KE11-B

DIAGNOSTIC PACKAGE

MD-11-DZKED-A

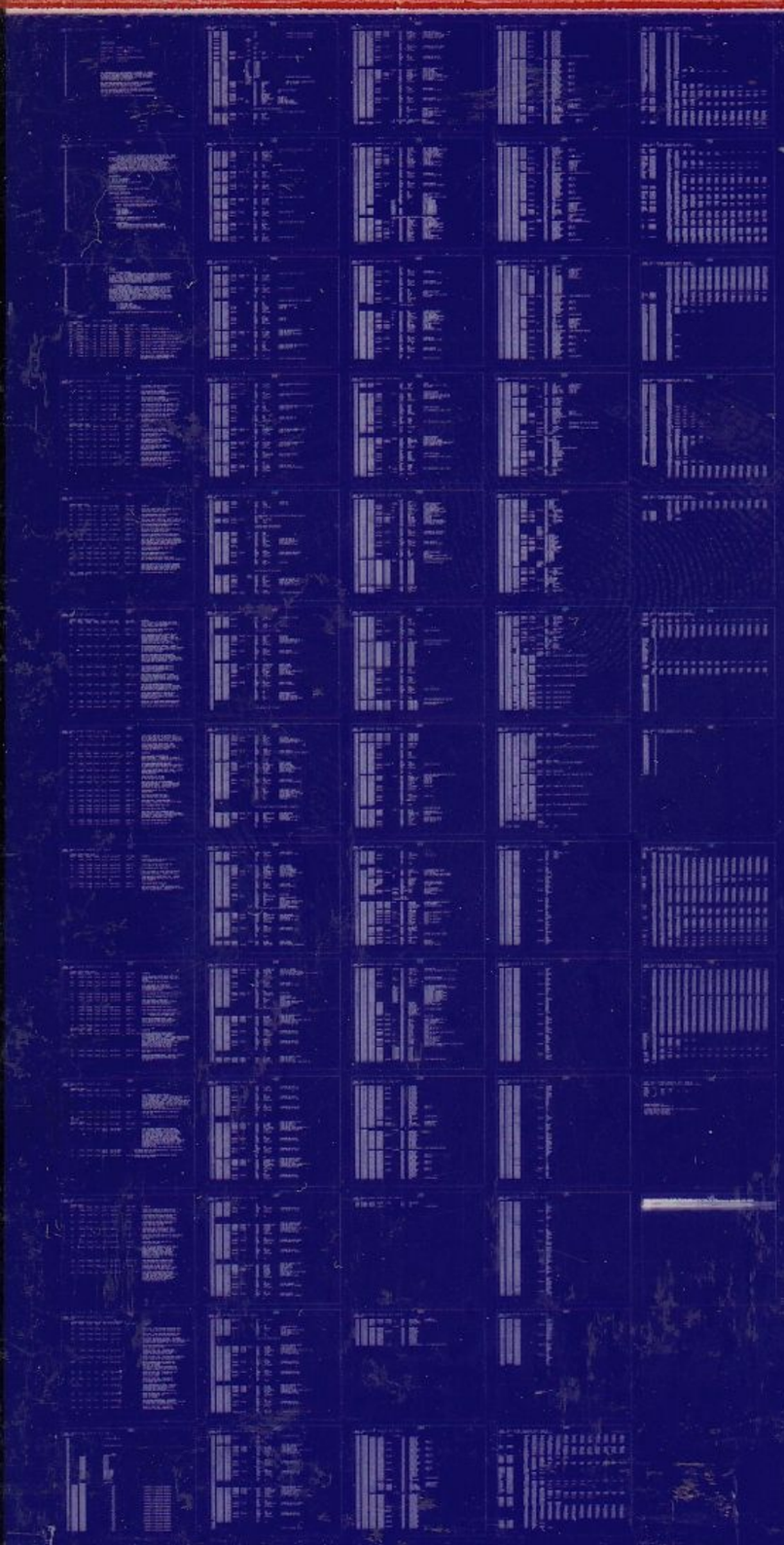
EP-DZKED-A-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN USA



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IDENTIFICATION
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PRODUCT CODE:     MAINDEC-11-DZKED-A

PRODUCT NAME:     KE11-B DIAGNOSTIC PACKAGE

DATE:             AUGUST 1976

MAINTAINED BY:    DIAGNOSTIC PROGRAMMING GROUP

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1.0 ABSTRACT:

THIS IS A DIAGNOSTIC PACKAGE FOR USE WITH THE KE11-B. THIS PACKAGE INCLUDES A USER'S GUIDE WHICH CONTAINS A DETAILED EXPLANATION OF THE INDIVIDUAL ERRORS,THE PARAMETERS TO BE USED WHILE IN THE FAST ERROR LOOP MODE AND THE TEST POINTS TO BE CHECKED.
THERE ARE THREE PARTS TO THE MAIN TEST. THESE BEING 1. REGISTER TESTS,2. LOGICAL AND ARITHMETIC SHIFT TESTS AND 3. MULTIPLY AND DIVIDE TESTS. THE PROGRAM ITSELF CONTAINS A COMPREHENSIVE ERROR HANDLER WHICH PERMITS THE USER TO INSERT THE DIFFERENT PARAMETERS FOR EACH INDIVIDUAL ERROR AND ENTER A FAST ERROR LOOP WHICH SHOULD GREATLY AID IN THE DEBUGGING OF THE KE11-B.

2.0 REQUIREMENTS:

1. PDP 11 (4K MINIMUM)
2. KE11-B INTERFACE
3. TELETYPE (ASR-33 OR EQUIVALENT)

3.0 LOADING PROCEEDURE:

LOAD THIS PROGRAM VIA THE ABSOLUTE LOADER

4.0 OPERATIONAL PROCEEDURE:

4.1 CONTROL SOFTWARE SWITCH SETTINGS

NOTE: ONLY AVAILABLE WHEN STARTING AT ADDRESS 210

SR0=1 SKIP LOGICAL AND ARITHMETIC SHIFT TESTS
SR1=1 SKIP MULTIPLY AND DIVIDE TESTS

4.2 OPERATOR ACTION
LOAD PROGRAM
LOAD ADDRESS 200
PRESS START

NOTE: STARTING AT ADDRESS 200 WILL NOT ALLOW ANY "SOFTWARE" SWITCH OPTIONS.

4.3 PASS DEFINATION
NORMAL OPERATION IS WITH ALL SWITCHS DOWN. UNDER THESE CONDITIONS A PASS WILL REQUIRE APPROXIMATLY 4 MINUTES AT WHICH TIME "EAE OK!" IS PRINTED ON THE TTY

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                                5.0     ERRORS:
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                                5.1 BUSS TIMOUT ERRORS
                                        A CHECK IS MADE FOR BUSS TIMOUT ERRORS FOR THE DURATION
                                OF THE TESTS.  ANY ERRORS WILL CAUSE A PRINTOUT INCLUDING THE
                                LOCATION WHERE THE ERROR OCCURED AND A REQUEST FOR THE FAILING
                                ADDRESS.  THERE ARE FOUR COMMANDS ASSOCIATED WITH THIS TYPE OF
                                ERROR WHICH ARE LISTED BELOW WITH THE EXCEPTION THAT THE "R"
                                COMMAND RESTARTS THE PROGRAM FROM BUSS ERROR.

                                5.2 OPERATIONAL ERRORS
                                        THERE ARE ELEVEN TYPES OF ERRORS POSSIBLE IN THIS PROGRAM
                                NOT COUNTING BUSS TIMOUT ERRORS.  THESE ERRORS VARY AS TO THE
                                NUMBER OF REGISTERS USED,THE INFORMATION DISPLAYED AND THE WAY
                                THE ERROR LOOPS ARE CONSTRUCTED.  IF YOU FOLLOW THE DIRECTIONS
                                PRINTED AND USE THE "USER'S GUIDE" IN THIS DOCUMENT, YOU
                                WILL HAVE NO PROBLEMS.  AFTER SUPPLYING THE PARAMETERS OBTAINED
                                FROM THE USER'S GUIDE, THERE ARE FOUR COMMANDS THAT CAN BE TYPED
                                ON THE TTY TO CONTROL EXECUTION OF THE ERROR LOOP.  THESE FOUR
                                COMMANDS ARE AS FOLLOWS:

                                        S= STOP THE LOOP
                                        C= CONTINUE THE LOOP
                                        P= CHANGE THE PARAMETERS
                                        R= RETURN TO THE FAILING TEST

                                BEFORE USING ANY OTHER COMMAND,THE "S" COMMAND MUST BE USED FIRST.
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KE11 - B USER GUIDE

REGISTER TESTS

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
001	177310	N/A	N/A	E60-11	ROM LDSC	SHEET 2	TEST SC=0, INSURE PROPER LOAD
002	177310	N/A	N/A	E60-11	ROM LDSC	SHEET 2,9	TEST SC=77 & SR=3X1,INSURE SC & SR =1'S
003	177304	N/A	N/A	E6-15	ROM ACTIVE	SHEET 7,8	TEST MQ=0, INSURE MQ =0 AT MQ REG & BUS DRVR
004	177304	N/A	N/A	E6-15	ROM ACTIVE	SHEET 2	TEST SR=36 WITH AC=MQ=0,MQ SIGN EXTENDS
005	177304	N/A	N/A	E6-15	ROM ACTIVE	SHEET 6,7,8	TEST MQ=1'S,INSURE PROPER LOAD AND BUS DRVRS
006	177304	N/A	N/A	E6-15	ROM ACTIVE	SHEET 2	TEST SR BIT 5 & 1,AC=177777 & MQ15=1
007	177302	N/A	N/A	E6-15	ROM ACTIVE	SHEET 6,7,8	TEST AC=0, INSURE PROPER LOAD & BUS DRVRS.
010	177302	N/A	N/A	E6-15	ROM ACTIVE	SHEET 2	TEST SR=20, IMPLIES AC=0, MQ = 177777
011	177302	N/A	N/A	E6-15	ROM ACTIVE	SHEET 7,8	TEST AC=177777, INSURE PROPER LOAD THE DATA PATH TO BUS DRIVERS IS VALID ALREADY AT THIS POINT IN TEST

012	177302	N/A	N/A	E6-15	ROM ACTIVE	SHEET 2	TEST SR=42, IMPLIES AC=177777 AND MQ15=1 INSURE SR=42 AT E106 & E89
013	177304	177302	N/A	E6-15	ROM ACTIVE	SHEET 6,7,8	TEST MQ WITH ALL NUMBERS PLACE FAULTY DATA PATTERN AS REQUESTED MAYBE TWO BITS TIED TOGETHER
014	177304	177302	N/A	E6-15	ROM ACTIVE	SHEET 6,7,8	TEST AC WITH ALL NUMBERS PLACE FAULTY DATA PATTERN AS REQUESTED MAYBE TWO BITS TIED TOGETHER
015	177304	N/A	N/A	E48-5	ROM ALU 03	SHEET 9	TEST SIGN EXT INTO AC, AC SHOULD = 1'S THE ALU SHOULD BE SET FOR ALL ONE'S OP
016	177304	N/A	N/A	E48-5	ROM ALU 03	SHEET 9	TEST SIGN EXT INTO AC, AC SHOULD = 0'S THE ALU SHOULD BE SET FOR ALL ZERO'S
017	177304	N/A	N/A	E77-9	I/O LDX	SHEET 7	TEST BYTE SIGN EXT OF MQ, MQ=177777 INSURE E108 & E69 ARE WORKING
020	177304	N/A	N/A	E48-5	ROM ALU 03	SHEET 9	TEST BYTE SIGN EXT INTO AC, AC=177777 INSURE PROPER ALU OP.

REGISTER TESTS (CONT.)

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
021	177304	N/A	N/A	E77-9	I/O LDX	SHEET 7	TEST BYTE EXT OF MQ, MQ=0 INSURE E108 & E69 ARE WORKING
022	177304	N/A	N/A	E48-5	ROM ALU 03	SHEET 9	TEST BYTE SIGN EXT INTO AC, AC=0 INSURE PROPER ALU OP
023	177304	N/A	N/A	E48-5	ROM ALU 03	SHEET 9	TEST SIGN EXT OF MQ15 ONLY AC SHOULD =177777, MQ = 100000 INSURE PROPER ALU OP
024	177304	N/A	N/A	E48-5	ROM ALU 03	SHEET 9	TEST BYTE SIGN EXT OF MQ07 ONLY AC=177777,MQ=177600 INSURE PROPER ALU OP
025	177304	N/A	N/A	E77-9	I/O LDX	SHEET 7	TEST BYTE SIGN EXT OF MQ WITH MQ07=1 ONLY INSURE E108 & E69 ARE WORKING
026	177310	177312	N/A	E72-15	TIM READ STB	SHEET 2	TEST DATI AT NOR ONLY READS THE LOW BYTE WHICH IS THE SC. INSURE READ STB HI IS INHIBITED (E89-15)
027	177310	177312	N/A	E72-15	TIM READ STB	SHEET2	TEST DATI AT NOR ONLY READS THE LOW BYTE WHICH IS THE SC.

F01

LOGICAL SHIFT TESTS

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
030	177314	177310	N/A	E60-5	ROM SC DEC	SHEET 2,8	TEST LSH, SHIFT LEFT ALL ZERO'S WITH MQ=0 INSURE STAT MQ00=0 AT E62-7
031	177314	177310	N/A	E68-9	I/O DATI	SHEET 2	TEST SR=36 AFTER LSH SHIFT LEFT ZEROS INSURE PROPER STATUS BITS.
032	177314	177310	N/A	E60-4	ROM SC ENB	SHEET 2,7	TEST LSH, SHIFT RIGHT ALL ZERO'S INTO AC INSURE ZERO IN AT STAT AC15 IN (E104-2, SHEET 7)
033	177314	177310	N/A	E68-9	I/O DATI	SHEET 2,6	TEST SR=36 AFTER LSH SHIFT RIGHT ZEROS AC & MQ SHOULD BOTH BE ZERO
034	177304	177302	177314	E60-4	ROM SC ENB	SHEET 2	TEST LSH WITH ZERO SHIFT COUNT MQ=1,AC=0 INSURE SC IS NEVER COUNTING
035	177304	177302	177314	E68-9	I/O DATI	SHEET 2,6	TEST SR = 20 AFTER LSH WITH ZERO SHIFT INSURE PROPER BIT SET IN SR ON SHEET 2
036	177304	177302	177314	E60-4	ROM SC ENB	SHEET 2,7,8	TEST LSH SHIFT RIGHT OF MQ WITH VARIABLE SHIFT COUNT 1 - 16, AC=0, MQ=1'S INITIALLY LOAD FAILING SHIFT COUNT INTO SWITCH REG AND INSURE PROPER DATA BEING SHIFTED
037	177304	177302	177314	E68-9	I/O DATI	SHEET 2,6	TEST SR=23 AFTER ABOVE (036) TEST INSURE SR BITS SET
040	177304	177302	177314	E60-4	ROM SC ENB	SHEET 2,7,8	TEST LSH ZERO SHIFT WITH AC=1'S INSURE PROPER DATA IN AC
041	177304	177302	177314	E68-9	I/O DATI	SHEET 2,6	TEST SR=350 AFTER ZERO SHIFT WITH AC=1'S, MQ=0 INITIALLY, CHECK FOR PROPER DATA
042	177304	177302	177314	E60-5	ROM SC DEC	SHEET 2,7,8	TEST LSH SHIFT LEFT OF AC WITH VARIABLE SHIFT COUNT 1-16, AC=1'S,MQ=0 INITIALLY LOAD FAILING SHIFT COUNT INTO SWITCH REG AND INSURE PROPER DATA BEING SHIFTED
043	177304	177302	177314	E68-9	I/O DATI	SHEET 2,6	TEST SR=311AFTER ABOVE (040) TEST INSURE SR BITS SET.

LOGICAL SHIFT TESTS (CONT.)

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
044	177304	177302	177314	E60-4	ROM SC ENB	SHEET 2,7,8	TEST LSH WITH ALT ONE/ZERO WITH ZERO SHIFT COUNT. AC=0,MQ=125252 INITIALLY. INSURE PROPER DATA PATTERN
045	177304	177302	177314	E68-9	I/O DATI	SHEET 2,6	TEST SR=20 AFTER ABOVE TEST (044) INSURE PROPER SR BITS.
046	177304	177302	177314	E60-4	ROM SC ENB	SHEET 2,7,8	TEST LSH WITH ALT ONE / ZEROS IN MQ USING VARIABLE SHIFT COUNT. LOAD FAILING SHIFT COUNT IN SWITCH REG AND INSURE PROPER DATA PATTERN. SHIFT COUNT VARIES FROM 177777 TO 177760. STATUS BITS ARE BAD FOR THIS TEST.
047	177304	177302	177314	E60-4	ROM SC ENB	SHEET 2,7,8	TEST DESCRIPTION AT ERR#046. ERROR IN DATA PATTERN OF MQ. LOAD FAULTY PATTERN IN REGISTERS WITH PROPER SHIFT COUNT AND MQ FOR FAULTY PATTERN.
050	177304	177302	177314	E60-4	ROM SC ENB	SHEET 2,7,8	TEST ALT ONE/ZERO IN AC REG WITH ZERO SHIFT COUNT FOR LSH OPERATION. THE AC IS DROPPING BITS OR BEING SHIFTED. CHECK OUT WHAT'S HAPPENING. LOAD MQ=0 AND AC=125252 AND LOCATE FAULTY BIT.
051	177304	177302	177314	E68-9	I/O DATI	SHEET 6,2	TEST SR=310 AFTER ABOVE TEST(050) LOAD MQ=0 AND AC=125252 AND SHIFT COUNT TO ZERO AND DETERMINE INCORRECT STATUS BITS.
052	177304	177302	177314	E68-9	I/O DATI	SHEET 2,6,7,8	TEST SR=211 OR 110 IF ODD OR EVEN SHIFT COUNT RESPECTIVELY. LOAD FAULTY PATTERN INTO REGISTERS AS INDICATED BY PRINTOUT AND CHECK STATUS BITS AT SHEET 9 CHIP E13.
053	177304	177302	177314	E60-5	ROM SC ENB	SHEET 2,7,8	TEST AC FOR PROPER DATA PATTERN LOAD AC AND SC WITH FAULTY DATA PATTERN AS INDICATED AND INSURE THAT AC HOLDS THE PROPER DATA AT TERMINATION OF SHIFTING.
054	177304	177302	177314	E60-5	ROM SC ENB	SHEET 2,7,8	TESTS SHIFT BETWEEN AC AND MQ WITH LSH SHIFT COUNT = 16. TEST AC=0. EXAMINE E53-7 FOR PROPER ENTERING DATA LOCATED ON SHEET 8.
055	177304	177302	177314	E60-5	ROM SC ENB	SHEET 8	TESTS MQ = 0 AFTER ABOVE OPERATION(054) EXAMINE STAT MQ00 IN AT E62-7 SHEET 8.
056	177304	177302	177314	E68-9	I/O DATI	SHEET 6	TESTS SR=36 AFTER OPERATION ABOVE (054)

057	177304	177302	177314	E60-5	ROM SC ENB	SHEET 8	TESTS THAT ONES CAN BE SHIFTED INTO THE AC FROM THE MQ. INITIALLY MQ=177777 AC = 0 AND SHIFT COUNT IS 16. CHECK THAT ONES ARE SHIFTED INTO AC AT E53-7 SHEET 8.
060	177304	177302	177314	E60-5	ROM SC ENB	SHEET 8	TESTS MQ=0 AFTER ABOVE TEST (057). INSURE ZEROS ENTER MQ AT E62-7 AND THAT MQ IS COMPLETELY SHIFTED INTO AC. IT MUST BE SHIFTED 16 TIMES.
ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
061	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TEST SR=150AT COMPLETION OF ABOVE TEST(057). INSURE SR IS CORRECT WHEN ROM ACTIVE IS COMPLETE WITH LSH CYCLE
062	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TESTS AC=100000 AFTER LSH LEFT 16 TIMES WITH AC=0 AND MQ=177777 INITIALLY. INSURE PROPER SHIFT THROUGH AC SHEET 7,8.
063	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TESTS MQ=0 AFTER ABOVE TEST (062). INSURE ZEROES SHIFTED INTO MQ AND ALL ONES ARE SHIFTED OUT.
064	177304	177302	177314	E6-15	ROM ACTIVE	SEET 2	CHECK SR FOR 111 AT END OF ROM ACTIVE LSH PULSE.
065	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH LEFT 16 WITH MQ=125252 AND AC=0 INITIALLY. AC IS CHECKED FOR 125252 AFTER SHIFT. LOAD DATA PATTERN AND CHECK AC AND MQ FOR PROPER SHIFT.
066	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TESTS MQ=0 AFTER TEST 065. INSURE MQ=0.
067	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TEST SR=110 AFTER TEST 065. CHECK STATUS BITS ON SHEET 2
070	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH LEFT 1 WITH AC=0 AND MQ=125252. CHECK AC=1 AFTER LSH IS DONE.
071	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST MQ=52524 AFTER TEST 070.
072	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TEST SR=0 AFTER TEST 070
073	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH LEFT WITH VARIABLE SHIFT COUNT OCTAL 21 TO 37. AC=0 AND MQ=000001 INITIALLY. LOAD FAULTY PATTERN INTO PROPER REGISTERS AND EXAMINE FAULT AREA.
074	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST MQ=0 AFTER ABOVE TEST 073.
075	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TESTS SR =10 AFTER TEST 073.

LOGICAL SHIFT TESTS (CONT.)

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
076	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TESTS AC=0 AFTER LSH RIGHT 16TIMES WITH AC=MQ=0 INITIALLY.
077	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TESTS MQ=0 AFTER ABOVE TEST 076
100	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TESTS SR=36 AFTER TEST 076.
101	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH RIGHT 16 TIMES WITH AC=177777 AND MQ=0 INITIALLY. CHECKS FOR AC=0.
102	177304	177302	177314	E6-15	ROM ACTIVE	SHEET7,8	TEST MQ=177777 AFTER TEST 101. INSURE ONES ARE BEING SHIFTED INTO THE MQ AT E114-2 SHEET 7.
103	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TEST SR=20 AFTER TEST 101.
104	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH RIGHT 31 TIMES WITH AC=177777 AND MQ = 0 INITIALLY. CHECKS FOR AC EQUAL ZERO AT COMPLETION OF SHIFTING.

LOGICAL SHIFT TESTS (CONT.)

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
105	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TESTS MQ=000001 AFTER ABOVE TEST 104. INSURE THAT ZERO IS SHIFTED THROUGH AC AND MQ.
106	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TESTS SR=23 AT END OF SHIFT.
107	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH RIGHT 16 TIMES WITH AC=125252 AND MQ =0 INITIALLY. CHECK FOR PROPER DATA AT END OF SHIFT. AC SHOULD EQUAL ZERO.
110	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST MQ=125252 AT COMPLETION OF TEST 107.
111	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TEST SR=20 AT COMPLETION OF TEST 107.
112	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH RIGHT 1 TIME WITH MQ=0 AND AC=52525 INITIALLY. CHECKS AC=25252 AFTER LSH COMPLETION.
113	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST MQ=100000 AFTER TEST 112.
114	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TEST SR=0 AFTER TEST 112 COMPLETION.
115	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TEST LSH RIGHT WITH VARIABLE SHIFT COUNT FROM 30 TO 19 TIMES WITH
116	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 7,8	TESTS MQ FOR PROPER DATA. LOAD FAULTY DATA PATTERN INTO REGISTERS AND EXAMINE MQ FOR PROPER DATA.
117	177304	177302	177314	E6-15	ROM ACTIVE	SHEET 2	TEST SR=22 AT COMPLETION OF TEST 115.

ARITHMETIC SHIFT TESTS

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
120	177304	177302	177316	E6-15	ROM ACTIVE	SHEET 2,6,7,8,9	TESTS ASH OPERATION UNDER VARIETY OF CONDITONS LOCATED IN TABLES TBLA1 THROUGH TBLA13. INSURE THAT SIGN EXTENSIO IS PROPER VIA SHEET 9 E3-6. INSURE SHEET 8 E62-LOW. EXAMINE AC & MQ AS REQUIRED. HOWEVER, AT THIS POINT DATA PATHS ARE PRETTY WELL CHECKED OUT FOR SHIFT PATTERNS. ERROR 120 IS FAILURE OF THE AC. LOAD FAILING DATA PATTERN AND DEBUG.
121	177304	177302	177316	E6-15	ROM ACTIVE	SHEET 2,6,7,8	TEST ASH OP FOR PROPER MQ DATA UNDER TEST 120.
122	177304	177302	177316	E6-15	ROM ACTIVE	SHEET 2	TESTS SR FOR PROPER DATA. SR WILL INDICATE OVERFLOW CONDITIONS AT SR7/SR6 XOR. THE ISR SHEET CONTAINS OVERFLOW DATA VIA E57-11.

NORMALIZE TESTS

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
123	177304	177302	177312	E60-4	ROM SC ENB	SHEET 2	TEST NORMALIZE USING TABLES TBLB1 THROUGH TBLB7. CHECK THAT MUX NOR1 (SHT 2 AND MUX NOR2 (SHT 2 E56-8) ARE CAUSING CYCLE TERMINATION. NOR1=> THAT AC=140000 AND MQ PRIOR TO ENTERING TEST. NOR2 => THAT EITHER SC= AC=160000 AND MQ=000000 OR AC14 NOT EQUAL AC13 BEFORE THE NEXT SHIFT. THE REST OF THE CIRCUITR PRETTY MUCH CHECKED OUT. FAILURE AT TEST 123 INDICATES AC FAILURE.
124	177304	177302	177312	E60-4	ROM SC ENB	SHEET 7,8	TEST MQ FOR PROPER DATA AT COMPLETION OF TEST 123.
125	177304	177302	177312	E60-4	ROM SC ENB	SHEET 2	TEST SR= PROPER DATA AT COMPLETION OF TEST 123.

MULTIPLY TESTS

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
126	177304	177302	177306	E35-5 E60-5	ROM PC BR04 ROM SC DEC	SHEET ????	TEST MULTIPLY OPERATION VIA TABLES TBLC1 THROUGH TBLC6. THIS TEST USES ALL SIGN CONVENTIONS AND DATA PATTERNS TO SHAKE OUT THE BUGS. TWO SYNC POINTS ARE NOTED BUT FURTHER POINTS MAY BE WRITTEN DEPENDENT ON TYPE OF FAILURE. THE ALU SHEET 7,8 IS DRIVEN FROM MUXES ON SHEET 9 THROUGH THREE DIFFERENT TYPES OF OPERATIONS. F=A+B, F=A-B AND F=A. SHEET 9 USED WITH FLOW CHARTS SHOULD BE A GOOD STARTING POINT. FAILURE AT THIS TEST IMPLIES BAD AC DATA.
127	177304	177302	177306	E35-5 E60-5	ROM PC BR04 ROM SC DEC		SEE ABOVE TEST 126 FOR(EXPLANATION. FAILURE HERE INDICATES BAD MQ DATA.
130	177304	177*02	177306	E35-5	ROM PC BR04	HSV6 ØQ	LOADED VIA E21-1*(SHEE\09.2HCV80GEPS ZEROED AND SR7 GETS SR6 INPUT.

DIVIDE TESTS

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
131	177302	177300	N/A	E39-2	ROM OVFL1	SHEET 3	TESTS FOR OVERFLOW ON ZERO DIVIDE SHOULD SET OVERFLOW FROM E74-6 SHT 3.
132	177302	177300	N/A	E13-10	WORD SEL	SHEET 9	INDICATES AC WAS POS. SIGN AND THE N BIT WAS NOT IF ERROR OCCURED. CHECK THAT SR7 (E13-13) WAS ZEROED.
133	177302	177300	N/A	E13-10	WORD SEL	SHEET 9	INDICATES AC WAS NEG. SIGN AND THE N BIT WAS NOT IF ERROR OCCURED. CHECK THAT SR7 WAS SET.
134	177302	177300	N/A	E13-10	WORD SEL	SHEET 9	INDICATES THAT OVERFLOW NOT SET WHEN AC=52525 & DIV=52525. CHECK THAT SR7 WAS SET AT E13-13 SHT 9.
135	177302	177300	N/A	E13-10	WORD SEL	SHEET 9	INDICATES THAT SR6 WAS NOT AT THE CORRECT SIGN. CHECK E13-15 SHT 9, SR6 SHOULD BE ZERO.
136	177302	177300	N/A	E13-10	WORD SEL	SHEET 9	INDICATES THAT SR6 WAS NOT SET CHECK E13-15 SHT 3.
137	177304	177302	177300	E6-15	ROM ACTIVE	SHEET 3,9	TEST OF DIVIDE OPERATION WITH TABLES TBLD1 THROUGH TBLD16. FAILURE INDICATES BAD AC DATA. REFER TO TABLE FOR CORRECT DATA PATTERN. SHEETS 3 & 9 ARE GOOD STARTING POINTS AS THE REST OF THE MODULE IS PREVIOUSLY TESTED.
140	177304	177302	177300	E6-15	ROM ACTIVE	SHEET 3 & 9	TEST FAILURE DUE TO BAD MQ DATA. INSURE PROPER ALU CONTROL LINES.
141	177304	177302	177300	E6-15	ROM ACTIVE	SHEET 9	FAILURE DUE TO BAD STATUS REG AFTER DIVIDE OP OF TEST 137. CHECK E13 SHEET 9 FOR PROPER OPERATION.
142	177304	177306	N/A	E6-15	ROM ACTIVE		THIS TESTS SUCCESIVE MULTIPLIES. FAILURE IN THIS AREA MOST LIKELY DUE TO SOME OBSCURE TIMING ERROR?? FAILURE DUE TO MQ NOT EQUAL 40000 AFTER MULTIPLING MQ=1 AND MUL=2 FOURTEEN SUCCESIVE TIMES.

MISCELLANEOUS TESTS ON MULTIPLY AND DIVIDE SEQUENCES

ERR #	REG#1	REG#2	REG#3	SYNC PT	SYNC MNEM	TEST AREA	COMMENTS
143	177304	177302	177306	E6-15	ROM ACTIVE		TEST 142. THIS FAILURE INDICATES THAT AC NOT EQUAL ZERO AFTER SUCCESIVE MULT.
144	177304	177302	177306	E6-15	ROM ACTIVE		TEST 142. THIS FAILURE INDICATES THAT SR NOT EQUAL 22 AFTER SUCCESIVE MULT.
145	177304	177302	177300	E6-15	ROM ACTIVE		THIS TEST SUCCESIVE DIVIDES. MQ=40000 INITIALLY AND IS DIVIDED BY DIV=2 FOURTEEN TIMES FAILURE AGAIN PROBABLY DUE TO TIMING ERROR. THIS TEST FAILURE DUE TO THE AC NOT EQUAL 0 AFTER SUCCESIVE DIVIDE.
146	177304	177302	177300	E6-15	ROM ACTIVE		REFER TO TEST 145. FAILURE HERE INDICATES THAT THE MQ NOT EQUAL TO 000001 AFTER SUCCESIVE DIVIDE.
147	177304	177302	177300	E6-15	ROM ACTIVE		REFER TO TEST 145. FAILURE HERE INDICATES SR NOT EQUAL 22 AFTER SUCCESIVE DIVIDE.
150	N/A	N/A	N/A	E6-15	ROM ACTIVE		TEST ALTERNATE MUL/DIV OPERATION. MQ INITIALLY=52525, THEN ALT. MUL AND DIV. BY 40000. FAILURE AT THIS POINT INDICATES MQ NOT EQUAL TO 52525 AFTER COMPLETION.
151	N/A	N/A	N/A	E6-15	ROM ACTIVE		REFER TO TEST 150. FAILURE AT THIS POINT AC NOT EQUAL 0 AFTER ALT. MULT & DIV. OPS.
152	N/A	N/A	N/A	E6-15	ROM ACTIVE		REFER TO TEST 150. FAILURE AT THIS POINT INDICATES FAILURE OF SR TO EQUAL 22.
153	N/A	N/A	N/A	E6-15	ROM ACTIVE		TESTS PROCESSING OF DATA. FAILURE INDICATES THAT THE MQ NOT=100000 AFTER MULTIPLY OPERATION. MQ=125252 AND MUL=40000 INITIALLY.
154	N/A	N/A	N/A	E6-15	ROM ACITVE		REFER TO TEST 153. FAILURE AT THIS POINT INDICATES AC NOT EQUAL TO 165252.
155	N/A	N/A	N/A	E6-15	ROM ACITVE		TEST DIVIDE PROCESSING. MQ=000001, AC=25253 AND DIV=125252 INITIALLY. FAILURE AT THIS POINT INDICATES BAD AC DATA.
156	N/A	N/A	N/A	E6-15	ROM ACTIVE		REFER TO TEST 155. FAILURE AT THIS POINT INDICATES BAD MQ DATA.

```
                                .LIST BIN,SEQ,LOC


                                ;MACRO DEFINITIONS:


                                        .ABS
                                ;DEFINITIONS:
000000                          R0=%0
000001                          R1=%1
000002                          R2=%2
000003                          R3=%3
000004                          R4=%4
000005                          R5=%5
000006                          SP=%6
000007                          PC=%7
177560                          KBS=177560
177562                          KBB=177562
177564                          PSR=177564
177566                          PBR=177566
000240                          NOP=240
177776                          CC=177776

                                .LIST MEB
000000                          .=0
000000  000002                        .+2
000002  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000004  000006                        .+2
000006  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000010  000012                        .+2
000012  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000014  000016                        .+2
000016  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000020  000022                        .+2
000022  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000024  000026                        .+2
000026  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000030  000032                        .+2
000032  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000034  000036                        .+2
000036  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000040  000042                        .+2
000042  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000044  000046                        .+2
000046  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000050  000052                        .+2
000052  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000054  000056                        .+2
000056  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000060  000062                        .+2
000062  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
000064  000066                        .+2
000066  000000                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
```

```
                                                .+2
                                                HALT                    ;TRAPPED TO PREVIOUS ADDRESS
                                                .+2
                                                HALT                    ;TRAPPED TO PREVIOUS ADDRESS
                                        .=46
                                        $ENDAD
                                        .=52
                                                .WORD   0
                                        .=60
                                                MON
                                                340
                                        .=200
                                                CLR     FLAG
                                                JMP     INIT
                                        .=210
                                                MOV     #1,FLAG         ;SET BIT TO ASK FOR OPTIONS
                                                JMP     INIT
                                        .=602
                                        DIV:    177300
                                        AC:     177302
                                        MQ:     177304
                                        MUL:    177306
                                        SC:     177310
                                        SR:     177311
                                        NOR:    177312
                                        LSH:    177314
                                        ASH:    177316
                                        SFTSWR: 000000                  ;SOFTWARE SWITCH REGISTER
                                        FLAG:   0
                                        .=1000
                                        INIT:   MOV     #ILLAD,4        ;SET UP ILLEGAL ADDRESS RETURN
                                        BEGIN:  MOV     #600,SP         ;SET UP STACK
                                                CLR     @AC
                                                CLR     @MQ
                                                CLR     %3
                                                TST     FLAG            ;ASK FOR SW OPTIONS
                                                BEQ     1$              ;NO
                                                MOV     #INMS1,R4
                                                JSR     R5,PRINT
                                                JSR     R5,ASCAL        ;GO GET IT
                                                MOV     ADDRS,SFTSWR    ;STORE IT
                                        1$:     CLR     PASCNT          ;CLEAR PASS COUNT
                                        BG1:    CLR     -(SP)           ;CLEAR PSW PRIORITY
                                                MOV     #TS1,-(SP)      ;SO TTY CAN INTERRUPT
                                                RTI

                                        ;       REGISTER TEST FOR WRITABILITY

                                                                        ;CHECK  SC FLOPS FOR 0 STATE
                                        TS1:    MOV     #0,@SC
                                                TSTB    @SC
                                                BEQ     .+14
                                                JSR     R5,ECOMP
                                                1
                                                1
                                                BR      TS1
```

```
 676
 677                                                                    ;CHECK SR AND SC FLOPS FOR 1 STATE
 678  001116  012777  140477  177466  TS2:    MOV     #140477,@SC
 679  001124  017746  177462                  MOV     @SC,-(6)
 680  001130  042716  037300                  BIC     #37300,(6)
 681  001134  022726  140477                  CMP     #140477,(6)+
 682  001140  001405                          BEQ     .+14
 683  001142  004567  006324                  JSR     R5,ECOMP
 684  001146  000001                          1
 685  001150  000002                          2
 686  001152  000761                          BR      TS2
 687  001154  005077  177432                  CLR     @SC
 688
 689                                                                    ;CHECK MQ FLOPS FOR 0 STATE
 690  001160  012777  000000  177420  TS3:    MOV     #0,@MQ
 691  001166  005777  177414                  TST     @MQ
 692  001172  001405                          BEQ     .+14
 693  001174  004567  006272                  JSR     R5,ECOMP
 694  001200  000001                          1
 695  001202  000003                          3
 696  001204  000765                          BR      TS3
 697
 698  001206  122777  000036  177400          CMPB    #36,@SR         ;CHECK STATUS 36
 699  001214  001405                          BEQ     .+14
 700  001216  004567  006250                  JSR     R5,ECOMP
 701  001222  000001                          1
 702  001224  000004                          4
 703  001226  000754                          BR      TS3
 704
 705                                                                    ;CHECK MQ FLOPS FOR 1 STATE
 706  001230  012777  177777  177350  TS4:    MOV     #-1,@MQ
 707  001236  022777  177777  177342          CMP     #-1,@MQ
 708  001244  001405                          BEQ     .+14
 709  001246  004567  006220                  JSR     R5,ECOMP
 710  001252  000001                          1
 711  001254  000005                          5
 712  001256  000764                          BR      TS4
 713
 714  001260  122777  000042  177326          CMPB    #42,@SR         ;CHECK STATUS 42
 715  001266  001405                          BEQ     .+14
 716  001270  004567  006176                  JSR     R5,ECOMP
 717  001274  000001                          1
 718  001276  000006                          6
 719  001300  000753                          BR      TS4
 720                                                                    ;CHECK AC FLOPS FOR 0 STATE
 721  001302  012777  000000  177274  TS5:    MOV     #0,@AC
 722  001310  005777  177270                  TST     @AC
 723  001314  001405                          BEQ     .+14
 724  001316  004567  006150                  JSR     R5,ECOMP
 725  001322  000001                          1
 726  001324  000007                          7
 727  001326  000765                          BR      TS5
 728
 729  001330  122777  000020  177256          CMPB    #20,@SR         ;CHECK STATUS 20
 730  001336  001405                          BEQ     .+14
 731  001340  004567  006126                  JSR     R5,ECOMP
```

```
  732  001344  000001                          1
  733  001346  000010                          10
  734  001350  000754                          BR      TS5
  735
  736                                                                  ;CHECK AC FLOPS FOR 1 STATE
  737  001352  012777  177777  177224  TS6:    MOV     #-1,@AC
  738  001360  022777  177777  177216          CMP     #-1,@AC
  739  001366  001405                          BEQ     .+14
  740  001370  004567  006076                  JSR     R5,ECOMP
  741  001374  000001                          1
  742  001376  000011                          11
  743  001400  000764                          BR      TS6
  744
  745  001402  122777  000042  177204          CMPB    #42,@SR         ;CHECK STATUS 42
  746  001410  001405                          BEQ     .+14
  747  001412  004567  006054                  JSR     R5,ECOMP
  748  001416  000001                          1
  749  001420  000012                          12
  750  001422  000753                          BR      TS6
  751
  752                                                                  ;CHECK AC AND MQ WITH ALL NUMBERS
  753  001424  005001                  TS7:    CLR     R1
  754  001426  005201                  CP1:    INC     R1
  755  001430  001424                          BEQ     TS8             ;FINISHED WHEN R1=0
  756  001432  010177  177150                  MOV     R1,@MQ          ;LOAD MQ
  757  001436  020177  177144                  CMP     R1,@MQ          ;TEST MQ
  758  001442  001405                          BEQ     .+14
  759  001444  004567  006022                  JSR     R5,ECOMP
  760  001450  000002                          2
  761  001452  000013                          13
  762  001454  000764                          BR      CP1
  763  001456  010177  177122                  MOV     R1,@AC          ;LOAD AC
  764  001462  020177  177116                  CMP     R1,@AC          ;TEST AC
  765  001466  001757                          BEQ     CP1
  766  001470  004567  005776                  JSR     R5,ECOMP
  767  001474  000002                          2
  768  001476  000014                          14
  769  001500  000752                          BR      CP1
  770                                                                  ;TEST OF SIGN EXTENTION
  771  001502  012777  177777  177076  TS8:    MOV     #-1,@MQ         ;LOAD MQ WITH -1
  772  001510  022777  177777  177066          CMP     #-1,@AC         ;TEST FOR SIGN EXTENTION
  773  001516  001405                          BEQ     .+14            ;SKIP IF OK
  774  001520  004567  005746                  JSR     R5,ECOMP
  775  001524  000001                          1
  776  001526  000015                          15
  777  001530  000764                          BR      TS8
  778
  779  001532  005077  177050          1$:     CLR     @MQ             ;CHECK FOR ZERO SIGN EXTENTION
  780  001536  005777  177042                  TST     @AC             ;CHECK FOR ZERO AC
  781  001542  001405                          BEQ     .+14            ;SKIP IF OK
  782  001544  004567  005722                  JSR     R5,ECOMP
  783  001550  000001                          1
  784  001552  000016                          16
  785  001554  000766                          BR      1$
  786
  787  001556  112777  177777  177022  2$:     MOVB    #-1,@MQ         ;TEST OF BYTE SIGN EXTENTION
```

```
 788  001564  022777  177777  177014          CMP     #-1,@MQ         ;CHECK FOR SIGN EXTENTION IN MQ
 789  001572  001405                          BEQ     .+14            ;SKIP IF OK
 790  001574  004567  005672                  JSR     R5,ECOMP
 791  001600  000001                          1
 792  001602  000017                          17
 793  001604  000764                          BR      2$
 794  001606  022777  177777  176770          CMP     #-1,@AC         ;CHECK FOR SIGN EXTENTION IN AC
 795  001614  001405                          BEQ     .+14            ;SKIP IF OK
 796  001616  004567  005650                  JSR     R5,ECOMP
 797  001622  000001                          1
 798  001624  000020                          20
 799  001626  000753                          BR      2$
 800
 801  001630  105077  176752          3$:     CLRB    @MQ             ;CHECK FOR BYTE ZERO SIGN EXTENTION
 802  001634  005777  176746                  TST     @MQ             ;CHECK FOR ZERO MQ
 803  001640  001405                          BEQ     .+14            ;SKIP IF OK
 804  001642  004567  005624                  JSR     R5,ECOMP
 805  001646  000001                          1
 806  001650  000021                          21
 807  001652  000766                          BR      3$
 808  001654  005777  176724                  TST     @AC             ;CHECK FOR ZERO AC
 809  001660  001405                          BEQ     .+14            ;SKIP IF OK
 810  001662  004567  005604                  JSR     R5,ECOMP
 811  001666  000001                          1
 812  001670  000022                          22
 813  001672  000756                          BR      3$
 814
 815  001674  012777  100000  176704  4$:     MOV     #100000,@MQ     ;LOAD MQ WITH LARGEST NUMBER
 816  001702  022777  177777  176674          CMP     #-1,@AC         ;DID IT SIGN EXTEND
 817  001710  001405                          BEQ     .+14            ;SKIP IF OK
 818  001712  004567  005554                  JSR     R5,ECOMP
 819  001716  000001                          1
 820  001720  000023                          23
 821  001722  000764                          BR      4$
 822
 823  001724  112777  000200  176654  5$:     MOVB    #200,@MQ        ;LOAD MQ WITH LARGEST BYTE
 824  001732  022777  177777  176644          CMP     #-1,@AC         ;DID IT SIGN EXTEND
 825  001740  001405                          BEQ     .+14            ;SKIP IF OK
 826  001742  004567  005524                  JSR     R5,ECOMP
 827  001746  000001                          1
 828  001750  000024                          24
 829  001752  000764                          BR      5$
 830  001754  022777  177600  176624          CMP     #177600,@MQ     ;DID IT SIGN EXTEND
 831  001762  001405                          BEQ     .+14            ;SKIP IF OK
 832  001764  004567  005502                  JSR     R5,ECOMP
 833  001770  000001                          1
 834  001772  000025                          25
 835  001774  000753                          BR      5$
 836
 837  001776  012777  000077  176606  6$:     MOV     #77,@SC         ;LOAD SC WITH -1
 838  002004  022777  000077  176604          CMP     #77,@NOR        ;CHECK FOR SIGN EXTENTION
 839  002012  001405                          BEQ     .+14
 840  002014  004567  005452                  JSR     R5,ECOMP
 841  002020  000001                          1
 842  002022  000026                          26
 843  002024  000764                          BR      6$
```

```
    002026  005077  176560          7$:     CLR     @SC                     ;CLEAR SC
    002032  005777  176560                  TST     @NOR                    ;CHECK NOR
    002036  001405                          BEQ     .+14
    002040  004567  005426                  JSR     R5,ECOMP
    002044  000001                          1
    002046  000027                          27
    002050  000766                          BR      7$

                                    ;       AT THIS POINT, ALL THE REGISTERS CAN HANDLE DATA OF
                                    ;       ANY FORM
    002052  032767  000001  176544          BIT     #1,SFTSWR
    002060  001401                          BEQ     .+4
    002062  000167  003342                  JMP     .DIV

                                    ;       LOGICAL SHIFT TEST SECTION
                                    ;       TEST MQ SHIFT OF 0'S LEFT


    002066  005077  176512          TS9:    CLR     @AC
    002072  005077  176510                  CLR     @MQ
    002076  012700  177777                  MOV     #-1,%0
    002102  005200                  LOOP:   INC     %0
    002104  005077  176502                  CLR     @SC                     ;CLEAR SR AND SC
    002110  010077  176504                  MOV     %0,@LSH                 ;SHIFT R0 TIMES LEFT
    002114  005777  176466                  TST     @MQ                     ;TEST MQ FOR '0'
    002120  001405                          BEQ     .+14                    ;SKIP ERROR IF GOOD
    002122  004567  005344                  JSR     R5,ECOMP
    002126  000001                          1
    002130  000030                          30
    002132  000763                          BR      LOOP
    002134  122777  000036  176452          CMPB    #36,@SR                 ;CHECK STATUS REGISTER
    002142  001405                          BEQ     .+14                    ;SKIP ERROR IF GOOD
    002144  004567  005322                  JSR     R5,ECOMP
    002150  000001                          1
    002152  000031                          31
    002154  000752                          BR      LOOP
    002156  022700  000020                  CMP     #16.,%0                 ;LAST ONE
    002162  001347                          BNE     LOOP



                                    ;       TEST AC SHIFT OF 0'S RIGHT


    002164  012700  000001          TS10:   MOV     #1,%0
    002170  005300                  LOOP1:  DEC     %0
    002172  005077  176414                  CLR     @SC                     ;CLEAR SR AND SC
    002176  010077  176416                  MOV     %0,@LSH                 ;SHIFT R0 TIMES RIGHT
    002202  005777  176376                  TST     @AC                     ;TEST AC FOR '0'
    002206  001405                          BEQ     .+14                    ;SKIP ERROR IF GOOD
    002210  004567  005256                  JSR     R5,ECOMP
    002214  000002                          2
    002216  000032                          32
    002220  000763                          BR      LOOP1
    002222  122777  000036  176364          CMPB    #36,@SR                 ;CHECK STATUS REGISTER
```

```
                                                BEQ     .+14            ;SKIP ERROR IF GOOD
002232  004567  005234                          JSR     R5,ECOMP
002236  000002                                  2
002240  000033                                  33
002242  000752                                  BR      LOOP1
002244  022700  177760                          CMP     #-16.,%0        ;LAST ONE
002250  001347                                  BNE     LOOP1

                                        ;       TEST MQ SHIFT OF 1'S RIGHT

002252  012777  177777  176326        TS11:   MOV     #-1,@MQ         ;SET MQ=-1
002260  005077  176320                          CLR     @AC             ;CLEAR AC
002264  005077  176330                          CLR     @LSH            ;INITALIZE SHIFT BY 0
002270  027727  176312  177777                  CMP     @MQ,#-1         ;COMPAIR UNSHIFTED MQ TO -1
002276  001405                                  BEQ     .+14            ;SKIP ERROR IF GOOD
002300  004567  005166                          JSR     R5,ECOMP
002304  000002                                  2
002306  000034                                  34
002310  000760                                  BR      TS11
002312  122777  000020  176274                  CMPB    #20,@SR         ;CHECK STATUS
002320  001405                                  BEQ     .+14            ;SKIP ERROR IF GOOD
002322  004567  005144                          JSR     R5,ECOMP
002326  000002                                  2
002330  000035                                  35
002332  000747                                  BR      TS11

002334  012700  177777              TS11A:  MOV     #177777,R0      ;SHIFT COUNT
002340  012701  077777                      MOV     #77777,R1       ;DATA PATTERN
002344  012777  177777  176234      1$:     MOV     #-1,@MQ         ;SET MQ TO -1
002352  005077  176226                      CLR     @AC             ;CLEAR AC
002356  010077  176236                      MOV     R0,@LSH         ;SHIFT MQ R0 TIMES RIGHT
002362  020177  176220                      CMP     R1,@MQ          ;CHECK RESULT
002366  001405                              BEQ     .+14            ;SKIP IF CORRECT
002370  004567  005076                      JSR     R5,ECOMP
002374  000003                              3
002376  000036                              36
002400  000761                              BR      1$
002402  122777  000023  176204              CMPB    #23,@SR         ;CHECK STATUS
002410  001405                              BEQ     .+14            ;SKIP IF CORRECT
002412  004567  005054                      JSR     R5,ECOMP
002416  000003                              3
002420  000037                              37
002422  000750                              BR      1$
002424  005300                              DEC     R0              ;STEP SHIFT COUNT
002426  000241                              CLC                     ;CLEAR CARRY
002430  006001                              ROR     R1              ;SHIFT DATA PATTERN
002432  001401                              BEQ     TS12            ;GO TO NEXT TEST IF DONE
002434  000743                              BR      1$              ;OTHERWISE CONTINUE


                                        ;       TEST AC SHIFT OF 1'S LEFT
```

```
002436  005077  176144                    TS12:   CLR     @MQ
002442  012777  177777  176134                    MOV     #-1,@AC          ;SET AC=-1
002450  005077  176144                            CLR     @LSH             ;INITALIZE SHIFT BY 0
002454  027727  176124  177777                    CMP     @AC,#-1          ;COMPAIR UNSHIFTED AC TO -1
002462  001405                                    BEQ     .+14             ;SKIP ERROR IF GOOD
002464  004567  005002                            JSR     R5,ECOMP
002470  000003                                    3
002472  000040                                    40
002474  000760                                    BR      TS12
002476  122777  000350  176110                    CMPB    #350,@SR         ;CHECK STATUS
002504  001405                                    BEQ     .+14             ;SKIP ERROR IF STATUS CORRECT
002506  004567  004760                            JSR     R5,ECOMP
002512  000003                                    3
002514  000041                                    41
002516  000747                                    BR      TS12

002520  012700  000001                    TS12A:  MOV     #1,R0            ;SHIFT COUNT
002524  012701  177776                            MOV     #177776,R1       ;DATA PATTERN
002530  012777  177777  176046            1$:     MOV     #-1,@AC          ;SET AC TO ONES
002536  010077  176056                            MOV     R0,@LSH          ;SHIFT AC R0 TIMES LEFT
002542  020177  176036                            CMP     R1,@AC           ;CHECK RESULT
002546  001405                                    BEQ     .+14             ;SKIP IF CORRECT
002550  004567  004716                            JSR     R5,ECOMP
002554  000002                                    2
002556  000042                                    42
002560  000763                                    BR      1$
002562  122777  000311  176024                    CMPB    #311,@SR         ;CHECK STATUS
002570  001405                                    BEQ     .+14             ;SKIP IF STATUS CORRECT
002572  004567  004674                            JSR     R5,ECOMP
002576  000002                                    2
002600  000043                                    43
002602  000752                                    BR      1$
002604  005200                                    INC     R0               ;STEP SHIFT COUNT
002606  022700  000020                            CMP     #20,R0           ;CHECK FOR LAST SHIFT
002612  001403                                    BEQ     TS13             ;GO TO NEXT TEST IF DONE
002614  000241                                    CLC                      ;CLEAR CARRY
002616  006101                                    ROL     R1               ;SHIFT DATA PATTERN
002620  000743                                    BR      1$               ;CONTINUE




                                          ;       TEST MQ SHIFT RIGHT OF ALTERNATE 1'S AND 0'S



002622  012777  125252  175756            TS13:   MOV     #125252,@MQ      ;SET MQ=125252
002630  005077  175750                            CLR     @AC              ;CLEAR AC
002634  005077  175760                            CLR     @LSH             ;INITALIZE SHIFT BY 0
002640  027727  175742  125252                    CMP     @MQ,#125252      ;COMPAIR MQ
002646  001405                                    BEQ     .+14             ;SKIP ERROR IF GOOD
002650  004567  004616                            JSR     R5,ECOMP
002654  000003                                    3
002656  000044                                    44
002660  000760                                    BR      TS13
```

```
1012  002662  122777  000020  175724          CMPB    #20,@SR         ;CHECK STATUS
1013  002670  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1014  002672  004567  004574                  JSR     R5,ECOMP
1015  002676  000003                          3
1016  002700  000045                          45
1017  002702  000747                          BR      TS13
1018
1019
1020  002704  012700  177777          TS13A:  MOV     #-1,R0          ;SHIFT COUNT
1021  002710  012701  152525                  MOV     #152525,R1      ;DATA PATTERN
1022  002714  005067  000102                  CLR     FLOP            ;CLEAR COMPARATOR
1023  002720  012777  125252  175660  1$:     MOV     #125252,@MQ     ;SET MQ = 125252
1024  002726  010077  175666                  MOV     R0,@LSH         ;SHIFT MQ R0 TIMES RIGHT
1025  002732  126777  000064  175654          CMPB    FLOP,@SR        ;CHECK STATUS
1026  002740  001405                          BEQ     .+14            ;SKIP IF CORRECT
1027  002742  004567  004524                  JSR     R5,ECOMP
1028  002746  000002                          2
1029  002750  000046                          46
1030  002752  000762                          BR      1$
1031  002754  020177  175626                  CMP     R1,@MQ          ;CHECK DATA
1032  002760  001405                          BEQ     .+14            ;SKIP IF CORRECT
1033  002762  004567  004504                  JSR     R5,ECOMP
1034  002766  000002                          2
1035  002770  000047                          47
1036  002772  000752                          BR      1$
1037  002774  005267  000022                  INC     FLOP            ;FLIP FLOP
1038  003000  042767  177776  000014          BIC     #177776,FLOP
1039  003006  005300                          DEC     R0              ;STEP SHIFT COUNT
1040  003010  022700  177760                  CMP     #177760,R0      ;DONE?
1041  003014  001403                          BEQ     TS14            ;GO TO NEXT TEST IF DONE
1042  003016  006201                          ASR     R1              ;SHIFT DATA PATTERN
1043  003020  000737                          BR      1$              ;CONTINUE
1044  003022  000000          FLOP:   000                             ;STATUS COMPARATOR
1045                          ;       TEST AC SHIFT LEFT OF ALTERNATE 1'S AND 0'S
1046
1047
1048  003024  005077  175556          TS14:   CLR     @MQ
1049  003030  012777  125252  175546          MOV     #125252,@AC     ;SET AC=125252
1050  003036  005077  175556                  CLR     @LSH            ;INITALIZE SHIFT BY 0
1051  003042  027727  175536  125252          CMP     @AC,#125252     ;COMPAIR AC
1052  003050  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1053  003052  004567  004414                  JSR     R5,ECOMP
1054  003056  000003                          3
1055  003060  000050                          50
1056  003062  000760                          BR      TS14
1057  003064  122777  000310  175522          CMPB    #310,@SR        ;CHECK STATUS
1058  003072  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1059  003074  004567  004372                  JSR     R5,ECOMP
1060  003100  000003                          3
1061  003102  000051                          51
1062  003104  000747                          BR      TS14
1063
1064
1065  003106  012700  000001          TS14A:  MOV     #1,R0           ;SHIFT COUNT
1066  003112  012701  052524                  MOV     #52524,R1       ;DATA PATTERN
1067  003116  012767  000211  177676          MOV     #211,FLOP       ;SET UP STATUS COMPARATOR
```

```
1068  003124  012777  125252  175452  1$:     MOV     #125252,@AC     ;SET AC = 125252
1069  003132  010077  175462                  MOV     R0,@LSH         ;SHIFT AC R0 TIMES LEFT
1070  003136  126777  177660  175450          CMPB    FLOP,@SR        ;CHECK STATUS(211 W/CARRY,110 W/O CARRY)
1071  003144  001405                          BEQ     .+14            ;SKIP IF STATUS CORRECT
1072  003146  004567  004320                  JSR     R5,ECOMP
1073  003152  000002                          2
1074  003154  000052                          52
1075  003156  000762                          BR      1$
1076  003160  020177  175420                  CMP     R1,@AC          ;CHECK DATA
1077  003164  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1078  003166  004567  004300                  JSR     R5,ECOMP
1079  003172  000002                          2
1080  003174  000053                          53
1081  003176  000752                          BR      1$
1082  003200  162767  000101  177614  2$:     SUB     #101,FLOP       ;FLIP FLOP
1083  003206  062767  100000  177764          ADD     #100000,2$
1084  003214  000241                          CLC                     ;CLEAR CARRY
1085  003216  005200                          INC     R0              ;STEP SHIFT COUNT
1086  003220  022700  000017                  CMP     #17,R0          ;DONE?
1087  003224  001403                          BEQ     TS15            ;GO TO NEXT TEST IF DONE
1088  003226  006301                          ASL     R1              ;SHIFT DATA PATTERN
1089  003230  000241                          CLC                     ;CLEAR CARRY
1090  003232  000734                          BR      1$              ;CONTINUE
1091                                  ;       TEST OF MQ SHIFT INTO AC
1092
1093
1094
1095                                                                  ;TEST OF LOGICAL SHIFT
1096  003234  012777  000000  175344  TS15:   MOV     #0,@MQ          ;LOAD MQ WITH 0
1097  003242  012777  000000  175334          MOV     #0,@AC          ;LOAD AC WITH 0
1098  003250  012777  000020  175342          MOV     #16.,@LSH       ;LOAD SHIFT COUNT (LSH) WITH 16.
1099  003256  022777  000000  175320          CMP     #0,@AC          ;COMPARE AC WITH 0
1100  003264  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1101  003266  004567  004200                  JSR     R5,ECOMP
1102  003272  000003                          3
1103  003274  000054                          54
1104  003276  000756                          BR      TS15
1105  003300  022777  000000  175300          CMP     #0,@MQ          ;COMPARE MQ WITH 0
1106  003306  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1107  003310  004567  004156                  JSR     R5,ECOMP
1108  003314  000003                          3
1109  003316  000055                          55
1110  003320  000745                          BR      TS15
1111  003322  122777  000036  175264          CMPB    #36,@SR         ;COMPARE SR WITH 36
1112  003330  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1113  003332  004567  004134                  JSR     R5,ECOMP
1114  003336  000003                          3
1115  003340  000056                          56
1116  003342  000734                          BR      TS15
1117
1118
1119
1120                                                                  ;TEST OF LOGICAL SHIFT
1121  003344  012777  177777  175234  1$:     MOV     #-1,@MQ         ;LOAD MQ WITH -1
1122  003352  012777  000000  175224          MOV     #0,@AC          ;LOAD AC WITH 0
1123  003360  012777  000020  175232          MOV     #16.,@LSH       ;LOAD SHIFT COUNT (LSH) WITH 16.
```

```
1124   003366   022777   177777   175210          CMP     #-1,@AC         ;COMPARE AC WITH -1
1125   003374   001405                            BEQ     .+14            ;GO TO ERROR IF BAD
1126   003376   004567   004070                   JSR     R5,ECOMP
1127   003402   000003                            3
1128   003404   000057                            57
1129   003406   000756                            BR      1$
1130   003410   022777   000000   175170          CMP     #0,@MQ          ;COMPARE MQ WITH 0
1131   003416   001405                            BEQ     .+14            ;GO TO ERROR IF BAD
1132   003420   004567   004046                   JSR     R5,ECOMP
1133   003424   000003                            3
1134   003426   000060                            60
1135   003430   000745                            BR      1$
1136   003432   122777   000150   175154          CMPB    #150,@SR        ;COMPARE SR WITH 150
1137   003440   001405                            BEQ     .+14            ;SKIP ERROR IF GOOD
1138   003442   004567   004024                   JSR     R5,ECOMP
1139   003446   000003                            3
1140   003450   000061                            61
1141   003452   000734                            BR      1$
1142
1143
1144
1145                                                                      ;TEST OF LOGICAL SHIFT
1146   003454   012777   177777   175124  2$:     MOV     #-1,@MQ         ;LOAD MQ WITH -1
1147   003462   012777   000000   175114          MOV     #0,@AC          ;LOAD AC WITH 0
1148   003470   012777   000037   175122          MOV     #31.,@LSH       ;LOAD SHIFT COUNT (LSH) WITH 31.
1149   003476   022777   100000   175100          CMP     #100000,@AC     ;COMPARE AC WITH 100000
1150   003504   001405                            BEQ     .+14            ;GO TO ERROR IF BAD
1151   003506   004567   003760                   JSR     R5,ECOMP
1152   003512   000003                            3
1153   003514   000062                            62
1154   003516   000756                            BR      2$
1155   003520   022777   000000   175060          CMP     #0,@MQ          ;COMPARE MQ WITH 0
1156   003526   001405                            BEQ     .+14            ;GO TO ERROR IF BAD
1157   003530   004567   003736                   JSR     R5,ECOMP
1158   003534   000003                            3
1159   003536   000063                            63
1160   003540   000745                            BR      2$
1161   003542   122777   000111   175044          CMPB    #111,@SR        ;COMPARE SR WITH 111
1162   003550   001405                            BEQ     .+14            ;SKIP ERROR IF GOOD
1163   003552   004567   003714                   JSR     R5,ECOMP
1164   003556   000003                            3
1165   003560   000064                            64
1166   003562   000734                            BR      2$
1167                                                                      ;TEST OF LOGICAL SHIFT
1168   003564   012777   125252   175014  3$:     MOV     #125252,@MQ     ;LOAD MQ WITH 125252
1169   003572   012777   000000   175004          MOV     #0,@AC          ;LOAD AC WITH 0
1170   003600   012777   000020   175012          MOV     #16.,@LSH       ;LOAD SHIFT COUNT (LSH) WITH 16.
1171   003606   022777   125252   174770          CMP     #125252,@AC     ;COMPARE AC WITH 125252
1172   003614   001405                            BEQ     .+14            ;GO TO ERROR IF BAD
1173   003616   004567   003650                   JSR     R5,ECOMP
1174   003622   000003                            3
1175   003624   000065                            65
1176   003626   000756                            BR      3$
1177   003630   022777   000000   174750          CMP     #0,@MQ          ;COMPARE MQ WITH 0
1178   003636   001405                            BEQ     .+14            ;GO TO ERROR IF BAD
1179   003640   004567   003626                   JSR     R5,ECOMP
```

```
1180  003644  000003                          3
1181  003646  000066                          66
1182  003650  000745                          BR      3$
1183  003652  122777  000110  174734          CMPB    #110,@SR        ;COMPARE SR WITH 110
1184  003660  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1185  003662  004567  003604                  JSR     R5,ECOMP
1186  003666  000003                          3
1187  003670  000067                          67
1188  003672  000734                          BR      3$
1189
1190
1191
1192                                                                  ;TEST OF LOGICAL SHIFT
1193  003674  012777  125252  174704  4$:     MOV     #125252,@MQ     ;LOAD MQ WITH 125252
1194  003702  012777  000000  174674          MOV     #0,@AC          ;LOAD AC WITH 0
1195  003710  012777  000001  174702          MOV     #1,@LSH         ;LOAD SHIFT COUNT (LSH) WITH 1
1196  003716  022777  000001  174660          CMP     #1,@AC          ;COMPARE AC WITH 1
1197  003724  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1198  003726  004567  003540                  JSR     R5,ECOMP
1199  003732  000003                          3
1200  003734  000070                          70
1201  003736  000756                          BR      4$
1202  003740  022777  052524  174640          CMP     #52524,@MQ      ;COMPARE MQ WITH 52524
1203  003746  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1204  003750  004567  003516                  JSR     R5,ECOMP
1205  003754  000003                          3
1206  003756  000071                          71
1207  003760  000745                          BR      4$
1208  003762  122777  000000  174624          CMPB    #0,@SR          ;COMPARE SR WITH 0
1209  003770  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1210  003772  004567  003474                  JSR     R5,ECOMP
1211  003776  000003                          3
1212  004000  000072                          72
1213  004002  000734                          BR      4$
1214
1215
1216                                                                  ;TEST OF LOGICAL SHIFT
1217  004004  012700  000021          TS15A:  MOV     #21,R0          ;SHIFT COUNT
1218  004010  012701  000002                  MOV     #2,R1           ;DATA PATTERN
1219  004014  012777  000001  174564  1$:     MOV     #1,@MQ          ;SET MQ = 1
1220  004022  012777  000000  174554          MOV     #0,@AC          ;SET AC = 0
1221  004030  010077  174564                  MOV     R0,@LSH         ;SHIFT MQ INTO AC R0 TIMES
1222  004034  020177  174544                  CMP     R1,@AC          ;CHECK DATA
1223  004040  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1224  004042  004567  003424                  JSR     R5,ECOMP
1225  004046  000003                          3
1226  004050  000073                          73
1227  004052  000760                          BR      1$
1228  004054  022777  000000  174524          CMP     #0,@MQ          ;IS MQ CLEARED?
1229  004062  001405                          BEQ     .+14            ;SKIP ERROR IF CLEARED
1230  004064  004567  003402                  JSR     R5,ECOMP
1231  004070  000003                          3
1232  004072  000074                          74
1233  004074  000747                          BR      1$
1234  004076  122777  000010  174510          CMPB    #10,@SR         ;CHECK STATUS
1235  004104  001405                          BEQ     .+14            ;SKIP ERROR IF CORRECT
```

```
1236  004106  004567  003360                  JSR     R5,ECOMP
1237  004112  000003                          3
1238  004114  000075                          75
1239  004116  000736                          BR      1$
1240  004120  005200                          INC     R0                      ;STEP SHIFT COUNT
1241  004122  022700  000037                  CMP     #37,R0                  ;DONE?
1242  004126  001403                          BEQ     TS16                    ;GO TO NEXT TEST IF DONE
1243  004130  000241                          CLC                             ;CLEAR CARRY
1244  004132  006101                          ROL     R1                      ;SHIFT DATA PATTERN
1245  004134  000727                          BR      1$                      ;CONTINUE
1246
1247                                  ;       TEST OF AC SHIFT INTO MQ
1248
1249
1250
1251                                                                          ;TEST OF LOGICAL SHIFT
1252  004136  012777  000000  174442  TS16:   MOV     #0,@MQ                  ;LOAD MQ WITH 0
1253  004144  012777  000000  174432          MOV     #0,@AC                  ;LOAD AC WITH 0
1254  004152  012777  177760  174440          MOV     #-16.,@LSH              ;LOAD SHIFT COUNT (LSH) WITH -16.
1255  004160  022777  000000  174416          CMP     #0,@AC                  ;COMPARE AC WITH 0
1256  004166  001405                          BEQ     .+14                    ;GO TO ERROR IF BAD
1257  004170  004567  003276                  JSR     R5,ECOMP
1258  004174  000003                          3
1259  004176  000076                          76
1260  004200  000756                          BR      TS16
1261  004202  022777  000000  174376          CMP     #0,@MQ                  ;COMPARE MQ WITH 0
1262  004210  001405                          BEQ     .+14                    ;GO TO ERROR IF BAD
1263  004212  004567  003254                  JSR     R5,ECOMP
1264  004216  000003                          3
1265  004220  000077                          77
1266  004222  000745                          BR      TS16
1267  004224  122777  000036  174362          CMPB    #36,@SR                 ;COMPARE SR WITH 36
1268  004232  001405                          BEQ     .+14                    ;SKIP ERROR IF GOOD
1269  004234  004567  003232                  JSR     R5,ECOMP
1270  004240  000003                          3
1271  004242  000100                          100
1272  004244  000734                          BR      TS16
1273
1274
1275                                                                          ;TEST OF LOGICAL SHIFT
1276  004246  012777  000000  174332  1$:     MOV     #0,@MQ                  ;LOAD MQ WITH 0
1277  004254  012777  177777  174322          MOV     #-1,@AC                 ;LOAD AC WITH -1
1278  004262  012777  177760  174330          MOV     #-16.,@LSH              ;LOAD SHIFT COUNT (LSH) WITH -16.
1279  004270  022777  000000  174306          CMP     #0,@AC                  ;COMPARE AC WITH 0
1280  004276  001405                          BEQ     .+14                    ;GO TO ERROR IF BAD
1281  004300  004567  003166                  JSR     R5,ECOMP
1282  004304  000003                          3
1283  004306  000101                          101
1284  004310  000756                          BR      1$
1285  004312  022777  177777  174266          CMP     #-1,@MQ                 ;COMPARE MQ WITH -1
1286  004320  001405                          BEQ     .+14                    ;GO TO ERROR IF BAD
1287  004322  004567  003144                  JSR     R5,ECOMP
1288  004326  000003                          3
1289  004330  000102                          102
1290  004332  000745                          BR      1$
1291  004334  122777  000020  174252          CMPB    #20,@SR                 ;COMPARE SR WITH 20
```

```
1292  004342  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1293  004344  004567  003122                  JSR     R5,ECOMP
1294  004350  000003                          3
1295  004352  000103                          103
1296  004354  000734                          BR      1$
1297                                                                  ;TEST OF LOGICAL SHIFT
1298  004356  012777  000000  174222  2$:     MOV     #0,@MQ          ;LOAD MQ WITH 0
1299  004364  012777  177777  174212          MOV     #-1,@AC         ;LOAD AC WITH -1
1300  004372  012777  177741  174220          MOV     #-31.,@LSH      ;LOAD SHIFT COUNT (LSH) WITH -31.
1301  004400  022777  000000  174176          CMP     #0,@AC          ;COMPARE AC WITH 0
1302  004406  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1303  004410  004567  003056                  JSR     R5,ECOMP
1304  004414  000003                          3
1305  004416  000104                          104
1306  004420  000756                          BR      2$
1307  004422  022777  000001  174156          CMP     #1,@MQ          ;COMPARE MQ WITH 1
1308  004430  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1309  004432  004567  003034                  JSR     R5,ECOMP
1310  004436  000003                          3
1311  004440  000105                          105
1312  004442  000745                          BR      2$
1313  004444  122777  000023  174142          CMPB    #23,@SR         ;COMPARE SR WITH 23
1314  004452  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1315  004454  004567  003012                  JSR     R5,ECOMP
1316  004460  000003                          3
1317  004462  000106                          106
1318  004464  000734                          BR      2$
1319
1320
1321
1322                                                                  ;TEST OF LOGICAL SHIFT
1323  004466  012777  000000  174112  3$:     MOV     #0,@MQ          ;LOAD MQ WITH 0
1324  004474  012777  125252  174102          MOV     #125252,@AC     ;LOAD AC WITH 125252
1325  004502  012777  177760  174110          MOV     #-16.,@LSH      ;LOAD SHIFT COUNT (LSH) WITH -16.
1326  004510  022777  000000  174066          CMP     #0,@AC          ;COMPARE AC WITH 0
1327  004516  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1328  004520  004567  002746                  JSR     R5,ECOMP
1329  004524  000003                          3
1330  004526  000107                          107
1331  004530  000756                          BR      3$
1332  004532  022777  125252  174046          CMP     #125252,@MQ     ;COMPARE MQ WITH 125252
1333  004540  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1334  004542  004567  002724                  JSR     R5,ECOMP
1335  004546  000003                          3
1336  004550  000110                          110
1337  004552  000745                          BR      3$
1338  004554  122777  000020  174032          CMPB    #20,@SR         ;COMPARE SR WITH 20
1339  004562  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1340  004564  004567  002702                  JSR     R5,ECOMP
1341  004570  000003                          3
1342  004572  000111                          111
1343  004574  000734                          BR      3$
1344
1345
1346
1347                                                                  ;TEST OF LOGICAL SHIFT
```

```
1348  004576  012777  000000  174002  4$:     MOV     #0,@MQ          ;LOAD MQ WITH 0
1349  004604  012777  052525  173772          MOV     #52525,@AC      ;LOAD AC WITH 52525
1350  004612  012777  177777  174000          MOV     #-1,@LSH        ;LOAD SHIFT COUNT (LSH) WITH -1
1351  004620  022777  025252  173756          CMP     #25252,@AC      ;COMPARE AC WITH 25252
1352  004626  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1353  004630  004567  002636                  JSR     R5,ECOMP
1354  004634  000003                          3
1355  004636  000112                          112
1356  004640  000756                          BR      4$
1357  004642  022777  100000  173736          CMP     #100000,@MQ     ;COMPARE MQ WITH 100000
1358  004650  001405                          BEQ     .+14            ;GO TO ERROR IF BAD
1359  004652  004567  002614                  JSR     R5,ECOMP
1360  004656  000003                          3
1361  004660  000113                          113
1362  004662  000745                          BR      4$
1363  004664  122777  000000  173722          CMPB    #0,@SR          ;COMPARE SR WITH 0
1364  004672  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1365  004674  004567  002572                  JSR     R5,ECOMP
1366  004700  000003                          3
1367  004702  000114                          114
1368  004704  000734                          BR      4$
1369
1370                                                                  ;TEST OF LOGICAL SHIFT
1371  004706  012700  177742          TS16A:  MOV     #177742,R0      ;SHIFT COUNT
1372  004712  012701  000002                  MOV     #2,R1           ;DATA PATTERN
1373  004716  012777  000000  173662  1$:     MOV     #0,@MQ          ;LOAD MQ WITH 0
1374  004724  012777  100000  173652          MOV     #100000,@AC     ;LOAD AC WITH 100000
1375  004732  010077  173662                  MOV     R0,@LSH         ;SHIFT AC INTO MQ R0 TIMES
1376  004736  022777  000000  173640          CMP     #0,@AC          ;AC CLEARED?
1377  004744  001405                          BEQ     .+14            ;SKIP ERROR IF CLEARED
1378  004746  004567  002520                  JSR     R5,ECOMP
1379  004752  000003                          3
1380  004754  000115                          115
1381  004756  000757                          BR      1$
1382  004760  020177  173622                  CMP     R1,@MQ          ;CHECK DATA
1383  004764  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1384  004766  004567  002500                  JSR     R5,ECOMP
1385  004772  000003                          3
1386  004774  000116                          116
1387  004776  000747                          BR      1$
1388  005000  122777  000022  173606          CMPB    #22,@SR         ;CHECK STATUS
1389  005006  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1390  005010  004567  002456                  JSR     R5,ECOMP
1391  005014  000003                          3
1392  005016  000117                          117
1393  005020  000736                          BR      1$
1394  005022  005200                          INC     R0              ;STEP SHIFT COUNT
1395  005024  022700  177755                  CMP     #177755,R0      ;DONE?
1396  005030  001403                          BEQ     TS17            ;GO TO NEXT TEST IF DONE
1397  005032  000241                          CLC                     ;CLEAR CARRY
1398  005034  006101                          ROL     R1              ;SHIFT DATA PATTERN
1399  005036  000727                          BR      1$              ;CONTINUE
1400
1401                          ; AT THIS POINT, LOGICAL SHIFT WORKS!
1402  005040  012701  014224          TS17:   MOV     #TBLA1,R1       ;SET POINTER
1403  005044  005000                          CLR     R0              ;CLEAR SHIFT COUNT
```

```
1404  005046  012767  000000  000144  1$:     MOV     #0,CCNT         ;SET LOAD COUNT
1405  005054  012702  005222                  MOV     #PMQ,R2         ;SET LOAD ADDRESS POINTER
1406  005060  012122                  2$:     MOV     (R1)+,(R2)+     ;LOAD PARAMETERS
1407  005062  005267  000132                  INC     CCNT            ;INCREMENT LOAD COUNT
1408  005066  022767  000006  000124          CMP     #6,CCNT         ;FINISHED LOADING?
1409  005074  001371                          BNE     2$              ;NO! KEEP ON LOADING
1410  005076  016777  000120  173502  3$:     MOV     PMQ,@MQ         ;LOAD MQ
1411  005104  016777  000114  173472          MOV     PAC,@AC         ;LOAD AC
1412  005112  016777  000110  173502          MOV     PASH,@ASH       ;LOAD SHIFT FACTOR
1413  005120  026777  000104  173456          CMP     ACCP,@AC        ;COMPARE AC
1414  005126  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1415  005130  004567  002336                  JSR     R5,ECOMP
1416  005134  000004                          4
1417  005136  000120                          120
1418  005140  000756                          BR      3$
1419  005142  026777  000064  173436          CMP     MQCP,@MQ        ;COMPARE MQ
1420  005150  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1421  005152  004567  002314                  JSR     R5,ECOMP
1422  005156  000004                          4
1423  005160  000121                          121
1424  005162  000745                          BR      3$
1425  005164  126777  000044  173422          CMPB    SRCP,@SR        ;CHECK STATUS
1426  005172  001405                          BEQ     .+14            ;SKIP ERROR IF CORRECT
1427  005174  004567  002272                  JSR     R5,ECOMP
1428  005200  000004                          4
1429  005202  000122                          122
1430  005204  000734                          BR      3$
1431  005206  005200                          INC     R0              ;STEP SHIFT COUNT
1432  005210  022700  000015                  CMP     #15,R0          ;DONE?
1433  005214  001410                          BEQ     TS18            ;GO TO NEXT TEST IF DONE
1434  005216  000713                          BR      1$              ;CONTINUE
1435  005220  000000          CCNT:   000                             ;LOAD COUNTER
1436  005222  000000          PMQ:    000                             ;MQ PARAMETER
1437  005224  000000          PAC:    000                             ;AC PARAMETER
1438  005226                  PDIV:                                   ;DIV PARAMETER
1439  005226                  PMUL:                                   ;MUL PARAMETER
1440  005226  000000          PASH:   000                             ;ASH PARAMETER
1441  005230  000000          ACCP:   000                             ;AC COMPARATOR
1442  005232  000000          MQCP:   000                             ;MQ COMPARATOR
1443  005234  000000          SRCP:   000                             ;SR COMPARATOR
1444
1445                          ; AT THIS POINT,THE ARITHMETIC SHIFT WORKS
1446  005236  005000          TS18:   CLR     R0              ;CLEAR CYCLE COUNT
1447  005240  012701  014460          MOV     #TBLB1,R1       ;LOAD POINTER
1448  005244  012767  000000  177746  1$:     MOV     #0,CCNT         ;SET LOAD COUNT
1449  005252  012702  005222                  MOV     #PMQ,R2         ;LOAD ADDRESS POINTER
1450  005256  012122                  2$:     MOV     (R1)+,(R2)+     ;LOAD PARAMETERS
1451  005260  005267  177734                  INC     CCNT            ;INCREMENT LOAD COUNT
1452  005264  022767  000006  177726          CMP     #6,CCNT         ;DONE?
1453  005272  001371                          BNE     2$              ;NO! CONTINUE LOADING
1454  005274  016777  177722  173304  3$:     MOV     PMQ,@MQ         ;LOAD MQ
1455  005302  016777  177716  173274          MOV     PAC,@AC         ;LOAD AC
1456  005310  005077  173302                  CLR     @NOR            ;START NORMALIZE
1457  005314  026777  177710  173262          CMP     ACCP,@AC        ;COMPARE AC
1458  005322  001405                          BEQ     .+14            ;SKIP ERROR IF GOOD
1459  005324  004567  002142                  JSR     R5,ECOMP
```

```
1460  005330  000004                                    4
1461  005332  000123                                    123
1462  005334  000757                                    BR      3$
1463  005336  026777  177670  173242                    CMP     MQCP,@MQ        ;COMPARE MQ
1464  005344  001405                                    BEQ     .+14            ;SKIP ERROR IF GOOD
1465  005346  004567  002120                            JSR     R5,ECOMP
1466  005352  000004                                    4
1467  005354  000124                                    124
1468  005356  000746                                    BR      3$
1469  005360  026777  177650  173224                    CMP     SRCP,@SC        ;CHECK STATUS
1470  005366  001405                                    BEQ     .+14            ;SKIP ERROR IF GOOD
1471  005370  004567  002076                            JSR     R5,ECOMP
1472  005374  000004                                    4
1473  005376  000125                                    125
1474  005400  000735                                    BR      3$
1475  005402  005200                                    INC     R0              ;STEP CYCLE COUNT
1476  005404  022700  000007                            CMP     #7,R0           ;DONE?
1477  005410  001407                                    BEQ     TS19            ;GO TO NEXT TEST IF DONE
1478  005412  000714                                    BR      1$              ;CONTINUE
1479  005414  032767  000002  173202                    BIT     #2,SFTSWR
1480  005422  001401                                    BEQ     .+4
1481  005424  000167  001530                            JMP     .DEV
1482          005430                          .DIV=.
1483                                          ;       TEST OF MULTIPLY
1484
1485
1486
1487  005430  005000                          TS19:   CLR     R0              ;CLEAR CYCLE COUNT
1488  005432  012701  014604                          MOV     #TBLC1,R1       ;LOAD POINTER
1489  005436  005067  177556                  1$:     CLR     CCNT            ;SET LOAD COUNT
1490  005442  012702  005222                          MOV     #PMQ,R2         ;LOAD ADDRESS POINTER
1491  005446  012122                          2$:     MOV     (R1)+,(R2)+     ;LOAD PARAMETERS
1492  005450  005267  177544                          INC     CCNT            ;INCREMENT LOAD COUNT
1493  005454  022767  000006  177536                  CMP     #6,CCNT         ;DONE?
1494  005462  001371                                  BNE     2$              ;NO! KEEP LOADING
1495  005464  016777  177532  173114          3$:     MOV     PMQ,@MQ         ;LOAD MQ
1496  005472  016777  177530  173110                  MOV     PMUL,@MUL       ;LOAD MUL
1497  005500  026777  177524  173076                  CMP     ACCP,@AC        ;COMPARE AC
1498  005506  001405                                  BEQ     .+14            ;SKIP ERROR IF GOOD
1499  005510  004567  001756                          JSR     R5,ECOMP
1500  005514  000004                                  4
1501  005516  000126                                  126
1502  005520  000761                                  BR      3$
1503  005522  026777  177504  173056                  CMP     MQCP,@MQ        ;COMPARE MQ
1504  005530  001405                                  BEQ     .+14            ;SKIP ERROR IF GOOD
1505  005532  004567  001734                          JSR     R5,ECOMP
1506  005536  000004                                  4
1507  005540  000127                                  127
1508  005542  000750                                  BR      3$
1509  005544  126777  177464  173042                  CMPB    SRCP,@SR        ;CHECK STATUS
1510  005552  001405                                  BEQ     .+14            ;SKIP ERROR IF GOOD
1511  005554  004567  001712                          JSR     R5,ECOMP
1512  005560  000004                                  4
1513  005562  000130                                  130
1514  005564  000737                                  BR      3$
1515  005566  005200                                  INC     R0              ;STEP CYCLE COUNT
```

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1516  005570  022700  000006                  CMP     #6,R0           ;DONE?
1517  005574  001401                          BEQ     TS20            ;GO TO NEXT TEST IF DONE
1518  005576  000717                          BR      1$              ;CONTINUE
1519                                  ;       TEST OF DIVIDE
1520
1521                                                                  ;TEST OF DIVIDE
1522  005600  005077  173002          TS20:   CLR     @MQ             ;LOAD MQ WITH 0
1523  005604  005077  172772                  CLR     @DIV            ;LOAD DIV WITH 0 AND DIVIDE
1524  005610  106177  173000                  ROLB    @SR             ;SHIFT OVERFLOW BIT INTO PS
1525  005614  102405                          BVS     .+14            ;SKIP ERROR IF GOOD
1526  005616  004567  001650                  JSR     R5,ECOMP
1527  005622  000005                          5
1528  005624  000131                          131
1529  005626  000764                          BR      TS20
1530  005630  005777  172750                  TST     @AC             ;CHECK AC'S SIGN
1531  005634  100411                          BMI     .MIN
1532  005636  106177  172752                  ROLB    @SR             ;SET APROPRIATE N AND V BITS
1533  005642  100016                          BPL     TS20A
1534  005644  004567  001622                  JSR     R5,ECOMP
1535  005650  000005                          5
1536  005652  000132                          132
1537  005654  000751                          BR      TS20
1538  005656  000410                          BR      TS20A
1539  005660  106177  172730          .MIN:   ROLB    @SR             ;SET APROPRIATE N AND V BITS
1540  005664  100405                          BMI     .+14
1541  005666                          .HLT:
1542  005666  004567  001600                  JSR     R5,ECOMP
1543  005672  000005                          5
1544  005674  000133                          133
1545  005676  000740                          BR      TS20
1546
1547
1548                                                                  ;TEST OF DIVIDE
1549  005700  005077  172702          TS20A:  CLR     @MQ             ;CLEAR THE MQ
1550  005704  012777  052525  172672          MOV     #52525,@AC      ;LOAD AC WITH 52525
1551  005712  012777  052525  172662          MOV     #52525,@DIV     ;LOAD DIV WITH 52525 AND DIVIDE
1552  005720  106177  172670                  ROLB    @SR             ;SHIFT OVERFLOW BIT INTO PS
1553  005724  102405                          BVS     .+14            ;SKIP ERROR IF GOOD
1554  005726  004567  001540                  JSR     R5,ECOMP
1555  005732  000005                          5
1556  005734  000134                          134
1557  005736  000760                          BR      TS20A
1558  005740  005777  172640                  TST     @AC             ;CHECK AC'S SIGN
1559  005744  100411                          BMI     .MIN1
1560  005746  106177  172642                  ROLB    @SR             ;SET APROPRIATE N AND V BITS
1561  005752  100016                          BPL     TS20B
1562  005754  004567  001512                  JSR     R5,ECOMP
1563  005760  000005                          5
1564  005762  000135                          135
1565  005764  000745                          BR      TS20A
1566  005766  000410                          BR      TS20B
1567  005770  106177  172620          .MIN1:  ROLB    @SR             ;SET APROPRIATE N AND V BITS
1568  005774  100405                          BMI     .+14
1569  005776                          .HLT1:
1570  005776  004567  001470                  JSR     R5,ECOMP
1571  006002  000005                          5
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1572  006004  000136                                  136
1573  006006  000734                                  BR      TS20A
1574  006010  005000                          TS20B:  CLR     R0              ;CLEAR CYCLE COUNT
1575  006012  012701  014714                        MOV     #TBLD1,R1       ;LOAD POINTER
1576  006016  005067  177176                  1$:   CLR     CCNT            ;SET LOAD COUNT
1577  006022  012702  005222                        MOV     #PMQ,R2         ;LOAD ADDRESS POINTER
1578  006026  012122                          2$:   MOV     (R1)+,(R2)+     ;LOAD PARAMETERS
1579  006030  005267  177164                        INC     CCNT            ;INCREMENT LOAD COUNT
1580  006034  022767  000006  177156                CMP     #6,CCNT         ;DONE?
1581  006042  001371                                BNE     2$              ;NO! KEEP LOADING
1582  006044  016777  177152  172534          3$:   MOV     PMQ,@MQ         ;LOAD MQ
1583  006052  016777  177146  172524                MOV     PAC,@AC         ;LOAD AC
1584  006060  016777  177142  172514                MOV     PDIV,@DIV       ;LOAD DIV AND DIVIDE
1585  006066  026777  177136  172510                CMP     ACCP,@AC        ;COMPARE AC (REMAINDER)
1586  006074  001405                                BEQ     .+14            ;SKIP ERROR IF GOOD
1587  006076  004567  001370                        JSR     R5,ECOMP
1588  006102  000004                                4
1589  006104  000137                                137
1590  006106  000756                                BR      3$
1591  006110  026777  177116  172470                CMP     MQCP,@MQ        ;COMPARE MQ (QUOTIANT)
1592  006116  001405                                BEQ     .+14            ;SKIP ERROR IF GOOD
1593  006120  004567  001346                        JSR     R5,ECOMP
1594  006124  000004                                4
1595  006126  000140                                140
1596  006130  000745                                BR      3$
1597  006132  126777  177076  172454                CMPB    SRCP,@SR        ;CHECK STATUS
1598  006140  001405                                BEQ     .+14            ;SKIP ERROR IF GOOD
1599  006142  004567  001324                        JSR     R5,ECOMP
1600  006146  000004                                4
1601  006150  000141                                141
1602  006152  000734                                BR      3$
1603  006154  005200                                INC     R0              ;STEP CYCLE COUNT
1604  006156  022700  000020                        CMP     #20,R0          ;DONE?
1605  006162  001401                                BEQ     TS21            ;GO TO NEXT TEST IF DONE
1606  006164  000714                                BR      1$              ;CONTINUE
1607                                                                         ;TEST OF SUCCESIVE MULTIPLIES
1608  006166  012777  000001  172412  TS21:   MOV     #1,@MQ
1609  006174  012777  000002  172406                MOV     #2,@MUL         ;FOURTEEN MULTIPLIES
1610  006202  012777  000002  172400                MOV     #2,@MUL
1611  006210  012777  000002  172372                MOV     #2,@MUL
1612  006216  012777  000002  172364                MOV     #2,@MUL
1613  006224  012777  000002  172356                MOV     #2,@MUL
1614  006232  012777  000002  172350                MOV     #2,@MUL
1615  006240  012777  000002  172342                MOV     #2,@MUL
1616  006246  012777  000002  172334                MOV     #2,@MUL
1617  006254  012777  000002  172326                MOV     #2,@MUL
1618  006262  012777  000002  172320                MOV     #2,@MUL
1619  006270  012777  000002  172312                MOV     #2,@MUL
1620  006276  012777  000002  172304                MOV     #2,@MUL
1621  006304  012777  000002  172276                MOV     #2,@MUL
1622  006312  012777  000002  172270                MOV     #2,@MUL
1623
1624  006320  022777  040000  172260                CMP     #40000,@MQ
1625  006326  001405                                BEQ     .+14
1626  006330  004567  001136                        JSR     R5,ECOMP
1627  006334  000006                                6
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1628  006336  000142                                  142
1629  006340  000712                                  BR      TS21
1630  006342  005777  172236                          TST     @AC
1631  006346  001405                                  BEQ     .+14
1632  006350  004567  001116                          JSR     R5,ECOMP
1633  006354  000006                                  6
1634  006356  000143                                  143
1635  006360  000702                                  BR      TS21
1636  006362  122777  000022  172224                  CMPB    #22,@SR         ;CHECK STATUS 22
1637  006370  001405                                  BEQ     .+14
1638  006372  004567  001074                          JSR     R5,ECOMP
1639  006376  000006                                  6
1640  006400  000144                                  144
1641  006402  000671                                  BR      TS21
1642                                                                  ;TEST OF SUCCESIVE DIVIDES
1643  006404  012777  040000  172174  TS22:           MOV     #40000,@MQ
1644  006412  012777  000002  172162                  MOV     #2,@DIV         ;FOURTEEN DIVIDES
1645  006420  012777  000002  172154                  MOV     #2,@DIV
1646  006426  012777  000002  172146                  MOV     #2,@DIV
1647  006434  012777  000002  172140                  MOV     #2,@DIV
1648  006442  012777  000002  172132                  MOV     #2,@DIV
1649  006450  012777  000002  172124                  MOV     #2,@DIV
1650  006456  012777  000002  172116                  MOV     #2,@DIV
1651  006464  012777  000002  172110                  MOV     #2,@DIV
1652  006472  012777  000002  172102                  MOV     #2,@DIV
1653  006500  012777  000002  172074                  MOV     #2,@DIV
1654  006506  012777  000002  172066                  MOV     #2,@DIV
1655  006514  012777  000002  172060                  MOV     #2,@DIV
1656  006522  012777  000002  172052                  MOV     #2,@DIV
1657  006530  012777  000002  172044                  MOV     #2,@DIV
1658
1659  006536  005777  172042                          TST     @AC
1660  006542  001405                                  BEQ     .+14
1661  006544  004567  000722                          JSR     R5,ECOMP
1662  006550  000006                                  6
1663  006552  000145                                  145
1664  006554  000713                                  BR      TS22
1665  006556  022777  000001  172022                  CMP     #1,@MQ
1666  006564  001405                                  BEQ     .+14
1667  006566  004567  000700                          JSR     R5,ECOMP
1668  006572  000006                                  6
1669  006574  000146                                  146
1670  006576  000702                                  BR      TS22
1671  006600  122777  000022  172006                  CMPB    #22,@SR         ;CHECK STATUS 22
1672  006606  001405                                  BEQ     .+14
1673  006610  004567  000656                          JSR     R5,ECOMP
1674  006614  000006                                  6
1675  006616  000147                                  147
1676  006620  000671                                  BR      TS22
1677                                                                  ;TEST OR ALTERNATE MUL AND DIV
1678  006622  012777  052525  171756  TS23:           MOV     #52525,@MQ
1679  006630  012777  040000  171752                  MOV     #40000,@MUL     ;FIVE MULTIPLIES AND
1680  006636  012777  040000  171736                  MOV     #40000,@DIV     ;FIVE DIVIDES
1681  006644  012777  040000  171736                  MOV     #40000,@MUL
1682  006652  012777  040000  171722                  MOV     #40000,@DIV
1683  006660  012777  040000  171722                  MOV     #40000,@MUL
```

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1684  006666  012777  040000  171706          MOV     #40000,@DIV
1685  006674  012777  040000  171706          MOV     #40000,@MUL
1686  006702  012777  040000  171672          MOV     #40000,@DIV
1687  006710  012777  040000  171672          MOV     #40000,@MUL
1688  006716  012777  040000  171656          MOV     #40000,@DIV
1689
1690  006724  022777  052525  171654          CMP     #52525,@MQ
1691  006732  001405                          BEQ     .+14
1692  006734  004567  000532                  JSR     R5,ECOMP
1693  006740  000007                          7
1694  006742  000150                          150
1695  006744  000726                          BR      TS23
1696  006746  005777  171632                  TST     @AC
1697  006752  001405                          BEQ     .+14
1698  006754  004567  000512                  JSR     R5,ECOMP
1699  006760  000007                          7
1700  006762  000151                          151
1701  006764  000716                          BR      TS23
1702  006766  122777  000022  171620          CMPB    #22,@SR         ;CHECK STATUS 22
1703  006774  001405                          BEQ     .+14
1704  006776  004567  000470                  JSR     R5,ECOMP
1705  007002  000007                          7
1706  007004  000152                          152
1707  007006  000705                          BR      TS23
1708                                                  ;TEST OF FAST PROCESSING OF DATA
1709  007010  016700  171572          TS24:   MOV     MQ,%0           ;SET UP POINTER
1710  007014  012720  125252                  MOV     #125252,(0)+    ;LOAD MQ
1711  007020  012710  040000                  MOV     #40000,(0)      ;LOAD MUL
1712  007024  014001                          MOV     -(0),%1         ;SAVE MQ
1713  007026  014002                          MOV     -(0),%2         ;SAVE AC
1714  007030  005720                          TST     (0)+
1715  007032  020127  100000                  CMP     %1,#100000      ;CHECK MQ
1716  007036  001405                          BEQ     .+14
1717  007040  004567  000426                  JSR     R5,ECOMP
1718  007044  000010                          10
1719  007046  000153                          153
1720  007050  000757                          BR      TS24
1721  007052  020227  165252                  CMP     %2,#165252      ;CHECK AC
1722  007056  001405                          BEQ     .+14
1723  007060  004567  000406                  JSR     R5,ECOMP
1724  007064  000010                          10
1725  007066  000154                          154
1726  007070  000747                          BR      TS24
1727
1728                                                  ;SAVE WITH DIVIDE
1729  007072  016700  171510          TS25:   MOV     MQ,%0
1730  007076  012710  000001                  MOV     #1,(0)          ;LOAD MQ WITH 1
1731  007102  012740  025253                  MOV     #25253,-(0)     ;LOAD AC WITH 25253
1732  007106  012740  125252                  MOV     #125252,-(0)    ;DIVIDE
1733  007112  005720                          TST     (0)+
1734  007114  012001                          MOV     (0)+,%1         ;SAVE THE AC IN R1
1735  007116  011002                          MOV     (0),%2          ;SAVE THE MQ IN R2
1736  007120  020127  000001                  CMP     %1,#1           ;TEST THE AC
1737  007124  001405                          BEQ     .+14
1738  007126  004567  000340                  JSR     R5,ECOMP
1739  007132  000011                          11
```

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                                                155
                                                BR      TS25
                                                CMP     %2,#100000      ;TEST THE MQ
                                                BEQ     .+14
                                                JSR     R5,ECOMP
                                                11
                                                156
                                                BR      TS25


                        .DEV=.
                                                INC     PASCNT          ;INCREMENT PASS COUNT
                                                CMP     #122,PASCNT     ;100 PASSES?
                                                BEQ     1$              ;YES! GO REPORT END OF PASS
                        2$:                     JMP     BG1             ;NO! CYCLE THRU TESTS AGAIN
                        1$:
                                                MOV     #ENMES,R4
                                                JSR     R5,PRINT
                                                CLR     PASCNT          ;ZERO PASS COUNTER
                                                MOV     @#42,R0         ;GET MONITOR ADDRESS
                                                BEQ     $END1           ;IF NOT
                                                RESET
                        $ENDAD:                 JSR     7,(0)           ;GO TO MONITOR
                                                240,240,240             ;SAVE ROOM FOR ACT11
                        $END1:                  JMP     @#BG1           ;RETURN
                        PASCNT:                 000                     ;PASS COUNTER

                        ;       EAE OK
                        ;COMMAND DECODER

MON:                    BIC     #100,KBS        ;DISABLE FURTHER INTERUPTS
                        MOV     KBB,CMND        ;SAVE COMMAND
                        BIC     #177600,CMND    ;CLEAR UNUSED BITS
                        BIT     #200,@#PSR
                        BEQ     .-6
                        MOV     CMND,PBR
MONA:                   CMP     #'P,CMND        ;IS IT A PARAMETER CHANGE?
                        BEQ     PCHNG           ;YES!
                        CMP     #'S,CMND        ;IS IT A STOP?
                        BEQ     STOP            ;YES!
                        CMP     #'C,CMND        ;IS IT A CONTINUE?
                        BEQ     CONU            ;YES!
                        CMP     #'R,CMND        ;IS IT A RETURN?
                        BEQ     RETURN          ;YES!
                        ILLCMD:
                        MOV     #ILMES,R4
                        JSR     R5,PRINT
                        BIT     #200,@#KBS
                        BEQ     .-6
                        JMP     MON             ;BETTER LUCK NEXT TIME!
                        STOP:
                        BIT     #200,@#KBS
                        BEQ     .-6
                        JMP     MON             ;GOT IT!
CONU:                   BIS     #100,KBS        ;ENABLE PI
                        RTI                     ;CONTINUE TESTING
```

```
1796  007412  016700  000034          RETURN: MOV     STRO,R0         ;RESTORE R0
1797  007416  022626                  CMP     (SP)+,(SP)+     ;POP THIS INTERRUPT OFF THE STACK
1798  007420  005046                  CLR     -(SP)
1799  007422  012746  007430          MOV     #1$,-(SP)
1800  007426  000002                  RTI
1801  007430  000205          1$:     RTS     R5              ;RETURN FROM ERROR
1802  007432  022626          PCHNG:  CMP     (SP)+,(SP)+     ;POP THIS INTERUPT OFF THE STACK
1803  007434  005046                  CLR     -(SP)
1804  007436  012746  007444          MOV     #1$,-(SP)
1805  007442  000002                  RTI
1806  007444  000177  000000  1$:     JMP     @PARCHN         ;GO GET NEW PARAMETERS
1807  007450  000000          PARCHN: 000                     ;PARAMETER CHANGE RETURN ADDRESS
1808  007452  000000          STRO:   000                     ;R0 STORAGE
1809  007454  000000          REG1:   000                     ;REGISTER 1 ADDRESS
1810  007456  000000          REG1D:  000                     ;REGISTER 1 STATIC DATA
1811  007460  000000          REG2:   000                     ;REGISTER 2 ADDRESS
1812  007462  000000          REG2D:  000                     ;REGISTER 2 STATIC DATA
1813  007464  000000          REG3:   000                     ;REGISTER 3 ADDRESS
1814  007466  000000          REG3D:  000                     ;REGISTER 3 STATIC DATA
1815  007470  000000          CMND:   000                     ;COMMAND STORAGE
1816  007472  010067  177754  ECOMP:  MOV     R0,STRO         ;SAVE R0
1817  007476  012567  000130          MOV     (R5)+,ET        ;STORE ERROR TYPE
1818  007502  012704  013555          MOV     #EMES1,R4
1819  007506  004567  003400          JSR     R5,PRINT
1820  007512  012567  003254          MOV     (R5)+,ADDRS     ;TYPE ERROR NUMBER
1821  007516  004567  003252          JSR     R5,OCTAS
1822  007522  004567  003540          JSR     R5,PRINTS
1823  007526  022737  007224  000042  CMP     #$ENDAD,@#42
1824  007534  001001                  BNE     1$              ;BR IF NO
1825  007536  000000                  HALT
1826  007540  022767  000005  000064  1$:     CMP     #5,ET           ;WHAT TYPE ERROR IS IT?
1827  007546  001436                  BEQ     ETYP5P          ;IT'S A TYPE 5
1828  007550  100413                  BMI     2$              ;IT'S GREATER THAN 5
1829  007552  022767  000003  000052          CMP     #3,ET           ;IS IT A 3?
1830  007560  001425                  BEQ     ETYP3P          ;YES!
1831  007562  100426                  BMI     ETYP4P          ;MUST BE A TYPE 4
1832  007564  022767  000001  000040          CMP     #1,ET           ;IS IT A 1?
1833  007572  001436                  BEQ     ETYP1           ;YES!
1834  007574  000167  000260          JMP     ETYP2           ;MUST BE A TYPE 2 AT THIS POINT
1835  007600  022767  000007  000024  2$:     CMP     #7,ET           ;IS IT A 7?
1836  007606  001422                  BEQ     ETYP7P          ;YES!
1837  007610  100402                  BMI     3$              ;MUST BE AN 8 OR 9
1838  007612  000167  000032          JMP     ETYP6P          ;IT'S A TYPE 6
1839  007616  022767  000010  000006  3$:     CMP     #10,ET          ;IS IT A TYPE 8?
1840  007624  001415                  BEQ     ETYP8P          ;YES IT IS!
1841  007626  000167  000032          JMP     ETYP9P          ;MUST BE A 9 CAUSE THAT'S ALL SHE WROTE!
1842  007632  000000          ET:     000                     ;ERROR TYPE STORAGE
1843  007634  000167  000452  ETYP3P: JMP     ETYP3
1844  007640  000167  000752  ETYP4P: JMP     ETYP4
1845  007644  000167  001442  ETYP5P: JMP     ETYP5
1846  007650  000167  001574  ETYP6P: JMP     ETYP6
1847  007654  000167  001766- ETYP7P: JMP     ETYP7
1848  007660  000167  002206  ETYP8P: JMP     ETYP8
1849  007664  000167  002334  ETYP9P: JMP     ETYP9
1850  007670  012767  007670  177552  ETYP1:  MOV     #ETYP1,PARCHN   ;LOAD PARAMETER RETURN
1851  007676  012704  013642          MOV     #EMES4,R4
```

```
 1852  007702  004567  003204                  JSR     R5,PRINT
 1853  007706  017767  170674  003056          MOV     @MQ,ADDRS
 1854  007714  004567  003054                  JSR     R5,OCTAS
 1855  007720  004567  003224                  JSR     R5,PRINT1
 1856  007724  017767  170654  003040          MOV     @AC,ADDRS
 1857  007732  004567  003036                  JSR     R5,OCTAS
 1858  007736  004567  003206                  JSR     R5,PRINT1
 1859  007742  017767  170644  003022          MOV     @SC,ADDRS
 1860  007750  004567  003020                  JSR     R5,OCTAS
 1861  007754  004567  003170                  JSR     R5,PRINT1
 1862  007760  012704  013304                  MOV     #AMES1,R4
 1863  007764  004567  003122                  JSR     R5,PRINT
 1864  007770  004567  002520                  JSR     R5,ASCAL        ;GET IT
 1865  007774  016767  002772  177452          MOV     ADDRS,REG1      ;SAVE IT
 1866  010002  012704  013766                  MOV     #IMES1,R4
 1867  010006  004567  003100                  JSR     R5,PRINT
 1868  010012  012704  014035                  MOV     #IMES2,R4
 1869  010016  004567  003070                  JSR     R5,PRINT
 1870  010022  005067  167534                  CLR     KBB             ;CLEAR BUFFER
 1871  010026  032737  000200  177560          BIT     #200,@#KBS
 1872  010034  001774                          BEQ     .-6
 1873  010036  005067  167520                  CLR     KBB             ;CLEAR BUFFER
 1874  010042  052767  000100  167510          BIS     #100,KBS        ;ENABLE PI
 1875  010050  016777  170550  177376  1$:     MOV     SFTSWR,@REG1    ;DO FUNCTION
 1876  010056  000774                          BR      1$
 1877
 1878  010060                          ETYP2:
 1879  010060  012704  013716                  MOV     #EMES5,R4
 1880  010064  004567  003022                  JSR     R5,PRINT
 1881  010070  016767  177356  002674          MOV     STRO,ADDRS
 1882  010076  004567  002672                  JSR     R5,OCTAS
 1883  010102  004567  003042                  JSR     R5,PRINT1
 1884  010106  012704  013565                  MOV     #EMES2,R4
 1885  010112  004567  002774                  JSR     R5,PRINT
 1886  010116  010167  002650                  MOV     R1,ADDRS
 1887  010122  004567  002646                  JSR     R5,OCTAS
 1888  010126  004567  003016                  JSR     R5,PRINT1
 1889  010132  012767  010140  177310          MOV     #ETYP2A,PARCHN  ;LOAD PARAMETER RETURN
 1890  010140                          ETYP2A:
 1891  010140  012704  013304                  MOV     #AMES1,R4
 1892  010144  004567  002742                  JSR     R5,PRINT
 1893  010150  004567  002340                  JSR     R5,ASCAL        ;GET IT
 1894  010154  016767  002612  177272          MOV     ADDRS,REG1      ;SAVE IT
 1895  010162  012704  013447                  MOV     #DMES1,R4
 1896  010166  004567  002720                  JSR     R5,PRINT
 1897  010172  004567  002316                  JSR     R5,ASCAL        ;GET IT
 1898  010176  016767  002570  177252          MOV     ADDRS,REG1D     ;SAVE IT
 1899  010204  012704  013345                  MOV     #AMES2,R4
 1900  010210  004567  002676                  JSR     R5,PRINT
 1901  010214  004567  002274                  JSR     R5,ASCAL        ;GET IT
 1902  010220  016767  002546  177232          MOV     ADDRS,REG2      ;SAVE IT
 1903  010226  012704  013766                  MOV     #IMES1,R4
 1904  010232  004567  002654                  JSR     R5,PRINT
 1905  010236  012704  014035                  MOV     #IMES2,R4
 1906  010242  004567  002644                  JSR     R5,PRINT
 1907  010246  005067  167310                  CLR     KBB             ;CLEAR BUFFER
```

```
 1908  010252  032737  000200  177560          BIT     #200,@#KBS
 1909  010260  001774                          BEQ     .-6
 1910  010262  005067  167274                  CLR     KBB             ;CLEAR BUFFER
```

```
 1911  010266  052767  000100  167264          BIS     #100,KBS          ;ENABLE PI
 1912  010274  016777  177156  177152  1$:     MOV     REG1D,@REG1       ;DO FUNCTION
 1913  010302  016777  170316  177150          MOV     SFTSWR,@REG2
 1914  010310  000771                          BR      1$
 1915  010312                          ETYP3:
 1916  010312  012704  013716                  MOV     #EMES5,R4
 1917  010316  004567  002570                  JSR     R5,PRINT
 1918  010322  016767  177124  002442          MOV     STRO,ADDRS
 1919  010330  004567  002440                  JSR     R5,OCTAS
 1920  010334  004567  002610                  JSR     R5,PRINT1
 1921  010340  012704  013565                  MOV     #EMES2,R4
 1922  010344  004567  002542                  JSR     R5,PRINT
 1923  010350  010167  002416                  MOV     R1,ADDRS
 1924  010354  004567  002414                  JSR     R5,OCTAS
 1925  010360  004567  002564                  JSR     R5,PRINT1
 1926  010364  012767  010372  177056          MOV     #ETYP3A,PARCHN    ;LOAD PARAMETER RETURN
```

```
1927  010372                          ETYP3A:
1928  010372  012704  013304                  MOV     #AMES1,R4
1929  010376  004567  002510                  JSR     R5,PRINT
1930  010402  004567  002106                  JSR     R5,ASCAL        ;GET IT
1931  010406  016767  002360  177040          MOV     ADDRS,REG1      ;SAVE IT
1932  010414  012704  013447                  MOV     #DMES1,R4
1933  010420  004567  002466                  JSR     R5,PRINT
1934  010424  004567  002064                  JSR     R5,ASCAL        ;GET IT
1935  010430  016767  002336  177020          MOV     ADDRS,REG1D     ;SAVE IT
1936  010436  012704  013345                  MOV     #AMES2,R4
1937  010442  004567  002444                  JSR     R5,PRINT
1938  010446  004567  002042                  JSR     R5,ASCAL        ;GET IT
1939  010452  016767  002314  177000          MOV     ADDRS,REG2      ;SAVE IT
1940  010460  012704  013447                  MOV     #DMES1,R4
1941  010464  004567  002422                  JSR     R5,PRINT
1942  010470  004567  002020                  JSR     R5,ASCAL        ;GET IT
1943  010474  016767  002272  176760          MOV     ADDRS,REG2D     ;SAVE IT
1944  010502  012704  013406                  MOV     #AMES3,R4
1945  010506  004567  002400                  JSR     R5,PRINT
1946  010512  004567  001776                  JSR     R5,ASCAL        ;GET IT
1947  010516  016767  002250  176740          MOV     ADDRS,REG3      ;SAVE IT
1948  010524  012704  013766                  MOV     #IMES1,R4
1949  010530  004567  002356                  JSR     R5,PRINT
1950  010534  012704  014035                  MOV     #IMES2,R4
1951  010540  004567  002346                  JSR     R5,PRINT
1952  010544  005067  167012                  CLR     KBB             ;CLEAR BUFFER
1953  010550  032737  000200  177560          BIT     #200,@#KBS
1954  010556  001774                          BEQ     .-6
1955  010560  005067  166776                  CLR     KBB             ;CLEAR BUFFER
1956  010564  052767  000100  166766          BIS     #100,KBS        ;ENABLE PI
1957  010572  016777  176660  176654  1$:     MOV     REG1D,@REG1     ;DO FUNCTION
1958  010600  016777  176656  176652          MOV     REG2D,@REG2
1959  010606  016777  170012  176650          MOV     SFTSWR,@REG3
1960  010614  000766                          BR      1$
1961  010616                          ETYP4:
1962  010616  012704  013716                  MOV     #EMES5,R4
1963  010622  004567  002264                  JSR     R5,PRINT
1964  010626  010067  002140                  MOV     R0,ADDRS
1965  010632  004567  002136                  JSR     R5,OCTAS
1966  010636  004567  002306                  JSR     R5,PRINT1
1967  010642  012704  013571                  MOV     #EMES3,R4
1968  010646  004567  002240                  JSR     R5,PRINT
1969  010652  016767  174344  002112          MOV     PMQ,ADDRS
1970  010660  004567  002110                  JSR     R5,OCTAS
1971  010664  004567  002260                  JSR     R5,PRINT1
1972  010670  016767  174330  002074          MOV     PAC,ADDRS
1973  010676  004567  002072                  JSR     R5,OCTAS
1974  010702  004567  002242                  JSR     R5,PRINT1
1975  010706  016767  174314  002056          MOV     PASH,ADDRS
1976  010714  004567  002054                  JSR     R5,OCTAS
1977  010720  004567  002224                  JSR     R5,PRINT1
1978  010724  016767  174300  002040          MOV     ACCP,ADDRS
1979  010732  004567  002036                  JSR     R5,OCTAS
1980  010736  004567  002206                  JSR     R5,PRINT1
1981  010742  016767  174264  002022          MOV     MQCP,ADDRS
1982  010750  004567  002020                  JSR     R5,OCTAS
```

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1983  010754  004567  002170                  JSR     R5,PRINT1
1984  010760  016767  174250  002004          MOV     SRCP,ADDRS
1985  010766  004567  002002                  JSR     R5,OCTAS
1986  010772  004567  002152                  JSR     R5,PRINT1
1987  010776  012704  013642                  MOV     #EMES4,R4
1988  011002  004567  002104                  JSR     R5,PRINT
1989  011006  017767  167574  001756          MOV     @MQ,ADDRS
1990  011014  004567  001754                  JSR     R5,OCTAS
1991  011020  004567  002124                  JSR     R5,PRINT1
1992  011024  017767  167554  001740          MOV     @AC,ADDRS
1993  011032  004567  001736                  JSR     R5,OCTAS
1994  011036  004567  002106                  JSR     R5,PRINT1
1995  011042  017767  167544  001722          MOV     @SC,ADDRS
1996  011050  004567  001720                  JSR     R5,OCTAS
1997  011054  004567  002070                  JSR     R5,PRINT1
1998  011060  012767  011066  176362          MOV     #ETYP4A,PARCHN  ;LOAD PARAMETER RETURN
1999  011066                  ETYP4A:
2000  011066  012704  013304                  MOV     #AMES1,R4
2001  011072  004567  002014                  JSR     R5,PRINT
2002  011076  004567  001412                  JSR     R5,ASCAL        ;GET IT
2003  011102  016767  001664  176344          MOV     ADDRS,REG1      ;SAVE IT
2004  011110  012704  013447                  MOV     #DMES1,R4
2005  011114  004567  001772                  JSR     R5,PRINT
2006  011120  004567  001370                  JSR     R5,ASCAL        ;GET IT
2007  011124  016767  001642  176324          MOV     ADDRS,REG1D     ;SAVE IT
2008  011132  012704  013345                  MOV     #AMES2,R4
2009  011136  004567  001750                  JSR     R5,PRINT
2010  011142  004567  001346                  JSR     R5,ASCAL        ;GET IT
2011  011146  016767  001620  176304          MOV     ADDRS,REG2      ;SAVE IT
2012  011154  012704  013447                  MOV     #DMES1,R4
2013  011160  004567  001726                  JSR     R5,PRINT
2014  011164  004567  001324                  JSR     R5,ASCAL        ;GET IT
2015  011170  016767  001576  176264          MOV     ADDRS,REG2D     ;SAVE IT
2016  011176  012704  013406                  MOV     #AMES3,R4
2017  011202  004567  001704                  JSR     R5,PRINT
2018  011206  004567  001302                  JSR     R5,ASCAL        ;GET IT
2019  011212  016767  001554  176244          MOV     ADDRS,REG3      ;SAVE IT
2020  011220  012704  013766                  MOV     #IMES1,R4
2021  011224  004567  001662                  JSR     R5,PRINT
2022  011230  012704  014035                  MOV     #IMES2,R4
2023  011234  004567  001652                  JSR     R5,PRINT
2024  011240  005067  166316                  CLR     KBB             ;CLEAR BUFFER
2025  011244  032737  000200  177560          BIT     #200,@#KBS
2026  011252  001774                          BEQ     .-6
2027  011254  005067  166302                  CLR     KBB             ;CLEAR BUFFER
2028  011260  052767  000100  166272          BIS     #100,KBS        ;ENABLE PI
2029  011266  016777  176164  176160  1$:     MOV     REG1D,@REG1     ;DO FUNCTION
2030  011274  016777  176162  176156          MOV     REG2D,@REG2
2031  011302  016777  167316  176154          MOV     SFTSWR,@REG3
2032  011310  000766                          BR      1$
2033  011312  012767  011312  176130  ETYP5:  MOV     #ETYP5,PARCHN   ;LOAD PARAMETER RETURN
2034  011320  012704  013474                  MOV     #DMES2,R4
2035  011324  004567  001562                  JSR     R5,PRINT
2036  011330  004567  001160                  JSR     R5,ASCAL                ;GET IT
2037  011334  016767  001432  176114          MOV     ADDRS,REG1D             ;SAVE IT
2038  011342  012704  013514                  MOV     #DMES3,R4
```

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2039  011346  004567  001540                    JSR     R5,PRINT
2040  011352  004567  001136                    JSR     R5,ASCAL        ;GET IT
2041  011356  016767  001410  176076            MOV     ADDRS,REG2D     ;SAVE IT
2042  011364  012704  014035                    MOV     #IMES2,R4
2043  011370  004567  001516                    JSR     R5,PRINT
2044  011374  005067  166162                    CLR     KBB             ;CLEAR BUFFER
2045  011400  032737  000200  177560            BIT     #200,@#KBS
2046  011406  001774                            BEQ     .-6
2047  011410  005067  166146                    CLR     KBB             ;CLEAR BUFFER
2048  011414  052767  000100  166136            BIS     #100,KBS        ;ENABLE PI
2049  011422  105077  167166          1$:       CLRB    @SR             ;CLEAR SR
2050  011426  005077  167154                    CLR     @MQ             ;CLEAR MQ
2051  011432  016777  176020  167144            MOV     REG1D,@AC       ;LOAD AC
2052  011440  016777  176016  167134            MOV     REG2D,@DIV      ;LOAD DIV
2053  011446  000765                            BR      1$
2054  011450  012767  011450  175772  ETYP6:    MOV     #ETYP6,PARCHN   ;LOAD PARAMETER RETURN
2055  011456  012704  013535                    MOV     #DMES4,R4
2056  011462  004567  001424                    JSR     R5,PRINT
2057  011466  004567  001022                    JSR     R5,ASCAL        ;GET IT
2058  011472  016767  001274  175762            MOV     ADDRS,REG2D     ;SAVE IT
2059  011500  012704  013304                    MOV     #AMES1,R4
2060  011504  004567  001402                    JSR     R5,PRINT
2061  011510  004567  001000                    JSR     R5,ASCAL        ;GET IT
2062  011514  016767  001252  175732            MOV     ADDRS,REG1      ;SAVE IT
2063  011522  012704  013447                    MOV     #DMES1,R4
2064  011526  004567  001360                    JSR     R5,PRINT
2065  011532  004567  000756                    JSR     R5,ASCAL        ;GET IT
2066  011536  016767  001230  175712            MOV     ADDRS,REG1D     ;SAVE IT
2067  011544  012704  014035                    MOV     #IMES2,R4
2068  011550  004567  001336                    JSR     R5,PRINT
2069  011554  005067  166002                    CLR     KBB             ;CLEAR BUFFER
2070  011560  032737  000200  177560            BIT     #200,@#KBS
2071  011566  001774                            BEQ     .-6
2072  011570  005067  165766                    CLR     KBB             ;CLEAR BUFFER
2073  011574  052767  000100  165756            BIS     #100,KBS        ;ENABLE PI
2074  011602  105077  167006          1$:       CLRB    @SR             ;CLEAR SR
2075  011606  005077  166772                    CLR     @AC             ;CLEAR AC
2076  011612  012767  000016  000024            MOV     #16,CYCNT       ;SET CYCLE COUNTER
2077  011620  016777  175636  166760            MOV     REG2D,@MQ       ;LOAD MQ
2078  011626  016777  175624  175620  2$:       MOV     REG1D,@REG1
2079  011634  005367  000004                    DEC     CYCNT           ;FOURTEEN CYCLES?
2080  011640  100760                            BMI     1$              ;YES!
2081  011642  000771                            BR      2$              ;NO!
2082  011644  000000                  CYCNT:    000                     ;CYCLE COUNTER
2083  011646  012767  011646  175574  ETYP7:    MOV     #ETYP7,PARCHN   ;LOAD PARAMETER RETURN
2084  011654  012704  013535                    MOV     #DMES4,R4
2085  011660  004567  001226                    JSR     R5,PRINT
2086  011664  004567  000624                    JSR     R5,ASCAL        ;GET IT
2087  011670  016767  001076  175560            MOV     ADDRS,REG1D     ;SAVE IT
2088  011676  012704  013447                    MOV     #DMES1,R4
2089  011702  004567  001204                    JSR     R5,PRINT
2090  011706  004567  000602                    JSR     R5,ASCAL        ;GET IT
2091  011712  016767  001054  175542            MOV     ADDRS,REG2D     ;SAVE IT
2092  011720  012704  014035                    MOV     #IMES2,R4
2093  011724  004567  001162                    JSR     R5,PRINT
2094  011730  005067  165626                    CLR     KBB             ;CLEAR BUFFFER
```

```
2095  011734  032737  000200  177560          BIT     #200,@#KBS
2096  011742  001774                          BEQ     .-6
2097  011744  005067  165612                  CLR     KBB             ;CLEAR BUFFER
2098  011750  052767  000100  165602          BIS     #100,KBS        ;ENABLE PI
2099  011756  005077  166622          1$:     CLR     @AC             ;CLEAR AC
2100  011762  105077  166626                  CLRB    @SR             ;CLEAR  SR
2101  011766  016777  175464  166612          MOV     REG1D,@MQ       ;LOAD MQ
2102  011774  016777  175462  166606          MOV     REG2D,@MUL      ;DO FUNCTION
2103  012002  016777  175454  166572          MOV     REG2D,@DIV
2104  012010  016777  175446  166572          MOV     REG2D,@MUL
2105  012016  016777  175440  166556          MOV     REG2D,@DIV
2106  012024  016777  175432  166556          MOV     REG2D,@MUL
2107  012032  016777  175424  166542          MOV     REG2D,@DIV
2108  012040  016777  175416  166542          MOV     REG2D,@MUL
2109  012046  016777  175410  166526          MOV     REG2D,@DIV
2110  012054  016777  175402  166526          MOV     REG2D,@MUL
2111  012062  016777  175374  166512          MOV     REG2D,@DIV
2112  012070  000732                          BR      1$
2113  012072  012767  012072  175350  ETYP8:  MOV     #ETYP8,PARCHN   ;LOAD PARAMETER RETURN
2114  012100  012704  013535                  MOV     #DMES4,R4
2115  012104  004567  001002                  JSR     R5,PRINT
2116  012110  004567  000400                  JSR     R5,ASCAL        ;GET IT
2117  012114  016767  000652  175334          MOV     ADDRS,REG1D     ;SAVE IT
2118  012122  012704  013447                  MOV     #DMES1,R4
2119  012126  004567  000760                  JSR     R5,PRINT
2120  012132  004567  000356                  JSR     R5,ASCAL        ;GET IT
2121  012136  016767  000630  175316          MOV     ADDRS,REG2D     ;SAVE IT
2122  012144  012704  014035                  MOV     #IMES2,R4
2123  012150  004567  000736                  JSR     R5,PRINT
2124  012154  005067  165402                  CLR     KBB             ;CLEAR BUFFER
2125  012160  032737  000200  177560          BIT     #200,@#KBS
2126  012166  001774                          BEQ     .-6
2127  012170  005067  165366                  CLR     KBB             ;CLEAR BUFFER
2128  012174  052767  000100  165356          BIS     #100,KBS        ;ENABLE PI
2129  012202  005077  166376          1$:     CLR     @AC             ;CLEAR AC
2130  012206  016700  166374                  MOV     MQ,R0           ;SET POINTER
2131  012212  016720  175240                  MOV     REG1D,(R0)+     ;LOAD MQ
2132  012216  016710  175240                  MOV     REG2D,(R0)      ;LOAD MUL
2133  012222  000767                          BR      1$
2134  012224  012767  012224  175216  ETYP9:  MOV     #ETYP9,PARCHN   ;LOAD PARAMETER RETURN
2135  012232  012704  013535                  MOV     #DMES4,R4
2136  012236  004567  000650                  JSR     R5,PRINT
2137  012242  004567  000246                  JSR     R5,ASCAL        ;GET IT
2138  012246  016767  000520  175202          MOV     ADDRS,REG1D     ;SAVE IT
2139  012254  012704  013474                  MOV     #DMES2,R4
2140  012260  004567  000626                  JSR     R5,PRINT
2141  012264  004567  000224                  JSR     R5,ASCAL        ;GET IT
2142  012270  016767  000476  175164          MOV     ADDRS,REG2D     ;SAVE IT
2143  012276  012704  013514                  MOV     #DMES3,R4
2144  012302  004567  000604                  JSR     R5,PRINT
2145  012306  004567  000202                  JSR     R5,ASCAL        ;GET IT
2146  012312  016767  000454  175146          MOV     ADDRS,REG3D     ;SAVE IT
2147  012320  012704  014035                  MOV     #IMES2,R4
2148  012324  004567  000562                  JSR     R5,PRINT
2149  012330  005067  165226                  CLR     KBB             ;CLEAR BUFFER
2150  012334  032737  000200  177560          BIT     #200,@#KBS
```

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2151  012342  001774                          BEQ     .-6
2152  012344  005067  165212                  CLR     KBB             ;CLEAR BUFFER
2153  012350  052767  000100  165202          BIS     #100,KBS        ;ENABLE PI
2154  012356  016700  166224          1$:     MOV     MQ,R0           ;SET POINTER
2155  012362  016710  175070                  MOV     REG1D,(R0)      ;LOAD MQ
2156  012366  016740  175070                  MOV     REG2D,-(R0)     ;LOAD AC
2157  012372  016740  175070                  MOV     REG3D,-(R0)     ;LOAD DIV
2158  012376  000767                          BR      1$
2159  012400                          ILLAD:
2160  012400  012704  014135                  MOV     #ILLMES,R4
2161  012404  004567  000502                  JSR     R5,PRINT
2162  012410  011667  000356                  MOV     (SP),ADDRS
2163  012414  004567  000354                  JSR     R5,OCTAS
2164  012420  004567  000524                  JSR     R5,PRINT1
2165  012424                          ILLAD1:
2166  012424  012704  013722                  MOV     #EMES6,R4
2167  012430  004567  000456                  JSR     R5,PRINT
2168  012434  004567  000054                  JSR     R5,ASCAL        ;GET IT
2169  012440  016767  000326  175006          MOV     ADDRS,REG1      ;SAVE IT
2170  012446  012767  012510  165330          MOV     #ILLAD3,4       ;SET UP RETURN
2171  012454  012767  012424  174766          MOV     #ILLAD1,PARCHN
2172  012462  012705  001000                  MOV     #INIT,R5
2173  012466  005067  165070                  CLR     KBB
2174  012472  012767  000100  165060          MOV     #100,KBS
2175  012500  005777  174750          ILLAD2: TST     @REG1           ;REFERENCE THE FAILING ADDRESS
2176  012504  000240                          NOP
2177  012506  000774                          BR      ILLAD2          ;TRY AGAIN
2178  012510  022626                  ILLAD3: CMP     (SP)+,(SP)+     ;NO POP THE STACK AND CONTINUE
2179  012512  000772                          BR      ILLAD2
2180  012514  005067  000246          ASCAL:  CLR     CFLG
2181  012520  005067  000246                  CLR ADDRS
2182  012524                          ASCAL1:
2183  012524  032737  000200  177560          BIT     #200,@#KBS
2184  012532  001774                          BEQ     .-6
2185  012534  013700  177562                  MOV @#KBB,R0
2186  012540  022700  000215          ASCAL2: CMP     #215,R0
2187  012544  001461                          BEQ     ASCAL3
2188  012546  022700  000212                  CMP     #212,R0
2189  012552  001456                          BEQ     ASCAL3
2190  012554  022700  000377                  CMP     #377,R0 ;CHARACTER RUBOUT
2191  012560  001027                          BNE     ASCALA
2192  012562  016767  000204  000172          MOV     ADDRS,ECHO
2193  012570  042767  177770  000164          BIC     #177770,ECHO
2194  012576  052767  000260  000156          BIS     #260,ECHO
2195  012604  032737  000200  177564          BIT     #200,@#PSR
2196  012612  001774                          BEQ     .-6
2197  012614  016737  000142  177566          MOV     ECHO,@#PBR
2198  012622  006267  000144                  ASR     ADDRS
2199  012626  006267  000140                  ASR     ADDRS
2200  012632  006267  000134                  ASR     ADDRS
2201  012636  000732                          BR      ASCAL1
2202  012640                          ASCALA:
2203  012640  032737  000200  177564          BIT     #200,@#PSR
2204  012646  001774                          BEQ     .-6
2205  012650  005267  000112                  INC     CFLG
2206  012654  010037  177566                  MOV R0,@#PBR
```

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2207  012660  042700  177760                    BIC #177760,R0
2208  012664  006367  000102                    ASL ADDRS
2209  012670  006367  000076                    ASL ADDRS
2210  012674  006367  000072                    ASL ADDRS
2211  012700  050067  000066                    BIS R0,ADDRS
2212  012704  000167  177614                    JMP ASCAL1
2213  012710  010067  000054          ASCAL3:   MOV     R0,MODCMP
2214  012714  032737  000200  177564            BIT     #200,@#PSR
2215  012722  001774                            BEQ     .-6
2216  012724  012737  000012  177566            MOV #12,@#PBR
2217  012732  032737  000200  177564            BIT     #200,@#PSR
2218  012740  001774                            BEQ     .-6
2219  012742  012737  000015  177566            MOV     #15,@#PBR
2220  012750  032737  000200  177564            BIT     #200,@#PSR
2221  012756  001774                            BEQ     .-6
2222  012760  000205                            RTS R5
2223  012762  000000          ECHO:     000
2224  012764  000000          AFLG:     000
2225  012766  000000          CFLG:     000
2226  012770  000000          MODCMP:   000
2227  012772  000000          ADDRS:    0
2228  012774  005067  000106  OCTAS:    CLR DIGCNT
2229  013000  012704  013302            MOV #STPLST,R4
2230  013004  022767  000006  000074    CMP #6,DIGCNT
2231  013012  001434                    BEQ OCTAS3
2232  013014  016767  177752  000066    MOV ADDRS,WORK
2233  013022  022767  000001  000056    CMP #1,DIGCNT
2234  013030  001003                    BNE OCTAS2
2235  013032  042767  160000  177732    BIC #160000,ADDRS
2236  013040  042767  177770  000042    BIC #177770,WORK
2237  013046  052767  000060  000034    BIS #60,WORK
2238  013054  116744  000030            MOVB WORK,-(R4)
2239  013060  006067  177706            ROR ADDRS
2240  013064  006067  177702            ROR ADDRS
2241  013070  006067  177676            ROR ADDRS
2242  013074  005267  000006            INC DIGCNT
2243  013100  000167  177700            JMP OCTAS1
2244  013104  000205          OCTAS3:   RTS R5
2245  013106  000000          DIGCNT:   0
2246  013110  000000          WORK:     0
2247  013112                    PRINT:
2248  013112  032737  000200  177564            BIT     #200,@#PSR
2249  013120  001774                            BEQ     .-6
2250  013122  012737  000015  177566            MOV #15,@#PBR
2251  013130  032737  000200  177564            BIT     #200,@#PSR
2252  013136  001774                            BEQ     .-6
2253  013140  001774                            BEQ .-6
2254  013142  012737  000012  177566            MOV #12,@#PBR
2255  013150  122714  000046          PRINT1:   CMPB #'&,@R4
2256  013154  001434                            BEQ PRINT3
2257  013156  122714  000052                    CMPB    #'*,@R4
2258  013162  001401                            BEQ     1$
2259  013164  000420                            BR      PRINT2
2260  013166                            1$:
2261  013166  032737  000200  177564            BIT     #200,@#PSR
2262  013174  001774                            BEQ     .-6
```

```
2263  013176  012737  000015  177566          MOV     #15,@#PBR
2264  013204  032737  000200  177564          BIT     #200,@#PSR
2265  013212  001774                          BEQ     .-6
2266  013214  012737  000012  177566          MOV     #12,@#PBR
2267  013222  105724                          TSTB    (R4)+
2268  013224  000751                          BR      PRINT1
2269  013226                          PRINT2:
2270  013226  032737  000200  177564          BIT     #200,@#PSR
2271  013234  001774                          BEQ     .-6
2272  013236  112437  177566                  MOVB (R4)+,@#PBR
2273  013242  000167  177702                  JMP PRINT1
2274  013246                          PRINT3:
2275  013246  032737  000200  177564          BIT     #200,@#PSR
2276  013254  001774                          BEQ     .-6
2277  013256  012737  000040  177566    . .   MOV #40,@#PBR
2278  013264  000205                          RTS R5
2279  013266  105724                  PRINTS: TSTB    (R4)+
2280  013270  001776                          BEQ     PRINTS
2281  013272  000726                          BR      PRINT1
2282  013274     000     000     000  STLIST: .BYTE   0,0,0,0,0
2283  013277     000     000
2284  013301     000                  LISTDA: .BYTE   0
2285  013302  000046                  STPLST: '&
2286  013304  044127  052101  051447  AMES1:  .ASCII  /WHAT'S THE ADDRESS OF REGISTER1?&/
2287  013312  052040  042510  040440
2288  013320  042104  042522  051523
2289  013326  047440  020106  042522
2290  013334  044507  052123  051105
2291  013342  037461     046
2292  013345     127  040510  023524  AMES2:  .ASCII  /WHAT'S THE ADDRESS OF REGISTER2?&/
2293  013352  020123  044124  020105
2294  013360  042101  051104  051505
2295  013366  020123  043117  051040
2296  013374  043505  051511  042524
2297  013402  031122  023077
2298  013406  044127  052101  051447  AMES3:  .ASCII  /WHAT'S THE ADDRESS OF REGISTER3?&/
2299  013414  052040  042510  040440
2300  013422  042104  042522  051523
2301  013430  047440  020106  042522
2302  013436  044507  052123  051105
2303  013444  037463     046
2304  013447     124  050131  020105  DMES1:  .ASCII  /TYPE IN DATA PATTERN&/
2305  013454  047111  042040  052101
2306  013462  020101  040520  052124
2307  013470  051105  023116
2308  013474  040504  040524  043040  DMES2:  .ASCII  /DATA FOR AC IS?&/
2309  013502  051117  040440  020103
2310  013510  051511  023077
2311  013514  040504  040524  043040  DMES3:  .ASCII  /DATA FOR DIV IS?&/
2312  013522  051117  042040  053111
2313  013530  044440  037523     046
2314  013535     104  052101  020101  DMES4:  .ASCII  /DATA FOR MQ IS?&/
2315  013542  047506  020122  050515
2316  013550  044440  037523     046
2317  013555     105  051122  051117  EMES1:  .ASCII  /ERROR# &/
2318  013562  020043     046
```

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2319  013565     122  036461     046  EMES2:  .ASCII  /R1=&/
2320  013571     120  051101  046501  EMES3:  .ASCII  /PARAMETERS USED DURING THIS ERROR WERE:*&/
2321  013576  052105  051105  020123
2322  013604  051525  042105  042040
2323  013612  051125  047111  020107
2324  013620  044124  051511  042440
2325  013626  051122  051117  053440
2326  013634  051105  035105  023052
2327  013642  047503  052116  047105  EMES4:  .ASCII  /CONTENTS OF MQ,AC,SR AND SC AT ERROR WERE:*&/
2328  013650  051524  047440  020106
2329  013656  050515  040454  026103
2330  013664  051123  040440  042116
2331  013672  051440  020103  052101
2332  013700  042440  051122  051117
2333  013706  053440  051105  035105
2334  013714  023052
2335  013716  030122  023075          EMES5:  .ASCII  /R0=&/
2336  013722  054524  042520  044440  EMES6:  .ASCII  /TYPE IN THE FAILING ADDRESS&/
2337  013730  020116  044124  020105
2338  013736  040506  046111  047111
2339  013744  020107  042101  051104
2340  013752  051505  023123
2341  013756  040505  020105  045517  ENMES:  .ASCII  /EAE OK!&/
2342  013764  023041
2343  013766  051123  053440  046111  IMES1:  .ASCII  /SR WILL HOLD THE VARIABLE DATA PATTERN&/
2344  013774  020114  047510  042114
2345  014002  052040  042510  053040
2346  014010  051101  040511  046102
2347  014016  020105  040504  040524
2348  014024  050040  052101  042524
2349  014032  047122     046
2350  014035     120  042522  051523  IMES2:  .ASCII  /PRESS ANY TTY KEY WHEN READY&/
2351  014042  040440  054516  052040
2352  014050  054524  045440  054505
2353  014056  053440  042510  020116
2354  014064  042522  042101  023131
2355  014072  046111  042514  040507  ILMES:  .ASCII  /ILLEGAL COMMAND!! S,C,R OR P ONLY!&/
2356  014100  020114  047503  046515
2357  014106  047101  020504  020041
2358  014114  026123  026103  020122
2359  014122  051117  050040  047440
2360  014130  046116  020531     046
2361  014135     111  046114  043505  ILLMES: .ASCII  /ILLEGAL ADDRESS REFERENCE AT PC&/
2362  014142  046101  040440  042104
2363  014150  042522  051523  051040
2364  014156  043105  051105  047105
2365  014164  042503  040440  020124
2366  014172  041520     046
2367  014175     124  050131  020105  INMS1:  .ASCII  /TYPE IN SWITCH OPTIONS&/
2368  014202  047111  051440  044527
2369  014210  041524  020110  050117
2370  014216  044524  047117  023123
2371                          .EVEN
2372                          ;TABLES
2373
2374  014224  000000          TBLA1:  000     ;PMQ
```

```
 2375  014226  000000                          000     ;PAC
 2376  014230  177760                          -16.    ;PASH/PMUL/PDIV
 2377  014232  000000                          000     ;ACCP
 2378  014234  000000                          000     ;MQCP
 2379  014236  000036                          36      ;SRCP
 2380  014240  000000                TBLA2:    000
 2381  014242  177777                          -1
 2382  014244  177760                          -16.
 2383  014246  177777                          -1
 2384  014250  177777                          -1
 2385  014252  000342                          342
 2386  014254  000000                TBLA3:    000
 2387  014256  125252                          125252
 2388  014260  177760                          -16.
 2389  014262  177777                          -1
 2390  014264  125252                          125252
 2391  014266  000342                          342
 2392  014270  000000                TBLA4:    000
 2393  014272  052525                          52525
 2394  014274  177760                          -16.
 2395  014276  000000                          000
 2396  014300  052525                          52525
 2397  014302  000022                          22
 2398  014304  000000                TBLA5:    000
 2399  014306  100000                          100000
 2400  014310  177740                          -32.
 2401  014312  177777                          -1
 2402  014314  177777                          -1
 2403  014316  000343                          343
 2404  014320  000000                TBLA6:    000
 2405  014322  000000                          000
 2406  014324  000020                          16.
 2407  014326  000000                          000
 2408  014330  000000                          000
 2409  014332  000036                          36
 2410  014334  177777                TBLA7:    -1
 2411  014336  000000                          000
 2412  014340  000017                          15.
 2413  014342  077777                          77777
 2414  014344  100000                          100000
 2415  014346  000000                          000
 2416  014350  177777                TBLA8:    -1
 2417  014352  000000                          000
 2418  014354  000020                          16.
 2419  014356  077777                          77777
 2420  014360  000000                          000
 2421  014362  000211                          211
 2422  014364  177776                TBLA9:    -2
 2423  014366  100000                          100000
 2424  014370  000017                          15.
 2425  014372  177777                          -1
 2426  014374  000000                          000
 2427  014376  000150                          150
 2428  014400  125252                TBLA10:   125252
 2429  014402  000000                          000
 2430  014404  000017                          15.
```

```
 2431  014406  052525                        52525
 2432  014410  000000                        000
 2433  014412  000010                        10
 2434  014414  125252              TBLA11:   125252
 2435  014416  000000                        000
 2436  014420  000020                        16.
 2437  014422  025252                        25252
 2438  014424  000000                        000
 2439  014426  000211                        211
 2440  014430  052525              TBLA12:   52525
 2441  014432  000000                        000
 2442  014434  000020                        16.
 2443  014436  052525                        52525
 2444  014440  000000                        000
 2445  014442  000010                        10
 2446  014444  000000              TBLA13:   000
 2447  014446  177777                        -1
 2448  014450  000020                        16.
 2449  014452  100000                        100000
 2450  014454  000000                        000
 2451  014456  000110                        110
 2452  014460  000000              TBLB1:    000
 2453  014462  000000                        000
 2454  014464  000000                        000
 2455  014466  000000                        000
 2456  014470  000000                        000
 2457  014472  017037                        17037
 2458  014474  177777              TBLB2:    -1
 2459  014476  177777                        -1
 2460  014500  000000                        000
 2461  014502  140000                        140000
 2462  014504  000000                        000
 2463  014506  144036                        144036
 2464  014510  000000              TBLB3:    000
 2465  014512  177777                        -1
 2466  014514  000000                        000
 2467  014516  140000                        140000
 2468  014520  000000                        000
 2469  014522  144016                        144016
 2470  014524  000001              TBLB4:    1
 2471  014526  000000                        000
 2472  014530  000000                        000
 2473  014532  040000                        40000
 2474  014534  000000                        000
 2475  014536  004036                        4036
 2476  014540  000005              TBLB5:    5
 2477  014542  000000                        000
 2478  014544  000000                        000
 2479  014546  050000                        50000
 2480  014550  000000                        000
 2481  014552  004034                        4034
 2482  014554  000001              TBLB6:    1
 2483  014556  100000                        100000
 2484  014560  000000                        000
 2485  014562  100000                        100000
 2486  014564  000001                        1
```

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2487  014566  140000                        140000
2488  014570  125252              TBLB7:    125252
2489  014572  170000                        170000
2490  014574  000000                        000
2491  014576  100005                        100005
2492  014600  052520                        52520
2493  014602  140003                        140003
2494  014604  000000              TBLC1:    000
2495  014606  000000                        000
2496  014610  000000                        000
2497  014612  000000                        000
2498  014614  000000                        000
2499  014616  000036                        36
2500  014620  177777              TBLC2:    -1
2501  014622  000000                        000
2502  014624  000001                        1
2503  014626  177777                        -1
2504  014630  177777                        -1
2505  014632  000342                        342
2506  014634  125252              TBLC3:    125252
2507  014636  000000                        000
2508  014640  000002                        2
2509  014642  177777                        -1
2510  014644  052524                        52524
2511  014646  000340                        340
2512  014650  052525              TBLC4:    52525
2513  014652  000000                        000
2514  014654  000002                        2
2515  014656  000000                        000
2516  014660  125252                        125252
2517  014662  000020                        20
2518  014664  125252              TBLC5:    125252
2519  014666  000000                        000
2520  014670  040000                        40000
2521  014672  165252                        165252
2522  014674  100000                        100000
2523  014676  000300                        300
2524  014700  100000              TBLC6:    100000
2525  014702  000000                        000
2526  014704  100000                        100000
2527  014706  040000                        40000
2528  014710  000000                        000
2529  014712  000010                        10
2530  014714  177777              TBLD1:    -1
2531  014716  177777                        -1
2532  014720  000001                        1
2533  014722  000000                        000
2534  014724  177777                        -1
2535  014726  000320                        320
2536  014730  000000              TBLD2:    000
2537  014732  000000                        000
2538  014734  000001                        1
2539  014736  000000                        000
2540  014740  000000                        000
2541  014742  000036                        36
2542  014744  125252              TBLD3:    125252
```

```
 2543  014746  177777                          -1
 2544  014750  000002                          2
 2545  014752  000000                          000
 2546  014754  152525                          152525
 2547  014756  000320                          320
 2548  014760  052525              TBLD4:      52525
 2549  014762  000000                          00
 2550  014764  000002                          2
 2551  014766  000001                          1
 2552  014770  025252                          25252
 2553  014772  000000                          000
 2554  014774  177777              TBLD5:      -1
 2555  014776  177777                          -1
 2556  015000  177777                          -1
 2557  015002  000000                          000
 2558  015004  000001                          1
 2559  015006  000022                          22
 2560  015010  000000              TBLD6:      000
 2561  015012  025253                          25253
 2562  015014  125252                          125252
 2563  015016  000000                          000
 2564  015020  100000                          100000
 2565  015022  000320                          320
 2566  015024  000001              TBLD7:      1
 2567  015026  025253                          25253
 2568  015030  125252                          125252
 2569  015032  000001                          1
 2570  015034  100000                          100000
 2571  015036  000300                          300
 2572  015040  077777              TBLD8:      77777
 2573  015042  037777                          37777
 2574  015044  077777                          77777
 2575  015046  077776                          77776
 2576  015050  077777                          77777
 2577  015052  000000                          000
 2578  015054  100000              TBLD9:      100000
 2579  015056  000000                          000
 2580  015060  000002                          2
 2581  015062  000000                          000
 2582  015064  040000                          40000
 2583  015066  000022                          22
 2584  015070  100001              TBLD10:     100001
 2585  015072  000000                          000
 2586  015074  000002                          2
 2587  015076  000001                          1
 2588  015100  040000                          40000
 2589  015102  000000                          000
 2590  015104  037776              TBLD11:     37776
 2591  015106  020000                          20000
 2592  015110  077777                          77777
 2593  015112  077776                          77776
 2594  015114  040000                          40000
 2595  015116  000000                          000
 2596  015120  077777              TBLD12:     77777
 2597  015122  177777                          177777
 2598  015124  177776                          177776
```

```
2599  015126  177777                          177777
2600  015130  040000                          40000
2601  015132  000040                          40
2602  015134  100001                TBLD13:   100001
2603  015136  157777                          157777
2604  015140  100000                          100000
2605  015142  100001                          100001
2606  015144  040000                          40000
2607  015146  000000                          000
2608  015150  052525                TBLD14:   52525
2609  015152  000000                          000
2610  015154  052525                          52525
2611  015156  000000                          000
2612  015160  000001                          1
2613  015162  000022                          22
2614  015164  052524                TBLD15:   52524
2615  015166  000000                          000
2616  015170  052525                          52525
2617  015172  052524                          52524
2618  015174  000000                          000
2619  015176  000010                          10
2620  015200  000000                TBLD16:   000
2621  015202  000000                          000
2622  015204  125252                          125252
2623  015206  000000                          000
2624  015210  000000                          000
2625  015212  000036                          36
2626  .       000001                          .END
```

```
AC      000604          639#    652*    721*    722     737*    738     763*    764     772     780     794     808     816
                        824     863*    893     912*    931*    958*    960     975*    977     1004*   1049*   1051    1068*
                       1076    1097*   1099    1122*   1124    1147*   1149    1169*   1171    1194*   1196    1220*   1222
                       1253*   1255    1277*   1279    1299*   1301    1324*   1326    1349*   1351    1374*   1376    1411*
                       1413    1455*   1457    1497    1530    1550*   1558    1583*   1585    1630    1659    1696    1856
                       1992    2051*   2075*   2099*   2129*
ACCP    005230         1413    1441#   1457    1497    1585    1978
ADDRS   012772          660    1820*   1853*   1856*   1859*   1865    1881*   1886*   1894    1898    1902    1918*   1923*
                       1931    1935    1939    1943    1947    1964*   1969*   1972*   1975*   1978*   1981*   1984*   1989*
                       1992*   1995*   2003    2007    2011    2015    2019    2037    2041    2058    2062    2066    2087
                       2091    2117    2121    2138    2142    2146    2162*   2169    2181*   2192    2198*   2199*   2200*
                       2208*   2209*   2210*   2211*   2227#   2232    2235*   2239*   2240*   2241*
AFLG    012764         2224#
AMES1   013304         1862    1891    1928    2000    2059    2286#
AMES2   013345         1899    1936    2008    2292#
AMES3   013406         1944    2016    2298#
ASCAL   012514          659    1864    1893    1897    1901    1930    1934    1938    1942    1946    2002    2006    2010
                       2014    2018    2036    2040    2057    2061    2065    2086    2090    2116    2120    2137    2141
                       2145    2168    2180#
ASCALA  012640         2191    2202#
ASCAL1  012524         2182#   2201    2212
ASCAL2  012540         2186#
ASCAL3  012710         2187    2189    2213#
ASH     000622          646#   1412*
BEGIN   001006          651#
BG1     001060          662#   1754    1764
CC    = 177776          588#
CCNT    005220         1404*   1407*   1408    1435#   1448*   1451*   1452    1489*   1492*   1493    1576*   1579*   1580
CFLG    012766         2180*   2205*   2225#
CMND    007470         1771*   1772*   1775    1776    1778    1780    1782    1815#
CONU    007402         1781    1794#
CP1     001426          754#    762     765     769
CYCNT   011644         2076*   2079*   2082#
DIGCNT  013106         2228*   2230    2233    2242*   2245#
DIV     000602          638#   1523*   1551*   1584*   1644*   1645*   1646*   1647*   1648*   1649*   1650*   1651*   1652*
                       1653*   1654*   1655*   1656*   1657*   1680*   1682*   1684*   1686*   1688*   2052*   2103*   2105*
                       2107*   2109*   2111*
DMES1   013447         1895    1932    1940    2004    2012    2063    2088    2118    2304#
DMES2   013474         2034    2139    2308#
DMES3   013514         2038    2143    2311#
DMES4   013535         2055    2084    2114    2135    2314#
ECHO    012762         2192*   2193*   2194*   2197    2223#
ECOMP   007472          672     683     693     700     709     716     724     731     740     747     759     766     774
                        782     790     796     804     810     818     826     832     840     848     871     877     895
                        901     916     922     935     941     962     968     979     985    1008    1014    1027    1033
                       1053    1059    1072    1078    1101    1107    1113    1126    1132    1138    1151    1157    1163
                       1173    1179    1185    1198    1204    1210    1224    1230    1236    1257    1263    1269    1281
                       1287    1293    1303    1309    1315    1328    1334    1340    1353    1359    1365    1378    1384
                       1390    1415    1421    1427    1459    1465    1471    1499    1505    1511    1526    1534    1542
                       1554    1562    1570    1587    1593    1599    1626    1632    1638    1661    1667    1673    1692
                       1698    1704    1717    1723    1738    1744    1816#
EMES1   013555         1818    2317#
EMES2   013565         1884    1921    2319#
EMES3   013571         1967    2320#
EMES4   013642         1851    1987    2327#
EMES5   013716         1879    1916    1962    2335#
```

DZKEDA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
EMES6   013722          2166    2336#
ENMES   013756          1756    2341#
ET      007632          1817*   1826    1829    1832    1835    1839    1842#
ETYP1   007670          1833    1850#
ETYP2   010060          1834    1878#
ETYP2A  010140          1889    1890#
ETYP3   010312          1843    1915#
ETYP3A  010372          1926    1927#
ETYP3P  007634          1830    1843#
ETYP4   010616          1844    1961#
ETYP4A  011066          1998    1999#
ETYP4P  007640          1831    1844#
ETYP5   011312          1845    2033#
ETYP5P  007644          1827    1845#
ETYP6   011450          1846    2054#
ETYP6P  007650          1838    1846#
ETYP7   011646          1847    2083#
ETYP7P  007654          1836    1847#
ETYP8   012072          1848    2113#
ETYP8P  007660          1840    1848#
ETYP9   012224          1849    2134#
ETYP9P  007664          1841    1849#
FLAG    000626           632*    635*    648#    655
FLOP    003022          1022*   1025    1037*   1038*   1044#   1067*   1070    1082*
ILLAD   012400           650    2159#
ILLAD1  012424          2165#   2171
ILLAD2  012500          2175#   2177    2179
ILLAD3  012510          2170    2178#
ILLCMD  007342          1784#
ILLMES  014135          2160    2361#
ILMES   014072          1785    2355#
IMES1   013766          1866    1903    1948    2020    2343#
IMES2   014035          1868    1905    1950    2022    2042    2067    2092    2122    2147    2350#
INIT    001000           633     636     650#    2172
INMS1   014175           657    2367#
KBB   = 177562           584#   1771    1870*   1873*   1907*   1910*   1952*   1955*   2024*   2027*   2044*   2047*   2069*
                        2072*   2094*   2097*   2124*   2127*   2149*   2152*   2173*   2185
KBS   = 177560           583#   1770*   1787    1791    1794*   1871    1874*   1908    1911*   1953    1956*   2025    2028*
                        2045    2048*   2070    2073*   2095    2098*   2125    2128*   2150    2153*   2174*   2183
LISTDA  013301          2284#
LOOP    002102           866#    874     880     882
LOOP1   002170           890#    898     904     906
LSH     000620           645#    868*    892*    913*    932*    959*    976*   1005*   1024*   1050*   1069*   1098*   1123*
                        1148*   1170*   1195*   1221*   1254*   1278*   1300*   1325*   1350*   1375*
MODCMP  012770          2213*   2226#
MON     007242           629    1770#   1789    1793
MONA    007302          1776#
MQ      000606           640#    653*    690*    691     706*    707     756*    757     771*    779*    787*    788     801*
                         802     815*    823*    830     864*    869     911*    914     930*    933     957*   1003*   1006
                        1023*   1031    1048*   1096*   1105    1121*   1130    1146*   1155    1168*   1177    1193*   1202
                        1219*   1228    1252*   1261    1276*   1285    1298*   1307    1323*   1332    1348*   1357    1373*
                        1382    1410*   1419    1454*   1463    1495*   1503    1522*   1549*   1582*   1591    1608*   1624
                        1643*   1665    1678*   1690    1709    1729    1853    1989    2050*   2077*   2101*   2130    2154
MQCP    005232          1419    1442#   1463    1503    1591    1981
MUL     000610           641#   1496*   1609*   1610*   1611*   1612*   1613*   1614*   1615*   1616*   1617*   1618*   1619*
                        1620*   1621*   1622*   1679*   1681*   1683*   1685*   1687*   2102*   2104*   2106*   2108*   2110*
```

DZKEDA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
NOP    = 000240   587#
NOR       000616   644#  838   846  1456*
OCTAS     012774  1821  1854  1857  1860  1882  1887  1919  1924  1965  1970  1973  1976  1979
                  1982  1985  1990  1993  1996  2163  2228#
OCTAS1    013004  2230#  2243
OCTAS2    013040  2234  2236#
OCTAS3    013104  2231  2244#
PAC       005224  1411  1437#  1455  1583  1972
PARCHN    007450  1806  1807#  1850*  1889*  1926*  1998*  2033*  2054*  2083*  2113*  2134*  2171*
PASCNT    007240   661*  1751*  1752  1758*  1765#
PASH      005226  1412  1440#  1975
PBR    = 177566   586#  1775*  2197*  2206*  2216*  2219*  2250*  2254*  2263*  2266*  2272*  2277*
PC     =%000007   582#
PCHNG     007432  1777  1802#
PDIV      005226  1438#  1584
PMQ       005222  1405  1410  1436#  1449  1454  1490  1495  1577  1582  1969
PMUL      005226  1439#  1496
PRINT     013112   658  1757  1786  1819  1852  1863  1867  1869  1880  1885  1892  1896  1900
                  1904  1906  1917  1922  1929  1933  1937  1941  1945  1949  1951  1963  1968
                  1988  2001  2005  2009  2013  2017  2021  2023  2035  2039  2043  2056  2060
                  2064  2068  2085  2089  2093  2115  2119  2123  2136  2140  2144  2148  2161
                  2167  2247#
PRINTS    013266  1822  2279#  2280
PRINT1    013150  1855  1858  1861  1883  1888  1920  1925  1966  1971  1974  1977  1980  1983
                  1986  1991  1994  1997  2164  2255#  2268  2273  2281
PRINT2    013226  2259  2269#
PRINT3    013246  2256  2274#
PSR    = 177564   58!#  1773  2195  2203  2214  2217  2220  2248  2251  2261  2264  2270  2275
REG1      007454  1809#  1865*  1875*  1894*  1912*  1931*  1957*  2003*  2029*  2062*  2078*  2169*  2175
REG1D     007456  1810#  1898*  1912  1935*  1957  2007*  2029  2037*  2051  2066*  2078  2087*  2101
                  2117*  2131  2138*  2155
REG2      007460  1811#  1902*  1913*  1939*  1958*  2011*  2030*
REG2D     007462  1812#  1943*  1958  2015*  2030  2041*  2052  2058*  2077  2091*  2102  2103  2104
                  2105  2106  2107  2108  2109  2110  2111  2121*  2132  2142*  2156
REG3      007464  1813#  1947*  1959*  2019*  2031*
REG3D     007466  1814#  2146*  2157
RETURN    007412  1783  1796#
R0     =%000000   575#  928*  932  945*  973*  976  989*  990  1020*  1024  1039*  1040  1065*
                  1069  1085*  1086  1217*  1221  1240*  1241  1371*  1375  1394*  1395  1403*  1431*
                  1432  1446*  1475*  1476  1487*  1515*  1516  1574*  1603*  1604  1759*  1796*  1816
                  1964  2130*  2131*  2132*  2154*  2155*  2156*  2157*  2185*  2186  2188  2190  2206
                  2207*  2211  2213
R1     =%000001   576#  753*  754*  756  757  763  764  929*  933  947*  974*  977  993*
                  1021*  1031  1042*  1066*  1076  1088*  1218*  1222  1244*  1372*  1382  1398*  1402*
                  1406  1447*  1450  1488*  1491  1575*  1578  1886  1923
R2     =%000002   577#  1405*  1406*  1449*  1450*  1490*  1491*  1577*  1578*
R3     =%000003   578#
R4     =%000004   579#  657*  1756*  1785*  1818*  1851*  1862*  1866*  1868*  1879*  1884*  1891*  1895*
                  1899*  1903*  1905*  1916*  1921*  1928*  1932*  1936*  1940*  1944*  1948*  1950*  1962*
                  1967*  1987*  2000*  2004*  2008*  2012*  2016*  2020*  2022*  2034*  2038*  2042*  2055*
                  2059*  2063*  2067*  2084*  2088*  2092*  2114*  2118*  2122*  2135*  2139*  2143*  2147*
                  2160*  2166*  2229*  2238*  2255  2257  2267  2272  2279
R5     =%000005   580#  658*  659*  672*  683*  693*  700*  709*  716*  724*  731*  740*  747*
                  759*  766*  774*  782*  790*  796*  804*  810*  818*  826*  832*  840*  848*
                  871*  877*  895*  901*  916*  922*  935*  941*  962*  968*  979*  985*  1008*
                  1014*  1027*  1033*  1053*  1059*  1072*  1078*  1101*  1107*  1113*  1126*  1132*  1138*
```

D05

DZKEDA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
                    1151*  1157*  1163*  1173*  1179*  1185*  1198*  1204*  1210*  1224*  1230*  1236*  1257*
                    1263*  1269*  1281*  1287*  1293*  1303*  1309*  1315*  1328*  1334*  1340*  1353*  1359*
                    1365*  1378*  1384*  1390*  1415*  1421*  1427*  1459*  1465*  1471*  1499*  1505*  1511*
                    1526*  1534*  1542*  1554*  1562*  1570*  1587*  1593*  1599*  1626*  1632*  1638*  1661*
                    1667*  1673*  1692*  1698*  1704*  1717*  1723*  1738*  1744*  1757*  1786*  1801*  1817
                    1819*  1820   1821*  1822*  1852*  1854*  1855*  1857*  1858*  1860*  1861*  1863*  1864*
                    1867*  1869*  1880*  1882*  1883*  1885*  1887*  1888*  1892*  1893*  1896*  1897*  1900*
                    1901*  1904*  1906*  1917*  1919*  1920*  1922*  1924*  1925*  1929*  1930*  1933*  1934*
                    1937*  1938*  1941*  1942*  1945*  1946*  1949*  1951*  1963*  1965*  1966*  1968*  1970*
                    1971*  1973*  1974*  1976*  1977*  1979*  1980*  1982*  1983*  1985*  1986*  1988*  1990*
                    1991*  1993*  1994*  1996*  1997*  2001*  2002*  2005*  2006*  2009*  2010*  2013*  2014*
                    2017*  2018*  2021*  2023*  2035*  2036*  2039*  2040*  2043*  2056*  2057*  2060*  2061*
                    2064*  2065*  2068*  2085*  2086*  2089*  2090*  2093*  2115*  2116*  2119*  2120*  2123*
                    2136*  2137*  2140*  2141*  2144*  2145*  2148*  2161*  2163*  2164*  2167*  2168*  2172*
                    2222*  2244*  2278*
SC          000612   642#   669*   670    678*   679    687*   837*   845*   867*   891*  1469   1859   1995
SFTSWR      000624   647#   660*   855   1479   1875   1913   1959   2031
SP      =%000006   581#   651*   662*   663*  1797   1798*  1799*  1802   1803*  1804*  2162   2178
SR          000614   643#   698    714    729    745    875    899    920    939    966    983   1012   1025
                    1057   1070   1111   1136   1161   1183   1208   1234   1267   1291   1313   1338   1363
                    1388   1425   1509   1524*  1532*  1539*  1552*  1560*  1567*  1597   1636   1671   1702
                    2049*  2074*  2100*
SRCP        005234   1425   1443#  1469   1509   1597   1984
STLIST      013274   2282#
STOP        007366   1779   1790#
STPLST      013302   2229   2285#
STRO        007452   1796   1808#  1816*  1881   1918
TBLA1       014224   1402   2374#
TBLA10      014400   2428#
TBLA11      014414   2434#
TBLA12      014430   2440#
TBLA13      014444   2446#
TBLA2       014240   2380#
TBLA3       014254   2386#
TBLA4       014270   2392#
TBLA5       014304   2398#
TBLA6       014320   2404#
TBLA7       014334   2410#
TBLA8       014350   2416#
TBLA9       014364   2422#
TBLB1       014460   1447   2452#
TBLB2       014474   2458#
TBLB3       014510   2464#
TBLB4       014524   2470#
TBLB5       014540   2476#
TBLB6       014554   2482#
TBLB7       014570   2488#
TBLC1       014604   1488   2494#
TBLC2       014620   2500#
TBLC3       014634   2506#
TBLC4       014650   2512#
TBLC5       014664   2518#
TBLC6       014700   2524#
TBLD1       014714   1575   2530#
TBLD10      015070   2584#
TBLD11      015104   2590#
```

```
TBLD12  015120            2596#
TBLD13  015134            2602#
TBLD14  015150            2608#
TBLD15  015164            2614#
TBLD16  015200            2620#
TBLD2   014730            2536#
TBLD3   014744            2542#
TBLD4   014760            2548#
TBLD5   014774            2554#
TBLD6   015010            2560#
TBLD7   015024            2566#
TBLD8   015040            2572#
TBLD9   015054            2578#
TS1     001070             663    669#    675
TS10    002164             889#
TS11    002252             911#    919     925
TS11A   002334             928#
TS12    002436             948     957#    965     971
TS12A   002520             973#
TS13    002622             991    1003#   1011    1017
TS13A   002704            1020#
TS14    003024            1041    1048#   1056    1062
TS14A   003106            1065#
TS15    003234            1087    1096#   1104    1110    1116
TS15A   004004            1217#
TS16    004136            1242    1252#   1260    1266    1272
TS16A   004706            1371#
TS17    005040            1396    1402#
TS18    005236            1433    1446#
TS19    005430            1477    1487#
TS2     001116             678#    686
TS20    005600            1517    1522#   1529    1537    1545
TS20A   005700            1533    1538    1549#   1557    1565    1573
TS20B   006010            1561    1566    1574#
TS21    006166            1605    1608#   1629    1635    1641
TS22    006404            1643#   1664    1670    1676
TS23    006622            1678#   1695    1701    1707
TS24    007010            1709#   1720    1726
TS25    007072            1729#   1741    1747
TS3     001160             690#    696     703
TS4     001230             706#    712     719
TS5     001302             721#    727     734
TS6     001352             737#    743     750
TS7     001424             753#
TS8     001502             755     771#    777
TS9     002066             863#
WORK    013110            2232*   2236*   2237*   2238    2246#
SENDAD  007224             625    1762#   1823
SEND1   007234            1760    1764#
.     = 015214             591#    592     594     596     598     600     602     604     606     608     610     612     614
                           616     618     620     622     624#    626#    628#    631#    634#    637#    649#    671     682
                           692     699     708     715     723     730     739     746     758     773     781     789     795
                           803     809     817     825     831     839     847     856     870     876     894     900     915
                           921     934     940     961     967     978     984    1007    1013    1026    1032    1052    1058
                          1071    1077    1100    1106    1112    1125    1131    1137    1150    1156    1162    1172    1178
                          1184    1197    1203    1209    1223    1229    1235    1256    1262    1268    1280    1286    1292
```

FO5


```
                        1302    1308    1314    1327    1333    1339    1352    1358    1364    1377    1383    1389    1414
                        1420    1426    1458    1464    1470    1480    1482    1498    1504    1510    1525    1540    1553
                        1568    1586    1592    1598    1625    1631    1637    1660    1666    1672    1691    1697    1703
                        1716    1722    1737    1743    1750    1774    1788    1792    1872    1909    1954    2026    2046
                        2071    2096    2126    2151    2184    2196    2204    2215    2218    2221    2249    2252    2253
                        2262    2265    2271    2276
.DEV  = 007160          1481    1750#
.DIV  = 005430           857    1482#
.HLT    005666          1541#
.HLT1   005776          1569#
.MIN    005660          1531    1539#
.MIN1   005770          1559    1567#
```

```
COMMEN      1#
CONOCT    570#  1853  1856  1859  1881  1886  1918  1923  1964  1969  1972  1975  1978  1981  1984
         1989  1992  1995  2162
ENDCOM      1#
ERROR     571#   672   683   693   700   709   716   724   731   740   747   759   766   774   782
           790   796   804   810   818   826   832   840   848   871   877   695   901   916   922
           935   941   962   968   979   985  1008  1014  1027  1033  1053  1059  1072  1078  1101
          1107  1113  1126  1132  1138  1151  1157  1163  1173  1179  1185  1198  1204  1210  1224
          1230  1236  1257  1263  1269  1281  1287  1293  1303  1309  1315  1328  1334  1340  1353
          1359  1365  1378  1384  1390  1415  1421  1427  1459  1465  1471  1499  1505  1511  1526
          1534  1541  1554  1562  1569  1587  1593  1599  1626  1632  1638  1661  1667  1673  1692
          1698  1704  1717  1723  1738  1744
ESCAPE      1#
GETPRI      1#
GETSWR      1#
MULT        1#
NEWTST      1#
POP         1#
PUSH        1#
REPORT      1#
SETPRI      1#
SETUP       1#
SKIP        1#
SLASH       1#
STARS       1#
SWRSU       1#
TEST      572#  1773  1787  1790  1871  1908  1953  2025  2045  2070  2095  2125  2150  2182  2195
         2202  2214  2217  2220  2247  2251  2260  2264  2269  2274
TYPBIN      1#
TYPDEC      1#
TYPE      569#   657  1755  1784  1818  1851  1862  1866  1868  1878  1884  1890  1895  1899  1903
         1905  1915  1921  1927  1932  1936  1940  1944  1948  1950  1961  1967  1987  1999  2004
         2008  2012  2016  2020  2022  2034  2038  2042  2055  2059  2063  2067  2084  2088  2092
         2114  2118  2122  2135  2139  2143  2147  2159  2165
TYPNAM      1#
TYPNUM      1#
TYPOCS      1#
TYPOCT      1#
TYPTXT      1#
$$ESCA      1#
$$NEWT      1#
$$SKIP      1#
.EQUAT      1#
.HEADE      1#
.KT11       1#
.SETUP      1#
.SWRHI      1#
.SACT1      1#
.SAPTB      1#
.SAPTH      1#
.SAPTY      1#
.SASTA      1#
.SCATC      1#
.SCMTA      1#
.SDB2D      1#
.SDB20      1#
```

```
.$DIV        1#
.$EOP        1#
.$ERRO       1#
.$ERRT       1#
.$MULT       1#
.$POWE       1#
.$RAND       1#
.$RDDE       1#
.$RDOC       1#
.$READ       1#
.$R2AZ       1#
.$SAVE       1#
.$SB2D       1#
.$SB2O       1#
.$SCOP       1#
.$SIZE       1#
.$SUPR       1#
.$TRAP       1#
.$TYPB       1#
.$TYPD       1#
.$TYPE       1#
.$TYPO       1#
.$40CA       1#
.1170        1#
```

I05

DZKEDA.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
ADD     1083
ASL     1088  2208  2209  2210
ASR     1042  2198  2199  2200
BEQ      656   671   692   692   699   708   715   723   730   739   746   755   758   765   773
         701   789   795   803   809   817   825   831   839   847   856   870   876   894   900
         915   921   934   940   948   961   967   978   984   991  1007  1013  1026  1032  1041
        1052  1058  1071  1077  1087  1100  1106  1112  1125  1131  1137  1150  1156  1162  1172
        1178  1184  1197  1203  1209  1223  1229  1235  1242  1256  1262  1263  1280  1286  1292
        1302  1308  1314  1327  1333  1339  1352  1358  1364  1377  1383  1389  1396  1414  1420
        1426  1433  1458  1464  1470  1477  1480  1498  1504  1510  1517  1586  1592  1598  1605
        1625  1631  1637  1660  1666  1672  1691  1697  1703  1716  1722  1737  1743  1753  1760
        1774  1777  1779  1781  1783  1788  1792  1827  1830  1833  1836  1840  1872  1909  1954
        2026  2046  2071  2096  2126  2151  2184  2187  2189  2196  2204  2215  2218  2221  2231
        2249  2252  2253  2256  2258  2262  2265  2271  2276  2280
BIC      680  1038  1770  1772  2193  2207  2235  2236
BIS     1794  1874  1911  1956  2028  2048  2073  2098  2128  2153  2194  2211  2237
BIT      855  1479  1773  1787  1791  1871  1908  1953  2025  2045  2070  2095  2125  2150  2183
        2195  2203  2214  2217  2220  2248  2251  2261  2264  2270  2275
BMI     1531  1540  1559  1568  1828  1831  1837  2080
BNE      882   906  1409  1453  1494  1581  1824  2191  2234
BPL     1533  1561
BR       675   686   696   703   712   719   727   734   743   750   762   769   777   785   793
         799   807   813   821   829   835   843   851   874   880   898   904   919   925   938
         944   949   965   971   982   988   994  1011  1017  1030  1036  1043  1056  1062  1075
        1081  1090  1104  1110  1116  1129  1135  1141  1154  1160  1166  1176  1182  1188  1201
        1207  1213  1227  1233  1239  1245  1260  1266  1272  1284  1290  1296  1306  1312  1318
        1331  1337  1343  1356  1362  1368  1381  1387  1393  1399  1418  1424  1430  1434  1462
        1468  1474  1478  1502  1508  1514  1518  1529  1537  1538  1545  1557  1565  1566  1573
        1590  1596  1602  1606  1629  1635  1641  1664  1670  1676  1695  1701  1707  1720  1726
        1741  1747  1876  1914  1960  2032  2053  2081  2112  2133  2158  2177  2179  2201  2259
        2268  2281
BVS     1525  1553
CLC      946   992  1084  1089  1243  1397
CLR      632   652   653   654   661   662   687   753   779   845   863   864   867   891   912
         913   931   957   959  1004  1005  1022  1048  1050  1403  1446  1456  1487  1489  1522
        1523  1549  1574  1576  1758  1798  1803  1870  1873  1907  1910  1952  1955  2024  2027
        2044  2047  2050  2069  2072  2075  2094  2097  2099  2124  2127  2129  2149  2152  2173
        2180  2181  2228
CLRB     801  2049  2074  2100
CMP      681   707   738   757   764   772   788   794   816   824   830   838   881   905   914
         933   960   977   990  1006  1031  1040  1051  1076  1086  1099  1105  1124  1130  1149
        1155  1171  1177  1196  1202  1222  1228  1241  1255  1261  1279  1285  1301  1307  1326
        1332  1351  1357  1376  1382  1395  1408  1413  1419  1432  1452  1457  1463  1469  1476
        1493  1497  1503  1516  1580  1585  1591  1604  1624  1665  1690  1715  1721  1736  1742
        1752  1776  1778  1780  1782  1797  1802  1823  1826  1829  1832  1835  1839  2178  2186
        2188  2190  2230  2233
CMPB     698   714   729   745   875   899   920   939   966   983  1012  1025  1057  1070  1111
        1136  1161  1183  1208  1234  1267  1291  1313  1338  1363  1388  1425  1509  1597  1636
        1671  1702  2255  2257
DEC      890   945  1039  2079
HALT     593   595   597   599   601   603   605   607   609   611   613   615   617   619   621
         623  1825
INC      754   866   989  1037  1085  1240  1394  1407  1431  1451  1475  1492  1515  1579  1603
        1751  2205  2242
JMP      633   636   857  1481  1754  1764  1789  1793  1806  1834  1838  1841  1843  1844  1845
        1846  1847  1848  1849  2212  2243  2273
```

DZKEDA.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
JSR      658   659   672   683   693   700   709   716   724   731   740   747   759   766   774
         782   790   796   804   810   818   826   832   840   848   871   877   895   901   916
         922   935   941   962   968   979   985  1008  1014  1027  1033  1053  1059  1072  1078
        1101  1107  1113  1126  1132  1138  1151  1157  1163  1173  1179  1185  1198  1204  1210
        1224  1230  1236  1257  1263  1269  1281  1287  1293  1303  1309  1315  1328  1334  1340
        1353  1359  1365  1378  1384  1390  1415  1421  1427  1459  1465  1471  1499  1505  1511
        1526  1534  1542  1554  1562  1570  1587  1593  1599  1626  1632  1638  1661  1667  1673
        1692  1698  1704  1717  1723  1738  1744  1757  1762  1786  1819  1821  1822  1852  1854
        1855  1857  1858  1860  1861  1863  1864  1867  1869  1880  1882  1883  1885  1887  1888
        1892  1893  1896  1897  1900  1901  1904  1906  1917  1919  1920  1922  1924  1925  1929
        1930  1933  1934  1937  1938  1941  1942  1945  1946  1949  1951  1963  1965  1966  1968
        1970  1971  1973  1974  1976  1977  1979  1980  1982  1983  1985  1986  1988  1990  1991
        1993  1994  1996  1997  2001  2002  2005  2006  2009  2010  2013  2014  2017  2018  2021
        2023  2035  2036  2039  2040  2043  2056  2057  2060  2061  2064  2065  2068  2085  2086
        2089  2090  2093  2115  2116  2119  2120  2123  2136  2137  2140  2141  2144  2145  2148
        2161  2163  2164  2167  2168
MOV      635   650   651   657   660   663   669   678   679   690   706   721   737   756   763
         771   815   837   865   868   889   892   911   928   929   930   932   958   973   974
         975   976  1003  1020  1021  1023  1024  1049  1065  1066  1067  1068  1069  1096  1097
        1098  1121  1122  1123  1146  1147  1148  1168  1169  1170  1193  1194  1195  1217  1218
        1219  1220  1221  1252  1253  1254  1276  1277  1278  1298  1299  1300  1323  1324  1325
        1348  1349  1350  1371  1372  1373  1374  1375  1402  1404  1405  1406  1410  1411  1412
        1447  1448  1449  1450  1454  1455  1488  1490  1491  1495  1496  1550  1551  1575  1577
        1578  1582  1583  1584  1608  1609  1610  1611  1612  1613  1614  1615  1616  1617  1618
        1619  1620  1621  1622  1643  1644  1645  1646  1647  1648  1649  1650  1651  1652  1653
        1654  1655  1656  1657  1678  1679  1680  1681  1682  1683  1684  1685  1686  1687  1688
        1709  1710  1711  1712  1713  1729  1730  1731  1732  1734  1735  1756  1759  1771  1775
        1785  1796  1799  1804  1816  1817  1818  1820  1850  1851  1853  1856  1859  1862  1865
        1866  1868  1875  1879  1881  1884  1886  1889  1891  1894  1895  1898  1899  1902  1903
        1905  1912  1913  1916  1918  1921  1923  1926  1928  1931  1932  1935  1936  1939  1940
        1943  1944  1947  1948  1950  1957  1958  1959  1962  1964  1967  1969  1972  1975  1978
        1981  1984  1987  1989  1992  1995  1998  2000  2003  2004  2007  2008  2011  2012  2015
        2016  2019  2020  2022  2029  2030  2031  2033  2034  2037  2038  2041  2042  2051  2052
        2054  2055  2058  2059  2062  2063  2066  2067  2076  2077  2078  2083  2084  2087  2088
        2091  2092  2101  2102  2103  2104  2105  2106  2107  2108  2109  2110  2111  2113  2114
        2117  2118  2121  2122  2130  2131  2132  2134  2135  2138  2139  2142  2143  2146  2147
        2154  2155  2156  2157  2160  2162  2166  2169  2170  2171  2172  2174  2185  2192  2197
        2206  2213  2216  2219  2229  2232  2250  2254  2263  2266  2277
MOVB     787   823  2238  2272
NOP     2176
RESET   1761
ROL      993  1244  1398
ROLB    1524  1532  1539  1552  1560  1567
ROR      947  2239  2240  2241
RTI      664  1795  1800  1805
RTS     1801  2222  2244  2278
SUB     1082
TST      655   691   722   780   802   808   846   869   893  1530  1558  1630  1659  1696  1714
        1733  2175
TSTB     670  2267  2279
.ABS     573
.ASCII  2286  2292  2298  2304  2308  2311  2314  2317  2319  2320  2327  2335  2336  2341  2343
        2350  2355  2361  2367
.BYTE   2282  2284
.ENABL     1
.END    2626
```

```
.MAIN.  MACY11 27(732)  03-NOV-76  15:41  PAGE 66
DZKEDA.P11      CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

.EVEN    2371
.LIST       1     564     590
.MACRO      1     569     570     571     572
.NLIST      1     115
.REM        3     116
.WORD     627


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *,DZKEDA.SEQ/SOL/CRF/PAGNUM/NL:TOC=SYSMAC.CD,DZKEDA.P11
 RUN-TIME: 26 34 3 SECONDS
 RUN-TIME RATIO: 133/64=2.0
 CORE USED:  33K  (65 PAGES)
```

Spooler runtime 9 Seconds, 40 KCS, 229 disk reads, 3 disk writes, 62 pages