PRODUCT CODE:	MAINDEC-8E-D0LB-D
PRODUCT TEST:	KE8-E (EAE) INSTRUCTION TEST 1
DATE CREATED:	FEBRUARY 9, 1972
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	ED FORTMILLER

Run for Duration : ≈6 min.

1, ABSTRACT

THIS PROGRAM IS A TEST OF ALL THE KE8-E EAE INSTRUCTIONS, (EXCEPT MULTIPLY AND DIVIDE).

2, REQUIREMENTS

2,1 EQUIPMENT

PDP-8/E OR /M PROCESSOR, KE8-E OPTION, AND A TELETYPE ARE REQUIRED.

2,2 STORAGE

LOCATIONS 0000 THROUGH 7600 ARE USED.

2,3 PRELIMINARY PROGRAMS

ALL PROCESSOR RELATED TEST PROGRAMS MUST HAVE BEEN RUN SUCCESSFULLY.

3, LOADING PROCEDURE

3,1 METHOD

THE BINARY LOADER IS USED TO LOAD THE PROGRAM INTO ANY DESIRED FIELD. REFER TO THE BINARY LOADER DOCUMENTATION IF UNFAMILIAR WITH ITS USE.

4, STARTING PROCEDURE

4,1 CONTROL SWITCH SETTING

CONTROL SWITCH SETTINGS DO NOT APPLY TO STEP COUNTER, GT, MODE, AND COMBINED TESTS. AN ERROR WILL BE INDICATED BY A PROGRAM HALT.

SR0=1 HALT ON ERROR

SR1=1 SCOPE MODE (REPEAT PATTERN AND/OR TEST)

SR2=1 PRINT ERROR INFORMATION

SR3=1 DO NOT EXIT CURRENT TEST.

SR10=11

SR10	SR11	
0	0	EXECUTE TEST IN "A" AND "B" MODES
0	1	EXECUTE TEST IN "A" AND "B" MODES.
1	0	SELECT "A" MODE.
1	1	SELECT "B" MODE.

4.2 STARTING ADDRESS

THIS PROGRAM STARTS AT LOCATION 0200.

4.3 PROGRAM AND/OR OPERATOR ACTION

WITH THE PROGRAM LOADED IN CORE PROCEED AS FOLLOWS:

A. INSURE TELETYPE IS ON-LINE.

B. LOAD ADDRESS 0200.

C. SET ANY DESIRED OPTIONS IN THE SR.

D. PRESS CLEAR AND CONTINUE.

NOTE:

FOR A NORMAL PROGRAM RUN, SET SR SWITCHES TO 5000.
PROGRAM WILL RUN CONTINUOUSLY EXECUTING THE TEST IN "A"
AND "B" MODES UNLESS AN ERROR IS DETECTED AT WHICH TIME
THE ERROR INFORMATION WOULD BE PRINTED OUT AND THEN
THE PROGRAM WILL HALT.

5. ERRORS

5.1 PROGRAM AND/OR OPERATOR ACTION.

THE PURPOSE OF THIS PROGRAM IS TO DETECT OPERATION ERRORS
IN THE KE-8 HARDWARE. UPON DETECTION OF AN ERROR, THE
PROGRAM EITHER HALTS, OR GIVES AN ERROR PRINTOUT DE-
PENDING ON THE SETTING OF SR 0 AND 2.

5.2 ERROR HALTS AND DESCRIPTION

LOC 0236	MQL FAILED TO CLEAR THE AC OR THE LINK WAS CLEARED.
LOC 0447	MQL FAILED TO CLEAR THE AC OR THE LINK WAS SET.
LOC 0562	MQL FAILED TO LOAD THE MQ OR MQA FAILED TO LOAD THE AC.
LOC 0727	MQL FAILED TO LOAD THE MQ OR MQA FAILED TO LOAD THE AC.
LOC 1054	MQA FAILED TO "INCLUSIVE OR" THE MQ WITH THE AC.
LOC 1222	MQA FAILED TO "INCLUSIVE OR" THE MQ WITH THE AC.
LOC 1301	SAM INSTRUCTION FAILED.
LOC 1414	SAM INSTRUCTION FAILED.
LOC 1477	SHL INSTRUCTION FAILED.
LOC 1631	SHL INSTRUCTION FAILED.
LOC 1716	LSR INSTRUCTION FAILED.
LOC 2031	LSR INSTRUCTION FAILED.
LOC 2116	ASR INSTRUCTION FAILED.
LOC 2231	ASR INSTRUCTION FAILED.
LOC 2516	DPSZ INSTRUCTION FAILED.
LOC 2637	DPIC INSTRUCTION FAILED.

LOC 2703 DPIC INSTRUCTION FAILED,

LOC 3014 DCM INSTRUCTION FAILED,

LOC 3124 DAD INSTRUCTION FAILED,

LOC 3274 DAD INSTRUCTION FAILED,

LOC 3434 DST INSTRUCTION FAILED,

LOC 3531 DST INSTRUCTION FAILED,

LOC 3653 NORMALIZE INSTRUCTION FAILED,

LOC 4336 NORMALIZE INSTRUCTION FAILED,

LOC 4520 NORMALIZE INSTRUCTION FAILED,

LOC 4605 EAE NOP SKIPPED,

LOC 4610 EAE NOP MODIFIED THE AC,

LOC 4614 EAE NOP MODIFIED THE MQ,

LOC 4622 EAE CLA SKIPPED,

LOC 4624 EAE CLA FAILED TO CLEAR THE AC,

LOC 4630 EAE CLA MODIFIED THE MQ,

LOC 4637 AC OR MQ NOT CLEARED BY CAM,

LOC 4650 SWP FAILED,

LOC 4655 SWP FAILED,

LOC 4666 ACL FAILED,

LOC 4710 DLD (CAM DAD) FAILED,

LOC 4715 DLD (CAM DAD) FAILED,

LOC 4736
4741
4744 DDZ (CAM DST) FAILED,

LOC 4752 "B" MODE NORMALIZE FAILED TO CLEAR AC,

LOC 5004 CLEAR KEY FAILED TO SET "MODE A" OR DPSZ FAILED,

LOC 5010 SWAB FAILED TO SET "MODE B" OR DPSZ FAILED,

LOC 5015 SWBA FAILED TO SET "MODE A",

LOC 5023 CAF FAILED TO SET "MODE A",

LOC 5031 SCL OR SCA ERROR,
5040
5047
5056
5065
5074
5103
5112
5117
5126
5135
5145
5155

LOC 5163 ACS INSTRUCTION FAILED
5170
5205
5210

LOC 5220 RTF INSTRUCTION FAILED TO SET GT FLAG TO Ø OR GTF FAILED TO GET IT,

LOC 5230 RTF INSTRUCTION FAILED TO SET GT FLAG TO 1 OR GTF FAILED TO GET IT,

LOC 5236 SGT SKIPPED WITH GT FLAG NOT SET,

LOC 5243 SGT FAILED TO SKIP WITH GT FLAG SET,

LOC 5252 SWBA FAILED TO CLEAR THE GT FLAG,

5,3 ERROR PRINTOUTS

5,3,1 MQL TESTS

```
MQLT    MODE A (OR B)

AC   1  000000000011
Ø=AC 1  000000000001

MQLT    MQL INSTRUCTION TEST WITH LINK SET TO A 1,
AC      THE ORIGINAL C(AC) AND C(L),
Ø=AC    C(AC) AND C(L) AFTER THE MQL INSTRUCTION WAS
        EXECUTED,
        NOTE THAT BIT 11 OF AC SHOULD EQUAL Ø,

MQLT1   MODE A (OR B)

AC   Ø  000000000001
Ø=AC Ø  000000000001


MQLT    MQL INSTRUCTION TEST WITH LINK SET TO A Ø,
AC      THE ORIGINAL C(AC) AND C(L),
Ø=AC    C(AC) AND C(L) AFTER THE MQL INSTRUCTION
        WAS EXECUTED,
        NOTE THAT BIT 11 OF THE AC SHOULD EQUAL Ø,
```

5,3,2 MQA TESTS

```
MQAT    MODE A (OR B)

AC  1   000000000001
MQL)1   000000000000
MQA)

MQAT            MQA MQL INSTRUCTIONS TEST WITH THE LINK SET
                TO A 1,
AC              THE ORIGINAL C(AC) AND C(L),
MQL MQA         THE C(AC) AND C(L) AFTER THE EXECUTION OF
                AN MQL INSTRUCTION FOLLOWED BY AN MQA IN-
                STRUCTION,  NOTE THAT BIT 11 OF THE AC SHOULD
                BE A 1,

MQAT1   MODE A (OR B)

AC   Ø  100000000000
MQL) Ø  011111111111
MQA)
```

```
MQAT1    MQL,MQA INSTRUCTION TEST WITH THE LINK SET TO A 0,
AC       THE ORIGINAL C(AC) AND C(L),
MQL,MQA  THE C(AC) AND C(L) AFTER THE EXECUTION OF AN MQL
         INSTRUCTION FOLLOWED BY AN MQA INSTRUCTION,
         NOTE THAT THE C(AC) SHOULD BE 4000,


MQAT2    MODE A (OR B)

AC     1 111111111110
MQ       000000000001
MQVAC  1 000000000000

MQAT2    MQA INSTRUCTION TEST,
AC       ORIGINAL C(AC) AND C(L),
MQ       ORIGINAL C(MQ),
MQVAC    THE C(AC) AND C(L) AFTER THE EXECUTION OF AN MQA
         INSTRUCTION,
         NOTE THAT THE C(AC) SHOULD BE 7777,

MQAT3    MODE A (OR B)

AC     0  111111111110
MQ        000000000001
MQVAC  0  000000000000


MQAT3    MQA INSTRUCTION TEST,
AC       ORIGINAL C(L) AND C(AC),
MQ       ORIGINAL C(MQ),
MQVAC    THE C(AC) AND THE C(L) AFTER THE EXECUTION
         OF AN MQA INSTRUCTION,
         NOTE THAT THE C(AC) SHOULD BE 7777,
```

5,3,3 SAM TESTS

```
SAM TEST 0 (OR 1) MODE B

           C(L)    C(AC)           C(MQ)           C(GT)   C(SC)

PROBLEM     1      000000111111    000001000000    0       000000000000
SIMULATED   0      000000000001    000001000000    1       000000000000
ACTUAL      0      000000000000    000001000000    1       000000000000

PROBLEM            THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING
                   A SAM INSTRUCTION,
SIMULATED          WHAT THE RESULTS SHOULD BE,
ACTUAL             WHAT THE RESULTS WERE FROM THE EXECUTION OF
                   A SAM INSTRUCTION,
                   NOTE THAT AC SHOULD BE 0001 IN THE "ACTUAL",
```

5,3,4 SHL TESTS

SHL TEST Ø (OR 1) ØØØ3 SHIFTS MODE A (OR B)

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	1	ØØØ1ØØ1ØØØØ1	ØØØ1ØØØØØØ1	Ø	ØØØØØØØØØØ1Ø
SIMULATED	Ø	1ØØ1ØØØØ1ØØØ	1ØØØØØØØ1ØØØ	Ø	ØØØØØØØØØØØØ
ACTUAL	Ø	1ØØ1ØØØØØØØØ	1ØØØØØØØ1ØØØ	Ø	ØØØØØØØØØØØØ

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING AN SHL INSTRUCTION. THE NUMBER CONTAINED IN C(SC) IS THE CONTENTS OF THE ADDRESS FOLLOWING THE SHL INSTRUCTION.

SIMULATED — WHAT THE RESULTS SHOULD BE.

ACTUAL — WHAT THE RESULTS WERE FROM THE EXECUTION OF AN SHL INSTRUCTION.

5,3,5 LSR TESTS

LSR TEST 1 (OR Ø) ØØØ4 SHIFTS MODE B (OR A)

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	1	ØØØØØ111111	ØØØØØØØ1111	Ø	ØØØØØØØØ17Ø
SIMULATED	Ø	ØØØØØØØØØ11	111100000000	1	ØØØØØØ11111
ACTUAL	Ø	ØØØØØØØØØ11	111100000000	Ø	ØØØØØØ11111

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING AN LSR INSTRUCTION. THE NUMBER CONTAINED IN C(SC) IS THE CONTENTS OF THE ADDRESS FOLLOWING THE LSR INSTRUCTION.

SIMULATED — WHAT THE RESULTS SHOULD BE.

ACTUAL — WHAT THE RESULTS WERE FROM THE EXECUTION OF AN LSR INSTRUCTION.
NOTE THAT THE C(GT) SHOULD BE 1 IN THE "ACTUAL".

5,3,6 ASR TESTS

ASR TEST Ø (OR 1) ØØØ2 SHIFTS MODE B (OR A)

	C(L)	C(AC	C(MQ)	C(GT)	C(SC)
PROBLEM	Ø	ØØØØØØØØØ11Ø	ØØØØØØ1ØØØ1	1	ØØØØØØØØØ1Ø
SIMULATED	1	11ØØØØØØØØØ1	1ØØØØØØ1ØØØ	Ø	ØØØØØØ11111
ACTUAL	1	11ØØØØØØØØØ1	ØØØØØØ1ØØØ	Ø	ØØØØØØ11111

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING AN ASR INSTRUCTION, THE NUMBER CONTAINED IN C(SC) IS THE CONTENTS OF THE ADDRESS FOLLOWING THE ASR INSTRUCTION,

SIMULATED — WHAT THE RESULTS SHOULD BE,

ACTUAL — WHAT THE RESULTS WERE FROM THE EXECUTION OF AN ASR INSTRUCTION,
NOTE THAT THE C(MQ) SHOULD BE 4Ø1Ø IN THE "ACTUAL,"

5,3,7 DPSZ TESTS

DPSZ TEST Ø MODE B

NO SKIP OCCURRED

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	Ø	ØØØØØØØØØØØØ	ØØØØØØØØØØØØ	Ø	ØØØØØØØØØØØØ
SIMULATED	Ø	ØØØØØØØØØØØØ	ØØØØØØØØØØØØ	Ø	ØØØØØØØØØØØØ
ACTUAL	Ø	ØØØØØØØØØØØØ	ØØØØØØØØØØØØ	Ø	ØØØØØØØØØØØØ

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING A DPSZ INSTRUCTION,

SIMULATED — WHAT THE REGISTERS SHOULD BE AFTER ISSUING THE DPSZ INSTRUCTION,

ACTUAL — WHAT THE REGISTERS WERE AFTER ISSUING THE DPSZ INSTRUCTION,
NOTE WITH AC ANC MQ BOTH ZERO A SKIP FAILED TO OCCUR,

DPSZ TEST Ø MODE B

SKIP OCCURRED

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	Ø	ØØØØØØØØØØØØ	ØØØØØØØØØØ1	Ø	ØØØØØØØØØØØ
SIMULATED	Ø	ØØØØØØØØØØØØ	ØØØØØØØØØØØ	Ø	ØØØØØØØØØØØ
ACTUAL	Ø	ØØØØØØØØØØØØ	ØØØØØØØØØØØ	Ø	ØØØØØØØØØØØ

PROBLEM — THE CONTENTS OF THE REGISTER PRIOR TO ISSUING A DPSZ INSTRUCTION,

SIMULATED — WHAT THE REGISTERS SHOULD BE AFTER ISSUING THE DPSZ INSTRUCTION,

ACTUAL — WHAT THE REGISTERS WERE AFTER ISSUING THE DPSZ INSTRUCTION,
NOTE WITH MQ NON ZERO A SKIP OCCURRED,

DPSZ TEST 0 MODE B

REG MODIFIED

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	0	000000000001	000000000000	0	000000000000
SIMULATED	0	000000000001	000000000000	0	000000000000
ACTUAL	0	000000000000	000000000000	0	000000000000

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING A DPSZ INSTRUCTION,

SIMULATED — WHAT THE REGISTERS SHOULD BE AFTER ISSUING THE DPSZ INSTRUCTION,

ACTUAL — WHAT THE REGISTERS WERE AFTER ISSUING THE DPSZ INSTRUCTION,
NOTE THAT THE C(AC) SHOULD BE 0001 IN THE "ACTUAL",

5,3,8 DPIC TESTS

DPIC TEST 0 (OR 1) MODE B

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	1	000000000000	000000000000	0	000000000000
SIMULATED	0	000000000000	000000000001	0	000000000000
ACTUAL	0	000000000000	000000000000	0	000000000000

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING A DPIC INSTRUCTION,

SIMULATED — WHAT THE REGISTERS SHOULD BE AFTER THE ISSUING OF A DPIC INSTRUCTION,

ACTUAL — WHAT THE REGISTERS WERE AFTER ISSUING THE DPIC INSTRUCTION,
NOTE THAT THE C(AC) SHOULD BE 0001 IN THE "ACTUAL",

5,3,9 DCM TESTS

DCM TEST 0 (OR 1) MODE B

	C(L)	C(AC)	C(MQ)		
PROBLEM	1	000000000000	000000000001	0	000000000000
SIMULATED	0	111111111111	111111111111	0	000000000000
ACTUAL	0	111111111111	111111111110	0	000000000000

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING A DCM INSTRUCTION,

SIMULATED — WHAT THE REGISTERS SHOULD BE AFTER THE ISSUING OF A DCM INSTRUCTION,

ACTUAL — WHAT THE REGISTERS WERE AFTER ISSUING THE DCM INSTRUCTION,
NOTE THAT THE C(MQ) SHOULD BE 7777,

5,3,10 DAD TESTS

DAD TEST Ø (OR 1) MODE B

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	Ø	ØØØØØØ11111	ØØØ11111Ø1Ø1	Ø	ØØØØØØØØØØØ
TO BE ADDED		111111ØØØØØ	111ØØØØ1Ø1Ø		
SIMULATED	Ø	111111111111	111111111111	Ø	ØØØØØØØ7ØØØ
ACTUAL	Ø	111111111111	111111111110	Ø	ØØØØØØØ7ØØØ

PROBLEM — THE CONTENTS OF THE REGISTERS PRIOR TO ISSUING A DAD INSTRUCTION,

TO BE ADDED — THE CONTENTS OF THE TWO ADDRESS TO BE ADDED TO THE AC AND MQ,

SIMULATED — WHAT THE REGISTERS SHOULD BE AFTER THE ISSUING THE DAD INSTRUCTION,

ACTUAL — WHAT THE REGISTERS WERE AFTER ISSUING THE DAD INSTRUCTION,
NOTE THAT C(MQ) SHOULD BE 7777 IN THE ACTUAL,

5,3,11 DST TESTS

DST TEST Ø (OR 1) MODE B

REG	BEFORE DST	AFTER DST
C(L)	1	1
C(AC)	111111111111	111111111111
C(MSH)		ØØØØØØØØØØØ
C(MQ)	111110111110	111110111110
C(LSH)		111110111110

BEFORE DST — THE CONTENTS OF THE REGISTERS BEFORE ISSUING A DST INSTRUCTION,

AFTER DST — WHAT THE REGISTERS WERE AFTER ISSUING THE DST INSTRUCTION,
MSH IS WHAT DST STORED FOR THE AC,
LSH IS WHAT DST STORED FOR THE MQ,
NOTE THAT THE C(MSH) SHOULD BE 7777,

5,3,12 NORMALIZE TESTS

NMIT	C(AC)	C(MQ)	MODE A (OR B)
	ØØØØØØØØØØØ	Ø1Ø1Ø1Ø1Ø1Ø1	
NMI	Ø1Ø1Ø1Ø1Ø1ØØ	ØØØØØØØØØØØ	
SCAT	ØØØØØØØ11ØØ		
SCA	ØØØØØØØ11ØØ		

NMIT — NORMALIZE AND STEP COUNTER TEST, ORIGINAL C(AC) AND C(MQ),

(5,3.12 CONT'D)

NMI — C(AC) AND C(MQ) AFTER THE NMI INSTRUCTION WAS EXECUTED.

SCAT — THE CORRECT COUNT OF THE STEP COUNTER AFTER THE NORMALIZE INSTRUCTION WAS EXECUTED.

SCA — THE ACTUAL COUNT IN THE STEP COUNTER AS READ INTO THE AC BY THE SCA INSTRUCTION AFTER THE NORMALIZE INSTRUCTION WAS EXECUTED.

NOTE THAT BIT 11 OF AC IN ERROR. C(AC) SHOULD EQUAL 2525.

5.4 TABLE OF INSTRUCTIONS

THE FOLLOWING TABLE CONTAINS THE TEST MNEMONIC, STARTING ADDRESS, ERROR HALT ADDRESS AND INSTRUCTION TESTED.

MNEMONIC	INSTRUCTIONS	STARTING ADDRESS	ERROR HALT
MQLT	MQL	0204	0236
MQLT1	MQL	0400	0447
MQAT	MQL,MQA	0503	0562
MQAT1	MQL,MQA	0650	0727
MQAT2	MQA	1000	1054
MQAT3	MQA	1135	1222
SAMTS0	SAM	1245	1301
SAMTS1	SAM	1333	1414
SHLTS0	SHL	1430	1477
SHLTS1	SHL	1600	1631
LSRTS0	LSR	1646	1716
LSRTS1	LSR	2000	2031
ASRTS0	ASR	2046	2116
ASRTS1	ASR	2200	2231
DPSZS0	DPSZ	2246	2516
DPITS0	DPIC	2600	2637
DPITS1	DPIC	2653	2703
DCMTS0	DCM	2717	3014
DADTS0	DAD	3030	3124
DADTS1	DAD	3200	3274
DSTTS0	DST	3310	3434
DSTTS1	DST	3450	3531
NORMT	NMI,SCA	3600	3653
NORMT1	NMI,SCA	4200	4336
NORMT2	NMI	4400	4520
COMTST	NOP,CLA,ACL,CAM SWP,DLD,DDZ,NMI	4600	4605-4744
MDTST	DPSZ,SWAB,SWBA	0200	5004-5023
TSCL	SCL,ACS	0200	5031-5210
GTTST	GTF,RTF,SGT	0200	5220-5252

6. DESCRIPTION

THE KE8 EAE INSTRUCTION TEST 1, TESTS THE FOLLOWING EXTENDED ARITHMETIC ELEMENT INSTRUCTIONS:

MQL, MQA, SHL, LSR, ASR, DPSZ, DPIC, DCM, DAD, DST, NMI, SWAB, SWBA, SGT, RTF, AND GTF.

THE EXTENDED ARITHMETIC ELEMENT IS TESTED USING PATTERNS NECESSARY TO DETECT AND ISOLATE ERRORS. IF A FAILURE DOES OCCUR, THE TEST WILL PRINTOUT THE ERROR INFORMATION AND/OR HALT AT A PREDETERMINED ERROR HALT ACCORDING TO THE SR SETTING.

7. EXECUTION TIME

ONE COMPLETE PROGRAM PASS TAKES APPROXIMATELY 6 MINUTES AND AT THE END OF EACH PASS "KE8 1" WILL BE PRINTED OUT ON THE TELETYPE.

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                    /KE8 EAE INSTRUCTION TEST PART 1  MAINDEC-8E-D0LB
                    /COPYRIGHT 1972, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS, 01754
                    /PROGRAMMER: ED FORTMILLER

                    /SWITCH REGISTER OPTIONS:

                    /SR0=1  HALT ON ERROR
                    /SR1=1  SCOPE MODE (REPEAT PATTERN AND/OR TEST)
                    /SR2=1  PRINT ERROR INFORMATION
                    /SR3=1  DO NOT EXIT CURRENT TEST

                    /SR10-11        SR10    SR11
                    /  =1            0       0      EXECUTE TEST IN "A" AND "B" MODES
                    /                0       1      EXECUTE TEST IN "A" AND "B" MODES
                    /                1       0      SELECT "A" MODE
                    /                1       1      SELECT "B" MODE

          7421      MQL=7421                /LOAD MQ,
          7501      MQA=7501                /INCLUSIVE OR MQ WITH AC,
          7401      NOPM=7401               /EAE NOP,
          7601      CLAM=7601               /EAE CLA,
          7411      NMI=7411                /NORMALIZE
          7413      SHL=7413                /SHIFT LEFT
          7415      ASR=7415                /ARITHMETIC SHIFT RIGHT
          7417      LSR=7417                /LOGICAL SHIFT RIGHT
          7521      SWP=7521                /SWAP AC AND MQ,
          7621      CAM=7621                /CLEAR AC AND MQ,
          7701      ACL=CLAM MQA            /LOAD AC FROM MQ,
          7441      SCA=7441                /STEP COUNTER TO AC,
          7431      SWAB=7431               /SWITCH FROM MODE "A" TO "B",
          7447      SWBA=7447               /SWITCH FROM MODE "B" TO "A",
          7403      SCL=7403                /STEP COUNTER LOAD FROM MEMORY,
          7403      ACS=7403                /ACCUMULATOR TO STEP COUNTER,
          7457      SAM=7457                /SUBTRACT AC FROM MQ,
          7443      DAD=7443                /DOUBLE PRECISION ADD,
          7445      DST=7445                /DOUBLE PRECISION STORE,
          7573      DPIC=7573               /DOUBLE PRECISION INCREMENT,
          7575      DCM=7575                /DOUBLE PRECISION COMPLEMENT,
          7451      DPSZ=7451               /DOUBLE PRECISION SKIP IF ZERO,
          7663      DLD=DAD CAM             /DOUBLE PRECISION LOAD,
          7665      DDE=DST CAM             /DOUBLE PRECISION DEPOSIT ZERO,

          6001      ION=6001                /TURN THE INTERRUPT ON,
          6002      IOF=6002                /TURN THE INTERRUPT OFF,
          6004      GTF=6004                /GET THE INTERRUPT FLAGS,
          6005      RTF=6005                /RESTORE THE INTERRUPT FLAGS,
          6006      SGT=6006                /SKIP ON GREATER THAN FLAG,
          6007      CAF=6007                /CLEAR THE WORLD,

          6214      RDF=6214                /READ THE DATA FIELD
          6224      RIF=6224                /READ THE INSTRUCTION FIELD,

          7002      BSW=7002                /SWAP BYTES IN AC,
          7400      NOP=7400                /GROUP 2 NOP,
          7402      HLT=7402                /HALT,
```



```
          0000      OPEN=0000               /PROGRAM MODIFIABLE,

          0000      *0
0000      0000              0
0001      5001              JMP 1
0002      0002              2
0003      0003              3
          0020      *0020

0020      0000      FILLER, 0               /SET TO NUMBER OF FILLER CHARACTERS NEEDED,


                    /THESE STORAGE LOCATIONS FROM "TOLINK THROUGH "ADDR" MUST
                    /REMAIN IN THE ORDER SHOWN,

0021      0000      TOLINK, OPEN
0022      0000      TOAC,   OPEN
0023      0000      TOMQ,   OPEN
0024      0000      TOSHIF, OPEN
0025      0000      TOGT,   OPEN
0026      0000      TLINK,  OPEN
0027      0000      TAC,    OPEN
0030      0000      TMQ,    OPEN
0031      0000      TSHIF,  OPEN
0032      0000      TGT,    OPEN
0033      0000      LKTOCK, OPEN
0034      0000      ACTOCK, OPEN
0035      0000      MQTOCK, OPEN
0036      0000      SCTOCK, OPEN
0037      0000      GTTOCK, OPEN
0040      0000      TEMPA,  OPEN
0041      0000      TEMPB,  OPEN
0042      0000      LSIM,   OPEN
0043      0000      MSH,    OPEN
0044      0000      LSH,    OPEN
0045      0000      SCSIM,  OPEN
0046      0000      GTSIM,  OPEN
0047      0000      ADDR,   OPEN

0050      6600      XTYPST, TYPST
0051      6670      UPSPC,  PSPC
0052      6345      UCOMP,  COMP
0053      6400      UMOVE,  MOVE
0054      6723      U1SPC,  SPACE1
0055      6727      U2SPC,  SPACE2


0056      0000      BACK,   0000
0057      0000      NEXT,   0000
0060      0400      XMQLT1, MQLT1
0061      0503      XMQAT,  MQAT
0062      0650      XMQAT1, MQAT1
```

```
0063  0000    ACP,    0               /GOOD AC
0064  0000    LXP,    0               /GOOD LINK
0065  0000    GENX,   0
0066  0000    BLXP,   0               /BAD LINK
0067  0000    BACP,   0               /BAD AC
0070  0215    CR,     0215            /CARRIAGE RETURN
0071  0212    LF,     0212            /LINE FEED
0072  0315    M,      0315            /M
0073  0321    Q,      0321            /Q
0074  0314    LL,     0314            /L
0075  0324    TT,     0324            /T
0076  0301    A,      0301            /A
0077  0303    C,      0303            /C
0100  0261    ONE,    0261            /1
0101  0260    ZERO,   0260            /0
0102  0000    LINK,   0
0103  0255    TO,     0255            /DASH
0104  7763    COUNTX, 7763
0105  0000    STRCNT, 0
0106  0000    BITSTR, 0
0107  1000    XMQAT2, MQAT2
0110  1135    XMQAT3, MQAT3
0111  0326    INCOR,  0326            /V
0112  0263    THREE,  0263            /3
0113  0262    TWO,    0262
0114  0000    SCOUNT, OPEN
0115  0000    MODE,   OPEN
0116  0000    ANYUSE, OPEN            /GENERAL USE,
0117  0000    COUNT,  OPEN
0120  0000    TWICE,  OPEN
0121  0000    DPMQ,   OPEN
0122  0000    DPAC,   OPEN


0123  7740    K7740,  7740
0124  5600    CRLF,   UCRLF
0125  5607    CRLF2,  UCRLF2
0126  5613    PRXLOP, RXLOP
0127  5640    PLINK,  UPLINK
0130  5656    ZEROR,  UZEROR
0131  5663    MESSG,  UMESSG
0132  5645    ONZER,  UONZER
0133  5652    ONEP,   UONEP
0134  5707    TYTST,  UTYTST
0135  5274    MODSEL, MDSEL
0136  5317    ONLYB,  UONLYB
0137  7000    PREGS,  UPREGS
0140  5520    ASCOMP, SCOMP
0141  5410    SAVREG, USVREG
0142  5546    UGEN,   GEN
0143  5325    TSTSW0, SW0TST
0144  5333    TSTSW1, SW1TST
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0145  5342    TSTSW2, SW2TST
0146  5400    TSTSW3, SW3TST
0147  7070    NUMSHF, NUMSH
0150  6525    RANDOM, RANGEN
0151  5751    LDREG,  ULDREG
0152  5732    RNDATA, RANDAT
0153  5761    LDGT,   ULDGT
0154  6000    RTFX,   XRTF
0155  5726    P1BIT,  UP1BIT
0156  5503    LDSC,   ULDSC


      0010    *0010
0010  0000    ACIND,  0
0011  0000    MQIND,  0
0012  0000    XACNMI, 0
0013  0000    XMQNMI, 0
      0200    *0200

0200  6007            CAF
0201  3115            DCA     MODE    /MODE "A" INITIALLY,
0202  7621            CAM
0203  4577            JMS I [TSCL     /TEST MODE SWITCHING, GT, AND SC,
                /TEST THAT MQL WILL CLEAR THE AC AND LEAVE THE LINK SET TO 1,

0204  5244    MQLT,   JMP HSE         /HOUSE KEEPING
0205  4542            JMS I UGEN
0206  7360            STL CLA CMA     /SET LINK
0207  0065            AND GENX
0210  3063            DCA ACP         /STORE AC PATTERN
0211  7240            CLA CMA
0212  3064            DCA LXP         /STORE LINK TO A ONE
0213  1063            TAD     ACP     /LOAD AC,
0214  7421            MQL
0215  3067            DCA BACP        /STORE AC RESULT
0216  7620            CLA SNL
0217  5345            JMP XPACP+5     /STORE LINK RESULT 0000
0220  7240            CLA CMA
0221  3066            DCA BLXP        /STORE LINK RESULT 7777
0222  1067            TAD     BACP
0223  7640            SZA CLA
0224  5231            JMP .+5         /AC NOT EQUAL TO 0000
0225  1066            TAD     BLXP
0226  7450            SNA
0227  5231            JMP .+2         /LINK NOT EQUAL TO A ONE
0230  5237            JMP .+7         /CONTINUE TEST MQLT
0231  4545            JMS I   TSTSW2  /TEST SW2
0232  4254            JMS PMQLT       /PRINT ERROR
0233  7704            CLL CLA OSR     /TEST SW 0
0234  7004            RAL
0235  7430            SZL
0236  7402            HLT             /HALT MQL ERROR
0237  7604            CLA OSR
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0240  7106          RTL CLL         /TEST SW1
0241  7430          SZL
0242  5206          JMP MQLT+2      /PROGRAM LOOP
0243  5205          JMP MQLT+1      /CONTINUE PROGRAM


0244  7300  HSE,    CLA CLL
0245  3065          DCA GENX
0246  1344          TAD XPACP+4
0247  3056          DCA BACK
0250  1060          TAD XMQLT1
0251  3057          DCA NEXT
0252  4535          JMS I   MODSEL          /PERFORM MODE SELECTION,
0253  5205          JMP MQLT+1

0254  0000  PMQLT,  0               /PRINT ROUTINE
0255  4525          JMS I   CRLF2           /CR AND LF',
0256  4302          JMS MQ
0257  4311          JMS L
0260  4316          JMS T

0261  4576  CP,     JMS I   CTYMOD          /TYPE THE MODE',
0262  4524          JMS I   CRLF            / CR AND LF,
0263  4455          JMS I   U2SPC           /2 SPACES,
0264  4323          JMS AC
0265  4455          JMS I   U2SPC           /2 SPACES,
0266  4332          JMS PLXP
0267  4454          JMS I   U1SPC           /1 SPACE',
0270  4740          JMS I XPACP
0271  4524          JMS I   CRLF            /CR AND LF',
0272  4530          JMS I   ZERO
0273  4741          JMS I XPACP+1   /RIGHT ARROW
0274  4323          JMS AC
0275  4455          JMS I   U2SPC           /2 SPACES,
0276  4742          JMS I XPACP+2
0277  4454          JMS I   U1SPC           /1 SPACE',
0300  4743          JMS I XPACP+3
0301  5654          JMP I PMQLT     /RETURN TO SWITCH ROUTINE

0302  0000  MQ,     0
0303  7240          CLA CMA
0304  0072          AND M                   /M
0305  4526          JMS I   PRXLOP          /PRINT,
0306  1073          TAD     Q               /"Q",
0307  4526          JMS I   PRXLOP          /PRINT,
0310  5702          JMP I MQ

0311  0000  L,      0
0312  7240          CLA CMA
0313  0074          AND LL                  /L
0314  4526          JMS I   PRXLOP          /PRINT,
0315  5711          JMP I L

0316  0000  T,      0
```



```
0317  7240          CLA CMA
0320  0075          AND TT                  /T
0321  4526          JMS I   PRXLOP          /PRINT,
0322  5716          JMP I T


0323  0000  AC,     0
0324  7240          CLA CMA
0325  0076          AND A                   /A
0326  4526          JMS I   PRXLOP          /PRINT,
0327  1077          TAD     C               /"C",
0330  4526          JMS I   PRXLOP          /PRINT,
0331  5723          JMP I AC

0332  0000  PLXP,   0
0333  7240          CLA CMA
0334  0064          AND LXP         /GOOD LINK
0335  3102          DCA LINK
0336  4527          JMS I   PLINK
0337  5732          JMP I PLXP

0340  0362  XPACP,  PACP
0341  0355          PTO
0342  0347          PBLXP
0343  0370          PBACP
0344  0204          MQLT
0345  3066          DCA BLXP
0346  5222          JMP MQLT+16



0347  0000  PBLXP,  0
0350  7240          CLA CMA
0351  0066          AND BLXP        /BAD LINK
0352  3102          DCA LINK
0353  4527          JMS I   PLINK
0354  5747          JMP I PBLXP

0355  0000  PTO,    0
0356  7240          CLA CMA
0357  0103          AND TO          /RIGHT ARROW
0360  4526          JMS I   PRXLOP          /PRINT,
0361  5755          JMP I PTO

0362  0000  PACP,   0
0363  7240          CLA CMA
0364  0063          AND ACP         /ACP
0365  3106          DCA BITSTR
0366  4531          JMS I   MESSG           /PRINT A MESSAGE',
0367  5762          JMP I PACP


0370  0000  PBACP,  0
```

```
0371  7240          CLA CMA
0372  0067          AND BACP        /BACP
0373  3106          DCA BITSTR
0374  4531          JMS I   MESSG           /PRINT A MESSAGE',
0375  5770          JMP I PBACP

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                /TEST THAT MQL WILL CLEAR THE AC AND LEAVE THE LINK CLEARED,

0400  5227    MQLT1,  JMP HSE1
0401  4542          JMS I UGEN
0402  7340          CLL CLA CMA     /CLEAR LINK
0403  0065          AND GENX
0404  3063          DCA ACP         /STORE AC PATTERN
0405  3064          DCA LXP         /STORE LINK TO A ZERO
0406  7040          CMA
0407  0063          AND ACP         /LOAD AC
0410  7421          MQL
0411  3067          DCA BACP        /STORE AC RESULT
0412  7620          CLA SNL
0413  5301          JMP XONE+6      /STORE LINK RESULT 0000
0414  7240          CLA CMA
0415  3066          DCA BLXP        /STORE LINK RESULT 7777
0416  7040          CMA
0417  0067          AND BACP
0420  7440          SZA
0421  5237          JMP MQ1SW               /AC NOT EQUAL TO 0000
0422  7240          CLA CMA
0423  0066          AND BLXP
0424  7440          SZA
0425  5237          JMP MQ1SW               /LINK NOT EQUAL TO A ZERO
0426  5250          JMP MQ1+4               /CONTINUE TEST MQLT1


0427  7300    HSE1,   CLA CLL
0430  3065          DCA GENX
0431  1060          TAD XMQLT1
0432  3056          DCA BACK
0433  1061          TAD XMQAT
0434  3057          DCA NEXT
0435  4535          JMS I   MODSEL          /PERFORM MODE SELECTION,
0436  5201          JMP MQLT1+1

0437  7604    MQ1SW,  CLA OSR         /TEST SW2
0440  7106          RTL CLL
0441  7004          RAL
0442  7430          SZL
0443  5256          JMP XMQ1+1      /PRINT ERROR

0444  7604    MQ1,    CLA OSR         /TEST SW0
0445  7104          RAL CLL
0446  7430          SZL
0447  7402          HLT             /MQL ERROR,
```



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0450  7604          CLA OSR
0451  7106          RTL CLL
0452  7430          SZL
0453  5202          JMP MQLT1+2     /PROGRAM LOOP
0454  5201          JMP MQLT1+1     /CONTINUE PROGRAM

0455  0444    XMQ1,   MQ1
0456  7240          CLA CMA
0457  0255          AND XMQ1
0460  3700          DCA I XONE+5
0461  4525          JMS I   CRLF2           /2 CR AND LF',
0462  4670          JMS I XCP+1
0463  4671          JMS I XCP+2
0464  4672          JMS I XCP+3
0465  4273          JMS XONE
0466  5667          JMP I XCP

0467  0261    XCP,    CP
0470  0302          MQ
0471  0311          L
0472  0316          T

0473  0000    XONE,   0
0474  7240          CLA CMA
0475  0100          AND ONE         /ONE
0476  4526          JMS I   PRXLOP          /PRINT,
0477  5673          JMP I XONE
0500  0254          PMQLT
0501  3066          DCA BLXP
0502  5216          JMP MQLT1+16


0503  5340    MQAT,   JMP HSE2
0504  4542          JMS I UGEN
0505  7360          STL CLA CMA     /SET LINK
0506  0065          AND GENX
0507  3063          DCA ACP         /STORE AC PATTERN
0510  7240          CLA CMA
0511  3064          DCA LXP         /STORE LINK TO A ONE
0512  7040          CMA
0513  0063          AND ACP         /LOAD AC
0514  7421          MQL             /LOAD MQ FROM AC
0515  7501          MQA             /LOAD AC FROM MP
0516  3067          DCA BACP        /STORE RESULT OF MQL, MQA
0517  7620          CLA SNL
0520  5777'         JMP YA+5                /STORE LINK RESULT 0000
0521  7240          CLA CMA
0522  3066          DCA BLXP                /STORE LINK RESULT 7777

0523  7040    RL2,    CMA
0524  0063          AND ACP         /COMPARE ACP WITH BACP
0525  7140          CLL CMA
0526  1067          TAD BACP
0527  7040          CMA
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0530  7450          SNA
0531  7430          SZL
0532  5350          JMP HSE2+10     /MQ DID NOT EQUAL AC
0533  7240          CLA CMA
0534  0066          AND BLXP
0535  7450          SNA
0536  5350          JMP HSE2+10     /LINK DID NOT EQUAL A ONE
0537  5363          JMP HSE2A

0540  7300  HSE2,   CLA CLL
0541  3065          DCA GENX
0542  1061          TAD XMQAT
0543  3056          DCA BACK
0544  1062          TAD XMQAT1
0545  3057          DCA     NEXT
0546  4535          JMS I   MODSEL          /PERFORM MODE SELECTION,
0547  5304          JMP MQAT+1
0550  7604          CLA OSR         /TEST SW2
0551  7106          RTL CLL
0552  7004          RAL
0553  7420          SNL
0554  5357          JMP .+3
0555  4776'         JMS PMQAT               /PRINT ERROR
0556  4775'         JMS MQA1
0557  7604          CLA OSR         /TEST SW0
0560  7104          RAL CLL
0561  7430          SZL
0562  7402          HLT             /MQL OR MQA ERROR,
0563  7604  HSE2A,  CLA OSR         /TEST SW1
0564  7106          RTL CLL
0565  7430          SZL
0566  5305          JMP MQAT+2      /PROGRAM LOOP
0567  5304          JMP MQAT+1      /CONTINUE PROGRAM

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0600  0000  PMQAT,  0
0601  4525          JMS I   CRLF2           /2 CR AND LF',
0602  4777'         JMS     MQ              /PRINT "MQ",
0603  4232          JMS     AT
0604  5600          JMP I PMQAT

0605  0000  MQA1,   OPEN
0606  4576          JMS I   [TYMOD          /TYPE THE MODE',
0607  4524          JMS I   CRLF            /CR AND LF',
0610  4451          JMS I   UPSPC           /5 SPACES,
0611  7773          -5
0612  4776'         JMS     AC              /PRINT "AC",
0613  4455          JMS I   U2SPC           /2 SPACES,
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0614  4775'         JMS     PLXP            /
0615  4454          JMS I   U1SPC           /1 SPACE',
0616  4774'         JMS     PACP            /
0617  4524          JMS I   CRLF            /CR AND LF',
0620  4777'         JMS     MQ              /PRINT "MQ",
0621  4773'         JMS     L               /PRINT "L",
0622  4454          JMS I   U1SPC           /1 SPACE',
0623  4777'         JMS     MQ              /PRINT "MQ",
0624  4241          JMS     YA              /PRINT "A",
0625  4455          JMS I   U2SPC           /2 SPACES,
0626  4772'         JMS     PBLXP           /
0627  4454          JMS I   U1SPC           /1 SPACE',
0630  4771'         JMS     PBACP           /
0631  5605          JMP I   MQA1            /EXIT,

0632  0000  AT,     0
0633  7240          CLA CMA
0634  0076          AND A           /A
0635  4526          JMS I   PRXLOP          /PRINT,
0636  1075          TAD TT          /"T",
0637  4526          JMS I   PRXLOP          /PRINT,
0640  5632          JMP I AT

0641  0000  YA,     0
0642  7240          CLA CMA
0643  0076          AND A           /A
0644  4526          JMS I   PRXLOP          /PRINT,
0645  5641          JMP I YA
0646  3066          DCA BLXP
0647  5770'         JMP RL2


              /TEST OF MQL WITH THE LINK SET TO 0

0650  4304  MQAT1,  JMS HSE3
0651  4542          JMS I UGEN
0652  7340          CLL CLA CMA     /CLEAR LINK
0653  0065          AND GENX
0654  3063          DCA ACP /STORE AC PATTERN
0655  3064          DCA LXP         /STORE LINK TO A ZERO
0656  7040          CMA
0657  0063          AND ACP         /LOAD AC
0660  7421          MQL             /LOAD MQ FROM AC
0661  7501          MQA             /LOAD AC FROM MQ
0662  3067          DCA BACP        /STORE RESULT OF MQL, MQA
0663  7620          CLA SNL
0664  5340          JMP NOPR+14
0665  7240          CLA CMA
0666  3066          DCA BLXP        /STORE LINK RESULT 7777
0667  7040          CMA
0670  0063          AND ACP         /COMPARE ACP WITH BACP
0671  7140          CLL CMA
0672  1067          TAD BACP
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0673  7040          CMA
0674  7450          SNA
0675  7430          SZL
0676  5314          JMP MQAER1      /MQ DID NOT EQUAL AC
0677  7240          CLA CMA
0700  0066          AND BLXP
0701  7440          SZA
0702  5314          JMP MQAER1      /LINK DID NOT EQUAL A ZERO
0703  5330          JMP NOPR+4

0704  7300    HSE3, CLA CLL
0705  3065          DCA GENX
0706  1062          TAD XMQAT1
0707  3056          DCA BACK
0710  1107          TAD XMQAT2
0711  3057          DCA NEXT
0712  4535          JMS I   MODSEL          /PERFORM MODE SELECTION.
0713  5251          JMP MQAT1+1


0714  7604    MQAER1, CLA OSR         /TEST SW2
0715  7106          RTL CLL
0716  7004          RAL
0717  7420          SNL
0720  5324          JMP NOPR
0721  4735          JMS I NOPR+11   /PRINT ERROR
0722  4736          JMS I NOPR+12
0723  4737          JMS I NOPR+13

0724  7604    NOPR, CLA OSR         /TEST SW0
0725  7104          RAL CLL
0726  7430          SZL
0727  7402          HLT             /MQL OR MQA ERROR,
0730  7604          CLA OSR         /TEST SW1
0731  7106          RTL CLL
0732  7430          SZL
0733  5252          JMP MQAT1+2     /PROGRAM LOOP
0734  5251          JMP MQAT1+1     /CONTINUE PROGRAM
0735  0600          PMQAT
0736  0473          XONE
0737  0605          MQA1
0740  3066          DCA BLXP
0741  5267          JMP MQAT1+17

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0771  0370
0772  0347
0773  0311
0774  0362
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0777  0302
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                /TEST OF MQA,

1000  5232    MQAT2,  JMP HSE4
1001  4542          JMS I UGEN
1002  7360          STL CLA CMA     /SET LINK
1003  0065          AND GENX
1004  7040          CMA             /COMPLEMENT GENX PATTERN
1005  3063          DCA ACP         /STORE AC PATTERN
1006  7040          CMA
1007  3064          DCA LXP         /STORE LINK TO A ONE
1010  1065          TAD     GENX
1011  7421          MQL             /LOAD MQ
1012  1063          TAD     ACP             /LOAD AC WITH COMPLEMENTED GENX
1013  7501          MQA
1014  3067          DCA BACP        /STORE RESULT OF MQA
1015  7620          CLA SNL
1016  5333          JMP CLRL4               /STORE LINK RESULT 0000
1017  7240          CLA CMA
1020  3066          DCA BLXP        /STORE LINK RESULT 7777

1021  1067    RL4,  TAD BACP        /AC SHOULD EQUAL 7777
1022  7040          CMA
1023  7440          SZA
1024  5242          JMP MQAER2      /MQ DID NOT INCLUSIVE OR WITH AC
1025  7040          CMA
1026  0066          AND BLXP
1027  7450          SNA
1030  5242          JMP MQAER2      /LINK DID NOT EQUAL A ONE
1031  5255          JMP LNPR2+4

1032  7300    HSE4, CLA CLL
1033  3065          DCA GENX
1034  1107          TAD XMQAT2
1035  3056          DCA BACK
1036  1110          TAD XMQAT3
1037  3057          DCA NEXT
1040  4535          JMS I   MODSEL          /PERFORM MODE SELECTION.
1041  5201          JMP MQAT2+1

1042  7604    MQAER2, CLA OSR         /TEST SW2
1043  7106          RTL CLL
1044  7004          RAL
1045  7420          SNL
1046  5251          JMP LNPR2               /PRINT ERROR
1047  4662          JMS I XPMQAT
1050  4263          JMS EMQAT2


1051  7604    LNPR2,  CLA OSR         /TEST SW0
1052  7104          RAL CLL
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1053  7430          SZL
1054  7402          HLT             /MQA ERROR,
1055  7604          CLA OSR         /TEST SW1
1056  7106          RTL CLL
1057  7430          SZL
1060  5202          JMP MQAT2+2     /PROGRAM LOOP
1061  5201          JMP MQAT2+1     /CONTINUE PROGRAM

1062  0600    XPMQAT, PMQAT


1063  0000    EMQAT2, OPEN
1064  4326          JMS     PTWO
1065  4576          JMS I   CTYMOD          /TYPE THE MODE,
1066  4524    AT3,  JMS I   CRLF            /CARRIAGE RETURN AND LINE FEED,
1067  4455          JMS I   U2SPC           /2 SPACES,
1070  4454          JMS I   U1SPC           /1 SPACE,
1071  4777'         JMS     AC              /PRINT "AC",
1072  4455          JMS I   U2SPC           /2 SPACES,
1073  4776'         JMS     PLXP            /
1074  4454          JMS I   U1SPC           /1 SPACE
1075  4775'         JMS     PACP            /
1076  4524          JMS I   CRLF            /CR AND LF,
1077  4455          JMS I   U2SPC           /2 SPACES,
1100  4454          JMS I   U1SPC           /1 SPACE,
1101  4774'         JMS     MQ              /PRINT "MQ",
1102  4455          JMS I   U2SPC           /2 SPACES,
1103  4455          JMS I   U2SPC           /2 SPACES,
1104  7200          CLA                     /0
1105  1065          TAD     GENX            /
1106  3063          DCA     ACP             /
1107  4775'         JMS     PACP            /
1110  4524          JMS I   CRLF            /CR AND LF,
1111  4774'         JMS     MQ              /PRINT "MQ",
1112  4321          JMS     VOR             /
1113  4777'         JMS     AC              /PRINT "AC",
1114  4455          JMS I   U2SPC           /2 SPACES,
1115  4773'         JMS     PBLXP           /
1116  4454          JMS I   U1SPC           /1 SPACE,
1117  4772'         JMS     PBACP           /
1120  5663          JMP I   EMQAT2          /EXIT,

1121  0000    VOR,  0                       /PRINT INCLUSIVE OR
1122  7240          CLA CMA
1123  0111          AND INCOR
1124  4526          JMS I   PRXLOP          /PRINT,
1125  5721          JMP I VOR


1126  0000    PTWO, 0                       /PRINT 2
1127  7240          CLA CMA
1130  0113          AND TWO
1131  4526          JMS I   PRXLOP          /PRINT,
1132  5726          JMP I PTWO
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1133  3066    CLRL4,  DCA BLXP
1134  5221          JMP RL4


              /TEST OF MQA,

1135  5771'   MQAT3,  JMP HSE5
1136  4542          JMS I UGEN
1137  7340          CLL CLA CMA     /CLEAR LINK
1140  0065          AND GENX
1141  7040          CMA             /COMPLEMENT GENX PATTERN
1142  3063          DCA ACP         /STORE AC PATTERN
1143  3064          DCA LXP         /STORE LINK TO A ZERO
1144  7040          CMA
1145  0065          AND GENX
1146  7421          MQL             /LOAD MQ
1147  1063          TAD ACP         /LOAD AC WITH COMPLEMENTED GENX,
1150  7501          MQA
1151  3067          DCA BACP        /STORE RESULT OF MQA
1152  7620          CLA SNL
1153  7410          SKP
1154  7240          CLA CMA
1155  3066          DCA BLXP        /STORE LINK RESULT 7777
1156  1067          TAD     BACP    /AC SHOULD EQUAL 7777,
1157  7040          CMA
1160  7440          SZA
1161  5770'         JMP MQAER3      /MQ DID NOT INCLUSIVE OR WITH AC
1162  7040          CMA
1163  0066          AND BLXP
1164  7440          SZA
1165  5770'         JMP MQAER3      /LINK DID NOT EQUAL A ZERO
1166  5767'         JMP NOPR3+4

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1170  1210
1171  1200
1172  0370
1173  0347
1174  0302
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1200  7300    HSE5,   CLA CLL
1201  3065          DCA GENX
1202  1110          TAD XMQAT3
1203  3056          DCA BACK
1204  1377          TAD ($AMTS0
1205  3057          DCA NEXT
1206  4535          JMS I   MODSEL          /PERFORM MODE SELECTION,
1207  5776'         JMP MQAT3+1
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1210  7604    MQAER3, CLA OSR          /TEST SW2
1211  7106            RTL CLL
1212  7004            RAL
1213  7420            SNL
1214  5217            JMP NOPR3               /PRINT ERROR
1215  4630            JMS I APMQAT
1216  5233            JMP AMQAT3

1217  7604    NOPR3,  CLA OSR          /TEST SW0
1220  7104            RAL CLL
1221  7430            SZL
1222  7402            HLT              /MQA ERROR,
1223  7604            CLA OSR          /TEST SW1
1224  7106            RTL CLL
1225  7430            SZL
1226  5775'           JMP MQAT3+2      /PROGRAM LOOP
1227  5776'           JMP MQAT3+1      /CONTINUE PROGRAM

1230  0600    APMQAT, PMQAT
1231  1217            NOPR3
1232  1063            EMQAT2

1233  4240    AMQAT3, JMS PTHREE
1234  4576            JMS I   [TYMOD           /TYPE THE MODE,
1235  1231            TAD     APMQAT+1
1236  3632            DCA I APMQAT+2
1237  5774'           JMP     AT3

1240  0000    PTHREE, 0
1241  7240            CLA CMA
1242  0112            AND THREE
1243  4526            JMS I   PRXLOP           /PRINT,
1244  5640            JMP I PTHREE


                /TEST OF THE SAM INSTRUCTION USING FIXED NUMBERS,

1245  4315    SAMTS0, JMS     SAMS0H           /GO DO HOUSEKEEPING,

1246  4263    SAM0,   JMS     SAMGEN           /LOAD
1247  1021            TAD     TOLINK
1250  7104            CLL RAL                  /LINK LOADED
1251  1023            TAD     TOMQ
1252  7421            MQL                      /MQ LOADED
1253  1022            TAD     TOAC             /AC LOADED
1254  7457            SAM                      /EAE SUBTRACT
1255  4541            JMS I   SAVREG           /SAVE L,AC,MQ,SC,AND GT,
1256  4773'           JMS     SAMSIM           /SIMULATE "SAM"
1257  4452            JMS I   UCOMP            /COMPARE ACTUAL AGAINST SIMULATED
1260  7773            -5
1261  5276            JMP     ESAM0            /ERROR
```



```
1262  5302            JMP     ESAM0+4          /NO ERROR

1263  0000    SAMGEN, OPEN
1264  4453            JMS I   UMOVE           /MOVE DATA TO:  TOLINK, TOAC, TOMQ,
1265  0000            OPEN
1266  0021            TOLINK
1267  7775            -3
1270  7325            CLA CLL CML IAC RAL      /AC = 3
1271  1265            TAD     .-4
1272  3265            DCA     .-5
1273  2114            ISZ     SCOUNT
1274  5663            JMP I   SAMGEN
1275  5575            JMP I   [GEN+3

                /ROUTINE TO CHECK SR OPTIONS FOR SAM TEST 0,

1276  4545    ESAM0,  JMS I   TSTSW2           /CHECK SR 2,
1277  4305            JMS     SM0ERR           /PRINT ERROR DATA,
1300  4543            JMS I   TSTSW0           /CHECK SR 0,
1301  7402            HLT                      /SUBTRACT AC FROM MQ ERROR, (SAM),
1302  4544            JMS I   TSTSW1           /CHECK SR 1,
1303  5247            JMP     SAM0+1           /LOOP THE ROUTINE,
1304  5246            JMP     SAM0             /CONTINUE NORMAL TEST,

                /ROUTINE TO PRINT ERROR INFORMATION FOR SAM TEST 0,

1305  0000    SM0ERR, OPEN
1306  4534            JMS I   TYTST            /TYPE THE FOLLOWING:
1307  7775            -3
1310  7524            ZSAM                     /SAM
1311  7440            TEST                     /TEST
1312  7443            ZER0                     /0
1313  4537            JMS I   PREGS            /PRINT HEADING AND CONTENTS OF REGISTERS,
1314  5705            JMP I   SM0ERR           /EXIT

                /INITIALIZATION ROUTINE FOR SAM TEST 0,

1315  0000    SAMS0H, OPEN                     /HOUSEKEEPING FOR SAMTS0,
1316  4540            JMS I   ASCOMP           /SET COMPARE ROUTINE
1317  1372            TAD     (SAMTAB          /GET ADDRESS OF THE TABLE
1320  3265            DCA     SAMGEN+2         /AND STORE IT AT SAMGEN+2
1321  1377            TAD     (SAMTS0
1322  3056            DCA     BACK             /BACK SET TO RETURN TO CURRENT TEST
1323  1371            TAD     (SAMTS1
1324  3057            DCA     NEXT
1325  1370            TAD     (-14             /NUMBER OF TESTS+1,
1326  3114            DCA     SCOUNT
1327  4535            JMS I   MODSEL           /PERFORM MODE SELECTION,
1330  4536            JMS I   ONLYB            /EXIT TEST IF A MODE,
1331  7403            ACS                      /CLEAR THE STEP COUNTER,
1332  5715            JMP I   SAMS0H           /EXIT,

                /TEST OF THE SAM INSTRUCTION USING RANDOM NUMBERS,
```

```
1333  4767'  SAMTS1, JMS     SAMS1H          /GO DO HOUSEKEEPING
1334  4552   SAM1,   JMS I   RNDATA          /LOAD WITH RANDOM
1335  1023           TAD     TOMQ
1336  7421           MQL                     /MQ LOADED
1337  4553           JMS I   LDGT            /LOAD THE GT ACCORDING TO "TOGT",
1340  4556           JMS I   LDSC            /LOAD THE SC ACCORDING TO "TOSHIFT",
1341  1021           TAD     TOLINK
1342  7104           CLL RAL                 /LINK LOADED,
1343  1022           TAD     TOAC            /AC LOADED
1344  7457           SAM                     /EAE SUBTRACT AC FROM MQ
1345  4541           JMS I   SAVREG          /SAVE L,AC,MQ,SC, AND GT,
1346  4773'          JMS     SAMSIM          /SIMULATE "SAM"
1347  4452           JMS I   UCOMP           /COMPARE ACTUAL AGAINST SIMULATED
1350  7773           -5                      /L, AC, MQ, AND SC,
1351  5766'          JMP     ESAM1           /ERROR
1352  5765'          JMP     ESAM1+4         /NO ERROR OCCURRED,

1365  1415
1366  1411
1367  1400
1370  7764
1371  1333
1372  7244
1373  6013
1374  1066
1375  1137
1376  1136
1377  1245
      1400           PAGE


                     /INITIALIZATION ROUTINE FOR SAM TEST 1,

1400  0000   SAMS1H, OPEN
1401  4540           JMS I   ASCOMP          /SET COMPARE ROUTINE,
1402  1377           TAD     (SHLTS0         /ADDRESS OF THE
1403  3057           DCA     NEXT            /NEXT TEST TO "NEXT"
1404  1376           TAD     (SAMTS1         /BACK SET TO
1405  3056           DCA     BACK            /RETURN TO CURRENT TEST,
1406  4535           JMS I   MODSEL          /PERFORM MODE SELECTION,
1407  4536           JMS I   ONLYB           /EXIT TEST IF MODE "AM",
1410  5600           JMP I   SAMS1H          /EXIT,

                     /ROUTINE TO CHECK SR OPTIONS FOR SAM TEST 1

1411  4545   ESAM1,  JMS I   TSTSW2          /CHECK SR 2,
1412  4220           JMS     SM1ERR          /PRINT ERROR DATA,
1413  4543           JMS I   TSTSW0          /CHECK SR 0,
1414  7402           HLT                     /SUBTRACT AC FROM MQ ERROR, (SAM),
1415  4544           JMS I   TSTSW1          /CHECK SR 1,
1416  5775'          JMP     SAM1+1          /LOOP THE ROUTINE,
1417  5774'          JMP     SAM1            /CONTINUE NORMAL TEST,

                     /ROUTINE TO PRINT ERROR INFORMATION FOR SAM TEST 1,
```



```
1420  0000   SM1ERR, OPEN
1421  4534           JMS I   TYTST           /TYPE THE FOLLOWING:
1422  7775           -3
1423  7524           ZSAM                    /SAM
1424  7440           TEST                    /TEST
1425  7445           ZONE                    /1
1426  4537           JMS I   PREGS           /PRINT HEADING AND CONTENTS OF REGISTERS-
1427  5620           JMP I   SM1ERR          /EXIT,


                     /TEST OF THE SHIFT LEFT INSTRUCTION USING AN
                     /INCREMENTING PATTERN IN THE MQ WITH THE AC 0
                     /AND SHIFTING EACH PATTERN 0-37 OCTAL SHIFTS,

1430  4253   SHLTS0, JMS     SLTS0H          /GO DO HOUSE KEEPING
1431  4542   SHL0,   JMS I   UGEN            /GENERATE A NUMBER AND STORE IT IN GENX
1432  7331           CLA CLL CML IAC RAR     /AC=4000,L=1
1433  3021           DCA     TOLINK          /SAVE LINK
1434  1065           TAD     GENX            /GET THE GENERATED NUMBER
1435  3023           DCA     TOMQ            /SAVE FOR MQ
1436  3022           DCA     TOAC            /0 FOR AC
1437  1244           TAD     NBSHL0          /GET NUMBER OF SHIFTS
1440  3024           DCA     TOSHIF          /SAVE NUMBER OF SHIFTS
1441  1065           TAD     GENX            /GET THE GENERATED NUMBER
1442  7421           MQL                     /LOAD THE MQ,
1443  7413           SHL                     /EAE SHIFT LEFT
1444  0000   NBSHL0, OPEN                    /SHIFT THIS AMOUNT OF TIMES,
1445  4541           JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
1446  4773'          JMS     SHLSIM          /SIMULATE SHL,
1447  4452           JMS I   UCOMP           /COMPARE SIMULATED SHL AGAINST ACTUAL SHL,
1450  7773           -5                      /L, AC, MQ, GT, AND SC,
1451  5274           JMP     S0ERR           /SIMULATED AND ACTUAL DID NOT COMPARE,
1452  5300           JMP     S0ERR+4         /SIMULATED AND ACTUAL COMPARED, CONTINUE TEST,

                     /INITIALIZATION SUBROUTINE FOR SHLTS0,

1453  0000   SLTS0H, OPEN                    /HOUSE KEEPING
1454  4540           JMS I   ASCOMP          /SET COMPARE ROUTINE,
1455  3065           DCA     GENX            /ZERO TO NUMBER GENERATOR
1456  3244           DCA     NBSHL0          /ZERO TO LOCATION CONTAINS SHIFTS,
1457  1372           TAD     (SHL0
1460  3056           DCA     BACK
1461  1371           TAD     (S0INC
1462  3057           DCA     NEXT
1463  1174           TAD     C-37
1464  3114           DCA     SCOUNT
1465  4535           JMS I   MODSEL          /PERFORM MODE SELECTION,
1466  5653           JMP I   SLTS0H          /EXIT, AC=0,

                     /ROUTINE TO INCREMENT SHIFT COUNT FOR SHL TEST 0,

1467  2244   S0INC,  ISZ     NBSHL0          /INCREMENT SHIFT COUNT,
1470  2114           ISZ     SCOUNT          /DONE SHIFTING
```

```
1471  5231          JMP     SHL0
1472  5673          JMP I   .+1
1473  1600          SHLTS1

                /ROUTINE TO CHECK SR OPTIONS FOR SHL TEST 0.

1474  4545  S0ERR, JMS I   TSTSW2          /CHECK SR 2,
1475  4303          JMS     S0ERR1         /PRINT ERROR DATA,
1476  4543          JMS I   TSTSW0         /CHECK SR 0,
1477  7402          HLT                    /SHL ERROR',
1500  4544          JMS I   TSTSW1         /CHECK SR 1,
1501  5232          JMP     SHL0+1         /LOOP THE ROUTINE,
1502  5231          JMP     SHL0           /CONTINUE NORMAL TEST,


                /ROUTINE TO PRINT ERROR INFORMATION FOR SHL TEST 0',

1503  0000  S0ERR1, OPEN
1504  4534          JMS I   TYTST          /TYPE THE FOLLOWING
1505  7775          -3
1506  7435          ZSHL                   /SHL
1507  7440          TEST                   /TEST
1510  7443          ZER0                   /0
1511  4547          JMS I   NUMSHF         /NUMBER OF SHIFTS IN DECIMAL,
1512  4537          JMS I   PREGS          /HEADING AND REGISTERS,
1513  5703          JMP I   S0ERR1         /EXIT, AC=0,

1571  1467
1572  1431
1573  6042
1574  1334
1575  1335
1576  1333
1577  1430
      1600          PAGE

                /TEST OF THE SHIFT LEFT INSTRUCTION USING RANDOM DATA',

1600  4216  SHLTS1, JMS     SLTS1H         /GO DO HOUSE KEEPING',
1601  4552  SHL1,   JMS I   RNDATA         /GENERATE RANDOM DATA',
1602  4551          JMS I   LDREG          /LOAD L, MQ, AND GT,
1603  1024          TAD     TOSHIF         /NUMBER OF SHIFTS,
1604  3207          DCA     NBSHL1         /LOAD THE NUMBER OF SHIFTS TO BE DONE',
1605  1022          TAD     TOAC           /AC LOADED',
1606  7413          SHL                    /EAE SHIFT LEFT,
1607  0000  NBSHL1, OPEN                   /THIS AMOUNT OF TIMES
1610  4541          JMS I   SAVREG         /SAVE L,AC,MQ,SC,GT,
1611  4777          JMS     SHLSIM         /SIMULATE SHL
1612  4452          JMS I   UCOMP          /COMPARE SIMULATED AGAINST THE ACTUAL',
1613  7773          -5                     /L, AC, MQ, GT, AND SC',
1614  5226          JMP     S1ERR          /ERROR
1615  5232          JMP     S1ERR+4        /NO ERRORS ENCOUNTERED',

                /INITIALIZATION SUBROUTINE FOR SHLTS1,
```



```
1616  0000  SLTS1H, OPEN                   /HOUSE KEEPING
1617  4540          JMS I   ASCOMP         /SET COMPARE ROUTINE AND CLEAR TABLE',
1620  1376          TAD     (SHLTS1
1621  3056          DCA     BACK
1622  1375          TAD     (LSRTS0
1623  3057          DCA     NEXT
1624  4535          JMS I   MODSEL         /PERFORM MODE SELECTION',
1625  5616          JMP I   SLTS1H         /EXIT, AC=0,

                /ROUTINE TO CHECK SR OPTIONS FOR SHL TEST 0,

1626  4545  S1ERR,  JMS I   TSTSW2          /CHECK SR 2,
1627  4235          JMS     S1ERR1         /PRINT ERROR DATA',
1630  4543          JMS I   TSTSW0         /CHECK SR 0,
1631  7402          HLT                    /SHL ERROR',
1632  4544          JMS I   TSTSW1         /CHECK SR 1,
1633  5202          JMP     SHL1+1         /LOOP THE ROUTINE,
1634  5201          JMP     SHL1           /CONTINUE NORMAL TEST',

                /ROUTINE TO PRINT ERROR INFORMATION FOR SHL TEST 0',

1635  0000  S1ERR1, OPEN
1636  4534          JMS I   TYTST          /TYPE THE FOLLOWING!
1637  7775          -3
1640  7435          ZSHL                   /SHL
1641  7440          TEST                   /TEST
1642  7445          ZONE                   /1
1643  4547          JMS I   NUMSHF         /NUMBER OF SHIFTS IN DECIMAL
1644  4537          JMS I   PREGS          /HEADING AND REGISTERS
1645  5635          JMP I   S1ERR1         /EXIT, AC=0

                /TEST OF THE LOGICAL SHIFT RIGHT INSTRUCTION', (LSR),
                /USING A INCREMENTING PATTERN FROM THE
                /MOST SIGNIFICANT TO LEAST SIGNIFICANT WITH THE
                /MQ=0 AND SHIFTING EACH PATTERN 0-37 OCTAL
                /SHIFTS,

1646  4272  LSRTS0, JMS     LSRS0H         /GO DO HOUSE KEEPING
1647  4542  LSR0,   JMS I   UGEN           /GENERATE A NUMBER
1650  1065          TAD     GENX           /GET THE NUMBER
1651  4774          JMS     OBVERS         /CHANGE IT TO THE OBVERSE
1652  3022          DCA     TOAC           /FOR THE AC
1653  3023          DCA     TOMQ           /0 FOR MQ,
1654  1263          TAD     NBLSR0
1655  3024          DCA     TOSHIF
1656  7331          CLA CLL CML IAC RAR    /L=1,AC=4000
1657  3021          DCA     TOLINK         /TOLINK=4000
1660  7421          MQL                    /MQ=0
1661  1022          TAD     TOAC           /AC LOADED',
1662  7417          LSR                    /EAE LOGICAL SHIFT RIGHT,
```

```
1663  0000  NBLSR0, OPEN                  /DATA TO STEP COUNTER,
1664  4541        JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
1665  4773        JMS     LSRSIM          /SIMULATE LSR
1666  4452        JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL,
1667  7773        -5                      /L,AC,MQ,GT,AND SC,
1670  5313        JMP     L0ERR           /ERROR
1671  5317        JMP     L0ERR+4         /NO ERRORS ENCOUNTERED

                  /INITIALIZATION SUBROUTINE FOR LSRTS0,

1672  0000  LSRS0H, OPEN
1673  4540        JMS I   ASCOMP          /SET COMPARE ROUTINE,
1674  3065        DCA     GENX            /ZERO TO NUMBER GENERATOR
1675  3263        DCA     NBLSR0          /ZERO TO LOCATION CONTAINIG SHIFTS
1676  1372        TAD     (LSR0
1677  3056        DCA     BACK
1700  1371        TAD     (L0INC
1701  3057        DCA     NEXT
1702  1174        TAD     [-37
1703  3114        DCA     SCOUNT
1704  4535        JMS I   MODSEL          /PERFORM MODE SELECTION,
1705  5672        JMP I   LSRS0H          /EXIT, AC=0,

                  /ROUTINE TO INCREMENT SHIFT COUNT FOR LSR TEST 0,

1706  2263  L0INC,  ISZ     NBLSR0
1707  2114        ISZ     SCOUNT
1710  5247        JMP     LSR0
1711  5712        JMP I   .+1
1712  2000        LSRTS1

                  /ROUTINE TO CHECK SR OPTIONS FOR LSR TEST 0,

1713  4545  L0ERR,  JMS I   TSTSW2         /CHECK SR 2,
1714  4322        JMS     L0ERR1          /PRINT ERROR DATA,
1715  4543        JMS I   TSTSW0          /CHECK SR 0,
1716  7402        HLT                     /LSR ERROR,
1717  4544        JMS I   TSTSW1          /CHECK SR 1,
1720  5250        JMP     LSR0+1          /LOOP THE ROUTINE,
1721  5247        JMP     LSR0            /CONTINUE NORMAL TEST,

                  /ROUTINE TO PRINT ERROR INFORMATION FOR LSR TEST 0,

1722  0000  L0ERR1, OPEN
1723  4534        JMS I   TYTST           /TYPE THE FOLLOWING
1724  7775        -3
1725  7453        'LSR                    /LSR
1726  7440        TEST                    /TEST
1727  7443        'ER0                    /0
1730  4547        JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL
1731  4537        JMS I   PREGS
1732  5722        JMP I   L0ERR1          /EXIT
```



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1771  1706
1772  1647
1773  6120
1774  6473
1775  1646
1776  1600
1777  6042
      2000        PAGE

                  /TEST OF THE LOGICAL SHIFT RIGHT INSTRUCTION USING RANDOM DATA,

2000  4216  LSRTS1, JMS     LSRS1H          /GO DO HOUSE KEEPING
2001  4552  LSR1,   JMS I   RNDATA          /GENERATE RANDOM DATA,
2002  4551        JMS I   LDREG           /LOAD L, MQ, AND GT,
2003  1024        TAD     TOSHIF          /
2004  3207        DCA     NBLSR1          /NUMBER OF SHIFTS,
2005  1022        TAD     TOAC            /AC LOADED,
2006  7417        LSR                     /LOGICAL SHIFT RIGHT,
2007  0000  NBLSR1, OPEN                  /NUMBER OF SHIFTS TO BE PERFORMED,
2010  4541        JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
2011  4777        JMS     LSRSIM          /SIMULATE LSR
2012  4452        JMS I   UCOMP           /CHECK SIMULATED AGAINST ACTUAL
2013  7773        -5                      /L, AC, MQ, GT, AND SC,
2014  5226        JMP     L1ERR           /ERROR
2015  5232        JMP     L1ERR+4         /NO ERRORS ENCOUNTERED,

                  /INITIALIZATION SUBROUTINE FOR LSRTS1

2016  0000  LSRS1H, OPEN
2017  4540        JMS I   ASCOMP          /SET COMPARE ROUTINE,
2020  1376        TAD     (LSRTS1
2021  3056        DCA     BACK
2022  1375        TAD     (ASRTS0
2023  3057        DCA     NEXT
2024  4535        JMS I   MODSEL          /PERFORM MODE SELECTION,
2025  5616        JMP I   LSRS1H          /EXIT, AC=0



                  /ROUTINE TO CHECK SR OPTIONS FOR LSR TEST 1,

2026  4545  L1ERR,  JMS I   TSTSW2         /CHECK SR 2,
2027  4235        JMS     L1ERR1          /PRINT ERROR DATA,
2030  4543        JMS I   TSTSW0          /CHECK SR 0,
2031  7402        HLT                     /LSR ERROR,
2032  4544        JMS I   TSTSW1          /CHECK SR 1,
2033  5202        JMP     LSR1+1          /LOOP THE ROUTINE,
2034  5201        JMP     LSR1            /CONTINUE NORMAL TEST,

                  /ROUTINE TO PRINT ERROR INFORMATION

2035  0000  L1ERR1, OPEN
```

```
2036  4534          JMS I   TYTST           /PRINT THE FOLLOWING:
2037  7775          -3
2040  7453          ZLSR                    /LSR
2041  7440          TEST                    /TEST
2042  7445          ZONE                    /1
2043  4547          JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL
2044  4537          JMS I   PREGS           /HEADING AND REGISTERS,
2045  5635          JMP I   L1ERR1          /EXIT

                    /TEST OF THE ARITHMETIC SHIFT RIGHT INSTRUCTION,
                    /USING AN INCREMENTING PATTERN FROM THE
                    /MOST SIGNIFICANT TO LEASE SIGNIFICANT WITH THE
                    /MQ ZERO AND SHIFTING EACH PATTERN 0-37 OCTAL
                    /SHIFTS,

2046  4272    ASRTS0, JMS     ASRS0H          /DO INITIALIZATION
2047  4542    ASR0,   JMS I   UGEN            /GENERATE A COUNT,
2050  1065            TAD     GENX            /GET THE NUMBER
2051  4774'           JMS     OBVERS          /CHANGE IT TO THE OBVERSE
2052  3022            DCA     TOAC            /COUNT PATTERN TO TOAC
2053  3023            DCA     TOMQ            /0 TO TOMQ
2054  1263            TAD     NBASR0
2055  3024            DCA     TOSHIF
2056  7331            CLA CLL CML IAC RAR     /L=1
2057  3021            DCA     TOLINK          /1 TO TOLINK
2060  7421            MQL                     /0 TO MQ
2061  1022            TAD TOAC                /AC LOADED
2062  7415            ASR                     /EAE ARITHMETIC SHIFT RIGHT,
2063  0000    NBASR0, OPEN
2064  4541            JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
2065  4773'           JMS     ASRSIM          /SIMULATE AN ASR,
2066  4452            JMS I   UCOMP           /COMPARE ACTUAL AGAINST SIMULATED
2067  7773            -5                      /L, AC, MQ, GT, AND SC,
2070  5313            JMP     A0ERR           /ERROR DETECTED,
2071  5317            JMP     A0ERR+4         /NO ERROR ENCOUNTERED

                    /INITIALIZATION SUBROUTINE FOR ASRTS0,

2072  0000    ASRS0H, OPEN
2073  4540            JMS I   ASCOMP          /SET COMPARE ROUTINE,
2074  3065            DCA     GENX            /ZERO TO NUMBER GENERATOR
2075  3263            DCA     NBASR0          /ZERO TO LOCATION CONTAINING SHIFTS,
2076  1372            TAD     (ASR0
2077  3056            DCA     BACK
2100  1371            TAD     (A0INC
2101  3057            DCA     NEXT
2102  1174            TAD     C-37            /SET UP FOR
2103  3114            DCA     SCOUNT          /37 OCTAL SHIFTS
2104  4535            JMS I   MODSEL          /PERFORM MODE SELECTION,
2105  5672            JMP I   ASRS0H          /EXIT, AC=0,

                    /ROUTINE TO INCREMENT SHIFT COUNT FOR ASR TEST 0,

2106  2263    A0INC,  ISZ     NBASR0
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```
2107  2114            ISZ SCOUNT              /DONE THIS TEST YET?
2110  5247            JMP     ASR0            /NO,
2111  5712            JMP I   .+1             /GO TO NEXT TEST,
2112  2200            ASRTS1

                    /ROUTINE TO CHECK SR OPTIONS FOR ASR TEST 0,

2113  4545    A0ERR,  JMS I   TSTSW2          /CHECK SR 2,
2114  4322            JMS     A0ERR1          /PRINT ERROR DATA,
2115  4543            JMS I   TSTSW0          /CHECK SR 0,
2116  7402            HLT                     /ASR ERROR,
2117  4544            JMS I   TSTSW1          /CHECK SR 1,
2120  5250            JMP     ASR0+1          /LOOP THE ROUTINE,
2121  5247            JMP     ASR0            /CONTINUE NORMAL TEST,

                    /ROUTINE TO PRINT ERROR INFORMATION FOR ASR TEST 0,

2122  0000    A0ERR1, OPEN
2123  4534            JMS I   TYTST           /PRINT THE FOLLOWING,
2124  7775            -3
2125  7462            ZASR                    /ASR
2126  7440            TEST                    /TEST
2127  7443            ZER0                    /0
2130  4547            JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL,
2131  4537            JMS I   PREGS           /HEADING AND REGISTERS,
2132  5722            JMP I   A0ERR1          /EXIT, AC=0,

2171  2106
2172  2047
2173  6200
2174  6473
2175  2046
2176  2000
2177  6120
      2200            PAGE

                    /TEST OF THE ARITHMETIC SHIFT RIGHT INSTRUCTION
                    /USING RANDOM DATA,

2200  4216    ASRTS1, JMS     ASRS1H          /GO DO HOUSEKEEPING
2201  4552    ASR1,   JMS I   RNDATA          /GENERATE RANDOM DATA,
2202  4551            JMS I   LDREG           /LOAD L, MQ, AND GT,
2203  1024            TAD     TOSHIF
2204  3207            DCA     NBASR1          /NUMBER OF SHIFTS LOADED,
2205  1022            TAD     TOAC            /AC LOADED
2206  7415            ASR                     /EAE ARITHMETIC SHIFT RIGHT
2207  0000    NBASR1, OPEN                    /NUMBER OF SHIFTS,
2210  4541            JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
2211  4777'           JMS     ASRSIM          /SIMULATE ASR,
2212  4452            JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL,
2213  7773            -5
2214  5226            JMP     A1ERR           /ERROR DETECTED,
2215  5232            JMP     A1ERR+4         /NO ERRORS ENCOUNTERED,
```

```
                    /INITIALIZATION SUBROUTINE FOR ASRTS1,

 2216  0000    ASRS1H, OPEN
 2217  4540            JMS I   ASCOMP          /SET COMPARE ROUTINE,
 2220  1376            TAD     (ASRTS1
 2221  3056            DCA     BACK
 2222  1375            TAD     (DPSZS0
 2223  3057            DCA     NEXT
 2224  4535            JMS I   MODSEL          /PERFORM MODE SELECTION,
 2225  5616            JMP I   ASRS1H          /EXIT,  AC=0,

                    /ROUTINE TO CHECK SR OPTIONS IN ASR TEST 1,

 2226  4545    A1ERR,  JMS I   TSTSW2          /CHECK SR 2,
 2227  4235            JMS     A1ERR1          /PRINT ERROR DATA,
 2230  4543            JMS I   TSTSW0          /CHECK SR 0,
 2231  7402            HLT                     /ASR ERROR,
 2232  4544            JMS I   TSTSW1          /CHECK SR 1,
 2233  5202            JMP     ASR1+1          /LOOP THE ROUTINE,
 2234  5201            JMP     ASR1            /CONTINUE NORMAL TEST,

                    /ROUTINE TO PRINT ERROR INFORMATION,

 2235  0000    A1ERR1, OPEN                    /PRINT THE FOLLOWING:
 2236  4534            JMS I   TYTST
 2237  7775            -3
 2240  7462            ZASR                    /ASR
 2241  7440            TEST                    /TEST
 2242  7445            ZONE                    /1
 2243  4547            JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL
 2244  4537            JMS I   PREGS           /HEADING AND REGISTERS
 2245  5635            JMP I   A1ERR1          /EXIT

                    /TEST OF THE DOUBLE PRECISION SKIP IF ZERO INSTRUCTION, (DPSZ),

 2246  4774'   DPSZS0, JMS     DPSZ0H          /GO DO HOUSE KEEPING,
 2247  7320            CLA CLL CML
 2250  4773'   DPSZ0,  JMS     ROTGEN
 2251  7300            CLA CLL
 2252  1044            TAD     LSH             /GET DATA THAT WILL BE PLACED IN THE MQ,
 2253  1043            TAD     MSH             /ADD THE AC DATA TO THAT,
 2254  7650            SNA CLA                 /WOULD THE AC AND MQ BE ZERO?
 2255  7430            SZL                     /CHECK FOR A CARRY WHEN AC AND MQ ARE ADDED,
 2256  4302            JMS     NOSKIP          /AC AND MQ WILL BE NON ZERO,
 2257  4313            JMS     YSKIP           /AC AND MQ WILL BE ZERO,
 2260  7331            CLA CLL CML IAC RAR     /AC = 4000; LINK = 1
 2261  3042            DCA     LSIM            /LOAD THE SIMULATED LINK
 2262  1042            TAD     LSIM
 2263  3021            DCA     TOLINK          /LOAD THE PROBLEM LINK,
 2264  1044            TAD     LSH
 2265  7421            MQL                     /MQ NOW LOADED,
 2266  1043            TAD     MSH             /AC NOW LOADED,
 2267  7451            DPSZ                    /EAE DOUBLE PRECISION SKIP IF ZERO
 2270  0000    NOSKP,  OPEN
 2271  0000    YESSKP, OPEN
```



```
 2272  4541    CKDATA, JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
 2273  4452            JMS I   UCOMP           /COMPARE L,AC,MQ
 2274  7775            -3
 2275  7610            SKP CLA                 /DPSZ MODIFIED A REGISTER,
 2276  5772'           JMP     EDPSZ0+5        /NO ERROR OCCURED,
 2277  1371            TAD     (DATER          /SET PRINTOUT FOR DATA ERROR
 2300  3770'           DCA     DPZPR1
 2301  5767'           JMP     EDPSZ0+1        /DPSZ MODIFIED ONE OF THE REGISTERS,

                    /ROUTINE TO SETUP FOR NO SKIP CONDITION

 2302  0000    NOSKIP, OPEN                    /AC AND MQ NOT 0
 2303  1366            TAD     (JMP CKDATA
 2304  3270            DCA     NOSKP
 2305  1364'           TAD     (JMP EDPSZ0
 2306  3271            DCA     YESSKP
 2307  1363            TAD     (SO
 2310  3770'           DCA     DPZPR1
 2311  2302            ISZ     NOSKIP
 2312  5702            JMP I   NOSKIP          /EXIT,  AC=0

                    /ROUTINE TO SET UP FOR A SKIP CONDITION

 2313  0000    YSKIP,  OPEN                    /AC AND MQ =0
 2314  1366            TAD     (JMP CKDATA
 2315  3271            DCA     YESSKP
 2316  1364'           TAD     (JMP EDPSZ0
 2317  3270            DCA     NOSKP
 2320  1362            TAD     (NSO
 2321  3770'           DCA     DPZPR1
 2322  5713            JMP I   YSKIP           /EXIT, AC = 0,


 2362  7554
 2363  7545
 2364  5765
 2365  2512
 2366  5272
 2367  2513
 2370  5544
 2371  7565
 2372  2517
 2373  2476
 2374  2400
 2375  2246
 2376  2200
 2377  6200
       2400              PAGE

                    /INITIALIZATION ROUTINE FOR DPSZS0,

 2400  0000    DPSZ0H, OPEN
 2401  4540            JMS I   ASCOMP          /SET COMPARE ROUTINE,
 2402  1377            TAD     (DPSZS0
 2403  3056            DCA     BACK
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2404  1376            TAD     (DZINC
2405  3057            DCA     NEXT
2406  1775'           TAD     DSZJMS
2407  3774'           DCA     PRCHG           /SET PRINTOUT ROUTINE FOR DPSZ TEST.
2410  7344            CLA CLL CMA RAL         /7776
2411  3273            DCA CNTR1
2412  7344            CLA CLL CMA RAL         /7776
2413  3274            DCA     CNTR2
2414  7344            CLA CLL CMA RAL         /7776
2415  3275            DCA     CNTR3
2416  1373            TAD     (-32
2417  3114            DCA     SCOUNT
2420  4535            JMS I   MODSEL          /PERFORM MODE SELECTION.
2421  1115            TAD     MODE
2422  7700            SMA CLA
2423  5264            JMP     MODA            /EXIT IF MODE A
2424  7403            ACS                     /CLEAR THE STEP COUNTER.
2425  5600            JMP I   DPSZ0H          /EXIT,  AC=0.


2426  2114    DZINC,  ISZ     SCOUNT
2427  5772'           JMP     DPSZ0+1
2430  7340            CLA CMA CLL
2431  3114            DCA     SCOUNT          /SET SCOUNT TO 7777 SO THE ROTGEN IS NOT USED.
2432  7240            CLA CMA
2433  3043            DCA     MSH             /7777
2434  3044            DCA     LSH             /0000
2435  2273            ISZ     CNTR1
2436  5772'           JMP     DPSZ0+1
2437  7240            CLA CMA
2440  3114            DCA     SCOUNT          /SET SCOUNT TO 7777 SO THE ROTGEN IS NOT USED.
2441  7240            CLA CMA
2442  3273            DCA     CNTR1           /SET CNTR1 TO 7777 SO AC=7777 + MQ=0 TEST IS NOT USED.
2443  7240            CLA CMA
2444  3044            DCA     LSH             /7777
2445  3043            DCA     MSH             /0000
2446  2274            ISZ     CNTR2
2447  5772'           JMP     DPSZ0+1
2450  7240            CLA CMA
2451  3114            DCA     SCOUNT          /SET SCOUNT TO 7777 SO THE ROTGEN IS NOT USED AGAIN.
2452  7040            CMA
2453  3273            DCA     CNTR1           /SET CNTR1 TO 7777 SO AC=7777+MQ=0 TEST IS NOT USED AGAIN.
2454  7040            CMA
2455  3274            DCA     CNTR2           /SET CNTR2 TO 7777 SO AC=0 + MQ=7777 TEST IS NOT USED AGAIN.
2456  7040            CMA
2457  3044            DCA     LSH             /7777
2460  7040            CMA
2461  3043            DCA     MSH             /7777
2462  2275            ISZ     CNTR3
2463  5772'           JMP     DPSZ0+1
2464  7604    MODA,   LAS                     /TEST SR 3.
2465  7006            RTL
2466  7004            RAL
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2467  7710            SPA CLA                 /SR 3 SET?
2470  5777'           JMP DPSZS0              /YES IT IS, REPEAT TEST.
2471  5672            JMP I   .+1
2472  2600            DPITS0

2473  0000    CNTR1,  OPEN
2474  0000    CNTR2,  OPEN
2475  0000    CNTR3,  OPEN

                /ROUTINE TO GENERATE A ROTATING BIT THROUGH THE MQ AND AC.

2476  0000    ROTGEN, OPEN                    /GENERATE ROTATING PATTERN
2477  1044            TAD     LSH
2500  7004            RAL
2501  3044            DCA     LSH
2502  1043            TAD     MSH
2503  7004            RAL
2504  3043            DCA     MSH
2505  1043            TAD     MSH
2506  3022            DCA     TOAC
2507  1044            TAD     LSH
2510  3023            DCA     TOMQ
2511  5226            JMP     DZINC           /EXIT,  AC=0.

                /ROUTINE TO CHECK SR OPTIONS FOR DPSZ TEST 0.

2512  4541    EDPSZ0, JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
2513  4545            JMS I   TSTSW2          /CHECK SR 2.
2514  4323            JMS     DZERR0          /PRINT ERROR DATA.
2515  4543            JMS I   TSTSW0          /CHECK SR 0.
2516  7402            HLT                     /DPSZ ERROR.
2517  4544            JMS I   TSTSW1          /CHECK SR 1.
2520  5772'           JMP     DPSZ0+1         /LOOP THE ROUTINE.
2521  7100            CLL
2522  5771'           JMP     DPSZ0           /CONTINUE NORMAL TEST.

                /ROUTINE TO PRINT ERROR INFORMATION.

2523  0000    DZERR0, OPEN
2524  4534            JMS I   TYTST
2525  7775            -3
2526  7465            ZDPSZ
2527  7440            TEST
2530  7443            ZERO
2531  4537            JMS I   PREGS
2532  5723            JMP I   DZERR0          /EXIT

2571  2250
2572  2251
2573  7746
2574  7002
2575  7045
2576  2426
2577  2246
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                2600            PAGE

                        /TEST OF THE DOUBLE PRECISION INCREMENT INSTRUCTION, (DPIC).

2600  4221    DPITS0, JMS     DPIS0H          /GO DO HOUSE KEEPING.
2601  4542    DPI0,   JMS I   UGEN            /GENERATE NUMBERS.
2602  7240            CLA CMA                 /7777
2603  3022            DCA     TOAC            /SIMULATED AC = 7777.
2604  3021            DCA     TOLINK          /SIMULATED LINK = 0.
2605  1065            TAD     GENX            /GET THE NUMBER GENERATED BY "GEN".
2606  7421            MQL                     /MQ LOADED.
2607  7701            CLA MQA                 /MQ TO AC.
2610  3023            DCA     TOMQ            /SIMULATED MQ = C(GENX).
2611  7240            CLA CMA                 /AC = 7777
2612  7573            DPIC                    /DOUBLE PRECISION INCREMENT
2613  4541            JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
2614  4777/           JMS     DPISIM          /SIMULATE DPI.
2615  4452            JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL.
2616  7775            -3                      /L,AC,MQ.
2617  5234            JMP     EDPI0           /ERROR
2620  5240            JMP     EDPI0+4


                        /INITIALIZATION ROUTINE FOR DPIC TEST 0.

2621  0000    DPIS0H, OPEN                    /HOUSE KEEPING OF DPITS0.
2622  4540            JMS I   ASCOMP          /SET COMPARE ROUTINE.
2623  3065            DCA     GENX
2624  1376            TAD     (DPI0
2625  3056            DCA     BACK
2626  1375            TAD     (DPITS1
2627  3057            DCA     NEXT
2630  4535            JMS I   MODSEL          /PERFORM MODE SELECTION.
2631  4536            JMS I   ONLYB           /EXIT IF MODE "A".
2632  7403            ACS                     /CLEAR THE STEP COUNTER.
2633  5621            JMP I   DPIS0H          /EXIT

                        /ROUTINE TO CHECK SR OPTIONS FOR DPIC TEST 0.

2634  4545    EDPI0,  JMS I   TSTSW2          /CHECK SR 2.
2635  4243            JMS     DI0ERR          /PRINT ERROR DATA.
2636  4543            JMS I   TSTSW0          /CHECK SR 0.
2637  7402            HLT                     /DPIC ERROR.
2640  4544            JMS I   TSTSW1          /CHECK SR 1.
2641  5202            JMP     DPI0+1          /LOOP THE ROUTINE.
2642  5201            JMP     DPI0            /CONTINUE NORMAL TEST.

                        /ROUTINE TO PRINT ERROR INFORMATION.

2643  0000    DI0ERR, OPEN
2644  4534            JMS I   TYTST           /PRINT THE FOLLOWING:
2645  7775            -3
2646  7470            ZDPIC                   /DPIC
2647  7440            TEST                    /TEST
```



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2650  7443            ZERO                    /0
2651  4537            JMS I   PREGS          /HEADING AND REGISTERS.
2652  5643            JMP I   DI0ERR          /EXIT,  AC=0.

                        /TEST OF THE DOUBLE PRECISION INCREMENT INSTRUCTION,
                        /USING RANDOM DATA.

2653  4267    DPITS1, JMS     DPIS1H          /GO DO HOUSEKEEPING
2654  4552    DPI1,   JMS I   RNDATA          /GENERATE RANDOM DATA.
2655  4556            JMS I   LDSC            /LOAD THE STEP COUNTER.
2656  4551            JMS I   LDREG           /LOAD L, MQ, AND GT.
2657  1022            TAD     TOAC            /AC LOADED.
2660  7573            DPIC                    /EAE DOUBLE PRECISION INCREMENT.
2661  4541            JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
2662  4777/           JMS     DPISIM          /SIMULATE DPIC.
2663  4452            JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL
2664  7773            -5                      /L,AC,MQ,CT, AD SC.
2665  5300            JMP     EDPI1           /ERROR
2666  5304            JMP     EDPI1+4         /NO ERRORS ENCOUNTERED

                        /INITIALIZATION ROUTINE FOR DPIC TEST 1.

2667  0000    DPIS1H, OPEN                    /HOUSEKEEPING FOR DPIS1
2670  4540            JMS I   ASCOMP          /SET COMPARE ROUTINE.
2671  1375            TAD     (DPITS1
2672  3056            DCA     BACK
2673  1374            TAD     (DCMTS0
2674  3057            DCA     NEXT
2675  4535            JMS I   MODSEL          /PERFORM MODE SELECTION.
2676  4536            JMS I   ONLYB           /EXIT IT MODE "A".
2677  5667            JMP I   DPIS1H          /EXIT

                        /ROUTINE TO CHECK SR OPTIONS IN DPIC TEST 1.

2700  4545    EDPI1,  JMS I   TSTSW2          /CHECK SR 2.
2701  4307            JMS     DI1ERR          /PRINT ERROR DATA.
2702  4543            JMS I   TSTSW0          /CHECK SR 0.
2703  7402            HLT                     /DPIC ERROR.
2704  4544            JMS I   TSTSW1          /CHECK SR 1.
2705  5255            JMP     DPI1+1          /LOOP THE ROUTINE.
2706  5254            JMP     DPI1            /CONTINUE NORMAL TEST.

                        /ROUTINE TO PRINT ERROR INFORMATION.

2707  0000    DI1ERR, OPEN                    /PRINT THE FOLLOWING:
2710  4534            JMS I   TYTST
2711  7775            -3
2712  7470            ZDPIC                   /DPIC
2713  7440            TEST                    /TEST
2714  7445            ZONE                    /1
2715  4537            JMS I   PREGS           /HEADING AND REGISTERS.
2716  5707            JMP I   DI1ERR          /EXIT,  AC=0.

                        /TEST OF THE DOUBLE PRECISION COMPLEMENT INSTRUCTION.
```

```
2717  4773'  DCMTS0, JMS     DCMS0H          /GO DO INITIALIZATION,
2720  4552   DCM0,   JMS I   RNDATA          /GENERATE RANDOM DATA,
2721  4556           JMS I   LDSC            /LOAD THE SC,
2722  4551           JMS I   LDREG           /LOAD L,MQ,AND GT,
2723  1022           TAD     TOAC            /AC LOADED
2724  7575           DCM                     /EAE DOUBLE PRECISION 2'S COMPLEMENT
2725  4541           JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
2726  4772'          JMS     DCMSIM          /SIMULATE DCM
2727  4452           JMS I   UCOMP           /COMPARE ACTUAL AGAINST SIMULATED,
2730  7775           -3                      /L,AC,MQ ONLY
2731  5771'          JMP     EDCM0           /ERROR
2732  5770'          JMP     EDCM0+4         /NO ERROR

2770  3015
2771  3011
2772  6311
2773  3000
2774  2717
2775  2653
2776  2601
2777  6273
      3000           PAGE

                /ROUTINE TO DO INITIALIZATION FOR DCM TEST 0,

3000  0000   DCMS0H, OPEN                    /HOUSEKEEPING FOR DCMTS0
3001  4540           JMS I   ASCOMP          /SET COMPARE ROUTINE,
3002  1377           TAD     (DCMTS0
3003  3056           DCA     BACK
3004  1376           TAD     (DADTS0
3005  3057           DCA     NEXT
3006  4535           JMS I   MODSEL          /PERFORM MODE SELECTION,
3007  4536           JMS I   ONLYB           /EXIT IF MODE "A",
3010  5600           JMP I   DCMS0H          /EXIT

                /ROUTINE TO CHECK SR OPTIONS FOR DCM TEST 0,

3011  4545   EDCM0,  JMS I   TSTSW2          /CHECK SR 2,
3012  4220           JMS     DM0ERR          /PRINT ERROR DATA,
3013  4543           JMS I   TSTSW0          /CHECK SR 0,
3014  7402           HLT                     /DCM ERROR,
3015  4544           JMS I   TSTSW1          /CHECK SR 1,
3016  5775'          JMP     DCM0+1          /LOOP THE ROUTINE,
3017  5774'          JMP     DCM0            /CONTINUE NORMAL TEST,

                /ROUTINE TO PRINT ERROR INFORMATION,

3020  0000   DM0ERR, OPEN
3021  4534           JMS I   TYTST           /PRINT THE FOLLOWING:
3022  7775           -3
3023  7473           ZDCM                    /DCM
3024  7440           TEST                    /TEST
3025  7443           ZER0                    /0
3026  4537           JMS I   PREGS           /HEADING AND REGISTERS,
```



```
3027  5620           JMP I   DM0ERR          /EXIT, AC=0,

                /TEST OF THE DOUBLE PRECISION ADD INSTRUCTION
                /USING FIXED DATA,

3030  4267   DADTS0, JMS     DADS0H          /GO DO HOUSEKEEPING
3031  4253   DAD0,   JMS     DADGEN          /GET NUMBERS TO ADD,
3032  1021           TAD     TOLINK
3033  7104           CLL RAL                 /LINK LOADED
3034  1023           TAD     TOMQ
3035  7421           MQL                     /MQ LOADED
3036  1024           TAD     TOSHIF
3037  3122           DCA     DPAC            /MSH LOADED
3040  1025           TAD     TOGT
3041  3121           DCA     DPMQ            /LSH LOADED
3042  1022           TAD     TOAC            /AC LOADED
3043  7443           DAD                     /EAE DOUBLE PRECISION ADD
3044  0121           DPMQ                    /ADDRESS
3045  4541           JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
3046  4773'          JMS     DADSIM          /SIMULATE DAD
3047  4452           JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL
3050  7775           -3                      /L,AC,MQ,
3051  5307           JMP     EDAD0           /ERROR
3052  5325           JMP     EDAD0+16        /NO ERRORS ENCOUNTERED


3053  0000   DADGEN, OPEN
3054  4453           JMS I   UMOVE
3055  0000           OPEN
3056  0021           TOLINK
3057  7773           -5
3060  7326           CLA CLL CML RTL         /AC=2
3061  7124           CLL CML RAL             /AC=5
3062  1255           TAD     .-5             /ADD THE ADDRESS
3063  3255           DCA     .-6             /PUT IT BACK WITH 5 ADDED TO IT
3064  2114           ISZ     SCOUNT          /FINISHED WITH ALL STORED PATTERNS
3065  5653           JMP I   DADGEN          /NO,
3066  5575           JMP I   DGEN+3          /YES,

                /INITIALIZATION ROUTINE FOR DAD TEST 0,

3067  0000   DADS0H, OPEN
3070  4540           JMS I   ASCOMP          /SET COMPARE ROUTINE,
3071  1372           TAD     (DADTAB         /GET ADDRESS OF TABLE
3072  3255           DCA     DADGEN+2        /AND STORE IT IN DADGEN+2
3073  1376           TAD     (DADTS0
3074  3056           DCA     BACK
3075  1371           TAD     (DADTS1
3076  3057           DCA     NEXT            /
3077  1370           TAD     (-11
3100  3114           DCA     SCOUNT
3101  1767'          TAD     DADJMS          /GET A JMS TO MODIFY PRINT ROUTINE,
3102  3766'          DCA     WILCHG          /PUT THE JMS IN WILCHG,
3103  4535           JMS I   MODSEL          /PERFORM MODE SELECTION,
3104  4536           JMS I   ONLYB           /EXIT IF MODE "A",
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3105  7403          ACS                     /CLEAR THE STEP COUNTER.
3106  5667          JMP I   DADS0H          /EXIT

                /ROUTINE TO CHECK SR OPTIONS FOR DAD TEST 0.

3107  1024  EDAD0,  TAD     TOSHIF
3110  3040          DCA     TEMPA           /MSH TO TEMPA
3111  1025          TAD     TOGT
3112  3041          DCA     TEMPB           /LSH TO TEMPB
3113  3024          DCA     TOSHIF          /0
3114  3025          DCA     TOGT            /0
3115  4545          JMS I   TSTSW2          /CHECK SR 2.
3116  4330          JMS     DA0ERR          /PRINT ERROR DATA
3117  1040          TAD     TEMPA
3120  3024          DCA     TOSHIF          /RESTORE MSH
3121  1041          TAD     TEMPB
3122  3025          DCA     TOGT            /RESTORE LSH
3123  4543          JMS I   TSTSW0          /CHECK SR 2.
3124  7402          HLT                     /DAD ERROR.
3125  4544          JMS I   TSTSW1          /CHECK SR 1.
3126  5232          JMP     DAD0+1
3127  5231          JMP     DAD0


                /ROUTINE TO PRINT ERROR INFORMATION.

3130  0000  DA0ERR, OPEN
3131  4534          JMS I   TYTST           /PRINT THE FOLLOWING:
3132  7775          -3
3133  7476          ZDAD                    /DAD
3134  7440          TEST                    /TEST
3135  7443          ZER0                    /0
3136  4537          JMS I   PREGS           /HEADING AND REGISTERS.
3137  5730          JMP I   DA0ERR          /EXIT,  AC=0.


3166  7016
3167  7044
3170  7767
3171  3200
3172  7327
3173  6332
3174  2720
3175  2721
3176  3030
3177  2717
      3200          PAGE


                /RANDOM DOUBLE PRECISION ADD TEST:

3200  4223  DADTS1, JMS     DADS1H          /GO DO HOUSEKEEPING
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3201  4241  DAD1,   JMS     RANDAD          /GENERATE RANDOM NUMBERS
3202  1021          TAD     TOLINK
3203  7104          CLL RAL                 /LINK LOADED
3204  1023          TAD     TOMQ
3205  7421          MQL                     /MQ LOADED
3206  1024          TAD     TOSHIF
3207  3122          DCA     DPAC
3210  1025          TAD     TOGT
3211  3121          DCA     DPMQ            /LEAST SIGNIFICANT LOADED
3212  1022          TAD     TOAC            /AC LOADED
3213  7443          DAD                     /EAE DOUBLE PRECISION ADD
3214  0121          DPMQ                    /ADDRESS
3215  4541          JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
3216  4777'         JMS     DADSIM          /SIMULATE DAD
3217  4452          JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL
3220  7775          -3                      /L, AC, MQ.
3221  5257          JMP     EDAD1           /ERROR
3222  5275          JMP     EDAD1+16        /NO ERRORS ENCOUNTERED

                /INITIALIZATION ROUTINE FOR DAD TEST 1.

3223  0000  DADS1H, OPEN
3224  4540          JMS I   ASCOMP          /SET COMPARE ROUTINE.
3225  1376          TAD     (DADTS1
3226  3056          DCA     BACK
3227  1375          TAD     (DSTTS0         /ADDRESS OF NEXT TEST
3230  3057          DCA     NEXT
3231  1774'         TAD     DADJMS          /GET A JMS TO MODIFY PRINT ROUTINE.
3232  3773'         DCA     WILCHG          /PUT THE JMS IN WILCHG.
3233  3045          DCA     SCSIM           /CLEAR
3234  3046          DCA     GTSIM           /CLEAR
3235  4535          JMS I   MODSEL          /PERFORM MODE SELECTION.
3236  4536          JMS I   ONLYB           /EXIT IF MODE "A".
3237  7403          ACS                     /CLEAR THE STEP COUNTER.
3240  5623          JMP I   DADS1H          /EXIT AC=0 L=0

3241  0000  RANDAD, OPEN
3242  4772'         JMS     RANGEN
3243  3022          DCA     TOAC            /RANDOM DATA FOR "AC"
3244  4772'         JMS     RANGEN
3245  3023          DCA     TOMQ            /RANDOM DATA FOR "MQ"
3246  4772'         JMS     RANGEN
3247  3024          DCA     TOSHIF          /RANDOM DATA FOR "MOST SIGNIFICANT"
3250  4772'         JMS     RANGEN
3251  3025          DCA     TOGT            /RANDOM DATA FOR "LEAST SIGNIFICANT"
3252  7210          CLA RAR
3253  3021          DCA     TOLINK          /RANDOM DATA FOR LINK
3254  4573          JMS I   CDCOUNT         /DONE?
3255  5641          JMP I   RANDAD          /NO
3256  5575          JMP I   CGEN+3          /YES

                /ROUTINE TO CHECK SR OPTIONS FOR DAD TEST 1.

3257  1024  EDAD1,  TAD     TOSHIF
```

```
3260  3040          DCA     TEMPA
3261  1025          TAD     TOGT
3262  3041          DCA     TEMPB
3263  3024          DCA     TOSHIF
3264  3025          DCA     TOGT
3265  4545          JMS I   TSTSW2          /CHECK SR 2,
3266  4300          JMS     DA1ERR          /PRINT ERROR DATA,
3267  1040          TAD     TEMPA
3270  3024          DCA     TOSHIF
3271  1041          TAD     TEMPB
3272  3025          DCA     TOGT
3273  4543          JMS I   TSTSW0          /CHECK SR 0,
3274  7402          HLT                     /DAD ERROR',
3275  4544          JMS I   TSTSW1          /CHECK SR 1,
3276  5202          JMP     DAD1+1
3277  5201          JMP     DAD1

                /ROUTINE TO PRINT ERROR INFORMATION FOR DAD TEST 1'

3300  0000    DA1ERR, OPEN
3301  4534          JMS I   TYTST           /PRINT THE FOLLOWING
3302  7775          -3
3303  7476          ZDAD                    /DAD
3304  7440          TEST                    /TEST
3305  7445          ZONE                    /1
3306  4537          JMS I   PREGS           /HEADING AND REGISTERS
3307  5700          JMP I   DA1ERR          /EXIT, AC=0



                /TEST OF THE DOUBLE PRECISION STORE INSTRUCTION,
                /USING FIXED DATA

3310  4771'   DSTTS0, JMS     DSTS0H          /GO DO HOUSEKEEPING
3311  4770'   DST0,   JMS     DST0GN          /SET UP NUMBERS TO BE STORED
3312  1042          TAD     LSIM
3313  7104          CLL RAL                 /LINK LOADED
3314  1044          TAD     LSH
3315  7421          MQL                     /MQ LOADED',
3316  1043          TAD     MSH             /AC LOADED
3317  7445          DST                     /EAE DOUBLE PRECISION STORE
3320  0121          DPMQ                    /MQ TO BE STORED IN DPMQ AND AC IN DPAC
3321  4541          JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
3322  1121          TAD     DPMQ
3323  3037          DCA     GTTOCK          /SAVE STORED MQ
3324  1122          TAD     DPAC
3325  3036          DCA     SCTOCK          /SAVE STORED AC
3326  4452          JMS I   UCOMP           /CHECK L, AC, MQ AGAINST ORIGINAL
3327  7775          -3
3330  5767'         JMP     EDST0           /ERROR, L, AC, OR MQ MODIFIED BY DST,
3331  1044          TAD     LSH
3332  7421          MQL                     /LOAD MQ WITH GOOD
3333  1043          TAD     MSH             /LOAD AC WITH GOOD
```



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3334  7575          DCM                     /2'S COMPLEMENT
3335  7443          DAD                     /ADD "TO BE CHECKED"
3336  0121          DPMQ                    /STORED AT THIS ADDRESS
3337  7451          DPSZ                    /ARE THEY THE SAME?
3340  5767'         JMP     EDST0           /ERROR
3341  5766'         JMP     EDST0+4         /NO ERRORS ENCOUNTERED

3366  3435
3367  3431
3370  3400
3371  3413
3372  6525
3373  7016
3374  7044
3375  3310
3376  3200
3377  6332
      3400          PAGE

3400  0000    DST0GN, OPEN
3401  4453          JMS I   UMOVE
3402  0000          OPEN
3403  0042          LSIM
3404  7775          -3
3405  7325          CLA CLL CML IAC RAL     /AC = 3
3406  1202          TAD     .+4
3407  3202          DCA     .+5             /+3 TO DST0GN+2
3410  2114          ISZ     SCOUNT
3411  5600          JMP I   DST0GN
3412  5575          JMP I   [GEN+3

                /INITIALIZATION ROUTINE FOR DST TEST 0

3413  0000    DSTS0H, OPEN
3414  4540          JMS I   ASCOMP          /SET COMPARE ROUTINE',
3415  1377          TAD     (DSTTAB
3416  3202          DCA     DST0GN+2
3417  1376          TAD     (DSTTS0
3420  3056          DCA     BACK
3421  1375          TAD     (DSTTS1
3422  3057          DCA     NEXT
3423  1374          TAD     (-7
3424  3114          DCA     SCOUNT
3425  4535          JMS I   MODSEL          /PERFORM MODE SELECTION',
3426  4536          JMS I   ONLYB           /EXIT IF MODE "A",
3427  7403          ACS                     /CLEAR THE STEP COUNTER',
3430  5613          JMP I   DSTS0H          /EXIT AC+L=0

                /ROUTINE TO CHECK SR OPTIONS FOR DST TEST 0

3431  4545    EDST0,  JMS I   TSTSW2          /CHECK SR 2,
3432  4240          JMS     DS0ERR          /PRINT ERROR DATA,
3433  4543          JMS I   TSTSW0          /CHECK SR 0,
3434  7402          HLT                     /DST ERROR',
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3435  4544          JMS I   TSTSW1          /CHECK SR 1,
3436  5773'         JMP     DST0+1          /LOOP THE ROUTINE,
3437  5772'         JMP     DST0            /CONTINUE NORMAL TEST,

                    /ROUTINE TO PRINT ERROR INFORMATION

3440  0000    DS0ERR, OPEN
3441  4534          JMS I   TYTST           /PRINT THE FOLLOWING
3442  7775          -3
3443  7501          ?DST                    /DST
3444  7440          TEST                    /TEST
3445  7443          ?ER0                    /0
3446  4771'         JMS     DSTREG          /HEADING AND REGISTERS
3447  5640          JMP I   DS0ERR          /EXIT, AC=0

                    /TEST OF THE DOUBLE PRECISION STORE INSTRUCTION,
                    /USING RANDOM DATA,

3450  4314    DSTTS1, JMS     DSTS1H          /GO DO HOUSEKEEPING
3451  4302    DST1,   JMS     DST1RN          /SET UP RANDOM NUMBERS
3452  1042          TAD     LSIM
3453  7104          CLL RAL                 /LINK LOADED
3454  1044          TAD     LSH
3455  7421          MQL                     /MQ LOADED
3456  1043          TAD     MSH             /AC LOADED
3457  7445          DST                     /EAE DOUBLE PRECISION STORE
3460  0121          DPMQ                    /MQ TO BE STORED IN DPMQ AND AC IN DPAC,
3461  4541          JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
3462  1121          TAD     DPMQ
3463  3037          DCA     GTTOCK          /SAVE LEAST SIGNIFICANT
3464  1122          TAD     DPAC
3465  3036          DCA     SCTOCK          /SAVE MOST SIGNIFICANT
3466  4452          JMS I   UCOMP           /COMPARE L, AC, AND MQ AGAINST ORIGINAL,
3467  7775          -3                      /L, AC, MQ
3470  5326          JMP     EDST1           /ERROR, L, AC, OR MQ MODIFIED BY DST,
3471  1044          TAD     LSH
3472  7421          MQL                     /ORIGINAL MQ
3473  1043          TAD     MSH             /ORIGINAL AC
3474  7575          DCM                     /2'S COMPLEMENT
3475  7443          DAD                     /ADD "TO BE CHECKED"
3476  0121          DPMQ                    /STORED AT THIS ADDRESS
3477  7451          DPSZ                    /ARE THEY THE SAME?
3500  5326          JMP     EDST1           /ERROR
3501  5332          JMP     EDST1+4         /NO ERRORS ENCOUNTERED,



                    /ROUTINE TO GENERATE RANDOM DATA FOR DST TEST 1,

3502  0000    DST1RN, OPEN
3503  4770'         JMS     RANGEN
3504  3043          DCA     MSH             /RANDOM DATA TO BE PUT IN AC
3505  4770'         JMS     RANGEN
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3506  3044          DCA     LSH             /RANDOM DATA TO BE PUT IN MQ
3507  7010          RAR
3510  3042          DCA     LSIM            /RANDOM DATA TO BE PUT IN LINK
3511  4573          JMS I   CDCOUNT         /DONE?
3512  5702          JMP I   DST1RN          /NO
3513  5575          JMP I   CGEN+3          /YES

                    /INITIALIZATION ROUTINE FOR DST TEST 1,

3514  0000    DSTS1H, OPEN
3515  4540          JMS I   ASCOMP          /SET COMPARE ROUTINE,
3516  1375          TAD     (DSTTS1
3517  3056          DCA     BACK
3520  1367          TAD     (NORMT
3521  3057          DCA     NEXT
3522  4535          JMS I   MODSEL          /PERFORM MODE SELECTION,
3523  4536          JMS I   ONLYB           /EXIT IF "A" MODE,
3524  7403          ACS                     /CLEAR THE STEP COUNTER,
3525  5714          JMP I   DSTS1H          /EXIT, AC=0

                    /ROUTINE TO CHECK SR OPTION FOR DST TEST 1

3526  4545    EDST1,  JMS I   TSTSW2          /CHECK SR 2,
3527  4335          JMS     DS1ERR          /PRINT ERROR DATA,
3530  4543          JMS I   TSTSW0          /CHECK SR 0,
3531  7402          HLT                     /DST ERROR,
3532  4544          JMS I   TSTSW1          /CHECK SR 1,
3533  5252          JMP     DST1+1          /LOOP THE ROUTINE,
3534  5251          JMP     DST1            /CONTINUE NORMAL TEST,

                    /ROUTINE TO PRINT ERROR INFORMATION,

3535  0000    DS1ERR, OPEN
3536  4534          JMS I   TYTST           /PRINT THE FOLLOWING
3537  7775          -3
3540  7501          ?DST                    /DST
3541  7440          TEST                    /TEST
3542  7445          ?ONE                    /1
3543  4771'         JMS     DSTREG          /HEADING AND REGISTERS
3544  5735          JMP I   DS1ERR          /EXIT, AC=0,


3567  3600
3570  6525
3571  7106
3572  3311
3573  3312
3574  7771
3575  3450
3576  3310
3577  7305
      3600          PAGE

                    /TEST OF THE NORMALIZE INSTRUCTION,
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3600  5257    NORMT,  JMP HSENMI
3601  4312            JMS GXEN
3602  7240            CLA CMA
3603  0305            AND MQNMIX
3604  7421            MQL                 /LOAD MQ INDEXED PATTERN
3605  7040            CMA
3606  0304            AND ACNMIX          /LOAD AC INDEXED PATTERN
3607  7411            NMI
3610  3307            DCA ACNMIN          /STORE AC
3611  7501            MQA
3612  3306            DCA MQNMIN          /STORE MQ
3613  7441            SCA
3614  3300            DCA SCAST                   /STORE SCA COUNT
3615  7040            CMA
3616  0307            AND ACNMIN
3617  7140            CLL CMA
3620  1301            TAD NMIODD          /6000
3621  7040            CMA
3622  7440            SZA
3623  5250            JMP NMIERR          /AC DID NOT EQUAL 6000
3624  7430            SZL
3625  5250            JMP NMIERR          /AC DID NOT EQUAL 6000
3626  7240            CLA CMA
3627  0306            AND MQNMIN
3630  7440            SZA
3631  5250            JMP NMIERR          /MQ DID NOT EQUAL 0000
3632  7040            CMA
3633  0300            AND SCAST
3634  7140            CLL CMA
3635  1303            TAD SCASTX          /INDEXED STEP COUNT #
3636  7040            CMA
3637  7440            SZA
3640  5250            JMP NMIERR          /SC IN ERROR
3641  7430            SZL
3642  5250            JMP NMIERR          /SC IN ERROR
3643  7240            CLA CMA
3644  0303            AND SCASTX          /TEST SCA COUNT FOR 0
3645  7440            SZA                 /TO EXIT
3646  5254            JMP NMIERR+4        /CONTINUE TEST
3647  5272            JMP     EXINMI
3650  4545    NMIERR, JMS I   TSTSW2              /CHECK SR 2,
3651  4711            JMS I   SCAST+11                    /JUMP TO PRINT ROUTINE,
3652  4543            JMS I   TSTSW0                      /CHECK SR 0,
3653  7402            HLT                 /NORMILIZE FAILED,
3654  4544            JMS I   TSTSW1      /CHECK SR 1,
3655  5202            JMP     NORMT+2     /LOOP TEST,
3656  5201            JMP     NORMT+1     /CONTINUE TEST,

3657  7240    HSENMI, CLA CMA
3660  0327            AND ANCMIQ
3661  3012            DCA XACNMI          /AC AUTO START ADDRESS
3662  7040            CMA
3663  0330            AND MQNMIQ
3664  3013            DCA XMQNMI          /MQ AUTO START ADDRESS
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3665  7040            CMA
3666  0302            AND SCC23                   /SC 23
3667  3303            DCA SCASTX          /STORE DECIMAL 23
3670  4535            JMS I   MODSEL      /PERFORM MODE SELECTION,
3671  5201            JMP NORMT+1

3672  7604    EXINMI, CLA OSR             /TEST SW3
3673  7106            RTL CLL
3674  7006            RTL
3675  7430            SZL
3676  5200            JMP NORMT                   /REPEAT ENTIRE TEST
3677  5710            JMP I SCAST+10      /JMP TO NEXT NMI TEST

3700  0000    SCAST,  0
3701  6000    NMIODD, 6000
3702  0027    SCC23,  0027                /23 DECIMAL
3703  0000    SCASTX, 0
3704  0000    ACNMIX, 0
3705  0000    MQNMIX, 0
3706  0000    MQNMIN, 0
3707  0000    ACNMIN, 0
3710  4200            NORMT1
3711  4000            PRNMI

3712  0000    GXEN,   0
3713  7240            CLA CMA
3714  0412            AND I XACNMI
3715  3304            DCA ACNMIX          /STORE AC PATTERN
3716  7040            CMA
3717  0413            AND I XMQNMI
3720  3305            DCA MQNMIX          /STORE MQ PATTERN
3721  7040            CMA
3722  0303            AND SCASTX          /SUBTRACT ONE FROM SCA COUNT
3723  7041            CIA
3724  7040            CMA
3725  3303            DCA SCASTX          /STORE DECREMENTED SCA COUNT
3726  5331            JMP EXEN
3727  4060    ANCMIQ, ACNMI
3730  4074    MQNMIQ, MQNMI
3731  7240    EXEN,   CLA CMA
3732  0303            AND SCASTX
3733  7440            SZA
3734  5712            JMP I GXEN
3735  5272            JMP EXINMI

      4000            PAGE



4000  0000    PRNMI,  OPEN
4001  4525            JMS I   CRLF2               /2 CR AND LF,
4002  4326            JMS     NMITPR              /
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4003  4451          JMS I   UPSPC          /6 SPACES,
4004  7772          -6
4005  4777'         JMS     PC             /
4006  4776'         JMS     LPAR           /
4007  4775'         JMS     AC             /PRINT "AC"
4010  4774'         JMS     RPAR           /
4011  4451          JMS I   UPSPC
4012  7765          -13
4013  4777'         JMS     PC             /PRINT "PC"
4014  4776'         JMS     LPAR           /
4015  4773'         JMS     MQ             /PRINT "MQ"
4016  4774'         JMS     RPAR           /
4017  4576          JMS I   [TYMOD         /TYPE THE MODE',
4020  4524          JMS I   CRLF           /CR AND LF',
4021  4451          JMS I   UPSPC          /6 SPACES,
4022  7772          -6
4023  1772'         TAD     ACNMIX         /
4024  4771'         JMS     P12BIT         /PRINT 12 BITS',
4025  4451          JMS I   UPSPC          /3 SPACES,
4026  7775          -3
4027  1770'         TAD     MQNMIX         /
4030  4771'         JMS     P12BIT         /PRINT 12 BITS',
4031  4524          JMS I   CRLF           /CR AND LF',
4032  4767'         JMS     NMIXX          /
4033  4451          JMS I   UPSPC          /3 SPACES,
4034  7775          -3
4035  1766'         TAD     ACNMIN         /
4036  4771'         JMS     P12BIT         /PRINT 12 BITS',
4037  4451          JMS I   UPSPC          /3 SPACES,
4040  7775          -3
4041  1765'         TAD     MQNMIN         /
4042  4771'         JMS     P12BIT         /PRINT 12 BITS',
4043  4524          JMS I   CRLF           /CR AND LF',
4044  4764'         JMS     SCATXX         /
4045  4455          JMS I   U2SPC          /2 SPACES,
4046  1763'         TAD     SCASTX         /
4047  4771'         JMS     P12BIT         /PRINT 12 BITS',
4050  4524          JMS I   CRLF           /CR AND LF',
4051  4762'         JMS     SCAXX          /
4052  4451          JMS I   UPSPC          /3 SPACES,
4053  7775          -3
4054  1761'         TAD     SCAST          /
4055  4771'         JMS     P12BIT         /PRINT 12 BITS',
4056  4524          JMS I   CRLF           /CR AND LF',
4057  5600          JMP I   PRNMI          /EXIT, AC=0,

4060  0000  ACNMI,  0
4061  7777          7777    /SC22
4062  7777          7777    /SC21
4063  7777          7777    /SC20
4064  7777          7777    /SC19
4065  7777          7777    /SC18
4066  7777          7777    /SC17
4067  7777          7777    /SC16
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4070  7777          7777    /SC15
4071  7777          7777    /SC14
4072  7777          7777    /SC13
4073  7777          7777    /SC12

4074  7777  MQNMI,  7777    /SC11
4075  7777          7777    /SC10
4076  7776          7776    /SC9
4077  7774          7774    /SC8
4100  7770          7770    /SC7
4101  7760          7760    /SC6
4102  7740          7740    /SC5
4103  7700          7700    /SC4
4104  7600          7600    /SC3
4105  7400          7400    /SC2
4106  7000          7000    /SC1
4107  6000          6000    /SC0
4110  4000          4000
4111  0000          0000
4112  0000          0000
4113  0000          0000
4114  0000          0
4115  0000          0
4116  0000          0
4117  0000          0
4120  0000          0
4121  0000          0
4122  0000          0
4123  0000          0
4124  0000          0
4125  0000          0

4126  0000  NMITPR, 0
4127  4332          JMS PNORM
4130  4343          JMS XNORMT
4131  5726          JMP I NMITPR
4132  0000  PNORM,  0
4133  7240          CLA CMA
4134  0760'         AND N
4135  4526          JMS I   PRXLOP         /PRINT,
4136  1757'         TAD     N+1
4137  4526          JMS I   PRXLOP         /PRINT,
4140  1756'         TAD     N+2
4141  4526          JMS I   PRXLOP         /PRINT,
4142  5732          JMP I PNORM
4143  0000  XNORMT, 0

4144  7240          CLA CMA
4145  0755'         AND N+3
4146  4526          JMS I   PRXLOP         /PRINT,
4147  5743          JMP I XNORMT
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4155  5477
4156  5476
4157  5475
4160  5474
4161  3700
4162  5434
4163  3703
4164  5430
4165  3706
4166  3707
4167  5425
4170  3705
4171  7200
4172  3704
4173  0302
4174  5467
4175  0323
4176  5462
4177  5455
      4200          PAGE

4200  5261  NORMT1, JMP HSENM
4201  4273         JMS GENNMI
4202  7240         CLA CMA
4203  0716         AND I TST25+1   /LOAD MQ PATTERN
4204  7421         MQL
4205  7240         CLA CMA
4206  0717         AND I TST25+2   /LOAD AC PATTERN
4207  7411         NMI
4210  3725         DCA I TST25+10  /STORE NORMALIZED AC
4211  7501         MQA
4212  3726         DCA I TST25+11  /STORE NORMALIZED MQ
4213  7441         SCA
4214  3727         DCA I TST25+12  /STORE SCA COUNT
4215  7240         CLA CMA
4216  0725         AND I TST25+10
4217  7140         CLL CMA
4220  1716         TAD I TST25+1
4221  7040         CMA
4222  7440         SZA
4223  5333         JMP NMERR               /AC DID NOT EQUAL 2525
4224  7430         SZL
4225  5333         JMP NMERR               /AC DID NOT EQUAL 2525
4226  7240         CLA CMA
4227  0726         AND I TST25+11
4230  7440         SZA
4231  5333         JMP NMERR               /MQ DID NOT EQUAL 0000
4232  7240         CLA CMA
4233  0727         AND I TST25+12
4234  7140         CLL CMA
4235  1331         TAD DEC12               /DECIMAL 12
4236  7040         CMA
4237  7440         SZA
4240  5333         JMP NMERR               /SC DID NOT EQUAL 12
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4241  7430         SZL
4242  5333         JMP NMERR               /SC DID NOT EQUAL 12
4243  2315         ISZ TST25               /REPEAT CURRENT TEST PATTERN
4244  5202         JMP NORMT1+2
4245  7604         CLA OSR          /TEST SW1
4246  7106         RTL CLL
4247  7430         SZL
4250  5202         JMP NORMT1+2
4251  2322         ISZ NMFLG
4252  5201         JMP NORMT1+1
4253  7604         CLA OSR          /TEST SW3
4254  7106         RTL CLL
4255  7006         RTL
4256  7430         SZL
4257  5200         JMP NORMT1
4260  5724         JMP I NEXNMI

4261  7200  HSENM, CLA
4262  3315         DCA TST25               /CLEAR TEST COUNTER
4263  7400         NOP
4264  7040         CMA
4265  0323         AND NM7776
4266  3322         DCA NMFLG
4267  1331         TAD DEC12
4270  3730         DCA I TST25+13
4271  4535         JMS I   MODSEL          /PERFORM MODE SELECTION.
4272  5201         JMP NORMT1+1


4273  0000  GENNMI, 0
4274  7240         CLA CMA
4275  0322         AND NMFLG
4276  7040         CMA
4277  7440         SZA
4300  5302         JMP PA2525      /GENERATE 2525
4301  5307         JMP PA2525+5    /GENERATE 5252
4302  7240  PA2525, CLA CMA
4303  0320         AND NM2525      /MQ PATTERN 2525
4304  3716         DCA I TST25+1
4305  3717         DCA I TST25+2   /AC PATTERN 0000
4306  5673         JMP I GENNMI
4307  7240         CLA CMA
4310  0321         AND NM5252      /MQ PATTERN 5252
4311  3716         DCA I TST25+1
4312  7040         CMA
4313  3717         DCA I TST25+2   /AC PATTERN 7777
4314  5673         JMP I GENNMI

4315  0000  TST25, 0
4316  3705         MQNMIX
4317  3704         ACNMIX
4320  2525  NM2525, 2525
4321  5252  NM5252, 5252
4322  0000  NMFLG, 0
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4323  7776    NM7776, 7776

4324  4400    NEXNMI, NORMT2
4325  3707            ACNMIN
4326  3706            MQNMIN
4327  3700            SCAST
4330  3703            SCASTX
4331  0014    DEC12,  0014
4332  4000            PRNMI

4333  4545    NMERR,  JMS I   TSTSW2          /CHECK SR 2,
4334  4732            JMS I   DEC12+1
4335  4543            JMS I   TSTSW0          /CHECK SR 0,
4336  7402            HLT                     /NORMALIZE ERROR',
4337  4544            JMS I   TSTSW1          /CHECK SR 1,
4340  7610            SKP CLA
4341  5202            JMP     NORMT1+2        /CONTINUE TEST',
4342  3315            DCA     TST25           /CLEAR CURRENT TEST COUNTER,
4343  5202            JMP     NORMT1+2        /LOOP CURRENT TEST',

      4400            PAGE

4400  5305    NORMT2, JMP HKE         /HOUSE KEEPING
4401  4253            JMS GEX         /PATTERN GENERATOR
4402  7621            CAM
4403  7040            CMA
4404  0725            AND I PAT01
4405  7421            MQL             /MQ PATTERN
4406  7140            CLL CMA         /AC PATTERN
4407  0726            AND I PAT00     /AC PATTERN
4410  7411            NMI
4411  3727            DCA I SPAT00    /STORE AC NORMALIZED PATTERN
4412  7501            MQA
4413  3730            DCA I SPAT01    /STORE MQ NORMALIZED PATTERN
4414  7441            SCA
4415  3734            DCA I SCANM     /STORE SCA COUNT
4416  7040            CMA
4417  0727            AND I SPAT00    /AC PATTERN
4420  7040            CMA
4421  1331            TAD CHKAC               /CHECK PATTERN AC
4422  7040            CMA
4423  7440            SZA             /TEST AC BITS
4424  5313            JMP MT2ER               /SPAT00 NOT EQUAL TO CHKAC
4425  7430            SZL
4426  5313            JMP MT2ER               /SPAT00 NOT EQUAL TO CHKAC
4427  7040            CMA
4430  0730            AND I SPAT01    /MQ PATTERN
4431  7040            CMA
4432  1332            TAD CHKMQ               /CHECK PATTERN MQ
4433  7040            CMA
4434  7440            SZA             /TEST MQ BITS
4435  5313            JMP MT2ER               /SPAT01 NOT EQUAL TO CHKMQ
4436  7430            SZL
4437  5313            JMP MT2ER               /SPAT01 NOT EQUAL TO CHKMQ
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4440  7040            CMA
4441  0734            AND I SCANM     /SCA COUNT PATTERN
4442  7041            CIA
4443  1733            TAD I CHKSCA    /CHECK PATTERN SCA
4444  7420            SNL
4445  5313            JMP MT2ER               /SCANM NOT EQUAL TO CHKSCA
4446  2336            ISZ AGAIN               /4096 REPEATS CURRENT TEST
4447  5202            JMP NORMT2+2

4450  4544    NMTS1,  JMS I   TSTSW1
4451  5202            JMP NORMT2+2
4452  5345            JMP PATCH               /JUMP TO SW3


4453  0000    GEX,    0
4454  7240            CLA CMA
4455  0337            AND TPFLAG
4456  7040            CMA
4457  7440            SZA
4460  5262            JMP .+2         /GENERATE 0000 MQ PATTERN
4461  5271            JMP .+10                /GENERATE 0001 MQ PATTERN
4462  7200            CLA
4463  3726            DCA I PAT00     /STORE AC PATTERN
4464  3725            DCA I PAT01     /STORE MQ PATTERN
4465  3331            DCA CHKAC       /STORE AC CHECK
4466  3332            DCA CHKMQ               /STORE MQ CHECK
4467  3733            DCA I CHKSCA    /STORE SCA CHECK
4470  5653            JMP I GEX
4471  7240            CLA CMA
4472  0335            AND SCANM+1     /MQ PATTERN (0001)
4473  3725            DCA I PAT01     /STORE MQ PATTERN
4474  7040            CMA
4475  0340            AND TPFLAG+1    /22 DECIMAL PLACES (0030)
4476  3733            DCA I CHKSCA
4477  3726            DCA I PAT00     /STORE AC PATTERN
4500  3332            DCA CHKMQ               /STORE MQ CHECK
4501  7040            CMA
4502  0341            AND TPFLAG+2    /20000
4503  3331            DCA CHKAC               /STORE AC CHECK
4504  5653            JMP I GEX

4505  7240    HKE,    CLA CMA         /HOUSE KEEPING
4506  0342            AND TPFLAG+3    /7776
4507  3337            DCA TPFLAG      /LOAD FLAG
4510  3336            DCA AGAIN               /CHECK TEST COUNTER
4511  4535            JMS I   MODSEL          /PERFORM MODE SELECTION',
4512  5201            JMP NORMT2+1

4513  4545    MT2ER,  JMS I   TSTSW2          /CHECK SR 2,
4514  4743            JMS I TPFLAG+4  /PRINT ROUTINE
4515  7604            CLA OSR         /TEST SW0
4516  7104            RAL CLL
4517  7430            SZL
4520  7402            HLT                     /NORMALIZE ERROR',
4521  5250            JMP NMTS1
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4522  4546  NMTS3,  JMS I   TSTSW3          /CHECK SR 3,
4523  5200          JMP NORMT2      /CONTINUE
4524  5744          JMP I TPFLAG+5
4525  3705  PAT01,  MQNMIX
4526  3704  PAT00,  ACNMIX
4527  3707  SPAT00, ACNMIN
4530  3706  SPAT01, MQNMIN
4531  0000  CHKAC,  0
4532  0000  CHKMQ,  0
4533  3703  CHKSCA, SCASTX
4534  3700  SCANM,  SCAST
4535  0001          0001
4536  0000  AGAIN,  0

4537  0000  TPFLAG, 0
4540  0026          0026
4541  2000          2000
4542  7776          7776
4543  4000          PRNMI
4544  4600          COMTST
4545  2337  PATCH,  ISZ TPFLAG
4546  5201          JMP NORMT2+1
4547  5322          JMP NMTS3

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                /TEST OF EAE NOP

4600  7240  COMTST, CLA CMA               /7777
4601  7421          MQL                   /MQ=7777
4602  7501          MQA                   /AC=7777
4603  7401          NOPM                  /EAE NOP
4604  7410          SKP
4605  7402          HLT                   /NOP SKIPPED
4606  7040          CMA                   /0
4607  7640          SZA CLA               /
4610  7402          HLT                   /AC MODIFIED BY NOPM
4611  7501          MQA                   /MQ TO AC
4612  7040          CMA                   /AC SHOULD NOW BE 0
4613  7440          SZA                   /WAS IT 0?
4614  7402          HLT                   /NO,  MQ WAS MODIFIED BY NOPM

                /TEST OF EAE CLA

4615  7240          CLA CMA               /7777
4616  7421          MQL                   /MQ=7777
4617  7501          MQA                   /AC=7777
4620  7601          CLAM                  /EAE CLA
4621  7410          SKP
4622  7402          HLT                   /CLAM SKIPPED,
4623  7640          SZA CLA               /
4624  7402          HLT                   /CLAM FAILED TO CLEAR THE AC,
4625  7501          MQA                   /MQ TO AC
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4626  7040          CMA                   /AC SHOULD NOW BE 0
4627  7440          SZA                   /WAS IT 0?
4630  7402          HLT                   /MQ MODIFIED BY CLAM

                /TEST OF EAE CAM

4631  7240          CLA CMA               /AC=7777
4632  7421          MQL                   /MQ=7777
4633  7501          MQA                   /AC=7777
4634  7621          CAM                   /CLEAR THE AC AND MQ,
4635  7501          MQA                   /MQ ORED WITH AC,
4636  7440          SZA                   /WERE THEY BOTH 0?
4637  7402          HLT                   /AC OR MQ NOT CLEARED BY CAM,

                /TEST OF EAE SWP,

4640  7200          CLA                   /0,
4641  1172          TAD [5252             /5252
4642  7421          MQL                   /MQ=5252
4643  1171          TAD     [2525         /AC=2525
4644  7521          SWP                   /SWAP AC AND MQ; AC=5252 & MQ=2525
4645  1171          TAD     [2525         /AC=7777
4646  7040          CMA                   /AC=0000
4647  7440          SZA
4650  7402          HLT                   /SWP FAILED,
4651  7501          MQA                   /AC=2525
4652  1172          TAD     [5252         /AC=7777
4653  7040          CMA                   /AC SHOULD BE 0
4654  7440          SZA
4655  7402          HLT                   /SWP FAILED,

                /TEST OF ACL  (MQA CLAM),

4656  7621          CAM                   /AC AND MQ = 0
4657  1171          TAD     [2525         /AC=2525
4660  7421          MQL                   /MQ=2525
4661  1172          TAD     [5252         /AC=5252
4662  7701          ACL                   /CLA THE AC AND LOAD AC FROM MQ,
4663  1172          TAD     [5252         /AC=7777
4664  7040          CMA                   /AC=0
4665  7440          SZA
4666  7402          HLT                   /ACL FAILED,

                /TEST OF DLD  (CAM DAD),

4667  7621          CAM                   /CLEAR AC AND MQ,
4670  1115          TAD     MODE          /GET THE MODE,
4671  7650          SNA CLA               /SKIP IF B MODE,
4672  5353          JMP     COMEND        /MODE A SO SKIP B TESTS,

4673  7431          SWAB                  /B MODE,
4674  7621          CAM                   /AC AND MQ = 0
4675  1171          TAD     [2525         /AC=2525
4676  7421          MQL                   /MQ=2525
4677  1172          TAD     [5252         /AC=5252
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4700  7663          DLD                     /EAE DOUBLE PRECISION LOAD,
4701  4703          ,+2                     /ADDRESS OF LSW OPERAND,
4702  5305          JMP     ,+3             /GO OVER,
4703  5252          5252                    /LSW OPERAND
4704  2525          2525                    /MSW OPERAND
4705  1172          TAD     [5252           /AC=7777
4706  7040          CMA                     /AC=0
4707  7440          SZA
4710  7402          HLT                     /DLD FAILED,
4711  7501          MQA                     /MQ TO AC,
4712  1171          TAD     [2525           /AC=7777
4713  7040          CMA                     /AC=0
4714  7440          SZA
4715  7402          HLT                     /DLD FAILED,

                /TEST OF DDE  (CAM DST),

4716  7431          SWAB                    /B MODE,
4717  7621          CAM                     /AC AND MQ ARE 0
4720  1171          TAD     [2525           /AC=2525
4721  7421          MQL                     /MQ=2525
4722  7501          MQA                     /AC=2525
4723  3332          DCA     ,+7             /LSW=2525
4724  1172          TAD     [5252           /AC=5252
4725  3333          DCA     ,+6             /MSW=5252
4726  1172          TAD     [5252           /AC=5252
4727  7665          DDE                     /EAE DOUBLE PRECISION DEPOSIT ZERO,
4730  4732          ,+2                     /OPERAND OF LSW
4731  5334          JMP     ,+3             /GO OVER,
4732  0000          OPEN                    /LSW
4733  0000          OPEN                    /MSW
4734  7501          MQA                     /MQ OR'ED WITH AC,
4735  7440          SZA                     /BOTH 0?
4736  7402          HLT                     /NO, AC OR MQ NOT 0,
4737  1332          TAD     ,-5             /GET C(LSW)
4740  7440          SZA                     /0?
4741  7402          HLT                     /NO, DDE FAILED,
4742  1333          TAD     ,-7             /GET C(MSW)
4743  7440          SZA                     /0?
4744  7402          HLT                     /DDE FAILED,  AC DID NOT GET STORED AS 0,

                /TEST OF NORMALIZE "B" MODE,

4745  7431          SWAB                    /GO TO B MODE,
4746  7621          CAM                     /CLEAR AC AND MQ,
4747  7330          CLA CLL CML RAR         /AC=4000, MQ=0000,
4750  7411          NMI                     /NORMALIZE,
4751  7440          SZA                     /DID AC GET CLEARED?
4752  7402          HLT                     /NMI FAILED TO CLEAR AC,

4753  7447  COMEND, SWBA                    /GO TO A MODE,
4754  4546          JMS I   TSTSW3          /REMAIN IN THIS TEST
4755  5200          JMP     COMTST          /YES, SR3=1
4756  2117          ISZ     COUNT           /DO THIS TEST 4096 TIMES BEFORE EXIT,
4757  5200          JMP     COMTST          /REPEAT THE TESTS UNTIL DONE,
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4760  5777          JMP     E3A             /GO PRINT OR SOMETHING,


4777  5261
      5000          PAGE

5000  0000  TSCL,   OPEN                    /MODE, GT, AND SC TESTS

                /TEST OF MODE SWITCHING,

5001  7621  MDTST,  CAM                     /CLEAR AC AND MQ,
5002  7451          DPSZ                    /
5003  7410          SKP                     /
5004  7402          HLT                     /CLEAR KEY FAILED TO SET TO "A" MODE OR DPSZ FAILED,
5005  7431          SWAB                    /SET "B" MODE,
5006  7621          CAM                     /
5007  7451          DPSZ                    /
5010  7402          HLT                     /SWAB FAILED TO SET "B" MODE OR DPSZ FAILED,
5011  7447          SWBA                    /SET "A" MODE,
5012  7621          CAM                     /
5013  7451          DPSZ                    /
5014  7410          SKP                     /
5015  7402          HLT                     /SWBA FAILED TO SET "A" MODE OR DPSZ FAILED,
5016  7431          SWAB                    /SET "B" MODE
5017  6007          CAF                     /INITIALIZE,
5020  7621          CAM                     /
5021  7451          DPSZ                    /
5022  7610          SKP CLA                 /
5023  7402          HLT                     /INITIALIZE FAILED TO SET TO "A" MODE,

                /STEP COUNTER TESTS,

5024  7200  SCL1,   CLA                     /TEST SCL=0
5025  7403          7403                    /SCL
5026  7737          7737                    /SC=0
5027  7441          SCA
5030  7640          CLA SZA
5031  7402  ESCL1,  HLT                     /ERROR; SC NOT=0
5032  7403  SCL2,   7403                    /TEST SCL=01
5033  7776          7776                    /SC=1
5034  7441          SCA
5035  1233          TAD ,-2
5036  7040          CMA
5037  7640          CLA SZA
5040  7402  ESCL2,  HLT                     /ERROR; SC NOT=01
5041  7403  SCL3,   7403                    /TEST SCL=02
5042  7775          7775                    /SC=2
5043  7441          SCA
5044  1242          TAD ,-2
5045  7040          CMA
5046  7640          CLA SZA
5047  7402  ESCL3,  HLT                     /ERROR; SC NOT=02
5050  7403  SCL4,   7403                    /TEST SCL=04
5051  7773          7773                    /SC=4
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5052  7441          SCA
5053  1251          TAD .-2
5054  7040          CMA
5055  7640          CLA SZA
5056  7402  ESCL4,  HLT             /ERROR; SC NOT = 04
5057  7403  SCL5,   7403            /TEST SCL=10
5060  7767          7767            /SC=10
5061  7441          SCA
5062  1260          TAD .-2
5063  7040          CMA
5064  7640          CLA SZA
5065  7402  ESCL5,  HLT             /ERROR; SC NOT=10
5066  7403  SCL6,   7403            /TEST SCL=20
5067  7757          7757            /SC=20
5070  7441          SCA
5071  1267          TAD .-2
5072  7040          CMA
5073  7640          CLA SZA
5074  7402  ESCL6,  HLT             /ERROR; SC NOT=20

5075  7403  SCL7,   7403            /TEST SCL=12
5076  7765          7765            /SC=12
5077  7441          SCA
5100  1276          TAD .-2
5101  7040          CMA
5102  7640          CLA SZA
5103  7402  ESCL7,  HLT             /ERROR; SC NOT=12
5104  7403  SCL8,   7403            /TEST SCL=25
5105  7752          7752
5106  7441          SCA
5107  1305          TAD .-2
5110  7040          CMA
5111  7640          CLA SZA
5112  7402  ESCL8,  HLT             /ERROR; SC NOT=25
5113  7403  SCL9,   7403            /TEST SCL=0
5114  0077          0077            /SC=0
5115  7441          SCA
5116  7640          CLA SZA
5117  7402  ESCL9,  HLT             /ERROR; SC NOT=0
5120  7403  SCL10,  7403            /TEST SCL=37
5121  7700          7700
5122  7441          SCA
5123  1123          TAD K7740
5124  7040          CMA
5125  7640          CLA SZA
5126  7402  ESCL10, HLT             /ERROR; SC NOT 37

5127  7403  SCL11,  SCL             /LOAD THE SC WITH
5130  7777          7777            /0000
5131  7240          CLA CMA         /7777
5132  7441          SCA             /SC  TO AC
5133  7040          CMA
5134  7440          SZA
5135  7402  ESCL11, HLT             /SC DID NOT "OR" WITH AC.
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5136  7403  SCL12,  SCL             /LOAD SC WITH
5137  7752          7752            /25
5140  7200          CLA
5141  1337          TAD     .-2
5142  7441          SCA             /SC TO AC
5143  7040          CMA
5144  7440          SZA
5145  7402  ESCL12, HLT             /SC DID NOT "OR" WITH THE AC.

5146  7403  SCL13,  SCL             /LOOAD THE SC
5147  7765          7765            /WITH 12,
5150  7200          CLA
5151  1347          TAD     .-2
5152  7441          SCA             /SC TO AC
5153  7040          CMA
5154  7440          SZA             /
5155  7402  ESCL13, HLT             /SC DID NOT "OR" WITH THE AC.

                /TEST OF THE ACS INSTRUCTION,

5156  7431  ACS1,   SWAB            /CHANGE TO MODE B
5157  7360          CLA CMA CLL CML /AC=7777 L=1
5160  7403          ACS             /AC TO SC
5161  7430          SZL
5162  7440          SZA
5163  7402          HLT             /ACS CLEARED THE LINK OR ACS FAILED
                                    /TO CLEAR THE AC,
5164  7441          SCA             /SC TO AC
5165  1123          TAD     K7740
5166  7040          CMA
5167  7440          SZA
5170  7402          HLT             /ACS FAILED TO LOAD THE STEP COUNTER WITH 37,
5171  5777/         JMP     ACS2    /

5177  5200
      5200          PAGE

5200  7320  ACS2,   CLA CML CLL     /AC=0, L=1,
5201  1123          TAD     K7740
5202  7403          ACS             /AC TO SC
5203  7430          SZL
5204  7440          SZA
5205  7402          HLT             /ACS CLEARRED LINK OR ACS FAILED TO CLEAR AC,
5206  7441          SCA             /SC TO AC
5207  7440          SZA             /
5210  7402          HLT             /ACS FAILED TO LOAD THE STEP COUNTER WITH 0,

                /TEST OF THE GT FLAG,

5211  7431  GTTST1, SWAB                    /B MODE,
5212  7300          CLA CLL
5213  4554          JMS I   RTFX            /RESTORE FLAGS; WE'RE ONLY CONCERNED WITH THE GT,
5214  6004          GTF                     /GET THE FLAGS,
5215  0377          AND     (2000           /SAVE THE GT FLAG,
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5216  7006          RTL                     /PUT THE GT FLAG INTO THE LINK,
5217  7430          SZL                     /GT A 1?
5220  7402          HLT                     /YES, RTF FAILED TO REESET GT OR
                                            /GTF FAILED TO GET IT,
5221  7431  GTTST2, SWAB                    /B MODE,
5222  7332          CLA CLL CML RTR         /2000
5223  4554          JMS I   RTFX            /RESTORE FLAGS, SET GT TO A 1,
5224  6004          GTF                     /GET THE FLAGS,
5225  0377          AND (2000               /SAVE ONLY THE GT FLAG,
5226  7006          RTL                     /PUT IT IN THE LINK TO CHECK,
5227  7420          SNL                     /LINK A ZERO INDICATING GT WAS A 0?
5230  7402          HLT                     /YES, RTF FAILED TO SET GT OR GTF
                                            /FAILED TO GET IT,
5231  7431  GTTST3, SWAB                    /B MODE,
5232  7300          CLA CLL
5233  4554          JMS I   RTFX            /RESTORE THE FLAGS,
5234  6006          SGT                     /GT FLAG = 0?
5235  7410          SKP                     /YES, OK
5236  7402          HLT                     /SGT SKIPPED ON NO GT FLAG,

5237  7431  GTTST4, SWAB                    /MODE B,
5240  7332          CLA CLL CML RTR         /2000
5241  4554          JMS I   RTFX            /RESTORE THE FLAGS,
5242  6006          SGT                     /GT FLAG = 1?
5243  7402          HLT                     /SGT DID NOT SKIP WITH GT = 1

5244  7431  GTTST5, SWAB                    /MODE B,
5245  7332          CLA CLL CML RTR         /2000
5246  4554          JMS I   RTFX            /RESTORE THE FLAGS,
5247  7447          SWBA                    /GO TO A MODE,
5250  6006          SGT                     /GT FLAG SET?
5251  7610          SKP CLA                 /NO, OK
5252  7402          HLT                     /SWBA FAILED TO CLEAR THE GT FLAG,
5253  4546          JMS I   TSTSW3          /REMAIN IN THIS TEST?
5254  5776'         JMP     MDTST           /YES, SR3=1
5255  2117          ISZ     COUNT           /FINISHED TEST 4096 TIMES,
5256  5776'         JMP     MDTST           /REPEAT INITIAL TESTS
5257  6007          CAF                     /CLEAR AND SET TO MODE "A",
5260  5775'         JMP     MQLT            /EXIT INITIAL TESTS,

              /END OF TEST PRINT-OUT ROUTINE,

5261  4524  E3A,    JMS I   CRLF            /CR AND LF,
5262  1115          TAD     MODE            /GET THE MODE, 0="A"; 7777="B",
5263  7650          SNA CLA                 /WHICH MODE?
5264  5267          JMP     .+3             /A MODE SO DON'T PRINT,
5265  4450          JMS I   XTYPST          /TYPE A MESSAGE
5266  7532          KE8SP1                  /"KE8 1"
5267  1115          TAD     MODE            /GET MODE
5270  7140          CMA CLL                 /CHANGE IT TO THE OPPOSITE MODE,
5271  3115          DCA     MODE            /RESET MODE,
5272  6007          CAF                     /INITIALIZE
5273  5774'         JMP     MQLT-2          /START FROM THE BEGINNING

              /ROUTINE TO SELECT MODE,
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5274  0000  MDSEL,  OPEN
5275  7604          LAS                     /READ THE SWITCHES,
5276  7112          CLL     RTR             /SR10 TO LINK, SR11 TO AC0,
5277  7430          SZL                     /SR 10 SET?
5300  5311          JMP     S10SET          /YES,
5301  7200          CLA
5302  1115          TAD     MODE            /GET MODE
5303  7640          SZA CLA                 /WHICH MODE?
5304  5307          JMP     .+3             /"B" MODE
5305  7447          SWBA                    /SET TO "A" MODE
5306  5674          JMP I   MDSEL           /EXIT SET TO "A" MODE,
5307  7431          SWAB                    /SET TO "B" MODE
5310  5674          JMP I   MDSEL           /EXIT SET TO "B" MODE,
5311  7710  S10SET, SPA CLA                 /SR11=0?
5312  5315          JMP     .+3             /NO, SR11=1, SO SELECT MODE "B",
5313  3115          DCA     MODE            /SELECT MODE "A"
5314  5301          JMP     MDSEL+5         /EXIT,
5315  7140          CLL CMA                 /7777 IN ORDER TO SELECT "B" MODE,
5316  5313          JMP     .-3             /EXIT,

              /ROUTINE TO EXIT TEST IF MODE "A" IS SELECTED,

5317  0000  UONLYB, OPEN
5320  7200          CLA
5321  1115          TAD     MODE
5322  7700          SMA CLA
5323  5575          JMP I   [GEN+3
5324  5717          JMP I   UONLYB

              /ROUTINE TO CHECK SR0,

5325  0000  SW0TST, OPEN
5326  7604          LAS
5327  7710          SPA CLA
5330  5725          JMP I   SW0TST
5331  2325          ISZ     SW0TST
5332  5725          JMP I   SW0TST

              /ROUTINE TO CHECK SR1,

5333  0000  SW1TST, OPEN
5334  7604          LAS
5335  7004          RAL
5336  7710          SPA CLA
5337  5733          JMP I   SW1TST
5340  2333          ISZ     SW1TST
5341  5733          JMP I   SW1TST

              /ROUTINE TO CHECK SR2,

5342  0000  SW2TST, OPEN
5343  7604          LAS
5344  7106          RTL CLL
5345  7710          SPA CLA
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5346  5742          JMP I   SW2TST
5347  2342          ISZ     SW2TST
5350  5742          JMP I   SW2TST

5374  0202
5375  0204
5376  5001
5377  2000
      5400          PAGE

                /ROUTINE TO CHECK SR3,

5400  0000    SW3TST, OPEN
5401  7604            LAS
5402  7106            RTL CLL
5403  7104            RAL CLL
5404  7710            SPA CLA
5405  5600            JMP I   SW3TST
5406  2200            ISZ     SW3TST
5407  5600            JMP I   SW3TST

                /ROUTINE TO SAVE REGISTERS,

5410  0000    USVREG, OPEN
5411  3034            DCA     ACTOCK          /SAVE AC
5412  7701            CLA     MQA
5413  3035            DCA     MQTOCK          /SAVE MQ
5414  7210            CLA     RAR
5415  3033            DCA     LKTOCK          /SAVE LINK
5416  7641            CLA     SCA
5417  3036            DCA     SCTOCK          /SAVE STEP COUNTER
5420  6004            GTF
5421  0377            AND     (2000
5422  7104            CLL     RAL
5423  3037            DCA     GTTOCK          /SAVE GTFLAG
5424  5610            JMP I   USVREG          /EXIT, AC=0

5425  0000    NMIXX,  0
5426  4776'           JMS PNORM
5427  5625            JMP I NMIXX

5430  0000    SCATXX, 0
5431  4237            JMS PSTEP
5432  4250            JMS PSTEPT
5433  5630            JMP I SCATXX

5434  0000    SCAXX,  0
5435  4237            JMS PSTEP
5436  5634            JMP I SCAXX

5437  0000    PSTEP,  0
5440  7240            CLA CMA
5441  0300            AND N=4
5442  4526            JMS I   PRXLOP          /PRINT,
```



```
5443  1301            TAD     N=5
5444  4526            JMS I   PRXLOP          /PRINT,
5445  1302            TAD     N=6
5446  4526            JMS I   PRXLOP          /PRINT,
5447  5637            JMP I PSTEP

5450  0000    PSTEPT, 0
5451  7240            CLA CMA
5452  0277            AND N=3
5453  4526            JMS I   PRXLOP          /PRINT,
5454  5650            JMP I PSTEPT

5455  0000    PC,     OPEN
5456  7200            CLA
5457  1077            TAD     C
5460  4526            JMS I   PRXLOP
5461  5655            JMP I   PC              /EXIT,

5462  0000    LPAR,   OPEN
5463  7200            CLA
5464  1375            TAD     (0250   /
5465  4526            JMS I   PRXLOP
5466  5662            JMP I   LPAR            /EXIT,

5467  0000    RPAR,   OPEN
5470  7200            CLA
5471  1374            TAD     (251
5472  4526            JMS I   PRXLOP
5473  5667            JMP I   RPAR            /EXIT,


5474  0316    N,      0316    /N
5475  0315            0315    /M
5476  0311            0311    /I
5477  0324            0324    /T
5500  0323            0323    /S
5501  0303            0303    /C
5502  0301            0301    /A

                /ROUTINE TO LOAD THE STEP COUNTER,

5503  0000    ULDSC,  OPEN
5504  1115            TAD     MODE
5505  7640            SZA CLA
5506  5315            JMP     LDSC1
5507  1024            TAD     TOSHIF
5510  7040            CMA
5511  3313            DCA     .+2
5512  7403            SCL
5513  0000            OPEN
5514  5703            JMP I   ULDSC
5515  1024    LDSC1,  TAD     TOSHIF
5516  7403            ACS
5517  5703            JMP I   ULDSC
```

```
                    /ROUTINE TO SET COMPARE ROUTINE AND DO OTHER JOBS.

 5520  0000    SCOMP,  OPEN
 5521  7344            CLA CLL CMA RAL
 5522  3120            DCA     TWICE
 5523  4554            JMS I   RTFX            /CLEAR THE GT
 5524  1170            TAD     CLSIM
 5525  3773'           DCA     C1
 5526  1167            TAD     CLKTOCK
 5527  3772'           DCA     C2
 5530  3114            DCA     SCOUNT
 5531  3021            DCA     TOLINK
 5532  3771'           DCA     WILCHG          /MAKE "WILCHG" EFFECTIVLY AN AND 0
                                               /WHICH IS REALLY A DO NOTHING INSTRUCTION.
 5533  3770'           DCA     PRCHG           /MAKE "PRCHG" EFFECTIVLY AN AND 0
                                               /WHICH IS REALLY A DO NOTHING INSTRUCTION.
 5534  4453            JMS I   UMOVE
 5535  0021            TOLINK
 5536  0022            TOAC
 5537  7753            -25
 5540  5720            JMP I   SCOMP           /EXIT, AC=0, L=0.

                    /ROUTINE FOR DPSZ PRINTOUT

 5541  0000    DPSZPR, OPEN
 5542  4525            JMS I   CRLF2           /2 CR AND LF.
 5543  4450            JMS I   XTYPST
 5544  0000    DPSZPR1, OPEN
 5545  5741            JMP I   DPSZPR          /EXIT.

                    /UP-COUNT GENERATOR

 5546  0000    GEN,    0
 5547  2065            ISZ GENX
 5550  5746            JMP I GEN
 5551  7604            CLA OSR         /TEST SW 3
 5552  7106            RTL CLL
 5553  7006            RTL
 5554  7630            SZL CLA
 5555  5456            JMP I BACK
 5556  5457            JMP I NEXT

 5570  7002
 5571  7016
 5572  6371
 5573  6370
 5574  0251
 5575  0250
 5576  4132
 5577  2000
       5600            PAGE

                    /ROUTINE TO DO A CR AND LF.
```



```
 5600  0000    UCRLF,  OPEN
 5601  7240            CLA CMA
 5602  0070            AND CR                  /CR
 5603  4526            JMS I   PRXLOP          /PRINT,
 5604  1071            TAD     LF              /"LINE FEED".
 5605  4526            JMS I   PRXLOP          /PRINT,
 5606  5600            JMP I   UCRLF           /EXIT.

                    /ROUTINE TO DO 2 CR AND LF.

 5607  0000    UCRLF2, OPEN
 5610  4524            JMS I   CRLF
 5611  4524            JMS I   CRLF
 5612  5607            JMP I   UCRLF2          /EXIT, AC = 0.

 5613  0000    RXLOP,  OPEN
 5614  3236            DCA     CHAR            /SAVE CHARACTER TO PRINTER.
 5615  1020            TAD     FILLER          /GET NUMBER OF FILLER CHARACTERS.
 5616  7040            CMA                     /COMPLEMENT.
 5617  3237            DCA     FILCNT          /SAVE COMPLEMENTED NUMBER OF FILLER CHAR.
 5620  1236            TAD     CHAR            /GET CHARACTER TO BE PRINTED.
 5621  6046            TLS
 5622  6041            TSF
 5623  5222            JMP     .-1
 5624  1166            TAD     [-215
 5625  7640            SZA CLA                 /WAS IT A CARRIAGE RETURN?
 5626  5613            JMP I   RXLOP           /NO.
 5627  2237            ISZ     FILCNT          /DONE OUTPUTTING FILLER CHARACTERS
 5630  7610            SKP CLA                 /NO.
 5631  5613            JMP I   RXLOP           /YES.
 5632  6046            TLS
 5633  6041            TSF
 5634  5233            JMP     .-1
 5635  5227            JMP     .-6
 5636  0000    CHAR,   OPEN
 5637  0000    FILCNT, OPEN

 5640  0000    UPLINK, 0
 5641  7240            CLA CMA
 5642  0102            AND LINK                /LINK
 5643  4245            JMS UONZER
 5644  5640            JMP I UPLINK

 5645  0000    UONZER, 0
 5646  7440            SZA
 5647  5252            JMP UONEP               /PRINT ONE
 5650  4256            JMS UZERO               /PRINT ZERO
 5651  5645            JMP I UONZER

 5652  7240    UONEP,  CLA CMA         /ONE
 5653  0100            AND ONE
 5654  4526            JMS I   PRXLOP          /PRINT,
 5655  5645            JMP I UONZER

 5656  0000    UZERO, 0
```

```
5657  7240          CLA CMA
5660  0101          AND ZERO                /ZERO
5661  4526          JMS I   PRXLOP          /PRINT,
5662  5656          JMP I UZERO2

5663  0000    UMESSG, OPEN
5664  7240          CLA CMA
5665  0104          AND COUNTX
5666  3105          DCA STRCNT
5667  2105          ISZ STRCNT
5670  7410          SKP
5671  5663          JMP I   UMESSG          /EXIT,
5672  7240          CLA CMA
5673  0106          AND BITSTR
5674  7100          CLL
5675  7004          RAL
5676  3106          DCA BITSTR
5677  7430          SZL
5700  5303          JMP UPRONE
5701  4256          JMS UZERO2
5702  5267          JMP .-13

5703  7240    UPRONE, CLA CMA
5704  0100          AND ONE                 /ONE
5705  4526          JMS I   PRXLOP          /PRINT,
5706  5267          JMP     UMESSG+4                /

5707  0000    UTYTST, OPEN
5710  4525          JMS I   CRLF2           /CR AND LF',
5711  1707          TAD I   UTYTST          /OBTAIN NUMBER OF WORDS
5712  3116          DCA     ANYUSE          /SAVE FOR DURATION OF THIS ROUTINE',
5713  2307          ISZ     UTYTST          /SET UP TO GET NEXT WORD,
5714  1707          TAD I   UTYTST          /GET THE WORD,
5715  3317          DCA     .+2             /STASH IT AWAY',
5716  4450          JMS I   XTYPST          /NOW PRINT THE WORD JUST STASHED AWAY,
5717  0000          OPEN                    /WORD TO BE PRINTED,
5720  4455          JMS I   U2SPC           /2 SPACES,
5721  2116          ISZ     ANYUSE          /DONE ALL THE WORDS SET UP FOR?
5722  5313          JMP     .-7             /NO, REPEAT,
5723  4454          JMS I   U1SPC           /YES,  1 SPACE',
5724  2307          ISZ     UTYTST          /SET UP FOR EXIT',
5725  5707          JMP I   UTYTST          /EXIT THIS ROUTINE',  AC EQUALS ZERO,

5726  0000    UP1BIT, OPEN
5727  3102          DCA     LINK
5730  4527          JMS I   PLINK
5731  5726          JMP I   UP1BIT          /EXIT,

                /ROUTINE TO LOAD REGISTERS WITH RANDOM DATA,

5732  0000    RANDAT, OPEN
5733  4550          JMS I   RANDOM          /GET RANDOM DATA',
5734  3022          DCA     TOAC            /SAVE FOR THE AC
5735  7010          RAR                     /LINK TO AC0
```



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5736  3021          DCA     TOLINK          /SAVE FOR THE LINK
5737  4550          JMS I   RANDOM          /GET RANDOM DATA
5740  3023          DCA     TOMQ            /SAVE FOR THE MQ
5741  7010          RAR                     /LINK TO AC0
5742  3025          DCA     TOGT            /SAVE FOR THE GT
5743  4550          JMS I   RANDOM          /GET RANDOM DATA
5744  0165          AND     C37             /KEEP AC 7-11
5745  3024          DCA     TOSHIF          /SAVE FOR THE STEP COUNTER
5746  4573          JMS I   CDCOUNT
5747  5732          JMP I   RANDAT
5750  5575          JMP I   CGEN+3

                /ROUTINE TO LOAD MQ, GT, AND LINK,

5751  0000    ULDREG, OPEN
5752  7300          CLA CLL
5753  1023          TAD     TOMQ
5754  7421          MQL                     /MQ LOADED',
5755  4553          JMS I   LDGT            /LOAD THE GT
5756  1021          TAD     TOLINK
5757  7104          CLL     RAL             /LINK LOADED',
5760  5751          JMP I   ULDREG

                /ROUTINE TO LOAD THE GT,

5761  0000    ULDGT,  OPEN
5762  7200          CLA
5763  1025          TAD     TOGT            /GET THE GT DATA
5764  7110          CLL RAR                 /MOVE TO AC1
5765  4554          JMS I   RTFX            /NOW LOAD
5766  5761          JMP I   ULDGT           /EXIT

                /ROUTINE TO DO A TEST 8192 OCTAL TIMES,

5767  0000    DCOUNT, OPEN
5770  2114          ISZ     SCOUNT
5771  5767          JMP I   DCOUNT
5772  2120          ISZ     TWICE
5773  5767          JMP I   DCOUNT
5774  2367          ISZ     DCOUNT
5775  5767          JMP I   DCOUNT


      6000          PAGE

                /SUBROUTINE TO LOAD GT',

6000  0000    XRTF,   OPEN
6001  3116          DCA     ANYUSE          /SAVE DATA TO BE PLACED IN THE GT',
6002  6214          RDF                     /READ THE DATA FIELD',
6003  7112          CLL RTR
6004  7010          RAR                     /DF NOW IN AC 9-11
6005  6224          RIF                     /READ THE INSTRUCTION FIELD,
6006  1116          TAD     ANYUSE          /GT DATA IN AC ALONG WITH IF AND DF,
6007  6005          RTF                     /RESTORE THE FLAGS',
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6010  6002          IOF                     /DO AWAY WITH THE ION CAUSED BY RTF,
6011  7300          CLA CLL                 /CLEAR FOR THE EXIT,
6012  5600          JMP I   XRTF            /EXIT, AC AND LINK ARE ZERO,


                    /ROUTINE TO SIMULATE THE SUBTRACT AC FROM MQ INSTRUCTION,

6013  0000    SAMSIM, OPEN
6014  1022          TAD     TOAC            /GET ORIGINAL AC',
6015  7500          SMA                     /IS IT NEGATIVE?
6016  7120          CLL CML                 /NO, SET LINK',
6017  7041          CMA IAC                 /NEGATE AC',
6020  3040          DCA     TEMPA           /SAVE IT,
6021  1023          TAD     TOMQ            /GET ORIGINAL MQ',
6022  7510          SPA                     /IS IT POSITIVE?
6023  7020          CML                     /NO, COMPLEMENT LINK',
6024  1040          TAD     TEMPA           /ADD NEGATED ORIGINAL AC,
6025  7230          CLA CML RAR             /COMPLEMENT LINK AND MOVE TO AC 0,
6026  3046          DCA     GTSIM           /SAVE SIMULATED GT',
6027  1022          TAD     TOAC            /GET ORIGINAL AC',
6030  7041          CMA IAC                 /NEGATE IT',
6031  1023          TAD     TOMQ            /ADD ORIGINAL MQ TO IT',
6032  3043          DCA     MSH             /SAVE AS SIMULATED AC',
6033  7010          RAR                     /MOVE LINK INTO AC 0',
6034  3042          DCA     LSIM            /SAVE AS SIMULATED LINK',
6035  1023          TAD     TOMQ            /GET ORIGINAL MQ
6036  3044          DCA     LSH             /SAVE AS SIMULATED MQ',
6037  1024          TAD     TOSHIF          /GET SC DATA',
6040  3045          DCA     SCSIM           /SAVE AS SIMULATED SC,
6041  5613          JMP I   SAMSIM          /EXIT, L+AC=0,

                    /ROUTINE TO SIMULATE THE SHIFT LEFT INSTRUCTION,

6042  0000    SHLSIM, OPEN                  /DOUBLE PRECISION SHIFT LEFT,
6043  1024          TAD     TOSHIF          /
6044  1115          TAD     MODE            /
6045  7140          CMA CLL                 /
6046  3045          DCA     SCSIM           /SAVE THE NUMBER OF SHIFTS TO BE PERFORMED',
6047  1022          TAD     TOAC            /GET ORIGINAL AC
6050  3043          DCA     MSH             /MOST SIGNIFICAN HALF
6051  1023          TAD     TOMQ            /GET ORIGINAL MQ
6052  3044          DCA     LSH             /LEAST SIGNIFICANT HALF
6053  1025          TAD     TOGT            /GET ORIGINAL GT
6054  0115          AND     MODE            /"AND" THE MODE
6055  3046          DCA     GTSIM           /SAVE AS THE SIMULATED GT',
6056  1045          TAD     SCSIM           /GET STEP COUNTER DATA
6057  1377          TAD     (32             /ADD 32,
6060  7710          SPA CLA                 /IF MORE THAN 31 SHIFTS THE RESULTS ARE PREDICTABLE
6061  5307          JMP     SHL031          /GO TO ROUTINE FOR MORE THAN 31 SHIFTS',
6062  1045          TAD     SCSIM           /GET STEP COUNTER DATA',
6063  7650          SNA CLA                 /IF 0 SHIFTS THE RESULTS ARE PREDICTABLE
6064  5313          JMP     SHIFT0          /GO TO ROUTINE FOR 0 SHIFTS
6065  1044          TAD     LSH             /GET CONTENTS OF LSH
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6066  7421          MQL                     /STORE IN THE MQ
6067  1043          TAD     MSH             /LOAD AC WITH CONTENTS OF MSH,
6070  7521          SWP                     /SWAP THE AC AND MQ
6071  7104          RAL CLL                 /SHIFT LEFT 1,
6072  7521          SWP                     /SWAP AC AND MQ,
6073  7004          RAL                     /SHIFT LEFT 1,
6074  2045    SHLA,   ISZ     SCSIM         /DONE NECESSARY SHIFTS?
6075  5270          JMP     .-5             /NO,
6076  3043          DCA     MSH             /SAVE SHIFTED AC',
6077  7501          MQA                     /MQ TO AC
6100  3044          DCA     LSH             /SAVE SHIFTED MQ',
6101  7210          CLA RAR                 /MOVE LINK INTO AC0,
6102  3042          DCA     LSIM            /SAVE AS SIMULATED LINK
6103  1115          TAD     MODE            /MODE IN AC, 7777=8, 0000=A,
6104  0165          AND     [37             /"AND" WITH A 37
6105  3045          DCA     SCSIM           /SAVE AS SIMULATED SC,
6106  5642          JMP I   SHLSIM          /EXIT WITH MOST SIGNIFICANT HALF IN "MSH"
                                            /AND LEAST SIGNIFICANT HALF IN "LSH",

6107  7340    SHL031, CLA CMA CLL           /7777 TO
6110  3045          DCA     SCSIM           /SCSIM SO AN IMMEDIATE EXIT TAKES PLACE
6111  7421          MQL                     /0 TO MQ,
6112  5274          JMP     SHLA            /CONTINUE IN MAIN BODY',

6113  1021    SHIFT0, TAD     TOLINK        /GET ORIGINAL LINK
6114  3042          DCA     LSIM            /SAVE AS SIMULATED LINK
6115  1165          TAD     [37             /37
6116  3045          DCA     SCSIM           /SAVE AS SIMULATED SC',
6117  5642          JMP I   SHLSIM          /EXIT, AC=0,

                    /ROUTINE TO SIMULATE THE LOGICAL SHIFT RIGHT INSTRUCTION,

6120  0000    LSRSIM, OPEN                  /DOUBLE PRECISION LOGICAL SHIFT RIGHT
6121  1024          TAD     TOSHIF          /
6122  1115          TAD     MODE            /
6123  7140          CLL CMA                 /
6124  3045          DCA     SCSIM           /SAVE THE NUMBER OF SHIFTS TO BE PERFORMED',
6125  1045          TAD     SCSIM           /GET SHIFT DATA',
6126  1164          TAD     [31             /ADD 31 TO IT
6127  7710          SPA CLA                 /IF MORE THAN 30 SHIFTS THE RESULTS ARE PREDICTABLE,
6130  5367          JMP     LSR030          /GO TO ROUTINE FOR MORE THAN 30 SHIFTS',
6131  1022          TAD     TOAC            /GET ORIGINAL AC',
6132  3043          DCA     MSH             /STORE IN MSH
6133  1023          TAD     TOMQ            /GET ORIGINAL MQ',
6134  3044          DCA     LSH             /STORE IN LSH
6135  1045          TAD     SCSIM           /GET SHIFT DATA
6136  7650          SNA CLA                 /IF 0 SHIFTS, THE RESULTS ARE PREDICTABLE',
6137  5364          JMP     LSR0SH+4        /JUST DO THE NECESSARY AND EXIT,
6140  1044          TAD     LSH             /GET CONTENTS OF LSH
6141  7421          MQL                     /STORE IN THE MQ',
6142  1043          TAD     MSH             /CONTENTS OF MSH TO AC',
6143  7110          CLL RAR                 /SHIFT RIGHT ONCE,
6144  7521          SWP                     /SWAP THE AC AND MQ,
6145  7010          RAR                     /SHIFT RIGHT ONEC',
6146  7521          SWP                     /SWAP THE AC AND MQ,
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6147  2045    LSRA,   ISZ     SCSIM           /DONE NECESSARY SHIFTS?
6150  5343            JMP     .-5             /NO,
6151  3043            DCA     MSH             /SAVE THE SHIFTED AC',
6152  7501            MQA
6153  3044            DCA     LSH             /SAVE THE SHIFTED MQ',
6154  3042            DCA     LSIM            /SAVE SIMULATED LINK
6155  7210            CLA     RAR
6156  0115            AND     MODE
6157  3046            DCA     GTSIM           /SAVE SIMULATED GT
6160  1165    LSR0SH, TAD     [37             /37
6161  0115            AND     MODE            /"AND" MODE',
6162  3045            DCA     SCSIM           /SAVE AS SIMULATED SC',
6163  5720            JMP I   LSRSIM          /EXIT, AC=0,
6164  1025            TAD     TOGT            /
6165  3046            DCA     GTSIM           /GT REMAINS SAME ON 0 SHIFTS,
6166  5360            JMP     LSR0SH          /CONTINUE IN MAIN BODY',

6167  7340    LSR030, CLA CLL CMA
6170  3045            DCA     SCSIM
6171  7421            MQL
6172  5347            JMP     LSRA

6177  0032
      6200              PAGE

                /ROUTINE TO SIMULATE THE ARITHMETIC SHIFT RIGHT INSTRUCTION,

6200  0000    ASRSIM, OPEN
6201  1024            TAD     TOSHIF          /
6202  1115            TAD     MODE            /
6203  7140            CLL CMA                 /
6204  3045            DCA     SCSIM           /SAVE THE NUMBER OF SHIFTS TO BE PERFORMED',
6205  1022            TAD     TOAC            /GET ORIGINAL AC
6206  3043            DCA     MSH             /MOST SIGNIFICANT HALF',
6207  1023            TAD     TOMQ            /GET ORIGINAL MQ',
6210  3044            DCA     LSH             /LEAST SIGNIFICANT HALF',
6211  1045            TAD     SCSIM           /GET SHIFT DATA
6212  7650            SNA CLA                 /IF 0 SHIFTS THE RESULTS ARE PREDICTABLE
6213  5251            JMP     ASR0SH          /JUST DO THE NECESSARY AND EXIT,
6214  1045            TAD     SCSIM           /GET SHIFT DATA
6215  1164            TAD     [31             /31
6216  7710            SPA CLA                 /IF MORE THAN 30 SHIFTS, THE RESULTS ARE PREDICTABLE,
6217  5257            JMP     ASR030          /GO TO ROUTINE FOR MORE THAN 30 SHIFTS
6220  1044            TAD     LSH             /CONTENTS OF LSH TO AC
6221  7421            MQL                     /LOAD IT IN THE MQ NOW',
6222  1043            TAD     MSH             /CONTENTS OF MSH TO AC',
6223  7100    SASR1,  CLL                     /CLEAR THE LINK,
6224  7510            SPA                     /AC0=1?
6225  7020            CML                     /YES, SET THE LINK',
6226  7010            RAR                     /SHIFT RIGHT ONCE,
6227  7521            SWP                     /SWAP AC AND MQ,
6230  7010            RAR                     /SHIFT RIGHT ONCE',
6231  7521            SWP                     /SWAP AC AND MQ,
6232  2045            ISZ     SCSIM           /DONE NECESSARY SHIFTS?
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6233  5223            JMP     SASR1           /NO,
6234  3043            DCA     MSH             /STORE SHIFTED AC',
6235  7501            MQA                     /MQ TO AC,
6236  3044            DCA     LSH             /STORE SHIFTED MQ',
6237  7210    SASR1A, CLA     RAR             /LINK TO AC0
6240  0115            AND     MODE
6241  3046    SASR2,  DCA     GTSIM           /SAVE AS SIMULATED GT
6242  1043            TAD     MSH             /GET MSH
6243  0163            AND     [4000           /KEEP AC0
6244  3042            DCA     LSIM            /SAVE AS SIMULATED LINK
6245  1165    SASR3,  TAD     [37             /37
6246  0115            AND     MODE            /"AND" MODE "A"=0, "B"=7777
6247  3045            DCA     SCSIM           /SAVE AS SIMULATED SC
6250  5600            JMP I   ASRSIM          /EXIT, AC=0
6251  1022    ASR0SH, TAD     TOAC            /GET ORIGINAL AC
6252  0163            AND     [4000           /KEEP AC0 ONLY
6253  3042            DCA     LSIM            /SAVE AS SIMULATED LINK
6254  1025            TAD     TOGT            /GET ORIGINAL GT
6255  3046            DCA     GTSIM           /SAVE AS SIMULATED GT
6256  5245            JMP     SASR3           /CONTINUE IN MAIN BODY

6257  1043    ASR030, TAD     MSH             /GET MSH
6260  0163            AND     [4000           /KEEP AC0
6261  7104            CLL RAL                 /PUT INTO LINK
6262  7620            SNL CLA                 /LINK=1? INDICATING AC0=1',
6263  5271            JMP     .+6             /NO, AC0 WAS A 0
6264  7040            CMA                     /YES, SET AC=7777
6265  3044            DCA     LSH             /SAVE AS SIMULATED MQ
6266  7040            CMA                     /7777
6267  3043            DCA     MSH             /SAVE AS SIMULATED AC
6270  5237            JMP     SASR1A          /CONTINUE IN MAIN BODY
6271  3044            DCA     LSH             /SAVE AS SIMULATED MQ
6272  5267            JMP     .-3             /SET SIMULATED AC

                /ROUTINE TO SIMULATE THE DOUBLE PRECISION INCREMENT INSTRUCTION,

6273  0000    DPISIM, OPEN                    /SIMULATE DPI INSTRUCTION',
6274  1023            TAD     TOMQ            /GET WHAT WAS LOADED INTO THE MQ
6275  7101            CLL     IAC             /INCREMENT IT
6276  3044            DCA     LSH             /SAVE IT AS "SIMULATED MQ"
6277  7004            RAL                     /LINK TO AC11; AC0 TO LINK',
6300  1022            TAD     TOAC            /ADD WHAT WAS LOADED INTO THE AC
6301  3043            DCA     MSH             /STORE IT AS "SIMULATED AC"
6302  7010            RAR                     /PUT LINK INTO AC0
6303  3042            DCA     LSIM            /STORE IT AS "SIMULATED LINK"
6304  1025            TAD     TOGT            /GET PROBLEM GT
6305  3046            DCA     GTSIM           /STORE IN SIMULATED GT ALSO
6306  1024            TAD     TOSHIF          /GET PROBLEM STEP COUNTER
6307  3045            DCA     SCSIM           /STORE IN SIMULATED SC',
6310  5673            JMP I   DPISIM          /EXIT,  AC AND LINK=0

                /ROUTINE TO SIMULATE THE DOUBLE PRECISION COMPLEMENT INSTRUCTION,

6311  0000    DCMSIM, OPEN                    /DOUBLE PRECISION 2'S COMPLEMENT SIMULATOR',
6312  1023            TAD     TOMQ            /GET WHAT WAS LOADED INTO THE MQ
```

```
6313  7041          CMA     IAC             /2'S COMPLEMENT IT
6314  3044          DCA     LSH             /SAVE AS SIM MQ
6315  1022          TAD     TOAC            /GET WHAT WAS LOADED INTO THE AC
6316  7040          CMA                     /1'S COMPLEMENT IT
6317  3043          DCA     MSH             /SAVE IT
6320  7004          RAL                     /GET THE CARRY FROM 2'S COMPLEMENT OF MQ
6321  1043          TAD     MSH             /ADD 1'S COMPLEMENT OF AC
6322  3043          DCA     MSH             /STORE AS 2'S COMPLEMENT OF AC
6323  7010          RAR                     /GET LINK
6324  3042          DCA     LSIM            /SAVE IT,
6325  1025          TAD     TOGT            /GET PROBLEM GT,
6326  3046          DCA     GTSIM           /SAVE AS SIMULATED GT,
6327  1024          TAD     TOSHIF          /GET PROBLEM STEP COUNTER,
6330  3045          DCA     SCSIM           /SAVE AS SIMULATED SC,
6331  5711          JMP I   DCMSIM          /EXIT, AC=0

                    /ROUTINE TO SIMULATE THE DOUBLE PRECISION ADD INSTRUCTION

6332  0000    DADSIM, OPEN                  /DOUBLE PRECISION ADD ROUTINE,
6333  1023          TAD     TOMQ            /GET ORIGINAL MQ
6334  1025          TAD     TOGT            /ADD ORIGINAL DATA IN "LEAST SIGNIFICANT"
6335  3044          DCA     LSH             /SAVE THE DATA
6336  7204          CLA RAL                 /LINK TO AC 11
6337  1022          TAD     TOAC            /ADD ORIGINAL AC TO IT
6340  1024          TAD     TOSHIF          /ADD ORIGINAL DATA IN "MOST SIGNIFICANT" TO IT,
6341  3043          DCA     MSH             /SAVE THE DATA,
6342  7010          RAR                     /LINK TO AC 0
6343  3042          DCA     LSIM            /SAVE AS SIMULATED LINK,
6344  5732          JMP I   DADSIM          /EXIT, AC=LINK=0,


                    /ROUTINE TO COMPARE THE CONTENTS OF 2 LOCATIONS,

6345  0000    COMP,   OPEN
6346  1745          TAD I   COMP            /GET AND STORE NUMBER OF
6347  3374          DCA     CMPCTR          /WORDS TO COMPARE,
6350  2345          ISZ     COMP
6351  1370          TAD     C1              /ADDRESS IN C1
6352  3372          DCA     C1A             /C1A,
6353  1371          TAD     C2              /ADDRESS IN C2
6354  3373          DCA     C2A             /TO C2A,
6355  1772    COMPA,  TAD I   C1A             /GET "GOOD" WORD
6356  7041          CIA                     /2'S COMPLEMENT IT
6357  1773          TAD I   C2A             /ADD RESULT WORD,
6360  7640          SZA     CLA             /RESULT ZERO?
6361  5745          JMP I   COMP            /NO, EXIT AC=0
6362  2372          ISZ     C1A             /YES, SET
6363  2373          ISZ     C2A             /FOR NEXT COMPARE
6364  2374          ISZ     CMPCTR          /DONE COMPARING
6365  5355          JMP     COMPA           /NO,
6366  2345          ISZ     COMP            /YES
6367  5745          JMP I   COMP            /EXIT, AC=0
6370  0000    C1,     OPEN                  /CONTAINS ADDRESS OF "GOOD"
```



```
6371  0000    C2,     OPEN                  /CONTAINS ADDRESS OF DATA TO BE COMPARED
6372  0000    C1A,    OPEN                  /WILL CONTAIN "GOOD" DATA
6373  0000    C2A,    OPEN                  /WILL CONTAIN DATA TO BE COMPARED
6374  0000    CMPCTR, OPEN                  /COUNTER,

      6400          PAGE


6400  0000    MOVE,   0
6401  7200          CLA
6402  1600          TAD I   MOVE            /GET "FROM ADDR" AND
6403  3223          DCA     FADDR           /STORE AT FDDR
6404  2200          ISZ     MOVE
6405  1600          TAD I   MOVE            /GET "TO ADDR" AND
6406  3224          DCA     TADDR           /STORE AT TDDR
6407  2200          ISZ     MOVE
6410  1600          TAD I   MOVE            /GET "MOVE COUNT" AND
6411  3225          DCA     MCTR            /STORE AT MCTR
6412  2200          ISZ     MOVE            /SET UP EXIT ADDRESS
6413  7200    MOVEA,  CLA
6414  1623          TAD I   FADDR           /GET "FROM" WORD
6415  3624          DCA I   TADDR           /STORE AT "TO" LOCATION
6416  2223          ISZ     FADDR           /INCREMENT "FROM" ADDRESS
6417  2224          ISZ     TADDR           /INCREMENT "TO" ADDRESS
6420  2225          ISZ     MCTR            /ALL WORDS MOVED?
6421  5213          JMP     MOVEA           /NO,
6422  5600          JMP I   MOVE            /YES
                    /
6423  0000    FADDR,  0
6424  0000    TADDR,  0
6425  0000    MCTR,   0


                    /ROUTINE TO CONVERT FROM BINARY TO DECIMAL,

6426  0000    BDCNV,  0
6427  1377          TAD     (-4
6430  3271          DCA     CNVCTR
6431  1262          TAD     ADDR2A
6432  3243          DCA     ARROW           /INITIALIZE ARROW
6433  1626          TAD I   BDCNV
6434  2226          ISZ     BDCNV
6435  3270          DCA     DIGIT
6436  1670          TAD I   DIGIT
6437  3267          DCA     VALUE
6440  3270          DCA     DIGIT           /CLEAR DIGIT
6441  7100          CLL
6442  1267          TAD     VALUE
6443  1263    ARROW,  TAD     TENPWR
6444  7420          SNL
6445  5251          JMP     .+4
6446  2270          ISZ     DIGIT           /DEVELOP DIGIT
6447  3267          DCA     VALUE
6450  5241          JMP     ARROW-2
6451  7200          CLA
```

```
6452  1270            TAD     DIGIT           /GET DIGIT
6453  1272            TAD     K260            /ADD 260
6454  4526            JMS I   PRXLOP          /PRINT
6455  7300            CLA     CLL
6456  2243            ISZ     ARROW           /POINT ARROW
6457  2271            ISZ     CNVCTR          /DONE?
6460  5240            JMP     ARROW-3         /NO, REPEAT
6461  5626            JMP I   BDCNV           /YES, EXIT
6462  1263    ADDR2A, TAD     TENPWR
6463  6030    TENPWR, -1750
6464  7634            -144
6465  7766            -12
6466  7777            -1
6467  0000    VALUE,  0
6470  0000    DIGIT,  0
6471  0000    CNVCTR, 0
6472  0260    K260,   260

                /ROUTINE TO CHANGE A BINARY NUMBER TO IT'S OBVERSE

6473  0000    OBVERS, OPEN                    /ENTER WITH "ABC DEF GHI JKL",
6474  7102            CLL BSW
6475  7421            MQL
6476  7501            MQA
6477  7012            RTR
6500  7010            RAR
6501  0376            AND     (707
6502  7521            SWP
6503  7106            CLL RTL
6504  7004            RAL
6505  0375            AND     (7070
6506  7501            MQA
6507  7421            MQL
6510  7501            MQA
6511  0374            AND     (2222
6512  3324            DCA     OBV
6513  7501            MQA
6514  0373            AND     (4444
6515  7112            CLL RTR
6516  7521            SWP
6517  0372            AND     (1111
6520  7106            CLL RTL
6521  1324            TAD     OBV
6522  7501            MQA
6523  5673            JMP I   OBVERS          /EXIT WITH "LKJ IHG FED CBA", AND LINK 0,


6524  0000    OBV,    OPEN

                /RANDOM NUMBER GENERATOR SUBROUTINE

6525  0000    RANGEN, 0
6526  7200            CLA
6527  1370            TAD     RANTND
```



```
6530  1355            TAD     RANDEX
6531  7640            SZA     CLA
6532  5342            JMP     RANTAD
6533  1357            TAD     RANTBL
6534  3355            DCA     RANDEX
6535  1356            TAD     RANCON
6536  7104            CLL     RAL
6537  7430            SZL
6540  7001            IAC
6541  3356            DCA     RANCON
6542  1356    RANTAD, TAD     RANCON
6543  1755            TAD I   RANDEX
6544  3755            DCA I   RANDEX
6545  1371            TAD     RANSAV
6546  7010            RAR
6547  1755            TAD I   RANDEX
6550  2355            ISZ     RANDEX
6551  7400            NOP
6552  3371            DCA     RANSAV
6553  1371            TAD     RANSAV
6554  5725            JMP I   RANGEN
6555  6570    RANDEX, RANTND
6556  6543    RANCON, 6543
6557  6560    RANTBL, .+1
6560  6543            6543
6561  3210            3210
6562  0765            0765
6563  5432            5432
6564  2107            2107
6565  7654            7654
6566  4321            4321
6567  0176            0176
6570  1210    RANTND, -.
6571  0000    RANSAV, OPEN

6572  1111
6573  4444
6574  2222
6575  7070
6576  0707
6577  7774
      6600            PAGE

                /ROUTINE FOR TYPING.

6600  0000    TYPST,  OPEN
6601  7200            CLA
6602  1600            TAD I   TYPST           /GET INITIAL ADDRESS
6603  3263            DCA     TEMQ            /STORE INITIAL ADDRESS
6604  3265            DCA     FLAG            /CLEAR FLAG
6605  2200            ISZ     TYPST           /PRESET UP EXIT
6606  1663    TSC1,   TAD I   TEMQ            /PICK UP DATA
6607  7012            RTR
6610  7012            RTR
6611  7012            RTR
```

```
6612  4217          JMS     TSC2            /GO TYPE FIRST CHARACTER
6613  1663          TAD I   TEMQ            /PICK-UP DATA
6614  4217          JMS     TSC2            /GO TYPE SECOND CHARACTER
6615  2263          ISZ     TEMQ            /EVEN STRING ADDRESS
6616  5206          JMP     TSC1            /GO BACK FOR MORE
6617  0000  TSC2,   OPEN
6620  0377          AND     (77             /MASK OFF SIX BITS
6621  3264          DCA     TEMR            /SAVE CHARACTER.
6622  1265          TAD     FLAG            /TEST "SPECIAL" FLAG'
6623  7640          SZA     CLA
6624  5234          JMP     TYPSP           /SET! TYPE SPECIAL
6625  1264          TAD     TEMR            /NO, REGULAR CHARACTER
6626  7450          SNA                     /ZERO?
6627  5232          JMP     .+3             /YES, SET FLAG
6630  4253  TYPAT,  JMS     PRINT           /NO, PRINT IT.
6631  5617          JMP I   TSC2            /RETURN
6632  2265          ISZ     FLAG            /SET "SPECIAL" FLAG
6633  5617          JMP I   TSC2            /EXIT
6634  3265  TYPSP,  DCA     FLAG            /CLEAR FLAG.
6635  1264          TAD     TEMR            /TEST FOR "0"
6636  7041          CIA
6637  7450          SNA
6640  5230          JMP     TYPAT           /0!TYPE "0"
6641  7001          IAC                     /TEST FOR 01'
6642  7650          SNA     CLA
6643  5600          JMP I   TYPST           /YES! EXIT CODE
6644  1266          TAD     SKIPMA          /ALTER INSTRUCTION
6645  3255          DCA     SWITCH          /TO BE "SMA"
6646  1264          TAD     TEMR            /TYPE CHAR
6647  4253          JMS     PRINT
6650  1267          TAD     SKIPPA          /ALTER INSTRUCTION
6651  3255          DCA     SWITCH          /TO BE "SPA"
6652  5617          JMP I   TSC2            /RETURN.
6653  0000  PRINT,  OPEN
6654  1376          TAD     (-40            /COMPARE WITH 40'
6655  7510  SWITCH, SPA                     /OR SMA FOR SPECIAL CODES
6656  1375          TAD     (100
6657  1374          TAD     (240
6660  4526          JMS I   PRXLOP          /PRINT.
6661  5653          JMP I   PRINT

6662  0000  TEMPQ,  OPEN
6663  0000  TEMQ,   OPEN
6664  0000  TEMR,   OPEN
6665  0000  FLAG,   OPEN
6666  7500  SKIPMA, SMA
6667  7510  SKIPPA, SPA


6670  0000  PSPC,   OPEN
6671  1670          TAD I   PSPC            /GET NUMBER
6672  3303          DCA     SPCTR           /OF SPACES
6673  2270          ISZ     PSPC
6674  4450          JMS I   XTYPST          /SPACE ONCE
6675  6701          .+4
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6676  2303          ISZ     SPCTR           /ALL SPACES DONE
6677  5274          JMP     .-3             /NO, REPEAT.
6700  5670          JMP I   PSPC            /YES, EXIT
6701  4000          4000
6702  0100          0100
6703  0000  SPCTR,  OPEN

                    /ROUTINE TO PRINT MODE FAILURE

6704  0000  TYMOD,  OPEN
6705  7300          CLA     CLL
6706  1115          TAD     MODE
6707  7040          CMA
6710  1373          TAD     (4002
6711  3321          DCA     MODEX+2
6712  4451          JMS I   UPSPC
6713  7774          -4
6714  4450          JMS I   XTYPST
6715  6717          MODEX

6716  5704          JMP I   TYMOD
6717  1517  MODEX,  1517
6720  0405          0405
6721  0000          OPEN
6722  0001          0001

                    /ROUTINE TO PRINT 1 SPACE

6723  0000  SPACE1, OPEN
6724  4451          JMS I   UPSPC
6725  7777          -1
6726  5723          JMP I   SPACE1

                    /ROUTINE TO PRINT 2 SPACES.

6727  0000  SPACE2, OPEN
6730  4451          JMS I   UPSPC
6731  7776          -2
6732  5727          JMP I   SPACE2

                    /ROUTINE TO PRINT A HEADING IN ERROR PRINTOUTS'

6733  0000  HEADIN, OPEN
6734  4525          JMS I   CRLF2           /2 CR AND LF'
6735  4451          JMS I   UPSPC           /#12 SPACES
6736  7764          -14
6737  4450          JMS I   XTYPST          /C(L)
6740  7407          CL
6741  4451          JMS I   UPSPC           /5 SPACES
6742  7773          -5
6743  4450          JMS I   XTYPST          /C(AC)
6744  7377          CAC
6745  4451          JMS I   UPSPC           /9 SPACES
6746  7767          -11
6747  4450          JMS I   XTYPST          /C(MQ)
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```
6750  7403            CMQ
6751  4451            JMS I UPSPC
6752  7774            -4
6753  4450            JMS I   XTYPST          /C(GT)
6754  7456            CGT
6755  4451            JMS I   UPSPC           /6 SPACES
6756  7772            -6
6757  4450            JMS I   XTYPST          /C(SC)
6760  7431            CSC
6761  5733            JMP I   HEADIN          /EXIT

6773  4002
6774  0240
6775  0100
6776  7740
6777  0077
      7000            PAGE

7000  0000    UPREGS, OPEN
7001  4576            JMS I   CTYMOD
7002  0000    PRCHG,  OPEN                    /THIS LOCATION WILL CONTAIN 0000 EXCEPT
                                              /WHEN THE DPSZ TEST ARE BEING EXECUTED AND
                                              /AT THAT TIME THERE WILL BE A JMS DPSZPR
                                              /IN THIS LOCATION.
7003  4777'           JMS     HEADIN          /PRINT HEADING
7004  4525            JMS I   CRLF2           /2 CR AND LF'S

7005  4453            JMS I   UMOVE
7006  0021            TOLINK
7007  0026            TLINK
7010  7773            -5
7011  4450            JMS I   XTYPST
7012  7412            PROBLM
7013  4451            JMS I   UPSPC
7014  7771            -7
7015  4246            JMS     PLAMGS          /PRINT C(L),C(AC),C(MQ),C(GT),C(SC)
7016  0000    WILCHG, OPEN            /THIS LOCATION WILL CONTAIN 0000 EXCEPT
                                      /WHEN THE DAD TESTS ARE BEING
                                      /EXECTUTED, THEN THERE WILL BE A JMS FORDAD
                                      /IN THIS LOCATION.

7017  4525            JMS I   CRLF2           /2 CR AND LF'S
7020  4450            JMS I   XTYPST          /PRINT "SIMULATED"
7021  7417            SIMULT
7022  4451            JMS I   UPSPC           /5 SPACES
7023  7773            -5
7024  4453            JMS I   UMOVE
7025  0042            LSIM
7026  0026            TLINK
7027  7773            -5


7030  4246            JMS     PLAMGS
7031  4525            JMS I   CRLF2           /2 CR AND LF'S
7032  4450            JMS I   XTYPST          /TYPE "ACTUAL"
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7033  7425            ACTUAL
7034  4451            JMS I   UPSPC           /7 SPACES
7035  7770            -10
7036  4453            JMS I   UMOVE
7037  0033            LKTOCK
7040  0026            TLINK
7041  7773            -5
7042  4246            JMS     PLAMGS
7043  5600            JMP I   UPREGS

7044  4776'   DADJMS, JMS     FORDAD
7045  4775'   DSZJMS, JMS     DPSZPR

7046  0000    PLAMGS, OPEN
7047  1026            TAD     TLINK
7050  4555            JMS I   P1BIT
7051  4455            JMS I   U2SPC           /2 SPACES
7052  1027            TAD     TAC
7053  4774'           JMS     P12BIT          /PRINT CONTENTS OF AC.
7054  4455            JMS I   U2SPC           /2 SPACES
7055  1030            TAD     TMQ
7056  4774'           JMS     P12BIT          /PRINT CONTENTS OF MQ.
7057  4451            JMS I   UPSPC           /3 SPACES
7060  7775            -3
7061  1032            TAD     TGT
7062  4555            JMS I   P1BIT
7063  4451            JMS I   UPSPC           /4 SPACES
7064  7774            -4
7065  1031            TAD     TSHIF
7066  4774'           JMS     P12BIT          /PRINT CONTENTS OF THE STEP COUNTER.
7067  5646            JMP I   PLAMGS          /EXIT, AC=0

                /ROUTINE TO PRINT THE NUMBER OF SHIFTS IN DECIMAL.

7070  0000    NUMSH,  OPEN                    /PRINT NUMBER OF SHIFTS IN DECIMAL.
7071  4451            JMS I   UPSPC
7072  7775            -3
7073  1024            TAD     TOSHIF
7074  7001            IAC
7075  1115            TAD     MODE
7076  3116            DCA     ANYUSE
7077  4773'           JMS     BDCNV
7100  0116            ANYUSE
7101  4455            JMS I   U2SPC
7102  4450            JMS I   XTYPST
7103  7447            SHIFTS
7104  4455            JMS I   U2SPC
7105  5670            JMP I   NUMSH           /EXIT

                /ROUTINE TO PRINT THE CONTENTS OF THE REGISTERS FOR THE DST INSTRUCTION.

7106  0000    DSTREG, OPEN
7107  4576            JMS I   CTYMOD
7110  4772'           JMS     DSTHED          /PRINT THE HEADING
7111  4525            JMS I   CRLF2           /2 CR AND LF'S
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7112  4450          JMS I   XTYPST          /PRINT C(L)
7113  7407          CL
7114  4451          JMS I   UPSPC           /5 SPACES
7115  7773          -5
7116  1042          TAD     LSIM
7117  4555          JMS I   P1BIT           /PRINT ORGINAL LINK,
7120  4451          JMS I   UPSPC           /15 SPACES
7121  7761          -17
7122  1033          TAD     LKTOCK
7123  4555          JMS I   P1BIT           /PRINT LINK AFTER EAE INSTRUCTION,
7124  4524          JMS I   CRLF            /CR AND LF',
7125  4450          JMS I   XTYPST          /PRINT C(AC)
7126  7377          CAC
7127  4451          JMS I   UPSPC           /4 SPACES
7130  7774          -4
7131  1043          TAD     MSH
7132  4774'         JMS     P12BIT          /PRINT ORGINAL AC
7133  4451          JMS I   UPSPC           /4 SPACES
7134  7774          -4
7135  1034          TAD     ACTOCK
7136  4774'         JMS     P12BIT          /PRINT AC AFTER DST
7137  4524          JMS I   CRLF            /CR AND LF',
7140  4450          JMS I   XTYPST          /PRINT C(MSH)
7141  7514          CMSH
7142  4451          JMS I   UPSPC           /19 SPACES
7143  7755          -23
7144  1036          TAD     SCTOCK
7145  4774'         JMS     P12BIT          /PRINT THE STORED AC
7146  4524          JMS I   CRLF            /CR AND LF',
7147  4450          JMS I   XTYPST          /PRINT C(MQ)
7150  7403          CMQ
7151  4451          JMS I   UPSPC           /4 SPACES
7152  7774          -4
7153  1044          TAD     LSH
7154  4774'         JMS     P12BIT          /PRINT ORGINAL MQ
7155  4451          JMS I   UPSPC           /4 SPACES
7156  7774          -4
7157  1035          TAD     MQTOCK
7160  4774'         JMS     P12BIT          /PRINT MQ AFTER DST
7161  4524          JMS I   CRLF            /CR AND LF',
7162  4450          JMS I   XTYPST          /PRINT C(LSH)
7163  7520          CLSH
7164  4451          JMS I   UPSPC           /19 SPACES
7165  7755          -23
7166  1037          TAD     GTTOCK
7167  4774'         JMS     P12BIT          /PRINT STORED MQ',
7170  5706          JMP I   DSTREG          /EXIT,

7172  7204
7173  6426
7174  7200
7175  5541
7176  7230
7177  6733
      7200          PAGE
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                    /ROUTINE TO PRINT THE 12 BITS OF A REGISTER,

7200  0000    P12BIT, OPEN
7201  3106            DCA     BITSTR
7202  4531            JMS I   MESSG           /PRINT A MESSAGE',
7203  5600            JMP I   P12BIT

                    /ROUTINE TO PRINT THE HEADING FOR THE DST INSTRUCTION,

7204  0000    DSTHED, OPEN
7205  4525            JMS I   CRLF2           /2 CR AND LF',
7206  4454            JMS I   U1SPC           /1SPACE
7207  4450            JMS I   XTYPST          /TYPE "REG"
7210  7527            REG
7211  4451            JMS I   UPSPC           /6 SPACES
7212  7772            -6
7213  4450            JMS I   XTYPST
7214  7504            BEFORE
7215  4454            JMS I   U1SPC
7216  4450            JMS I   XTYPST
7217  7501            ZDST
7220  4451            JMS I   UPSPC
7221  7772            -6
7222  4450            JMS I   XTYPST
7223  7510            AFTER
7224  4454            JMS I   U1SPC
7225  4450            JMS I   XTYPST
7226  7501            ZDST
7227  5604            JMP I   DSTHED          /EXIT, AC = 0',

                    /ROUTINE TO TYPE THE DATA TO BE ADDED TO THE AC+MQ FOR THE DAD INSTRUCTION',

7230  0000    FORDAD, OPEN
7231  4525            JMS I   CRLF2           /2 CR AND LF',
7232  4450            JMS I   XTYPST          /PRINT "TO BE ADDED",
7233  7536            TOBEAD
7234  4451            JMS I   UPSPC           /6 SPACES
7235  7772            -6
7236  1040            TAD     TEMPA           /MSH TO BE ADDED',
7237  4200            JMS     P12BIT          /PRINT THE MSH TO BE ADDED,
7240  4455            JMS I   U2SPC           /2 SPACES,
7241  1041            TAD     TEMPB           /LSH TO BE ADDED',
7242  4200            JMS     P12BIT          /PRINT THE LSH TO BE ADDED,
7243  5630            JMP I   FORDAD          /EXIT,


7244  0000    SAMTAB, 0
7245  0000            0000
7246  7777            7777

7247  4000            4000
7250  7777            7777
7251  0000            0000
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```
7252  0000            0
7253  7777            7777
7254  7777            7777

7255  0000            0
7256  0000            0000
7257  0000            0000

7260  0000            0
7261  0001            0001
7262  0002            0002

7263  3000            0
7264  3776            3776
7265  3777            3777

7266  4000            4000
7267  3777            3777
7270  3776            3776

7271  4000            4000
7272  4777            4777
7273  4776            4776

7274  0000            0
7275  4776            4776
7276  4777            4777

7277  4000            4000
7300  7777            7777
7301  3776            3776

7302  0000            0
7303  3776            3776
7304  7777            7777

7305  0000    DSTTAB, 0
7306  7777            7777
7307  7777            7777

7310  4000            4000
7311  0000            0000
7312  0000            0000

7313  4000            4000
7314  2525            2525
7315  5252            5252

7316  0000            0
7317  5252            5252
7320  2525            2525

7321  0000            0
7322  7007            7007
```



```
7323  0770            0770

7324  4000            4000
7325  0770            0770
7326  7007            7007

7327  0000    DADTAB, 0
7330  0000            0000
7331  0000            0000
7332  0000            0000
7333  0000            0000

7334  4000            4000
7335  7777            7777
7336  7777            7777
7337  0000            0000
7340  0000            0000

7341  4000            4000
7342  0000            0000
7343  0000            0000
7344  7777            7777
7345  7777            7777

7346  0000            0
7347  2525            2525
7350  5252            5252
7351  5252            5252
7352  2525            2525

7353  4000            4000
7354  5252            5252
7355  2525            2525
7356  2525            2525
7357  5252            5252

7360  4000            4000
7361  0770            0770
7362  7007            7007
7363  7007            7007
7364  0770            0770

7365  0000            0
7366  7007            7007
7367  0770            0770
7370  0770            0770
7371  7007            7007

7372  0000            0
7373  7777            7777
7374  7777            7777
7375  7777            7777
7376  7777            7777

              /MESSAGES)
```

```
7377  0350    CAC,    0350                    /C(AC)
7400  0103            0103
7401  5100            5100
7402  0100            0100
7403  0350    CMQ,    0350                    /C(MQ)
7404  1521            1521
7405  5100            5100
7406  0100            0100
7407  0350    C.,     0350                    /C(L)
7410  1451            1451
7411  0001            0001
7412  2022    PROBLM, 2022
7413  1702            1702
7414  1405            1405
7415  1500            1500
7416  0100            0100

7417  2311    SIMULT, 2311                    /SIMULATED
7420  1525            1525
7421  1401            1401
7422  2405            2405
7423  0400            0400
7424  0100            0100

7425  0103    ACTUAL, 0103                    /ACTUAL
7426  2425            2425
7427  0114            0114
7430  0001            0001

7431  0350    CSC,    0350                    /C(SC)
7432  2303            2303
7433  5100            5100
7434  0100            0100
7435  2310    ZSHL,   2310                    /SHL
7436  1400            1400
7437  0100            0100
7440  2405    TEST,   2405                    /TEST
7441  2324            2324
7442  0001            0001
7443  6000    ZERO,   6000                    /0
7444  0100            0100
7445  6100    ZONE,   6100                    /"1"
7446  0100            0100
7447  2310    SHIFTS, 2310                    /SHIFTS
7450  1106            1106
7451  2423            2423
7452  0001            0001
7453  1423    ZLSR,   1423                    /LSR
7454  2200            2200
7455  0100            0100
7456  0350    CGT,    0350                    /C(GT)
7457  0724            0724
7460  5100            5100
7461  0100            0100
```



```
7462  0123    ZASR,   0123                    /ASR
7463  2200            2200
7464  0100            0100
7465  0420    ZDPSZ,  0420                    /DPSZ
7466  2332            2332
7467  0001            0001
7470  0420    ZDPIC,  0420                    /DPIC
7471  1103            1103
7472  0001            0001
7473  0403    ZDCM,   0403                    /DCM
7474  1500            1500
7475  0100            0100
7476  0401    ZDAD,   0401                    /DAD
7477  0400            0400
7500  0100            0100
7501  0423    ZDST,   0423                    /DST
7502  2400            2400
7503  0100            0100
7504  0205    BEFORE, 0205                    /BEFORE
7505  0617            0617
7506  2205            2205
7507  0001            0001
7510  0106    AFTER,  0106                    /AFTER
7511  2405            2405
7512  2200            2200
7513  0100            0100
7514  0350    CMSH,   0350                    /C(MSH)
7515  1523            1523
7516  1051            1051
7517  0001            0001
7520  0350    CLSH,   0350                    /C(LSH)
7521  1423            1423
7522  1051            1051
7523  0001            0001

7524  2301    ZSAM,   2301                    /"SAM"
7525  1500            1500
7526  0100            0100

7527  2205    REG,    2205                    /"REG"
7530  0700            0700
7531  0100            0100

7532  1305    KE8SP1, 1305                    /"KE8 1"
7533  7040            7040
7534  6100            6100
7535  0100            0100

7536  2417    TOBEAD, 2417                    /TO BE ADDED.
7537  4002            4002
7540  0540            0540
7541  0104            0104
7542  0405            0405
7543  0400            0400
7544  0100            0100
```

```
7545  2313    SO,     2313                    /SKIP OCCURED.
7546  1120            1120
7547  4017            4017
7550  0303            0303
7551  2522            2522
7552  0504            0504
7553  0001            0001

7554  1617    NSO,    1617                    /NO SKIP OCCURED.
7555  4023            4023
7556  1311            1311
7557  2040            2040
7560  1703            1703
7561  0325            0325
7562  2205            2205
7563  0400            0400
7564  0100            0100


7565  2205    DATER,  2205                    /REG MODIFIED.
7566  0740            0740
7567  1517            1517
7570  0411            0411
7571  0611            0611
7572  0504            0504
7573  0001            0001

                      $
0163  4000
0164  0031
0165  0037
0166  7563
0167  0033
0170  0042
0171  2525
0172  5252
0173  5767
0174  7741
0175  5551
0176  6704
0177  5000
```



```
0000  11110000  11110000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111110  00011111  11111111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11000000  00000000  00000000  11111111


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11100000  00000111  11111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11110000  00000000  00000000  00000000  00000000  00000000  01111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11100000  00000000  00000000  00000000  01111111


2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11100000  00000000  00000000  00000000  01111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11100000  00000000  00000000  00000000  00111111  11111111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11100000  00000000  00000000  00000000  01111111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11100000  00000000  00000000  00000000  11111111


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  00000000  00000000  00000001  11111111

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11000000  00000000  00000011  11111111

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111000  00000000  00000001  11111111

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111100  00000000  00000000  00000000  00000000
```

```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11111111  11111111  11111111  00000111  11111111  11111111

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11111111  11110000  00000000  00000000  00000000

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  00000000  00000000  00000000

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00000001


5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000001

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  10000000  00000000  00001111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111110  00000000  11111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100


6000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100001

6200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

6400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6700  11111111  11111111  11111111  11111111  11111111  11111111  11000000  00011111


7000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  10111111

7200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

7400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000

7600
7700
```



```
A         0076      CAC       7377      DEC12     4331      ESCL10    5126
A0ERR     2113      CAF       6007      DI0ERR    2643      ESCL11    5135
A0ERR1    2122      CAM       7621      DI1ERR    2707      ESCL12    5145
A0INC     2106      CGT       7456      DIGIT     6470      ESCL13    5155
A1ERR     2226      CHAR      5636      DLD       7663      ESCL2     5040
A1ERR1    2235      CHKAC     4531      DM0ERR    3020      ESCL3     5047
AC        0323      CHKMQ     4532      DPAC      0122      ESCL4     5056
ACIND     0010      CHKSCA    4533      DPI0      2601      ESCL5     5065
ACL       7701      CKDATA    2272      DPI1      2654      ESCL6     5074
ACNMI     4060      CL        7407      DPIC      7573      ESCL7     5103
ACNMIN    3707      CLAM      7601      DPIS0H    2621      ESCL8     5112
ACNMIX    3704      CLRL4     1133      DPIS1H    2667      ESCL9     5117
ACP       0063      CLSH      7520      DPISIM    6273      EXEN      3731
ACS       7403      CMPCTR    6374      DPITS0    2600      EXINMI    3672
ACS1      5156      CMQ       7403      DPITS1    2653      FADDR     6423
ACS2      5200      CMSH      7514      DPMQ      0121      FILCNT    5637
ACTOCK    0034      CNTR1     2473      DPSZ      7451      FILLER    0020
ACTUAL    7425      CNTR2     2474      DPSZ0     2250      FLAG      6665
ADDR      0047      CNTR3     2475      DPSZ0H    2400      FORDAD    7230
ADDRZA    6462      CNVCTR    6471      DPSZPR    5541      GEN       5546
AFTER     7510      COMEND    4753      DPSZS0    2246      GENNMI    4273
AGAIN     4536      COMP      6345      DPZPR1    5544      GENX      0065
AMQAT3    1233      COMPA     6355      DS0ERR    3440      GEX       4453
ANCMIQ    3727      COMTST    4600      DS1ERR    3535      GTF       6004
ANYUSE    0116      COUNT     0117      DST       7445      GTSIM     0046
APMQAT    1230      COUNTX    0104      DST0      3311      GTTOCK    0037
ARROW     6443      CP        0261      DST0GN    3400      GTTST1    5211
ASCOMP    0140      CR        0070      DST1      3451      GTTST2    5221
ASR       7415      CRLF      0124      DST1RN    3502      GTTST3    5231
ASR0      2047      CRLF2     0125      DSTHED    7204      GTTST4    5237
ASR0SH    6251      CSC       7431      DSTREG    7106      GTTST5    5244
ASR1      2201      DA0ERR    3130      DSTS0H    3413      GXEN      3712
ASR03Ø    6257      DA1ERR    3300      DSTS1H    3514      HEADIN    6733
ASRS0H    2072      DAD       7443      DSTTAB    7305      HKE       4505
ASRS1H    2216      DAD0      3031      DSTTS0    3310      HLT       7402
ASRSIM    6200      DAD1      3201      DSTTS1    3450      HSE       0244
ASRTS0    2046      DADGEN    3053      DSZJMS    7045      HSE1      0427
ASRTS1    2200      DADJMS    7044      DZERR0    2523      HSE2      0540
AT        0632      DADS0H    3067      DZINC     2426      HSE2A     0563
AT3       1066      DADS1H    3223      E3A       5261      HSE3      0704
BACK      0056      DADSIM    6332      EDAD0     3107      HSE4      1032
BACP      0067      DADTAB    7327      EDAD1     3257      HSE5      1200
BDCNV     6426      DADTS0    3030      EDCM0     3011      HSENM     4261
BEFORE    7504      DADTS1    3200      EDPI0     2634      HSENMI    3657
BITSTR    0106      DATER     7565      EDPI1     2700      INCOR     0111
BLXP      0066      DCM       7575      EDPSZ0    2512      IOF       6002
BSW       7002      DCM0      2720      EDST0     3431      ION       6001
C         0077      DCMS0H    3000      EDST1     3526      K260      6472
C1        6370      DCMSIM    6311      EMQAT2    1063      K7740     0123
C1A       6372      DCMTS0    2717      ESAM0     1276      KE8SP1    7532
C2        6371      DCOUNT    5767      ESAM1     1411      L         0311
C2A       6373      DDZ       7665      ESCL1     5031      L0ERR     1713
```

```
L8ERR1  1722        MQL     7421        PA2525  4302        S1ERR   1626
L8INC   1706        MQLT    0204        PACP    0362        S1ERR1  1635
L1ERR   2026        MQLT1   0400        PAT00   4526        SAM     7457
L1ERR1  2035        MQNMI   4074        PAT01   4525        SAM0    1246
LDGT    0153        MQNMIN  3706        PATCH   4545        SAM1    1334
LDREG   0151        MQNMIQ  3730        PBACP   0370        SAMGEN  1263
LDSC    0156        MQNMIX  3705        PBLXP   0347        SAMS0H  1315
LDSC1   5515        MQTOCK  0035        PC      5495        SAMS1H  1400
LF      0071        MSH     0043        PLAMGS  7046        SAMSIM  6013
LINK    0102        MT2ER   4513        PLINK   0127        SAMTAB  7244
LKTOCK  0033        N       5474        PLXP    0332        SAMTS0  1245
LL      0074        NBASR0  2063        PMQAT   0600        SAMTS1  1333
LNPR2   1051        NBASR1  2207        PMQLT   0254        SASR1   6223
LPAR    5462        NBLSR0  1663        PNORM   4132        SASR1A  6237
LSH     0044        NBLSR1  2007        PRCHG   7002        SASR2   6241
LSIM    0042        NBSHL0  1444        PREGS   0137        SASR3   6245
LSR     7417        NBSHL1  1607        PRINT   6653        SAVREG  0141
LSR0    1647        NEXNMI  4324        PRNMI   4000        SCA     7441
LSR0SH  6160        NEXT    0057        PROBLM  7412        SCANM   4534
LSR1    2001        NM2525  4320        PRXLOP  0126        SCAST   3700
LSRA    6147        NM3252  4321        PSPC    6670        SCASTX  3703
LSRO30  6167        NM7776  4323        PSTEP   5437        SCATXX  5430
LSRS0H  1672        NMERR   4333        PSTEPT  5450        SCAXX   5434
LSRS1H  2016        NMFLG   4322        PTHREE  1240        SCC23   3702
LSRSIM  6120        NMI     7411        PTO     0355        SCL     7403
LSRTS0  1646        NMIERR  3650        PTWO    1126        SCL1    5024
LSRTS1  2000        NMIODD  3701        Q       0073        SCL10   5120
LXP     0064        NMITPR  4126        RANCON  6556        SCL11   5127
M       0072        NMIXX   5425        RANDAD  3241        SCL12   5136
MCTR    6425        NMTS1   4450        RANDAT  5732        SCL13   5146
MDSEL   5274        NMTS3   4522        RANDEX  6555        SCL2    5032
MDTST   5001        NOP     7400        RANDOM  0150        SCL3    5041
MESSG   0131        NOPM    7401        RANGEN  6525        SCL4    5050
MODA    2464        NOPR    0724        RANSAV  6571        SCL5    5057
MODE    0115        NOPR3   1217        RANTAD  6542        SCL6    5066
MODEX   6717        NORMT   3600        RANTBL  6557        SCL7    5075
MODSEL  0135        NORMT1  4200        RANTND  6570        SCL8    5104
MOVE    6400        NORMT2  4400        RDF     6214        SCL9    5113
MOVEA   6413        NOSKIP  2302        REG     7527        SCOMP   5520
MQ      0302        NOSKP   2270        RIF     6224        SCOUNT  0114
MQ1     0444        NSO     7554        RL2     0523        SCSIM   0045
MQ1SW   0437        NUMSH   7070        RL4     1021        SCTOCK  0036
MQA     7501        NUMSHF  0147        RNDATA  0152        SGT     6006
MQA1    0605        OBV     6524        ROTGEN  2476        SHIFT0  6113
MQAER1  0714        OBVERS  6473        RPAR    5467        SHIFTS  7447
MQAER2  1042        ONE     0100        RTF     6005        SHL     7413
MQAER3  1210        ONEP    0133        RTFX    0154        SHL0    1431
MQAT    0503        ONLYB   0136        RXLOP   5613        SHL1    1601
MQAT1   0650        ONZER   0132        S0ERR   1474        SHLA    6074
MQAT2   1000        OPEN    0000        S0ERR1  1503        SHLO31  6107
MQAT3   1135        P12BIT  7200        S0INC   1467        SHLSIM  6042
MQIND   0011        P1BIT   0155        S10SET  5311        SHLTS0  1430
```



```
SHLTS1  1600        TSTSW2  0145        YSKIP   2313
SIMULT  7417        TSTSW3  0146
SKIPMA  6666        TT      0075        ZASR    7462
SKIPPA  6667        TWICE   0120        ZDAD    7476
SLTS0H  1453        TWO     0113        ZDCM    7473
SLTS1H  1616        TYMOD   6704        ZDPIC   7470
SM0ERR  1305        TYPAT   6630        ZDPSZ   7465
SM1ERR  1420        TYPSP   6634        ZDST    7501
SO      7545        TYPST   6600        ZER0    7443
SPACE1  6723        TYTST   0134        ZERO    0101
SPACE2  6727        U1SPC   0054        ZEROR   0130
SPAT00  4527        U2SPC   0055        ZLSR    7453
SPAT01  4530        UCOMP   0052        ZONE    7445
SPCTR   6703        UCRLF   5600        ZSAM    7524
STRCNT  0105        UCRLF2  5607        ZSHL    7435
SW0TST  5325        UGEN    0142
SW1TST  5333        ULDGT   5761
SW2TST  5342        ULDREG  5751
SW3TST  5400        ULDSC   5503
SWAB    7431        UMESSG  5663
SWBA    7447        UMOVE   0053
SWITCH  6655        UONEP   5652
SWP     7521        UONLYB  5317
T       0316        UONZER  5645
TAC     0027        UP1BIT  5726
TADDR   6424        UPLINK  5640
TEMPA   0040        UPREGS  7000
TEMPB   0041        UPRONE  5703
TEMPQ   6662        UPSPC   0051
TEMQ    6663        USVREG  5410
TEMR    6664        UTYTST  5707
TENPWR  6463        UZEROR  5656
TEST    7440        VALUE   6467
TGT     0032        VOR     1121
THREE   0112        WILCHG  7016
TLINK   0026        XACNMI  0012
TMQ     0030        XCP     0467
TO      0103        XMQ1    0455
TOAC    0022        XMQAT   0061
TOBEAD  7536        XMQAT1  0062
TOGT    0025        XMQAT2  0107
TOLINK  0021        XMQAT3  0110
TOMQ    0023        XMQLT1  0060
TOSHIF  0024        XMQNMI  0013
TPFLAG  4537        XNORMT  4143
TSC1    6606        XONE    0473
TSC2    6617        XPACP   0340
TSCL    5000        XPMQAT  1062
TSHIF   0031        XRTF    6000
TST25   4315        XTYPST  0050
TSTSW0  0143        YA      0641
TSTSW1  0144        YESSKP  2271
```

ERRORS DETECTED: 0

LINKS GENERATED: 144

RUN-TIME: 48 SECONDS

3K CORE USED