000 B-OP. IS 12
 78  B,13          000000 000000 000013 000000 B-OP. IS 13
 79  B,14          000000 000000 000014 000000 B-OP. IS 14
 80  B,15          000000 000000 000015 000000 B-OP. IS 15
 81  B,16          000000 000000 000016 000000 B-OP. IS 16
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 82  B,17              000000 000000 000017 000000 B-OP. IS 17
 83  ALUF,ANDAQ        010000 000000 000000 000000 A /\ Q -> F
 84  ALUF,ANDAB        010200 000000 000000 000000 A /\ B -> F
 85  ALUF,ANDDA        011200 000000 000000 000000 D /\ A -> F
 86  ALUF,ANDDQ        011400 000000 000000 000000 D /\ Q -> F
 87  ALUF,ORAQ         006000 000000 000000 000000 A \/ Q -> F
 88  ALUF,ORAB         006200 000000 000000 000000 A \/ B -> F
 89  ALUF,ORDA         007200 000000 000000 000000 D \/ A -> F
 90  ALUF,ORDQ         007400 000000 000000 000000 D \/ Q -> F
 91  ALUF,XORAQ        014000 000000 000000 000000 A XOR Q -> F
 92  ALUF,XORAB        014200 000000 000000 000000 A XOR B -> F
 93  ALUF,XORDA        015200 000000 000000 000000 D XOR A -> F
 94  ALUF,XORDQ        015400 000000 000000 000000 D XOR Q -> F
 95  ALUF,XNORAQ       016000 000000 000000 000000 NOT(A XOR Q) -> F
 96  ALUF,XNORAB       016200 000000 000000 000000 NOT(A XOR B) -> F
 97  ALUF,XNORDA       017200 000000 000000 000000 NOT(D XOR A) -> F
 98  ALUF,XNORDQ       017400 000000 000000 000000 NOT(D XOR Q) -> F
 99  ALUF,ZERO         010400 000000 000000 000000 0 -> F
100  ALUF,INVQ         016400 000000 000000 000000 NOT(Q) -> F
101  ALUF,INVB         016600 000000 000000 000000 NOT(B) -> F
102  ALUF,INVA         017000 000000 000000 000000 NOT(A) -> F
103  ALUF,INVD         017600 000000 000000 000000 NOT(D) -> F
104  ALUF,PASSQ        014400 000000 000000 000000 Q -> F
105  ALUF,PASSB        014600 000000 000000 000000 B -> F
106  ALUF,PASSA        015000 000000 000000 000000 A -> F
107  ALUF,PASSD        015600 000000 000000 000000 D -> F
108  ALUF,MASKAQ       012000 000000 000000 000000 NOT(A) /\ Q -> F
109  ALUF,MASKAB       012200 000000 000000 000000 NOT(A) /\ B -> F
110  ALUF,MASKDA       013200 000000 000000 000000 NOT(D) /\ A -> F
111  ALUF,MASKDQ       013400 000000 000000 000000 NOT(D) /\ Q -> F
112  ALUF,A+Q          000000 000000 000000 000000 A + Q -> F
113  ALUF,A+B          000200 000000 000000 000000 A + B -> F
114  ALUF,D+A          001200 000000 000000 000000 D + A -> F
115  ALUF,D+Q          001400 000000 000000 000000 D + Q -> F
116  ALUF,A+Q+1        000000 040000 000000 000000 A + Q + 1 -> F
117  ALUF,A+B+1        000200 040000 000000 000000 A + B + 1 -> F
118  ALUF,D+A+1        001200 040000 000000 000000 D + A + 1 -> F
119  ALUF,D+Q+1        001400 040000 000000 000000 D + Q + 1 -> F
120  ALUF,-Q-1         004400 000000 000000 000000 -Q - 1 -> F
121  ALUF,-B-1         004600 000000 000000 000000 -B - 1 -> F
122  ALUF,-A-1         005000 000000 000000 000000 -A - 1 -> F
123  ALUF,-D-1         003600 000000 000000 000000 -D - 1 -> F
124  ALUF,Q-A-1        002000 000000 000000 000000 Q - A - 1 -> F
125  ALUF,B-A-1        002200 000000 000000 000000 B - A - 1 -> F
126  ALUF,A-D-1        003200 000000 000000 000000 A - D - 1 -> F
127  ALUF,Q-D-1        003400 000000 000000 000000 Q - D - 1 -> F
128  ALUF,A-Q-1        004000 000000 000000 000000 A - Q - 1 -> F
129  ALUF,A-B-1        004200 000000 000000 000000 A - B - 1 -> F
130  ALUF,D-A-1        005200 000000 000000 000000 D - A - 1 -> F
131  ALUF,D-Q-1        005400 000000 000000 000000 D - Q - 1 -> F
132  ALUF,Q            000400 000000 000000 000000 Q -> F
133  ALUF,B            000600 000000 000000 000000 B -> F
134  ALUF,A            001000 000000 000000 000000 A -> F
135  ALUF,D            001600 000000 000000 000000 D -> F
136  ALUF,Q+1          000400 040000 000000 000000 Q + 1 -> F
137  ALUF,B+1          000600 040000 000000 000000 B + 1 -> F
138  ALUF,A+1          001000 040000 000000 000000 A + 1 -> F
139  ALUF,D+1          001600 040000 000000 000000 D + 1 -> F
140  ALUF,Q-1          002400 000000 000000 000000 Q - 1 -> F
141  ALUF,B-1          002600 000000 000000 000000 B - 1 -> F
142  ALUF,A-1          003000 000000 000000 000000 A - 1 -> F
143  ALUF,D-1          005600 000000 000000 000000 D - 1 -> F
144  ALUF,-Q           004400 040000 000000 000000 -Q -> F
145  ALUF,-B           004600 040000 000000 000000 -B -> F
146  ALUF,-A           005000 040000 000000 000000 -A -> F
147  ALUF,-D           003600 040000 000000 000000 -D -> F
148  ALUF,Q-A          002000 040000 000000 000000 Q - A -> F
149  ALUF,B-A          002200 040000 000000 000000 B - A -> F
150  ALUF,A-D          003200 040000 000000 000000 A - D -> F
151  ALUF,Q-D          003400 040000 000000 000000 Q - D -> F
152  ALUF,A-Q          004000 040000 000000 000000 A - Q -> F
153  ALUF,A-B          004200 040000 000000 000000 A - B -> F
154  ALUF,D-A          005200 040000 000000 000000 D - A -> F
155  ALUF,D-Q          005400 040000 000000 000000 D - Q -> F
156  ALUD,Q            000000 000000 000000 000000 F -> Q ; F -> Y
157  ALUD,NONE         020000 000000 000000 000000 F -> Y
158  ALUD,B,YA         040000 000000 000000 000000 F -> B ; A -> Y
159  ALUD,B            060000 000000 000000 000000 F -> B ; F -> Y
160  ALUD,SRD          100000 000000 000000 000000 F -> Y ; (F,Q)/2 -> (B,Q)
161  ALUD,SRB          120000 000000 000000 000000 F -> Y ; F/2 -> B
162  ALUD,SLD          140000 000000 000000 000000 F -> Y ; (F,Q)*2 -> (B,Q)
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163  ALUD,SLB          160000 000000 000000 000000 F -> Y ; F*2 -> B
164  STS,LO            000140 000000 000000 000000 IDB-BITS 0-7 -> STATUS-BITS 0-7
165  STS,EA            000040 000000 000000 000000 CRY -> STS C ; OVF -> STS Q ; OVF \/ STS 0 -> STS 0
166  STS,ES            000100 000000 000000 000000 ALU SHIFT OUTPUT -> STATUS M
167  CRY,C             000000 100000 000000 000000 STATUS C -> CARRY IN
168  CRY,GPR           000000 140000 000000 000000 GPR BIT 0 -> CARRY IN
169  ALUM,FMU          000000 010000 000000 000000 MULT. ALU MODE. GPR 0 -> ALU-INST-B 1 ; RIGHT GPR-SHIF
170  ALUM,FDV          000000 020000 000000 000000 DIVISION ALU MODE. GPR 0 -> ALU-INST-B 3 ; LEFT GPR-SH
171  ALUM,IR           000000 030000 000000 000000 SHIFT INSTR. MODE. SH MODE FROM IR-BITS. M IS SET AUTO
172  ALUM,MIC          000000 000000 000000 000000 MICROPROGRAM CONTR. SHIFT. SHIFT MODE FROM 'MIS-BITS'
173  MIS,ROT           000000 002000 000000 000000 SPECIFIES ROTATIONAL SHIFT IF 'ALUM,MIC'
174  MIS,ZIN           000000 004000 000000 000000 SPECIFIES ZERO-END-INPUT SHIFT IF 'ALUM,MIC'
175  MIS,LIN           000000 006000 000000 000000 SPECIFIES LINK-END-INPUT SHIFT IF 'ALUM,MIC'
176  LCOUNT            000000 000000 000100 000000 COUNT LOOP-COUNTER ; IF FALSE 'RETURN'&'HOLD'
177  CONDENABL         000000 000000 000200 000000 ENABLE COND. SEQ., USE 'FALSE' SPECS IF COND. FALSE
178  IDBS,ALU          000000 000000 000000 000000 ARITHMETIC-LOGIC-UNIT -> IDB. CGA.
179  IDBS,BMG          000000 000040 000000 000000 BIT-MASK-GENERATOR -> IDB. CGA.
180  IDBS,GPR          000000 000100 000000 000000 GENERAL-PURPOSE-REGISTER -> IDB. CGA.
181  IDBS,DBR          000000 000140 000000 000000 DATA-BUS-REGISTER -> IDB. CGA.
182  IDBS,ARG          000000 000200 000000 000000 ARGUMENT (MICRO-INSTRUCTION-BITS 0 - 15) -> IDB. CGA.
183  IDBS,REG          000000 000240 000040 000000 REGISTER-FILE -> IDB
184  IDBS,STS          000000 000300 000000 000000 STATUS -> IDB. CGA.
185  NOT,USED          000000 000340 000000 000000 NOT USED
186  IDBS,BARG         000000 000400 000000 000000 B-OPERAND-ARGUMENT (0-17) -> IDB. CGA.
187  IDBS,SWAP         000000 000440 000000 000000 BYTE-SWAP OF LAST IDB -> IDB. CGA.
188  IDBS,PEA          000000 000500 000040 000000 PEA-REGISTER -> IDB
189  IDBS,PES          000000 000540 000040 000000 PES-REGISTER -> IDB
190  IDBS,AARG         000000 000600 000000 000000 A-OPERAND-ARGUMENT*10 (0-170) -> IDB. CGA.
191  IDBS,PIC          000000 000640 000000 000000 PRIORITY-INTERRUPT-CONTROL STATUS REG. -> IDB. CGA.
192  IDBS,IOR          000000 000700 000040 000000 UART-STATUS -> IDB
193  IDBS,DSABL        000000 000740 000040 000000 DISABLE IDBS (USED TO READ 'PIC'-INFO, EXCEPT PIC-STS)
194  IDBS,MIPANS       000000 001000 000040 000000 IR 0 USED BY MOPC
195  IDBS,MAPANS       000000 001040 000040 000000 IR 0 USED BY TRA-INSTRUCTION
196  IDBS,GPR,SEXT     000000 001100 000000 000000 GPR-BITS 0-7 (WITH BITS 8-15 = BIT 7) -> IDB. CGA.
197  IDBS,PGS          000000 001140 000040 000000 PAGING STATUS ACCORDING TO LAST REQUEST. CGA.
198  IDBS,CSR          000000 001200 000040 000000 CACHE STATUS REGISTER
199  IDBS,PCR          000000 001240 000040 000000 READ PAGING CONTROL REG.(NUMBER SELECTED BY PIL) CGA.
200  IDBS,ALD          000000 001300 000040 000000 ALD & PRINT STATUS
201  IDBS,PANEL        000000 001340 000040 000000 PANEL VECTOR
202  IDBS,RCS          000000 001400 000040 000000 READ CONTROL STORE
203  IDBS,PICVC        000000 001440 000040 000000 INTERRUPT VECTOR. CGA.
204  NOT,USED          000000 001500 000000 000000 NOT USED
205  NOT,USED          000000 001540 000000 000000 NOT USED
206  IDBS,LA           000000 001600 000000 000000 LOG.ADDR. FROM 'MAC' USED BY 'ALU' WHEN JUMP.
207  IDBS,INR          000000 001640 000040 000000 READ INSTALLATION NUMBER FROM BACKWIRING.
208  IDBS,PICM         000000 001700 000040 000000 INTERRRUPT MASK REGISTER. CGA.
209  IDBS,UART         000000 001740 000000 000000 READ FROM THE REG. ADDRESSED BY COMM,UART
210  COMM,LDPIL        000000 000001 000040 000000 IDB-BITS 8-15 -> STATUS-BITS 8-15
211  COMM,LDGPR        000000 000002 000040 000000 IDB -> GENERAL-PURPOSE-REGISTER
212  COMM,EWRF         000000 000003 000040 000000 IDB -> REGISTER FILE WORD ADDR.ED BY A-OP. AND B-OP.
213  COMM,CLIRQ        000000 000004 000000 000000 PREVENT JUMP TO INTER VECT,REMOVE 'PAN'-EFF ON 'IRQ'-T
214  COMM,UART,DATA    000000 000005 000000 000000 CONSOLE DATA-REGISTERS
215  COMM,UART,STATUS  000000 002005 000000 000000 CONSOLE STATUS-REGISTER
216  COMM,UART,MODE    000000 004005 000000 000000 CONSOLE MODE-REGISTERS 1/2
217  COMM,UART,COM     000000 006005 000000 000000 CONSOLE COMMAND-REGISTER
218  NOT,USED          000000 000006 000000 000000 'TRANSMIT BUFFER STROBE' TO 'UART'. IDB 0-7 -> 'UART'
219  NOT,USED          000000 002006 000000 000000 NOT USED
220  COMM,LDPANC       000000 004006 000000 000000 SEND ONE BYTE TO IR 0
221  COMM,LDPCR        000000 006006 000040 000000 LOAD PCR (NUMBER DETERMINED BY PIL)
222  COMM,SIOC         000000 000007 000040 000000 LOAD 'I/O-CONTROL' REGISTER.
223  COMM,SLOW         000000 000010 000000 000000 SLOW CYCLE (200NS)
224  COMM,EPIC         000000 000011 000000 000000 A-OP. IS AN INSTRUCTION TO 'PIC'.
225  COMM,SMPID        000000 000012 000000 000000 SET MICRO-PID. PID-POSITIONS WHERE IDB HAS A '1' IS '1
226  COMM,START        000000 000013 000000 000000 RESET THE 'STOP'-FLIP-FLOP
227  COMM,SSTOP        000000 000014 000000 000000 SET THE 'STOP'-FLIP-FLOP
228  COMM,CLRTC        000000 000015 000000 000000 CLEAR THE 20 MS CLOCK FLIP-FLOP
229  COMM,CLFF         000000 000016 000000 000000 CLEAR THE 'OOD'- AND THE 'DZD'-FLIP-FLOP
230  COMM,LDLC         000000 000017 000040 000000 LOAD THE 'LOOP COUNTER' WITH THE 6 LOWER IDB-BITS
231  COMM,LDSEG        000000 000020 000040 000000 LOAD SEGMENT REGISTER (SELECTS PHYSICAL 64K-AREA)
232  NOT,USED          000000 002020 004040 000000 LOAD SINTRAN 4 DOMAIN REGISTER
233  NOT,USED          000000 004020 004040 000000 LOAD SINTRAN 4 PS REGISTER
234  COMM,LDIRV        000000 006020 000040 000000 LOAD INSTRUCTION REGISTER FOR OR-LOGIC USE
235  COMM,WCIHM        000000 000021 000040 000000 WRITE CACHE INHIBIT MAP (BIT 15=1: NORMAL. =0: INHIBIT
236  COMM,SSEMA        000000 002021 000000 000000 THE NEXT REQUEST IS A SEMAPHOR REQUEST
237  COMM,CCLR         000000 004021 000000 000000 CACHE CLEAR
238  COMM,LDEXM        000000 006021 000040 000000 LOAD EXAMINE MODE
239  COMM,IREAD,PT     000000 000022 002040 000000 INDIRECT ADDR. READ (PT-RELATIVE)
240  COMM,IREAD,APT    000000 002022 006040 000000 INDIRECT ADDR. READ (APT-RELATIVE)
241  COMM,MAP          000000 004022 000040 000000 USE IDB AS INSTRUCTION (AS IN EXR)
242  COMM,CNEXT,NWP    000000 006022 000040 000000 EX. NEXT INSTR. IF P HAS NOT BEEN CHANGED IN,LAST CYCL
243  COMM,CJMP,F15     000000 000023 002040 000000 JUMP IF F15 = 1
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244  COMM,CJMP,NF15     000000 002023 002040 000000 JUMP IF F15 = 0
245  COMM,CJMP,F=0      000000 004023 002040 000000 JUMP IF F = 0
246  COMM,CJMP,NF=0     000000 006023 002040 000000 JUMP IF F  <> 0
247  COMM,CNEXT,SGR     000000 000024 000040 000000 SKIP LST
248  COMM,CNEXT,NSGR    000000 002024 000040 000000 SKIP GRE
249  COMM,CNEXT,CRY     000000 004024 000040 000000 SKIP MLS
250  COMM,CNEXT,NCRY    000000 006024 000040 000000 SKIP MGR
251  COMM,CNEXT,F15     000000 000025 000040 000000 SKIP GEQ
252  COMM,CNEXT,NF15    000000 002025 000040 000000 SKIP LSS
253  COMM,CNEXT,F=0     000000 004025 000040 000000 SKIP UEQ
254  COMM,CNEXT,NF=0    000000 006025 000040 000000 SKIP EQL
255  COMM,JMP,*         000000 000026 002040 000000 JMP P-REL
256  COMM,JMP,B         000000 002026 006040 000000 JMP ,B
257  COMM,JMP,I         000000 004026 002040 000000 JMP I & I,B
258  COMM,JMP,X         000000 006026 006040 000000 JMP ,X
259  COMM,JMP,XB        000000 000027 006040 000000 JMP ,X,B
260  COMM,JMP,XI        000000 002027 006040 000000 JMP I,X & I,B,X
261  NOT,USED           000000 004027 000040 000000 USED IN PREX-INSTRUCTION ONLY
262  COMM,CONTINUE      000000 006027 000040 000000 FETCH NEW INSTRUCTION RELATIVE TO P
263  COMM,AREAD,*       000000 000030 002040 000000 READ P-REL
264  COMM,AREAD,B       000000 002030 006040 000000 READ ,B
265  COMM,AREAD,I       000000 004030 002040 000000 READ I & I,B
266  COMM,AREAD,X       000000 006030 006040 000000 READ ,X
267  COMM,AREAD,XB      000000 000031 006040 000000 READ ,B,X
268  COMM,AREAD,XI      000000 002031 006040 000000 READ I,X & I,B,X
269  NOT,USED           000000 004031 000040 000000 READ FIRST PART OF 32-BIT INDIRECT ADDR.
270  COMM,AREAD,NEXT    000000 006031 000040 000000 READ NEXT ADDR.
271  COMM,AWRITE,*      000000 000032 002000 000000 WRITE P-REL
272  COMM,AWRITE,B      000000 002032 006000 000000 WRITE ,B
273  COMM,AWRITE,I      000000 004032 002000 000000 WRITE I & I,B
274  COMM,AWRITE,X      000000 006032 006000 000000 WRITE ,X
275  COMM,AWRITE,XB     000000 000033 006000 000000 WRITE ,X,B
276  COMM,AWRITE,XI     000000 002033 006000 000000 WRITE I,X & I,X,B
277  COMM,AWRITE,HOLD   000000 004033 000000 000000 WRITE IN LAST ADDR.
278  COMM,AWRITE,NEXT   000000 006033 000000 000000 WRITE IN NEXT ADDR.
279  COMM,RDRQ,PT       000000 000034 002040 000000 READ PT-RELATIVE, ADDR. FROM IDB
280  COMM,RDRQ,APT      000000 002034 002040 000000 READ APT-RELATIVE, ADDR. FROM IDB
281  COMM,RDRQ,HOLD     000000 004034 002040 000000 READ FROM LAST USED PT, ADDR. FROM IDB
282  COMM,EXRQ          000000 006034 002040 000000 EXAMINE
283  COMM,WRRQ,PT       000000 000035 002000 000000 WRITE PT-RELATIVE, ADDR. FROM IDB
284  COMM,WRRQ,APT      000000 002035 002000 000000 WRITE APT-RELATIVE, ADDR. FROM IDB
285  COMM,WRRQ,HOLD     000000 004035 002000 000000 WRITE IN LAST USED PT, ADDR. FROM IDB
286  COMM,DERQ          000000 006035 002000 000000 DEPOSIT
287  COMM,ADCS          000000 000036 000000 000000 SET CONTROL STORE ADDR.
288  COMM,RWCS          000000 002036 000000 000000 READ OR WRITE IN CONTROL STORE
289  COMM,MACL          000000 004036 000000 000000 HARD RESET. MASTER CLEAR WITH LOAD CONTROL STORE.
290  COMM,XSLOW         000000 006036 000000 000000 MAKE EXTRA SLOW CYCLE (425NS)
291  COMM,IDENT         000000 004037 002000 000000 IDENT BUS REQUEST
292  COMM,IOX           000000 006037 002000 000000 IOX BUS REQUEST
293  T,JMP              000000 000000 000000 000000 TRUE SEQUENCE IS JMP
294  T,JMP0-3           000000 000000 001000 000000 TRUE JMP. IR-BITS 0-3 CONTROLS THE FOUR LOWER JUMP ADD
295  T,JMPAOPR          000000 006000 001000 000000 TRUE JMP. THE A-OP. CONTROLS THE 4 LOWER JUMP ADDR.
296  T,RETURN           000000 000000 040000 000000 TRUE SEQUENCE IS RETURN
297  T,NEXT             000000 000000 100000 000000 TRUE SEQUENCE IS NEXT
298  T,HOLD             000000 000000 000000 000000 TRUE STACK OPERATION IS HOLD
299  T,POP              000000 000000 010000 000000 TRUE STACK OPERATION IS POP
300  T,LOAD             000000 000000 020000 000000 TRUE STACK OPERATION IS LOAD
301  T,PUSH             000000 000000 030000 000000 TRUE STACK OPERATION IS PUSH
302  F,JMP              000000 000000 000000 000000 FALSE SEQUENCE IS JMP. USED WITH A COND. SETTING
303  F,RETURN           000000 000000 000000 000004 FALSE SEQUENCE IS RETURN. USED WITH A COND. SETTING
304  F,NEXT             000000 000000 000000 000010 FALSE SEQUENCE IS NEXT. USED WITH A COND. SETTING
305  F,HOLD             000000 000000 000000 000000 FALSE STACK OPERATION IS HOLD. USED WITH A COND. SETTI
306  F,POP              000000 000000 000000 000001 FALSE STACK OPERATION IS POP. USED WITH  A COND. SETTI
307  F,LOAD             000000 000000 000000 000002 FALSE STACK OPERATION IS LOAD. USED WITH A COND. SETTI
308  F,PUSH             000000 000000 000000 000003 FALSE STACK OPERATION IS PUSH. USED WITH A COND. SETTI
309  COND,STP           000000 000000 000400 000360 COND. FOR TESTING IS  'STOP'
310  COND,PXM           000000 000000 000400 000220 COND. FOR TESTING IS PREFIX-MODE
311  COND,OVF           000000 000000 000400 000240 COND. FOR TESTING IS 'OVERFLOW' FROM ALU-BIT-SLICES
312  COND,CRY           000000 000000 000400 000260 COND. FOR TESTING IS 'CARRY' FROM ALU-BIT-SLICES
313  COND,F11           000000 000000 000400 000300 COND. FOR TESTING IS BIT 11 FROM ALU-BIT-SLICES
314  COND,F15           000000 000000 000400 000320 COND. FOR TESTING IS BIT 15 FROM ALU-BIT-SLICES
315  COND,F=0           000000 000000 000400 000340 COND. FOR TESTING IS 'ALL ZEROS' FROM ALU-BIT-SLICES
316  COND,LC=0          000000 000000 000400 000020 COND. FOR TESTING IS 'LOOP-COUNTER'-CONTENT = 0
317  COND,FETCH         000000 000000 000400 000100 COND. FOR TESTING IS LAST MEM.REQ. WAS FETCH
318  COND,IRQ           000000 000000 000400 000040 COND. FOR TST IS 'IRQ'. CHECKS LEV 10-15 IF 'COMM,CLIR
319  COND,RESTR         000000 000000 000400 000060 COND. FOR TST IS 'RESTRICTED-MODE'. TRUE IF RING 0-1
320  COND,OOD           000000 000000 000400 000120 COND. FOR TST IS THE 'ONE-OUT-DETECT'-FLIP-FLOP
321  COND,DZD           000000 000000 000400 000000 COND. FOR TST IS THE 'DOUBLE-ZERO-DETECT'-FLIP-FLOP
322  COND,COND          000000 000000 000400 000160 COND. FOR TST IS THE OUTCOME OF THE LATEST TEST.
323  AB,CDIGI           000000 000000 000011 170000 COUNTER CONTROLLING THE NUMBER OF DIGITS IN AN OCTAL #
324  AB,UPPNR           000000 000000 000012 130000 THE UPPER ADDR. LIMIT IN A MOPC DUMP CMD.
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325  AB,CURNR     000000 000000 000013 130000 THE CURRENT ADDR. IN A MOPC DUMP CMD.
326  AB,CNT10     000000 000000 000017 170000 COUNTER CONTROLLING THE NUMBER OF OCTAL NUMBERS PER LI
327  AB,PRCHR     000000 000000 000016 160000 THE NEXT CHARACTER TO BE WRITTEN BY MOPC
328  AB,TXT1      000000 000000 000014 160000 SCRATCH WORD CONTAINING DISPLAY TEXT
329  AB,TXT2      000000 000000 000013 160000 SCRATCH WORD CONTAINING DISPLAY TEXT
330  AB,SCRAM     000000 000000 000015 140000 SCRAMBLED REPRESENTATION OF LETTERS IN MOPC-INPUT
331  AB,OCTNR     000000 000000 000015 150000 OCTAL NUMBER ASSEMBLED FROM MOPC-INPUT
332  AB,DISPL     000000 000000 000015 160000 TYPE OF RUNNING DISPLAY
333  AB,OCTAD     000000 000000 000013 150000 ADDR. OF RUNNING DISPLAY
334  AB,OCTA2     000000 000000 000012 160000 WORD TO EXTEND ADDR. IN OCTAD TO 24 BITS
335  AB,DEPOS     000000 000000 000017 150000 SOME OCTAL DIGIT HAS BEEN W. SINCE LAST CMD. WAS TERM.
336  AB,DUMPF     000000 000000 000016 150000 SCRATCH WORD INDICATING THAT A DUMP IS IN PROGRESS
337  AB,RONLY     000000 000000 000014 150000 THE EXAMINED REGISTER IS READ-ONLY
338  AB,WRTYP     000000 000000 000012 150000 TYPE OF VARIABLE IN CASE OF DEPOSIT
339  AB,WRADR     000000 000000 000011 150000 ADDR. OF VARIABLE IS CASE OF DEPOSIT
340  AB,ACTLV     000000 000000 000017 140000 SCRATCH WORD HOLDING 'ACTIVE LEVELS'
341  AB,PVL       000000 000000 000015 170000 SCRATCH WORD HOLDING 'PREVIOUS LEVEL'
342  AB,IIE       000000 000000 000012 170000 A 'PIC'-REPRESENTATION OF THE LAST 'IIE'-SETTING
343  AB,PID       000000 000000 000014 170000 THE MICROPROGRAM-KNOWN BITS OF THE 'PID'-REGISTER
344  AB,PIE       000000 000000 000013 170000 SCRATCH WORD HOLDING THE 'PIE'-REGISTER
345  AB,STATUS    000000 000000 000017 160000 SCRATCH WORD HOLDING THE LATEST 'COMM,SIOC'-INFORMATIO
346  AB,OCTN2     000000 000000 000015 130000 SCRATCH WORD EXPANDING THE 'AB,OCTNR' TO 24 BITS
347  AB,NUMBR     000000 000000 000012 120000 AN OCTAL NUMBER BEING PRINTED BY MOPC
348  AB,OPR       000000 000000 000011 160000 SCRATCH WORD HOLDING THE 'OPR'-REGISTER VALUE
349  AB,BRKPT     000000 000000 000016 140000 SCRATCH WORD HOLDING BREAKPOINT ADDR.
350  AB,SINGL     000000 000000 000014 140000 SCRATCH WORD COUNTING SINGLE-INSTRUCTION
351  AB,BPFLG     000000 000000 000013 140000 SCRATCH WORD INDICATING THAT BREAKPOINT IS ON
352  AB,MACL      000000 000000 000011 140000 SCRATCH WORD HOLDING RETRY COUNTER FOR LOAD AFTER MACL
353  AB,LMP       000000 000000 000012 140000 SCRATCH WORD HOLDING THE 'LMP'-REGISTER VALUE
354  AB,EXMOD     000000 000000 000011 130000 SCRATCH WORD HOLDING THE 'EXM'-REGISTER
355  AB,MANIR     000000 000000 000014 130000 SCRATCH WORD HOLDING FLAG FOR MANUAL IR
356  AB,SSAVE     000000 000000 000016 130000 SCRATCH WORD HOLDING STS DURING DECIMAL INTRUCTIONS
357  XRF          000004 000000 000000 000000 SELECT EXTENDED REGISTER FILE
358  AB,UCIL      000000 000000 000014 120000 SCRATCH WORD HOLDING CACHE INHIBIT UPPER LIMIT
359  AB,LCIL      000000 000000 000013 120000 SCRATCH REGISTER HOLDING CACHE INHIBIT LOWER LIMIT
360  AB,PGS       000000 000000 000015 120000 COPY OF PGS FROM LAST PF/PV
361  AB,STBNK     000000 000000 000011 120000 GLOBAL BANK POINTER TO THE SEGMENT TABLE BANK
362  AB,STSRT     000000 000000 000016 120000 GLOBAL POINTER TO THE SEGMENT TABLE WITHIN THE BANK
363  AB,CMBNK     000000 000000 000017 120000 GLOBAL POINTER TO THE CORE MAP TABLE BANK
364  AB,BAUD      000000 000000 000010 010000 BAUD RATE THUMBWHEEL VALUE.
365  AB,OLD303    000000 000000 000015 050000 SAVED IOX 303 A REG TO SPOT UART DIFFS
366  AB,NOISE     000000 000000 000010 020000 SET ON MACL, RESET ON STOP. INHIBIT LOAD AFTER MACL
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5INIT	001174	AAA	007724	AAB	007720	AALD1	000751
AAT	007730	AAX	007734	ACS	000746	ACTX	003147
ADD	006600	ADD1	000176	ADDA	011063	ADDB	010214
ADDCC	011065	ADDE	010521	ADDI	000123	ADDIX	000124
ADDXB	000177	ADEMP	011612	ADSLC	011104	ADSLT	011071
AIIC1	000725	AIIC2	000742	AIIC3	000737	ALDLO	002210
ALDVC	003560	AND	006700	AND1	000202	ANDI	000127
ANDIX	000130	ANDXB	000203	ANEMP	010317	ANGBR	002712
APES1	000755	APGC1	000756	APGS1	000775	APID1	000702
APID2	000711	APID3	000716	APID4	000724	APIE1	000745
APTRD	004310	APTWR	004322	APVL1	000750	ASS8	002317
ASS81	002321	ASS82	002320	ASTRX	002717	ATOVE	011023
AXX	003107	BAANN	012123	BANC	000303	BAND	000314
BAUDS	004775	BAUDV	005660	BCHNG	001263	BFIL2	001347
BFIL3	003165	BFILL	001333	BFILQ	001360	BFLOO	001354
BIN	002327	BLDA	000321	BLDC	000310	BORA	000317
BORC	000306	BOTWD	010675	BPCHK	003627	BRKZZ	002703
BSAVE	011735	BSE11	000301	BSEK1	000275	BSET	007740
BSET0	000243	BSET1	000250	BSETC	000252	BSETK	000241
BSKP	007750	BSKP0	000262	BSKP1	000256	BSKP9	000264
BSKPC	000254	BSKPK	000260	BSTA	000267	BSTC	000271
BTL	001317	BTR	001325	BTX	001323	BUILD	002565
BUNNC	011233	BUNOR	010510	BWEX1	001715	BWEXL	001711
BWEXQ	001714	BWLO1	001670	BWLOO	001667	BXX	003105
CAPT	004260	CAPTW	004273	CAROV	011522	CCARY	011514
CFIR	010312	CHKIT	001112	CHKOF	003475	CHKUF	003472
CHRE1	004157	CHRE2	004161	CHRE3	004176	CHRE4	004200
CHREE	005763	CHSIG	011315	CILI1	001055	CILI2	001070
CILI3	001061	CILI4	001057	CILIL	001066	CJP1	000214
CLEPT	005761	CLEPU	005764	CLK1	000605	CLK3	000607
CLK31	000612	CLKVC	003730	CLKX	000512	CLLBY	010340
CLNR1	004132	CLNR2	004152	CLNR3	004153	CLNR4	004144
CLNR5	004156	CLNRE	005762	CLOOP	011755	CLPK1	004543
CLPK3	004577	CLPK4	004555	CLPT	005705	CLPT1	004071
CLPT3	004115	CLPU1	004071	CLR14	001161	CLRXX	001162
CNRE1	004531	CNREK	005704	COBVC	010160	COMD	010270
COMM	007401	COMME	010217	COMPA	010404	CONT	000145
CONTI	002256	COPCM	002475	CPT	004256	CPT1	004262
CPTW	004271	CPTW1	004275	CPTW2	004301	CPTW3	004304
CR	002721	CR1	003034	CR10	003012	CR10B	003014
CR11	003026	CR12	003030	CR13	003037	CR14	003042
CR15	003051	CR16	002764	CR2	002734	CR20	002753
CR21	002747	CR22	002745	CR23	002756	CR3	002761
CR4	002774	CR5	003005	CR6	002771	CR9	003017
CROSS	002633	CSAV1	010223	CUSV1	010227	DECP	011022
DECSA	011620	DEP0	003657	DEP02	000672	DEPOS	003001
DISPL	002477	DMP10	002400	DMP11	003046	DMP61	002412
DNZ	007520	DNZ1	003545	DNZ2	003523	DOLOA	002257
DOT	003633	DSPLY	002502	DUMMY	000230	DUMP2	002374
DUMP3	002410	DUMP4	002376	DUMP5	002414	DUMP6	002411
DUMP7	002416	DUMP8	002415	DUMP9	002417	DVACT	002315
DXX	003103	DYDAT	002544	DYSWP	002545	DYTP1	002542
DYTP2	002546	DYTP7	002746	ELEAV	001243	EMBC	011632
EMPOS	012264	ENPK1	004557	ENPT	005706	ENTR	001212
ENTRB	001236	ENTRC	001224	EOVER	012222	EQLLT	010743
EQUAL	003223	ESCAP	002610	ETLO1	002262	ETLOA	002257
EXAM	003656	EXAM2	000667	EXAMI	002504	EXCL	002626
EXFOU	002271	EXIT	010416	EXITB	010423	EXITC	011062
EXITD	011061	EXMO2	001172	EXPHY	000674	EXR	007406
EXR1	000464	EXT14	001124	FAD	007000	FAD0	003215
FAD1	003172	FAD3	003326	FAD4	003276	FAD5	003314
FAD6	003307	FADD	003237	FADI	000133	FADIX	000134
FADXB	000206	FDV	007140	FDV1	003432	FDV2	003420
FDV4	003405	FDVI	000137	FDVIX	000140	FDVXB	000211
FINI	011000	FINSH	011267	FIOGR	010426	FIOSL	010561
FIROA	010553	FIROB	010556	FIROC	010535	FIROE	010547
FIROL	010545	FIROP	010567	FLOVF	003465	FMU	007100
FMU1	003351	FMU2	003343	FMU4	003330	FMUI	000135
FMUIX	000136	FMUXB	000210	FSB	007040	FSBXB	000207
FTCH	000032	FTCH2	000046	FWEX1	001702	FWEXL	001675
FWEXQ	001700	FWFST	001725	FWLO1	001662	FWLO2	001735
FWLO3	001750	FWLO4	001753	FWLO5	001752	FWLO6	001755
FWLOO	001661	GEC2	004033	GECO	007427	GECO1	004000
GECOX	007421	GECX1	004021	GETK	000245	HALVB	012206

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ID10	004405	ID12	004373	ID12B	004377	ID13	004411
IDENT	007436	IDNT1	004364	IDRET	004402	IDSPC	004400
IDX	004415	IL	012502	ILC	012475	ILCDP	012112
ILL	012471	ILLC	012073	ILLCH	012071	ILLCV	012067
ILLE	012467	ILLEG	002473	ILLI2	000220	ILLIN	000216
IN1	002443	IN2	002447	IN3	002453	INCH	002310
INCRP	012215	INPUT	002423	INSP1	004455	INSP2	004474
INSP3	004476	INSPL	005702	INTER	004315	INV	003265
INVCC	010773	INVER	010735	INVQ	010762	INVR	010764
INVS	010766	INVSS	010755	INVT	010770	INVWC	010771
INVWR	010745	INVWS	010754	IOF	003641	IOF2	000661
ION	003642	ION2	000663	IOOPC	003135	IOT	007600
IOT1	000655	IOX	007640	IOX1	000471	IOXG	000477
IOXT	003655	IOXT2	000474	IOXX1	000501	IRQBW	001620
IRQFW	001612	IRR	000401	IRR1	000406	IRR2	000411
IRR3	000376	IRRX	007536	IRW	000415	IRW1	000423
IRW2	000427	IRW3	000412	IRWRD	000332	IRWX	007534
ITSRV	003740	IXX	003115	JAF	007314	JAN	007304
JAP	007300	JAZ	007310	JMPI	000143	JMPIX	000144
JMPXB	000213	JNC	007324	JPC	007320	JPL	007340
JUMP	007240	JXN	007334	JXZ	007330	LAB2	004700
LABEL	002562	LACB	005722	LACB1	004676	LARDC	012346
LASB	005720	LASTC	012006	LASTW	012003	LAWRA	012347
LAWRC	012354	LAWRD	012350	LBIT	005710	LBITP	005711
LBT1	004637	LBT2	004661	LBT3	004664	LBT4	004665
LBTL	001374	LBTL1	001373	LBTP1	004642	LBTR	001376
LBYP1	004603	LBYPM	004607	LBYT	007422	LBYT1	004331
LBYTM	004335	LBYTP	005714	LBYTU	004334	LDA	006440
LDA1	000170	LDA8	001765	LDAD8	001767	LDAI	000115
LDAIX	000116	LDAXB	000171	LDB8	001773	LDD	006240
LDD1	000154	LDDI	000105	LDDIX	000106	LDDXB	000156
LDF	006340	LDF1	000161	LDFI	000111	LDFIX	000112
LDFXB	000162	LDT	006500	LDT1	000172	LDTI	000117
LDTIX	000120	LDTXB	000173	LDX	006540	LDX1	000174
LDX8	001766	LDXI	000121	LDXIX	000122	LDXXB	000175
LEAD	011676	LEADA	011701	LEADB	011703	LEADC	012404
LEAV	001254	LEOVF	011351	LETTR	002621	LFEED	002620
LFTBY	011034	LIKE	011013	LOAD	002252	LOAD1	002214
LRB	007526	LRB2	000353	LRB3	000375	LSBT1	004657
LSET1	001264	LSHFB	011177	LSHFC	011235	LSHFT	011206
LSHLC	011244	LVSWP	001146	LWA	010244	LWAA	010247
LWAB	010233	LWABB	010242	LWABC	010236	LWAC	010252
LWAD	010257	LWRIC	011322	LWRIR	011276	LWRIT	011310
LXB2	004705	LXCB	005725	LXCB1	004703	LXSB	005724
LXX	003106	MACL	002001	MACL2	002160	MACL3	002003
MACL4	001777	MACRI	000052	MANIR	002674	MAS1	002220
MAS2	002230	MASS	002217	MB1	001556	MB1T	001554
MB1T2	001545	MB1T4	001516	MB2	001547	MB21	001550
MB3	001532	MB31	001542	MB32	001536	MB3T	001530
MB4	001521	MB41	001524	MB5	001505	MB51	001513
MB52	001514	MB5T	001503	MB5T6	001477	MB5T8	001454
MB6	001501	MB7	001467	MB71	001475	MB7T	001465
MB8	001457	MBERR	001624	MBX1	001640	MBXBW	001636
MBXFW	001626	MBXS1	001265	MBXSR	001644	MCL	007502
MCL1	000615	MCLEA	000633	MCMS1	000631	MCPID	000637
MCPIE	000642	MCRY1	003401	MCSTS	000635	MEMOT	002633
MIN	006400	MIN1	000163	MINI	000113	MINIX	000114
MINTD	001424	MINXB	000167	MIX3	007432	MIX4	000470
MM0	002636	MM00	002635	MM1	002637	MM2	002640
MM3	002641	MM31	002645	MM4	002650	MM41	002654
MMERR	002665	MON	007530	MON1	000653	MOPC	002341
MOVB	001410	MOVB0	001627	MOVB2	001435	MOVB3	001414
MOVB4	001622	MOVB5	001427	MOVB9	001404	MOVBF	001412
MOVBX	001632	MOVEW	007431	MOVW1	004201	MPID	000640
MPIE	000643	MPY	007200	MPY1	004424	MPY2	004426
MPY3	004434	MPY4	004440	MPY5	004420	MPYI	000141
MPYIX	000142	MPYXB	000212	MRET1	002341	MRET2	002406
MRET3	002407	MS20	002333	MSET	000634	MSPID	000647
MSPIE	000651	MSSTS	000645	MST	007503	MST1	000623
MVW0	004206	MVW1	004212	MVW2	004216	MVW3	004223
MVW4	004227	MVW5	004233	MVW6	004240	MVW7	004245
MVW8	004252	MVWVC	005740	NED1	003216	NEG	011642
NEMP	011577	NLZ	007514	NLZ1	003505	NLZ2	003512
NLZ3	003501	NOCAR	011031	NOCRY	003254	NOINT	000043

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NOINV	003270	NONEW	011741	NORM1	003232	NOTEB	010444
NOTEC	010662	NOTEQ	010643	NOTI2	001020	NOUTP	002422
NOVFL	011346	NTECC	010651	NTOP	012512	OCDI2	002606
OCDIG	002574	OCDIX	002575	OFUF	003427	OLAP1	001601
OPAST	002526	OPCRB	000331	OPRX	003144	ORA	006740
ORA1	000204	ORAI	000131	ORAIX	000132	ORAXB	000205
ORDBN	012122	OUTP1	002367	OUTPT	002346	OVERF	011120
OVFLO	011054	OVLAP	001604	OXEQ6	001610	PACK	011533
PANEL	000047	PANVC	003760	PATA1	004120	PATA2	004121
PATA4	004131	PFDST	001312	PFSRC	001305	PGU3	000066
PHALB	011731	PHRD	004312	PHWR	004325	PICF2	001167
PICFM	001163	PINF1	000657	PIOF	003645	PION	003652
PIONF	007504	PLBYT	011764	PLINT	001133	PLOOP	011743
PLPC2	000761	PLPCR	000770	PLUS1	010347	PLUS2	010352
PLV0	001140	PNWRT	012110	POF	003644	POF2	000662
PON	003650	POS	011647	POSDV	003462	POSS	012164
POSSH	012314	POVEC	012064	POVEF	012037	POVER	012057
POVFL	012017	PREAD	012020	PREX	007425	PRFIR	011555
PRICH	002365	PRIVI	000217	PROCT	002547	PRQ	002340
PSLUT	012026	PTC	003151	PTC1	003160	PTC2	003163
PTC3	003161	PTC4	003154	PTRD	004306	PTWR	004317
PUSAV	012043	PVCHK	000326	PVPF	000027	PWRIT	012027
PXTST	000074	PXX	003104	PZERC	011646	PZERO	011645
QSH2	004736	QSH4	004734	QUOTE	002671	R3DCR	001660
R3INC	001657	RADD	007460	RAND	007444	RBLOK	000330
RBTL	001367	RBTR	001402	RBYT	012333	RCCL1	001035
RCHAR	002434	RCIL1	001052	RCIU1	001047	RCONT	011415
RCS	001040	RDDS2	001304	RDDS3	001303	RDDST	001300
RDIV	007416	RDIV1	000433	RDIV2	000436	RDIV3	000452
RDIV4	000455	RDIV5	000457	RDIV6	000430	RDIVZ	000461
RDSR2	001656	RDSR3	001655	RDSRC	001652	RDUP1	004630
RDUS	004763	RDUSP	005717	RECC1	001042	REGXX	003112
REMP1	004503	REMP2	004515	REMP3	004522	REMP4	004525
REMPL	005703	REPK1	004560	REPK2	004561	REPT	005707
RESEM	002513	REX	003647	REXO	007450	REXO2	000225
RFIRW	011136	RGB1	004450	RGLOB	005701	RIGTB	010265
RIIE1	001006	RLFBY	011523	RLLBY	010515	RLMP1	001034
RMPY	007412	RMPY1	004353	RMPY2	004355	RMPY3	004362
RMPY4	004350	RNGDW	000056	RONLY	002612	RORA	007454
ROUND	011472	RPANC	001045	RPCR1	000762	RPID1	001030
RPIE1	001021	RSFTC	011370	RSHFT	011360	RSTR1	002250
RSTR2	002247	RSTRT	002236	RWLB	007423	RWRIC	011462
RWRIT	011457	RWX	003117	RWY	003121	RWZ	003130
RXX	003113	S3K1	004441	S3K1I	007405	S3K1V	005700
S3K2	004673	S3K2I	007407	S3K2V	005720	S3SEG	007403
S3SG1	004054	SAA	007704	SAB	007700	SACB	005723
SACB1	004701	SAD	007546	SAD1	000236	SADD	010207
SAEMP	011154	SAME	012271	SASB	005721	SAT	007710
SAVTP	010674	SAX	007714	SBIT	005712	SBITP	005713
SBT1	004646	SBT2	004666	SBT4	004672	SBTP1	004652
SBUNO	011225	SBYP1	004611	SBYP2	004616	SBYPU	004620
SBYT	007426	SBYT1	004343	SBYT2	004337	SBYTP	005715
SBYTU	004345	SDIFC	010441	SDIFF	010427	SECOP	010526
SEEK	002263	SELFT	002053	SEOGR	010443	SEPRB	012425
SEPT1	004056	SEPTR	011712	SETEM	002514	SETK0	000324
SETK1	000313	SETPT	005760	SEX	003646	SHA	007544
SHA1	000226	SHCON	011157	SHD	007542	SHD1	000234
SHDE	011121	SHT	007540	SHT1	000232	SIGN	010677
SIGNA	010702	SIGNB	010705	SIGNC	010710	SIGND	010711
SIKI	002264	SING2	002707	SINGL	002703	SINIT	002706
SINT1	001762	SINT4	007402	SINTR	007433	SKEQL	007400
SKGEQ	007404	SKGRE	007410	SKIP	000325	SKIP1	000215
SKLSS	007424	SKLST	007430	SKMGR	007414	SKMLS	007434
SKRVC	011050	SKUEQ	007420	SLASH	003061	SLBYT	010633
SLLBY	011231	SLUT	012344	SPAC2	002173	SPAC3	002366
SPAC9	002616	SPACE	002613	SPOS	011742	SRB	007524
SRB1	000341	SRB2	000334	SRIGT	011762	SSPOS	011321
SSUB	010200	ST1	002054	ST2	002060	ST3	002066
ST4	002100	ST5	002106	ST6	002113	ST7	002125
ST77	002153	ST8	002140	STA	006040	STAD8	001775
STAXB	000147	STD	006200	STD1	000152	STDI	000103
STDIX	000104	STDXB	000153	STER1	002155	STER2	002154
STERR	002156	STF	006300	STF1	000157	STFI	000107
STFIX	000110	STFXB	000160	STLP	002275	STNOE	011126

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STOP	002203	STOP2	003624	STOPW	002202	STR1I	000101
STR1IX	000102	STRPS	010332	STRTW	010343	STSEX	003461
STSST	003461	STSTZ	000246	STT	006100	STTS0	002556
STTST	002560	STTXB	000150	STX	006140	STXXB	000151
STZ	006000	STZXB	000146	SUB	006640	SUB1	000200
SUBB	010204	SUBD	010520	SUBDC	010716	SUBEM	012260
SUBF	003260	SUBI	000125	SUBIX	000126	SUBXB	000201
SUPRD	012345	SW0	000222	SW00	000223	SW2	000224
SWAP	007440	SXX	003102	SZCB	005727	SZCB1	004706
SZSB	005726	TAALD	003672	TACS	003677	TACSR	003670
TADEM	011570	TAEMP	012157	TAIIC	003665	TAOPR	003662
TAPEA	003675	TAPES	003673	TAPGC	003674	TAPGS	003663
TAPID	003666	TAPIE	003667	TAPIM	003671	TAPVL	003664
TASTS	003661	TBOD	011721	TBODC	011725	TCARY	011503
TCLIR	011306	TEFIN	011040	TEMPT	012137	TEMTS	011216
TERMX	000511	TFIRE	010563	TILOV	012102	TLEAC	012366
TLEAD	012357	TNOEQ	010607	TNOTE	012132	TOLAP	001564
TOPHB	012407	TOPWD	010671	TOVER	012065	TOVFL	012360
TPLEC	011654	TPLED	011656	TR14	003714	TR16	003716
TR4	003704	TRA	000701	TRA1	000675	TRA4	007500
TRAIL	011670	TRAX	000677	TRBYT	011664	TRCCL	003710
TRCIL	003711	TRCIP	003713	TRCIU	003712	TRCS	003717
TRECC	003715	TRIIE	003705	TRLMP	003702	TRM0	000515
TRM2	000521	TRM20	000527	TRM20B	000535	TRM21	000537
TRM22	000541	TRM3	000542	TRM31	000555	TRM32	000561
TRM33	000564	TRM34	000565	TRM35	000571	TRM6	000575
TRM61	000600	TRM7	000602	TRMVC	003720	TRPCR	003703
TRPID	003706	TRPIE	003707	TRR	001005	TRR1	001002
TRR4	007501	TRSTS	003701	TSAVE	011771	TSEP1	004634
TSET	004710	TSET1	004770	TSET2	004746	TSET3	004754
TSET4	004740	TSET5	004760	TSET6	004724	TSET7	004751
TSETP	005716	TSHTD	011171	TSIGF	011026	TSIGN	010622
TSTAC	001221	TSTLO	004733	TSTP1	004623	TSTPV	004731
TTDCR	001756	TTPWD	010260	TUSIG	011015	TXX	003110
TYP1	003114	TYP2	003146	TYP3	003116	UCLOP	012303
UDCS	012235	UDECA	012216	UDECB	012225	UDECC	012211
UEMP1	012200	UILCV	012474	ULEAD	012300	ULONE	012501
UNEMP	012165	UNEQL	010424	UNSF2	003256	UPACK	012125
UPLOP	012301	UPLP	012317	UPOVR	012364	UPRED	012337
URBOT	012141	URFIC	012153	URFIR	012147	USAV3	011356
USAV4	012454	USAVE	011056	USEPL	012416	USEPT	012266
USIGN	011674	USOVF	012431	UTGNG	010525	UVFLO	012445
UVFLT	012442	UWRIT	012432	UWRTS	012456	UXX	003145
VC41	002522	VC417	002540	VC42	002527	VC43	002533
VC431	002537	VCSI3	003600	VECT1	003640	VECT2	003660
VECT3	003700	VECT4	003620	VERSN	000020	W1013	001111
WAIT	007510	WAIT1	001072	WAIT2	001077	WCS	007435
WGB1	004443	WGLOB	005700	WIP3	000067	WIPGU	000070
WLLBY	011326	WLRBY	011324	WRDS2	001277	WRDS3	001276
WRDST	001273	WRITB	011332	WRITS	012046	WRITT	011353
WRTOP	012451	WSIO2	000514	WSIOC	000513	WT14	001122
WTCCL	004773	XADEM	011540	XINT	001131	XNOTE	011542
XOVER	011456	XTHOB	010467	XTOPR	011447	XTSHO	010372
XXX	003111	ZAD	003274	ZAD2	003547	ZAD3	003546
ZCHAR	002700	ZEROF	011345	ZFILR	011436	ZRORS	011443
ZTSTS	00024						

```
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MICRO-DELI-INSTR                                          PAGE        1

     1      000000
     2      000000   %*****************************************************
     3      000000   %*****************************************************
     4      000000   % M I C R O P R O G R A M   F O R   N D - 1 9 0 / C X
     5      000000   %*****************************************************
     6      000000   %*****************************************************
     7      000000   %*****************************************************
     8      000000
     9      000000   %*****************************************************
    10      000000   %*****************************************************
    11      000000   % HARDWARE TRAP VECTOR
    12      000000   %*****************************************************
    13      000000
    14      000000   0/
    15      000000   % MASTER CLEAR / POWER CLEAR
    16      000000
    17      000000            AB,MACL                                  ALUD,NONE
    18      000000            IDBS,ARG              COMM,EWRF T,JMP    T,HOLD
    19      000000            MACL;
    20      000001
    21      000001   1/
    22      000001   % PAGE FAULT
    23      000001
    24      000001            A,6                                      ALUD,NONE
    25      000001            IDBS,BMG              COMM,SMPID T,JMP   T,HOLD
    26      000001            PVPF;
    27      000002
    28      000002   2/
    29      000002   % PROTECT VIOLATION
    30      000002
    31      000002            A,5                                      ALUD,NONE
    32      000002            IDBS,BMG              COMM,SMPID T,JMP   T,HOLD
    33      000002            PVPF;
    34      000003
    35      000003   3/
    36      000003   % RING-DOWN TRAP
    37      000003
    38      000003                  B,R7            ALUF,PASSD         ALUD,B
    39      000003            IDBS,PGS                       T,JMP     T,HOLD
    40      000003            RNGDW;
    41      000004
    42      000004   4/
    43      000004   % PGU TRAP SINTRAN III
    44      000004
    45      000004                  B,R7            ALUF,PASSD         ALUD,B
    46      000004            IDBS,PGS                       T,JMP     T,HOLD
    47      000004            PGU3;
    48      000005
    49      000005   5/
    50      000005   % WIP TRAP SINTRAN III
    51      000005
    52      000005                  B,R7            ALUF,PASSD         ALUD,B
    53      000005            IDBS,PGS                       T,JMP     T,HOLD
    54      000005            WIP3;
    55      000006
    56      000006   6/
    57      000006   % ALT-TRAP SINTRAN 4
    58      000006
    59      000006            T,JMP 6 COMM,SLOW;
    60      000007
    61      000007   7/
    62      000007   % WIP-TRAP SINTRAN 4
    63      000007
    64      000007            T,JMP 7 COMM,SLOW;
    65      000010
    66      000010   10/
    67      000010   % MISMATCH TRAP SINTRAN 4
    68      000010
    69      000010            T,JMP 10 COMM,SLOW;
    70      000011
    71      000011   11/
    72      000011   % PGU-TRAP SINTRAN 4
    73      000011
    74      000011            T,JMP 11 COMM,SLOW;
    75      000012
```

```
 76   000012
 77   000012   12/
 78   000012   % DOUBLE PREFIX IS NOT ALLOWED (20-BIT LOG.ADDRESSING MUST BE ACTIVE)
 79   000012
 80   000012          ALUD,NONE IDBS,ALU COMM,SLOW T,JMP T,HOLD ILLIN;
 81   000013
 82   000013   13/
 83   000013   %   SPARE VECTOR LOCATIONS
 84   000013
 85   000013          T,JMP 13 COMM,SLOW;
 86   000014          T,JMP 14 COMM,SLOW;
 87   000015          T,JMP 15 COMM,SLOW;
 88   000016
 89   000016   16/
 90   000016   % PANEL INTERRUPT
 91   000016
 92   000016                                                    ALUD,NONE
 93   000016          IDBS,PANEL              COMM,LDLC T,JMP   T,HOLD
 94   000016          PANEL;
 95   000017
 96   000017   17/
 97   000017   % MACRO INTERRUPT
 98   000017
 99   000017          PIC,RVECT B,R1          ALUF,PASSD        ALUD,B
100   000017          1DBS,PICVC              COMM,EPIC T,JMP   T,HOLD
101   000017          MACRI;
102   000020
103   000020   20/
104   000020   % READ VERSION INSTRUCTION
105   000020
106   000020   VERSN:        B,T               ALUF,PASSD        ALUD,B
107   000020          IDBS,ARG                        T,NEXT    T,HOLD
108   000020          100013; % K-VERSION
109   000021
110   000021   %CC K: ELEAV: LEAVE INSTRUCTION PROBLEM AT PAGE BOUNDARY TRAPS.
111   000021
112   000021                                  ALUF,PASSD        ALUD,Q
113   000021          IDBS,STS                        T,NEXT    T,HOLD;
114   000022
115   000022          A,A                     ALUF,PASSA        ALUD,NONE
116   000022          IDBS,ALU                COMM,LDPIL T,NEXT T,HOLD;
117   000023          DELAY
118   000023                B,D               ALUF,PASSD        ALUD,B
119   000023          IDBS,INR                        T,NEXT    T,HOLD;
120   000024
121   000024                                  ALUF,PASSQ        ALUD,NONE
122   000024          IDBS,ALU                COMM,LDPIL T,NEXT T,HOLD;
123   000025
124   000025                                  ALUF,PASSD        ALUD,Q
125   000025          IDBS,ARG                        T,NEXT    T,HOLD
126   000025          40377;
127   000026
128   000026   %CC INVERT BIT 0-3 (ALD), BIT 4-6 (PRINT RELEASE), BIT 7 (CX), BIT14 (PRINT NO)
129   000026   %CC BIT7=1 => HIGH SPEED, BIT 15-13=101 => 3202
130   000026
131   000026                B,A               ALUF,XORDQ        ALUD,B
132   000026          IDBS,ALD                        T,JMP     T,HOLD
133   000026          CONT;
134   000027
135   000027   %*************************************************************
136   000027   %*************************************************************
137   000027
138   000027   % SPECIAL TREATMENT OF PAGE FAULT AND PROTECT VIOLATION
139   000027
140   000027   %*************************************************************
141   000027
142   000027   PVPF:  AB,PGS                                    ALUD,NONE
143   000027          IDBS,PGS                COMM,EWRF T,NEXT  T,HOLD
144   000027          COND,FETCH                      F,NEXT    F,HOLD;
145   000030
146   000030                                                    ALUD,NONE
147   000030          IDBS,ALU                        T,JMP     T,HOLD
148   000030          FTCH CONDENABL;
149   000031
150   000031
151   000031   %*********************************************************
152   000031   % INCREMENT P IF NOT FETCH
153   000031
154   000031                B,P               ALUF,B+1          ALUD,B
155   000031          IDBS,ALU                        T,NEXT    T,HOLD;
156   000032
```

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157  000032  FTCH:                                                  ALUD,NONE
158  000032          IDBS,ALU                          T,NEXT       T,HOLD;
159  000033
160  000033                                                         ALUD,NONE
161  000033          IDBS,ALU                          T,NEXT       T,HOLD;
162  000034
163  000034                B,P             ALUF,B-1                 ALUD,B
164  000034          IDBS,ALU              COMM,CLIRQ T,NEXT        T,HOLD
165  000034          COND,IRQ                          F,JMP        F,HOLD;
166  000035
167  000035                                ALUF,PASSQ               ALUD,NONE
168  000035          IDBS,ALU              COMM,LDGPR T,NEXT        T,HOLD
169  000035          NOINT CONDENABL;
170  000036
171  000036
172  000036  %*********************************************************
173  000036  % INTERRUPT IS PENDING
174  000036
175  000036                                                         ALUD,NONE
176  000036          IDBS,ALU                          T,NEXT       T,HOLD
177  000036          COND,STP                          F,JMP        F,HOLD;
178  000037
179  000037                                                         ALUD,NONE
180  000037          IDBS,ALU                          T,NEXT       T,HOLD
181  000037          FTCH2 CONDENABL;
182  000040
183  000040
184  000040  %*********************************************************
185  000040  % CPU IS IN STOP MODE, MULTIPLE SINGLE OR BREAKPOINT MUST BE THE CASE
186  000040
187  000040          AB,BPFLG              ALUF,PASSD               ALUD,NONE
188  000040          IDBS,REG                          T,NEXT       T,HOLD
189  000040          COND,F=0                          F,JMP        F,HOLD;
190  000041
191  000041          AB,SINGL              ALUF,PASSD               ALUD,NONE
192  000041          IDBS,REG                          T,NEXT       T,HOLD
193  000041          BRKZZ CONDENABL;
194  000042
195  000042                                                         ALUD,NONE
196  000042          IDBS,ALU                          T,NEXT       T,HOLD
197  000042          BRKZZ CONDENABL;
198  000043
199  000043
200  000043
201  000043  %*********************************************************
202  000043  % NO INTERRUPT IS PENDING, IT CAN BE IOF-PAGEFAULT
203  000043
204  000043  NOINT:                                                 ALUD,NONE
205  000043          IDBS,ALU                          T,NEXT       T,HOLD
206  000043          COND,FETCH                        F,NEXT       F,HOLD;
207  000044
208  000044                                                         ALUD,NONE
209  000044          IDBS,ALU                          T,JMP         T,HOLD
210  000044          FTCH2 CONDENABL;
211  000045
212  000045
213  000045  %*********************************************************
214  000045  % DECREMENT P, IT HAS BEEN INCREMENTED
215  000045
216  000045                B,P             ALUF,B-1                 ALUD,B
217  000045          IDBS,ALU                          T,JMP        T,HOLD
218  000045          FTCH2;
219  000046
220  000046
221  000046
222  000046
223  000046  %*********************************************************
224  000046  % EXECUTE LEVEL CHANGE OR TRY SAME INSTRUCTION AGAIN.
225  000046
226  000046  FTCH2:          B,Z             ALUF,ZERO                ALUD,B
227  000046          IDBS,ALU        COMM,CONTINUE     T,JMP        T,HOLD;
228  000047
229  000047
230  000047  %*********************************************************
231  000047  %*********************************************************
232  000047  PANEL:
233  000047
234  000047                                                         ALUD,NONE
235  000047          IDBS,ALU                          T,NEXT       T,HOLD;
236  000050
237  000050          A,LC                                           ALUD,NONE
```

```
238  000050          IDBS,ALU                          T,NEXT     T,HOLD;
239  000051
240  000051          A,LC                                         ALUD,NONE
241  000051          IDBS,ALU                T,JMPAOPR T,HOLD
242  000051          PANVC;
243  000052
244  000052  MACRI:  A,R1                    ALUF,PASSA           ALUD,NONE
245  000052          IDBS,ALU                COMM,LDLC T,NEXT     T,HOLD;
246  000053
247  000053                                                       ALUD,NONE
248  000053          IDBS,ALU                          T,NEXT     T,HOLD;
249  000054
250  000054          A,LC                                         ALUD,NONE
251  000054          IDBS,ALU                          T,NEXT     T,HOLD;
252  000055
253  000055          A,LC                                         ALUD,NONE
254  000055          IDBS,ALU                          T,JMPAOPR  T,HOLD
255  000055          ITSRV;
256  000056
257  000056  %*************************************************************
258  000056  % RING-DOWN TRAP
259  000056
260  000056  RNGDW:        B,R5              ALUF.PASSD           ALUD,B
261  000056          IDBS,STS                          T,JMP      T,PUSH
262  000056          PTC;
263  000057
264  000057                                                       ALUD,NONE
265  000057          IDBS,DBR                          T,NEXT     T,HOLD;
266  000060
267  000060               B,R1               ALUF,PASSD           ALUD,SRB
268  000060          IDBS,SWAP                         T,NEXT     T,HOLD;
269  000061
270  000061          A,PIL B,0  XRF          ALUF,PASSD           ALUD,Q
271  000061          IDBS,REG                          T,NEXT     T,HOLD;
272  000062
273  000062               B,R2               ALUF,ANDDQ           ALUD,B
274  000062          IDBS,ARG                          T,NEXT     T,HOLD
275  000062          177774;
276  000063
277  000063          A,R1  B,3               ALUF,ANDDA           ALUD,Q
278  000063          IDBS,BARG                         T,NEXT     T,HOLD;
279  000064
280  000064          A,R2                    ALUF,ORAQ            ALUD,Q
281  000064          IDBS,ALU                COMM,LDPCR T,NEXT    T,HOLD;
282  000065
283  000065          A,PIL B,0  XRF          ALUF,PASSQ           ALUD,NONE
284  000065          IDBS,ALU                COMM,EWRF  T,JMP     T,HOLD
285  000065          PXTST;
286  000066
287  000066  %*************************************************************
288  000066  % PGU-TRAP FOR SINTRAN III
289  000066
290  000066  PGU3:   A,13  B,R1              ALUF,PASSD           ALUD,B
291  000066          IDBS,BMG                          T,JMP      T,HOLD
292  000066          WIPGU;
293  000067
294  000067  %*************************************************************
295  000067  % WIP-TRAP FOR SINTRAN III
296  000067
297  000067  WIP3:         B,R1              ALUF,PASSD           ALUD,B
298  000067          IDBS,ARG                          T,NEXT     T,HOLD
299  000067          54000;
300  000070
301  000070  %CC SET READ PERMIT ALSO.
302  000070
303  000070  WIPGU:       B,R5              ALUF,PASSD           ALUD,B
304  000070          IDBS,STS                          T,JMP      T,PUSH
305  000070          PTC;
306  000071
307  000071          A,R1  B,R1              ALUF,ORDA            ALUD,B
308  000071          IDBS,DBR                          T,NEXT     T,HOLD;
309  000072
310  000072          A,R7                    ALUF,PASSA           ALUD,NONE
311  000072          IDBS,ALU                          T,NEXT     T,HOLD;
312  000073
313  000073          A,R1                    ALUF,PASSA           ALUD,NONE
314  000073          IDBS,ALU                COMM,DERQ T,NEXT     T,HOLD;
315  000074
316  000074  PXTST:        B,P               ALUF,B-1             ALUD,B
317  000074          IDBS,ALU                          T,JMP      T,HOLD
318  000074          CONT;
```

```
319     000075
320     000075  %*********************************************************
321     000075  %*********************************************************
322     000075  |
323     000075
324     000075  101/
325     000101  % INDIRECT MEMORY REFERENCES. MUST BE IN-LINE WITH PREFIXED COUNTERPARTS
326     000101
327     000101  STR1I: A,R1 ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,I T,JMP T,HOLD CONT;
328     000102  STR1IX: A,R1 ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,XI T,JMP T,HOLD CONT;
329     000103  STDI:  A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,I T,JMP T,HOLD STD1;
330     000104  STDIX: A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,XI T,JMP T,HOLD STD1;
331     000105  LDDI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD LDD1;
332     000106  LDDIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD LDD1;
333     000107  STFI:  A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,I T,JMP T,HOLD STF1;
334     000110  STFIX: A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,XI T,JMP T,HOLD STF1;
335     000111  LDFI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD LDF1;
336     000112  LDFIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD LDF1;
337     000113  MINI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD MIN1;
338     000114  MINIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD MIN1;
339     000115  LDAI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD LDA1;
340     000116  LDAIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD LDA1;
341     000117  LDTI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD LDT1;
342     000120  LDTIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD LDT1;
343     000121  LDXI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD LDX1;
344     000122  LDXIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD LDX1;
345     000123  ADDI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD ADD1;
346     000124  ADDIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD ADD1;
347     000125  SUBI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD SUB1;
348     000126  SUBIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD SUB1;
349     000127  ANDI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD AND1;
350     000130  ANDIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD AND1;
351     000131  ORAI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD ORA1;
352     000132  ORAIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD ORA1;
353     000133  FADI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD FAD1;
354     000134  FADIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD FAD1;
355     000135  FMUI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD FMU4;
356     000136  FMUIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD FMU4;
357     000137  FDVI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD FDV4;
358     000140  FDVIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD FDV4;
359     000141  MPYI:  ALUD,NONE IDBS,ALU COMM,AREAD,I T,JMP T,HOLD MPY5;
360     000142  MPYIX: ALUD,NONE IDBS,ALU COMM,AREAD,XI T,JMP T,HOLD MPY5;
361     000143  JMPI:  ALUD,NONE IDBS,LA COMM,JMP,I T,JMP T,HOLD;
362     000144  JMPIX: ALUD,NONE IDBS,LA COMM,JMP,XI T,JMP T,HOLD;
363     000145
364     000145
365     000145
366     000145  % NORMAL CONTINUE EXECUTION
367     000145
368     000145  CONT:        B,Z              ALUF,ZERO           ALUD,B
369     000145         IDBS,ALU              COMM,CONTINUE T,JMP T,HOLD;
370     000146
371     000146
372     000146  % CONTINUATION OF MOST COMMON INSTRUCTIONS:
373     000146
374     000146  STZXB: A,Z ALUF,PASSA ALUD,NONE COMM,AWRITE,XB T,JMP T,HOLD CONT;
375     000147  STAXB: A,A ALUF,PASSA ALUD,NONE COMM,AWRITE,XB T,JMP T,HOLD CONT;
376     000150  STTXB: A,T ALUF,PASSA ALUD,NONE COMM,AWRITE,XB T,JMP T,HOLD CONT;
377     000151  STXXB: A,X ALUF,PASSA ALUD,NONE COMM,AWRITE,XB T,JMP T,HOLD CONT;
378     000152  STD1:  A,D ALUF,PASSA ALUD,NONE COMM,AWRITE,NEXT T,JMP T,HOLD CONT;
379     000153  STDXB: A,A ALUF,PASSA ALUD,NONE COMM,AWRITE,XB T,JMP T,HOLD STD1;
380     000154  LDD1:  B,A ALUF,PASSD ALUD,B IDBS,DBR COMM,AREAD,NEXT T,NEXT T,HOLD;
381     000155         B,D ALUF,PASSD ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
382     000156  LDDXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD LDD1;
383     000157  STF1:  A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,NEXT T,JMP T,HOLD STD1;
384     000160  STFXB: A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,XB T,JMP T,HOLD STF1;
385     000161  LDF1:  B,T ALUF,PASSD ALUD,B IDBS,DBR COMM,AREAD,NEXT T,JMP T,HOLD LDD1;
386     000162  LDFXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD LDF1;
387     000163  MIN1:  B,R1 ALUF,PASSD ALUD,B IDBS,DBR T,NEXT T,HOLD;
388     000164         B,R1 ALUF,B+1 ALUD,B IDBS,ALU COMM,AWRITE,HOLD T,NEXT T,HOLD;
389     000165         A,R1 ALUF,PASSA ALUD,NONE IDBS,ALU COMM,CNEXT,NF=0 T,NEXT T,HOLD;
390     000166         A,R1 ALUF,PASSA ALUD,NONE IDBS,ALU COMM,CNEXT,F=0 T,NEXT T,HOLD;
391     000167  MINXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD MIN1;
392     000170  LDA1:  B,A ALUF,PASSD ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
393     000171  LDAXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD LDA1;
394     000172  LDT1:  B,T ALUF,PASSD ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
395     000173  LDTXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD LDT1;
396     000174  LDX1:  B,X ALUF,PASSD ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
397     000175  LDXXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD LDX1;
398     000176  ADD1:  A,A B,A ALUF,D+A STS,EA ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
399     000177  ADDXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD ADD1;
```

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400   000200   SUB1:  A,A B,A ALUF,A-D STS,EA ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
401   000201   SUBXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD SUB1;
402   000202   AND1:  A,A B,A ALUF,ANDDA ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
403   000203   ANDXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD AND1;
404   000204   ORA1:  A,A B,A ALUF,ORDA ALUD,B IDBS,DBR COMM,CONTINUE T,JMP T,HOLD;
405   000205   ORAXB: ALUD,NONE IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD ORA1;
406   000206   FADXB: ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,XB T,JMP T,HOLD FAD1;
407   000207   FSBXB: A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,AREAD,XB T,JMP T,HOLD FAD1;
408   000210   FMUXB: A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,XB T,JMP T,HOLD FMU4;
409   000211   FDVXB: A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,XB T,JMP T,HOLD FDV4;
410   000212   MPYXB: ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,XB T,JMP T,HOLD MPY5;
411   000213   JMPXB: ALUD,NONE IDBS,LA COMM,JMP,XB T,JMP T,HOLD;
412   000214   CJP1:  ALUD,NONE IDBS,ALU COMM,CONTINUE T,JMP T,HOLD;
413   000215   SKIP1:  ALUF,ZERO ALUD,NONE IDBS,ALU COMM,CNEXT,F=0 T,JMP T,HOLD;
414   000216   ILLIN: A,7 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD ILLI2;
415   000217   PRIVI: A,11 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD ILLI2;
416   000220   ILLI2: ALUD,NONE IDBS,ALU T,NEXT T,HOLD;  % PAUSE
417   000221          ALUD,NONE IDBS,ALU T,JMP T,HOLD CONT;
418   000222   SW0:   A,SRCE B,DEST ALUF,PASSA ALUD,B IDBS,ALU T,JMP T,HOLD SW00;
419   000223   SW00:  B,SRCE ALUF,PASSQ ALUD,B IDBS,ALU COMM,CNEXT,NWP T,JMP T,HOLD CONT;
420   000224   SW2:   A,SRCE B,DEST ALUF,INVA ALUD,B IDBS,ALU T,JMP T,HOLD SW00;
421   000225   REXO2: A,R1 B,DEST ALUF,ORAB ALUD,B IDBS,ALU COMM,CNEXT,NWP T,JMP T,HOLD CONT;
422   000226
423   000226
424   000226
425   000226
426   000226
427   000226
428   000226
429   000226
430   000226
431   000226
432   000226   %*****************************************************************
433   000226   %*****************************************************************
434   000226
435   000226   % SHIFT INSTRUCTIONS
436   000226
437   000226   %*****************************************************************
438   000226
439   000226   SHA1:                                                  ALUD,NONE
440   000226          IDBS,GPR              COMM,LDLC T,JMP          T,LOAD
441   000226          DUMMY;
442   000227
443   000227                B,A             ALUF,PASSB  ALUM,IR ALUD,SRB
444   000227          IDBS,ALU                          T,JMP      T,POP
445   000227          CONT LCOUNT;
446   000230
447   000230
448   000230   %*****************************************************************
449   000230   % SUBROUTINE TO REMOVE ONE SHIFT COUNT
450   000230
451   000230   DUMMY:                                                 ALUD,NONE
452   000230          IDBS,ALU                          T,NEXT     T,HOLD
453   000230          COND,LC=0;
454   000231
455   000231                                                         ALUD,NONE
456   000231          IDBS,ALU                          T,RETURN   T,HOLD
457   000231          LCOUNT;
458   000232
459   000232   SHT1:                                                  ALUD,NONE
460   000232          IDBS,GPR              COMM,LDLC T,JMP          T,LOAD
461   000232          DUMMY;
462   000233
463   000233                B,T             ALUF,PASSB ALUM,IR   ALUD,SRB
464   000233          IDBS,ALU                          T,JMP      T,POP
465   000233          CONT LCOUNT;
466   000234
467   000234   SHD1:                                                  ALUD,NONE
468   000234          IDBS,GPR              COMM,LDLC T,JMP          T,LOAD
469   000234          DUMMY;
470   000235
471   000235                B,D             ALUF,PASSB ALUM,IR   ALUD,SRB
472   000235          IDBS,ALU                          T,JMP      T,POP
473   000235          CONT LCOUNT;
474   000236
475   000236   SAD1:  A,D                   ALUF,PASSA           ALUD,Q
476   000236          IDBS,GPR              COMM,LDLC T,JMP      T,LOAD
477   000236          DUMMY;
478   000237
479   000237                B,A             ALUF,PASSB ALUM,IR   ALUD,SRD
480   000237          IDBS,ALU                          T,NEXT     T,POP
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481   000237          LCOUNT;
482   000240
483   000240                B,D             ALUF,PASSQ          ALUD,B
484   000240          IDBS,ALU                        T,JMP     T,HOLD
485   000240          CONT;
486   000241
487   000241
488   000241
489   000241
490   000241
491   000241
492   000241
493   000241
494   000241    %*****************************************************************
495   000241    %*****************************************************************
496   000241
497   000241    % BIT INSTRUCTIONS
498   000241
499   000241    %*****************************************************************
500   000241    % BSET BAC
501   000241
502   000241    BSETK:        B,4             ALUF,PASSD          ALUD,Q
503   000241          IDBS,BARG                       T,JMP     T,PUSH
504   000241          GETK;
505   000242
506   000242                                                    ALUD,NONE
507   000242          IDBS,ALU                        T,NEXT    T,HOLD
508   000242          BSET1 CONDENABL;
509   000243
510   000243
511   000243    %*****************************
512   000243    % BSET ZRO
513   000243
514   000243    BSET0: A,REG B,R1             ALUF,INVD           ALUD,B
515   000243          IDBS,BMG                        T,JMP     T,PUSH
516   000243          STSTZ;
517   000244
518   000244          A,R1  B,DEST            ALUF,ANDAB          ALUD,B
519   000244          IDBS,ALU                        T,JMP     T,HOLD
520   000244          ZTSTS;
521   000245
522   000245
523   000245    %*****************************************************************
524   000245    % SUBROUTINE TO ISOLATE K-FLIP-FLOP
525   000245
526   000245    GETK:                         ALUF,ANDDQ          ALUD,Q
527   000245          IDBS,STS                        T,RETURN  T,POP
528   000245          COND,F=0                        F,JMP     F,HOLD;
529   000246
530   000246
531   000246    %*****************************************************************
532   000246    % SUBROUTINE TO TRANSFER STS TO Z-REGISTER
533   000246
534   000246    STSTZ:        B,Z             ALUF,PASSD          ALUD,B
535   000246          IDBS,STS                        T,RETURN  T,POP;
536   000247
537   000247
538   000247    %*****************************************************************
539   000247    % SUBROUTINE TO TRANSFER Z-REGISTER TO STS
540   000247
541   000247    ZTSTS: A,Z                    ALUF,PASSA          ALUD,Q    STS,LO
542   000247          IDBS,ALU                        T,JMP     T,HOLD
543   000247          CONT;
544   000250
545   000250
546   000250    %*************************
547   000250    % BSET ONE
548   000250
549   000250    BSET1: A,REG B,R1             ALUF,PASSD          ALUD,B
550   000250          IDBS,BMG                        T,JMP     T,PUSH
551   000250          STSTZ;
552   000251
553   000251          A,R1  B,DEST            ALUF,ORAB           ALUD,B
554   000251          IDBS,ALU                        T,JMP     T,HOLD
555   000251          ZTSTS;
556   000252
557   000252
558   000252    %*************************
559   000252    % BSET BCM
560   000252
561   000252    BSETC: A,REG B,R1             ALUF,PASSD          ALUD,B
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562  000252          IDBS,BMG                          T,JMP     T,PUSH
563  000252          STSTZ;
564  000253
565  000253          A,R1  B,DEST          ALUF,XORAB            ALUD,B
566  000253          IDBS,ALU                          T,JMP     T,HOLD
567  000253          ZTSTS;
568  000254
569  000254
570  000254  %*********************************
571  000254  % BSKP BCM
572  000254
573  000254  BSKPC:          B,4           ALUF,PASSD            ALUD,Q
574  000254          IDBS,BARG                         T,JMP     T,LOAD
575  000254          GETK;
576  000255
577  000255                                                      ALUD,NONE
578  000255          IDBS,ALU                          T,NEXT    T,HOLD
579  000255          BSKP0 CONDENABL;
580  000256
581  000256
582  000256  %*********************************
583  000256  % BSKP ONE
584  000256
585  000256  BSKP1:          B,Z           ALUF,PASSD            ALUD,B
586  000256          IDBS,STS                          T,NEXT    T,HOLD;
587  000257
588  000257                 B,DEST         ALUF,INVB             ALUD,Q
589  000257          IDBS,ALU                          T,JMP     T,HOLD
590  000257          BSKP9;
591  000260
592  000260
593  000260  %*********************************
594  000260  % BSKP BAC
595  000260
596  000260  BSKPK:          B,4           ALUF,PASSD            ALUD,Q
597  000260          IDBS,BARG                         T,JMP     T,LOAD
598  000260          GETK;
599  000261
600  000261                                                      ALUD,NONE
601  000261          IDBS,ALU                          T,NEXT    T,HOLD
602  000261          BSKP1 CONDENABL;
603  000262
604  000262
605  000262  %*********************************
606  000262  % BSKP ZRO
607  000262
608  000262  BSKP0:          B,Z           ALUF,PASSD            ALUD,B
609  000262          IDBS,STS                          T,NEXT    T,HOLD;
610  000263
611  000263                 B,DEST         ALUF,PASSB            ALUD,Q
612  000263          IDBS,ALU                          T,NEXT    T,HOLD;
613  000264
614  000264  BSKP9: A,REG                  ALUF,ANDDQ            ALUD,NONE
615  000264          IDBS,BMG                          T,NEXT    T,HOLD
616  000264          COND,F=0                          F,NEXT    F,HOLD;
617  000265
618  000265                                                      ALUD,NONE
619  000265          IDBS,ALU                          T,JMP     T,HOLD
620  000265          SKIP CONDENABL;
621  000266
622  000266                 B,Z            ALUF,ZERO             ALUD,B
623  000266          IDBS,ALU       COMM,CONTINUE      T,JMP     T,HOLD;
624  000267
625  000267
626  000267  %*************************
627  000267  % BSTA
628  000267
629  000267  BSTA:  A,2    B,R2           ALUF,INVD             ALUD,B
630  000267          IDBS,BMG                          T,JMP     T,PUSH
631  000267          BSEK1;
632  000270
633  000270          A,Z    B,R2           ALUF,ANDAB            ALUD,NONE STS,LO
634  000270          IDBS,ALU                          T,JMP     T,HOLD
635  000270          CONT;
636  000271
637  000271
638  000271  %*************************
639  000271  % BSTC
640  000271
641  000271  BSTC:  A,2    B,R2           ALUF,PASSD            ALUD,B
642  000271          IDBS,BMG                          T,NEXT    T,HOLD;
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643     000272
644     000272          A,R2                    ALUF,XORDA          ALUD,Q
645     000272          IDBS,STS                        T,NEXT      T,HOLD;
646     000273
647     000273                                  ALUF,PASSQ          ALUD,NONE STS,LO
648     000273          IDBS,ALU                        T,JMP       T,PUSH
649     000273          BSEK1;
650     000274
651     000274          A,Z   B,R2              ALUF,ORAB           ALUD,NONE STS,LO
652     000274          IDBS,ALU                        T,JMP       T,HOLD
653     000274          CONT;
654     000275
655     000275  BSEK1:        B,4               ALUF,PASSD          ALUD,Q
656     000275          IDBS,BARG                       T,JMP       T,PUSH
657     000275          GETK;
658     000276
659     000276                                                      ALUD,NONE
660     000276          IDBS,ALU                        T,NEXT      T,HOLD
661     000276          BSE11 CONDENABL;
662     000277
663     000277          A,REG B,R1              ALUF,INVD           ALUD,B
664     000277          IDBS,BMG                        T,JMP       T,PUSH
665     000277          STSTZ;
666     000300
667     000300          A,R1  B,DEST            ALUF,ANDAB          ALUD,B
668     000300          IDBS,ALU                        T,RETURN    T,POP;
669     000301
670     000301  BSE11: A,REG B,R1              ALUF,PASSD          ALUD,B
671     000301          IDBS,BMG                        T,JMP       T,PUSH
672     000301          STSTZ;
673     000302
674     000302          A,R1  B,DEST            ALUF,ORAB           ALUD,B
675     000302          IDBS,ALU                        T,RETURN    T,POP;
676     000303
677     000303
678     000303  %*****************************
679     000303  % BANC
680     000303
681     000303  BANC:         B,4               ALUF,PASSD          ALUD,Q
682     000303          IDBS,BARG                       T,JMP       T,LOAD
683     000303          GETK;
684     000304
685     000304                                                      ALUD,NONE
686     000304          IDBS,ALU                        T,NEXT      T,HOLD
687     000304          BLDC CONDENABL;
688     000305
689     000305               B,Z                ALUF,ZERO           ALUD,B
690     000305          IDBS,ALU              COMM,CONTINUE T,JMP T,HOLD;
691     000306
692     000306
693     000306  %*****************************
694     000306  % BORC
695     000306
696     000306  BORC:         B,4               ALUF,PASSD          ALUD,Q
697     000306          IDBS,BARG                       T,JMP       T,LOAD
698     000306          GETK;
699     000307
700     000307                                                      ALUD,NONE
701     000307          IDBS,ALU                        T,NEXT      T,HOLD
702     000307          CONT CONDENABL;
703     000310
704     000310
705     000310  %*****************************
706     000310  % BLDC
707     000310
708     000310  BLDC:   A,REG B,R1              ALUF,PASSD          ALUD,B
709     000310          IDBS,BMG                        T,JMP       T,PUSH
710     000310          STSTZ;
711     000311
712     000311          A,R1  B,DEST            ALUF,ANDAB          ALUD,NONE
713     000311          IDBS,ALU                        T,NEXT      T,HOLD
714     000311          COND,F=0                        F,JMP       F,HOLD;
715     000312
716     000312          A,2   B,R2              ALUF,PASSD          ALUD,B
717     000312          IDBS,BMG                        T,NEXT      T,HOLD
718     000312          SETK0 CONDENABL;
719     000313
720     000313  SETK1: A,R2   B,Z               ALUF,ORAB           ALUD,NONE STS,LO
721     000313          IDBS,ALU                        T,JMP       T,HOLD
722     000313          CONT;
723     000314
```

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000314
000314  %*********************************
000314  % BAND
000314
000314  BAND:       B,4             ALUF,PASSD          ALUD,Q
000314          IDBS,BARG                       T,JMP   T,LOAD
000314          GETK;
000315
000315                                              ALUD,NONE
000315          IDBS,ALU                        T,NEXT  T,HOLD
000315          BLDA CONDENABL;
000316
000316              B,Z             ALUF,ZERO           ALUD,B
000316          IDBS,ALU        COMM,CONTINUE T,JMP T,HOLD;
000317
000317
000317  %*********************************
000317  % BORA
000317
000317  BORA:       B,4             ALUF,PASSD          ALUD,Q
000317          IDBS,BARG                       T,JMP   T,LOAD
000317          GETK;
000320
000320                                              ALUD,NONE
000320          IDBS,ALU                        T,NEXT  T,HOLD
000320          CONT CONDENABL;
000321
000321
000321
000321  %*****************************
000321  % BLDA
000321
000321  BLDA:   A,REG B,R1          ALUF,PASSD          ALUD,B
000321          IDBS,BMG                        T,JMP   T,PUSH
000321          STSTZ;
000322
000322          A,R1  B,DEST        ALUF,ANDAB          ALUD,NONE
000322          IDBS,ALU                        T,NEXT  T,HOLD
000322          COND,F=0                        F,JMP   F,HOLD;
000323
000323          A,2   B,R2          ALUF,PASSD          ALUD,B
000323          IDBS,BMG                        T,NEXT  T,HOLD
000323          SETK1 CONDENABL;
000324
000324  SETK0:  A,R2  B,Z           ALUF,MASKAB         ALUD,NONE STS,LO
000324          IDBS,ALU                        T,JMP   T,HOLD
000324          CONT;
000325
000325
000325  SKIP:       B,P             ALUF,B+1            ALUD,B
000325          IDBS,ALU                        T,JMP   T,HOLD
000325          CONT;
000326
000326
000326
000326  %*************************************************************
000326  %*************************************************************
000326
000326  % SUBROUTINE TO CHECK PROTECT VIOLATION FOR RESTRICTED INSTRUCTIONS
000326
000326  %*************************************************************
000326
000326  PVCHK:                                          ALUD,NONE
000326          IDBS,ALU                        T,NEXT  T,HOLD
000326          COND,RESTR                      F,RETURN F,HOLD;
000327
000327                                              ALUD,NONE
000327          IDBS,ALU            T,JMP       T,HOLD
000327          PRIVI CONDENABL;
000330
000330
000330
000330
000330
000330
000330  %*************************************************************************
000330  % SUBROUTINE TO CHECK FOR OWN LEVEL IN SRB, LRB, IRW, IRR
000330
000330  RBLOK:                          ALUF,PASSD          ALUD,Q
000330          IDBS,GPR                        T,NEXT  T,HOLD;
000331
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000331
000331  %*****************************************
000331  % ENTRY USED BY MOPC IN REGISTER DEPOSIT
000331
000331  OPCRB:                                                  ALUD,NONE
000331          IDBS,ALU                            T,NEXT      T,HOLD;
000332
000332
000332  %*****************************************
000332  % ENTRY USED BY IRR AND IRW
000332
000332  IRWRD: A,PIL                    ALUF,XORDQ              ALUD,Q
000332          IDBS,AARG                       T,NEXT          T,HOLD
000332          COND,F=0                        F,JMP           F,HOLD;
000333
000333                                  ALUF,ANDDQ              ALUD,Q
000333          IDBS,ARG                        T,RETURN        T,POP
000333          170;
000334
000334
000334
000334
000334
000334
000334
000334
000334  %*****************************************
000334  %*****************************************
000334
000334  % STORE REGISTER BLOCK
000334
000334  %*****************************************
000334
000334  SRB2:           B,7                             ALUD,NONE
000334          IDBS,BARG       COMM,LDLC       T,JMP       T,PUSH
000334          PVCHK;
000335
000335          B,Z             ALUF,PASSD      ALUD,B
000335          IDBS,STS                        T,JMP       T,PUSH
000335          RBLOK;
000336
000336          A,10            ALUF,D-1        ALUD,Q
000336          IDBS,BMG                        T,NEXT      T,HOLD
000336          SRB1 CONDENABL;
000337
000337
000337  %*****************************************
000337  % OWN LEVEL, SAVE REGISTER BLOCK IN REGISTER FILE
000337
000337                                                      ALUD,NONE
000337          IDBS,ALU                        T,NEXT      T,PUSH
000337          COND,LC=0;
000340
000340          A,PIL B,LC              ALUF,PASSB          ALUD,NONE
000340          IDBS,ALU                COMM,EWRF T,NEXT    T,POP
000340          LCOUNT;
000341
000341  SRB1:   A,X                     ALUF,PASSA          ALUD,NONE
000341          IDBS,ALU                        T,NEXT      T,HOLD;
000342
000342          A,REG B,P ALUD,NONE IDBS,REG COMM,WRRQ,APT      T,NEXT T,HOLD;
000343          A,REG B,X ALUD,NONE IDBS,REG COMM,AWRITE,NEXT   T,NEXT T,HOLD;
000344          A,REG B,T ALUD,NONE IDBS,REG COMM,AWRITE,NEXT   T,NEXT T,HOLD;
000345          A,REG B,A ALUD,NONE IDBS,REG COMM,AWRITE,NEXT   T,NEXT T,HOLD;
000346          A,REG B,D ALUD,NONE IDBS,REG COMM,AWRITE,NEXT   T,NEXT T,HOLD;
000347          A,REG B,L ALUD,NONE IDBS,REG COMM,AWRITE,NEXT   T,NEXT T,HOLD;
000350          A,REG B,Z ALUF,ANDDQ ALUD,Q IDBS,REG            T,NEXT T,HOLD;
000351          ALUF,PASSQ ALUD,NONE IDBS,ALU COMM,AWRITE,NEXT  T,NEXT T,HOLD;
000352          A,REG B,B ALUD,NONE IDBS,REG COMM,AWRITE,NEXT   T,JMP  T,HOLD CONT;
000353
000353
000353
000353
000353  %*************************************************
000353  %*************************************************
000353
000353  % LOAD REGISTER BLOCK
000353
000353  %*************************************************
000353
000353  LRB2:  ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
000354
```

```
886  000354              B,7                                   ALUD,NONE
887  000354         IDBS,BARG              COMM,LDLC T,JMP     T,PUSH
888  000354         RBLOK;
889  000355
890  000355         A,P   B,R2             ALUF,PASSA          ALUD,B
891  000355         IDBS,ALU                         T,NEXT    T,HOLD;
892  000356
893  000356         A,X   B,R1             ALUF,PASSA          ALUD,B
894  000356         IDBS,ALU                         T,NEXT    T,HOLD;
895  000357
896  000357   ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD;
897  000360   A,REG B,P ALUD,NONE IDBS,DBR COMM,EWRF T,JMP T,PUSH LRB3;
898  000361   A,REG B,X ALUD,NONE IDBS,DBR COMM,EWRF T,JMP T,PUSH LRB3;
899  000362   A,REG B,T ALUD,NONE IDBS,DBR COMM,EWRF T,JMP T,PUSH LRB3;
900  000363   A,REG B,A ALUD,NONE IDBS,DBR COMM,EWRF T,JMP T,PUSH LRB3;
901  000364   A,REG B,D ALUD,NONE IDBS,DBR COMM,EWRF T,JMP T,PUSH LRB3;
902  000365   A,REG B,L ALUD,NONE IDBS,DBR COMM,EWRF T,JMP T,PUSH LRB3;
903  000366   A,REG B,Z ALUD,NONE IDBS,DBR COMM,EWRF T,JMP T,PUSH LRB3;
904  000367
905  000367         A,REG B,B              ALUF,PASSQ          ALUD,NONE
906  000367         IDBS,DBR               COMM,EWRF T,NEXT    T,HOLD
907  000367         COND,F=0                         F,JMP     F,POP;
908  000370
909  000370                                                    ALUD,NONE
910  000370         IDBS,ALU                         T,NEXT    T,HOLD
911  000370         CONT CONDENABL;
912  000371
913  000371
914  000371   %*****************************************
915  000371   % OWN LEVEL, UNSAVE REGISTER BLOCK
916  000371
917  000371                                                    ALUD,NONE
918  000371         IDBS,ALU                         T,NEXT    T,PUSH
919  000371         COND,LC=0;
920  000372
921  000372         A,PIL B,LC             ALUF,PASSD          ALUD,B
922  000372         IDBS,REG                         T,NEXT    T,POP
923  000372         LCOUNT;
924  000373
925  000373         A,R2  B,P              ALUF,PASSA          ALUD,B % P IS UNCHANGED
926  000373         IDBS,ALU                         T,NEXT    T,HOLD;
927  000374
928  000374         A,Z                    ALUF,PASSA          ALUD,NONE  STS,LO % CHANGE STS
929  000374         IDBS,ALU                         T,JMP     T,HOLD
930  000374         CONT;
931  000375
932  000375
933  000375   LRB3:                                            ALUD,NONE
934  000375         IDBS,ALU      COMM,AREAD,NEXT    T,RETURN  T,POP;
935  000376
936  000376
937  000376
938  000376
939  000376
940  000376
941  000376
942  000376
943  000376   %*************************************************
944  000376   %*************************************************
945  000376
946  000376   % INTER-REGISTER READ
947  000376
948  000376   %*************************************************
949  000376
950  000376
951  000376   IRR3:  ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
952  000377          ALUD,NONE IDBS,ALU T,JMP T,PUSH IRR;
953  000400
954  000400               B,Z              ALUF,ZERO           ALUD,B
955  000400         IDBS,ALU            COMM,CONTINUE T,JMP T,HOLD;
956  000401
957  000401
958  000401
959  000401   IRR:        B,Z              ALUF,PASSD          ALUD,B
960  000401         IDBS,STS                         T,NEXT    T,HOLD;
961  000402
962  000402                                ALUF,PASSD          ALUD,Q
963  000402         IDBS,GPR                         T,JMP     T,PUSH
964  000402         IRWRD;
965  000403
966  000403         A,REG B,Z              ALUF,PASSD          ALUD,Q
```

```
 967  000403          IDBS,REG                          T,NEXT    T,HOLD
 968  000403          IRR1 CONDENABL;
 969  000404
 970  000404
 971  000404    %*********************************
 972  000404    % OWN LEVEL
 973  000404
 974  000404          A,Z   B,Z              ALUF,ANDDA           ALUD,B
 975  000404          IDBS,ARG                          T,NEXT    T,HOLD
 976  000404          377;
 977  000405
 978  000405               B,DEST            ALUF,PASSB           ALUD,Q
 979  000405          IDBS,ALU                          T,JMP     T,HOLD
 980  000405          IRR2;
 981  000406
 982  000406
 983  000406    %************************************
 984  000406    % OTHER LEVEL
 985  000406
 986  000406    IRR1:                          ALUF,ANDDQ           ALUD,Q
 987  000406          IDBS,ARG                          T,NEXT    T,HOLD
 988  000406          377;
 989  000407
 990  000407          A,REG B,Z              ALUF,PASSQ           ALUD,NONE
 991  000407          IDBS,ALU               COMM,EWRF T,NEXT     T,HOLD;
 992  000410
 993  000410          A,REG B,DEST           ALUF,PASSD           ALUD,Q
 994  000410          IDBS,REG                          T,NEXT    T,HOLD;
 995  000411
 996  000411    IRR2:      B,A               ALUF,PASSQ           ALUD,B
 997  000411          IDBS,ALU                          T,RETURN  T,HOLD;
 998  000412
 999  000412
1000  000412
1001  000412
1002  000412
1003  000412
1004  000412
1005  000412
1006  000412
1007  000412
1008  000412
1009  000412
1010  000412
1011  000412    %*********************************************
1012  000412    %*********************************************
1013  000412
1014  000412    % INTER REGISTER WRITE
1015  000412
1016  000412    %*********************************************
1017  000412    IRW3:  ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
1018  000413           ALUD,NONE IDBS,ALU T,JMP T,PUSH IRW;
1019  000414
1020  000414               B,Z                ALUF,ZERO            ALUD,B
1021  000414          IDBS,ALU             COMM,CONTINUE T,JMP T,HOLD;
1022  000415
1023  000415
1024  000415    IRW:   A,P   B,R2           ALUF,PASSA           ALUD,B
1025  000415          IDBS,ALU                          T,NEXT    T,HOLD;
1026  000416
1027  000416                                ALUF,PASSD           ALUD,Q
1028  000416          IDBS,GPR                          T,JMP     T,PUSH
1029  000416          IRWRD;
1030  000417
1031  000417                                                      ALUD,NONE
1032  000417          IDBS,ALU                          T,NEXT    T,HOLD
1033  000417          IRW1 CONDENABL;
1034  000420
1035  000420
1036  000420    %*********************************
1037  000420    % OWN LEVEL
1038  000420
1039  000420          A,A   B,DEST           ALUF,PASSA           ALUD,B
1040  000420          IDBS,ALU                          T,JMP     T,PUSH
1041  000420          IRW2;
1042  000421
1043  000421          A,R2  B,P              ALUF,PASSA           ALUD,B
1044  000421          IDBS,ALU                          T,NEXT    T,HOLD
1045  000421          CONDENABL;
1046  000422
1047  000422
```

```
1048  000422  %*****************************************
1049  000422  % STS MUST BE LOADED
1050  000422
1051  000422          A,Z                     ALUF,PASSA          ALUD,NONE STS,LO
1052  000422          IDBS,ALU                        T,RETURN    T,HOLD;
1053  000423
1054  000423
1055  000423
1056  000423  %*****************************************
1057  000423  % OTHER LEVEL
1058  000423
1059  000423  IRW1:   A,A                     ALUF,PASSA          ALUD,Q
1060  000423          IDBS,ALU                        T,NEXT      T,HOLD;
1061  000424
1062  000424          A,REG B,DEST            ALUF,PASSQ          ALUD,NONE
1063  000424          IDBS,ALU                COMM,EWRF T,JMP     T,PUSH
1064  000424          IRW2;
1065  000425
1066  000425                                  ALUF,ANDDQ          ALUD,Q
1067  000425          IDBS,ARG                        T,NEXT      T,HOLD
1068  000425          377 CONDENABL;
1069  000426
1070  000426
1071  000426  %************************************
1072  000426  % STS MUST BE LOADED
1073  000426
1074  000426          A,REG B,Z               ALUF,PASSQ          ALUD,NONE
1075  000426          IDBS,ALU                COMM,EWRF T,RETURN  T,HOLD;
1076  000427
1077  000427
1078  000427  %************************************
1079  000427  % SUBROUTINE TO CHECK FOR STS AS DESTINATION
1080  000427
1081  000427  IRW2:           B,DEST          ALUF,PASSD          ALUD,NONE
1082  000427          IDBS,BARG                       T,RETURN    T,POP
1083  000427          COND,F=0                        F,RETURN    F,HOLD;
1084  000430
1085  000430
1086  000430
1087  000430
1088  000430
1089  000430
1090  000430
1091  000430  %*************************************************
1092  000430  %*************************************************
1093  000430
1094  000430  % REGISTER DIVIDE
1095  000430
1096  000430  %*************************************************
1097  000430
1098  000430  RDIV6:  A,SRCE B,R1             ALUF,PASSA          ALUD,B
1099  000430          IDBS,ALU                        T,NEXT      T,HOLD
1100  000430          COND,F15                        F,JMP       F,HOLD;
1101  000431
1102  000431          A,A    B,R5             ALUF,PASSA          ALUD,B
1103  000431          IDBS,ALU                        T,NEXT      T,HOLD
1104  000431          RDIV1 CONDENABL;
1105  000432
1106  000432                B,R1              ALUF,-B             ALUD,B % NEGATIVE DIVISOR
1107  000432          IDBS,ALU                        T,NEXT      T,HOLD
1108  000432          COND,COND                       F,JMP       F,HOLD;
1109  000433
1110  000433  RDIV1:  A,SRCE B,A             ALUF,XORAB          ALUD,Q
1111  000433          IDBS,ALU                        T,NEXT      T,HOLD
1112  000433          RDIV2 CONDENABL;
1113  000434
1114  000434                B,D               ALUF,-B             ALUD,B    STS,EA % NEGATIVE
1115  000434          IDBS,ALU                        T,NEXT      T,HOLD;          % DIVIDEND
1116  000435
1117  000435                B,A               ALUF,-B-1           ALUD,B    CRY,C
1118  000435          IDBS,ALU                        T,NEXT      T,HOLD;
1119  000436
1120  000436  RDIV2:  A,R1  B,A              ALUF,B-A            ALUD,B
1121  000436          IDBS,ALU                        T,NEXT      T,HOLD
1122  000436          COND,CRY                        F,NEXT      F,HOLD;
1123  000437
1124  000437                B,R7              ALUF,PASSQ          ALUD,B
1125  000437          IDBS,ALU                        T,JMP       T,HOLD
1126  000437          RDIVZ CONDENABL;
1127  000440
1128  000440                B,D               ALUF,PASSB          ALUD,Q
```

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1129  000440          IDBS,ARG              COMM,LDLC T,NEXT    T,HOLD
1130  000440          16;
1131  000441
1132  000441               B,STS            ALUF,PASSD          ALUD,B
1133  000441          IDBS,STS                        T,NEXT    T,HOLD;
1134  000442
1135  000442          A,7                   ALUF,PASSD          ALUD,NONE STS,LO
1136  000442          IDBS,BMG              COMM,LDGPR T,NEXT   T,HOLD;
1137  000443
1138  000443          A,0   B,A  MIS,ZIN    ALUF,PASSB          ALUD,SLD  STS,ES
1139  000443          IDBS,AARG             COMM,LDGPR T,NEXT    T,PUSH
1140  000443          COND,LC=0;
1141  000444
1142  000444
1143  000444    %*****************************
1144  000444    % DIVIDE LOOP
1145  000444
1146  000444          A,R1  B,A  MIS,ZIN    ALUF,B-A-1 ALUM,FDV ALUD,SLD  STS,ES CRY,GPR
1147  000444          IDBS,ALU                        T,NEXT    T,POP
1148  000444          LCOUNT;
1149  000445
1150  000445                                ALUF,PASSD          ALUD,Q
1151  000445          IDBS,GPR                        T,NEXT    T,HOLD;
1152  000446
1153  000446          A,A   B,D MIS,LIN     ALUF,PASSA          ALUD,SRB
1154  000446          IDBS,ALU                        T,NEXT    T,HOLD;
1155  000447
1156  000447               B,1              ALUF,ANDDQ          ALUD,NONE
1157  000447          IDBS,BARG                       T,NEXT    T,HOLD
1158  000447          COND,F=0                        F,JMP     F,HOLD;
1159  000450
1160  000450          A,STS                 ALUF,PASSA          ALUD,NONE STS,LO
1161  000450          IDBS,ALU                        T,NEXT    T,HOLD
1162  000450          RDIV3 CONDENABL;
1163  000451
1164  000451          A,R1  B,D             ALUF,A+B            ALUD,B
1165  000451          IDBS,ALU                        T,NEXT    T,HOLD;
1166  000452
1167  000452    RDIV3: A,R7                 ALUF,PASSA          ALUD,NONE
1168  000452          IDBS,ALU                        T,NEXT    T,HOLD
1169  000452          COND,F15                        F,JMP     F,HOLD;
1170  000453
1171  000453          A,R5                  ALUF,PASSA          ALUD,NONE
1172  000453          IDBS,ALU                        T,NEXT    T,HOLD
1173  000453          RDIV4 CONDENABL;
1174  000454
1175  000454
1176  000454    %*************************************
1177  000454    % CHANGE QUOTIENT SIGN
1178  000454
1179  000454                                ALUF,-Q             ALUD,Q
1180  000454          IDBS,ALU                        T,NEXT    T,HOLD
1181  000454          COND,COND                       F,JMP     F,HOLD;
1182  000455
1183  000455    RDIV4:      B,A             ALUF,PASSQ          ALUD,B
1184  000455          IDBS,ALU                        T,NEXT    T,HOLD
1185  000455          RDIV5 CONDENABL;
1186  000456
1187  000456
1188  000456    %*********************************
1189  000456    % CHANGE REMAINDER SIGN
1190  000456
1191  000456               B,D              ALUF,-B             ALUD,B
1192  000456          IDBS,ALU                        T,NEXT    T,HOLD;
1193  000457
1194  000457    RDIV5: A,A   B,R7           ALUF,XORAB          ALUD,NONE
1195  000457          IDBS,ALU                        T,NEXT    T,HOLD
1196  000457          COND,F15                        F,JMP     F,POP;
1197  000460
1198  000460                                                    ALUD,NONE
1199  000460          IDBS,ALU                        T,NEXT    T,HOLD
1200  000460          CONT CONDENABL;
1201  000461
1202  000461
1203  000461
1204  000461    %************************************************
1205  000461    % OVERFLOW (OR ERROR IN EXR, DNZ ETC.)
1206  000461
1207  000461    RDIVZ:      B,10            ALUF,PASSD          ALUD,Q
1208  000461          IDBS,BARG                       T,NEXT    T,HOLD;
1209  000462
```

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1210   000462                B,STS          ALUF,ORDQ          ALUD,B
1211   000462          IDBS,STS                        T,NEXT    T,HOLD;
1212   000463
1213   000463          A,STS                ALUF,PASSA          ALUD,NONE STS,LO
1214   000463          IDBS,ALU       COMM,CONTINUE      T,JMP     T,HOLD;
1215   000464
1216   000464
1217   000464
1218   000464
1219   000464
1220   000464
1221   000464
1222   000464
1223   000464
1224   000464   %*********************************************
1225   000464   %*********************************************
1226   000464
1227   000464   % EXECUTE REGISTER
1228   000464
1229   000464   %*********************************************
1230   000464
1231   000464   EXR1:  A,SRCE                ALUF,XORDA          ALUD,Q
1232   000464          IDBS,GPR                        T,NEXT    T,HOLD
1233   000464          COND,F=0                        F,NEXT    F,HOLD;
1234   000465
1235   000465                               ALUF,ANDDQ          ALUD,NONE
1236   000465          IDBS,ARG                        T,NEXT    T,HOLD
1237   000465          177700;
1238   000466
1239   000466          A,SRCE               ALUF,PASSA          ALUD,NONE
1240   000466          IDBS,ALU             COMM,CLIRQ T,JMP    T,HOLD
1241   000466          RDIVZ CONDENABL;
1242   000467
1243   000467
1244   000467   %*****************************
1245   000467   % OK, NOT EXR(EXR)
1246   000467
1247   000467          A,SRCE               ALUF,PASSA          ALUD,NONE
1248   000467          IDBS,ALU             COMM,MAP   T,JMP    T,HOLD:
1249   000470
1250   000470
1251   000470
1252   000470
1253   000470
1254   000470
1255   000470
1256   000470
1257   000470
1258   000470
1259   000470
1260   000470   %*********************************************************
1261   000470   %*********************************************************
1262   000470
1263   000470   % MIX3-INSTRUCTION
1264   000470
1265   000470   %*********************************************************
1266   000470
1267   000470   MIX4:  A,X   B,X             ALUF,D+A            ALUD,B
1268   000470          IDBS,GPR       COMM,CONTINUE      T,JMP     T,HOLD;
1269   000471
1270   000471
1271   000471
1272   000471
1273   000471
1274   000471
1275   000471
1276   000471
1277   000471
1278   000471
1279   000471
1280   000471
1281   000471
1282   000471   %*********************************************
1283   000471   %*********************************************
1284   000471
1285   000471
1286   000471   % IOX-INSTRUCTION
1287   000471
1288   000471   %*********************************************
1289   000471
1290   000471
```

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1291  000471  IOX1:       B,R1            ALUF,PASSD          ALUD,B
1292  000471          IDBS,GPR                        T,JMP     T,PUSH
1293  000471          PVCHK;
1294  000472
1295  000472                                                    ALUD,NONE
1296  000472          IDBS,ALU            COMM,LDGPR T,JMP      T,PUSH
1297  000472          IOXG;
1298  000473
1299  000473                                                    ALUD,NONE
1300  000473          IDBS,ALU    COMM,CONTINUE       T,JMP     T,HOLD;
1301  000474
1302  000474
1303  000474
1304  000474
1305  000474
1306  000474
1307  000474
1308  000474  %*********************************************
1309  000474  %*********************************************
1310  000474
1311  000474  % IOXT - INSTRUCION
1312  000474
1313  000474  %*********************************************
1314  000474
1315  000474  IOXT2: A,T   B,R1            ALUF,PASSA          ALUD,B
1316  000474          IDBS,ALU            COMM,LDIRV T,NEXT     T,HOLD;
1317  000475
1318  000475                                                    ALUD,NONE
1319  000475          IDBS,ALU                        T,JMP     T,PUSH
1320  000475          IOXX1;
1321  000476
1322  000476                                                    ALUD,NONE
1323  000476          IDBS,ALU    COMM,CONTINUE       T,JMP     T,HOLD;
1324  000477
1325  000477
1326  000477
1327  000477
1328  000477
1329  000477
1330  000477
1331  000477
1332  000477  %*********************************************
1333  000477  %*********************************************
1334  000477
1335  000477  % SUBROUTINE USED BY IOX OR MICROPROGRAMMED LOADERS
1336  000477  % TO ISSUE IOXINSTRUCTIONS ON SYSTEM BUS
1337  000477
1338  000477  %*********************************************
1339  000477  % IOX-ROUTINE FOR 11-BIT IOX-ADDRESS
1340  000477
1341  000477  IOXG:                       ALUF,PASSD          ALUD,Q
1342  000477          IDBS,ARG                        T,NEXT    T,HOLD
1343  000477          3777;
1344  000500
1345  000500          A,R1  B,R1          ALUF,ANDAQ          ALUD,B
1346  000500          IDBS,ALU                        T,NEXT    T,HOLD;
1347  000501
1348  000501
1349  000501  %*********************************************
1350  000501  % IOX-ROUTINE FOR 16-BIT IOX ADDRESS
1351  000501
1352  000501  IOXX1: A,R1  B,7            ALUF,MASKDA         ALUD,Q
1353  000501          IDBS,BARG                       T,NEXT    T,HOLD
1354  000501          COND,F=0                        F,NEXT    F,HOLD;
1355  000502
1356  000502  %*********************************************
1357  000502  % CHECK IF DEVICE NUMBERS 30X IS ON THE CPU-BOARD
1358  000502
1359  000502                              ALUF,XORDQ          ALUD,NONE
1360  000502          IDBS,ARG                        T,NEXT    T,HOLD
1361  000502          300;
1362  000503
1363  000503          A,R1  B,3           ALUF,MASKDA         ALUD,Q
1364  000503          IDBS,BARG                       T,JMP     T,HOLD
1365  000503          TERMX CONDENABL;
1366  000504
1367  000504
1368  000504  %*********************************************
1369  000504  % CHECK IF DEVICE IS IN THE RANGE 10-13
1370  000504
1371  000504               B,10           ALUF,XORDQ          ALUD,NONE
```

```
1372  000504          IDBS,BARG                       T,NEXT    T,HOLD
1373  000504          COND,F=0                        F,NEXT    F,HOLD;
1374  000505
1375  000505                                                    ALUD,NONE
1376  000505          IDBS,ALU                        T,JMP     T,HOLD
1377  000505          CLKX CONDENABL;
1378  000506
1379  000506
1380  000506    %*************************************************
1381  000506    % DEVICE IS NOT ON CPU-BOARD, ISSUE GENERAL IOX
1382  000506
1383  000506          A,R1                    ALUF,PASSA          ALUD,NONE % ADDRESS -> IOX
1384  000506          IDBS,ALU                        T,NEXT      T,HOLD;
1385  000507
1386  000507          A,A                     ALUF,PASSA          ALUD,NONE % OUTPUT DATA
1387  000507          IDBS,ALU                COMM,IOX T,NEXT    T,HOLD;
1388  000510
1389  000510                B,A               ALUF,PASSD          ALUD,B % INPUT DATA
1390  000510          IDBS,DBR                COMM,SLOW T,RETURN  T,POP;
1391  000511
1392  000511    %CC SLOW CYCLE TO LET MEGALINK GET TIME TO TURN OFF DATA OUT ENABLE
1393  000511    %CC BEFORE THE NEXT CPU FETCH.
1394  000511
1395  000511
1396  000511    %*************************************************
1397  000511    % DEV.NO. 30X IS ON CPU BOARD, JUMP TO VECTOR
1398  000511
1399  000511    TERMX: AB,STATUS                ALUF,PASSD          ALUD,Q
1400  000511          IDBS,REG                        T,JMP0-3    T,HOLD
1401  000511          TRMVC;
1402  000512
1403  000512
1404  000512
1405  000512    %*************************************************
1406  000512    % DEV.NO. IS 10-13, JUMP TO VECTOR
1407  000512
1408  000512    CLKX:  AB,STATUS                ALUF,PASSD          ALUD,Q
1409  000512          IDBS,REG                        T,JMP0-3 T,HOLD
1410  000512          CLKVC;
1411  000513
1412  000513
1413  000513
1414  000513
1415  000513
1416  000513    %*********************************************************
1417  000513    % SUBROUTINE TO WRITE STATUS-SCRATCH WORD, AND TO WRITE SIOC-REGISTER
1418  000513
1419  000513    WSIOC: AB,STATUS                ALUF,PASSQ          ALUD,NONE
1420  000513          IDBS,ALU                  COMM,EWRF T,NEXT    T,HOLD;
1421  000514
1422  000514    WSIO2:                          ALUF,PASSQ          ALUD,NONE
1423  000514          IDBS,ALU                  COMM,SIOC T,RETURN  T,POP;
1424  000515
1425  000515
1426  000515
1427  000515
1428  000515
1429  000515
1430  000515
1431  000515    %*************************************************
1432  000515
1433  000515    % ROUTINES FOR CPU-TERMINAL, ENTERED FROM VECTOR
1434  000515
1435  000515    %*************************************************
1436  000515    % IOX 300 READ CONSOLE DATA
1437  000515
1438  000515
1439  000515    TRM0:                                           ALUD,NONE
1440  000515          IDBS,ALU                        T,NEXT    T,HOLD
1441  000515          COND,F11                        F,RETURN  F,POP;
1442  000516
1443  000516          IDBS,ALU                                  ALUD,NONE
1444  000516          CONDENABL                       T,NEXT    T,HOLD;
1445  000517
1446  000517    %CC RETURN IF IN OPCOM
1447  000517
1448  000517                                  ALUF,PASSD          ALUD,Q
1449  000517          IDBS,UART       COMM,UART,DATA  T,NEXT      T,HOLD;
1450  000520
1451  000520    %CC READ UART DATA
1452  000520
```

```
1453  000520                B,A             ALUF,ANDDQ          ALUD,B
1454  000520          IDBS,ARG                        T,RETURN  T,POP
1455  000520          377;
1456  000521
1457  000521    %CC MASK OFF THE CRAP AND PUT CHARACTER IN A-REGISTER
1458  000521
1459  000521    %*************************************
1460  000521    % IOX 302 READ CONSOLE INPUT STATUS
1461  000521    %CC UART STATUS REG IN Q-REG. FE=BIT5,PE=BIT3,OR=BIT4.
1462  000521    %CC MACRO STATUS WORD UPON EXIT:
1463  000521    %CC PIN=BIT0,DA=BIT3,ERR=BIT4,FE=BIT5,PE=BIT6,OR=BIT7.
1464  000521    %CC OTHER BITS 0.
1465  000521
1466  000521    TRM2:  A,7                  ALUF,ANDDQ          ALUD,Q
1467  000521          IDBS,AARG                       T,NEXT    T,HOLD
1468  000521          COND,F=0                        F,NEXT    F,HOLD;
1469  000522
1470  000522    %CC MASK OFF EVERYTHING BUT BIT3-5. JUMP IF NO ERRORS.
1471  000522
1472  000522          A,3   B,R4            ALUF,ANDDQ          ALUD,B
1473  000522          IDBS,AARG                       T,JMP     T,HOLD
1474  000522          TRM20 CONDENABL;
1475  000523
1476  000523    %CC PE,OR -> R4.
1477  000523
1478  000523          A,2                   ALUF,ORDQ           ALUD,Q
1479  000523          IDBS,AARG                       T,NEXT    T,HOLD;
1480  000524
1481  000524    %CC SET INCLUSIVE OR OF ERRORS  (ERR=BIT4).
1482  000524
1483  000524                B,1                                 ALUD,NONE
1484  000524          IDBS,BARG             COMM,LDLC T,NEXT    T,HOLD
1485  000524          COND,LC=0;
1486  000525
1487  000525    %CC SET UP FOR LOOP 3 TIMES
1488  000525
1489  000525          A,6                   ALUF,ANDDQ          ALUD,Q
1490  000525          IDBS,AARG                       T,NEXT    T,PUSH;
1491  000526
1492  000526    %CC MASK EVERYTHING BUT FE AND ERR.
1493  000526
1494  000526               B,R4   MIS,ZIN   ALUF,PASSB ALUM,MIC ALUD,SLB
1495  000526          IDBS,ALU    LCOUNT                T,NEXT    T,POP;
1496  000527
1497  000527    %CC PE=BIT3 -> 6  OR=BIT4 -> 7
1498  000527
1499  000527    TRM20: A,R4  B,A            ALUF,PASSA          ALUD,B
1500  000527          IDBS,ALU                        T,NEXT    T,HOLD;
1501  000530
1502  000530    %CC BIT 4-7 OK
1503  000530
1504  000530                                ALUF,PASSD          ALUD,Q
1505  000530          IDBS,IOR                        T,NEXT    T,HOLD;
1506  000531
1507  000531    %CC SAME AS RASK FROM HERE, EXCEPT DA INVERTED.
1508  000531
1509  000531          A,16                  ALUF,ANDDQ          ALUD,NONE
1510  000531          IDBS,BMG                        T,NEXT    T,HOLD
1511  000531          COND,F=0                        F,JMP     F,HOLD;
1512  000532
1513  000532          A,13                  ALUF,ANDDQ          ALUD,NONE
1514  000532          IDBS,BMG                        T,NEXT    T,HOLD
1515  000532          TRM21 CONDENABL;
1516  000533
1517  000533          AB,STATUS             ALUF,PASSD          ALUD,Q
1518  000533          IDBS,REG                        T,NEXT    T,HOLD
1519  000533          TRM20B CONDENABL;
1520  000534
1521  000534          IDBS,ALU               ALUF,PASSQ         ALUD,NONE
1522  000534                                          T,JMP     T,HOLD
1523  000534          TRM21;
1524  000535
1525  000535    TRM20B: A,3   B,R6           ALUF,PASSD          ALUD,B
1526  000535          IDBS,BMG                        T,NEXT    T,HOLD;
1527  000536
1528  000536          A,R6  B,A             ALUF,ORAB           ALUD,B
1529  000536          IDBS,ALU                        T,NEXT    T,HOLD;
1530  000537
1531  000537    TRM21: A,1                  ALUF,ANDDQ          ALUD,NONE
1532  000537          IDBS,BMG                        T,NEXT    T,HOLD
1533  000537          COND,F=0                        F,NEXT    F,HOLD;
```

```
1534    000540
1535    000540          A,0   B,R6            ALUF,PASSD          ALUD,B
1536    000540          IDBS,BMG                          T,RETURN T,POP
1537    000540          CONDENABL;
1538    000541
1539    000541    TRM22: A,R6  B,A             ALUF,ORAB           ALUD,B
1540    000541          IDBS,ALU                          T,RETURN T,POP;
1541    000542
1542    000542
1543    000542
1544    000542    %*************************************
1545    000542    %IOX 303 WRITE CONSOLE INPUT CONTROL
1546    000542    %CC MACRO STATUS WORD UPON ENTRY:
1547    000542    %CC PIN=BIT0,WORD LENGTH =BIT12,11,STOP BITS=BIT13,CHECK PARITY=BIT14
1548    000542    %CC           WORD LENGTH 5 => 1  1              0=>1.5 STOP BITS
1549    000542    %CC           WORD LENGTH 6 => 1  0              0=>2   STOP BITS
1550    000542    %CC           WORD LENGTH 7 => 0  1              0=>2   STOP BITS
1551    000542    %CC           WORD LENGTH 8 => 0  0              0=>2   STOP BITS
1552    000542    %CC PARITY IS EVEN
1553    000542    %CC OTHER BITS 0.
1554    000542    %CC UART MODE REG 1: CHECK PARITY=BIT4,WORD LENGTH=BIT2,3 INVERTED
1555    000542    %CC STOP BITS=BIT7,6. 01=1 STOP BIT,10=1.5 STOP BITS. 11=2 STOP BITS.
1556    000542    %CC BIT0=0,BIT1=1,BIT5=1 ALWAYS. (EVEN PARITY,ASYNC. 16XBAUD RATE FACT.)
1557    000542
1558    000542    TRM3:  IDBS,ALU                                     ALUD,NONE
1559    000542          COND,F=0                          F,NEXT    F,HOLD
1560    000542                                            T,NEXT    T,HOLD;
1561    000543
1562    000543                                 ALUF,ANDDQ           ALUD,NONE
1563    000543          IDBS,ARG   074000                 T,NEXT    T,HOLD;
1564    000544
1565    000544    %CC JUMP IF NO UART CONTROL BITS CHANGED
1566    000544
1567    000544          A,A B,R2               ALUF,INVA            ALUD,B
1568    000544          IDBS,ALU                          T,JMP     T,HOLD
1569    000544          TRM34 CONDENABL;
1570    000545
1571    000545                B,R7             ALUF,PASSD  MIS,ZIN ALUD,SRB
1572    000545          IDBS,SWAP                         T,NEXT    T,HOLD;
1573    000546    %
1574    000546    %CC R7=XXPSWWXX
1575    000546
1576    000546                B,R6             ALUF,INVD            ALUD,B
1577    000546          IDBS,ARG                        T,NEXT    T,HOLD
1578    000546          14;
1579    000547
1580    000547          IDBS,ALU                                ALUD,NONE
1581    000547          COND,F=0                          F,JMP     F,HOLD
1582    000547                                            T,NEXT    T,HOLD;
1583    000550
1584    000550    %CC R6=11110011
1585    000550
1586    000550          A,R6  B,R7             ALUF,ORAB            ALUD,B
1587    000550          IDBS,BMG               COMM,LDGPR T,NEXT    T,HOLD;
1588    000551
1589    000551    %CC R7=1111WW11, 0100000000000000 -> GPR
1590    000551
1591    000551                 B,R7            ALUF,ANDDA           ALUD,B
1592    000551           IDBS,ARG                         T,NEXT    T,HOLD
1593    000551           177776;
1594    000552
1595    000552    %CC R7=1111WW10 (TOP 4 BITS OF ARG WILL MAKE A-OP = R7)
1596    000552
1597    000552          A,A                    ALUF,ANDDA           ALUD,NONE
1598    000552          IDBS,GPR             COMM,UART,COM T,NEXT T,HOLD;
1599    000553
1600    000553    %CC TEST CHECK PARITY BIT. DISABLE RECEIVE AND TRANSMIT.
1601    000553
1602    000553                                                     ALUD,NONE
1603    000553          IDBS,ALU                          T,NEXT    T,HOLD
1604    000553          TRM31 CONDENABL;
1605    000554
1606    000554    %CC JUMP IF PARITY CHECK ENABLED
1607    000554
1608    000554                B,R7             ALUF,ANDDA           ALUD,B
1609    000554          IDBS,ARG                          T,NEXT    T,HOLD
1610    000554          177757;
1611    000555
1612    000555    %CC R7=111PWW10 (TOP 4 BITS OF ARG WILL MAKE A-OP = R7)
1613    000555
1614    000555    TRM31: A,15                  ALUF,ANDDQ           ALUD,NONE
```

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1615  000555          IDBS,BMG              COMM,XSLOW  T,NEXT   T,HOLD
1616  000555          COND,F=0                          F,NEXT   F,HOLD;
1617  000556
1618  000556    %CC 425NS DELAY. TEST STOP BITS.
1619  000556
1620  000556          AB,OLD303             ALUF,PASSA           ALUD,NONE
1621  000556          IDBS,ALU              COMM,EWRF   T,JMP    T,HOLD
1622  000556          TRM32 CONDENABL;
1623  000557
1624  000557    %CC A-REG -> OLD303. JUMP IF 2 OR 1.5 STOP BITS.
1625  000557
1626  000557               B,R7             ALUF,ANDDA           ALUD,B
1627  000557          IDBS,ARG                          T,NEXT   T,HOLD
1628  000557          177577;
1629  000560
1630  000560    %CC R7=S11PWW10 (TOP 4 BITS OF ARG WILL MAKE A-OP = R7)
1631  000560
1632  000560                                                     ALUD,NONE
1633  000560          IDBS,ALU                             T,JMP T,HOLD
1634  000560          TRM33;
1635  000561
1636  000561
1637  000561    TRM32: A,R6  B,R7           ALUF,MASKAB          ALUD,NONE
1638  000561          IDBS,ALU                          T,NEXT   T,HOLD
1639  000561          COND,F=0                          F,JMP    F,HOLD;
1640  000562
1641  000562    %CC TEST FOR 5 DATA BITS
1642  000562
1643  000562          IDBS,ALU                                   ALUD,NONE
1644  000562          TRM33 CONDENABL                   T,NEXT   T,HOLD;
1645  000563
1646  000563    %CC JUMP IF 2 STOP BITS
1647  000563
1648  000563               B,R7             ALUF,ANDDA           ALUD,B
1649  000563          IDBS,ARG                          T,NEXT   T,HOLD
1650  000563          177677;
1651  000564
1652  000564    %CC R7=SS1PWW10 (TOP 4 BITS OF ARG WILL MAKE A-OP = R7)
1653  000564
1654  000564    TRM33: A,R7                 ALUF,PASSA           ALUD,NONE
1655  000564          IDBS,ALU          COMM,UART,MODE T,JMP     T,PUSH
1656  000564          BAUDS;
1657  000565
1658  000565    %CC R7 -> UART MODE 1 REGISTER
1659  000565    %CC SAME AS RASK FROM HERE
1660  000565
1661  000565    TRM34: AB,STATUS            ALUF,PASSD           ALUD,Q
1662  000565          IDBS,REG                          T,NEXT   T,HOLD;
1663  000566
1664  000566          A,R2  B,1             ALUF,ANDDA           ALUD,NONE
1665  000566          IDBS,BARG                         T,NEXT   T,HOLD
1666  000566          COND,F=0                          F,NEXT   F,HOLD;
1667  000567
1668  000567          A,R2  B,R2            ALUF,ORDA            ALUD,B
1669  000567          IDBS,BARG                         T,JMP    T,HOLD
1670  000567          TRM35 CONDENABL;
1671  000570
1672  000570          A,R2  B,R2            ALUF,MASKDA          ALUD,B
1673  000570          IDBS,BARG                         T,NEXT   T,HOLD;
1674  000571
1675  000571    TRM35:       B,R3           ALUF,PASSD           ALUD,B
1676  000571          IDBS,ARG                          T,NEXT   T,HOLD
1677  000571          74002;
1678  000572
1679  000572          A,R3  B,R2            ALUF,ANDAB           ALUD,B
1680  000572          IDBS,ALU                          T,NEXT   T,HOLD;
1681  000573
1682  000573                                ALUF,ANDDQ           ALUD,Q
1683  000573          IDBS,ARG                          T,NEXT   T,HOLD
1684  000573          175;
1685  000574
1686  000574          A,R2                  ALUF,ORAQ            ALUD,Q
1687  000574          IDBS,ALU                          T,JMP    T,HOLD
1688  000574          WSIOC;
1689  000575
1690  000575
1691  000575    %*************************************
1692  000575    % IOX 306 READ CONSOLE OUTPUT STATUS
1693  000575    %CC SIOC BIT 2 -> BIT0= INTERRUPT AT READY FOR TRANSFER
1694  000575    %CC TBMT       -> BIT3= TRANSMIT BUFFER EMPTY
1695  000575
```

```
1696    000575  TRM6:                           ALUF,PASSD          ALUD,NONE
1697    000575          IDBS,IOR                        T,NEXT      T,HOLD
1698    000575          COND,F15                        F,NEXT      F,HOLD;
1699    000576
1700    000576  %CC TBMT INVERSE POLARITY. NO OTHER CHANGES.
1701    000576
1702    000576          AB,STATUS               ALUF,PASSD          ALUD,Q
1703    000576          IDBS,REG                        T,JMP       T,HOLD
1704    000576          TRM61 CONDENABL;
1705    000577
1706    000577          A,3    B,A              ALUF,PASSD          ALUD,B
1707    000577          IDBS,BMG                        T,NEXT      T,HOLD;
1708    000600
1709    000600  TRM61:  A,2                     ALUF,ANDDQ          ALUD,NONE
1710    000600          IDBS,BMG                        T,NEXT      T,HOLD
1711    000600          COND,F=0                        F,JMP       F,HOLD;
1712    000601
1713    000601
1714    000601          A,0    B,R6             ALUF,PASSD          ALUD,B
1715    000601          IDBS,BMG                        T,RETURN    T,POP
1716    000601          TRM22 CONDENABL;
1717    000602
1718    000602
1719    000602  %***************************************
1720    000602  % IOX 307 WRITE CONSOLE OUTPUT CONTROL
1721    000602  %CC BIT0= INTERRUPT AT READY FOR TRANSFER -> SIOC BIT 2
1722    000602  %CC SAME AS RASK
1723    000602
1724    000602  TRM7:   A,A    B,1              ALUF,ANDDA          ALUD,NONE
1725    000602          IDBS,BARG                       T,NEXT      T,HOLD
1726    000602          COND,F=0                        F,JMP       F,HOLD;
1727    000603
1728    000603          A,2                     ALUF,ORDQ           ALUD,Q
1729    000603          IDBS,BMG                        T,NEXT      T,HOLD
1730    000603          WSIOC CONDENABL;
1731    000604
1732    000604                B,4               ALUF,MASKDQ         ALUD,Q
1733    000604          IDBS,BARG                       T,JMP       T,HOLD
1734    000604          WSIOC;
1735    000605
1736    000605
1737    000605
1738    000605
1739    000605
1740    000605
1741    000605
1742    000605
1743    000605  %*******************************************************
1744    000605
1745    000605  % ROUTINES FOR DEVICE NUMBERS 10-13, ENTERED FROM VECTOR
1746    000605
1747    000605  %*******************************************************
1748    000605  % IOX 11
1749    000605
1750    000605  CLK1:                           ALUF,PASSQ          ALUD,NONE
1751    000605          IDBS,ALU                COMM,SIOC T,NEXT    T,HOLD;
1752    000606
1753    000606          A,7                     ALUF,MASKDQ         ALUD,Q
1754    000606          IDBS,BMG                COMM,CLRTC T,JMP    T,HOLD
1755    000606          WSIO2;
1756    000607
1757    000607
1758    000607  %***************************************
1759    000607  % IOX 13
1760    000607
1761    000607  CLK3:   A,A    B,1              ALUF,ANDDA          ALUD,NONE
1762    000607          IDBS,BARG                       T,NEXT      T,HOLD
1763    000607          COND,F=0                        F,JMP       F,HOLD;
1764    000610
1765    000610          A,15   B,R2             ALUF,PASSD          ALUD,B
1766    000610          IDBS,BMG                        T,NEXT      T,HOLD
1767    000610          CLK31 CONDENABL;
1768    000611
1769    000611                B,1               ALUF,MASKDQ         ALUD,Q
1770    000611          IDBS,BARG                       T,NEXT      T,HOLD;
1771    000612
1772    000612  CLK31:  A,A    B,R2             ALUF,ANDAB          ALUD,NONE
1773    000612          IDBS,ALU                        T,NEXT      T,HOLD
1774    000612          COND,F=0                        F,NEXT      F,HOLD;
1775    000613
1776    000613                                                      ALUD,NONE
```

```
1777    000613          IDBS,ALU                        T,JMP     T,HOLD
1778    000613          WSIOC CONDENABL;
1779    000614
1780    000614                B,10              ALUF,MASKDQ       ALUD,Q
1781    000614          IDBS,BARG                       T,JMP     T,HOLD
1782    000614          WSIOC;
1783    000615
1784    000615
1785    000615
1786    000615
1787    000615
1788    000615
1789    000615
1790    000615
1791    000615
1792    000615
1793    000615
1794    000615
1795    000615
1796    000615
1797    000615  %*************************************************
1798    000615  %*************************************************
1799    000615
1800    000615  % MASKED CLEAR INSTRUCTION
1801    000615
1802    000615  %*************************************************
1803    000615
1804    000615
1805    000615  MCL1:   ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
1806    000616
1807    000616                                  ALUF,PASSD        ALUD,Q
1808    000616          IDBS,GPR                        T,JMP     T.PUSH
1809    000616          MCMS1;
1810    000617
1811    000617                B,6               ALUF,Q-D          ALUD,NONE
1812    000617          IDBS,BARG                       T,JMP     T,HOLD
1813    000617          MCSTS CONDENABL;
1814    000620
1815    000620                B,7               ALUF,Q-D          ALUD,NONE
1816    000620          IDBS,BARG                       T,JMP     T,HOLD
1817    000620          MCPID CONDENABL;
1818    000621
1819    000621                                                    ALUD,NONE
1820    000621          IDBS,ALU                        T,JMP     T,HOLD
1821    000621          MCPIE CONDENABL;
1822    000622
1823    000622          ALUD,NONE IDBS,ALU T,JMP T,HOLD I
1824    000623
1825    000623
1826    000623
1827    000623
1828    000623
1829    000623
1830    00062
1831    000
1832
1833
1834
```

```
                                                ***********

                                             JSH PVCHK:

                                           JF,PASSD          ALUD,Q
                                                   T,JMP     T,PUSH


                                           ALUF,Q-D          ALUD,NONE
                                                   T,JMP     T,HOLD
                                BL;

                                           ALUF,Q-D          ALUD,NONE
                                                   T,JMP     T,HOLD
                             NDENABL;

                                                             ALUD,NONE
                           ALU                     T,JMP     T,HOLD
                           E CONDENABL;

                        D,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
```

```
1858
1859
1860                    %*********************************************
1861                    % SUBROUTINE FOR MCL & MST INSTRUCTIONS
1862
1863                    MS1:    B,17            ALUF,ANDDQ          ALUD,Q
1864                            IDBS,BARG                   T,NEXT  T,HOLD
1865                            COND,F=0                    F,NEXT  F,HOLD;
1866
1867                            B,1             ALUF,Q-D            ALUD,NONE
1868                            IDBS,BARG                   T,RETURN T,POP;
1869
1870
1871
1872                    %*********************************************
1873                    % SUBROUTINE FOR MCL
1874
1875                    MCLEA:  A,A             ALUF,MASKAQ         ALUD,Q
1876                            IDBS,ALU                    T,RETURN T,POP;
1877
1878
1879
1880
1881                    %*********************************************
1882                    % SUBROUTINE FOR MST
1883
1884                    MSET:   A,A             ALUF,ORAQ           ALUD,Q
1885                            IDBS,ALU                    T,RETURN T,POP;
1886
1887
1888                    %*********************************************
1889                    % MCL STS
1890
1891
1892                    MCSTS:                  ALUF,PASSD          ALUD,Q
1893                            IDBS,STS                    T,NEXT  T,HOLD;
1894
1895                            A,A             ALUF,MASKAQ         ALUD,NONE STS,LO
1896                            IDBS,ALU                    T,JMP   T,HOLD
1897                            CONT;
1898
1899
1900                    %*********************************************
1901                    % MCL PID
1902
1903                    MCPID:  AB,PID          ALUF,PASSD          ALUD,Q
1904                            IDBS,REG                    T,JMP   T,PUSH
1905                            MCLEA;
1906
1907                    MPID:                                       ALUD,NONE
1908                            IDBS,ALU                    T,JMP   T,PUSH
1909                            TRPID;
1910
1911                                B,Z         ALUF,ZERO           ALUD,B
1912                            IDBS,ALU    COMM,CONTINUE T,JMP T,HOLD;
1913
1914
1915
1916                    %*********************************************
1917                    % MCL PIE
1918
1919                    MCPIE:  AB,PIE          ALUF,PASSD          ALUD,Q
1920                            IDBS,REG                    T,JMP   T,PUSH
1921                            MCLEA;
1922
1923                    MPIE:                                       ALUD,NONE
1924                            IDBS,ALU                    T,JMP   T,PUSH
1925                            TRPIE;
1926
1927                                B,Z         ALUF,ZERO           ALUD,B
1928                            IDBS,ALU    COMM,CONTINUE T,JMP T,HOLD;
1929
1930
1931                    %*********************************************
1932                    % MST STS
1933
1934                    MSSTS:  A,A             ALUF,ORDA           ALUD,Q
1935                            IDBS,STS                    T,NEXT  T,HOLD;
1936
1937                                            ALUF,PASSQ          ALUD,NONE STS,LO
1938                            IDBS,ALU                    T,JMP T,HOLD
```

```
000646          CONT;
000647
000647
000647  %*********************************
000647  % MST PID
000647
000647  MSPID:  AB,PID                  ALUF,PASSD          ALUD,Q
000647          IDBS,REG                        T,JMP       T,PUSH
000647          MSET;
000650
000650                                                      ALUD,NONE
000650          IDBS,ALU                        T,JMP       T,HOLD
000650          MPID;
000651
000651
000651  %*************************************
000651  % MST PIE
000651
000651  MSPIE:  AB,PIE                  ALUF,PASSD          ALUD,Q
000651          IDBS,REG                        T,JMP       T,PUSH
000651          MSET;
000652
000652                                                      ALUD,NONE
000652          IDBS,ALU                        T,JMP       T,HOLD
000652          MPIE;
000653
000653
000653
000653
000653
000653
000653
000653
000653
000653  %*************************************************
000653  %*************************************************
000653
000653  % MONITOR CALL INSTRUCTION
000653
000653  %*************************************************
000653
000653  MON1:   A,16  B,T                                   ALUD,NONE
000653          IDBS,GPR,SEXT           COMM,EWRF   T,NEXT  T,HOLD;
000654
000654          ALUD,NONE IDBS,ALU T,JMP T,HOLD CONT;
000655
000655
000655
000655
000655
000655
000655  %*********************************************************
000655  %*********************************************************
000655
000655  % IOT - INSTRUCTION IS PRIVILEGED WHEN RING = 0 OR 1
000655  %                   AND ILLEGAL    WHEN RING = 2 OR 3
000655
000655  IOT1:   ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
000656          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
000657
000657
000657
000657
000657  %*********************************************************
000657  %*********************************************************
000657
000657  % PIONF (1504XX) - GROUP OF INSTRUCTIONS
000657
000657  %*********************************************************
000657
000657  PINF1:  ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
000660
000660                                  ALUF,PASSD          ALUD,Q
000660          IDBS,STS                        T,JMP0-3    T,HOLD
000660          VECT1;                  % VECTORIZED JUMP
000661
000661
000661
000661  %*************************************************
000661
000661  % DIFFERENT PIONF-ROUTINES, ENTERED FROM VECTOR
000661
```

```
000661  %*****************************************************
000661  % IOF
000661
000661  IOF2:  PIC,IOF                                    ALUD,NONE
000661         IDBS,ALU              COMM,EPIC T,NEXT     T,HOLD;
000662
000662
000662  %*************************************************
000662  % POF
000662
000662  POF2:                        ALUF,PASSQ           ALUD,NONE
000662         IDBS,ALU              COMM,LDPIL T,JMP     T,HOLD
000662         TRAX;
000663
000663  %*************************************************
000663  % ION
000663
000663  ION2:                        ALUF,PASSQ           ALUD,NONE
000663         IDBS,ALU              COMM,LDPIL T,NEXT    T,HOLD;
000664
000664         ALUD,NONE IDBS,ALU              T,NEXT T,HOLD;
000665
000665         PIC,ION                                    ALUD,NONE
000665         IDBS,ALU              COMM,EPIC T,JMP      T,PUSH
000665         CHKIT;
000666
000666               B,Z             ALUF,ZERO            ALUD,B
000666         IDBS,ALU           COMM,CONTINUE T,JMP T,HOLD;
000667
000667
000667  %*****************************************************
000667  % EXAM - INSTRUCTION
000667
000667  EXAM2: A,D                   ALUF,PASSA           ALUD,NONE
000667         IDBS,ALU                        T,NEXT     T,HOLD;
000670
000670                                                    ALUD,NONE
000670         IDBS,ALU              COMM,EXRQ T,NEXT     T,HOLD;
000671
000671               B,T             ALUF,PASSD           ALUD,B
000671         IDBS,DBR       COMM,CONTINUE     T,JMP     T,HOLD;
000672
000672
000672
000672  %*****************************************************
000672  % DEPO - INSTRUCTION
000672
000672  DEPO2: A,D                   ALUF,PASSA           ALUD,NONE
000672         IDBS,ALU                        T,NEXT     T,HOLD;
000673
000673         A,T                   ALUF,PASSA           ALUD,NONE
000673         IDBS,ALU              COMM,DERQ T,JMP      T,HOLD
000673         CONT;
000674
000674
000674  %*************************************************************************
000674  % SUBROUTINE USED BY PHYSICAL MEMORY HANDLING INSTRUCTIONS TO OUTPUT
000674  % SEGMENT NUMBER.
000674
000674  EXPHY: A,R7                  ALUF,PASSA           ALUD,NONE
000674         IDBS,ALU              COMM,LDSEG T,RETURN T,POP;
000675
000675
000675
000675
000675
000675
000675
000675
000675  %*****************************************************
000675  %*****************************************************
000675
000675  % TRA-INSTRUCTION (1500XX)
000675
000675  %*****************************************************
000675
000675  TRA1:  ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
000676         ALUD,NONE IDBS,ALU T,JMP T,PUSH TRA;
000677
000677  TRAX:                                         ALUD,NONE
000677         IDBS,ALU                            T,NEXT T,HOLD;
```

```
000700
000700  %CC DUMMY INSTRUCTION TO MAKE DVACC GO OFF IN TIME
000700
000700              B,Z             ALUF,ZERO           ALUD,B
000700          IDBS,ALU                        T,JMP T,HOLD
000700          CONT;
000701
000701  TRA:                                    ALUD,NONE
000701          IDBS,ALU                    T,JMP0-3 T,HOLD
000701          VECT2;              % VECTORIZED JUMP
000702
000702
000702
000702  %************************************************************
000702
000702  % TRA-ROUTINES, ENTERED FROM VECTOR
000702
000702  %************************************************************
000702  % TRA PID
000702
000702
000702  APID1: PIC,RSTS B,R5        ALUF,PASSD          ALUD,B
000702          IDBS,PIC            COMM,EPIC T,NEXT    T,HOLD
000702          COND,IRQ                      F,JMP     F,HOLD;
000703
000703          PIC,LOSTS B,10      ALUF,ZERO           ALUD,Q
000703          IDBS,BARG           COMM,EPIC T,NEXT    T,HOLD;
000704
000704          PIC,ION  B,R6       ALUF,INVD           ALUD,B
000704          IDBS,BMG            COMM,EPIC T,NEXT    T,HOLD;
000705
000705          PIC,LMSK B,R6       ALUF,PASSB          ALUD,NONE
000705          IDBS,ALU            COMM,EPIC T,NEXT    T,HOLD;
000706
000706          AB,IIE              ALUF,PASSD          ALUD,B
000706          IDBS,REG            COMM,CLIRQ T,NEXT   T,HOLD;
000707
000707          A,17                                    ALUD,NONE
000707          IDBS,BMG            COMM,LDGPR T,NEXT   T,HOLD
000707          APID2 CONDENABL;
000710
000710          A,17                ALUF,PASSD          ALUD,Q
000710          IDBS,BMG                      T,NEXT    T,HOLD;
000711
000711  APID2:        B,5                               ALUD,NONE
000711          IDBS,BARG           COMM,LDLC T,NEXT    T,HOLD;
000712
000712          A,4   B,R3          ALUF,INVD           ALUD,B
000712          IDBS,BMG                       T,NEXT   T,HOLD;
000713
000713          PIC,LMSK B,R2       ALUF,INVB           ALUD,NONE
000713          IDBS,ALU            COMM,EPIC T,JMP     T,PUSH
000713          APID3;
000714
000714
000714
000714          PIC,LMSK B,R3       ALUF,PASSB          ALUD,NONE
000714          IDBS,ALU            COMM,EPIC T,NEXT    T,HOLD
000714          APID3 CONDENABL;
000715
000715                              ALUF,ORDQ           ALUD,Q
000715          IDBS,GPR                      T,NEXT    T,HOLD;
000716
000716  APID3: PIC,LOSTS B,10                           ALUD,NONE
000716          IDBS,BARG           COMM,EPIC  T,NEXT   T,HOLD
000716          COND,LC=0;
000717
000717               B,R3           ALUF,PASSB ALUM,FMU ALUD,SRB
000717          IDBS,ALU            COMM,CLIRQ T,NEXT   T,POP
000717          LCOUNT COND,IRQ               F,JMP     F,HOLD;
000720
000720
000720          AB,PID              ALUF,ORDQ           ALUD,Q
000720          IDBS,REG                      T,NEXT    T,HOLD;
000721
000721          PIC,LOSTS B,R5      ALUF,PASSB          ALUD,NONE
000721          IDBS,ALU            COMM,EPIC T,NEXT    T,HOLD;
000722
000722                              ALUF,PASSD          ALUD,NONE
000722          IDBS,STS                      T,NEXT    T,HOLD
000722          COND,F15                      F,NEXT    F,HOLD;
```

```
2182    000723
2183    000723          PIC,LMSK B,R1           ALUF,PASSB          ALUD,NONE
2184    000723          IDBS,ALU                COMM,EPIC T,JMP     T,HOLD
2185    000723          APIE1 CONDENABL;
2186    000724
2187    000724  APID4:  PIC,IOF                                     ALUD,NONE
2188    000724          IDBS,ALU                COMM,EPIC T,JMP     T,HOLD
2189    000724          APIE1;
2190    000725
2191    000725
2192    000725
2193    000725
2194    000725  %*************************************************************
2195    000725  % TRA IIC
2196    000725
2197    000725  AIIC1:  PIC,RMSK  B,R6          ALUF,PASSD          ALUD,B
2198    000725          IDBS,DSABL              COMM,EPIC T,NEXT    T,HOLD;
2199    000726
2200    000726          AB,IIE                  ALUF,PASSD          ALUD,Q
2201    000726          IDBS,REG                        T,NEXT      T,HOLD;
2202    000727
2203    000727                                  ALUF,ANDDQ          ALUD,Q
2204    000727          IDBS,ARG                        T,NEXT      T,HOLD
2205    000727          37760;
2206    000730
2207    000730          PIC,LMSK                ALUF,INVQ           ALUD,NONE
2208    000730          IDBS,ALU                COMM,EPIC T,NEXT    T,HOLD;
2209    000731
2210    000731                                  ALUF,PASSD          ALUD,Q
2211    000731          IDBS,ARG                        T,NEXT      T,HOLD
2212    000731          25;
2213    000732
2214    000732          PIC,ION  B,13           ALUF,PASSD          ALUD,B
2215    000732          IDBS,BARG               COMM,EPIC T,NEXT    T,PUSH
2216    000732          COND,F=0                        F,NEXT      F,HOLD;
2217    000733
2218    000733
2219    000733
2220    000733          PIC,LOSTS               ALUF,PASSQ          ALUD,NONE
2221    000733          IDBS,ALU                COMM,EPIC T,JMP     T,POP
2222    000733          AIIC3 CONDENABL;
2223    000734
2224    000734          A,R3                    ALUF,A-Q            ALUD,NONE
2225    000734          IDBS,ALU                        T,NEXT      T,HOLD
2226    000734          COND,F=0                        F,RETURN    F,HOLD;
2227    000735
2228    000735                                  ALUF,Q-1            ALUD,Q
2229    000735          IDBS,ALU                COMM,CLIRQ T,NEXT   T,POP
2230    000735          CONDENABL  COND,IRQ             F,NEXT      F,HOLD;
2231    000736
2232    000736
2233    000736
2234    000736
2235    000736                                  ALUF,ZERO           ALUD,Q
2236    000736          IDBS,ALU                        T,JMP       T,HOLD
2237    000736          AIIC2;
2238    000737
2239    000737  AIIC3:                          ALUF,Q-D            ALUD,Q
2240    000737          IDBS,ARG                        T,NEXT      T,HOLD
2241    000737          12;
2242    000740
2243    000740          A,16                                        ALUD,NONE
2244    000740          IDBS,BMG                COMM,SMPID T,NEXT   T,HOLD;
2245    000741
2246    000741          ALUD,NONE IDBS,ALU              T,NEXT T,HOLD;
2247    000742
2248    000742  AIIC2:  PIC,LOSTS  B,R5         ALUF,PASSB          ALUD,NONE
2249    000742          IDBS,ALU                COMM,EPIC T,JMP     T,PUSH
2250    000742          CLR14;
2251    000743
2252    000743                                  ALUF,PASSD          ALUD,NONE
2253    000743          IDBS,STS                        T,NEXT      T,HOLD
2254    000743          COND,F15                        F,JMP       F,HOLD;
2255    000744
2256    000744          PIC,LMSK  B,R6          ALUF,PASSB          ALUD,NONE
2257    000744          IDBS,ALU                COMM,EPIC T,NEXT    T,HOLD
2258    000744          APID4 CONDENABL;
2259    000745
2260    000745
2261    000745
2262    000745
```

```
2263  000745  %*********************************************************
2264  000745  % TRA PIE
2265  000745
2266  000745  APIE1:      B,A              ALUF,PASSQ          ALUD,B
2267  000745        IDBS,ALU                        T,RETURN  T,HOLD;
2268  000746
2269  000746  %*********************************************************
2270  000746  % TRA CS
2271  000746
2272  000746  ACS:   A,X                   ALUF,ANDAQ          ALUD,NONE
2273  000746        IDBS,ALU                COMM,ADCS T,NEXT    T,HOLD;
2274  000747
2275  000747             B,A              ALUF,PASSD          ALUD,B
2276  000747        IDBS,RCS                COMM,RWCS T,RETURN  T,HOLD;
2277  000750
2278  000750
2279  000750  %*********************************************************
2280  000750  % TRA PVL
2281  000750
2282  000750  APVL1:      B,A              ALUF,ORDQ           ALUD,B
2283  000750        IDBS,ARG                        T,RETURN  T,HOLD
2284  000750        153602;
2285  000751
2286  000751
2287  000751  %*********************************************
2288  000751  % TRA ALD
2289  000751
2290  000751  AALD1: ALUD,NONE IDBS,ALU T,NEXT T,HOLD;
2291  000752
2292  000752        A,LC                                  ALUD,NONE
2293  000752        IDBS,ALU                        T,NEXT    T,HOLD;
2294  000753
2295  000753        A,LC                                  ALUD,NONE
2296  000753        IDBS,ALU                        T,JMPAOPR T,PUSH
2297  000753        ALDVC;
2298  000754
2299  000754             B,A              ALUF,PASSQ          ALUD,B
2300  000754        IDBS,ALU                        T,RETURN  T,HOLD;
2301  000755
2302  000755
2303  000755  %*********************************************
2304  000755  %CC TRA PES. NEED TO CLEAR DOWN PARERR INTERUPT FROM
2305  000755  %CC THE ON-BOARD MEMORY.
2306  000755
2307  000755  APES1: PIC,MCLPID          COMM,EPIC          IDBS,ARG
2308  000755        4000                          T,RETURN T,HOLD;
2309  000756
2310  000756  %*********************************************
2311  000756  % TRA PGC (PAGING CONTROL REG.)
2312  000756
2313  000756  APGC1:      B,R6             ALUF,PASSD          ALUD,B
2314  000756        IDBS,STS                        T,JMP     T,PUSH
2315  000756        PLPCR;
2316  000757
2317  000757        A,PIL B,0  XRF         ALUF,PASSD          ALUD,Q
2318  000757        IDBS,REG                        T,NEXT    T,HOLD;
2319  000760
2320  000760             B,A              ALUF,PASSQ          ALUD,B
2321  000760        IDBS,ALU                        T,NEXT    T,HOLD;
2322  000761
2323  000761
2324  000761
2325  000761  %*********************************************
2326  000761  % SUBROUTINE FOR TRA PGC AND TRR PCR
2327  000761
2328  000761  PLPC2: A,R6                   ALUF,PASSA          ALUD,NONE
2329  000761        IDBS,ALU                COMM,LDPIL T,RETURN T,HOLD;
2330  000762
2331  000762
2332  000762  %*********************************************
2333  000762  % TRR PCR
2334  000762
2335  000762  RPCR1:
2336  000762             B,R6             ALUF,PASSD          ALUD,B
2337  000762        IDBS,STS                        T,JMP     T,PUSH
2338  000762        PLPCR;
2339  000763
2340  000763        A,PIL B,0  XRF         ALUF,PASSQ          ALUD,B
2341  000763
2342  000763        IDBS,ALU                COMM,EWRF  T,NEXT   T,HOLD;
2343  000764
```

```
2344  000764          A,R6  B,R5              ALUF,XORAB          ALUD,Q
2345  000764          IDBS,ALU                        T,NEXT      T,HOLD
2346  000764          COND,F=0                        F,JMP       F,HOLD;
2347  000765
2348  000765                                  ALUF,ANDDQ          ALUD,NONE
2349  000765          IDBS,ARG                        T,NEXT      T,HOLD
2350  000765          7400;
2351  000766
2352  000766                                                      ALUD,NONE
2353  000766          IDBS,ALU                        T,NEXT      T,HOLD
2354  000766          PLPC2 CONDENABL;
2355  000767
2356  000767  % TRR PCR IS EXECUTED ON OWN LEVEL, UPDATE HARDWARE PCR
2357  000767
2358  000767          A,0                     ALUF,PASSA          ALUD,NONE
2359  000767          IDBS,ALU                COMM,LDPCR T,JMP    T,HOLD
2360  000767          PLPC2;
2361  000770
2362  000770
2363  000770
2364  000770  %*************************************************************
2365  000770  % SUBROUTINE FOR TRR PCR AND TRA PGC
2366  000770
2367  000770  PLPCR:          B,2                                 ALUD,NONE
2368  000770          IDBS,BARG               COMM,LDLC T,NEXT    T,HOLD;
2369  000771
2370  000771          A,A   B,R5              ALUF,PASSA          ALUD,SLB
2371  000771          IDBS,ALU                        T,NEXT      T,PUSH
2372  000771          COND,LC=0;
2373  000772
2374  000772                B,R5              ALUF,PASSB          ALUD,SLB
2375  000772          IDBS,ALU                        T,NEXT      T,POP
2376  000772          LCOUNT;
2377  000773
2378  000773          A,R5                    ALUF,PASSA          ALUD,NONE
2379  000773          IDBS,ALU                COMM,LDPIL T,NEXT   T,HOLD;
2380  000774
2381  000774          ALUD,NONE IDBS,ALU T,RETURN T,POP;          % PAUSE FOR PIL TO BE VALID
2382  000775
2383  000775
2384  000775  %*********************************************
2385  000775  % TRA PGS
2386  000775
2387  000775
2388  000775  APGS1:          B,A             ALUF,PASSQ          ALUD,B
2389  000775          IDBS,ALU                        T,NEXT      T,HOLD;
2390  000776
2391  000776          A,2                     ALUF,PASSD          ALUD,Q
2392  000776          IDBS,BMG                        T,NEXT      T,HOLD;
2393  000777
2394  000777          A,PIL B,0  XRF          ALUF,ANDDQ          ALUD,NONE  % TEST BIT 2
2395  000777          IDBS,REG                        T,NEXT      T,HOLD     % IN PCR
2396  000777          COND,F=0                        F,NEXT      F,HOLD;
2397  001000
2398  001000          A,A                     ALUF,PASSA          ALUD,Q
2399  001000          IDBS,ALU                        T,RETURN    T,HOLD
2400  001000          CONDENABL;
2401  001001
2402  001001                B,A               ALUF,XORDQ          ALUD,B     % 16 PT MODUS
2403  001001          IDBS,ARG                        T,RETURN    T,HOLD     % INVERT 2 BITS
2404  001001          1400;
2405  001002
2406  001002
2407  001002
2408  001002
2409  001002  %*************************************************************
2410  001002  %*************************************************************
2411  001002
2412  001002  % TRR INSTRUCTIONS (1501XX)
2413  001002
2414  001002  %*************************************************
2415  001002  TRR1:  ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
2416  001003          ALUD,NONE IDBS,ALU T,JMP T,PUSH TRR;
2417  001004
2418  001004                B,Z               ALUF,ZERO           ALUD,B
2419  001004          IDBS,ALU                        T,JMP T,HOLD
2420  001004          CONT;
2421  001005
2422  001005  TRR:            B,A             ALUF,PASSB          ALUD,Q
2423  001005          IDBS,ALU                        T,JMP0-3    T,HOLD
2424  001005          VECT3;                  % VECTORIZED JUMP
```

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2425    001006
2426    001006
2427    001006
2428    001006
2429    001006  %*****************************************************
2430    001006
2431    001006  % TRR ROUTINES, ENTERED FROM VECTOR
2432    001006
2433    001006  %*****************************************************
2434    001006  % TRR IIE
2435    001006
2436    001006  RIIE1:                          ALUF,ANDDQ          ALUD,Q
2437    001006          IDBS,ARG                          T,NEXT    T,HOLD
2438    001006          7774;
2439    001007
2440    001007                B,R1              ALUF,ORDQ           ALUD,SLB
2441    001007          IDBS,ARG                          T,NEXT    T,HOLD
2442    001007          10000;
2443    001010
2444    001010          PIC,RMSK B,R2           ALUF,INVD           ALUD,B
2445    001010          IDBS,DSABL              COMM,EPIC T,NEXT    T,HOLD;
2446    001011
2447    001011          AB,PIE                  ALUF,PASSD          ALUD,Q
2448    001011          IDBS,REG                          T,NEXT    T,HOLD;
2449    001012
2450    001012          A,16                    ALUF,ANDDQ          ALUD,NONE
2451    001012          IDBS,BMG                          T,NEXT    T,HOLD
2452    001012          COND,F=0                          F,NEXT    F,HOLD;
2453    001013
2454    001013          A,R1  B,R1              ALUF,A+B            ALUD,Q
2455    001013          IDBS,ALU                          T,JMP     T,HOLD
2456    001013          NOTI2 CONDENABL;
2457    001014
2458    001014                B,R6              ALUF,PASSD          ALUD,B
2459    001014          IDBS,ARG                          T,NEXT    T,HOLD
2460    001014          100017;
2461    001015
2462    001015          A,R6  B,R2              ALUF,ANDAB          ALUD,B
2463    001015          IDBS,ALU                          T,NEXT    T,HOLD;
2464    001016
2465    001016          A,R2  B,R2              ALUF,ORAQ           ALUD,B
2466    001016          IDBS,ALU                          T,NEXT    T,HOLD;
2467    001017
2468    001017          PIC,LMSK B,R2           ALUF,INVB           ALUD,NONE
2469    001017          IDBS,ALU                COMM,EPIC T,NEXT    T,HOLD;
2470    001020
2471    001020
2472    001020  NOTI2:  AB,IIE                  ALUF,PASSQ          ALUD,NONE
2473    001020          IDBS,ALU                COMM,EWRF T,RETURN  T,HOLD;
2474    001021
2475    001021
2476    001021
2477    001021
2478    001021  %*************************************
2479    001021  % TRR PIE
2480    001021
2481    001021  RPIE1:                          ALUF,PASSD          ALUD,Q
2482    001021          IDBS,SWAP                         T,JMP     T,PUSH
2483    001021          PICFM;
2484    001022
2485    001022          A,Z   B,STS             ALUF,PASSA          ALUD,B
2486    001022          IDBS,ALU                          T,NEXT    T,HOLD;
2487    001023
2488    001023                B,R1              ALUF,ANDDA          ALUD,B
2489    001023          IDBS,ARG                          T,NEXT    T,HOLD
2490    001023          100017;
2491    001024
2492    001024          A,STS                   ALUF,PASSA          ALUD,Q
2493    001024          IDBS,ALU                          T,NEXT    T,HOLD;
2494    001025
2495    001025          AB,IIE                  ALUF,ANDDQ          ALUD,Q
2496    001025          IDBS,REG                          T,NEXT    T,HOLD;
2497    001026
2498    001026          A,R1  B,R1              ALUF,ORAQ           ALUD,B
2499    001026          IDBS,ALU                          T,NEXT    T,HOLD;
2500    001027
2501    001027          PIC,LMSK  B,R1          ALUF,INVB           ALUD,NONE
2502    001027          IDBS,ALU                COMM,EPIC T,JMP     T,HOLD
2503    001027          CHKIT;
2504    001030
2505    001030
```

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2506    001030
2507    001030
2508    001030
2509    001030  %************************************
2510    001030  % TRR PID
2511    001030
2512    001030  RPID1:                          ALUF,PASSD          ALUD,Q
2513    001030          IDBS,SWAP                       T,JMP       T,PUSH
2514    001030          PICFM;
2515    001031
2516    001031                                  ALUF,PASSD          ALUD,Q
2517    001031          IDBS,ARG                        T,NEXT      T,HOLD
2518    001031          140017;
2519    001032
2520    001032          A,Z   B,R1              ALUF,MASKAQ         ALUD,B
2521    001032          IDBS,ALU                        T,JMP       T,PUSH
2522    001032          CLRXX;
2523    001033
2524    001033          A,Z                     ALUF,ANDAQ          ALUD,NONE
2525    001033          IDBS,ALU                COMM,SMPID T,JMP    T,HOLD
2526    001033          CHKIT;
2527    001034
2528    001034
2529    001034
2530    001034  %*********************************************
2531    001034  % TRR LMP
2532    001034
2533    001034  RLMP1: AB,LMP                   ALUF,PASSQ          ALUD,NONE
2534    001034          IDBS,ALU                COMM,EWRF T,RETURN  T,HOLD;
2535    001035
2536    001035
2537    001035
2538    001035
2539    001035
2540    001035  %*****************************************************
2541    001035  % TRR CCLR (CACHE CLEAR)
2542    001035
2543    001035  RCCL1:                          ALUF,ANDDQ          ALUD,NONE
2544    001035          IDBS,CSR                        T,NEXT      T,HOLD
2545    001035          COND,F=0                        F,NEXT      F,HOLD;
2546    001036
2547    001036                                                      ALUD,NONE
2548    001036          IDBS,ALU                        T,JMP       T,HOLD
2549    001036          RCCL1 CONDENABL;
2550    001037
2551    001037                                                      ALUD,NONE
2552    001037          IDBS,ALU                COMM,CCLR T,RETURN  T,HOLD;
2553    001040
2554    001040  %*****************************************************
2555    001040  % TRR CS
2556    001040
2557    001040  RCS:    A,X                     ALUF,ORAQ           ALUD,NONE
2558    001040          IDBS,ALU                COMM,ADCS T,NEXT    T,HOLD;
2559    001041
2560    001041          A,A                     ALUF,PASSA          ALUD,NONE
2561    001041          IDBS,ALU                COMM,RWCS T,RETURN  T,HOLD;
2562    001042
2563    001042
2564    001042
2565    001042
2566    001042  %*****************************************************
2567    001042  % TRR ECCR, USES IOX - NUMBER 100115
2568    001042
2569    001042  RECC1:          B,R1            ALUF,PASSD          ALUD,B
2570    001042          IDBS,ARG                        T,NEXT      T,HOLD
2571    001042          100115;
2572    001043
2573    001043                                                      ALUD,NONE
2574    001043          IDBS,DBR                COMM,LDGPR T,JMP    T,PUSH
2575    001043          IOXX1;
2576    001044
2577    001044          ALUD,NONE IDBS,ALU T,RETURN T,HOLD;
2578    001045
2579    001045
2580    001045
2581    001045  %*************************************************
2582    001045  % TRR PANC
2583    001045
2584    001045
2585    001045  RPANC:                                              ALUD,NONE
2586    001045          IDBS,SWAP           COMM,LDPANC T,NEXT      T,HOLD;
```

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2587    001046
2588    001046                                                          ALUD,NONE
2589    001046          IDBS,SWAP               COMM,LDPANC T,RETURN    T,HOLD;
2590    001047
2591    001047
2592    001047  %*************************************************
2593    001047  % TRR CILU (CACHE INHIBIT LIMIT UPPER)
2594    001047
2595    001047  RCIU1:                          ALUF,ANDDQ              ALUD,Q
2596    001047          IDBS,ARG                        T,NEXT          T,HOLD
2597    001047          37777;
2598    001050
2599    001050          AB,UCIL                 ALUF,PASSQ              ALUD,NONE
2600    001050          IDBS,ALU                COMM,EWRF T,NEXT        T,HOLD;
2601    001051
2602    001051          AB,LCIL                 ALUF,PASSD              ALUD,B % R3
2603    001051          IDBS,REG                        T,JMP           T,HOLD
2604    001051          CILI1;
2605    001052
2606    001052  %*****************************************************
2607    001052  % TRR CILL (CACHE INHIBIT LIMIT LOWER)
2608    001052
2609    001052  RCIL1:                          ALUF,ANDDQ              ALUD,Q
2610    001052          IDBS,ARG                        T,NEXT          T,HOLD
2611    001052          37777;
2612    001053
2613    001053          AB,LCIL                 ALUF,PASSQ              ALUD,B % R3
2614    001053          IDBS,ALU                COMM,EWRF T,NEXT        T,HOLD;
2615    001054
2616    001054          AB,UCIL                 ALUF,PASSD              ALUD,Q
2617    001054          IDBS,REG                        T,JMP           T,HOLD
2618    001054          CILI1;
2619    001055
2620    001055  CILI1:  A,R3                    ALUF,Q-A                ALUD,NONE % UPPER-LOWER
2621    001055          IDBS,ALU                        T,NEXT          T,HOLD
2622    001055          COND,CRY                        F,NEXT          F,HOLD;
2623    001056
2624    001056          A,17  B,R1                ALUF,ZERO             ALUD,B
2625    001056          IDBS,BMG                COMM,LDGPR T,JMP        T,HOLD
2626    001056          CILI3 CONDENABL;
2627    001057
2628    001057  CILI4:  A,16  B,R2              ALUF,D-1                ALUD,B % 37777
2629    001057          IDBS,BMG                        T,JMP           T,PUSH
2630    001057          CILIL; % NORMAL R1 -> 37777
2631    001060
2632    001060          ALUD,NONE IDBS,ALU T,RETURN T,HOLD;
2633    001061
2634    001061  CILI3:  A,R3  B,R2              ALUF,PASSA              ALUD,B % CILL
2635    001061          IDBS,ALU                        T,JMP           T,PUSH
2636    001061          CILIL; % NORMAL 0 -> CILL
2637    001062
2638    001062                B,R2              ALUF,PASSQ              ALUD,B % CILU
2639    001062          IDBS,ARG                COMM,LDGPR T,NEXT       T,HOLD;
2640    001063
2641    001063          A,R3  B,R1              ALUF,PASSA              ALUD,B % CILL
2642    001063          IDBS,ALU                        T,JMP           T,PUSH
2643    001063          CILIL; % INHIBIT CILL -> CILU
2644    001064
2645    001064                                  ALUF,XORDQ              ALUD,NONE
2646    001064          IDBS,ARG                        T,NEXT          T,HOLD
2647    001064          37777;                  % COND,F=0 F,JMP       F,HOLD
2648    001065
2649    001065          A,17  B,R1              ALUF,Q+1                ALUD,B % CILU+1
2650    001065          IDBS,BMG                COMM,LDGPR T,RETURN T,HOLD % FINISHED
2651    001065          CILI4 CONDENABL;
2652    001066
2653    001066  % SUBROUTINE TO FILL MAP AREA FROM R1 TO R2 WITH GPR-CONTENT.
2654    001066
2655    001066  CILIL:  A,R1  B,R6              ALUF,ORDA               ALUD,B
2656    001066          IDBS,GPR                        T,NEXT          T,HOLD;
2657    001067
2658    001067          A,R2  B,R7              ALUF,ORDA               ALUD,B
2659    001067          IDBS,GPR                        T,NEXT          T,HOLD;
2660    001070
2661    001070  CILI2:  A,R6  B,R7              ALUF,XORAB              ALUD,NONE
2662    001070          IDBS,ALU                        T,NEXT          T,HOLD
2663    001070          COND,F=0                        F,JMP           F,HOLD;
2664    001071
2665    001071          A,R6  B,R6              ALUF,B+1                ALUD,B,YA
2666    001071          IDBS,ALU                COMM,WCIHM T,RETURN T,POP
2667    001071          CILI2 CONDENABL;
```

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2668    001072
2669    001072
2670    001072
2671    001072
2672    001072  %*****************************************************
2673    001072  %*****************************************************
2674    001072
2675    001072  % WAIT INSTRUCTION
2676    001072
2677    001072  %*****************************************************
2678    001072
2679    001072  WAIT1: ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
2680    001073
2681    001073                                  ALUF,PASSD          ALUD,NONE
2682    001073          IDBS,STS                          T,NEXT    T,HOLD
2683    001073          COND,F15                          F,JMP     F,HOLD;
2684    001074
2685    001074                                  ALUF,PASSD          ALUD,Q
2686    001074          IDBS,SWAP                         T,NEXT    T,HOLD
2687    001074          STOPW CONDENABL;
2688    001075
2689    001075
2690    001075  %*********************************
2691    001075  % INTERRUPT IS ON
2692    001075
2693    001075                B,17              ALUF,ANDDQ          ALUD,Q
2694    001075          IDBS,BARG                         T,JMP     T,PUSH
2695    001075          WAIT2;
2696    001076
2697    001076                B,Z               ALUF,ZERO           ALUD,B
2698    001076          IDBS,ALU            COMM,CONTINUE T,JMP T,HOLD;
2699    001077
2700    001077  %*********************************
2701    001077  % REMOVE CURRENT PID-BIT
2702    001077
2703    001077  WAIT2:        B,R1              ALUF,PASSQ          ALUD,B
2704    001077          IDBS,ALU                COMM,LDLC T,NEXT    T,HOLD;
2705    001100
2706    001100          AB,PID                  ALUF,PASSD          ALUD,Q
2707    001100          IDBS,REG                          T,NEXT    T,HOLD;
2708    001101
2709    001101          A,LC                    ALUF,MASKDQ         ALUD,Q
2710    001101          IDBS,BMG                          T,NEXT    T,HOLD;
2711    001102
2712    001102          A,R1  B,16              ALUF,A-D            ALUD,NONE
2713    001102          IDBS,BARG                         T,NEXT    T,HOLD
2714    001102          COND,F=0                          F,NEXT    F,HOLD;
2715    001103
2716    001103          AB,PID                  ALUF,PASSQ          ALUD,NONE
2717    001103          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
2718    001103          WT14 CONDENABL;
2719    001104
2720    001104
2721    001104  %*********************************************
2722    001104  % NOT ON LEVEL 14
2723    001104
2724    001104          A,R1  B,12              ALUF,A-D            ALUD,Q
2725    001104          IDBS,BARG                         T,NEXT    T,HOLD
2726    001104          COND,F15                          F,NEXT    F,HOLD;
2727    001105
2728    001105                                  ALUF,PASSQ          ALUD,NONE
2729    001105          IDBS,ALU                COMM,LDLC T,JMP     T,HOLD
2730    001105          CHKIT CONDENABL;
2731    001106
2732    001106
2733    001106  %*****************************************
2734    001106  % ON LEVEL 10-15 (EXCEPT 14)
2735    001106
2736    001106                B,4               ALUF,Q-D            ALUD,NONE
2737    001106          IDBS,BARG                         T,NEXT    T,HOLD
2738    001106          COND,F15                          F,NEXT    F,HOLD;
2739    001107
2740    001107          A,LC                    ALUF,PASSD          ALUD,Q
2741    001107          IDBS,BMG                          T,JMP     T,HOLD
2742    001107          W1013 CONDENABL;
2743    001110
2744    001110
2745    001110  %*********************************************
2746    001110  % ON LEVEL 15
2747    001110
2748    001110          A,17                    ALUF,PASSD          ALUD,Q
```

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2749  001110          IDBS,BMG                          T,NEXT    T,HOLD;
2750  001111
2751  001111  W1013: PIC,MCLPID            ALUF,PASSQ           ALUD,NONE
2752  001111          IDBS,ALU              COMM,EPIC T,NEXT     T,HOLD;
2753  001112
2754  001112
2755  001112
2756  001112
2757  001112
2758  001112  %*************************************************************
2759  001112  %*************************************************************
2760  001112
2761  001112  % ROUTINE TO CHECK WHICH INTERRUPT LEVEL SHOULD BE ENTERED
2762  001112
2763  001112  %*************************************************************
2764  001112
2765  001112  CHKIT: ALUD,NONE IDBS,ALU            T,NEXT T,HOLD;
2766  001113
2767  001113          PIC,LOSTS B,10                                ALUD,NONE
2768  001113          IDBS,BARG             COMM,EPIC T,NEXT      T,HOLD
2769  001113          COND,IRQ                        F,NEXT      F,HOLD;
2770  001114
2771  001114          AB,PID                ALUF,PASSD            ALUD,Q
2772  001114          IDBS,REG              COMM,CLIRQ T,NEXT     T,HOLD;
2773  001115
2774  001115                                ALUF,PASSD            ALUD,NONE
2775  001115          IDBS,STS                        T,RETURN    T,HOLD
2776  001115          CONDENABL COND,F15              F,RETURN    F,HOLD;
2777  001116
2778  001116
2779  001116  %*************************************************
2780  001116  % NO HARDWARE INTERRUPT REQUEST IS PENDING
2781  001116
2782  001116          AB,PIE                ALUF,ANDDQ            ALUD,SLB
2783  001116          IDBS,REG                        T,NEXT      T,HOLD
2784  001116          CONDENABL COND,F11;
2785  001117
2786  001117
2787  001117  %*************************************************
2788  001117  % CPU IS IN ION
2789  001117
2790  001117                                ALUF,PASSD            ALUD,Q
2791  001117          IDBS,ARG              COMM,LDLC T,NEXT      T,PUSH
2792  001117          100013;
2793  001120
2794  001120
2795  001120  %*************************************************
2796  001120  % LOOP TO FIND HIGHEST ENABLED LEVEL
2797  001120
2798  001120               B,R3             ALUF,PASSB ALUM,MIC ALUD,SLD
2799  001120          IDBS,ALU                        T,NEXT      T,POP
2800  001120          LCOUNT;
2801  001121
2802  001121               B,LC             ALUF,PASSD            ALUD,Q % NEW LEVEL -> Q
2803  001121          IDBS,BARG                         T,JMP     T,HOLD
2804  001121          PLINT;
2805  001122
2806  001122
2807  001122
2808  001122  %*************************************************
2809  001122  % THE WAIT-INSTRUCTION WAS ON LEVEL 14
2810  001122
2811  001122  WT14:                         ALUF,PASSD            ALUD,Q
2812  001122          IDBS,ARG                        T,NEXT      T,HOLD
2813  001122          40000;
2814  001123
2815  001123          PIC,MCLPID            ALUF,PASSQ            ALUD,NONE
2816  001123          IDBS,ALU              COMM,EPIC T,JMP       T,HOLD
2817  001123          CHKIT;
2818  001124
2819  001124
2820  001124
2821  001124
2822  001124
2823  001124
2824  001124
2825  001124
2826  001124
2827  001124
2828  001124
2829  001124
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2830    001124
2831    001124
2832    001124
2833    001124
2834    001124  %*************************************************************
2835    001124  %*************************************************************
2836    001124
2837    001124  % HARDWARE INTERRUPT HANDLING (EXT. OR INT. INTERRUPTS)
2838    001124  % ENTERED FROM INTERRUPT VECTOR (3740-3757)
2839    001124
2840    001124  %*************************************************************
2841    001124  % INTERNAL INTERRUPTS
2842    001124
2843    001124  EXT14:      B,P              ALUF,B-1            ALUD,B
2844    001124          IDBS,ARG             COMM,LDGPR T,NEXT   T,HOLD
2845    001124          27;
2846    001125
2847    001125          A,16                                     ALUD,NONE
2848    001125          IDBS,BMG             COMM,SMPID T,NEXT   T,HOLD;
2849    001126
2850    001126
2851    001126  %*************************************************
2852    001126  % ONLY LEVEL 15 IS HIGHER THAN STATUS 27
2853    001126
2854    001126          ALUD,NONE IDBS,ALU            T,NEXT T,HOLD;
2855    001127
2856    001127          PIC,LOSTS                                ALUD,NONE
2857    001127          IDBS,GPR             COMM,EPIC T,JMP     T,PUSH
2858    001127          PLINT;
2859    001130
2860    001130               B,Z             ALUF,ZERO           ALUD,B
2861    001130          IDBS,ALU          COMM,CONTINUE T,JMP T,HOLD;
2862    001131
2863    001131
2864    001131
2865    001131  %*************************************************************
2866    001131  % HARDWARE INTERRUPT EXCEPT LEVEL 14
2867    001131
2868    001131  XINT:       B,P              ALUF,B-1            ALUD,B
2869    001131          IDBS,ALU                      T,JMP      T,PUSH
2870    001131          PLINT;
2871    001132
2872    001132               B,Z             ALUF,ZERO           ALUD,B
2873    001132          IDBS,ALU          COMM,CONTINUE T,JMP T,HOLD;
2874    001133
2875    001133
2876    001133  %*************************************************
2877    001133  % LEVEL IN Q SHOULD BE ENTERED
2878    001133
2879    001133  PLINT:                   ALUF,PASSQ              ALUD,NONE
2880    001133          IDBS,ALU         COMM,LDLC T,NEXT        T,HOLD
2881    001133          COND,F=0                  F,NEXT         F,HOLD;
2882    001134
2883    001134               B,R6        ALUF,PASSD              ALUD,B
2884    001134          IDBS,SWAP                 T,JMP          T,HOLD
2885    001134          PLV0 CONDENABL;
2886    001135
2887    001135
2888    001135  %*************************************************
2889    001135  % NEW LEVEL IS NOT LEVEL 0, UPDATE PID
2890    001135
2891    001135          A,LC             ALUF,PASSD              ALUD,Q
2892    001135          IDBS,BMG                  T,NEXT         T,HOLD;
2893    001136
2894    001136          AB,PID           ALUF,ORDQ               ALUD,B
2895    001136          IDBS,REG                  T,NEXT         T,HOLD;
2896    001137
2897    001137          AB,PID           ALUF,PASSB              ALUD,NONE
2898    001137          IDBS,ALU         COMM,EWRF T,NEXT        T,HOLD;
2899    001140
2900    001140  PLV0:   A,PIL            ALUF,PASSD              ALUD,Q
2901    001140          IDBS,BMG                  T,NEXT         T,HOLD;
2902    001141
2903    001141          A,LC             ALUF,ANDDQ              ALUD,NONE
2904    001141          IDBS,BMG                  T,NEXT         T,HOLD
2905    001141          COND,F=0                  F,RETURN       F,HOLD;
2906    001142
2907    001142                           ALUF,ANDDQ              ALUD,NONE
2908    001142          IDBS,ARG                  T,NEXT         T,HOLD
2909    001142          140000 CONDENABL;
2910    001143
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2911    001143
2912    001143  %*************************************************
2913    001143  % NEW LEVEL IS UNEQUAL TO OLD LEVEL
2914    001143
2915    001143          A,LC                    ALUF,PASSD          ALUD,Q
2916    001143          IDBS,BMG                        T,NEXT      T,HOLD
2917    001143          COND,COND                       F,JMP       F,HOLD;
2918    001144
2919    001144          A,PIL B,R5              ALUF,PASSD          ALUD,B
2920    001144          IDBS,AARG                       T,NEXT      T,HOLD
2921    001144          LVSWP CONDENABL;
2922    001145
2923    001145
2924    001145  %*****************************************
2925    001145  % OLD LEVEL IS NOT 14 OR 15
2926    001145
2927    001145          AB,PVL                  ALUF,PASSB          ALUD,NONE
2928    001145          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2929    001146
2930    001146
2931    001146
2932    001146
2933    001146  %*****************************************************
2934    001146  % CHANGE LEVEL ROUTINE.  Q = NEW LEVEL
2935    001146
2936    001146  LVSWP:  AB,ACTLV                ALUF,ORDQ           ALUD,B
2937    001146          IDBS,REG                        T,NEXT      T,HOLD;
2938    001147
2939    001147
2940    001147                                                      ALUD,NONE
2941    001147          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD
2942    001147          7;
2943    001150
2944    001150                B,Z               ALUF,PASSD          ALUD,B
2945    001150          IDBS,STS                        T,NEXT      T,PUSH
2946    001150          COND,LC=0;
2947    001151
2948    001151          A,PIL B,LC              ALUF,PASSB          ALUD,Q    % SAVE LOOP
2949    001151          IDBS,ALU                COMM,EWRF T,NEXT    T,POP
2950    001151          LCOUNT;
2951    001152
2952    001152
2953    001152                B,Z               ALUF,ANDDQ          ALUD,B
2954    001152          IDBS,ARG                        T,NEXT      T,HOLD
2955    001152          170000;
2956    001153
2957    001153          A,Z    B,R6             ALUF,ORAB           ALUD,NONE
2958    001153          IDBS,ALU                COMM,LDPIL T,NEXT   T,HOLD;
2959    001154
2960    001154                                                      ALUD,NONE
2961    001154          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD
2962    001154          7;
2963    001155
2964    001155          AB,ACTLV                ALUF,PASSB          ALUD,NONE
2965    001155          IDBS,ALU                COMM,EWRF T,NEXT    T,PUSH;
2966    001156
2967    001156          A,PIL B,LC              ALUF,PASSD          ALUD,B    % UNSAVE LOOP
2968    001156          IDBS,REG                        T,NEXT      T,POP
2969    001156          LCOUNT;
2970    001157
2971    001157          A,PIL B,0  XRF                              ALUD,NONE
2972    001157          IDBS,REG                COMM,LDPCR T,NEXT   T,HOLD;
2973    001160
2974    001160          A,Z                     ALUF,PASSA          ALUD,NONE STS,LO
2975    001160          IDBS,ALU                        T,RETURN    T,POP;
2976    001161
2977    001161
2978    001161
2979    001161
2980    001161
2981    001161
2982    001161
2983    001161
2984    001161
2985    001161  %*************************************************************
2986    001161  % SUBROUTINE TO CLEAR INTERNAL INTERUPTS
2987    001161
2988    001161  CLR14:          B,R1            ALUF,PASSD          ALUD,B
2989    001161          IDBS,ARG                        T,NEXT      T,HOLD
2990    001161          37760;
2991    001162
```

```
2992    001162  CLRXX: PIC,MCLPID B,R1        ALUF,PASSB          ALUD,NONE
2993    001162         IDBS,ALU               COMM,EPIC T,RETURN  T,POP;
2994    001163
2995    001163
2996    001163
2997    001163
2998    001163
2999    001163
3000    001163
3001    001163
3002    001163
3003    001163
3004    001163  %*************************************************************
3005    001163  % SUBROUTINE USED BY TRR PID AND TRR PIE TO TRANSLATE TO PIC-FORMAT
3006    001163
3007    001163  PICFM:       B,Z              ALUF,ANDDQ          ALUD,SRB
3008    001163         IDBS,ARG                        T,NEXT     T,HOLD
3009    001163         74;
3010    001164
3011    001164         A,7                   ALUF,ANDDQ          ALUD,NONE
3012    001164         IDBS,BMG                        T,NEXT     T,HOLD
3013    001164         COND,F=0                        F,NEXT     F,HOLD;
3014    001165
3015    001165         A,6                   ALUF,ANDDQ          ALUD,NONE
3016    001165         IDBS,BMG                        T,JMP      T,HOLD
3017    001165         PICF2 CONDENABL;
3018    001166
3019    001166         A,0   B,Z             ALUF,ORDA           ALUD,B
3020    001166         IDBS,BMG                        T,NEXT     T,HOLD
3021    001166         COND,COND                       F,NEXT     F,HOLD;
3022    001167
3023    001167  PICF2:       B,Z  MIS,ROT     ALUF,PASSB          ALUD,SRB
3024    001167         IDBS,ALU                        T,RETURN   T,POP
3025    001167         CONDENABL;
3026    001170
3027    001170                               ALUF,PASSD          ALUD,Q
3028    001170         IDBS,ARG                        T,NEXT     T,HOLD
3029    001170         77760;
3030    001171
3031    001171         A,Z   B,Z             ALUF,ORAQ           ALUD,B
3032    001171         IDBS,ALU                        T,RETURN   T,POP;
3033    001172
3034    001172
3035    001172
3036    001172
3037    001172
3038    001172
3039    001172
3040    001172
3041    001172
3042    001172
3043    001172  %*************************************************************************
3044    001172  % SUBROUTINE USED BY E-COMMAND & MACL TO SET OUT EXAMINE MODE
3045    001172
3046    001172  EXMO2:
3047    001172         AB,EXMOD              ALUF,PASSQ          ALUD,NONE
3048    001172         IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
3049    001173
3050    001173              B,15                                 ALUD,NONE
3051    001173         IDBS,BARG          COMM,LDPANC T,RETURN   T,POP;
3052    001174
3053    001174
3054    001174
3055    001174
3056    001174
3057    001174
3058    001174
3059    001174  %*************************************************************
3060    001174  %*************************************************************
3061    001174
3062    001174  %       PLANC ENTER- AND LEAVE- ROUTINES
3063    001174
3064    001174  %*************************************************************
3065    001174
3066    001174  %       5INIT IN PLANC
3067    001174
3068    001174  5INIT: A,P   B,R1             ALUF,A+1            ALUD,B
3069    001174         IDBS,ALU                        T,NEXT     T,HOLD;
3070    001175
3071    001175              B,R6             ALUF,PASSD          ALUD,B
3072    001175         IDBS,ARG           COMM,RDRQ,PT T,NEXT    T,HOLD
```

```
3073    001175          176;
3074    001176
3075    001176          A,B   B,R2          ALUF,PASSA          ALUD,B
3076    001176          IDBS,ALU                      T,NEXT    T,HOLD;
3077    001177
3078    001177                                ALUF,PASSD          ALUD,Q
3079    001177          IDBS,DBR                      T,JMP     T,PUSH
3080    001177          ENTRC;
3081    001200
3082    001200                B,R1          ALUF,B+1            ALUD,B
3083    001200          IDBS,ALU                      T,NEXT    T,HOLD;
3084    001201
3085    001201                B,R5          ALUF,PASSD          ALUD,B
3086    001201          IDBS,ARG          COMM,RDRQ,PT T,NEXT   T,HOLD
3087    001201          172;
3088    001202
3089    001202                B,R7          ALUF,D+Q            ALUD,B
3090    001202          IDBS,DBR                      T,JMP     T,PUSH
3091    001202          ENTRB;
3092    001203
3093    001203                                ALUF,PASSD          ALUD,Q
3094    001203          IDBS,STS                      T,NEXT    T,HOLD;
3095    001204
3096    001204                B,R1          ALUF,B+1            ALUD,B
3097    001204          IDBS,ALU                      T,NEXT    T,HOLD;
3098    001205
3099    001205                                                  ALUD,NONE
3100    001205          IDBS,ALU          COMM,RDRQ,PT T,NEXT   T,HOLD;
3101    001206
3102    001206                                ALUF,XORDQ          ALUD,Q
3103    001206          IDBS,DBR                      T,NEXT    T,HOLD;
3104    001207
3105    001207          A,0                 ALUF,ANDDQ          ALUD,NONE
3106    001207          IDBS,BMG                      T,NEXT    T,HOLD
3107    001207          COND,F=0                      F,NEXT    F,HOLD;
3108    001210
3109    001210          A,R1  B,P           ALUF,A+1            ALUD,B
3110    001210          IDBS,ALU                      T,JMP     T,HOLD
3111    001210          TSTAC CONDENABL;
3112    001211
3113    001211                B,P           ALUF,B+1            ALUD,B
3114    001211          IDBS,ALU                      T,JMP     T,POP
3115    001211          BCHNG;
3116    001212
3117    001212
3118    001212
3119    001212  %*************************************************************
3120    001212
3121    001212  %       5ENTR IN PLANC
3122    001212
3123    001212
3124    001212  ENTR:         B,R6          ALUF,PASSD          ALUD,B
3125    001212          IDBS,ARG                      T,NEXT    T,HOLD
3126    001212          176;
3127    001213
3128    001213          A,B   B,R6          ALUF,A-B            ALUD,NONE
3129    001213          IDBS,ALU                      T,NEXT    T,HOLD;
3130    001214
3131    001214          A,B   B,R2          ALUF,PASSA          ALUD,B
3132    001214          IDBS,ALU        COMM,RDRQ,APT T,NEXT    T,HOLD;
3133    001215
3134    001215                                ALUF,PASSD          ALUD,Q
3135    001215          IDBS,DBR                      T,JMP     T,PUSH
3136    001215          ENTRC;
3137    001216
3138    001216          A,R2  B,R4          ALUF,A-B            ALUD,NONE
3139    001216          IDBS,ALU                      T,NEXT    T,HOLD;
3140    001217
3141    001217                B,R5          ALUF,PASSD          ALUD,B
3142    001217          IDBS,ARG          COMM,RDRQ,APT T,NEXT    T,HOLD
3143    001217          172;
3144    001220
3145    001220                B,R7          ALUF,PASSD          ALUD,B
3146    001220          IDBS,DBR                      T,JMP     T,PUSH
3147    001220          ENTRB;
3148    001221
3149    001221  TSTAC:  A,R7  B,R3          ALUF,A-B            ALUD,NONE
3150    001221          IDBS,ALU                      T,NEXT    T,HOLD
3151    001221          COND,CRY                      F,JMP     F,POP;
3152    001222
3153    001222                B,P           ALUF,B+1            ALUD,B
```

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3154    001222          IDBS,ALU                        T,NEXT    T,HOLD
3155    001222          BCHNG CONDENABL;
3156    001223
3157    001223                B,P             ALUF,B+1            ALUD,B
3158    001223          IDBS,ALU                        T,JMP     T,POP
3159    001223          BCHNG;
3160    001224
3161    001224  ENTRC:                          ALUF,PASSQ          ALUD,NONE
3162    001224          IDBS,ALU                        T,NEXT    T,HOLD;
3163    001225
3164    001225                B,L             ALUF,B+1            ALUD,NONE
3165    001225          IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD;
3166    001226
3167    001226          A,7   B,STS             ALUF,D+Q            ALUD,B
3168    001226          IDBS,BMG                        T,NEXT    T,HOLD;
3169    001227
3170    001227          A,R6  B,R3              ALUF,A+1            ALUD,B
3171    001227          IDBS,ALU                        T,NEXT    T,HOLD;
3172    001230
3173    001230          A,P                     ALUF,PASSA          ALUD,NONE
3174    001230          IDBS,ALU                        T,NEXT    T,HOLD;
3175    001231
3176    001231                                                    ALUD,NONE
3177    001231          IDBS,ALU          COMM,RDRQ,PT    T,NEXT    T,HOLD;
3178    001232
3179    001232                                                    ALUD,NONE
3180    001232          IDBS,DBR                COMM,LDGPR T,NEXT T,HOLD;
3181    001233
3182    001233          A,STS B,R3              ALUF,A-B            ALUD,NONE
3183    001233          IDBS,ALU                        T,NEXT    T,HOLD;
3184    001234
3185    001234                B,R2              ALUF,PASSB          ALUD,NONE
3186    001234          IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD;
3187    001235
3188    001235          A,R6  B,R4              ALUF,A-1            ALUD,B
3189    001235          IDBS,ALU                        T,RETURN  T,POP;
3190    001236
3191    001236  ENTRB:  A,STS B,R4              ALUF,A-B            ALUD,NONE
3192    001236          IDBS,ALU                        T,NEXT    T,HOLD;
3193    001237
3194    001237          A,R7                    ALUF,PASSA          ALUD,NONE
3195    001237          IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD;
3196    001240
3197    001240          A,R5                    ALUF,D-A            ALUD,Q
3198    001240          IDBS,GPR                        T,NEXT    T,HOLD;
3199    001241
3200    001241          A,STS B,R6              ALUF,A-B            ALUD,NONE
3201    001241          IDBS,ALU                        T,NEXT    T,HOLD;
3202    001242
3203    001242          A,STS B,R3              ALUF,A+Q            ALUD,B
3204    001242          IDBS,ALU          COMM,WRRQ,APT T,RETURN    T,POP;
3205    001243
3206    001243  %*************************************************************
3207    001243
3208    001243  %       5LEAV AND ELEAV IN PLANC
3209    001243
3210    001243  ELEAV:                          ALUF,PASSD          ALUD,Q
3211    001243          IDBS,ARG                        T,NEXT    T,HOLD
3212    001243          173;
3213    001244
3214    001244          A,B                     ALUF,A-Q            ALUD,NONE
3215    001244          IDBS,ALU                        T,NEXT    T,HOLD;
3216    001245
3217    001245          A,A                     ALUF,PASSA          ALUD,NONE
3218    001245          IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD;
3219    001246
3220    001246          A,7                     ALUF,PASSD          ALUD,Q
3221    001246          IDBS,BMG                        T,NEXT    T,HOLD;
3222    001247
3223    001247          A,B                     ALUF,A-Q            ALUD,Q
3224    001247          IDBS,ALU                        T,NEXT    T,HOLD;
3225    001250
3226    001250                                                    ALUD,NONE
3227    001250          IDBS,ALU          COMM,RDRQ,APT T,NEXT      T,HOLD;
3228    001251
3229    001251                B,STS             ALUF,D-1            ALUD,B
3230    001251          IDBS,DBR                        T,NEXT    T,HOLD;
3231    001252
3232    001252                                  ALUF,PASSQ          ALUD,NONE
3233    001252          IDBS,ALU                        T,NEXT    T,HOLD;
3234    001253
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3235  001253                B,STS          ALUF,PASSB          ALUD,NONE
3236  001253          IDBS,ALU          COMM,WRRQ,APT T,NEXT    T,HOLD;
3237  001254
3238  001254  LEAV:        B,R1          ALUF,PASSD          ALUD,B
3239  001254          IDBS,ARG                    T,NEXT    T,HOLD
3240  001254          177;
3241  001255
3242  001255          A,B   B,R1          ALUF,A-B            ALUD,B
3243  001255          IDBS,ALU                    T,NEXT    T,HOLD;
3244  001256
3245  001256                                                  ALUD,NONE
3246  001256          IDBS,ALU          COMM,RDRQ,APT T,NEXT    T,HOLD;
3247  001257
3248  001257                B,STS          ALUF,PASSD          ALUD,B
3249  001257          IDBS,DBR                    T,NEXT    T,HOLD;
3250  001260
3251  001260          A,R1                ALUF,A-1            ALUD,NONE
3252  001260          IDBS,ALU                    T,NEXT    T,HOLD;
3253  001261
3254  001261                                                  ALUD,NONE
3255  001261          IDBS,ALU          COMM,RDRQ,APT T,NEXT    T,HOLD;
3256  001262
3257  001262                B,P           ALUF,PASSD          ALUD,B
3258  001262          IDBS,DBR            COMM,LDGPR T,JMP    T,POP
3259  001262          BCHNG;
3260  001263
3261  001263  BCHNG:  A,STS B,B           ALUF,PASSA          ALUD,B
3262  001263          IDBS,ALU      COMM,CONTINUE       T,JMP     T,HOLD;
3263  001264
3264  001264
3265  001264
3266  001264
3267  001264
3268  001264
3269  001264
3270  001264
3271  001264  %*************************************************************
3272  001264  %*************************************************************
3273  001264
3274  001264  % SUBROUTINES FOR COMMERCIAL INSTRUCTIONS
3275  001264
3276  001264  %*************************************************************
3277  001264  % SUBROUTINE TO REMEMBER IN R4 THE NUMBER OF WORDS TO FILL OR MOVE
3278  001264
3279  001264  LSET1:  A,R1  B,R4          ALUF,PASSA          ALUD,B
3280  001264          IDBS,ALU                    T,RETURN  T,POP
3281  001264          COND,F=0                    F,JMP     F,PUSH;
3282  001265
3283  001265
3284  001265
3285  001265  %*********************************************
3286  001265  % SUBROUTINE TO ADD TO X,T THE CONTENT OF R6, WHICH IS BYTE COUNT SHIFTED ROT 1
3287  001265
3288  001265  MBXS1:  A,17               ALUF,PASSD          ALUD,Q
3289  001265          IDBS,BMG                    T,NEXT    T,HOLD;
3290  001266
3291  001266          A,R6  B,R4          ALUF,ANDAQ          ALUD,B
3292  001266          IDBS,ALU                    T,NEXT    T,HOLD;
3293  001267
3294  001267          A,13                ALUF,D-1            ALUD,Q
3295  001267          IDBS,BMG                    T,NEXT    T,HOLD;
3296  001270
3297  001270          A,R6  B,R6          ALUF,ANDAQ          ALUD,B
3298  001270          IDBS,ALU                    T,NEXT    T,HOLD;
3299  001271
3300  001271          A,R4  B,T           ALUF,A+B            ALUD,B    STS,EA
3301  001271          IDBS,ALU                    T,NEXT    T,HOLD;
3302  001272
3303  001272          A,R6  B,X           ALUF,A+B            ALUD,B    CRY,C
3304  001272          IDBS,ALU                    T,RETURN  T,POP;
3305  001273
3306  001273
3307  001273
3308  001273
3309  001273
3310  001273  %*********************************************
3311  001273  % SUBROUTINE TO WRITE R10 INTO LOCATION [R3]
3312  001273
3313  001273  WRDST:  A,R7  B,T           ALUF,ANDAB          ALUD,NONE
3314  001273          IDBS,ALU                    T,NEXT    T,HOLD
3315  001273          COND,F=0                    F,NEXT    F,HOLD;
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3316    001274
3317    001274          A,R3                    ALUF,PASSA          ALUD,NONE
3318    001274          IDBS,ALU                        T,JMP       T,HOLD
3319    001274          WRDS2 CONDENABL;
3320    001275
3321    001275          A,STS                   ALUF,PASSA          ALUD,NONE
3322    001275          IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD;
3323    001276
3324    001276  WRDS3:                                              ALUD,NONE
3325    001276          IDBS,ALU                COMM,CLIRQ T,RETURN T,POP
3326    001276          COND,IRQ                        F,NEXT      F,HOLD;
3327    001277
3328    001277  WRDS2:  A,STS                   ALUF,PASSA          ALUD,NONE
3329    001277          IDBS,ALU           COMM,WRRQ,PT T,JMP       T,HOLD
3330    001277          WRDS3;
3331    001300
3332    001300
3333    001300
3334    001300
3335    001300  %*****************************************
3336    001300  % SUBROUTINE TO READ LOCATION [R3] INTO R10
3337    001300
3338    001300  RDDST:  A,R7  B,T                ALUF,ANDAB          ALUD,NONE
3339    001300          IDBS,ALU                        T,NEXT      T,HOLD
3340    001300          COND,F=0                        F,NEXT      F,HOLD;
3341    001301
3342    001301          A,R3                    ALUF,PASSA          ALUD,NONE
3343    001301          IDBS,ALU                        T,JMP       T,HOLD
3344    001301          RDDS2 CONDENABL;
3345    001302
3346    001302                                                      ALUD,NONE
3347    001302          IDBS,ALU          COMM,RDRQ,APT T,NEXT      T,HOLD;
3348    001303
3349    001303  RDDS3:        B,STS             ALUF,PASSD          ALUD,B
3350    001303          IDBS,DBR                        T,RETURN    T,POP;
3351    001304
3352    001304  RDDS2:                                              ALUD,NONE
3353    001304          IDBS,ALU           COMM,RDRQ,PT T,JMP       T,HOLD
3354    001304          RDDS3;
3355    001305
3356    001305
3357    001305
3358    001305  %*****************************************
3359    001305  % SUBROUTINES TO CHECK THAT LAST PAGE NEEDED BY MOVE IS IN MEMORY
3360    001305
3361    001305  PFSRC:  A,R5  B,1                ALUF,ANDDA          ALUD,NONE
3362    001305          IDBS,BARG                       T,NEXT      T,HOLD
3363    001305          COND,F=0                        F,JMP       F,HOLD;
3364    001306
3365    001306          A,D                     ALUF,PASSA          ALUD,Q
3366    001306          IDBS,ALU                        T,NEXT      T,HOLD
3367    001306          RDSRC CONDENABL;
3368    001307
3369    001307          A,17                    ALUF,ANDDQ          ALUD,NONE
3370    001307          IDBS,BMG                        T,NEXT      T,HOLD;
3371    001310
3372    001310                                                      ALUD,NONE
3373    001310          IDBS,ALU                        T,NEXT      T,HOLD
3374    001310          RDSRC CONDENABL;
3375    001311
3376    001311                B,R2              ALUF,B-1            ALUD,B
3377    001311          IDBS,ALU                        T,JMP       T,HOLD
3378    001311          RDSRC;
3379    001312
3380    001312
3381    001312  PFDST:  A,R5  B,1                ALUF,ANDDA          ALUD,NONE
3382    001312          IDBS,BARG                       T,NEXT      T,HOLD
3383    001312          COND,F=0                        F,JMP       F,HOLD;
3384    001313
3385    001313          A,T                     ALUF,PASSA          ALUD,Q
3386    001313          IDBS,ALU                        T,NEXT      T,HOLD
3387    001313          RDDST CONDENABL;
3388    001314
3389    001314          A,17                    ALUF,ANDDQ          ALUD,NONE
3390    001314          IDBS,BMG                        T,NEXT      T,HOLD;
3391    001315
3392    001315                                                      ALUD,NONE
3393    001315          IDBS,ALU                        T,NEXT      T,HOLD
3394    001315          RDDST CONDENABL;
3395    001316
3396    001316                B,R3              ALUF,B-1            ALUD,B
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3397    001316          IDBS,ALU                T,JMP     T,HOLD
3398    001316          RDDST;
3399    001317
3400    001317
3401    001317
3402    001317
3403    001317
3404    001317  %*********************************************
3405    001317  % SUBROUTINE TO FILL LEFT BYTE OF [R3] WITH LEFT BYTE OF Q
3406    001317
3407    001317  BTL:            B,R2            ALUF,B-1                ALUD,B
3408    001317          IDBS,ALU                        T,JMP     T,PUSH
3409    001317          RDDST;
3410    001320
3411    001320          A,Z    B,STS            ALUF,ANDAB              ALUD,B
3412    001320          IDBS,ALU                        T,NEXT    T,HOLD;
3413    001321
3414    001321          A,STS B,STS             ALUF,ORAQ               ALUD,B
3415    001321          IDBS,ALU                        T,JMP     T,PUSH
3416    001321          WRDST;
3417    001322
3418    001322                B,R3              ALUF,B-1                ALUD,B
3419    001322          IDBS,ALU                        T,NEXT    T,HOLD;
3420    001323
3421    001323
3422    001323  %*****************************************************
3423    001323  % ADJUST R5 AND R6 FOR BTL AND BTR
3424    001323
3425    001323  BTX:            B,R5            ALUF,B-1                ALUD,B
3426    001323          IDBS,ALU                        T,NEXT    T,HOLD;
3427    001324
3428    001324                B,R6              ALUF,B-1                ALUD,B
3429    001324          IDBS,ALU                        T,RETURN  T,POP;
3430    001325
3431    001325
3432    001325
3433    001325
3434    001325  %*****************************************************
3435    001325  % SUBROUTINE TO FILL RIGHT BYTE OF [R3] WITH RIGHT BYTE OF Q
3436    001325
3437    001325  BTR:                                                    ALUD,NONE
3438    001325          IDBS,ALU                        T,JMP     T,PUSH
3439    001325          RDDST;
3440    001326
3441    001326          A,Z    B,STS            ALUF,MASKAB             ALUD,B
3442    001326          IDBS,ALU                        T,NEXT    T,HOLD;
3443    001327
3444    001327          A,STS B,STS             ALUF,ORAQ               ALUD,B
3445    001327          IDBS,ALU                        T,JMP     T,PUSH
3446    001327          WRDST;
3447    001330
3448    001330          A,17   B,R3             ALUF,B+1                ALUD,B
3449    001330          IDBS,BMG                COMM,LDGPR T,NEXT       T,HOLD;
3450    001331
3451    001331          A,T    B,T              ALUF,MASKDA             ALUD,B
3452    001331          IDBS,GPR                        T,NEXT    T,HOLD;
3453    001332
3454    001332                B,X               ALUF,B+1                ALUD,B
3455    001332          IDBS,ALU                        T,JMP     T,HOLD
3456    001332          BTX;
3457    001333
3458    001333
3459    001333
3460    001333
3461    001333
3462    001333
3463    001333
3464    001333
3465    001333
3466    001333
3467    001333
3468    001333
3469    001333
3470    001333
3471    001333  %*********************************************
3472    001333  %*********************************************
3473    001333
3474    001333  % BYTE FILL INSTRUCTION  BFILL  (140130)
3475    001333
3476    001333  %*********************************************
3477    001333
```

```
3478    001333  BFILL: A,16  B,R7          ALUF,PASSD          ALUD,B
3479    001333         IDBS,BMG                        T,NEXT    T,HOLD;
3480    001334
3481    001334                                ALUF,PASSD          ALUD,Q
3482    001334         IDBS,ARG                        T,NEXT    T,HOLD
3483    001334         7777;
3484    001335
3485    001335         A,T   B,R5             ALUF,ANDAQ          ALUD,B
3486    001335         IDBS,ALU                        T,NEXT    T,HOLD
3487    001335         COND,F=0                        F,JMP     F,PUSH;
3488    001336
3489    001336         A,X   B,R3             ALUF,PASSA          ALUD,B
3490    001336         IDBS,ALU                        T,NEXT    T,HOLD
3491    001336         BFIL2 CONDENABL;
3492    001337
3493    001337
3494    001337  %*****************************************
3495    001337  % FINISHED, OR 0 BYTES TO MOVE
3496    001337
3497    001337         A,R5  B,1              ALUF,ANDDA          ALUD,NONE
3498    001337         IDBS,BARG                       T,NEXT    T,HOLD
3499    001337         COND,F=0                        F,JMP     F,PUSH;
3500    001340
3501    001340         A,Z   B,STS            ALUF,MASKAB         ALUD,Q
3502    001340         IDBS,ALU                        T,NEXT    T,HOLD
3503    001340         BTL CONDENABL;  % LAST BYTE NOT ON WORD BOUNDARY -> BTL
3504    001341
3505    001341         AB,SSAVE                                  ALUD,NONE
3506    001341         IDBS,STS               COMM,EWRF T,NEXT   T,HOLD;
3507    001342
3508    001342         A,R5  B,R6             ALUF,PASSA MIS,ROT ALUD,SRB
3509    001342         IDBS,ALU                        T,JMP     T,PUSH
3510    001342         MBXS1;
3511    001343
3512    001343                                ALUF,PASSD          ALUD,Q
3513    001343         IDBS,ARG                        T,NEXT    T,HOLD
3514    001343         170000;
3515    001344
3516    001344         A,T   B,T              ALUF,ANDAQ          ALUD,B
3517    001344         IDBS,ALU                        T,NEXT    T,HOLD;
3518    001345
3519    001345         AB,SSAVE                                  ALUD,NONE STS,LO
3520    001345         IDBS,REG                        T,NEXT    T,HOLD;
3521    001346
3522    001346               B,P              ALUF,B+1            ALUD,B
3523    001346         IDBS,ALU                        T,JMP     T,HOLD
3524    001346         CONT;
3525    001347
3526    001347
3527    001347
3528    001347
3529    001347
3530    001347
3531    001347  BFIL2:       B,Z              ALUF,PASSD          ALUD,B
3532    001347         IDBS,ARG                        T,NEXT    T,HOLD
3533    001347         377;
3534    001350
3535    001350         A,Z   B,A              ALUF,ANDAB          ALUD,Q
3536    001350         IDBS,ALU                        T,NEXT    T,HOLD;
3537    001351
3538    001351               B,R2             ALUF,ORDQ           ALUD,B
3539    001351         IDBS,SWAP                       T,NEXT    T,HOLD
3540    001351         COND,F15                        F,RETURN  F,POP;
3541    001352
3542    001352         A,T                    ALUF,PASSA          ALUD,NONE
3543    001352         IDBS,ALU                        T,JMP     T,PUSH
3544    001352         BFIL3;
3545    001353
3546    001353         A,R5  B,R1             ALUF,PASSA ALUM,MIC ALUD,SRB
3547    001353         IDBS,ALU                        T,JMP     T,PUSH
3548    001353         LSET1;
3549    001354
3550    001354
3551    001354
3552    001354  %*****************************************
3553    001354  % LOOP TO STORE WORDS OF TWO BYTES EACH
3554    001354
3555    001354  BFLOO: A,R2  B,STS            ALUF,PASSA          ALUD,B
3556    001354         IDBS,ALU                        T,RETURN  T,POP
3557    001354         WRDST CONDENABL;
3558    001355
```

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3559  001355                B,R3            ALUF,B+1            ALUD,B
3560  001355          IDBS,ALU                        T,JMP       T,HOLD
3561  001355          BFILQ CONDENABL;
3562  001356
3563  001356                B,R1            ALUF,B-1            ALUD,B
3564  001356          IDBS,ALU                        T,NEXT      T,HOLD
3565  001356          COND,F=0                        F,JMP       F,PUSH;
3566  001357
3567  001357          A,R1                  ALUF,PASSA            ALUD,NONE
3568  001357          IDBS,ALU                        T,JMP       T,HOLD
3569  001357          BFLOO;
3570  001360
3571  001360
3572  001360
3573  001360
3574  001360    %*********************************************
3575  001360    % INTERRUPT IS SENSED WHILE INSIDE LOOP
3576  001360
3577  001360    BFILQ: A,R4  B,R1             ALUF,A-B            ALUD,Q
3578  001360          IDBS,ALU                        T,NEXT      T,HOLD;
3579  001361
3580  001361          A,X   B,X             ALUF,A+Q+1            ALUD,B
3581  001361          IDBS,ALU                        T,NEXT      T,HOLD;
3582  001362
3583  001362                B,R1            ALUF,Q+1              ALUD,SLB
3584  001362          IDBS,ARG              COMM,LDGPR T,NEXT     T,HOLD
3585  001362          170000;
3586  001363
3587  001363          A,T   B,T             ALUF,ANDDA            ALUD,B
3588  001363          IDBS,GPR                        T,NEXT      T,HOLD;
3589  001364
3590  001364          A,R5  B,R1            ALUF,A-B              ALUD,B
3591  001364          IDBS,ALU                        T,NEXT      T,HOLD;
3592  001365
3593  001365          A,R1  B,T             ALUF,ORAB             ALUD,B
3594  001365          IDBS,ALU                        T,NEXT      T,HOLD;
3595  001366
3596  001366                B,P             ALUF,B-1              ALUD,B
3597  001366          IDBS,ALU                        T,JMP       T,HOLD
3598  001366          CONT;
3599  001367
3600  001367
3601  001367
3602  001367
3603  001367
3604  001367
3605  001367
3606  001367
3607  001367
3608  001367
3609  001367
3610  001367
3611  001367
3612  001367
3613  001367
3614  001367
3615  001367
3616  001367    %*************************************************
3617  001367    % SUBROUTINE TO MOVE RIGHT BYTE OF [R2] TO LEFT BYTE OF [R3]
3618  001367
3619  001367    RBTL:                                             ALUD,NONE
3620  001367          IDBS,ALU                        T,JMP       T,PUSH
3621  001367          RDSRC;
3622  001370
3623  001370          A,Z   B,R4            ALUF,ANDDA            ALUD,B
3624  001370          IDBS,SWAP             COMM,LDGPR T,NEXT     T,HOLD;
3625  001371
3626  001371                                ALUF,PASSD            ALUD,Q
3627  001371          IDBS,GPR                        T,NEXT      T,HOLD;
3628  001372
3629  001372          A,Z                   ALUF,MASKAQ           ALUD,Q
3630  001372          IDBS,ALU                        T,JMP       T,HOLD
3631  001372          BTL;
3632  001373
3633  001373
3634  001373
3635  001373
3636  001373    %*************************************************
3637  001373    % SUBROUTINE TO MOVE LEFT BYTE OF [R2] TO LEFT BYTE OF [R3]
3638  001373
3639  001373    LBTL1:        B,D             ALUF,B-1              ALUD,B
```

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3640   001373          IDBS,ALU                          T,NEXT    T,HOLD;
3641   001374
3642   001374   LBTL:                                              ALUD,NONE
3643   001374          IDBS,ALU                          T,JMP     T,PUSH
3644   001374          RDSRC;
3645   001375
3646   001375          A,Z   B,STS          ALUF,MASKAB            ALUD,Q
3647   001375          IDBS,ALU                          T,JMP     T,HOLD
3648   001375          BTL;
3649   001376
3650   001376
3651   001376
3652   001376   %*************************************************************
3653   001376   % SUBROUTINE TO MOVE LEFT BYTE OF [R2] TO RIGHT BYTE OF [R3]
3654   001376
3655   001376   LBTR:         B,D            ALUF,B-1               ALUD,B
3656   001376          IDBS,ALU                          T,JMP     T,PUSH
3657   001376          RDSRC;
3658   001377
3659   001377          A,Z                  ALUF,ANDDA             ALUD,Q
3660   001377          IDBS,SWAP            COMM,LDGPR T,NEXT      T,HOLD;
3661   001400
3662   001400               B,R4            ALUF,PASSD             ALUD,B
3663   001400          IDBS,GPR                          T,NEXT    T,HOLD;
3664   001401
3665   001401          A,Z   B,R4           ALUF,MASKAB            ALUD,B
3666   001401          IDBS,ALU                          T,JMP     T,HOLD
3667   001401          BTR;
3668   001402
3669   001402
3670   001402   %*************************************************************
3671   001402   % SUBROUTINE TO MOVE RIGHT BYTE OF [R2] TO RIGHT BYTE OF [R3]
3672   001402
3673   001402
3674   001402   RBTR:                                              ALUD,NONE
3675   001402          IDBS,ALU                          T,JMP     T,PUSH
3676   001402          RDSRC;
3677   001403
3678   001403          A,Z   B,STS          ALUF,ANDAB             ALUD,Q
3679   001403          IDBS,ALU                          T,JMP     T,HOLD
3680   001403          BTR;
3681   001404
3682   001404
3683   001404
3684   001404
3685   001404
3686   001404   %*********************************************
3687   001404   %*********************************************
3688   001404
3689   001404   % ZERO BYTES TO BE MOVED
3690   001404
3691   001404   %*********************************************
3692   001404
3693   001404   MOVB9: A,14                  ALUF,PASSD             ALUD,Q
3694   001404          IDBS,BMG                          T,NEXT    T,HOLD;
3695   001405
3696   001405          A,D                  ALUF,ANDAQ             ALUD,NONE
3697   001405          IDBS,ALU                          T,NEXT    T,HOLD
3698   001405          COND,F=0                          F,JMP     F,HOLD;
3699   001406
3700   001406                                                       ALUD,NONE
3701   001406          IDBS,ALU                          T,NEXT    T,HOLD
3702   001406          MB52 CONDENABL;
3703   001407
3704   001407                                                       ALUD,NONE
3705   001407          IDBS,ALU                          T,JMP     T,HOLD
3706   001407          MB21;
3707   001410
3708   001410
3709   001410
3710   001410
3711   001410
3712   001410
3713   001410
3714   001410
3715   001410
3716   001410
3717   001410   %*************************************************************
3718   001410   %*************************************************************
3719   001410
3720   001410   % MOVE BYTES INSTRUCTIONS
```

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3721    001410
3722    001410  %*************************************************************
3723    001410
3724    001410  MOVB:  A,T                    ALUF,PASSA          ALUD,Q
3725    001410         IDBS,ALU                          T,NEXT    T,HOLD;
3726    001411
3727    001411         A,14  B,T              ALUF,MASKDQ         ALUD,B
3728    001411         IDBS,BMG                          T,JMP     T,HOLD
3729    001411         MOVB3;
3730    001412
3731    001412
3732    001412
3733    001412
3734    001412
3735    001412  %*************************************************
3736    001412  %*************************************************
3737    001412
3738    001412  % MOVE BYTES FORWARDS  INSTRUCTION
3739    001412
3740    001412  %*************************************************
3741    001412
3742    001412
3743    001412  MOVBF:                        ALUF,PASSD          ALUD,Q
3744    001412         IDBS,ARG                          T,NEXT    T,HOLD
3745    001412         10000;
3746    001413
3747    001413         A,T   B,T              ALUF,ORAQ           ALUD,B
3748    001413         IDBS,ALU                          T,NEXT    T,HOLD;
3749    001414
3750    001414
3751    001414
3752    001414
3753    001414  %*************************************************************
3754    001414  % COMMON PARTS OF MOVB AND MOVBF
3755    001414  % SET UP INITIAL REGISTERS
3756    001414
3757    001414  MOVB3:                       ALUF,PASSD          ALUD,Q
3758    001414         IDBS,ARG                          T,NEXT    T,HOLD
3759    001414         7777;
3760    001415
3761    001415         A,D   B,R5             ALUF,ANDAQ          ALUD,B
3762    001415         IDBS,ALU                          T,NEXT    T,HOLD
3763    001415         COND,F=0                          F,NEXT    F,HOLD;
3764    001416
3765    001416         A,15  B,R1             ALUF,PASSD          ALUD,B
3766    001416         IDBS,BMG                          T,NEXT    T,HOLD;
3767    001417
3768    001417         A,T   B,R1             ALUF,ANDAB          ALUD,NONE
3769    001417         IDBS,ALU                          T,NEXT    T,HOLD;
3770    001420
3771    001420         A,T   B,R6             ALUF,ANDAQ          ALUD,B
3772    001420         IDBS,ALU                          T,JMP     T,HOLD
3773    001420         MINTD CONDENABL;
3774    001421
3775    001421         A,14  B,R2             ALUF,PASSD          ALUD,B
3776    001421         IDBS,BMG                          T,NEXT    T,HOLD;
3777    001422
3778    001422         A,T   B,R2             ALUF,ANDAB          ALUD,NONE
3779    001422         IDBS,ALU                          T,NEXT    T,HOLD;
3780    001423
3781    001423                                                     ALUD,NONE
3782    001423         IDBS,ALU                          T,JMP     T,HOLD
3783    001423         MOVB2 CONDENABL;
3784    001424
3785    001424  MINTD: A,R5  B,R6             ALUF,B-A            ALUD,NONE
3786    001424         IDBS,ALU                          T,NEXT    T,HOLD
3787    001424         COND,F15                          F,JMP     F,HOLD;
3788    001425
3789    001425         A,14  B,R4             ALUF,INVQ           ALUD,B
3790    001425         IDBS,BMG               COMM,LDGPR T,NEXT   T,HOLD
3791    001425         MOVB5 CONDENABL;
3792    001426
3793    001426         A,R6  B,R5             ALUF,PASSA          ALUD,B
3794    001426         IDBS,ALU                          T,NEXT    T,HOLD;
3795    001427
3796    001427
3797    001427  MOVB5: A,T                    ALUF,ANDDA          ALUD,NONE
3798    001427         IDBS,GPR                          T,NEXT    T,HOLD
3799    001427         COND,F=0                          F,JMP     F,HOLD;
3800    001430
3801    001430         A,R1  B,T              ALUF,ORAB           ALUD,B
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3802    001430          IDBS,ALU                        T,NEXT    T,HOLD
3803    001430          MOVB2 CONDENABL;
3804    001431
3805    001431          A,R4  B,T           ALUF,ANDAB            ALUD,B
3806    001431          IDBS,ALU                        T,NEXT    T,HOLD;
3807    001432
3808    001432          A,R5  B,T           ALUF,ORAB             ALUD,B
3809    001432          IDBS,ALU                        T,NEXT    T,HOLD;
3810    001433
3811    001433
3812    001433          A,R4  B,D           ALUF,ANDAB            ALUD,B
3813    001433          IDBS,ALU                        T,NEXT    T,HOLD;
3814    001434
3815    001434          A,R5  B,D           ALUF,ORAB             ALUD,B
3816    001434          IDBS,ALU                        T,NEXT    T,HOLD;
3817    001435
3818    001435  MOVB2:  A,10  B,Z           ALUF,D-1              ALUD,B
3819    001435          IDBS,BMG                        T,NEXT    T,HOLD;
3820    001436
3821    001436          A,R5                ALUF,PASSA            ALUD,NONE
3822    001436          IDBS,ALU            COMM,LDGPR T,NEXT     T,HOLD
3823    001436          COND,F=0                        F,NEXT    F,HOLD;
3824    001437
3825    001437          A,16  B,R7          ALUF,PASSD            ALUD,B
3826    001437          IDBS,BMG                        T,JMP     T,HOLD
3827    001437          MOVB9 CONDENABL;    % ZERO BYTES TO MOVE
3828    001440
3829    001440
3830    001440  %*****************************************************
3831    001440  % ENSURE THAT NECESSARY PAGES ARE IN MEMORY
3832    001440
3833    001440                B,R2          ALUF,ZERO ALUM,FMU    ALUD,SRB
3834    001440          IDBS,ALU                        T,NEXT    T,HOLD;
3835    001441
3836    001441          A,A   B,R2          ALUF,D+A              ALUD,B
3837    001441          IDBS,GPR                        T,JMP     T,PUSH
3838    001441          PFSRC;
3839    001442
3840    001442          A,X   B,R3          ALUF,D+A              ALUD,B
3841    001442          IDBS,GPR                        T,JMP     T,PUSH
3842    001442          PFDST;
3843    001443
3844    001443                B,R2          ALUF,ZERO ALUM,FMU    ALUD,SRB
3845    001443          IDBS,ALU                        T,JMP     T,PUSH
3846    001443          WRDST;
3847    001444
3848    001444          A,A   B,R2          ALUF,D+A              ALUD,B
3849    001444          IDBS,GPR                        T,JMP     T,PUSH
3850    001444          RDSRC;
3851    001445
3852    001445          A,X   B,R3          ALUF,D+A              ALUD,B
3853    001445          IDBS,GPR                        T,JMP     T,PUSH
3854    001445          RDDST;
3855    001446
3856    001446                                                    ALUD,NONE
3857    001446          IDBS,ALU                        T,JMP     T,PUSH
3858    001446          WRDST;
3859    001447
3860    001447          A,A   B,R2          ALUF,PASSA            ALUD,B
3861    001447          IDBS,ALU                        T,JMP     T,PUSH
3862    001447          RDSRC;
3863    001450
3864    001450          A,X   B,R3          ALUF,PASSA            ALUD,B
3865    001450          IDBS,ALU                        T,JMP     T,PUSH
3866    001450          RDDST;
3867    001451
3868    001451                                                    ALUD,NONE
3869    001451          IDBS,ALU                        T,JMP     T,PUSH
3870    001451          WRDST;
3871    001452
3872    001452
3873    001452  %*************************************
3874    001452  % SELECT WAY THROUGH MOVE
3875    001452
3876    001452          A,D                 ALUF,PASSA            ALUD,NONE
3877    001452          IDBS,ALU                        T,NEXT    T,HOLD
3878    001452          COND,F15                        F,JMP     F,HOLD;
3879    001453
3880    001453          A,T                 ALUF,PASSA            ALUD,NONE
3881    001453          IDBS,ALU                        T,NEXT    T,HOLD
3882    001453          MB1T4 CONDENABL;
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3883    001454
3884    001454  MB5T8: A,R5  B,R4          ALUF,A-1   ALUM,MIC ALUD,SRB
3885    001454         IDBS,ALU                       T,NEXT   T,HOLD
3886    001454         MB5T6 CONDENABL;
3887    001455
3888    001455         A,A   B,X           ALUF,A-B             ALUD,NONE
3889    001455         IDBS,ALU                       T,NEXT   T,HOLD
3890    001455         COND,CRY                       F,JMP    F,PUSH;
3891    001456
3892    001456         A,17  B,R1          ALUF,PASSD           ALUD,B
3893    001456         IDBS,BMG                       T,NEXT   T,HOLD
3894    001456         MB7T CONDENABL;
3895    001457
3896    001457
3897    001457  %*****************************************
3898    001457  % FORWARD ALIGNED, FIRST BYTE RIGHT
3899    001457
3900    001457  MB8:   A,17  B,R1          ALUF,PASSD           ALUD,B
3901    001457         IDBS,BMG                       T,JMP    T,PUSH
3902    001457         RBTR;
3903    001460
3904    001460               B,R2          ALUF,B+1             ALUD,B
3905    001460         IDBS,ALU                       T,NEXT   T,HOLD;
3906    001461
3907    001461               B,A           ALUF,B+1             ALUD,B
3908    001461         IDBS,ALU                       T,NEXT   T,HOLD;
3909    001462
3910    001462               B,D           ALUF,B-1             ALUD,B
3911    001462         IDBS,ALU                       T,JMP    T,PUSH
3912    001462         TTDCR;
3913    001463
3914    001463         A,R1  B,D           ALUF,MASKAB          ALUD,B
3915    001463         IDBS,ALU                       T,JMP    T,PUSH
3916    001463         FWLOO;
3917    001464
3918    001464                                                 ALUD,NONE
3919    001464         IDBS,ALU                       T,JMP    T,HOLD
3920    001464         MB21;
3921    001465
3922    001465
3923    001465  MB7T:  A,D   B,T           ALUF,XORAB           ALUD,Q
3924    001465         IDBS,ALU                       T,JMP    T,PUSH
3925    001465         TOLAP;
3926    001466
3927    001466         A,R5  B,STS         ALUF,PASSA           ALUD,SRB
3928    001466         IDBS,ALU                       T,NEXT   T,POP
3929    001466         CONDENABL;
3930    001467
3931    001467
3932    001467  %*****************************************
3933    001467  % BACKWARD ALIGNED, FIRST BYTE RIGHT
3934    001467
3935    001467  MB7:   A,STS B,R2           ALUF,A+B             ALUD,B
3936    001467         IDBS,ALU                       T,NEXT   T,HOLD
3937    001467         COND,F=0                       F,NEXT   F,HOLD;
3938    001470
3939    001470         A,R5  B,1           ALUF,ANDDA           ALUD,NONE
3940    001470         IDBS,BARG                      T,NEXT   T,HOLD;
3941    001471
3942    001471         A,STS B,R3          ALUF,A+B             ALUD,B
3943    001471         IDBS,ALU                       T,JMP    T,PUSH
3944    001471         LBTL1 CONDENABL;
3945    001472
3946    001472                                                 ALUD,NONE
3947    001472         IDBS,ALU                       T,JMP    T.PUSH
3948    001472         BWLOO;
3949    001473
3950    001473               B,P           ALUF,B+1             ALUD,B
3951    001473         IDBS,ALU                       T,JMP    T,PUSH
3952    001473         MBXBW;
3953    001474
3954    001474         A,T   B,R4          ALUF,PASSA           ALUD,B
3955    001474         IDBS,ALU                       T,JMP    T,PUSH
3956    001474         RBTR;
3957    001475
3958    001475  MB71:        B,X           ALUF,B-1             ALUD,B
3959    001475         IDBS,ALU                       T,NEXT   T,HOLD;
3960    001476
3961    001476         A,R4  B,T           ALUF,PASSA           ALUD,B
3962    001476         IDBS,ALU                       T,JMP    T,HOLD
3963    001476         CONT;
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3964    001477
3965    001477  MB5T6:  A,A   B,X             ALUF,A-B            ALUD,NONE
3966    001477          IDBS,ALU                          T,NEXT    T,HOLD
3967    001477          COND,CRY                          F,JMP     F,PUSH;
3968    001500
3969    001500          A,17  B,R1            ALUF,PASSD          ALUD,B
3970    001500          IDBS,BMG                          T,NEXT    T,HOLD
3971    001500          MB5T CONDENABL;
3972    001501
3973    001501
3974    001501  %*****************************************
3975    001501  % FORWARDS SWAP, FIRST BYTE RIGHT
3976    001501
3977    001501  MB6:                                                ALUD,NONE
3978    001501          IDBS,ALU                          T,JMP     T,PUSH
3979    001501          FWEXL;
3980    001502
3981    001502                                                      ALUD,NONE
3982    001502          IDBS,ALU                          T,JMP     T,HOLD
3983    001502          MB41;
3984    001503
3985    001503
3986    001503  MB5T:   A,D   B,T             ALUF,XORAB          ALUD,Q
3987    001503          IDBS,ALU                          T,JMP     T,PUSH
3988    001503          TOLAP;
3989    001504
3990    001504          A,R5  B,STS           ALUF,PASSA          ALUD,SRB
3991    001504          IDBS,ALU                          T,NEXT    T,POP
3992    001504          CONDENABL;
3993    001505
3994    001505
3995    001505  %*********************************************
3996    001505  % BACKWARD SWAP, FIRST BYTE RIGHT
3997    001505
3998    001505  MB5:    A,STS B,R2            ALUF,A+B            ALUD,B
3999    001505          IDBS,ALU                          T,NEXT    T,HOLD
4000    001505          COND,F=0                          F,NEXT    F,HOLD;
4001    001506
4002    001506          A,R5  B,1             ALUF,ANDDA          ALUD,NONE
4003    001506          IDBS,BARG                         T,NEXT    T,HOLD;
4004    001507
4005    001507          A,R4  B,R3            ALUF,A+B            ALUD,B
4006    001507          IDBS,ALU                          T,JMP     T,HOLD
4007    001507          MB51 CONDENABL;
4008    001510
4009    001510                B,D             ALUF,B-1            ALUD,B
4010    001510          IDBS,ALU                          T,JMP     T,PUSH
4011    001510          RBTL;
4012    001511
4013    001511          A,R4                  ALUF,PASSA          ALUD,Q
4014    001511          IDBS,ALU                          T,JMP     T,PUSH
4015    001511          BWEXQ;
4016    001512
4017    001512                                                      ALUD,NONE
4018    001512          IDBS,ALU                          T,JMP     T,HOLD
4019    001512          MB52;
4020    001513
4021    001513  MB51:                                               ALUD,NONE
4022    001513          IDBS,ALU                          T,JMP     T,PUSH
4023    001513          BWEXL;
4024    001514
4025    001514  MB52:                                               ALUD,NONE
4026    001514          IDBS,ALU                          T,JMP     T,PUSH
4027    001514          MBXBW;
4028    001515
4029    001515                B,P             ALUF,B+1            ALUD,B
4030    001515          IDBS,ALU                          T,JMP     T,HOLD
4031    001515          CONT;
4032    001516
4033    001516
4034    001516  MB1T4:  A,R5  B,R4            ALUF,A-1   ALUM,MIC ALUD,SRB
4035    001516          IDBS,ALU                          T,NEXT    T,HOLD
4036    001516          MB1T2 CONDENABL;
4037    001517
4038    001517          A,A   B,X             ALUF,B-A            ALUD,NONE
4039    001517          IDBS,ALU                          T,NEXT    T,HOLD
4040    001517          COND,CRY                          F,NEXT    F,HOLD;
4041    001520
4042    001520          A,17  B,R1            ALUF,PASSD          ALUD,B
4043    001520          IDBS,BMG                          T,JMP     T,PUSH
4044    001520          MB3T CONDENABL;
```

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4045    001521
4046    001521
4047    001521  %*****************************************
4048    001521  % FORWARD SWAP, FIRST BYTE LEFT
4049    001521
4050    001521  MB4:    A,R1  B,T           ALUF,MASKAB         ALUD,B
4051    001521          IDBS,ALU                    T,JMP       T,PUSH
4052    001521          LBTR;
4053    001522
4054    001522          A,R1  B,D           ALUF,ORAB           ALUD,B
4055    001522          IDBS,ALU                    T,JMP       T,PUSH
4056    001522          TTDCR;
4057    001523
4058    001523          A,R4                ALUF,PASSA          ALUD,Q
4059    001523          IDBS,ALU                    T,JMP       T,PUSH
4060    001523          FWEXQ;
4061    001524
4062    001524  MB41:       B,R1            ALUF,PASSQ          ALUD,B
4063    001524          IDBS,ALU                    T,JMP       T,PUSH
4064    001524          MBXFW;
4065    001525
4066    001525          A,R5  B,1           ALUF,ANDDA          ALUD,NONE
4067    001525          IDBS,BARG                   T,NEXT      T,HOLD
4068    001525          COND,F=0                    F,JMP       F,PUSH;
4069    001526
4070    001526          A,R1                ALUF,PASSA          ALUD,Q
4071    001526          IDBS,ALU                    T,NEXT      T,HOLD
4072    001526          BTL CONDENABL;
4073    001527
4074    001527              B,P             ALUF,B+1            ALUD,B
4075    001527          IDBS,ALU                    T,JMP       T,HOLD
4076    001527          CONT;
4077    001530
4078    001530  MB3T:   A,D   B,T           ALUF,XORAB          ALUD,Q
4079    001530          IDBS,ALU                    T,JMP       T,PUSH
4080    001530          TOLAP;
4081    001531
4082    001531          A,R5  B,STS         ALUF,PASSA          ALUD,SRB
4083    001531          IDBS,ALU                    T,NEXT      T,POP
4084    001531          CONDENABL;
4085    001532
4086    001532
4087    001532  %*****************************************
4088    001532  % BACKWARD SWAP, FIRST BYTE LEFT
4089    001532
4090    001532  MB3:    A,R4  B,R2          ALUF,A+B            ALUD,B
4091    001532          IDBS,ALU                    T,NEXT      T,HOLD
4092    001532          COND,F=0                    F,NEXT      F,HOLD;
4093    001533
4094    001533          A,R5  B,1           ALUF,ANDDA          ALUD,NONE
4095    001533          IDBS,BARG                   T,NEXT      T,HOLD;
4096    001534
4097    001534          A,STS B,R3          ALUF,A+B            ALUD,B
4098    001534          IDBS,ALU                    T,JMP       T,HOLD
4099    001534          MB31 CONDENABL;
4100    001535
4101    001535                                                  ALUD,NONE
4102    001535          IDBS,ALU                    T,JMP       T,PUSH
4103    001535          BWEXL;
4104    001536
4105    001536  MB32:       B,R1            ALUF,PASSQ          ALUD,B
4106    001536          IDBS,ALU                    T,JMP       T,PUSH
4107    001536          MBXBW;
4108    001537
4109    001537          A,T   B,R4          ALUF,PASSA          ALUD,B
4110    001537          IDBS,ALU                    T,NEXT      T,HOLD;
4111    001540
4112    001540          A,R1                ALUF,PASSA          ALUD,Q
4113    001540          IDBS,ALU                    T,JMP       T,PUSH
4114    001540          BTR;
4115    001541
4116    001541              B,P             ALUF,B+1            ALUD,B
4117    001541          IDBS,ALU                    T,JMP       T,HOLD
4118    001541          MB71;
4119    001542
4120    001542  MB31:       B,D             ALUF,B-1            ALUD,B
4121    001542          IDBS,ALU                    T,JMP       T,PUSH
4122    001542          RBTL;
4123    001543
4124    001543          A,R4                ALUF,PASSA          ALUD,Q
4125    001543          IDBS,ALU                    T,JMP       T,PUSH
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4126    001543          BWEXQ;
4127    001544
4128    001544                                                          ALUD,NONE
4129    001544          IDBS,ALU                        T,JMP           T,HOLD
4130    001544          MB32;
4131    001545
4132    001545  MB1T2:  A,A   B,X               ALUF,B-A                ALUD,NONE
4133    001545          IDBS,ALU                        T,NEXT          T,HOLD
4134    001545          COND,CRY                        F,NEXT          F,HOLD;
4135    001546
4136    001546          A,17  B,R1              ALUF,PASSD              ALUD,B
4137    001546          IDBS,BMG                        T,JMP           T,PUSH
4138    001546          MB1T CONDENABL;
4139    001547
4140    001547
4141    001547  %*************************************************
4142    001547  % FORWARD ALIGNED, FIRST BYTE LEFT
4143    001547
4144    001547  MB2:                                                    ALUD,NONE
4145    001547          IDBS,ALU                        T,JMP           T,PUSH
4146    001547          FWLOO;
4147    001550
4148    001550  MB21:                                                   ALUD,NONE
4149    001550          IDBS,ALU                        T,JMP           T,PUSH
4150    001550          MBXFW;
4151    001551
4152    001551          A,R5  B,1               ALUF,ANDDA              ALUD,NONE
4153    001551          IDBS,BARG                       T,NEXT          T,HOLD
4154    001551          COND,F=0                        F,JMP           F,PUSH;
4155    001552
4156    001552                                                          ALUD,NONE
4157    001552          IDBS,ALU                        T,NEXT          T,HOLD
4158    001552          LBTL CONDENABL;
4159    001553
4160    001553                B,P               ALUF,B+1                ALUD,B
4161    001553          IDBS,ALU                        T,JMP           T,HOLD
4162    001553          CONT;
4163    001554
4164    001554  MB1T:   A,D   B,T               ALUF,XORAB              ALUD,Q
4165    001554          IDBS,ALU                        T,JMP           T,PUSH
4166    001554          TOLAP;
4167    001555
4168    001555                                                          ALUD,NONE
4169    001555          IDBS,ALU                        T,NEXT          T,POP
4170    001555          CONDENABL;
4171    001556
4172    001556
4173    001556  %*********************************************
4174    001556  % BACKWARD ALIGNED, FIRST BYTE LEFT
4175    001556
4176    001556  MB1:    A,R4  B,R2              ALUF,A+B                ALUD,B
4177    001556          IDBS,ALU                        T,NEXT          T,HOLD
4178    001556          COND,F=0                        F,JMP           F,PUSH;
4179    001557
4180    001557          A,R5  B,1               ALUF,ANDDA              ALUD,NONE
4181    001557          IDBS,BARG                       T,NEXT          T,HOLD;
4182    001560
4183    001560          A,R4  B,R3              ALUF,A+B                ALUD,B
4184    001560          IDBS,ALU                        T,NEXT          T,HOLD
4185    001560          LBTL1 CONDENABL;
4186    001561
4187    001561                                                          ALUD,NONE
4188    001561          IDBS,ALU                        T,JMP           T,PUSH
4189    001561          BWLOO;
4190    001562
4191    001562                                                          ALUD,NONE
4192    001562          IDBS,ALU                        T,JMP           T,PUSH
4193    001562          MBXBW;
4194    001563
4195    001563                B,P               ALUF,B+1                ALUD,B
4196    001563          IDBS,ALU                        T,JMP           T,HOLD
4197    001563          CONT;
4198    001564
4199    001564
4200    001564
4201    001564
4202    001564
4203    001564
4204    001564
4205    001564
4206    001564  %*************************************************
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4207  001564  % SUBROUTINE TO TEST ILLEGAL OVERLAP OF SOURCE AND DESTINATION
4208  001564
4209  001564  TOLAP: A,16                    ALUF,ANDDQ          ALUD,NONE
4210  001564         IDBS,BMG                       T,NEXT      T,HOLD
4211  001564         COND,F=0                       F,RETURN    F,POP;
4212  001565
4213  001565                                 ALUF,PASSD          ALUD,Q
4214  001565         IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4215  001565         10000 CONDENABL;
4216  001566
4217  001566         A,D                     ALUF,ANDDA          ALUD,NONE
4218  001566         IDBS,GPR                       T,NEXT      T,HOLD;
4219  001567
4220  001567         AB,SSAVE                ALUF,ZERO           ALUD,Q
4221  001567         IDBS,STS                COMM,EWRF T,NEXT    T,HOLD
4222  001567         CONDENABL;
4223  001570
4224  001570         A,17  B,R5 MIS,ROT      ALUF,PASSB          ALUD,SRB
4225  001570         IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD;
4226  001571
4227  001571         A,D                     ALUF,ANDDA          ALUD,Q
4228  001571         IDBS,GPR                       T,NEXT      T,HOLD;
4229  001572
4230  001572         A,R5                    ALUF,A+Q            ALUD,Q  STS,EA
4231  001572         IDBS,ALU                       T,NEXT      T,HOLD;
4232  001573
4233  001573                                                     ALUD,NONE
4234  001573         IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4235  001573         3777;
4236  001574
4237  001574         A,R5  B,R6              ALUF,ANDDA          ALUD,B
4238  001574         IDBS,GPR                       T,NEXT      T,HOLD;
4239  001575
4240  001575         A,A   B,R6              ALUF,A+B            ALUD,B  CRY,C
4241  001575         IDBS,ALU                       T,NEXT      T,HOLD;
4242  001576
4243  001576         AB,SSAVE                                   ALUD,NONE  STS,LO
4244  001576         IDBS,REG                       T,JMP       T,PUSH
4245  001576         OLAP1;
4246  001577
4247  001577
4248  001577  %*****************************************
4249  001577  % RETURN HERE MEANS NO OVERLAP
4250  001577
4251  001577               B,R5  MIS,ROT      ALUF,PASSB          ALUD,SLB
4252  001577         IDBS,ALU                       T,NEXT      T,HOLD;
4253  001600
4254  001600               B,1                ALUF,PASSD          ALUD,Q
4255  001600         IDBS,BARG                      T,RETURN    T,POP
4256  001600         COND,F=0                       F,RETURN    F,POP;
4257  001601
4258  001601
4259  001601
4260  001601
4261  001601  OLAP1: A,X   B,R6              ALUF,B-A            ALUD,B
4262  001601         IDBS,ALU                       T,NEXT      T,HOLD
4263  001601         COND,CRY                       F,RETURN    F,POP;
4264  001602
4265  001602         A,14  B,R6              ALUF,PASSB          ALUD,NONE
4266  001602         IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD
4267  001602         CONDENABL  COND,F=0             F,NEXT      F,HOLD;
4268  001603
4269  001603         A,17                    ALUF,ANDDQ          ALUD,NONE
4270  001603         IDBS,BMG                       T,JMP       T,HOLD
4271  001603         OXEQ6 CONDENABL;
4272  001604
4273  001604
4274  001604
4275  001604
4276  001604  %*************************************************
4277  001604  % OVERLAP EXISTS, ILLEGAL IF  'MOVBF'
4278  001604
4279  001604  OVLAP: A,T                     ALUF,ANDDA          ALUD,NONE
4280  001604         IDBS,GPR                       T,NEXT      T,POP
4281  001604         COND,F=0                       F,JMP       F,HOLD;
4282  001605
4283  001605         A,14  B,R5  MIS,ROT     ALUF,PASSB          ALUD,SLB
4284  001605         IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD
4285  001605         MBERR CONDENABL;
4286  001606
4287  001606         A,D   B,D               ALUF,ORDA           ALUD,B
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4288  001606          IDBS,GPR                        T,NEXT    T,HOLD;
4289  001607
4290  001607                                ALUF,ZERO           ALUD,Q
4291  001607          IDBS,ALU                        T,RETURN  T,POP
4292  001607          COND,F=0                        F,RETURN  F,POP;
4293  001610
4294  001610
4295  001610
4296  001610
4297  001610
4298  001610  OXEQ6:  A,T                   ALUF,PASSA          ALUD,NONE
4299  001610          IDBS,ALU                        T,RETURN  T,POP
4300  001610          CONDENABL COND,F15              F,JMP     F,HOLD;
4301  001611
4302  001611                                                    ALUD,NONE
4303  001611          IDBS,ALU                        T,RETURN  T,POP
4304  001611          OVLAP CONDENABL;
4305  001612
4306  001612
4307  001612
4308  001612
4309  001612
4310  001612  %*************************************************
4311  001612  % FORWARDS MOVE LOOP IS INTERRUPTED
4312  001612
4313  001612  IRQFW:  A,R4   B,R1             ALUF,A-B            ALUD,Q
4314  001612          IDBS,ALU                        T,NEXT    T,HOLD;
4315  001613
4316  001613          A,A    B,A              ALUF,A+Q+1          ALUD,B
4317  001613          IDBS,ALU                        T,NEXT    T,HOLD;
4318  001614
4319  001614          A,14   B,R1             ALUF,Q+1            ALUD,SLB
4320  001614          IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD;
4321  001615
4322  001615          A,T                     ALUF,ANDDA          ALUD,NONE
4323  001615          IDBS,GPR                        T,NEXT    T,HOLD
4324  001615          COND,F=0                        F,NEXT    F,HOLD;
4325  001616
4326  001616          A,X    B,X              ALUF,A+Q+1          ALUD,B
4327  001616          IDBS,ALU                        T,JMP     T,HOLD
4328  001616          MOVB4 CONDENABL;
4329  001617
4330  001617          A,R1   B,T              ALUF,B-A            ALUD,B
4331  001617          IDBS,ALU                        T,JMP     T,HOLD
4332  001617          MOVB4;
4333  001620
4334  001620
4335  001620
4336  001620
4337  001620  %*************************************************
4338  001620  % BACKWARDS MOVE LOOP IS INTERRUPTED
4339  001620
4340  001620  IRQBW:  A,R4   B,R1             ALUF,A-B            ALUD,Q
4341  001620          IDBS,ALU                        T,NEXT    T,HOLD;
4342  001621
4343  001621                B,R1              ALUF,Q+1            ALUD,SLB
4344  001621          IDBS,ALU                        T,NEXT    T,HOLD;
4345  001622
4346  001622  MOVB4:  A,R1   B,D              ALUF,B-A            ALUD,B
4347  001622          IDBS,ALU                        T,NEXT    T,HOLD;
4348  001623
4349  001623                B,P               ALUF,B-1            ALUD,B
4350  001623          IDBS,ALU                        T,JMP     T,HOLD
4351  001623          CONT;
4352  001624
4353  001624
4354  001624
4355  001624
4356  001624
4357  001624  %*************************************************
4358  001624  % ILLEGAL OVERLAP IN MOVBF-INSTRUCTION
4359  001624
4360  001624  MBERR:                                              ALUD,NONE
4361  001624          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4362  001624          30000;
4363  001625
4364  001625          A,T    B,T              ALUF,MASKDA         ALUD,B
4365  001625          IDBS,GPR                        T,JMP     T,HOLD
4366  001625          CONT;
4367  001626
4368  001626
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4369    001626
4370    001626
4371    001626
4372    001626
4373    001626
4374    001626
4375    001626  %*********************************************************
4376    001626  % SUBROUTINE TO ADJUST BYTE POINTERS WHEN FORWARDS MOVE IS FINISHED
4377    001626
4378    001626  MBXFW: A,R5  B,R6            ALUF,PASSA MIS,ROT  ALUD,SRB
4379    001626         IDBS,ALU                        T,JMP     T,PUSH
4380    001626         MBXSR;
4381    001627
4382    001627  MOVB0: A,T                   ALUF,PASSA          ALUD,Q
4383    001627         IDBS,ALU                        T,NEXT    T,HOLD
4384    001627         COND,F=0                        F,NEXT    F,HOLD;
4385    001630
4386    001630         A,14                  ALUF,ANDDQ          ALUD,NONE
4387    001630         IDBS,BMG                        T,NEXT    T,HOLD;
4388    001631
4389    001631                                                   ALUD,NONE
4390    001631         IDBS,ALU                        T,JMP     T,HOLD
4391    001631         MBX1 CONDENABL;
4392    001632
4393    001632  MOVBX:                       ALUF,PASSD          ALUD,Q
4394    001632         IDBS,ARG                        T,NEXT    T,HOLD
4395    001632         147777;
4396    001633
4397    001633         A,T   B,T             ALUF,ANDAQ          ALUD,B
4398    001633         IDBS,ALU                        T,NEXT    T,HOLD;
4399    001634
4400    001634         A,R5  B,T             ALUF,B-A            ALUD,B
4401    001634         IDBS,ALU                        T,NEXT    T,HOLD;
4402    001635
4403    001635         A,R5  B,D             ALUF,B-A            ALUD,B
4404    001635         IDBS,ALU                        T,RETURN  T,POP;
4405    001636
4406    001636
4407    001636
4408    001636
4409    001636
4410    001636
4411    001636
4412    001636  %*********************************************************
4413    001636  % SUBROUTINE TO ADJUST BYTE POINTERS WHEN BACKWARDS MOVE IS FINISHED
4414    001636
4415    001636  MBXBW:       B,R6            ALUF,PASSD          ALUD,B
4416    001636         IDBS,ARG                        T,NEXT    T,HOLD
4417    001636         7777;
4418    001637
4419    001637         A,T   B,R6            ALUF,ANDAB MIS,ROT  ALUD,SRB
4420    001637         IDBS,ALU                        T,JMP     T,PUSH
4421    001637         MBXSR;
4422    001640
4423    001640  MBX1:                        ALUF,PASSD          ALUD,Q
4424    001640         IDBS,ARG                        T,NEXT    T,HOLD
4425    001640         147777;
4426    001641
4427    001641         A,T   B,T             ALUF,ANDAQ          ALUD,B
4428    001641         IDBS,ALU                        T,NEXT    T,HOLD;
4429    001642
4430    001642                               ALUF,PASSD          ALUD,Q
4431    001642         IDBS,ARG                        T,NEXT    T,HOLD
4432    001642         170000;
4433    001643
4434    001643         A,D   B,D             ALUF,ANDAQ          ALUD,B
4435    001643         IDBS,ALU                        T,RETURN  T,POP;
4436    001644
4437    001644
4438    001644
4439    001644  %*********************************************
4440    001644  % SUBROUTINE USED BY MBXFW AND MBXBW
4441    001644
4442    001644  MBXSR: AB,SSAVE                                  ALUD,NONE
4443    001644         IDBS,STS               COMM,EWRF T,JMP    T,PUSH
4444    001644         MBXS1;
4445    001645
4446    001645         A,R4  B,D              ALUF,A+B           ALUD,B    STS,EA
4447    001645         IDBS,ALU                        T,NEXT    T,HOLD;
4448    001646
4449    001646         A,R6  B,A              ALUF,A+B           ALUD,B    CRY,C
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4450   001646          IDBS,ALU                          T,NEXT    T,HOLD;
4451   001647
4452   001647                                ALUF,PASSD            ALUD,Q
4453   001647          IDBS,ARG                          T,NEXT    T,HOLD
4454   001647          167777;
4455   001650
4456   001650          A,D   B,D             ALUF,ANDAQ            ALUD,B
4457   001650          IDBS,ALU                          T,NEXT    T,HOLD;
4458   001651
4459   001651          AB,SSAVE                                    ALUD,NONE STS,LO
4460   001651          IDBS,REG                          T,RETURN  T,POP;
4461   001652
4462   001652
4463   001652
4464   001652
4465   001652
4466   001652
4467   001652  %*************************************************
4468   001652  % SUBROUTINE TO READ WORD [R2] INTO R10
4469   001652
4470   001652  RDSRC: A,R7  B,D              ALUF,ANDAB            ALUD,NONE
4471   001652          IDBS,ALU                          T,NEXT    T,HOLD
4472   001652          COND,F=0                          F,NEXT    F,HOLD;
4473   001653
4474   001653          A,R2                  ALUF,PASSA            ALUD,NONE
4475   001653          IDBS,ALU                          T,JMP     T,HOLD
4476   001653          RDSR2 CONDENABL;
4477   001654
4478   001654                                                      ALUD,NONE
4479   001654          IDBS,ALU          COMM,RDRQ,APT T,NEXT      T,HOLD;
4480   001655
4481   001655  RDSR3:        B,STS           ALUF,PASSD            ALUD,B
4482   001655          IDBS,DBR                          T,RETURN  T,POP;
4483   001656
4484   001656  RDSR2:                                              ALUD,NONE
4485   001656          IDBS,ALU           COMM,RDRQ,PT T,JMP       T,HOLD
4486   001656          RDSR3;
4487   001657
4488   001657
4489   001657
4490   001657
4491   001657  %*************************************************
4492   001657  % SUBROUTINE TO INCREMENT R3
4493   001657
4494   001657  R3INC:        B,R3            ALUF,B+1              ALUD,B
4495   001657          IDBS,ALU                          T,RETURN  T,POP
4496   001657          COND,F=0                          F,JMP     F,PUSH;
4497   001660
4498   001660
4499   001660
4500   001660
4501   001660  %*************************************
4502   001660  % SUBROUTINE TO DECREMENT R3
4503   001660
4504   001660  R3DCR:        B,R3            ALUF,B-1              ALUD,B
4505   001660          IDBS,ALU                          T,RETURN  T,POP
4506   001660          COND,F=0                          F,JMP     F,PUSH;
4507   001661
4508   001661
4509   001661
4510   001661
4511   001661
4512   001661
4513   001661
4514   001661
4515   001661
4516   001661
4517   001661  %*********************************************************
4518   001661  % SUBROUTINE TO MOVE WORDS FORWARDS, BYTES ALIGNED
4519   001661
4520   001661  FWLOO: A,R5  B,R1              ALUF,PASSA ALUM,MIC   ALUD,SRB
4521   001661          IDBS,ALU                          T,JMP     T,PUSH
4522   001661          FWFST;
4523   001662
4524   001662  FWLO1:                                              ALUD,NONE
4525   001662          IDBS,ALU                          T,RETURN  T,POP
4526   001662          RDSRC CONDENABL;
4527   001663
4528   001663                                                      ALUD,NONE
4529   001663          IDBS,ALU                          T,JMP     T,PUSH
4530   001663          WRDST;
```

```
4531  001664
4532  001664              B,R2          ALUF,B+1          ALUD,B
4533  001664        IDBS,ALU                      T,JMP     T,HOLD
4534  001664        IRQFW CONDENABL;
4535  001665
4536  001665              B,R3          ALUF,B+1          ALUD,B
4537  001665        IDBS,ALU                      T,NEXT    T,HOLD
4538  001665        COND,F=0                      F,JMP     F,PUSH;
4539  001666
4540  001666              B,R1          ALUF,B-1          ALUD,B
4541  001666        IDBS,ALU                      T,JMP     T,HOLD
4542  001666        FWLO1;
4543  001667
4544  001667
4545  001667
4546  001667
4547  001667
4548  001667  %*******************************************************
4549  001667  % SUBROUTINE TO MOVE WORDS BACKWARDS, BYTES ALIGNED
4550  001667
4551  001667  BWLOO: A,R5  B,R1          ALUF,PASSA ALUM,MIC ALUD,SRB
4552  001667        IDBS,ALU                      T,JMP     T,PUSH
4553  001667        LSET1;
4554  001670
4555  001670  BWLO1:                                        ALUD,NONE
4556  001670        IDBS,ALU                      T,RETURN  T,POP
4557  001670        RDSRC CONDENABL;
4558  001671
4559  001671                                                ALUD,NONE
4560  001671        IDBS,ALU                      T,JMP     T,PUSH
4561  001671        WRDST;
4562  001672
4563  001672              B,R2          ALUF,B-1          ALUD,B
4564  001672        IDBS,ALU                      T,JMP     T,HOLD
4565  001672        IRQBW CONDENABL;
4566  001673
4567  001673              B,R3          ALUF,B-1          ALUD,B
4568  001673        IDBS,ALU                      T,NEXT    T,HOLD
4569  001673        COND,F=0                      F,JMP     F,PUSH;
4570  001674
4571  001674              B,R1          ALUF,B-1          ALUD,B
4572  001674        IDBS,ALU                      T,JMP     T,HOLD
4573  001674        BWLO1;
4574  001675
4575  001675
4576  001675
4577  001675
4578  001675
4579  001675  %*******************************************************
4580  001675  % SUBROUTINE TO MOVE WORDS FORWARDS, BYTES SWAPPED
4581  001675
4582  001675  FWEXL:                                        ALUD,NONE
4583  001675        IDBS,ALU                      T,JMP     T,PUSH
4584  001675        RDSRC;
4585  001676
4586  001676        A,Z   B,STS         ALUF,ANDAB          ALUD,NONE
4587  001676        IDBS,ALU                      T,NEXT    T,HOLD;
4588  001677
4589  001677                            ALUF,PASSD          ALUD,Q
4590  001677        IDBS,SWAP                     T,NEXT    T,HOLD;
4591  001700
4592  001700
4593  001700  %*************************************************************
4594  001700  % ALTERNATIVE ENTRY IF FIRST BYTE ALREADY PRESENT IN Q
4595  001700
4596  001700
4597  001700  FWEXQ:      B,R2          ALUF,B+1          ALUD,B
4598  001700        IDBS,ALU                      T,NEXT    T,HOLD;
4599  001701
4600  001701        A,R5  B,R1          ALUF,PASSA ALUM,MIC ALUD,SRB
4601  001701        IDBS,ALU                      T,JMP     T,PUSH
4602  001701        LSET1;
4603  001702
4604  001702  FWEX1:                                        ALUD,NONE
4605  001702        IDBS,ALU                      T,RETURN  T,POP
4606  001702        RDSRC CONDENABL;
4607  001703
4608  001703        A,Z   B,STS         ALUF,ANDDA          ALUD,B
4609  001703        IDBS,SWAP           COMM,LDGPR T,NEXT   T,HOLD;
4610  001704
4611  001704              B,R6          ALUF,PASSD          ALUD,B
```

```
4612   001704          IDBS,GPR                          T,NEXT    T,HOLD;
4613   001705
4614   001705          A,STS B,STS          ALUF,ORAQ              ALUD,B
4615   001705          IDBS,ALU                          T,JMP     T,PUSH
4616   001705          WRDST;
4617   001706
4618   001706          A,Z   B,R6           ALUF,MASKAB            ALUD,Q
4619   001706          IDBS,ALU                          T,JMP     T,HOLD
4620   001706          IRQFW CONDENABL;
4621   001707
4622   001707                B,R2           ALUF,B+1               ALUD,B
4623   001707          IDBS,ALU                          T,JMP     T,PUSH
4624   001707          R3INC;
4625   001710
4626   001710                B,R1           ALUF,B-1               ALUD,B
4627   001710          IDBS,ALU                          T,JMP     T,HOLD
4628   001710          FWEX1;
4629   001711
4630   001711
4631   001711
4632   001711
4633   001711
4634   001711
4635   001711   %*******************************************************
4636   001711   % SUBROUTINE TO MOVE BYTES BACKWARDS, BYTES SWAPPED
4637   001711
4638   001711   BWEXL:                                                  ALUD,NONE
4639   001711          IDBS,ALU                          T,JMP     T,PUSH
4640   001711          RDSRC;
4641   001712
4642   001712          A,STS B,R2           ALUF,B-1               ALUD,B,YA
4643   001712          IDBS,ALU                          T,NEXT    T,HOLD;
4644   001713
4645   001713          A,Z                  ALUF,ANDDA             ALUD,Q
4646   001713          IDBS,SWAP                         T,NEXT    T,HOLD;
4647   001714
4648   001714
4649   001714   %*******************************************************
4650   001714   % ALTERNATIVE ENTRY IF FIRST BYTE ALREADY PRESENT IN Q
4651   001714
4652   001714   BWEXQ: A,R5  B,R1           ALUF,PASSA ALUM,MIC    ALUD,SRB
4653   001714          IDBS,ALU                          T,JMP     T,PUSH
4654   001714          LSET1;
4655   001715
4656   001715   BWEX1:                                                  ALUD,NONE
4657   001715          IDBS,ALU                          T,RETURN  T,POP
4658   001715          RDSRC CONDENABL;
4659   001716
4660   001716          A,Z   B,R6           ALUF,ANDDA             ALUD,B
4661   001716          IDBS,SWAP            COMM,LDGPR T,NEXT      T,HOLD;
4662   001717
4663   001717                B,STS          ALUF,PASSD             ALUD,B
4664   001717          IDBS,GPR                          T,NEXT    T,HOLD;
4665   001720
4666   001720          A,Z   B,STS          ALUF,MASKAB            ALUD,B
4667   001720          IDBS,ALU                          T,NEXT    T,HOLD;
4668   001721
4669   001721          A,STS B,STS          ALUF,ORAQ              ALUD,B
4670   001721          IDBS,ALU                          T,JMP     T,PUSH
4671   001721          WRDST;
4672   001722
4673   001722          A,R6                 ALUF,PASSA             ALUD,Q
4674   001722          IDBS,ALU                          T,JMP     T,HOLD
4675   001722          IRQBW CONDENABL;
4676   001723
4677   001723                B,R2           ALUF,B-1               ALUD,B
4678   001723          IDBS,ALU                          T,JMP     T,PUSH
4679   001723          R3DCR;
4680   001724
4681   001724                B,R1           ALUF,B-1               ALUD,B
4682   001724          IDBS,ALU                          T,JMP     T,HOLD
4683   001724          BWEX1;
4684   001725
4685   001725
4686   001725
4687   001725   %*******************************************************
4688   001725   % SUBROUTINE TO MOVE WORDS ALIGNED FORWARDS AS LONG AS >10 ARE LEFT
4689   001725   % OPTIMIZED AGAINST SPEED
4690   001725
4691   001725
4692   001725   FWFST: A,R1  B,7             ALUF,PASSA             ALUD,Q
```

```
4693    001725          IDBS,BARG               COMM,LDLC T,NEXT    T,HOLD
4694    001725          COND,F15                          F,NEXT    F,HOLD;
4695    001726
4696    001726                                  ALUF,Q-D            ALUD,NONE
4697    001726          IDBS,ARG                          T,NEXT    T,HOLD
4698    001726          40;
4699    001727
4700    001727          A,R1  B,R4              ALUF,PASSA          ALUD,B
4701    001727          IDBS,ALU                          T,RETURN  T,POP
4702    001727          CONDENABL COND,F=0                F,JMP     F,PUSH;
4703    001730
4704    001730                                                      ALUD,NONE
4705    001730          IDBS,ALU                          T,NEXT    T,PUSH
4706    001730          COND,LC=0;
4707    001731
4708    001731          A,PIL B,LC              ALUF,PASSB          ALUD,NONE
4709    001731          IDBS,ALU                COMM,EWRF T,JMP     T,LOAD
4710    001731          LCOUNT FWLO2;
4711    001732
4712    001732                                                      ALUD,NONE
4713    001732          IDBS,ALU                          T,NEXT    T,PUSH
4714    001732          COND,LC=0;
4715    001733
4716    001733          A,PIL B,LC              ALUF,PASSD          ALUD,B
4717    001733          IDBS,REG                          T,NEXT    T,POP
4718    001733          LCOUNT;
4719    001734
4720    001734          A,R4                    ALUF,PASSA          ALUD,NONE
4721    001734          IDBS,ALU                          T,RETURN  T,POP
4722    001734          COND,F=0                          F,JMP     F,PUSH;
4723    001735
4724    001735  FWLO2:  A,R1  B,11              ALUF,A-D            ALUD,NONE
4725    001735          IDBS,BARG                         T,NEXT    T,HOLD
4726    001735          COND,F15                          F,NEXT    F,HOLD;
4727    001736
4728    001736          A,R7  B,7               ALUF,PASSA          ALUD,Q
4729    001736          IDBS,BARG               COMM,LDLC T,RETURN  T,POP
4730    001736          CONDENABL COND,F=0                F,NEXT    F,HOLD;
4731    001737
4732    001737          A,PIL B,D               ALUF,ANDDQ          ALUD,NONE
4733    001737          IDBS,REG                          T,JMP     T,PUSH
4734    001737          FWLO3;
4735    001740
4736    001740                B,LC              ALUF,PASSD          ALUD,B
4737    001740          IDBS,DBR        COMM,AREAD,NEXT   T,NEXT    T,POP
4738    001740          LCOUNT;
4739    001741
4740    001741                B,LC              ALUF,PASSD          ALUD,B
4741    001741          IDBS,DBR                          T,NEXT    T,HOLD;
4742    001742
4743    001742                B,6                                   ALUD,NONE
4744    001742          IDBS,BARG               COMM,LDLC T,NEXT    T,HOLD
4745    001742          COND,F=0                          F,NEXT    F,HOLD;
4746    001743
4747    001743          A,PIL B,T               ALUF,ANDDQ          ALUD,NONE
4748    001743          IDBS,REG                          T,JMP     T,PUSH
4749    001743          FWLO4;
4750    001744
4751    001744          A,LC  B,R1              ALUF,B-1            ALUD,B,YA
4752    001744          IDBS,ALU        COMM,AWRITE,NEXT  T,NEXT    T,POP
4753    001744          LCOUNT;
4754    001745
4755    001745                B,Z               ALUF,D+1            ALUD,B
4756    001745          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD
4757    001745          7;
4758    001746
4759    001746          A,Z   B,R2              ALUF,A+B            ALUD,B
4760    001746          IDBS,ALU                          T,NEXT    T,HOLD
4761    001746          COND,IRQ                          F,JMP     F,HOLD;
4762    001747
4763    001747          A,Z   B,R3              ALUF,A+B            ALUD,B
4764    001747          IDBS,ALU                COMM,CLIRQ T,RETURN T,POP
4765    001747          FWLO2 CONDENABL;
4766    001750
4767    001750
4768    001750  FWLO3:  A,R2                    ALUF,PASSA          ALUD,NONE
4769    001750          IDBS,ALU                          T,JMP     T,HOLD
4770    001750          FWLO5 CONDENABL;
4771    001751
4772    001751                                                      ALUD,NONE
4773    001751          IDBS,ALU          COMM,RDRQ,APT T,RETURN    T,HOLD
```

```
4774    001751          400 COND,LC=0 LCOUNT;                   % STOPS WHEN LC = 1
4775    001752
4776    001752  FWLO5:                                                  ALUD,NONE
4777    001752          IDBS,ALU            COMM,RDRQ,PT T,RETURN       T,HOLD
4778    001752          400 COND,LC=0 LCOUNT;                   % STOPS WHEN LC = 1
4779    001753
4780    001753
4781    001753  FWLO4:  A,R3                    ALUF,PASSA              ALUD,NONE
4782    001753          IDBS,ALU                        T,JMP           T,HOLD
4783    001753          FWLO6 CONDENABL;
4784    001754
4785    001754          A,7   B,R1              ALUF,B-1                ALUD,B,YA
4786    001754          IDBS,ALU          COMM,WRRQ,APT T,RETURN        T,HOLD
4787    001754          COND,LC=0 LCOUNT;
4788    001755
4789    001755  FWLO6:  A,7   B,R1              ALUF,B-1                ALUD,B,YA
4790    001755          IDBS,ALU          COMM,WRRQ,PT T,RETURN         T,HOLD
4791    001755          COND,LC=0 LCOUNT;
4792    001756
4793    001756
4794    001756
4795    001756
4796    001756  %*******************************************************
4797    001756  % TEST IF T-REG SHOULD BE DECREMENTED AFTER SINGLE BYTE MOVED BEFORE
4798    001756  % LOOPS ARE ENTERED.
4799    001756
4800    001756  TTDCR:  A,T                     ALUF,PASSA              ALUD,Q
4801    001756          IDBS,ALU                        T,NEXT          T,HOLD;
4802    001757
4803    001757          A,14                    ALUF,ANDDQ              ALUD,NONE
4804    001757          IDBS,BMG                        T,NEXT          T,HOLD
4805    001757          COND,F=0                        F,NEXT          F,HOLD;
4806    001760
4807    001760                                                          ALUD,NONE
4808    001760          IDBS,ALU                        T,RETURN        T,POP
4809    001760          CONDENABL;
4810    001761
4811    001761                B,T               ALUF,B-1                ALUD,B
4812    001761          IDBS,ALU                        T,RETURN        T,POP;
4813    001762
4814    001762
4815    001762
4816    001762
4817    001762
4818    001762
4819    001762
4820    001762
4821    001762
4822    001762
4823    001762
4824    001762  %*************************************************************
4825    001762  %*************************************************************
4826    001762
4827    001762  % INSTRUCTIONS FOR BIG CORE-MAP HANDLING IN SINTRAN III
4828    001762
4829    001762  %*************************************************************
4830    001762
4831    001762  SINT1:  A,X   B,SRCE            ALUF,D+A                ALUD,Q
4832    001762          IDBS,BARG                       T,NEXT          T,HOLD
4833    001762          COND,RESTR                      F,NEXT          F,HOLD;
4834    001763
4835    001763                                                          ALUD,NONE
4836    001763          IDBS,ALU                        T,JMP           T,HOLD
4837    001763          PRIVI CONDENABL;
4838    001764
4839    001764                                  ALUF,PASSQ              ALUD,NONE
4840    001764          IDBS,ALU                        T,JMP0-3        T,HOLD
4841    001764          VCSI3;
4842    001765
4843    001765
4844    001765  LDA8:           B,A             ALUF,PASSD              ALUD,B
4845    001765          IDBS,DBR      COMM,CONTINUE     T,JMP           T,HOLD;
4846    001766
4847    001766  LDX8:           B,X             ALUF,PASSD              ALUD,B
4848    001766          IDBS,DBR      COMM,CONTINUE     T,JMP           T,HOLD;
4849    001767
4850    001767  LDAD8:          B,A             ALUF,PASSD              ALUD,B
4851    001767          IDBS,DBR                        T,NEXT          T,HOLD;
4852    001770
4853    001770                                  ALUF,Q+1                ALUD,NONE
4854    001770          IDBS,ALU                        T,NEXT          T,HOLD;
```

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4855    001771
4856    001771                                                          ALUD,NONE
4857    001771          IDBS,ALU                COMM,EXRQ T,NEXT        T,HOLD;
4858    001772
4859    001772                B,D               ALUF,PASSD              ALUD,B
4860    001772          IDBS,DBR        COMM,CONTINUE       T,JMP       T,HOLD;
4861    001773
4862    001773  LDB8:         B,R7              ALUF,PASSD MIS,ZIN      ALUD,SLB
4863    001773          IDBS,DBR                          T,NEXT        T,HOLD;
4864    001774
4865    001774     7000 A,R7  B,B               ALUF,ORDA               ALUD,B  % 177000 .OR. B
4866    001774          IDBS,ARG        COMM,CONTINUE       T,JMP       T,HOLD;
4867    001775
4868    001775  STAD8:                          ALUF,Q+1                ALUD,NONE
4869    001775          IDBS,ALU                          T,NEXT        T,HOLD;
4870    001776
4871    001776          A,D                     ALUF,PASSA              ALUD,NONE
4872    001776          IDBS,ALU                COMM,DERQ T,JMP         T,HOLD
4873    001776          CONT;
4874    001777
4875    001777
```

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4876 001777

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ND-110 micro code assembler   4.2 September 1987          18:56:17        24:11:1987
MICRO-DELI-MOPC                                           PAGE        3

     1      001777
     2      001777
     3      001777   %*********************************************************************
     4      001777   %*********************************************************************
     5      001777
     6      001777   % MASTER CLEAR ROUTINE
     7      001777
     8      001777   %*********************************************************************
     9      001777
    10      001777   MACL4:                          ALUF,Q+1            ALUD,Q
    11      001777           IDBS,ALU                           T,NEXT     T,HOLD
    12      001777           MACL4 CONDENABL;
    13      002000
    14      002000                B,R1               ALUF,B-1            ALUD,B
    15      002000           IDBS,ALU                           T,JMP      T,HOLD
    16      002000           MACL3;
    17      002001
    18      002001   MACL:                           ALUF,PASSD          ALUD,Q
    19      002001           IDBS,ARG               COMM,SIOC T,NEXT    T,HOLD
    20      002001           30120;
    21      002002
    22      002002           A,6    B,R1            ALUF,PASSD          ALUD,B
    23      002002           IDBS,BMG                           T,NEXT     T,HOLD
    24      002002           COND,F=0                           F,JMP      F,HOLD;
    25      002003
    26      002003   MACL3:         B,1             ALUF,PASSD          ALUD,Q
    27      002003           IDBS,BARG                          T,NEXT     T,HOLD
    28      002003           MACL4 CONDENABL;    % WAITING LOOP 0.5 - 1 SECOND
    29      002004
    30      002004                                   ALUF,PASSD          ALUD,Q   % STOP
    31      002004           IDBS,STS               COMM,SSTOP T,NEXT   T,HOLD;
    32      002005
    33      002005                                   ALUF,MASKDQ         ALUD,Q
    34      002005           IDBS,ARG                           T,NEXT     T,HOLD
    35      002005           160000;
    36      002006
    37      002006           PIC,IOF                                       ALUD,NONE
    38      002006           IDBS,ALU               COMM,EPIC T,NEXT    T,HOLD;
    39      002007
    40      002007                                   ALUF,PASSQ
    41      002007           IDBS,ALU               COMM,LDPIL T,NEXT   T,HOLD;
    42      002010
    43      002010                                                       ALUD,NONE
    44      002010           IDBS,ARG           COMM,UART,MODE T,NEXT    T,HOLD
    45      002010           372;
    46      002011
    47      002011   %CC ASYNC, 7BITS, EVEN PARITY, 2 STOP BITS, 16X BAUD RATE -> MODE 1 REG.
    48      002011
    49      002011                                   ALUF,PASSD          ALUD,Q
    50      002011           IDBS,ARG                           T,NEXT     T,HOLD
    51      002011           44000;
    52      002012
    53      002012   %CC ASYNC, 7BITS, EVEN PARITY, 2 STOP BITS -> Q-REG.
    54      002012
    55      002012           AB,OLD303              ALUF,PASSQ          ALUD,NONE
    56      002012           IDBS,ALU               COMM,EWRF  T,NEXT   T,HOLD;
    57      002013
    58      002013   %CC ASYNC, 7BITS, EVEN PARITY, 2 STOP BITS -> REG FILE.
    59      002013
    60      002013                                   ALUF,PASSD          ALUD,Q
    61      002013           IDBS,IOR               COMM,XSLOW T,NEXT    T,HOLD;
    62      002014
    63      002014   %CC IOR -> Q
    64      002014
    65      002014                B,17               ALUF,ANDDQ          ALUD,Q
    66      002014           IDBS,BARG                          T,NEXT     T,HOLD;
    67      002015
    68      002015   %CC BAUD RATE THUMBWHEEL POSITION IN Q
    69      002015
    70      002015           AB,BAUD                ALUF,PASSQ          ALUD,NONE
    71      002015           IDBS,ALU               COMM,EWRF T,NEXT    T,HOLD;
    72      002016
    73      002016   %CC SAVE IN REG FILE
    74      002016
    75      002016                                   ALUF,PASSQ          ALUD,NONE

Last written :  18:56:25  24:11:87      Printed at :      10:01:29   1:12:87
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```
 76   002016          IDBS,ALU              COMM,LDIRV T,NEXT   T,HOLD;
 77   002017
 78   002017   %CC SET UP FOR VECTOR JUMP
 79   002017
 80   002017                                                    ALUD,NONE
 81   002017          IDBS,ALU                          T,JMP0-3 T,PUSH
 82   002017          BAUDV;
 83   002020
 84   002020   %CC VECTOR JUMP
 85   002020
 86   002020                                                    ALUD,NONE
 87   002020          IDBS,ALU              COMM,XSLOW  T,NEXT   T,HOLD;
 88   002021
 89   002021                                                    ALUD,NONE
 90   002021          IDBS,ALU              COMM,SLOW   T,NEXT   T,HOLD;
 91   002022
 92   002022   %CC WAIT 625 NS
 93   002022
 94   002022                                                    ALUD,NONE
 95   002022          IDBS,ARG              COMM,UART,COM T,NEXT T,HOLD
 96   002022          60;
 97   002023
 98   002023   %CC DISABLE TRANSMIT AND RECEIVE, RESET ERROR, FORCE RTS.
 99   002023
100   002023                                                    ALUD,NONE
101   002023          IDBS,ALU              COMM,XSLOW  T,NEXT   T,HOLD;
102   002024
103   002024                                                    ALUD,NONE
104   002024          IDBS,ALU              COMM,SLOW   T,NEXT   T,HOLD;
105   002025
106   002025   %CC WAIT 625 NS
107   002025
108   002025                                                    ALUD,NONE
109   002025          IDBS,ARG              COMM,UART,COM T,NEXT T,HOLD
110   002025          45;
111   002026
112   002026   %CC ENABLE TRANSMIT AND RECEIVE
113   002026
114   002026                                ALUF,ZERO           ALUD,Q
115   002026          IDBS,ALU                        T,JMP     T,PUSH
116   002026          RIIE1;
117   002027
118   002027          ALUD,NONE IDBS,ALU            T,NEXT T,HOLD;
119   002030
120   002030          PIC,LOSTS B,10        ALUF,ZERO           ALUD,Q    % 0 -> PIE
121   002030          IDBS,BARG             COMM,EPIC T,JMP     T,PUSH
122   002030          TRPIE;
123   002031
124   002031                                ALUF,PASSD          ALUD,Q
125   002031          IDBS,ARG                        T,NEXT    T,HOLD
126   002031          177777;
127   002032
128   002032
129   002032   % INITIALIZE MOPC VARIABLES
130   002032
131   002032          AB,RONLY ALUF,PASSQ ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
132   002033          AB,CDIGI ALUF,PASSQ ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
133   002034          443 AB,PRCHR        ALUD,NONE IDBS,ARG COMM,EWRF T,NEXT T,HOLD;
134   002035
135   002035          ALUD,NONE IDBS,ALU            T,NEXT T,HOLD;
136   002036
137   002036          PIC,LMSK              ALUF,PASSQ          ALUD,NONE
138   002036          IDBS,ALU              COMM,EPIC T,NEXT    T,HOLD;
139   002037
140   002037
141   002037          AB,DISPL              ALUF,PASSQ          ALUD,NONE
142   002037          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
143   002040
144   002040          AB,OCTAD              ALUF,ZERO           ALUD,NONE
145   002040          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
146   002041
147   002041
148   002041          AB,OCTA2              ALUF,ZERO           ALUD,NONE
149   002041          IDBS,ALU              COMM,EWRF T,JMP     T,PUSH
150   002041          SPAC2;
151   002042
152   002042          AB,BPFLG              ALUF,ZERO           ALUD,NONE
153   002042          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
154   002043
155   002043               B,R1             ALUF,ZERO           ALUD,B
156   002043          IDBS,ALU                        T,NEXT    T,HOLD;
```

```
157  002044
158  002044                                    ALUF,PASSD          ALUD,Q
159  002044          IDBS,ARG                  COMM,LDEXM T,NEXT   T,PUSH
160  002044          37777;
161  002045
162  002045          A,R1                      ALUF,A-Q            ALUD,NONE
163  002045          IDBS,ALU                            T,NEXT    T,HOLD
164  002045          COND,F=0                            F,RETURN  F,HOLD;
165  002046
166  002046          A,R1  B,R1                ALUF,A+1            ALUD,B,YA
167  002046          IDBS,ALU                  COMM,WCIHM T,NEXT   T,POP
168  002046          CONDENABL; % JUMPS TO *-1
169  002047
170  002047          AB,UCIL                   ALUF,PASSQ          ALUD,NONE
171  002047          IDBS,ALU                  COMM,EWRF T,JMP     T,PUSH
172  002047          TRCCL;
173  002050
174  002050          AB,LCIL                   ALUF,ZERO           ALUD,NONE
175  002050          IDBS,ALU                  COMM,EWRF T,JMP     T,PUSH
176  002050          TRCCL;
177  002051
178  002051                                    ALUF,ZERO           ALUD,Q
179  002051          IDBS,ALU                  COMM,LDEXM T,JMP    T,PUSH
180  002051          EXMO2;
181  002052
182  002052                                    ALUF,PASSQ          ALUD,NONE
183  002052          IDBS,ALU                  COMM,LDPANC T,JMP   T,HOLD
184  002052          SELFT;
185  002053
186  002053
187  002053
188  002053  %*************************************************
189  002053  % SELF-TEST PROGRAM FOR CPU
190  002053
191  002053  SELFT:        B,R2                ALUF,PASSD          ALUD,B
192  002053          IDBS,ARG                            T,NEXT    T,PUSH
193  002053          400;
194  002054
195  002054
196  002054
197  002054  %*************************************************
198  002054  % TEST 1 : 0-1+1=0
199  002054
200  002054  ST1:          B,R1                ALUF,ZERO           ALUD,B
201  002054          IDBS,ALU                            T,NEXT    T,HOLD;
202  002055
203  002055                B,R1                ALUF,B-1            ALUD,B
204  002055          IDBS,ALU                            T,NEXT    T,HOLD;
205  002056
206  002056                B,R1                ALUF,B+1            ALUD,B
207  002056          IDBS,ALU                            T,NEXT    T,HOLD
208  002056          COND,F=0                            F,JMP     F,HOLD;
209  002057
210  002057
211  002057  %*************************************************
212  002057  % STERR IF NOT 0  (400)
213  002057
214  002057                                              ALUD,NONE
215  002057          IDBS,ALU                            T,NEXT    T,PUSH
216  002057          STERR CONDENABL;
217  002060
218  002060
219  002060
220  002060  %*************************************************
221  002060  % TEST 2 : 0 + 1*5 = 5
222  002060
223  002060  ST2:          B,R2                ALUF,PASSD          ALUD,B
224  002060          IDBS,ARG                            T,NEXT    T,HOLD
225  002060          1000;
226  002061
227  002061                                    ALUF,ZERO           ALUD,Q
228  002061          IDBS,ARG                  COMM,LDLC T,NEXT    T,HOLD
229  002061          3;
230  002062
231  002062                                              ALUD,NONE
232  002062          IDBS,ALU                            T,NEXT    T,PUSH
233  002062          COND,LC=0;
234  002063
235  002063                                    ALUF,Q+1            ALUD,Q  % LOOP 5 TIMES
236  002063          IDBS,ALU                            T,NEXT    T,POP
237  002063          LCOUNT;
```

```
002064
002064                B,5             ALUF,D-Q            ALUD,NONE
002064          IDBS,BARG                       T,NEXT    T,HOLD
002064          COND,F=0                        F,JMP     F,HOLD;
002065
002065
002065    %*************************************
002065    % STERR IF NOT 5  (1000)
002065
002065                                                    ALUD,NONE
002065          IDBS,ALU                        T,NEXT    T,PUSH
002065          STERR CONDENABL;
002066
002066
002066
002066    %************************************************************
002066    % TEST 3 : SHIFT DOUBLE LEFT
002066
002066    ST3:        B,R2            ALUF,PASSD          ALUD,B
002066          IDBS,ARG                        T,NEXT    T,HOLD
002066          1400;
002067
002067                B,3                                 ALUD,NONE
002067          IDBS,BARG             COMM,LDLC T,NEXT    T,HOLD
002067          COND,LC=0;
002070
002070                                ALUF,PASSD          ALUD,Q
002070          IDBS,ARG                        T,NEXT    T,HOLD
002070          70707;
002071
002071                B,R3            ALUF,PASSD          ALUD,B
002071          IDBS,ARG                        T,NEXT    T,PUSH
002071          30303;
002072
002072                B,R3 MIS,ROT    ALUF,PASSB          ALUD,SLD  % LOOP 5 TIMES
002072          IDBS,ALU                        T,NEXT    T,POP
002072          LCOUNT;
002073
002073                                ALUF,Q-D            ALUD,Q
002073          IDBS,ARG                        T,NEXT    T,HOLD
002073          34346;
002074
002074                                ALUF,PASSQ          ALUD,NONE
002074          IDBS,ALU                        T,NEXT    T,HOLD
002074          COND,F=0                        F,JMP     F,HOLD;
002075
002075
002075    %*****************************************
002075    % STERR IF Q ERRONEOUS  (1400)
002075
002075                B,R3            ALUF,PASSB          ALUD,Q
002075          IDBS,ALU                        T,NEXT    T,HOLD
002075          STERR CONDENABL;
002076
002076                                ALUF,Q-D            ALUD,NONE
002076          IDBS,ARG                        T,NEXT    T,HOLD
002076          14156;
002077
002077
002077    %************************************************************
002077    % STER1 IF R3 ERRONEOUS  (2000)
002077
002077                                                    ALUD,NONE
002077          IDBS,ALU                        T,NEXT    T,PUSH
002077          STER1 CONDENABL;
002100
002100
002100
002100    %************************************************************
002100    % TEST 4 : -1 -> R5,   0 -> Q
002100
002100    ST4:        B,R2            ALUF,PASSD          ALUD,B
002100          IDBS,ARG                        T,NEXT    T,HOLD
002100          2400;
002101
002101                B,R5            ALUF,PASSD          ALUD,B
002101          IDBS,ARG                        T,NEXT    T,HOLD
002101          177777;
002102
002102                B,0             ALUF,PASSD          ALUD,Q
002102          IDBS,BARG                       T,NEXT    T,HOLD;
```

```
002103
002103                                  ALUF,PASSQ          ALUD,NONE
002103          IDBS,ALU                            T,NEXT  T,HOLD
002103          COND,F=0                            F,JMP   F,HOLD;
002104
002104
002104  %*******************************************
002104  % STERR IF Q NOT 0  (2400)
002104
002104                B,R5              ALUF,B+1            ALUD,NONE
002104          IDBS,ALU                            T,NEXT  T,HOLD
002104          STERR CONDENABL;
002105
002105
002105  %*********************************************
002105  % STER1 IF R5+1 NOT 0  (3000)
002105
002105                                              ALUD,NONE
002105          IDBS,ALU                            T,NEXT  T,PUSH
002105          STER1 CONDENABL;
002106
002106
002106
002106
002106  %***********************************************
002106  % TEST 5 : 170(AARG) -> SWAP = 74000
002106
002106  ST5:          B,R2              ALUF,PASSD          ALUD,B
002106          IDBS,ARG                            T,NEXT  T,HOLD
002106          3400;
002107
002107          A,17                                        ALUD,NONE
002107          IDBS,AARG                           T,NEXT  T,HOLD;
002110
002110                                  ALUF,PASSD          ALUD,Q
002110          IDBS,SWAP                           T,NEXT  T,HOLD
002110          COND,F=0                            F,JMP   F,HOLD;
002111
002111                                  ALUF,Q-D            ALUD,NONE
002111          IDBS,ARG                            T,NEXT  T,HOLD
002111          74000;
002112
002112
002112  %***********************************************
002112  % STERR IF NOT 74000  (3400)
002112
002112                                              ALUD,NONE
002112          IDBS,ALU                            T,NEXT  T,PUSH
002112          STERR CONDENABL;
002113
002113
002113
002113  %*************************************************
002113  % TEST 6 : LC USED TO GENERATE 1 AMONG 0'S.
002113  %   SHIFT RIGHT DOUBLE WITH SHIFT GPR.
002113
002113  ST6:          B,R2              ALUF,B+1            ALUD,B
002113          IDBS,ARG                            T,NEXT  T,HOLD
002113          4000;
002114
002114                B,R1              ALUF,ZERO           ALUD,B
002114          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD
002114          17;
002115
002115                                  ALUF,PASSD          ALUD,Q
002115          IDBS,ARG                COMM,LDGPR T,NEXT   T,PUSH
002115          100000;
002116
002116                                              ALUD,NONE
002116          IDBS,ALU                            T,NEXT  T,HOLD;
002117
002117          A,LC                    ALUF,Q-D            ALUD,NONE
002117          IDBS,BMG                            T,NEXT  T,HOLD
002117          COND,F=0                            F,JMP   F,POP;
002120
002120
002120  %*************************************************************
002120  % STERR IF BMG(LC) NOT CORRECT  (4000)
002120
002120                                  ALUF,Q-D            ALUD,NONE
002120          IDBS,GPR                            T,NEXT  T,HOLD
```

```
400   002120          STERR CONDENABL;
401   002121
402   002121
403   002121   %*************************************************************
404   002121   % STER1 IF GPR NOT SHIFTED CORRECT  (4400)
405   002121
406   002121               B,R1            ALUF,PASSB ALUM,FMU ALUD,SRD
407   002121          IDBS,ALU                        T,NEXT    T,HOLD
408   002121          STER1 CONDENABL;
409   002122
410   002122                                                    ALUD,NONE
411   002122          IDBS,ALU                        T,NEXT    T,HOLD
412   002122          COND,LC=0;
413   002123
414   002123                                                    ALUD,NONE  % LOOP BACK
415   002123          IDBS,PEA                        T,NEXT    T,HOLD
416   002123          LCOUNT;
417   002124
418   002124               B,R7            ALUF,PASSD          ALUD,B
419   002124          IDBS,STS                        T,NEXT    T,LOAD;
420   002125
421   002125
422   002125
423   002125   %*************************************************************
424   002125   % TEST 7 : TEST STS AND REGISTER FILE
425   002125
426   002125   ST7:        B,R2            ALUF,PASSD          ALUD,B
427   002125          IDBS,ARG                        T,NEXT    T,HOLD
428   002125          5000;
429   002126
430   002126               B,STS                                ALUD,NONE % -1 -> REG.FILE
431   002126          IDBS,ARG            COMM,EWRF T,NEXT    T,HOLD
432   002126          177777;
433   002127
434   002127                              ALUF,ZERO           ALUD,NONE STS,LO % 0 -> STS
435   002127          IDBS,ALU            COMM,LDPIL T,JMP    T,PUSH
436   002127          ST77;
437   002130
438   002130                              ALUF,PASSD          ALUD,Q % STS -> Q
439   002130          IDBS,STS                        T,NEXT    T,HOLD
440   002130          COND,F=0                        F,JMP     F,HOLD;
441   002131
442   002131                              ALUF,PASSQ          ALUD,NONE
443   002131          IDBS,ARG                        T,NEXT    T,HOLD;
444   002132
445   002132
446   002132   %*********************************************
447   002132   % STERR IF STS NOT 10000  (5000)
448   002132
449   002132          A,17  B,STS         ALUF,D+1            ALUD,NONE
450   002132          IDBS,REG                        T,NEXT    T,HOLD
451   002132          STERR CONDENABL;
452   002133
453   002133
454   002133   %*************************************************************
455   002133   % STER1 IF REG.FILE NOT -1  (5400)
456   002133
457   002133          A,17  B,STS         ALUF,ZERO           ALUD,NONE  % 0 -> REG.FILE
458   002133          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD
459   002133          STER1 CONDENABL;
460   002134
461   002134          A,17  B,STS         ALUF,PASSD          ALUD,NONE
462   002134          IDBS,REG                        T,NEXT    T,HOLD;
463   002135
464   002135
465   002135
466   002135   %*************************************************************
467   002135   % STER2 IF REG.FILE NOT 0   (6000)
468   002135
469   002135          A,14                ALUF,PASSD          ALUD,Q
470   002135          IDBS,BMG                        T,NEXT    T,HOLD
471   002135          STER2 CONDENABL;
472   002136
473   002136          A,R7                ALUF,ORAQ           ALUD,NONE STS,LO
474   002136          IDBS,ALU            COMM,LDPIL T,NEXT   T,HOLD;
475   002137
476   002137          A,A   B,R7          ALUF,PASSA          ALUD,B
477   002137          IDBS,ALU                        T,NEXT    T,PUSH;
478   002140
479   002140
480   002140
```

```
002140  %*************************************************
002140  % TEST 8 : TEST OF PIC
002140
002140  ST8:        B,R2          ALUF,PASSD          ALUD,B
002140             IDBS,ARG                 T,NEXT    T,HOLD
002140             6400;
002141
002141                                                 ALUD,NONE % PID -> REG.FILE
002141             IDBS,ALU                 T,JMP     T,PUSH
002141             TAPID;
002142
002142             A,17  B,STS   ALUF,PASSQ           ALUD,NONE
002142             IDBS,ALU      COMM,EWRF T,NEXT     T,HOLD;
002143
002143                           ALUF,ZERO            ALUD,Q  % 0 -> PID
002143             IDBS,ALU                 T,JMP     T,LOAD
002143             TRPID;
002144
002144                                                 ALUD,NONE % 176000 -> PID
002144             IDBS,ARG      COMM,SMPID T,NEXT    T,HOLD
002144             140017;
002145
002145                                                 ALUD,NONE
002145             IDBS,ALU                 T,JMP     T,PUSH
002145             TAPID;
002146
002146                           ALUF,D-Q             ALUD,Q % CHECK PID
002146             IDBS,ARG                 T,NEXT    T,POP
002146             176000;
002147
002147                           ALUF,PASSQ           ALUD,NONE
002147             IDBS,ALU                 T,NEXT    T,HOLD
002147             COND,F=0                 F,JMP     F,HOLD;
002150
002150
002150  %*************************************************
002150  % STERR IF PID NOT 176000  (6400)
002150
002150             A,17  B,STS   ALUF,PASSD           ALUD,Q
002150             IDBS,REG                 T,NEXT    T,HOLD
002150             STERR CONDENABL;
002151
002151                   B,R6    ALUF,ZERO            ALUD,B % REG.FILE -> PID
002151             IDBS,ALU                  T,JMP    T,PUSH
002151             TRPID;
002152
002152             A,R7  B,A     ALUF,PASSA           ALUD,B
002152             IDBS,ALU                 T,JMP     T,HOLD
002152             MACL2;
002153
002153
002153
002153
002153
002153
002153  %*************************************************
002153  % SUBROUTINE TO PLACE IDB HIGH
002153
002153  ST77:                                          ALUD,NONE
002153             IDBS,ARG                 T,RETURN  T,POP
002153             177777;
002154
002154
002154
002154
002154
002154  %*************************************************
002154  % DISPLAY ERROR NO. R2+2
002154
002154  STER2: 400 A,R2 B,R2     ALUF,A+B             ALUD,B
002154             IDBS,ARG                 T,NEXT    T,HOLD;
002155
002155
002155
002155
002155
002155
002155
002155  %*************************************************
002155  % DISPLAY ERROR NO. R2+1
002155
```

```
562   002155  STER1: 400 A,R2 B,R2          ALUF,A+B            ALUD,B
563   002155         IDBS,ARG                          T,NEXT    T,HOLD;
564   002156
565   002156
566   002156
567   002156
568   002156
569   002156
570   002156  %*************************************************
571   002156  % DISPLAY ERROR NO. R2
572   002156
573   002156  STERR:       B,R2             ALUF,PASSB          ALUD,Q
574   002156         IDBS,ALU                          T,JMP     T,PUSH
575   002156         DYTP2;
576   002157
577   002157                                 ALUF,PASSQ          ALUD,NONE % LOOP ON ERROR
578   002157         IDBS,ALU                COMM,LDPIL T,RETURN T,HOLD;
579   002160
580   002160
581   002160
582   002160
583   002160
584   002160
585   002160  %
586   002160  %*************************************************
587   002160  % LAST PART OF MASTER CLEAR ROUTINE
588   002160
589   002160  MACL2:                         ALUF,PASSD          ALUD,Q
590   002160         IDBS,ARG                COMM,SIOC T,NEXT    T,HOLD
591   002160         30140;
592   002161
593   002161         AB,STATUS               ALUF,PASSQ          ALUD,NONE
594   002161         IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
595   002162
596   002162         AB,MANIR                ALUF,ZERO           ALUD,NONE
597   002162         IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
598   002163
599   002163         IDBS,ARG             ALUF,PASSD             ALUD,Q
600   002163         17777                             T,NEXT    T,HOLD;
601   002164
602   002164         AB,NOISE                ALUF,PASSQ          ALUD,NONE
603   002164         IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
604   002165
605   002165  %CC WRITE A VALUE <> 0 TO THE NOISE FLIP FLOP. DISABLES LOAD IMMEDIATELY
606   002165  %CC AFTER MACL.
607   002165
608   002165         AB,TXT1                 ALUF,ZERO           ALUD,NONE
609   002165         IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
610   002166
611   002166         AB,TXT2                 ALUF,ZERO           ALUD,NONE
612   002166         IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
613   002167
614   002167         AB,SINGL                ALUF,ZERO           ALUD,Q
615   002167         IDBS,ALU                COMM,EWRF T,JMP     T,PUSH
616   002167         LVSWP;
617   002170
618   002170                                 ALUF,ZERO           ALUD,NONE
619   002170         IDBS,ALU                COMM,LDPCR T,NEXT   T,HOLD;
620   002171
621   002171         A,PIL B,0  XRF          ALUF,ZERO           ALUD,NONE
622   002171         IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;   % PCR LEVEL 0
623   002172
624   002172               B,Z               ALUF,ZERO           ALUD,B
625   002172         IDBS,ALU                COMM,CONTINUE T,JMP T,HOLD;
626   002173
627   002173
628   002173
629   002173
630   002173
631   002173
632   002173
633   002173
634   002173  %*************************************************************
635   002173  %*************************************************************
636   002173
637   002173  % SUBROUTINE USED BY MOPC AND MACL TO CLEAR SEVERAL MOPC VARIABLES
638   002173
639   002173  %*************************************************************
640   002173
641   002173  SPAC2: AB,DUMPF ALUF,ZERO ALUD,B    IDBS,ALU COMM,EWRF T,NEXT T,HOLD; %0->R6
642   002174         AB,SCRAM ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
```

```
643   002175          AB,OCTNR ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
644   002176          AB,CURNR ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
645   002177          AB,UPPNR ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
646   002200          AB,OCTN2 ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
647   002201          AB,DEPOS ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,RETURN T,POP;
648   002202
649   002202
650   002202
651   002202
652   002202
653   002202
654   002202
655   002202
656   002202
657   002202
658   002202   %*************************************************
659   002202   %*************************************************
660   002202
661   002202   % STOP CPU. ENTERED FROM WAIT-INSTRUCTION. PRINT #
662   002202
663   002202   %*************************************************
664   002202
665   002202   STOPW: 443 AB,PRCHR                                ALUD,NONE
666   002202          IDBS,ARG              COMM,EWRF T,NEXT     T,HOLD;
667   002203
668   002203
669   002203
670   002203
671   002203
672   002203   %*******************************************************
673   002203   %*******************************************************
674   002203
675   002203   % FROM INTERRUPT VECTOR IF THE CPU IS IN STOP (3760 OR 3770)
676   002203
677   002203   %*******************************************************
678   002203
679   002203   STOP:  AB,NOISE               ALUF,ZERO            ALUD,NONE
680   002203          IDBS,ALU              COMM,EWRF T,NEXT     T,HOLD;
681   002204
682   002204   %CC RESET THE NOISE FLIP-FLOP. WILL NOW ENABLE THE LOAD BUTTON.
683   002204
684   002204          AB,MACL               ALUF,PASSD           ALUD,NONE
685   002204          IDBS,REG                        T,NEXT     T,HOLD
686   002204          COND,F=0                        F,NEXT     F,HOLD;
687   002205
688   002205                                ALUF,PASSD           ALUD,Q
689   002205          IDBS,IOR                        T,JMP      T,HOLD
690   002205          STOP2 CONDENABL;
691   002206
692   002206   %*************************************************************
693   002206   % STOP FOLLOWS DIRECTLY AFTER MASTER CLEAR. STAND-BY IS NOT OK
694   002206
695   002206          A,15                  ALUF,ANDDQ           ALUD,NONE
696   002206          IDBS,BMG                        T,NEXT     T,HOLD
697   002206          COND,F=0                        F,JMP      F,HOLD;
698   002207
699   002207          AB,MACL               ALUF,ZERO            ALUD,NONE
700   002207          IDBS,ALU              COMM,EWRF T,NEXT     T,HOLD
701   002207          STOP2 CONDENABL;
702   002210
703   002210
704   002210
705   002210
706   002210   %*****************************************************************
707   002210   % PANEL IS LOCKED WHEN POWER-UP, OR LOAD IS PRESSED
708   002210
709   002210   ALDLO:                                             ALUD,NONE % USE ALD-SWITCH
710   002210          IDBS,ALD              COMM,LDLC T,NEXT     T,HOLD;
711   002211
712   002211          ALUD,NONE IDBS,ALU T,NEXT       T,HOLD;
713   002212
714   002212          A,LC                                       ALUD,NONE
715   002212          IDBS,ALU                        T,NEXT     T,HOLD;
716   002213
717   002213          A,LC                                       ALUD,NONE
718   002213          IDBS,ALU                        T,JMPAOPR  T,PUSH
719   002213          ALDVC;
720   002214
721   002214
722   002214
723   002214   %*******************************************************
```

```
724   002214   % LOAD, $ OR &, LOAD CODE IN Q
725   002214
726   002214   LOAD1: A,17                  ALUF,MASKDQ          ALUD,Q
727   002214          IDBS,BMG                        T,NEXT     T,HOLD
728   002214          COND,F=0                        F,NEXT     F,HOLD;
729   002215
730   002215          A,15                 ALUF,ANDDQ           ALUD,NONE
731   002215          IDBS,BMG                        T,JMP      T,HOLD
732   002215          CONT CONDENABL;
733   002216
734   002216
735   002216   %*****************************
736   002216   % Q IS NOT 0
737   002216
738   002216          A,7   B,STS            ALUF,D-1             ALUD,B
739   002216          IDBS,BMG                        T,JMP      T,HOLD
740   002216          ETLO1 CONDENABL;
741   002217
742   002217
743   002217
744   002217
745   002217
746   002217
747   002217
748   002217
749   002217
750   002217
751   002217
752   002217   %*************************************************************
753   002217   %*************************************************************
754   002217
755   002217   % MASS STORAGE LOAD, BECAUSE BIT 13 IS 1
756   002217
757   002217   %*************************************************************
758   002217
759   002217   MASS:  A,1   B,D              ALUF,D+Q             ALUD,B % DEV.NO. +2 -> D
760   002217          IDBS,BMG                        T,NEXT     T,HOLD;
761   002220
762   002220   MAS1:         B,A             ALUF,ZERO            ALUD,B
763   002220          IDBS,ALU                        T,NEXT     T,HOLD;
764   002221
765   002221
766   002221   %*****************************************
767   002221   % IOX N+1  (0)  CORE ADDRESS
768   002221
769   002221          A,D   B,R1             ALUF,A-1             ALUD,B
770   002221          IDBS,ALU                        T,JMP      T,PUSH
771   002221          IOXG;
772   002222
773   002222
774   002222   %*********************************************
775   002222   % IOX N+1  (0)  CORE ADDRESS
776   002222
777   002222          A,D   B,R1             ALUF,A-1             ALUD,B
778   002222          IDBS,ALU                        T,JMP      T,PUSH
779   002222          IOXG;
780   002223
781   002223
782   002223   %*************************************************
783   002223   % IOX N+3  (0)  BLOCK ADDRESS
784   002223
785   002223          A,D   B,R1             ALUF,A+1             ALUD,B
786   002223          IDBS,ALU                        T,JMP      T,PUSH
787   002223          IOXG;
788   002224
789   002224
790   002224   %*************************************************
791   002224   % IOX N+7  (2000)  WORD COUNTER
792   002224
793   002224          5 A,D B,R1             ALUF,D+A             ALUD,B
794   002224          IDBS,ARG                        T,NEXT     T,HOLD;
795   002225
796   002225          A,12  B,A              ALUF,PASSD           ALUD,B
797   002225          IDBS,BMG                        T,JMP      T,PUSH
798   002225          IOXG;
799   002226
800   002226
801   002226   %*************************************************
802   002226   % IOX N+5  (4)  ACTIVATE DEVICE
803   002226
804   002226          A,D   B,R1             ALUF,D+A+1           ALUD,B
```

```
805   002226          IDBS,BMG                          T,NEXT    T,HOLD;
806   002227
807   002227          A,2   B,A             ALUF,PASSD            ALUD,B
808   002227          IDBS,BMG                          T,JMP     T,PUSH
809   002227          IOXG;
810   002230
811   002230
812   002230
813   002230
814   002230  %*****************************************
815   002230  % IOX N+4  READ STATUS
816   002230
817   002230  MAS2:   A,D   B,R1            ALUF,D+A              ALUD,B
818   002230          IDBS,BMG                          T,JMP     T,PUSH
819   002230          IOXG;
820   002231
821   002231          A,A   B,4             ALUF,ANDDA            ALUD,NONE
822   002231          IDBS,BARG                         T,NEXT    T,HOLD
823   002231          COND,F=0                          F,JMP     F,HOLD;
824   002232
825   002232          A,2   B,R7            ALUF,PASSD            ALUD,B
826   002232          IDBS,AARG                         T,NEXT    T,HOLD
827   002232          MAS2 CONDENABL;
828   002233
829   002233
830   002233  %*************************************
831   002233  % DEVICE FINISHED
832   002233
833   002233          A,A   B,R7            ALUF,ANDAB            ALUD,NONE
834   002233          IDBS,ALU                          T,NEXT    T,HOLD;
835   002234
836   002234                                                      ALUD,NONE
837   002234          IDBS,ALU                          T,NEXT    T,HOLD
838   002234          MAS1 CONDENABL;
839   002235
840   002235
841   002235  %*****************************************
842   002235  % NO ERRORS, START IN 0, AND LEAVE MOPC
843   002235
844   002235                B,P             ALUF,ZERO             ALUD,B
845   002235          IDBS,ALU              COMM,START T,JMP      T,HOLD
846   002235          ESCAP;
847   002236
848   002236
849   002236
850   002236
851   002236
852   002236
853   002236
854   002236
855   002236
856   002236
857   002236  %*************************************************************
858   002236  %*************************************************************
859   002236
860   002236  % RESTART, ENTERED FROM INTERRUPT VECTOR (3766)
861   002236  % ONLY IF STAND-BY POWER IS OK
862   002236
863   002236  %*************************************************************
864   002236
865   002236  RSTRT:                        ALUF,PASSD            ALUD,Q
866   002236          IDBS,IOR              COMM,CLRTC T,NEXT     T,HOLD
867   002236          COND,STP                          F,RETURN  F,POP;
868   002237
869   002237          A,15                  ALUF,ANDDQ            ALUD,Q
870   002237          IDBS,BMG                          T,NEXT    T,HOLD
871   002237          CONDENABL COND,F=0                F,JMP     F,HOLD;
872   002240
873   002240
874   002240  %*************************************************************
875   002240  % ONLY IF IN STOP MODE
876   002240
877   002240          AB,MACL               ALUF,PASSD            ALUD,NONE
878   002240          IDBS,REG                          T,NEXT    T,HOLD
879   002240          RSTR1 CONDENABL;
880   002241
881   002241
882   002241  %*********************************
883   002241  % IF LOCKED
884   002241
885   002241                                                      ALUD,NONE
```

```
886   002241          IDBS,ALD              COMM,LDLC T,NEXT     T,HOLD;
887   002242
888   002242          AB,MACL               ALUF,ZERO            ALUD,NONE
889   002242          IDBS,ALU              COMM,EWRF T,NEXT     T,HOLD;
890   002243
891   002243          A,LC                                       ALUD,NONE
892   002243          IDBS,ALU                        T,NEXT     T,HOLD;
893   002244
894   002244          A,LC                                       ALUD,NONE
895   002244          IDBS,ALU                        T,JMPAOPR  T,PUSH
896   002244          ALDVC;                % USE ALD SWITCHES
897   002245
898   002245                                ALUF,PASSQ           ALUD,NONE
899   002245          IDBS,ALU                        T,NEXT     T,HOLD
900   002245          COND,F15                        F,NEXT     F,HOLD;
901   002246
902   002246
903   002246    %*************************************************************
904   002246    % LOAD IF BIT 15=1, START IN ADDRESS 20 IF BIT 15=0
905   002246
906   002246                                                     ALUD,NONE
907   002246          IDBS,ALU                        T,JMP      T,HOLD
908   002246          LOAD1 CONDENABL;
909   002247
910   002247
911   002247
912   002247
913   002247    %***********************************
914   002247    % START CPU IN ADDRESS 20
915   002247
916   002247    RSTR2: A,2    B,P             ALUF,PASSD           ALUD,B
917   002247          IDBS,AARG                       T,JMP      T,HOLD
918   002247          CONTI;
919   002250
920   002250
921   002250
922   002250    %*************************************************************
923   002250    % IF UNLOCKED, DO NOTHING JUST AFTER MASTER CLEAR, ELSE START IN 20
924   002250
925   002250    RSTR1: AB,MACL                ALUF,ZERO            ALUD,NONE
926   002250          IDBS,ALU                COMM,EWRF T,NEXT     T,HOLD
927   002250          CONT CONDENABL;
928   002251
929   002251                                                     ALUD,NONE
930   002251          IDBS,ALU                        T,JMP      T,HOLD
931   002251          RSTR2;
932   002252
933   002252
934   002252
935   002252
936   002252
937   002252
938   002252
939   002252
940   002252    %*************************************************************
941   002252    %*************************************************************
942   002252
943   002252    % LOAD BUTTON IS PRESSED, ENTERED FROM INTERRUPT VECTOR (3764 OR 3774)
944   002252
945   002252    %*************************************************************
946   002252
947   002252    LOAD:  AB,NOISE                       ALUF,PASSD   ALUD,NONE
948   002252          IDBS,REG            COMM,CLRTC  T,NEXT       T,HOLD
949   002252          COND,F=0                        F,JMP        F,HOLD;
950   002253
951   002253          CONT CONDENABL                T,NEXT       T,HOLD;
952   002254
953   002254                                                     ALUD,NONE
954   002254          IDBS,ALU                        T,NEXT     T,HOLD
955   002254          COND,STP                        F,NEXT     F,HOLD;
956   002255
957   002255                                                     ALUD,NONE
958   002255          IDBS,ALU                        T,JMP      T,HOLD
959   002255          ALDLO CONDENABL;
960   002256
961   002256
962   002256
963   002256    %*****************************************************
964   002256    %*****************************************************
965   002256
966   002256    % CPU IS NOT IN STOP WHEN LOAD IS PRESSED, OR
```

```
 967   002256   % CONTINUE BUTTON IS PRESSED, ENTERED FROM INTERRUPT VECTOR  (3765 OR 3775)
 968   002256
 969   002256   %*****************************************************
 970   002256
 971   002256   CONTI:                                                    ALUD,NONE
 972   002256           IDBS,ALU              COMM,START T,JMP           T,HOLD
 973   002256           ESCAP;
 974   002257
 975   002257
 976   002257
 977   002257
 978   002257
 979   002257
 980   002257
 981   002257
 982   002257   %*************************************************************
 983   002257   %*************************************************************
 984   002257
 985   002257   % $ OR & IS TYPED TO MOPC
 986   002257
 987   002257   %*************************************************************
 988   002257
 989   002257   DOLOA:
 990   002257   ETLOA:  AB,OCTNR              ALUF,PASSD                 ALUD,Q
 991   002257           IDBS,REG                          T,NEXT        T,HOLD
 992   002257           COND,F=0                          F,NEXT        F,HOLD;
 993   002260
 994   002260
 995   002260   %*******************************************
 996   002260   % USE ALD-SWITCH IF NO OCTAL NUMBER GIVEN
 997   002260
 998   002260                                                             ALUD,NONE
 999   002260           IDBS,ALU                          T,JMP         T,HOLD
1000   002260           ALDLO CONDENABL;
1001   002261
1002   002261                                                             ALUD,NONE
1003   002261           IDBS,ALU                          T,JMP         T,HOLD
1004   002261           LOAD1;
1005   002262
1006   002262
1007   002262
1008   002262
1009   002262
1010   002262
1011   002262
1012   002262
1013   002262
1014   002262
1015   002262
1016   002262
1017   002262
1018   002262   %*************************************************************
1019   002262   %*************************************************************
1020   002262
1021   002262   % BINARY LOADER.  LOAD CODE BIT 13 IS 0.
1022   002262
1023   002262   %*************************************************************
1024   002262
1025   002262   ETLO1:          B,D           ALUF,PASSQ                 ALUD,B % DEV.NO. -> D
1026   002262           IDBS,ALU                          T,JMP         T,PUSH
1027   002262           DVACT;
1028   002263
1029   002263   SEEK:   A,R5   B,P            ALUF,PASSA                 ALUD,B % POSSIBLE S.A.
1030   002263           IDBS,ALU                          T,NEXT        T,HOLD;
1031   002264
1032   002264   SIKI:   A,5    B,L            ALUF,D+1                   ALUD,B % READ OCTAL NO.
1033   002264           IDBS,BMG                          T,JMP         T,PUSH
1034   002264           ASS8;
1035   002265
1036   002265           A,R2   B,15           ALUF,A-D                   ALUD,NONE
1037   002265           IDBS,BARG                         T,NEXT        T,HOLD
1038   002265           COND,F=0                          F,NEXT        F,HOLD;
1039   002266
1040   002266           A,R2   B,L            ALUF,A-B                  ALUD,NONE
1041   002266           IDBS,ALU                          T,JMP         T,HOLD
1042   002266           SEEK CONDENABL;
1043   002267
1044   002267
1045   002267   %*********************************
1046   002267   % LAST CHAR. IS NOT CR
1047   002267
```

```
1048    002267                                                  ALUD,NONE
1049    002267          IDBS,ALU                        T,JMP   T,HOLD
1050    002267          EXFOU CONDENABL;
1051    002270
1052    002270
1053    002270  %*********************************
1054    002270  % LAST CHAR. IS NOT !
1055    002270
1056    002270                                                  ALUD,NONE
1057    002270          IDBS,ALU                        T,JMP   T,HOLD
1058    002270          SIKI;
1059    002271
1060    002271
1061    002271
1062    002271
1063    002271  %*************************************
1064    002271  % EXCLAMATION MARK (!) FOUND
1065    002271
1066    002271  EXFOU:  A,10  B,STS             ALUF,D-1        ALUD,B
1067    002271          IDBS,BMG                        T,NEXT  T,HOLD;
1068    002272
1069    002272                B,L               ALUF,ZERO       ALUD,B % READ CORE ADDR.
1070    002272          IDBS,ALU                        T,JMP   T,PUSH
1071    002272          BIN;
1072    002273
1073    002273          A,Z   B,X               ALUF,PASSA      ALUD,B % READ WORD COUNT
1074    002273          IDBS,ALU                        T,JMP   T,PUSH
1075    002273          BIN;
1076    002274
1077    002274          A,Z   B,T               ALUF,PASSA      ALUD,B
1078    002274          IDBS,ALU                        T,NEXT  T,HOLD;
1079    002275
1080    002275
1081    002275
1082    002275  %*****************************************
1083    002275  %LOOP TO STORE PROGRAM IN MEMORY
1084    002275
1085    002275  STLP:                                           ALUD,NONE % READ ONE WORD
1086    002275          IDBS,ALU                        T,JMP   T,PUSH
1087    002275          BIN;
1088    002276
1089    002276                B,T               ALUF,B-1        ALUD,B % DECR. WORD COUNT
1090    002276          IDBS,ALU                        T,NEXT  T,HOLD
1091    002276          COND,F=0                        F,JMP   F,HOLD;
1092    002277
1093    002277          A,X   B,X               ALUF,B+1        ALUD,B,YA % INCR. CORE ADDR.
1094    002277          IDBS,ALU                        T,NEXT  T,HOLD
1095    002277          COND,COND                       F,JMP   F,HOLD;
1096    002300
1097    002300          A,Z   B,L               ALUF,A+B        ALUD,B,YA % ACCUMULATE CH.SM.
1098    002300          IDBS,ALU          COMM,WRRQ,PT  T,NEXT  T,HOLD
1099    002300          STLP CONDENABL;
1100    002301
1101    002301
1102    002301
1103    002301
1104    002301
1105    002301  %*************************************************
1106    002301  % ALL WORDS ARE PLACED IN MEMORY
1107    002301
1108    002301                                                  ALUD,NONE % READ CHECKSUM
1109    002301          IDBS,ALU                        T,JMP   T,PUSH
1110    002301          BIN;
1111    002302
1112    002302          A,Z   B,L               ALUF,XORAB      ALUD,NONE % TEST CH.SM.
1113    002302          IDBS,ALU                        T,NEXT  T,HOLD
1114    002302          COND,F=0                        F,JMP   F,HOLD;
1115    002303
1116    002303                                                  ALUD,NONE
1117    002303          IDBS,ALU                        T,NEXT  T,HOLD
1118    002303          ILLEG CONDENABL;
1119    002304
1120    002304
1121    002304  %*************************************
1122    002304  % CHECKSUM OK, READ ACTION CODE
1123    002304
1124    002304                                                  ALUD,NONE
1125    002304          IDBS,ALU                        T,JMP   T,PUSH
1126    002304          ASS8;
1127    002305
1128    002305          A,R2                    ALUF,PASSA      ALUD,NONE
```

```
1129  002305          IDBS,ALU                        T,NEXT    T,HOLD
1130  002305          COND,F=0                        F,JMP     F,HOLD;
1131  002306
1132  002306                                                    ALUD,NONE
1133  002306          IDBS,ALU                        T,NEXT    T,HOLD
1134  002306          ESCAP CONDENABL;
1135  002307
1136  002307
1137  002307  %*****************************************
1138  002307  % ACTION CODE =0,  START PROGRAM
1139  002307                                                  -
1140  002307                                                    ALUD,NONE
1141  002307          IDBS,ALU              COMM,START T,JMP    T,HOLD
1142  002307          ESCAP;
1143  002310
1144  002310
1145  002310
1146  002310
1147  002310
1148  002310  %*************************************************
1149  002310  % SUBROUTINE FOR BINARY LOADER TO READ ONE CHARACTER
1150  002310
1151  002310  INCH:   A,D    B,R1            ALUF,D+A                ALUD,B % IOX N+2
1152  002310          IDBS,BMG                        T,JMP     T,PUSH
1153  002310          IOXG;
1154  002311
1155  002311          A,A    B,10             ALUF,ANDDA              ALUD,NONE
1156  002311          IDBS,BARG                       T,NEXT    T,HOLD
1157  002311          COND,F=0                        F,NEXT    F,HOLD;
1158  002312
1159  002312                                                    ALUD,NONE
1160  002312          IDBS,ALU                        T,JMP     T,HOLD
1161  002312          INCH CONDENABL;
1162  002313
1163  002313
1164  002313  %*********************************
1165  002313  % READY FOR TRANSFER
1166  002313
1167  002313          A,D    B,R1             ALUF,PASSA              ALUD,B % IOX N
1168  002313          IDBS,ALU                        T,JMP     T,PUSH
1169  002313          IOXG;
1170  002314
1171  002314          A,A    B,STS            ALUF,ANDAB              ALUD,NONE
1172  002314          IDBS,ALU                COMM,LDGPR T,JMP    T,HOLD
1173  002314          DVACT;
1174  002315
1175  002315
1176  002315
1177  002315  %*************************************************
1178  002315  % ACTIVATE DEVICE
1179  002315
1180  002315  DVACT:          B,A             ALUF,PASSD              ALUD,B
1181  002315          IDBS,ARG                        T,NEXT    T,HOLD
1182  002315          4005;
1183  002316
1184  002316          A,D    B,R1             ALUF,D+A+1              ALUD,B % IOX N+3 (4005)
1185  002316          IDBS,BMG                        T,JMP     T,HOLD
1186  002316          IOXG;
1187  002317
1188  002317
1189  002317
1190  002317
1191  002317
1192  002317
1193  002317
1194  002317
1195  002317
1196  002317
1197  002317  %*****************************************************************
1198  002317  % SUBROUTINE FOR BINARY LOADER TO READ OCTAL NUMBER, RETURNS ON NON-OCTAL CHAR
1199  002317
1200  002317  ASS8:   AB,OCTNR               ALUF,ZERO               ALUD,B
1201  002317          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
1202  002317          ASS81;
1203  002320
1204  002320
1205  002320
1206  002320  %*********************************
1207  002320  % OCTAL DIGIT FOUND
1208  002320
1209  002320  ASS82:                                              ALUD,NONE
```

```
1210  002320          IDBS,ALU                        T,JMP     T,PUSH
1211  002320          OCDIG;
1212  002321
1213  002321  ASS81:  AB,OCTNR               ALUF,PASSD          ALUD,B % READ CHARACTER
1214  002321          IDBS,REG                        T,JMP     T,PUSH
1215  002321          INCH;
1216  002322
1217  002322          A,STS B,R2              ALUF,ANDDA          ALUD,B
1218  002322          IDBS,GPR                        T,NEXT    T,HOLD
1219  002322          COND,F15                        F,NEXT    F,HOLD;
1220  002323
1221  002323                                  ALUF,PASSD          ALUD,Q
1222  002323          IDBS,ARG                        T,NEXT    T,HOLD
1223  002323          60;
1224  002324
1225  002324          A,R2  B,R3              ALUF,A-Q            ALUD,B
1226  002324          IDBS,ALU                        T,NEXT    T,HOLD;
1227  002325
1228  002325          A,R3  B,10              ALUF,A-D            ALUD,NONE
1229  002325          IDBS,BARG                       T,RETURN  T,POP
1230  002325          CONDENABL  COND,F15              F,RETURN  F,POP;
1231  002326
1232  002326                                                    ALUD,NONE
1233  002326          IDBS,ALU                        T,JMP     T,HOLD
1234  002326          ASS82 CONDENABL;
1235  002327
1236  002327
1237  002327
1238  002327
1239  002327
1240  002327
1241  002327
1242  002327
1243  002327
1244  002327  %*************************************************************************
1245  002327  % SUBROUTINE USED BY BINARY LOADER TO READ TWO BYTES AS ONE 16-BIT WORD
1246  002327
1247  002327  BIN:                                              ALUD,NONE % READ BYTE 1
1248  002327          IDBS,ALU                        T,JMP     T,PUSH
1249  002327          INCH;
1250  002330
1251  002330                                                    ALUD,NONE % SWAP BYTES
1252  002330          IDBS,GPR                        T,NEXT    T,HOLD;
1253  002331
1254  002331                B,Z               ALUF,PASSD          ALUD,B
1255  002331          IDBS,SWAP                       T,JMP     T,PUSH
1256  002331          INCH;                   % READ BYTE 2
1257  002332
1258  002332          A,Z   B,Z               ALUF,ORDA           ALUD,B % MAKE WORD
1259  002332          IDBS,GPR                        T,RETURN  T,POP;
1260  002333
1261  002333
1262  002333
1263  002333
1264  002333
1265  002333
1266  002333
1267  002333
1268  002333
1269  002333
1270  002333  %*************************************************************
1271  002333  %*************************************************************
1272  002333
1273  002333  % ENTERED FROM INTERRUPT VECTOR EVERY 20 MS
1274  002333
1275  002333  %*************************************************************
1276  002333
1277  002333  MS20:         B,10              ALUF,PASSD          ALUD,Q
1278  002333          IDBS,BARG               COMM,CLRTC T,NEXT   T,HOLD;
1279  002334
1280  002334          AB,STATUS               ALUF,ORDQ           ALUD,Q
1281  002334          IDBS,REG                        T,JMP     T,PUSH
1282  002334          WSIOC;
1283  002335
1284  002335
1285  002335
1286  002335
1287  002335
1288  002335  %*********************************************************
1289  002335  % TEST IF 20 MS CLOCK SHOULD ACTIVATE MOPC
1290  002335
```

```
1291    002335                                  ALUF,PASSD          ALUD,NONE
1292    002335          IDBS,MIPANS                         T,NEXT  T,HOLD
1293    002335          COND,F15                            F,JMP   F,HOLD;
1294    002336
1295    002336                                                      ALUD,NONE
1296    002336          IDBS,ALU                            T,NEXT  T,HOLD
1297    002336          MOPC CONDENABL;
1298    002337
1299    002337
1300    002337
1301    002337  %*************************************************
1302    002337  % MOPC SHOULD BE DRIVEN BY PANEL REQUEST FROM MEMORY MANAGEMENT MODULE
1303    002337
1304    002337                B,Z             ALUF,ZERO           ALUD,B
1305    002337          IDBS,ALU          COMM,CONTINUE T,JMP     T,HOLD;
1306    002340
1307    002340
1308    002340
1309    002340
1310    002340
1311    002340
1312    002340
1313    002340
1314    002340
1315    002340
1316    002340
1317    002340
1318    002340
1319    002340
1320    002340  %*****************************************************
1321    002340  %*****************************************************
1322    002340
1323    002340  % PANEL REQUEST,   ENTERED FROM INTERRUPT VECTOR (3762)
1324    002340
1325    002340  %*****************************************************
1326    002340
1327    002340  PRQ:                                                 ALUD,NONE
1328    002340          IDBS,MIPANS                         T,NEXT  T,HOLD;
1329    002341
1330    002341
1331    002341
1332    002341
1333    002341
1334    002341
1335    002341
1336    002341
1337    002341
1338    002341
1339    002341  %*****************************************************
1340    002341  %*****************************************************
1341    002341
1342    002341  % MAIN ENTRY POINT OF MOPC
1343    002341
1344    002341  %*************************************************
1345    002341
1346    002341  MOPC:
1347    002341  MRET1:  AB,PRCHR                ALUF,PASSD          ALUD,NONE
1348    002341          IDBS,REG                            T,NEXT  T,HOLD
1349    002341          COND,F=0                            F,NEXT  F,HOLD;
1350    002342
1351    002342                                  ALUF,PASSD          ALUD,Q
1352    002342          IDBS,IOR                            T,JMP   T,HOLD
1353    002342          NOUTP CONDENABL;
1354    002343
1355    002343
1356    002343  %*************************************************************
1357    002343  % CHARACTER IS WAITING TO BE OUTPUTTED
1358    002343
1359    002343          A,16                    ALUF,ANDDQ          ALUD,NONE
1360    002343          IDBS,BMG                            T,NEXT  T,HOLD
1361    002343          COND,F=0                            F,JMP   F,HOLD;
1362    002344
1363    002344  %CC TBMT INVERSE POLARITY
1364    002344
1365    002344          A,17                    ALUF,ANDDQ          ALUD,NONE
1366    002344          IDBS,BMG                            T,NEXT  T,HOLD
1367    002344          OUTPT CONDENABL;
1368    002345
1369    002345  %CC DA INVERSE POLARITY
1370    002345
1371    002345  %*****************************************
```

```
1372    002345  % OUTPUT STOPPED BY INPUT
1373    002345                                                          ALUD,NONE
1374    002345          IDBS,UART       COMM,UART,DATA T,JMP            T,HOLD
1375    002345          RONLY;
1376    002346
1377    002346  %CC READ DATA, RESET DA, DISCARD CHARACTER
1378    002346
1379    002346  OUTPT:                                                  ALUD,NONE
1380    002346          IDBS,ALU                        T,NEXT          T,HOLD
1381    002346          CONT CONDENABL;
1382    002347
1383    002347
1384    002347  %************************************************
1385    002347  % UART READY FOR OUTPUT
1386    002347
1387    002347          AB,PRCHR            ALUF,PASSD                  ALUD,Q
1388    002347          IDBS,REG        COMM,UART,DATA T,NEXT           T,HOLD
1389    002347          COND,F=0                        F,NEXT          F,HOLD;
1390    002350
1391    002350  %CC PRCHR -> UART DATA
1392    002350
1393    002350                          ALUF,D-Q                        ALUD,NONE
1394    002350          IDBS,ARG        COMM,LDGPR T,NEXT               T,HOLD
1395    002350          43;
1396    002351
1397    002351
1398    002351  %************************************************************
1399    002351  % JUMP TO CR IF OUTPUTTED CHAR. WAS #
1400    002351
1401    002351                B,12      ALUF,D-Q                        ALUD,NONE
1402    002351          IDBS,BARG                       T,JMP           T,HOLD
1403    002351          CR CONDENABL;
1404    002352
1405    002352
1406    002352  %************************************************************
1407    002352  % JUMP TO LFEED IF OUTPUTTED CHAR. WAS LF
1408    002352
1409    002352          AB,PRCHR            ALUF,ZERO                   ALUD,NONE
1410    002352          IDBS,ALU            COMM,EWRF T,JMP             T,HOLD
1411    002352          LFEED CONDENABL;
1412    002353
1413    002353          AB,CDIGI            ALUF,PASSD                  ALUD,Q
1414    002353          IDBS,REG                        T,NEXT          T,HOLD
1415    002353          COND,F15                        F,NEXT          F,HOLD;
1416    002354
1417    002354                                                          ALUD,NONE
1418    002354          IDBS,ALU                        T,JMP           T,HOLD
1419    002354          OUTP1 CONDENABL;
1420    002355
1421    002355
1422    002355  %************************************************************************
1423    002355  % THERE ARE MORE CHARACTERS LEFT TO BE PRINTED IN ONE OCTAL NUMBER
1424    002355
1425    002355                          ALUF,PASSQ                      ALUD,NONE
1426    002355          IDBS,ALU                        T,NEXT          T,HOLD
1427    002355          COND,F=0                        F,NEXT          F,HOLD;
1428    002356
1429    002356          AB,CDIGI            ALUF,Q-1                    ALUD,NONE
1430    002356          IDBS,ALU            COMM,EWRF T,JMP             T,HOLD
1431    002356          SPAC3 CONDENABL;
1432    002357
1433    002357
1434    002357  %*****************************************************
1435    002357  % GET NEXT DIGIT
1436    002357
1437    002357          AB,NUMBR MIS,ROT    ALUF,PASSD ALUM,MIC         ALUD,SLB
1438    002357          IDBS,REG                        T,NEXT          T,HOLD;
1439    002360
1440    002360          AB,NUMBR MIS,ROT    ALUF,PASSB ALUM,MIC         ALUD,SLB
1441    002360          IDBS,ALU                        T,NEXT          T,HOLD;
1442    002361
1443    002361          AB,NUMBR MIS,ROT    ALUF,PASSB ALUM,MIC         ALUD,SLB
1444    002361          IDBS,ALU                        T,NEXT          T,HOLD;
1445    002362
1446    002362          AB,NUMBR            ALUF,PASSB                  ALUD,Q
1447    002362          IDBS,ALU            COMM,EWRF T,NEXT            T,HOLD;
1448    002363
1449    002363                              ALUF,ANDDQ                  ALUD,Q
1450    002363          IDBS,ARG                        T,NEXT          T,HOLD
1451    002363          7;
1452    002364
```

```
1453    002364                                  ALUF,D+Q            ALUD,Q
1454    002364          IDBS,ARG                        T,NEXT      T,HOLD
1455    002364          60;
1456    002365
1457    002365
1458    002365  %*****************************************************
1459    002365  % PLACE IT IN PRCHR
1460    002365
1461    002365  PRICH:  AB,PRCHR                ALUF,PASSQ          ALUD,NONE
1462    002365          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
1463    002365          MRET1;
1464    002366
1465    002366
1466    002366  %************************************************
1467    002366  % GET SPACE, WHICH IS THE LAST CHAR. IN AN OCTAL NUMBER
1468    002366
1469    002366  SPACJ:  A,5                     ALUF,PASSD          ALUD,Q
1470    002366          IDBS,BMG                        T,JMP       T,HOLD
1471    002366          PRICH;
1472    002367
1473    002367
1474    002367
1475    002367
1476    002367
1477    002367
1478    002367  %*********************************************************
1479    002367  % ONE OCTAL NUMBER IS FINISHED
1480    002367
1481    002367  OUTP1:  AB,DUMPF                ALUF,PASSD          ALUD,Q
1482    002367          IDBS,REG                        T,NEXT      T,HOLD
1483    002367          COND,F=0                        F,NEXT      F,HOLD;
1484    002370
1485    002370          AB,CNT10                ALUF,PASSD          ALUD,Q
1486    002370          IDBS,REG                        T,JMP       T,HOLD
1487    002370          MRET1 CONDENABL;
1488    002371
1489    002371
1490    002371  %************************************************
1491    002371  % WE ARE PRESENTLY INSIDE A DUMP COMMAND
1492    002371
1493    002371                B,2               ALUF,Q-D            ALUD,NONE
1494    002371          IDBS,BARG                       T,NEXT      T,HOLD
1495    002371          COND,F15                        F,NEXT      F,HOLD;
1496    002372
1497    002372                B,12              ALUF,Q-D            ALUD,NONE
1498    002372          IDBS,BARG                       T,JMP       T,HOLD
1499    002372          DUMP2 CONDENABL;
1500    002373
1501    002373          AB,CURNR                ALUF,PASSD          ALUD,Q
1502    002373          IDBS,REG                        T,JMP       T,HOLD
1503    002373          DMP10 CONDENABL;
1504    002374
1505    002374
1506    002374  %*********************************************************
1507    002374  % SOMETHING ELSE THAN MEMORY CONTENT SHOULD BE PRINTED IN THE DUMP NOW
1508    002374
1509    002374  DUMP2:  AB,CNT10                ALUF,PASSD          ALUD,Q
1510    002374          IDBS,REG                        T,NEXT      T,HOLD
1511    002374          COND,F=0                        F,JMP       F,PUSH;
1512    002375
1513    002375                                  ALUF,PASSQ          ALUD,NONE
1514    002375          IDBS,ALU                        T,JMP       T,PUSH
1515    002375          DUMP3;
1516    002376
1517    002376
1518    002376  %***********************************
1519    002376  % CNT10 = 0 , PRINT ADDRESS
1520    002376
1521    002376  DUMP4:  AB,CURNR                ALUF,PASSD          ALUD,Q
1522    002376          IDBS,REG                        T,JMP       T,PUSH
1523    002376          PROCT;
1524    002377
1525    002377          AB,CNT10                ALUF,D+1            ALUD,Q
1526    002377          IDBS,REG                        T,JMP       T,HOLD
1527    002377          MRET3;
1528    002400
1529    002400
1530    002400
1531    002400  %*********************************************************
1532    002400  % NEXT OCTAL NUMBER SHOULD POSSIBLY BE PRINTED
1533    002400
```

```
1534    002400  DMP10: AB,UPPNR              ALUF,Q-D            ALUD,NONE
1535    002400         IDBS,REG                          T,NEXT    T,HOLD
1536    002400         COND,F=0                          F,NEXT    F,HOLD;
1537    002401
1538    002401         AB,PRCHR              ALUF,ZERO           ALUD,NONE
1539    002401         IDBS,ALU                          T,JMP     T,HOLD
1540    002401         SPACE CONDENABL;      % JUMP TO SPACE IF FINISHED WITH DUMP
1541    002402
1542    002402
1543    002402  %*********************************
1544    002402  % NOT FINISHED
1545    002402
1546    002402         AB,SCRAM                                    ALUD,NONE
1547    002402         IDBS,REG              COMM,LDLC T,NEXT      T,HOLD;
1548    002403
1549    002403
1550    002403  %*********************************
1551    002403  % GET VALUE
1552    002403
1553    002403                                                     ALUD,NONE
1554    002403         IDBS,ALU                          T,JMP     T,PUSH
1555    002403         DSPLY;
1556    002404
1557    002404         AB,CURNR              ALUF,D+1              ALUD,B
1558    002404         IDBS,REG                          T,NEXT    T,HOLD;
1559    002405
1560    002405
1561    002405  %*****************************************
1562    002405  % PRINT IT WITH PROCT
1563    002405
1564    002405         AB,CURNR              ALUF,PASSB            ALUD,NONE
1565    002405         IDBS,ALU              COMM,EWRF T,JMP       T,PUSH
1566    002405         PROCT;
1567    002406
1568    002406
1569    002406
1570    002406  %*************************************************************
1571    002406  % INCREMENT CNT10, CONTROLLING THE NUMBER OF ADDRESSES PER LINE
1572    002406
1573    002406  MRET2: AB,CNT10              ALUF,D+1              ALUD,Q
1574    002406         IDBS,REG                          T,NEXT    T,HOLD;
1575    002407
1576    002407  MRET3: AB,CNT10              ALUF,PASSQ            ALUD,NONE
1577    002407         IDBS,ALU              COMM,EWRF T,JMP       T,HOLD
1578    002407         MRET1;
1579    002410
1580    002410
1581    002410  DUMP3:       B,1             ALUF,D-Q              ALUD,NONE
1582    002410         IDBS,BARG                         T,RETURN  T,POP
1583    002410         DUMP5 CONDENABL;
1584    002411
1585    002411
1586    002411  %*****************************************
1587    002411  % CNT10 = 1, PRINT /
1588    002411
1589    002411  DUMP6:                       ALUF,PASSD            ALUD,Q
1590    002411         IDBS,ARG                          T,NEXT    T,HOLD
1591    002411         57;
1592    002412
1593    002412  DMP61: AB,PRCHR              ALUF,PASSQ            ALUD,NONE
1594    002412         IDBS,ALU              COMM,EWRF T,NEXT      T,HOLD;
1595    002413
1596    002413         AB,CNT10              ALUF,D+1              ALUD,Q
1597    002413         IDBS,REG                          T,JMP     T,HOLD
1598    002413         MRET3;
1599    002414
1600    002414  DUMP5:       B,12            ALUF,D-Q              ALUD,NONE
1601    002414         IDBS,BARG                         T,RETURN  T,POP
1602    002414         DUMP7 CONDENABL;
1603    002415
1604    002415
1605    002415  %*****************************************
1606    002415  % CNT10 = 12, PRINT CR
1607    002415
1608    002415  DUMP8:       B,15            ALUF,PASSD            ALUD,Q
1609    002415         IDBS,BARG                         T,JMP     T,HOLD
1610    002415         DMP61;
1611    002416
1612    002416  DUMP7:                                             ALUD,NONE
1613    002416         IDBS,ALU                          T,RETURN  T,POP
1614    002416         DUMP9 CONDENABL;
```

```
1615  002417
1616  002417
1617  002417  %*************************************************
1618  002417  % CNT10 = 13, PRINT LF
1619  002417
1620  002417  DUMP9:                          ALUF,PASSD          ALUD,Q
1621  002417          IDBS,ARG                          T,NEXT    T,HOLD
1622  002417          412;
1623  002420
1624  002420          AB,PRCHR                ALUF,PASSQ          ALUD,NONE
1625  002420          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
1626  002421
1627  002421          AB,CNT10                ALUF,ZERO           ALUD,NONE
1628  002421          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
1629  002421          MRET1;
1630  002422
1631  002422
1632  002422
1633  002422
1634  002422
1635  002422
1636  002422
1637  002422
1638  002422
1639  002422
1640  002422  %*************************************************************
1641  002422  %*************************************************************
1642  002422
1643  002422  % NO OUTPUT IS WAITING TO GET OUT
1644  002422
1645  002422  %*************************************************************
1646  002422  % COPCM TO CHECK IF MOPC SHOULD USE TERMINAL INPUT
1647  002422
1648  002422  NOUTP: A,13                     ALUF,ANDDQ          ALUD,NONE
1649  002422          IDBS,BMG                          T,JMP     T,PUSH
1650  002422          COPCM;
1651  002423
1652  002423
1653  002423  %*****************************************
1654  002423  % MOPC USES TERMINAL INPUT
1655  002423
1656  002423  INPUT: AB,STATUS                ALUF,PASSD          ALUD,Q
1657  002423          IDBS,REG                          T,NEXT    T,HOLD;
1658  002424
1659  002424          A,6                     ALUF,MASKDQ         ALUD,Q
1660  002424          IDBS,BMG                          T,JMP     T,PUSH
1661  002424          WSIOC;
1662  002425
1663  002425                                  ALUF,PASSD          ALUD,Q
1664  002425          IDBS,IOR                          T,NEXT    T,HOLD;
1665  002426
1666  002426          A,16                    ALUF,ANDDQ          ALUD,NONE
1667  002426          IDBS,BMG                          T,NEXT    T,HOLD
1668  002426          COND,F=0                          F,JMP     F,HOLD;
1669  002427
1670  002427  %CC DA INVERTED
1671  002427
1672  002427  %************************************
1673  002427  % NO DATA AVAILABLE ?
1674  002427
1675  002427               B,Z                ALUF,ZERO           ALUD,B
1676  002427          IDBS,ALU                          T,NEXT    T,HOLD
1677  002427          DISPL CONDENABL;
1678  002430
1679  002430
1680  002430  %*****************************
1681  002430  %CC CHECK BAUD RATE THUMBWHEEL
1682  002430
1683  002430               B,17               ALUF,ANDDQ          ALUD,Q
1684  002430          IDBS,BARG                         T,NEXT    T,HOLD
1685  002430          COND,F=0                          F,NEXT    F,HOLD;
1686  002431
1687  002431  %CC MASK OFF REST OF IOR
1688  002431
1689  002431          AB,BAUD                 ALUF,XORDQ          ALUD,NONE
1690  002431          IDBS,REG                          T,NEXT    T,HOLD;
1691  002432
1692  002432  %CC CHECK AGAINST OLD THUMBWHEEL POSITION.
1693  002432
1694  002432                                                      ALUD,NONE
1695  002432          IDBS,ALU                          T,JMP     T,HOLD
```

```
1696    002432          RCHAR CONDENABL;
1697    002433
1698    002433  %CC JUMP IF THUMBWHEEL THE SAME AS PREVIOS VALUE
1699    002433
1700    002433                                                          ALUD,NONE
1701    002433          IDBS,UART           COMM,UART,MODE T,JMP        T,PUSH
1702    002433          BAUDS;
1703    002434
1704    002434  %CC SKIP WRITING TO MODE 1 REGISTER
1705    002434
1706    002434  %*************************
1707    002434  % READ CHARACTER
1708    002434
1709    002434  RCHAR:                          ALUF,PASSD          ALUD,Q
1710    002434          IDBS,UART           COMM,UART,DATA T,NEXT   T,HOLD;
1711    002435
1712    002435
1713    002435                                  ALUF,ANDDQ          ALUD,Q
1714    002435          IDBS,ARG            COMM,SLOW      T,NEXT   T,HOLD
1715    002435          177;
1716    002436
1717    002436  %CC 625 NS DELAY
1718    002436
1719    002436                                                      ALUD,NONE
1720    002436          IDBS,ALU            COMM,XSLOW     T,NEXT   T,HOLD;
1721    002437
1722    002437  %***************************
1723    002437  % PRINT ECHO
1724    002437
1725    002437               B,R2           ALUF,PASSQ          ALUD,B
1726    002437          IDBS,ALU            COMM,UART,DATA T,NEXT  T,HOLD
1727    002437          COND,F=0                           F,NEXT   F,HOLD;
1728    002440
1729    002440               B,15           ALUF,Q-D            ALUD,NONE
1730    002440          IDBS,BARG                          T,JMP    T,PUSH
1731    002440          IN1;
1732    002441
1733    002441
1734    002441  %*********************************************
1735    002441  % CHARACTER WAS CR, PRINT LF
1736    002441
1737    002441               B,12           ALUF,PASSD          ALUD,Q
1738    002441          IDBS,BARG                          T,NEXT   T,HOLD;
1739    002442
1740    002442          AB,PRCHR            ALUF,PASSQ          ALUD,NONE
1741    002442          IDBS,ALU            COMM,EWRF T,JMP     T,HOLD
1742    002442          CONT;
1743    002443
1744    002443
1745    002443
1746    002443  %*********************************
1747    002443  % CHECK IF OCTAL DIGIT (60-71)
1748    002443
1749    002443  IN1:                                                ALUD,NONE
1750    002443          IDBS,ALU                           T,RETURN T,POP
1751    002443          COND,F15                           F,NEXT   F,POP CONDENABL;
1752    002444
1753    002444               B,R1           ALUF,Q-D            ALUD,B
1754    002444          IDBS,ARG                           T,NEXT   T,HOLD
1755    002444          60;
1756    002445
1757    002445          A,R1  B,10          ALUF,A-D            ALUD,NONE
1758    002445          IDBS,BARG                          T,JMP    T,HOLD
1759    002445          IN2 CONDENABL;
1760    002446
1761    002446                                                      ALUD,NONE
1762    002446          IDBS,ALU                           T,JMP    T,HOLD
1763    002446          OCDI2 CONDENABL;
1764    002447
1765    002447
1766    002447
1767    002447  %*************************************************************
1768    002447  % CHARACTER WAS NOT OCTAL DIGIT, CHECK LETTER
1769    002447
1770    002447  IN2:                            ALUF,Q-D            ALUD,NONE
1771    002447          IDBS,ARG                           T,NEXT   T,HOLD
1772    002447          101;
1773    002450
1774    002450               B,R5           ALUF,ZERO           ALUD,B
1775    002450          IDBS,ALU                           T,JMP    T,HOLD
1776    002450          IN3 CONDENABL;
```

```
1777  002451
1778  002451                                  ALUF,Q-D              ALUD,NONE
1779  002451          IDBS,ARG                          T,NEXT      T,HOLD
1780  002451          132;
1781  002452
1782  002452                                                        ALUD,NONE
1783  002452          IDBS,ALU                          T,JMP       T,HOLD
1784  002452          LETTR CONDENABL;
1785  002453
1786  002453
1787  002453
1788  002453    %*********************************************************
1789  002453    % CHARACTER WAS NOT LETTER A-Y, CHECK SPECIAL CHARACTERS
1790  002453
1791  002453    IN3:  A,6                       ALUF,Q-D              ALUD,Q
1792  002453          IDBS,BMG                          T,NEXT      T,HOLD
1793  002453          COND,F=0                          F,NEXT      F,HOLD;
1794  002454
1795  002454          B,4  ALUF,D+Q ALUD,Q IDBS,BARG T,JMP T,HOLD SPACE CONDENABL;
1796  002455          B,15 ALUF,D+Q ALUD,Q IDBS,BARG T,JMP T,HOLD ANGBR CONDENABL;
1797  002456          B,5  ALUF,D+Q ALUD,Q IDBS,BARG T,JMP T,HOLD SLASH CONDENABL;
1798  002457          B,17 ALUF,D+Q ALUD,Q IDBS,BARG T,JMP T,HOLD ASTRX CONDENABL;
1799  002460          B,5  ALUF,Q-D ALUD,Q IDBS,BARG T,JMP T,HOLD ESCAP CONDENABL;
1800  002461
1801  002461
1802  002461          A,7   B,R1              ALUF,Q-D-1            ALUD,B
1803  002461          IDBS,AARG                         T,JMP       T,HOLD
1804  002461          SPACE CONDENABL;
1805  002462
1806  002462
1807  002462    %*************************************************************
1808  002462    % OTHER CHARACTERS ONLY LEGAL IN STOP, AND WITHOUT LETTERS IN FRONT
1809  002462
1810  002462               B,R1               ALUF,B-1              ALUD,B
1811  002462          IDBS,ALU                          T,JMP       T,PUSH
1812  002462          STTS0;
1813  002463
1814  002463               B,1                ALUF,Q-D              ALUD,Q
1815  002463          IDBS,BARG                         T,NEXT      T,HOLD
1816  002463          COND,F=0                          F,NEXT      F,HOLD;
1817  002464
1818  002464       B,R1 ALUF,PASSB ALUD,NONE IDBS,ALU T,JMP T,HOLD EXCL  CONDENABL;
1819  002465            B,1  ALUF,Q-D ALUD,Q IDBS,BARG T,JMP T,HOLD ZCHAR CONDENABL;
1820  002466            B,1  ALUF,Q-D ALUD,Q IDBS,BARG T,JMP T,HOLD QUOTE CONDENABL;
1821  002467            B,1  ALUF,Q-D ALUD,Q IDBS,BARG T,JMP T,HOLD CROSS CONDENABL;
1822  002470            B,2  ALUF,Q-D ALUD,Q IDBS,BARG T,JMP T,HOLD DOLOA CONDENABL;
1823  002471            B,10 ALUF,Q-D ALUD,Q IDBS,BARG T,JMP T,HOLD ETLOA CONDENABL;
1824  002472            ALUD,NONE IDBS,ALU             T,JMP T,HOLD DOT   CONDENABL;
1825  002473
1826  002473
1827  002473
1828  002473    %*************************************************
1829  002473    % ILLEGAL MOPC CONDITION, PRINT ?
1830  002473
1831  002473    ILLEG:                          ALUF,PASSD            ALUD,Q
1832  002473          IDBS,ARG                          T,NEXT      T,HOLD
1833  002473          77;
1834  002474
1835  002474          AB,PRCHR                  ALUF,PASSQ            ALUD,NONE
1836  002474          IDBS,ALU                  COMM,EWRF T,JMP       T,HOLD
1837  002474          RONLY;
1838  002475
1839  002475
1840  002475
1841  002475
1842  002475
1843  002475
1844  002475
1845  002475
1846  002475
1847  002475
1848  002475
1849  002475
1850  002475    %*************************************************************
1851  002475    % RETURN IF MOPC INPUT IS ACTIVE
1852  002475
1853  002475    COPCM:                                                ALUD,NONE
1854  002475          IDBS,ALU                          T,RETURN    T,POP
1855  002475          COND,STP                          F,NEXT      F,HOLD CONDENABL;
1856  002476
1857  002476
```

```
1858    002476  %*************************************************
1859    002476  % INPUT IF STOP
1860    002476
1861    002476                                                  ALUD,NONE
1862    002476          IDBS,ALU                        T,JMP   T,HOLD
1863    002476          INPUT CONDENABL;
1864    002477
1865    002477  %*****************************************************
1866    002477  % REFRESH DISPLAY IF MOPC IS IDLE
1867    002477
1868    002477
1869    002477  DISPL:  AB,DISPL                                ALUD,NONE
1870    002477          IDBS,REG            COMM,LDLC T,NEXT    T,HOLD;
1871    002500
1872    002500
1873    002500  %***********************************************
1874    002500  % SEND DATA TO DISPLAY PROCESSOR
1875    002500
1876    002500          AB,OCTAD            ALUF,PASSD          ALUD,Q
1877    002500          IDBS,REG                        T,JMP   T,PUSH
1878    002500          DSPLY;
1879    002501
1880    002501                                                  ALUD,NONE
1881    002501          IDBS,ALU                        T,JMP   T,HOLD
1882    002501          CONT;
1883    002502
1884    002502
1885    002502
1886    002502
1887    002502
1888    002502
1889    002502
1890    002502
1891    002502
1892    002502
1893    002502  %*************************************************************
1894    002502  %*************************************************************
1895    002502
1896    002502  % SUBROUTINE TO SEND DATA TO OPTIONAL DISPLAY. LC = DISPLAY TYPE. Q = ADDRESS
1897    002502
1898    002502  %*************************************************************
1899    002502
1900    002502  DSPLY:  A,LC  B,R4          ALUF,PASSD          ALUD,B
1901    002502          IDBS,ARG                        T,NEXT  T,HOLD
1902    002502          174001;
1903    002503
1904    002503               B,3                                ALUD,NONE
1905    002503          IDBS,BARG           COMM,LDGPR T,JMPAOPR T,HOLD
1906    002503          VECT4;              % VECTORIZED JUMP, CONTROLLED BY LOOP COUNTER
1907    002504
1908    002504
1909    002504
1910    002504  %*********************************************
1911    002504  % LC=0, MEMORY EXAMINE
1912    002504
1913    002504  EXAMI:
1914    002504          AB,OCTA2            ALUF,PASSD          ALUD,B
1915    002504          IDBS,REG            COMM,LDSEG T,NEXT   T,HOLD;
1916    002505
1917    002505               B,10                               ALUD,NONE
1918    002505          IDBS,BARG           COMM,LDPANC T,NEXT  T,HOLD;
1919    002506
1920    002506          AB,OCTA2            ALUF,PASSB          ALUD,NONE
1921    002506          IDBS,ALU            COMM,LDPANC T,JMP   T,PUSH
1922    002506          DYDAT;
1923    002507
1924    002507          A,10  B,R3          ALUF,D-1            ALUD,B
1925    002507          IDBS,BMG                        T,JMP   T,PUSH
1926    002507          SETEM;
1927    002510
1928    002510                              ALUF,PASSQ          ALUD,NONE
1929    002510          IDBS,ALU                        T,NEXT  T,HOLD;
1930    002511
1931    002511          ALUD,NONE IDBS,ALU COMM,EXRQ T,NEXT T,HOLD;
1932    002512
1933    002512                              ALUF,PASSD          ALUD,Q
1934    002512          IDBS,DBR                        T,JMP   T,PUSH
1935    002512          DYDAT;
1936    002513
1937    002513
1938    002513  RESEM:
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```
1939  002513                                ALUF,ZERO           ALUD,NONE
1940  002513          IDBS,ALU              COMM,LDEXM T,RETURN T,POP;
1941  002514
1942  002514    SETEM:
1943  002514          A,PIL  B,0            ALUF,PASSD          ALUD,B
1944  002514          IDBS,REG   XRF                T,NEXT    T,HOLD
1945  002514          COND,F=0                      F,NEXT    F,HOLD;
1946  002515
1947  002515          A,0    B,4            ALUF,ANDDA          ALUD,NONE
1948  002515          IDBS,BARG                     T,NEXT    T,HOLD;
1949  002516
1950  002516          AB,EXMOD              ALUF,PASSD          ALUD,B     % R1
1951  002516          IDBS,REG              COMM,LDEXM T,RETURN T,POP
1952  002516          CONDENABL;
1953  002517
1954  002517          A,R1   B,4            ALUF,ANDDA          ALUD,NONE
1955  002517          IDBS,BARG                     T,NEXT    T,HOLD
1956  002517          COND,F=0                      F,NEXT    F,HOLD;
1957  002520
1958  002520       30 A,R1   B,R1           ALUF,XORDA          ALUD,SRB
1959  002520          IDBS,ARG                      T,RETURN  T,POP
1960  002520          CONDENABL;
1961  002521
1962  002521       % VIRTUAL EXAMINE
1963  002521
1964  002521          A,R1                  ALUF,PASSA          ALUD,NONE
1965  002521          IDBS,ALU              COMM,LDSEG T,RETURN T,POP;
1966  002522
1967  002522
1968  002522
1969  002522
1970  002522    %*************************************************
1971  002522    % LC=1, REGISTER EXAMINE
1972  002522
1973  002522    VC41:                       ALUF,PASSQ          ALUD,NONE
1974  002522          IDBS,ALU              COMM,LDIRV T,NEXT   T,HOLD;
1975  002523
1976  002523                                ALUF,PASSQ          ALUD,NONE
1977  002523          IDBS,ALU              COMM,LDGPR T,NEXT   T,HOLD;
1978  002524
1979  002524                                                    ALUD,NONE
1980  002524          IDBS,ALU                      T,JMP       T,PUSH
1981  002524          IRR;
1982  002525
1983  002525          A,A                   ALUF,PASSA          ALUD,Q
1984  002525          IDBS,ALU                      T,NEXT      T,POP;
1985  002526
1986  002526    OPAST: A,R7   B,A           ALUF,PASSA          ALUD,B
1987  002526          IDBS,ALU                      T,JMP       T,HOLD
1988  002526          DYTP1;
1989  002527
1990  002527
1991  002527
1992  002527
1993  002527    %*************************************************
1994  002527    % LC=2, AUXILIARY REGISTER EXAMINE
1995  002527
1996  002527    VC42:                       ALUF,PASSQ          ALUD,NONE
1997  002527          IDBS,ALU              COMM,LDIRV T,NEXT   T,HOLD;
1998  002530
1999  002530          A,R6                  ALUF,PASSA          ALUD,NONE
2000  002530          IDBS,ALU              COMM,LDLC T,NEXT    T,HOLD;
2001  002531
2002  002531                                                    ALUD,NONE
2003  002531          IDBS,ALU                      T,NEXT      T,HOLD;
2004  002532
2005  002532          A,REG B,LC            ALUF,PASSD          ALUD,Q
2006  002532          IDBS,REG                      T,JMP       T,HOLD
2007  002532          DYTP1;
2008  002533
2009  002533
2010  002533
2011  002533    %*************************************************
2012  002533    % LC = 3 : INTERNAL REGISTER EXAMINE
2013  002533
2014  002533    VC43:                       ALUF,PASSQ          ALUD,NONE
2015  002533          IDBS,ALU              COMM,LDIRV T,NEXT   T,HOLD;
2016  002534
2017  002534                                ALUF,PASSQ          ALUD,NONE
2018  002534          IDBS,ALU              COMM,LDGPR T,NEXT   T,HOLD;
2019  002535
```

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2020  002535                                                    ALUD,NONE
2021  002535          IDBS,ALU                        T,JMP     T,PUSH
2022  002535          VC431;
2023  002536
2024  002536          A,A                   ALUF,PASSA          ALUD,Q
2025  002536          IDBS,ALU                        T,JMP     T,POP
2026  002536          OPAST;
2027  002537
2028  002537
2029  002537  %*****************************
2030  002537  % USE TRA-INSTRUCTION
2031  002537
2032  002537  VC431:                                            ALUD,NONE
2033  002537          IDBS,ALU                        T,JMP     T,HOLD
2034  002537          TRA;
2035  002540
2036  002540
2037  002540
2038  002540  %************************************************
2039  002540  %  LC = 17 : ACTIVITY EXAMINE (ACTIVE LEVELS)
2040  002540
2041  002540  VC417: AB,ACTLV  A,PIL       ALUF,PASSD          ALUD,B
2042  002540          IDBS,BMG                        T,NEXT    T,HOLD;
2043  002541
2044  002541          AB,ACTLV              ALUF,PASSB          ALUD,NONE
2045  002541          IDBS,ALU              COMM,EWRF T,JMP     T,HOLD
2046  002541          DYTP2;
2047  002542
2048  002542
2049  002542
2050  002542
2051  002542  %************************************************************
2052  002542  % SUBROUTINE TO SEND DATA FROM REGISTER EXAMINE TO MMM
2053  002542
2054  002542  DYTP1:
2055  002542               B,11                               ALUD,NONE
2056  002542          IDBS,BARG           COMM,LDPANC T,JMP     T,PUSH
2057  002542          DYDAT;
2058  002543
2059  002543          A,P                   ALUF,PASSA          ALUD,NONE
2060  002543          IDBS,ALU            COMM,LDPANC T,JMP     T,HOLD
2061  002543          DYSWP;
2062  002544
2063  002544
2064  002544
2065  002544
2066  002544  %************************************************************
2067  002544  % SUBROUTINE TO SEND Q AS TWO BYTES TO MMM
2068  002544
2069  002544  DYDAT:                        ALUF,PASSQ          ALUD,NONE
2070  002544          IDBS,ALU            COMM,LDPANC T,NEXT    T,HOLD;
2071  002545
2072  002545  DYSWP:                                            ALUD,NONE
2073  002545          IDBS,SWAP           COMM,LDPANC T,RETURN  T,POP;
2074  002546
2075  002546
2076  002546
2077  002546  %************************************************************
2078  002546  % SUBROUTINE TO SEND ACTIVE LEVELS DATA TO MMM
2079  002546
2080  002546  DYTP2:
2081  002546               B,12                               ALUD,NONE
2082  002546          IDBS,BARG           COMM,LDPANC T,JMP     T,HOLD
2083  002546          DYDAT;
2084  002547
2085  002547
2086  002547
2087  002547
2088  002547
2089  002547
2090  002547
2091  002547
2092  002547
2093  002547  %************************************************************
2094  002547
2095  002547  % SUBROUTINE TO PRINT OCTAL NUMBER AS 6 DIGITS + SPACE
2096  002547
2097  002547  %************************************************************
2098  002547
2099  002547  PROCT: AB,NUMBR MIS,ROT     ALUF,PASSQ ALUM,MIC ALUD,SLB
2100  002547          IDBS,ALU                        T,NEXT    T,HOLD;
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2101  002550
2102  002550          AB,NUMBR                ALUF,PASSB              ALUD,Q
2103  002550          IDBS,ALU                COMM,EWRF T,NEXT        T,HOLD;
2104  002551
2105  002551                                  ALUF,ANDDQ              ALUD,Q
2106  002551          IDBS,ARG                        T,NEXT          T,HOLD
2107  002551          1;
2108  002552
2109  002552                                  ALUF,D+Q                ALUD,Q
2110  002552          IDBS,ARG                        T,NEXT          T,HOLD
2111  002552          60;
2112  002553
2113  002553          AB,PRCHR                ALUF,PASSQ              ALUD,NONE
2114  002553          IDBS,ALU                COMM,EWRF T,NEXT        T,HOLD;
2115  002554
2116  002554                                  ALUF,PASSD              ALUD,Q
2117  002554          IDBS,ARG                        T,NEXT          T,HOLD
2118  002554          5;
2119  002555
2120  002555          AB,CDIGI                ALUF,PASSQ              ALUD,NONE
2121  002555          IDBS,ALU                COMM,EWRF T,RETURN      T,POP;
2122  002556
2123  002556
2124  002556
2125  002556
2126  002556
2127  002556    %*************************************************************
2128  002556
2129  002556    % SUBROUTINE TO CHECK THAT SCRAM = 0 AND STOP
2130  002556
2131  002556    %*************************************************************
2132  002556
2133  002556    STTS0: AB,SCRAM               ALUF,PASSD              ALUD,NONE
2134  002556          IDBS,REG                        T,NEXT          T,HOLD
2135  002556          COND,F=0                        F,JMP           F,HOLD;
2136  002557
2137  002557                                                          ALUD,NONE
2138  002557          IDBS,ALU                        T,NEXT          T,HOLD
2139  002557          ILLEG CONDENABL;
2140  002560
2141  002560
2142  002560    %*****************************************************
2143  002560    % SUBROUTINE TO CHECK STOP
2144  002560
2145  002560    STTST:                                                ALUD,NONE
2146  002560          IDBS,ALU                        T,NEXT          T,HOLD
2147  002560          COND,STP                        F,JMP           F,HOLD;
2148  002561
2149  002561                                                          ALUD,NONE
2150  002561          IDBS,ALU                        T,RETURN        T,POP
2151  002561          ILLEG CONDENABL;
2152  002562
2153  002562
2154  002562
2155  002562
2156  002562
2157  002562    %*************************************************
2158  002562
2159  002562    % SUBROUTINE TO SEND LABEL TO MMM
2160  002562
2161  002562    %*************************************************
2162  002562
2163  002562    LABEL:
2164  002562               B,16                                       ALUD,NONE
2165  002562          IDBS,BARG             COMM,LDPANC T,NEXT        T,HOLD;
2166  002563
2167  002563          AB,TXT1                                         ALUD,NONE
2168  002563          IDBS,REG              COMM,LDPANC T,JMP         T,PUSH
2169  002563          DYSWP;
2170  002564
2171  002564          AB,TXT2                                         ALUD,NONE
2172  002564          IDBS,REG              COMM,LDPANC T,JMP         T,HOLD
2173  002564          DYSWP;
2174  002565
2175  002565
2176  002565
2177  002565
2178  002565    %*********************************************************************
2179  002565
2180  002565    % SUBROUTINE TO ASSEMBLE CHARACTERS AS LABELS FOR MMM
2181  002565
```

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2182    002565  %*****************************************************************
2183    002565
2184    002565  BUILD: AB,TXT1              ALUF,PASSD          ALUD,B
2185    002565         IDBS,REG                       T,NEXT    T,HOLD
2186    002565         COND,LC=0;
2187    002566
2188    002566              B,6                                  ALUD,NONE
2189    002566         IDBS,BARG            COMM,LDLC T,NEXT     T,HOLD;
2190    002567
2191    002567         AB,TXT2              ALUF,PASSD          ALUD,Q
2192    002567         IDBS,REG                       T,NEXT    T,PUSH;
2193    002570
2194    002570         AB,TXT1              ALUF,PASSB ALUM,MIC ALUD,SLD
2195    002570         IDBS,ALU                       T,NEXT    T,POP
2196    002570         LCOUNT;
2197    002571
2198    002571         A,R2                 ALUF,ORAQ                        ALUD,Q
2199    002571         IDBS,ALU                       T,NEXT    T,HOLD;
2200    002572
2201    002572         AB,TXT1              ALUF,PASSB          ALUD,NONE
2202    002572         IDBS,ALU             COMM,EWRF T,NEXT    T,HOLD;
2203    002573
2204    002573         AB,TXT2              ALUF,PASSQ          ALUD,NONE
2205    002573         IDBS,ALU             COMM,EWRF T,RETURN  T,POP;
2206    002574
2207    002574
2208    002574
2209    002574
2210    002574
2211    002574
2212    002574  %*****************************************************************
2213    002574
2214    002574  % SUBROUTINE TO ASSEMBLE AN OCTAL NUMBER FROM A DIGIT
2215    002574
2216    002574  %*****************************************************************
2217    002574
2218    002574  OCDIG: AB,OCTN2              ALUF,PASSD          ALUD,B
2219    002574         IDBS,REG                       T,JMP     T,PUSH
2220    002574         BUILD;
2221    002575
2222    002575  OCDIX: AB,OCTNR              ALUF,PASSD          ALUD,Q
2223    002575         IDBS,REG                       T,NEXT    T,HOLD;
2224    002576
2225    002576              B,R5            ALUF,PASSB ALUM,MIC ALUD,SLD
2226    002576         IDBS,ALU                       T,NEXT    T,HOLD;
2227    002577
2228    002577              B,R5            ALUF,PASSB ALUM,MIC ALUD,SLD
2229    002577         IDBS,ALU                       T,NEXT    T,HOLD;
2230    002600
2231    002600              B,R5            ALUF,PASSB ALUM,MIC ALUD,SLD
2232    002600         IDBS,ALU                        T,NEXT   T,HOLD;
2233    002601
2234    002601       7 A,R2  B,R2           ALUF,ANDDA          ALUD,B
2235    002601         IDBS,ARG                       T,NEXT    T,HOLD;
2236    002602
2237    002602         A,R2                 ALUF,ORAQ           ALUD,Q
2238    002602         IDBS,ALU                       T,NEXT    T,HOLD;
2239    002603
2240    002603         AB,OCTNR             ALUF,PASSQ          ALUD,NONE
2241    002603         IDBS,ALU             COMM,EWRF T,NEXT    T,HOLD;
2242    002604
2243    002604         AB,OCTN2             ALUF,PASSB          ALUD,NONE
2244    002604         IDBS,ALU             COMM,EWRF T,NEXT    T,HOLD;
2245    002605
2246    002605         AB,DEPOS                                 ALUD,NONE
2247    002605         IDBS,ARG             COMM,EWRF T,RETURN  T,POP;
2248    002606
2249    002606
2250    002606
2251    002606
2252    002606  %*************************************************
2253    002606  %*************************************************
2254    002606
2255    002606  % ROUTINES FOR DIFFERENT MOPC INPUT CARACTERS
2256    002606
2257    002606  %*************************************************
2258    002606  % MOPC INPUT CHARACTER WAS 0-7
2259    002606
2260    002606  OCDI2:                                           ALUD,NONE
2261    002606         IDBS,ALU                       T,JMP     T,PUSH
2262    002606         OCDIG;
```

```
2263    002607
2264    002607                                                      ALUD,NONE
2265    002607          IDBS,ALU                        T,JMP       T,HOLD
2266    002607          CONT;
2267    002610
2268    002610
2269    002610
2270    002610
2271    002610  %*************************************************
2272    002610  % MOPC INPUT CHARACTER WAS ESCAPE
2273    002610
2274    002610  ESCAP:  AB,STATUS               ALUF,PASSD          ALUD,Q
2275    002610          IDBS,REG                        T,NEXT      T,HOLD;
2276    002611
2277    002611          A,6                     ALUF,ORDQ           ALUD,Q
2278    002611          IDBS,BMG                        T,JMP       T,PUSH
2279    002611          WSIOC;
2280    002612
2281    002612
2282    002612
2283    002612
2284    002612  %*********************************************************
2285    002612  % ROUTINE TO MAKE DEPOSIT ILLEGAL
2286    002612
2287    002612  RONLY:  AB,RONLY                                    ALUD,NONE
2288    002612          IDBS,ARG                COMM,EWRF T,JMP     T,HOLD
2289    002612          SPACE;
2290    002613
2291    002613
2292    002613
2293    002613
2294    002613
2295    002613  %*************************************************************
2296    002613  % MOPC INPUT CHARACTER WAS SPACE OR @, RESET MOPC
2297    002613
2298    002613  SPACE:  AB,MANIR ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
2299    002614          AB,BPFLG ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
2300    002615          AB,SINGL ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,NEXT T,HOLD;
2301    002616
2302    002616  %*************************************************************
2303    002616  % MOPC INPUT CHARACTER WAS  .  "  Z       PARTIALLY RESET MOPC
2304    002616
2305    002616  SPAC9:  AB,TXT1  ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,JMP  T,PUSH SPAC2;
2306    002617          AB,TXT2  ALUF,ZERO ALUD,NONE IDBS,ALU COMM,EWRF T,JMP  T,HOLD CONT;
2307    002620
2308    002620
2309    002620
2310    002620  %*************************************************************
2311    002620  % MOPC OUTPUT CHARACTER WAS LF, PRINT #
2312    002620
2313    002620  LFEED:  AB,PRCHR                                    ALUD,NONE
2314    002620          IDBS,GPR                COMM,EWRF T,JMP     T,HOLD
2315    002620          CONT;
2316    002621
2317    002621
2318    002621
2319    002621
2320    002621
2321    002621  %*********************************************************
2322    002621  % MOPC INPUT CHARACTER WAS A-Y, SCRAMBLE CHARACTERS
2323    002621
2324    002621  LETTR:  AB,SCRAM                ALUF,PASSD ALUM,MIC ALUD,SLB
2325    002621          IDBS,REG                        T,JMP       T,PUSH
2326    002621          BUILD;
2327    002622
2328    002622                                  ALUF,PASSD          ALUD,Q
2329    002622          IDBS,ARG                        T,NEXT      T,HOLD
2330    002622          37;
2331    002623
2332    002623          A,R2  B,R2              ALUF,ANDAQ          ALUD,B
2333    002623          IDBS,ALU                        T,NEXT      T,HOLD;
2334    002624
2335    002624          A,R2  B,R5              ALUF,A+B            ALUD,B
2336    002624          IDBS,ALU                        T,NEXT      T,HOLD;
2337    002625
2338    002625          AB,SCRAM                ALUF,PASSB          ALUD,NONE
2339    002625          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
2340    002625          CONT;
2341    002626
2342    002626
2343    002626
```

```
2344    002626
2345    002626   %*****************************
2346    002626   % ! TYPED, START PROGRAM
2347    002626
2348    002626   EXCL:  AB,SCRAM              ALUF,PASSD          ALUD,NONE
2349    002626          IDBS,REG                        T,NEXT    T,HOLD
2350    002626          COND,F=0                        F,JMP     F,HOLD;
2351    002627
2352    002627          AB,OCTNR             ALUF,PASSD          ALUD,Q
2353    002627          IDBS,REG                        T,NEXT    T,HOLD
2354    002627          ILLEG CONDENABL;
2355    002630
2356    002630          AB,DEPOS             ALUF,PASSD          ALUD,NONE
2357    002630          IDBS,REG                        T,NEXT    T,HOLD
2358    002630          COND,F=0                        F,NEXT    F,HOLD;
2359    002631
2360    002631                                                    ALUD,NONE
2361    002631          IDBS,ALU             COMM,START T,JMP     T,HOLD
2362    002631          ESCAP CONDENABL;
2363    002632
2364    002632
2365    002632               B,P             ALUF,PASSQ          ALUD,B
2366    002632          IDBS,ALU                        T,JMP     T,HOLD
2367    002632          ESCAP;
2368    002633
2369    002633
2370    002633
2371    002633
2372    002633
2373    002633
2374    002633
2375    002633
2376    002633   %*********************************
2377    002633   % # TYPED, MEMORY TEST
2378    002633
2379    002633   CROSS:
2380    002633   MEMOT:      B,A              ALUF,ZERO           ALUD,B
2381    002633          IDBS,ALU                        T,NEXT    T,HOLD
2382    002633          150122;
2383    002634
2384    002634          AB,OCTNR                                  ALUD,NONE
2385    002634          IDBS,REG           COMM,LDSEG T,NEXT      T,HOLD;
2386    002635
2387    002635   MM00:      B,D              ALUF,ZERO           ALUD,B
2388    002635          IDBS,ALU                        T,NEXT    T,HOLD;
2389    002636
2390    002636   MM0:   A,0   B,T            ALUF,PASSD          ALUD,B
2391    002636          IDBS,BMG                        T,NEXT    T,HOLD;
2392    002637
2393    002637   MM1:       B,R2             ALUF,ZERO           ALUD,B
2394    002637          IDBS,ALU                        T,NEXT    T,HOLD;
2395    002640
2396    002640   MM2:   A,B   B,P            ALUF,PASSA          ALUD,B
2397    002640          IDBS,ALU                        T,NEXT    T,HOLD;
2398    002641
2399    002641   MM3:   A,P   B,L            ALUF,PASSA          ALUD,B
2400    002641          IDBS,ALU                        T,NEXT    T,HOLD;
2401    002642
2402    002642          A,A                  ALUF,PASSA          ALUD,NONE
2403    002642          IDBS,ALU                        T,NEXT    T,HOLD
2404    002642          COND,F=0                        F,JMP     F,HOLD;
2405    002643
2406    002643          A,R2                 ALUF,PASSA          ALUD,NONE
2407    002643          IDBS,ALU                        T,NEXT    T,HOLD
2408    002643          MM31 CONDENABL;
2409    002644
2410    002644          A,T   B,L            ALUF,PASSA          ALUD,B
2411    002644          IDBS,ALU                        T,NEXT    T,HOLD
2412    002644          COND,COND                       F,JMP     F,HOLD;
2413    002645
2414    002645   MM31:  A,D   B,L            ALUF,XORAB          ALUD,B
2415    002645          IDBS,ALU                        T,NEXT    T,HOLD
2416    002645          MM4 CONDENABL;
2417    002646
2418    002646          A,P   B,P            ALUF,B+1            ALUD,B,YA
2419    002646          IDBS,ALU                        T,NEXT    T,HOLD;
2420    002647
2421    002647          A,L                  ALUF,PASSA          ALUD,NONE
2422    002647          IDBS,ALU             COMM,DERQ T,JMP     T,HOLD
2423    002647          MM41;
2424    002650
```

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2425  002650  MM4:   A,P   B,P              ALUF,B+1            ALUD,B,YA
2426  002650         IDBS,ALU                          T,NEXT    T,HOLD;
2427  002651
2428  002651         ALUD,NONE IDBS,ALU COMM,EXRQ T,NEXT T,HOLD;
2429  002652
2430  002652         A,L                    ALUF,XORDA          ALUD,NONE
2431  002652         IDBS,DBR               COMM,LDGPR T,NEXT   T,HOLD
2432  002652         COND,F=0                          F,JMP     F,HOLD;
2433  002653
2434  002653                                                     ALUD,NONE
2435  002653         IDBS,ALU                          T,NEXT    T,HOLD
2436  002653         MMERR CONDENABL;
2437  002654
2438  002654  MM41:  A,P   B,X              ALUF,A-B-1          ALUD,NONE
2439  002654         IDBS,ALU                          T,NEXT    T,HOLD
2440  002654         COND,F=0                          F,JMP     F,HOLD;
2441  002655
2442  002655               B,R2             ALUF,INVB           ALUD,NONE
2443  002655         IDBS,ALU                          T,NEXT    T,HOLD
2444  002655         MM3 CONDENABL;
2445  002656
2446  002656               B,R2             ALUF,INVB           ALUD,B
2447  002656         IDBS,ALU                          T,NEXT    T,HOLD
2448  002656         MM2 CONDENABL;
2449  002657
2450  002657         A,T   B,T              ALUF,A+B            ALUD,B
2451  002657         IDBS,ALU                          T,NEXT    T,HOLD;
2452  002660
2453  002660               B,D              ALUF,INVB           ALUD,NONE
2454  002660         IDBS,ALU                          T,NEXT    T,HOLD
2455  002660         MM1 CONDENABL;
2456  002661
2457  002661               B,D              ALUF,INVB           ALUD,B
2458  002661         IDBS,ALU                          T,NEXT    T,HOLD
2459  002661         MM0 CONDENABL;
2460  002662
2461  002662               B,A              ALUF,INVB           ALUD,B
2462  002662         IDBS,ARG               COMM,LDGPR T,NEXT   T,HOLD
2463  002662         443;
2464  002663
2465  002663                                                     ALUD,NONE
2466  002663         IDBS,ALU                          T,NEXT    T,HOLD
2467  002663         MM00 CONDENABL;
2468  002664
2469  002664         AB,PRCHR                                    ALUD,NONE
2470  002664         IDBS,GPR               COMM,EWRF T,JMP     T,HOLD
2471  002664         RONLY;
2472  002665
2473  002665  MMERR:       B,D              ALUF,PASSD          ALUD,B
2474  002665         IDBS,GPR                          T,NEXT    T,HOLD;
2475  002666
2476  002666               B,P              ALUF,B-1            ALUD,B
2477  002666         IDBS,ALU                          T,NEXT    T,HOLD;
2478  002667
2479  002667         A,L   B,D              ALUF,XORAB          ALUD,Q
2480  002667         IDBS,ALU                          T,NEXT    T,HOLD;
2481  002670
2482  002670               B,T              ALUF,PASSQ          ALUD,B
2483  002670         IDBS,ALU                          T,JMP     T,HOLD
2484  002670         ILLEG;
2485  002671
2486  002671
2487  002671
2488  002671
2489  002671
2490  002671
2491  002671
2492  002671
2493  002671  %*********************************************
2494  002671  % " TYPED, SET READY FOR MANUAL INSTRUCTION
2495  002671
2496  002671  QUOTE: AB,OCTNR               ALUF,PASSD          ALUD,Q
2497  002671         IDBS,REG                          T,NEXT    T,HOLD;
2498  002672
2499  002672         AB,BRKPT               ALUF,PASSQ          ALUD,NONE
2500  002672         IDBS,ALU               COMM,EWRF T,NEXT    T,HOLD;
2501  002673
2502  002673         AB,MANIR                                    ALUD,NONE
2503  002673         IDBS,ARG               COMM,EWRF T,JMP     T,HOLD
2504  002673         SPAC9;
2505  002674
```

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2506    002674
2507    002674
2508    002674
2509    002674
2510    002674  %*********************************************************
2511    002674  % STOP-ROUTINE CONTINUED, CHECK FOR MANUAL INSTRUCTION (NOT USED BY MOPC)
2512    002674
2513    002674  MANIR: AB,MANIR              ALUF,PASSD          ALUD,NONE
2514    002674         IDBS,REG                        T,NEXT    T,HOLD
2515    002674         COND,F=0                        F,NEXT    F,HOLD;
2516    002675
2517    002675         AB,BRKPT                                  ALUD,NONE
2518    002675         IDBS,REG              COMM,LDGPR T,JMP    T,HOLD
2519    002675         CONT CONDENABL;
2520    002676
2521    002676
2522    002676  %*****************************
2523    002676  % DO MANUAL INSTRUCTION
2524    002676
2525    002676                                                    ALUD,NONE
2526    002676         IDBS,ALU              COMM,CLIRQ T,NEXT   T,HOLD;
2527    002677
2528    002677                                                    ALUD,NONE
2529    002677         IDBS,GPR              COMM,MAP   T,JMP    T,HOLD;
2530    002700
2531    002700
2532    002700
2533    002700
2534    002700
2535    002700
2536    002700  %*****************************************************
2537    002700  % Z IS TYPED, MAKE READY FOR SINGLE INSTRUCTION
2538    002700
2539    002700  ZCHAR: AB,BPFLG              ALUF,PASSD          ALUD,NONE
2540    002700         IDBS,REG                        T,NEXT    T,HOLD
2541    002700         COND,F=0                        F,JMP     F,HOLD;
2542    002701
2543    002701
2544    002701  %*********************************************
2545    002701  % ILLEGAL IF BREAKPOINT IS ACTIVE
2546    002701
2547    002701         AB,OCTNR              ALUF,PASSD          ALUD,Q
2548    002701         IDBS,REG                        T,NEXT    T,HOLD
2549    002701         ILLEG CONDENABL;
2550    002702
2551    002702                                                    ALUD,NONE
2552    002702         IDBS,ALU                        T,NEXT    T,HOLD
2553    002702         SINIT CONDENABL;
2554    002703
2555    002703
2556    002703
2557    002703
2558    002703
2559    002703  %*****************************************************************
2560    002703  % PERFORM ONE SINGLE INSTRUCTION IN Z OR BREAKPOINT MODE. USED BY STOP OR MOPC
2561    002703  % ALSO ENTERED FROM PAGE FAULTS & PROT. VIOLS. WHEN IN STOP
2562    002703
2563    002703  SINGL:
2564    002703  BRKZZ: ALUD,NONE IDBS,ALU COMM,START T,NEXT T,HOLD;
2565    002704         ALUD,NONE IDBS,ALU COMM,SSTOP T,NEXT T,HOLD;
2566    002705
2567    002705  %*****************************************************************
2568    002705  % EXECUTE ONE INSTRUCTION OR ONE INTERRUPT.
2569    002705
2570    002705              B,Z               ALUF,ZERO           ALUD,B
2571    002705         IDBS,ALU               COMM,CONTINUE T,NEXT T,HOLD;
2572    002706
2573    002706
2574    002706
2575    002706
2576    002706
2577    002706  %*************************************************************
2578    002706  % MULTIPLE SINGLE, USED BY MOPC ONLY
2579    002706
2580    002706  SINIT: AB,SINGL              ALUF,PASSQ          ALUD,NONE
2581    002706         IDBS,ALU              COMM,EWRF T,JMP     T,HOLD
2582    002706         SPAC9;
2583    002707
2584    002707
2585    002707
2586    002707
```

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2587    002707  %*************************************************
2588    002707  % ENTERED FROM INTERRUPT VECTOR, SINGLE BUTTON PRESSED
2589    002707  % ONLY LEGAL IN STOP
2590    002707
2591    002707  SING2:                                          ALUD,NONE
2592    002707          IDBS,ALU                        T,NEXT  T,HOLD
2593    002707          COND,STP                        F,NEXT  F,HOLD;
2594    002710
2595    002710                                                  ALUD,NONE
2596    002710          IDBS,ALU                        T,JMP   T,HOLD
2597    002710          SINGL CONDENABL;
2598    002711
2599    002711                                                  ALUD,NONE
2600    002711          IDBS,ALU                        T,JMP   T,HOLD
2601    002711          CONT;
2602    002712
2603    002712
2604    002712
2605    002712
2606    002712
2607    002712
2608    002712
2609    002712
2610    002712
2611    002712
2612    002712
2613    002712  %*****************************************
2614    002712  % < TYPED
2615    002712
2616    002712  ANGBR:  AB,SCRAM                ALUF,PASSD      ALUD,NONE
2617    002712          IDBS,REG                        T,NEXT  T,HOLD
2618    002712          COND,F=0                        F,JMP   F,HOLD;
2619    002713
2620    002713          AB,OCTNR                ALUF,PASSD      ALUD,Q
2621    002713          IDBS,REG                        T,NEXT  T,HOLD
2622    002713          ILLEG CONDENABL;
2623    002714
2624    002714          AB,CURNR                ALUF,PASSQ      ALUD,NONE
2625    002714          IDBS,ALU                COMM,EWRF T,NEXT T,HOLD;
2626    002715
2627    002715          AB,DUMPF                                ALUD,NONE
2628    002715          IDBS,BARG               COMM,EWRF T,NEXT  T,HOLD;
2629    002716
2630    002716          AB,OCTNR                ALUF,ZERO       ALUD,NONE
2631    002716          IDBS,ALU                COMM,EWRF T,JMP T,HOLD
2632    002716          CONT;
2633    002717
2634    002717
2635    002717
2636    002717
2637    002717
2638    002717  %*********************************
2639    002717  % * TYPED
2640    002717
2641    002717  ASTRX:  AB,OCTAD                ALUF,PASSD      ALUD,Q
2642    002717          IDBS,REG                        T,JMP   T,PUSH
2643    002717          PROCT;
2644    002720
2645    002720                                                  ALUD,NONE
2646    002720          IDBS,ALU                        T,JMP   T,HOLD
2647    002720          SPACE;
2648    002721
2649    002721
2650    002721
2651    002721
2652    002721
2653    002721
2654    002721
2655    002721
2656    002721  %*************************************************************
2657    002721  % MOPC JUST PRINTED # AFTER LNE WAS ENDED
2658    002721
2659    002721  CR:     AB,PRCHR                ALUF,ZERO       ALUD,NONE
2660    002721          IDBS,ALU                COMM,EWRF T,NEXT T,HOLD;
2661    002722
2662    002722          AB,DUMPF                ALUF,PASSD      ALUD,NONE
2663    002722          IDBS,REG                        T,NEXT  T,HOLD
2664    002722          COND,F=0                        F,JMP   F,PUSH;
2665    002723
2666    002723          AB,SCRAM                ALUF,PASSD      ALUD,Q
2667    002723          IDBS,REG                        T,NEXT  T,HOLD
```

```
2668    002723          CR1 CONDENABL;
2669    002724
2670    002724  %*********************************
2671    002724  % DUMP SHOULD NOT BE STARTED
2672    002724
2673    002724                                  ALUF,Q-D            ALUD,NONE
2674    002724          IDBS,ARG                          T,NEXT    T,HOLD
2675    002724          114;
2676    002725
2677    002725                B,0                                   ALUD,NONE
2678    002725          IDBS,BARG               COMM,LDLC T,NEXT    T,HOLD
2679    002725          CR2 CONDENABL;
2680    002726
2681    002726
2682    002726  %*********************************
2683    002726  % IRD WRITTEN, TEST IF STOP
2684    002726
2685    002726                B,3               ALUF,PASSD          ALUD,Q
2686    002726          IDBS,BARG                         T,JMP     T,PUSH
2687    002726          STTST;
2688    002727
2689    002727
2690    002727  %*********************************************
2691    002727  % SET UP FOR INTERNAL REGISTER DUMP
2692    002727
2693    002727          AB,DUMPF                ALUF,PASSQ          ALUD,NONE
2694    002727          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2695    002730
2696    002730          AB,SCRAM                ALUF,PASSQ          ALUD,NONE
2697    002730          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2698    002731
2699    002731                                  ALUF,PASSD          ALUD,Q
2700    002731          IDBS,ARG                          T,NEXT    T,HOLD
2701    002731          20;
2702    002732
2703    002732          AB,UPPNR                ALUF,PASSQ          ALUD,NONE
2704    002732          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2705    002733
2706    002733          AB,CURNR                ALUF,ZERO           ALUD,NONE
2707    002733          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
2708    002733          DMP11;
2709    002734
2710    002734
2711    002734
2712    002734  %*********************************
2713    002734  % IRD NOT WRITTEN
2714    002734
2715    002734  CR2:          B,5               ALUF,Q-D            ALUD,NONE
2716    002734          IDBS,BARG                         T,NEXT    T,HOLD;
2717    002735
2718    002735                B,6               ALUF,Q-D            ALUD,NONE
2719    002735          IDBS,BARG                         T,NEXT    T,HOLD
2720    002735          CR21 CONDENABL;
2721    002736
2722    002736
2723    002736  %*******************
2724    002736  % E WRITTEN
2725    002736
2726    002736          AB,DEPOS                ALUF,PASSD          ALUD,NONE
2727    002736          IDBS,REG                          T,NEXT    T,HOLD
2728    002736          COND,F=0                          F,NEXT    F,HOLD;
2729    002737
2730    002737          AB,OCTNR                ALUF,PASSD          ALUD,Q
2731    002737          IDBS,REG                          T,JMP     T,HOLD
2732    002737          CR22 CONDENABL;
2733    002740
2734    002740  %***************************************
2735    002740  % SET VIRTUAL EXAMINE
2736    002740                B,R1              ALUF,PASSQ          ALUD,SLB
2737    002740          IDBS,ALU                          T,NEXT    T,HOLD;
2738    002741
2739    002741                B,R2              ALUF,ANDDQ          ALUD,B
2740    002741          IDBS,ARG                          T,NEXT    T,HOLD
2741    002741          3;
2742    002742
2743    002742       30 A,R1  B,R1              ALUF,ANDDA          ALUD,B
2744    002742          IDBS,ARG                          T,NEXT    T,HOLD;
2745    002743
2746    002743          A,R1  B,R2              ALUF,ORAB           ALUD,Q
2747    002743          IDBS,ALU                          T,NEXT    T,HOLD;
2748    002744
```

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2749    002744          A,2                     ALUF,ORDQ           ALUD,Q
2750    002744          IDBS,BMG                        T,NEXT      T,HOLD;
2751    002745
2752    002745
2753    002745  CR22:
2754    002745                                                      ALUD,NONE
2755    002745          IDBS,ALU                        T,JMP       T,PUSH
2756    002745          EXMO2;
2757    002746
2758    002746
2759    002746
2760    002746  %*************************************
2761    002746  % SEND ONE Q-BYTE TO MMM
2762    002746
2763    002746  DYTP7:                          ALUF,PASSQ          ALUD,NONE
2764    002746          IDBS,ALU            COMM,LDPANC T,JMP       T,HOLD
2765    002746          RONLY;
2766    002747
2767    002747
2768    002747
2769    002747
2770    002747
2771    002747  %*************************************
2772    002747  % E NOT TYPED, CHECK F
2773    002747
2774    002747  CR21:                                               ALUD,NONE
2775    002747          IDBS,ALU                        T,NEXT      T,HOLD
2776    002747          CR20 CONDENABL;
2777    002750
2778    002750
2779    002750  %*******************
2780    002750  % F TYPED
2781    002750
2782    002750               B,17                                   ALUD,NONE
2783    002750          IDBS,BARG           COMM,LDPANC T,NEXT      T,HOLD;
2784    002751
2785    002751          AB,OCTNR                                    ALUD,NONE
2786    002751          IDBS,REG            COMM,LDPANC T,JMP       T,PUSH
2787    002751          DYSWP;
2788    002752
2789    002752                                                      ALUD,NONE
2790    002752          IDBS,ALU                        T,JMP       T,HOLD
2791    002752          RONLY;
2792    002753
2793    002753  %****************************************
2794    002753  % F NOT TYPED, CHECK MACL
2795    002753
2796    002753  CR20:                           ALUF,Q-D            ALUD,NONE
2797    002753          IDBS,ARG                        T,NEXT      T,HOLD
2798    002753          176;
2799    002754
2800    002754                                                      ALUD,NONE
2801    002754          IDBS,ALU                        T,NEXT      T,HOLD
2802    002754          CR23 CONDENABL;
2803    002755
2804    002755
2805    002755  %*************************************
2806    002755  % MACL TYPED
2807    002755
2808    002755                                                      ALUD,NONE
2809    002755          IDBS,ALU                        T,JMP       T,HOLD
2810    002755          MACL;
2811    002756
2812    002756  %****************************************
2813    002756  %CC MACL NOT TYPED, CHECK LCS
2814    002756
2815    002756  CR23:                           ALUF,Q-D            ALUD,NONE
2816    002756          IDBS,ARG                        T,NEXT      T,HOLD
2817    002756          111;
2818    002757
2819    002757                                                      ALUD,NONE
2820    002757          IDBS,ALU                        T,NEXT      T,HOLD
2821    002757          CR3 CONDENABL;
2822    002760
2823    002760  %*************************************
2824    002760  %CC LCS TYPED
2825    002760  %CC COMM,MACL WILL GENERATE A PULSE ON PWCL, I.E. HARD RESET.
2826    002760
2827    002760                                                      ALUD,NONE
2828    002760          IDBS,ALU            COMM,MACL   T,JMP       T,HOLD
2829    002760          MACL;
```

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2830    002761
2831    002761  %*********************************
2832    002761  % MACL NOT TYPED, CHECK STOP
2833    002761
2834    002761  CR3:                            ALUF,Q-D            ALUD,NONE
2835    002761          IDBS,ARG                        T,NEXT      T,HOLD
2836    002761          426;
2837    002762
2838    002762                                                      ALUD,NONE
2839    002762          IDBS,ALU                        T,NEXT      T,HOLD
2840    002762          CR16 CONDENABL;
2841    002763
2842    002763
2843    002763  %***************************
2844    002763  % STOP TYPED
2845    002763
2846    002763                                                      ALUD,NONE
2847    002763          IDBS,ALU                COMM,SSTOP T,JMP    T,HOLD
2848    002763          RONLY;
2849    002764
2850    002764
2851    002764
2852    002764
2853    002764  %*****************************************
2854    002764  % NO SPECIAL CR FUNCTION. DEPOSIT OR NEXT MEMORY EXAMINE
2855    002764
2856    002764  CR16:   AB,DEPOS                ALUF,PASSD          ALUD,NONE
2857    002764          IDBS,REG                        T,NEXT      T,HOLD;
2858    002765
2859    002765                                                      ALUD,NONE
2860    002765          IDBS,ALU                        T,NEXT      T,HOLD
2861    002765          CR4 CONDENABL;
2862    002766
2863    002766
2864    002766  %*********************************
2865    002766  % NOTHING TO DEPOSIT
2866    002766
2867    002766          AB,SCRAM                ALUF,PASSD          ALUD,NONE
2868    002766          IDBS,REG                        T,NEXT      T,HOLD;
2869    002767
2870    002767          AB,DISPL                ALUF,PASSD          ALUD,NONE
2871    002767          IDBS,REG                        T,NEXT      T,HOLD
2872    002767          ILLEG CONDENABL;        % ILLEGAL IF ANY LETTER HAS BEEN WRITTEN
2873    002770
2874    002770          AB,OCTAD                ALUF,PASSD          ALUD,Q
2875    002770          IDBS,REG                        T,NEXT      T,HOLD
2876    002770          RONLY CONDENABL;        % RONLY IF NOT MEMORY EXAMINE
2877    002771
2878    002771
2879    002771  %************************************************
2880    002771  % GET AND PRINT NEXT MEMORY ADDRESS
2881    002771
2882    002771  CR6:    AB,OCTAD                ALUF,Q+1            ALUD,Q
2883    002771          IDBS,ALU                COMM,EWRF T,JMP     T,PUSH
2884    002771          DSPLY;
2885    002772
2886    002772                                                      ALUD,NONE
2887    002772          IDBS,ALU                        T,JMP       T,PUSH
2888    002772          PROCT;
2889    002773
2890    002773                                                      ALUD,NONE
2891    002773          IDBS,ALU                        T,JMP       T,HOLD
2892    002773          SPACE;
2893    002774
2894    002774
2895    002774
2896    002774  %*********************************************
2897    002774  % SOMETHING TO DEPOSIT
2898    002774
2899    002774  CR4:                            ALUF,D-Q            ALUD,NONE
2900    002774          IDBS,ARG                        T,NEXT      T,HOLD
2901    002774          52;
2902    002775
2903    002775
2904    002775  %*******************************************
2905    002775  % IF SCRAM IS UNEQUAL TO 'DEP', CHECK THAT SCRAM = 0 AND STOP
2906    002775
2907    002775                                                      ALUD,NONE
2908    002775          IDBS,ALU                        T,NEXT      T,HOLD
2909    002775          STTS0 CONDENABL;
2910    002776
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2911  002776          AB,RONLY              ALUF,PASSD          ALUD,NONE
2912  002776          IDBS,REG                        T,NEXT    T,HOLD
2913  002776          COND,F=0                        F,JMP     F,HOLD;
2914  002777
2915  002777          AB,WRTYP              ALUF,PASSD          ALUD,Q
2916  002777          IDBS,REG                        T,NEXT    T,HOLD
2917  002777          ILLEG CONDENABL;      % DEPOSIT IS ILLEGAL NOW
2918  003000
2919  003000                B,1             ALUF,Q-D            ALUD,NONE
2920  003000          IDBS,BARG                       T,NEXT    T,HOLD
2921  003000          CR5 CONDENABL;
2922  003001
2923  003001
2924  003001
2925  003001
2926  003001  %*************************************
2927  003001  % MEMORY DEPOSIT
2928  003001
2929  003001  DEPOS:
2930  003001          AB,OCTA2                                  ALUD,NONE
2931  003001          IDBS,REG              COMM,LDSEG T,JMP    T,PUSH
2932  003001          SETEM;
2933  003002
2934  003002          AB,OCTAD              ALUF,PASSD          ALUD,Q
2935  003002          IDBS,REG                        T,NEXT    T,HOLD;
2936  003003
2937  003003          AB,OCTNR                                  ALUD,NONE
2938  003003          IDBS,REG              COMM,DERQ T,JMP     T,PUSH
2939  003003          RESEM;
2940  003004
2941  003004                                                    ALUD,NONE
2942  003004          IDBS,ALU                        T,JMP     T,HOLD
2943  003004          CR6;
2944  003005
2945  003005  CR5:          B,2             ALUF,Q-D            ALUD,NONE
2946  003005          IDBS,BARG                       T,NEXT    T,HOLD
2947  003005          CR9 CONDENABL;
2948  003006
2949  003006
2950  003006
2951  003006  %*********************************************
2952  003006  % REGISTER DEPOSIT, COMPARES WITH IRW
2953  003006
2954  003006          AB,WRADR              ALUF,PASSD          ALUD,Q
2955  003006          IDBS,REG              COMM,LDIRV T,JMP    T,PUSH
2956  003006          OPCRB;
2957  003007
2958  003007          AB,OCTNR              ALUF,PASSD          ALUD,Q
2959  003007          IDBS,REG                        T,NEXT    T,HOLD
2960  003007          CR10 CONDENABL;
2961  003010
2962  003010                B,DEST          ALUF,PASSQ          ALUD,B
2963  003010          IDBS,ALU                        T,JMP     T,PUSH
2964  003010          CR10B;
2965  003011
2966  003011                                ALUF,PASSQ          ALUD,NONE STS,LO
2967  003011          IDBS,ALU                        T,JMP     T,HOLD
2968  003011          RONLY;
2969  003012
2970  003012  CR10:   A,REG B,DEST         ALUF,PASSQ          ALUD,NONE
2971  003012          IDBS,ALU              COMM,EWRF T,JMP     T,PUSH
2972  003012          CR10B;
2973  003013
2974  003013          A,REG B,Z             ALUF,PASSQ          ALUD,NONE
2975  003013          IDBS,ALU              COMM,EWRF T,JMP     T,HOLD
2976  003013          RONLY;
2977  003014
2978  003014  CR10B:                        ALUF,ANDDQ          ALUD,Q
2979  003014          IDBS,ARG                        T,NEXT    T,HOLD
2980  003014          377;
2981  003015
2982  003015                B,DEST          ALUF,PASSD          ALUD,NONE
2983  003015          IDBS,BARG                       T,NEXT    T,HOLD
2984  003015          COND,F=0                        F,JMP     F,HOLD;
2985  003016
2986  003016                                                    ALUD,NONE
2987  003016          IDBS,ALU                        T,RETURN  T,POP
2988  003016          RONLY CONDENABL;
2989  003017
2990  003017  CR9:                                              ALUD,NONE
2991  003017          IDBS,ALU                        T,NEXT    T,HOLD
```

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2992    003017          CR11 CONDENABL;
2993    003020
2994    003020
2995    003020
2996    003020  %*************************************
2997    003020  % AUXILIARY REGISTER DEPOSIT
2998    003020
2999    003020          AB,WRADR                ALUF,PASSD          ALUD,Q
3000    003020          IDBS,REG                        T,NEXT      T,HOLD;
3001    003021
3002    003021          A,3   B,R6              ALUF,ORDQ           ALUD,B
3003    003021          IDBS,BMG                        T,NEXT      T,HOLD;
3004    003022
3005    003022                                  ALUF,PASSQ          ALUD,NONE
3006    003022          IDBS,ALU                COMM,LDIRV T,NEXT   T,HOLD;
3007    003023
3008    003023          A,R6                    ALUF,PASSA          ALUD,NONE
3009    003023          IDBS,ALU                COMM,LDLC T,NEXT    T,HOLD;
3010    003024
3011    003024          AB,OCTNR                ALUF,PASSD          ALUD,Q
3012    003024          IDBS,REG                        T,NEXT      T,HOLD;
3013    003025
3014    003025          A,REG B,LC              ALUF,PASSQ          ALUD,NONE
3015    003025          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
3016    003025          RONLY;
3017    003026
3018    003026
3019    003026
3020    003026  %*****************************************
3021    003026  % INTERNAL REGISTER DEPOSIT
3022    003026
3023    003026  CR11:   A,A   B,R7              ALUF,PASSA          ALUD,B
3024    003026          IDBS,ALU                        T,JMP       T,PUSH
3025    003026          CR12;
3026    003027
3027    003027          A,R7  B,A               ALUF,PASSA          ALUD,B
3028    003027          IDBS,ALU                        T,JMP       T,HOLD
3029    003027          RONLY;
3030    003030
3031    003030  CR12:   AB,WRADR                ALUF,PASSD          ALUD,Q
3032    003030          IDBS,REG                COMM,LDIRV T,NEXT   T,HOLD;
3033    003031
3034    003031                                  ALUF,PASSQ          ALUD,NONE
3035    003031          IDBS,ALU                COMM,LDGPR T,NEXT   T,HOLD;
3036    003032
3037    003032          AB,OCTNR                ALUF,PASSD          ALUD,Q
3038    003032          IDBS,REG                        T,NEXT      T,HOLD;
3039    003033
3040    003033
3041    003033
3042    003033  %****************************
3043    003033  % USE TRR
3044    003033
3045    003033                B,A               ALUF,PASSQ          ALUD,B
3046    003033          IDBS,ALU                        T,JMP       T,HOLD
3047    003033          TRR;
3048    003034
3049    003034
3050    003034
3051    003034
3052    003034
3053    003034
3054    003034
3055    003034
3056    003034
3057    003034
3058    003034  %*******************************************
3059    003034  % DUMP SHOULD STARTED AFTER CR
3060    003034
3061    003034  CR1:    A,5                     ALUF,Q-D            ALUD,NONE
3062    003034          IDBS,AARG                       T,NEXT      T,HOLD
3063    003034          CR13 CONDENABL;
3064    003035
3065    003035
3066    003035  %*************************************
3067    003035  % MEMORY DUMP
3068    003035
3069    003035          AB,OCTNR                ALUF,D+1            ALUD,Q
3070    003035          IDBS,REG                        T,NEXT      T,HOLD;
3071    003036
3072    003036          AB,UPPNR                ALUF,PASSQ          ALUD,NONE
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3073    003036          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
3074    003036          DMP11;
3075    003037
3076    003037  CR13:                                               ALUD,NONE
3077    003037          IDBS,ALU                        T,NEXT      T,HOLD
3078    003037          CR14 CONDENABL;
3079    003040
3080    003040
3081    003040  %*********************************
3082    003040  % REGISTER DUMP
3083    003040
3084    003040          AB,OCTNR                ALUF,D+1            ALUD,B
3085    003040          IDBS,REG                        T,JMP       T,PUSH
3086    003040          CR15;
3087    003041
3088    003041          AB,SCRAM                ALUF,PASSQ          ALUD,NONE
3089    003041          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
3090    003041          DMP11;
3091    003042
3092    003042  CR14:                           ALUF,Q-D            ALUD,NONE
3093    003042          IDBS,ARG                        T,NEXT      T,HOLD
3094    003042          125;
3095    003043
3096    003043                                                      ALUD,NONE
3097    003043          IDBS,ALU                        T,NEXT      T,HOLD
3098    003043          ILLEG CONDENABL;
3099    003044
3100    003044
3101    003044  %****************************************
3102    003044  % REGISTER DUMP EXTENDED (AUXILIARY REGISTERS)
3103    003044
3104    003044          AB,OCTNR                ALUF,D+1            ALUD,B
3105    003044          IDBS,REG                        T,JMP       T,PUSH
3106    003044          CR15;
3107    003045
3108    003045          AB,SCRAM                ALUF,Q+1            ALUD,NONE
3109    003045          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
3110    003046
3111    003046
3112    003046
3113    003046
3114    003046
3115    003046
3116    003046  %****************************************
3117    003046  % END OF DUMP SET-UP ROUTINES
3118    003046
3119    003046  DMP11:                          ALUF,PASSD          ALUD,Q
3120    003046          IDBS,ARG                        T,NEXT      T,HOLD
3121    003046          15;
3122    003047
3123    003047          AB,PRCHR                ALUF,PASSQ          ALUD,NONE
3124    003047          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
3125    003050
3126    003050          AB,CNT10                ALUF,ZERO           ALUD,NONE
3127    003050          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
3128    003050          CONT;
3129    003051
3130    003051
3131    003051
3132    003051  %*********************************************
3133    003051  % SUBROUTINE COMMON FOR RD AND RDE
3134    003051
3135    003051  CR15:   AB,CURNR                ALUF,PASSD          ALUD,Q
3136    003051          IDBS,REG                        T,NEXT      T,HOLD;
3137    003052
3138    003052        AB,OCTNR ALUF,PASSB ALUM,MIC ALUD,SLD IDBS,ALU   T,NEXT T,HOLD;
3139    003053        AB,OCTNR ALUF,PASSB ALUM,MIC ALUD,SLD IDBS,ALU   T,NEXT T,HOLD;
3140    003054        AB,OCTNR ALUF,PASSB ALUM,MIC ALUD,SLD IDBS,ALU   T,NEXT T,HOLD;
3141    003055
3142    003055          AB,CURNR                ALUF,PASSQ          ALUD,NONE
3143    003055          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
3144    003056
3145    003056          AB,OCTNR                ALUF,PASSB          ALUD,Q
3146    003056          IDBS,ALU                        T,NEXT      T,HOLD;
3147    003057
3148    003057          AB,UPPNR                ALUF,PASSQ          ALUD,NONE
3149    003057          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
3150    003060
3151    003060               B,1                ALUF,PASSD          ALUD,Q
3152    003060          IDBS,BARG                       T,RETURN    T,POP;
3153    003061
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3154    003061
3155    003061
3156    003061
3157    003061
3158    003061
3159    003061
3160    003061
3161    003061  %***********************************************
3162    003061  % / TYPED
3163    003061
3164    003061  SLASH: AB,SCRAM                ALUF,PASSD          ALUD,Q
3165    003061         IDBS,REG                             T,NEXT    T,HOLD
3166    003061         COND,F=0                             F,NEXT    F,HOLD;
3167    003062
3168    003062               B,11              ALUF,Q-D            ALUD,Q
3169    003062         IDBS,BARG                            T,JMP     T,HOLD
3170    003062         RWX CONDENABL;
3171    003063
3172    003063   B,17 IDBS,BARG ALUF,Q-D ALUD,Q T,JMP T,HOLD IXX CONDENABL;
3173    003064   B,4  IDBS,BARG ALUF,D+Q ALUD,Q T,JMP T,HOLD XXX CONDENABL;
3174    003065   B,1  IDBS,BARG ALUF,D+Q ALUD,Q T,JMP T,HOLD TXX CONDENABL;
3175    003066   B,3  IDBS,BARG ALUF,D+Q ALUD,Q T,JMP T,HOLD SXX CONDENABL;
3176    003067   B,4  IDBS,BARG ALUF,D+Q ALUD,Q T,JMP T,HOLD PXX CONDENABL;
3177    003070   B,13 IDBS,BARG ALUF,D+Q ALUD,Q T,JMP T,HOLD LXX CONDENABL;
3178    003071   B,1  IDBS,BARG ALUF,Q-D ALUD,Q T,JMP T,HOLD AXX CONDENABL;
3179    003072   B,2  IDBS,BARG ALUF,Q-D ALUD,Q T,JMP T,HOLD BXX CONDENABL;
3180    003073   B,16 IDBS,BARG ALUF,Q-D ALUD,Q T,JMP T,HOLD DXX CONDENABL;
3181    003074   B,3  IDBS,BARG ALUF,Q-D ALUD,Q T,JMP T,HOLD RXX CONDENABL;
3182    003075   B,14 IDBS,BARG ALUF,Q-D ALUD,Q T,JMP T,HOLD UXX CONDENABL;
3183    003076   B,3  IDBS,BARG ALUF,D+Q ALUD,Q T,JMP T,HOLD IOOPC CONDENABL;
3184    003077   A,12 IDBS,AARG ALUF,Q-D ALUD,Q T,JMP T,HOLD ACTX CONDENABL;
3185    003100   A,5  IDBS,AARG ALUF,D+Q+1 ALUD,Q T,JMP T,HOLD OPRX CONDENABL;
3186    003101              ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLEG;
3187    003102
3188    003102
3189    003102
3190    003102  %*****************************
3191    003102  % REGISTER NAMES/
3192    003102
3193    003102  SXX:   B,0 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3194    003103  DXX:   B,1 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3195    003104  PXX:   B,2 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3196    003105  BXX:   B,3 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3197    003106  LXX:   B,4 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3198    003107  AXX:   B,5 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3199    003110  TXX:   B,6 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3200    003111  XXX:   B,7 IDBS,BARG ALUF,PASSD ALUD,Q T,JMP T,HOLD REGXX;
3201    003112
3202    003112  REGXX:       B,R2              ALUF,PASSQ          ALUD,B
3203    003112         IDBS,ALU                             T,JMP     T,PUSH
3204    003112         OCDIX;
3205    003113
3206    003113
3207    003113
3208    003113  %******************
3209    003113  % R/
3210    003113
3211    003113  RXX:   AB,OCTNR                ALUF,PASSD          ALUD,Q
3212    003113         IDBS,REG                             T,JMP     T,HOLD
3213    003113         TYP1;
3214    003114
3215    003114  TYP1:  A,0   B,R1              ALUF,PASSD          ALUD,B
3216    003114         IDBS,BMG                             T,JMP     T,HOLD
3217    003114         RWY;
3218    003115
3219    003115
3220    003115
3221    003115  %*********************
3222    003115  % I/
3223    003115
3224    003115  IXX:   AB,OCTNR                ALUF,PASSD          ALUD,Q
3225    003115         IDBS,REG                             T,NEXT    T,HOLD;
3226    003116
3227    003116  TYP3:  A,1   B,R1              ALUF,D+1            ALUD,B
3228    003116         IDBS,BMG                             T,JMP     T,HOLD
3229    003116         RWY;
3230    003117
3231    003117
3232    003117
3233    003117
3234    003117
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3235    003117
3236    003117  %*****************************
3237    003117  % MEMORY EXAMINE
3238    003117
3239    003117  RWX:        B,R1            ALUF,ZERO           ALUD,B
3240    003117          IDBS,ALU                        T,NEXT  T,HOLD;
3241    003120
3242    003120          AB,OCTNR            ALUF,PASSD          ALUD,Q
3243    003120          IDBS,REG                        T,NEXT  T,HOLD;
3244    003121
3245    003121
3246    003121
3247    003121  %*****************************
3248    003121  % REGISTER EXAMINE
3249    003121
3250    003121  RWY:    AB,OCTAD            ALUF,PASSQ          ALUD,NONE
3251    003121          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3252    003122
3253    003122          AB,WRADR            ALUF,PASSQ          ALUD,NONE
3254    003122          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3255    003123
3256    003123          AB,OCTN2            ALUF,PASSD          ALUD,Q
3257    003123          IDBS,REG                        T,NEXT  T,HOLD;
3258    003124
3259    003124          AB,OCTA2            ALUF,PASSQ          ALUD,NONE
3260    003124          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3261    003125
3262    003125          A,R1                ALUF,PASSA          ALUD,Q
3263    003125          IDBS,ALU            COMM,LDLC T,NEXT    T,HOLD;
3264    003126
3265    003126          AB,DISPL            ALUF,PASSQ          ALUD,NONE
3266    003126          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3267    003127
3268    003127          AB,WRTYP            ALUF,PASSQ          ALUD,NONE
3269    003127          IDBS,ALU            COMM,EWRF T,JMP     T,HOLD
3270    003127          RWZ;
3271    003130
3272    003130
3273    003130
3274    003130  %*******************************
3275    003130  % GET VALUE OF EXAMINE
3276    003130
3277    003130  RWZ:    AB,OCTAD            ALUF,PASSD          ALUD,Q
3278    003130          IDBS,REG                        T,JMP   T,PUSH
3279    003130          DSPLY;
3280    003131
3281    003131          AB,RONLY            ALUF,ZERO           ALUD,NONE
3282    003131          IDBS,ALU            COMM,EWRF T,JMP     T,PUSH
3283    003131          PROCT;
3284    003132
3285    003132          AB,DISPL            ALUF,PASSD          ALUD,NONE
3286    003132          IDBS,REG                        T,NEXT  T,HOLD
3287    003132          COND,F=0                        F,JMP   F,PUSH;
3288    003133
3289    003133
3290    003133                                                  ALUD,NONE
3291    003133          IDBS,ALU                        T,NEXT  T,HOLD
3292    003133          LABEL CONDENABL;
3293    003134
3294    003134                                                  ALUD,NONE
3295    003134          IDBS,ALU                        T,JMP   T,HOLD
3296    003134          SPACE;
3297    003135
3298    003135
3299    003135
3300    003135
3301    003135
3302    003135
3303    003135
3304    003135  %***************************
3305    003135  % IO/  TYPED
3306    003135
3307    003135  IOOPC:  A,A    B,R4         ALUF,PASSA          ALUD,B
3308    003135          IDBS,ALU                        T,NEXT  T,HOLD;
3309    003136
3310    003136          AB,OCTNR            ALUF,PASSD          ALUD,Q
3311    003136          IDBS,REG            COMM,LDIRV T,NEXT   T,HOLD;
3312    003137
3313    003137                B,R1          ALUF,PASSQ          ALUD,B
3314    003137          IDBS,ALU                        T,NEXT  T,HOLD;
3315    003140
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3316    003140          AB,OPR                  ALUF,PASSD          ALUD,Q
3317    003140          IDBS,REG                        T,NEXT      T,HOLD;
3318    003141
3319    003141                B,A               ALUF,PASSQ          ALUD,B
3320    003141          IDBS,ALU                        T,JMP       T,PUSH
3321    003141          IOXX1;
3322    003142
3323    003142          A,A                     ALUF,PASSA          ALUD,Q
3324    003142          IDBS,ALU                        T,JMP       T,PUSH
3325    003142          PROCT;
3326    003143
3327    003143          A,R4  B,A               ALUF,PASSA          ALUD,B
3328    003143          IDBS,ALU                        T,JMP       T,HOLD
3329    003143          RONLY;
3330    003144
3331    003144
3332    003144
3333    003144
3334    003144
3335    003144
3336    003144
3337    003144  %*************************
3338    003144  % OPR/  TYPED
3339    003144
3340    003144  OPRX:   A,16                    ALUF,D+1            ALUD,Q
3341    003144          IDBS,AARG                       T,JMP       T,HOLD
3342    003144          TYP2;
3343    003145
3344    003145
3345    003145
3346    003145
3347    003145
3348    003145
3349    003145
3350    003145  %*************************
3351    003145  % U/   TYPED
3352    003145
3353    003145  UXX:                            ALUF,PASSD          ALUD,Q
3354    003145          IDBS,ARG                        T,NEXT      T,HOLD
3355    003145          142;
3356    003146
3357    003146  TYP2:   A,1   B,R1              ALUF,PASSD          ALUD,B
3358    003146          IDBS,BMG                        T,JMP       T,HOLD
3359    003146          RWY;
3360    003147
3361    003147
3362    003147
3363    003147
3364    003147
3365    003147
3366    003147
3367    003147
3368    003147  %*************************
3369    003147  % ACTX/   TYPED
3370    003147
3371    003147
3372    003147  ACTX:         B,17              ALUF,PASSD          ALUD,Q
3373    003147          IDBS,BARG                       T,NEXT      T,HOLD;
3374    003150
3375    003150          AB,DISPL                ALUF,PASSQ          ALUD,NONE
3376    003150          IDBS,ALU                COMM,EWRF T,JMP     T,PUSH
3377    003150          RONLY;
3378    003151
3379    003151
3380    003151
3381    003151
3382    003151  % SUBROUTINE FOR PGU- WIP- AND RING-DOWN TRAP
3383    003151
3384    003151  PTC:    A,PIL B,0  XRF          ALUF,PASSD          ALUD,Q
3385    003151          IDBS,REG                        T,JMP       T,PUSH
3386    003151          PTC4;
3387    003152
3388    003152          A,R7                    ALUF,PASSA          ALUD,NONE
3389    003152          IDBS,ALU                        T,NEXT      T,HOLD;
3390    003153
3391    003153                                                      ALUD,NONE
3392    003153          IDBS,ALU                COMM,EXRQ T,RETURN  T,POP;
3393    003154
3394    003154
3395    003154
3396    003154  PTC4:   A,2                     ALUF,ANDDQ          ALUD,NONE
```

```
3397    003154          IDBS,BMG                        T,NEXT    T,HOLD
3398    003154          COND,F=0                        F,JMP     F,HOLD;
3399    003155
3400    003155          A,15                ALUF,ANDDA            ALUD,NONE  % R5 .AND. BIT 13
3401    003155          IDBS,BMG                        T,NEXT    T,HOLD
3402    003155          PTC3 CONDENABL;
3403    003156
3404    003156  % REX OR SEX-MODE
3405    003156
3406    003156                              ALUF,ZERO             ALUD,NONE
3407    003156          IDBS,ALU            COMM,LDSEG T,NEXT     T,HOLD
3408    003156          PTC1 CONDENABL;
3409    003157
3410    003157  % REX-MODE
3411    003157
3412    003157    7400 A,R7  B,R7           ALUF,ORDA             ALUD,B
3413    003157          IDBS,ARG                        T,RETURN  T,POP; % ARG IS 177400
3414    003160
3415    003160  %  SEX-MODE
3416    003160
3417    003160  PTC1:
3418    003160    7400 A,R7  B,R7           ALUF,ORDA             ALUD,SLB
3419    003160          IDBS,ARG                        T,RETURN  T,POP; % ARG IS 177400
3420    003161
3421    003161  % 20-BIT MODE OR 16-PT MODE
3422    003161
3423    003161  PTC3:                       ALUF,ZERO             ALUD,NONE
3424    003161          IDBS,ALU            COMM,LDSEG T,NEXT     T,HOLD
3425    003161          PTC2 CONDENABL;
3426    003162
3427    003162  % 20-BIT MODE
3428    003162
3429    003162          A,R7  B,R7          ALUF,ORDA             ALUD,SLB
3430    003162          IDBS,ARG                        T,RETURN  T,POP; % ARG IS 170000
3431    003163
3432    003163  % 16-PT MODE
3433    003163
3434    003163  PTC2:
3435    003163    6000 A,R7                 ALUF,ORDA             ALUD,Q
3436    003163          IDBS,ARG                        T,NEXT    T,HOLD; % ARG IS 176000
3437    003164
3438    003164               B,R7         ALUF,XORDQ            ALUD,SLB
3439    003164          IDBS,ARG                        T,RETURN  T,POP
3440    003164          1400;   % THESE TWO BITS MUST BE INVERTED TO MATCH THE PT LAYOUT
3441    003165
3442    003165
3443    003165
3444    003165
3445    003165  % PART OF BFILL-INSTRUCTION
3446    003165
3447    003165  BFIL3:                                            ALUD,NONE
3448    003165          IDBS,ALU                        T,JMP     T,PUSH
3449    003165          BTR CONDENABL; % FIRST BYTE NOT ON WORD BOUNDARY -> BTR
3450    003166
3451    003166               B,T          ALUF,B-1              ALUD,B
3452    003166          IDBS,ALU                        T,RETURN  T,POP;
3453    003167
3454    003167
3455    003167
```

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3456 003167

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     1      003167
     2      003167   %*******************************************************
     3      003167   %*******************************************************
     4      003167
     5      003167   %  FLOATING ADD & SUBTRACT INSTRUCTION,  32 BITS
     6      003167
     7      003167   %*******************************************************
     8      003167
     9      003167   3172/
    10      003172   FAD1:       B,4                                  ALUD,NONE
    11      003172              IDBS,BARG            COMM,LDLC T,NEXT   T,HOLD;
    12      003173
    13      003173                   B,R2            ALUF,XORDQ         ALUD,B
    14      003173              IDBS,DBR                      T,NEXT    T,HOLD;
    15      003174
    16      003174                   B,STS           ALUF,PASSD         ALUD,B
    17      003174              IDBS,STS       COMM,AREAD,NEXT  T,NEXT  T,HOLD;
    18      003175
    19      003175                                                      ALUD,NONE
    20      003175              IDBS,ARG             COMM,LDGPR T,NEXT  T,HOLD
    21      003175              100077;
    22      003176
    23      003176              A,R2                 ALUF,MASKDA        ALUD,Q
    24      003176              IDBS,GPR                      T,NEXT    T,HOLD
    25      003176              COND,F=0                      F,NEXT    F,HOLD;
    26      003177
    27      003177              A,A   B,R4           ALUF,MASKDA        ALUD,B
    28      003177              IDBS,GPR                      T,JMP     T,HOLD
    29      003177              FAD0 CONDENABL;
    30      003200
    31      003200                   B,R1            ALUF,PASSD         ALUD,B
    32      003200              IDBS,DBR                      T,JMP     T,HOLD
    33      003200              UNSF2 CONDENABL;
    34      003201
    35      003201              A,R4  B,R3           ALUF,A-Q           ALUD,B
    36      003201              IDBS,ALU                      T,NEXT    T,PUSH
    37      003201              COND,LC=0;
    38      003202
    39      003202                   B,R3            ALUF,PASSB         ALUD,SRB  STS,ES
    40      003202              IDBS,ARG             COMM,LDGPR T,NEXT  T,POP
    41      003202              LCOUNT 30;
    42      003203
    43      003203              A,R3                 ALUF,D-A           ALUD,NONE
    44      003203              IDBS,GPR                      T,NEXT    T,HOLD
    45      003203              COND,F15                      F,NEXT    F,HOLD;
    46      003204
    47      003204              A,R3                 ALUF,D+A           ALUD,NONE
    48      003204              IDBS,GPR                      T,JMP     T,HOLD
    49      003204              STSST CONDENABL;
    50      003205
    51      003205                   B,R3            ALUF,PASSB         ALUD,NONE
    52      003205              IDBS,ALU                      T,JMP     T,HOLD
    53      003205              UNSF2 CONDENABL;
    54      003206
    55      003206              A,R3                 ALUF,A+1           ALUD,NONE
    56      003206              IDBS,ALU             COMM,LDLC T,JMP    T,HOLD
    57      003206              NED1 CONDENABL;
    58      003207
    59      003207              A,R3                 ALUF,PASSA         ALUD,NONE
    60      003207              IDBS,ALU                      T,NEXT    T,HOLD
    61      003207              COND,F=0                      F,NEXT    F,HOLD;
    62      003210
    63      003210              A,R3                 ALUF,A-1           ALUD,NONE
    64      003210              IDBS,ALU             COMM,LDLC T,JMP    T,HOLD
    65      003210              EQUAL CONDENABL;
    66      003211
    67      003211
    68      003211   %*******************************************************
    69      003211   % AD-OPERAND GREATEST
    70      003211
    71      003211                   B,R1            ALUF,PASSB        ALUD,Q
    72      003211              IDBS,ARG             COMM,LDGPR T,NEXT  T,HOLD
    73      003211              77;
    74      003212
    75      003212              A,R2  B,R5           ALUF,ANDDA         ALUD,B

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 76   003212          IDBS,GPR                          T,NEXT    T,HOLD;
 77   003213
 78   003213          A,A   B,R3          ALUF,ANDDA              ALUD,B
 79   003213          IDBS,GPR                          T,NEXT    T,HOLD;
 80   003214
 81   003214          A,A   B,R6          ALUF,MASKDA             ALUD,B
 82   003214          IDBS,GPR                          T,JMP     T,HOLD
 83   003214          NORM1;
 84   003215
 85   003215  FAD0:                                               ALUD,NONE
 86   003215          IDBS,DBR                          T,JMP     T,HOLD
 87   003215          STSST;
 88   003216
 89   003216  %*****************************************************
 90   003216  % MEMORY OPERAND GREATEST
 91   003216
 92   003216
 93   003216  NED1:       B,D             ALUF,PASSB              ALUD,Q
 94   003216          IDBS,ARG            COMM,LDGPR T,NEXT       T,HOLD
 95   003216          77;
 96   003217
 97   003217          A,R2  B,R6          ALUF,MASKDA             ALUD,B
 98   003217          IDBS,GPR                          T,NEXT    T,HOLD;
 99   003220
100   003220          A,A   B,R5          ALUF,ANDDA              ALUD,B
101   003220          IDBS,GPR                          T,NEXT    T,HOLD;
102   003221
103   003221          A,R1  B,D           ALUF,PASSA              ALUD,B
104   003221          IDBS,ALU                          T,NEXT    T,HOLD;
105   003222
106   003222          A,R2  B,R3          ALUF,ANDDA              ALUD,B
107   003222          IDBS,GPR                          T,JMP     T,HOLD
108   003222          NORM1;
109   003223
110   003223  %*****************************************************
111   003223  % EQUAL EXPONENTS
112   003223
113   003223
114   003223  EQUAL:      B,R1            ALUF,PASSB              ALUD,Q
115   003223          IDBS,ARG            COMM,LDGPR T,NEXT       T,HOLD
116   003223          77;
117   003224
118   003224          A,A   B,R3          ALUF,ANDDA              ALUD,B
119   003224          IDBS,GPR                          T,NEXT    T,HOLD;
120   003225
121   003225          A,R2  B,R5          ALUF,ANDDA              ALUD,B
122   003225          IDBS,GPR                          T,NEXT    T,HOLD;
123   003226
124   003226          A,A   B,R6          ALUF,MASKDA             ALUD,B
125   003226          IDBS,GPR                          T,NEXT    T,HOLD;
126   003227
127   003227                                                      ALUD,NONE
128   003227          IDBS,ARG            COMM,LDGPR T,NEXT       T,HOLD
129   003227          100;
130   003230
131   003230          A,R5  B,R5          ALUF,ORDA               ALUD,B
132   003230          IDBS,GPR                          T,NEXT    T,HOLD;
133   003231
134   003231          A,R3  B,R3          ALUF,ORDA               ALUD,B
135   003231          IDBS,GPR                          T,JMP     T,HOLD
136   003231          FADD;
137   003232
138   003232  %*****************************************************
139   003232  % ALIGNEMENT SHIFT
140   003232
141   003232
142   003232  NORM1:                                              ALUD,NONE
143   003232          IDBS,ARG            COMM,LDGPR T,NEXT       T,HOLD
144   003232          100;
145   003233
146   003233          A,R5  B,R5          ALUF,ORDA               ALUD,B
147   003233          IDBS,GPR                          T,NEXT    T,HOLD;
148   003234
149   003234          A,R3  B,R3          ALUF,ORDA               ALUD,B
150   003234          IDBS,GPR            COMM,CLFF T,NEXT        T,PUSH
151   003234          COND,LC=0;
152   003235
153   003235              B,R5  MIS,ZIN   ALUF,PASSB ALUM,MIC     ALUD,SRD  STS,ES
154   003235          IDBS,ALU                          T,NEXT    T,POP
155   003235          LCOUNT;
156   003236
```

```
003236                B,R5 MIS,LIN    ALUF,PASSB ALUM,MIC ALUD,SLD
003236          IDBS,ALU                          T,NEXT    T,HOLD;
003237
003237
003237    %*************************************************
003237    % EQUAL SIGNS?
003237
003237
003237    FADD:  A,A    B,R2          ALUF,XORAB            ALUD,B
003237           IDBS,ALU                       T,NEXT     T,HOLD
003237           COND,F15                       F,NEXT     F,HOLD;
003240
003240           A,7    B,R1          ALUF,PASSD            ALUD,B
003240           IDBS,BMG                       T,JMP      T,HOLD
003240           SUBF CONDENABL;
003241
003241    %*****************************************************
003241    % EQUAL SIGNS, ADD MANTISSAS
003241
003241
003241           A,D    B,D           ALUF,A+Q              ALUD,Q     STS,EA
003241           IDBS,ALU                       T,NEXT     T,HOLD;
003242
003242           A,R5   B,R3          ALUF,A+B              ALUD,B     CRY,C
003242           IDBS,ALU                       T,NEXT     T,HOLD
003242           COND,F=0                       F,NEXT     F,HOLD;
003243
003243           A,R3   B,R1          ALUF,ANDAB            ALUD,NONE
003243           IDBS,ALU                       T,NEXT     T,HOLD;
003244
003244           A,6    B,D           ALUF,PASSQ            ALUD,B
003244           IDBS,BMG             COMM,LDGPR T,JMP      T,HOLD
003244           NOCRY CONDENABL;
003245
003245    %*****************************************************
003245    % ADDITION GAVE CARRY
003245
003245
003245           A,R6   B,R2          ALUF,D+A              ALUD,B
003245           IDBS,GPR                       T,NEXT     T,HOLD;
003246
003246                 B,R3  MIS,ZIN  ALUF,PASSB            ALUD,SRD
003246           IDBS,ALU                       T,NEXT     T,HOLD;
003247
003247                 B,D           ALUF,PASSQ            ALUD,B
003247           IDBS,ARG             COMM,LDGPR T,NEXT     T,HOLD
003247           100;
003250
003250           A,R2                 ALUF,PASSA            ALUD,Q
003250           IDBS,ALU                       T,NEXT     T,HOLD;
003251
003251           A,R3   B,R3          ALUF,MASKDA           ALUD,B
003251           IDBS,GPR                       T,NEXT     T,HOLD;
003252
003252           A,16                                      ALUD,NONE
003252           IDBS,BMG             COMM,LDGPR T,JMP     T,PUSH
003252           CHKOF;
003253
003253                                                     ALUD,NONE
003253           IDBS,ALU                         T,JMP    T,HOLD
003253           STSEX;
003254
003254    NOCRY: A,R3   B,A           ALUF,MASKDA           ALUD,B
003254           IDBS,GPR                       T,NEXT     T,HOLD;
003255
003255           A,R6   B,A           ALUF,ORAB             ALUD,B
003255           IDBS,ALU                       T,JMP      T,HOLD
003255           STSST;
003256
003256
003256
003256
003256    %*****************************************************
003256    % AD-OPERAND INSIGNIFICANT
003256
003256
003256    UNSF2: A,R2   B,A           ALUF,PASSA            ALUD,B
003256           IDBS,ALU                       T,NEXT     T,HOLD;
003257
003257           A,R1   B,D           ALUF,PASSA            ALUD,B
003257           IDBS,ALU                       T,JMP      T,HOLD
```

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238  003257          STSST;
239  003260
240  003260
241  003260  %*******************************************************
242  003260  % UNEQUAL SIGNS, SUBTRACT MANTISSAS
243  003260
244  003260  SUBF:  A,D   B,D              ALUF,A-Q-1          ALUD,B    STS,EA
245  003260         IDBS,ALU                          T,NEXT    T,HOLD;
246  003261
247  003261         A,R3  B,R5             ALUF,A-B-1          ALUD,Q    CRY,C
248  003261         IDBS,ALU,                         T,NEXT    T,HOLD
249  003261         COND,F15                          F,NEXT    F,HOLD;
250  003262
251  003262                                                     ALUD,NONE
252  003262         IDBS,ALU                          T,JMP     T,HOLD
253  003262         INV CONDENABL;
254  003263
255  003263               B,D              ALUF,B+1            ALUD,B    STS,EA
256  003263         IDBS,ALU                          T,NEXT    T,HOLD;
257  003264
258  003264               B,A              ALUF,Q              ALUD,B    CRY,C
259  003264         IDBS,ALU                          T,JMP     T,HOLD
260  003264         NOINV;
261  003265
262  003265  %*******************************************************
263  003265  % INVERT ANSWER AFTER SUBTRACTION
264  003265
265  003265
266  003265  INV:         B,A               ALUF,INVQ           ALUD,B
267  003265         IDBS,ARG               COMM,LDGPR T,NEXT   T,HOLD
268  003265         100000;
269  003266
270  003266         A,R6  B,R6             ALUF,XORDA          ALUD,B
271  003266         IDBS,GPR                          T,NEXT    T,HOLD;
272  003267
273  003267               B,D              ALUF,INVB           ALUD,B
274  003267         IDBS,ALU                          T,NEXT    T,HOLD;
275  003270
276  003270
277  003270  %*******************************************************
278  003270  % NORMALIZE ANSWER AFTER SUBTRACTION
279  003270
280  003270  NOINV:       B,R1              ALUF,D-1            ALUD,B
281  003270         IDBS,ARG               COMM,LDLC T,NEXT    T,HOLD
282  003270         21;
283  003271
284  003271         A,6   B,A              ALUF,PASSB          ALUD,NONE
285  003271         IDBS,BMG               COMM,LDGPR T,NEXT   T,HOLD
286  003271         COND,F=0                          F,JMP     F,HOLD;
287  003272
288  003272               B,D              ALUF,PASSB          ALUD,NONE
289  003272         IDBS,ALU                          T,NEXT    T,HOLD
290  003272         FAD5 CONDENABL;
291  003273
292  003273         A,R6  B,R4             ALUF,PASSA          ALUD,B
293  003273         IDBS,ALU                          T,NEXT    T,HOLD
294  003273         FAD4 CONDENABL;
295  003274
296  003274  %*******************************************************
297  003274  % AD-OPERAND = 0
298  003274
299  003274
300  003274  ZAD:         B,A               ALUF,ZERO           ALUD,B
301  003274         IDBS,ALU                          T,NEXT    T,HOLD;
302  003275
303  003275               B,D              ALUF,ZERO           ALUD,B
304  003275         IDBS,ALU                           T,JMP    T,HOLD
305  003275         STSEX;
306  003276
307  003276
308  003276  %*******************************************************
309  003276  % A-REG EQ ZERO D-REG NEQ ZERO
310  003276
311  003276  FAD4:  A,16  B,R5              ALUF,PASSD          ALUD,B
312  003276         IDBS,BMG               COMM,CLFF T,NEXT    T,PUSH
313  003276         COND,F15;
314  003277
315  003277               B,D  MIS,ROT     ALUF,PASSB ALUM,MIC ALUD,SLB
316  003277         IDBS,ALU                          T,NEXT    T,POP
317  003277         LCOUNT;
318  003300
```

```
319   003300                B,D  MIS,ROT    ALUF,PASSB ALUM,MIC ALUD,SRB
320   003300          IDBS,ALU                        T,NEXT    T,HOLD;
321   003301
322   003301                B,D  MIS,ROT    ALUF,PASSB ALUM,MIC ALUD,SRB
323   003301          IDBS,ALU                        T,NEXT    T,HOLD;
324   003302
325   003302          A,R1  B,LC            ALUF,A-D              ALUD,Q
326   003302          IDBS,BARG                       T,NEXT    T,HOLD
327   003302          COND,LC=0;
328   003303
329   003303                B,R2            ALUF,D+Q+1            ALUD,B
330   003303          IDBS,ARG              COMM,LDLC T,NEXT      T,HOLD
331   003303          5;
332   003304
333   003304                B,D             ALUF,PASSB            ALUD,Q
334   003304          IDBS,ALU                        T,NEXT    T,PUSH;
335   003305
336   003305                B,A  MIS,ROT    ALUF,PASSB ALUM,MIC ALUD,SLD
337   003305          IDBS,ALU                        T,NEXT    T,POP
338   003305          LCOUNT;
339   003306
340   003306                                                    ALUD,NONE
341   003306          IDBS,ARG              COMM,LDLC T,NEXT      T,HOLD
342   003306          4;
343   003307
344   003307    FAD6:       B,D             ALUF,PASSQ            ALUD,B
345   003307          IDBS,ALU                        T,NEXT    T,PUSH;
346   003310
347   003310          A,6   B,R2  MIS,ROT   ALUF,PASSB ALUM,MIC ALUD,SLB
348   003310          IDBS,BMG              COMM,LDGPR T,NEXT     T,POP
349   003310          LCOUNT;
350   003311
351   003311          A,A   B,A             ALUF,MASKDA           ALUD,B
352   003311          IDBS,GPR                        T,NEXT    T,HOLD;
353   003312
354   003312          A,R6  B,R2            ALUF,A-B              ALUD,Q
355   003312          IDBS,ALU                        T,JMP     T,PUSH
356   003312          CHKUF;
357   003313
358   003313                                                    ALUD,NONE
359   003313          IDBS,ALU                         T,JMP    T,HOLD
360   003313          STSEX;
361   003314
362   003314
363   003314    %*************************************************************
364   003314    % A-REG AND D-REG NEQ ZERO
365   003314
366   003314    FAD5:  A,A                    ALUF,ANDDA            ALUD,NONE
367   003314          IDBS,GPR                        T,NEXT    T,HOLD;
368   003315
369   003315                B,D             ALUF,PASSB            ALUD,Q
370   003315          IDBS,ALU                        T,NEXT    T,HOLD
371   003315          FAD3 CONDENABL;
372   003316
373   003316          A,16  B,R5            ALUF,PASSD            ALUD,B
374   003316          IDBS,BMG                        T,NEXT    T,PUSH
375   003316          COND,F11;
376   003317
377   003317                B,A MIS,ZIN     ALUF,PASSB ALUM,MIC ALUD,SLD
378   003317          IDBS,ALU                        T,NEXT    T,POP
379   003317          LCOUNT;
380   003320
381   003320                B,D             ALUF,PASSQ            ALUD,B
382   003320          IDBS,ALU                        T,NEXT    T,HOLD;
383   003321
384   003321          A,R1  B,LC            ALUF,A-D              ALUD,Q
385   003321          IDBS,BARG                       T,NEXT    T,HOLD
386   003321          COND,LC=0;
387   003322
388   003322                B,R2            ALUF,Q-D-1            ALUD,B
389   003322          IDBS,ARG              COMM,LDLC T,NEXT      T,HOLD
390   003322          5;
391   003323
392   003323                B,D             ALUF,PASSB            ALUD,Q
393   003323          IDBS,ALU                        T,NEXT    T,PUSH;
394   003324
395   003324                B,A  MIS,ZIN    ALUF,PASSB ALUM,MIC ALUD,SRD
396   003324          IDBS,ALU                        T,NEXT    T,POP
397   003324          LCOUNT;
398   003325
399   003325                B,4                                   ALUD,NONE
```

```
400   003325          IDBS,BARG              COMM,LDLC T,JMP      T,HOLD
401   003325          FAD6;
402   003326
403   003326   FAD3:  A,A   B,A              ALUF,MASKDA          ALUD,B
404   003326          IDBS,GPR                        T,NEXT     T,HOLD;
405   003327
406   003327          A,R6  B,A              ALUF,ORAB            ALUD,B
407   003327          IDBS,ALU                        T,JMP      T,HOLD
408   003327          STSST;
409   003330
410   003330
411   003330   %*****************************************************
412   003330   %*****************************************************
413   003330
414   003330   %  FLOATING MULTIPLY INSTRUCTION
415   003330
416   003330   %*****************************************************
417   003330
418   003330   3330/
419   003330   FMU4:        B,R2              ALUF,PASSD           ALUD,B
420   003330          IDBS,DBR      COMM,AREAD,NEXT     T,NEXT     T,HOLD;
421   003331
422   003331               B,STS             ALUF,PASSD           ALUD,B
423   003331          IDBS,STS                        T,NEXT     T,HOLD;
424   003332
425   003332               B,R4              ALUF,PASSD           ALUD,B
426   003332          IDBS,ARG               COMM,LDGPR T,NEXT    T,HOLD
427   003332          77;
428   003333
429   003333          A,A                    ALUF,MASKDA          ALUD,Q
430   003333          IDBS,GPR                        T,NEXT     T,HOLD
431   003333          COND,F=0                        F,NEXT     F,HOLD;
432   003334
433   003334               B,R1              ALUF,PASSD           ALUD,B
434   003334          IDBS,DBR                        T,JMP      T,HOLD
435   003334          ZAD CONDENABL;
436   003335
437   003335          A,R2  B,R3             ALUF,MASKDA          ALUD,B
438   003335          IDBS,GPR                        T,NEXT     T,HOLD;
439   003336
440   003336
441   003336   %*********************************************************
442   003336   % ADD EXPONENTS
443   003336
444   003336          A,R3                   ALUF,A+Q             ALUD,Q
445   003336          IDBS,ALU                        T,JMP      T,HOLD
446   003336          ZAD CONDENABL;
447   003337
448   003337               B,R6              ALUF,MASKDQ          ALUD,B
449   003337          IDBS,ARG                        T,NEXT     T,HOLD
450   003337          100000;
451   003340
452   003340          A,A   B,R2             ALUF,XORAB           ALUD,Q
453   003340          IDBS,ALU                        T,NEXT     T,HOLD
454   003340          COND,F15                        F,JMP      F,HOLD;
455   003341
456   003341          A,17  B,R5             ALUF,PASSD           ALUD,B
457   003341          IDBS,BMG                        T,NEXT     T,HOLD
458   003341          FMU2 CONDENABL;
459   003342
460   003342   %*********************************************************
461   003342   % UNEQUAL SIGNS, CHANGE SIGNBIT
462   003342
463   003342
464   003342          A,R5  B,R6             ALUF,ORAB            ALUD,B
465   003342          IDBS,ALU                        T,NEXT     T,HOLD;
466   003343
467   003343   FMU2:  A,16  B,R5             ALUF,PASSD           ALUD,B
468   003343          IDBS,BMG                        T,NEXT     T,HOLD;
469   003344
470   003344          A,R5                   ALUF,ANDAQ           ALUD,NONE
471   003344          IDBS,ALU                        T,NEXT     T,HOLD
472   003344          COND,F=0                        F,JMP      F,HOLD;
473   003345
474   003345               B,R1              ALUF,PASSB           ALUD,NONE
475   003345          IDBS,ALU               COMM,LDGPR T,NEXT    T,HOLD
476   003345          FMU1 CONDENABL;
477   003346
478   003346          A,R6  B,A              ALUF,XNORAB          ALUD,Q
479   003346          IDBS,ALU                        T,NEXT     T,HOLD;
480   003347
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481   003347          A,R5                    ALUF,ANDAQ          ALUD,NONE
482   003347          IDBS,ALU                        T,NEXT      T,HOLD;
483   003350
484   003350          A,16  B,R1              ALUF,PASSD          ALUD,B
485   003350          IDBS,BMG                        T,NEXT      T,HOLD
486   003350          OFUF CONDENABL;
487   003351
488   003351
489   003351  %*****************************************************
490   003351  % MULTIPLY MANTISSAS
491   003351
492   003351  FMU1:   A,R5  B,R6              ALUF,XORAB          ALUD,B
493   003351          IDBS,ALU                        T,NEXT      T,HOLD;
494   003352
495   003352          A,R4  B,A               ALUF,ANDAB          ALUD,B
496   003352          IDBS,ALU                        T,NEXT      T,HOLD;
497   003353
498   003353          A,R2  B,R4              ALUF,ANDAB          ALUD,B
499   003353          IDBS,ALU                        T,NEXT      T,HOLD;
500   003354
501   003354          A,6   B,R1              ALUF,PASSD          ALUD,B
502   003354          IDBS,BMG                        T,NEXT      T,HOLD;
503   003355
504   003355          A,R1  B,R4              ALUF,ORAB           ALUD,B
505   003355          IDBS,ALU                        T,NEXT      T,HOLD;
506   003356
507   003356
508   003356          A,R1  B,A               ALUF,ORAB           ALUD,B
509   003356          IDBS,ALU                        T,NEXT      T,HOLD;
510   003357
511   003357                                  ALUF,ZERO           ALUD,Q
512   003357          IDBS,ALU                        T,NEXT      T,HOLD
513   003357          COND,LC=0;
514   003360
515   003360                B,R3              ALUF,ZERO           ALUD,B
516   003360          IDBS,ARG                COMM,LDLC T,NEXT    T,PUSH
517   003360          17;
518   003361
519   003361          A,D                     ALUF,A+Q  ALUM,FMU  ALUD,Q    STS,EA
520   003361          IDBS,ALU                          T,NEXT    T,HOLD;
521   003362
522   003362          A,A   B,R3  MIS,ZIN     ALUF,A+B  ALUM,FMU  ALUD,SRD  STS,EA    CRY,C
523   003362          IDBS,ALU                          T,NEXT    T,POP
524   003362          LCOUNT;
525   003363
526   003363          A,R4                    ALUF,PASSA          ALUD,NONE
527   003363          IDBS,ALU                COMM,LDGPR T,NEXT   T,HOLD;
528   003364
529   003364                B,5                                   ALUD,NONE
530   003364          IDBS,BARG               COMM,LDLC  T,NEXT   T,PUSH;
531   003365
532   003365          A,D                     ALUF,A+Q  ALUM,FMU  ALUD,Q    STS,EA
533   003365          IDBS,ALU                          T,NEXT    T,HOLD;
534   003366
535   003366          A,A   B,R3  MIS,ZIN     ALUF,A+B  ALUM,FMU  ALUD,SRD  STS,EA    CRY,C
536   003366          IDBS,ALU                          T,NEXT    T,POP
537   003366          LCOUNT;
538   003367
539   003367          A,D                     ALUF,A+Q  ALUM,FMU  ALUD,Q    STS,EA
540   003367          IDBS,ALU                          T,NEXT    T,HOLD;
541   003370
542   003370          A,A   B,R3  MIS,ZIN     ALUF,A+B  ALUM,FMU  ALUD,B    STS,EA    CRY,C
543   003370          IDBS,ALU                          T,NEXT    T,HOLD
544   003370          COND,F=0                          F,JMP     F,HOLD;
545   003371
546   003371          A,7   B,R4              ALUF,PASSD          ALUD,B
547   003371          IDBS,BMG                        T,NEXT      T,HOLD;
548   003372
549   003372          A,R3  B,R4              ALUF,ANDAB          ALUD,NONE
550   003372          IDBS,ALU                        T,NEXT      T,HOLD;
551   003373
552   003373          A,R3  B,A               ALUF,PASSA          ALUD,B
553   003373          IDBS,ALU                        T,NEXT      T,HOLD
554   003373          MCRY1 CONDENABL;
555   003374
556   003374  %*****************************************************
557   003374  % NO CARRY FROM LAST ADDITION IN MULTIPLY LOOP
558   003374
559   003374          A,A                     ALUF,PASSA          ALUD,NONE
560   003374          IDBS,ALU                        T,NEXT      T,HOLD
561   003374          COND,F=0                        F,NEXT      F,HOLD;
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562     003375
563     003375                B,D             ALUF,PASSQ          ALUD,B
564     003375          IDBS,ALU                        T,JMP     T,HOLD
565     003375          ZAD CONDENABL;
566     003376
567     003376          A,R1  B,A               ALUF,MASKAB         ALUD,B
568     003376          IDBS,ALU                        T,NEXT    T,HOLD;
569     003377
570     003377          A,R6  B,R1              ALUF,A-B            ALUD,Q
571     003377          IDBS,ALU                        T,JMP     T,PUSH
572     003377          CHKUF;
573     003400
574     003400                                                    ALUD,NONE
575     003400          IDBS,ALU                         T,JMP    T,HOLD
576     003400          STSEX;
577     003401
578     003401
579     003401  %*********************************************************
580     003401  % CARRY FROM LAST ADDITION IN MULTIPLY LOOP
581     003401
582     003401  MCRY1: A,R4  B,A               ALUF,MASKAB         ALUD,B
583     003401          IDBS,ALU                        T,NEXT    T,HOLD;
584     003402
585     003402                B,A  MIS,ZIN      ALUF,PASSB ALUM,MIC ALUD,SRD
586     003402          IDBS,ALU                        T,NEXT    T,HOLD;
587     003403
588     003403                B,D               ALUF,PASSQ          ALUD,B
589     003403          IDBS,ALU                         T,NEXT   T,HOLD;
590     003404
591     003404          A,R6  B,A               ALUF,ORAB           ALUD,B
592     003404          IDBS,ALU                        T,JMP     T,HOLD
593     003404          STSEX;
594     003405
595     003405  %*********************************************************
596     003405  %*********************************************************
597     003405
598     003405  %  FLOATING DIVIDE INSTRUCTION
599     003405
600     003405  %*********************************************************
601     003405
602     003405
603     003405  3405/
604     003405  FDV4:         B,R2              ALUF,PASSD          ALUD,B
605     003405          IDBS,DBR      COMM,AREAD,NEXT     T,NEXT    T,HOLD;
606     003406
607     003406                B,STS             ALUF,PASSD          ALUD,B
608     003406          IDBS,STS                        T,NEXT    T,HOLD;
609     003407
610     003407          A,R2  B,R4              ALUF,PASSA          ALUD,B
611     003407          IDBS,ALU                         T,NEXT   T,HOLD;
612     003410
613     003410                                                    ALUD,NONE
614     003410          IDBS,ARG                COMM,LDGPR T,NEXT T,HOLD
615     003410          77;
616     003411
617     003411          A,A                     ALUF,MASKDA         ALUD,Q
618     003411          IDBS,GPR                        T,NEXT    T,HOLD
619     003411          COND,F=0                        F,NEXT    F,HOLD;
620     003412
621     003412                B,R5              ALUF,PASSD          ALUD,B
622     003412          IDBS,DBR                        T,JMP     T,HOLD
623     003412          ZAD CONDENABL;
624     003413
625     003413          A,R2  B,R3              ALUF,MASKDA         ALUD,B
626     003413          IDBS,GPR                        T,NEXT    T,HOLD;
627     003414
628     003414          A,R3                    ALUF,Q-A            ALUD,Q
629     003414          IDBS,ALU                        T,NEXT    T,HOLD
630     003414          COND,F15                        F,JMP     F,HOLD;
631     003415
632     003415          A,A   B,R2              ALUF,XORAB          ALUD,B
633     003415          IDBS,ALU                        T,NEXT    T,HOLD;
634     003416
635     003416          A,17                    ALUF,MASKDQ         ALUD,Q
636     003416          IDBS,BMG                        T,NEXT    T,HOLD
637     003416          FDV2 CONDENABL;
638     003417
639     003417
640     003417  %*********************************************************
641     003417  % UNEQUAL SIGNS, CHANGE SIGNBIT
642     003417
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643   003417
644   003417          A,17                    ALUF,ORDQ           ALUD,Q
645   003417          IDBS,BMG                          T,NEXT    T,HOLD;
646   003420
647   003420
648   003420  FDV2:         B,R6              ALUF,XORDQ          ALUD,B
649   003420          IDBS,ARG                          T,NEXT    T,HOLD
650   003420          40000;
651   003421
652   003421          A,R3                    ALUF,PASSA          ALUD,NONE
653   003421          IDBS,ALU                          T,NEXT    T,HOLD
654   003421          COND,F=0                          F,NEXT    F,HOLD;
655   003422
656   003422          A,16  B,R1              ALUF,PASSD          ALUD,B
657   003422          IDBS,BMG                          T,JMP     T,HOLD
658   003422          FLOVF CONDENABL;
659   003423
660   003423          A,R2  B,R1              ALUF,ANDAB          ALUD,NONE
661   003423          IDBS,ALU                          T,NEXT    T,HOLD
662   003423          COND,F=0                          F,NEXT    F,HOLD;
663   003424
664   003424          A,A   B,R6              ALUF,XORAB          ALUD,Q
665   003424          IDBS,ALU                          T,JMP     T,HOLD
666   003424          FDV1 CONDENABL;
667   003425
668   003425          A,R1                    ALUF,ANDAQ          ALUD,NONE
669   003425          IDBS,ALU                          T,NEXT    T,HOLD
670   003425          COND,F=0                          F,NEXT    F,HOLD;
671   003426
672   003426          A,16  B,R1              ALUF,PASSD          ALUD,B
673   003426          IDBS,BMG                          T,JMP     T,HOLD
674   003426          FDV1 CONDENABL;
675   003427
676   003427  OFUF:   A,A   B,R1              ALUF,ANDAB          ALUD,NONE
677   003427          IDBS,ALU                          T,NEXT    T,HOLD
678   003427          COND,F=0                          F,JMP     F,HOLD;
679   003430
680   003430                                                      ALUD,NONE
681   003430          IDBS,ALU                          T,NEXT    T,HOLD
682   003430          FLOVF CONDENABL;
683   003431
684   003431                                                      ALUD,NONE
685   003431          IDBS,ALU                          T,JMP     T,HOLD
686   003431          ZAD;
687   003432
688   003432
689   003432  %*************************************************************
690   003432  % DIVIDE MANTISSAS
691   003432
692   003432  FDV1:         B,R1              ALUF,PASSD          ALUD,B
693   003432          IDBS,ARG                          T,NEXT    T,HOLD
694   003432          100;
695   003433
696   003433          A,R4  B,R4              ALUF,ANDDA          ALUD,B
697   003433          IDBS,GPR                          T,NEXT    T,HOLD;
698   003434
699   003434          A,A   B,A               ALUF,ANDDA          ALUD,B
700   003434          IDBS,GPR                          T,NEXT    T,HOLD;
701   003435
702   003435      6   A,R1  B,R4              ALUF,ORAB           ALUD,B
703   003435          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD;
704   003436
705   003436          A,R1  B,A               ALUF,ORAB           ALUD,B
706   003436          IDBS,ALU                          T,NEXT    T,HOLD;
707   003437
708   003437                B,D               ALUF,PASSB          ALUD,Q
709   003437          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
710   003437          0;
711   003440
712   003440          A,7   B,R1              ALUF,PASSD          ALUD,B    STS,LO
713   003440          IDBS,BMG                          T,NEXT    T,HOLD
714   003440          COND,LC=0;
715   003441
716   003441          A,R5                    ALUF,Q-A            ALUD,Q    STS,EA
717   003441          IDBS,ALU                          T,NEXT    T,HOLD;
718   003442
719   003442          A,R4  B,A  MIS,ZIN      ALUF,B-A-1 ALUM,MIC ALUD,SLD  STS,ES    CRY,C
720   003442          IDBS,ALU                          T,NEXT    T,PUSH;
721   003443
722   003443          A,R5                    ALUF,Q-A-1 ALUM,FDV ALUD,Q    STS,EA    CRY,GPR
723   003443          IDBS,ALU                          T,NEXT    T,HOLD;
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724   003444
725   003444          A,R4  B,A  MIS,ZIN    ALUF,B-A-1 ALUM,FDV ALUD,SLD  STS,ES    CRY,C
726   003444          IDBS,ALU                        T,NEXT    T,POP
727   003444          LCOUNT;
728   003445
729   003445                B,R3            ALUF,PASSD          ALUD,B
730   003445          IDBS,GPR                        T,NEXT    T,HOLD;
731   003446
732   003446                                                    ALUD,NONE
733   003446          IDBS,ARG              COMM,LDLC T,NEXT    T,PUSH
734   003446          17;
735   003447
736   003447          A,R5                  ALUF,Q-A-1 ALUM,FDV ALUD,Q    STS,EA    CRY,GPR
737   003447          IDBS,ALU                        T,NEXT    T,HOLD;
738   003450
739   003450          A,R4  B,A  MIS,ZIN    ALUF,B-A-1 ALUM,FDV ALUD,SLD  STS,ES    CRY,C
740   003450          IDBS,ALU                        T,NEXT    T,POP
741   003450          LCOUNT;
742   003451
743   003451          A,R3  B,R1            ALUF,ANDAB          ALUD,NONE
744   003451          IDBS,ALU                        T,NEXT    T,HOLD
745   003451          COND,F=0                        F,NEXT    F,HOLD;
746   003452
747   003452                                ALUF,PASSD          ALUD,Q
748   003452          IDBS,GPR                        T,JMP     T,HOLD
749   003452          POSDV CONDENABL;
750   003453
751   003453                B,R3  MIS,ZIN   ALUF,PASSB ALUM,MIC ALUD,SRD
752   003453          IDBS,ALU                        T,NEXT    T,HOLD;
753   003454
754   003454          A,6   B,D             ALUF,PASSQ          ALUD,B
755   003454          IDBS,BMG              COMM,LDGPR T,NEXT   T,HOLD;
756   003455
757   003455          A,R6                  ALUF,D+A            ALUD,Q
758   003455          IDBS,GPR                        T,NEXT    T,HOLD;
759   003456
760   003456          A,R3  B,R3            ALUF,MASKDA         ALUD,B
761   003456          IDBS,GPR                        T,NEXT    T,HOLD;
762   003457
763   003457          A,16                                      ALUD,NONE
764   003457          IDBS,BMG              COMM,LDGPR T,JMP    T,PUSH
765   003457          CHKOF;
766   003460
767   003460          A,R7                  ALUF,PASSA          ALUD,NONE
768   003460          IDBS,ALU              COMM,LDGPR T,NEXT   T,HOLD;
769   003461
770   003461    STSST:
771   003461    STSEX: A,STS                ALUF,PASSA          ALUD,NONE STS,LO
772   003461          IDBS,ALU                        T,JMP     T,HOLD
773   003461          CONT;
774   003462
775   003462    POSDV: A,6   B,D            ALUF,PASSQ          ALUD,B
776   003462          IDBS,BMG              COMM,LDGPR T,NEXT   T,HOLD;
777   003463
778   003463          A,R3  B,A             ALUF,MASKDA         ALUD,B
779   003463          IDBS,GPR                        T,NEXT    T,HOLD;
780   003464
781   003464          A,R6  B,A             ALUF,ORAB           ALUD,B
782   003464          IDBS,ALU                        T,JMP     T,HOLD
783   003464          STSST;
784   003465
785   003465    FLOVF: A,Z   B,D            ALUF,INVA           ALUD,B
786   003465          IDBS,ALU                        T,NEXT    T,HOLD;
787   003466
788   003466                                                    ALUD,NONE
789   003466          IDBS,ARG              COMM,LDGPR T,NEXT   T,HOLD
790   003466          77777;
791   003467
792   003467          A,R6  B,A             ALUF,ORDA           ALUD,B
793   003467          IDBS,GPR                        T,NEXT    T,HOLD;
794   003470
795   003470                                ALUF,PASSD          ALUD,Q
796   003470          IDBS,ARG                        T,NEXT    T,HOLD
797   003470          10;
798   003471
799   003471          A,STS B,STS           ALUF,ORAQ           ALUD,B
800   003471          IDBS,ALU                         T,JMP    T,HOLD
801   003471          STSEX;
802   003472
803   003472    CHKUF: A,R6  B,R2           ALUF,MASKAQ         ALUD,B
804   003472          IDBS,ALU                        T,NEXT    T,HOLD
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805     003472          COND,F=0                        F,JMP     F,HOLD;
806     003473
807     003473          A,R2  B,R5          ALUF,ANDAB            ALUD,NONE
808     003473          IDBS,ALU                        T,NEXT    T,HOLD;
809     003474
810     003474          A,A   B,A           ALUF,ORAQ             ALUD,B
811     003474          IDBS,ALU                        T,RETURN  T,POP
812     003474          ZAD CONDENABL;
813     003475
814     003475  CHKOF:        B,R2          ALUF,INVQ             ALUD,B
815     003475          IDBS,ALU                        T,NEXT    T,HOLD;
816     003476
817     003476          A,R6  B,R2          ALUF,ANDAB            ALUD,B
818     003476          IDBS,ALU                        T,NEXT    T,HOLD
819     003476          COND,F=0                        F,JMP     F,POP;
820     003477
821     003477          A,R2  B,R2          ALUF,ANDDA            ALUD,B
822     003477          IDBS,GPR                        T,NEXT    T,HOLD;
823     003500
824     003500          A,R3  B,A           ALUF,A+Q              ALUD,B
825     003500          IDBS,ALU                        T,RETURN  T,POP
826     003500          FLOVF CONDENABL;
827     003501
828     003501
829     003501
830     003501
831     003501  %*************************************************************
832     003501  %*************************************************************
833     003501
834     003501  % NORMALIZE INSTRUCTION
835     003501
836     003501  %*************************************************************
837     003501
838     003501  3501/
839     003501  NLZ3:   A,10                    ALUF,PASSD            ALUD,Q
840     003501          IDBS,BMG                        T,NEXT    T,HOLD;
841     003502
842     003502          A,A                     ALUF,PASSA            ALUD,NONE
843     003502          IDBS,ALU                        T,NEXT    T,HOLD
844     003502          COND,F=0                        F,JMP     F,HOLD;
845     003503
846     003503                B,D               ALUF,ZERO             ALUD,B
847     003503          IDBS,ALU                        T,NEXT    T,HOLD
848     003503          NLZ1 CONDENABL;
849     003504
850     003504                B,A               ALUF,ZERO             ALUD,B
851     003504          IDBS,ALU      COMM,CONTINUE     T,JMP     T,HOLD;
852     003505
853     003505  NLZ1:         B,R6              ALUF,D+Q              ALUD,B
854     003505          IDBS,GPR,SEXT                   T,NEXT    T,HOLD;
855     003506
856     003506          A,A                     ALUF,PASSA            ALUD,NONE
857     003506          IDBS,ALU                        T,NEXT    T,HOLD
858     003506          COND,F15                        F,JMP     F,HOLD;
859     003507
860     003507          A,11                                      ALUD,NONE
861     003507          IDBS,BMG                COMM,LDGPR T,NEXT T,HOLD
862     003507          NLZ2 CONDENABL;
863     003510
864     003510          A,R6  B,R6              ALUF,D+A              ALUD,B
865     003510          IDBS,GPR                        T,NEXT    T,HOLD;
866     003511
867     003511                B,A               ALUF,-B               ALUD,B
868     003511          IDBS,ALU                        T,NEXT    T,HOLD;
869     003512
870     003512  NLZ2:         B,R5              ALUF,D-1              ALUD,B
871     003512          IDBS,ARG                COMM,LDLC T,NEXT  T,PUSH
872     003512          21;
873     003513
874     003513                B,A  MIS,ZIN      ALUF,PASSB ALUM,MIC ALUD,SLB  STS,ES
875     003513          IDBS,ALU                        T,NEXT    T,POP
876     003513          LCOUNT;
877     003514
878     003514                B,A  MIS,LIN      ALUF,PASSB ALUM,MIC ALUD,SRB
879     003514          IDBS,ALU                        T,NEXT    T,HOLD;
880     003515
881     003515          A,R5  B,LC              ALUF,A-D-1            ALUD,Q
882     003515          IDBS,BARG                       T,NEXT    T,HOLD;
883     003516
884     003516      4   A,R6  B,R6              ALUF,A-Q              ALUD,B
885     003516          IDBS,ARG                COMM,LDLC T,NEXT  T,HOLD;
```

```
886   003517
887   003517              B,A              ALUF,PASSB          ALUD,Q
888   003517        IDBS,ALU                       T,NEXT     T,PUSH
889   003517        COND,LC=0;
890   003520
891   003520              B,R6             ALUF,PASSB ALUM,MIC ALUD,SLD
892   003520        IDBS,ALU                       T,NEXT     T,POP
893   003520        LCOUNT;
894   003521
895   003521              B,D              ALUF,PASSQ          ALUD,B
896   003521        IDBS,ALU                       T,NEXT     T,HOLD;
897   003522
898   003522        A,R6  B,A              ALUF,PASSA          ALUD,B
899   003522        IDBS,ALU      COMM,CONTINUE    T,JMP      T,HOLD;
900   003523
901   003523  %*************************************************************
902   003523  %*************************************************************
903   003523
904   003523  % DENORMALIZE INSTRUCTION
905   003523
906   003523  %*************************************************************
907   003523
908   003523  3523/
909   003523  DNZ2:       B,D              ALUF,PASSB          ALUD,Q
910   003523        IDBS,ARG               COMM,LDLC T,NEXT    T,HOLD
911   003523        4;
912   003524
913   003524              B,R1             ALUF,PASSD          ALUD,B
914   003524        IDBS,GPR,SEXT                  T,NEXT     T,PUSH
915   003524        COND,LC=0;
916   003525
917   003525              B,A              ALUF,PASSB          ALUD,SRD
918   003525        IDBS,ALU                       T,NEXT     T,POP
919   003525        LCOUNT;
920   003526
921   003526        A,17  B,D              ALUF,PASSQ          ALUD,SRB
922   003526        IDBS,BMG               COMM,LDGPR T,NEXT   T,HOLD;
923   003527
924   003527        A,D   B,D              ALUF,ORDA           ALUD,B
925   003527        IDBS,GPR                       T,NEXT     T,HOLD;
926   003530
927   003530        A,R1  B,A              ALUF,A+B            ALUD,Q
928   003530        IDBS,ALU                       T,NEXT     T,HOLD;
929   003531
930   003531              B,R2             ALUF,D+Q            ALUD,B
931   003531        IDBS,ARG                       T,NEXT     T,HOLD
932   003531        20;
933   003532
934   003532              B,R6             ALUF,PASSD          ALUD,B
935   003532        IDBS,ARG                       T,NEXT     T,HOLD
936   003532        400;
937   003533
938   003533        A,R2  B,R6             ALUF,ANDAB          ALUD,NONE
939   003533        IDBS,ALU                       T,NEXT     T,HOLD
940   003533        COND,F=0                       F,NEXT     F,HOLD;
941   003534
942   003534                               ALUF,PASSQ          ALUD,NONE
943   003534        IDBS,ALU               COMM,LDLC T,JMP     T,HOLD
944   003534        ZAD2 CONDENABL;
945   003535
946   003535        A,10                   ALUF,ANDDQ          ALUD,NONE
947   003535        IDBS,BMG                       T,NEXT     T,HOLD
948   003535        COND,F=0                       F,JMP      F,HOLD;
949   003536
950   003536                                                   ALUD,NONE
951   003536        IDBS,ALU                       T,NEXT     T,HOLD
952   003536        RDIVZ CONDENABL;
953   003537
954   003537        A,11  B,R3             ALUF,PASSD          ALUD,B
955   003537        IDBS,BMG                       T,NEXT     T,PUSH
956   003537        COND,LC=0;
957   003540
958   003540              B,D  MIS,ZIN     ALUF,PASSB          ALUD,SRD
959   003540        IDBS,ALU                       T,NEXT     T,POP
960   003540        LCOUNT;
961   003541
962   003541              B,D              ALUF,PASSB          ALUD,SLD
963   003541        IDBS,ALU                       T,NEXT     T,HOLD;
964   003542
965   003542        A,A   B,R3             ALUF,ANDAB          ALUD,NONE
966   003542        IDBS,ALU                       T,NEXT     T,HOLD
```

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967     003542          COND,F=0                                F,NEXT    F,HOLD;
968     003543
969     003543                B,D               ALUF,PASSB                ALUD,SLD
970     003543          IDBS,ALU                                T,JMP     T,HOLD
971     003543          DNZ1 CONDENABL;
972     003544
973     003544                B,D               ALUF,-B                   ALUD,B
974     003544          IDBS,ALU                                T,NEXT    T,HOLD;
975     003545
976     003545  DNZ1:   A,D   B,A               ALUF,PASSA                ALUD,B
977     003545          IDBS,ALU                                T,NEXT    T,HOLD;
978     003546
979     003546  ZAD3:         B,D               ALUF,ZERO                 ALUD,B
980     003546          IDBS,ALU        COMM,CONTINUE           T,JMP     T,HOLD;
981     003547
982     003547
983     003547  ZAD2:         B,A               ALUF,ZERO                 ALUD,B
984     003547          IDBS,ALU                                T,JMP     T,HOLD
985     003547          ZAD3;
986     003550
987     003550
988     003550
989     003550
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     1      003550
     2      003550   %*****************************************
     3      003550   %*****************************************
     4      003550
     5      003550   % VECTOR TO DETERMINE ALD-VALUES
     6      003550
     7      003550   %*****************************************
     8      003550
     9      003550   3560/
    10      003560   ALDVC: ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 0;
    11      003561          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 1560;
    12      003562          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 20500;
    13      003563          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 21540;
    14      003564          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 400;
    15      003565          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 1600;
    16      003566          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 21560;
    17      003567          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 0;
    18      003570          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 100000;
    19      003571          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 101560;
    20      003572          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 120500;
    21      003573          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 121540;
    22      003574          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 100400;
    23      003575          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 101600;
    24      003576          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 121560;
    25      003577          ALUF,PASSD ALUD,Q IDBS,ARG T,RETURN T,POP 100000;
    26      003600
    27      003600
    28      003600
    29      003600
    30      003600
    31      003600
    32      003600
    33      003600
    34      003600
    35      003600   %*****************************************************
    36      003600   %*****************************************************
    37      003600
    38      003600   % VECTOR FOR SINTRAN CORE-MAP INSTRUCTIONS
    39      003600
    40      003600   %*****************************************************
    41      003600
    42      003600   VCSI3: ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDA8;
    43      003601          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDX8;
    44      003602          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDAD8;
    45      003603          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDB8;
    46      003604          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
    47      003605              ALUF,ZERO  ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
    48      003606          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD STAD8;
    49      003607          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD STAD8;
    50      003610
    51      003610          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDA8;
    52      003611          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDX8;
    53      003612          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDAD8;
    54      003613          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LDB8;
    55      003614          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
    56      003615              ALUF,ZERO  ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
    57      003616          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD STAD8;
    58      003617          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD STAD8;
    59      003620
    60      003620
    61      003620
    62      003620
    63      003620
    64      003620   %*********************************************************
    65      003620   %*********************************************************
    66      003620
    67      003620   % VECTOR FOR MOPC EXAMINE DISPLAY FUNCTION
    68      003620
    69      003620   %*********************************************************
    70      003620
    71      003620   VECT4:                                          ALUD,NONE % MEM. EX. (0)
    72      003620          IDBS,ALU                          T,JMP   T,HOLD
    73      003620          EXAMI;
    74      003621
    75      003621          A,A   B,R7          ALUF,PASSA          ALUD,B    % REG. EX. (1)

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003621          IDBS,ALU                COMM,CLIRQ T,JMP    T,HOLD
003621          VC41;
003622
003622          A,3   B,R6              ALUF,ORDQ           ALUD,B % AUX. REG. EX. (2)
003622          IDBS,BMG                COMM,CLIRQ T,JMP    T,HOLD
003622          VC42;
003623
003623          A,A   B,R7              ALUF,PASSA          ALUD,B % INT. REG. EX. (3)
003623          IDBS,ALU                          T,JMP     T,HOLD
003623          VC43;
003624
003624
003624
003624  %*********************************************
003624  % MOPC STOP-ROUTINE CONTINUED
003624
003624  STOP2:  AB,SINGL                ALUF,PASSD          ALUD,Q
003624          IDBS,REG                COMM,SSTOP T,NEXT   T,HOLD
003624          COND,F=0                          F,NEXT    F,HOLD;
003625
003625          AB,BPFLG                ALUF,PASSD          ALUD,NONE
003625          IDBS,REG                          T,JMP     T,HOLD
003625          BPCHK CONDENABL;
003626
003626
003626  %*********************************************
003626  % MULTIPLE SINGLE IS ON
003626
003626          AB,SINGL                ALUF,Q-1            ALUD,NONE
003626          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
003626          SINGL;
003627
003627  BPCHK:  AB,BRKPT                ALUF,PASSD          ALUD,Q
003627          IDBS,REG                          T,JMP     T,HOLD
003627          MANIR CONDENABL;
003630
003630
003630  %*********************************************
003630  % BREAKPOINT IS ON
003630
003630          A,P                     ALUF,Q-A            ALUD,NONE
003630          IDBS,ALU                          T,NEXT    T,HOLD
003630          COND,F=0                          F,JMP     F,HOLD;
003631
003631          A,6                     ALUF,D-1            ALUD,Q
003631          IDBS,AARG                         T,NEXT    T,HOLD
003631          SINGL CONDENABL;
003632
003632
003632  %*********************************************
003632  % BREAKPOINT IS FINISHED, PRINT  .
003632
003632          AB,PRCHR                ALUF,Q-1            ALUD,NONE
003632          IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
003632          RONLY;
003633
003633
003633
003633
003633  %*********************************************
003633  % .  PRINTED TO MOPC, SET UP BREAKPOINT MODE
003633
003633  DOT:    AB,OCTNR                ALUF,PASSD          ALUD,Q
003633          IDBS,REG                          T,NEXT    T,HOLD;
003634
003634          AB,BRKPT                ALUF,PASSQ          ALUD,NONE
003634          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
003635
003635          AB,BPFLG                                    ALUD,NONE
003635          IDBS,ARG                COMM,EWRF T,JMP     T,HOLD
003635          SPAC9;
003636
003636
003636
003636
003636  3637/
003637  %*************************************************************
003637  % LAST ENTRY IN VECT4 : DEFAULT DISPLAY MODE (ACTIVITY) (17)
003637
003637          AB,ACTLV                ALUF,PASSD          ALUD,Q
003637          IDBS,REG                          T,JMP     T,HOLD
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157   003637          VC417;
158   003640
159   003640
160   003640
161   003640
162   003640
163   003640
164   003640
165   003640
166   003640
167   003640
168   003640
169   003640
170   003640   %*****************************************************************
171   003640   %*****************************************************************
172   003640
173   003640   % VECTOR FOR 1504XX- INSTRUCTIONS  (PON ETC.)
174   003640
175   003640   %*****************************************************************
176   003640
177   003640   VECT1: ALUD,NONE IDBS,ALU T,JMP T,HOLD INPUT;
178   003641
179   003641   IOF:   A,17                    ALUF,MASKDQ          ALUD,Q
180   003641          IDBS,BMG                          T,JMP      T,HOLD
181   003641          IOF2;
182   003642
183   003642   ION:   A,17                    ALUF,ORDQ            ALUD,Q
184   003642          IDBS,BMG                          T,JMP      T,HOLD
185   003642          ION2;
186   003643
187   003643          A,7 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD CONT;
188   003644
189   003644   POF:   A,16                    ALUF,MASKDQ          ALUD,Q
190   003644          IDBS,BMG                          T,JMP      T,HOLD
191   003644          POF2;
192   003645
193   003645   PIOF:  A,16                    ALUF,MASKDQ          ALUD,Q
194   003645          IDBS,BMG                          T,JMP T,HOLD
195   003645          IOF;
196   003646
197   003646   SEX:   A,15                    ALUF,ORDQ            ALUD,Q
198   003646          IDBS,BMG                          T,JMP      T,HOLD
199   003646          POF2;
200   003647
201   003647   REX:   A,15                    ALUF,MASKDQ          ALUD,Q
202   003647          IDBS,BMG                          T,JMP      T,HOLD
203   003647          POF2;
204   003650
205   003650   PON:   A,16                    ALUF,ORDQ            ALUD,Q
206   003650          IDBS,BMG                          T,JMP      T,HOLD
207   003650          POF2;
208   003651
209   003651          A,7 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD CONT;
210   003652
211   003652   PION:  A,16                    ALUF,ORDQ            ALUD,Q
212   003652          IDBS,BMG                          T,JMP      T,HOLD
213   003652          ION;
214   003653
215   003653          A,7 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD CONT;
216   003654          A,7 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD CONT;
217   003655   IOXT:      ALUD,NONE                        T,JMP T,HOLD IOXT2;
218   003656
219   003656   EXAM:  A,A                     ALUF,PASSA           ALUD,NONE
220   003656          IDBS,ALU                COMM,LDSEG T,JMP     T,HOLD
221   003656          EXAM2;
222   003657
223   003657   DEPO:  A,A                     ALUF,PASSA           ALUD,NONE
224   003657          IDBS,ALU                COMM,LDSEG T,JMP     T,HOLD
225   003657          DEPO2;
226   003660
227   003660
228   003660
229   003660
230   003660
231   003660
232   003660
233   003660
234   003660
235   003660
236   003660
237   003660
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238     003660
239     003660  %*************************************************************************
240     003660  %*************************************************************************
241     003660
242     003660  % VECTOR FOR 1500XX-INSTRUCTIONS  (TRA)
243     003660
244     003660  %*************************************************************************
245     003660
246     003660  VECT2:      B,A              ALUF,PASSD          ALUD,B
247     003660          IDBS,MAPANS                  T,RETURN   T,HOLD;
248     003661
249     003661  TASTS:      B,A              ALUF,PASSD          ALUD,B
250     003661          IDBS,STS                     T,RETURN   T,HOLD;
251     003662
252     003662  TAOPR: AB,OPR                ALUF,PASSD          ALUD,Q
253     003662          IDBS,REG                     T,JMP      T,HOLD
254     003662          APIE1;
255     003663
256     003663  TAPGS: AB,PGS                ALUF,PASSD          ALUD,Q
257     003663          IDBS,REG                     T,JMP      T,HOLD
258     003663          APGS1;
259     003664
260     003664  TAPVL: AB,PVL                ALUF,PASSD          ALUD,Q
261     003664          IDBS,REG                     T,JMP      T,HOLD
262     003664          APVL1;
263     003665
264     003665  TAIIC: PIC,RSTS B,R5         ALUF,PASSD          ALUD,B
265     003665          IDBS,PIC             COMM,EPIC T,JMP    T,HOLD
266     003665          AIIC1;
267     003666
268     003666  TAPID: PIC,RMSK B,R1         ALUF,PASSD          ALUD,B
269     003666          IDBS,DSABL           COMM,EPIC T,JMP    T,HOLD
270     003666          APID1;
271     003667
272     003667  TAPIE: AB,PIE                ALUF,PASSD          ALUD,Q
273     003667          IDBS,REG                     T,JMP      T,HOLD
274     003667          APIE1;
275     003670
276     003670  TACSR:      B,A              ALUF,PASSD          ALUD,B
277     003670          IDBS,CSR                     T,RETURN   T,HOLD;
278     003671
279     003671  TAPIM: A,PIL B,A             ALUF,PASSD          ALUD,B
280     003671          IDBS,BMG                     T,RETURN   T,HOLD;
281     003672
282     003672  TAALD:                                          ALUD,NONE
283     003672          IDBS,ALD             COMM,LDLC T,JMP    T,HOLD
284     003672          AALD1;
285     003673
286     003673  TAPES:      B,A              ALUF,PASSD          ALUD,B
287     003673          IDBS,PES                     T,JMP      T,HOLD
288     003673          APES1;
289     003674
290     003674  TAPGC: ALUD,NONE IDBS,ALU   T,JMP   T,HOLD APGC1;
291     003675
292     003675  TAPEA:      B,A              ALUF,PASSD          ALUD,B
293     003675          IDBS,PEA                     T,JMP      T,HOLD
294     003675          APES1;
295     003676
296     003676              B,A              ALUF,ZERO           ALUD,B
297     003676          IDBS,ALU                     T,RETURN   T,HOLD;
298     003677
299     003677  TACS:  A,17                  ALUF,INVD           ALUD,Q
300     003677          IDBS,BMG                     T,JMP      T,HOLD
301     003677          ACS;
302     003700
303     003700
304     003700
305     003700
306     003700
307     003700
308     003700
309     003700
310     003700
311     003700
312     003700
313     003700
314     003700  %*************************************************
315     003700  %*************************************************
316     003700
317     003700  % VECTOR FOR 1501XX-INSTRUCTIONS (TRR)
318     003700
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319     003700  %*********************************************
320     003700
321     003700  VECT3: A,A                      ALUF,PASSA          ALUD,NONE
322     003700         IDBS,ALU                           T,JMP     T,HOLD
323     003700         RPANC;
324     003701
325     003701  TRSTS:                          ALUF,PASSQ          ALUD,NONE STS,LO
326     003701         IDBS,ALU                           T,RETURN  T,HOLD;
327     003702
328     003702  TRLMP: ALUD,NONE IDBS,ALU   T,JMP    T,HOLD RLMP1;
329     003703
330     003703  TRPCR: A,17                     ALUF,MASKDQ         ALUD,Q
331     003703         IDBS,BMG                           T,JMP     T,HOLD
332     003703         RPCR1;
333     003704
334     003704  TR4:   ALUD,NONE IDBS,ALU   T,JMP    T,HOLD ILLIN;
335     003705
336     003705  TRIIE: A,A                      ALUF,A+Q            ALUD,Q
337     003705         IDBS,ALU                           T,JMP     T,HOLD
338     003705         RIIE1;
339     003706
340     003706  TRPID: AB,PID                   ALUF,PASSQ          ALUD,NONE
341     003706         IDBS,ALU                 COMM,EWRF T,JMP     T,HOLD
342     003706         RPID1;
343     003707
344     003707  TRPIE: AB,PIE                   ALUF,PASSQ          ALUD,NONE
345     003707         IDBS,ALU                 COMM,EWRF T,JMP     T,HOLD
346     003707         RPIE1;
347     003710
348     003710  TRCCL: A,3                      ALUF,PASSD          ALUD,Q
349     003710         IDBS,BMG                           T,JMP     T,HOLD
350     003710         RCCL1;
351     003711
352     003711  TRCIL: A,A                      ALUF,PASSA          ALUD,Q
353     003711         IDBS,ALU                           T,JMP     T,HOLD
354     003711         RCIL1;
355     003712
356     003712  TRCIU: A,A                      ALUF,PASSA          ALUD,Q
357     003712         IDBS,ALU                           T,JMP     T,HOLD
358     003712         RCIU1;
359     003713
360     003713  TRCIP:       B,A                ALUF,PASSB          ALUD,NONE
361     003713         IDBS,ALU                 COMM,WCIHM T,RETURN T,HOLD;
362     003714
363     003714  TR14:  ALUD,NONE IDBS,ALU   T,JMP    T,HOLD ILLIN;
364     003715
365     003715  TRECC:                                              ALUD,NONE
366     003715         IDBS,ALU                           T,JMP     T,HOLD
367     003715         RECC1;
368     003716
369     003716  TR16:  ALUD,NONE IDBS,ALU   T,JMP    T,HOLD ILLIN;
370     003717
371     003717  TRCS:  A,17                     ALUF,PASSD          ALUD,Q
372     003717         IDBS,BMG                           T,JMP     T,HOLD
373     003717         RCS;
374     003720
375     003720
376     003720
377     003720
378     003720
379     003720
380     003720
381     003720
382     003720
383     003720
384     003720
385     003720
386     003720
387     003720  %*********************************************
388     003720  %*********************************************
389     003720
390     003720  % VECTOR FOR  IOX 30X  INSTRUCTIONS
391     003720
392     003720  %*********************************************
393     003720
394     003720  TRMVC:                          ALUF,PASSD          ALUD,Q
395     003720         IDBS,IOR                 COMM,XSLOW T,JMP     T,HOLD
396     003720         TRM0;
397     003721
398     003721  %CC RETURN IF IN OPCOM
399     003721
```

```
400   003721                                                    ALUD,NONE
401   003721          IDBS,ALU                        T,RETURN  T,POP;
402   003722
403   003722    %CC NOT USED
404   003722
405   003722                                ALUF,PASSD          ALUD,Q
406   003722          IDBS,UART          COMM,UART,STATUS T,JMP T,HOLD
407   003722          TRM2;
408   003723
409   003723    %CC READ UART STATUS REGISTER
410   003723
411   003723          AB,OLD303          ALUF,XORDA          ALUD,Q
412   003723          IDBS,REG                        T,JMP     T,HOLD
413   003723          TRM3;
414   003724
415   003724    %CC OLD A-REG XOR NEW A-REG
416   003724
417   003724               B,A           ALUF,ZERO           ALUD,B
418   003724          IDBS,ALU                        T,RETURN  T,POP:
419   003725
420   003725    %CC 0 -> AREG
421   003725
422   003725          A,A                 ALUF,PASSA          ALUD,NONE
423   003725          IDBS,ALU         COMM,UART,DATA T,RETURN T,POP;
424   003726
425   003726    %CC WRITE DATA TO UART
426   003726
427   003726               B,A           ALUF,ZERO           ALUD,B
428   003726          IDBS,ALU                        T,JMP     T,HOLD
429   003726          TRM6;
430   003727
431   003727          AB,STATUS           ALUF,PASSD          ALUD,Q
432   003727          IDBS,REG                        T,JMP     T,HOLD
433   003727          TRM7;
434   003730
435   003730
436   003730
437   003730
438   003730
439   003730
440   003730
441   003730
442   003730
443   003730
444   003730
445   003730    %*****************************************
446   003730    %*****************************************
447   003730
448   003730    % VECTOR FOR  IOX 10-13
449   003730
450   003730    %*****************************************
451   003730
452   003730    CLKVC: A,A                  ALUF,ZERO           ALUD,B
453   003730          IDBS,ALU                        T,RETURN  T,POP;
454   003731
455   003731          A,7                 ALUF,ORDQ           ALUD,Q
456   003731          IDBS,BMG                        T,JMP     T,HOLD
457   003731          CLK1;
458   003732
459   003732               B,A           ALUF,ANDDQ          ALUD,B
460   003732          IDBS,ARG                        T,RETURN  T,POP
461   003732          11;
462   003733
463   003733          A,0                 ALUF,ORDQ           ALUD,Q
464   003733          IDBS,BMG                        T,JMP     T,HOLD
465   003733          CLK3;
466   003734
467   003734
468   003734
469   003734
470   003734    3740/
471   003740    %*************************************
472   003740    %*************************************
473   003740    %                                    *
474   003740    %  I N T E R R U P T   V E C T O R   *
475   003740    %                                    *
476   003740    %*************************************
477   003740    %*************************************
478   003740
479   003740
480   003740    ITSRV: B,12 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD XINT;
```

```
481     003741          B,13 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD XINT;
482     003742          B,14 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD XINT;
483     003743          B,15 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD XINT;
484     003744          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
485     003745          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
486     003746          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
487     003747          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
488     003750          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
489     003751          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
490     003752          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
491     003753          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
492     003754          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
493     003755          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
494     003756          B,16 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD EXT14;
495     003757          B,17 ALUF,PASSD ALUD,Q IDBS,BARG T,JMP T,HOLD XINT;
496     003760
497     003760    PANVC: B,P ALUF,B-1 ALUD,B IDBS,ALU   T,JMP T,HOLD STOP;
498     003761          B,P ALUF,B-1 ALUD,B IDBS,ALU   T,JMP T,HOLD MS20;
499     003762          B,P ALUF,B-1 ALUD,B IDBS,ALU   T,JMP T,HOLD PRQ;
500     003763          B,P ALUF,B-1 ALUD,B IDBS,ALU   T,JMP T,HOLD SING2;
501     003764          B,P ALUF,B-1 ALUD,B IDBS,ALU   T,JMP T,HOLD LOAD;
502     003765          B,P ALUF,B-1 ALUD,B IDBS,ALU COMM,CLRTC  T,JMP T,HOLD CONT;
503     003766          B,P ALUF,B-1 ALUD,B IDBS,ALU   T,JMP T,HOLD RSTRT;
504     003767    AB,MACL ALUD,NONE IDBS,ARG COMM,EWRF  T,JMP T,HOLD MACL;
505     003770
506     003770    %
507     003770
```

```
ND-110 micro code assembler   4.2 September 1987          18:56:17        24:11:1987
MICRO-DELI-EXTRA                                          PAGE        7

     1      003770
     2      003770   4000/
     3      004000
     4      004000   %*****************************************
     5      004000   %*****************************************
     6      004000
     7      004000   % GECO-INSTRUCTION
     8      004000
     9      004000   %*****************************************
    10      004000   %*****************************************
    11      004000
    12      004000   GECO1:
    13      004000           A,D   B,R1            ALUF,A              ALUD,B    STS,EA
    14      004000           IDBS,ALU                        T,NEXT    T,HOLD
    15      004000           COND,RESTR                      F,NEXT    F,PUSH;
    16      004001
    17      004001           A,A   B,R7            ALUF,PASSA          ALUD,B
    18      004001           IDBS,ALU                        T,JMP     T,HOLD
    19      004001           PRIVI  CONDENABL;
    20      004002
    21      004002                 B,R7   CRY,C    ALUF,B              ALUD,B
    22      004002           IDBS,ALU              COMM,LDSEG T,NEXT   T,HOLD
    23      004002           COND,LC=0;
    24      004003
    25      004003           A,R1  B,R1            ALUF,A+1            ALUD,B,YA STS,EA
    26      004003           IDBS,ALU                        T,NEXT    T,HOLD;
    27      004004
    28      004004                                                    ALUD,NONE
    29      004004           IDBS,ALU              COMM,EXRQ T,NEXT    T,HOLD;
    30      004005
    31      004005           A,0   B,LC                                ALUD,NONE
    32      004005           IDBS,DBR      XRF     COMM,EWRF T,NEXT    T,POP
    33      004005           LCOUNT;
    34      004006
    35      004006           A,B   B,R1            ALUF,PASSA          ALUD,B
    36      004006           IDBS,ALU                        T,NEXT    T,HOLD;
    37      004007
    38      004007           A,R2                  ALUF,PASSA          ALUD,NONE
    39      004007           IDBS,ALU              COMM,LDLC T,NEXT    T,PUSH
    40      004007           COND,LC=0;
    41      004010
    42      004010           A,R1  B,R1            ALUF,A+1            ALUD,B,YA
    43      004010           IDBS,ALU                        T,NEXT    T,HOLD;
    44      004011
    45      004011           A,0   B,LC                                ALUD,NONE
    46      004011           IDBS,REG  XRF      COMM,WRRQ,APT T,NEXT   T,POP
    47      004011           LCOUNT;
    48      004012
    49      004012           A,R2  B,17            ALUF,ANDDA          ALUD,Q
    50      004012           IDBS,BARG                       T,NEXT    T,HOLD;
    51      004013
    52      004013           A,L   B,D             ALUF,A+B            ALUD,B    STS,EA
    53      004013           IDBS,ALU                        T,NEXT    T,HOLD;
    54      004014
    55      004014                 B,A    CRY,C    ALUF,B              ALUD,B
    56      004014           IDBS,ALU                        T,NEXT    T,HOLD;
    57      004015
    58      004015           A,T   B,B             ALUF,A+B            ALUD,B    STS,EA
    59      004015           IDBS,ALU                        T,NEXT    T,HOLD;
    60      004016
    61      004016                 B,X             ALUF,B+1            ALUD,B
    62      004016           IDBS,ALU                        T,NEXT    T,HOLD
    63      004016           COND,F15                        F,NEXT    F,HOLD;
    64      004017
    65      004017                 B,P             ALUF,B-1            ALUD,B
    66      004017           IDBS,ALU                        T,JMP     T,HOLD
    67      004017           CONT  CONDENABL;
    68      004020
    69      004020                 B,P             ALUF,B+1            ALUD,B
    70      004020           IDBS,ALU                        T,JMP     T,HOLD
    71      004020           CONT;
    72      004021
    73      004021
    74      004021
    75      004021   %*****************************************

Last written :  18:56:25  24:11:87      Printed at :      10:01:29   1:12:87
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 76   004021  %*****************************************
 77   004021
 78   004021  % GECOX-INSTRUCTION
 79   004021
 80   004021  %*****************************************
 81   004021  %*****************************************
 82   004021
 83   004021
 84   004021  GECX1:
 85   004021          A,D   B,R4              ALUF,A              ALUD,B     STS,EA
 86   004021          IDBS,ALU                          T,NEXT    T,HOLD
 87   004021          COND,RESTR                        F,NEXT    F,HOLD;
 88   004022
 89   004022          A,A   B,R7              ALUF,PASSA          ALUD,B
 90   004022          IDBS,ALU                          T,JMP     T,HOLD
 91   004022          PRIVI  CONDENABL;
 92   004023
 93   004023               B,R5               ALUF,PASSD          ALUD,B
 94   004023          IDBS,ARG                          T,NEXT    T,HOLD
 95   004023          4;
 96   004024
 97   004024       13 A,R5  B,R6              ALUF,PASSA          ALUD,B
 98   004024          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD;
 99   004025
100   004025          A,L                     ALUF,PASSA          ALUD,Q
101   004025          IDBS,ALU                          T,NEXT    T,PUSH;
102   004026
103   004026
104   004026               B,R7   CRY,C       ALUF,B              ALUD,B
105   004026          IDBS,ALU                COMM,LDSEG T,NEXT   T,HOLD;
106   004027
107   004027          A,R4  B,R4              ALUF,A+Q            ALUD,B,YA STS,EA
108   004027          IDBS,ALU                          T,NEXT    T,HOLD;
109   004030
110   004030               B,R5               ALUF,B-1            ALUD,B
111   004030          IDBS,ALU                COMM,EXRQ T,NEXT    T,HOLD
112   004030          COND,F=0;
113   004031
114   004031               B,LC               ALUF,PASSD          ALUD,B
115   004031          IDBS,DBR                          T,NEXT    T,POP
116   004031          LCOUNT;
117   004032
118   004032
119   004032          A,B   B,Z               ALUF,A-B            ALUD,B
120   004032          IDBS,ALU                          T,NEXT    T,HOLD;
121   004033
122   004033
123   004033  GEC2: 13 A,T B,Z               ALUF,A+B            ALUD,B
124   004033          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD;
125   004034
126   004034               B,R5               ALUF,PASSD          ALUD,B
127   004034          IDBS,ARG                          T,NEXT    T,PUSH
128   004034          4;
129   004035
130   004035
131   004035               B,R5               ALUF,B-1            ALUD,B
132   004035          IDBS,ALU                          T,NEXT    T,HOLD
133   004035          COND,F=0;
134   004036
135   004036               B,LC               ALUF,PASSB MIS,ROT  ALUD,SLD
136   004036          IDBS,ALU                          T,NEXT    T,HOLD
137   004036          COND,COND;
138   004037
139   004037               B,LC               ALUF,PASSB MIS,ROT  ALUD,SLD
140   004037          IDBS,ALU                          T,NEXT    T,HOLD;
141   004040
142   004040               B,LC               ALUF,PASSB MIS,ROT  ALUD,SLD
143   004040          IDBS,ALU                          T,NEXT    T,HOLD;
144   004041
145   004041               B,LC               ALUF,PASSB MIS,ROT  ALUD,SLD
146   004041          IDBS,ALU                          T,NEXT    T,POP
147   004041          LCOUNT;
148   004042
149   004042
150   004042          A,Z   B,R6              ALUF,B-1            ALUD,B,YA
151   004042          IDBS,ALU                          T,NEXT    T,HOLD
152   004042          COND,F=0                          F,JMP     F,HOLD;
153   004043
154   004043                                  ALUF,PASSQ          ALUD,NONE
155   004043          IDBS,ALU        COMM,WRRQ,APT     T,NEXT    T,HOLD
156   004043          GEC2 CONDENABL;
```

```
157     004044
158     004044
159     004044          A,T   B,Z               ALUF,PASSD          ALUD,Q
160     004044          IDBS,REG       XRF                T,NEXT    T,HOLD;
161     004045
162     004045                                   ALUF,ANDDQ          ALUD,Q
163     004045          IDBS,ARG                           T,NEXT    T,HOLD
164     004045          17;
165     004046
166     004046          A,R4  B,D              ALUF,PASSA            ALUD,B
167     004046          IDBS,ALU                           T,NEXT    T,HOLD;
168     004047
169     004047          A,R7  B,A     CRY,C    ALUF,A                ALUD,B
170     004047          IDBS,ALU                           T,NEXT    T,HOLD;
171     004050
172     004050          A,B   B,B              ALUF,A+Q              ALUD,B    STS,EA
173     004050          IDBS,ALU                           T,NEXT    T,HOLD;
174     004051
175     004051               B,X               ALUF,B+1              ALUD,B
176     004051          IDBS,ALU                           T,NEXT    T,HOLD
177     004051          COND,F15                           F,NEXT    F,HOLD;
178     004052
179     004052               B,P               ALUF,B-1              ALUD,B
180     004052          IDBS,ALU                           T,JMP     T,HOLD
181     004052          CONT CONDENABL;
182     004053
183     004053               B,P               ALUF,B+1              ALUD,B
184     004053          IDBS,ALU                           T,JMP     T,HOLD
185     004053          CONT;
186     004054
187     004054
188     004054
189     004054
190     004054
191     004054
192     004054
193     004054
194     004054  %*************************************************************************
195     004054  %*************************************************************************
196     004054  %                                                                        *
197     004054  % INSTRUCTIONS TO SPEED UP SINTRAN III SEGMENT HANDLING                  *
198     004054  % THE INSTRUCTION GROUP 'S3SEG'  OPCODE 1403XX                          *
199     004054  %                                                                        *
200     004054  %*************************************************************************
201     004054  %*************************************************************************
202     004054  %                                                                        *
203     004054  %       OPCODE 140300      :   SETPT                                    *
204     004054  %                                                                        *
205     004054  % SETPT:      JXZ * 10          % FINISHED                             *
206     004054  %             LDDTX 20                                                 *
207     004054  %             BSET ZRO 130 DA % PGU-BIT                                *
208     004054  %             LDBTX 10                                                 *
209     004054  %             177777            % OLD BUG IN LDBTX                     *
210     004054  %             STD ,B            % ALWAYS INSIDE PAGE TABLE             *
211     004054  %             LDXTX 00                                                 *
212     004054  %             JMP *-7                                                  *
213     004054  %                                                                        *
214     004054  %*************************************************************************
215     004054  %                                                                        *
216     004054  %       OPCODE 140301      :   CLEPT                                    *
217     004054  %                                                                        *
218     004054  % CLEPT:      JXZ * 11          % FINISHED                             *
219     004054  %             LDBTX 10                                                 *
220     004054  %             177777            % OLD BUG IN LDBTX                     *
221     004054  %             LDA ,B                                                   *
222     004054  %             JAZ * 3                                                  *
223     004054  %             STATX 20                                                 *
224     004054  %             STZ ,B            % ALWAYS INSIDE PAGE TABLE             *
225     004054  %             LDXTX 00                                                 *
226     004054  %             JMP *-10                                                 *
227     004054  %                                                                        *
228     004054  %*************************************************************************
229     004054  %                                                                        *
230     004054  %       OPCODE 140302    :     CLNREENT                                 *
231     004054  %                                                                        *
232     004054  %       READ ADDRESS  A+2  TO FIND PAGE TABLE TO BE AFFECTED             *
233     004054  %       READ RT-DESCRIPTION BITMAP WORDS, FOUND FROM ADDRESS X+25.       *
234     004054  %       CLEAR PAGE-TABLE ENTRIES CORRESPONDING TO 1-BITS IN BITMAP,      *
235     004054  %       THE LAST BITMAP-ADDRESS IS IN ADDRESS X+T.                       *
236     004054  %                                                                        *
237     004054  %*************************************************************************
```

```
238     004054  %                                                               *
239     004054  %       OPCODE 140303   :       CHREENTPAGES                    *
240     004054  %                                                               *
241     004054  %  1. READ ADDRESS  D,X -> R1 ;  D,X -> PREVIOUS (SCRATCH REG)  *
242     004054  %  2. IF R1 = 0; SKIP RETURN (FINISHED)                         *
243     004054  %  3. READ ADDRESS T,R1+2                                       *
244     004054  %  4. IF NOT WIP; T,R1 -> PREVIOUS; READ ADDR T,R1  ->  R1; GOTO 2 *
245     004054  %  5. READ ADDRESS T,R1 -> R2                                   *
246     004054  %  6. WRITE R2 -> ADDRESS PREVIOUS                             *
247     004054  %  7. R1 -> X ; PREVIOUS -> D,A ; RETURN                        *
248     004054  %                                                             * *
249     004054  %*****************************************************************
250     004054  %                                                               *
251     004054  %       OPCODE 140304   :       CLEPU                           *
252     004054  %                                                               *
253     004054  %  AS 'CLEPT', BUT INCLUDING WORKING SET INFORMATION             *
254     004054  %       FOR ALL PAGE-TABLE ENTRIES HANDLED                      *
255     004054  %          IF PGU OF ENTRY IS 1                                 *
256     004054  %             D /\ 300                                          *
257     004054  %             B /\ 776 SHR 1 - D                                *
258     004054  %             B-REG BITS 0-3 IS NOW BIT NUMBER                  *
259     004054  %             B-REG BITS 4-6 IS NOW WORD NUMBER                 *
260     004054  %             SET BIT IN 8-WORD TABLE IN PAGE-MAP BANK          *
261     004054  %             POINTED TO BY L-REGISTER                          *
262     004054  %                                                               *
263     004054  %           LAYOUT OF 8-WORD TABLE :                            *
264     004054  %                                                               *
265     004054  %                   BIT 15                              BIT 0   *
266     004054  %                   ----------------------------------------    *
267     004054  % L-REG -> WORD  0 # PAGE  17                         PAGE  0 #  *
268     004054  %          WORD  1 # PAGE  37                              20 #  *
269     004054  %          WORD  2 # PAGE  57                              40 #  *
270     004054  %                                                               *
271     004054  %          WORD  7 # PAGE 177                             160 #  *
272     004054  %                   ----------------------------------------    *
273     004054  %                                                               *
274     004054  %*****************************************************************
275     004054  %*****************************************************************
276     004054
277     004054
278     004054  SJSG1: ALUD,NONE IDBS,ALU T,JMP T,PUSH PVCHK;
279     004055
280     004055         A,A                    ALUF,A+1            ALUD,Q
281     004055         IDBS,ALU                        T,JMP0-3 T,HOLD
282     004055         SETPT;
283     004056
284     004056  %*****************************************************************
285     004056
286     004056
287     004056  SEPT1:                                             ALUD,NONE
288     004056         IDBS,ALU                        T,JMP       T,PUSH
289     004056         PATA1;
290     004057
291     004057               B,R1              ALUF,B+1            ALUD,B
292     004057         IDBS,ALU                        T,NEXT      T,HOLD;
293     004060
294     004060                                                     ALUD,NONE
295     004060         IDBS,ALU              COMM,EXRQ T,JMP       T,PUSH
296     004060         PATA4;
297     004061
298     004061               B,R1              ALUF,B+1            ALUD,B
299     004061         IDBS,ALU                        T,NEXT      T,HOLD;
300     004062
301     004062                                                     ALUD,NONE
302     004062         IDBS,ALU              COMM,EXRQ T,NEXT      T,HOLD;
303     004063
304     004063               B,D               ALUF,PASSD          ALUD,B
305     004063         IDBS,DBR                        T,NEXT      T,HOLD;
306     004064
307     004064         A,B                   ALUF,PASSA          ALUD,NONE
308     004064         IDBS,ALU                        T,NEXT      T,HOLD;
309     004065
310     004065         A,R7  B,A             ALUF,MASKAB         ALUD,B
311     004065         IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD;
312     004066
313     004066         A,B                   ALUF,A+1            ALUD,NONE
314     004066         IDBS,ALU                        T,NEXT      T,HOLD
315     004066         COND,IRQ                        F,JMP       F,HOLD;
316     004067
317     004067         A,D                   ALUF,PASSA          ALUD,NONE
318     004067         IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD
```

```
004067          PATA2 CONDENABL;
004070
004070                B,P             ALUF,B-1            ALUD,B
004070          IDBS,ALU                        T,JMP       T,POP
004070          CONT;
004071
004071    %*****************************************************************
004071
004071
004071    CLPU1:
004071    CLPT1:                        ALUF,PASSD          ALUD,Q
004071          IDBS,ARG                        T,NEXT      T,HOLD
004071          600;
004072
004072          A,D   B,R4              ALUF,ANDAQ          ALUD,SLB
004072          IDBS,ALU                        T,JMP       T,PUSH
004072          PATA1;
004073
004073          A,B                     ALUF,PASSA          ALUD,Q
004073          IDBS,ALU                        T,NEXT      T,HOLD;
004074
004074                                                      ALUD,NONE
004074          IDBS,ALU          COMM,RDRQ,APT T,JMP       T,PUSH
004074          PATA4;
004075
004075          A,A   B,R7              ALUF,ANDAB          ALUD,NONE
004075          IDBS,ALU                        T,JMP       T,HOLD
004075          PATA2 CONDENABL;
004076
004076                B,R1              ALUF,B+1            ALUD,B
004076          IDBS,ALU                        T,NEXT      T,HOLD
004076          COND,COND                       F,NEXT      F,HOLD;
004077
004077          A,A                     ALUF,PASSA          ALUD,NONE
004077          IDBS,ALU                COMM,DERQ T,NEXT    T,HOLD;
004100
004100          A,R4                    ALUF,Q-A            ALUD,Q
004100          IDBS,ALU                        T,JMP       T,HOLD
004100          CLPT3 CONDENABL;
004101
004101    % CLEPU-INSTRUCTION AND PGU-BIT = 1
004101
004101                B,R3              ALUF,ANDDQ          ALUD,SRB  % BIT NO.
004101          IDBS,ARG                        T,NEXT      T,HOLD
004101          36;
004102
004102                B,R6              ALUF,ANDDQ          ALUD,SLB
004102          IDBS,ARG                        T,NEXT      T,HOLD
004102          740;
004103
004103          A,R6  B,R6              ALUF,A+B            ALUD,SLB
004103          IDBS,ALU                        T,NEXT      T,HOLD;
004104
004104                B,R6              ALUF,PASSB          ALUD,NONE
004104          IDBS,ALU                        T,NEXT      T,HOLD;
004105
004105          A,L   B,R6              ALUF,D+A            ALUD,B
004105          IDBS,SWAP                       T,NEXT      T,HOLD;
004106
004106          A,R6                    ALUF,PASSA          ALUD,NONE
004106          IDBS,ALU                        T,NEXT      T,HOLD;
004107
004107                                                      ALUD,NONE
004107          IDBS,ALU                COMM,EXRQ T,NEXT    T,HOLD;
004110
004110          A,R3                    ALUF,PASSA          ALUD,NONE
004110          IDBS,ALU                COMM,LDLC T,NEXT    T,HOLD;
004111
004111                                  ALUF,PASSD          ALUD,Q
004111          IDBS,DBR                        T,NEXT      T,HOLD;
004112
004112          A,LC                    ALUF,ORDQ           ALUD,Q
004112          IDBS,BMG                        T,NEXT      T,HOLD;
004113
004113          A,R6                    ALUF,PASSA          ALUD,NONE
004113          IDBS,ALU                        T,NEXT      T,HOLD;
004114
004114                                  ALUF,PASSQ          ALUD,NONE
004114          IDBS,ALU                COMM,DERQ T,NEXT    T,HOLD;
004115
004115    CLPT3: A,B                    ALUF,PASSA          ALUD,NONE
```

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400   004115          IDBS,ALU                          T,NEXT    T,HOLD
401   004115          COND,IRQ                          F,JMP     F,HOLD;
402   004116
403   004116                                ALUF,ZERO             ALUD,NONE
404   004116          IDBS,ALU          COMM,WRRQ,APT T,NEXT      T,HOLD
405   004116          PATA2 CONDENABL;
406   004117
407   004117                B,P             ALUF,B-1              ALUD,B
408   004117          IDBS,ALU                          T,JMP     T,POP
409   004117          CONT;
410   004120
411   004120    %*************************************************************************
412   004120
413   004120
414   004120    PATA1: A,T                    ALUF,PASSA            ALUD,NONE
415   004120          IDBS,ALU              COMM,LDSEG T,NEXT       T,HOLD;
416   004121
417   004121    PATA2: A,X    B,R1            ALUF,PASSA            ALUD,B
418   004121          IDBS,ALU                          T,NEXT      T,HOLD;
419   004122
420   004122          A,X                   ALUF,PASSA            ALUD,NONE
421   004122          IDBS,ALU              COMM,EXRQ T,NEXT        T,HOLD
422   004122          COND,F=0                          F,NEXT      F,HOLD;
423   004123
424   004123                B,X             ALUF,PASSD            ALUD,B
425   004123          IDBS,DBR                          T,JMP       T,POP
426   004123          CONT CONDENABL;
427   004124
428   004124                B,R1            ALUF,B+1              ALUD,B
429   004124          IDBS,ALU                          T,NEXT      T,HOLD;
430   004125
431   004125                                                      ALUD,NONE
432   004125          IDBS,ALU              COMM,EXRQ T,NEXT        T,HOLD;
433   004126
434   004126                B,B             ALUF,PASSD            ALUD,B
435   004126          IDBS,DBR                          T,NEXT      T,HOLD;
436   004127
437   004127          A,B   B,B             ALUF,A+B              ALUD,Q
438   004127          IDBS,ALU                          T,NEXT      T,HOLD;
439   004130
440   004130                B,B             ALUF,ORDQ             ALUD,B
441   004130          IDBS,ARG                          T,RETURN    T,HOLD
442   004130          177000;
443   004131
444   004131
445   004131
446   004131
447   004131    PATA4:      B,A             ALUF,PASSD            ALUD,B
448   004131          IDBS,DBR                          T,RETURN    T,POP
449   004131          COND,F=0                          F,NEXT      F,HOLD;
450   004132
451   004132
452   004132    %*************************************************************************
453   004132
454   004132    CLNR1:                        ALUF,Q+1              ALUD,NONE
455   004132          IDBS,ALU                          T,NEXT      T,HOLD
456   004132          COND,F=0                          F,NEXT      F,HOLD;
457   004133
458   004133          A,A                   ALUF,PASSA            ALUD,NONE
459   004133          IDBS,ALU          COMM,RDRQ,APT T,NEXT      T,HOLD;
460   004134
461   004134                                ALUF,PASSD            ALUD,Q
462   004134          IDBS,DBR                          T,JMP       T,POP
463   004134          CONT CONDENABL;
464   004135
465   004135                B,R7            ALUF,ANDDQ            ALUD,SLB
466   004135          IDBS,ARG                          T,NEXT      T,HOLD
467   004135          300;
468   004136
469   004136                B,R1            ALUF,D+A              ALUD,B
470   004136          IDBS,ARG                          T,NEXT      T,HOLD
471   004136          177000;
472   004137
473   004137          A,X                   ALUF,PASSA            ALUD,Q
474   004137          IDBS,ALU                          T,NEXT      T,HOLD;
475   004140
476   004140                B,R2            ALUF,D+Q              ALUD,B
477   004140          IDBS,ARG                          T,NEXT      T,HOLD
478   004140          25;
479   004141
480   004141          A,T   B,R3            ALUF,A+Q+1            ALUD,B
```

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481  004141          IDBS,ALU                              T,NEXT    T,PUSH
482  004141          COND,F=0                              F,NEXT    F,HOLD;
483  004142
484  004142          A,R2  B,R2            ALUF,A+1                  ALUD,B,YA
485  004142          IDBS,ALU                              T,JMP     T,POP
486  004142          CONT  CONDENABL;
487  004143                                                          ALUD,NONE
488  004143          IDBS,ALU          COMM,RDRQ,APT T,JMP     T,HOLD
489  004143          CLNR4;
490  004144
491  004144
492  004144  CLNR4:        B,R4            ALUF,PASSD                ALUD,B
493  004144          IDBS,DBR                              T,NEXT    T,HOLD
494  004144          COND,F=0                              F,NEXT    F,HOLD;
495  004145
496  004145          A,R1  B,17            ALUF,PASSA                ALUD,Q
497  004145          IDBS,BARG             COMM,LDLC T,JMP     T,HOLD
498  004145          CLNR5 CONDENABL;
499  004146
500  004146          A,0   B,R6            ALUF,PASSD                ALUD,B
501  004146          IDBS,BMG                              T,NEXT    T,HOLD;
502  004147
503  004147                B,2             ALUF,PASSD                ALUD,Q
504  004147          IDBS,BARG                             T,NEXT    T,PUSH
505  004147          COND,F=0                              F,NEXT    F,HOLD;
506  004150
507  004150          A,R4  B,R6            ALUF,ANDAB                ALUD,NONE
508  004150          IDBS,ALU                              T,JMP     T,PUSH
509  004150          CLNR3;
510  004151
511  004151                B,R6            ALUF,PASSB                ALUD,SLB
512  004151          IDBS,ALU                              T,NEXT    T,POP
513  004151          LCOUNT COND,F=0                       F,NEXT    F,HOLD;
514  004152
515  004152  CLNR2: A,R3  B,R2            ALUF,A-B                  ALUD,NONE
516  004152          IDBS,ALU                              T,RETURN  T,HOLD
517  004152          COND,F=0                              F,NEXT    F,HOLD;
518  004153
519  004153
520  004153  CLNR3: A,R1  B,R1            ALUF,A+Q                  ALUD,B
521  004153          IDBS,ALU                              T,RETURN  T,POP
522  004153          COND,LC=0 CONDENABL;
523  004154
524  004154          A,R1                  ALUF,A-Q                  ALUD,NONE
525  004154          IDBS,ALU                              T,NEXT    T,HOLD;
526  004155
527  004155                                ALUF,ZERO                 ALUD,NONE
528  004155          IDBS,ALU          COMM,WRRQ,APT T,RETURN  T,POP;
529  004156
530  004156  CLNR5: A,5   B,R1            ALUF,D+Q                  ALUD,B
531  004156          IDBS,BMG                              T,JMP     T,HOLD
532  004156          CLNR2;
533  004157
534  004157  %*************************************************************************
535  004157
536  004157  CHRE1: A,D   B,R6            ALUF,PASSA                ALUD,B
537  004157          IDBS,ALU              COMM,LDSEG T,NEXT   T,HOLD;
538  004160
539  004160          A,X   B,R7            ALUF,PASSA                ALUD,B
540  004160          IDBS,ALU                              T,NEXT    T,HOLD;
541  004161
542  004161  CHRE2:                                                  ALUD,NONE
543  004161          IDBS,ALU              COMM,EXRQ T,NEXT    T,HOLD;
544  004162
545  004162                B,R1            ALUF,PASSD                ALUD,B
546  004162          IDBS,DBR                              T,NEXT    T,HOLD
547  004162          COND,F=0                              F,NEXT    F,HOLD;
548  004163
549  004163          A,T   B,R1            ALUF,B+1                  ALUD,B,YA
550  004163          IDBS,ALU              COMM,LDSEG T,JMP    T,HOLD
551  004163          CHRE4 CONDENABL;
552  004164
553  004164          A,R1                  ALUF,A+1                  ALUD,NONE
554  004164          IDBS,ALU                              T,NEXT    T,HOLD;
555  004165
556  004165                                                          ALUD,NONE
557  004165          IDBS,ALU              COMM,EXRQ T,NEXT    T,HOLD;
558  004166
559  004166          A,R4                  ALUF,ANDDA                ALUD,NONE
560  004166          IDBS,DBR                              T,NEXT    T,HOLD
561  004166          COND,F=0                              F,NEXT    F,HOLD;
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562  004167
563  004167          A,R1  B,R1            ALUF,A-1            ALUD,B
564  004167          IDBS,ALU                        T,JMP     T,HOLD
565  004167          CHRE3 CONDENABL;
566  004170
567  004170    % WIP
568  004170                                                    ALUD,NONE
569  004170          IDBS,ALU              COMM,EXRQ T,NEXT    T,HOLD;
570  004171
571  004171                B,R2            ALUF,PASSD          ALUD,B
572  004171          IDBS,DBR                        T,NEXT    T,HOLD;
573  004172
574  004172          A,R6  B,D             ALUF,PASSA          ALUD,B
575  004172          IDBS,ALU              COMM,LDSEG T,NEXT   T,HOLD;
576  004173
577  004173          A,R7  B,A             ALUF,PASSA          ALUD,B
578  004173          IDBS,ALU                        T,NEXT    T,HOLD;
579  004174
580  004174          A,R2                  ALUF,PASSA          ALUD,NONE
581  004174          IDBS,ALU              COMM,DERQ T,NEXT    T,HOLD;
582  004175
583  004175          A,R1  B,X             ALUF,PASSA          ALUD,B
584  004175          IDBS,ALU      COMM,CONTINUE       T,JMP     T,HOLD;
585  004176
586  004176    % NOT WIP
587  004176
588  004176    CHRE3: A,T   B,R6           ALUF,PASSA          ALUD,B
589  004176          IDBS,ALU              T,NEXT    T,HOLD;
590  004177
591  004177          A,R1  B,R7            ALUF,PASSA          ALUD,B
592  004177          IDBS,ALU                        T,JMP     T,HOLD
593  004177          CHRE2;
594  004200
595  004200    % FINISHED
596  004200
597  004200    CHRE4:        B,P           ALUF,B+1            ALUD,B
598  004200          IDBS,ALU                        T,JMP     T,HOLD
599  004200          CONT;
600  004201
601  004201
602  004201
603  004201
604  004201
605  004201    %*****************************************************************
606  004201    %*****************************************************************
607  004201    %
608  004201    %
609  004201    % MOVE-WORDS - INSTRUCTION : OPCODE 1431XX
610  004201    %
611  004201    %
612  004201    %*****************************************************************
613  004201    %*****************************************************************
614  004201
615  004201    MOVW1: A,L                    ALUF,A-Q-1          ALUD,NONE
616  004201          IDBS,ALU                        T,NEXT    T,HOLD
617  004201          COND,CRY                        F,NEXT    F,HOLD;
618  004202
619  004202                                                    ALUD,NONE
620  004202          IDBS,ALU                        T,JMP     T,HOLD     % > 2K WORDS
621  004202          CONT CONDENABL;
622  004203
623  004203          A,L                   ALUF,PASSA          ALUD,NONE
624  004203          IDBS,ALU                        T,NEXT    T,HOLD
625  004203          COND,F=0                        F,JMP     F,HOLD;
626  004204
627  004204                                                    ALUD,NONE
628  004204          IDBS,ALU              T,JMP0-3  T,NEXT    T,HOLD
629  004204          MVWVC CONDENABL;
630  004205
631  004205    % 0 WORDS
632  004205                                                    ALUD,NONE
633  004205          IDBS,ALU          COMM,CONTINUE   T,JMP     T,HOLD;
634  004206
635  004206
636  004206    % PT -> PT
637  004206
638  004206    MVW0:  A,D                    ALUF,PASSA          ALUD,Q
639  004206          IDBS,ALU                        T,JMP     T,PUSH
640  004206          CPT;
641  004207
642  004207          A,T                   ALUF,PASSA          ALUD,Q
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004207          IDBS,ALU                        T,JMP     T,PUSH
004207          CPTW;
004210
004210                                                    ALUD,NONE
004210          IDBS,ALU                        T,JMP     T,PUSH
004210          PTRD;
004211
004211                B,R1          ALUF,PASSD            ALUD,B
004211          IDBS,DBR                        T,JMP     T,HOLD
004211          PTWR;
004212
004212
004212    % PT -> APT
004212
004212    MVW1: A,D                   ALUF,PASSA            ALUD,Q
004212          IDBS,ALU                        T,JMP     T,PUSH
004212          CPT;
004213
004213          A,T                   ALUF,PASSA            ALUD,Q
004213          IDBS,ALU                        T,JMP     T,PUSH
004213          CAPTW;
004214
004214                                                    ALUD,NONE
004214          IDBS,ALU                        T,JMP     T,PUSH
004214          PTRD;
004215
004215                B,R1          ALUF,PASSD            ALUD,B
004215          IDBS,DBR                        T,JMP     T,HOLD
004215          APTWR;
004216
004216
004216    % PT -> PHYSICAL
004216
004216    MVW2:                                           ALUD,NONE
004216          IDBS,ALU                        T,NEXT    T,HOLD
004216          COND,RESTR                      F,NEXT    F,HOLD;
004217
004217          A,X                   ALUF,PASSA            ALUD,NONE
004217          IDBS,ALU              COMM,LDSEG T,JMP      T,HOLD
004217          PRIVI CONDENABL;
004220
004220          A,D                   ALUF,PASSA            ALUD,Q
004220          IDBS,ALU                        T,JMP     T,PUSH
004220          CPT;
004221
004221                                                    ALUD,NONE
004221          IDBS,DBR                        T,JMP     T,PUSH
004221          PTRD;
004222
004222                B,R1          ALUF,PASSD            ALUD,B
004222          IDBS,DBR                        T,JMP     T,HOLD
004222          PHWR;
004223
004223
004223    % APT -> PT
004223
004223    MVW3: A,D                   ALUF,PASSA            ALUD,Q
004223          IDBS,ALU                        T,JMP     T,PUSH
004223          CAPT;
004224
004224          A,T                   ALUF,PASSA            ALUD,Q
004224          IDBS,ALU                        T,JMP     T,PUSH
004224          CPTW;
004225
004225                                                    ALUD,NONE
004225          IDBS,ALU                        T,JMP     T,PUSH
004225          APTRD;
004226
004226                B,R1          ALUF,PASSD            ALUD,B
004226          IDBS,DBR                        T,JMP     T,HOLD
004226          PTWR;
004227
004227
004227    % APT -> APT
004227
004227    MVW4: A,D                   ALUF,PASSA            ALUD,Q
004227          IDBS,ALU                        T,JMP     T,PUSH
004227          CAPT;
004230
004230          A,T                   ALUF,PASSA            ALUD,Q
004230          IDBS,ALU                        T,JMP     T,PUSH
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724   004230          CAPTW;
725   004231
726   004231                                                    ALUD,NONE
727   004231          IDBS,ALU                        T,JMP     T,PUSH
728   004231          APTRD;
729   004232
730   004232                B,R1          ALUF,PASSD            ALUD,B
731   004232          IDBS,DBR                        T,JMP     T,HOLD
732   004232          APTWR;
733   004233
734   004233
735   004233    % APT -> PHYSICAL
736   004233
737   004233    MVW5:                                           ALUD,NONE
738   004233          IDBS,ALU                        T,NEXT    T,HOLD
739   004233          COND,RESTR                      F,NEXT    F,HOLD;
740   004234
741   004234          A,X                 ALUF,PASSA            ALUD,NONE
742   004234          IDBS,ALU            COMM,LDSEG T,JMP      T,HOLD
743   004234          PRIVI CONDENABL;
744   004235
745   004235          A,D                 ALUF,PASSA            ALUD,Q
746   004235          IDBS,ALU                        T,JMP     T,PUSH
747   004235          CAPT;
748   004236
749   004236                                                    ALUD,NONE
750   004236          IDBS,DBR                        T,JMP     T,PUSH
751   004236          APTRD;
752   004237
753   004237                B,R1          ALUF,PASSD            ALUD,B
754   004237          IDBS,DBR                        T,JMP     T,HOLD
755   004237          PHWR;
756   004240
757   004240
758   004240    % PHYSICAL -> PT
759   004240
760   004240    MVW6:                                           ALUD,NONE
761   004240          IDBS,ALU                        T,NEXT    T,HOLD
762   004240          COND,RESTR                      F,NEXT    F,HOLD;
763   004241
764   004241          A,A                 ALUF,PASSA            ALUD,NONE
765   004241          IDBS,ALU            COMM,LDSEG T,JMP      T,HOLD
766   004241          PRIVI CONDENABL;
767   004242
768   004242
769   004242          A,T                 ALUF,PASSA            ALUD,Q
770   004242          IDBS,ALU                        T,JMP     T,PUSH
771   004242          CPTW;
772   004243
773   004243                                                    ALUD,NONE
774   004243          IDBS,ALU                        T,JMP     T,PUSH
775   004243          PHRD;
776   004244
777   004244                B,A           ALUF,B                ALUD,B    CRY,C
778   004244          IDBS,ALU            COMM,LDSEG T,JMP      T,HOLD
779   004244          PTWR;
780   004245
781   004245
782   004245    % PHYSICAL -> APT
783   004245
784   004245    MVW7:                                           ALUD,NONE
785   004245          IDBS,ALU                        T,NEXT    T,HOLD
786   004245          COND,RESTR                      F,NEXT    F,HOLD;
787   004246
788   004246          A,A                 ALUF,PASSA            ALUD,NONE
789   004246          IDBS,ALU            COMM,LDSEG T,JMP      T,HOLD
790   004246          PRIVI CONDENABL;
791   004247
792   004247          A,T                 ALUF,PASSA            ALUD,Q
793   004247          IDBS,ALU                        T,JMP     T,PUSH
794   004247          CAPTW;
795   004250
796   004250                                                    ALUD,NONE
797   004250          IDBS,ALU                        T,JMP     T,PUSH
798   004250          PHRD;
799   004251
800   004251                B,A           ALUF,B                ALUD,B    CRY,C
801   004251          IDBS,ALU            COMM,LDSEG T,JMP      T,HOLD
802   004251          APTWR;
803   004252
804   004252
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805   004252   % PHYSICAL -> PHYSICAL
806   004252
807   004252   MVW8:                                                    ALUD,NONE
808   004252          IDBS,ALU                              T,NEXT     T,HOLD
809   004252          COND,RESTR                            F,NEXT     F,PUSH;
810   004253
811   004253                                                           ALUD,NONE
812   004253          IDBS,ALU                              T,JMP      T,HOLD
813   004253          PRIVI CONDENABL;
814   004254
815   004254          A,A                    ALUF,PASSA                ALUD,NONE
816   004254          IDBS,ALU               COMM,LDSEG T,JMP          T,PUSH
817   004254          PHRD;
818   004255
819   004255          A,X   B,A              ALUF,B                    ALUD,B,YA CRY,C
820   004255          IDBS,ALU               COMM,LDSEG T,JMP          T,HOLD
821   004255          PHWR;
822   004256
823   004256
824   004256   % SUBROUTINES FOR MOVEW
825   004256
826   004256   % CHECK THAT PT-ADDRESSED FIELD IS PRESENT FOR READ
827   004256
828   004256   CPT:                   ALUF,PASSQ                      ALUD,NONE
829   004256          IDBS,ALU                              T,NEXT     T,HOLD;
830   004257
831   004257                                                           ALUD,NONE
832   004257          IDBS,ALU          COMM,RDRQ,PT T,JMP             T,HOLD
833   004257          CPT1;
834   004260
835   004260
836   004260   % CHECK THAT APT-ADDRESSED FIELD IS PRESENT FOR READ
837   004260
838   004260   CAPT:                  ALUF,PASSQ                      ALUD,NONE
839   004260          IDBS,ALU                              T,NEXT     T,HOLD;
840   004261
841   004261                                                           ALUD,NONE
842   004261          IDBS,ALU          COMM,RDRQ,APT T,JMP            T,HOLD
843   004261          CPT1;
844   004262
845   004262
846   004262   CPT1:  A,L   B,R2              ALUF,PASSA                ALUD,SRB  MIS,ZIN
847   004262          IDBS,DBR                              T,NEXT     T,HOLD;
848   004263
849   004263          A,R2                   ALUF,A+Q                  ALUD,NONE
850   004263          IDBS,ALU                              T,NEXT     T,HOLD;
851   004264
852   004264                                                           ALUD,NONE
853   004264          IDBS,ALU          COMM,RDRQ,HOLD T,NEXT          T,HOLD;
854   004265
855   004265          A,L   B,R2             ALUF,A-1                  ALUD,B
856   004265          IDBS,DBR                              T,NEXT     T,HOLD;
857   004266
858   004266          A,R2                   ALUF,A+Q                  ALUD,NONE
859   004266          IDBS,ALU                              T,NEXT     T,HOLD;
860   004267
861   004267                                                           ALUD,NONE
862   004267          IDBS,ALU          COMM,RDRQ,HOLD T,NEXT          T,HOLD
863   004267          COND,IRQ                              F,RETURN   F,POP;
864   004270
865   004270                                                           ALUD,NONE
866   004270          IDBS,DBR                              T,RETURN   T,HOLD;
867   004271
868   004271
869   004271   % CHECK THAT PT-ADDRESSED FIELD IS PRESENT FOR WRITE
870   004271
871   004271   CPTW:                  ALUF,PASSQ                      ALUD,NONE
872   004271          IDBS,ALU                              T,NEXT     T,HOLD;
873   004272
874   004272                                                           ALUD,NONE
875   004272          IDBS,ALU          COMM,RDRQ,PT T,JMP             T,HOLD
876   004272          CPTW1;
877   004273
878   004273
879   004273   % CHECK THAT APT-ADDRESSED FIELD IS PRESENT FOR WRITE
880   004273
881   004273   CAPTW:                 ALUF,PASSQ                      ALUD,NONE
882   004273          IDBS,ALU                              T,NEXT     T,HOLD;
883   004274
884   004274                                                           ALUD,NONE
885   004274          IDBS,ALU          COMM,RDRQ,APT T,JMP            T,HOLD
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886   004274          CPTW1;
887   004275
888   004275   CPTW1:       B,R1            ALUF,PASSD          ALUD,B
889   004275          IDBS,DBR                        T,JMP     T,PUSH
890   004275          CPTW3;
891   004276
892   004276          A,L   B,R2            ALUF,PASSA          ALUD,SRB  MIS,ZIN
893   004276          IDBS,ALU                        T,JMP     T,PUSH
894   004276          CPTW2;
895   004277
896   004277          A,L   B,R2            ALUF,A-1            ALUD,B
897   004277          IDBS,ALU                        T,JMP     T,PUSH
898   004277          CPTW2;
899   004300
900   004300                                                    ALUD,NONE
901   004300          IDBS,ALU                        T,RETURN  T,HOLD
902   004300          COND,IRQ                        F,RETURN  F,POP;
903   004301
904   004301
905   004301   CPTW2: A,R2  B,T             ALUF,A+B            ALUD,Q
906   004301          IDBS,ALU                        T,NEXT    T,HOLD;
907   004302
908   004302                                                    ALUD,NONE
909   004302          IDBS,ALU          COMM,RDRQ,HOLD T,NEXT   T,HOLD;
910   004303
911   004303               B,R1             ALUF,PASSD          ALUD,B
912   004303          IDBS,DBR                        T,NEXT    T,HOLD;
913   004304
914   004304   CPTW3:                       ALUF,PASSQ          ALUD,NONE
915   004304          IDBS,ALU                        T,NEXT    T,HOLD;
916   004305
917   004305          A,R1                 ALUF,PASSA          ALUD,NONE
918   004305          IDBS,ALU          COMM,WRRQ,HOLD T,RETURN T,POP;
919   004306
920   004306
921   004306
922   004306   % READ PT-WORD
923   004306
924   004306   PTRD:  A,D   B,D             ALUF,B+1            ALUD,B,YA
925   004306          IDBS,ALU                        T,NEXT    T,HOLD;
926   004307
927   004307                                                    ALUD,NONE
928   004307          IDBS,ALU            COMM,RDRQ,PT T,JMP    T,HOLD
929   004307          INTER CONDENABL;
930   004310
931   004310
932   004310   % READ APT-WORD
933   004310
934   004310   APTRD: A,D   B,D             ALUF,B+1            ALUD,B,YA
935   004310          IDBS,ALU                        T,NEXT    T,HOLD;
936   004311
937   004311                                                    ALUD,NONE
938   004311          IDBS,ALU          COMM,RDRQ,APT T,JMP     T,HOLD
939   004311          INTER CONDENABL;
940   004312
941   004312
942   004312   % READ PHYSICAL WORD
943   004312
944   004312   PHRD:  A,D   B,D             ALUF,B+1            ALUD,B,YA STS,EA
945   004312          IDBS,ALU                        T,NEXT    T,HOLD;
946   004313
947   004313                                                    ALUD,NONE
948   004313          IDBS,ALU             COMM,EXRQ T,NEXT     T,HOLD
949   004313          COND,IRQ                        F,RETURN  F,POP;
950   004314
951   004314               B,R1             ALUF,PASSD          ALUD,B
952   004314          IDBS,DBR                        T,JMP     T,HOLD
953   004314          INTER CONDENABL;
954   004315
955   004315
956   004315   % INSTRUCTION IS INTERRUPTED
957   004315
958   004315   INTER:       B,D             ALUF,B-1            ALUD,B
959   004315          IDBS,ALU                        T,NEXT    T,HOLD;
960   004316
961   004316               B,P             ALUF,B-1            ALUD,B
962   004316          IDBS,ALU                        T,JMP     T,HOLD
963   004316          CONT;
964   004317
965   004317
966   004317   % WRITE PT-WORD
```

```
 967     004317
 968     004317  PTWR:  A,T    B,L              ALUF,B-1              ALUD,B,YA
 969     004317         IDBS,ALU                             T,NEXT    T,HOLD
 970     004317         COND,F=0                             F,RETURN  F,HOLD;
 971     004320
 972     004320         A,R1   B,T              ALUF,B+1              ALUD,B,YA
 973     004320         IDBS,ALU           COMM,WRRQ,PT      T,NEXT    T,HOLD
 974     004320         CONDENABL COND,IRQ                   F,RETURN  F,POP;
 975     004321
 976     004321                                                        ALUD,NONE
 977     004321         IDBS,ALU      COMM,CONTINUE          T,JMP     T,HOLD;
 978     004322
 979     004322
 980     004322  % WRITE APT-WORD
 981     004322
 982     004322  APTWR: A,T    B,L              ALUF,B-1              ALUD,B,YA
 983     004322         IDBS,ALU                             T,NEXT    T,HOLD
 984     004322         COND,F=0                             F,RETURN  F,HOLD;
 985     004323
 986     004323         A,R1   B,T              ALUF,B+1              ALUD,B,YA
 987     004323         IDBS,ALU          COMM,WRRQ,APT      T,NEXT    T,HOLD
 988     004323         CONDENABL COND,IRQ                   F,RETURN  F,POP;
 989     004324
 990     004324                                                        ALUD,NONE
 991     004324         IDBS,ALU           COMM,CONTINUE     T,JMP     T,HOLD;
 992     004325
 993     004325
 994     004325  % WRITE PHYSICAL WORD
 995     004325
 996     004325  PHWR:  A,T    B,L              ALUF,B-1              ALUD,B,YA
 997     004325         IDBS,ALU                             T,NEXT    T,HOLD
 998     004325         COND,F=0                             F,RETURN  F,HOLD;
 999     004326
1000     004326         A,R1   B,T              ALUF,B+1              ALUD,B,YA STS,EA
1001     004326         IDBS,ALU                COMM,DERQ    T,NEXT    T,HOLD
1002     004326         COND,COND                            F,RETURN  F,HOLD;
1003     004327
1004     004327               B,X               ALUF,B                ALUD,B    CRY,C
1005     004327         IDBS,ALU                COMM,LDSEG   T,NEXT    T,HOLD
1006     004327         CONDENABL COND,IRQ                   F,RETURN  F,POP;
1007     004330
1008     004330                                                        ALUD,NONE
1009     004330         IDBS,ALU           COMM,CONTINUE     T,JMP     T,HOLD;
1010     004331
1011     004331
1012     004331
1013     004331  %*********************************************
1014     004331  %*********************************************
1015     004331
1016     004331  % LOAD BYTE
1017     004331
1018     004331  %*********************************************
1019     004331
1020     004331  LBYT1: A,X    B,R1  MIS,ZIN    ALUF,PASSA ALUM,MIC ALUD,SRB
1021     004331         IDBS,ALU                             T,JMP     T,PUSH
1022     004331         LBYTM;
1023     004332
1024     004332                               ALUF,PASSD              ALUD,Q
1025     004332         IDBS,DBR                             T,JMP     T,PUSH
1026     004332         LBYTU CONDENABL;
1027     004333
1028     004333
1029     004333  %*************************************************
1030     004333  % CODE FOR BOTH UPPER AND LOWER BYTE
1031     004333
1032     004333               B,A               ALUF,ANDDQ            ALUD,B
1033     004333         IDBS,ARG          COMM,CONTINUE      T,JMP     T,HOLD
1034     004333         377;
1035     004334
1036     004334
1037     004334  %*****************************************
1038     004334  % UPPER BYTE
1039     004334
1040     004334  LBYTU:                       ALUF,PASSD              ALUD,Q
1041     004334         IDBS,SWAP                            T,RETURN  T,POP;
1042     004335
1043     004335
1044     004335
1045     004335  %*************************************************
1046     004335  % SUBROUTINE TO CALCULATE ADDRESS IN LBYT AND SBYT
1047     004335
```

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1048    004335  LBYTM: A,T    B,R1            ALUF,A+B            ALUD,B
1049    004335         IDBS,ALU                          T,NEXT    T,HOLD;
1050    004336
1051    004336         A,X    B,1              ALUF,ANDDA          ALUD,NONE
1052    004336         IDBS,BARG          COMM,RDRQ,APT T,RETURN  T,POP
1053    004336         COND,F=0                          F,NEXT    F,HOLD;
1054    004337
1055    004337
1056    004337
1057    004337
1058    004337
1059    004337
1060    004337
1061    004337
1062    004337
1063    004337  %*************************************************
1064    004337  %*************************************************
1065    004337
1066    004337
1067    004337  % STORE BYTE
1068    004337
1069    004337  %*************************************************
1070    004337
1071    004337  SBYT2:        B,R3            ALUF,PASSD          ALUD,B
1072    004337         IDBS,ARG                          T,NEXT    T,HOLD
1073    004337         377;
1074    004340
1075    004340         A,A    B,R3             ALUF,ANDAB          ALUD,B % ISOLATE BYTE
1076    004340         IDBS,ALU                          T,JMP     T,PUSH
1077    004340         LBYTM;
1078    004341
1079    004341                                 ALUF,PASSD          ALUD,Q % READ WORD
1080    004341         IDBS,DBR                          T,JMP     T,HOLD
1081    004341         SBYTU CONDENABL;
1082    004342
1083    004342
1084    004342  %*************************
1085    004342  % LOWER BYTE
1086    004342
1087    004342               B,R2              ALUF,ANDDQ          ALUD,B
1088    004342         IDBS,ARG                          T,NEXT    T,HOLD
1089    004342         177400;
1090    004343
1091    004343
1092    004343
1093    004343  %*************************************
1094    004343  % BOTH BYTES
1095    004343
1096    004343  SBYT1: A,R1                    ALUF,PASSA          ALUD,NONE
1097    004343         IDBS,ALU                          T,NEXT    T,HOLD;
1098    004344
1099    004344         A,R3   B,R2             ALUF,ORAB           ALUD,NONE
1100    004344         IDBS,ALU           COMM,WRRQ,APT T,JMP     T,HOLD
1101    004344         CONT;
1102    004345
1103    004345
1104    004345  %*************************************
1105    004345  % UPPER BYTE
1106    004345
1107    004345  SBYTU:        B,R2              ALUF,ANDDQ          ALUD,B
1108    004345         IDBS,ARG                          T,NEXT    T,HOLD
1109    004345         377;
1110    004346
1111    004346         A,R3                    ALUF,PASSA          ALUD,NONE
1112    004346         IDBS,ALU                          T,NEXT    T,HOLD;
1113    004347
1114    004347               B,R3              ALUF,PASSD          ALUD,B
1115    004347         IDBS,SWAP                         T,JMP     T,HOLD
1116    004347         SBYT1;
1117    004350
1118    004350
1119    004350
1120    004350
1121    004350
1122    004350
1123    004350
1124    004350
1125    004350
1126    004350
1127    004350
1128    004350
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1129  004350  %*************************************************
1130  004350  %*************************************************
1131  004350
1132  004350  % REGISTER MULTIPLY
1133  004350
1134  004350  %*************************************************
1135  004350
1136  004350  RMPY4: A,SRCE B,R1          ALUF,PASSA          ALUD,B
1137  004350         IDBS,ALU                      T,NEXT    T,HOLD
1138  004350         COND,F15                      F,JMP     F,HOLD;
1139  004351
1140  004351               B,DEST         ALUF,PASSB          ALUD,Q
1141  004351         IDBS,ALU             COMM,LDGPR T,NEXT   T,HOLD
1142  004351         RMPY1 CONDENABL;
1143  004352
1144  004352               B,R1           ALUF,-B             ALUD,B % FIRST OP. NEG.
1145  004352         IDBS,ALU                      T,NEXT    T,HOLD
1146  004352         COND,COND                     F,JMP     F,HOLD;
1147  004353
1148  004353  RMPY1:       B,16           ALUF,ZERO           ALUD,B
1149  004353         IDBS,BARG            COMM,LDLC T,NEXT    T,HOLD
1150  004353         RMPY2 CONDENABL;
1151  004354
1152  004354                              ALUF,-Q             ALUD,NONE % SEC. OP. NEG.
1153  004354         IDBS,ALU             COMM,LDGPR T,NEXT   T,HOLD;
1154  004355
1155  004355  RMPY2:                                          ALUD,NONE
1156  004355         IDBS,ALU                      T,NEXT    T,PUSH
1157  004355         COND,LC=0;
1158  004356
1159  004356         A,R1  B,R6  MIS,ZIN  ALUF,A+B  ALUM,FMU  ALUD,SRD % MULTIPLY LOOP
1160  004356         IDBS,ALU                      T,NEXT    T,POP
1161  004356         LCOUNT;
1162  004357
1163  004357         A,SRCE B,DEST        ALUF,XORAB          ALUD,NONE
1164  004357         IDBS,ALU                      T,NEXT    T,HOLD
1165  004357         COND,F15                      F,NEXT    F,HOLD;
1166  004360
1167  004360               B,D            ALUF,PASSQ          ALUD,B
1168  004360         IDBS,ALU                      T,JMP     T,HOLD
1169  004360         RMPY3 CONDENABL;
1170  004361
1171  004361         A,R6  B,A            ALUF,PASSA          ALUD,B % ANSWER POSITIVE
1172  004361         IDBS,ALU       COMM,CONTINUE  T,JMP     T,HOLD;
1173  004362
1174  004362  RMPY3:       B,D            ALUF,-Q             ALUD,B    STS,EA % ANSWER NEG.
1175  004362         IDBS,ALU                      T,NEXT    T,HOLD;
1176  004363
1177  004363         A,R6  B,A            ALUF,-A-1           ALUD,B    CRY,C
1178  004363         IDBS,ALU       COMM,CONTINUE  T,JMP     T,HOLD;
1179  004364
1180  004364
1181  004364
1182  004364
1183  004364
1184  004364
1185  004364  %*************************************************
1186  004364  %*************************************************
1187  004364
1188  004364  % IDENT-INTRUCTION
1189  004364
1190  004364  %*************************************************
1191  004364
1192  004364  IDNT1: A,R1  B,R1            ALUF,ANDDA          ALUD,B
1193  004364         IDBS,GPR                      T,JMP     T,PUSH
1194  004364         PVCHK;
1195  004365
1196  004365                                                   ALUD,NONE
1197  004365         IDBS,ALU                      T,NEXT    T,HOLD
1198  004365         COND,F=0                      F,NEXT    F,HOLD;
1199  004366
1200  004366               B,R6           ALUF,PASSD          ALUD,B
1201  004366         IDBS,ARG                      T,NEXT    T,HOLD
1202  004366         43;
1203  004367
1204  004367         A,R1  B,R6           ALUF,A-B            ALUD,NONE
1205  004367         IDBS,ALU                      T,NEXT    T,HOLD;
1206  004370
1207  004370         A,R1  B,4            ALUF,A-D            ALUD,NONE
1208  004370         IDBS,BARG                     T,JMP     T,HOLD
1209  004370         ID13 CONDENABL;
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1210    004371
1211    004371          A,R1  B,11          ALUF,A-D            ALUD,NONE
1212    004371          IDBS,BARG                   T,JMP       T,HOLD
1213    004371          ID10 CONDENABL;
1214    004372
1215    004372                                ALUF,PASSD          ALUD,Q
1216    004372          IDBS,IOR                    T,JMP       T,HOLD
1217    004372          IDX CONDENABL;
1218    004373
1219    004373
1220    004373  %*****************************************************
1221    004373  % IDENT IS ON LEVEL 12, CHECK IF TERMINAL GAVE INTERRUPT
1222    004373
1223    004373  ID12:   A,16                  ALUF,ANDDQ          ALUD,NONE
1224    004373          IDBS,BMG                    T,NEXT      T,HOLD
1225    004373          COND,F=0                    F,JMP       F,HOLD;
1226    004374
1227    004374  %CC DA INV. POLARITY
1228    004374
1229    004374          A,13                  ALUF,ANDDQ          ALUD,NONE
1230    004374          IDBS,BMG                    T,NEXT      T,HOLD
1231    004374          IDX CONDENABL;
1232    004375
1233    004375          AB,STATUS             ALUF,PASSD          ALUD,Q
1234    004375          IDBS,REG                    T,NEXT      T,HOLD
1235    004375          ID12B CONDENABL;
1236    004376
1237    004376                                ALUF,PASSQ          ALUD,NONE
1238    004376          IDBS,ALU                    T,JMP       T,HOLD
1239    004376          IDX;
1240    004377
1241    004377  ID12B:  A,1                   ALUF,ANDDQ          ALUD,NONE
1242    004377          IDBS,BMG              COMM,LDLC T,NEXT    T,HOLD
1243    004377          COND,F=0                    F,NEXT      F,HOLD;
1244    004400
1245    004400
1246    004400
1247    004400  %*********************************************************************
1248    004400  % CPU-BOARD TERMINAL READY FOR TRANSFER
1249    004400
1250    004400  IDSPC:                                          ALUD,NONE
1251    004400          IDBS,ALU                    T,NEXT      T,HOLD
1252    004400          COND,COND                   F,NEXT      F,HOLD;
1253    004401
1254    004401                B,LC          ALUF,MASKDQ         ALUD,Q
1255    004401          IDBS,BARG                   T,JMP       T,HOLD
1256    004401          IDX CONDENABL;
1257    004402
1258    004402
1259    004402
1260    004402  %*************************************************************
1261    004402  % DEVICE ON CPU-BOARD (TERMINAL OR CLOCK) READY FOR TRANSFER AND INT. ENABLED
1262    004402
1263    004402  IDRET:  A,0   B,A             ALUF,PASSD          ALUD,B
1264    004402          IDBS,BMG                    T,NEXT      T,HOLD;
1265    004403
1266    004403                                ALUF,PASSQ          ALUD,NONE
1267    004403          IDBS,ALU              COMM,SIOC T,NEXT    T,HOLD;
1268    004404
1269    004404          AB,STATUS             ALUF,PASSQ          ALUD,NONE
1270    004404          IDBS,ALU              COMM,EWRF T,JMP     T,HOLD
1271    004404          CONT;
1272    004405
1273    004405
1274    004405  %*************************************************************
1275    004405  % IDENT IS ON LEVEL 10, CHECK IF TERMINAL GAVE INTERRUPT
1276    004405
1277    004405  ID10:   A,17                  ALUF,PASSD          ALUD,Q
1278    004405          IDBS,BMG                    T,NEXT      T,HOLD;
1279    004406
1280    004406                                ALUF,ANDDQ          ALUD,NONE
1281    004406          IDBS,IOR                    T,NEXT      T,HOLD
1282    004406          COND,F=0                    F,JMP       F,HOLD;
1283    004407
1284    004407  %CC TBMT INVERSE POLARITY
1285    004407
1286    004407          AB,STATUS             ALUF,PASSD          ALUD,Q
1287    004407          IDBS,REG                    T,NEXT      T,HOLD
1288    004407          IDX CONDENABL;
1289    004410
1290    004410          A,2                   ALUF,ANDDQ          ALUD,NONE
```

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1291  004410          IDBS,BMG              COMM,LDLC T,JMP      T,HOLD
1292  004410          IDSPC;
1293  004411
1294  004411
1295  004411
1296  004411  %*************************************************************
1297  004411  % IDENT IS ON LEVEL 13, CHECK IF CLOCK GAVE INTERRUPT
1298  004411
1299  004411  ID13:   AB,STATUS            ALUF,PASSD           ALUD,Q
1300  004411          IDBS,REG                        T,NEXT     T,HOLD
1301  004411          COND,F=0                        F,NEXT     F,HOLD;
1302  004412
1303  004412                B,R2            ALUF,ANDDQ           ALUD,B
1304  004412          IDBS,ARG                        T,NEXT     T,HOLD
1305  004412          11;
1306  004413
1307  004413          A,R2  B,11            ALUF,D-A             ALUD,NONE
1308  004413          IDBS,BARG                       T,NEXT     T,HOLD;
1309  004414
1310  004414          A,0                   ALUF,MASKDQ          ALUD,Q
1311  004414          IDBS,BMG                         T,JMP     T,HOLD
1312  004414          IDRET CONDENABL;
1313  004415
1314  004415
1315  004415
1316  004415
1317  004415  %*******************************************************
1318  004415  % DEVICE IS NOT ON CPU-BOARD, SEND OUT GENERAL IDENT
1319  004415
1320  004415  IDX:    A,R1                  ALUF,PASSA           ALUD,NONE % ADDRESS -> IDENT
1321  004415          IDBS,ALU                         T,NEXT    T,HOLD;
1322  004416
1323  004416          A,A                   ALUF,PASSA           ALUD,NONE % OUTPUT DATA
1324  004416          IDBS,ALU              COMM,IDENT T,NEXT    T,HOLD;
1325  004417
1326  004417                B,A             ALUF,PASSD           ALUD,B % INPUT DATA
1327  004417          IDBS,DBR        COMM,CONTINUE   T,JMP      T,HOLD;
1328  004420
1329  004420
1330  004420
1331  004420
1332  004420  %*******************************************************
1333  004420  %*******************************************************
1334  004420
1335  004420  % MULTIPLY SINGLE PRECISION
1336  004420
1337  004420  %*******************************************************
1338  004420
1339  004420  MPY5:         B,STS           ALUF,MASKDQ          ALUD,B % RESET DYN. OVERFLOW
1340  004420          IDBS,ARG                        T,NEXT     T,HOLD
1341  004420          20;
1342  004421
1343  004421          A,A   B,R2            ALUF,PASSA           ALUD,B % COPY A-REG.
1344  004421          IDBS,ALU                        T,NEXT     T,HOLD
1345  004421          COND,F15                        F,JMP      F,HOLD;
1346  004422
1347  004422                B,R3            ALUF,PASSD           ALUD,B % READ MEM. OPERAND
1348  004422          IDBS,DBR              COMM,LDGPR T,NEXT    T,HOLD
1349  004422          MPY1 CONDENABL;
1350  004423
1351  004423                B,R2            ALUF,-B              ALUD,B % NEGATIVE A-REG.
1352  004423          IDBS,ALU                        T,NEXT     T,HOLD
1353  004423          COND,COND                       F,JMP      T,HOLD;
1354  004424
1355  004424  MPY1:         B,16            ALUF,ZERO            ALUD,Q % LOAD LOOP-COUNTER
1356  004424          IDBS,BARG             COMM,LDLC T,NEXT     T,HOLD
1357  004424          MPY2 CONDENABL;
1358  004425
1359  004425          A,R3                  ALUF,-A              ALUD,NONE % NEG. MEM.-OPERAND
1360  004425          IDBS,ALU              COMM,LDGPR T,NEXT    T,HOLD;
1361  004426
1362  004426  MPY2:         B,R5            ALUF,ZERO            ALUD,B
1363  004426          IDBS,ALU                        T,NEXT     T,PUSH
1364  004426          COND,LC=0;
1365  004427
1366  004427          A,R2  B,R5 MIS,ZIN    ALUF,A+B ALUM,FMU    ALUD,SRD % MAKE RESULT IN R5
1367  004427          IDBS,ALU                        T,NEXT     T,POP
1368  004427          LCOUNT;
1369  004430
1370  004430                B,R5  MIS,ZIN   ALUF,PASSB ALUM,MIC ALUD,SLD
1371  004430          IDBS,ALU                        T,NEXT     T,HOLD;
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1372    004431
1373    004431              B,R5 MIS,ZIN     ALUF,PASSB ALUM,MIC ALUD,SRD
1374    004431        IDBS,ALU                          T,NEXT    T,HOLD
1375    004431        COND,F=0                          F,NEXT    F,HOLD;
1376    004432
1377    004432              B,R4             ALUF,ZERO            ALUD,B
1378    004432        IDBS,ALU                          T,JMP     T,HOLD
1379    004432        MPY3 CONDENABL;
1380    004433
1381    004433              B,R4             ALUF,PASSD           ALUD,B % SET DYN. & STAT. OVF.
1382    004433        IDBS,ARG                          T,NEXT    T,HOLD
1383    004433        60;
1384    004434
1385    004434  MPY3:  A,STS B,R4            ALUF,ORAB            ALUD,NONE STS,LO
1386    004434        IDBS,ALU                          T,NEXT    T,HOLD;
1387    004435
1388    004435        A,A   B,R3             ALUF,XORAB           ALUD,NONE % TEST SIGN
1389    004435        IDBS,ALU                          T,NEXT    T,HOLD
1390    004435        COND,F15                          F,JMP     F,HOLD;
1391    004436
1392    004436              B,A              ALUF,PASSQ           ALUD,B
1393    004436        IDBS,ALU                          T,NEXT    T,HOLD
1394    004436        MPY4 CONDENABL;
1395    004437
1396    004437              B,A              ALUF,-B              ALUD,B % INVERT RESULT
1397    004437        IDBS,ALU         COMM,CONTINUE    T,JMP     T,HOLD;
1398    004440
1399    004440  MPY4:                                             ALUD,NONE
1400    004440        IDBS,ALU         COMM,CONTINUE    T,JMP     T,HOLD;
1401    004441
1402    004441
1403    004441
1404    004441
1405    004441
1406    004441
1407    004441
1408    004441
1409    004441
1410    004441  %*********************************************************
1411    004441  %*********************************************************
1412    004441
1413    004441  % SINTRAN III VERSION K  MACROINSTRUCTIONS
1414    004441
1415    004441  % INSTRUCTION 1405XX
1416    004441
1417    004441
1418    004441  S3K1:  A,A                       ALUF,PASSA           ALUD,NONE
1419    004441        IDBS,ALU                   COMM,LDLC T,JMP      T,PUSH
1420    004441        PVCHK;
1421    004442
1422    004442        A,1   B,R1               ALUF,PASSD           ALUD,B
1423    004442        IDBS,BMG                          T,JMP0-3  T,HOLD
1424    004442        S3K1V;
1425    004443
1426    004443
1427    004443  % WRITE GLOBAL BANK POINTERS
1428    004443
1429    004443  WGB1:  AB,STBNK                  ALUF,PASSQ           ALUD,NONE
1430    004443        IDBS,ALU                   COMM,EWRF T,NEXT     T,HOLD;
1431    004444
1432    004444        A,A                        ALUF,PASSA           ALUD,Q
1433    004444        IDBS,ALU                          T,NEXT    T,HOLD;
1434    004445
1435    004445        AB,STSRT                   ALUF,PASSQ           ALUD,NONE
1436    004445        IDBS,ALU                   COMM,EWRF T,NEXT     T,HOLD;
1437    004446
1438    004446        A,D                        ALUF,PASSA           ALUD,Q
1439    004446        IDBS,ALU                          T,NEXT    T,HOLD;
1440    004447
1441    004447        AB,CMBNK                   ALUF,PASSQ           ALUD,NONE
1442    004447        IDBS,ALU                   COMM,EWRF T,JMP      T,POP
1443    004447        CONT;
1444    004450
1445    004450
1446    004450  % READ GLOBAL POINTERS
1447    004450
1448    004450  RGB1:        B,T               ALUF,PASSQ           ALUD,B
1449    004450        IDBS,ALU                          T,NEXT    T,HOLD;
1450    004451
1451    004451        AB,STSRT                   ALUF,PASSD           ALUD,Q
1452    004451        IDBS,REG                          T,NEXT    T,HOLD;
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1453  004452
1454  004452                B,A             ALUF,PASSQ          ALUD,B
1455  004452          IDBS,ALU                      T,NEXT      T,HOLD;
1456  004453
1457  004453          AB,CMBNK              ALUF,PASSD          ALUD,Q
1458  004453          IDBS,REG                      T,NEXT      T,HOLD;
1459  004454
1460  004454                B,D             ALUF,PASSQ          ALUD,B
1461  004454          IDBS,ALU              COMM,CONTINUE T,JMP       T,HOLD;
1462  004455
1463  004455
1464  004455
1465  004455
1466  004455
1467  004455    % INSERT PAGE IN PAGE LIST
1468  004455
1469  004455    INSP1: A,B    B,7           ALUF,D+A            ALUD,Q
1470  004455          IDBS,BARG                     T,NEXT      T,HOLD;
1471  004456
1472  004456                                ALUF,PASSQ          ALUD,NONE
1473  004456          IDBS,ALU                      T,NEXT      T,HOLD;
1474  004457
1475  004457                                                    ALUD,NONE
1476  004457          IDBS,ALU              COMM,EXRQ T,NEXT    T,HOLD;
1477  004460
1478  004460                B,R1            ALUF,PASSD          ALUD,B
1479  004460          IDBS,DBR                      T,NEXT      T,HOLD;
1480  004461
1481  004461                                ALUF,PASSQ          ALUD,NONE
1482  004461          IDBS,ALU                      T,NEXT      T,HOLD;
1483  004462
1484  004462          A,X                   ALUF,PASSA          ALUD,NONE
1485  004462          IDBS,ALU              COMM,DERQ T,NEXT    T,HOLD;
1486  004463
1487  004463          AB,CMBNK                                  ALUD,NONE
1488  004463          IDBS,REG              COMM,LDSEG T,NEXT   T,HOLD;
1489  004464
1490  004464          A,X                   ALUF,PASSA          ALUD,NONE
1491  004464          IDBS,ALU                      T,NEXT      T,HOLD;
1492  004465
1493  004465          A,R1                  ALUF,PASSA          ALUD,NONE
1494  004465          IDBS,ALU              COMM,DERQ T,NEXT    T,HOLD
1495  004465          COND,F=0                      F,NEXT      F,HOLD;
1496  004466
1497  004466          AB,STSRT              ALUF,PASSD          ALUD,Q
1498  004466          IDBS,REG                      T,JMP       T,HOLD
1499  004466          INSP2 CONDENABL;
1500  004467
1501  004467    % NORMAL PAGE
1502  004467
1503  004467          A,R1                  ALUF,A+1            ALUD,NONE
1504  004467          IDBS,ALU                      T,NEXT      T,HOLD;
1505  004470
1506  004470                                                    ALUD,NONE
1507  004470          IDBS,ALU              COMM,EXRQ T,NEXT    T,HOLD;
1508  004471
1509  004471                                ALUF,PASSD          ALUD,Q
1510  004471          IDBS,DBR                      T,NEXT      T,HOLD;
1511  004472
1512  004472          A,R1                  ALUF,A+1            ALUD,NONE
1513  004472          IDBS,ALU                      T,NEXT      T,HOLD;
1514  004473
1515  004473          A,X                   ALUF,PASSA          ALUD,NONE
1516  004473          IDBS,ALU              COMM,DERQ T,JMP     T,HOLD
1517  004473          INSP3;
1518  004474
1519  004474    % FIRST PAGE
1520  004474
1521  004474    INSP2: A,B    B,R4          ALUF,A-Q  MIS,ZIN   ALUD,SRB
1522  004474          IDBS,ALU                      T,NEXT      T,HOLD;
1523  004475
1524  004475          A,R4  B,3             ALUF,ORDA           ALUD,Q
1525  004475          IDBS,BARG                     T,NEXT      T,HOLD;
1526  004476
1527  004476    INSP3: A,X    B,R5          ALUF,A+1            ALUD,B
1528  004476          IDBS,ALU                      T,NEXT      T,HOLD;
1529  004477
1530  004477                                ALUF,PASSQ          ALUD,NONE
1531  004477          IDBS,ALU              COMM,DERQ T,NEXT    T,HOLD;
1532  004500
1533  004500                B,R4            ALUF,PASSD          ALUD,B
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1534   004500          IDBS,ARG                        T,NEXT    T,HOLD
1535   004500          3;
1536   004501
1537   004501          A,X   B,R4          ALUF,A+B              ALUD,NONE
1538   004501          IDBS,ALU                        T,NEXT    T,HOLD;
1539   004502
1540   004502          A,T                 ALUF,PASSA            ALUD,NONE
1541   004502          IDBS,ALU            COMM,DERQ T,JMP       T,HOLD
1542   004502          CONT;
1543   004503
1544   004503
1545   004503  % REMOVE PAGE FROM PAGE LIST
1546   004503
1547   004503  REMP1:  A,X                 ALUF,PASSA            ALUD,NONE
1548   004503          IDBS,ALU                        T,NEXT    T,HOLD;
1549   004504
1550   004504                                                    ALUD,NONE
1551   004504          IDBS,ALU            COMM,EXRQ T,NEXT      T,HOLD;
1552   004505
1553   004505                B,R1          ALUF,PASSD            ALUD,B
1554   004505          IDBS,DBR                        T,NEXT    T,HOLD;
1555   004506
1556   004506          A,X                 ALUF,A+1              ALUD,NONE
1557   004506          IDBS,ALU                        T,NEXT    T,HOLD;
1558   004507
1559   004507                                                    ALUD,NONE
1560   004507          IDBS,ALU            COMM,EXRQ T,NEXT      T,HOLD;
1561   004510
1562   004510                B,R2          ALUF,PASSD            ALUD,B
1563   004510          IDBS,DBR                        T,NEXT    T,HOLD;
1564   004511
1565   004511          A,R2  B,3           ALUF,ANDDA            ALUD,NONE
1566   004511          IDBS,BARG                       T,NEXT    T,HOLD
1567   004511          COND,F=0                        F,JMP     F,HOLD;
1568   004512
1569   004512          A,1   B,R4          ALUF,D-1              ALUD,B
1570   004512          IDBS,AARG                       T,NEXT    T,HOLD
1571   004512          REMP2 CONDENABL;
1572   004513
1573   004513  % NORMAL PAGE
1574   004513
1575   004513          A,R2                ALUF,PASSA            ALUD,NONE
1576   004513          IDBS,ALU                        T,NEXT    T,HOLD
1577   004513          COND,F=0                        F,NEXT    F,HOLD;
1578   004514
1579   004514          A,R1                ALUF,PASSA            ALUD,NONE
1580   004514          IDBS,ALU            COMM,DERQ T,JMP       T,HOLD
1581   004514          REMP3;
1582   004515
1583   004515  % LAST PAGE
1584   004515
1585   004515  REMP2:  A,R2  B,R2          ALUF,A+B              ALUD,Q
1586   004515          IDBS,ALU                        T,NEXT    T,HOLD;
1587   004516
1588   004516          AB,STSRT            ALUF,D+Q              ALUD,Q
1589   004516          IDBS,REG                        T,NEXT    T,HOLD;
1590   004517
1591   004517          AB,STBNK                                  ALUD,NONE
1592   004517          IDBS,REG            COMM,LDSEG T,NEXT     T,HOLD;
1593   004520
1594   004520          A,R4                ALUF,ORAQ             ALUD,NONE
1595   004520          IDBS,ALU                        T,NEXT    T,HOLD;
1596   004521
1597   004521          A,R1                ALUF,PASSA            ALUD,NONE
1598   004521          IDBS,ALU            COMM,DERQ T,NEXT      T,HOLD
1599   004521          COND,F=0                        F,NEXT    F,HOLD;
1600   004522
1601   004522  REMP3:  AB,CMBNK                                  ALUD,NONE
1602   004522          IDBS,REG            COMM,LDSEG T,JMP      T,HOLD
1603   004522          REMP4 CONDENABL;
1604   004523
1605   004523  % NORMAL PAGE
1606   004523
1607   004523          A,R1                ALUF,A+1              ALUD,NONE
1608   004523          IDBS,ALU                        T,NEXT    T,HOLD;
1609   004524
1610   004524          A,R2                ALUF,PASSA            ALUD,NONE
1611   004524          IDBS,ALU            COMM,DERQ T,NEXT      T,HOLD;
1612   004525
1613   004525  REMP4:  A,X                 ALUF,PASSA            ALUD,NONE
1614   004525          IDBS,ALU                        T,NEXT    T,HOLD;
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1615  004526
1616  004526                                    ALUF,ZERO           ALUD,NONE
1617  004526          IDBS,ALU                  COMM,DERQ T,NEXT    T,HOLD;
1618  004527
1619  004527          A,X                       ALUF,A+1            ALUD,NONE
1620  004527          IDBS,ALU                            T,NEXT    T,HOLD;
1621  004530
1622  004530                                    ALUF,ZERO           ALUD,NONE
1623  004530          IDBS,ALU                  COMM,DERQ T,JMP     T,HOLD
1624  004530          CONT;
1625  004531
1626  004531
1627  004531    % CLEAR NON-REENTRANT PAGES
1628  004531
1629  004531    CNRE1: A,R1  B,A                ALUF,A+B            ALUD,NONE
1630  004531          IDBS,ALU                            T,NEXT    T,HOLD
1631  004531          COND,F=0                            F,NEXT    F,HOLD;
1632  004532
1633  004532          A,A                       ALUF,PASSA          ALUD,NONE
1634  004532          IDBS,ALU                  COMM,EXRQ T,NEXT    T,HOLD;
1635  004533
1636  004533                                    ALUF,PASSD          ALUD,Q
1637  004533          IDBS,DBR                            T,JMP     T,POP
1638  004533          CONT  CONDENABL;
1639  004534
1640  004534                B,R7                ALUF,ANDDQ          ALUD,SLB
1641  004534          IDBS,ARG                            T,NEXT    T,HOLD
1642  004534          1700;
1643  004535
1644  004535                B,R1                ALUF,D+A            ALUD,B
1645  004535          IDBS,ARG                            T,NEXT    T,HOLD
1646  004535          174000;
1647  004536
1648  004536          A,X                       ALUF,PASSA          ALUD,Q
1649  004536          IDBS,ALU                            T,NEXT    T,HOLD;
1650  004537
1651  004537          A,T   B,R2                ALUF,PASSQ          ALUD,B,YA
1652  004537          IDBS,ALU                  COMM,LDSEG T,NEXT   T,HOLD
1653  004537          COND,F=0                            F,NEXT    F,HOLD;
1654  004540
1655  004540                B,R3                ALUF,D+Q            ALUD,B
1656  004540          IDBS,ARG                            T,NEXT    T,PUSH
1657  004540          10;
1658  004541
1659  004541          A,R2  B,R2                ALUF,A+1            ALUD,B,YA
1660  004541          IDBS,ALU                            T,JMP     T,POP
1661  004541          CONT  CONDENABL;
1662  004542
1663  004542                                                        ALUD,NONE
1664  004542          IDBS,ALU                  COMM,EXRQ T,JMP     T,HOLD
1665  004542          CLNR4;
1666  004543
1667  004543
1668  004543
1669  004543    % CLEAR SEGMENT FROM PAGE TABLE (SIN III K)
1670  004543
1671  004543    CLPK1:        B,R2              ALUF,PASSD          ALUD,B
1672  004543          IDBS,ARG                              T,NEXT  T,HOLD
1673  004543          176000;
1674  004544
1675  004544          A,X                       ALUF,PASSA          ALUD,NONE
1676  004544          IDBS,ALU                            T,NEXT    T,PUSH
1677  004544          COND,F=0                            F,NEXT    F,HOLD;
1678  004545
1679  004545          A,X   B,R1                ALUF,A+B+1          ALUD,NONE
1680  004545          IDBS,ALU                            T,JMP     T,POP
1681  004545          CONT CONDENABL;
1682  004546
1683  004546          A,A                       ALUF,PASSA          ALUD,NONE
1684  004546          IDBS,ALU                  COMM,EXRQ T,NEXT    T,HOLD
1685  004546          COND,F15                            F,NEXT    F,HOLD;
1686  004547
1687  004547          A,R2  B,B                 ALUF,ORDA           ALUD,SLB
1688  004547          IDBS,DBR                            T,JMP     T,HOLD
1689  004547          CLPK4 CONDENABL;
1690  004550
1691  004550          A,B                       ALUF,PASSA          ALUD,NONE
1692  004550          IDBS,ALU                            T,NEXT    T,HOLD;
1693  004551
1694  004551                                                        ALUD,NONE
1695  004551          IDBS,ALU        COMM,RDRQ,APT       T,NEXT    T,HOLD;
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1696    004552
1697    004552                B,R3            ALUF,PASSD          ALUD,B
1698    004552          IDBS,DBR                        T,NEXT      T,HOLD
1699    004552          COND,F=0                        F,NEXT      F,HOLD;
1700    004553
1701    004553          A,X   B,R1              ALUF,A+B            ALUD,NONE
1702    004553          IDBS,ALU                        T,JMP       T,HOLD
1703    004553          CLPK3  CONDENABL;
1704    004554
1705    004554          A,R3  B,A               ALUF,PASSB          ALUD,B,YA
1706    004554          IDBS,ALU                COMM,DERQ T,NEXT    T,HOLD
1707    004554          COND,F=0                        F,JMP       F,HOLD;
1708    004555
1709    004555  CLPK4:  A,B                     ALUF,PASSA          ALUD,NONE
1710    004555          IDBS,ALU                        T,NEXT      T,HOLD
1711    004555          CLPK3 CONDENABL;
1712    004556
1713    004556                                  ALUF,ZERO           ALUD,NONE
1714    004556          IDBS,ALU        COMM,WRRQ,APT   T,JMP       T,HOLD
1715    004556          CLPK3;
1716    004557
1717    004557
1718    004557  % ENTER SEGMENT INTO PAGE TABLE (SIN III K)
1719    004557
1720    004557  ENPK1:  A,13  B,R4              ALUF,INVD           ALUD,B
1721    004557          IDBS,BMG                        T,JMP       T,HOLD
1722    004557          REPK2;
1723    004560
1724    004560
1725    004560  % ENTER REENTRANT SEGMENT INTO PAGE TABLE (SIN III K)
1726    004560
1727    004560  REPK1:        B,R4              ALUF,INVD           ALUD,B
1728    004560          IDBS,ARG                        T,NEXT      T,HOLD
1729    004560          104000;
1730    004561
1731    004561  REPK2:
1732    004561                B,R2              ALUF,PASSD          ALUD,B
1733    004561          IDBS,ARG                        T,NEXT      T,HOLD
1734    004561          176000;
1735    004562
1736    004562          A,X                     ALUF,PASSA          ALUD,NONE
1737    004562          IDBS,ALU                        T,NEXT      T,PUSH
1738    004562          COND,F=0                        F,NEXT      F,HOLD;
1739    004563
1740    004563          A,X   B,R1              ALUF,A+B            ALUD,NONE
1741    004563          IDBS,ALU                        T,JMP       T,POP
1742    004563          CONT CONDENABL;
1743    004564
1744    004564                                                      ALUD,NONE
1745    004564          IDBS,ALU                COMM,EXRQ T,NEXT    T,HOLD;
1746    004565
1747    004565          A,R4  B,A               ALUF,ANDDA          ALUD,B
1748    004565          IDBS,DBR                        T,NEXT      T,HOLD;
1749    004566
1750    004566          A,X   B,R1              ALUF,A+B+1          ALUD,NONE
1751    004566          IDBS,ALU                        T,NEXT      T,HOLD;
1752    004567
1753    004567                                                      ALUD,NONE
1754    004567          IDBS,ALU                COMM,EXRQ T,NEXT    T,HOLD;
1755    004570
1756    004570          A,X   B,R3              ALUF,PASSA  MIS,ZIN ALUD,SRB
1757    004570          IDBS,ALU                        T,NEXT      T,HOLD;
1758    004571
1759    004571                B,R3              ALUF,PASSB  MIS,ZIN ALUD,SRB
1760    004571          IDBS,ALU                        T,NEXT      T,HOLD;
1761    004572
1762    004572          A,R2  B,B               ALUF,ORDA           ALUD,SLB
1763    004572          IDBS,DBR                        T,NEXT      T,HOLD;
1764    004573
1765    004573          A,B                     ALUF,PASSA          ALUD,NONE
1766    004573          IDBS,ALU                        T,NEXT      T,HOLD;
1767    004574
1768    004574          A,A                     ALUF,PASSA          ALUD,NONE
1769    004574          IDBS,ALU        COMM,WRRQ,APT   T,NEXT      T,HOLD;
1770    004575
1771    004575          A,B                     ALUF,A+1            ALUD,NONE
1772    004575          IDBS,ALU                        T,NEXT      T,HOLD;
1773    004576
1774    004576          A,R3                    ALUF,PASSA          ALUD,NONE
1775    004576          IDBS,ALU        COMM,WRRQ,APT   T,JMP       T,HOLD
1776    004576          CLPK3;
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1777    004577
1778    004577
1779    004577  CLPK3:  A,X                     ALUF,PASSA          ALUD,NONE
1780    004577          IDBS,ALU                            T,NEXT  T,HOLD
1781    004577          COND,IRQ                            F,RETURN F,HOLD;
1782    004600
1783    004600                                              ALUD,NONE
1784    004600          IDBS,ALU                COMM,EXRQ T,NEXT    T,HOLD;
1785    004601
1786    004601                B,X               ALUF,PASSD          ALUD,B
1787    004601          IDBS,DBR                            T,NEXT  T,POP
1788    004601          CONDENABL COND,F=0                  F,NEXT  F,HOLD;
1789    004602
1790    004602                B,P               ALUF,B-1            ALUD,B
1791    004602          IDBS,ALU                            T,JMP   T,HOLD
1792    004602          CONT;
1793    004603
1794    004603
1795    004603  % LOAD BYTE PHYSICAL
1796    004603
1797    004603  LBYP1:  A,X   B,R1  MIS,ZIN     ALUF,PASSA ALUM,MIC ALUD,SRB
1798    004603          IDBS,ALU                            T,JMP   T,PUSH
1799    004603          LBYPM;
1800    004604
1801    004604                                  ALUF,PASSD          ALUD,Q
1802    004604          IDBS,DBR                            T,JMP   T,PUSH
1803    004604          LBYTU CONDENABL;
1804    004605
1805    004605
1806    004605  %*************************************************
1807    004605  % CODE FOR BOTH UPPER AND LOWER BYTE
1808    004605
1809    004605                B,A               ALUF,ANDDQ          ALUD,B
1810    004605          IDBS,ARG                            T,NEXT  T,HOLD
1811    004605          377;
1812    004606
1813    004606                                              ALUD,NONE
1814    004606          IDBS,ALU                            T,JMP   T,HOLD
1815    004606          CONT;
1816    004607
1817    004607
1818    004607
1819    004607
1820    004607  %*************************************************
1821    004607  % SUBROUTINE TO CALCULATE ADDRESS IN LBYT AND SBYT
1822    004607
1823    004607  LBYPM:  A,T   B,R1               ALUF,A+B            ALUD,B
1824    004607          IDBS,ALU                            T,NEXT  T,HOLD;
1825    004610
1826    004610          A,X   B,1               ALUF,ANDDA          ALUD,NONE
1827    004610          IDBS,BARG               COMM,EXRQ T,RETURN  T,POP
1828    004610          COND,F=0                            F,NEXT  F,HOLD;
1829    004611
1830    004611
1831    004611  % STORE BYTE PHYSICAL
1832    004611
1833    004611  SBYP1:        B,R3              ALUF,PASSD          ALUD,B
1834    004611          IDBS,ARG                            T,NEXT  T,HOLD
1835    004611          377;
1836    004612
1837    004612          A,A   B,R3              ALUF,ANDAB          ALUD,B % ISOLATE BYTE
1838    004612          IDBS,ALU                            T,NEXT  T,HOLD;
1839    004613
1840    004613          A,X   B,R1  MIS,ZIN     ALUF,PASSA ALUM,MIC ALUD,SRB
1841    004613          IDBS,ALU                            T,JMP   T,PUSH
1842    004613          LBYPM;
1843    004614
1844    004614                                  ALUF,PASSD          ALUD,Q % READ WORD
1845    004614          IDBS,DBR                            T,JMP   T,HOLD
1846    004614          SBYPU CONDENABL;
1847    004615
1848    004615
1849    004615  %*************************
1850    004615  % LOWER BYTE
1851    004615
1852    004615                B,R2              ALUF,ANDDQ          ALUD,B
1853    004615          IDBS,ARG                            T,NEXT  T,HOLD
1854    004615          177400;
1855    004616
1856    004616
1857    004616
```

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1858    004616
1859    004616  SBYP2: A,R1                    ALUF,PASSA          ALUD,NONE
1860    004616         IDBS,ALU                          T,NEXT    T,HOLD;
1861    004617
1862    004617         A,R3  B,R2              ALUF,ORAB           ALUD,NONE
1863    004617         IDBS,ALU                COMM,DERQ T,JMP     T,HOLD
1864    004617         CONT;
1865    004620
1866    004620  SBYPU:       B,R2              ALUF,ANDDQ          ALUD,B
1867    004620         IDBS,ARG                          T,NEXT    T,HOLD
1868    004620         377;
1869    004621
1870    004621         A,R3                    ALUF,PASSA          ALUD,NONE
1871    004621         IDBS,ALU                          T,NEXT    T,HOLD;
1872    004622
1873    004622               B,R3              ALUF,PASSD          ALUD,B
1874    004622         IDBS,SWAP                         T,JMP     T,HOLD
1875    004622         SBYP2;
1876    004623
1877    004623
1878    004623
1879    004623
1880    004623  % TEST AND SET PHYSICAL
1881    004623
1882    004623  TSTP1:
1883    004623         A,3                     ALUF,PASSD          ALUD,Q
1884    004623         IDBS,BMG                          T,JMP     T,PUSH
1885    004623         WTCCL;  % WAIT FOR CACHE CLEAR TO FINISH
1886    004624
1887    004624                                                     ALUD,NONE
1888    004624         IDBS,ALU                COMM,SSEMA T,JMP    T,PUSH
1889    004624         TSEP1;
1890    004625
1891    004625         A,X                     ALUF,PASSA          ALUD,NONE
1892    004625         IDBS,ALU                          T,NEXT    T,HOLD;
1893    004626
1894    004626         A,Z                     ALUF,A-1            ALUD,NONE
1895    004626         IDBS,ALU                COMM,DERQ T,NEXT    T,HOLD;
1896    004627
1897    004627                                                     ALUD,NONE
1898    004627         IDBS,ALU                COMM,CONTINUE T,JMP     T,HOLD;
1899    004630
1900    004630
1901    004630
1902    004630  % READ DONT USE CACHE PHYSICAL
1903    004630
1904    004630  RDUP1:
1905    004630         A,3                     ALUF,PASSD          ALUD,Q
1906    004630         IDBS,BMG                          T,JMP     T,PUSH
1907    004630         WTCCL;  % WAIT FOR CACHE CLEAR TO FINISH
1908    004631
1909    004631                                                     ALUD,NONE
1910    004631         IDBS,BARG               COMM,SSEMA T,JMP    T,PUSH
1911    004631         TSEP1;
1912    004632
1913    004632         A,X                     ALUF,PASSA          ALUD,NONE
1914    004632         IDBS,ALU                          T,NEXT    T,HOLD;
1915    004633
1916    004633                                                     ALUD,NONE
1917    004633         IDBS,ALU                COMM,EXRQ T,JMP     T,HOLD
1918    004633         CONT;
1919    004634
1920    004634  TSEP1: A,X                     ALUF,PASSA          ALUD,NONE
1921    004634         IDBS,ALU                          T,NEXT    T,HOLD;
1922    004635
1923    004635                                                     ALUD,NONE
1924    004635         IDBS,ALU                COMM,EXRQ T,NEXT    T,HOLD;
1925    004636
1926    004636               B,A               ALUF,PASSD          ALUD,B
1927    004636         IDBS,DBR                          T,RETURN  T,POP;
1928    004637
1929    004637
1930    004637
1931    004637  % LOAD BIT LOGICAL PRIVILEGED
1932    004637
1933    004637  LBT1:        B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRB
1934    004637         IDBS,ALU                          T,JMP     T,PUSH
1935    004637         LSBT1;
1936    004640
1937    004640         A,X   B,R1              ALUF,A+B            ALUD,NONE
1938    004640         IDBS,ALU                          T,NEXT    T,HOLD;
```

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1939    004641
1940    004641          A,LC                    ALUF,PASSD          ALUD,Q
1941    004641          IDBS,BMG        COMM,RDRQ,APT     T,JMP     T,HOLD
1942    004641          LBT2;
1943    004642
1944    004642
1945    004642
1946    004642  % LOAD BIT PHYSICAL
1947    004642
1948    004642  LBTP1:        B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRB
1949    004642          IDBS,ALU                          T,JMP     T,PUSH
1950    004642          LSBT1;
1951    004643
1952    004643          A,T                     ALUF,PASSA          ALUD,NONE
1953    004643          IDBS,ALU                COMM,LDSEG T,NEXT   T,HOLD;
1954    004644
1955    004644          A,X   B,R1              ALUF,A+B            ALUD,NONE
1956    004644          IDBS,ALU                          T,NEXT    T,HOLD;
1957    004645
1958    004645          A,LC                    ALUF,PASSD          ALUD,Q
1959    004645          IDBS,BMG                COMM,EXRQ T,JMP     T,HOLD
1960    004645          LBT2;
1961    004646
1962    004646
1963    004646  % STORE BIT LOGICAL PRIVILEGED
1964    004646
1965    004646  SBT1:         B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRB
1966    004646          IDBS,ALU                          T,JMP     T,PUSH
1967    004646          LSBT1;
1968    004647
1969    004647          A,X   B,R1              ALUF,A+B            ALUD,B
1970    004647          IDBS,ALU                          T,NEXT    T,HOLD;
1971    004650
1972    004650                                  ALUF,PASSD          ALUD,Q
1973    004650          IDBS,STS        COMM,RDRQ,APT     T,JMP     T,PUSH
1974    004650          SBT2;
1975    004651
1976    004651                                  ALUF,PASSQ          ALUD,NONE
1977    004651          IDBS,ALU        COMM,WRRQ,APT     T,JMP     T,HOLD
1978    004651          CONT;
1979    004652
1980    004652
1981    004652
1982    004652  % STORE BIT PHYSICAL
1983    004652
1984    004652  SBTP1:        B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRB
1985    004652          IDBS,ALU                          T,JMP     T,PUSH
1986    004652          LSBT1;
1987    004653
1988    004653          A,T                     ALUF,PASSA          ALUD,NONE
1989    004653          IDBS,ALU                COMM,LDSEG T,NEXT   T,HOLD;
1990    004654
1991    004654          A,X   B,R1              ALUF,A+B            ALUD,B
1992    004654          IDBS,ALU                          T,NEXT    T,HOLD;
1993    004655
1994    004655                                  ALUF,PASSD          ALUD,Q
1995    004655          IDBS,STS                COMM,EXRQ T,JMP     T,PUSH
1996    004655          SBT2;
1997    004656
1998    004656                                  ALUF,PASSQ
1999    004656          IDBS,ALU                COMM,DERQ T,JMP     T,HOLD
2000    004656          CONT;
2001    004657
2002    004657
2003    004657  LSBT1:        B,R1              ALUF,PASSB MIS,ZIN  ALUD,SRB
2004    004657          IDBS,ALU                          T,NEXT    T,HOLD;
2005    004660
2006    004660                B,R1              ALUF,PASSB MIS,ZIN  ALUD,SRB
2007    004660          IDBS,ALU                           T,RETURN T,POP;
2008    004661
2009    004661
2010    004661  LBT2:                           ALUF,ANDDQ          ALUD,NONE
2011    004661          IDBS,DBR                          T,NEXT    T,HOLD
2012    004661          COND,F=0                          F,JMP     F,HOLD;
2013    004662
2014    004662                                  ALUF,PASSD          ALUD,Q
2015    004662          IDBS,STS                          T,NEXT    T,HOLD
2016    004662          LBT3 CONDENABL;
2017    004663
2018    004663          A,2                     ALUF,MASKDQ         ALUD,Q
2019    004663          IDBS,BMG                          T,JMP     T,HOLD
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2020   004663          LBT4;
2021   004664
2022   004664   LBT3:  A,2                    ALUF,ORDQ            ALUD,Q
2023   004664          IDBS,BMG                        T,NEXT       T,HOLD;
2024   004665
2025   004665   LBT4:                         ALUF,PASSQ           ALUD,NONE STS,LO
2026   004665          IDBS,ALU                COMM,CONTINUE T,JMP      T,HOLD;
2027   004666
2028   004666
2029   004666
2030   004666   SBT2:  A,2                    ALUF,ANDDQ           ALUD,NONE
2031   004666          IDBS,BMG                        T,NEXT       T,HOLD
2032   004666          COND,F=0                        F,NEXT       F,HOLD;
2033   004667
2034   004667                                ALUF,PASSD           ALUD,Q
2035   004667          IDBS,DBR                        T,NEXT       T,HOLD
2036   004667          COND,COND                       F,NEXT       F,HOLD;
2037   004670
2038   004670          A,LC                  ALUF,MASKDQ          ALUD,Q
2039   004670          IDBS,BMG                        T,JMP        T,HOLD
2040   004670          SBT4 CONDENABL;
2041   004671
2042   004671          A,LC                  ALUF,ORDQ            ALUD,Q
2043   004671          IDBS,BMG                        T,NEXT       T,HOLD;
2044   004672
2045   004672   SBT4:  A,R1                   ALUF,PASSA           ALUD,NONE
2046   004672          IDBS,ALU                        T,RETURN     T,POP;
2047   004673
2048   004673
2049   004673
2050   004673
2051   004673
2052   004673   % MACROINSTRUCTION  1407XX,   S3K2
2053   004673
2054   004673   S3K2:
2055   004673          AB,STBNK                                     ALUD,NONE
2056   004673          IDBS,REG              COMM,LDSEG T,NEXT      T,HOLD
2057   004673          COND,RESTR                      F,NEXT       F,HOLD;
2058   004674
2059   004674                B,SRCE          ALUF,PASSD           ALUD,Q
2060   004674          IDBS,BARG                       T,JMP        T,HOLD
2061   004674          PRIVI CONDENABL;
2062   004675
2063   004675          A,B                   ALUF,A+Q             ALUD,NONE
2064   004675          IDBS,ALU                        T,JMP0-3     T,HOLD
2065   004675          S3K2V;
2066   004676
2067   004676
2068   004676
2069   004676
2070   004676
2071   004676   % LOAD A FROM COREMAP BANK
2072   004676
2073   004676   LACB1: A,X                    ALUF,A+Q             ALUD,NONE
2074   004676          IDBS,ALU                        T,NEXT       T,HOLD;
2075   004677
2076   004677                                                       ALUD,NONE
2077   004677          IDBS,ALU              COMM,EXRQ T,NEXT       T,HOLD;
2078   004700
2079   004700   LAB2:        B,A              ALUF,PASSD           ALUD,B
2080   004700          IDBS,DBR              COMM,CONTINUE T,JMP      T,HOLD;
2081   004701
2082   004701
2083   004701   % STORE A IN COREMAP BANK
2084   004701
2085   004701   SACB1: A,X                    ALUF,A+Q             ALUD,NONE
2086   004701          IDBS,ALU                        T,NEXT       T,HOLD;
2087   004702
2088   004702          A,A                   ALUF,PASSA           ALUD,NONE
2089   004702          IDBS,ALU              COMM,DERQ T,JMP      T,HOLD
2090   004702          CONT;
2091   004703
2092   004703
2093   004703
2094   004703   % LOAD X FROM COREMAP BANK
2095   004703
2096   004703   LXCB1: A,X                    ALUF,A+Q             ALUD,NONE
2097   004703          IDBS,ALU                        T,NEXT       T,HOLD;
2098   004704
2099   004704                                                       ALUD,NONE
2100   004704          IDBS,ALU              COMM,EXRQ T,NEXT       T,HOLD;
```

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2101    004705
2102    004705  LXB2:       B,X             ALUF,PASSD          ALUD,B
2103    004705          IDBS,DBR            COMM,CONTINUE T,JMP     T,HOLD;
2104    004706
2105    004706
2106    004706
2107    004706  % STORE ZERO IN COREMAP BANK
2108    004706
2109    004706  SZCB1: A,X                  ALUF,A+Q            ALUD,NONE
2110    004706          IDBS,ALU                        T,NEXT  T,HOLD;
2111    004707
2112    004707                              ALUF,ZERO           ALUD,NONE
2113    004707          IDBS,ALU            COMM,DERQ T,JMP     T,HOLD
2114    004707          CONT;
2115    004710
2116    004710
2117    004710
2118    004710
2119    004710
2120    004710
2121    004710
2122    004710
2123    004710
2124    004710  %*****************************************************************
2125    004710  %*****************************************************************
2126    004710  %
2127    004710  % TSET - INSTRUCTION,  OPCODE 140123,  RDUS-INSTRUCTION,  OPCODE 140127
2128    004710  %
2129    004710  %*****************************************************************
2130    004710  %*****************************************************************
2131    004710
2132    004710  TSET:
2133    004710          A,16                ALUF,ANDDQ          ALUD,NONE
2134    004710          IDBS,BMG                        T,NEXT  T,HOLD
2135    004710          COND,F=0                        F,NEXT  F,HOLD;
2136    004711
2137    004711          A,T   B,R5          ALUF,PASSQ          ALUD,B,YA
2138    004711          IDBS,ALU                        T,JMP   T,HOLD
2139    004711          TSET6 CONDENABL;
2140    004712
2141    004712  % PON, TSET-ACCESS WILL THEN ONLY BE DONE WHEN WRITE IS PERMITTED
2142    004712  %                  WIP WILL BE SET TO 1 BEFORE LOCK IS ISSUED
2143    004712
2144    004712                              ALUF,PASSD          ALUD,Q
2145    004712          IDBS,SWAP                       T,NEXT  T,HOLD;
2146    004713
2147    004713               B,R7           ALUF,ANDDQ          ALUD,SRB % LOG. P.N. * 2
2148    004713          IDBS,ARG                        T,NEXT  T,HOLD
2149    004713          374;
2150    004714
2151    004714          A,PIL B,0     XRF   ALUF,PASSD          ALUD,Q  % PCR
2152    004714          IDBS,REG                        T,JMP   T,PUSH
2153    004714          TSET4;
2154    004715
2155    004715          A,R7  B,R7          ALUF,ORAQ           ALUD,B
2156    004715          IDBS,ALU                        T,NEXT  T,HOLD;
2157    004716
2158    004716                                                  ALUD,NONE
2159    004716          IDBS,ALU            COMM,EXRQ T,NEXT    T,HOLD; % PT-ENTRY
2160    004717
2161    004717                              ALUF,PASSD          ALUD,Q
2162    004717          IDBS,DBR                        T,NEXT  T,HOLD;
2163    004720
2164    004720          A,17                ALUF,ANDDQ          ALUD,NONE
2165    004720          IDBS,BMG                        T,NEXT  T,HOLD
2166    004720          COND,F=0                        F,NEXT  F,HOLD;
2167    004721
2168    004721          A,14                ALUF,ORDQ           ALUD,Q
2169    004721          IDBS,BMG                        T,JMP   T,HOLD
2170    004721          TSTPV CONDENABL;
2171    004722
2172    004722  % WPM
2173    004722
2174    004722          A,R7                ALUF,PASSA          ALUD,NONE
2175    004722          IDBS,ALU                        T,NEXT  T,HOLD;
2176    004723
2177    004723                              ALUF,PASSQ          ALUD,NONE
2178    004723          IDBS,ALU            COMM,DERQ T,NEXT    T,HOLD;   % 1 -> WIP
2179    004724
2180    004724  TSET6:
2181    004724          A,3                 ALUF,PASSD          ALUD,Q
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2182    004724          IDBS,BMG                                T,JMP     T,PUSH
2183    004724          WTCCL;  % WAIT FOR CACHE CLEAR TO FINISH
2184    004725
2185    004725                                                            ALUD,NONE
2186    004725          IDBS,ALU                COMM,SSEMA T,JMP          T,PUSH
2187    004725          TSET1;
2188    004726
2189    004726          A,T                     ALUF,PASSA                ALUD,NONE
2190    004726          IDBS,ALU                           T,NEXT         T,HOLD;
2191    004727
2192    004727          A,Z                     ALUF,A-1                  ALUD,NONE
2193    004727          IDBS,ALU             COMM,WRRQ,APT T,NEXT         T,HOLD;
2194    004730
2195    004730                                                            ALUD,NONE
2196    004730          IDBS,ALU      COMM,CONTINUE       T,JMP           T,HOLD;
2197    004731
2198    004731  % PAGE IS WRITE PROTECTED, PERFORM ACCESS TO GET TRAP
2199    004731
2200    004731  TSTPV:  A,T                     ALUF,PASSA                ALUD,NONE
2201    004731          IDBS,ALU                           T,NEXT         T,HOLD;
2202    004732
2203    004732          A,T                     ALUF,PASSA                ALUD,NONE
2204    004732          IDBS,ALU           COMM,WRRQ,APT  T,NEXT         T,HOLD;
2205    004733
2206    004733  % PV-TRAP OCCURS. THE FOLLOWING INSTRUCTION SHOULD NEVER BE EXECUTED
2207    004733  % MICROPROGRAM/HARDWARE ERROR !!!
2208    004733
2209    004733  TSTLO:                                                    ALUD,NONE
2210    004733          IDBS,ALU                           T,JMP          T,HOLD
2211    004733          TSTLO;
2212    004734
2213    004734
2214    004734
2215    004734  % SUBROUTINE TO SHIFT (R1 AND) THE Q-REGISTER 4 BITS RIGHT
2216    004734  QSH4:
2217    004734                B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRD
2218    004734          IDBS,ALU                           T,NEXT         T,HOLD;
2219    004735
2220    004735                B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRD
2221    004735          IDBS,ALU                           T,NEXT         T,HOLD;
2222    004736
2223    004736  % SUBROUTINE TO SHIFT (R1 AND) THE Q-REGISTER 2 BITS RIGHT
2224    004736  QSH2:
2225    004736                B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRD
2226    004736          IDBS,ALU                           T,NEXT         T,HOLD;
2227    004737
2228    004737                B,R1              ALUF,PASSB  MIS,ZIN ALUD,SRD
2229    004737          IDBS,ALU                           T,RETURN       T,POP;
2230    004740
2231    004740
2232    004740  %*************************************************************
2233    004740  % ROUTINE TO DETERMINE PAGING MODE, AND FIND PT-ELEMENT.
2234    004740
2235    004740  TSET4:  A,2                     ALUF,ANDDQ                ALUD,NONE
2236    004740          IDBS,BMG                           T,NEXT         T,HOLD
2237    004740          COND,F=0                           F,NEXT         F,HOLD;
2238    004741
2239    004741          A,15                    ALUF,ANDDA                ALUD,NONE % R5 .AND. BIT 13
2240    004741          IDBS,BMG                           T,JMP          T,HOLD
2241    004741          TSET3 CONDENABL;
2242    004742
2243    004742  % 16 PT-MODE OR 20-BIT MODE
2244    004742
2245    004742          A,R5  B,1               ALUF,ANDDA                ALUD,NONE
2246    004742          IDBS,BARG                          T,JMP          T,HOLD
2247    004742          TSET2 CONDENABL;
2248    004743
2249    004743  % 16 PT MODE
2250    004743
2251    004743                                  ALUF,ZERO                 ALUD,NONE
2252    004743          IDBS,ALU                COMM,LDSEG T,JMP          T,PUSH
2253    004743          QSH4 CONDENABL;
2254    004744
2255    004744    4000  A,R7  B,R7              ALUF,ORDA                 ALUD,B
2256    004744          IDBS,ARG                           T,NEXT         T,HOLD;  % ARG IS 174000
2257    004745
2258    004745                                  ALUF,ANDDQ                ALUD,Q
2259    004745          IDBS,ARG                           T,RETURN       T,POP
2260    004745          3600;
2261    004746
2262    004746  % 20-BIT MODE
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2263    004746
2264    004746  TSET2: A,0   B,R1            ALUF,PASSB          ALUD,SLD
2265    004746         IDBS,AARG             COMM,LDSEG T,JMP    T,HOLD
2266    004746         TSET7 CONDENABL;
2267    004747
2268    004747              B,R1             ALUF,PASSB          ALUD,SLD
2269    004747         IDBS,ALU                        T,NEXT    T,HOLD;
2270    004750
2271    004750              B,R1             ALUF,PASSB          ALUD,SLD
2272    004750         IDBS,ALU                        T,NEXT    T,HOLD;
2273    004751
2274    004751  TSET7:      B,R1             ALUF,PASSB          ALUD,SLD
2275    004751         IDBS,ARG              COMM,LDGPR T,NEXT   T,HOLD
2276    004751         160000;
2277    004752
2278    004752         A,R7  B,R7            ALUF,ORDA           ALUD,B
2279    004752         IDBS,GPR                        T,NEXT    T,HOLD;
2280    004753
2281    004753                               ALUF,ANDDQ          ALUD,Q
2282    004753         IDBS,ARG                        T,RETURN  T,POP
2283    004753         14000;
2284    004754
2285    004754  % REX OR SEX MODE
2286    004754
2287    004754  TSET3: A,R5  B,1             ALUF,ANDDA          ALUD,NONE
2288    004754         IDBS,BARG                       T,JMP     T,HOLD
2289    004754         TSET5 CONDENABL;
2290    004755
2291    004755  % SEX MODE
2292    004755
2293    004755                               ALUF,ZERO           ALUD,NONE
2294    004755         IDBS,ALU              COMM,LDSEG T,JMP    T,PUSH
2295    004755         QSH2 CONDENABL;
2296    004756
2297    004756    7000 A,R7  B,R7            ALUF,ORDA           ALUD,B
2298    004756         IDBS,ARG                        T,NEXT    T,HOLD;  % ARG IS 177000
2299    004757
2300    004757                               ALUF,ANDDQ          ALUD,Q
2301    004757         IDBS,ARG                        T,RETURN  T,POP
2302    004757         600;
2303    004760
2304    004760  % REX MODE
2305    004760
2306    004760  TSET5:                       ALUF,ZERO           ALUD,NONE
2307    004760         IDBS,ALU              COMM,LDSEG T,JMP    T,PUSH
2308    004760         QSH2 CONDENABL;
2309    004761
2310    004761    7000 A,R7  B,R7            ALUF,ORDA           ALUD,SRD % SIGN IS COPIED
2311    004761         IDBS,ARG                        T,NEXT    T,HOLD;  % ARG IS 177000
2312    004762
2313    004762                               ALUF,ANDDQ          ALUD,Q
2314    004762         IDBS,ARG                        T,RETURN  T,POP
2315    004762         300;
2316    004763
2317    004763  % ******************************************************
2318    004763
2319    004763  RDUS:
2320    004763         A,3                   ALUF,PASSD          ALUD,Q
2321    004763         IDBS,BMG                        T,JMP     T,PUSH
2322    004763         WTCCL;  % WAIT FOR CACHE CLEAR TO FINISH
2323    004764
2324    004764                                                   ALUD,NONE
2325    004764         IDBS,ALU              COMM,SSEMA T,JMP    T,PUSH
2326    004764         TSET1;
2327    004765
2328    004765         A,T                   ALUF,PASSA          ALUD,NONE
2329    004765         IDBS,ALU                        T,NEXT    T,HOLD;
2330    004766
2331    004766                                                   ALUD,NONE
2332    004766         IDBS,ALU        COMM,RDRQ,APT T,NEXT      T,HOLD;
2333    004767
2334    004767                                                   ALUD,NONE
2335    004767         IDBS,ALU    COMM,CONTINUE     T,JMP       T,HOLD;
2336    004770
2337    004770
2338    004770  TSET1:
2339    004770         A,T                   ALUF,PASSA          ALUD,NONE
2340    004770         IDBS,ALU                        T,NEXT    T,HOLD;
2341    004771
2342    004771                                                   ALUD,NONE
2343    004771         IDBS,ALU        COMM,RDRQ,APT T,NEXT      T,HOLD;
```

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2344    004772
2345    004772                B,A             ALUF,PASSD          ALUD,B
2346    004772          IDBS,DBR                        T,RETURN    T,POP;
2347    004773
2348    004773
2349    004773    % SUBROUTINE FOR SEMAPHORE INSTRUCTIONS TO WAIT FOR CACHE CLEAR TO FINISH
2350    004773
2351    004773    WTCCL:
2352    004773                                ALUF,ANDDQ          ALUD,NONE
2353    004773          IDBS,CSR                        T,NEXT      T,HOLD
2354    004773          COND,F=0                        F,RETURN    F,POP;
2355    004774
2356    004774                                                      ALUD,NONE
2357    004774          IDBS,ALU                        T,JMP       T,HOLD
2358    004774          WTCCL CONDENABL;
2359    004775
2360    004775    %CC SUBROUTINE TO CHANGE BAUD RATE
2361    004775
2362    004775    BAUDS:                      ALUF,PASSD          ALUD,Q
2363    004775          IDBS,IOR              COMM,XSLOW T,NEXT     T,HOLD;
2364    004776
2365    004776    %CC IOR -> Q
2366    004776
2367    004776                B,17            ALUF,ANDDQ          ALUD,Q
2368    004776          IDBS,BARG                       T,NEXT      T,HOLD;
2369    004777
2370    004777    %CC BAUD RATE THUMBWHEEL POSITION IN Q
2371    004777
2372    004777          AB,BAUD               ALUF,PASSQ          ALUD,NONE
2373    004777          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
2374    005000
2375    005000    %CC SAVE IN REG FILE
2376    005000
2377    005000                                ALUF,PASSQ          ALUD,NONE
2378    005000          IDBS,ALU              COMM,LDIRV T,NEXT   T,HOLD;
2379    005001
2380    005001    %CC SET UP FOR VECTOR JUMP
2381    005001
2382    005001                                                    ALUD,NONE
2383    005001          IDBS,ALU                        T,JMP0-3  T,PUSH
2384    005001          BAUDV;
2385    005002
2386    005002    %CC VECTOR JUMP
2387    005002
2388    005002                                                    ALUD,NONE
2389    005002          IDBS,ALU              COMM,XSLOW  T,NEXT    T,HOLD;
2390    005003
2391    005003                                                    ALUD,NONE
2392    005003          IDBS,ALU              COMM,SLOW   T,NEXT    T,HOLD;
2393    005004
2394    005004    %CC WAIT 625NS
2395    005004
2396    005004                                                    ALUD,NONE
2397    005004          IDBS,ARG              COMM,UART,COM T,RETURN T,POP
2398    005004          45;
2399    005005
2400    005005    %CC ENABLE TRANSMIT AND RECEIVE
2401    005005
2402    005005
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 2403     005005
 2404     005005   % VECTOR FOR INSTRUCTIONS 1405XX, S3K1
 2405     005005
 2406     005005   5660/
 2407     005660   BAUDV: IDBS,ARG   0 COMM,UART,MODE T,RETURN T,POP; % EXT CLOCK
 2408     005661          IDBS,ARG   0 COMM,UART,MODE T,RETURN T,POP; % EXT CLOCK
 2409     005662          IDBS,ARG 360 COMM,UART,MODE T,RETURN T,POP; % 50 BAUD
 2410     005663          IDBS,ARG 361 COMM,UART,MODE T,RETURN T,POP; % 75 BAUD
 2411     005664          IDBS,ARG 363 COMM,UART,MODE T,RETURN T,POP; % 134.5 BAUD
 2412     005665          IDBS,ARG 365 COMM,UART,MODE T,RETURN T,POP; % 200 BAUD
 2413     005666          IDBS,ARG 367 COMM,UART,MODE T,RETURN T,POP; % 600 BAUD
 2414     005667          IDBS,ARG 374 COMM,UART,MODE T,RETURN T,POP; % 2400 BAUD
 2415     005670          IDBS,ARG 376 COMM,UART,MODE T,RETURN T,POP; % 9600 BAUD
 2416     005671          IDBS,ARG 375 COMM,UART,MODE T,RETURN T,POP; % 4800 BAUD
 2417     005672          IDBS,ARG 372 COMM,UART,MODE T,RETURN T,POP; % 1800 BAUD
 2418     005673          IDBS,ARG 371 COMM,UART,MODE T,RETURN T,POP; % 1200 BAUD
 2419     005674          IDBS,ARG 374 COMM,UART,MODE T,RETURN T,POP; % 2400 BAUD
 2420     005675          IDBS,ARG 366 COMM,UART,MODE T,RETURN T,POP; % 300 BAUD
 2421     005676          IDBS,ARG 364 COMM,UART,MODE T,RETURN T,POP; % 150 BAUD
 2422     005677          IDBS,ARG 362 COMM,UART,MODE T,RETURN T,POP; % 110 BAUD
 2423     005700
 2424     005700   S3K1V:
 2425     005700   WGLOB: A,T                    ALUF,PASSA          ALUD,Q
 2426     005700          IDBS,ALU                        T,JMP       T,HOLD
 2427     005700          WGB1;
 2428     005701
 2429     005701   RGLOB: AB,STBNK               ALUF,PASSD          ALUD,Q
 2430     005701          IDBS,REG                        T,JMP       T,HOLD
 2431     005701          RGB1;
 2432     005702
 2433     005702   INSPL: AB,STBNK                                   ALUD,NONE
 2434     005702          IDBS,REG               COMM,LDSEG T,JMP    T,HOLD
 2435     005702          INSP1;
 2436     005703
 2437     005703   REMPL: AB,CMBNK                                   ALUD,NONE
 2438     005703          IDBS,REG               COMM,LDSEG T,JMP    T,HOLD
 2439     005703          REMP1;
 2440     005704
 2441     005704   CNREK: AB,STBNK                                   ALUD,NONE
 2442     005704          IDBS,REG               COMM,LDSEG T,JMP    T,HOLD
 2443     005704          CNRE1;
 2444     005705
 2445     005705   CLPT:  AB,CMBNK                                   ALUD,NONE
 2446     005705          IDBS,REG               COMM,LDSEG T,JMP    T,HOLD
 2447     005705          CLPK1;
 2448     005706
 2449     005706   ENPT:  AB,CMBNK                                   ALUD,NONE
 2450     005706          IDBS,REG               COMM,LDSEG T,JMP    T,HOLD
 2451     005706          ENPK1;
 2452     005707
 2453     005707   REPT:  AB,CMBNK                                   ALUD,NONE
 2454     005707          IDBS,REG               COMM,LDSEG T,JMP    T,HOLD
 2455     005707          REPK1;
 2456     005710
 2457     005710   LBIT:  A,A B,R1 ALUF,PASSA ALUD,SRB MIS,ZIN IDBS,ALU T,JMP T,HOLD  LBT1;
 2458     005711   LBITP: A,A B,R1 ALUF,PASSA ALUD,SRB MIS,ZIN IDBS,ALU T,JMP T,HOLD  LBTP1;
 2459     005712   SBIT:  A,A B,R1 ALUF,PASSA ALUD,SRB MIS,ZIN IDBS,ALU T,JMP T,HOLD  SBT1;
 2460     005713   SBITP: A,A B,R1 ALUF,PASSA ALUD,SRB MIS,ZIN IDBS,ALU T,JMP T,HOLD  SBTP1;
 2461     005714
 2462     005714   LBYTP: A,D ALUF,PASSA ALUD,NONE IDBS,ALU COMM,LDSEG T,JMP T,HOLD LBYP1;
 2463     005715   SBYTP: A,D ALUF,PASSA ALUD,NONE IDBS,ALU COMM,LDSEG T,JMP T,HOLD SBYP1;
 2464     005716   TSETP: A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,LDSEG T,JMP T,HOLD TSTP1;
 2465     005717   RDUSP: A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,LDSEG T,JMP T,HOLD RDUP1;
 2466     005720
 2467     005720
 2468     005720   % VECTOR FOR INSTRUCTIONS 1407XX, S3K2.
 2469     005720
 2470     005720   5720/
 2471     005720   S3K2V:
 2472     005720   LASB:  ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LAB2;
 2473     005721   SASB:  A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
 2474     005722   LACB:  AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD LACB1;
 2475     005723   SACB:  AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD SACB1;
 2476     005724   LXSB:  ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LXB2;
 2477     005725   LXCB:  AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD LXCB1;
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2478    005726  SZSB:   ALUF,ZERO ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
2479    005727  SZCB:   AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD SZCB1;
2480    005730
2481    005730          % DUPLICATED TO ALLOW FOR DISPLACEMENT BIT INSIDE VECTOR FIELD
2482    005730
2483    005730          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LAB2;
2484    005731          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
2485    005732          AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD LACB1;
2486    005733          AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD SACB1;
2487    005734          ALUD,NONE IDBS,ALU COMM,EXRQ T,JMP T,HOLD LXB2;
2488    005735          AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD LXCB1;
2489    005736          ALUF,ZERO ALUD,NONE IDBS,ALU COMM,DERQ T,JMP T,HOLD CONT;
2490    005737          AB,CMBNK ALUD,NONE IDBS,REG COMM,LDSEG T,JMP T,HOLD SZCB1;
2491    005740
2492    005740
2493    005740
2494    005740
2495    005740
2496    005740  %*****************************************************************
2497    005740  %*****************************************************************
2498    005740
2499    005740  % VECTOR TO FIND TYPE OF MOVEW INSTRUCTION
2500    005740
2501    005740  5740/
2502    005740
2503    005740  MVWVC:
2504    005740          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW0;
2505    005741          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW1;
2506    005742          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW2;
2507    005743          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW3;
2508    005744          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW4;
2509    005745          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW5;
2510    005746          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW6;
2511    005747          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW7;
2512    005750          ALUD,NONE IDBS,ALU T,JMP T,HOLD MVW8;
2513    005751          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
2514    005752          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
2515    005753          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
2516    005754          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
2517    005755          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
2518    005756          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
2519    005757          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
2520    005760
2521    005760  %
2522    005760
2523    005760
2524    005760
2525    005760  %*****************************************************************
2526    005760  %*****************************************************************
2527    005760  %
2528    005760  % VECTOR TO SELECT BETWEEN INSTRUCTIONS IN THE 1403XX-GROUP
2529    005760
2530    005760  5760/
2531    005760
2532    005760  SETPT:  A,13  B,R7              ALUF,PASSD          ALUD,B
2533    005760          IDBS,BMG                        T,JMP       T,HOLD
2534    005760          SEPT1;
2535    005761
2536    005761  CLEPT:          B,R7            ALUF,ZERO           ALUD,B
2537    005761          IDBS,ALU                        T,JMP       T,HOLD
2538    005761          CLPT1;
2539    005762
2540    005762  CLNRE:                                              ALUD,NONE
2541    005762          IDBS,ALU                        T,JMP       T,HOLD
2542    005762          CLNR1;
2543    005763
2544    005763  CHREE:  A,14  B,R4              ALUF,PASSD          ALUD,B
2545    005763          IDBS,BMG                        T,JMP       T,HOLD
2546    005763          CHRE1;
2547    005764
2548    005764  CLEPU:  A,13  B,R7              ALUF,PASSD          ALUD,B
2549    005764          IDBS,BMG                        T,JMP       T,HOLD
2550    005764          CLPU1;
2551    005765
2552    005765          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2553    005766          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2554    005767          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2555    005770          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2556    005771          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2557    005772          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2558    005773          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
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2559    005774          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2560    005775          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2561    005776          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2562    005777          T,JMP T,HOLD ALUD,NONE IDBS,ALU ILLIN;
2563    006000
2564    006000
2565    006000
2566    006000
2567    006000
2568    006000  %
2569    006000
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      1      006000   6000/
      2      006000   STZ:    A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
      3      006001           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
      4      006002           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
      5      006003           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
      6      006004
      7      006004           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
      8      006005           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
      9      006006           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
     10      006007           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
     11      006010
     12      006010           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     13      006011           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     14      006012           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     15      006013           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     16      006014
     17      006014           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     18      006015           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     19      006016           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     20      006017           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     21      006020
     22      006020           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     23      006021           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     24      006022           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     25      006023           A,Z ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     26      006024
     27      006024           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STZXB;
     28      006025           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STZXB;
     29      006026           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STZXB;
     30      006027           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STZXB;
     31      006030
     32      006030           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
     33      006031           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
     34      006032           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
     35      006033           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
     36      006034
     37      006034           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
     38      006035           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
     39      006036           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
     40      006037           A,Z B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
     41      006040
     42      006040
     43      006040   STA:    A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
     44      006041           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
     45      006042           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
     46      006043           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
     47      006044
     48      006044           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
     49      006045           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
     50      006046           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
     51      006047           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
     52      006050
     53      006050           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     54      006051           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     55      006052           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     56      006053           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
     57      006054
     58      006054           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     59      006055           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     60      006056           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     61      006057           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
     62      006060
     63      006060           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     64      006061           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     65      006062           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     66      006063           A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
     67      006064
     68      006064           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STAXB;
     69      006065           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STAXB;
     70      006066           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STAXB;
     71      006067           A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STAXB;
     72      006070
     73      006070           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
     74      006071           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
     75      006072           A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
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 76   006073          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
 77   006074
 78   006074          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
 79   006075          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
 80   006076          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
 81   006077          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
 82   006100
 83   006100
 84   006100
 85   006100    STT:  A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
 86   006101          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
 87   006102          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
 88   006103          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
 89   006104
 90   006104          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
 91   006105          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
 92   006106          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
 93   006107          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
 94   006110
 95   006110          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
 96   006111          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
 97   006112          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
 98   006113          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
 99   006114
100   006114          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
101   006115          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
102   006116          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
103   006117          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
104   006120
105   006120          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
106   006121          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
107   006122          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
108   006123          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
109   006124
110   006124          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STTXB;
111   006125          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STTXB;
112   006126          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STTXB;
113   006127          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STTXB;
114   006130
115   006130          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
116   006131          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
117   006132          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
118   006133          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
119   006134
120   006134          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
121   006135          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
122   006136          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
123   006137          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
124   006140
125   006140
126   006140
127   006140
128   006140    STX:  A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
129   006141          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
130   006142          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
131   006143          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD CONT;
132   006144
133   006144          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
134   006145          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
135   006146          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
136   006147          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD CONT;
137   006150
138   006150          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
139   006151          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
140   006152          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
141   006153          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1I;
142   006154
143   006154          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
144   006155          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
145   006156          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
146   006157          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1I;
147   006160
148   006160          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
149   006161          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
150   006162          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
151   006163          A,X ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD CONT;
152   006164
153   006164          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STXXB;
154   006165          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STXXB;
155   006166          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STXXB;
156   006167          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STXXB;
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157     006170
158     006170          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
159     006171          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
160     006172          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
161     006173          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STR1IX;
162     006174
163     006174          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
164     006175          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
165     006176          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
166     006177          A,X B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STR1IX;
167     006200
168     006200
169     006200
170     006200  STD:    A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STD1;
171     006201          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STD1;
172     006202          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STD1;
173     006203          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STD1;
174     006204
175     006204          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STD1;
176     006205          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STD1;
177     006206          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STD1;
178     006207          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STD1;
179     006210
180     006210          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDI;
181     006211          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDI;
182     006212          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDI;
183     006213          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDI;
184     006214
185     006214          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDI;
186     006215          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDI;
187     006216          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDI;
188     006217          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDI;
189     006220
190     006220          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STD1;
191     006221          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STD1;
192     006222          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STD1;
193     006223          A,A ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STD1;
194     006224
195     006224          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STDXB;
196     006225          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STDXB;
197     006226          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STDXB;
198     006227          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STDXB;
199     006230
200     006230          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDIX;
201     006231          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDIX;
202     006232          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDIX;
203     006233          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STDIX;
204     006234
205     006234          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDIX;
206     006235          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDIX;
207     006236          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDIX;
208     006237          A,A B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STDIX;
209     006240
210     006240  LDD:    ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDD1;
211     006241          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDD1;
212     006242          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDD1;
213     006243          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDD1;
214     006244
215     006244          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDD1;
216     006245          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDD1;
217     006246          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDD1;
218     006247          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDD1;
219     006250
220     006250          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDI;
221     006251          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDI;
222     006252          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDI;
223     006253          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDI;
224     006254
225     006254          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDI;
226     006255          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDI;
227     006256          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDI;
228     006257          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDI;
229     006260
230     006260          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDD1;
231     006261          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDD1;
232     006262          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDD1;
233     006263          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDD1;
234     006264
235     006264          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDDXB;
236     006265          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDDXB;
237     006266          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDDXB;
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238   006267          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDDXB;
239   006270
240   006270          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDIX;
241   006271          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDIX;
242   006272          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDIX;
243   006273          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDDIX;
244   006274
245   006274          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDIX;
246   006275          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDIX;
247   006276          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDIX;
248   006277          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDDIX;
249   006300
250   006300
251   006300    STF:  A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STF1;
252   006301          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STF1;
253   006302          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STF1;
254   006303          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,* T,JMP T,HOLD STF1;
255   006304
256   006304          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STF1;
257   006305          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STF1;
258   006306          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STF1;
259   006307          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,B T,JMP T,HOLD STF1;
260   006310
261   006310          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFI;
262   006311          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFI;
263   006312          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFI;
264   006313          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFI;
265   006314
266   006314          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFI;
267   006315          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFI;
268   006316          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFI;
269   006317          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFI;
270   006320
271   006320          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STF1;
272   006321          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STF1;
273   006322          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STF1;
274   006323          A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,AWRITE,X T,JMP T,HOLD STF1;
275   006324
276   006324          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STFXB;
277   006325          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STFXB;
278   006326          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STFXB;
279   006327          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD STFXB;
280   006330
281   006330          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFIX;
282   006331          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFIX;
283   006332          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFIX;
284   006333          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD STFIX;
285   006334
286   006334          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFIX;
287   006335          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFIX;
288   006336          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFIX;
289   006337          A,T B,R1 ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD STFIX;
290   006340
291   006340    LDF:  ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDF1;
292   006341          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDF1;
293   006342          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDF1;
294   006343          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDF1;
295   006344
296   006344          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDF1;
297   006345          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDF1;
298   006346          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDF1;
299   006347          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDF1;
300   006350
301   006350          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFI;
302   006351          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFI;
303   006352          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFI;
304   006353          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFI;
305   006354
306   006354          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFI;
307   006355          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFI;
308   006356          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFI;
309   006357          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFI;
310   006360
311   006360          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDF1;
312   006361          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDF1;
313   006362          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDF1;
314   006363          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDF1;
315   006364
316   006364          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDFXB;
317   006365          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDFXB;
318   006366          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDFXB;
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319   006367          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDFXB;
320   006370
321   006370          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFIX;
322   006371          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFIX;
323   006372          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFIX;
324   006373          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDFIX;
325   006374
326   006374          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFIX;
327   006375          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFIX;
328   006376          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFIX;
329   006377          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDFIX;
330   006400
331   006400   MIN:   ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD MIN1;
332   006401          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD MIN1;
333   006402          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD MIN1;
334   006403          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD MIN1;
335   006404
336   006404          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD MIN1;
337   006405          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD MIN1;
338   006406          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD MIN1;
339   006407          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD MIN1;
340   006410
341   006410          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINI;
342   006411          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINI;
343   006412          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINI;
344   006413          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINI;
345   006414
346   006414          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINI;
347   006415          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINI;
348   006416          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINI;
349   006417          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINI;
350   006420
351   006420          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD MIN1;
352   006421          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD MIN1;
353   006422          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD MIN1;
354   006423          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD MIN1;
355   006424
356   006424          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MINXB;
357   006425          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MINXB;
358   006426          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MINXB;
359   006427          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MINXB;
360   006430
361   006430          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINIX;
362   006431          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINIX;
363   006432          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINIX;
364   006433          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD MINIX;
365   006434
366   006434          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINIX;
367   006435          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINIX;
368   006436          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINIX;
369   006437          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD MINIX;
370   006440
371   006440   LDA:   ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDA1;
372   006441          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDA1;
373   006442          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDA1;
374   006443          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDA1;
375   006444
376   006444          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDA1;
377   006445          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDA1;
378   006446          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDA1;
379   006447          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDA1;
380   006450
381   006450          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAI;
382   006451          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAI;
383   006452          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAI;
384   006453          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAI;
385   006454
386   006454          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAI;
387   006455          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAI;
388   006456          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAI;
389   006457          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAI;
390   006460
391   006460          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDA1;
392   006461          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDA1;
393   006462          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDA1;
394   006463          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDA1;
395   006464
396   006464          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDAXB;
397   006465          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDAXB;
398   006466          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDAXB;
399   006467          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDAXB;
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400   006470
401   006470          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAIX;
402   006471          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAIX;
403   006472          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAIX;
404   006473          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDAIX;
405   006474
406   006474          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAIX;
407   006475          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAIX;
408   006476          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAIX;
409   006477          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDAIX;
410   006500
411   006500
412   006500    LDT:  ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDT1;
413   006501          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDT1;
414   006502          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDT1;
415   006503          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDT1;
416   006504
417   006504          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDT1;
418   006505          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDT1;
419   006506          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDT1;
420   006507          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDT1;
421   006510
422   006510          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTI;
423   006511          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTI;
424   006512          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTI;
425   006513          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTI;
426   006514
427   006514          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTI;
428   006515          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTI;
429   006516          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTI;
430   006517          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTI;
431   006520
432   006520          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDT1;
433   006521          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDT1;
434   006522          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDT1;
435   006523          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDT1;
436   006524
437   006524          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDTXB;
438   006525          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDTXB;
439   006526          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDTXB;
440   006527          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDTXB;
441   006530
442   006530          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTIX;
443   006531          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTIX;
444   006532          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTIX;
445   006533          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDTIX;
446   006534
447   006534          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTIX;
448   006535          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTIX;
449   006536          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTIX;
450   006537          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDTIX;
451   006540
452   006540
453   006540    LDX:  ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDX1;
454   006541          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDX1;
455   006542          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDX1;
456   006543          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD LDX1;
457   006544
458   006544          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDX1;
459   006545          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDX1;
460   006546          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDX1;
461   006547          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD LDX1;
462   006550
463   006550          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXI;
464   006551          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXI;
465   006552          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXI;
466   006553          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXI;
467   006554
468   006554          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXI;
469   006555          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXI;
470   006556          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXI;
471   006557          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXI;
472   006560
473   006560          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDX1;
474   006561          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDX1;
475   006562          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDX1;
476   006563          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD LDX1;
477   006564
478   006564          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDXXB;
479   006565          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDXXB;
480   006566          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDXXB;
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481   006567          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD LDXXB;
482   006570
483   006570          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXIX;
484   006571          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXIX;
485   006572          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXIX;
486   006573          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD LDXIX;
487   006574
488   006574          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXIX;
489   006575          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXIX;
490   006576          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXIX;
491   006577          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD LDXIX;
492   006600
493   006600
494   006600    ADD:  ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ADD1;
495   006601          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ADD1;
496   006602          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ADD1;
497   006603          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ADD1;
498   006604
499   006604          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ADD1;
500   006605          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ADD1;
501   006606          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ADD1;
502   006607          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ADD1;
503   006610
504   006610          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDI;
505   006611          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDI;
506   006612          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDI;
507   006613          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDI;
508   006614
509   006614          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDI;
510   006615          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDI;
511   006616          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDI;
512   006617          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDI;
513   006620
514   006620          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ADD1;
515   006621          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ADD1;
516   006622          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ADD1;
517   006623          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ADD1;
518   006624
519   006624          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ADDXB;
520   006625          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ADDXB;
521   006626          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ADDXB;
522   006627          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ADDXB;
523   006630
524   006630          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDIX;
525   006631          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDIX;
526   006632          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDIX;
527   006633          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ADDIX;
528   006634
529   006634          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDIX;
530   006635          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDIX;
531   006636          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDIX;
532   006637          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ADDIX;
533   006640
534   006640
535   006640
536   006640    SUB:  ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD SUB1;
537   006641          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD SUB1;
538   006642          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD SUB1;
539   006643          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD SUB1;
540   006644
541   006644          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD SUB1;
542   006645          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD SUB1;
543   006646          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD SUB1;
544   006647          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD SUB1;
545   006650
546   006650          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBI;
547   006651          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBI;
548   006652          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBI;
549   006653          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBI;
550   006654
551   006654          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBI;
552   006655          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBI;
553   006656          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBI;
554   006657          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBI;
555   006660
556   006660          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD SUB1;
557   006661          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD SUB1;
558   006662          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD SUB1;
559   006663          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD SUB1;
560   006664
561   006664          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD SUBXB;
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562   006665          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD SUBXB;
563   006666          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD SUBXB;
564   006667          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD SUBXB;
565   006670
566   006670          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBIX;
567   006671          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBIX;
568   006672          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBIX;
569   006673          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD SUBIX;
570   006674
571   006674          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBIX;
572   006675          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBIX;
573   006676          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBIX;
574   006677          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD SUBIX;
575   006700
576   006700
577   006700
578   006700    AND:  ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD AND1;
579   006701          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD AND1;
580   006702          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD AND1;
581   006703          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD AND1;
582   006704
583   006704          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD AND1;
584   006705          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD AND1;
585   006706          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD AND1;
586   006707          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD AND1;
587   006710
588   006710          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDI;
589   006711          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDI;
590   006712          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDI;
591   006713          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDI;
592   006714
593   006714          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDI;
594   006715          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDI;
595   006716          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDI;
596   006717          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDI;
597   006720
598   006720          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD AND1;
599   006721          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD AND1;
600   006722          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD AND1;
601   006723          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD AND1;
602   006724
603   006724          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ANDXB;
604   006725          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ANDXB;
605   006726          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ANDXB;
606   006727          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ANDXB;
607   006730
608   006730          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDIX;
609   006731          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDIX;
610   006732          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDIX;
611   006733          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ANDIX;
612   006734
613   006734          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDIX;
614   006735          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDIX;
615   006736          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDIX;
616   006737          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ANDIX;
617   006740
618   006740
619   006740
620   006740    ORA:  ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ORA1;
621   006741          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ORA1;
622   006742          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ORA1;
623   006743          ALUD,NONE IDBS,ALU COMM,AREAD,* T,JMP T,HOLD ORA1;
624   006744
625   006744          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ORA1;
626   006745          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ORA1;
627   006746          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ORA1;
628   006747          ALUD,NONE IDBS,ALU COMM,AREAD,B T,JMP T,HOLD ORA1;
629   006750
630   006750          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAI;
631   006751          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAI;
632   006752          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAI;
633   006753          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAI;
634   006754
635   006754          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAI;
636   006755          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAI;
637   006756          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAI;
638   006757          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAI;
639   006760
640   006760          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ORA1;
641   006761          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ORA1;
642   006762          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ORA1;
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643   006763          ALUD,NONE IDBS,ALU COMM,AREAD,X T,JMP T,HOLD ORA1;
644   006764
645   006764          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ORAXB;
646   006765          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ORAXB;
647   006766          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ORAXB;
648   006767          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD ORAXB;
649   006770
650   006770          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAIX;
651   006771          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAIX;
652   006772          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAIX;
653   006773          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD ORAIX;
654   006774
655   006774          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAIX;
656   006775          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAIX;
657   006776          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAIX;
658   006777          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD ORAIX;
659   007000
660   007000
661   007000    FAD:  ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,* T,JMP T,HOLD FAD1;
662   007001          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,* T,JMP T,HOLD FAD1;
663   007002          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,* T,JMP T,HOLD FAD1;
664   007003          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,* T,JMP T,HOLD FAD1;
665   007004
666   007004          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,B T,JMP T,HOLD FAD1;
667   007005          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,B T,JMP T,HOLD FAD1;
668   007006          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,B T,JMP T,HOLD FAD1;
669   007007          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,B T,JMP T,HOLD FAD1;
670   007010
671   007010          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADI;
672   007011          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADI;
673   007012          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADI;
674   007013          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADI;
675   007014
676   007014          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADI;
677   007015          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADI;
678   007016          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADI;
679   007017          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADI;
680   007020
681   007020          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,X T,JMP T,HOLD FAD1;
682   007021          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,X T,JMP T,HOLD FAD1;
683   007022          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,X T,JMP T,HOLD FAD1;
684   007023          ALUF,ZERO ALUD,Q IDBS,ALU COMM,AREAD,X T,JMP T,HOLD FAD1;
685   007024
686   007024          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FADXB;
687   007025          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FADXB;
688   007026          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FADXB;
689   007027          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FADXB;
690   007030
691   007030          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADIX;
692   007031          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADIX;
693   007032          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADIX;
694   007033          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD FADIX;
695   007034
696   007034          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADIX;
697   007035          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADIX;
698   007036          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADIX;
699   007037          ALUF,ZERO ALUD,Q IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD FADIX;
700   007040
701   007040
702   007040    FSB:  A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,* T,JMP T,HOLD FAD1;
703   007041          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,* T,JMP T,HOLD FAD1;
704   007042          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,* T,JMP T,HOLD FAD1;
705   007043          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,* T,JMP T,HOLD FAD1;
706   007044
707   007044          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,B T,JMP T,HOLD FAD1;
708   007045          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,B T,JMP T,HOLD FAD1;
709   007046          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,B T,JMP T,HOLD FAD1;
710   007047          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,B T,JMP T,HOLD FAD1;
711   007050
712   007050          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FADI;
713   007051          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FADI;
714   007052          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FADI;
715   007053          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FADI;
716   007054
717   007054          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FADI;
718   007055          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FADI;
719   007056          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FADI;
720   007057          A,17 ALUF,PASSD ALUD,Q IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FADI;
721   007060
722   007060          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,X T,JMP T,HOLD FAD1;
723   007061          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,X T,JMP T,HOLD FAD1;
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724   007062          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,X T,JMP T,HOLD FAD1;
725   007063          A,17 ALUF,PASSD IDBS,BMG ALUD,Q  COMM,AREAD,X T,JMP T,HOLD FAD1;
726   007064
727   007064          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FSBXB;
728   007065          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FSBXB;
729   007066          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FSBXB;
730   007067          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FSBXB;
731   007070
732   007070          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,PT T,JMP T,HOLD FADIX;
733   007071          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,PT T,JMP T,HOLD FADIX;
734   007072          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,PT T,JMP T,HOLD FADIX;
735   007073          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,PT T,JMP T,HOLD FADIX;
736   007074
737   007074          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,APT T,JMP T,HOLD FADIX;
738   007075          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,APT T,JMP T,HOLD FADIX;
739   007076          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,APT T,JMP T,HOLD FADIX;
740   007077          A,17 ALUF,PASSD IDBS,BMG ALUD,Q COMM,IREAD,APT T,JMP T,HOLD FADIX;
741   007100
742   007100    FMU:  A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FMU4;
743   007101          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FMU4;
744   007102          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FMU4;
745   007103          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FMU4;
746   007104
747   007104          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FMU4;
748   007105          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FMU4;
749   007106          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FMU4;
750   007107          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FMU4;
751   007110
752   007110          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUI;
753   007111          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUI;
754   007112          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUI;
755   007113          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUI;
756   007114
757   007114          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUI;
758   007115          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUI;
759   007116          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUI;
760   007117          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUI;
761   007120
762   007120          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FMU4;
763   007121          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FMU4;
764   007122          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FMU4;
765   007123          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FMU4;
766   007124
767   007124          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FMUXB;
768   007125          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FMUXB;
769   007126          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FMUXB;
770   007127          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FMUXB;
771   007130
772   007130          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUIX;
773   007131          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUIX;
774   007132          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUIX;
775   007133          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FMUIX;
776   007134
777   007134          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUIX;
778   007135          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUIX;
779   007136          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUIX;
780   007137          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FMUIX;
781   007140
782   007140
783   007140    FDV:  A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FDV4;
784   007141          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FDV4;
785   007142          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FDV4;
786   007143          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,* T,JMP T,HOLD FDV4;
787   007144
788   007144          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FDV4;
789   007145          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FDV4;
790   007146          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FDV4;
791   007147          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,B T,JMP T,HOLD FDV4;
792   007150
793   007150          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVI;
794   007151          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVI;
795   007152          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVI;
796   007153          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVI;
797   007154
798   007154          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVI;
799   007155          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVI;
800   007156          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVI;
801   007157          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVI;
802   007160
803   007160          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FDV4;
804   007161          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FDV4;
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805   007162          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FDV4;
806   007163          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,AREAD,X T,JMP T,HOLD FDV4;
807   007164
808   007164          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FDVXB;
809   007165          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FDVXB;
810   007166          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FDVXB;
811   007167          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD FDVXB;
812   007170
813   007170          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVIX;
814   007171          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVIX;
815   007172          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVIX;
816   007173          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,PT T,JMP T,HOLD FDVIX;
817   007174
818   007174          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVIX;
819   007175          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVIX;
820   007176          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVIX;
821   007177          A,1 B,STS ALUF,INVD ALUD,B IDBS,BMG COMM,IREAD,APT T,JMP T,HOLD FDVIX;
822   007200
823   007200
824   007200    MPY:  ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,* T,JMP T,HOLD MPY5;
825   007201          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,* T,JMP T,HOLD MPY5;
826   007202          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,* T,JMP T,HOLD MPY5;
827   007203          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,* T,JMP T,HOLD MPY5;
828   007204
829   007204          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,B T,JMP T,HOLD MPY5;
830   007205          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,B T,JMP T,HOLD MPY5;
831   007206          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,B T,JMP T,HOLD MPY5;
832   007207          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,B T,JMP T,HOLD MPY5;
833   007210
834   007210          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYI;
835   007211          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYI;
836   007212          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYI;
837   007213          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYI;
838   007214
839   007214          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYI;
840   007215          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYI;
841   007216          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYI;
842   007217          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYI;
843   007220
844   007220          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,X T,JMP T,HOLD MPY5;
845   007221          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,X T,JMP T,HOLD MPY5;
846   007222          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,X T,JMP T,HOLD MPY5;
847   007223          ALUF,PASSD ALUD,Q IDBS,STS COMM,AREAD,X T,JMP T,HOLD MPY5;
848   007224
849   007224          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MPYXB;
850   007225          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MPYXB;
851   007226          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MPYXB;
852   007227          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD MPYXB;
853   007230
854   007230          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYIX;
855   007231          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYIX;
856   007232          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYIX;
857   007233          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,PT T,JMP T,HOLD MPYIX;
858   007234
859   007234          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYIX;
860   007235          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYIX;
861   007236          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYIX;
862   007237          ALUF,PASSD ALUD,Q IDBS,STS COMM,IREAD,APT T,JMP T,HOLD MPYIX;
863   007240
864   007240
865   007240    JUMP: ALUD,NONE IDBS,LA COMM,JMP,* T,JMP T,HOLD;
866   007241          ALUD,NONE IDBS,LA COMM,JMP,* T,JMP T,HOLD;
867   007242          ALUD,NONE IDBS,LA COMM,JMP,* T,JMP T,HOLD;
868   007243          ALUD,NONE IDBS,LA COMM,JMP,* T,JMP T,HOLD;
869   007244
870   007244          ALUD,NONE IDBS,LA COMM,JMP,B T,JMP T,HOLD;
871   007245          ALUD,NONE IDBS,LA COMM,JMP,B T,JMP T,HOLD;
872   007246          ALUD,NONE IDBS,LA COMM,JMP,B T,JMP T,HOLD;
873   007247          ALUD,NONE IDBS,LA COMM,JMP,B T,JMP T,HOLD;
874   007250
875   007250          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
876   007251          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
877   007252          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
878   007253          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
879   007254
880   007254          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
881   007255          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
882   007256          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
883   007257          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
884   007260
885   007260          ALUD,NONE IDBS,LA COMM,JMP,X T,JMP T,HOLD;
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886   007261          ALUD,NONE IDBS,LA COMM,JMP,X T,JMP T,HOLD;
887   007262          ALUD,NONE IDBS,LA COMM,JMP,X T,JMP T,HOLD;
888   007263          ALUD,NONE IDBS,LA COMM,JMP,X T,JMP T,HOLD;
889   007264
890   007264          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
891   007265          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
892   007266          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
893   007267          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
894   007270
895   007270          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
896   007271          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
897   007272          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
898   007273          ALUD,NONE IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
899   007274
900   007274          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
901   007275          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
902   007276          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
903   007277          ALUD,NONE IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
904   007300
905   007300
906   007300    JAP:  A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
907   007301          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
908   007302          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
909   007303          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
910   007304
911   007304    JAN:  A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
912   007305          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
913   007306          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
914   007307          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
915   007310
916   007310    JAZ:  A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
917   007311          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
918   007312          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
919   007313          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
920   007314
921   007314    JAF:  A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF=0 T,JMP T,HOLD CJP1;
922   007315          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF=0 T,JMP T,HOLD CJP1;
923   007316          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF=0 T,JMP T,HOLD CJP1;
924   007317          A,A ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,NF=0 T,JMP T,HOLD CJP1;
925   007320
926   007320    JPC:  B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
927   007321          B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
928   007322          B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
929   007323          B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,NF15 T,JMP T,HOLD CJP1;
930   007324
931   007324    JNC:  B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
932   007325          B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
933   007326          B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
934   007327          B,X ALUF,B+1 ALUD,B IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
935   007330
936   007330    JXZ:  A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
937   007331          A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
938   007332          A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
939   007333          A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F=0 T,JMP T,HOLD CJP1;
940   007334
941   007334    JXN:  A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
942   007335          A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
943   007336          A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
944   007337          A,X ALUF,PASSA ALUD,NONE IDBS,LA COMM,CJMP,F15 T,JMP T,HOLD CJP1;
945   007340
946   007340
947   007340    JPL:  A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,* T,JMP T,HOLD;
948   007341          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,* T,JMP T,HOLD;
949   007342          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,* T,JMP T,HOLD;
950   007343          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,* T,JMP T,HOLD;
951   007344
952   007344          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,B T,JMP T,HOLD;
953   007345          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,B T,JMP T,HOLD;
954   007346          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,B T,JMP T,HOLD;
955   007347          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,B T,JMP T,HOLD;
956   007350
957   007350          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
958   007351          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
959   007352          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
960   007353          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPI;
961   007354
962   007354          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
963   007355          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
964   007356          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
965   007357          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPI;
966   007360
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 967   007360          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,X T,JMP T,HOLD;
 968   007361          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,X T,JMP T,HOLD;
 969   007362          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,X T,JMP T,HOLD;
 970   007363          A,P B,L ALUF,PASSA ALUD,B IDBS,LA COMM,JMP,X T,JMP T,HOLD;
 971   007364
 972   007364          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
 973   007365          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
 974   007366          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
 975   007367          A,X B,B ALUF,A+B ALUD,NONE IDBS,GPR T,JMP T,HOLD JMPXB;
 976   007370
 977   007370          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
 978   007371          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
 979   007372          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
 980   007373          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,PT T,JMP T,HOLD JMPIX;
 981   007374
 982   007374          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
 983   007375          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
 984   007376          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
 985   007377          A,P B,L ALUF,PASSA ALUD,B IDBS,ALU COMM,IREAD,APT T,JMP T,HOLD JMPIX;
 986   007400
 987   007400   SKEQL:
 988   007400    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,NF=0 T,JMP T,HOLD SKIP1;
 989   007401   COMM:  A,6 ALUF,PASSD ALUD,Q IDBS,AARG T,JMP T,HOLD COMME;
 990   007402   SINT4: ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN; % SINT4-INSTR. NOT INCLUDED
 991   007403   S3SEG: ALUD,NONE IDBS,ALU T,JMP T,HOLD S3SG1;
 992   007404
 993   007404   SKGEQ:
 994   007404    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,F15 T,JMP T,HOLD SKIP1;
 995   007405   S3K1I: ALUD,NONE IDBS,ALU T,JMP T,HOLD S3K1;
 996   007406   EXR:   ALUD,NONE IDBS,ALU T,JMP T,HOLD EXR1;
 997   007407   S3K2I: ALUD,NONE IDBS,ALU T,JMP T,HOLD S3K2;
 998   007410
 999   007410   SKGRE:
1000   007410    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,NSGR T,JMP T,HOLD SKIP1;
1001   007411          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1002   007412   RMPY:  ALUD,NONE IDBS,ALU T,JMP T,HOLD RMPY4;
1003   007413          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1004   007414
1005   007414   SKMGR:
1006   007414    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,NCRY T,JMP T,HOLD SKIP1;
1007   007415          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1008   007416   RDIV:  ALUD,NONE IDBS,ALU T,JMP T,HOLD RDIV6;
1009   007417          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1010   007420
1011   007420   SKUEQ:
1012   007420    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,F=0 T,JMP T,HOLD SKIP1;
1013   007421   GECOX: A,T B,Z ALUF,PASSA ALUD,B IDBS,GPR XRF COMM,EWRF T,JMP T,HOLD GECX1;
1014   007422   LBYT:  ALUD,NONE IDBS,ALU T,JMP T,HOLD LBYT1;
1015   007423   RWLB:  ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN; % 20-BIT LOG.ADDR. ERRONEOUS
1016   007424
1017   007424   SKLSS:
1018   007424    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,NF15 T,JMP T,HOLD SKIP1;
1019   007425   PREX:  ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN; % 20-BIT LOG.ADDR. ERRONEOUS
1020   007426   SBYT:  A,X B,R1 MIS,ZIN ALUF,PASSA ALUD,SRB IDBS,ALU T,JMP T,HOLD SBYT2;
1021   007427   GECO:  B,R2 ALUF,PASSD ALUD,B IDBS,GPR COMM,LDLC T,JMP T,HOLD GECO1;
1022   007430
1023   007430   SKLST:
1024   007430    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,SGR T,JMP T,HOLD SKIP1;
1025   007431   MOVEW: A,13 ALUF,PASSD ALUD,Q IDBS,BMG T,JMP T,HOLD MOVW1;
1026   007432   MIX3:  A,A B,X ALUF,A-1 ALUD,SLB IDBS,ALU COMM,LDGPR T,JMP T,HOLD MIX4;
1027   007433   SINTR: A,T ALUF,PASSA ALUD,NONE IDBS,ALU COMM,LDSEG T,JMP T,HOLD SINT1;
1028   007434
1029   007434   SKMLS:
1030   007434    A,SRCE B,DEST ALUF,B-A ALUD,NONE IDBS,ALU COMM,CNEXT,CRY T,JMP T,HOLD SKIP1;
1031   007435   WCS:   ALUD,NONE IDBS,ALU T,JMP T,HOLD CONT;
1032   007436   IDENT: A,6 B,R1 ALUF,D-1 ALUD,B IDBS,BMG T,JMP T,HOLD IDNT1;
1033   007437          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1034   007440
1035   007440   SWAP:  B,DEST ALUF,PASSB ALUD,Q IDBS,ALU T,JMP T,HOLD SW0;
1036   007441                 ALUF,ZERO  ALUD,Q IDBS,ALU T,JMP T,HOLD SW0;
1037   007442          B,DEST ALUF,PASSB ALUD,Q IDBS,ALU T,JMP T,HOLD SW2;
1038   007443                 ALUF,ZERO  ALUD,Q IDBS,ALU T,JMP T,HOLD SW2;
1039   007444
1040   007444   RAND:  A,SRCE B,DEST ALUF,ANDAB ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1041   007445                 B,DEST ALUF,ZERO  ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1042   007446          A,SRCE B,DEST ALUF,MASKAB ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1043   007447                 B,DEST ALUF,ZERO  ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1044   007450
1045   007450   REXO:  A,SRCE B,DEST ALUF,XORAB ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1046   007451          A,SRCE B,DEST ALUF,PASSA ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1047   007452          A,SRCE B,R1   ALUF,INVA  ALUD,B                T,JMP T,HOLD REXO2;
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1048    007453          A,SRCE B,DEST ALUF,INVA  ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1049    007454
1050    007454  RORA:   A,SRCE B,DEST ALUF,ORAB  ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1051    007455          A,SRCE B,DEST ALUF,PASSA ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1052    007456          A,SRCE B,R1   ALUF,INVA  ALUD,B                 T,JMP T,HOLD REXO2;
1053    007457          A,SRCE B,DEST ALUF,INVA  ALUD,B COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1054    007460
1055    007460  RADD:
1056    007460  A,SRCE B,DEST ALUF,A+B   ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1057    007461  A,SRCE B,DEST ALUF,A     ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1058    007462  A,SRCE B,DEST ALUF,B-A-1 ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1059    007463  A,SRCE B,DEST ALUF,-A-1  ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1060    007464
1061    007464  A,SRCE B,DEST ALUF,A+B+1 ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1062    007465  A,SRCE B,DEST ALUF,A+1   ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1063    007466  A,SRCE B,DEST ALUF,B-A   ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1064    007467  A,SRCE B,DEST ALUF,-A    ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1065    007470
1066    007470  A,SRCE B,DEST ALUF,A+B   CRY,C ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1067    007471  A,SRCE B,DEST ALUF,A     CRY,C ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1068    007472  A,SRCE B,DEST ALUF,B-A-1 CRY,C ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1069    007473  A,SRCE B,DEST ALUF,-A-1  CRY,C ALUD,B STS,EA COMM,CNEXT,NWP T,JMP T,HOLD CONT;
1070    007474
1071    007474          ALUD,NONE IDBS,ALU COMM,CONTINUE T,JMP T,HOLD;
1072    007475          ALUD,NONE IDBS,ALU COMM,CONTINUE T,JMP T,HOLD;
1073    007476          ALUD,NONE IDBS,ALU COMM,CONTINUE T,JMP T,HOLD;
1074    007477          ALUD,NONE IDBS,ALU COMM,CONTINUE T,JMP T,HOLD;
1075    007500
1076    007500  TRA4:   ALUD,NONE IDBS,ALU T,JMP T,HOLD TRA1;
1077    007501  TRR4:   ALUD,NONE IDBS,ALU T,JMP T,HOLD TRR1;
1078    007502  MCL:    ALUD,NONE IDBS,ALU T,JMP T,HOLD MCL1;
1079    007503  MST:    ALUD,NONE IDBS,ALU T,JMP T,HOLD MST1;
1080    007504
1081    007504  PIONF:  ALUD,NONE IDBS,ALU T,JMP T,HOLD PINF1;
1082    007505          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1083    007506          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1084    007507          ALUD,NONE IDBS,ALU T,JMP T,HOLD ILLIN;
1085    007510
1086    007510  WAIT:   ALUD,NONE IDBS,ALU T,JMP T,HOLD WAIT1;
1087    007511          ALUD,NONE IDBS,ALU T,JMP T,HOLD WAIT1;
1088    007512          ALUD,NONE IDBS,ALU T,JMP T,HOLD WAIT1;
1089    007513          ALUD,NONE IDBS,ALU T,JMP T,HOLD WAIT1;
1090    007514
1091    007514  NLZ:    ALUD,NONE IDBS,ALU T,JMP T,HOLD NLZ3;
1092    007515          ALUD,NONE IDBS,ALU T,JMP T,HOLD NLZ3;
1093    007516          ALUD,NONE IDBS,ALU T,JMP T,HOLD NLZ3;
1094    007517          ALUD,NONE IDBS,ALU T,JMP T,HOLD NLZ3;
1095    007520
1096    007520  DNZ:    A,16 B,R6 ALUF,PASSD ALUD,B IDBS,BMG T,JMP T,HOLD DNZ2;
1097    007521          A,16 B,R6 ALUF,PASSD ALUD,B IDBS,BMG T,JMP T,HOLD DNZ2;
1098    007522          A,16 B,R6 ALUF,PASSD ALUD,B IDBS,BMG T,JMP T,HOLD DNZ2;
1099    007523          A,16 B,R6 ALUF,PASSD ALUD,B IDBS,BMG T,JMP T,HOLD DNZ2;
1100    007524
1101    007524  SRB:    ALUD,NONE IDBS,ALU T,JMP T,HOLD SRB2;
1102    007525          ALUD,NONE IDBS,ALU T,JMP T,HOLD SRB2;
1103    007526  LRB:    ALUD,NONE IDBS,ALU T,JMP T,HOLD LRB2;
1104    007527          ALUD,NONE IDBS,ALU T,JMP T,HOLD LRB2;
1105    007530
1106    007530  MON:    A,4 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD MON1;
1107    007531          A,4 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD MON1;
1108    007532          A,4 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD MON1;
1109    007533          A,4 ALUD,NONE IDBS,BMG COMM,SMPID T,JMP T,HOLD MON1;
1110    007534
1111    007534  IRWX:   ALUD,NONE IDBS,ALU T,JMP T,HOLD IRW3;
1112    007535          ALUD,NONE IDBS,ALU T,JMP T,HOLD IRW3;
1113    007536  IRRX:   ALUD,NONE IDBS,ALU T,JMP T,HOLD IRR3;
1114    007537          ALUD,NONE IDBS,ALU T,JMP T,HOLD IRR3;
1115    007540
1116    007540  SHT:    ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1117    007541          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1118    007542  SHD:    ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
1119    007543          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
1120    007544
1121    007544  SHA:    ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1122    007545          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1123    007546  SAD:    ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1124    007547          ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1125    007550
1126    007550          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1127    007551          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1128    007552          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
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1129    007553          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
1130    007554
1131    007554          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1132    007555          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1133    007556          ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1134    007557          ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1135    007560
1136    007560          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1137    007561          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1138    007562          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
1139    007563          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
1140    007564
1141    007564          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1142    007565          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1143    007566          ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1144    007567          ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1145    007570
1146    007570          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1147    007571          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHT1;
1148    007572          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
1149    007573          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHD1;
1150    007574
1151    007574          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1152    007575          ALUD,NONE IDBS,ALU T,JMP T,HOLD SHA1;
1153    007576          ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1154    007577          ALUD,NONE IDBS,ALU T,JMP T,HOLD SAD1;
1155    007600
1156    007600  IOT:    ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1157    007601          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1158    007602          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1159    007603          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1160    007604
1161    007604          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1162    007605          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1163    007606          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1164    007607          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1165    007610
1166    007610          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1167    007611          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1168    007612          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1169    007613          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1170    007614
1171    007614          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1172    007615          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1173    007616          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1174    007617          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1175    007620
1176    007620          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1177    007621          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1178    007622          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1179    007623          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1180    007624
1181    007624          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1182    007625          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1183    007626          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1184    007627          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1185    007630
1186    007630          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1187    007631          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1188    007632          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1189    007633          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1190    007634
1191    007634          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1192    007635          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1193    007636          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1194    007637          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOT1;
1195    007640
1196    007640  IOX:    ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1197    007641          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1198    007642          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1199    007643          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1200    007644
1201    007644          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1202    007645          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1203    007646          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1204    007647          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1205    007650
1206    007650          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1207    007651          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1208    007652          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1209    007653          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
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1210    007654
1211    007654          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1212    007655          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1213    007656          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1214    007657          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1215    007660
1216    007660          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1217    007661          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1218    007662          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1219    007663          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1220    007664
1221    007664          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1222    007665          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1223    007666          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1224    007667          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1225    007670
1226    007670          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1227    007671          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1228    007672          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1229    007673          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1230    007674
1231    007674          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1232    007675          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1233    007676          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1234    007677          ALUD,NONE IDBS,ALU T,JMP T,HOLD IOX1;
1235    007700
1236    007700  SAB:    B,B ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1237    007701          B,B ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1238    007702          B,B ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1239    007703          B,B ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1240    007704
1241    007704  SAA:    B,A ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1242    007705          B,A ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1243    007706          B,A ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1244    007707          B,A ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1245    007710
1246    007710  SAT:    B,T ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1247    007711          B,T ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1248    007712          B,T ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1249    007713          B,T ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1250    007714
1251    007714  SAX:    B,X ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1252    007715          B,X ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1253    007716          B,X ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1254    007717          B,X ALUF,PASSD ALUD,B IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1255    007720
1256    007720  AAB:    A,B B,B ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1257    007721          A,B B,B ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1258    007722          A,B B,B ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1259    007723          A,B B,B ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1260    007724
1261    007724  AAA:    A,A B,A ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1262    007725          A,A B,A ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1263    007726          A,A B,A ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1264    007727          A,A B,A ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1265    007730
1266    007730  AAT:    A,T B,T ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1267    007731          A,T B,T ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1268    007732          A,T B,T ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1269    007733          A,T B,T ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1270    007734
1271    007734  AAX:    A,X B,X ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1272    007735          A,X B,X ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1273    007736          A,X B,X ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1274    007737          A,X B,X ALUF,D+A ALUD,B STS,EA IDBS,GPR,SEXT COMM,CONTINUE T,JMP T,HOLD;
1275    007740
1276    007740  BSET:   ALUD,NONE IDBS,ALU T,JMP T,HOLD BSET0;
1277    007741          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSET0;
1278    007742          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSET1;
1279    007743          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSET1;
1280    007744
1281    007744          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSETC;
1282    007745          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSETC;
1283    007746          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSETK;
1284    007747          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSETK;
1285    007750
1286    007750  BSKP:   ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKP0;
1287    007751          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKP0;
1288    007752          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKP1;
1289    007753          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKP1;
1290    007754
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1291    007754          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKPC;
1292    007755          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKPC;
1293    007756          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKPK;
1294    007757          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSKPK;
1295    007760
1296    007760          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSTC;
1297    007761          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSTC;
1298    007762          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSTA;
1299    007763          ALUD,NONE IDBS,ALU T,JMP T,HOLD BSTA;
1300    007764
1301    007764          ALUD,NONE IDBS,ALU T,JMP T,HOLD BLDC;
1302    007765          ALUD,NONE IDBS,ALU T,JMP T,HOLD BLDC;
1303    007766          ALUD,NONE IDBS,ALU T,JMP T,HOLD BLDA;
1304    007767          ALUD,NONE IDBS,ALU T,JMP T,HOLD BLDA;
1305    007770
1306    007770          ALUD,NONE IDBS,ALU T,JMP T,HOLD BANC;
1307    007771          ALUD,NONE IDBS,ALU T,JMP T,HOLD BANC;
1308    007772          ALUD,NONE IDBS,ALU T,JMP T,HOLD BAND;
1309    007773          ALUD,NONE IDBS,ALU T,JMP T,HOLD BAND;
1310    007774
1311    007774          ALUD,NONE IDBS,ALU T,JMP T,HOLD BORC;
1312    007775          ALUD,NONE IDBS,ALU T,JMP T,HOLD BORC;
1313    007776          ALUD,NONE IDBS,ALU T,JMP T,HOLD BORA;
1314    007777          ALUD,NONE IDBS,ALU T,JMP T,HOLD BORA;
1315    010000
1316    010000
1317    010000
1318    010000
1319    010000
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ND-110 micro code assembler   4.2 September 1987          18:56:17        24:11:1987
MICRO-DELI-BCD                                            PAGE       10

     1      010000
     2      010000   10160/
     3      010160   %*****************************************************************
     4      010160   %*****************************************************************
     5      010160
     6      010160   % VECTOR FOR DECODING OF BCD, BYTE BLOCK, STACK ,TSET AND RDUS
     7      010160
     8      010160   %*****************************************************************
     9      010160   %*****************************************************************
    10      010160
    11      010160
    12      010160   COBVC: A,2   B,11            ALUF,ZERO          ALUD,NONE %DECIMAL ADD
    13      010160          IDBS,ALU              COMM,EWRF T,JMP    T,HOLD
    14      010160          ADDE;
    15      010161
    16      010161          A,0                                      ALUD,NONE %DECIMAL SUBTRACT
    17      010161          IDBS,BMG              COMM,LDGPR T,JMP   T,HOLD
    18      010161          SUBD;
    19      010162
    20      010162          A,0   B,17                               ALUD,NONE %DECIMAL COMPARE
    21      010162          IDBS,BARG       XRF   COMM,EWRF T,JMP    T,HOLD
    22      010162          COMD;
    23      010163
    24      010163                                ALUF,PASSD         ALUD,Q    % TSET
    25      010163          IDBS,STS                      T,JMP      T,HOLD
    26      010163          TSET;
    27      010164
    28      010164                                                   ALUD,NONE %CONVERT TO BCD
    29      010164          IDBS,ALU                      T,JMP      T,HOLD
    30      010164          PACK;
    31      010165
    32      010165                                                   ALUD,NONE %CONVERT TO ASCII
    33      010165          IDBS,ALU                      T,JMP      T,HOLD
    34      010165          UPACK;
    35      010166
    36      010166                                                   ALUD,NONE %DECIMAL SHIFT
    37      010166          IDBS,ALU                      T,JMP      T,HOLD
    38      010166          SHDE;
    39      010167
    40      010167                                                   ALUD,NONE % RDUS
    41      010167          IDBS,ALU                      T,JMP      T,HOLD
    42      010167          RDUS;
    43      010170
    44      010170          ALUD,NONE   IDBS,ALU  T,JMP     T,HOLD   BFILL;
    45      010171          ALUD,NONE   IDBS,ALU  T,JMP     T,HOLD   MOVB;
    46      010172          ALUD,NONE   IDBS,ALU  T,JMP     T,HOLD   MOVBF;
    47      010173          ALUD,NONE   IDBS,ALU  T,JMP     T,HOLD   VERSN;
    48      010174
    49      010174                                                   ALUD,NONE
    50      010174          IDBS,DBR              COMM,LDGPR T,JMP   T,HOLD
    51      010174          5INIT;
    52      010175
    53      010175                                                   ALUD,NONE
    54      010175          IDBS,DBR              COMM,LDGPR T,JMP   T,HOLD
    55      010175          ENTR;
    56      010176
    57      010176                                                   ALUD,NONE
    58      010176          IDBS,ALU                        T,JMP    T,HOLD
    59      010176          LEAV;
    60      010177
    61      010177                                                   ALUD,NONE
    62      010177          IDBS,ALU                        T,JMP    T,HOLD
    63      010177          ELEAV;
    64      010200
    65      010200
    66      010200
    67      010200
    68      010200
    69      010200
    70      010200
    71      010200
    72      010200
    73      010200   %*********************************************************
    74      010200
    75      010200   %       DECIMAL SUBTRACTION SUBROUTINE

Last written :  18:56:25  24:11:87      Printed at :      10:01:29   1:12:87
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 76   010200
 77   010200
 78   010200  SSUB:       B,R5            ALUF,XORDQ          ALUD,B
 79   010200          IDBS,GPR                        T,NEXT  T,HOLD;
 80   010201
 81   010201                              ALUF,Q-D-1 CRY,C    ALUD,Q    STS,EA
 82   010201          IDBS,GPR                        T,NEXT  T,HOLD
 83   010201          COND,CRY                        F,NEXT  F,HOLD;
 84   010202
 85   010202          A,R5  B,R5          ALUF,XORAQ          ALUD,B
 86   010202          IDBS,ALU                        T,JMP   T,HOLD
 87   010202          SUBB CONDENABL;
 88   010203
 89   010203                              ALUF,Q-D            ALUD,Q
 90   010203          IDBS,ARG                        T,NEXT  T,HOLD
 91   010203          60000;
 92   010204
 93   010204  SUBB:   A,L   B,R5          ALUF,ANDAB          ALUD,SRB
 94   010204          IDBS,ALU                        T,NEXT  T,HOLD;
 95   010205
 96   010205          A,R5  B,R2          ALUF,PASSA          ALUD,SRB
 97   010205          IDBS,ALU                        T,NEXT  T,HOLD;
 98   010206
 99   010206          A,R2  B,R5          ALUF,ORAB           ALUD,SRB
100   010206          IDBS,ALU                        T,RETURN T,POP;
101   010207
102   010207  %*************************************************************
103   010207
104   010207  %       DECIMAL ADDITION SUBROUTINE
105   010207
106   010207
107   010207  SADD:       B,R5            ALUF,XORDQ          ALUD,B
108   010207          IDBS,GPR                        T,NEXT  T,HOLD;
109   010210
110   010210                              ALUF,D+Q            ALUD,Q
111   010210          IDBS,ARG                        T,NEXT  T,HOLD
112   010210          63146;
113   010211
114   010211                              ALUF,D+Q  CRY,C     ALUD,Q    STS,EA
115   010211          IDBS,GPR                        T,NEXT  T,HOLD
116   010211          COND,CRY                        F,NEXT  F,HOLD;
117   010212
118   010212          A,R5  B,R5          ALUF,XNORAQ         ALUD,B
119   010212          IDBS,ALU                        T,JMP   T,HOLD
120   010212          ADDB CONDENABL;
121   010213
122   010213                              ALUF,Q-D            ALUD,Q
123   010213          IDBS,ARG                        T,NEXT  T,HOLD
124   010213          60000;
125   010214
126   010214  ADDB:   A,L   B,R5          ALUF,ANDAB          ALUD,SRB
127   010214          IDBS,ALU                        T,NEXT  T,HOLD;
128   010215
129   010215          A,R5  B,R2          ALUF,PASSA          ALUD,SRB
130   010215          IDBS,ALU                        T,NEXT  T,HOLD;
131   010216
132   010216          A,R2  B,R5          ALUF,ORAB           ALUD,SRB
133   010216          IDBS,ALU                        T,RETURN T,POP;
134   010217
135   010217
136   010217  %*************************************************************
137   010217
138   010217  %       ENTRY-POINT ALL COMMERCIAL INSTRUCTIONS
139   010217
140   010217  %*************************************************************
141   010217
142   010217
143   010217  COMME:                      ALUF,ANDDQ          ALUD,Q
144   010217          IDBS,GPR                        T,NEXT  T,HOLD;
145   010220
146   010220          A,2                 ALUF,XORDQ          ALUD,NONE
147   010220          IDBS,AARG                       T,NEXT  T,HOLD
148   010220          COND,F=0                        F,JMP   F,HOLD;
149   010221
150   010221          A,2   B,16                              ALUD,NONE
151   010221          IDBS,STS            COMM,EWRF T,NEXT    T,HOLD
152   010221          ILLIN CONDENABL;
153   010222
154   010222          A,2   B,15                              ALUD,NONE
155   010222          IDBS,BARG           COMM,EWRF T,JMP0-3  T,HOLD
156   010222          COBVC;
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157     010223
158     010223
159     010223
160     010223
161     010223
162     010223
163     010223
164     010223  %*************************************************************
165     010223
166     010223  %       SUBROUTINE TO SAVE REGISTERS FROM CURRENT LEVEL
167     010223  %       L -> RF(5,13)
168     010223  %       B -> RF(5,12)
169     010223  %       GPR IS USED AS SCRATCH
170     010223
171     010223
172     010223  CSAV1: A,L                      ALUF,PASSA          ALUD,NONE
173     010223         IDBS,ALU                 COMM,LDGPR T,NEXT   T,HOLD;
174     010224
175     010224         A,5   B,13                                   ALUD,NONE
176     010224         IDBS,GPR                 COMM,EWRF T,NEXT    T,HOLD;
177     010225
178     010225         A,B                      ALUF,PASSA          ALUD,NONE
179     010225         IDBS,ALU                 COMM,LDGPR T,NEXT   T,HOLD;
180     010226
181     010226         A,5   B,12                                   ALUD,NONE
182     010226         IDBS,GPR                 COMM,EWRF T,RETURN  T,POP;
183     010227
184     010227  %*************************************************************
185     010227
186     010227  %       SUBROUTINE TO UNSAVE REGISTERS TO CURRENT LEVEL
187     010227  %       RF(5,13) -> L
188     010227  %       RF(5,12) -> B
189     010227  %       GPR IS USED AS SCRATCH
190     010227
191     010227
192     010227  CUSV1: A,5   B,12                                   ALUD,NONE
193     010227         IDBS,REG                 COMM,LDGPR T,NEXT   T,HOLD;
194     010230
195     010230               B,B                ALUF,PASSD          ALUD,B
196     010230         IDBS,GPR                           T,NEXT    T,HOLD;
197     010231
198     010231         A,5   B,13                                   ALUD,NONE
199     010231         IDBS,REG                 COMM,LDGPR T,NEXT   T,HOLD;
200     010232
201     010232               B,L                ALUF,PASSD          ALUD,B
202     010232         IDBS,GPR                           T,RETURN  T,POP;
203     010233
204     010233  %*************************************************************
205     010233
206     010233  %       SUBROUTINE TO COMPUTE BOTTOM WORD ADDRESS
207     010233  %       AND NUMBER OF WORDS OF AN ASCII OPERAND
208     010233  %       DESCRIPTORS IN R1,R2
209     010233  %       RETURN WITH NUMBER OF WORDS IN R4
210     010233  %                   NUMBER OF BYTES IN R7
211     010233  %                   BOTTOM WORD ADDRESS IN R6
212     010233
213     010233  LWAB:        B,R2                ALUF,PASSB          ALUD,NONE
214     010233         IDBS,ALU                           T,NEXT    T,HOLD
215     010233         COND,F15                           F,JMP     F,HOLD;
216     010234
217     010234         A,R2  B,R7                ALUF,ANDDA          ALUD,B
218     010234         IDBS,GPR                           T,NEXT    T,HOLD
219     010234         LWABC CONDENABL;
220     010235
221     010235               B,R7                ALUF,B+1            ALUD,B
222     010235         IDBS,ALU                           T,NEXT    T,HOLD;
223     010236
224     010236  LWABC: A,R7  B,1                 ALUF,ANDDA          ALUD,NONE
225     010236         IDBS,BARG                          T,NEXT    T,HOLD
226     010236         COND,F=0                           F,JMP     F,HOLD;
227     010237
228     010237         A,R7  B,R4  MIS,ZIN       ALUF,PASSA          ALUD,SRB
229     010237         IDBS,ALU                           T,NEXT    T,HOLD
230     010237         LWABB CONDENABL;
231     010240
232     010240         A,R6  B,R4                ALUF,A+B            ALUD,Q
233     010240         IDBS,ALU                           T,NEXT    T,HOLD;
234     010241
235     010241               B,R6                ALUF,Q-1            ALUD,B
236     010241         IDBS,ALU                           T,RETURN  T,POP;
237     010242
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238  010242  LWABB: A,R4  B,R4            ALUF,B+1             ALUD,B,YA
239  010242         IDBS,ALU              COMM,LDGPR T,NEXT    T,HOLD;
240  010243
241  010243         A,R6  B,R6            ALUF,D+A             ALUD,B
242  010243         IDBS,GPR                        T,RETURN   T,POP;
243  010244
244  010244  %*****************************************************
245  010244
246  010244  %      SUBROUTINE TO COMPUTE NUMBER OF WORDS
247  010244  %      AND BOTTOM WORD ADDRESS OF A BCD-OPERAND
248  010244  %      DESCRIPTORS IN R1,R2
249  010244  %      RETURN WITH NUMBER OF WORDS IN STS
250  010244  %                  NUMBER OF NIBLES IN R3
251  010244  %                  BOTTOM WORD ADDRESS IN R1
252  010244
253  010244  LWA:   A,R2  B,1             ALUF,ANDDA           ALUD,NONE
254  010244         IDBS,BARG                       T,NEXT     T,HOLD
255  010244         COND,F=0                        F,NEXT     F,HOLD;
256  010245
257  010245         A,R2  B,STS           ALUF,ANDDA           ALUD,B
258  010245         IDBS,GPR                        T,JMP      T,HOLD
259  010245         LWAA CONDENABL;
260  010246
261  010246               B,STS           ALUF,B+1             ALUD,B
262  010246         IDBS,ALU                        T,NEXT     T,HOLD;
263  010247
264  010247  LWAA:  A,R2                  ALUF,PASSA           ALUD,NONE
265  010247         IDBS,ALU                        T,NEXT     T,HOLD
266  010247         COND,F15                        F,JMP      F,HOLD;
267  010250
268  010250               B,STS  MIS,ZIN  ALUF,PASSB           ALUD,SRB
269  010250         IDBS,ALU                        T,NEXT     T,HOLD
270  010250         LWAC CONDENABL;
271  010251
272  010251               B,STS           ALUF,B+1             ALUD,B
273  010251         IDBS,ALU                        T,NEXT     T,HOLD;
274  010252
275  010252  LWAC:  A,STS B,R3   MIS,ZIN  ALUF,PASSA           ALUD,SLB
276  010252         IDBS,ALU                        T,NEXT     T,HOLD;
277  010253
278  010253               B,STS  MIS,ZIN  ALUF,PASSB           ALUD,SRB
279  010253         IDBS,ALU                        T,NEXT     T,HOLD;
280  010254
281  010254         A,R3  B,2             ALUF,ANDDA           ALUD,NONE
282  010254         IDBS,BARG                       T,NEXT     T,HOLD
283  010254         COND,F=0                        F,NEXT     F,HOLD;
284  010255
285  010255         A,STS B,R1            ALUF,A+B             ALUD,B
286  010255         IDBS,ALU                        T,JMP      T,HOLD
287  010255         LWAD CONDENABL;
288  010256
289  010256               B,STS           ALUF,B+1             ALUD,B
290  010256         IDBS,ARG              COMM,LDGPR T,RETURN  T,POP
291  010256         37;
292  010257
293  010257  LWAD:        B,R1            ALUF,B-1             ALUD,B
294  010257         IDBS,ARG              COMM,LDGPR T,RETURN  T,POP
295  010257         37;
296  010260
297  010260  %*****************************************************
298  010260
299  010260  %      SUBROUTINE TO MAKE MASK FOR TOPWORD BCD-OPERANDS
300  010260  %      DESCRIPTOR IN R2, RETURN WITH MASK IN Z.
301  010260
302  010260  TTPWD: A,R2                   ALUF,PASSA           ALUD,NONE
303  010260         IDBS,GPR              COMM,LDLC T,NEXT     T,HOLD
304  010260         COND,F15                        F,NEXT     F,HOLD;
305  010261
306  010261                                                     ALUD,NONE
307  010261         IDBS,ALU                        T,JMP      T,HOLD
308  010261         RIGTB CONDENABL;
309  010262
310  010262         A,R2  B,1             ALUF,ANDDA           ALUD,NONE
311  010262         IDBS,BARG                       T,NEXT     T,HOLD
312  010262         COND,F=0                        F,RETURN   F,POP;
313  010263
314  010263         A,14  B,Z             ALUF,D-1             ALUD,B
315  010263         IDBS,BMG                        T,NEXT     T,HOLD
316  010263         CONDENABL;
317  010264
318  010264               B,0             ALUF,D-1             ALUD,B
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319  010264          IDBS,BARG                       T,RETURN  T,POP;
320  010265
321  010265  RIGTB:  A,R2  B,1          ALUF,ANDDA              ALUD,NONE
322  010265          IDBS,BARG                       T,NEXT    T,HOLD
323  010265          COND,F=0                        F,RETURN  F,POP;
324  010266
325  010266          A,4   B,Z          ALUF,D-1                ALUD,B
326  010266          IDBS,BMG                        T,NEXT    T,HOLD
327  010266          CONDENABL;
328  010267
329  010267          A,10  B,Z          ALUF,D-1                ALUD,B
330  010267          IDBS,BMG                        T,RETURN  T,POP;
331  010270
332  010270
333  010270
334  010270
335  010270
336  010270
337  010270  %*****************************************************
338  010270
339  010270  %   COMMERCIAL INSTRUCTION: COMPARE
340  010270
341  010270  %*****************************************************
342  010270
343  010270
344  010270  COMD:  A,Z   B,R4           ALUF,A+1                ALUD,B
345  010270         IDBS,ARG            COMM,LDGPR T,NEXT       T,HOLD
346  010270         37;
347  010271
348  010271               B,R5          ALUF,PASSD              ALUD,B
349  010271         IDBS,ARG                        T,NEXT    T,HOLD
350  010271         16;
351  010272
352  010272  %*****************************************************
353  010272
354  010272  %       TEST SECOND OPERAND EMPTY
355  010272
356  010272
357  010272         A,T   B,R7          ALUF,ANDDA              ALUD,B
358  010272         IDBS,GPR                        T,NEXT    T,HOLD
359  010272         COND,F=0                        F,NEXT    F,HOLD;
360  010273
361  010273         A,X   B,R1          ALUF,PASSA              ALUD,B
362  010273         IDBS,ALU                        T,JMP     T,HOLD
363  010273         CFIR CONDENABL;
364  010274
365  010274         A,T   B,R2          ALUF,PASSA              ALUD,B
366  010274         IDBS,ALU                        T,JMP     T,PUSH
367  010274         LWA;
368  010275
369  010275  %*****************************************************
370  010275
371  010275  %       IF NOT EMPTY, READ SECOND OPERAND TO XRF(RA,0)
372  010275
373  010275         A,X   B,17          ALUF,A-1                ALUD,Q
374  010275         IDBS,BARG           COMM,LDLC T,NEXT        T,PUSH;
375  010276
376  010276                             ALUF,Q+1                ALUD,Q
377  010276         IDBS,ALU                        T,NEXT    T,HOLD;
378  010277
379  010277         ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD; %*********************
380  010300
381  010300         A,R1  B,LC          ALUF,A-Q-1              ALUD,NONE
382  010300         IDBS,BARG           COMM,LDGPR T,NEXT       T,HOLD
383  010300         COND,F15;
384  010301
385  010301         A,0   B,LC                                  ALUD,NONE
386  010301         IDBS,DBR      XRF   COMM,EWRF T,NEXT        T,POP
387  010301         LCOUNT;
388  010302
389  010302         A,R3  B,R7          ALUF,PASSA              ALUD,B
390  010302         IDBS,ALU                        T,NEXT    T,HOLD;
391  010303
392  010303         A,STS B,R4          ALUF,PASSA              ALUD,B
393  010303         IDBS,ALU                        T,NEXT    T,HOLD;
394  010304
395  010304               B,R5          ALUF,D-1                ALUD,B
396  010304         IDBS,GPR            COMM,LDLC T,NEXT        T,HOLD;
397  010305
398  010305         A,T   B,R2          ALUF,PASSA              ALUD,B
399  010305         IDBS,ALU                        T,JMP     T,PUSH
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400     010305          TTPWD;
401     010306
402     010306          A,0   B,17            ALUF,PASSD          ALUD,Q
403     010306          IDBS,REG       XRF                T,NEXT   T,HOLD;
404     010307
405     010307          A,Z                   ALUF,ANDAQ          ALUD,Q
406     010307          IDBS,ALU                        T,NEXT    T,HOLD;
407     010310
408     010310          A,0   B,17            ALUF,PASSQ          ALUD,NONE
409     010310          IDBS,ALU       XRF    COMM,EWRF T,NEXT    T,HOLD;
410     010311
411     010311                                                     ALUD,NONE
412     010311          IDBS,ARG              COMM,LDGPR T,NEXT    T,HOLD
413     010311          37;
414     010312
415     010312  %*********************************************************
416     010312
417     010312  %       TEST FIRST OPERAND EMPTY
418     010312
419     010312
420     010312  CFIR:   A,D   B,R3            ALUF,ANDDA          ALUD,B
421     010312          IDBS,GPR                        T,NEXT    T,HOLD
422     010312          COND,F=0                        F,JMP     F,HOLD;
423     010313
424     010313          A,A   B,R1            ALUF,PASSA          ALUD,B
425     010313          IDBS,ALU                        T,NEXT    T,HOLD
426     010313          ANEMP CONDENABL;
427     010314
428     010314          A,1   B,17                                ALUD,NONE
429     010314          IDBS,BARG      XRF    COMM,EWRF T,NEXT    T,HOLD;
430     010315
431     010315          A,0   B,STS           ALUF,PASSD          ALUD,B
432     010315          IDBS,BMG                        T,NEXT    T,HOLD;
433     010316
434     010316                B,R6            ALUF,PASSD          ALUD,B
435     010316          IDBS,BARG                       T,JMP     T,HOLD
436     010316          STRPS;
437     010317
438     010317  ANEMP:  A,D   B,R2            ALUF,PASSA          ALUD,B
439     010317          IDBS,ALU                        T,JMP     T,PUSH
440     010317          LWA;
441     010320
442     010320  %*********************************************************
443     010320
444     010320  %       IF NOT EMPTY, READ FIRST OPERAND TO XRF(RA,1)
445     010320
446     010320
447     010320          A,A   B,17            ALUF,A-1            ALUD,Q
448     010320          IDBS,BARG             COMM,LDLC T,NEXT    T,PUSH;
449     010321
450     010321                                ALUF,Q+1            ALUD,Q
451     010321          IDBS,ALU                        T,NEXT    T,HOLD;
452     010322
453     010322          ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD; %**********************
454     010323
455     010323          A,R1  B,LC            ALUF,A-Q-1          ALUD,NONE
456     010323          IDBS,BARG             COMM,LDGPR T,NEXT   T,HOLD
457     010323          COND,F15;
458     010324
459     010324          A,1   B,LC                                ALUD,NONE
460     010324          IDBS,DBR       XRF    COMM,EWRF T,NEXT    T,POP
461     010324          LCOUNT;
462     010325
463     010325                B,R6            ALUF,D-1            ALUD,B
464     010325          IDBS,GPR                        T,NEXT    T,HOLD;
465     010326
466     010326          A,D   B,R2            ALUF.PASSA          ALUD,B
467     010326          IDBS,ALU                        T,JMP     T,PUSH
468     010326          TTPWD;
469     010327
470     010327          A,1   B,17            ALUF,PASSD          ALUD,Q
471     010327          IDBS,REG       XRF                T,NEXT   T,HOLD;
472     010330
473     010330          A,Z                   ALUF,ANDAQ          ALUD,Q
474     010330          IDBS,ALU                        T,NEXT    T,HOLD;
475     010331
476     010331          A,1   B,17            ALUF,PASSQ          ALUD,NONE
477     010331          IDBS,ALU       XRF    COMM,EWRF T,NEXT    T,HOLD;
478     010332
479     010332  STRPS:  A,2   B,Z             ALUF,D-1            ALUD,B
480     010332          IDBS,AARG                       T,NEXT    T,HOLD;
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481   010333
482   010333                B,R5            ALUF,B+1            ALUD,NONE
483   010333          IDBS,ALU              COMM,LDLC T,NEXT    T,HOLD;
484   010334
485   010334          A,R7  B,2             ALUF,ANDDA          ALUD,NONE
486   010334          IDBS,BARG                       T,NEXT    T,HOLD
487   010334          COND,F=0                        F,JMP     F,HOLD;
488   010335
489   010335          A,0   B,LC            ALUF,PASSD          ALUD,Q
490   010335          IDBS,REG       XRF              T,NEXT    T,HOLD
491   010335          CLLBY CONDENABL;
492   010336
493   010336                B,R2            ALUF,ANDDQ          ALUD,B
494   010336          IDBS,ARG                        T,NEXT    T,HOLD
495   010336          17;
496   010337
497   010337          A,0   B,LC            ALUF,MASKAQ         ALUD,NONE
498   010337          IDBS,ALU       XRF    COMM,EWRF T,JMP     T,HOLD
499   010337          STRTW;
500   010340
501   010340  CLLBY:  A,Z   B,R2            ALUF,ANDDA          ALUD,B
502   010340          IDBS,SWAP                       T,NEXT    T,HOLD;
503   010341
504   010341                                ALUF,ANDDQ          ALUD,Q
505   010341          IDBS,ARG                        T,NEXT    T,HOLD
506   010341          170000;
507   010342
508   010342          A,0   B,LC            ALUF,PASSQ          ALUD,NONE
509   010342          IDBS,ALU       XRF    COMM,EWRF T,NEXT    T,HOLD;
510   010343
511   010343  STRTW:        B,R6            ALUF,B+1            ALUD,NONE
512   010343          IDBS,ALU              COMM,LDLC T,JMP     T,PUSH
513   010343          BUNOR;
514   010344
515   010344  %*******************************************************
516   010344
517   010344  %       TEST UNSIGNED OPERANDS AND EQUAL SIGNS
518   010344
519   010344
520   010344          A,Z   B,17            ALUF,A-D            ALUD,NONE
521   010344          IDBS,BARG                       T,NEXT    T,HOLD
522   010344          COND,F=0                        F,JMP     F,HOLD;
523   010345
524   010345          A,L                   ALUF,PASSA          ALUD,Q
525   010345          IDBS,ALU                        T,NEXT    T,HOLD
526   010345          PLUS1 CONDENABL;
527   010346
528   010346                B,Z             ALUF,B-1            ALUD,B
529   010346          IDBS,ALU                        T,NEXT    T,HOLD;
530   010347
531   010347  PLUS1:  A,R2  B,17            ALUF,A-D            ALUD,NONE
532   010347          IDBS,BARG                       T,NEXT    T,HOLD
533   010347          COND,F=0                        F,JMP     F,HOLD;
534   010350
535   010350          A,5   B,13            ALUF,PASSQ          ALUD,NONE
536   010350          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD
537   010350          PLUS2 CONDENABL;
538   010351
539   010351                B,R2            ALUF,B-1            ALUD,B
540   010351          IDBS,ALU                        T,NEXT    T,HOLD;
541   010352
542   010352  PLUS2:  A,Z   B,R2            ALUF,XORAB          ALUD,Q
543   010352          IDBS,ALU                        T,NEXT    T,HOLD;
544   010353
545   010353          A,0                   ALUF,ANDDQ          ALUD,NONE
546   010353          IDBS,BMG                        T,NEXT    T,HOLD
547   010353          COND,F=0                        F,JMP     F,HOLD;
548   010354
549   010354          A,3   B,R2            ALUF,PASSB          ALUD,NONE
550   010354          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD
551   010354          SDIFF CONDENABL;
552   010355
553   010355  %*******************************************************
554   010355
555   010355  %       TEST EQUAL LENGTH
556   010355
557   010355
558   010355          A,R4  B,STS           ALUF,A-B            ALUD,NONE
559   010355          IDBS,ALU                        T,NEXT    T,HOLD
560   010355          COND,F15                        F,NEXT    F,HOLD;
561   010356
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562  010356          A,6                                          ALUD,NONE STS,LO
563  010356          IDBS,BMG                        T,JMP        T,HOLD
564  010356          XTSHO CONDENABL;
565  010357
566  010357          A,R4  B,STS          ALUF,A-B                ALUD,NONE
567  010357          IDBS,ALU                        T,NEXT       T,HOLD
568  010357          COND,F=0                        F,NEXT       F,PUSH;
569  010360
570  010360          A,R5  B,R1           ALUF,A+1                ALUD,B
571  010360          IDBS,ALU                        T,JMP        T,HOLD
572  010360          COMPA CONDENABL;
573  010361
574  010361  %*****************************************************
575  010361
576  010361  %       FIRST OPERAND SHORTEST LENGTH,INSERT ZEROES
577  010361
578  010361                B,R6           ALUF,B+1                ALUD,B
579  010361          IDBS,ALU             COMM,LDLC T,NEXT        T,HOLD;
580  010362
581  010362                B,R5           ALUF,B+1                ALUD,B
582  010362          IDBS,ALU             COMM,LDLC T,NEXT        T,HOLD;
583  010363
584  010363          A,1   B,LC           ALUF,PASSD              ALUD,Q
585  010363          IDBS,REG        XRF             T,NEXT       T,HOLD;
586  010364
587  010364          A,R6  B,17           ALUF,A-D                ALUD,NONE
588  010364          IDBS,BARG                       T,NEXT       T,HOLD
589  010364          COND,F15                        F,NEXT       F,POP;
590  010365
591  010365          A,1   B,LC           ALUF,PASSQ              ALUD,NONE
592  010365          IDBS,ALU        XRF  COMM,EWRF T,RETURN      T,HOLD
593  010365          CONDENABL;
594  010366
595  010366                                                       ALUD,NONE
596  010366          IDBS,ALU                        T,NEXT       T,PUSH;
597  010367
598  010367                B,R5           ALUF,B+1                ALUD,B
599  010367          IDBS,ALU             COMM,LDLC T,NEXT        T,HOLD;
600  010370
601  010370          A,R5  B,17           ALUF,A-D                ALUD,NONE
602  010370          IDBS,BARG                       T,NEXT       T,HOLD
603  010370          COND,F15                        F,JMP        F,POP;
604  010371
605  010371          A,1   B,LC           ALUF,ZERO               ALUD,NONE
606  010371          IDBS,ALU        XRF  COMM,EWRF T,RETURN      T,HOLD
607  010371          COMPA CONDENABL;
608  010372
609  010372
610  010372  %*****************************************************
611  010372
612  010372  %       SECOND OPERAND SHORTEST, INSERT ZEROES
613  010372
614  010372
615  010372  XTSHO:  A,R6  B,R1           ALUF,A+1                ALUD,B
616  010372          IDBS,ALU                        T,NEXT       T,PUSH;
617  010373
618  010373                B,R5           ALUF,B+1                ALUD,B
619  010373          IDBS,ALU             COMM,LDLC T,NEXT        T,HOLD;
620  010374
621  010374                B,R6           ALUF,B+1                ALUD,B
622  010374          IDBS,ALU             COMM,LDLC T,NEXT        T,HOLD;
623  010375
624  010375          A,0   B,LC           ALUF,PASSD              ALUD,Q
625  010375          IDBS,REG        XRF             T,NEXT       T,HOLD;
626  010376
627  010376          A,R5  B,17           ALUF,A-D                ALUD,NONE
628  010376          IDBS,BARG                       T,NEXT       T,HOLD
629  010376          COND,F15                        F,NEXT       F,POP;
630  010377
631  010377          A,0   B,LC           ALUF,PASSQ              ALUD,NONE
632  010377          IDBS,ALU        XRF  COMM,EWRF T,RETURN      T,HOLD
633  010377          CONDENABL;
634  010400
635  010400                                                       ALUD,NONE
636  010400          IDBS,ALU                        T,NEXT       T,PUSH;
637  010401
638  010401                B,R6           ALUF,B+1                ALUD,B
639  010401          IDBS,ALU             COMM,LDLC T,NEXT        T,HOLD;
640  010402
641  010402          A,R6  B,17           ALUF,A-D                ALUD,NONE
642  010402          IDBS,BARG                       T,NEXT       T,HOLD
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643     010402          COND,F15                        F,NEXT     F,POP;
644     010403
645     010403          A,0    B,LC          ALUF,ZERO              ALUD,NONE
646     010403          IDBS,ALU       XRF    COMM,EWRF T,RETURN     T,HOLD
647     010403          CONDENABL;
648     010404
649     010404  %*******************************************************
650     010404
651     010404  %       COMPARE
652     010404
653     010404
654     010404  COMPA:  A,R7   B,R3           ALUF,XORAB             ALUD,Q
655     010404          IDBS,ALU                        T,NEXT     T,HOLD;
656     010405
657     010405          A,1                   ALUF,ANDDQ             ALUD,NONE
658     010405          IDBS,BMG                        T,NEXT     T,HOLD
659     010405          COND,F=0                        F,JMP      F,HOLD;
660     010406
661     010406          A,10   B,Z            ALUF,D-1               ALUD,B
662     010406          IDBS,BMG                        T,NEXT     T,HOLD
663     010406          NOTEB CONDENABL;
664     010407
665     010407  %*******************************************************
666     010407
667     010407  %       BOTH OPERANDS EQUAL BOTTOM BYTE ADDRESS, COMPARE WORDS
668     010407
669     010407               B,17                                  ALUD,NONE
670     010407          IDBS,BARG             COMM,LDLC T,NEXT       T,PUSH;
671     010410
672     010410               B,L              ALUF,PASSD             ALUD,B
673     010410          IDBS,ARG                        T,NEXT     T,HOLD
674     010410          10420;
675     010411
676     010411          A,0    B,LC           ALUF,PASSD             ALUD,Q
677     010411          IDBS,REG       XRF              T,NEXT     T,HOLD;
678     010412
679     010412          A,1    B,LC                                  ALUD,NONE
680     010412          IDBS,REG       XRF    COMM,LDGPR T,JMP       T,PUSH
681     010412          SSUB;
682     010413
683     010413          A,R5                  ALUF,Q-A               ALUD,NONE
684     010413          IDBS,ALU                        T,NEXT     T,HOLD
685     010413          COND,F=0                        F,JMP      F,POP;
686     010414
687     010414          A,R1   B,LC           ALUF,A-D               ALUD,NONE
688     010414          IDBS,BARG                       T,NEXT     T,HOLD
689     010414          UNEQL CONDENABL;
690     010415
691     010415          A,6    B,A            ALUF,ZERO              ALUD,B     STS,LO
692     010415          IDBS,BMG                        T,NEXT     T,POP
693     010415          LCOUNT;
694     010416
695     010416  EXIT:   A,3    B,12           ALUF,PASSD             ALUD,B
696     010416          IDBS,REG                        T,NEXT     T,HOLD;
697     010417
698     010417          A,R2   B,1            ALUF,ANDDA             ALUD,NONE
699     010417          IDBS,BARG                       T,NEXT     T,HOLD
700     010417          COND,F=0                        F,NEXT     F,HOLD;
701     010420
702     010420          A,5    B,13           ALUF,PASSD             ALUD,Q
703     010420          IDBS,REG                        T,JMP      T,HOLD
704     010420          EXITB CONDENABL;
705     010421
706     010421               B,A              ALUF,INVB              ALUD,B
707     010421          IDBS,ALU                        T,NEXT     T,HOLD;
708     010422
709     010422               B,A              ALUF,B+1               ALUD,B
710     010422          IDBS,ALU                        T,NEXT     T,HOLD;
711     010423
712     010423  EXITB:       B,L              ALUF,PASSQ             ALUD,B
713     010423          IDBS,ALU                        T,JMP      T,HOLD
714     010423          EXITC;
715     010424
716     010424
717     010424  %*******************************************************
718     010424
719     010424  %       UNEQUAL, TEST CARRY FROM SUBTACT SUBROUTINE
720     010424
721     010424
722     010424  UNEQL:       B,0              ALUF,D     CRY,C       ALUD,NONE
723     010424          IDBS,BARG                       T,NEXT     T,HOLD
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724   010424          COND,F=0                              F,JMP     F,HOLD;
725   010425
726   010425                                                          ALUD,NONE
727   010425          IDBS,ALU                              T,NEXT    T,HOLD
728   010425          SEOGR CONDENABL;
729   010426
730   010426  FI0GR:  A,0   B,A             ALUF,PASSD              ALUD,B
731   010426          IDBS,BMG                              T,JMP     T,HOLD
732   010426          EXIT;
733   010427
734   010427  %*******************************************************
735   010427
736   010427  %       DIFFERENT SIGNS
737   010427
738   010427
739   010427  SDIFF:        B,17                                      ALUD,NONE
740   010427          IDBS,BARG             COMM,LDLC T,NEXT        T,HOLD;
741   010430
742   010430                B,R4            ALUF,B+1                ALUD,B
743   010430          IDBS,ALU                              T,NEXT    T,PUSH;
744   010431
745   010431          A,0   B,LC            ALUF,PASSD              ALUD,NONE
746   010431          IDBS,REG       XRF                    T,NEXT    T,HOLD
747   010431          COND,F=0                              F,JMP     F,POP;
748   010432
749   010432                B,R4            ALUF,B-1                ALUD,B
750   010432          IDBS,ALU                              T,NEXT    T,HOLD
751   010432          SDIFC CONDENABL;
752   010433
753   010433                                                          ALUD,NONE
754   010433          IDBS,ALU                              T,NEXT    T,POP
755   010433          LCOUNT;
756   010434
757   010434                B,17                                      ALUD,NONE
758   010434          IDBS,BARG             COMM,LDLC T,NEXT        T,HOLD;
759   010435
760   010435                B,STS           ALUF,B+1                ALUD,B
761   010435          IDBS,ALU                              T,NEXT    T,PUSH;
762   010436
763   010436          A,1   B,LC            ALUF,PASSD              ALUD,NONE
764   010436          IDBS,REG          XRF                 T,NEXT    T,HOLD
765   010436          COND,F=0                              F,JMP     F,POP;
766   010437
767   010437                B,STS           ALUF,B-1                ALUD,B
768   010437          IDBS,ALU                              T,NEXT    T,HOLD
769   010437          SDIFC CONDENABL;
770   010440
771   010440                B,A             ALUF,ZERO               ALUD,B
772   010440          IDBS,ALU                              T,JMP     T,POP
773   010440          LCOUNT EXIT;
774   010441
775   010441  SDIFC:  A,Z                   ALUF,ANDDA              ALUD,NONE
776   010441          IDBS,BMG                              T,NEXT    T,HOLD
777   010441          COND,F=0                              F,NEXT    F,HOLD;
778   010442
779   010442          A,3   B,12            ALUF,ZERO               ALUD,NONE
780   010442          IDBS,ALU              COMM,EWRF T,JMP         T,HOLD
781   010442          FIOGR CONDENABL;
782   010443
783   010443  SEOGR:  A,0   B,A             ALUF,D-1                ALUD,B
784   010443          IDBS,AARG                             T,JMP     T,HOLD
785   010443          EXIT;
786   010444
787   010444  %*******************************************************
788   010444
789   010444  %       OPERANDS NOT EQUAL BOTTOM BYTE ADDRESS, COMPARE SWAPPED BYTES
790   010444
791   010444
792   010444  NOTEB:  A,R7  B,2             ALUF,ANDDA              ALUD,NONE
793   010444          IDBS,BARG                             T,NEXT    T,HOLD
794   010444          COND,F=0                              F,JMP     F,HOLD;
795   010445
796   010445          A,6   B,R7            ALUF,ZERO               ALUD,B    STS,LO
797   010445          IDBS,BMG                              T,NEXT    T,HOLD
798   010445          XTHOB CONDENABL;
799   010446
800   010446                B,17                                      ALUD,NONE
801   010446          IDBS,BARG             COMM,LDLC T,NEXT        T,PUSH;
802   010447
803   010447                B,L             ALUF,PASSD              ALUD,B
804   010447          IDBS,ARG                              T,NEXT    T,HOLD
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805     010447          10420;
806     010450
807     010450          A,0   B,LC            ALUF,PASSD          ALUD,Q
808     010450          IDBS,REG        XRF             T,NEXT    T,HOLD;
809     010451
810     010451          A,Z   B,R3            ALUF,ANDDA          ALUD,B
811     010451          IDBS,SWAP                       T,NEXT    T,HOLD;
812     010452
813     010452          A,Z   B,R6            ALUF,ANDAQ          ALUD,B
814     010452          IDBS,ALU                        T,NEXT    T,HOLD;
815     010453
816     010453          A,R7                  ALUF,PASSA          ALUD,NONE
817     010453          IDBS,ALU              COMM,LDGPR T,NEXT   T,HOLD;
818     010454
819     010454                B,R3            ALUF,PASSB          ALUD,Q
820     010454          IDBS,ALU                        T,JMP     T,PUSH
821     010454          SSUB;
822     010455
823     010455          A,R5                  ALUF,Q-A            ALUD,NONE
824     010455          IDBS,ALU                        T,NEXT    T,HOLD
825     010455          COND,F=0                        F,JMP     F,POP;
826     010456
827     010456          A,1   B,LC            ALUF,PASSD          ALUD,Q
828     010456          IDBS,REG        XRF             T,NEXT    T,HOLD
829     010456          UNEQL CONDENABL;
830     010457
831     010457          A,Z   B,R5            ALUF,ANDDA          ALUD,B
832     010457          IDBS,SWAP                       T,NEXT    T,HOLD;
833     010460
834     010460          A,Z   B,R7            ALUF,ANDAQ          ALUD,B
835     010460          IDBS,ALU                        T,NEXT    T,HOLD;
836     010461
837     010461          A,6   B,R6            ALUF,PASSB          ALUD,Q    STS,LO
838     010461          IDBS,BMG                        T,NEXT    T,HOLD;
839     010462
840     010462          A,R5                  ALUF,PASSA          ALUD,NONE
841     010462          IDBS,ALU              COMM,LDGPR T,JMP    T,PUSH
842     010462          SSUB;
843     010463
844     010463          A,R5                  ALUF,Q-A            ALUD,NONE
845     010463          IDBS,ALU                        T,NEXT    T,HOLD
846     010463          COND,F=0                        F,JMP     F,POP;
847     010464
848     010464                                                    ALUD,NONE
849     010464          IDBS,ALU                        T,NEXT    T,HOLD
850     010464          UNEQL CONDENABL;
851     010465
852     010465          A,R1  B,LC            ALUF,D-A-1          ALUD,NONE
853     010465          IDBS,BARG                       T,NEXT    T,HOLD
854     010465          COND,F15;
855     010466
856     010466          A,6   B,A             ALUF,ZERO           ALUD,B    STS,LO
857     010466          IDBS,BMG                        T,JMP     T,POP
858     010466          LCOUNT EXIT;
859     010467
860     010467  XTHOB:        B,17                                ALUD,NONE
861     010467          IDBS,BARG             COMM,LDLC T,NEXT    T,PUSH;
862     010470
863     010470                B,L             ALUF,PASSD          ALUD,B
864     010470          IDBS,ARG                        T,NEXT    T,HOLD
865     010470          10420;
866     010471
867     010471          A,1   B,LC            ALUF,PASSD          ALUD,Q
868     010471          IDBS,REG        XRF             T,NEXT    T,HOLD;
869     010472
870     010472          A,Z   B,R3            ALUF,ANDDA          ALUD,B
871     010472          IDBS,SWAP                       T,NEXT    T,HOLD;
872     010473
873     010473          A,Z   B,R6            ALUF,ANDAQ          ALUD,B
874     010473          IDBS,ALU                        T,NEXT    T,HOLD;
875     010474
876     010474          A,R7                  ALUF,PASSA          ALUD,Q
877     010474          IDBS,ALU                        T,NEXT    T,HOLD;
878     010475
879     010475          A,R3                  ALUF,PASSA          ALUD,NONE
880     010475          IDBS,ALU              COMM,LDGPR T,JMP    T,PUSH
881     010475          SSUB;
882     010476
883     010476          A,R5                  ALUF,Q-A            ALUD,NONE
884     010476          IDBS,ALU                        T,NEXT    T,HOLD
885     010476          COND,F=0                        F,JMP     F,POP;
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886   010477
887   010477          A,0   B,LC              ALUF,PASSD          ALUD,Q
888   010477          IDBS,REG        XRF               T,NEXT    T,HOLD
889   010477          UNEQL CONDENABL;
890   010500
891   010500          A,Z   B,R5              ALUF,ANDDA          ALUD,B
892   010500          IDBS,SWAP                         T,NEXT    T,HOLD;
893   010501
894   010501          A,Z   B,R7              ALUF,ANDAQ          ALUD,B
895   010501          IDBS,ALU                          T,NEXT    T,HOLD;
896   010502 .
897   010502          A,6   B,R5              ALUF,PASSB          ALUD,Q     STS,LO
898   010502          IDBS,BMG                          T,NEXT    T,HOLD;
899   010503
900   010503          A,R6                    ALUF,PASSA          ALUD,NONE
901   010503          IDBS,ALU                COMM,LDGPR T,JMP    T,PUSH
902   010503          SSUB;
903   010504
904   010504          A,R5                    ALUF,Q-A            ALUD,NONE
905   010504          IDBS,ALU                          T,NEXT    T,HOLD
906   010504          COND,F=0                          F,JMP     F,POP;
907   010505
908   010505                                                      ALUD,NONE
909   010505          IDBS,ALU                          T,NEXT    T,HOLD
910   010505          UNEQL CONDENABL;
911   010506
912   010506          A,R1  B,LC              ALUF,D-A-1          ALUD,NONE
913   010506          IDBS,BARG                         T,NEXT    T,HOLD
914   010506          COND,F15;
915   010507
916   010507          A,6   B,A               ALUF,ZERO           ALUD,B     STS,LO
917   010507          IDBS,BMG                          T,JMP     T,POP
918   010507          LCOUNT EXIT;
919   010510
920   010510  BUNOR:  A,R3  B,2               ALUF,ANDDA          ALUD,NONE
921   010510          IDBS,BARG                         T,NEXT    T,HOLD
922   010510          COND,F=0                          F,JMP     F,HOLD;
923   010511
924   010511          A,1   B,LC              ALUF,PASSD          ALUD,Q
925   010511          IDBS,REG        XRF               T,NEXT    T,HOLD
926   010511          RLLBY CONDENABL;
927   010512
928   010512                B,Z               ALUF,ANDDQ          ALUD,B
929   010512          IDBS,ARG                          T,NEXT    T,HOLD
930   010512          17;
931   010513
932   010513                                  ALUF,MASKDQ         ALUD,Q
933   010513          IDBS,ARG                          T,NEXT    T,HOLD
934   010513          17;
935   010514
936   010514          A,1   B,LC              ALUF,PASSQ          ALUD,NONE
937   010514          IDBS,ALU        XRF     COMM,EWRF T,RETURN  T,POP;
938   010515
939   010515  RLLBY:  A,Z   B,Z               ALUF,ANDDA          ALUD,B
940   010515          IDBS,SWAP                         T,NEXT    T,HOLD;
941   010516
942   010516                                  ALUF,ANDDQ          ALUD,Q
943   010516          IDBS,ARG                          T,NEXT    T,HOLD
944   010516          170000;
945   010517
946   010517          A,1   B,LC              ALUF,PASSQ          ALUD,NONE
947   010517          IDBS,ALU        XRF     COMM,EWRF T,RETURN  T,POP;
948   010520
949   010520
950   010520
951   010520
952   010520
953   010520
954   010520
955   010520
956   010520
957   010520  %*******************************************************
958   010520
959   010520  %   COMMERSIAL INSTRUCTION:ADDD (A,D +/- X,T -> A,D)
960   010520
961   010520  %*******************************************************
962   010520
963   010520  SUBD:   A,2   B,11                                    ALUD,NONE
964   010520          IDBS,GPR                COMM,EWRF T,NEXT    T,HOLD;
965   010521
966   010521  ADDE:                                               ALUD,NONE
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 967  010521          IDBS,ARG              COMM,LDGPR T,NEXT   T,HOLD
 968  010521          37;
 969  010522
 970  010522          A,T                   ALUF,ANDDA          ALUD,Q
 971  010522          IDBS,GPR                        T,NEXT    T,HOLD
 972  010522          COND,F=0                        F,JMP     F,HOLD;
 973  010523
 974  010523          A,D   B,R7            ALUF,ANDDA          ALUD,B
 975  010523          IDBS,GPR                        T,NEXT    T,HOLD
 976  010523          SECOP CONDENABL;
 977  010524
 978  010524          A,A   B,R1            ALUF,PASSA          ALUD,B
 979  010524          IDBS,ALU                        T,NEXT    T,HOLD
 980  010524          FIROC CONDENABL;
 981  010525
 982  010525  UTGNG:        B,P             ALUF,B+1            ALUD,B
 983  010525          IDBS,ALU                        T,JMP     T,POP
 984  010525          CONT;
 985  010526
 986  010526  SECOP:  A,5   B,16            ALUF,PASSQ          ALUD,NONE
 987  010526          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
 988  010527
 989  010527          A,5   B,17            ALUF,PASSB          ALUD,NONE
 990  010527          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
 991  010530
 992  010530          A,X   B,R1            ALUF,PASSA          ALUD,B
 993  010530          IDBS,ALU                        T,NEXT    T,HOLD;
 994  010531
 995  010531          A,T   B,R2            ALUF,PASSA          ALUD,B
 996  010531          IDBS,ALU                        T,JMP     T,PUSH
 997  010531          LWA;
 998  010532
 999  010532          A,R1  B,R6            ALUF,PASSA          ALUD,B
1000  010532          IDBS,ALU                        T,NEXT    T,HOLD;
1001  010533
1002  010533          A,STS B,R4            ALUF,PASSA          ALUD,B
1003  010533          IDBS,ALU                        T,NEXT    T,HOLD;
1004  010534
1005  010534          A,R3  B,R7            ALUF,PASSA          ALUD,B
1006  010534          IDBS,ALU                        T,JMP     T,HOLD
1007  010534          TFIRE;
1008  010535
1009  010535
1010  010535  %*******************************************************
1011  010535
1012  010535  %       X,T EMPTY, SET SIGN IN A,D TO 14 (+) OR 15 (-)
1013  010535
1014  010535
1015  010535  FIROC:  A,D   B,R2            ALUF,PASSA          ALUD,B
1016  010535          IDBS,ALU                        T,JMP     T,PUSH
1017  010535          LWA;
1018  010536
1019  010536          A,R1                  ALUF,PASSA          ALUD,NONE
1020  010536          IDBS,ALU                        T,NEXT    T,HOLD;
1021  010537
1022  010537          A,R3  B,2             ALUF,ANDDA          ALUD,NONE
1023  010537          IDBS,BARG       COMM,RDRQ,APT   T,NEXT    T,HOLD    %******************
1024  010537          COND,F=0                        F,NEXT    F,HOLD;
1025  010540
1026  010540                                ALUF,PASSD          ALUD,Q
1027  010540          IDBS,DBR                        T,JMP     T,HOLD
1028  010540          FIROL CONDENABL;
1029  010541
1030  010541                B,R4            ALUF,ANDDQ          ALUD,B
1031  010541          IDBS,ARG              COMM,LDGPR T,NEXT   T,HOLD
1032  010541          7400;
1033  010542
1034  010542                B,R4            ALUF,PASSB          ALUD,NONE
1035  010542          IDBS,ALU                        T,NEXT    T,HOLD;
1036  010543
1037  010543                B,R4            ALUF,PASSD          ALUD,B
1038  010543          IDBS,SWAP                       T,NEXT    T,HOLD;
1039  010544
1040  010544                                ALUF,MASKDQ         ALUD,Q
1041  010544          IDBS,GPR                        T,JMP     T,HOLD
1042  010544          FIROE;
1043  010545
1044  010545  FIROL:        B,R4            ALUF,ANDDQ          ALUD,B
1045  010545          IDBS,ARG              COMM,LDGPR T,NEXT   T,HOLD
1046  010545          17;
1047  010546
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1048  010546                                    ALUF,MASKDQ          ALUD,Q
1049  010546          IDBS,GPR                                T,NEXT    T,HOLD;
1050  010547
1051  010547   FIROE: A,15                                              ALUD,NONE
1052  010547          IDBS,BMG                  COMM,LDGPR T,NEXT       T,HOLD;
1053  010550
1054  010550          A,D                       ALUF,ANDDA              ALUD,NONE
1055  010550          IDBS,GPR                                T,NEXT    T,HOLD
1056  010550          COND,F=0                                F,NEXT    F,HOLD;
1057  010551
1058  010551                                                            ALUD,NONE
1059  010551          IDBS,ALU                                T,JMP     T,HOLD
1060  010551          FIROA CONDENABL;
1061  010552
1062  010552          A,2   B,R4                ALUF,D-1                ALUD,B
1063  010552          IDBS,AARG                               T,JMP     T,HOLD
1064  010552          FIROB;
1065  010553
1066  010553   FIROA: A,R4  B,1                 ALUF,ANDDA              ALUD,NONE
1067  010553          IDBS,BARG                               T,NEXT    T,HOLD
1068  010553          COND,F=0                                F,NEXT    F,HOLD;
1069  010554
1070  010554                B,14                ALUF,PASSD              ALUD,B
1071  010554          IDBS,BARG                                 T,JMP   T,HOLD
1072  010554          FIROB CONDENABL;
1073  010555
1074  010555                B,R4                ALUF,B+1                ALUD,B
1075  010555          IDBS,ALU                                T,NEXT    T,HOLD;
1076  010556
1077  010556   FIROB: A,R3  B,2                 ALUF,ANDDA              ALUD,NONE
1078  010556          IDBS,BARG                               T,NEXT    T,HOLD
1079  010556          COND,F=0                                F,NEXT    F,HOLD;
1080  010557
1081  010557                B,R4                ALUF,PASSB              ALUD,NONE
1082  010557          IDBS,ALU                                T,JMP     T,HOLD
1083  010557          FIOSL CONDENABL;
1084  010560
1085  010560                B,R4                ALUF,PASSD              ALUD,B
1086  010560          IDBS,SWAP                               T,NEXT    T,HOLD;
1087  010561
1088  010561   FIOSL: A,R1                      ALUF,PASSA              ALUD,NONE
1089  010561          IDBS,ALU                                T,NEXT    T,HOLD;
1090  010562
1091  010562          A,R4                      ALUF,ORAQ               ALUD,NONE
1092  010562          IDBS,ALU          COMM,WRRQ,APT  T,JMP            T,HOLD    %********************
1093  010562          UTGNG;
1094  010563
1095  010563   %*****************************************************
1096  010563
1097  010563   %       TEST FIRST OPERAND EMPTY
1098  010563
1099  010563   TFIRE: A,D   B,R3                ALUF,ANDDA              ALUD,B
1100  010563          IDBS,GPR                                T,NEXT    T,HOLD
1101  010563          COND,F=0                                F,JMP     F,HOLD;
1102  010564
1103  010564          A,A   B,R1                ALUF,PASSA              ALUD,B
1104  010564          IDBS,ALU                                T,NEXT    T,HOLD
1105  010564          FIROP CONDENABL;
1106  010565
1107  010565          A,1   B,17                                        ALUD,NONE
1108  010565          IDBS,BARG       XRF       COMM,EWRF T,NEXT        T,HOLD;
1109  010566
1110  010566          A,0   B,STS               ALUF,D                  ALUD,B
1111  010566          IDBS,BMG                                T,JMP     T,HOLD
1112  010566          TNOEQ;
1113  010567
1114  010567   FIROP: A,D   B,R2                ALUF,PASSA              ALUD,B
1115  010567          IDBS,ALU                                T,JMP     T,PUSH
1116  010567          LWA;
1117  010570
1118  010570                B,R1                ALUF,B+1                ALUD,Q
1119  010570          IDBS,ARG                  COMM,LDLC T,NEXT        T,PUSH
1120  010570          17;
1121  010571
1122  010571   %*****************************************************
1123  010571
1124  010571   %       READ FIRST OPERAND TO XRF (RA,1)
1125  010571
1126  010571
1127  010571                                    ALUF,Q-1                ALUD,Q
1128  010571          IDBS,ALU                                T,NEXT    T,HOLD;
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1129    010572
1130    010572          ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD; %**********************
1131    010573
1132    010573          A,A   B,LC            ALUF,Q-A-1          ALUD,NONE
1133    010573          IDBS,BARG             COMM,LDGPR T,NEXT   T,HOLD
1134    010573          COND,F15;
1135    010574
1136    010574          A,1   B,LC                                ALUD,NONE
1137    010574          IDBS,DBR        XRF   COMM,EWRF T,NEXT    T,HOLD
1138    010574          COND,COND;
1139    010575
1140    010575                                ALUF,PASSQ          ALUD,NONE
1141    010575          IDBS,ALU                      T,NEXT      T,HOLD;
1142    010576
1143    010576          A,1   B,LC                                ALUD,NONE
1144    010576          IDBS,REG   XRF        COMM,WRRQ,APT T,NEXT T,POP
1145    010576          LCOUNT;
1146    010577
1147    010577          A,D   B,R2            ALUF,PASSA          ALUD,B
1148    010577          IDBS,ALU                      T,JMP       T,PUSH
1149    010577          TTPWD;
1150    010600
1151    010600                B,Z           ALUF,PASSB          ALUD,Q
1152    010600          IDBS,GPR              COMM,LDLC T,NEXT    T,HOLD;
1153    010601
1154    010601          A,2   B,14            ALUF,PASSQ          ALUD,NONE
1155    010601          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
1156    010602
1157    010602          A,1   B,LC            ALUF,PASSD          ALUD,Q
1158    010602          IDBS,REG       XRF            T,NEXT      T,HOLD;
1159    010603
1160    010603          A,Z   B,R2            ALUF,MASKAQ         ALUD,B
1161    010603          IDBS,ALU                      T,NEXT      T,HOLD;
1162    010604
1163    010604          A,Z                   ALUF,ANDAQ          ALUD,Q
1164    010604          IDBS,ALU                      T,NEXT      T,HOLD;
1165    010605
1166    010605          A,1   B,LC            ALUF,PASSQ          ALUD,NONE
1167    010605          IDBS,ALU       XRF    COMM,EWRF T,NEXT    T,HOLD;
1168    010606
1169    010606          A,2   B,12            ALUF,PASSB          ALUD,NONE
1170    010606          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
1171    010607
1172    010607  TNOEQ:  A,R7  B,R3            ALUF,XORAB          ALUD,Q
1173    010607          IDBS,ALU                      T,NEXT      T,HOLD;
1174    010610
1175    010610          A,1                   ALUF,ANDDQ          ALUD,NONE
1176    010610          IDBS,BMG                      T,NEXT      T,HOLD
1177    010610          COND,F=0                      F,JMP       F,HOLD;
1178    010611
1179    010611          A,10  B,R2            ALUF,D-1            ALUD,B
1180    010611          IDBS,BMG                      T,NEXT      T,HOLD
1181    010611          NOTEQ CONDENABL;
1182    010612
1183    010612  %*****************************************************
1184    010612
1185    010612  %       READ SECOND OPERAND TO XRF (RA,0)
1186    010612
1187    010612
1188    010612                B,R6          ALUF,B+1            ALUD,B
1189    010612          IDBS,ARG              COMM,LDLC T,NEXT    T,PUSH
1190    010612          17;
1191    010613
1192    010613                B,R6          ALUF,B-1            ALUD,B
1193    010613          IDBS,ALU                      T,NEXT      T,HOLD;
1194    010614
1195    010614          A,X   B,R6            ALUF,B-A-1          ALUD,NONE
1196    010614          IDBS,ALU         COMM,RDRQ,APT  T,NEXT    T,HOLD    %*******************
1197    010614          COND,F15;
1198    010615
1199    010615          A,0   B,LC            ALUF,PASSD          ALUD,Q
1200    010615          IDBS,DBR       XRF    COMM,EWRF T,NEXT    T,POP
1201    010615          LCOUNT;
1202    010616
1203    010616                B,LC                                ALUD,NONE
1204    010616          IDBS,BARG             COMM,LDGPR T,NEXT   T,HOLD;
1205    010617
1206    010617          A,T   B,R2            ALUF,PASSA          ALUD,B
1207    010617          IDBS,ALU                      T,JMP       T,PUSH
1208    010617          TTPWD;
1209    010620
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1210    010620              B,R2            ALUF,PASSD          ALUD,B
1211    010620        IDBS,ARG                      T,NEXT      T,HOLD
1212    010620        17;
1213    010621
1214    010621        A,Z   B,LC            ALUF,ANDAQ          ALUD,NONE
1215    010621        IDBS,ALU      XRF     COMM,EWRF T,JMP     T,PUSH
1216    010621        CSAV1;
1217    010622
1218    010622  TSIGN: A,R3  B,2            ALUF,ANDDA          ALUD,NONE
1219    010622        IDBS,BARG                     T,NEXT      T,HOLD
1220    010622        COND,F=0                      F,JMP       F,HOLD;
1221    010623
1222    010623        A,1   B,17            ALUF,PASSD          ALUD,Q
1223    010623        IDBS,REG      XRF             T,NEXT      T,HOLD
1224    010623        SLBYT CONDENABL;
1225    010624
1226    010624  %*****************************************************
1227    010624
1228    010624  %       SIGN IN RIGHT BYTE
1229    010624
1230    010624
1231    010624              B,Z             ALUF,ANDDQ          ALUD,B
1232    010624        IDBS,ARG                      T,NEXT      T,HOLD
1233    010624        17;
1234    010625
1235    010625                              ALUF,MASKDQ         ALUD,Q
1236    010625        IDBS,ARG                      T,NEXT      T,HOLD
1237    010625        17;
1238    010626
1239    010626        A,1   B,17            ALUF,PASSQ          ALUD,NONE
1240    010626        IDBS,ALU      XRF     COMM,EWRF T,NEXT    T,HOLD;
1241    010627
1242    010627        A,0   B,17            ALUF,PASSD          ALUD,Q
1243    010627        IDBS,REG      XRF             T,NEXT      T,HOLD;
1244    010630
1245    010630              B,R2            ALUF,ANDDQ          ALUD,B
1246    010630        IDBS,ARG                      T,NEXT      T,HOLD
1247    010630        17;
1248    010631
1249    010631                              ALUF,MASKDQ         ALUD,Q
1250    010631        IDBS,ARG                      T,NEXT      T,HOLD
1251    010631        17;
1252    010632
1253    010632        A,0   B,17            ALUF,PASSQ          ALUD,NONE
1254    010632        IDBS,ALU      XRF     COMM,EWRF T,JMP     T,HOLD
1255    010632        SIGN;
1256    010633
1257    010633  %*****************************************************
1258    010633
1259    010633  %       SIGN IN LEFT BYTE FIRST OPERAND
1260    010633
1261    010633  SLBYT: A,R2  B,Z             ALUF,ANDDA          ALUD,B
1262    010633        IDBS,SWAP                     T,NEXT      T,HOLD;
1263    010634
1264    010634              B,B             ALUF,ANDDQ          ALUD,B
1265    010634        IDBS,ARG                      T,NEXT      T,HOLD
1266    010634        377;
1267    010635
1268    010635                              ALUF,ANDDQ          ALUD,Q
1269    010635        IDBS,ARG                      T,NEXT      T,HOLD
1270    010635        170000;
1271    010636
1272    010636        A,1   B,17            ALUF,PASSQ          ALUD,NONE
1273    010636        IDBS,ALU      XRF     COMM,EWRF T,NEXT    T,HOLD;
1274    010637
1275    010637        A,0   B,17            ALUF,PASSD          ALUD,Q
1276    010637        IDBS,REG      XRF             T,NEXT      T,HOLD;
1277    010640
1278    010640        A,R2  B,R2            ALUF,ANDDA          ALUD,B
1279    010640        IDBS,SWAP                     T,NEXT      T,HOLD;
1280    010641
1281    010641                              ALUF,ANDDQ          ALUD,Q
1282    010641        IDBS,ARG                      T,NEXT      T,HOLD
1283    010641        170000;
1284    010642
1285    010642        A,0   B,17            ALUF,PASSQ          ALUD,NONE
1286    010642        IDBS,ALU      XRF     COMM,EWRF T,JMP     T,HOLD
1287    010642        SIGN;
1288    010643
1289    010643  %*****************************************************
1290    010643
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1291    010643  %       SWAP SECOND OPERAND WHEN READING TO XRF LEVEL 0
1292    010643
1293    010643
1294    010643  NOTEQ:  A,R7  B,2            ALUF,ANDDA          ALUD,NONE
1295    010643          IDBS,BARG                       T,NEXT      T,HOLD
1296    010643          COND,F=0                        F,NEXT      F,HOLD;
1297    010644
1298    010644          A,R2  B,R7           ALUF,INVA          ALUD,B
1299    010644          IDBS,BARG            COMM,LDLC T,JMP    T,HOLD
1300    010644          BOTWD CONDENABL;
1301    010645
1302    010645          A,R6  B,R6           ALUF,B-1           ALUD,B,YA
1303    010645          IDBS,ALU                        T,NEXT      T,HOLD;
1304    010646
1305    010646                                                  ALUD,NONE
1306    010646          IDBS,ALU        COMM,RDRQ,APT  T,JMP    T,PUSH   %******************
1307    010646          CSAV1;
1308    010647
1309    010647          A,R6  B,X            ALUF,A-B           ALUD,NONE
1310    010647          IDBS,DBR                        T,NEXT      T,HOLD
1311    010647          COND,F15                        F,NEXT      F,HOLD;
1312    010650
1313    010650          A,R2  B,Z            ALUF,ANDDA         ALUD,B
1314    010650          IDBS,SWAP                       T,JMP       T,HOLD
1315    010650          NOTEC CONDENABL;
1316    010651
1317    010651  NTECC:        B,17                                ALUD,NONE
1318    010651          IDBS,BARG            COMM,LDLC T,NEXT   T,PUSH;
1319    010652
1320    010652                B,R6           ALUF,PASSB         ALUD,NONE
1321    010652          IDBS,ALU                        T,NEXT      T,HOLD;
1322    010653
1323    010653          ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD; %**********************
1324    010654
1325    010654                B,R6           ALUF,B-1           ALUD,B
1326    010654          IDBS,DBR                        T,NEXT      T,HOLD;
1327    010655
1328    010655          A,R7  B,R5           ALUF,ANDDA         ALUD,B
1329    010655          IDBS,SWAP            COMM,LDGPR T,NEXT  T,HOLD;
1330    010656
1331    010656          A,R5  B,Z            ALUF,ORAB          ALUD,Q
1332    010656          IDBS,ALU                        T,NEXT      T,HOLD;
1333    010657
1334    010657          A,R2  B,Z            ALUF,ANDDA         ALUD,B
1335    010657          IDBS,GPR                        T,NEXT      T,HOLD;
1336    010660
1337    010660          A,R6  B,X            ALUF,A-B           ALUD,NONE
1338    010660          IDBS,ALU                        T,NEXT      T,HOLD
1339    010660          COND,F15;
1340    010661
1341    010661          A,0   B,LC           ALUF,PASSQ         ALUD,NONE
1342    010661          IDBS,ALU        XRF  COMM,EWRF T,NEXT   T,POP
1343    010661          LCOUNT;
1344    010662
1345    010662  NOTEC:        B,LC                                ALUD,NONE
1346    010662          IDBS,BARG            COMM,LDGPR T,NEXT  T,HOLD;
1347    010663
1348    010663          A,T                  ALUF,PASSA         ALUD,NONE
1349    010663          IDBS,ALU                        T,NEXT      T,HOLD
1350    010663          COND,F15                        F,JMP       F,HOLD;
1351    010664
1352    010664          A,4   B,R2           ALUF,D-1           ALUD,B
1353    010664          IDBS,BMG                        T,NEXT      T,HOLD
1354    010664          TOPWD CONDENABL;
1355    010665
1356    010665          A,T   B,1            ALUF,ANDDA         ALUD,NONE
1357    010665          IDBS,BARG                       T,NEXT      T,HOLD
1358    010665          COND,F=0                        F,NEXT      F,HOLD;
1359    010666
1360    010666                B,R4           ALUF,B-1           ALUD,B
1361    010666          IDBS,GPR             COMM,LDLC T,JMP    T,HOLD
1362    010666          TSIGN CONDENABL;
1363    010667
1364    010667                               ALUF,ANDDQ         ALUD,Q
1365    010667          IDBS,ARG                        T,NEXT      T,HOLD
1366    010667          7777;
1367    010670
1368    010670          A,0   B,LC           ALUF,PASSQ         ALUD,NONE
1369    010670          IDBS,ALU        XRF  COMM,EWRF T,JMP    T,HOLD
1370    010670          TSIGN;
1371    010671
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1372    010671  TOPWD: A,T   B,1            ALUF,ANDDA          ALUD,NONE
1373    010671         IDBS,BARG                        T,NEXT    T,HOLD
1374    010671         COND,F=0                         F,NEXT    F,HOLD;
1375    010672
1376    010672                                                    ALUD,NONE
1377    010672         IDBS,ALU                         T,JMP     T,HOLD
1378    010672         SAVTP CONDENABL;
1379    010673
1380    010673         A,R2  B,Z            ALUF,ANDAB          ALUD,B
1381    010673         IDBS,ALU                         T,NEXT    T,HOLD;
1382    010674
1383    010674  SAVTP: A,0   B,LC           ALUF,PASSA          ALUD,NONE
1384    010674         IDBS,ALU       XRF   COMM,EWRF T,JMP     T,HOLD
1385    010674         TSIGN;
1386    010675
1387    010675  BOTWD:       B,Z           ALUF,ZERO           ALUD,B
1388    010675         IDBS,ALU                         T,JMP     T,PUSH
1389    010675         CSAV1;
1390    010676
1391    010676              B,R4           ALUF,B+1            ALUD,B
1392    010676         IDBS,ALU                         T,JMP     T,HOLD
1393    010676         NTECC;
1394    010677
1395    010677
1396    010677  %*****************************************************
1397    010677
1398    010677  %      TEST UNSIGNED OPERAND AND ADD/SUB
1399    010677
1400    010677
1401    010677  SIGN:  A,R2  B,17           ALUF,A-D            ALUD,NONE
1402    010677         IDBS,BARG            COMM,LDLC T,NEXT    T,HOLD
1403    010677         COND,F=0                         F,JMP     F,HOLD;
1404    010700
1405    010700         A,2   B,11           ALUF,PASSD          ALUD,Q
1406    010700         IDBS,REG                         T,NEXT    T,HOLD
1407    010700         SIGNA CONDENABL;
1408    010701
1409    010701              B,R2           ALUF,B-1            ALUD,B
1410    010701         IDBS,ALU                         T,NEXT    T,HOLD;
1411    010702
1412    010702  SIGNA: A,Z   B,LC           ALUF,A-D            ALUD,NONE
1413    010702         IDBS,BARG                        T,NEXT    T,HOLD
1414    010702         COND,F=0                         F,JMP     F,HOLD;
1415    010703
1416    010703         A,R2                 ALUF,XORAQ          ALUD,Q
1417    010703         IDBS,ALU                         T,NEXT    T,HOLD
1418    010703         SIGNB CONDENABL;
1419    010704
1420    010704         A,Z   B,Z            ALUF,A-1            ALUD,B
1421    010704         IDBS,ALU                         T,NEXT    T,HOLD;
1422    010705
1423    010705  SIGNB: A,R4  B,STS          ALUF,A-B            ALUD,NONE
1424    010705         IDBS,ALU                         T,NEXT    T,HOLD
1425    010705         COND,F15                         F,NEXT    F,HOLD;
1426    010706
1427    010706         A,Z                  ALUF,XORAQ          ALUD,Q
1428    010706         IDBS,ALU                         T,JMP     T,HOLD
1429    010706         SIGNC CONDENABL;
1430    010707
1431    010707         A,STS B,R6           ALUF,PASSA          ALUD,B
1432    010707         IDBS,ALU                         T,JMP     T,HOLD
1433    010707         SIGND;
1434    010710
1435    010710  SIGNC: A,R4  B,R6           ALUF,PASSA          ALUD,B
1436    010710         IDBS,ALU                         T,NEXT    T,HOLD;
1437    010711
1438    010711  SIGND:       B,L           ALUF,PASSD          ALUD,B
1439    010711         IDBS,ARG                         T,NEXT    T,HOLD
1440    010711         10420;
1441    010712
1442    010712         A,0                  ALUF,ANDDQ          ALUD,NONE
1443    010712         IDBS,BMG                         T,NEXT    T,HOLD
1444    010712         COND,F=0                         F,NEXT    F,HOLD;
1445    010713
1446    010713         A,5   B,14                                 ALUD,NONE
1447    010713         IDBS,BARG            COMM,EWRF T,JMP     T,HOLD
1448    010713         ADDA CONDENABL;
1449    010714
1450    010714  %*****************************************************
1451    010714
1452    010714  %      SUBTRACTION
```

```
1453    010714
1454    010714
1455    010714          A,6                                         ALUD,NONE STS,LO
1456    010714          IDBS,BMG                        T,JMP       T,PUSH
1457    010714          SUBDC;
1458    010715
1459    010715          A,1   B,LC          ALUF,PASSQ              ALUD,NONE
1460    010715          IDBS,ALU      XRF   COMM,EWRF T,NEXT        T,HOLD;
1461    010716
1462    010716  SUBDC:  A,1   B,LC          ALUF,PASSD              ALUD,Q
1463    010716          IDBS,REG      XRF             T,NEXT        T,HOLD;
1464    010717
1465    010717          A,0   B,LC                                  ALUD,NONE
1466    010717          IDBS,REG      XRF   COMM,LDGPR T,JMP        T,PUSH
1467    010717          SSUB;
1468    010720
1469    010720                B,R6          ALUF,B-1                ALUD,B
1470    010720          IDBS,ALU                        T,NEXT      T,HOLD
1471    010720          COND,F=0;
1472    010721
1473    010721          A,R5                ALUF,Q-A                ALUD,Q
1474    010721          IDBS,ALU                        T,NEXT      T,POP
1475    010721          LCOUNT;
1476    010722
1477    010722          A,1   B,LC          ALUF,PASSQ              ALUD,NONE
1478    010722          IDBS,ALU      XRF   COMM,EWRF T,NEXT        T,HOLD;
1479    010723
1480    010723          A,5   B,16          ALUF,PASSD              ALUD,Q
1481    010723          IDBS,REG                        T,NEXT      T,HOLD;
1482    010724
1483    010724          A,5   B,17          ALUF,Q-D                ALUD,B
1484    010724          IDBS,REG                        T,NEXT      T,HOLD
1485    010724          COND,F15                        F,NEXT      F,HOLD;
1486    010725
1487    010725          A,R4  B,STS         ALUF,A-B                ALUD,Q
1488    010725          IDBS,ALU                        T,JMP       T,HOLD
1489    010725          FINI CONDENABL;
1490    010726
1491    010726          A,R7                ALUF,PASSA              ALUD,NONE
1492    010726          IDBS,ALU                        T,NEXT      T,HOLD
1493    010726          COND,F=0                        F,NEXT      F,HOLD;
1494    010727
1495    010727                B,R5          ALUF,Q+1                ALUD,B
1496    010727          IDBS,ALU                        T,JMP       T,HOLD
1497    010727          EQLLT CONDENABL;
1498    010730
1499    010730  %*************************************************************
1500    010730
1501    010730  %       FIRST OPERAND SHORTEST
1502    010730
1503    010730
1504    010730                B,R5          ALUF,B-1                ALUD,NONE
1505    010730          IDBS,ALU                        T,NEXT      T,HOLD
1506    010730          COND,F=0                        F,NEXT      F,PUSH;
1507    010731
1508    010731                B,LC          ALUF,ZERO               ALUD,Q
1509    010731          IDBS,BARG           COMM,LDGPR T,JMP        T,HOLD
1510    010731          EQLLT CONDENABL;
1511    010732
1512    010732          A,0   B,LC          ALUF,PASSD              ALUD,NONE
1513    010732          IDBS,REG      XRF             T,NEXT        T,HOLD
1514    010732          COND,F=0                        F,JMP       F,POP;
1515    010733
1516    010733                B,R5          ALUF,B-1                ALUD,B
1517    010733          IDBS,ALU                        T,NEXT      T,HOLD
1518    010733          INVER CONDENABL;
1519    010734
1520    010734                                                      ALUD,NONE
1521    010734          IDBS,ALU                        T,JMP       T,POP
1522    010734          LCOUNT EQLLT;
1523    010735
1524    010735  INVER:                      ALUF,Q      CRY,C       ALUD,NONE
1525    010735          IDBS,GPR            COMM,LDLC T,NEXT        T,HOLD
1526    010735          COND,F=0                        F,NEXT      F,HOLD;
1527    010736
1528    010736          A,2   B,15          ALUF,ZERO               ALUD,NONE
1529    010736          IDBS,ALU            COMM,EWRF T,JMP         T,HOLD
1530    010736          INVWR CONDENABL;
1531    010737
1532    010737          A,R4  B,STS         ALUF,A-B-1              ALUD,NONE
1533    010737          IDBS,ALU                        T,NEXT      T,HOLD
```

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1534    010737          COND,F=0                                F,JMP     F,HOLD;
1535    010740
1536    010740          A,0   B,LC              ALUF,D-1                  ALUD,NONE
1537    010740          IDBS,REG    XRF                   T,NEXT    T,HOLD
1538    010740          INVWR CONDENABL;
1539    010741
1540    010741                                                            ALUD,NONE
1541    010741          IDBS,ALU                              T,NEXT    T,HOLD
1542    010741          INVWR CONDENABL;
1543    010742
1544    010742          A,2   B,15                                        ALUD,NONE
1545    010742          IDBS,BARG               COMM,EWRF  T,JMP    T,HOLD
1546    010742          INVWR;
1547    010743
1548    010743  %*****************************************************
1549    010743
1550    010743  %       OPERANDS HAVE EQUAL LENGTH
1551    010743
1552    010743  EQLLT:        B,0               ALUF,D    CRY,C     ALUD,NONE
1553    010743          IDBS,BARG                           T,NEXT    T,HOLD
1554    010743          COND,F=0                            F,JMP     F,HOLD;
1555    010744
1556    010744                                                            ALUD,NONE
1557    010744          IDBS,ALU                              T,NEXT    T,HOLD
1558    010744          TUSIG CONDENABL;
1559    010745
1560    010745  INVWR:  17 A,STS B,R6           ALUF,PASSA                ALUD,B
1561    010745          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD;
1562    010746
1563    010746                B,R5              ALUF,PASSD                ALUD,B
1564    010746          IDBS,ARG                              T,NEXT    T,HOLD
1565    010746          360;
1566    010747
1567    010747                B,R4              ALUF,PASSD                ALUD,B
1568    010747          IDBS,ARG                              T,NEXT    T,HOLD
1569    010747          170000;
1570    010750
1571    010750                B,R7              ALUF,PASSD                ALUD,B
1572    010750          IDBS,ARG                              T,NEXT    T,HOLD
1573    010750          7400;
1574    010751
1575    010751          A,1   B,17                                        ALUD,NONE
1576    010751          IDBS,REG       XRF      COMM,LDGPR T,JMP    T,PUSH
1577    010751          INVWS;
1578    010752
1579    010752                B,17              ALUF,PASSD                ALUD,Q
1580    010752          IDBS,BARG                             T,NEXT    T,HOLD;
1581    010753
1582    010753          A,1   B,LC              ALUF,ANDDQ                ALUD,NONE
1583    010753          IDBS,REG       XRF      COMM,LDGPR T,JMP    T,HOLD
1584    010753          INVSS;
1585    010754
1586    010754  INVWS:                          ALUF,ZERO                 ALUD,NONE
1587    010754          IDBS,ALU                              T,NEXT    T,HOLD
1588    010754          COND,F=0                              F,JMP     F,POP;
1589    010755
1590    010755  INVSS:  A,R5                    ALUF,ANDDA                ALUD,NONE
1591    010755          IDBS,GPR                              T,NEXT    T,HOLD
1592    010755          INVQ CONDENABL;
1593    010756
1594    010756          A,R7                    ALUF,ANDDA                ALUD,NONE
1595    010756          IDBS,GPR                              T,NEXT    T,HOLD
1596    010756          INVR CONDENABL;
1597    010757
1598    010757          A,R4                    ALUF,ANDDA                ALUD,NONE
1599    010757          IDBS,GPR                              T,NEXT    T,HOLD
1600    010757          INVS CONDENABL;
1601    010760
1602    010760                B,R6              ALUF,B-1                  ALUD,B
1603    010760          IDBS,ALU                              T,NEXT    T,HOLD
1604    010760          INVT CONDENABL;
1605    010761
1606    010761                                                            ALUD,NONE
1607    010761          IDBS,ALU                              T,JMP     T,POP
1608    010761          LCOUNT TUSIG;
1609    010762
1610    010762  INVQ:                           ALUF,PASSD                ALUD,Q
1611    010762          IDBS,ARG                              T,NEXT    T,HOLD
1612    010762          114633;
1613    010763
1614    010763                B,R6              ALUF,B-1                  ALUD,B
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1615    010763          IDBS,ALU                        T,JMP     T,HOLD
1616    010763          INVWC;
1617    010764
1618    010764  INVR:                           ALUF,PASSD        ALUD,Q
1619    010764          IDBS,ARG                        T,NEXT    T,HOLD
1620    010764          114641;
1621    010765
1622    010765               B,R6               ALUF,B-1          ALUD,B
1623    010765          IDBS,ALU                        T,JMP     T,HOLD
1624    010765          INVWC;
1625    010766
1626    010766  INVS:                           ALUF,PASSD        ALUD,Q
1627    010766          IDBS,ARG                        T,NEXT    T,HOLD
1628    010766          115001;
1629    010767
1630    010767               B,R6               ALUF,B-1          ALUD,B
1631    010767          IDBS,ALU                        T,JMP     T,HOLD
1632    010767          INVWC;
1633    010770
1634    010770  INVT:                           ALUF,PASSD        ALUD,Q
1635    010770          IDBS,ARG                        T,NEXT    T,HOLD
1636    010770          120001;
1637    010771
1638    010771  INVWC:       B,R6               ALUF,B+1          ALUD,B    STS,EA
1639    010771          IDBS,ALU                        T,JMP     T,PUSH
1640    010771          INVCC;
1641    010772
1642    010772                                  ALUF,PASSD        ALUD,Q
1643    010772          IDBS,ARG                        T,NEXT    T,HOLD
1644    010772          114631;
1645    010773
1646    010773  INVCC: A,1   B,LC               ALUF,ZERO         ALUD,NONE
1647    010773          IDBS,REG        XRF     COMM,LDGPR T,JMP  T,PUSH
1648    010773          SSUB;
1649    010774
1650    010774          A,R5                    ALUF,Q-A          ALUD,Q
1651    010774          IDBS,ALU                        T,NEXT    T,HOLD;
1652    010775
1653    010775               B,R6               ALUF,B-1          ALUD,B
1654    010775          IDBS,ALU                        T,NEXT    T,HOLD
1655    010775          COND,F=0;
1656    010776
1657    010776          A,1   B,LC              ALUF,PASSQ        ALUD,NONE
1658    010776          IDBS,ALU        XRF     COMM,EWRF T,NEXT  T,POP
1659    010776          LCOUNT;
1660    010777
1661    010777          A,Z   B,Z               ALUF,XORDA        ALUD,B
1662    010777          IDBS,BMG                        T,JMP     T,HOLD
1663    010777          TUSIG;
1664    011000
1665    011000
1666    011000  %*************************************************************
1667    011000
1668    011000  %       SECOND OPERAND SHORTEST
1669    011000
1670    011000
1671    011000  FINI:        B,0                ALUF,D    CRY,C     ALUD,NONE
1672    011000          IDBS,BARG                       T,NEXT    T,HOLD
1673    011000          COND,F=0                        F,JMP     F,HOLD;
1674    011001
1675    011001          A,0   B,R6              ALUF,-Q           ALUD,B    STS,LO
1676    011001          IDBS,AARG                       T,NEXT    T,HOLD
1677    011001          TUSIG CONDENABL;
1678    011002
1679    011002                                  ALUF,PASSQ        ALUD,NONE
1680    011002          IDBS,ALU                        T,NEXT    T,HOLD
1681    011002          COND,F=0                        F,NEXT    F,PUSH;
1682    011003
1683    011003               B,0                                  ALUD,NONE
1684    011003          IDBS,BARG               COMM,LDGPR T,JMP  T,HOLD
1685    011003          INVWR CONDENABL;
1686    011004
1687    011004                                                   ALUD,NONE
1688    011004          IDBS,ALU                        T,NEXT    T,HOLD;
1689    011005
1690    011005          A,1   B,LC              ALUF,PASSD        ALUD,Q
1691    011005          IDBS,REG        XRF             T,JMP     T,PUSH
1692    011005          SSUB;
1693    011006
1694    011006          A,R5                    ALUF,Q-A          ALUD,Q
1695    011006          IDBS,ALU                        T,NEXT    T,HOLD;
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1696    011007
1697    011007              B,0             ALUF,D    CRY,C     ALUD,NONE
1698    011007          IDBS,BARG                     T,NEXT    T,HOLD
1699    011007          COND,F=0                      F,JMP     F,POP;
1700    011010
1701    011010          A,1   B,LC          ALUF,PASSQ          ALUD,NONE
1702    011010          IDBS,ALU      XRF   COMM,EWRF T,NEXT    T,HOLD
1703    011010          TUSIG CONDENABL;
1704    011011
1705    011011              B,R6            ALUF,B-1            ALUD,B
1706    011011          IDBS,ALU                      T,NEXT    T,HOLD
1707    011011          COND,F=0;
1708    011012
1709    011012          A,0                                     ALUD,NONE STS,LO
1710    011012          IDBS,AARG                     T,JMP     T,POP
1711    011012          LCOUNT INVWR;
1712    011013
1713    011013  %*******************************************************
1714    011013
1715    011013  %       ADD, OPERANDS EQUAL LENGTH
1716    011013
1717    011013
1718    011013  LIKE:        B,0             ALUF,D    CRY,C     ALUD,NONE
1719    011013          IDBS,BARG                     T,NEXT    T,HOLD
1720    011013          COND,F=0                      F,JMP     F,HOLD;
1721    011014
1722    011014          A,R1                ALUF,PASSA          ALUD,NONE
1723    011014          IDBS,ALU            COMM,LDGPR T,NEXT   T,HOLD
1724    011014          OVERF CONDENABL;
1725    011015
1726    011015  TUSIG:  A,5   B,17          ALUF,PASSD          ALUD,NONE
1727    011015          IDBS,REG                      T,NEXT    T,HOLD
1728    011015          COND,F=0                      F,JMP     F,HOLD;
1729    011016
1730    011016          A,15                                    ALUD,NONE
1731    011016          IDBS,BMG            COMM,LDGPR T,NEXT   T,HOLD
1732    011016          ATOVE CONDENABL;
1733    011017
1734    011017          A,2   B,15          ALUF,PASSD          ALUD,NONE
1735    011017          IDBS,REG                      T,NEXT    T,HOLD
1736    011017          COND,F=0                      F,NEXT    F,HOLD;
1737    011020
1738    011020          A,1   B,17          ALUF,PASSD          ALUD,Q
1739    011020          IDBS,REG      XRF             T,JMP     T,HOLD
1740    011020          DECP CONDENABL;
1741    011021
1742    011021                                                  ALUD,NONE
1743    011021          IDBS,ALU                      T,JMP     T,HOLD
1744    011021          EXITD CONDENABL;
1745    011022
1746    011022  DECP:       B,P             ALUF,B-1            ALUD,B
1747    011022          IDBS,ALU                      T,JMP     T,HOLD
1748    011022          EXITD;
1749    011023
1750    011023  ATOVE:  A,D                 ALUF,ANDDA          ALUD,NONE
1751    011023          IDBS,GPR                      T,NEXT    T,HOLD
1752    011023          COND,F=0                      F,NEXT    F,HOLD;
1753    011024
1754    011024              B,14            ALUF,PASSD          ALUD,Q
1755    011024          IDBS,BARG                     T,JMP     T,HOLD
1756    011024          TSIGF CONDENABL;
1757    011025
1758    011025          A,2   B,Z           ALUF,D-1            ALUD,B
1759    011025          IDBS,AARG                     T,JMP     T,HOLD
1760    011025          NOCAR;
1761    011026
1762    011026  TSIGF:  A,Z   B,1           ALUF,ANDDA          ALUD,NONE
1763    011026          IDBS,BARG                     T,NEXT    T,HOLD
1764    011026          COND,F=0                      F,NEXT    F,HOLD;
1765    011027
1766    011027              B,Z             ALUF,PASSQ          ALUD,B
1767    011027          IDBS,ALU                      T,JMP     T,HOLD
1768    011027          NOCAR CONDENABL;
1769    011030
1770    011030              B,Z             ALUF,Q+1            ALUD,B
1771    011030          IDBS,ALU                      T,NEXT    T,HOLD;
1772    011031
1773    011031  NOCAR:  A,R3  B,2           ALUF,ANDDA          ALUD,NONE
1774    011031          IDBS,BARG                     T,NEXT    T,HOLD
1775    011031          COND,F=0                      F,JMP     F,HOLD;
1776    011032
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1777    011032          A,1   B,17            ALUF,PASSD          ALUD,Q
1778    011032          IDBS,REG      XRF               T,NEXT    T,HOLD
1779    011032          LFTBY CONDENABL;
1780    011033
1781    011033          A,Z                     ALUF,ORAQ           ALUD,Q
1782    011033          IDBS,ALU                          T,JMP     T,HOLD
1783    011033          TEFIN;
1784    011034
1785    011034  LFTBY:  A,Z                     ALUF,PASSA          ALUD,NONE
1786    011034          IDBS,ALU                          T,NEXT    T,HOLD;
1787    011035
1788    011035                                  ALUF,ORDQ           ALUD,Q
1789    011035          IDBS,SWAP                         T,NEXT    T,HOLD;
1790    011036
1791    011036                                  ALUF,MASKDQ         ALUD,Q
1792    011036          IDBS,ARG                          T,NEXT    T,HOLD
1793    011036          377;
1794    011037
1795    011037          A,B                     ALUF,ORAQ           ALUD,Q
1796    011037          IDBS,ALU                          T,NEXT    T,HOLD;
1797    011040
1798    011040  TEFIN:  A,1   B,17              ALUF,PASSQ          ALUD,NONE
1799    011040          IDBS,ALU      XRF       COMM,EWRF T,NEXT    T,HOLD;
1800    011041
1801    011041          A,2   B,16                                  ALUD,NONE STS,LO
1802    011041          IDBS,REG                          T,NEXT    T,HOLD;
1803    011042
1804    011042          A,R1  B,A               ALUF,A-B            ALUD,NONE
1805    011042          IDBS,ALU                          T,NEXT    T,HOLD
1806    011042          COND,F=0                          F,NEXT    F,PUSH;
1807    011043
1808    011043                B,17                                  ALUD,NONE
1809    011043          IDBS,BARG               COMM,LDLC T,JMP     T,HOLD
1810    011043          SKRVC CONDENABL;
1811    011044
1812    011044          A,R1                    ALUF,PASSA          ALUD,NONE
1813    011044          IDBS,ALU                          T,NEXT    T,HOLD;
1814    011045
1815    011045          A,1   B,LC                                  ALUD,NONE
1816    011045          IDBS,REG        XRF COMM,WRRQ,APT T,NEXT    T,HOLD; %**********************
1817    011046
1818    011046          A,R1  B,A               ALUF,A-B-1          ALUD,NONE
1819    011046          IDBS,ALU                          T,NEXT    T,HOLD
1820    011046          COND,F=0;
1821    011047
1822    011047                B,R1              ALUF,B-1            ALUD,B
1823    011047          IDBS,ALU                COMM,LDGPR T,NEXT   T,POP
1824    011047          LCOUNT;
1825    011050
1826    011050  SKRVC:  A,2   B,15              ALUF,PASSD          ALUD,NONE
1827    011050          IDBS,REG                          T,NEXT    T,HOLD
1828    011050          COND,F=0                          F,NEXT    F,HOLD;
1829    011051
1830    011051          A,1   B,LC              ALUF,PASSD          ALUD,Q
1831    011051          IDBS,REG        XRF               T,JMP     T,HOLD
1832    011051          OVFLO CONDENABL;
1833    011052
1834    011052          A,2   B,14              ALUF,MASKDQ         ALUD,NONE
1835    011052          IDBS,REG                          T,NEXT    T,HOLD
1836    011052          COND,F=0                          F,NEXT    F,HOLD;
1837    011053
1838    011053          A,2   B,14              ALUF,ANDDQ          ALUD,Q
1839    011053          IDBS,REG                          T,JMP     T,HOLD
1840    011053          USAVE CONDENABL;
1841    011054
1842    011054  OVFLO:        B,P               ALUF,B-1            ALUD,B
1843    011054          IDBS,ALU                          T,NEXT    T,HOLD;
1844    011055
1845    011055          A,2   B,14              ALUF,ANDDQ          ALUD,Q
1846    011055          IDBS,REG                          T,NEXT    T,HOLD;
1847    011056
1848    011056  USAVE:  A,2   B,12              ALUF,ORDQ           ALUD,Q
1849    011056          IDBS,REG                          T,NEXT    T,HOLD;
1850    011057
1851    011057                B,A               ALUF,PASSB          ALUD,NONE
1852    011057          IDBS,ALU                          T,NEXT    T,HOLD;
1853    011060
1854    011060                                  ALUF,PASSQ          ALUD,NONE
1855    011060          IDBS,ALU          COMM,WRRQ,APT   T,NEXT    T,HOLD;   %****************
1856    011061
1857    011061  EXITD:                         ALUF,PASSQ          ALUD,NONE
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1858    011061          IDBS,ALU                                T,JMP     T,PUSH
1859    011061          CUSV1;
1860    011062
1861    011062  EXITC:  A,2   B,16                                        ALUD,NONE STS,LO
1862    011062          IDBS,REG                                T,JMP     T,HOLD
1863    011062          UTGNG;
1864    011063
1865    011063
1866    011063
1867    011063
1868    011063  %*******************************************************
1869    011063
1870    011063  %       ADDITION
1871    011063
1872    011063
1873    011063  ADDA:   A,0                                               ALUD,NONE STS,LO
1874    011063          IDBS,AARG                               T,JMP     T,PUSH
1875    011063          ADDCC;
1876    011064
1877    011064          A,1   B,LC              ALUF,PASSQ                ALUD,NONE
1878    011064          IDBS,ALU        XRF     COMM,EWRF T,NEXT          T,HOLD;
1879    011065
1880    011065  ADDCC:  A,1   B,LC              ALUF,PASSD                ALUD,Q
1881    011065          IDBS,REG        XRF             T,NEXT            T,HOLD;
1882    011066
1883    011066          A,0   B,LC                                        ALUD,NONE
1884    011066          IDBS,REG        XRF     COMM,LDGPR T,JMP          T,PUSH
1885    011066          SADD;
1886    011067
1887    011067                B,R6              ALUF,B-1                  ALUD,B
1888    011067          IDBS,ALU                        T,NEXT            T,HOLD
1889    011067          COND,F=0;
1890    011070
1891    011070          A,R5                    ALUF,Q-A                  ALUD,Q
1892    011070          IDBS,ALU                        T,NEXT            T,POP
1893    011070          LCOUNT;
1894    011071
1895    011071  ADSLT:  A,1   B,LC              ALUF,PASSQ                ALUD,NONE
1896    011071          IDBS,ALU        XRF     COMM,EWRF T,NEXT          T,HOLD;
1897    011072
1898    011072          A,5   B,16              ALUF,PASSD                ALUD,Q
1899    011072          IDBS,REG                        T,NEXT            T,HOLD;
1900    011073
1901    011073          A,5   B,17              ALUF,D-Q                  ALUD,B
1902    011073          IDBS,REG                        T,NEXT            T,HOLD
1903    011073          COND,F15                        F,JMP             F,HOLD;
1904    011074
1905    011074          A,R4  B,STS             ALUF,A-B                  ALUD,Q
1906    011074          IDBS,ALU                        T,NEXT            T,HOLD
1907    011074          ADSLC CONDENABL;
1908    011075
1909    011075  %*******************************************************
1910    011075
1911    011075  %       FIRST OPERAND SHORTEST
1912    011075
1913    011075                B,0               ALUF,D    CRY,C           ALUD,NONE
1914    011075          IDBS,BARG                       T,NEXT            T,HOLD
1915    011075          COND,F=0                        F,JMP             F,HOLD;
1916    011076
1917    011076                B,R6              ALUF,Q+1                  ALUD,B
1918    011076          IDBS,ALU                        T,NEXT            T,HOLD
1919    011076          OVERF CONDENABL;
1920    011077
1921    011077                                  ALUF,PASSQ                ALUD,NONE
1922    011077          IDBS,ALU                        T,NEXT            T,HOLD
1923    011077          COND,F=0                        F,NEXT            F,PUSH;
1924    011100
1925    011100                                                            ALUD,NONE
1926    011100          IDBS,ALU                        T,JMP             T,HOLD
1927    011100          TUSIG CONDENABL;
1928    011101
1929    011101          A,0   B,LC              ALUF,PASSD                ALUD,NONE
1930    011101          IDBS,REG        XRF             T,NEXT            T,HOLD
1931    011101          COND,F=0                        F,JMP             F,POP;
1932    011102
1933    011102                B,R6              ALUF,B-1                  ALUD,B
1934    011102          IDBS,ALU                        T,NEXT            T,HOLD
1935    011102          OVERF CONDENABL;
1936    011103
1937    011103                                                            ALUD,NONE
1938    011103          IDBS,ALU                        T,JMP             T,POP
```

```
1939  011103          LCOUNT TUSIG;
1940  011104
1941  011104  %*******************************************************
1942  011104
1943  011104  %       SECOND OPERAND SHORTEST
1944  011104
1945  011104   .
1946  011104  ADSLC: A,R7                    ALUF,PASSA          ALUD,NONE
1947  011104         IDBS,ALU                          T,NEXT    T,HOLD
1948  011104         COND,F=0                          F,NEXT    F,HOLD;
1949  011105
1950  011105         A,STS B,R4              ALUF,A-B            ALUD,Q
1951  011105         IDBS,ALU                          T,JMP     T,HOLD
1952  011105         LIKE CONDENABL;
1953  011106
1954  011106              B,0                ALUF,D    CRY,C     ALUD,NONE
1955  011106         IDBS,BARG                         T,NEXT    T,HOLD
1956  011106         COND,F=0                          F,NEXT    F,PUSH;
1957  011107
1958  011107              B,R6               ALUF,PASSQ          ALUD,B
1959  011107         IDBS,ALU                          T,JMP     T,HOLD
1960  011107         TUSIG CONDENABL;
1961  011110
1962  011110              B,0                                   ALUD,NONE
1963  011110         IDBS,BARG               COMM,LDGPR T,JMP    T,HOLD
1964  011110         OVERF CONDENABL;
1965  011111
1966  011111                                                    ALUD,NONE
1967  011111         IDBS,ALU                          T,NEXT    T,HOLD;
1968  011112
1969  011112         A,1   B,LC              ALUF,PASSD          ALUD,Q
1970  011112         IDBS,REG      XRF                 T,JMP     T,PUSH
1971  011112         SADD;
1972  011113
1973  011113         A,R5                    ALUF,Q-A            ALUD,Q
1974  011113         IDBS,ALU                          T,NEXT    T,HOLD;
1975  011114
1976  011114              B,0                ALUF,D    CRY,C     ALUD,NONE
1977  011114         IDBS,BARG                         T,NEXT    T,HOLD
1978  011114         COND,F=0                          F,NEXT    F,HOLD;
1979  011115
1980  011115         A,1   B,LC              ALUF,PASSQ          ALUD,NONE
1981  011115         IDBS,ALU        XRF     COMM,EWRF T,JMP     T,POP
1982  011115         TUSIG CONDENABL;
1983  011116
1984  011116              B,R6               ALUF,B-1            ALUD,B
1985  011116         IDBS,ALU                          T,NEXT    T,HOLD
1986  011116         COND,F=0;
1987  011117
1988  011117         A,1   B,LC              ALUF,PASSQ          ALUD,NONE
1989  011117         IDBS,ALU        XRF     COMM,EWRF T,NEXT    T,POP
1990  011117         LCOUNT;
1991  011120
1992  011120  OVERF: A,2   B,15              ALUF,ZERO           ALUD,NONE
1993  011120         IDBS,ALU                COMM,EWRF T,JMP     T,HOLD
1994  011120         TUSIG;
1995  011121
1996  011121
1997  011121
1998  011121
1999  011121
2000  011121  %*******************************************************
2001  011121
2002  011121  %   COMMERCIAL INSTRUCTION: SHIFT
2003  011121
2004  011121  %*******************************************************
2005  011121
2006  011121  SHDE:                                                 ALUD,NONE
2007  011121         IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
2008  011121         37;
2009  011122
2010  011122         A,T                     ALUF,ANDDA          ALUD,NONE
2011  011122         IDBS,GPR                          T,NEXT    T,HOLD
2012  011122         COND,F=0                          F,JMP     F,HOLD;
2013  011123
2014  011123         A,D                     ALUF,ANDDA          ALUD,Q
2015  011123         IDBS,GPR                          T,NEXT    T,HOLD
2016  011123         STNOE CONDENABL;
2017  011124
2018  011124                                                    ALUD,NONE
2019  011124         IDBS,ALU                          T,NEXT    T,HOLD
```

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2020    011124          SAEMP CONDENABL;
2021    011125
2022    011125                B,P             ALUF,B+1            ALUD,B
2023    011125          IDBS,ALU                        T,JMP       T,POP
2024    011125          CONT;
2025    011126
2026    011126  %*****************************************************
2027    011126
2028    011126  %       X,T-OPERAND NOT EMPTY, READ FIRST AND LAST WORD
2029    011126
2030    011126  STNOE:  A,X   B,R1              ALUF,PASSA          ALUD,B
2031    011126          IDBS,ALU                        T,NEXT      T,HOLD;
2032    011127
2033    011127          A,T   B,R2              ALUF,PASSA          ALUD,B
2034    011127          IDBS,ALU                        T,JMP       T,PUSH
2035    011127          LWA;
2036    011130
2037    011130          A,R1  B,R2              ALUF,ZERO           ALUD,B,YA
2038    011130          IDBS,ALU                        T,NEXT      T,HOLD;
2039    011131
2040    011131          A,R3  B,2               ALUF,ANDDA          ALUD,NONE
2041    011131          IDBS,BARG         COMM,RDRQ,APT T,NEXT      T,HOLD    %*****************
2042    011131          COND,F=0                        F,NEXT      F,HOLD;
2043    011132
2044    011132                                  ALUF,PASSD          ALUD,Q
2045    011132          IDBS,DBR                        T,NEXT      T,HOLD
2046    011132          COND,COND                       F,NEXT      F,HOLD;
2047    011133
2048    011133          A,R1                    ALUF,PASSA          ALUD,NONE
2049    011133          IDBS,ALU                        T,NEXT      T,HOLD;
2050    011134
2051    011134                                  ALUF,PASSQ          ALUD,NONE
2052    011134          IDBS,ALU                COMM,WRRQ,APT T,JMP T,HOLD
2053    011134          RFIRW CONDENABL;
2054    011135
2055    011135                B,R2              ALUF,ANDDQ          ALUD,B
2056    011135          IDBS,ARG                        T,NEXT      T,HOLD
2057    011135          377;
2058    011136
2059    011136  RFIRW:  A,2   B,R2              ALUF,PASSB          ALUD,NONE
2060    011136          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2061    011137
2062    011137          A,STS B,R4              ALUF,PASSA          ALUD,B
2063    011137          IDBS,ALU                        T,NEXT      T,HOLD;
2064    011140
2065    011140          A,R1  B,R6              ALUF,PASSA          ALUD,B
2066    011140          IDBS,ALU                        T,NEXT      T,HOLD;
2067    011141
2068    011141          A,R3  B,R7              ALUF,PASSA          ALUD,B
2069    011141          IDBS,ALU                        T,NEXT      T,HOLD;
2070    011142
2071    011142          A,X                     ALUF,PASSA          ALUD,NONE
2072    011142          IDBS,ALU                        T,NEXT      T,HOLD;
2073    011143
2074    011143          A,T   B,R2              ALUF,PASSA          ALUD,B
2075    011143          IDBS,ALU          COMM,RDRQ,APT T,JMP       T,PUSH    %*****************
2076    011143          TTPWD;
2077    011144
2078    011144          A,Z   B,STS             ALUF,ZERO           ALUD,B,YA
2079    011144          IDBS,ALU                COMM,LDGPR T,NEXT   T,HOLD;
2080    011145
2081    011145          A,2   B,14                                  ALUD,NONE
2082    011145          IDBS,GPR                COMM,EWRF T,NEXT    T,HOLD;
2083    011146
2084    011146                B,Z               ALUF,INVB           ALUD,B
2085    011146          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
2086    011146          37;
2087    011147
2088    011147                                  ALUF,PASSD          ALUD,Q
2089    011147          IDBS,DBR                        T,NEXT      T,HOLD;
2090    011150
2091    011150          A,X                     ALUF,PASSA          ALUD,NONE
2092    011150          IDBS,ALU                        T,NEXT      T,HOLD;
2093    011151
2094    011151                                  ALUF,PASSQ          ALUD,NONE
2095    011151          IDBS,ALU                COMM,WRRQ,APT T,NEXT T,HOLD;
2096    011152
2097    011152          A,Z                     ALUF,ANDAQ          ALUD,Q
2098    011152          IDBS,ALU                        T,NEXT      T,HOLD;
2099    011153
2100    011153          A,2   B,11              ALUF,PASSQ          ALUD,NONE
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2101    011153          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2102    011154
2103    011154  SAEMP:  A,D   B,R3               ALUF,ANDDA          ALUD,B
2104    011154          IDBS,GPR                        T,NEXT      T,HOLD
2105    011154          COND,F=0                        F,NEXT      F,HOLD;
2106    011155
2107    011155          A,A   B,R1              ALUF,A              ALUD,B    STS,EA
2108    011155          IDBS,ALU                        T,JMP       T,HOLD
2109    011155          SHCON CONDENABL;
2110    011156
2111    011156          A,D   B,R2              ALUF,PASSA          ALUD,B
2112    011156          IDBS,ALU                        T,JMP       T,PUSH
2113    011156          LWA;
2114    011157
2115    011157  %*****************************************************
2116    011157
2117    011157  %       COMPUTE SHIFT COUNT FROM THE DIFFERENCE IN
2118    011157  %       DECIMAL POSITION OF THE OPERANDS
2119    011157
2120    011157
2121    011157  SHCON:  A,R3  B,3               ALUF,PASSA          ALUD,Q
2122    011157          IDBS,BARG               COMM,LDLC T,NEXT    T,HOLD
2123    011157          COND,LC=0;
2124    011160
2125    011160                B,R5              ALUF,PASSQ          ALUD,B
2126    011160          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
2127    011160          1740;
2128    011161
2129    011161          A,D                     ALUF,ANDDA          ALUD,Q
2130    011161          IDBS,GPR                        T,NEXT      T,HOLD;
2131    011162
2132    011162          A,T   B,R2              ALUF,ANDDA          ALUD,B
2133    011162          IDBS,GPR                        T,NEXT      T,PUSH;
2134    011163
2135    011163                B,R2  MIS,ZIN     ALUF,PASSB          ALUD,SRD
2136    011163          IDBS,ALU                        T,NEXT      T,POP
2137    011163          LCOUNT;
2138    011164
2139    011164          A,R2                    ALUF,A-Q            ALUD,Q
2140    011164          IDBS,ALU                        T,NEXT      T,HOLD;
2141    011165
2142    011165          A,R7  B,R3              ALUF,XORAB          ALUD,B
2143    011165          IDBS,ALU                        T,NEXT      T,HOLD;
2144    011166
2145    011166          A,R7  B,2               ALUF,ANDDA          ALUD,NONE
2146    011166          IDBS,BARG               COMM,LDGPR T,NEXT   T,HOLD
2147    011166          COND,F=0                        F,JMP       F,HOLD;
2148    011167
2149    011167          A,R3  B,R3              ALUF,ANDDA          ALUD,B
2150    011167          IDBS,GPR                        T,NEXT      T,HOLD
2151    011167          TSHTD CONDENABL;
2152    011170
2153    011170                B,R3              ALUF,-B             ALUD,B
2154    011170          IDBS,ALU                        T,NEXT      T,HOLD;
2155    011171
2156    011171  TSHTD:  A,0   B,17                                  ALUD,NONE
2157    011171          IDBS,ARG      XRF       COMM,EWRF T,NEXT    T,HOLD
2158    011171          14;
2159    011172
2160    011172          A,R3  B,R3              ALUF,A+Q            ALUD,B
2161    011172          IDBS,ALU                        T,NEXT      T,HOLD
2162    011172          COND,F15                        F,NEXT      F,HOLD;
2163    011173
2164    011173                B,17                                  ALUD,NONE
2165    011173          IDBS,BARG               COMM,LDLC T,JMP     T,HOLD
2166    011173          RSHFT CONDENABL;
2167    011174
2168    011174  %*********************************************************
2169    011174  %*********************************************************
2170    011174
2171    011174  %       LEFT SHIFT
2172    011174
2173    011174
2174    011174          A,R5  B,17              ALUF,PASSA          ALUD,Q
2175    011174          IDBS,BARG               COMM,LDGPR T,NEXT   T,HOLD
2176    011174          COND,F=0                        F,JMP       F,HOLD;
2177    011175
2178    011175          A,2   B,Z               ALUF,D-1            ALUD,B
2179    011175          IDBS,AARG                       T,NEXT      T,HOLD
2180    011175          LSHFB CONDENABL;
2181    011176
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2182    011176          A,2   B,R1            ALUF,D-1            ALUD,B
2183    011176          IDBS,AARG                       T,JMP     T,HOLD
2184    011176          LSHFT;
2185    011177
2186    011177  %*******************************************************
2187    011177
2188    011177  %       READ FIRST OPERAND TO RF LEVEL 0
2189    011177
2190    011177  LSHFB:  A,A                     ALUF,A-1            ALUD,Q
2191    011177          IDBS,ALU                        T,NEXT    T,PUSH;
2192    011200
2193    011200                                  ALUF,Q+1            ALUD,Q
2194    011200          IDBS,ALU                        T,NEXT    T,HOLD;
2195    011201
2196    011201          ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD; %**********************
2197    011202
2198    011202          A,R1  B,LC              ALUF,A-Q-1          ALUD,NONE
2199    011202          IDBS,BARG               COMM,LDGPR T,NEXT   T,HOLD
2200    011202          COND,F15;
2201    011203
2202    011203          A,0   B,LC                                  ALUD,NONE
2203    011203          IDBS,DBR        XRF     COMM,EWRF T,NEXT    T,POP
2204    011203          LCOUNT;
2205    011204
2206    011204                B,R1              ALUF,PASSD          ALUD,B
2207    011204          IDBS,GPR                        T,NEXT    T,HOLD;
2208    011205
2209    011205          A,D   B,R2              ALUF,PASSA          ALUD,B
2210    011205          IDBS,ALU                        T,JMP     T,PUSH
2211    011205          TTPWD;
2212    011206
2213    011206  LSHFT:  A,0   B,17              ALUF,PASSD          ALUD,Q
2214    011206          IDBS,REG        XRF             T,NEXT    T,HOLD;
2215    011207
2216    011207          A,Z                     ALUF,ANDAQ          ALUD,Q
2217    011207          IDBS,GPR                COMM,LDLC T,NEXT    T,HOLD;
2218    011210
2219    011210          A,0   B,17              ALUF,PASSQ          ALUD,NONE
2220    011210          IDBS,ALU        XRF     COMM,EWRF T,JMP     T,PUSH
2221    011210          CSAV1;
2222    011211
2223    011211          A,2   B,Z               ALUF,D-1            ALUD,B
2224    011211          IDBS,AARG                       T,JMP     T,PUSH
2225    011211          SBUNO;
2226    011212
2227    011212          A,R1  B,R5              ALUF,PASSA          ALUD,B
2228    011212          IDBS,ALU                        T,NEXT    T,HOLD;
2229    011213
2230    011213          A,4   B,14              ALUF,PASSB          ALUD,NONE
2231    011213          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2232    011214
2233    011214          A,R5                    ALUF,A-1            ALUD,Q
2234    011214          IDBS,ALU                        T,JMP     T,PUSH
2235    011214          TEMTS;
2236    011215
2237    011215                B,3                                   ALUD,NONE
2238    011215          IDBS,BARG               COMM,LDGPR T,JMP    T,HOLD
2239    011215          LSHFC;
2240    011216
2241    011216  TEMTS:                                              ALUD,NONE
2242    011216          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
2243    011216          37;
2244    011217
2245    011217          A,T                     ALUF,ANDDA          ALUD,NONE
2246    011217          IDBS,GPR                        T,NEXT    T,HOLD
2247    011217          COND,F=0                        F,RETURN  F,POP;
2248    011220
2249    011220                                                      ALUD,NONE
2250    011220          IDBS,ALU                        T,NEXT    T,PUSH
2251    011220          CONDENABL;
2252    011221
2253    011221          A,0   B,LC              ALUF,PASSD          ALUD,NONE
2254    011221          IDBS,REG        XRF             T,NEXT    T,HOLD
2255    011221          COND,F=0                        F,JMP     F,POP;
2256    011222
2257    011222                B,LC              ALUF,D-Q            ALUD,NONE
2258    011222          IDBS,BARG                       T,NEXT    T,HOLD
2259    011222          USAV3 CONDENABL;
2260    011223
2261    011223                                                      ALUD,NONE
2262    011223          IDBS,ALU                        T,NEXT    T,POP
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2263    011223          LCOUNT;
2264    011224
2265    011224                B,P             ALUF,B+1            ALUD,B
2266    011224          IDBS,ALU                        T,JMP       T,HOLD
2267    011224          USAV3;
2268    011225
2269    011225  SBUNO:  A,R5  B,2               ALUF,ANDDA          ALUD,NONE
2270    011225          IDBS,BARG                       T,NEXT      T,HOLD
2271    011225          COND,F=0                        F,JMP       F,HOLD;
2272    011226
2273    011226          A,0   B,LC              ALUF,PASSD          ALUD,Q
2274    011226          IDBS,REG      XRF               T,NEXT      T,HOLD
2275    011226          SLLBY CONDENABL;
2276    011227
2277    011227                B,L             ALUF,ANDDQ          ALUD,B
2278    011227          IDBS,ARG                        T,NEXT      T,HOLD
2279    011227          17;
2280    011230
2281    011230                B,17            ALUF,MASKDQ         ALUD,Q
2282    011230          IDBS,BARG                       T,JMP       T,HOLD
2283    011230          BUNNC;
2284    011231
2285    011231  SLLBY:  A,Z   B,L               ALUF,ANDDA          ALUD,B
2286    011231          IDBS,SWAP                       T,NEXT      T,HOLD;
2287    011232
2288    011232                                  ALUF,ANDDQ          ALUD,Q
2289    011232          IDBS,ARG                        T,NEXT      T,HOLD
2290    011232          170000;
2291    011233
2292    011233  BUNNC:  A,0   B,LC              ALUF,PASSQ          ALUD,NONE
2293    011233          IDBS,ALU      XRF       COMM,EWRF T,NEXT    T,HOLD;
2294    011234
2295    011234          A,4   B,10              ALUF,PASSA          ALUD,NONE
2296    011234          IDBS,ALU                COMM,EWRF T,RETURN  T,POP;
2297    011235
2298    011235  LSHFC:  A,R3  B,4               ALUF,A-D            ALUD,NONE
2299    011235          IDBS,BARG                       T,NEXT      T,HOLD
2300    011235          COND,F15                        F,NEXT      F,HOLD;
2301    011236
2302    011236          A,2   B,B               ALUF,D-1            ALUD,B
2303    011236          IDBS,AARG                       T,JMP       T,HOLD
2304    011236          LSHLC CONDENABL;
2305    011237
2306    011237  %*******************************************************
2307    011237
2308    011237  %       SHIFT-COUNT > 4, MOVE POINTERS
2309    011237
2310    011237          A,R3  B,R2  MIS,ZIN     ALUF,PASSA          ALUD,SRB
2311    011237          IDBS,ALU                        T,NEXT      T,HOLD;
2312    011240
2313    011240                B,R2  MIS,ZIN     ALUF,PASSB          ALUD,SRB
2314    011240          IDBS,ARG                COMM,LDGPR T,NEXT   T,PUSH
2315    011240          3;
2316    011241
2317    011241                B,R5              ALUF,B-1            ALUD,B
2318    011241          IDBS,ALU                COMM,LDLC T,NEXT    T,HOLD
2319    011241          COND,F=0;
2320    011242
2321    011242                B,R2              ALUF,B-1            ALUD,B
2322    011242          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
2323    011242          3;
2324    011243
2325    011243          A,0   B,LC              ALUF,ZERO           ALUD,NONE
2326    011243          IDBS,ALU        XRF     COMM,EWRF T,NEXT    T,POP
2327    011243          LCOUNT;
2328    011244
2329    011244  LSHLC:  A,R3  B,R3              ALUF,ANDDA          ALUD,B
2330    011244          IDBS,GPR                        T,NEXT      T,HOLD
2331    011244          COND,F=0                        F,NEXT      F,HOLD;
2332    011245
2333    011245          A,R4  B,STS             ALUF,PASSA          ALUD,B
2334    011245          IDBS,ALU                        T,JMP       T,HOLD
2335    011245          FINSH CONDENABL;
2336    011246
2337    011246  %*******************************************************
2338    011246
2339    011246  %       SHIFT INSIDE THE WORD (SHIFT-COUNT<4)
2340    011246
2341    011246
2342    011246                B,R2              ALUF,ZERO           ALUD,B
2343    011246          IDBS,ARG                COMM,LDLC T,NEXT    T,HOLD
```

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2344    011246          17;
2345    011247
2346    011247                B,R3  MIS,ZIN   ALUF,PASSB          ALUD,SLD
2347    011247          IDBS,ALU                          T,NEXT   T,HOLD;
2348    011250
2349    011250                B,R5            ALUF,B-1           ALUD,B
2350    011250          IDBS,ALU                          T,NEXT   T,HOLD;
2351    011251
2352    011251                B,R3  MIS,ZIN   ALUF,PASSB          ALUD,SLD
2353    011251          IDBS,ARG              COMM,LDGPR T,NEXT   T,HOLD
2354    011251          2;
2355    011252
2356    011252          A,R3  B,R3            ALUF,A-D           ALUD,B
2357    011252          IDBS,GPR                          T,NEXT   T,HOLD;
2358    011253
2359    011253          A,2   B,L             ALUF,D-1           ALUD,B
2360    011253          IDBS,AARG                         T,NEXT   T,PUSH;
2361    011254
2362    011254                B,R3            ALUF,PASSB         ALUD,NONE
2363    011254          IDBS,ALU              COMM,LDLC T,NEXT   T,HOLD
2364    011254          COND,LC=0;
2365    011255
2366    011255          A,0   B,LC            ALUF,PASSD         ALUD,Q
2367    011255          IDBS,REG       XRF              T,NEXT   T,HOLD;
2368    011256
2369    011256                B,R1            ALUF,ZERO          ALUD,B
2370    011256          IDBS,ALU                          T,NEXT   T,PUSH;
2371    011257
2372    011257                B,R1  MIS,ZIN   ALUF,PASSB          ALUD,SLD
2373    011257          IDBS,ALU                          T,NEXT   T,POP
2374    011257          LCOUNT;
2375    011260
2376    011260          A,L   B,R4            ALUF,B-1           ALUD,B,YA
2377    011260          IDBS,ALU              COMM,LDLC T,NEXT   T,HOLD;
2378    011261
2379    011261          A,R2  B,R1            ALUF,ORAB          ALUD,NONE
2380    011261          IDBS,ALU              COMM,LDGPR T,NEXT  T,HOLD;
2381    011262
2382    011262          A,0   B,LC                               ALUD,NONE
2383    011262          IDBS,GPR         XRF  COMM,EWRF  T,NEXT  T,HOLD;
2384    011263
2385    011263                B,L             ALUF,B-1           ALUD,B
2386    011263          IDBS,ALU              COMM,LDLC T,NEXT   T,HOLD;
2387    011264
2388    011264          A,R5  B,LC            ALUF,D-A-1         ALUD,NONE
2389    011264          IDBS,BARG                         T,NEXT   T,HOLD
2390    011264          COND,F=0                          F,RETURN F,HOLD;
2391    011265
2392    011265                B,R2            ALUF,PASSQ         ALUD,B
2393    011265          IDBS,ALU                          T,NEXT   T,POP
2394    011265          CONDENABL;
2395    011266
2396    011266          A,0   B,LC            ALUF,PASSQ         ALUD,NONE
2397    011266          IDBS,ALU         XRF  COMM,EWRF T,NEXT   T,HOLD;
2398    011267
2399    011267    %*****************************************************
2400    011267
2401    011267    %     TEST OVERFLOW
2402    011267
2403    011267    FINSH: A,R5  B,STS          ALUF,A+B           ALUD,B
2404    011267          IDBS,ALU              COMM,LDLC T,NEXT   T,HOLD;
2405    011270
2406    011270          A,STS B,17            ALUF,A-D-1         ALUD,NONE
2407    011270          IDBS,BARG                         T,NEXT   T,HOLD
2408    011270          COND,F15                          F,JMP    F,HOLD;
2409    011271
2410    011271          A,12  B,R3            ALUF,INVB          ALUD,B
2411    011271          IDBS,BMG              COMM,LDGPR T,NEXT  T,PUSH
2412    011271          RWRIT CONDENABL;
2413    011272
2414    011272          A,0   B,LC            ALUF,PASSD         ALUD,NONE
2415    011272          IDBS,REG       XRF              T,NEXT   T,HOLD
2416    011272          COND,F=0                          F,JMP    F,POP;
2417    011273
2418    011273                B,STS           ALUF,B+1           ALUD,B
2419    011273          IDBS,ALU              COMM,LDLC T,NEXT   T,HOLD
2420    011273          XOVER CONDENABL;
2421    011274
2422    011274          A,STS B,17            ALUF,D-A           ALUD,NONE
2423    011274          IDBS,BARG                         T,NEXT   T,HOLD
2424    011274          COND,F15                          F,RETURN F,HOLD;
```

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2425    011275
2426    011275                B,STS           ALUF,PASSA          ALUD,NONE
2427    011275          IDBS,ALU                        T,JMP       T,POP
2428    011275          RWRIT CONDENABL;
2429    011276
2430    011276
2431    011276  %*****************************************************
2432    011276
2433    011276  %       CARRY FROM ROUNDING, AND LEFT SHIFT
2434    011276
2435    011276
2436    011276  LWRIR:        B,R1              ALUF,B+1            ALUD,B
2437    011276          IDBS,ALU                COMM,LDLC T,NEXT    T,PUSH;
2438    011277
2439    011277          A,R1  B,17              ALUF,A-D-1          ALUD,NONE
2440    011277          IDBS,BARG                       T,NEXT      T,HOLD
2441    011277          COND,F15                        F,JMP       F,POP;
2442    011300
2443    011300          A,Z   B,R5              ALUF,PASSA          ALUD,B
2444    011300          IDBS,ALU                        T,NEXT      T,HOLD
2445    011300          LWRIT CONDENABL;
2446    011301
2447    011301                B,R1              ALUF,B+1            ALUD,B
2448    011301          IDBS,ALU                        T,NEXT      T,HOLD;
2449    011302
2450    011302          A,0   B,LC              ALUF,PASSD          ALUD,Q
2451    011302          IDBS,REG        XRF             T,JMP       T,PUSH
2452    011302          SADD;
2453    011303
2454    011303          A,R5                    ALUF,Q-A            ALUD,Q
2455    011303          IDBS,ALU                        T,NEXT      T,HOLD;
2456    011304
2457    011304          A,R1  B,R4              ALUF,B-1            ALUD,B,YA
2458    011304          IDBS,ALU                COMM,LDLC T,NEXT    T,HOLD
2459    011304          COND,F=0                        F,RETURN    F,HOLD;
2460    011305
2461    011305          A,0   B,LC              ALUF,PASSQ          ALUD,NONE
2462    011305          IDBS,ALU        XRF     COMM,EWRF T,NEXT    T,POP
2463    011305          CONDENABL;
2464    011306
2465    011306  TCLIR:        B,0               ALUF,D      CRY,C   ALUD,NONE
2466    011306          IDBS,BARG                       T,NEXT      T,HOLD
2467    011306          COND,F=0                        F,JMP       F,HOLD;
2468    011307
2469    011307          A,Z   B,R5              ALUF,PASSA          ALUD,B
2470    011307          IDBS,ALU                        T,NEXT      T,HOLD
2471    011307          CAROV CONDENABL;
2472    011310
2473    011310  %*****************************************************
2474    011310
2475    011310  %       TEST UNSIGNED DESTINATION, AND INSERT SIGN
2476    011310
2477    011310  LWRIT: A,4    B,10              ALUF,PASSD          ALUD,Q
2478    011310          IDBS,REG                        T,NEXT      T,HOLD;
2479    011311
2480    011311          A,15  B,Z               ALUF,PASSQ          ALUD,B
2481    011311          IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD;
2482    011312
2483    011312          A,T                     ALUF,ANDDA          ALUD,NONE
2484    011312          IDBS,GPR                        T,NEXT      T,HOLD
2485    011312          COND,F=0                        F,NEXT      F,HOLD;
2486    011313
2487    011313          A,R5  B,R5              ALUF,B+1            ALUD,B,YA
2488    011313          IDBS,ALU                COMM,LDLC T,JMP     T,HOLD
2489    011313          CHSIG CONDENABL;
2490    011314
2491    011314          A,2   B,Z               ALUF,D-1            ALUD,B
2492    011314          IDBS,AARG                       T,JMP       T,HOLD
2493    011314          LWRIC;
2494    011315
2495    011315  CHSIG: A,Z    B,17              ALUF,A-D            ALUD,NONE
2496    011315          IDBS,BARG                       T,NEXT      T,HOLD
2497    011315          COND,F=0                        F,NEXT      F,HOLD;
2498    011316
2499    011316          A,Z   B,1               ALUF,ANDDA          ALUD,NONE
2500    011316          IDBS,BARG                       T,JMP       T,HOLD
2501    011316          SSPOS CONDENABL;
2502    011317
2503    011317                B,15              ALUF,PASSD          ALUD,Q
2504    011317          IDBS,BARG                       T,JMP       T,HOLD
2505    011317          SSPOS CONDENABL;
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2506  011320
2507  011320              B,Z              ALUF,PASSQ          ALUD,B
2508  011320        IDBS,ALU                       T,JMP      T,HOLD
2509  011320        LWRIC;
2510  011321
2511  011321  SSPOS:      B,Z              ALUF,PASSD          ALUD,B
2512  011321        IDBS,ARG                       T,NEXT     T,HOLD
2513  011321        14;
2514  011322
2515  011322  LWRIC: A,R7  B,2              ALUF,ANDDA          ALUD,NONE
2516  011322        IDBS,BARG                      T,NEXT     T,HOLD
2517  011322        COND,F=0                       F,JMP      F,HOLD;
2518  011323
2519  011323        A,0   B,LC             ALUF,PASSD          ALUD,Q
2520  011323        IDBS,REG      XRF              T,NEXT     T,HOLD
2521  011323        WLLBY CONDENABL;
2522  011324
2523  011324  WLRBY:      B,17             ALUF,MASKDQ         ALUD,Q
2524  011324        IDBS,BARG                      T,NEXT     T,HOLD;
2525  011325
2526  011325        A,Z                    ALUF,ORAQ           ALUD,Q
2527  011325        IDBS,ALU                       T,JMP      T,HOLD
2528  011325        WRITB;
2529  011326
2530  011326  WLLBY:                       ALUF,ANDDQ          ALUD,Q
2531  011326        IDBS,ARG                       T,NEXT     T,HOLD
2532  011326        170000;
2533  011327
2534  011327        A,Z                    ALUF,PASSA          ALUD,NONE
2535  011327        IDBS,ALU                       T,NEXT     T,HOLD;
2536  011330
2537  011330                               ALUF,ORDQ           ALUD,Q
2538  011330        IDBS,SWAP                      T,NEXT     T,HOLD;
2539  011331
2540  011331        A,2   B,12             ALUF,ORDQ           ALUD,Q
2541  011331        IDBS,REG                       T,NEXT     T,HOLD;
2542  011332
2543  011332  WRITB:      B,R3             ALUF,PASSB          ALUD,NONE
2544  011332        IDBS,ALU                       T,NEXT     T,HOLD
2545  011332        COND,F15                       F,NEXT     F,HOLD;
2546  011333
2547  011333        A,0   B,LC             ALUF,PASSQ          ALUD,NONE
2548  011333        IDBS,ALU      XRF      COMM,EWRF T,JMP     T,HOLD
2549  011333        RWRIC CONDENABL;
2550  011334
2551  011334  %*****************************************************
2552  011334
2553  011334  %       WRITE SECOND OPERAND WHEN LEFT SHIFT
2554  011334
2555  011334        A,X   B,R6             ALUF,B-A            ALUD,NONE
2556  011334        IDBS,ALU                       T,NEXT     T,HOLD
2557  011334        COND,F=0                       F,NEXT     F,PUSH;
2558  011335
2559  011335        A,R5  B,R6             ALUF,B+1            ALUD,B,YA
2560  011335        IDBS,ALU               COMM,LDLC  T,JMP    T,HOLD
2561  011335        NOVFL CONDENABL;
2562  011336
2563  011336              B,R6             ALUF,B-1            ALUD,B
2564  011336        IDBS,ALU                       T,NEXT     T,HOLD;
2565  011337
2566  011337                               ALUF,PASSQ          ALUD,NONE
2567  011337        IDBS,ALU          COMM,WRRQ,APT  T,NEXT     T,HOLD;   %******************
2568  011340
2569  011340        A,R5  B,17             ALUF,D-A            ALUD,NONE
2570  011340        IDBS,BARG                      T,NEXT     T,HOLD
2571  011340        COND,F15                       F,NEXT     F,HOLD;
2572  011341
2573  011341        A,0   B,LC             ALUF,PASSD          ALUD,Q
2574  011341        IDBS,REG      XRF              T,JMP      T,PUSH
2575  011341        ZEROF CONDENABL;
2576  011342
2577  011342        A,R6  B,X              ALUF,A-B-1          ALUD,NONE
2578  011342        IDBS,ALU                       T,NEXT     T,HOLD
2579  011342        COND,F=0                       F,RETURN   F,HOLD;
2580  011343
2581  011343              B,R5             ALUF,B+1            ALUD,B
2582  011343        IDBS,ALU               COMM,LDLC  T,NEXT   T,POP
2583  011343        CONDENABL;
2584  011344
2585  011344              B,R6             ALUF,B-1            ALUD,B
2586  011344        IDBS,ALU                       T,JMP      T,HOLD
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2587    011344          NOVFL;
2588    011345
2589    011345  ZEROF:      B,0             ALUF,D    CRY,C     ALUD,Q    STS,EA
2590    011345          IDBS,BARG                     T,RETURN  T,POP;
2591    011346
2592    011346  %*******************************************************
2593    011346
2594    011346  %       TEST OVERFLOW
2595    011346
2596    011346  NOVFL: A,2   B,15            ALUF,PASSD          ALUD,NONE
2597    011346          IDBS,REG                      T,NEXT    T,HOLD
2598    011346          COND,F=0                      F,NEXT    F,HOLD;
2599    011347
2600    011347          A,2   B,14            ALUF,MASKDQ         ALUD,NONE
2601    011347          IDBS,REG                      T,JMP     T,HOLD
2602    011347          LEOVF CONDENABL;
2603    011350
2604    011350          A,2   B,14            ALUF,ANDDQ          ALUD,Q
2605    011350          IDBS,REG                      T,JMP     T,HOLD
2606    011350          WRITT CONDENABL;
2607    011351
2608    011351  LEOVF:      B,P             ALUF,B-1            ALUD,B
2609    011351          IDBS,ALU                      T,NEXT    T,HOLD;
2610    011352
2611    011352          A,2   B,14            ALUF,ANDDQ          ALUD,Q
2612    011352          IDBS,REG                      T,NEXT    T,HOLD;
2613    011353
2614    011353  %*******************************************************
2615    011353
2616    011353  %       WRITE TOP-WORD
2617    011353
2618    011353  WRITT: A,2   B,11            ALUF,ORDQ           ALUD,Q
2619    011353          IDBS,REG                      T,NEXT    T,HOLD;
2620    011354
2621    011354          A,X   B,P             ALUF,B+1            ALUD,B,YA
2622    011354          IDBS,ALU                      T,NEXT    T,HOLD;
2623    011355
2624    011355                                ALUF,PASSQ          ALUD,NONE
2625    011355          IDBS,ALU        COMM,WRRQ,APT T,NEXT      T,HOLD;   %*****************
2626    011356
2627    011356  USAV3:                                            ALUD,NONE
2628    011356          IDBS,ALU                      T,JMP     T,PUSH
2629    011356          CUSV1;
2630    011357
2631    011357          A,2   B,16                                ALUD,NONE STS,LO
2632    011357          IDBS,REG                      T,JMP     T,POP
2633    011357          CONT;
2634    011360
2635    011360
2636    011360
2637    011360  %*******************************************************
2638    011360  %*******************************************************
2639    011360
2640    011360  %       RIGHT SHIFT
2641    011360
2642    011360
2643    011360  RSHFT: A,R5                   ALUF,PASSA          ALUD,Q
2644    011360          IDBS,ALU                      T,NEXT    T,HOLD
2645    011360          COND,F=0                      F,NEXT    F,PUSH;
2646    011361
2647    011361          A,2   B,Z             ALUF,D-1            ALUD,B
2648    011361          IDBS,AARG                     T,JMP     T,HOLD
2649    011361          RSFTC CONDENABL;
2650    011362
2651    011362  %*******************************************************
2652    011362
2653    011362  %       READ SOURCE OPERAND TO XRF (RA,0)
2654    011362
2655    011362               B,R1             ALUF,B+1            ALUD,Q
2656    011362          IDBS,ALU                      T,NEXT    T,PUSH;
2657    011363
2658    011363                                ALUF,Q-1            ALUD,Q
2659    011363          IDBS,ALU                      T,NEXT    T,HOLD;
2660    011364
2661    011364          ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD; %**********************
2662    011365
2663    011365          A,A   B,LC            ALUF,Q-A-1          ALUD,NONE
2664    011365          IDBS,BARG             COMM,LDGPR T,NEXT   T,HOLD
2665    011365          COND,F15;
2666    011366
2667    011366          A,0   B,LC                                ALUD,NONE
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2668  011366          IDBS,DBR       XRF     COMM,EWRF T,NEXT    T,HOLD
2669  011366          LCOUNT;
2670  011367
2671  011367          A,D   B,R2              ALUF,PASSA          ALUD,B
2672  011367          IDBS,ALU                        T,JMP       T,PUSH
2673  011367          TTPWD;
2674  011370
2675  011370  RSFTC:  A,0   B,LC              ALUF,PASSD          ALUD,Q
2676  011370          IDBS,REG       XRF              T,JMP       T,PUSH
2677  011370          CSAV1;
2678  011371
2679  011371          A,4   B,14              ALUF,PASSB          ALUD,B
2680  011371          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
2681  011372
2682  011372                B,LC                                  ALUD,NONE
2683  011372          IDBS,BARG               COMM,LDGPR T,NEXT   T,HOLD;
2684  011373
2685  011373          A,Z   B,17              ALUF,ANDAQ          ALUD,Q
2686  011373          IDBS,BARG               COMM,LDLC T,NEXT    T,HOLD;
2687  011374
2688  011374          A,0   B,LC              ALUF,PASSQ          ALUD,NONE
2689  011374          IDBS,ALU        XRF     COMM,EWRF T,NEXT    T,HOLD;
2690  011375
2691  011375                B,B               ALUF,PASSD          ALUD,B
2692  011375          IDBS,GPR                        T,NEXT      T,HOLD;
2693  011376
2694  011376          A,2   B,Z               ALUF,D-1            ALUD,B
2695  011376          IDBS,AARG                       T,JMP       T,PUSH
2696  011376          SBUNO;
2697  011377
2698  011377          A,B   B,17              ALUF,A-1            ALUD,Q
2699  011377          IDBS,BARG               COMM,LDLC T,JMP     T,PUSH
2700  011377          TEMTS;
2701  011400
2702  011400                B,R3              ALUF,-B             ALUD,B
2703  011400          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
2704  011400          37;
2705  011401
2706  011401          A,D                     ALUF,ANDDA          ALUD,Q
2707  011401          IDBS,GPR                        T,NEXT      T,HOLD;
2708  011402
2709  011402          A,2   B,R5              ALUF,D-1            ALUD,B
2710  011402          IDBS,AARG                       T,NEXT      T,HOLD;
2711  011403
2712  011403          A,R3  B,3               ALUF,A-D-1          ALUD,NONE
2713  011403          IDBS,BARG               COMM,LDGPR T,NEXT   T,HOLD
2714  011403          COND,F15                        F,NEXT      F,HOLD;
2715  011404
2716  011404                B,17              ALUF,PASSD          ALUD,Q
2717  011404          IDBS,BARG                       T,JMP       T,HOLD
2718  011404          RCONT CONDENABL;
2719  011405
2720  011405  %*************************************************
2721  011405
2722  011405  %       SHIFT COUNT > 4, MOVE POINTERS AND INSERT ZEROES
2723  011405
2724  011405
2725  011405          A,R3  B,R2  MIS,ZIN     ALUF,PASSA          ALUD,SRB
2726  011405          IDBS,ALU                        T,NEXT      T,HOLD;
2727  011406
2728  011406                B,R2  MIS,ZIN     ALUF,PASSB          ALUD,SRB
2729  011406          IDBS,ALU                        T,NEXT      T,HOLD;
2730  011407
2731  011407          A,R2  B,R5              ALUF,B-A            ALUD,B
2732  011407          IDBS,ALU                        T,NEXT      T,HOLD;
2733  011410
2734  011410                B,B               ALUF,B-1            ALUD,B
2735  011410          IDBS,ALU                COMM,LDLC T,NEXT    T,PUSH
2736  011410          COND,F=0;
2737  011411
2738  011411                B,R2              ALUF,B-1            ALUD,B
2739  011411          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
2740  011411          3;
2741  011412
2742  011412          A,0   B,LC              ALUF,ZERO           ALUD,NONE
2743  011412          IDBS,ALU        XRF     COMM,EWRF T,NEXT    T,POP
2744  011412          LCOUNT;
2745  011413
2746  011413                B,LC              ALUF,PASSD          ALUD,Q
2747  011413          IDBS,BARG                       T,NEXT      T,HOLD;
2748  011414
```

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2749  011414                B,B              ALUF,PASSQ          ALUD,B
2750  011414          IDBS,ALU                         T,NEXT    T,HOLD;
2751  011415
2752  011415  RCONT:  A,R3  B,R3              ALUF,ANDDA          ALUD,B
2753  011415          IDBS,GPR                         T,NEXT    T,HOLD
2754  011415          COND,F=0                         F,NEXT    F,HOLD;
2755  011416
2756  011416                B,R1             ALUF,ZERO           ALUD,B
2757  011416          IDBS,ALU                         T,JMP     T,HOLD
2758  011416          ZRORS CONDENABL;
2759  011417
2760  011417  %*****************************************************
2761  011417
2762  011417  %       SHIFT WITHIN EACH WORD
2763  011417
2764  011417                B,R3   MIS,ZIN   ALUF,PASSB          ALUD,SLB
2765  011417          IDBS,ALU                         T,NEXT    T,HOLD;
2766  011420
2767  011420          A,R5  B,L                ALUF,PASSA          ALUD,B
2768  011420          IDBS,ALU                 COMM,LDLC T,NEXT    T,HOLD;
2769  011421
2770  011421                B,R5             ALUF,B-1            ALUD,B
2771  011421          IDBS,ALU                         T,NEXT    T,HOLD;
2772  011422
2773  011422                B,R3             ALUF,B-1            ALUD,SLB
2774  011422          IDBS,ALU                         T,NEXT    T,PUSH;
2775  011423
2776  011423          A,0   B,LC               ALUF,PASSD          ALUD,Q
2777  011423          IDBS,REG        XRF                T,NEXT   T,HOLD;
2778  011424
2779  011424          A,R3  B,R1               ALUF,PASSQ          ALUD,B,YA
2780  011424          IDBS,ALU                 COMM,LDLC T,NEXT    T,HOLD;
2781  011425
2782  011425          A,0   B,17               ALUF,ZERO           ALUD,Q
2783  011425          IDBS,ALU        XRF      COMM,EWRF T,NEXT    T,PUSH
2784  011425          COND,LC=0;
2785  011426
2786  011426                B,R1   MIS,ZIN   ALUF,PASSB          ALUD,SRD
2787  011426          IDBS,ALU                         T,NEXT    T,POP
2788  011426          LCOUNT;
2789  011427
2790  011427                B,L              ALUF,PASSB          ALUD,NONE
2791  011427          IDBS,ALU                 COMM,LDLC T,NEXT    T,HOLD;
2792  011430
2793  011430          A,R2                     ALUF,ORAQ           ALUD,Q
2794  011430          IDBS,ALU                         T,NEXT    T,HOLD;
2795  011431
2796  011431          A,0   B,LC               ALUF,PASSQ          ALUD,NONE
2797  011431          IDBS,ALU        XRF      COMM,EWRF T,NEXT    T,HOLD;
2798  011432
2799  011432                B,R4             ALUF,B-1            ALUD,B
2800  011432          IDBS,ALU                         T,NEXT    T,HOLD
2801  011432          COND,F15                         F,NEXT    F,HOLD;
2802  011433
2803  011433                B,L              ALUF,B-1            ALUD,B
2804  011433          IDBS,ALU                 COMM,LDLC T,JMP     T,POP
2805  011433          XTOPR CONDENABL;
2806  011434
2807  011434          A,B   B,LC               ALUF,D-A            ALUD,NONE
2808  011434          IDBS,BARG                        T,NEXT    T,HOLD
2809  011434          COND,F=0                         F,RETURN  F,HOLD;
2810  011435
2811  011435          A,R1  B,R2               ALUF,PASSA          ALUD,B
2812  011435          IDBS,ALU                         T,NEXT    T,POP
2813  011435          CONDENABL;
2814  011436
2815  011436  %*****************************************************
2816  011436
2817  011436  %       FILL ZEROES
2818  011436
2819  011436
2820  011436  ZFILR:  A,R2                     ALUF,PASSA          ALUD,Q
2821  011436          IDBS,ALU                         T,NEXT    T,PUSH;
2822  011437
2823  011437                                                       ALUD,NONE
2824  011437          IDBS,ALU                         T,NEXT    T,HOLD;
2825  011440
2826  011440          A,0   B,LC               ALUF,PASSQ          ALUD,NONE
2827  011440          IDBS,ALU        XRF      COMM,EWRF T,NEXT    T,HOLD;
2828  011441
2829  011441                B,R4             ALUF,B-1            ALUD,B
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2830    011441          IDBS,ALU                        T,NEXT    T,HOLD
2831    011441          COND,F15;
2832    011442
2833    011442          A,12                ALUF,ZERO             ALUD,Q
2834    011442          IDBS,BMG            COMM,LDGPR T,JMP      T,POP
2835    011442          LCOUNT RWRIT;
2836    011443
2837    011443  ZRORS:  A,STS B,R4          ALUF,A-B              ALUD,NONE
2838    011443          IDBS,ALU                        T,NEXT    T,HOLD
2839    011443          COND,F15                        F,NEXT    F,HOLD;
2840    011444
2841    011444                                                    ALUD,NONE
2842    011444          IDBS,ALU                        T,JMP     T,HOLD
2843    011444          ZFILR CONDENABL;
2844    011445
2845    011445          A,R5  B,R4          ALUF,A-B              ALUD,NONE
2846    011445          IDBS,ALU            COMM,LDLC T,NEXT      T,HOLD;
2847    011446
2848    011446                B,R1          ALUF,ZERO             ALUD,B
2849    011446          IDBS,ALU                        T,NEXT    T,HOLD;
2850    011447
2851    011447  %*******************************************************
2852    011447
2853    011447  %       TEST OVERFLOW
2854    011447
2855    011447  XTOPR:  A,R1                ALUF,PASSA            ALUD,NONE
2856    011447          IDBS,ALU                        T,NEXT    T,HOLD
2857    011447          COND,F=0                        F,JMP     F,HOLD;
2858    011450
2859    011450          A,12                                      ALUD,NONE
2860    011450          IDBS,BMG            COMM,LDGPR T,NEXT     T,HOLD
2861    011450          XOVER CONDENABL;
2862    011451
2863    011451          A,B   B,LC          ALUF,D-A              ALUD,NONE
2864    011451          IDBS,BARG                       T,NEXT    T,HOLD
2865    011451          COND,F15                        F,NEXT    F,PUSH;
2866    011452
2867    011452                                                    ALUD,NONE
2868    011452          IDBS,ALU                        T,JMP     T,HOLD
2869    011452          RWRIT CONDENABL;
2870    011453
2871    011453          A,0   B,LC          ALUF,PASSD            ALUD,NONE
2872    011453          IDBS,REG       XRF              T,NEXT    T,HOLD
2873    011453          COND,F=0                        F,JMP     F,POP;
2874    011454
2875    011454          A,B   B,LC          ALUF,A-D              ALUD,NONE
2876    011454          IDBS,BARG                       T,NEXT    T,HOLD
2877    011454          XOVER CONDENABL;
2878    011455
2879    011455                                                    ALUD,NONE
2880    011455          IDBS,ALU                        T,JMP     T,POP
2881    011455          LCOUNT RWRIT;
2882    011456
2883    011456  XOVER:  A,2   B,15          ALUF,ZERO             ALUD,NONE
2884    011456          IDBS,ALU            COMM,EWRF T,NEXT      T,HOLD;
2885    011457
2886    011457  %*************************************************************
2887    011457
2888    011457  %       TEST ROUNDING
2889    011457
2890    011457
2891    011457  RWRIT:  A,T                 ALUF,ANDDA            ALUD,NONE
2892    011457          IDBS,GPR                        T,NEXT    T,HOLD
2893    011457          COND,F=0                        F,NEXT    F,HOLD;
2894    011460
2895    011460          A,R3  B,R3          ALUF,INVA             ALUD,B
2896    011460          IDBS,ALU                        T,JMP     T,HOLD
2897    011460          LWRIT CONDENABL;
2898    011461
2899    011461          A,R5                ALUF,PASSA            ALUD,NONE
2900    011461          IDBS,ALU            COMM,LDLC T,JMP       T,HOLD
2901    011461          ROUND;
2902    011462
2903    011462  %*******************************************************
2904    011462
2905    011462  %       WRITE SECOND OPERAND WHILE RIGHT SHIFT
2906    011462
2907    011462  RWRIC:  A,R6  B,X           ALUF,A-B              ALUD,NONE
2908    011462          IDBS,ALU                        T,NEXT    T,HOLD
2909    011462          COND,F=0                        F,NEXT    F,PUSH;
2910    011463
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2911    011463          A,R5                    ALUF,A-1            ALUD,NONE
2912    011463          IDBS,ALU                COMM,LDLC T,JMP     T,HOLD
2913    011463          NOVFL CONDENABL;
2914    011464
2915    011464                B,R6              ALUF,PASSB          ALUD,NONE
2916    011464          IDBS,ALU                        T,NEXT      T,HOLD;
2917    011465
2918    011465          A,0   B,LC                                    ALUD,NONE
2919    011465          IDBS,REG        XRF COMM,WRRQ,APT T,NEXT    T,HOLD;  %******************
2920    011466
2921    011466          A,R6  B,X       -       ALUF,A-B-1          ALUD,NONE
2922    011466          IDBS,ALU                        T,NEXT      T,HOLD
2923    011466          COND,F=0;
2924    011467
2925    011467                B,R6              ALUF,B-1            ALUD,B
2926    011467          IDBS,ALU                         T,NEXT     T.POP
2927    011467          LCOUNT;
2928    011470
2929    011470                                                      ALUD,NONE
2930    011470          IDBS,ALU                        T,NEXT      T,HOLD;
2931    011471
2932    011471          A,0   B,LC              ALUF,PASSD          ALUD,Q
2933    011471          IDBS,REG        XRF             T,JMP       T,HOLD
2934    011471          NOVFL;
2935    011472
2936    011472  ROUND:  A,R7  B,2               ALUF,ANDDA          ALUD,NONE
2937    011472          IDBS,BARG                       T,NEXT      T,HOLD
2938    011472          COND,F=0                        F,JMP       F,HOLD;
2939    011473
2940    011473          A,0   B,LC              ALUF,PASSD          ALUD,Q
2941    011473          IDBS,REG        XRF             T,NEXT      T,HOLD
2942    011473          RLFBY CONDENABL;
2943    011474
2944    011474                B,R1              ALUF,ANDDQ          ALUD,B
2945    011474          IDBS,ARG                        T,NEXT      T,HOLD
2946    011474          17;
2947    011475
2948    011475                                  ALUF,MASKDQ         ALUD,Q
2949    011475          IDBS,ARG                        T,NEXT      T,HOLD
2950    011475          17;
2951    011476
2952    011476          A,R1  B,5               ALUF,A-D            ALUD,NONE
2953    011476          IDBS,BARG                       T,NEXT      T,HOLD
2954    011476          COND,F15                        F,NEXT      F,HOLD;
2955    011477
2956    011477          A,4                     ALUF,ZERO           ALUD,NONE STS,EA
2957    011477          IDBS,BMG                COMM,LDGPR T,JMP    T,HOLD
2958    011477          LWRIT CONDENABL;
2959    011500
2960    011500                B,L               ALUF,PASSD          ALUD,B
2961    011500          IDBS,ARG                        T,NEXT      T,HOLD
2962    011500          10420;
2963    011501
2964    011501          A,R5  B,R1              ALUF,PASSA          ALUD,B
2965    011501          IDBS,ALU                        T,JMP       T,PUSH
2966    011501          SADD;
2967    011502
2968    011502          A,R5                    ALUF,Q-A            ALUD,Q
2969    011502          IDBS,ALU                        T,NEXT      T,HOLD;
2970    011503
2971    011503  TCARY:  A,0   B,LC              ALUF,PASSQ          ALUD,NONE
2972    011503          IDBS,ALU        XRF     COMM,EWRF T,NEXT    T,HOLD;
2973    011504
2974    011504                B,0               ALUF,D     CRY,C    ALUD,NONE
2975    011504          IDBS,BARG               COMM,LDGPR T,NEXT   T,HOLD
2976    011504          COND,F=0                        F,NEXT      F,HOLD;
2977    011505
2978    011505          A,R1  B,R5              ALUF,PASSA          ALUD,B
2979    011505          IDBS,ALU                        T,JMP       T,HOLD
2980    011505          LWRIT CONDENABL;
2981    011506
2982    011506          A,4   B,14              ALUF,D-1            ALUD,B
2983    011506          IDBS,REG                        T,NEXT      T,HOLD
2984    011506          COND,F=0                        F,NEXT      F,HOLD;
2985    011507
2986    011507          A,R5                    ALUF,A-1            ALUD,NONE
2987    011507          IDBS,ALU                COMM,LDLC T,JMP     T,HOLD
2988    011507          CAROV CONDENABL;
2989    011510
2990    011510                B,R3              ALUF,PASSB          ALUD,NONE
2991    011510          IDBS,ALU                        T,NEXT      T,HOLD
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2992    011510          COND,F15                        F,JMP     F,HOLD;
2993    011511
2994    011511          A,R5  B,Z               ALUF,PASSA        ALUD,B
2995    011511          IDBS,ALU                        T,NEXT    T,HOLD
2996    011511          LWRIR CONDENABL;
2997    011512
2998    011512                                                    ALUD,NONE
2999    011512          IDBS,ALU                        T,JMP     T,PUSH
3000    011512          CCARY;
3001    011513
3002    011513          A,0   B,LC              ALUF,PASSQ        ALUD,NONE
3003    011513          IDBS,ALU        XRF     COMM,EWRF T,NEXT  T,HOLD;
3004    011514
3005    011514  CCARY:  A,0   B,LC              ALUF,PASSD        ALUD,Q
3006    011514          IDBS,REG        XRF             T,JMP     T,PUSH
3007    011514          SADD;
3008    011515
3009    011515                B,R4              ALUF,B-1          ALUD,B
3010    011515          IDBS,ALU                        T,NEXT    T,HOLD
3011    011515          COND,F=0;
3012    011516
3013    011516          A,R5                    ALUF,Q-A          ALUD,Q
3014    011516          IDBS,ALU                        T,NEXT    T,POP
3015    011516          LCOUNT;
3016    011517
3017    011517          A,0   B,LC              ALUF,PASSQ        ALUD,NONE
3018    011517          IDBS,ALU        XRF     COMM,EWRF T,NEXT  T,HOLD;
3019    011520
3020    011520                B,0               ALUF,D    CRY,C   ALUD,NONE
3021    011520          IDBS,BARG                       T,NEXT    T,HOLD
3022    011520          COND,F=0                        F,NEXT    F,HOLD;
3023    011521
3024    011521          A,R1  B,R5              ALUF,PASSA        ALUD,B
3025    011521          IDBS,ALU                COMM,LDLC T,JMP   T,HOLD
3026    011521          LWRIT CONDENABL;
3027    011522
3028    011522  CAROV:  A,2   B,15              ALUF,ZERO         ALUD,NONE
3029    011522          IDBS,ALU                COMM,EWRF T,JMP   T,HOLD
3030    011522          LWRIT;
3031    011523
3032    011523  RLFBY:        B,R1              ALUF,ANDDQ        ALUD,B
3033    011523          IDBS,ARG                        T,NEXT    T,HOLD
3034    011523          7400;
3035    011524
3036    011524                                  ALUF,ANDDQ        ALUD,Q
3037    011524          IDBS,ARG                        T,NEXT    T,HOLD
3038    011524          170000;
3039    011525
3040    011525                                                    ALUD,NONE
3041    011525          IDBS,ARG                COMM,LDGPR T,NEXT T,HOLD
3042    011525          2400;
3043    011526
3044    011526          A,R1                    ALUF,A-D          ALUD,NONE
3045    011526          IDBS,GPR                        T,NEXT    T,HOLD
3046    011526          COND,F15                        F,NEXT    F,HOLD;
3047    011527
3048    011527          A,14                    ALUF,ZERO         ALUD,NONE STS,EA
3049    011527          IDBS,BMG                COMM,LDGPR T,JMP  T,HOLD
3050    011527          LWRIT CONDENABL;
3051    011530
3052    011530                B,L               ALUF,PASSD        ALUD,B
3053    011530          IDBS,ARG                        T,NEXT    T,HOLD
3054    011530          10420;
3055    011531
3056    011531          A,R5  B,R1              ALUF,PASSA        ALUD,B
3057    011531          IDBS,ALU                        T,JMP     T,PUSH
3058    011531          SADD;
3059    011532
3060    011532          A,R5                    ALUF,Q-A          ALUD,Q
3061    011532          IDBS,ALU                        T,JMP     T,HOLD
3062    011532          TCARY;
3063    011533
3064    011533
3065    011533
3066    011533
3067    011533
3068    011533  %*****************************************************
3069    011533
3070    011533  %   COMMERCIAL INSTRUCTION: PACK (A,D -ASCII-FIELD -> X,T -BCD-FIELD)
3071    011533
3072    011533  %*****************************************************
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3073    011533
3074    011533  PACK:       B,R5            ALUF,ZERO           ALUD,B
3075    011533          IDBS,ARG            COMM,LDGPR T,NEXT   T,HOLD
3076    011533          37;
3077    011534
3078    011534          A,T   B,R1          ALUF,ANDDA          ALUD,B
3079    011534          IDBS,GPR                    T,NEXT      T,HOLD
3080    011534          COND,F=0                    F,JMP       F,HOLD;
3081    011535
3082    011535          A,D                 ALUF,ANDDA          ALUD,Q
3083    011535          IDBS,GPR                    T,NEXT      T,HOLD
3084    011535          XNOTE CONDENABL;
3085    011536
3086    011536          A,0   B,STS         ALUF,PASSD          ALUD,B
3087    011536          IDBS,BMG                    T,NEXT      T,HOLD
3088    011536          XADEM CONDENABL;
3089    011537
3090    011537               B,P            ALUF,B+1            ALUD,B
3091    011537          IDBS,ALU                    T,JMP       T,POP
3092    011537          CONT;
3093    011540
3094    011540  XADEM:  A,3   B,11          ALUF,PASSB          ALUD,NONE
3095    011540          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3096    011541
3097    011541          A,3   B,12          ALUF,PASSQ          ALUD,NONE
3098    011541          IDBS,ALU            COMM,EWRF T,JMP     T,HOLD
3099    011541          TADEM;
3100    011542
3101    011542  %*******************************************************
3102    011542
3103    011542  %       READ X,T-OPERAND FIRST AND LAST WORD IF NOT EMPTY
3104    011542
3105    011542  XNOTE:  A,3   B,11          ALUF,PASSB          ALUD,NONE
3106    011542          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3107    011543
3108    011543          A,3   B,12          ALUF,PASSQ          ALUD,NONE
3109    011543          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3110    011544
3111    011544          A,X   B,R1          ALUF,PASSA          ALUD,B
3112    011544          IDBS,ALU                    T,NEXT      T,HOLD;
3113    011545
3114    011545          A,T   B,R2          ALUF,PASSA          ALUD,B
3115    011545          IDBS,ALU                    T,JMP       T,PUSH
3116    011545          LWA;
3117    011546
3118    011546          A,R1  B,R2          ALUF,ZERO           ALUD,B,YA
3119    011546          IDBS,ALU                    T,NEXT      T,HOLD;
3120    011547
3121    011547          A,R3  B,2           ALUF,ANDDA          ALUD,NONE
3122    011547          IDBS,BARG       COMM,RDRQ,APT  T,NEXT   T,HOLD    %********************
3123    011547          COND,F=0                    F,NEXT      F,HOLD;
3124    011550
3125    011550                              ALUF,PASSD          ALUD,Q
3126    011550          IDBS,DBR                    T,NEXT      T,HOLD
3127    011550          COND,COND                   F,NEXT      F,HOLD;
3128    011551
3129    011551          A,R1                ALUF,PASSA          ALUD,NONE
3130    011551          IDBS,ALU                    T,NEXT      T,HOLD;
3131    011552
3132    011552                              ALUF,PASSQ          ALUD,NONE
3133    011552          IDBS,ALU            COMM,WRRQ,APT T,JMP T,HOLD
3134    011552          PRFIR CONDENABL;
3135    011553
3136    011553               B,R2           ALUF,ANDDQ          ALUD,B
3137    011553          IDBS,ARG                    T,NEXT      T,HOLD
3138    011553          377;
3139    011554
3140    011554          A,1   B,R5          ALUF,PASSD          ALUD,B
3141    011554          IDBS,AARG                   T,NEXT      T,HOLD;
3142    011555
3143    011555  PRFIR:  A,2   B,R2          ALUF,PASSB          ALUD,NONE
3144    011555          IDBS,ALU            COMM,EWRF T,NEXT    T,HOLD;
3145    011556
3146    011556          A,X                 ALUF,PASSA          ALUD,NONE
3147    011556          IDBS,ALU                    T,NEXT      T,HOLD;
3148    011557
3149    011557          A,T   B,R2          ALUF,PASSA          ALUD,B
3150    011557          IDBS,ALU        COMM,RDRQ,APT  T,JMP    T,PUSH    %*****************
3151    011557          TTPWD;
3152    011560
3153    011560          A,Z   B,Z           ALUF,INVA           ALUD,B,YA
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3154    011560          IDBS,ALU                COMM,LDGPR  T,NEXT   T,HOLD;
3155    011561
3156    011561                                  ALUF,PASSD           ALUD,Q
3157    011561          IDBS,DBR                          T,NEXT     T,HOLD;
3158    011562
3159    011562          A,X                     ALUF,PASSA           ALUD,NONE
3160    011562          IDBS,ALU                          T,NEXT     T,HOLD;
3161    011563
3162    011563                                  ALUF,PASSQ           ALUD,NONE
3163    011563          IDBS,ALU                COMM,WRRQ,APT T,NEXT T,HOLD;
3164    011564
3165    011564          A,Z                     ALUF,ANDAQ           ALUD,Q
3166    011564          IDBS,ALU                          T,NEXT     T,HOLD;
3167    011565
3168    011565          A,2    B,11             ALUF,PASSQ           ALUD,NONE
3169    011565          IDBS,ALU                COMM,EWRF T,NEXT     T,HOLD;
3170    011566
3171    011566          A,2    B,14                                  ALUD,NONE
3172    011566          IDBS,GPR                COMM,EWRF T,NEXT     T,HOLD;
3173    011567
3174    011567                                                       ALUD,NONE
3175    011567          IDBS,ARG                COMM,LDGPR T,NEXT    T,HOLD
3176    011567          37;
3177    011570
3178    011570  %*******************************************************
3179    011570
3180    011570  %       TEST A,D-OPREAND EMPTY, AND READ IT TO RF LEVEL 0
3181    011570
3182    011570  TADEM:  A,3    B,12             ALUF,PASSD           ALUD,NONE
3183    011570          IDBS,REG                          T,NEXT     T,HOLD
3184    011570          COND,F=0                          F,JMP      F,HOLD;
3185    011571
3186    011571          A,A    B,R6             ALUF,PASSA           ALUD,B
3187    011571          IDBS,ALU                          T,NEXT     T,HOLD
3188    011571          NEMP CONDENABL;
3189    011572
3190    011572                 B,R3             ALUF,PASSD           ALUD,B
3191    011572          IDBS,ARG                          T,NEXT     T,HOLD
3192    011572          30060;
3193    011573
3194    011573                 B,R2             ALUF,ZERO            ALUD,B
3195    011573          IDBS,ALU                          T,JMP      T,PUSH
3196    011573          CSAV1;
3197    011574
3198    011574                 B,B              ALUF,PASSD           ALUD,B
3199    011574          IDBS,ARG                          T,NEXT     T,HOLD
3200    011574          16;
3201    011575
3202    011575          A,5    B,R1             ALUF,PASSB           ALUD,NONE
3203    011575          IDBS,ALU                COMM,EWRF T,NEXT     T,HOLD;
3204    011576
3205    011576                 B,R4             ALUF,ZERO            ALUD,B
3206    011576          IDBS,ALU                          T,JMP      T,HOLD
3207    011576          USIGN;
3208    011577
3209    011577  NEMP:   A,D    B,R2             ALUF,PASSA           ALUD,B
3210    011577          IDBS,ALU                          T,JMP      T,PUSH
3211    011577          LWAB;
3212    011600
3213    011600          A,R6   B,17             ALUF,A+1             ALUD,Q
3214    011600          IDBS,BARG               COMM,LDLC T,NEXT     T,PUSH;
3215    011601
3216    011601                                  ALUF,Q-1             ALUD,Q
3217    011601          IDBS,ALU                          T,NEXT     T,HOLD;
3218    011602
3219    011602          ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD;     %*****************
3220    011603
3221    011603          A,A    B,LC             ALUF,Q-A-1           ALUD,NONE
3222    011603          IDBS,BARG               COMM,LDGPR T,NEXT    T,HOLD
3223    011603          COND,F15;
3224    011604
3225    011604          A,0    B,LC                                  ALUD,NONE
3226    011604          IDBS,DBR       XRF      COMM,EWRF T,NEXT     T,POP
3227    011604          LCOUNT;
3228    011605
3229    011605          A,0    B,LC             ALUF,PASSD           ALUD,Q
3230    011605          IDBS,REG       XRF               T,NEXT     T,HOLD;
3231    011606
3232    011606          A,D                     ALUF,PASSA           ALUD,NONE
3233    011606          IDBS,GPR                COMM,LDLC T,NEXT     T,HOLD
3234    011606          COND,F15                          F,JMP      F,HOLD;
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3235    011607
3236    011607                  B,R2            ALUF,ZERO           ALUD,B
3237    011607          IDBS,ALU                        T,NEXT      T,HOLD
3238    011607          ADEMP CONDENABL;
3239    011610
3240    011610                                  ALUF,ANDDQ          ALUD,Q
3241    011610          IDBS,ARG                        T,NEXT      T,HOLD
3242    011610          377;
3243    011611
3244    011611                                  ALUF,ORDQ           ALUD,Q
3245    011611          IDBS,ARG                        T,NEXT      T,HOLD
3246    011611          30000;
3247    011612
3248    011612  ADEMP:  A,0    B,LC             ALUF,PASSQ          ALUD,NONE
3249    011612          IDBS,ALU        XRF     COMM,EWRF T,JMP     T,PUSH
3250    011612          CSAV1;
3251    011613
3252    011613                  B,B             ALUF,PASSD          ALUD,B
3253    011613          IDBS,ARG                        T,NEXT      T,HOLD
3254    011613          16;
3255    011614
3256    011614          A,R7   B,1              ALUF,ANDDA          ALUD,NONE
3257    011614          IDBS,BARG                       T,NEXT      T,HOLD
3258    011614          COND,F=0                        F,NEXT      F,HOLD;
3259    011615
3260    011615          A,0    B,17             ALUF,PASSD          ALUD,Q
3261    011615          IDBS,REG        XRF     COMM,LDGPR T,JMP    T,HOLD
3262    011615          DECSA CONDENABL;
3263    011616
3264    011616                                  ALUF,PASSD          ALUD,Q
3265    011616          IDBS,SWAP                       T,NEXT      T,HOLD;
3266    011617
3267    011617          A,1    B,R2             ALUF,PASSD          ALUD,B
3268    011617          IDBS,AARG                       T,NEXT      T,HOLD;
3269    011620
3270    011620  %*******************************************************
3271    011620
3272    011620  %       DECODE SIGN REPRESENTATION OF A,D-OPERAND
3273    011620
3274    011620  DECSA:                          ALUF,ANDDQ          ALUD,Q
3275    011620          IDBS,ARG                        T,NEXT      T,HOLD
3276    011620          177;
3277    011621
3278    011621          A,5    B,11             ALUF,PASSB          ALUD,NONE
3279    011621          IDBS,ALU                COMM,EWRF T,NEXT    T,HOLD;
3280    011622
3281    011622                  B,R3            ALUF,PASSD          ALUD,B
3282    011622          IDBS,GPR                        T,NEXT      T,HOLD;
3283    011623
3284    011623          A,15   B,R4             ALUF,B-1            ALUD,B
3285    011623          IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD
3286    011623          COND,F=0                        F,JMP       F,HOLD;
3287    011624
3288    011624          A,D                     ALUF,ANDDA          ALUD,NONE
3289    011624          IDBS,GPR                        T,NEXT      T,HOLD;
3290    011625
3291    011625          A,14                                        ALUD,NONE
3292    011625          IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD
3293    011625          USIGN CONDENABL;
3294    011626
3295    011626          A,D                     ALUF,ANDDA          ALUD,NONE
3296    011626          IDBS,GPR                        T,NEXT      T,HOLD
3297    011626          COND,F=0                        F,JMP       F,HOLD;
3298    011627
3299    011627          A,1    B,R1             ALUF,PASSD          ALUD,B
3300    011627          IDBS,AARG                       T,NEXT      T,HOLD
3301    011627          LEAD CONDENABL;
3302    011630
3303    011630          A,D                     ALUF,PASSA          ALUD,NONE
3304    011630          IDBS,ALU                        T,NEXT      T,HOLD
3305    011630          COND,F11                        F,NEXT      F,HOLD;
3306    011631
3307    011631          A,R1   B,R2             ALUF,A+B            ALUD,B
3308    011631          IDBS,ALU                        T,JMP       T,HOLD
3309    011631          SEPTR CONDENABL;
3310    011632
3311    011632  %*******************************************************
3312    011632
3313    011632  %       EMBEDDED TRAILING/LEADING
3314    011632
3315    011632
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3316    011632  EMBC:       B,R1            ALUF,B+1            ALUD,B
3317    011632          IDBS,ARG            COMM,LDGPR T,NEXT   T,HOLD
3318    011632          173;
3319    011633
3320    011633                              ALUF,D-Q            ALUD,NONE
3321    011633          IDBS,GPR                    T,NEXT      T,HOLD
3322    011633          COND,F=0                    F,NEXT      F,HOLD;
3323    011634
3324    011634          A,R1  B,Z           ALUF,A+1            ALUD,B
3325    011634          IDBS,ALU                    T,JMP       T,HOLD
3326    011634          PZERO CONDENABL;
3327    011635
3328    011635                              ALUF,D-Q            ALUD,NONE
3329    011635          IDBS,ARG                    T,NEXT      T,HOLD
3330    011635          175;
3331    011636
3332    011636              B,Z             ALUF,B+1            ALUD,B
3333    011636          IDBS,ALU                    T,JMP       T,HOLD
3334    011636          PZERO CONDENABL;
3335    011637
3336    011637              B,Z             ALUF,B-1            ALUD,B
3337    011637          IDBS,ARG            COMM,LDGPR T,NEXT   T,HOLD
3338    011637          112;
3339    011640
3340    011640                              ALUF,Q-D            ALUD,NONE
3341    011640          IDBS,GPR                    T,NEXT      T,HOLD
3342    011640          COND,F15                    F,NEXT      F,HOLD;
3343    011641
3344    011641              B,17                                ALUD,NONE
3345    011641          IDBS,BARG           COMM,LDGPR T,JMP    T,HOLD
3346    011641          POS CONDENABL;
3347    011642
3348    011642  NEG:                        ALUF,D-Q            ALUD,NONE
3349    011642          IDBS,ARG                    T,NEXT      T,HOLD
3350    011642          122;
3351    011643
3352    011643          A,11                ALUF,Q-D-1          ALUD,Q
3353    011643          IDBS,AARG                   T,JMP       T,HOLD
3354    011643          ILCDP CONDENABL;
3355    011644
3356    011644          A,1   B,Z           ALUF,B+1            ALUD,B
3357    011644          IDBS,BMG            COMM,LDGPR T,JMP    T,HOLD
3358    011644          PZERC;
3359    011645
3360    011645  PZERO:      B,2             ALUF,ZERO           ALUD,Q
3361    011645          IDBS,BARG           COMM,LDGPR T,NEXT   T,HOLD;
3362    011646
3363    011646  PZERC:  A,Z   B,Z           ALUF,D+A            ALUD,B
3364    011646          IDBS,GPR                    T,JMP       T,HOLD
3365    011646          TPLED;
3366    011647
3367    011647  POS:    A,10                ALUF,D-Q            ALUD,NONE
3368    011647          IDBS,AARG                   T,NEXT      T,HOLD
3369    011647          COND,F15                    F,NEXT      F,HOLD;
3370    011650
3371    011650          A,7   B,L           ALUF,D+1            ALUD,B
3372    011650          IDBS,AARG                   T,JMP       T,HOLD
3373    011650          TPLEC CONDENABL;
3374    011651
3375    011651          A,6                 ALUF,Q-D            ALUD,NONE
3376    011651          IDBS,AARG                   T,NEXT      T,HOLD
3377    011651          COND,F15                    F,NEXT      F,HOLD;
3378    011652
3379    011652          A,L                 ALUF,A-Q            ALUD,NONE
3380    011652          IDBS,ALU                    T,JMP       T,HOLD
3381    011652          ILCDP CONDENABL;
3382    011653
3383    011653                                                  ALUD,NONE
3384    011653          IDBS,ALU                    T,JMP       T,HOLD
3385    011653          ILCDP CONDENABL;
3386    011654
3387    011654  TPLEC:                      ALUF,ANDDQ          ALUD,Q
3388    011654          IDBS,GPR                    T,NEXT      T,HOLD;
3389    011655
3390    011655          A,1                                     ALUD,NONE
3391    011655          IDBS,BMG            COMM,LDGPR T,JMP    T,HOLD
3392    011655          PZERC;
3393    011656
3394    011656  TPLED:  A,14                                    ALUD,NONE
3395    011656          IDBS,BMG            COMM,LDGPR T,NEXT   T,HOLD;
3396    011657
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3397    011657          A,D                     ALUF,ANDDA          ALUD,NONE
3398    011657          IDBS,GPR                        T,NEXT      T,HOLD
3399    011657          COND,F=0                        F,NEXT      F,HOLD;
3400    011660
3401    011660          A,2   B,R1              ALUF,D+1            ALUD,B
3402    011660          IDBS,BMG                        T,JMP       T,HOLD
3403    011660          TRAIL CONDENABL;
3404    011661
3405    011661          A,D                     ALUF,PASSA          ALUD,NONE
3406    011661          IDBS,ALU                        T,NEXT      T,HOLD
3407    011661          COND,F15                        F,NEXT      F,HOLD;
3408    011662
3409    011662                                  ALUF,PASSQ          ALUD,NONE
3410    011662          IDBS,ALU                        T,JMP       T,HOLD
3411    011662          TRBYT CONDENABL;
3412    011663
3413    011663                                  ALUF,PASSD          ALUD,Q
3414    011663          IDBS,SWAP                       T,NEXT      T,HOLD;
3415    011664
3416    011664  TRBYT:  A,0   B,LC              ALUF,ORDQ           ALUD,Q
3417    011664          IDBS,REG        XRF             T,NEXT      T,HOLD;
3418    011665
3419    011665          A,0   B,LC              ALUF,PASSQ          ALUD,NONE
3420    011665          IDBS,ALU        XRF     COMM,EWRF T,NEXT    T,HOLD;
3421    011666
3422    011666          A,0   B,17              ALUF,PASSD          ALUD,Q
3423    011666          IDBS,REG        XRF             T,NEXT      T,HOLD;
3424    011667
3425    011667                B,R3              ALUF,PASSQ          ALUD,B
3426    011667          IDBS,ALU                        T,JMP       T,HOLD
3427    011667          TBOD;
3428    011670
3429    011670  TRAIL:  A,1   B,R7              ALUF,PASSQ          ALUD,B
3430    011670          IDBS,BMG                COMM,LDLC T,NEXT    T,HOLD
3431    011670          COND,LC=0;
3432    011671
3433    011671          A,1   B,R1              ALUF,D+1            ALUD,B
3434    011671          IDBS,AARG                       T,NEXT      T,PUSH;
3435    011672
3436    011672                B,R7              ALUF,PASSB          ALUD,SLB
3437    011672          IDBS,ALU                        T,NEXT      T,POP
3438    011672          LCOUNT;
3439    011673
3440    011673          A,R7  B,Z               ALUF,ORAB           ALUD,B
3441    011673          IDBS,ALU                        T,JMP       T,HOLD
3442    011673          TBOD;
3443    011674
3444    011674  %*******************************************************
3445    011674
3446    011674  %       UNSIGNED
3447    011674
3448    011674  USIGN:        B,Z               ALUF,PASSD          ALUD,B
3449    011674          IDBS,ARG                        T,NEXT      T,HOLD
3450    011674          14;
3451    011675
3452    011675          A,2   B,R1              ALUF,D+1            ALUD,B
3453    011675          IDBS,BMG                        T,JMP       T,HOLD
3454    011675          TBOD;
3455    011676
3456    011676  %*******************************************************
3457    011676
3458    011676  %       LEADING
3459    011676
3460    011676
3461    011676  LEAD:   A,D                     ALUF,PASSA          ALUD,NONE
3462    011676          IDBS,ALU                        T,NEXT      T,HOLD
3463    011676          COND,F15                        F,JMP       F,HOLD;
3464    011677
3465    011677          A,0   B,LC              ALUF,PASSD          ALUD,Q
3466    011677          IDBS,REG        XRF     COMM,LDGPR T,NEXT   T,HOLD
3467    011677          LEADA CONDENABL;
3468    011700
3469    011700          A,6                     ALUF,PASSD          ALUD,Q
3470    011700          IDBS,AARG                       T,JMP       T,HOLD
3471    011700          LEADB;
3472    011701
3473    011701  LEADA:                                              ALUD,NONE
3474    011701          IDBS,SWAP               COMM,LDGPR T,NEXT   T,HOLD;
3475    011702
3476    011702                                  ALUF,ANDDQ          ALUD,Q
3477    011702          IDBS,ARG                        T,NEXT      T,HOLD
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3478    011702          377;
3479    011703
3480    011703  LEADB:                          ALUF,ORDQ           ALUD,Q
3481    011703          IDBS,ARG                        T,NEXT      T,HOLD
3482    011703          30000;
3483    011704
3484    011704          A,0    B,LC             ALUF,PASSQ          ALUD,NONE
3485    011704          IDBS,ALU       XRF      COMM,EWRF T,NEXT    T,HOLD;
3486    011705
3487    011705                                  ALUF,PASSD          ALUD,Q
3488    011705          IDBS,ARG                        T,NEXT      T,HOLD
3489    011705          177;
3490    011706
3491    011706          A,D                     ALUF,PASSA          ALUD,NONE
3492    011706          IDBS,ALU                        T,NEXT      T,HOLD
3493    011706          COND,F11                        F,JMP       F,HOLD;
3494    011707
3495    011707                                  ALUF,ANDDQ          ALUD,Q
3496    011707          IDBS,GPR                        T,NEXT      T,HOLD
3497    011707          EMBC CONDENABL;
3498    011710
3499    011710          A,0    B,17                                 ALUD,NONE
3500    011710          IDBS,REG       XRF      COMM,LDGPR T,NEXT   T,HOLD;
3501    011711
3502    011711                B,R3              ALUF,PASSD          ALUD,B
3503    011711          IDBS,GPR                        T,NEXT      T,HOLD;
3504    011712
3505    011712  %*******************************************************
3506    011712
3507    011712  %       SEPARATE LEADING/TRAILING
3508    011712
3509    011712  SEPTR:  A,2    B,R1             ALUF,D+1            ALUD,B
3510    011712          IDBS,BMG                        T,NEXT      T,HOLD
3511    011712          COND,F=0                        F,NEXT      F,HOLD;
3512    011713
3513    011713                                  ALUF,Q-D            ALUD,NONE
3514    011713          IDBS,ARG                        T,NEXT      T,HOLD
3515    011713          53;
3516    011714
3517    011714                B,14                                  ALUD,NONE
3518    011714          IDBS,BARG               COMM,LDGPR T,JMP    T,HOLD
3519    011714          SPOS   CONDENABL;
3520    011715
3521    011715                                  ALUF,Q-D            ALUD,NONE
3522    011715          IDBS,ARG                        T,NEXT      T,HOLD
3523    011715          55;
3524    011716
3525    011716                B,Z               ALUF,D+1            ALUD,B
3526    011716          IDBS,GPR                        T,JMP       T,HOLD
3527    011716          TBOD CONDENABL;
3528    011717
3529    011717          A,4                     ALUF,Q-D            ALUD,NONE
3530    011717          IDBS,AARG                       T,NEXT      T,HOLD
3531    011717          COND,F=0                        F,JMP       F,HOLD;
3532    011720
3533    011720                B,Z               ALUF,PASSD          ALUD,B
3534    011720          IDBS,GPR                        T,NEXT      T,HOLD
3535    011720          ILCDP CONDENABL;
3536    011721
3537    011721  %*******************************************************
3538    011721
3539    011721  %       TEST UNSIGNED DESTINATION AND PREPARE FOR CONVERSION LOOP
3540    011721
3541    011721  TBOD:   A,15                                        ALUD,NONE
3542    011721          IDBS,BMG                COMM,LDGPR T,NEXT   T,HOLD;
3543    011722
3544    011722          A,T                     ALUF,ANDDA          ALUD,NONE
3545    011722          IDBS,GPR                        T,NEXT      T,HOLD
3546    011722          COND,F=0                        F,NEXT      F,HOLD;
3547    011723
3548    011723          A,Z    B,17             ALUF,MASKDA         ALUD,Q
3549    011723          IDBS,BARG                       T,JMP       T,HOLD
3550    011723          TBODC CONDENABL;
3551    011724
3552    011724                B,Z               ALUF,ORDQ           ALUD,B
3553    011724          IDBS,ARG                        T,NEXT      T,HOLD
3554    011724          17;
3555    011725
3556    011725  TBODC:        B,R5              ALUF,B-1            ALUD,B
3557    011725          IDBS,ALU                        T,NEXT      T,HOLD
3558    011725          COND,F15                        F,JMP       F,HOLD;
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3559    011726
3560    011726          A,R1  B,R5            ALUF,A+B            ALUD,B
3561    011726          IDBS,ALU                        T,NEXT    T,HOLD
3562    011726          PHALB CONDENABL;
3563    011727
3564    011727          A,Z   B,R1            ALUF,PASSA          ALUD,B
3565    011727          IDBS,ALU              COMM,LDGPR T,NEXT   T,HOLD;
3566    011730
3567    011730          A,2   B,Z             ALUF,D-1            ALUD,B
3568    011730          IDBS,AARG                       T,JMP     T,HOLD
3569    011730          NONEW;
3570    011731
3571    011731  PHALB:  A,R5  B,17            ALUF,A-D-1          ALUD,NONE
3572    011731          IDBS,BARG                       T,NEXT    T,HOLD
3573    011731          COND,F=0                        F,NEXT    F,HOLD;
3574    011732
3575    011732                B,Z             ALUF,PASSB          ALUD,NONE
3576    011732          IDBS,ALU                        T,JMP     T,HOLD
3577    011732          BSAVE CONDENABL;
3578    011733
3579    011733                B,R1            ALUF,PASSD          ALUD,B
3580    011733          IDBS,SWAP             COMM,LDGPR T,NEXT   T,HOLD;
3581    011734
3582    011734          A,2   B,Z             ALUF,D-1            ALUD,B
3583    011734          IDBS,AARG                       T,JMP     T,HOLD
3584    011734          NONEW;
3585    011735
3586    011735  BSAVE:        B,R1            ALUF,ZERO           ALUD,B
3587    011735          IDBS,SWAP             COMM,LDGPR T,NEXT   T,HOLD;
3588    011736
3589    011736                B,Z             ALUF,D-1            ALUD,B
3590    011736          IDBS,ARG              COMM,LDLC T,NEXT    T,HOLD
3591    011736          17;
3592    011737
3593    011737                B,STS           ALUF,B-1            ALUD,B
3594    011737          IDBS,ALU                        T,NEXT    T,HOLD
3595    011737          COND,F=0                        F,NEXT    F,HOLD;
3596    011740
3597    011740                B,R5            ALUF,ZERO           ALUD,B
3598    011740          IDBS,ALU                        T,JMP     T,HOLD
3599    011740          LASTW CONDENABL;
3600    011741
3601    011741  NONEW:  A,1   B,17                                ALUD,NONE
3602    011741          IDBS,GPR      XRF     COMM,EWRF T,JMP     T,HOLD
3603    011741          PLOOP;
3604    011742
3605    011742  SPOS:         B,Z             ALUF,PASSD          ALUD,B
3606    011742          IDBS,GPR                        T,JMP     T,HOLD
3607    011742          TBOD;
3608    011743
3609    011743  %*****************************************************
3610    011743
3611    011743  %       CONVERSION LOOP
3612    011743  %
3613    011743  %       R2 = BYTE-COUNTER
3614    011743  %       R5 = NIBLE-COUNTER
3615    011743  %       R6 = CONSTANT
3616    011743  %      GPR = SCRATCH
3617    011743  %       R3 = CURRENT ASCII-WORD
3618    011743  %       Q  = SCRATCH
3619    011743  %       L  = SCRATCH
3620    011743  %       R1 = CURRENT BCD-WORD
3621    011743
3622    011743  PLOOP:  A,3   B,10            ALUF,PASSB          ALUD,NONE
3623    011743          IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
3624    011744
3625    011744                B,R7            ALUF,PASSD          ALUD,B
3626    011744          IDBS,ARG                        T,NEXT    T,PUSH
3627    011744          34400;
3628    011745
3629    011745          A,R2  B,10            ALUF,D-A            ALUD,NONE
3630    011745          IDBS,BARG                       T,NEXT    T,HOLD
3631    011745          COND,F15                        F,NEXT    F,HOLD;
3632    011746
3633    011746          A,7   B,R6            ALUF,D+1            ALUD,B
3634    011746          IDBS,AARG                       T,JMP     T,PUSH
3635    011746          PREAD CONDENABL;
3636    011747
3637    011747          A,6   B,R2            ALUF,PASSB          ALUD,NONE
3638    011747          IDBS,AARG                       T,NEXT    T,HOLD
3639    011747          COND,F=0                        F,JMP     F,HOLD;
```

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3640    011750
3641    011750          A,R3                    ALUF,PASSA          ALUD,Q
3642    011750          IDBS,SWAP               COMM,LDGPR T,NEXT   T,HOLD
3643    011750          PLBYT CONDENABL;
3644    011751
3645    011751                                  ALUF,ANDDQ          ALUD,Q
3646    011751          IDBS,ARG                        T,NEXT      T,HOLD
3647    011751          177;
3648    011752
3649    011752          A,6                     ALUF,Q-D            ALUD,NONE
3650    011752          IDBS,AARG                       T,NEXT      T,HOLD
3651    011752          COND,F15                        F,NEXT      F,HOLD;
3652    011753
3653    011753          A,R6  B,17              ALUF,A-Q            ALUD,NONE
3654    011753          IDBS,BARG               COMM,LDGPR T,JMP    T,HOLD
3655    011753          ILLCH CONDENABL;
3656    011754
3657    011754                B,L               ALUF,ANDDQ          ALUD,B
3658    011754          IDBS,GPR                        T,JMP       T,HOLD
3659    011754          ILLCH CONDENABL;
3660    011755
3661    011755  CLOOP:  A,R5  B,R2              ALUF,A-B            ALUD,NONE
3662    011755          IDBS,ALU                COMM,LDGPR T,NEXT   T,HOLD
3663    011755          COND,F15                        F,NEXT      F,HOLD;
3664    011756
3665    011756          A,R2  B,R5              ALUF,A-B-1          ALUD,NONE
3666    011756          IDBS,ALU                COMM,LDLC T,JMP     T,HOLD
3667    011756          SRIGT CONDENABL;
3668    011757
3669    011757                B,L  MIS,ROT      ALUF,PASSB          ALUD,SRB
3670    011757          IDBS,GPR                COMM,LDLC T,NEXT    T,HOLD
3671    011757          COND,LC=0;
3672    011760
3673    011760                B,L  MIS,ROT      ALUF,PASSB          ALUD,SRB
3674    011760          IDBS,ALU                COMM,CLFF T,NEXT    T,PUSH;
3675    011761
3676    011761          A,1   B,L  MIS,ROT      ALUF,PASSB          ALUD,SLB
3677    011761          IDBS,AARG               COMM,LDGPR T,JMP    T,POP
3678    011761          LCOUNT TSAVE;
3679    011762
3680    011762  SRIGT:        B,L  MIS,ROT      ALUF,PASSB          ALUD,SLB
3681    011762          IDBS,ALU                        T,NEXT      T,PUSH
3682    011762          COND,LC=0;
3683    011763
3684    011763          A,1   B,L  MIS,ROT      ALUF,PASSB          ALUD,SRB
3685    011763          IDBS,AARG               COMM,LDGPR T,JMP    T,POP
3686    011763          LCOUNT TSAVE;
3687    011764
3688    011764  PLBYT:                          ALUF,ANDDQ          ALUD,Q
3689    011764          IDBS,ARG                        T,NEXT      T,HOLD
3690    011764          77400;
3691    011765
3692    011765                                  ALUF,Q-D            ALUD,NONE
3693    011765          IDBS,GPR                        T,NEXT      T,HOLD
3694    011765          COND,F15                        F,NEXT      F,HOLD;
3695    011766
3696    011766          A,R7  B,17              ALUF,A-Q            ALUD,NONE
3697    011766          IDBS,BARG                       T,JMP       T,HOLD
3698    011766          ILLCV CONDENABL;
3699    011767
3700    011767                                  ALUF,ANDDQ          ALUD,Q
3701    011767          IDBS,SWAP                       T,JMP       T,HOLD
3702    011767          ILLCV CONDENABL;
3703    011770
3704    011770                B,L               ALUF,PASSQ          ALUD,B
3705    011770          IDBS,ALU                        T,JMP       T,HOLD
3706    011770          CLOOP;
3707    011771
3708    011771  TSAVE:  A,R2  B,R2              ALUF,D+A            ALUD,B
3709    011771          IDBS,GPR                        T,NEXT      T,HOLD;
3710    011772
3711    011772          A,R3  B,4               ALUF,PASSA          ALUD,Q
3712    011772          IDBS,BARG               COMM,LDGPR T,NEXT   T,HOLD;
3713    011773
3714    011773          A,R5  B,R5              ALUF,D+A            ALUD,B
3715    011773          IDBS,GPR                        T,NEXT      T,HOLD;
3716    011774
3717    011774          A,R5  B,14              ALUF,D-A            ALUD,NONE
3718    011774          IDBS,BARG                       T,NEXT      T,HOLD
3719    011774          COND,F15                        F,RETURN    F,HOLD;
3720    011775
```

```
3721    011775          A,L   B,R1            ALUF,ORAB           ALUD,B
3722    011775          IDBS,ALU              COMM,LDGPR T,NEXT   T,HOLD
3723    011775          CONDENABL;
3724    011776
3725    011776                B,R5            ALUF,ZERO           ALUD,B
3726    011776          IDBS,ALU                        T,NEXT    T,HOLD;
3727    011777
3728    011777                B,STS           ALUF,B-1            ALUD,B
3729    011777          IDBS,ALU                        T,NEXT    T,HOLD
3730    011777          COND,F=0                        F,NEXT    F,HOLD;
3731    012000
3732    012000          A,Z   B,Z             ALUF,B-1            ALUD,B,YA
3733    012000          IDBS,ALU              COMM,LDLC T,JMP     T,HOLD
3734    012000          LASTW CONDENABL;
3735    012001
3736    012001                B,R1            ALUF,ZERO           ALUD,B
3737    012001          IDBS,ALU                        T,NEXT    T,HOLD;
3738    012002
3739    012002          A,1   B,LC                                ALUD,NONE
3740    012002          IDBS,GPR      XRF     COMM,EWRF T,RETURN  T,HOLD;
3741    012003
3742    012003  %*******************************************************
3743    012003
3744    012003  %       SAVE LAST WORD, TEST OVERFLOW
3745    012003
3746    012003
3747    012003  LASTW:  A,R2  B,17            ALUF,A-D-1          ALUD,NONE
3748    012003          IDBS,BARG                       T,NEXT    T,HOLD
3749    012003          COND,F=0                        F,NEXT    F,HOLD;
3750    012004
3751    012004                                ALUF,PASSD          ALUD,Q
3752    012004          IDBS,SWAP                       T,JMP     T,HOLD
3753    012004          LASTC CONDENABL;
3754    012005
3755    012005          A,R3                  ALUF,ANDAQ          ALUD,NONE
3756    012005          IDBS,ALU                        T,NEXT    T,HOLD
3757    012005          COND,F=0                        F,JMP     F,HOLD;
3758    012006
3759    012006  LASTC:  A,1   B,LC                                ALUD,NONE
3760    012006          IDBS,GPR      XRF     COMM,EWRF  T,NEXT   T,HOLD
3761    012006          POVFL CONDENABL;
3762    012007
3763    012007          A,B   B,R4            ALUF,PASSB          ALUD,B,YA
3764    012007          IDBS,ALU              COMM,LDLC T,NEXT    T,HOLD
3765    012007          COND,F=0                        F,NEXT    F,HOLD;
3766    012010
3767    012010                                                    ALUD,NONE
3768    012010          IDBS,ALU                        T,JMP     T,HOLD
3769    012010          PWRIT CONDENABL;
3770    012011
3771    012011                B,R1            ALUF,PASSD          ALUD,B
3772    012011          IDBS,ARG                        T,NEXT    T,PUSH
3773    012011          30060;
3774    012012
3775    012012                                ALUF,PASSD          ALUD,Q
3776    012012          IDBS,ARG                        T,NEXT    T,HOLD
3777    012012          77577;
3778    012013
3779    012013          A,0   B,LC            ALUF,ANDDQ          ALUD,Q
3780    012013          IDBS,REG      XRF               T,NEXT    T,HOLD;
3781    012014
3782    012014          A,R1                  ALUF,XORAQ          ALUD,NONE
3783    012014          IDBS,ALU                        T,NEXT    T,HOLD
3784    012014          COND,F=0                        F,JMP     F,POP;
3785    012015
3786    012015                B,R4            ALUF,B-1            ALUD,B
3787    012015          IDBS,ALU                        T,NEXT    T,HOLD
3788    012015          POVFL CONDENABL;
3789    012016
3790    012016                                                    ALUD,NONE
3791    012016          IDBS,ALU                        T,JMP     T,POP
3792    012016          LCOUNT PWRIT;
3793    012017
3794    012017  POVFL:  A,2   B,15            ALUF,ZERO           ALUD,NONE
3795    012017          IDBS,ALU              COMM,EWRF T,JMP     T,HOLD
3796    012017          PWRIT;
3797    012020
3798    012020  %*******************************************************
3799    012020
3800    012020  %       READ NEXT WORD FROM FIRST OPERAND
3801    012020
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3802    012020  PREAD: A,R4                    ALUF,PASSA          ALUD,NONE
3803    012020         IDBS,ALU                         T,NEXT      T,HOLD
3804    012020         COND,F=0                         F,NEXT      F,HOLD;
3805    012021
3806    012021         A,B   B,R2               ALUF,ZERO           ALUD,B,YA
3807    012021         IDBS,ALU                 COMM,LDLC T,JMP     T,HOLD
3808    012021         PSLUT CONDENABL;
3809    012022
3810    012022               B,R4               ALUF,B-1            ALUD,B
3811    012022         IDBS,ALU                         T,NEXT      T,HOLD;
3812    012023
3813    012023         A,0   B,LC               ALUF,PASSD          ALUD,Q
3814    012023         IDBS,REG       XRF               T,NEXT      T,HOLD;
3815    012024
3816    012024               B,R3               ALUF,PASSQ          ALUD,B
3817    012024         IDBS,ALU                         T,NEXT      T,HOLD;
3818    012025
3819    012025               B,B                ALUF,B-1            ALUD,B
3820    012025         IDBS,ALU                         T,RETURN    T,POP;
3821    012026
3822    012026  PSLUT:       B,R3               ALUF,PASSD          ALUD,B
3823    012026         IDBS,ARG                         T,RETURN    T,POP
3824    012026         30060;
3825    012027
3826    012027  %*****************************************************
3827    012027
3828    012027  %      TEST DESTINATION EMPTY, WRITE X,T-FIELD, AND TEST OVERFLOW
3829    012027
3830    012027
3831    012027  PWRIT: A,X   B,R6               ALUF,PASSA          ALUD,B
3832    012027         IDBS,ALU                         T,NEXT      T,HOLD;
3833    012030
3834    012030         A,3   B,11               ALUF,PASSD          ALUD,NONE
3835    012030         IDBS,REG                         T,NEXT      T,HOLD
3836    012030         COND,F=0                         F,NEXT      F,HOLD;
3837    012031
3838    012031         A,5   B,11               ALUF,PASSD          ALUD,B
3839    012031         IDBS,REG                         T,JMP       T,HOLD
3840    012031         POVER CONDENABL;
3841    012032
3842    012032         A,1   B,17               ALUF,PASSD          ALUD,Q
3843    012032         IDBS,REG       XRF               T,JMP       T,PUSH
3844    012032         WRITS;
3845    012033
3846    012033         A,2   B,15               ALUF,PASSD          ALUD,NONE
3847    012033         IDBS,REG                         T,NEXT      T,HOLD
3848    012033         COND,F=0                         F,NEXT      F,HOLD;
3849    012034
3850    012034         A,1   B,LC               ALUF,PASSD          ALUD,Q
3851    012034         IDBS,REG       XRF               T,JMP       T,HOLD
3852    012034         POVEF CONDENABL;
3853    012035
3854    012035         A,2   B,14               ALUF,MASKDQ         ALUD,NONE
3855    012035         IDBS,REG                         T,NEXT      T,HOLD
3856    012035         COND,F=0                         F,NEXT      F,HOLD;
3857    012036
3858    012036         A,2   B,14               ALUF,ANDDQ          ALUD,Q
3859    012036         IDBS,REG                         T,JMP       T,HOLD
3860    012036         PUSAV CONDENABL;
3861    012037
3862    012037  POVEF:       B,P                ALUF,B-1            ALUD,B
3863    012037         IDBS,ARG                 COMM,LDGPR T,NEXT   T,HOLD
3864    012037         37;
3865    012040
3866    012040         A,D   B,D                ALUF,MASKDA         ALUD,B
3867    012040         IDBS,GPR                         T,NEXT      T,HOLD;
3868    012041
3869    012041         A,D   B,D                ALUF,D+A+1          ALUD,B
3870    012041         IDBS,BMG                         T,NEXT      T,HOLD;
3871    012042
3872    012042         A,2   B,14               ALUF,ANDDQ          ALUD,Q
3873    012042         IDBS,REG                         T,NEXT      T,HOLD;
3874    012043
3875    012043  PUSAV: A,2   B,11               ALUF,ORDQ           ALUD,Q
3876    012043         IDBS,REG                         T,NEXT      T,HOLD;
3877    012044
3878    012044         A,R6  B,P                ALUF,B+1            ALUD,B,YA
3879    012044         IDBS,ALU                         T,NEXT      T,HOLD;
3880    012045
3881    012045                                  ALUF,PASSQ          ALUD,NONE
3882    012045         IDBS,ALU          COMM,WRRQ,APT  T,JMP       T,HOLD    %*******************
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3883  012045          USAV4;
3884  012046
3885  012046  %*********************************************************
3886  012046
3887  012046  %       SUBROUTINE TO WRITE FROM XRF LEVEL 1 TO MEMORY
3888  012046
3889  012046  WRITS: A,2   B,12            ALUF,ORDQ           ALUD,Q
3890  012046         IDBS,REG                        T,NEXT    T,HOLD;
3891  012047
3892  012047         A,1   B,17            ALUF,PASSQ          ALUD,NONE
3893  012047         IDBS,ALU       XRF    COMM,EWRF T,NEXT    T,HOLD;
3894  012050
3895  012050         A,R1  B,R6            ALUF,A-B            ALUD,NONE
3896  012050         IDBS,ALU                        T,NEXT    T,HOLD
3897  012050         COND,F=0                        F,NEXT    F,PUSH;
3898  012051
3899  012051               B,17                                ALUD,NONE
3900  012051         IDBS,BARG             COMM,LDLC T,RETURN  T,POP
3901  012051         CONDENABL;
3902  012052
3903  012052         A,R1                  ALUF,PASSA          ALUD,NONE
3904  012052         IDBS,ALU                        T,NEXT    T,HOLD;
3905  012053
3906  012053         A,1   B,LC                                ALUD,NONE
3907  012053         IDBS,REG       XRF COMM,WRRQ,APT T,NEXT   T,HOLD;   %*****************
3908  012054
3909  012054         A,R1  B,R6            ALUF,A-B-1          ALUD,NONE
3910  012054         IDBS,ALU                        T,NEXT    T,HOLD
3911  012054         COND,F=0;
3912  012055
3913  012055               B,R1            ALUF,B-1            ALUD,B
3914  012055         IDBS,ALU                        T,NEXT    T,POP
3915  012055         LCOUNT;
3916  012056
3917  012056                                                    ALUD,NONE
3918  012056         IDBS,ALU                        T,RETURN  T,POP;
3919  012057
3920  012057  %*********************************************************
3921  012057
3922  012057  %       X,T-OPERAND EMPTY, TEST OVERFLOW
3923  012057
3924  012057
3925  012057  POVER: A,2   B,15            ALUF,PASSD          ALUD,NONE
3926  012057         IDBS,REG                        T,NEXT    T,HOLD
3927  012057         COND,F=0                        F,NEXT    F,HOLD;
3928  012060
3929  012060         A,4   B,R1            ALUF,D-1            ALUD,B
3930  012060         IDBS,AARG                       T,JMP     T,HOLD
3931  012060         TOVER CONDENABL;
3932  012061
3933  012061         A,1   B,17            ALUF,PASSD          ALUD,Q
3934  012061         IDBS,REG       XRF              T,NEXT    T,HOLD;
3935  012062
3936  012062               B,17            ALUF,MASKDQ         ALUD,NONE
3937  012062         IDBS,BARG                       T,NEXT    T,HOLD
3938  012062         COND,F=0                        F,JMP     F,HOLD;
3939  012063
3940  012063                                                    ALUD,NONE
3941  012063         IDBS,ALU                        T,NEXT    T,HOLD
3942  012063         TOVER CONDENABL;
3943  012064
3944  012064  POVEC:       B,P             ALUF,B+1            ALUD,B
3945  012064         IDBS,ALU                        T,JMP     T,HOLD
3946  012064         USAV4;
3947  012065
3948  012065  TOVER: A,R1  B,D             ALUF,MASKAB         ALUD,B
3949  012065         IDBS,ALU                        T,NEXT    T,HOLD;
3950  012066
3951  012066         A,D   B,D             ALUF,D+A+1          ALUD,B
3952  012066         IDBS,BMG                        T,JMP     T,HOLD
3953  012066         USAV4;
3954  012067
3955  012067  %*********************************************************
3956  012067
3957  012067  %       ILLEGAL CODE, SET ADDRESS AND CODE IN A,D-REG.
3958  012067
3959  012067
3960  012067  ILLCV: A,7   B,STS           ALUF,A+B            ALUD,B
3961  012067         IDBS,BMG                         T,NEXT   T,HOLD;
3962  012070
3963  012070         A,D   B,R3            ALUF,MASKDA         ALUD,B
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3964    012070          IDBS,SWAP                       T,JMP     T,HOLD
3965    012070          ILLC;
3966    012071
3967    012071  ILLCH:  A,7   B,STS             ALUF,A+B                ALUD,B
3968    012071          IDBS,BMG                        T,NEXT    T,HOLD;
3969    012072
3970    012072          A,D   B,R3              ALUF,ORDA               ALUD,B
3971    012072          IDBS,SWAP                       T,NEXT    T,HOLD;
3972    012073
3973    012073  ILLC:   A,3   B,10              ALUF,PASSD              ALUD,NONE
3974    012073          IDBS,REG                        T,NEXT    T,HOLD
3975    012073          COND,F=0                        F,NEXT    F,HOLD;
3976    012074
3977    012074          A,4   B,R1              ALUF,D-1                ALUD,B
3978    012074          IDBS,AARG                       T,JMP     T,HOLD
3979    012074          TILOV CONDENABL;
3980    012075
3981    012075          A,STS B,R6              ALUF,A-1                ALUD,B
3982    012075          IDBS,ALU                        T,NEXT    T,HOLD;
3983    012076
3984    012076          A,3   B,11              ALUF,PASSD              ALUD,NONE
3985    012076          IDBS,REG                        T,NEXT    T,HOLD
3986    012076          COND,F=0                        F,NEXT    F,HOLD;
3987    012077
3988    012077          A,R1  B,R3              ALUF,MASKAB             ALUD,B
3989    012077          IDBS,ALU                        T,JMP     T,HOLD
3990    012077          TOVER CONDENABL;
3991    012100
3992    012100          A,1   B,17              ALUF,PASSD              ALUD,Q
3993    012100          IDBS,REG        XRF             T,NEXT    T,HOLD;
3994    012101
3995    012101          A,5   B,11              ALUF,PASSD              ALUD,B
3996    012101          IDBS,REG                        T,JMP     T,PUSH
3997    012101          WRITS;
3998    012102
3999    012102  TILOV:  A,R6  B,X               ALUF,A-B                ALUD,NONE
4000    012102          IDBS,ALU                        T,NEXT    T,HOLD
4001    012102          COND,F=0                        F,JMP     F,HOLD;
4002    012103
4003    012103          A,R5                    ALUF,PASSA              ALUD,NONE
4004    012103          IDBS,ALU                COMM,LDLC T,NEXT        T,HOLD
4005    012103          PNWRT CONDENABL;
4006    012104
4007    012104          A,17                    ALUF,D-1                ALUD,Q
4008    012104          IDBS,BMG                        T,NEXT    T,HOLD;
4009    012105
4010    012105          A,2   B,14              ALUF,ANDDQ              ALUD,Q
4011    012105          IDBS,REG                        T,NEXT    T,HOLD;
4012    012106
4013    012106          A,LC                    ALUF,Q-D                ALUD,NONE
4014    012106          IDBS,BMG                        T,NEXT    T,HOLD
4015    012106          COND,F15                        F,NEXT    F,HOLD;
4016    012107
4017    012107          A,4   B,R1              ALUF,D-1                ALUD,B
4018    012107          IDBS,AARG                       T,JMP     T,HOLD
4019    012107          TOVER CONDENABL;
4020    012110
4021    012110  PNWRT:  A,R4  B,A               ALUF,A+B                ALUD,B
4022    012110          IDBS,ALU                        T,NEXT    T,HOLD;
4023    012111
4024    012111          A,R3  B,D               ALUF,D+A+1              ALUD,B
4025    012111          IDBS,BARG                       T,JMP     T,HOLD
4026    012111          USAV4;
4027    012112
4028    012112  %*******************************************************
4029    012112
4030    012112  %       ILLEGAL CODE IN SIGN, GIVE ADDRESS AND CODE IN A,D-REG.
4031    012112
4032    012112  ILCDP:  A,3   B,11              ALUF,PASSD              ALUD,NONE
4033    012112          IDBS,REG                        T,NEXT    T,HOLD
4034    012112          COND,F=0                        F,NEXT    F,HOLD;
4035    012113
4036    012113          A,4   B,R1              ALUF,D-1                ALUD,B
4037    012113          IDBS,AARG                       T,JMP     T,HOLD
4038    012113          TOVER CONDENABL;
4039    012114
4040    012114          A,14                    ALUF,PASSD              ALUD,Q
4041    012114          IDBS,BMG                        T,NEXT    T,HOLD;
4042    012115
4043    012115          A,D                     ALUF,ANDAQ              ALUD,NONE
4044    012115          IDBS,ALU                        T,NEXT    T,HOLD
```

```
4045  012115          COND,F=0                          F,JMP     F,HOLD;
4046  012116
4047  012116          A,17  B,D             ALUF,PASSB            ALUD,Q
4048  012116          IDBS,BMG              COMM,LDGPR T,NEXT     T,HOLD
4049  012116          BAANN CONDENABL;
4050  012117
4051  012117          A,R7  B,1             ALUF,ANDDA            ALUD,NONE
4052  012117          IDBS,BARG                        T,NEXT     T,HOLD
4053  012117          COND,F=0                         F,NEXT     F,HOLD;
4054  012120
4055  012120          A,R6  B,A             ALUF,PASSA            ALUD,B
4056  012120          IDBS,ALU                         T,JMP      T,HOLD
4057  012120          ORDBN CONDENABL;
4058  012121
4059  012121          A,D                   ALUF,MASKDA           ALUD,Q
4060  012121          IDBS,GPR                         T,JMP      T,HOLD
4061  012121          BAANN;
4062  012122
4063  012122  ORDBN:  A,D                   ALUF,ORDA             ALUD,Q
4064  012122          IDBS,GPR                         T,NEXT     T,HOLD;
4065  012123
4066  012123  BAANN:        B,D             ALUF,MASKDQ           ALUD,B
4067  012123          IDBS,ARG                         T,NEXT     T,HOLD
4068  012123          37;
4069  012124
4070  012124          A,D   B,D             ALUF,ORDA             ALUD,B
4071  012124          IDBS,BMG                         T,JMP      T,HOLD
4072  012124          USAV4;
4073  012125
4074  012125
4075  012125
4076  012125
4077  012125
4078  012125
4079  012125
4080  012125
4081  012125  %*******************************************************
4082  012125
4083  012125  %   COMMERCIAL INSTRUCTION: UPACK (A,D -BCD-FIELD -> X,T -ASCII-FIELD)
4084  012125
4085  012125  %*******************************************************
4086  012125
4087  012125  UPACK:        B,R5             ALUF,ZERO             ALUD,B
4088  012125          IDBS,ARG               COMM,LDGPR T,NEXT     T,HOLD
4089  012125          37;
4090  012126
4091  012126          A,T   B,R1             ALUF,ANDDA            ALUD,B
4092  012126          IDBS,GPR                         T,NEXT     T,HOLD
4093  012126          COND,F=0                         F,JMP      F,HOLD;
4094  012127
4095  012127          A,D                    ALUF,ANDDA            ALUD,Q
4096  012127          IDBS,GPR                         T,NEXT     T,HOLD
4097  012127          TNOTE CONDENABL;
4098  012130
4099  012130          A,0   B,R4             ALUF,PASSD            ALUD,B
4100  012130          IDBS,BMG                         T,NEXT     T,HOLD
4101  012130          TEMPT CONDENABL;
4102  012131
4103  012131                B,P              ALUF,B+1              ALUD,B
4104  012131          IDBS,ALU                         T,JMP      T,POP
4105  012131          CONT;
4106  012132
4107  012132  %*******************************************************
4108  012132
4109  012132  %       READ FIRST AND LAST WORD OF X,T-OPERAND
4110  012132
4111  012132
4112  012132  TNOTE:  A,3   B,11             ALUF,PASSB            ALUD,NONE
4113  012132          IDBS,ALU               COMM,EWRF T,NEXT      T,HOLD;
4114  012133
4115  012133          A,3   B,12             ALUF,PASSQ            ALUD,NONE
4116  012133          IDBS,ALU               COMM,EWRF T,NEXT      T,HOLD;
4117  012134
4118  012134          A,X   B,R6             ALUF,PASSA            ALUD,B
4119  012134          IDBS,ALU                         T,NEXT     T,HOLD;
4120  012135
4121  012135          A,T   B,R2             ALUF,PASSA            ALUD,B
4122  012135          IDBS,ALU                         T,JMP      T,PUSH
4123  012135          LWAB;
4124  012136
4125  012136          A,R6  B,R2             ALUF,ZERO             ALUD,B,YA
```

```
4126    012136          IDBS,ALU                                T,JMP     T,HOLD
4127    012136          URBOT;
4128    012137
4129    012137  TEMPT:  A,3    B,11             ALUF,PASSB              ALUD,NONE
4130    012137          IDBS,ALU                COMM,EWRF T,NEXT        T,HOLD;
4131    012140
4132    012140          A,3    B,12             ALUF,PASSQ              ALUD,NONE
4133    012140          IDBS,ALU                COMM,EWRF T,JMP         T,HOLD
4134    012140          TAEMP;
4135    012141
4136    012141  URBOT:  A,R7   B,1              ALUF,ANDDA              ALUD,NONE
4137    012141          IDBS,BARG          COMM,RDRQ,APT  T,NEXT        T,HOLD    %*****************
4138    012141          COND,F=0                               F,NEXT   F,HOLD;
4139    012142
4140    012142                                  ALUF,PASSD              ALUD,Q
4141    012142          IDBS,DBR                               T,NEXT   T,HOLD
4142    012142          COND,COND                              F,NEXT   T,HOLD;
4143    012143
4144    012143          A,R6                    ALUF,PASSA              ALUD,NONE
4145    012143          IDBS,ALU                               T,NEXT   T,HOLD;
4146    012144
4147    012144                                  ALUF,PASSQ              ALUD,NONE
4148    012144          IDBS,ALU                COMM,WRRQ,APT T,JMP     T,HOLD
4149    012144          URFIR CONDENABL;
4150    012145
4151    012145                B,R2              ALUF,ANDDQ              ALUD,B
4152    012145          IDBS,ARG                               T,NEXT   T,HOLD
4153    012145          377;
4154    012146
4155    012146          A,1    B,R5             ALUF,PASSD              ALUD,B
4156    012146          IDBS,AARG                              T,NEXT   T,HOLD;
4157    012147
4158    012147  URFIR:  A,X    B,T              ALUF,PASSB              ALUD,B,YA
4159    012147          IDBS,ALU                               T,NEXT   T,HOLD
4160    012147          COND,F15                               F,JMP    F,HOLD;
4161    012150
4162    012150                B,T               ALUF,PASSB              ALUD,NONE
4163    012150          IDBS,ALU           COMM,RDRQ,APT  T,NEXT        T,HOLD;  %*******************
4164    012151
4165    012151          A,2    B,R2             ALUF,PASSB              ALUD,NONE
4166    012151          IDBS,ALU                COMM,EWRF T,NEXT        T,HOLD
4167    012151          URFIC CONDENABL;
4168    012152
4169    012152                B,Z               ALUF,PASSD              ALUD,B
4170    012152          IDBS,ARG                               T,NEXT   T,HOLD
4171    012152          177400;
4172    012153
4173    012153  URFIC:  A,Z                     ALUF,ANDDA              ALUD,Q
4174    012153          IDBS,DBR                COMM,LDGPR T,NEXT       T,HOLD;
4175    012154
4176    012154          A,X                     ALUF,PASSA              ALUD,NONE
4177    012154          IDBS,ALU                               T,NEXT   T,HOLD;
4178    012155
4179    012155                                                          ALUD,NONE
4180    012155          IDBS,GPR                COMM,WRRQ,APT T,NEXT T,HOLD;
4181    012156
4182    012156          A,2    B,11             ALUF,PASSQ              ALUD,NONE
4183    012156          IDBS,ALU                COMM,EWRF T,NEXT        T,HOLD;
4184    012157
4185    012157  %*************************************************************
4186    012157
4187    012157  %       TEST A,D-OPERAND EMPTY, AND READ IT TO RF LEVEL 1
4188    012157
4189    012157
4190    012157  TAEMP:  A,3    B,12             ALUF,PASSD              ALUD,NONE
4191    012157          IDBS,REG                               T,NEXT   T,HOLD
4192    012157          COND,F=0                               F,JMP    F,HOLD;
4193    012160
4194    012160          A,A    B,R1             ALUF,PASSA              ALUD,B
4195    012160          IDBS,ALU                               T,NEXT   T,HOLD
4196    012160          UNEMP CONDENABL;
4197    012161
4198    012161          A,1    B,17                                     ALUD,NONE
4199    012161          IDBS,BARG        XRF    COMM,EWRF T,NEXT        T,HOLD;
4200    012162
4201    012162                B,R3              ALUF,ZERO               ALUD,B
4202    012162          IDBS,ARG                COMM,LDLC T,NEXT        T,HOLD
4203    012162          17;
4204    012163
4205    012163          A,0    B,STS            ALUF,PASSD              ALUD,B
4206    012163          IDBS,BMG                               T,JMP    T,HOLD
```

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4207    012163          UEMP1;
4208    012164
4209    012164  POSS:       B,13                                    ALUD,NONE
4210    012164          IDBS,BARG           COMM,LDGPR T,JMP        T,HOLD
4211    012164          UDCS;
4212    012165
4213    012165  UNEMP:                                              ALUD,NONE
4214    012165          IDBS,ARG            COMM,LDGPR T,NEXT       T,HOLD
4215    012165          37;
4216    012166
4217    012166          A,D   B,R2          ALUF,PASSA              ALUD,B
4218    012166          IDBS,ALU                    T,JMP           T,PUSH
4219    012166          LWA;
4220    012167
4221    012167          A,R1  B,17          ALUF,A+1                ALUD,Q
4222    012167          IDBS,BARG           COMM,LDLC T,NEXT        T,PUSH;
4223    012170
4224    012170                              ALUF,Q-1                ALUD,Q
4225    012170          IDBS,ALU                    T,NEXT          T,HOLD;
4226    012171
4227    012171          ALUD,NONE IDBS,ALU COMM,RDRQ,APT T,NEXT T,HOLD; %*********************
4228    012172
4229    012172          A,A   B,LC          ALUF,Q-A-1              ALUD,NONE
4230    012172          IDBS,BARG           COMM,LDGPR T,NEXT       T,HOLD
4231    012172          COND,F15;
4232    012173
4233    012173          A,1   B,LC                                  ALUD,NONE
4234    012173          IDBS,DBR        XRF COMM,EWRF T,NEXT        T,POP
4235    012173          LCOUNT;
4236    012174
4237    012174          A,D   B,R2          ALUF,PASSA              ALUD,B
4238    012174          IDBS,GPR            COMM,LDLC T,JMP         T,PUSH
4239    012174          TTPWD;
4240    012175
4241    012175          A,1   B,LC          ALUF,PASSD              ALUD,Q
4242    012175          IDBS,REG        XRF         T,NEXT          T,HOLD;
4243    012176
4244    012176          A,Z                 ALUF,ANDAQ              ALUD,Q
4245    012176          IDBS,ALU                    T,NEXT          T,HOLD;
4246    012177
4247    012177          A,1   B,LC          ALUF,PASSQ              ALUD,NONE
4248    012177          IDBS,ALU        XRF COMM,EWRF T,NEXT        T,HOLD;
4249    012200
4250    012200  UEMP1:  A,2   B,Z           ALUF,D-1                ALUD,B
4251    012200          IDBS,AARG                   T,JMP           T,PUSH
4252    012200          CSAV1;
4253    012201
4254    012201          A,R3  B,2           ALUF,ANDDA              ALUD,NONE
4255    012201          IDBS,BARG                   T,NEXT          T,HOLD
4256    012201          COND,F=0                    F,JMP           F,HOLD;
4257    012202
4258    012202          A,1   B,17          ALUF,PASSD              ALUD,Q
4259    012202          IDBS,REG        XRF         T,NEXT          T,HOLD
4260    012202          HALVB CONDENABL;
4261    012203
4262    012203              B,Z             ALUF,ANDDQ              ALUD,B
4263    012203          IDBS,ARG                    T,NEXT          T,HOLD
4264    012203          17;
4265    012204
4266    012204              B,17            ALUF,MASKDQ             ALUD,Q
4267    012204          IDBS,BARG                   T,NEXT          T,HOLD;
4268    012205
4269    012205          A,1   B,R2          ALUF,D+1                ALUD,B
4270    012205          IDBS,BMG                    T,JMP           T,HOLD
4271    012205          UDECC;
4272    012206
4273    012206  HALVB:  A,Z   B,Z           ALUF,ANDDA              ALUD,B
4274    012206          IDBS,SWAP                   T,NEXT          T,HOLD;
4275    012207
4276    012207                              ALUF,ANDDQ              ALUD,Q
4277    012207          IDBS,ARG                    T,NEXT          T,HOLD
4278    012207          170000;
4279    012210
4280    012210              B,R2            ALUF,D+1                ALUD,B
4281    012210          IDBS,BARG                   T,NEXT          T,HOLD;
4282    012211
4283    012211  %*****************************************************
4284    012211
4285    012211  %       IF X,T-OPERAND EMPTY, TEST OVERFLOW
4286    012211
4287    012211
```

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4288  012211  UDECC: A,3   B,11          ALUF,PASSD          ALUD,NONE
4289  012211         IDBS,REG                      T,NEXT    T,HOLD
4290  012211         COND,F=0                      F,JMP     F,HOLD;
4291  012212
4292  012212               B,STS          ALUF,B-1            ALUD,B
4293  012212         IDBS,ALU                      T,NEXT    T,HOLD
4294  012212         UDECB CONDENABL;
4295  012213
4296  012213               B,16           ALUF,PASSQ          ALUD,NONE
4297  012213         IDBS,BARG            COMM,LDLC T,NEXT    T,HOLD
4298  012213         UDECA CONDENABL;
4299  012214
4300  012214                                                  ALUD,NONE
4301  012214         IDBS,ALU                      T,NEXT    T,HOLD
4302  012214         EOVER CONDENABL;
4303  012215
4304  012215  INCRP:       B,P            ALUF,B+1            ALUD,B
4305  012215         IDBS,ALU                      T,JMP     T,HOLD
4306  012215         USAV4;
4307  012216
4308  012216  UDECA:       B,STS          ALUF,B+1            ALUD,B
4309  012216         IDBS,ALU                      T,NEXT    T,PUSH
4310  012216         EOVER CONDENABL;
4311  012217
4312  012217         A,1   B,LC           ALUF,PASSD          ALUD,NONE
4313  012217         IDBS,REG       XRF            T,NEXT    T,HOLD
4314  012217         COND,F=0                      F,JMP     F,POP;
4315  012220
4316  012220               B,STS          ALUF,B-1            ALUD,B
4317  012220         IDBS,ALU                      T,NEXT    T,HOLD
4318  012220         EOVER CONDENABL;
4319  012221
4320  012221                                                  ALUD,NONE
4321  012221         IDBS,ALU                      T,JMP     T,POP
4322  012221         LCOUNT INCRP;
4323  012222
4324  012222  EOVER:                                          ALUD,NONE
4325  012222         IDBS,ARG             COMM,LDGPR T,NEXT   T,HOLD
4326  012222         37;
4327  012223
4328  012223         A,D   B,D            ALUF,MASKDA         ALUD,B
4329  012223         IDBS,GPR                      T,NEXT    T,HOLD;
4330  012224
4331  012224         A,D   B,D            ALUF,D+A+1          ALUD,B
4332  012224         IDBS,BMG                      T,JMP     T,HOLD
4333  012224         USAV4;
4334  012225
4335  012225  %*****************************************************
4336  012225
4337  012225  %      DECODE SIGN REPRESENTATION  OF X,T-OPERAND AND CONVERT SIGN
4338  012225
4339  012225  UDECB: A,15  B,R3           ALUF,PASSQ          ALUD,B
4340  012225         IDBS,BMG             COMM,LDGPR T,NEXT   T,HOLD;
4341  012226
4342  012226         A,T                  ALUF,ANDDA          ALUD,NONE
4343  012226         IDBS,GPR                      T,NEXT    T,HOLD
4344  012226         COND,F=0                      F,JMP     F,HOLD;
4345  012227
4346  012227         A,2   B,B            ALUF,D-1            ALUD,B
4347  012227         IDBS,AARG                     T,NEXT    T,HOLD
4348  012227         ULEAD CONDENABL;
4349  012230
4350  012230         A,4   B,R1           ALUF,PASSD          ALUD,B
4351  012230         IDBS,AARG                     T,NEXT    T,HOLD;
4352  012231
4353  012231         A,Z   B,17           ALUF,A-D            ALUD,NONE
4354  012231         IDBS,BARG                      T,NEXT   T,HOLD
4355  012231         COND,F=0                      F,NEXT    F,HOLD;
4356  012232
4357  012232         A,Z   B,15           ALUF,A-D            ALUD,NONE
4358  012232         IDBS,BARG            COMM,LDGPR T,JMP    T,HOLD
4359  012232         POSS CONDENABL;
4360  012233
4361  012233         A,Z   B,1            ALUF,ANDDA          ALUD,NONE
4362  012233         IDBS,BARG                     T,NEXT    T,HOLD;
4363  012234
4364  012234                                                  ALUD,NONE
4365  012234         IDBS,ALU                      T,JMP     T,HOLD
4366  012234         POSS CONDENABL;
4367  012235
4368  012235  UDCS:  A,R1                 ALUF,ORDA           ALUD,Q
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4369  012235          IDBS,GPR                          T,NEXT    T,HOLD;
4370  012236
4371  012236          A,2   B,14          ALUF,PASSQ              ALUD,NONE
4372  012236          IDBS,ALU            COMM,EWRF T,NEXT        T,HOLD;
4373  012237
4374  012237                B,R1          ALUF,PASSQ              ALUD,B
4375  012237          IDBS,ALU                        T,NEXT      T,HOLD;
4376  012240
4377  012240          A,14  B,R3          ALUF,PASSB              ALUD,Q
4378  012240          IDBS,BMG            COMM,LDGPR T,NEXT       T,HOLD;
4379  012241
4380  012241          A,T                 ALUF,ANDDA              ALUD,NONE
4381  012241          IDBS,GPR                        T,NEXT      T,HOLD
4382  012241          COND,F=0                        F,JMP       F,HOLD;
4383  012242
4384  012242                B,R2          ALUF,B-1                ALUD,NONE
4385  012242          IDBS,ALU            COMM,LDLC T,NEXT        T,HOLD
4386  012242          ULEAD CONDENABL;
4387  012243
4388  012243          A,T                 ALUF,PASSA              ALUD,NONE
4389  012243          IDBS,ALU                        T,NEXT      T,HOLD
4390  012243          COND,F11                        F,NEXT      F,HOLD;
4391  012244
4392  012244                                                      ALUD,NONE
4393  012244          IDBS,ALU                        T,JMP       T,HOLD
4394  012244          USEPT CONDENABL;
4395  012245
4396  012245  %*****************************************************
4397  012245
4398  012245  %       EMBEDDED TRAILING
4399  012245
4400  012245
4401  012245          A,R3  B,Z           ALUF,PASSA              ALUD,B
4402  012245          IDBS,ALU                        T,NEXT      T,PUSH
4403  012245          COND,LC=0;
4404  012246
4405  012246          A,2   B,Z   MIS,ZIN ALUF,PASSB              ALUD,SRB
4406  012246          IDBS,BMG            COMM,LDGPR T,NEXT       T,POP
4407  012246          LCOUNT;
4408  012247
4409  012247          A,Z   B,17          ALUF,ANDDA              ALUD,Q
4410  012247          IDBS,BARG                       T,NEXT      T,HOLD;
4411  012250
4412  012250                B,Z           ALUF,PASSD              ALUD,B
4413  012250          IDBS,ARG                        T,NEXT      T,HOLD
4414  012250          16;
4415  012251
4416  012251                B,12          ALUF,Q-D                ALUD,NONE
4417  012251          IDBS,BARG                       T,NEXT      T,HOLD
4418  012251          COND,F15                        F,JMP       F,HOLD;
4419  012252
4420  012252          A,R2  B,R2          ALUF,D+A                ALUD,B
4421  012252          IDBS,GPR                        T,NEXT      T,HOLD
4422  012252          ILLE CONDENABL;
4423  012253
4424  012253                                                      ALUD,NONE
4425  012253          IDBS,ALU                        T,JMP       T,PUSH
4426  012253          SUBEM;
4427  012254
4428  012254          A,R5                ALUF,PASSA              ALUD,NONE
4429  012254          IDBS,ALU                        T,NEXT      T,HOLD
4430  012254          COND,F=0                        F,JMP       F,HOLD;
4431  012255
4432  012255                B,R1          ALUF,PASSB              ALUD,NONE
4433  012255          IDBS,ALU                        T,NEXT      T,HOLD
4434  012255          SAME CONDENABL;
4435  012256
4436  012256                B,R3          ALUF,PASSB              ALUD,Q
4437  012256          IDBS,ALU                        T,NEXT      T,HOLD;
4438  012257
4439  012257          A,1   B,R5          ALUF,PASSD              ALUD,B
4440  012257          IDBS,AARG                       T,JMP       T,HOLD
4441  012257          UPLOP;
4442  012260
4443  012260  SUBEM:  A,R1  B,4           ALUF,ANDDA              ALUD,NONE
4444  012260          IDBS,BARG                       T,NEXT      T,HOLD
4445  012260          COND,F=0                        F,NEXT      F,HOLD;
4446  012261
4447  012261                              ALUF,PASSQ              ALUD,NONE
4448  012261          IDBS,ALU                        T,JMP       T,HOLD
4449  012261          EMPOS CONDENABL;
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4450    012262
4451    012262                B,R1            ALUF,PASSD          ALUD,B
4452    012262          IDBS,ARG                        T,RETURN    T,POP
4453    012262          CONDENABL 175;
4454    012263
4455    012263                B,R1            ALUF,D+Q            ALUD,B
4456    012263          IDBS,ARG                        T,RETURN    T,POP
4457    012263          111;
4458    012264
4459    012264  EMPOS:        B,R1            ALUF,PASSD          ALUD,B
4460    012264          IDBS,ARG                        T,RETURN    T,POP
4461    012264          173 CONDENABL;
4462    012265
4463    012265          A,10  B,R1            ALUF,D+Q            ALUD,B
4464    012265          IDBS,AARG                       T,RETURN    T,POP;
4465    012266
4466    012266  %*****************************************************
4467    012266
4468    012266  %       SEPARATE TRAILING
4469    012266
4470    012266  USEPT:  A,R5                  ALUF,PASSA          ALUD,NONE
4471    012266          IDBS,ALU                        T,NEXT      T,HOLD
4472    012266          COND,F=0                        F,NEXT      F,HOLD;
4473    012267
4474    012267          A,1   B,R5            ALUF,PASSD          ALUD,B
4475    012267          IDBS,AARG                       T,JMP       T,HOLD
4476    012267          UPLOP CONDENABL;
4477    012270
4478    012270          A,2   B,14                                  ALUD,NONE
4479    012270          IDBS,REG                        T,NEXT      T,HOLD;
4480    012271
4481    012271  SAME:   A,0   B,17                                  ALUD,NONE
4482    012271          IDBS,SWAP       XRF   COMM,EWRF T,NEXT      T,HOLD;
4483    012272
4484    012272                B,B             ALUF,PASSD          ALUD,B
4485    012272          IDBS,ARG              COMM,LDLC T,NEXT      T,HOLD
4486    012272          16;
4487    012273
4488    012273                B,Z             ALUF,PASSD          ALUD,B
4489    012273          IDBS,ARG                        T,NEXT      T,HOLD
4490    012273          16;
4491    012274
4492    012274                B,R4            ALUF,B-1            ALUD,B
4493    012274          IDBS,ALU                        T,NEXT      T,HOLD
4494    012274          COND,F=0                        F,NEXT      F,HOLD;
4495    012275
4496    012275                B,R3            ALUF,PASSB          ALUD,Q
4497    012275          IDBS,ALU                        T,JMP       T,HOLD
4498    012275          LAWRA CONDENABL;
4499    012276
4500    012276                B,R1            ALUF,ZERO           ALUD,B
4501    012276          IDBS,ALU                        T,NEXT      T,HOLD;
4502    012277
4503    012277                B,R5            ALUF,ZERO           ALUD,B
4504    012277          IDBS,ALU                        T,JMP       T,HOLD
4505    012277          UCLOP;
4506    012300
4507    012300  %*****************************************************
4508    012300
4509    012300  %       LEADING SIGN IN X,T-OPERAND
4510    012300
4511    012300
4512    012300  ULEAD:        B,R1            ALUF,ZERO           ALUD,B
4513    012300          IDBS,ALU                        T,NEXT      T,HOLD;
4514    012301
4515    012301  UPLOP:  A,R1                  ALUF,PASSA          ALUD,NONE
4516    012301          IDBS,ALU              COMM,LDGPR T,NEXT     T,HOLD;
4517    012302
4518    012302          A,0   B,17                                  ALUD,NONE
4519    012302          IDBS,GPR        XRF   COMM,EWRF T,NEXT      T,HOLD;
4520    012303
4521    012303  %*****************************************************
4522    012303
4523    012303  %       CONVERSION LOOP
4524    012303
4525    012303  %       R2 = NIBLE-COUNTER
4526    012303  %       R5 = BYTE-COUNTER
4527    012303  %       R3 = CURRENT BCD-WORD
4528    012303  %       R1 = CURRENT ASCII-WORD
4529    012303  %       L  = SCRATCH
4530    012303  %       Q  = SCRATCH
```

```
4531    012303
4532    012303
4533    012303  UCLOP:      B,R2            ALUF,B+1            ALUD,B
4534    012303          IDBS,ALU                        T,NEXT  T,HOLD;
4535    012304
4536    012304              B,Z             ALUF,PASSD          ALUD,B
4537    012304          IDBS,ARG                        T,NEXT  T,PUSH
4538    012304          16;
4539    012305
4540    012305          A,R2  B,14          ALUF,D-A            ALUD,NONE
4541    012305          IDBS,BARG                       T,NEXT  T,HOLD
4542    012305          COND,F15                        F,NEXT  F,HOLD;
4543    012306
4544    012306                                                  ALUD,NONE
4545    012306          IDBS,ALU                        T,JMP   T,PUSH
4546    012306          UPRED CONDENABL;
4547    012307
4548    012307          A,R2  B,R5          ALUF,A-B            ALUD,NONE
4549    012307          IDBS,ALU            COMM,LDGPR T,NEXT   T,HOLD
4550    012307          COND,F15                        F,JMP   F,HOLD;
4551    012310
4552    012310          A,R3  B,L           ALUF,PASSA          ALUD,B
4553    012310          IDBS,GPR            COMM,LDLC T,NEXT    T,HOLD
4554    012310          POSSH CONDENABL;
4555    012311
4556    012311          A,R5  B,R2          ALUF,A-B-1          ALUD,NONE
4557    012311          IDBS,ALU            COMM,LDLC T,NEXT    T,HOLD;
4558    012312
4559    012312              B,L  MIS,ROT    ALUF,PASSB          ALUD,SRB
4560    012312          IDBS,ALU                        T,NEXT  T,PUSH
4561    012312          COND,LC=0;
4562    012313
4563    012313              B,L  MIS,ROT    ALUF,PASSB          ALUD,SLB
4564    012313          IDBS,ALU                        T,JMP   T,POP
4565    012313          LCOUNT UPLP;
4566    012314
4567    012314  POSSH:      B,L  MIS,ROT    ALUF,PASSB          ALUD,SLB
4568    012314          IDBS,ALU            COMM,CLFF T,NEXT    T,PUSH
4569    012314          COND,LC=0;
4570    012315
4571    012315              B,L  MIS,ROT    ALUF,PASSB          ALUD,SRB
4572    012315          IDBS,ALU                        T,NEXT  T,POP
4573    012315          LCOUNT;
4574    012316
4575    012316              B,L  MIS,ROT    ALUF,PASSB          ALUD,SLB
4576    012316          IDBS,ALU                        T,NEXT  T,HOLD;
4577    012317
4578    012317  UPLP:   A,L                 ALUF,PASSA          ALUD,Q
4579    012317          IDBS,ALU                        T,NEXT  T,HOLD;
4580    012320
4581    012320          A,R5  B,4           ALUF,PASSA          ALUD,NONE
4582    012320          IDBS,BARG           COMM,LDGPR T,NEXT   T,HOLD
4583    012320          COND,F=0                        F,NEXT  F,HOLD;
4584    012321
4585    012321          A,R2  B,R2          ALUF,D+A            ALUD,B
4586    012321          IDBS,GPR                        T,JMP   T,HOLD
4587    012321          RBYT CONDENABL;
4588    012322
4589    012322                              ALUF,ANDDQ          ALUD,Q
4590    012322          IDBS,ARG                        T,NEXT  T,HOLD
4591    012322          7400;
4592    012323
4593    012323                                                  ALUD,NONE
4594    012323          IDBS,ARG            COMM,LDGPR T,NEXT   T,HOLD
4595    012323          5000;
4596    012324
4597    012324                              ALUF,Q-D            ALUD,NONE
4598    012324          IDBS,GPR                        T,NEXT  T,HOLD
4599    012324          COND,F15                        F,JMP   F,HOLD;
4600    012325
4601    012325              B,R5            ALUF,ZERO           ALUD,B
4602    012325          IDBS,ALU                        T,NEXT  T,HOLD
4603    012325          ILL CONDENABL;
4604    012326
4605    012326                              ALUF,ORDQ           ALUD,Q
4606    012326          IDBS,ARG                        T,NEXT  T,HOLD
4607    012326          30000;
4608    012327
4609    012327          A,R1                ALUF,ORAQ           ALUD,Q
4610    012327          IDBS,ALU                        T,NEXT  T,HOLD;
4611    012330
```

```
4612  012330          A,B   B,R4              ALUF,B-1              ALUD,B,YA
4613  012330          IDBS,ALU                COMM,LDLC T,NEXT      T,HOLD
4614  012330          COND,F=0                          F,NEXT      F,HOLD;
4615  012331
4616  012331                B,B               ALUF,B-1              ALUD,B
4617  012331          IDBS,ALU                          T,JMP       T,POP
4618  012331          LAWRD CONDENABL;
4619  012332
4620  012332          A,0   B,LC              ALUF,PASSQ            ALUD,NONE
4621  012332          IDBS,ALU        XRF     COMM,EWRF T,RETURN    T,HOLD;
4622  012333
4623  012333  RBYT:                           ALUF,ANDDQ            ALUD,Q
4624  012333          IDBS,ARG                          T,NEXT      T,HOLD
4625  012333          17;
4626  012334
4627  012334                B,12              ALUF,Q-D              ALUD,NONE
4628  012334          IDBS,BARG                         T,NEXT      T,HOLD
4629  012334          COND,F15                          F,JMP       F,HOLD;
4630  012335
4631  012335          A,1   B,R5              ALUF,PASSD            ALUD,B
4632  012335          IDBS,AARG                         T,NEXT      T,HOLD
4633  012335          ILL CONDENABL;
4634  012336
4635  012336                B,R1              ALUF,ORDQ             ALUD,B
4636  012336          IDBS,ARG                          T,RETURN    T,HOLD
4637  012336          60;
4638  012337
4639  012337  %*****************************************************
4640  012337
4641  012337  %       READ NEXT WORD FROM A,D-OPERAND TO Q,R3
4642  012337
4643  012337
4644  012337  UPRED:         B,STS             ALUF,PASSB            ALUD,NONE
4645  012337          IDBS,ALU                          T,NEXT      T,HOLD
4646  012337          COND,F=0                          F,NEXT      F,HOLD;
4647  012340
4648  012340          A,Z   B,R2              ALUF,ZERO             ALUD,B,YA
4649  012340          IDBS,ALU                COMM,LDLC T,JMP       T,HOLD
4650  012340          SLUT CONDENABL;
4651  012341
4652  012341                B,STS             ALUF,B-1              ALUD,B
4653  012341          IDBS,ALU                          T,NEXT      T,HOLD;
4654  012342
4655  012342          A,1   B,LC              ALUF,PASSD            ALUD,Q
4656  012342          IDBS,REG        XRF               T,NEXT      T,HOLD;
4657  012343
4658  012343                B,Z               ALUF,B-1              ALUD,B
4659  012343          IDBS,ALU                          T,JMP       T,HOLD
4660  012343          SUPRD;
4661  012344
4662  012344  SLUT:                           ALUF,ZERO             ALUD,Q
4663  012344          IDBS,ALU                          T,NEXT      T,HOLD;
4664  012345
4665  012345  SUPRD:        B,R3              ALUF,PASSQ            ALUD,B
4666  012345          IDBS,ALU                          T,RETURN    T,POP;
4667  012346
4668  012346  %*****************************************************
4669  012346
4670  012346  %       SAVE LAST WORD OF X,T OPERAND AND TEST OVERFLOW
4671  012346
4672  012346
4673  012346  LARDC:  A,0   B,L               ALUF,D-1              ALUD,B
4674  012346          IDBS,AARG                         T,JMP       T,HOLD
4675  012346          LAWRC;
4676  012347
4677  012347  LAWRA:        B,R2              ALUF,B+1              ALUD,B
4678  012347          IDBS,ALU                          T,NEXT      T,HOLD;
4679  012350
4680  012350  LAWRD:  A,R2                    ALUF,PASSA            ALUD,NONE
4681  012350          IDBS,ALU                COMM,LDLC T,NEXT      T,HOLD;
4682  012351
4683  012351          A,0   B,LC              ALUF,PASSQ            ALUD,NONE  %OBS! LAST LC (B)
4684  012351          IDBS,ALU        XRF     COMM,EWRF T,NEXT      T,HOLD;
4685  012352
4686  012352          A,R2  B,17              ALUF,A-D-1            ALUD,NONE
4687  012352          IDBS,BARG                         T,NEXT      T,HOLD
4688  012352          COND,F=0                          F,NEXT      F,HOLD;
4689  012353
4690  012353          A,LC  B,L               ALUF,D-1              ALUD,B
4691  012353          IDBS,BMG                          T,JMP       T,HOLD
4692  012353          LARDC CONDENABL;
```

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4693    012354
4694    012354  LAWRC: A,L   B,R3          ALUF,MASKAB          ALUD,NONE
4695    012354         IDBS,ALU                        T,NEXT    T,HOLD
4696    012354         COND,F=0                        F,JMP     F,HOLD;
4697    012355
4698    012355               B,STS         ALUF,PASSB           ALUD,NONE
4699    012355         IDBS,ALU                        T,NEXT    T,HOLD
4700    012355         UPOVR CONDENABL;
4701    012356
4702    012356               B,Z           ALUF,PASSB           ALUD,NONE
4703    012356         IDBS,ALU              COMM,LDLC T,NEXT    T,HOLD
4704    012356         TOVFL CONDENABL;
4705    012357
4706    012357  TLEAD: A,15                                      ALUD,NONE
4707    012357         IDBS,BMG              COMM,LDGPR T,JMP    T,HOLD
4708    012357         TLEAC;
4709    012360
4710    012360  TOVFL:       B,STS           ALUF,B+1             ALUD,B
4711    012360         IDBS,ALU                        T,NEXT    T,PUSH;
4712    012361
4713    012361         A,1   B,LC            ALUF,PASSD           ALUD,NONE
4714    012361         IDBS,REG      XRF               T,NEXT    T,HOLD
4715    012361         COND,F=0                        F,JMP     F,POP:
4716    012362
4717    012362               B,STS           ALUF,B-1             ALUD,B
4718    012362         IDBS,ALU                        T,NEXT    T,HOLD
4719    012362         UPOVR CONDENABL;
4720    012363
4721    012363                                                   ALUD,NONE
4722    012363         IDBS,ALU                        T,JMP     T,POP
4723    012363         LCOUNT TLEAD;
4724    012364
4725    012364  UPOVR: A,2   B,15            ALUF,ZERO            ALUD,NONE
4726    012364         IDBS,ALU              COMM,EWRF T,NEXT    T,HOLD;
4727    012365
4728    012365         A,X   B,R1            ALUF,PASSA           ALUD,B
4729    012365         IDBS,ALU                        T,JMP     T,HOLD
4730    012365         TLEAD;
4731    012366
4732    012366  %*********************************************************
4733    012366
4734    012366  %       TEST LEADING SIGN OF X,T-OPERAND
4735    012366
4736    012366
4737    012366  TLEAC: A,T                   ALUF,ANDDA           ALUD,NONE
4738    012366         IDBS,GPR                        T,NEXT    T,HOLD
4739    012366         COND,F=0                        F,JMP     F,HOLD;
4740    012367
4741    012367         A,X   B,R1            ALUF,PASSA           ALUD,B
4742    012367         IDBS,ALU                        T,NEXT    T,HOLD
4743    012367         UWRIT CONDENABL;
4744    012370
4745    012370         A,14                                     ALUD,NONE
4746    012370         IDBS,BMG              COMM,LDGPR T,NEXT   T,HOLD;
4747    012371
4748    012371         A,T                   ALUF,ANDDA           ALUD,NONE
4749    012371         IDBS,GPR                        T,NEXT    T,HOLD
4750    012371         COND,F=0                        F,NEXT    F,HOLD;
4751    012372
4752    012372         A,13                                     ALUD,NONE
4753    012372         IDBS,BMG              COMM,LDGPR T,JMP    T,HOLD
4754    012372         UWRIT CONDENABL;
4755    012373
4756    012373         A,T                   ALUF,ANDDA           ALUD,NONE
4757    012373         IDBS,GPR                        T,NEXT    T,HOLD
4758    012373         COND,F=0                        F,JMP     F,HOLD;
4759    012374
4760    012374               B,R3            ALUF,PASSQ           ALUD,B
4761    012374         IDBS,ALU                        T,NEXT    T,HOLD
4762    012374         USEPL CONDENABL;
4763    012375
4764    012375  %*********************************************************
4765    012375
4766    012375  %       EMBEDDED LEADING
4767    012375
4768    012375
4769    012375         A,2   B,14                               ALUD,NONE
4770    012375         IDBS,REG              COMM,LDGPR T,NEXT   T,HOLD;
4771    012376
4772    012376         A,T                   ALUF,PASSA           ALUD,NONE
4773    012376         IDBS,ALU                        T,NEXT    T,HOLD
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4774    012376          COND,F15                        F,JMP       F,HOLD;
4775    012377
4776    012377                B,R1              ALUF,PASSD          ALUD,B
4777    012377          IDBS,GPR                        T,NEXT      T,HOLD
4778    012377          TOPHB CONDENABL;
4779    012400
4780    012400                B,17              ALUF,ANDDQ          ALUD,Q
4781    012400          IDBS,BARG                       T,JMP       T,PUSH
4782    012400          SUBEM;
4783    012401
4784    012401                                                      ALUD,NONE
4785    012401          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4786    012401          377;
4787    012402
4788    012402          A,R3                    ALUF,MASKDA         ALUD,Q
4789    012402          IDBS,GPR                        T,NEXT      T,HOLD;
4790    012403
4791    012403          A,R1                    ALUF,ORAQ           ALUD,Q
4792    012403          IDBS,ALU                        T,NEXT      T,HOLD;
4793    012404
4794    012404  LEADC:  A,B                     ALUF,A+1            ALUD,NONE
4795    012404          IDBS,ALU                COMM,LDLC T,NEXT    T,HOLD;
4796    012405
4797    012405          A,X    B,R1             ALUF,PASSA          ALUD,B
4798    012405          IDBS,ALU                        T,NEXT      T,HOLD;
4799    012406
4800    012406          A,0    B,LC             ALUF,PASSQ          ALUD,NONE
4801    012406          IDBS,ALU        XRF     COMM,EWRF T,JMP     T,HOLD
4802    012406          UWRIT;
4803    012407
4804    012407  TOPHB:                          ALUF,PASSQ          ALUD,NONE
4805    012407          IDBS,ALU                        T,NEXT      T,HOLD;
4806    012410
4807    012410                                  ALUF,PASSD          ALUD,Q
4808    012410          IDBS,SWAP                       T,NEXT      T,HOLD;
4809    012411
4810    012411                B,17              ALUF,ANDDQ          ALUD,Q
4811    012411          IDBS,BARG                       T,JMP       T,PUSH
4812    012411          SUBEM;
4813    012412
4814    012412                                                      ALUD,NONE
4815    012412          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4816    012412          377;
4817    012413
4818    012413          A,R3                    ALUF,ANDDA          ALUD,Q
4819    012413          IDBS,GPR                        T,NEXT      T,HOLD;
4820    012414
4821    012414          A,R1                    ALUF,PASSA          ALUD,NONE
4822    012414          IDBS,ALU                        T,NEXT      T,HOLD;
4823    012415
4824    012415                                  ALUF,ORDQ           ALUD,Q
4825    012415          IDBS,SWAP                       T,JMP       T,HOLD
4826    012415          LEADC;
4827    012416
4828    012416  %*******************************************************
4829    012416
4830    012416  %       SEPARATE LEADING
4831    012416
4832    012416  USEPL:  A,T                     ALUF,PASSA          ALUD,NONE
4833    012416          IDBS,ALU                        T,NEXT      T,HOLD
4834    012416          COND,F15                        F,NEXT      F,HOLD;
4835    012417
4836    012417          A,10                    ALUF,D-1            ALUD,Q
4837    012417          IDBS,BMG                        T,JMP       T,HOLD
4838    012417          SEPRB CONDENABL;
4839    012420
4840    012420                                                      ALUD,NONE
4841    012420          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4842    012420          7400;
4843    012421
4844    012421          A,R3                    ALUF,ANDDA          ALUD,NONE
4845    012421          IDBS,GPR                        T,NEXT      T,HOLD
4846    012421          COND,F=0                        F,JMP       F,PUSH;
4847    012422
4848    012422          A,R3                    ALUF,ANDAQ          ALUD,Q
4849    012422          IDBS,ALU                        T,NEXT      T,HOLD
4850    012422          USOVF CONDENABL;
4851    012423
4852    012423          A,2    B,14                                 ALUD,NONE
4853    012423          IDBS,REG                        T,NEXT      T,HOLD;
4854    012424
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4855    012424                                  ALUF,ORDQ           ALUD,Q
4856    012424          IDBS,SWAP                       T,JMP       T,HOLD
4857    012424          LEADC;
4858    012425
4859    012425  SEPRB:                          ALUF,INVQ           ALUD,Q
4860    012425          IDBS,ALU                        T,NEXT      T,HOLD;
4861    012426
4862    012426          A,R3  B,17              ALUF,ANDDA          ALUD,NONE
4863    012426          IDBS,BARG                       T,NEXT      T,HOLD
4864    012426          COND,F=0                        F,JMP       F,PUSH;
4865    012427
4866    012427          A,R3                    ALUF,ANDAQ          ALUD,Q
4867    012427          IDBS,ALU                        T,NEXT      T,HOLD
4868    012427          USOVF CONDENABL;
4869    012430
4870    012430          A,2   B,14              ALUF,ORDQ           ALUD,Q
4871    012430          IDBS,REG                        T,JMP       T,HOLD
4872    012430          LEADC;
4873    012431
4874    012431  USOVF:  A,2   B,15              ALUF,ZERO           ALUD,NONE
4875    012431          IDBS,ALU                COMM,EWRF T,RETURN  T,POP;
4876    012432
4877    012432  %*******************************************************
4878    012432
4879    012432  %       WRITE X,T OPERAND, TEST OVERFLOW IN TOP-WORD
4880    012432
4881    012432  UWRIT:  A,0   B,17              ALUF,PASSD          ALUD,Q
4882    012432          IDBS,REG        XRF             T,JMP       T,PUSH
4883    012432          UWRTS;
4884    012433
4885    012433          A,2   B,15              ALUF,PASSD          ALUD,NONE
4886    012433          IDBS,REG                        T,NEXT      T,HOLD
4887    012433          COND,F=0                        F,NEXT      F,HOLD;
4888    012434
4889    012434          A,0   B,LC              ALUF,PASSD          ALUD,Q
4890    012434          IDBS,REG        XRF             T,JMP       T,HOLD
4891    012434          UVFLT CONDENABL;
4892    012435
4893    012435          A,T   B,17              ALUF,PASSA          ALUD,NONE
4894    012435          IDBS,BARG                       T,NEXT      T,HOLD
4895    012435          COND,F15                        F,JMP       F,HOLD;
4896    012436
4897    012436                                                      ALUD,NONE
4898    012436          IDBS,SWAP               COMM,LDGPR T,NEXT   T,HOLD
4899    012436          WRTOP CONDENABL;
4900    012437
4901    012437          A,10  B,Z               ALUF,D-1            ALUD,B
4902    012437          IDBS,BMG                        T,NEXT      T,HOLD;
4903    012440
4904    012440                                  ALUF,ANDDQ          ALUD,NONE
4905    012440          IDBS,GPR                        T,NEXT      T,HOLD
4906    012440          COND,F=0                        F,NEXT      F,HOLD;
4907    012441
4908    012441          A,Z                     ALUF,ANDAQ          ALUD,Q
4909    012441          IDBS,ALU                        T,JMP       T,HOLD
4910    012441          WRTOP CONDENABL;
4911    012442
4912    012442  UVFLT:  A,T                     ALUF,PASSA          ALUD,NONE
4913    012442          IDBS,ALU                        T,NEXT      T,HOLD
4914    012442          COND,F15                        F,JMP       F,HOLD;
4915    012443
4916    012443          A,10  B,Z               ALUF,D-1            ALUD,B
4917    012443          IDBS,BMG                        T,NEXT      T,HOLD
4918    012443          UVFLO CONDENABL;
4919    012444
4920    012444          A,Z                     ALUF,ANDAQ          ALUD,Q
4921    012444          IDBS,ALU                        T,NEXT      T,HOLD;
4922    012445
4923    012445  UVFLO:                                              ALUD,NONE
4924    012445          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4925    012445          37;
4926    012446
4927    012446          A,D   B,D               ALUF,MASKDA         ALUD,B
4928    012446          IDBS,GPR                        T,NEXT      T,HOLD;
4929    012447
4930    012447                B,P               ALUF,B-1            ALUD,B
4931    012447          IDBS,ARG                COMM,LDGPR T,NEXT   T,HOLD
4932    012447          3;
4933    012450
4934    012450          A,D   B,D               ALUF,ORDA           ALUD,B
4935    012450          IDBS,GPR                        T,NEXT      T,HOLD;
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 4936     012451
 4937     012451   WRTOP: A,2   B,11            ALUF,ORDQ           ALUD,Q
 4938     012451          IDBS,REG                          T,NEXT   T,HOLD;
 4939     012452
 4940     012452          A,R6  B,P             ALUF,B+1            ALUD,B,YA
 4941     012452          IDBS,ALU                          T,NEXT   T,HOLD;
 4942     012453
 4943     012453                                ALUF,PASSQ          ALUD,NONE
 4944     012453          IDBS,ALU          COMM,WRRQ,APT  T,NEXT   T,HOLD:   %******************
 4945     012454
*4946   < 012454   %*************************************************************
 4947     012454
 4948     012454   %       EXIT, UNSAVE REGISTERS AND STATUS
 4949     012454
 4950     012454   USAV4:                                           ALUD,NONE
 4951     012454          IDBS,ALU                           T,JMP   T,PUSH
 4952     012454          CUSV1;
 4953     012455
 4954     012455          A,2   B,16                                 ALUD,NONE STS,LO
 4955     012455          IDBS,REG                          T,JMP    T,POP
 4956     012455          CONT;
 4957     012456
 4958     012456   %*************************************************************
 4959     012456
 4960     012456   %       SUBROUTINE TO WRITE WORDS FROM RF LEVEL 0 TO MEMORY
 4961     012456
 4962     012456   UWRTS: A,2   B,12             ALUF,ORDQ           ALUD,Q
 4963     012456          IDBS,REG                          T,NEXT   T,HOLD:
 4964     012457
 4965     012457          A,0   B,17            ALUF,PASSQ          ALUD,NONE
 4966     012457          IDBS,ALU       XRF    COMM,EWRF T,NEXT    T,HOLD:
 4967     012460
 4968     012460          A,R6  B,R1            ALUF,A-B            ALUD,NONE
 4969     012460          IDBS,ALU                          T,NEXT   T,HOLD
 4970     012460          COND,F=0                          F,NEXT   F,PUSH:
 4971     012461
 4972     012461                B,17                                ALUD,NONE
 4973     012461          IDBS,BARG             COMM,LDLC T,RETURN  T,POP
 4974     012461          CONDENABL;
 4975     012462
 4976     012462          A,R6                  ALUF,PASSA          ALUD,NONE
 4977     012462          IDBS,ALU                          T,NEXT   T,HOLD;
 4978     012463
 4979     012463          A,0   B,LC                                 ALUD,NONE
 4980     012463          IDBS,REG       XRF COMM,WRRQ,APT T,NEXT    T,HOLD:   %******************
 4981     012464
 4982     012464          A,R6  B,R1            ALUF,A-B-1          ALUD,NONE
 4983     012464          IDBS,ALU                          T,NEXT   T,HOLD
 4984     012464          COND,F=0;
 4985     012465
 4986     012465                B,R6            ALUF,B-1            ALUD,B
 4987     012465          IDBS,ALU                          T,NEXT   T,POP
 4988     012465          LCOUNT;
 4989     012466
 4990     012466                                                    ALUD,NONE
 4991     012466          IDBS,ALU                          T,RETURN T,POP;
 4992     012467
 4993     012467   %*************************************************************
 4994     012467
 4995     012467   %       ILLEGAL CODE, TEST IN WHITCH BYTE AND GIVE ADDRESS AND CODE IN A,D REG
 4996     012467
 4997     012467
 4998     012467   ILLE:        B,10                                 ALUD,NONE
 4999     012467          IDBS,BARG             COMM,LDGPR T,NEXT   T,HOLD;
 5000     012470
 5001     012470          A,R5  B,R5            ALUF,D+A            ALUD,B
 5002     012470          IDBS,GPR                          T,NEXT   T,HOLD;
 5003     012471
 5004     012471   ILL:   A,R2  B,14            ALUF,A-D            ALUD,NONE
 5005     012471          IDBS,BARG                          T,NEXT  T,HOLD
 5006     012471          COND,F15                          F,JMP    F,HOLD;
 5007     012472
 5008     012472          A,17  B,R4            ALUF,PASSB          ALUD,Q
 5009     012472          IDBS,BMG              COMM,LDGPR T,NEXT   T,HOLD
 5010     012472          UILCV CONDENABL;
 5011     012473
 5012     012473          A,D   B,R3            ALUF,ORDA           ALUD,B
 5013     012473          IDBS,GPR                          T,JMP    T,HOLD
 5014     012473          ILC;
 5015     012474
*5016     012474   UILCV: A,D   B,R3            ALUF,MASKDA         ALUD,B
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5017    012474          IDBS,GPR                        T,NEXT    T,HOLD;
5018    012475
5019    012475  ILC:    A,3   B,10          ALUF,PASSD            ALUD,NONE
5020    012475          IDBS,REG                        T,NEXT    T,HOLD
5021    012475          COND,F=0                        F,NEXT    F,HOLD;
5022    012476
5023    012476          A,4   B,R7          ALUF,D-1              ALUD,B
5024    012476          IDBS,AARG                       T,JMP     T,HOLD
5025    012476          ULONE CONDENABL;
5026    012477
5027    012477          A,X                 ALUF,A+Q              ALUD,Q
5028    012477          IDBS,ALU                        T,NEXT    T,HOLD;
5029    012500
5030    012500                B,R1          ALUF,Q-1              ALUD,B
5031    012500          IDBS,ALU                        T,JMP     T,HOLD
5032    012500          IL;
5033    012501
5034    012501  ULONE:  A,X   B,R1          ALUF,A+Q              ALUD,B
5035    012501          IDBS,ALU                        T,NEXT    T,HOLD;
5036    012502
5037    012502  IL:     A,R7  B,R3          ALUF,MASKAB           ALUD,B
5038    012502          IDBS,ALU                        T,NEXT    T,HOLD;
5039    012503
5040    012503          A,0   B,17          ALUF,PASSD            ALUD,Q
5041    012503          IDBS,REG      XRF               T,JMP     T,PUSH
5042    012503          UWRTS;
5043    012504
5044    012504          A,R1  B,X           ALUF,A-B              ALUD,NONE
5045    012504          IDBS,ALU                        T,NEXT    T,HOLD
5046    012504          COND,F=0                        F,JMP     F,HOLD;
5047    012505
5048    012505          A,0   B,LC          ALUF,PASSD            ALUD,Q
5049    012505          IDBS,REG      XRF               T,NEXT    T,HOLD
5050    012505          NTOP CONDENABL;
5051    012506
5052    012506          A,T                 ALUF,PASSA            ALUD,NONE
5053    012506          IDBS,ALU                        T,NEXT    T,HOLD
5054    012506          COND,F15                        F,JMP     F,HOLD;
5055    012507
5056    012507                                                    ALUD,NONE
5057    012507          IDBS,ALU                        T,NEXT    T,HOLD
5058    012507          NTOP CONDENABL;
5059    012510
5060    012510          A,R5  B,10          ALUF,A-D              ALUD,NONE
5061    012510          IDBS,BARG                       T,NEXT    T,HOLD
5062    012510          COND,F=0                        F,JMP     F,HOLD;
5063    012511
5064    012511                                                    ALUD,NONE
5065    012511          IDBS,ALU                        T,NEXT    T,HOLD
5066    012511          EOVER CONDENABL;
5067    012512
5068    012512  NTOP:   A,STS B,A           ALUF,A+B              ALUD,B
5069    012512          IDBS,ALU                        T,NEXT    T,HOLD;
5070    012513
5071    012513          A,R3  B,D           ALUF,D+A+1            ALUD,B
5072    012513          IDBS,BARG                       T,JMP     T,HOLD
5073    012513          USAV4;
5074    012514
5075    012514
5076    012514
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