PRODUCT CODE: MAINDEC-8E-D0LA-D-(D)

PRODUCT TEST: KE-8E (EAE) INSTRUCTION TEST 1

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MAINTAINER: DIAGNOSTIC GROUP

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1. ABSTRACT

THIS PROGRAM IS A TEST OF ALL THE KE-8E EAE INSTRUCTIONS.
(EXCEPT MULTIPLY AND DIVIDE).

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-8/E PROCESSOR, KE-8E 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 DE-
SIRED 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 E[ ] HALTS AND DESCRIPTION

LOC 0240	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 1434	SAM INSTRUCTION FAILED.
LOC 1522	SHL INSTRUCTION FAILED.
LOC 1635	SHL INSTRUCTION FAILED.
LOC 1725	LSR INSTRUCTION FAILED.
LOC 2035	LSR INSTRUCTION FAILED.
LOC 2125	ASR INSTRUCTION FAILED.
LOC 2235	ASR INSTRUCTION FAILED.
LOC 2516	DPSZ INSTRUCTION FAILED.
LOC 2637	DPIC INSTRUCTION FAILED.

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LOC 2705        DPIC IN
LOC 3034        DCM INSTRUCTION FAILED',
LOC 3147        DAD INSTRUCTION FAILED',
LOC 3300        DAD INSTRUCTION FAILED',
LOC 3434        DST INSTRUCTION FAILED',
LOC 3536        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 4704        DLD (CAM DAD) FAILED',
LOC 4711        DLD (CAM DAD) FAILED',
LOC 4732        DDE (CAM DST) FAILED',
    4735
    4740

LOC 5003        CLEAR KEY FAILED TO SET "MODE A" OR SKB FAILED',
LOC 5006        SWAB FAILED TO SET "MODE B" OR SKB FAILED',
LOC 5012        SWBA FAILED TO SET "MODE A",
LOC 5017        CAF FAILED TO SET "MODE A",
```

```
L   025          SCL OR SCA ERROR,
    5034
    5043
    5052
    5061
    5070
    5077
    5106
    5113
    5122
    5131
    5141
    5151


LOC 5157         ACS INSTRUCTION FAILED
    5164
    5172
    5175

LOC 5207         RTF INSTRUCTION FAILED TO SET GT FLAG TO 0 OR
                 GTF FAILED TO GET IT,

LOC 5217         RTF INSTRUCTION FAILED TO SET GT FLAG TO 1 OR
                 GTF FAILED TO GET IT,

LOC 5225         SGT SKIPPED WITH GT FLAG NOT SET,

LOC 5232         SGT FAILED TO SKIP WITH GT FLAG SET,

LOC 5241         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)
```

```
MQ      MQL,MQA INSTRUCTION TEST WITH THE LINK SET TO
AL      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 0 (OR 1) 0003 SHIFTS MODE A (OR B)

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	1	000100100001	000100000001	0	000000000010
SIMULATED	0	100100001000	100000001000	0	000000000000
ACTUAL	0	100100000000	100000001000	0	000000000000

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 0) 0004 SHIFTS MODE B (OR A)

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	1	000000111111	000000001111	0	000000000100
SIMULATED	0	000000000011	111100000000	1	000000001111
ACTUAL	0	000000000011	111100000000	0	000000001111

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 0 (OR 1) 0002 SHIFTS MODE B (OR A)

	C(L)	C(AC	C(MQ)	C(GT)	C(SC)
PROBLEM	0	000000000110	000000100001	1	000000000010
SIMULATED	1	110000000001	100000001000	0	000000011111
ACTUAL	1	110000000001	000000001000	0	000000011111

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 4010 IN THE "ACTUAL".#

5.3.7 DPSZ TESTS

DPSZ TEST 0 MODE B

NO SKIP OCCURRED

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	0	000000000000	000000000000	0	000000000000
SIMULATED	0	000000000000	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 WITH AC ANC MQ BOTH ZERO A SKIP FAILED TO OCCUR.

DPSZ TEST 0 MODE B

SKIP OCCURRED

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

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 DA STS

DAD TEST 0 (OR 1) MODE B

	C(L)	C(AC)	C(MQ)	C(GT)	C(SC)
PROBLEM	0	000000011111	000011110101	0	000000000000
TO BE ADDED		111111100000	111100001010		
SIMULATED	0	111111111111	111111111111	0	000000000000
ACTUAL	0	111111111111	111111111110	0	000000000000

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 0 (OR 1) MODE B

REG	BEFORE DST	AFTER DST
C(L)	1	1
C(AC)	111111111111	111111111111
C(MSH)		000000000000
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)
	000000000000	010101010101	
NMI	010101010100	000000000000	
SCAT	000000001100		
SCA	000000001100		

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

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	0203	0240
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	1336	1434
SHLTS0	SHL	1450	1522
SHLTS1	SHL	1600	1635
LSRTS0	LSR	1652	1725
LSRTS1	LSR	2000	2035
ASRTS0	ASR	2052	2125
ASRTS1	ASR	2200	2235
DPSZS0	DPSZ	2252	2516
DPITS0	DPIC	2600	2637
DPITS1	DPIC	2653	2705
DCMTS0	DCM	2721	3034
DADTS0	DAD	3050	3147
DADTS1	DAD	3200	3300
DSTTS0	DST	3314	3434
DSTTS1	DST	3450	3536
NORMT	NMI,SCA	3600	3653
NORMT1	NMI,SCA	4200	4336
NORMT2	NMI	4400	4520
COMTST	NOP,CLA,ACL DLD,DDE	4600	4605-4740
MQTST	SKB,SWAB,SWBA	0200	5003-5017
TSCL	SCL,ACS	0200	5025-5175
GTTST	GTF,RTF,SGT	0200	5207-5241

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, SKB, 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 6.5 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 MAIND  8E-D0LA
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/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",
7671    SKB=7671                /SKIP IF MODE "B",
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    DDZ=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,
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```
                0000    OPEN=0000               /PROGRAM MODIFIABLE.

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


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

0020    0000    TOLINK, OPEN
0021    0000    TOAC,   OPEN
0022    0000    TOMQ,   OPEN
0023    0000    TOSHIF, OPEN
0024    0000    TOGT,   OPEN
0025    0000    TLINK,  OPEN
0026    0000    TAC,    OPEN
0027    0000    TMQ,    OPEN
0030    0000    TSHIF,  OPEN
0031    0000    TGT,    OPEN
0032    0000    LKTOCK, OPEN
0033    0000    ACTOCK, OPEN
0034    0000    MQTOCK, OPEN
0035    0000    SCTOCK, OPEN
0036    0000    GTTOCK, OPEN
0037    0000    TEMPA,  OPEN
0040    0000    TEMPB,  OPEN
0041    0000    LSIM,   OPEN
0042    0000    MSH,    OPEN
0043    0000    LSH,    OPEN
0044    0000    SCSIM,  OPEN
0045    0000    GTSIM,  OPEN
0046    0000    ADDR,   OPEN

0047    6600    XTYPST, TYPST
0050    6670    UPSPC,  PSPC
0051    6334    UCOMP,  COMP
0052    6400    UMOVE,  MOVE
0053    6723    U1SPC,  SPACE1
0054    6727    U2SPC,  SPACE2


0055    0000    BACK,   0000
0056    0000    NEXT,   0000
0057    6600    XMQLT1, MQLT1
0060    0503    XMQAT,  MQAT
0061    0650    XMQAT1, MQAT1
```

```
0062  0000  ACP,    0                /GOOD AC
0063  0000  LXP,    0                /GOOD LINK
0064  0000  GENX,   0
0065  0000  BLXP,   0                /BAD LINK
0066  0000  BACP,   0                /BAD AC
0067  0215  CR,     0215             /CARRIAGE RETURN
0070  0212  LF,     0212             /LINE FEED
0071  0315  M,      0315             /M
0072  0321  Q,      0321             /Q
0073  0314  LL,     0314             /L
0074  0324  TT,     0324             /T
0075  0301  A,      0301             /A
0076  0303  C,      0303             /C
0077  0261  ONE,    0261             /1
0100  0260  ZERO,   0260             /0
0101  0000  LINK,   0
0102  0255  TO,     0255             /DASH
0103  7763  COUNTX,  7763
0104  0000  STRCNT,  0
0105  0000  BITSTR,  0
0106  1000  XMQAT2,  MQAT2
0107  1135  XMQAT3,  MQAT3
0110  0326  INCOR,   0326            /V
0111  0263  THREE,   0263            /3
0112  0262  TWO,    0262
0113  0000  SCOUNT,  OPEN
0114  0000  MODE,   OPEN
0115  0000  ANYUSE,  OPEN            /GENERAL USE.
0116  0000  COUNT,   OPEN


0117  7740  K7740,  7740
0120  5611  CRLF,   UCRLF
0121  5620  CRLF2,  UCRLF2
0122  5624  PRXLOP,  RXLOP
0123  5632  PLINK,  UPLINK
0124  5650  ZEROR,  UZEROR
0125  5655  MESSG,  UMESSG
0126  5637  ONZER,  UONZER
0127  5644  ONEP,   UONEP
0130  5701  TYTST,  UTYTST
0131  5263  MQDSEL,  MQSEL
0132  5306  ONLYB,  UONLYB
0133  7000  PREGS,  UPREGS
0134  5473  ASCOMP,  SCOMP
0135  5350  SAVREG,  USVREG
0136  5600  UGEN,   GEN
0137  5314  TSTSW0,  SW0TST
0140  5322  TSTSW1,  SW1TST
0141  5331  TSTSW2,  SW2TST
0142  5340  TSTSW3,  SW3TST
0143  7070  NUMSHF,  NUMSH
0144  6525  RANDOM,  RANGEN
0145  5743  LDREG,  ULDREG
```

```
0146  5724    RNDATA, RANDAT
0147  5753    LOGT,   ULOGT
0150  6000    RTFX,   XRTF
0151  5720    P1BIT,  UP1BIT
0152  5456    LDSC,   ULDSC


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

0200  7300            CLA CLL
0201  3114            DCA     MODE            /MODE "A" INITIALLY,
0202  4577            JMS I ETSCL     /TEST MODE SWITCHING, GT, AND SC.

                /TEST THAT MQL WILL CLEAR THE AC AND LEAVE THE LINK SET TO 1.

0203  5246    MQLT,   JMP HSE         /HOUSE KEEPING
0204  4536            JMS I UGEN
0205  7360            STL CLA CMA     /SET LINK
0206  0064            AND GENX
0207  3062            DCA ACP         /STORE AC PATTERN
0210  7240            CLA CMA
0211  3063            DCA LXP         /STORE LINK TO A ONE
0212  1062            TAD     ACP     /LOAD AC,
0213  7421            MQL
0214  3066            DCA BACP        /STORE AC RESULT
0215  7620            CLA SNL
0216  5347            JMP XPACP+5     /STORE LINK RESULT 0000
0217  7240            CLA CMA
0220  3065            DCA BLXP        /STORE LINK RESULT 7777
0221  1066            TAD     BACP
0222  7640            SZA CLA
0223  5230            JMP .+5         /AC NOT EQUAL TO 0000
0224  1065            TAD     BLXP
0225  7450            SNA
0226  5230            JMP .+2         /LINK NOT EQUAL TO A ONE
0227  5241            JMP .+12        /CONTINUE TEST MQL

0230  7604            CLA OSR         /TEST SW2
0231  7106            RTL CLL
0232  7004            RAL
0233  7430            SZL
0234  4256            JMS PMQLT       /PRINT ERROR
0235  7704            CLL CLA OSR     /TEST SW 0
0236  7004            RAL
0237  7430            SZL
0240  7402            HLT             /HALT MQL ERROR
0241  7604            CLA OSR
0242  7106            RTL CLL         /TEST SW1
0243  7430            SZL
```

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                .4  5205            JMP MQLT+2      /PROGRAM LOOP
0245  5204            JMP MQLT+1      /CONTINUE PROGRAM


0246  7300    HSE,    CLA CLL
0247  3064            DCA GENX
0250  1346            TAD XPACP+4
0251  3055            DCA BACK
0252  1057            TAD XMQLT1
0253  3056            DCA NEXT
0254  4531            JMS I   MODSEL          /PERFORM MODE SELECTION,
0255  5204            JMP MQLT+1

0256  0000    PMQLT,  0               /PRINT ROUTINE
0257  4521            JMS I   CRLF2           /CR AND LF,
0260  4304            JMS MQ
0261  4313            JMS L
0262  4320            JMS T

0263  4576    CP,     JMS I   CTYMOD          /TYPE THE MODE,
0264  4520            JMS I   CRLF            / CR AND LF,
0265  4454            JMS I   U2SPC           /2 SPACES,
0266  4325            JMS AC
0267  4454            JMS I   U2SPC           /2 SPACES,
0270  4334            JMS PLXP
0271  4453            JMS I   U1SPC           /1 SPACE,
0272  4742            JMS I XPACP
0273  4520            JMS I   CRLF            /CR AND LF,
0274  4524            JMS I   ZERO
0275  4743            JMS I XPACP+1   /RIGHT ARROW
0276  4325            JMS AC
0277  4454            JMS I   U2SPC           /2 SPACES,
0300  4744            JMS I XPACP+2
0301  4453            JMS I   U1SPC           /1 SPACE,
0302  4745            JMS I XPACP+3
0303  5656            JMP I PMQLT     /RETURN TO SWITCH ROUTINE

0304  0000    MQ,     0
0305  7240            CLA CMA
0306  0071            AND M           /M
0307  4522            JMS I   PRXLOP          /PRINT,
0310  1072            TAD     Q       /"Q",
0311  4522            JMS I   PRXLOP          /PRINT,
0312  5704            JMP I MQ

0313  0000    L,      0
0314  7240            CLA CMA
0315  0073            AND LL          /L
0316  4522            JMS I   PRXLOP          /PRINT,
0317  5713            JMP I L

0320  0000    T,      0
0321  7240            CLA CMA
0322  0074            AND TT          /T
```

```
0323  4522          JMS I   PRXLOP          /PRINT,
0324  5720          JMP I ?


0325  0000  AC,     0
0326  7240          CLA CMA
0327  0075          AND A             /A
0330  4522          JMS I   PRXLOP          /PRINT,
0331  1076          TAD     C         /"C",
0332  4522          JMS I   PRXLOP          /PRINT,
0333  5725          JMP I AC

0334  0000  PLXP,   0
0335  7240          CLA CMA
0336  0063          AND LXP           /GOOD LINK
0337  3101          DCA LINK
0340  4523          JMS I   PLINK
0341  5734          JMP I PLXP

0342  0364  XPACP,  PACP
0343  0357          PTO
0344  0351          PBLXP
0345  0372          PBACP
0346  0203          MQLT
0347  3065          DCA BLXP
0350  5222          JMP MQLT+17


0351  0000  PBLXP,  0
0352  7240          CLA CMA
0353  0065          AND BLXP          /BAD LINK
0354  3101          DCA LINK
0355  4523          JMS I   PLINK
0356  5751          JMP I PBLXP

0357  0000  PTO,    0
0360  7240          CLA CMA
0361  0102          AND TO            /RIGHT ARROW
0362  4522          JMS I   PRXLOP          /PRINT,
0363  5757          JMP I PTO

0364  0000  PACP,   0
0365  7240          CLA CMA
0366  0062          AND ACP           /ACP
0367  3105          DCA BITSTR
0370  4525          JMS I   MESSG           /PRINT A MESSAGE.
0371  5764          JMP I PACP


0372  0000  PBACP,  0
0373  7240          CLA CMA
0374  0066          AND BACP          /BACP
0375  3105          DCA BITSTR
```

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0376  4525              JMS I   MESSG           /PRINT - MESSAGE.
0377  5772              JMP I PBACP

      0400              PAGE

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

0400  5227      MQLT1,  JMP HSE1
0401  4536              JMS I UGEN
0402  7340              CLL CLA CMA     /CLEAR LINK
0403  0064              AND GENX
0404  3062              DCA ACP         /STORE AC PATTERN
0405  3063              DCA LXP         /STORE LINK TO A ZERO
0406  7040              CMA
0407  0062              AND ACP         /LOAD AC
0410  7421              MQL
0411  3066              DCA BACP        /STORE AC RESULT
0412  7620              CLA SNL
0413  5301              JMP XONE+6      /STORE LINK RESULT 0000
0414  7240              CLA CMA
0415  3065              DCA BLXP        /STORE LINK RESULT 7777
0416  7040              CMA
0417  0066              AND BACP
0420  7440              SZA
0421  5237              JMP MQ1SW               /AC NOT EQUAL TO 0000
0422  7240              CLA CMA
0423  0065              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  3064              DCA GENX
0431  1057              TAD XMQLT1
0432  3055              DCA BACK
0433  1060              TAD XMQAT
0434  3056              DCA NEXT
0435  4531              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.
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  4521          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  0263  XCP,    CP
0470  0304          MQ
0471  0313          L
0472  0320          T

0473  0000  XONE,   0
0474  7240          CLA CMA
0475  0077          AND ONE         /ONE
0476  4522          JMS I   PRXLOP          /PRINT,
0477  5673          JMP I XONE
0500  0256          PMQLT
0501  3065          DCA BLXP
0502  5216          JMP MQLT1+16


0503  5340  MQAT,   JMP HSE2
0504  4536          JMS I UGEN
0505  7360          STL CLA CMA     /SET LINK
0506  0064          AND GENX
0507  3062          DCA ACP         /STORE AC PATTERN
0510  7240          CLA CMA
0511  3063          DCA LXP         /STORE LINK TO A ONE
0512  7040          CMA
0513  0062          AND ACP         /LOAD AC
0514  7421          MQL             /LOAD MQ FROM AC
0515  7501          MQA             /LOAD AC FROM MP
0516  3066          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  3065          DCA BLXP                /STORE LINK RESULT 7777

0523  7040  RL2,    CMA
0524  0062          AND ACP         /COMPARE ACP WITH BACP
0525  7140          CLL CMA
0526  1066          TAD BACP
0527  7040          CMA
0530  7450          SNA
0531  7430          SZL
0532  5350          JMP HSE2+10     /MQ DID NOT EQUAL AC
```

```
   ;3  7240            CLA CMA
0534  0065            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  3064            DCA GENX
0542  1060            TAD XMQAT
0543  3055            DCA BACK
0544  1061            TAD XMQAT1
0545  3056            DCA     NEXT
0546  4531            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

0575  0605
0576  0600
0577  0646
      0600            PAGE



0600  0000    PMQAT,  0
0601  4521            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  4520            JMS I   CRLF             /CR AND LF.
0610  4450            JMS I   UPSPC            /5 SPACES.
0611  7773            -5
0612  4776            JMS     AC               /PRINT "AC".
0613  4454            JMS I   U2SPC            /2 SPACES.
0614  4775            JMS     PLXP             /
0615  4453            JMS I   U1SPC            /1 SPACE.
0616  4774            JMS     PACP             /
```

```
0617  4520          JMS I   CRLF            /CR AND LF,
0620  4777'         JMS     MQ              /PRINT "MQ",
0621  4773'         JMS     L               /PRINT "L",
0622  4453          JMS I   U1SPC           /1 SPACE,
0623  4777'         JMS     MQ              /PRINT "MQ",
0624  4241          JMS     YA              /PRINT "A",
0625  4454          JMS I   U2SPC           /2 SPACES,
0626  4772'         JMS     PBLXP           /
0627  4453          JMS I   U1SPC           /1 SPACE,
0630  4771'         JMS     PBACP           /
0631  5605          JMP I   MQA1            /EXIT,

0632  0000    AT,   0
0633  7240          CLA CMA
0634  0075          AND A             /A
0635  4522          JMS I   PRXLOP          /PRINT,
0636  1074          TAD TT            /"T",
0637  4522          JMS I   PRXLOP          /PRINT,
0640  5632          JMP I AT

0641  0000    YA,   0
0642  7240          CLA CMA
0643  0075          AND A             /A
0644  4522          JMS I   PRXLOP          /PRINT,
0645  5641          JMP I YA
0646  3065          DCA BLXP
0647  5770'         JMP RLE


                    /TEST OF MQL WITH THE LINK SET TO 0

0650  4304    MQATI,  JMS HSE3
0651  4536          JMS I UGEN
0652  7340          CLL CLA CMA       /CLEAR LINK
0653  0064          AND GENX
0654  3062          DCA ACP /STORE AC PATTERN
0655  3063          DCA LXP           /STORE LINK TO A ZERO
0656  7040          CMA
0657  0062          AND ACP           /LOAD AC
0660  7421          MQL               /LOAD MQ FROM AC
0661  7501          MQA               /LOAD AC FROM MQ
0662  3066          DCA BACP          /STORE RESULT OF MQL, MQA
0663  7620          CLA SNL
0664  5340          JMP NOPR+14
0665  7240          CLA CMA
0666  3065          DCA BLXP          /STORE LINK RESULT 7777
0667  7040          CMA
0670  0062          AND ACP           /COMPARE ACP WITH BACP
0671  7140          CLL CMA
0672  1066          TAD BACP
0673  7040          CMA
0674  7450          SNA
0675  7430          SZL
```

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                6  5314            JMP MQAER1      /MQ DID NOT EQ. _ AC
0677  7240            CLA CMA
0700  0065            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  3064            DCA GENX
0706  1061            TAD XMQAT1
0707  3055            DCA BACK
0710  1106            TAD XMQAT2
0711  3056            DCA NEXT
0712  4531            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  3065            DCA BLXP
0741  5267            JMP MQAT1+17

0770  0523
0771  0372
0772  0351
0773  0313
0774  0364
0775  0334
0776  0325
0777  0304
      1000            PAGE
```

```
                    /TEST OF MQA,

1000  5232  MQAT2,  JMP HSE4
1001  4536          JMS I UGEN
1002  7360          STL CLA CMA     /SET LINK
1003  0064          AND GENX
1004  7040          CMA             /COMPLEMENT GENX PATTERN
1005  3062          DCA ACP         /STORE AC PATTERN
1006  7040          CMA
1007  3063          DCA LXP         /STORE LINK TO A ONE
1010  1064          TAD     GENX
1011  7421          MQL             /LOAD MQ
1012  1062          TAD     ACP             /LOAD AC WITH COMPLEMENTED GENX
1013  7501          MQA
1014  3066          DCA BACP        /STORE RESULT OF MQA
1015  7620          CLA SNL
1016  5333          JMP CLRL4               /STORE LINK RESULT 0000
1017  7240          CLA CMA
1020  3065          DCA BLXP        /STORE LINK RESULT 7777

1021  1066  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  0065          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  3064          DCA GENX
1034  1106          TAD XMQAT2
1035  3055          DCA BACK
1036  1107          TAD XMQAT3
1037  3056          DCA NEXT
1040  4531          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
1053  7430          SZL
1054  7402          HLT             /MQA ERROR,
1055  7604          CLA OSR         /TEST SW1
```

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   6  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   [TYMOD          /TYPE THE MODE',
1066  4520    AT3,  JMS I   CRLF            /CARRIAGE RETURN AND LINE FEED',
1067  4454          JMS I   U2SPC           /2 SPACES',
1070  4453          JMS I   U1SPC           /1 SPACE',
1071  4777          JMS     AC              /PRINT "AC",
1072  4454          JMS I   U2SPC           /2 SPACES',
1073  4776          JMS     PLXP            /
1074  4453          JMS I   U1SPC           /1 SPACE
1075  4775          JMS     PACP            /
1076  4520          JMS I   CRLF            /CR AND LF',
1077  4454          JMS I   U2SPC           /2 SPACES',
1100  4453          JMS I   U1SPC           /1 SPACE',
1101  4774          JMS     MQ              /PRINT "MQ",
1102  4454          JMS I   U2SPC           /2 SPACES',
1103  4454          JMS I   U2SPC           /2 SPACES',
1104  7200          CLA                     /0
1105  1064          TAD     GENX            /
1106  3062          DCA     ACP             /
1107  4775          JMS     PACP            /
1110  4520          JMS I   CRLF            /CR AND LF',
1111  4774          JMS     MQ              /PRINT "MQ",
1112  4321          JMS     VOR             /
1113  4777          JMS     AC              /PRINT "AC",
1114  4454          JMS I   U2SPC           /2 SPACES',
1115  4773          JMS     PBLXP           /
1116  4453          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  0110          AND INCOR
1124  4522          JMS I   PRXLOP          /PRINT',
1125  5721          JMP I VOR



1126  0000    PTWO, 0               /PRINT 2
1127  7240          CLA CMA
1130  0112          AND TWO
1131  4522          JMS I   PRXLOP          /PRINT',
1132  5726          JMP I PTWO

1133  3065    CLRL4,  DCA BLXP
1134  5221          JMP RL4
```

```
                    /TEST OF MQA.

1135  5771'   MQAT3, JMP HSE5
1136  4536           JMS I UGEN
1137  7340           CLL CLA CMA      /CLEAR LINK
1140  0064           AND GENX
1141  7040           CMA              /COMPLEMENT GENX PATTERN
1142  3062           DCA ACP          /STORE AC PATTERN
1143  3063           DCA LXP          /STORE LINK TO A ZERO
1144  7040           CMA
1145  0064           AND GENX
1146  7421           MQL              /LOAD MQ
1147  1062           TAD ACP          /LOAD AC WITH COMPLEMENTED GENX.
1150  7501           MQA
1151  3066           DCA BACP         /STORE RESULT OF MQA
1152  7620           CLA SNL
1153  7410           SKP
1154  7240           CLA CMA
1155  3065           DCA BLXP         /STORE LINK RESULT 7777
1156  1066           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  0065           AND BLXP
1164  7440           SZA
1165  5770'          JMP MQAER3       /LINK DID NOT EQUAL A ZERO
1166  5767'          JMP NOPR3+4

1167  1223
1170  1210
1171  1200
1172  0372
1173  0351
1174  0304
1175  0364
1176  0334
1177  0325
      1200           PAGE

1200  7300    HSE5,  CLA CLL
1201  3064           DCA GENX
1202  1107           TAD XMQAT3
1203  3055           DCA BACK
1204  1377           TAD (SAMTS0
1205  3056           DCA NEXT
1206  4531           JMS I   MODSEL          /PERFORM MODE SELECTION.
1207  5776'          JMP MQAT3+1

1210  7604    MQAER3, CLA OSR          /TEST SW2
1211  7106           RTL CLL
```

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   .2  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  0111            AND THREE
1243  4522            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  1020            TAD     TOLINK
1250  7104            CLL RAL                 /LINK LOADED
1251  1022            TAD     TOMQ
1252  7421            MQL                     /MQ LOADED
1253  1021            TAD     TOAC            /AC LOADED
1254  7457            SAM                     /EAE SUBTRACT
1255  4535            JMS I   SAVREG          /SAVE L,AC,MQ,SC,AND GT',
1256  4773            JMS     SAMSIM          /SIMULATE "SAM"
1257  4451            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  4452          JMS I   UMOVE            /MOVE DATA TO  TOLINK, TOAC, TOMQ.
1265  0000          OPEN
1266  0020          TOLINK
1267  7775          -3
1270  7325          CLA CLL CML IAC RAL      /AC = 3
1271  1265          TAD     .-4
1272  3265          DCA     .-5
1273  2113          ISZ     SCOUNT
1274  5663          JMP I   SAMGEN
1275  5772          JMP     GEN+3

              /ROUTINE TO CHECK SR OPTIONS FOR SAM TEST 0.

1276  4541    ESAM0,  JMS I   TSTSW2           /CHECK SR 2.
1277  4305          JMS     SM0ERR           /PRINT ERROR DATA.
1300  4537          JMS I   TSTSW0           /CHECK SR 0.
1301  7402          HLT                      /SUBTRACT AC FROM MQ ERROR, (SAM).
1302  4540          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  4530          JMS I   TYTST            /TYPE THE FOLLOWING:
1307  7775          -3
1310  7502          ZSAM                     /SAM
1311  7416          TEST                     /TEST
1312  7421          ZER0                     /0
1313  4533          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  4534          JMS I   ASCOMP           /SET COMPARE ROUTINE
1317  1371          TAD     (SAMTAB          /GET ADDRESS OF THE TABLE
1320  3265          DCA     SAMGEN+2         /AND STORE IT AT SAMGEN+2
1321  1377          TAD     (SAMTS0
1322  3055          DCA     BACK             /BACK SET TO RETURN TO CURRENT TEST
1323  1370          TAD     (SAMTS1
1324  3056          DCA     NEXT
1325  1367          TAD     (-5              /NUMBER OF TESTS.
1326  3113          DCA     SCOUNT
1327  3023          DCA     TOSHIF           /0
1330  3024          DCA     TOGT             /0
1331  3044          DCA     SCSIM            /0
1332  4531          JMS I   MODSEL           /PERFORM MODE SELECTION.
1333  4532          JMS I   ONLYB            /EXIT TEST IF A MODE.
1334  7403          ACS                      /CLEAR THE STEP COUNTER.
1335  5715          JMP I   SAMS0H           /EXIT.

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

```
   6  4766'  SAMTS1, JMS      SAMSIM          /GO DO   JSEREEPING
1337  4765'  SAM1,   JMS      SAMRGN          /LOAD WITH RANDOM
1340  1022         TAD      TOMQ
1341  7421         MQL                      /MQ LOADED
1342  4547         JMS I    LDGT            /LOAD THE GT ACCORDING TO "TOGT".
1343  1020         TAD      TOLINK
1344  7104         CLL RAL                  /LINK LOADED.
1345  1021         TAD      TOAC            /AC LOADED
1346  7457         SAM                      /EAE SUBTRACT AC FROM MQ
1347  4535         JMS I    SAVREG          /SAVE L,AC,MQ,SC, AND GT.
1350  4773'        JMS      SAMSIM          /SIMULATE "SAM"
1351  4451         JMS I    UCOMP           /COMPARE ACTUAL AGAINST SIMULATED
1352  7773         -5                       /L, AC, MQ, AND SC.
1353  5764'        JMP      ESAM1           /ERROR
1354  5763'        JMP      ESAM1+4         /NO ERROR OCCURRED.

1363  1435
1364  1431
1365  1400
1366  1414
1367  7773
1370  1336
1371  7244
1372  5603
1373  6013
1374  1066
1375  1137
1376  1136
1377  1245
      1400         PAGE


                   /SUBROUTINE TO GENERATE THE RANDOM DATE FOR SAM TEST 1.

1400  0000   SAMRGN, OPEN
1401  4777'        JMS      RANGEN          /GET RANDOM DATA.
1402  3021         DCA      TOAC            /THIS WILL BE LOADED INTO THE AC.
1403  7010         RAR                      /RANDOM DATA FOR GT.
1404  3024         DCA      TOGT            /
1405  4777'        JMS      RANGEN          /GET RANDOM DATA.
1406  3022         DCA      TOMQ            /THIS WILL BE LOADED INTO THE MQ.
1407  7010         RAR                      /RANDOM DATA FOR LINK.
1410  3020         DCA      TOLINK          /
1411  2113         ISZ      SCOUNT          /DONE 4096 TIMES
1412  5600         JMP I    SAMRGN          /NO.
1413  5776'        JMP      GEN+3           /YES.

                   /INITIALIZATION ROUTINE FOR SAM TEST 1.

1414  0000   SAMSIM, OPEN
1415  4534         JMS I    ASCOMP          /SET COMPARE ROUTINE.
1416  1375         TAD      (SHLTS0         /ADDRESS OF THE
1417  3056         DCA      NEXT            /NEXT TEST TO "NEXT"
1420  1374         TAD      (SAMTS1         /BACK SET TO
```

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1421  3055          DCA     BACK            /RETURN TO CURRENT TEST',
1422  3113          DCA     SCOUNT          /0
1423  3023          DCA     TOSHIF          /0
1424  3044          DCA     SCSIM           /
1425  4531          JMS I   MODSEL          /PERFORM MODE SELECTION',
1426  4532          JMS I   ONLYB           /EXIT TEST IF MODE "A",
1427  7403          ACS                     /CLEAR THE STEP COUNTER',
1430  5614          JMP I   SAMS1H          /EXIT',

                /ROUTINE TO CHECK SR OPTIONS FOR SAM TEST 1

1431  4541  ESAM1,  JMS I   TSTSW2          /CHECK SR 2',
1432  4240          JMS     SM1ERR          /PRINT ERROR DATA',
1433  4537          JMS I   TSTSW0          /CHECK SR 0',
1434  7402          HLT                     /SUBTRACT AC FROM MQ ERROR, (SAM)',
1435  4540          JMS I   TSTSW1          /CHECK SR 1',
1436  5773'         JMP     SAM1+1          /LOOP THE ROUTINE',
1437  5772'         JMP     SAM1            /CONTINUE NORMAL TEST',

                /ROUTINE TO PRINT ERROR INFORMATION FOR SAM TEST 1'.

1440  0000  SM1ERR, OPEN
1441  4530          JMS I   TYTST           /TYPE THE FOLLOWING:
1442  7775          -3
1443  7502          ZSAM                    /SAM
1444  7416          TEST                    /TEST
1445  7423          ZONE                    /1
1446  4533          JMS I   PREGS           /PRINT HEADING AND CONTENTS OF REGISTERS.
1447  5640          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'.

1450  4276  SHLTS0, JMS     SLTS0H          /GO DO HOUSE KEEPING
1451  4536  SHL0,   JMS I   UGEN            /GENERATE A NUMBER AND STORE IT IN GENX
1452  7331          CLA CLL CML IAC RAR     /AC=4000,L=1
1453  3020          DCA     TOLINK          /SAVE LINK
1454  1064          TAD     GENX            /GET THE GENERATED NUMBER
1455  3022          DCA     TOMQ            /SAVE FOR MQ
1456  3021          DCA     TOAC            /0 FOR AC
1457  1264          TAD     NBSHL0          /GET NUMBER OF SHIFTS
1460  3023          DCA     TOSHIF          /SAVE NUMBER OF SHIFTS
1461  1064          TAD     GENX            /GET THE GENERATED NUMBER
1462  7421          MQL                     /LOAD THE MQ',
1463  7413          SHL                     /EAE SHIFT LEFT
1464  0000  NBSHL0, OPEN                    /SHIFT THIS AMOUNT OF TIMES',
1465  4535          JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT',
1466  1023          TAD     TOSHIF
1467  1114          TAD     MODE
1470  7040          CMA
1471  4771'         JMS     SHLSIM          /SIMULATE SHL',
1472  4451          JMS I   UCOMP           /COMPARE SIMULATED SHL AGAINST ACTUAL SHL',
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1473  7773          -5                  /L, AC, MQ, GT, AND SC.
1474  5317          JMP     S0ERR       /SIMULATED AND ACTUAL DID NOT COMPARE.
1475  5323          JMP     S0ERR+4     /SIMULATED AND ACTUAL COMPARED. CONTINUE TEST.

              /INITIALIZATION SUBROUTINE FOR SHLTS0.

1476  0000    SLTS0H, OPEN              /HOUSE KEEPING
1477  4534          JMS I   ASCOMP      /SET COMPARE ROUTINE.
1500  3064          DCA     GENX        /ZERO TO NUMBER GENERATOR
1501  3264          DCA     NBSHL0      /ZERO TO LOCATION CONTAINS SHIFTS.
1502  1370          TAD     (SHL0
1503  3055          DCA     BACK
1504  1367          TAD     (S0INC
1505  3056          DCA     NEXT
1506  1175          TAD     C-37
1507  3113          DCA     SCOUNT
1510  4531          JMS I   MODSEL      /PERFORM MODE SELECTION.
1511  5676          JMP I   SLTS0H      /EXIT. AC=0.

              /ROUTINE TO INCREMENT SHIFT COUNT FOR SHL TEST 0.

1512  2264    S0INC,  ISZ     NBSHL0      /INCREMENT SHIFT COUNT.
1513  2113          ISZ     SCOUNT      /DONE SHIFTING
1514  5251          JMP     SHL0
1515  5716          JMP I   .+1
1516  1600          SHLTS1

              /ROUTINE TO CHECK SR OPTIONS FOR SHL TEST 0.

1517  4541    S0ERR,  JMS I   TSTSW2      /CHECK SR 2.
1520  4326          JMS     S0ERR1      /PRINT ERROR DATA.
1521  4537          JMS I   TSTSW0      /CHECK SR 0.
1522  7402          HLT                 /SHL ERROR.
1523  4540          JMS I   TSTSW1      /CHECK SR 1.
1524  5252          JMP     SHL0+1      /LOOP THE ROUTINE.
1525  5251          JMP     SHL0        /CONTINUE NORMAL TEST.


              /ROUTINE TO PRINT ERROR INFORMATION FOR SHL TEST 0.

1526  0000    S0ERR1, OPEN
1527  4530          JMS I   TYTST       /TYPE THE FOLLOWING
1530  7775          -3
1531  7413          ZSHL                /SHL
1532  7416          TEST                /TEST
1533  7421          ZERO                /0
1534  4543          JMS I   NUMSHF      /NUMBER OF SHIFTS IN DECIMAL.
1535  4533          JMS I   PREGS       /HEADING AND REGISTERS.
1536  5726          JMP I   S0ERR1      /EXIT. AC=0.

1567  1512
1570  1451
1571  6051
1572  1337
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1573  1340
1574  1336
1575  1450
1576  5603
1577  6525
      1600            PAGE

                /TEST OF THE SHIFT LEFT INSTRUCTION USING RANDOM DATA.

1600  4221  SHLTS1, JMS     SLTSIH          /GO DO HOUSE KEEPING.
1601  4546  SHL1.   JMS I   RNDATA          /GENERATE RANDOM DATA.
1602  4545           JMS I   LDREG           /LOAD L, MQ, AND GT.
1603  1023           TAD     TOSHIF          /NUMBER OF SHIFTS.
1604  3207           DCA     NBSHL1          /LOAD THE NUMBER OF SHIFTS TO BE DONE.
1605  1021           TAD     TOAC            /AC LOADED.
1606  7413           SHL                     /EAE SHIFT LEFT.
1607  0000  NBSHL1, OPEN                    /THIS AMOUNT OF TIMES
1610  4535           JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
1611  1023           TAD     TOSHIF          /
1612  1114           TAD     MODE            /
1613  7140           CMA CLL                 /
1614  4777           JMS     SHLSIM          /SIMULATE SHL
1615  4451           JMS I   UCOMP           /COMPARE SIMULATED AGAINST THE ACTUAL.
1616  7773           -5                      /L, AC, MQ, GT, AND SC.
1617  5232           JMP     SIERR           /ERROR
1620  5236           JMP     SIERR+4         /NO ERRORS ENCOUNTERED.

                /INITIALIZATION SUBROUTINE FOR SHLTS1.

1621  0000  SLTSIH, OPEN                    /HOUSE KEEPING
1622  4534           JMS I   ASCOMP          /SET COMPARE ROUTINE AND CLEAR TABLE.
1623  1376           TAD     (SHLTSI
1624  3055           DCA     BACK
1625  1375           TAD     (LSRTS0
1626  3056           DCA     NEXT
1627  3113           DCA     SCOUNT
1630  4531           JMS I   MODSEL          /PERFORM MODE SELECTION.
1631  5621           JMP I   SLTSIH          /EXIT, AC=0.

                /ROUTINE TO CHECK SR OPTIONS FOR SHL TEST 0.

1632  4541  SIERR,  JMS I   TSTSW2          /CHECK SR 2.
1633  4241           JMS     SIERR1          /PRINT ERROR DATA.
1634  4537           JMS I   TSTSW0          /CHECK SR 0.
1635  7402           HLT                     /SHL ERROR.
1636  4540           JMS I   TSTSW1          /CHECK SR 1.
1637  5202           JMP     SHL1+1          /LOOP THE ROUTINE.
1640  5201           JMP     SHL1            /CONTINUE NORMAL TEST.

                /ROUTINE TO PRINT ERROR INFORMATION FOR SHL TEST 0.

1641  0000  SIERR1, OPEN
1642  4530           JMS I   TYTST           /TYPE THE FOLLOWING:
```

```
   3  7775             -3
1644  7413             ESHL                       /SHL
1645  7416             TEST                       /TEST
1646  7423             EONE                       /1
1647  4543             JMS I     NUMSHF           /NUMBER OF SHIFTS IN DECIMAL
165Ø  4533             JMS I     PREGS            /HEADING AND REGISTERS
1651  5641             JMP I     S1ERR1           /EXIT, AC=Ø

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

1652  43Ø1      LSRTSØ, JMS      LSRSØH           /GO DO HOUSE KEEPING
1653  4536      LSRØ,   JMS I    UGEN             /GENERATE A NUMBER
1654  1Ø64              TAD      GENX             /GET THE NUMBER
1655  4774              JMS      OBVERS           /CHANGE IT TO THE OBVERSE
1656  3Ø21              DCA      TOAC             /FOR THE AC
1657  3Ø22              DCA      TOMQ             /Ø FOR MQ.
166Ø  1267              TAD      NBLSRØ
1661  3Ø23              DCA      TOSHIF
1662  7331              CLA CLL  CML IAC RAR      /L=1,AC=4ØØØ
1663  3Ø2Ø              DCA      TOLINK           /TOLINK=4ØØØ
1664  74Ø1              MQL                       /MQ=Ø
1665  1Ø21              TAD      TOAC             /AC LOADED.
1666  7417              LSR                       /EAE LOGICAL SHIFT RIGHT.


1667  ØØØØ      NBLSRØ, OPEN                      /DATA TO STEP COUNTER.
167Ø  4535              JMS I    SAVREG           /SAVE L,AC,MQ,SC,GT.
1671  1Ø23              TAD      TOSHIF           /GET NUMBER OF SHIFTS
1672  1114              TAD      MODE             /ADD MODE TO IT
1673  714Ø              CMA CLL                   /COMPLEMENT IT.
1674  4773              JMS      LSRSIM           /SIMULATE LSR
1675  4431              JMS I    UCOMP            /COMPARE SIMULATED AGAINST ACTUAL.
1676  7773              -5                        /L,AC,MQ,GT,AND SC.
1677  5322              JMP      LØERR            /ERROR
17ØØ  5326              JMP      LØERR+4          /NO ERRORS ENCOUNTERED

                /INITIALIZATION SUBROUTINE FOR LSRTSØ.

17Ø1  ØØØØ      LSRSØH, OPEN
17Ø2  4534              JMS I    ASCOMP           /SET COMPARE ROUTINE.
17Ø3  3Ø64              DCA      GENX             /ZERO TO NUMBER GENERATOR
17Ø4  3267              DCA      NBLSRØ           /ZERO TO LOCATION CONTAINIG SHIFTS
17Ø5  1372              TAD      (LSRØ
17Ø6  3Ø55              DCA      BACK
17Ø7  1371              TAD      (LØINC
171Ø  3Ø56              DCA      NEXT
1711  1175              TAD      [-37
1712  3113              DCA      SCOUNT
1713  4531              JMS I    MODSEL           /PERFORM MODE SELECTION.
1714  57Ø1              JMP I    LSRSØH           /EXIT, AC=Ø.
```

```
                /ROUTINE TO INCREMENT SHIFT COUNT FOR LSR TEST 0.

1715  2267      L0INC,  ISZ     NBLSR0
1716  2113              ISZ     SCOUNT
1717  5253              JMP     LSR0
1720  5721              JMP I   .+1
1721  2000              LSRTS1

                /ROUTINE TO CHECK SR OPTIONS FOR LSR TEST 0.

1722  4541      L0ERR,  JMS I   TSTSW2          /CHECK SR 2.
1723  4331              JMS     L0ERR1          /PRINT ERROR DATA.
1724  4537              JMS I   TSTSW0          /CHECK SR 0.
1725  7402              HLT                     /LSR ERROR.
1726  4540              JMS I   TSTSW1          /CHECK SR 1.
1727  5254              JMP     LSR0+1          /LOOP THE ROUTINE.
1730  5253              JMP     LSR0            /CONTINUE NORMAL TEST.

                /ROUTINE TO PRINT ERROR INFORMATION FOR LSR TEST 0.

1731  0000      L0ERR1, OPEN
1732  4530              JMS I   TYTST           /TYPE THE FOLLOWING
1733  7775              -3
1734  7431              ZLSR                    /LSR
1735  7416              TEST                    /TEST
1736  7421              ZER0                    /0
1737  4543              JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL
1740  4533              JMS I   PREGS
1741  5731              JMP I   L0ERR1          /EXIT

1771  1715
1772  1653
1773  6130
1774  6473
1775  1652
1776  1600
1777  6051
      2000              PAGE

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

2000  4221      LSRTS1, JMS     LSRSIH          /GO DO HOUSE KEEPING
2001  4546      LSR1,   JMS I   RNDATA          /GENERATE RANDOM DATA.
2002  4545              JMS I   LDREG           /LOAD L, MQ, AND GT.
2003  1023              TAD     TOSHIF          /
2004  3207              DCA     NBLSR1          /NUMBER OF SHIFTS.
2005  1021              TAD     TOAC            /AC LOADED.
2006  7417              LSR                     /LOGICAL SHIFT RIGHT.
2007  0000      NBLSR1, OPEN                    /NUMBER OF SHIFTS TO BE PERFORMED.
2010  4535              JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
2011  1023              TAD     TOSHIF
```

```
   .2  1174          TAD     MODE
2013  7140          CMA CLL
2014  4777          JMS     LSRSIM          /SIMULATE LSR
2015  4451          JMS I   UCOMP           /CHECK SIMULATED AGAINST ACTUAL
2016  7773          =5                      /L, AC, MQ, GT, AND SC.
2017  5232          JMP     L1ERR           /ERROR
2020  5236          JMP     L1ERR+4         /NO ERRORS ENCOUNTERED.

                    /INITIALIZATION SUBROUTINE FOR LSRTS1

2021  0000    LSRSIH, OPEN
2022  4534          JMS I   ASCOMP          /SET COMPARE ROUTINE.
2023  1376          TAD     (LSRTS1
2024  3055          DCA     BACK
2025  1375          TAD     (ASRTS0
2026  3056          DCA     NEXT
2027  3113          DCA     SCOUNT          /4096 TESTS
2030  4531          JMS I   MODSEL          /PERFORM MODE SELECTION.
2031  5621          JMP I   LSRSIH          /EXIT, AC=0



                    /ROUTINE TO CHECK SR OPTIONS FOR LSR TEST 1.

2032  4541    L1ERR,  JMS I   TSTSW2          /CHECK SR 2.
2033  4241            JMS     L1ERR1          /PRINT ERROR DATA.
2034  4537            JMS I   TSTSW0          /CHECK SR 0.
2035  7402            HLT                     /LSR ERROR.
2036  4540            JMS I   TSTSW1          /CHECK SR 1.
2037  5202            JMP     LSR1+1          /LOOP THE ROUTINE.
2040  5201            JMP     LSR1            /CONTINUE NORMAL TEST.

                    /ROUTINE TO PRINT ERROR INFORMATION

2041  0000    L1ERR1, OPEN
2042  4530            JMS I   TYTST           /PRINT THE FOLLOWING:
2043  7775            =3
2044  7431            ZLSR                    /LSR
2045  7416            TEST                    /TEST
2046  7423            ZONE                    /1
2047  4543            JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL
2050  4533            JMS I   PREGS           /HEADING AND REGISTERS.
2051  5641            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.

2052  4301    ASRTS0, JMS     ASRS0H          /DO INITIALIZATION
2053  4536    ASR0,   JMS I   UGEN            /GENERATE A COUNT.
2054  1064            TAD     GENX            /GET THE NUMBER
2055  4774            JMS     OBVERS          /CHANGE IT TO THE OBVERSE
```

```
2056  3021          DCA     TOAC            /COUNT PATTERN TO TOAC
2057  3022          DCA     TOMQ            /0 TO TOMQ
2060  1267          TAD     NBASR0
2061  3023          DCA     TOSHIF
2062  7331          CLA CLL CML IAC RAR     /L=1
2063  3020          DCA     TOLINK          /1 TO TOLINK
2064  7421          MQL                     /0 TO MQ
2065  1021          TAD TOAC                /AC LOADED
2066  7415          ASR                     /EAE ARITHMETIC SHIFT RIGHT.
2067  0000  NBASR0, OPEN
2070  4535          JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
2071  1023          TAD     TOSHIF
2072  1114          TAD     MODE
2073  7140          CMA CLL
2074  4773          JMS     ASRSIM          /SIMULATE ASR
2075  4451          JMS I   UCOMP           /COMPARE ACTUAL AGAINST SIMULATED
2076  7773          -5                      /L, AC, MQ, GT, AND SC.
2077  5322          JMP     A0ERR           /ERROR DETECTED.
2100  5326          JMP     A0ERR+4         /NO ERROR ENCOUNTERED

                    /INITIALIZATION SUBROUTINE FOR ASRTS0.

2101  0000  ASRS0H, OPEN
2102  4534          JMS I   ASCOMP          /SET COMPARE ROUTINE.
2103  3064          DCA     GENX            /ZERO TO NUMBER GENERATOR
2104  3267          DCA     NBASR0          /ZERO TO LOCATION CONTAINING SHIFTS.
2105  1372          TAD     (ASR0
2106  3055          DCA     BACK
2107  1371          TAD     (A0INC
2110  3056          DCA     NEXT
2111  1175          TAD     I-37            /SET UP FOR
2112  3113          DCA     SCOUNT          /37 OCTAL SHIFTS
2113  4531          JMS I   MODSEL          /PERFORM MODE SELECTION.
2114  5701          JMP I   ASRS0H          /EXIT, AC=0.

                    /ROUTINE TO INCREMENT SHIFT COUNT FOR ASR TEST 0.

2115  2267  A0INC,  ISZ     NBASR0
2116  2113          ISZ SCOUNT              /DONE THIS TEST YET?
2117  5253          JMP     ASR0            /NO.
2120  5721          JMP I   .+1             /GO TO NEXT TEST.
2121  2200          ASRTS1

                    /ROUTINE TO CHECK SR OPTIONS FOR ASR TEST 0.

2122  4541  A0ERR,  JMS I   TSTSW2          /CHECK SR 2.
2123  4331          JMS     A0ERR1          /PRINT ERROR DATA.
2124  4537          JMS I   TSTSW0          /CHECK SR 0.
2125  7402          HLT                     /ASR ERROR.
2126  4540          JMS I   TSTSW1          /CHECK SR 1.
2127  5254          JMP     ASR0+1          /LOOP THE ROUTINE.
2130  5253          JMP     ASR0            /CONTINUE NORMAL TEST.

                    /ROUTINE TO PRINT ERROR INFORMATION FOR ASR TEST 0.
```

```
2131  0000  A0ERR1, OPEN
2132  4530        JMS I   TYTST           /PRINT THE FOLLOWING:
2133  7775        -3
2134  7440        ZASR                    /ASR
2135  7416        TEST                    /TEST
2136  7421        ZERO                    /0
2137  4543        JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL:
2140  4533        JMS I   PREGS           /HEADING AND REGISTERS:
2141  5731        JMP I   A0ERR1          /EXIT, AC=0:

2171  2115
2172  2053
2173  6200
2174  6473
2175  2052
2176  2000
2177  6120
      2200        PAGE


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

2200  4221  ASRTS1, JMS      ASRSIH          /GO DO HOUSEKEEPING
2201  4546  ASR1,   JMS I    RNDATA          /GENERATE RANDOM DATA:
2202  4545        JMS I   LDREG           /LOAD L, MQ, AND GT:
2203  1023        TAD     TOSHIF
2204  3207        DCA     NBASR1          /NUMBER OF SHIFTS LOADED:
2205  1021        TAD     TOAC            /AC LOADED
2206  7415        ASR                     /EAE ARITHMETIC SHIFT RIGHT
2207  0000  NBASR1, OPEN                  /NUMBER OF SHIFTS:
2210  4535        JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT:
2211  1023        TAD     TOSHIF
2212  1114        TAD     MODE
2213  7140        CMA CLL
2214  4777'       JMS     ASRSIM          /SIMULATE ASR:
2215  4451        JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL:
2216  7773        -5
2217  5232        JMP     A1ERR           /ERROR DETECTED:
2220  5236        JMP     A1ERR+4         /NO ERRORS ENCOUNTERED:

                  /INITIALIZATION SUBROUTINE FOR ASRTS1:

2221  0000  ASRSIH, OPEN
2222  4534        JMS I   ASCOMP          /SET COMPARE ROUTINE:
2223  1376        TAD     (ASRTSI
2224  3055        DCA     BACK
2225  1375        TAD     (OPSES0
2226  3056        DCA     NEXT
2227  3113        DCA     SCOUNT
2230  4531        JMS I   MODSEL          /PERFORM MODE SELECTION:
2231  5621        JMP I   ASRSIH          /EXIT,  AC=0:

                  /ROUTINE TO CHECK SR OPTIONS IN ASR TEST 1:
```

```
2232  4541    A1ERR,  JMS I   TSTSW2          /CHECK SR 2,
2233  4241            JMS     A1ERR1          /PRINT ERROR DATA,
2234  4537            JMS I   TSTSW0          /CHECK SR 0,
2235  7402            HLT                     /ASR ERROR,
2236  4540            JMS I   TSTSW1          /CHECK SR 1,
2237  5202            JMP     ASR1+1          /LOOP THE ROUTINE,
2240  5201            JMP     ASR1            /CONTINUE NORMAL TEST,

                /ROUTINE TO PRINT ERROR INFORMATION,

2241  0000    A1ERR1, OPEN                    /PRINT THE FOLLOWING:
2242  4530            JMS I   TYTST
2243  7775            =3
2244  7440            ZASR                    /ASR
2245  7416            TEST                    /TEST
2246  7423            ZONE                    /1
2247  4543            JMS I   NUMSHF          /NUMBER OF SHIFTS IN DECIMAL
2250  4533            JMS I   PREGS           /HEADING AND REGISTERS
2251  5641            JMP I   A1ERR1          /EXIT

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

2252  4774'   DPSZS0, JMS     DPSZ0H          /GO DO HOUSE KEEPING,
2253  7320            CLA CLL CML
2254  4773'   DPSZ0,  JMS     ROTGEN
2255  7300            CLA CLL
2256  1043            TAD     LSH             /GET DATA THAT WILL BE PLACED IN THE MQ,
2257  1042            TAD     MSH             /ADD THE AC DATA TO THAT,
2260  7650            SNA CLA                 /WOULD THE AC AND MQ BE ZERO?
2261  7430            SZL                     /CHECK FOR A CARRY WHEN AC AND MQ ARE ADDED,
2262  4306            JMS     NOSKIP          /AC AND MQ WILL BE NON ZERO,
2263  4317            JMS     YSKIP           /AC AND MQ WILL BE ZERO,
2264  7331            CLA CLL CML IAC RAR     /AC = 4000, LINK = 1
2265  3041            DCA     LSIM            /LOAD THE SIMULATED LINK
2266  1041            TAD     LSIM
2267  3020            DCA     TOLINK          /LOAD THE PROBLEM LINK,
2270  1043            TAD     LSH
2271  7421            MQL                     /MQ NOW LOADED,
2272  1042            TAD     MSH             /AC NOW LOADED,
2273  7451            DPSZ                    /EAE DOUBLE PRECISION SKIP IF ZERO
2274  0000    NOSKP,  OPEN
2275  0000    YESSKP, OPEN
2276  4535    CKDATA, JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
2277  4451            JMS I   UCOMP           /COMPARE L,AC,MQ
2300  7775            =3
2301  7610            SKP CLA                 /DPSZ MODIFIED A REGISTER,
2302  5772'           JMP     EDPSZ0+5        /NO ERROR OCCURED,
2303  1371            TAD     (DATER          /SET PRINTOUT FOR DATA ERROR
2304  3770'           DCA     DPZPR1
2305  5767'           JMP     EDPSZ0+1        /DPSZ MODIFIED ONE OF THE REGISTERS,

                /ROUTINE TO SETUP FOR NO SKIP CONDITION

2306  0000    NOSKIP, OPEN                    /AC AND MQ NOT 0
```

```
 107  1366          TAD     (JMP CKDATA
 310  3274          DCA     NOSKP
2311  1364          TAD     (JMP EDPSZ0
2312  3275          DCA     YESSKP
2313  1363          TAD     (SO
2314  3770          DCA     DPZPR1
2315  2306          ISZ     NOSKIP
2316  5706          JMP I   NOSKIP          /EXIT, AC=0

                /ROUTINE TO SET UP FOR A SKIP CONDITION

2317  0000    YSKIP, OPEN                   /AC AND MQ =0
2320  1366          TAD     (JMP CKDATA
2321  3275          DCA     YESSKP
2322  1364          TAD     (JMP EDPSZ0
2323  3274          DCA     NOSKP
2324  1362          TAD     (NSO
2325  3770          DCA     DPZPR1
2326  5717          JMP I   YSKIP          /EXIT, AC = 0,

2362  7532
2363  7523
2364  5765
2365  2512
2366  5276
2367  2513
2370  5515
2371  7543
2372  2517
2373  2476
2374  2400
2375  2252
2376  2200
2377  6200
      2400          PAGE

                /INITIALIZATION ROUTINE FOR DPSZS0.

2400  0000    DPSZ0H, OPEN
2401  4534          JMS I   ASCOMP        /SET COMPARE ROUTINE.
2402  1377          TAD     (DPSZS0
2403  3055          DCA     BACK
2404  1376          TAD     (DZINC
2405  3056          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  3113          DCA     SCOUNT
```

```
2420  4531          JMS I   MODSEL          /PERFORM MODE SELECTION.
2421  1114          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  2113  DZINC,  ISZ     SCOUNT
2427  5772          JMP     DPSZ0+1
2430  7340          CLA CMA CLL
2431  3113          DCA     SCOUNT         /SET SCOUNT TO 7777 SO THE ROTGEN IS NOT USED.
2432  7240          CLA CMA
2433  3042          DCA     MSH            /7777
2434  3043          DCA     LSH            /0000
2435  2273          ISZ     CNTR1
2436  5772          JMP     DPSZ0+1
2437  7240          CLA CMA
2440  3113          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  3043          DCA     LSH            /7777
2445  3042          DCA     MSH            /0000
2446  2274          ISZ     CNTR2
2447  5772          JMP     DPSZ0+1
2450  7240          CLA CMA
2451  3113          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  3043          DCA     LSH            /7777
2460  7040          CMA
2461  3042          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
2467  7710          SPA CLA                /SR 3 SET?
2470  5777          JMP DPSZSØ             /YES IT IS. REPEAT TEST.
2471  5672          JMP I   .+1
2472  2600          DPITSØ

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

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

```
                0000    ROTGEN, OPEN                    /GENER.  ROTATING PATTERN
2477    1043            TAD     LSH
2500    7004            RAL
2501    3043            DCA     LSH
2502    1042            TAD     MSH
2503    7004            RAL
2504    3042            DCA     MSH
2505    1042            TAD     MSH
2506    3021            DCA     TOAC
2507    1043            TAD     LSH
2510    3022            DCA     TOMQ
2511    5226            JMP     DZINC           /EXIT.  AC=0.

                /ROUTINE TO CHECK SR OPTIONS FOR DPSZ TEST 0.

2512    4535    EDPSZ0, JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
2513    4541            JMS I   TSTSW2          /CHECK SR 2.
2514    4323            JMS     DZERR0          /PRINT ERROR DATA.
2515    4537            JMS I   TSTSW0          /CHECK SR 0.
2516    7402            HLT                     /DPSZ ERROR.
2517    4540            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    4530            JMS I   TYTST
2525    7775            -3
2526    7443            ZDPSZ
2527    7416            TEST
2530    7421            ZERO
2531    4533            JMS I   PREGS
2532    5723            JMP I   DZERR0          /EXIT

2571    2254
2572    2255
2573    7746
2574    7002
2575    7045
2576    2426
2577    2252
        2600            PAGE

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

2600    4221    DPITS0, JMS     DPISOH          /GO DO HOUSE KEEPING.
2601    4536    DPI0,   JMS I   UGEN            /GENERATE NUMBERS.
2602    7240            CLA CMA                 /7777
2603    3021            DCA     TOAC            /SIMULATED AC = 7777.
2604    3020            DCA     TOLINK          /SIMULATED LINK = 0.
2605    1064            TAD     GENX            /GET THE NUMBER GENERATED BY "GEN".
2606    7421            MQL                     /MQ LOADED.
2607    7701            CLA MQA                 /MQ TO AC.
```

```
2610  3022          DCA     TOMQ            /SIMULATED MQ = C(GENX)'.
2611  7240          CLA CMA                 /AC = 7777
2612  7573          DPIC                    /DOUBLE PRECISION INCREMENT
2613  4535          JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT',
2614  4777          JMS     DPISIM          /SIMULATE DPI',
2615  4451          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  4534          JMS I   ASCOMP          /SET COMPARE ROUTINE',
2623  3064          DCA     GENX
2624  1376          TAD     (DPI0
2625  3055          DCA     BACK
2626  1375          TAD     (DPITS1
2627  3056          DCA     NEXT
2630  4531          JMS I   MODSEL          /PERFORM MODE SELECTION',
2631  4532          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  4541    EDPI0,  JMS I   TSTSW2        /CHECK SR 2',
2635  4243          JMS     DI0ERR          /PRINT ERROR DATA',
2636  4537          JMS I   TSTSW0          /CHECK SR 0',
2637  7402          HLT                     /DPIC ERROR',
2640  4540          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  4530          JMS I   TYTST           /PRINT THE FOLLOWING:
2645  7775          -3
2646  7446          ZDPIC                   /DPIC
2647  7416          TEST                    /TEST
2650  7421          ZERO                    /0
2651  4533          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  4546    DPI1,   JMS I   RNDATA        /GENERATE RANDOM DATA',
2655  4552          JMS I   LDSC            /LOAD THE STEP COUNTER',
2656  4545          JMS I   LDREG           /LOAD L, MQ, AND GT',
2657  1021          TAD     TOAC            /AC LOADED',
```

```
    0  7573            DPIC                    /EAE (    E PRECISION INCREMENT.
2661  4535            JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
2662  4777'           JMS     DPISIM          /SIMULATE DPIC.
2663  4451            JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL
2664  7773            -5                      /L,AC,MQ,GT. AND SC.
2665  5302            JMP     EDPII           /ERROR
2666  5306            JMP     EDPII+4         /NO ERRORS ENCOUNTERED


                /INITIALIZATION ROUTINE FOR DPIC TEST 1.

2667  0000    DPISIH, OPEN                    /HOUSEKEEPING FOR DPISI
2670  4534            JMS I   ASCJMP          /SET COMPARE ROUTINE.
2671  3113            DCA     SCOUNT
2672  1374            TAD     (DPII
2673  3055            DCA     BACK
2674  1373            TAD     (DCMTS0
2675  3056            DCA     NEXT
2676  4531            JMS I   MODSEL          /PERFORM MODE SELECTION.
2677  4532            JMS I   ONLYB           /EXIT IT MODE "A".
2700  7403            ACS                     /CLEAR THE STEP COUNTER.
2701  5667            JMP I   DPISIH          /EXIT

                /ROUTINE TO CHECK SR OPTIONS IN DPIC TEST 1.

2702  4541    EDPII,  JMS I   TSTSW2          /CHECK SR 2.
2703  4311            JMS     DIIERR          /PRINT ERROR DATA.
2704  4537            JMS I   TSTSW0          /CHECK SR 0.
2705  7402            HLT                     /DPIC ERROR
2706  4540            JMS I   TSTSW1          /CHECK SR 1.
2707  5255            JMP     DPII+1          /LOOP THE ROUTINE.
2710  5254            JMP     DPII            /CONTINUE NORMAL TEST.

                /ROUTINE TO PRINT ERROR INFORMATION.

2711  0000    DIIERR, OPEN                    /PRINT THE FOLLOWING:
2712  4530            JMS I   TYTST
2713  7775            -3
2714  7446            ZDPIC                   /DPIC
2715  7416            TEST                    /TEST
2716  7423            ZONE                    /1
2717  4533            JMS I   PREGS           /HEADING AND REGISTERS.
2720  5711            JMP I   DIIERR          /EXIT.  AC=0.

                /TEST OF THE DOUBLE PRECISION COMPLEMENT INSTRUCTION.

2721  4772'   DCMTS0, JMS     DCMS0H          /GO DO HOUSEKEEPING
2722  4771'   DCM0,   JMS     DCMGEN          /LOAD
2723  1020            TAD     TOLINK
2724  7104            CLL RAL                 /LINK LOADED
2725  1022            TAD     TOMQ
2726  7421            MQL                     /MQ LOADED
2727  1021            TAD     TOAC            /AC LOADED
2730  7575            DCM                     /EAE DOUBLE PRECISION 2'S COMPLEMENT
2731  4535            JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT.
```

```
2732  4770'          JMS     DCMSIM          /SIMULATE DCM
2733  4451           JMS I   UCOMP           /COMPARE ACTUAL AGAINST SIMULATED,
2734  7775           =3                      /L,AC,MQ ONLY
2735  5767'          JMP     EDCM0           /ERROR
2736  5766'          JMP     EDCM0+4         /NO ERROR

2766  3035
2767  3031
2770  6302
2771  3000
2772  3013
2773  2721
2774  2654
2775  2653
2776  2601
2777  6264
      3000           PAGE

3000  0000    DCMGEN, OPEN
3001  4452           JMS I   UMOVE           /MOVE DATA TO TOLINK, TOAC, TOMQ
3002  0000           OPEN
3003  0020           TOLINK
3004  7773           =5
3005  7325           CLA CLL CML IAC RAL     /AC=0003
3006  1202           TAD     .-4             /ADD THE ADDRESS
3007  3202           DCA     .-5             /PUT IT BACK WITH 3 ADDED TO IT
3010  2113           ISZ     SCOUNT          /FINISHED WITH ALL STORED PATTERNS?
3011  5600           JMP I   DCMGEN          /NO
3012  5777'          JMP     GEN+3           /YES

                     /ROUTINE TO DO INITIALIZATION FOR DCM TEST 0.

3013  0000    DCMS0H, OPEN                    /HOUSEKEEPING FOR DCMT00
3014  4534           JMS I   ASCOMP          /SET COMPARE ROUTINE,
3015  1376           TAD     (COMTAB         /GET THE ADDRESS OF THE TABLE
3016  3202           DCA     DCMGEN+2        /STORE IT IN DCMGEN+2
3017  1375           TAD     (DCMTS0
3020  3055           DCA     BACK
3021  1374           TAD     (DADTS0
3022  3056           DCA     NEXT
3023  1373           TAD     (=6             /SET UP
3024  3113           DCA     SCOUNT          /SCOUNT,
3025  4531           JMS I   MODSEL          /PERFORM MODE SELECTION,
3026  4532           JMS I   ONLYB           /EXIT IF MODE "A",
3027  7403           ACS                     /CLEAR THE STEP COUNTER,
3030  5613           JMP I   DCMS0H          /EXIT

                     /ROUTINE TO CHECK SR OPTIONS FOR DCM TEST 0.

3031  4541    EDCM0,  JMS I   TSTSW2          /CHECK SR 2,
3032  4240           JMS     DM0ERR          /PRINT ERROR DATA,
3033  4537           JMS I   TSTSW0          /CHECK SR 0,
3034  7402           HLT                     /DCM ERROR,
3035  4540           JMS I   TSTSW1          /CHECK SR 1,
3036  5772'          JMP     DCM0+1          /LOOP THE ROUTINE,
```

```
/ 5771/          JMP     DCM0            /CONTI    NORMAL TEST',

                 /ROUTINE TO PRINT ERROR INFORMATION.

3040  0000  DM0ERR, OPEN
3041  4530          JMS I   TYTST           /PRINT THE FOLLOWING:
3042  7775          -3
3043  7451          ZDCM                    /DCM
3044  7416          TEST                    /TEST
3045  7421          ZER0                    /0
3046  4533          JMS I   PREGS           /HEADING AND REGISTERS'.
3047  5640          JMP I   DM0ERR          /EXIT', AC=0'.

                 /TEST OF THE DOUBLE PRECISION ADD INSTRUCTION
                 /USING FIXED DATA'.

3050  4312  DADTS0, JMS     DADS0H          /GO DO HOUSEKEEPING
3051  4276  DAD0,   JMS     DADGEN          /GET NUMBERS TO ADD'.
3052  1020          TAD     TOLINK
3053  7104          CLL RAL                 /LINK LOADED
3054  1022          TAD     TOMQ
3055  7421          MQL                     /MQ LOADED
3056  1023          TAD     TOSHIF
3057  3267          DCA     .+10            /MSH LOADED
3060  1024          TAD     TOGT
3061  3266          DCA     .+5             /LSH LOADED
3062  1021          TAD     TOAC            /AC LOADED
3063  7443          DAD                     /EAE DOUBLE PRECISION ADD
3064  3066          .+2                     /ADDRESS
3065  5270          JMP     .+3             /JMP OVER
3066  0000          OPEN                    /LSH OPERAND
3067  0000          OPEN                    /MSH OPERAND
3070  4535          JMS I   SAVREG          /SAVE L,AC,MQ,SC.GT',
3071  4770/         JMS     DADSIM          /SIMULATE DAD
3072  4451          JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL
3073  7775          -3                      /L,AC,MQ'.
3074  5332          JMP     EDAD0           /ERROR
3075  5350          JMP     EDAD0+16        /NO ERRORS ENCOUNTERED


3076  0000  DADGEN, OPEN
3077  4452          JMS I   UMOVE
3100  0000          OPEN
3101  0020          TOLINK
3102  7773          -5
3103  7326          CLA CLL CML RTL         /AC=2
3104  7124          CLL CML RAL             /AC=5
3105  1300          TAD     .-5             /ADD THE ADDRESS
3106  3300          DCA     .-6             /PUT IT BACK WITH 5 ADDED TO IT
3107  2113          ISZ     SCOUNT          /FINISHED WITH ALL STORED PATTERNS
3110  5676          JMP I   DADGEN          /NO.
3111  5777/         JMP     GEN+3           /YES.

                 /INITIALIZATION ROUTINE FOR DAD TEST 0.
```

```
3112  0000    DADSØH, OPEN
3113  4534            JMS I   ASCOMP          /SET COMPARE ROUTINE,
3114  1367            TAD     (DADTAB         /GET ADDRESS OF TABLE
3115  3300            DCA     DADGEN+2        /AND STORE IT IN DADGEN+2
3116  1374            TAD     (DADTSØ
3117  3055            DCA     BACK
3120  1366            TAD     (DADTSI
3121  3056            DCA     NEXT            /
3122  1365            TAD     (-5
3123  3113            DCA     SCOUNT
3124  1764            TAD     DADJMS          /GET A JMS TO MODIFY PRINT ROUTINE,
3125  3763            DCA     WILCHG          /PUT THE JMS IN WILCHG,
3126  4531            JMS I   MODSEL          /PERFORM MODE SELECTION,
3127  4532            JMS I   ONLYB           /EXIT IF MODE "A",
3130  7403            ACS                     /CLEAR THE STEP COUNTER,
3131  5712            JMP I   DADSØH          /EXIT

                /ROUTINE TO CHECK SR OPTIONS FOR DAD TEST Ø,

3132  1023    EDADØ,  TAD     TOSHIF
3133  3037            DCA     TEMPA           /MSH TO TEMPA
3134  1024            TAD     TOGT
3135  3040            DCA     TEMPB           /LSH TO TEMPB
3136  3023            DCA     TOSHIF          /Ø
3137  3024            DCA     TOGT            /Ø
3140  4541            JMS I   TSTSW2          /CHECK SR 2,
3141  4353            JMS     DAØERR          /PRINT ERROR DATA
3142  1037            TAD     TEMPA
3143  3023            DCA     TOSHIF          /RESTORE MSH
3144  1040            TAD     TEMPB
3145  3024            DCA     TOGT            /RESTORE LSH
3146  4537            JMS I   TSTSWØ          /CHECK SR 2,
3147  7402            HLT                     /DAD ERROR,
3150  4540            JMS I   TSTSWI          /CHECK SR 1,
3151  5252            JMP     DADØ+1
3152  5251            JMP     DADØ


                /ROUTINE TO PRINT ERROR INFORMATION,

3153  0000    DAØERR, OPEN
3154  4530            JMS I   TYTST           /PRINT THE FOLLOWING:
3155  7775            -3
3156  7454            ZDAD                    /DAD
3157  7416            TEST                    /TEST
3160  7421            ZERØ                    /Ø
3161  4533            JMS I   PREGS           /HEADING AND REGISTERS,
3162  5753            JMP I   DAØERR          /EXIT,  AC=Ø,


3163  7016
3164  7044
3165  7773
3166  3200
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                /  7302
3170            3170  6320
3171            3171  2722
3172            3172  2723
3173            3173  7772
3174            3174  3050
3175            3175  2721
3176            3176  7333
3177            3177  5603
                3200          PAGE


                      /RANDOM DOUBLE PRECISION ADD TEST:

3200  4226      DADTS1, JMS     DADSIH          /GO DO HOUSEKEEPING
3201  4245      DAD1,   JMS     RANDAD          /GENERATE RANDOM NUMBERS
3202  1020              TAD     TOLINK
3203  7104              CLL RAL                 /LINK LOADED
3204  1022              TAD     TOMQ
3205  7421              MQL                     /MQ LOADED
3206  1023              TAD     TOSHIF
3207  3217              DCA     .+10
3210  1024              TAD     TOGT
3211  3216              DCA     .+5             /LEAST SIGNIFICANT LOADED
3212  1021              TAD     TOAC            /AC LOADED
3213  7443              DAD                     /EAE DOUBLE PRECISION ADD
3214  3216              .+2                     /ADDRESS
3215  5220              JMP     .+3             /JMP OVER
3216  0000              OPEN                    /LEAST SIGNIFICANT OPERAND
3217  0000              OPEN                    /MOST SIGNIFICANT OPERAND
3220  4535              JMS I   SAVREG          /SAVE L,AC,MQ,SC,GT,
3221  4777              JMS     DADSIM          /SIMULATE DAD
3222  4451              JMS I   UCOMP           /COMPARE SIMULATED AGAINST ACTUAL
3223  7775              -3                      /L, AC, MQ,
3224  5263              JMP     EDAD1           /ERROR
3225  5301              JMP     EDAD1+16        /NO ERRORS ENCOUNTERED

                      /INITIALIZATION ROUTINE FOR DAD TEST 1,

3226  0000      DADSIH, OPEN
3227  4534              JMS I   ASCOMP          /SET COMPARE ROUTINE,
3230  1376              TAD     (DADTS1
3231  3055              DCA     BACK
3232  1375              TAD     (DSTTS0         /ADDRESS OF NEXT TEST
3233  3056              DCA     NEXT
3234  1774              TAD     DADJMS          /GET A JMS TO MODIFY PRINT ROUTINE,
3235  3773              DCA     WILCHG          /PUT THE JMS IN WILCHG,
3236  3113              DCA     SCOUNT
3237  3044              DCA     SCSIM           /CLEAR
3240  3045              DCA     GTSIM           /CLEAR
3241  4531              JMS I   MODSEL          /PERFORM MODE SELECTION,
3242  4532              JMS I   ONLYB           /EXIT IF MODE "A",
3243  7403              ACS                     /CLEAR THE STEP COUNTER,
```

```
3244  5626          JMP I   DADS1H          /EXIT AC=0 L=0

3245  0000    RANDAD, OPEN
3246  4772'         JMS     RANGEN
3247  3021          DCA     TOAC            /RANDOM DATA FOR "AC"
3250  4772'         JMS     RANGEN
3251  3022          DCA     TOMQ            /RANDOM DATA FOR "MQ"
3252  4772'         JMS     RANGEN
3253  3023          DCA     TOSHIF          /RANDOM DATA FOR "MOST SIGNIFICANT"
3254  4772'         JMS     RANGEN
3255  3024          DCA     TOGT            /RANDOM DATA FOR "LEAST SIGNIFICANT"
3256  7210          CLA RAR
3257  3020          DCA     TOLINK          /RANDOM DATA FOR LINK
3260  2113          ISZ     SCOUNT          /DONE
3261  5645          JMP I   RANDAD          /NO
3262  5771'         JMP     GEN+3           /YES


                /ROUTINE TO CHECK SR OPTIONS FOR DAD TEST 1.

3263  1023    EDAD1,  TAD     TOSHIF
3264  3037          DCA     TEMPA
3265  1024          TAD     TOGT
3266  3040          DCA     TEMPB
3267  3023          DCA     TOSHIF
3270  3024          DCA     TOGT
3271  4541          JMS I   TSTSW2          /CHECK SR 2.
3272  4304          JMS     DA1ERR          /PRINT ERROR DATA.
3273  1037          TAD     TEMPA
3274  3023          DCA     TOSHIF
3275  1040          TAD     TEMPB
3276  3024          DCA     TOGT
3277  4537          JMS I   TSTSW0          /CHECK SR 0.
3300  7402          HLT                     /DAD ERROR.
3301  4540          JMS I   TSTSW1          /CHECK SR 1.
3302  5202          JMP     DAD1+1
3303  5201          JMP     DAD1

                /ROUTINE TO PRINT ERROR INFORMATION FOR DAD TEST 1.

3304  0000    DA1ERR, OPEN
3305  4530          JMS I   TYTST           /PRINT THE FOLLOWING
3306  7775          =3
3307  7454          ZDAD                    /DAD
3310  7416          TEST                    /TEST
3311  7423          ZONE                    /1
3312  4533          JMS I   PREGS           /HEADING AND REGISTERS
3313  5704          JMP I   DA1ERR          /EXIT, AC=0


                /TEST OF THE DOUBLE PRECISION STORE INSTRUCTION.
                /USING FIXED DATA
```

```
    4  4770  DSTTS0, JMS      DSTS0H          /GO DO HOUSEKEEPING
3315  4767  DST0,   JMS      DST0GN          /SET UP NUMBERS TO BE STORED
3316  1041          TAD      LSIM
3317  7104          CLL RAL                  /LINK LOADED
3320  1043          TAD      LSH
3321  7421          MQL                      /MQ LOADED.
3322  1042          TAD      MSH             /AC LOADED
3323  7445          DST                      /EAE DOUBLE PRECISION STORE
3324  3326          .+2                      /START WITH OPERAND DEFINED BY THE ADDRESS
3325  5330          JMP      .+3             /GO OVER
3326  0000  DST0A,  OPEN                     /MQ TO BE STORED HERE
3327  0000  DST0B,  OPEN                     /AC TO BE STORED HERE
3330  4535          JMS I    SAVREG          /SAVE L,AC,MQ,SC,GT.
3331  1326          TAD      .-3
3332  3036          DCA      GTTOCK          /SAVE STORED MQ
3333  1327          TAD      .-4
3334  3035          DCA      SCTOCK          /SAVE STORED AC
3335  4451          JMS I    UCOMP           /CHECK L, AC, MQ AGAINST ORIGINAL
3336  7775          -3
3337  5766          JMP      EDST0           /ERROR, L, AC, OR MQ MODIFIED BY DST.
3340  1043          TAD      LSH
3341  7421          MQL                      /LOAD MQ WITH GOOD
3342  1042          TAD      MSH             /LOAD AC WITH GOOD
3343  7575          DCM                      /2'S COMPLEMENT
3344  7443          DAD                      /ADD "TO BE CHECKED"
3345  3326          DST0A                    /STORED AT THIS ADDRESS
3346  7451          DPSZ                     /ARE THEY THE SAME?
3347  5766          JMP      EDST0           /ERROR
3350  5765          JMP      EDST0+4         /NO ERRORS ENCOUNTERED

3365  3435
3366  3431
3367  3400
3370  3413
3371  5603
3372  6525
3373  7016
3374  7044
3375  3314
3376  3200
3377  6320
      3400          PAGE

3400  0000  DST0GN, OPEN
3401  4452          JMS I    UMOVE
3402  0000          OPEN
3403  0041          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  2113          ISZ      SCOUNT
3411  5600          JMP I    DST0GN
3412  5777          JMP      GEN+3
```

```
                    /INITIALIZATION ROUTINE FOR DST TEST 0

3413  0000  DSTS0H, OPEN
3414  4534        JMS I   ASCOMP          /SET COMPARE ROUTINE.
3415  1376        TAD     (DSTTAB
3416  3202        DCA     DST0GN+2
3417  1375        TAD     (DSTTS0
3420  3055        DCA     BACK
3421  1374        TAD     (DSTTS1
3422  3056        DCA     NEXT
3423  1373        TAD     (-5
3424  3113        DCA     SCOUNT
3425  4531        JMS I   MODSEL          /PERFORM MODE SELECTION.
3426  4532        JMS I   ONLY8           /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  4541  EDST0,  JMS I   TSTSW2          /CHECK SR 2.
3432  4240        JMS     DS0ERR          /PRINT ERROR DATA.
3433  4537        JMS I   TSTSW0          /CHECK SR 0.
3434  7402        HLT                     /DST ERROR.
3435  4540        JMS I   TSTSW1          /CHECK SR 1.
3436  5772        JMP     DST0+1          /LOOP THE ROUTINE.
3437  5771        JMP     DST0            /CONTINUE NORMAL TEST.

                    /ROUTINE TO PRINT ERROR INFORMATION

3440  0000  DS0ERR, OPEN
3441  4530        JMS I   TYTST           /PRINT THE FOLLOWING
3442  7775        -3
3443  7457        ZDST                    /DST
3444  7416        TEST                    /TEST
3445  7421        ZER0                    /0
3446  4770        JMS     DSTREG          /HEADING AND REGISTERS
3447  5640        JMP I   DS0ERR          /EXIT, AC=0

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

3450  4317  DSTTS1, JMS     DSTS1H          /GO DO HOUSEKEEPING
3451  4305  DST1,   JMS     DSTIRN          /SET UP RANDOM NUMBERS
3452  1041        TAD     LSIM
3453  7104        CLL RAL                 /LINK LOADED
3454  1043        TAD     LSH
3455  7421        MQL                     /MQ LOADED
3456  1042        TAD     MSH             /AC LOADED
3457  7445        DST                     /EAE DOUBLE PRECISION STORE
3460  3462        DST1A
3461  5264        JMP     .+3
3462  0000  DST1A,  OPEN                  /LEAST SIGNIFICANT
3463  0000  DST1B,  OPEN                  /MOST SIGNIFICANT
```

```
 464  4535            JMS I   SAVREG          /SAVE AC,MQ,SC,GT.
 465  1262            TAD     DST1A
3466  3036            DCA     GTTOCK          /SAVE LEAST SIGNIFICANT
3467  1263            TAD     DST1B
3470  3035            DCA     SCTOCK          /SAVE MOST SIGNIFICANT
3471  4451            JMS I   UCOMP           /COMPARE L, AC, AND MQ AGAINST ORIGINAL.
3472  7775            -3                      /L, AC, MQ
3473  5333            JMP     EDST1           /ERROR, L, AC, OR MQ MODIFIED BY DST.
3474  1043            TAD     LSH
3475  7421            MQL                     /ORIGINAL MQ
3476  1042            TAD     MSH             /ORIGINAL AC
3477  7575            DCM                     /2'S COMPLEMENT
3500  7443            DAD                     /ADD "TO BE CHECKED"
3501  3462            DST1A                   /STORED AT THIS ADDRESS
3502  7451            DPSZ                    /ARE THEY THE SAME?
3503  5333            JMP     EDST1           /ERROR
3504  5337            JMP     EDST1+4         /NO ERRORS ENCOUNTERED.


                      /ROUTINE TO GENERATE RANDOM DATA FOR DST TEST 1.

3505  0000  DST1RN,   OPEN
3506  4767' 
                      JMS     RANGEN
3507  3042            DCA     MSH             /RANDOM DATA TO BE PUT IN AC
3510  4767' 
                      JMS     RANGEN
3511  3043            DCA     LSH             /RANDOM DATA TO BE PUT IN MQ
3512  7010            RAR
3513  3041            DCA     LSIM            /RANDOM DATA TO BE PUT IN LINK
3514  2113            ISZ     SCOUNT          /DONE?
3515  5705            JMP I   DST1RN          /NO
3516  5777' 
                      JMP     GEN+3           /YES

                      /INITIALIZATION ROUTINE FOR DST TEST 1.

3517  0000  DSTS1H,   OPEN
3520  4534            JMS I   ASCOMP          /SET COMPARE ROUTINE.
3521  1374            TAD     (DSTTS1
3522  3055            DCA     BACK
3523  1366            TAD     (NORMT
3524  3056            DCA     NEXT
3525  1365            TAD     (-1000
3526  3113            DCA     SCOUNT
3527  4531            JMS I   MODSEL          /PERFORM MODE SELECTION.
3530  4532            JMS I   ONLYB           /EXIT IF "A" MODE.
3531  7403            ACS                     /CLEAR THE STEP COUNTER.
3532  5717            JMP I   DSTS1H          /EXIT, AC=0

                      /ROUTINE TO CHECK SR OPTION FOR DST TEST 1

3533  4541  EDST1,    JMS I   TSTSW2          /CHECK SR 2.
3534  4342            JMS     DS1ERR          /PRINT ERROR DATA.
3535  4537            JMS I   TSTSW0          /CHECK SR 0.
```

```
3536  7402          HLT                     /DST ERROR.
3537  4540          JMS I   TSTSW1          /CHECK SR 1.
3540  5252          JMP     DST1+1          /LOOP THE ROUTINE.
3541  5251          JMP     DST1            /CONTINUE NORMAL TEST.

              /ROUTINE TO PRINT ERROR INFORMATION.

3542  0000  DS1ERR, OPEN
3543  4530          JMS I   TYTST           /PRINT THE FOLLOWING
3544  7775          -3
3545  7457          ZDST                    /DST
3546  7416          TEST                    /TEST
3547  7423          ZONE                    /1
3550  4770          JMS     DSTREG          /HEADING AND REGISTERS
3551  5742          JMP I   DS1ERR          /EXIT, AC=0.


3565  7000
3566  3600
3567  6525
3570  7106
3571  3315
3572  3316
3573  7773
3574  3450
3575  3314
3576  7263
3577  5603
      3600          PAGE

              /TEST OF THE NORMALIZE INSTRUCTION.

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
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1627  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  1333            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  4541    NMIERR, JMS I   TSTSW2          /CHECK SR 2,
3651  4711            JMS I   SCAST+11                /JUMP TO PRINT ROUTINE,
3652  4537            JMS I   TSTSW0                  /CHECK SR 0,
3653  7402            HLT                     /NORMILIZE FAILED,
3654  4540            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
3665  7040            CMA
3666  0302            AND SCC23               /SC 23
3667  3303            DCA SCASTX      /STORE DECIMAL 23
3670  4531            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
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```
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  4521            JMS I   CRLF2           /2 CR AND LF'S
4002  4326            JMS     NMITPR          /
4003  4450            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  4450            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  4520            JMS I   CRLF            /CR AND LF'
4021  4450            JMS I   UPSPC           /6 SPACES'
4022  7772            -6
4023  1772'           TAD     ACNMIX          /
4024  4771'           JMS     P12BIT          /PRINT 12 BITS'
4025  4450            JMS I   UPSPC           /3 SPACES'
4026  7775            -3
4027  1770'           TAD     MQNMIX          /
4030  4771'           JMS     P12BIT          /PRINT 12 BITS'
4031  4520            JMS I   CRLF            /CR AND LF'
```

```
 032  4767'          JMS     NMIXX           /
+033  4450           JMS I   UPSPC           /3 SPACES,
4034  7775           -3
4035  1766'          TAD     ACNMIN          /
4036  4771'          JMS     P12BIT          /PRINT 12 BITS,
4037  4450           JMS I   UPSPC           /3 SPACES,
4040  7775           -3
4041  1765'          TAD     MQNMIN          /
4042  4771'          JMS     P12BIT          /PRINT 12 BITS,
4043  4520           JMS I   CRLF            /CR AND LF,
4044  4764'          JMS     SCATXX          /
4045  4454           JMS I   U2SPC           /2 SPACES,
4046  1763'          TAD     SCASTX          /
4047  4771'          JMS     P12BIT          /PRINT 12 BITS,
4050  4520           JMS I   CRLF            /CR AND LF,
4051  4762'          JMS     SCAXX           /
4052  4450           JMS I   UPSPC           /3 SPACES,
4053  7775           -3
4054  1761'          TAD     SCAST           /
4055  4771'          JMS     P12BIT          /PRINT 12 BITS,
4056  4520           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
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
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```
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  4522            JMS I   PRXLOP          /PRINT,
4136  1757'           TAD     N+1
4137  4522            JMS I   PRXLOP          /PRINT,
4140  1756'           TAD     N+2
4141  4522            JMS I   PRXLOP          /PRINT,
4142  5732            JMP I PNORM
4143  0000    XNORMT, 0

4144  7240            CLA CMA
4145  0755'           AND N+3
4146  4522            JMS I   PRXLOP          /PRINT,
4147  5743            JMP I XNORMT

4155  5452
4156  5451
4157  5450
4160  5447
4161  3700
4162  5407
4163  3703
4164  5403
4165  3706
4166  3707
4167  5400
4170  3705
4171  7200
4172  3704
4173  0304
4174  5442
4175  0325
4176  5435
4177  5430
      4200            PAGE

4200  5261    NORMT1, JMP HSENM
```

```
 201  4273            JMS GENNMI
 202  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
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
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4267  1331            TAD DEC12
4270  3730            DCA I TST25+13
4271  4531            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
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  4541    NMERR,  JMS I   TSTSW2          /CHECK SR 2.
4334  4732            JMS I   DEC12+1
4335  4537            JMS I   TSTSW0          /CHECK SR 0.
4336  7402            HLT                     /NORMALIZE ERROR.
4337  4540            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.


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 100  5305    NORMT2, JMP HKE          /HOUSE KEEPI
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
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  4540    NMTSI,  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
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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  4531            JMS I   MODSEL          /PERFORM MODE SELECTION,
4512  5201            JMP NORMT2+1

4513  4541  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

4522  4542  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
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 546  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
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 OR'ED 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  1174            TAD [5252           /5252
4642  7421            MQL                 /MQ=5252
4643  1173            TAD     [2525       /AC=2525
4644  7521            SWP                 /SWAP AC AND MQ; AC=5252 & MQ=2525
4645  1173            TAD     [2525       /AC=7777
4646  7040            CMA                 /AC=0000
```

```
4647  7440          SZA
4650  7402          HLT                     /SWP FAILED.
4651  7501          MQA                     /AC=2525
4652  1174          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  1173          TAD     [2525           /AC=2525
4660  7421          MQL                     /MQ=2525
4661  1174          TAD     [5252           /AC=5252
4662  7701          ACL                     /CLA THE AC AND LOAD AC FROM MQ.
4663  1174          TAD     [5252           /AC=7777
4664  7040          CMA                     /AC=0
4665  7440          SZA
4666  7402          HLT                     /ACL FAILED.

                /TEST OF DLD  (CAM DAD).

4667  7431          SWAB                    /B MODE.
4670  7621          CAM                     /AC AND MQ = 0
4671  1173          TAD     [2525           /AC=2525
4672  7421          MQL                     /MQ=2525
4673  1174          TAD     [5252           /AC=5252
4674  7663          DLD                     /EAE DOUBLE PRECISION LOAD.
4675  4677          .+2                     /ADDRESS OF LSH OPERAND.
4676  5301          JMP     .+3             /GO OVER.
4677  5252          5252                    /LSH OPERAND
4700  2525          2525                    /MSH OPERAND
4701  1174          TAD     [5252           /AC=7777
4702  7040          CMA                     /AC=0
4703  7440          SZA
4704  7402          HLT                     /DLD FAILED.
4705  7501          MQA                     /MQ TO AC.
4706  1173          TAD     [2525           /AC=7777
4707  7040          CMA                     /AC=0
4710  7440          SZA
4711  7402          HLT                     /DLD FAILED.

                /TEST OF DDZ  (CAM DST).

4712  7431          SWAB                    /B MODE.
4713  7621          CAM                     /AC AND MQ ARE 0
4714  1173          TAD     [2525           /AC=2525
4715  7421          MQL                     /MQ=2525
4716  7501          MQA                     /AC=2525
4717  3326          DCA     .+7             /LSH=2525
4720  1174          TAD     [5252           /AC=5252
4721  3327          DCA     .+6             /MSH=5252
4722  1174          TAD     [5252           /AC=5252
4723  7665          DDZ                     /EAE DOUBLE PRECISION DEPOSIT ZERO.
4724  4726          .+2                     /OPERAND OF LSH
```

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 '25  5330            JMP     .+3             /GO     '
.726  0000            OPEN                    /LSH
4727  0000            OPEN                    /MSH
4730  7501            MQA                     /MQ ORED WITH AC.
4731  7440            SZA                     /BOTH 0?
4732  7402            HLT                     /NO, AC OR MQ NOT 0.
4733  1326            TAD     .-5             /GET C(LSH)
4734  7440            SZA                     /0?
4735  7402            HLT                     /NO, DDZ FAILED.
4736  1327            TAD     .-7             /GET C(MSH)
4737  7440            SZA                     /0?
4740  7402            HLT                     /DDZ FAILED.  AC DID NOT GET STORED AS 0.

4741  7447            SWBA                    /GO TO A MODE.
4742  4542            JMS I   TSTSW3          /REMAIN IN THIS TEST
4743  5200            JMP     COMTST          /YES, SR3=1
4744  2116            ISZ     COUNT           /DO THIS TEST 4096 TIMES BEFORE EXIT.
4745  5200            JMP     COMTST          /REPEAT THE TESTS UNTIL DONE.
4746  5777/           JMP     E3A             /GO PRINT OR SOMETHING.



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

                      /TEST OF MODE SWITCHING.

5001  7671  MDTST,    SKB                     /SKIP IF MODE B.
5002  7610            SKP CLA                 /
5003  7402            HLT                     /CLEAR KEY FAILED TO SET TO "A" MODE OR SKB FAILED.
5004  7431            SWAB                    /CHANGE TO "B" MODE.
5005  7671            SKB                     /SKIP IF MODE B.
5006  7402            HLT                     /SWAB FAILED TO SET TO MODE B OR SKB FAILED.
5007  7447            SWBA                    /CHANGE TO MODE A.
5010  7671            SKB                     /WAS IT MODE "A"?
5011  7410            SKP                     /YES
5012  7402            HLT                     /SWBA FAILED TO SET TO MODE A.
5013  7431            SWAB                    /B MODE.
5014  6007            CAF                     /INITIALIZE (SET TO MODE A.)
5015  7671            SKB                     /DID MODE "A" GET SET?
5016  7610            SKP CLA                 /YES
5017  7402            HLT                     /CAF FAILED TO SET MODE A.

                      /STEP COUNTER TESTS.

5020  7200  SCL1,     CLA                     /TEST SCL=0
5021  7403            7403                    /SCL
5022  7737            7737                    /SC=0
5023  7441            SCA
5024  7640            CLA SZA
5025  7402  ESCL1,    HLT                     /ERROR; SC NOT=0
5026  7403  SCL2,     7403                    /TEST SCL=01
5027  7776            7776                    /SC=1
```

```
5030  7441          SCA
5031  1227          TAD [-2
5032  7040          CMA
5033  7640          CLA SZA
5034  7402  ESCL2,  HLT             /ERROR: SC NOT=01
5035  7403  SCL3,   7403            /TEST SCL=02
5036  7775          7775            /SC=2
5037  7441          SCA
5040  1236          TAD [-2
5041  7040          CMA
5042  7640          CLA SZA
5043  7402  ESCL3,  HLT             /ERROR: SC NOT=02
5044  7403  SCL4,   7403            /TEST SCL=04
5045  7773          7773            /SC=4
5046  7441          SCA
5047  1245          TAD [-2
5050  7040          CMA
5051  7640          CLA SZA
5052  7402  ESCL4,  HLT             /ERROR: SC NOT = 04
5053  7403  SCL5,   7403            /TEST SCL=10
5054  7767          7767            /SC=10
5055  7441          SCA
5056  1254          TAD [-2
5057  7040          CMA
5060  7640          CLA SZA
5061  7402  ESCL5,  HLT             /ERROR: SC NOT=10
5062  7403  SCL6,   7403            /TEST SCL=20
5063  7757          7757            /SC=20
5064  7441          SCA
5065  1263          TAD [-2
5066  7040          CMA
5067  7640          CLA SZA
5070  7402  ESCL6,  HLT             /ERROR: SC NOT=20

5071  7403  SCL7,   7403            /TEST SCL=12
5072  7765          7765            /SC=12
5073  7441          SCA
5074  1272          TAD [-2
5075  7040          CMA
5076  7640          CLA SZA
5077  7402  ESCL7,  HLT             /ERROR: SC NOT=12
5100  7403  SCL8,   7403            /TEST SCL=25
5101  7752          7752
5102  7441          SCA
5103  1301          TAD [-2
5104  7040          CMA
5105  7640          CLA SZA
5106  7402  ESCL8,  HLT             /ERROR: SC NOT=25
5107  7403  SCL9,   7403            /TEST SCL=0
5110  0077          0077            /SC=0
5111  7441          SCA
5112  7640          CLA SZA
5113  7402  ESCL9,  HLT             /ERROR: SC NOT=0
5114  7403  SCL10,  7403            /TEST SCL=37
```

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                .15  7700          7700
                5116  7441         SCA
                5117  1117         TAD K7740
                5120  7040         CMA
                5121  7640         CLA SZA
                5122  7402   ESCL10, HLT              /ERROR; SC NOT 37

                5123  7403   SCL11,  SCL              /LOAD THE SC WITH
                5124  7777         7777              /0000
                5125  7240         CLA CMA           /7777
                5126  7441         SCA               /SC  TO AC
                5127  7040         CMA
                5130  7440         SZA
                5131  7402   ESCL11, HLT              /SC DID NOT "OR" WITH AC.

                5132  7403   SCL12,  SCL              /LOAD SC WITH
                5133  7752         7752              /25
                5134  7200         CLA
                5135  1333         TAD     .+2
                5136  7441         SCA               /SC TO AC
                5137  7040         CMA
                5140  7440         SZA
                5141  7402   ESCL12, HLT              /SC DID NOT "OR" WITH THE AC.

                5142  7403   SCL13,  SCL              /LOOAD THE SC
                5143  7765         7765              /WITH 12.
                5144  7200         CLA
                5145  1343         TAD     .+2
                5146  7441         SCA               /SC TO AC
                5147  7040         CMA
                5150  7440         SZA               /
                5151  7402   ESCL13, HLT              /SC DID NOT "OR" WITH THE AC.

                      /TEST OF THE ACS INSTRUCTION.

                5152  7431   ACS1,   SWAB             /CHANGE TO MODE B
                5153  7360         CLA CMA CLL CML   /AC=7777 L=1
                5154  7403         ACS               /AC TO SC
                5155  7430         SZL
                5156  7440         SZA
                5157  7402         HLT               /ACS CLEARED THE LINK OR ACS FAILED      — AC = 7777  L=1
                                                     /TO CLEAR THE AC.
                5160  7441         SCA               /SC TO AC
                5161  1117         TAD     K7740
                5162  7040         CMA
                5163  7440         SZA
                5164  7402         HLT               /ACS FAILED TO LOAD THE STEP COUNTER WITH 37.   AC = 40  L=0

                5165  7320   ACS2,   CLA CML CLL      /AC=0, L=1.
                5166  1117         TAD     K7740
                5167  7403         ACS               /AC TO SC
                5170  7430         SZL
                5171  7440         SZA
                5172  7402         HLT               /ACS CLEARRED LINK OR ACS FAILED TO CLEAR AC.   AC=7740  L=1
                5173  7441         SCA               /SC TO AC
```

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5174  7440          SZA                 /
5175  7402          HLT                 /ACS FAILED TO LOAD THE STEP COUNTER WITH 0.
5176  5777'         JMP     GTTST1      /GO TO THE GT FLAG TEST.

5177  5200
      5200          PAGE

                /TEST OF THE GT FLAG.

5200  7431    GTTST1, SWAB                        /B MODE.
5201  7300          CLA CLL
5202  4550          JMS I   RTFX                /RESTORE FLAGS, WE'RE ONLY CONCERNED WITH THE GT.
5203  6004          GTF                         /GET THE FLAGS.
5204  0377          AND     (2000               /SAVE THE GT FLAG.
5205  7006          RTL                         /PUT THE GT FLAG INTO THE LINK.
5206  7430          SZL                         /GT A 1?
5207  7402          HLT                         /YES, RTF FAILED TO RESET GT OR
                                                  /GTF FAILED TO GET IT.
5210  7431    GTTST2, SWAB                        /B MODE.
5211  7332          CLA CLL CML RTR             /2000
5212  4550          JMS I   RTFX                /RESTORE FLAGS, SET GT TO A 1.
5213  6004          GTF                         /GET THE FLAGS.
5214  0377          AND (2000                   /SAVE ONLY THE GT FLAG.
5215  7006          RTL                         /PUT IT IN THE LINK TO CHECK.
5216  7420          SNL                         /LINK A ZERO INDICATING GT WAS A 0?
5217  7402          HLT                         /YES, RTF FAILED TO SET GT OR GTF
                                                  /FAILED TO GET IT.
5220  7431    GTTST3, SWAB                        /B MODE.
5221  7300          CLA CLL
5222  4550          JMS I   RTFX                /RESTORE THE FLAGS.
5223  6006          SGT                         /GT FLAG = 0?
5224  7410          SKP                         /YES, OK
5225  7402          HLT                         /SGT SKIPPED ON NO GT FLAG.

5226  7431    GTTST4, SWAB                        /MODE B.
5227  7332          CLA CLL CML RTR             /2000
5230  4550          JMS I   RTFX                /RESTORE THE FLAGS.
5231  6006          SGT                         /GT FLAG = 1?
5232  7402          HLT                         /SGT DID NOT SKIP WITH GT = 1

5233  7431    GTTST5, SWAB                        /MODE B.
5234  7332          CLA CLL CML RTR             /2000
5235  4550          JMS I   RTFX                /RESTORE THE FLAGS.
5236  7447          SWBA                        /GO TO A MODE.
5237  6006          SGT                         /GT FLAG SET?
5240  7610          SKP CLA                     /NO, OK
5241  7402          HLT                         /SWBA FAILED TO CLEAR THE GT FLAG.
5242  4542          JMS I   TSTSW3              /REMAIN IN THIS TEST?
5243  5776'         JMP     MDTST               /YES, SR3=1
5244  2116          ISZ     COUNT               /FINISHED TEST 4096 TIMES.
5245  5776'         JMP     MDTST               /REPEAT INITIAL TESTS
5246  6007          CAF                         /CLEAR AND SET TO MODE "A".
5247  5775'         JMP     MQLT                /EXIT INITIAL TESTS.

                /END OF TEST PRINT-OUT ROUTINE.
```

```
5250  4520    E3A,    JMS I   CRLF           /CR AND LF',
5251  1114            TAD     MODE           /GET THE MODE', 0="A"; 7777="B",
5252  7650            SNA CLA                /WHICH MODE?
5253  5256            JMP     .+3            /A MODE SO DON'T PRINT',
5254  4447            JMS I   XTYPST         /TYPE A MESSAGE
5255  7510            KE8SP1                 /"KE8 1"
5256  1114            TAD     MODE           /GET MODE
5257  7140            CMA CLL                /CHANGE IT TO THE OPPOSITE MODE',
5260  3114            DCA     MODE           /RESET MODE',
5261  6007            CAF                    /INITIALIZE
5262  5774'           JMP     MQLT+1         /START FROM THE BEGINNING

                /ROUTINE TO SELECT MODE',

5263  0000    MDSEL,  OPEN
5264  7604            LAS                    /READ THE SWITCHES',
5265  7112            CLL     RTR            /SR10 TO LINK; SR11 TO AC0',
5266  7430            SZL                    /SR 10 SET?
5267  5300            JMP     S10SET         /YES',
5270  7200            CLA
5271  1114            TAD     MODE           /GET MODE
5272  7640            SZA CLA                /WHICH MODE?
5273  5276            JMP     .+3            /"B" MODE
5274  7447            SWBA                   /SET TO "A" MODE
5275  5663            JMP I   MDSEL          /EXIT SET TO "A" MODE',
5276  7431            SWAB                   /SET TO "B" MODE
5277  5663            JMP I   MDSEL          /EXIT SET TO "B" MODE',
5300  7710    S10SET, SPA CLA                /SR11=0?
5301  5304            JMP     .+3            /NO, SR11=1, SO SELECT MODE "B",
5302  3114            DCA     MODE           /SELECT MODE "A"
5303  5270            JMP     MDSEL+5        /EXIT',
5304  7140            CLL CMA                /7777 IN ORDER TO SELECT "B" MODE',
5305  5302            JMP     .-3            /EXIT',

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

5306  0000    UONLYB, OPEN
5307  7200            CLA
5310  1114            TAD     MODE
5311  7700            SMA CLA
5312  5773'           JMP     GEN+3
5313  5706            JMP I   UONLYB

                /ROUTINE TO CHECK SR0',

5314  0000    SW0TST, OPEN
5315  7604            LAS
5316  7710            SPA CLA
5317  5714            JMP I   SW0TST
5320  2314            ISZ     SW0TST
5321  5714            JMP I   SW0TST

                /ROUTINE TO CHECK SR1',
```

```
5322  0000    SW1TST, OPEN
5323  7604            LAS
5324  7004            RAL
5325  7710            SPA CLA
5326  5722            JMP I   SW1TST
5327  2322            ISZ     SW1TST
5330  5722            JMP I   SW1TST

                /ROUTINE TO CHECK SR2.

5331  0000    SW2TST, OPEN
5332  7604            LAS
5333  7106            RTL CLL
5334  7710            SPA CLA
5335  5731            JMP I   SW2TST
5336  2331            ISZ     SW2TST
5337  5731            JMP I   SW2TST

                /ROUTINE TO CHECK SR3.

5340  0000    SW3TST, OPEN
5341  7604            LAS
5342  7106            RTL CLL
5343  7104            RAL CLL
5344  7710            SPA CLA
5345  5740            JMP I   SW3TST
5346  2340            ISZ     SW3TST
5347  5740            JMP I   SW3TST


                /ROUTINE TO SAVE REGISTERS.

5350  0000    USVREG, OPEN
5351  3033            DCA     ACTOCK          /SAVE AC
5352  7701            CLA     MQA
5353  3034            DCA     MQTOCK          /SAVE MQ
5354  7210            CLA     RAR
5355  3032            DCA     LKTOCK          /SAVE LINK
5356  7641            CLA     SCA
5357  3035            DCA     SCTOCK          /SAVE STEP COUNTER
5360  6004            GTF
5361  0377            AND     (2000
5362  7104            CLL     RAL
5363  3036            DCA     GTTOCK          /SAVE GTFLAG
5364  5750            JMP I   USVREG          /EXIT, AC=0

5373  5603
5374  0202
5375  0203
5376  5001
5377  2000
      5400            PAGE

5400  0000    NMIXX,  0
5401  4777/           JMS PNORM
```

```
 402  5600            JMP I NMIXX

5403  0000  SCATXX,  0
5404  4212            JMS PSTEP
5405  4223            JMS PSTEPT
5406  5603            JMP I SCATXX

5407  0000  SCAXX,   0
5410  4212            JMS PSTEP
5411  5607            JMP I SCAXX

5412  0000  PSTEP,   0
5413  7240            CLA CMA
5414  0253            AND N+4
5415  4522            JMS I   PRXLOP          /PRINT,
5416  1254            TAD     N+5
5417  4522            JMS I   PRXLOP          /PRINT,
5420  1255            TAD     N+6
5421  4522            JMS I   PRXLOP          /PRINT,
5422  5612            JMP I PSTEP

5423  0000  PSTEPT, 0
5424  7240            CLA CMA
5425  0252            AND N+3
5426  4522            JMS I   PRXLOP          /PRINT,
5427  5623            JMP I PSTEPT

5430  0000  PC,      OPEN
5431  7200            CLA
5432  1076            TAD     C
5433  4522            JMS I   PRXLOP
5434  5630            JMP I   PC              /EXIT,

5435  0000  LPAR,    OPEN
5436  7200            CLA
5437  1376            TAD     (0250   /
5440  4522            JMS I   PRXLOP
5441  5635            JMP I   LPAR            /EXIT,

5442  0000  RPAR,    OPEN
5443  7200            CLA
5444  1375            TAD     (251
5445  4522            JMS I   PRXLOP
5446  5642            JMP I   RPAR            /EXIT,


5447  0316  N,       0316    /N
5450  0315            0315    /M
5451  0311            0311    /I
5452  0324            0324    /T
5453  0323            0323    /S
5454  0303            0303    /C
5455  0301            0301    /A

                /ROUTINE TO LOAD THE STEP COUNTER.
```

```
5456  0000  ULDSC,  OPEN
5457  1114          TAD     MODE
5460  7640          SZA CLA
5461  5270          JMP     LDSC1
5462  1023          TAD     TOSHIF
5463  7040          CMA
5464  3266          DCA     .+2
5465  7403          SCL
5466  0000          OPEN
5467  5656          JMP I   ULDSC
5470  1023  LDSC1,  TAD     TOSHIF
5471  7403          ACS
5472  5656          JMP I   ULDSC

                    /ROUTINE TO SET COMPARE ROUTINE AND DO OTHER JOBS.

5473  0000  SCOMP,  OPEN
5474  7300          CLA CLL
5475  4550          JMS I   RTFX            /CLEAR THE GT
5476  1172          TAD     CLSIM
5477  3774/         DCA     C1
5500  1171          TAD     CLKTOCK
5501  3773/         DCA     C2
5502  3020          DCA     TOLINK
5503  3772/         DCA     WILCHG          /MAKE "WILCHG" EFFECTIVLY AN AND 0
                                            /WHICH IS REALLY A DO NOTHING INSTRUCTION.
5504  3771/         DCA     PRCHG           /MAKE "PRCHG" EFFECTIVLY AN AND 0
                                            /WHICH IS REALLY A DO NOTHING INSTRUCTION.
5505  4452          JMS I   UMOVE
5506  0020          TOLINK
5507  0021          TOAC
5510  7753          -25
5511  5673          JMP I   SCOMP           /EXIT, AC=0, L=0.


                    /ROUTINE FOR DPSZ PRINTOUT

5512  0000  DPSZPR, OPEN
5513  4521          JMS I   CRLF2           /2 CR AND LF.
5514  4447          JMS I   XTYPST
5515  0000  DPZPR1, OPEN
5516  5712          JMP I   DPSZPR          /EXIT.


5571  7002
5572  7016
5573  6360
5574  6357
5575  0251
5576  0250
5577  4132
      5600          PAGE

                    /UP-COUNT GENERATOR
```

```
 5600  0000  GEN,   0
 5601  2004         ISZ GENX
 5602  5600         JMP I GEN
 5603  7604         CLA OSR          /TEST SW 3
 5604  7106         RTL CLL
 5605  7006         RTL
 5606  7630         SZL CLA
 5607  5455         JMP I BACK
 5610  5456         JMP I NEXT

              /ROUTINE TO DO A CR AND LF.

 5611  0000  UCRLF, OPEN
 5612  7240         CLA CMA
 5613  0067         AND CR                    /CR
 5614  4522         JMS I   PRXLOP            /PRINT.
 5615  1070         TAD     LF                /"LINE FEED".
 5616  4522         JMS I   PRXLOP            /PRINT.
 5617  5611         JMP I   UCRLF             /EXIT.

              /ROUTINE TO DO 2 CR AND LF.

 5620  0000  UCRLF2, OPEN
 5621  4520         JMS I   CRLF
 5622  4520         JMS I   CRLF
 5623  5620         JMP I   UCRLF2            /EXIT, AC = 0.

 5624  0000  RXLOP,  0
 5625  6046         TLS               /PRINT LOOP
 5626  6041         TSF
 5627  5226         JMP .-1
 5630  7200         CLA
 5631  5624         JMP I RXLOP

 5632  0000  UPLINK, 0
 5633  7240         CLA CMA
 5634  0101         AND LINK                  /LINK
 5635  4237         JMS UONZER
 5636  5632         JMP I UPLINK

 5637  0000  UONZER, 0
 5640  7440         SZA
 5641  5244         JMP UONEP                 /PRINT ONE
 5642  4250         JMS UZEROR                /PRINT ZERO
 5643  5637         JMP I UONZER

 5644  7240  UONEP,  CLA CMA          /ONE
 5645  0077         AND ONE
 5646  4522         JMS I   PRXLOP            /PRINT.
 5647  5637         JMP I UONZER

 5650  0000  UZEROR, 0
 5651  7240         CLA CMA
 5652  0100         AND ZERO                  /ZERO
```

```
5653  4522          JMS I   PRXLOP          /PRINT,
5654  5650          JMP I UZERROR

5655  0000  UMESSG, OPEN
5656  7240          CLA CMA
5657  0103          AND COUNTX
5660  3104          DCA STRCNT
5661  2104          ISZ STRCNT
5662  7410          SKP
5663  5655          JMP I   UMESSG          /EXIT,
5664  7240          CLA CMA
5665  0105          AND BITSTR
5666  7100          CLL
5667  7004          RAL
5670  3105          DCA BITSTR
5671  7430          SZL
5672  5275          JMP UPRONE
5673  4250          JMS UZERROR
5674  5261          JMP .-13

5675  7240  UPRONE, CLA CMA
5676  0077          AND ONE                 /ONE
5677  4522          JMS I   PRXLOP          /PRINT,
5700  5261          JMP     UMESSG+4                ;

5701  0000  UTYTST, OPEN
5702  4521          JMS I   CRLF2           /CR AND LF,
5703  1701          TAD I   UTYTST          /OBTAIN NUMBER OF WORDS
5704  3115          DCA     ANYUSE          /SAVE FOR DURATION OF THIS ROUTINE.
5705  2301          ISZ     UTYTST          /SET UP TO GET NEXT WORD.
5706  1701          TAD I   UTYTST          /GET THE WORD.
5707  3311          DCA     .+2             /STASH IT AWAY.
5710  4447          JMS I   XTYPST          /NOW PRINT THE WORD JUST STASHED AWAY.
5711  0000          OPEN                    /WORD TO BE PRINTED.
5712  4454          JMS I   U2SPC           /2 SPACES.
5713  2115          ISZ     ANYUSE          /DONE ALL THE WORDS SET UP FOR?
5714  5305          JMP     .-7             /NO, REPEAT.
5715  4453          JMS I   U1SPC           /YES,  1 SPACE.
5716  2301          ISZ     UTYTST          /SET UP FOR EXIT.
5717  5701          JMP I   UTYTST          /EXIT THIS ROUTINE.  AC EQUALS ZERO.

5720  0000  UPIBIT, OPEN
5721  3101          DCA     LINK
5722  4523          JMS I   PLINK
5723  5720          JMP I   UPIBIT          /EXIT.

                    /ROUTINE TO LOAD REGISTERS WITH RANDOM DATA.

5724  0000  RANDAT, OPEN
5725  4544          JMS I   RANDOM          /GET RANDOM DATA.
5726  3021          DCA     TOAC            /SAVE FOR THE AC
5727  7010          RAR                     /LINK TO AC0
5730  3020          DCA     TOLINK          /SAVE FOR THE LINK
5731  4544          JMS I   RANDOM          /GET RANDOM DATA
```

```
5732  3022          DCA     TOMQ            /SA   'OR THE MQ
5733  7010          RAR                     /LI.  .O AC0
5734  3024          DCA     TOGT            /SAVE FOR THE GT
5735  4544          JMS I   RANDOM          /GET RANDOM DATA
5736  0170          AND     C37             /KEEP AC 7-11
5737  3023          DCA     TOSHIF          /SAVE FOR THE STEP COUNTER
5740  2113          ISZ     SCOUNT
5741  5724          JMP I   RANDAT
5742  5203          JMP     GEN+3

                /ROUTINE TO LOAD MQ, GT, AND LINK.

5743  0000    ULDREG, OPEN
5744  7300          CLA CLL
5745  1022          TAD     TOMQ
5746  7421          MQL                     /MQ LOADED.
5747  4547          JMS I   LDGT            /LOAD THE GT
5750  1020          TAD     TOLINK
5751  7104          CLL     RAL             /LINK LOADED.
5752  5743          JMP I   ULDREG

                /ROUTINE TO LOAD THE GT.

5753  0000    ULDGT,  OPEN
5754  7200          CLA
5755  1024          TAD     TOGT            /GET THE GT DATA
5756  7110          CLL RAR                 /MOVE TO AC1
5757  4550          JMS I   RTFX            /NOW LOAD
5760  5753          JMP I   ULDGT           /EXIT

      6000          PAGE

                /SUBROUTINE TO LOAD GT.

6000  0000    XRTF,   OPEN
6001  3115          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  1115          TAD     ANYUSE          /GT DATA IN AC ALONG WITH IF AND DF.
6007  6005          RTF                     /RESTORE THE FLAGS.
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  7300          CLA CLL
6015  1021          TAD     TOAC            /GET ORIGINAL AC
6016  7041          CMA IAC                 /NEGATE IT.
```

```
6017  1022          TAD     TOMQ            /ADD ORIGINAL MQ TO IT
6020  3042          DCA     MSH             /SAVE AS MQ = AC.
6021  1022          TAD     TOMQ            /BRING BACK THE ORIGINAL MQ.
6022  3043          DCA     LSH             /AND SAVE IT.
6023  7010          RAR                     /GET LINK INTO AC0.
6024  3041          DCA     LSIM            /SAVE IT.
6025  1021          TAD     TOAC            /GET ORGINAL AC.
6026  0167          AND     [4000           /SAVE THE SIGN BIT ONLY
6027  1022          TAD     TOMQ            /ADD ORIGINAL MQ TO IT.
6030  7710          SPA CLA                 /AC0 = 1?
6031  5245          JMP     BODIFF          /YES,  AC AND MQ HAD DIFFERENT SIGNS.
6032  1021          TAD     TOAC            /NO, SAME SIGNS.  GET ORIGINAL AC
6033  0166          AND     [3777           /KILL THE SIGN BIT
6034  7041          CIA                     /NEGATE IT
6035  3037          DCA     TEMPA           /SAVE FOR A MOMENT
6036  1022          TAD     TOMQ            /ORIGINAL MQ TO AC
6037  0166          AND     [3777           /KILL THE SIGN BIT
6040  1037          TAD     TEMPA           /NOW ADD THE UNSIGNED 2'S COMPLEMENT OF THE AC TO IT.
6041  7040          CMA                     /COMPLEMENT = (ONLY FOR BIT 0)
6042  0167          AND     [4000           /SAVE BIT 0 =
6043  3045          DCA     GTSIM           /AS THE SIMULATED GT FLAG
6044  5613          JMP I   SAMSIM          /EXIT,  AC = 0.
6045  1021  BODIFF, TAD     TOAC            /GET ORIGINAL AC
6046  0167          AND     [4000           /SAVE THE SIGN BIT
6047  3045          DCA     GTSIM           /AS THE GT FLAG.
6050  5613          JMP I   SAMSIM          /EXIT,  AC = 0.
```

/ROUTINE TO SIMULATE THE SHIFT LEFT INSTRUCTION.

```
6051  0000  SHLSIM, OPEN                    /DOUBLE PRECISION SHIFT LEFT.
6052  3044          DCA     SCSIM           /SAVE THE NUMBER OF SHIFTS TO BE PERFORMED.
6053  1021          TAD     TOAC            /GET ORIGINAL AC
6054  3042          DCA     MSH             /MOST SIGNIFICANT HALF
6055  1022          TAD     TOMQ            /GET ORIGINAL MQ
6056  3043          DCA     LSH             /LEAST SIGNIFICANT HALF
6057  1024          TAD     TOGT            /GET ORIGINAL GT
6060  0114          AND     MODE            /"AND" THE MODE
6061  3045          DCA     GTSIM           /SAVE AS THE SIMULATED GT.
6062  1044          TAD     SCSIM           /GET STEP COUNTER DATA
6063  1377          TAD     (32             /ADD 32.
6064  7710          SPA CLA                 /IF MORE THAN 31 SHIFTS THE RESULTS ARE PREDICTABLE
6065  5307          JMP     SHLO31          /GO TO ROUTINE FOR MORE THAN 31 SHIFTS.
6066  1044          TAD     SCSIM           /GET STEP COUNTER DATA.
6067  7650          SNA CLA                 /IF 0 SHIFTS THE RESULTS ARE PREDICTABLE
6070  5313          JMP     SHIFT0          /GO TO ROUTINE FOR 0 SHIFTS
6071  1043          TAD     LSH             /GET CONTENTS OF LSH
6072  7104          CLL RAL                 /SHIFT LEFT
6073  3043          DCA     LSH             /SAVE THE SHIFTED DATA.
6074  1042          TAD     MSH             /GET CONTENTS OF MSH
6075  7004          RAL                     /SHIFT LEFT.
6076  3042  SHLA,   DCA     MSH             /SAVE THE SHIFTED DATA.
6077  2044          ISZ     SCSIM           /DONE NECESSARY SHIFTS?
```

```
6100  5271          JMP     .+7             /NO
6101  7210          CLA RAR                 /MOV. LINK INTO ACØ.
6102  3041          DCA     LSIM            /SAVE AS SIMULATED LINK
6103  1114          TAD     MODE            /MODE IN AC. 7777=B, 0000=A.
6104  0170          AND     C37             /"AND" WITH A 37
6105  3044          DCA     SCSIM           /SAVE AS SIMULATED SC.
6106  5651          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  3044          DCA     SCSIM           /SCSIM SO AN IMMEDIATE EXIT TAKES PLACE
6111  3043          DCA     LSH             /Ø TO LSH
6112  5276          JMP     SHLA            /CONTINUE IN MAIN BODY.

6113  1020  SHIFTØ, TAD     TOLINK          /GET ORIGINAL LINK
6114  3041          DCA     LSIM            /SAVE AS SIMULATED LINK
6115  1170          TAD     C37             /37
6116  3044          DCA     SCSIM           /SAVE AS SIMULATED SC.
6117  5651          JMP I   SHLSIM          /EXIT, AC=Ø.

                    /ROUTINE TO SIMULATE THE LOGICAL SHIFT RIGHT INSTRUCTION.

6120  0000  LSRSIM, OPEN                    /DOUBLE PRECISION LOGICAL SHIFT RIGHT
6121  3044          DCA     SCSIM           /SAVE THE NUMBER OF SHIFTS TO BE PERFORMED.
6122  1044          TAD     SCSIM           /GET SHIFT DATA.
6123  1165          TAD     C31             /ADD 31 TO IT
6124  7710          SPA CLA                 /IF MORE THAN 30 SHIFTS THE RESULTS ARE PREDICTABLE.
6125  5360          JMP     LSRO30          /GO TO ROUTINE FOR MORE THAN 30 SHIFTS.
6126  1021          TAD     TOAC            /GET ORIGINAL AC.
6127  3042          DCA     MSH             /STORE IN MSH
6130  1022          TAD     TOMQ            /GET ORIGINAL MQ.
6131  3043          DCA     LSH             /STORE IN LSH
6132  1044          TAD     SCSIM           /GET SHIFT DATA
6133  7650          SNA CLA                 /IF Ø SHIFTS, THE RESULTS ARE PREDICTABLE.
6134  5355          JMP     LSRØSH+4        /JUST DO THE NECESSARY AND EXIT.
6135  1042  LSHIFT, TAD     MSH             /GET CONTENTS OF MSH
6136  7110          CLL     RAR             /SHIFT RIGHT
6137  3042          DCA     MSH             /SAVE THE SHIFTED DATA
6140  1043          TAD     LSH             /GET CONTENTS OF LSH
6141  7010          RAR                     /SHIFT RIGHT ONE.
6142  3043  LSRA,   DCA     LSH             /SAVE SHIFTED DATA
6143  2044          ISZ     SCSIM           /DONE NECESSARY SHIFTS?
6144  5335          JMP     LSHIFT          /NO, REPEAT
6145  3041  SEXIT,  DCA     LSIM            /SAVE SIMULATED LINK
6146  7210          CLA     RAR
6147  0114          AND     MODE
6150  3045          DCA     GTSIM           /SAVE SIMULATED GT
6151  1170  LSRØSH, TAD     C37             /37
6152  0114          AND     MODE            /"AND" MODE.
6153  3044          DCA     SCSIM           /SAVE AS SIMULATED SC.
6154  5720          JMP I   LSRSIM          /EXIT, AC=Ø.
6155  1024          TAD     TOGT            /
6156  3045          DCA     GTSIM           /GT REMAINS SAME ON Ø SHIFTS.
6157  5351          JMP     LSRØSH          /CONTINUE IN MAIN BODY.
```

```
6160  7340    LSRO30, CLA CLL CMA
6161  3044            DCA     SCSIM
6162  3042            DCA     MSH
6163  5342            JMP     LSRA

6177  0032
      6200            PAGE


                /ROUTINE TO SIMULATE THE ARITHMETIC SHIFT RIGHT INSTRUCTION.

6200  0000    ASRSIM, OPEN
6201  3044            DCA     SCSIM           /SAVE THE NUMBER OF SHIFTS TO BE PERFORMED.
6202  1021            TAD     TOAC            /GET ORIGINAL AC
6203  3042            DCA     MSH             /MOST SIGNIFICANT HALF.
6204  1022            TAD     TOMQ            /GET ORIGINAL MQ.
6205  3043            DCA     LSH             /LEAST SIGNIFICANT HALF.
6206  1044            TAD     SCSIM           /GET SHIFT DATA
6207  7650            SNA CLA                 /IF 0 SHIFTS THE RESULTS ARE PREDICTABLE
6210  5242            JMP     ASRØSH          /JUST DO THE NECESSARY AND EXIT.
6211  1044            TAD     SCSIM           /GET SHIFT DATA
6212  1165            TAD     [31]            /31
6213  7710            SPA CLA                 /IF MORE THAN 30 SHIFTS, THE RESULTS ARE PREDICTABLE.
6214  5250            JMP     ASRO30          /GO TO ROUTINE FOR MORE THAN 30 SHIFTS
6215  1042    SASR1,  TAD     MSH             /GET MSH
6216  7100            CLL                     /CLEAR THE LINK
6217  7510            SPA                     /AC0=1?
6220  7020            CML                     /YES, SET LINK
6221  7010            RAR                     /SHIFT RIGHT
6222  3042            DCA     MSH             /SAVE SHIFTED DATA
6223  1043            TAD     LSH             /GET LSH
6224  7010            RAR                     /SHIFT RIGHT
6225  3043            DCA     LSH             /SAVE SHIFTED DATA
6226  2044            ISZ     SCSIM           /DONE NECESSARY SHIFTS?
6227  5215            JMP     SASR1           /NO, REPEAT
6230  7210    SASR1A, CLA     RAR             /LINK TO AC0
6231  0114            AND     MODE
6232  3045    SASR2,  DCA     GTSIM           /SAVE AS SIMULATED GT
6233  1042            TAD     MSH             /GET MSH
6234  0167            AND     [4000           /KEEP AC0
6235  3041            DCA     LSIM            /SAVE AS SIMULATED LINK
6236  1170    SASR3,  TAD     [37]            /37
6237  0114            AND     MODE            /"AND" MODE "A"=0, "B"=7777
6240  3044            DCA     SCSIM           /SAVE AS SIMULATED SC
6241  5600            JMP I   ASRSIM          /EXIT, AC=0
6242  1021    ASRØSH, TAD     TOAC            /GET ORIGINAL AC
6243  0167            AND     [4000           /KEEP AC0 ONLY
6244  3041            DCA     LSIM            /SAVE AS SIMULATED LINK
6245  1024            TAD     TOGT            /GET ORIGINAL GT
6246  3045            DCA     GTSIM           /SAVE AS SIMULATED GT
6247  5236            JMP     SASR3           /CONTINUE IN MAIN BODY

6250  1042    ASRO30, TAD     MSH             /GET MSH
6251  0167            AND     [4000           /KEEP AC0
6252  7104            CLL RAL                 /PUT INTO LINK
```

```
 253 7620            SNL CLA                /LIN   ) INDICATING AC0=1
 254 5262            JMP     .+6            /NO,   0 WAS A 0
6255 7040            CMA                    /YES, SET AC=7777
6256 3043            DCA     LSH            /SAVE AS SIMULATED MQ
6257 7040            CMA                    /7777
6260 3042            DCA     MSH            /SAVE AS SIMULATED AC
6261 5230            JMP     SASR1A         /CONTINUE IN MAIN BODY
6262 3043            DCA     LSH            /SAVE AS SIMULATED MQ
6263 5260            JMP     .-3            /SET SIMULATED AC

                /ROUTINE TO SIMULATE THE DOUBLE PRECISION INCREMENT INSTRUCTION.

6264 0000    DPISIM, OPEN                   /SIMULATE DPI INSTRUCTION.
6265 1022            TAD     TOMQ           /GET WHAT WAS LOADED INTO THE MQ
6266 7101            CLL     IAC            /INCREMENT IT
6267 3043            DCA     LSH            /SAVE IT AS "SIMULATED MQ"
6270 7004            RAL                    /LINK TO AC11; AC0 TO LINK.
6271 1021            TAD     TOAC           /ADD WHAT WAS LOADED INTO THE AC
6272 3042            DCA     MSH            /STORE IT AS "SIMULATED AC"
6273 7010            RAR                    /PUT LINK INTO AC0
6274 3041            DCA     LSIM           /STORE IT AS "SIMULATED LINK"
6275 1024            TAD     TOGT           /GET PROBLEM GT
6276 3045            DCA     GTSIM          /STORE IN SIMULATED GT ALSO
6277 1023            TAD     TOSHIF         /GET PROBLEM STEP COUNTER
6300 3044            DCA     SCSIM          /STORE IN SIMULATED SC.
6301 5664            JMP I   DPISIM         /EXIT,  AC AND LINK=0

                /ROUTINE TO SIMULATE THE DOUBLE PRECISION COMPLEMENT INSTRUCTION.

6302 0000    DCMSIM, OPEN                   /DOUBLE PRECISION 2'S COMPLEMENT SIMULATOR.
6303 7300            CLA CLL                /CLEAR
6304 1022            TAD     TOMQ           /GET WHAT WAS LOADED INTO THE MQ
6305 7041            CMA     IAC            /2'S COMPLEMENT IT
6306 3043            DCA     LSH            /SAVE AS SIM MQ
6307 1021            TAD     TOAC           /GET WHAT WAS LOADED INTO THE AC
6310 7040            CMA                    /1'S COMPLEMENTIT
6311 3042            DCA     MSH            /SAVE IT
6312 7004            RAL                    /GET THE CARRY FROM 2'S COMPLEMENT OF MQ
6313 1042            TAD     MSH            /ADD 1'S COMPLEMENT OF AC
6314 3042            DCA     MSH            /STORE AS 2'S COMPLEMENT OF AC
6315 7010            RAR                    /GET LINK
6316 3041            DCA     LSIM           /SAVE IT.
6317 5702            JMP I   DCMSIM         /EXIT, AC=0

                /ROUTINE TO SIMULATE THE DOUBLE PRECISION ADD INSTRUCTION

6320 0000    DADSIM, OPEN                   /DOUBLE PRECISION ADD ROUTINE.
6321 7300            CLA CLL                /CLEAR
6322 1022            TAD     TOMQ           /GET ORIGINAL MQ
6323 1024            TAD     TOGT           /ADD ORIGINAL DATA IN "LEAST SIGNIFICANT"
6324 3043            DCA     LSH            /SAVE THE DATA
6325 7204            CLA RAL                /LINK TO AC 11
6326 1021            TAD     TOAC           /ADD ORIGINAL AC TO IT
6327 1023            TAD     TOSHIF         /ADD ORIGINAL DATA IN "MOST SIGNIFICANT" TO IT.
```

```
6330  3042          DCA     MSH             /SAVE THE DATA,
6331  7010          RAR                     /LINK TO AC 0
6332  3041          DCA     LSIM            /SAVE AS SIMULATED LINK,
6333  5720          JMP I   DADSIM          /EXIT, AC=LINK=0,


                    /ROUTINE TO COMPARE THE CONTENTS OF 2 LOCATIONS,

6334  0000  COMP,   OPEN
6335  1734          TAD I   COMP            /GET AND STORE NUMBER OF
6336  3363          DCA     CMPCTR          /WORDS TO COMPARE,
6337  2334          ISZ     COMP
6340  1357          TAD     C1              /ADDRESS IN C1
6341  3361          DCA     C1A             /C1A,
6342  1360          TAD     C2              /ADDRESS IN C2
6343  3362          DCA     C2A             /TO C2A,
6344  1761  COMPA,  TAD I   C1A             /GET "GOOD" WORD
6345  7041          CIA                     /2'S COMPLEMENT IT
6346  1762          TAD I   C2A             /ADD RESULT WORD,
6347  7640          SZA     CLA             /RESULT ZERO?
6350  5734          JMP I   COMP            /NO, EXIT AC=0
6351  2361          ISZ     C1A             /YES, SET
6352  2362          ISZ     C2A             /FOR NEXT COMPARE
6353  2363          ISZ     CMPCTR          /DONE COMPARING
6354  5344          JMP     COMPA           /NO,
6355  2334          ISZ     COMP            /YES
6356  5734          JMP I   COMP            /EXIT, AC=0
6357  0000  C1,     OPEN                    /CONTAINS ADDRESS OF "GOOD"
6360  0000  C2,     OPEN                    /CONTAINS ADDRESS OF DATA TO BE COMPARED
6361  0000  C1A,    OPEN                    /WILL CONTAIN "GOOD" DATA
6362  0000  C2A,    OPEN                    /WILL CONTAIN DATA TO BE COMPARED
6363  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 PDDR
6404  2200          ISZ     MOVE
6405  1600          TAD I   MOVE            /GET "TO ADDR" AND
6406  3224          DCA     TADDR           /STORE AT PDDR
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,
```

```
 422  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     ADDRZA
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  4522            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    ADDRZA, 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
```

```
 562  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 "@"
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  4522          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  4447          JMS I   XTYPST          /SPACE ONCE
6675  6701          .+4
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  1114          TAD     MODE
6707  7040          CMA
6710  1373          TAD     (4002
6711  3321          DCA     MODEX+2
6712  4450          JMS I   UPSPC
6713  7774          -4
6714  4447          JMS I   XTYPST
6715  6717          MODEX

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

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                        /ROUTINE TO PRINT 1 SPACE

6723  0000    SPACE1, OPEN
6724  4450            JMS I   UPSPC
6725  7777            -1
6726  5723            JMP I   SPACE1

                        /ROUTINE TO PRINT 2 SPACES.

6727  0000    SPACE2, OPEN
6730  4450            JMS I   UPSPC
6731  7776            -2
6732  5727            JMP I   SPACE2

                        /ROUTINE TO PRINT A HEADING IN ERROR PRINTOUTS.

6733  0000    HEADIN, OPEN
6734  4521            JMS I   CRLF2           /2 CR AND LF.
6735  4450            JMS I   UPSPC           /#12 SPACES
6736  7764            -14
6737  4447            JMS I   XTYPST          /C(L)
6740  7365            CL
6741  4450            JMS I   UPSPC          /5 SPACES
6742  7773            -5
6743  4447            JMS I   XTYPST          /C(AC)
6744  7305            CAC
6745  4450            JMS I   UPSPC          /9 SPACES
6746  7767            -11
6747  4447            JMS I   XTYPST          /C(MQ)
6750  7361            CMQ
6751  4450            JMS I UPSPC
6752  7774            -4
6753  4447            JMS I   XTYPST          /C(GT)
6754  7434            CGT
6755  4450            JMS I   UPSPC          /6 SPACES
6756  7772            -6
6757  4447            JMS I   XTYPST          /C(SC)
6760  7407            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 OPSZ TEST ARE BEING EXECUTED AND
                                              /AT THAT TIME THERE WILL BE A JMS OPSZPR
                                              /IN THIS LOCATION.
7003  4777/             JMS     HEADIN        /PRINT HEADING
7004  4521              JMS I   CRLF2          /2 CR AND LF.
```

```
7005  4452            JMS I   UMOVE
7006  0020            TOLINK
7007  0025            TLINK
7010  7773            -5
7011  4447            JMS I   XTYPST
7012  7370            PROBLM
7013  4450            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  4521            JMS I   CRLF2           /2 CR AND LF.
7020  4447            JMS I   XTYPST          /PRINT "SIMULATED"
7021  7375            SIMULT
7022  4450            JMS I   UPSPC           /5 SPACES
7023  7773            -5
7024  4452            JMS I   UMOVE
7025  0041            LSIM
7026  0025            TLINK
7027  7773            -5


7030  4246            JMS     PLAMGS
7031  4521            JMS I   CRLF2           /2 CR AND LF.
7032  4447            JMS I   XTYPST          /TYPE "ACTUAL"
7033  7403            ACTUAL
7034  4450            JMS I   UPSPC           /7 SPACES
7035  7770            -10
7036  4452            JMS I   UMOVE
7037  0032            LKTOCK
7040  0025            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  1025            TAD     TLINK
7050  4551            JMS I   P1BIT
7051  4454            JMS I   U2SPC           /2 SPACES
7052  1026            TAD     TAC
7053  4774'           JMS     P12BIT          /PRINT CONTENTS OF AC.
7054  4454            JMS I   U2SPC           /2 SPACES
7055  1027            TAD     TMQ
7056  4774'           JMS     P12BIT          /PRINT CONTENTS OF MQ.
7057  4450            JMS I   UPSPC           /3 SPACES
7060  7775            -3
7061  1031            TAD     TGT
7062  4551            JMS I   P1BIT
```

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7063  4450          JMS I   UPSPC          /4 ES
7064  7774          -4
7065  1030          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  4450          JMS I   UPSPC
7072  7775          -3
7073  1023          TAD     TOSHIF
7074  7001          IAC
7075  1114          TAD     MODE
7076  3115          DCA     ANYUSE
7077  4773'         JMS     BDCNV
7100  0115          ANYUSE
7101  4454          JMS I   U2SPC
7102  4447          JMS I   XTYPST
7103  7425          SHIFTS
7104  4454          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  4521          JMS I   CRLF2          /2 CR AND LF.
7112  4447          JMS I   XTYPST         /PRINT C(L)
7113  7365          CL
7114  4450          JMS I   UPSPC          /5 SPACES
7115  7773          -5
7116  1041          TAD     LSIM
7117  4551          JMS I   P1BIT          /PRINT ORGINAL LINK,
7120  4450          JMS I   UPSPC          /15 SPACES
7121  7761          -17
7122  1032          TAD     LKTOCK
7123  4551          JMS I   P1BIT          /PRINT LINK AFTER EAE INSTRUCTION,
7124  4520          JMS I   CRLF           /CR AND LF,
7125  4447          JMS I   XTYPST         /PRINT C(AC)
7126  7355          CAC
7127  4450          JMS I   UPSPC          /4 SPACES
7130  7774          -4
7131  1042          TAD     MSH
7132  4774'         JMS     P12BIT         /PRINT ORGINAL AC
7133  4450          JMS I   UPSPC          /4 SPACES
7134  7774          -4
7135  1033          TAD     ACTOCK
7136  4774'         JMS     P12BIT         /PRINT AC AFTER DST
7137  4520          JMS I   CRLF           /CR AND LF,
7140  4447          JMS I   XTYPST         /PRINT C(MSH)
7141  7472          CMSH
7142  4450          JMS I   UPSPC          /19 SPACES
7143  7755          -23
```

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7144  1035          TAD     SCTOCK
7145  4774'         JMS     P12BIT          /PRINT THE STORED AC
7146  4520          JMS I   CRLF            /CR AND LF',
7147  4447          JMS I   XTYPST          /PRINT C(MQ)
7150  7361          CMQ
7151  4450          JMS I   UPSPC           /4 SPACES
7152  7774          -4
7153  1043          TAD     LSH
7154  4774'         JMS     P12BIT          /PRINT ORGINAL MQ
7155  4450          JMS I   UPSPC           /4 SPACES
7156  7774          -4
7157  1034          TAD     MQTOCK
7160  4774'         JMS     P12BIT          /PRINT MQ AFTER DST
7161  4520          JMS I   CRLF            /CR AND LF',
7162  4447          JMS I   XTYPST          /PRINT C(LSH)
7163  7476          CLSH
7164  4450          JMS I   UPSPC           /19 SPACES
7165  7755          -23
7166  1036          TAD     GTTOCK
7167  4774'         JMS     P12BIT          /PRINT STORED MQ',
7170  5706          JMP I   OSTREG          /EXIT',

7172  7204
7173  6426
7174  7200
7175  5512
7176  7230
7177  6733
      7200          PAGE

                /ROUTINE TO PRINT THE 12 BITS OF A REGISTER',

7200  0000    P12BIT, OPEN
7201  3105          DCA     BITSTR
7202  4525          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  4521          JMS I   CRLF2           /2 CR AND LF',
7206  4453          JMS I   UISPC           /1SPACE
7207  4447          JMS I   XTYPST          /TYPE "REG"
7210  7505          REG
7211  4450          JMS I   UPSPC           /6 SPACES
7212  7772          -6
7213  4447          JMS I   XTYPST
7214  7462          BEFORE
7215  4453          JMS I   UISPC
7216  4447          JMS I   XTYPST
7217  7457          ZDST
7220  4450          JMS I   UPSPC
7221  7772          -6
7222  4447          JMS I   XTYPST
7223  7466          AFTER
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7224  4453          JMS I   U1SPC
7225  4447          JMS I   XTYPST
7226  7457          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  4521          JMS I   CRLF2           /2 CR AND LF.
7232  4447          JMS I   XTYPST          /PRINT "TO BE ADDED".
7233  7514          TOBEAD
7234  4450          JMS I   UPSPC           /6 SPACES
7235  7772          -6
7236  1023          TAD     TOSHIP          /MSH TO BE ADDED.
7237  4200          JMS     P12BIT          /PRINT THE MSH TO BE ADDED.
7240  4454          JMS I   U2SPC           /2 SPACES.
7241  1024          TAD     TOGT            /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

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  0000    DSTTAB, 0
7264  7777          7777
7265  7777          7777

7266  4000          4000
7267  0000          0000
7270  0000          0000

7271  4000          4000
7272  2525          2525
7273  5252          5252

7274  0000          0
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```
7275  7007            7007
7276  0770            0770

7277  4000            4000
7300  0770            0770
7301  7007            7007

7302  0000    DADTAB, 0
7303  0000            0000
7304  0000            0000
7305  0000            0000
7306  0000            0000

7307  4000            4000
7310  7777            7777
7311  7777            7777
7312  0000            0000
7313  0000            0000

7314  4000            4000
7315  0000            0000
7316  0000            0000
7317  7777            7777
7320  7777            7777

7321  0000            0
7322  2525            2525
7323  5252            5252
7324  5252            5252
7325  2525            2525

7326  0000            0
7327  7777            7777
7330  7777            7777
7331  7777            7777
7332  7777            7777

7333  4000    COMTAB, 4000                    /1 7777 0000
7334  7777            7777
7335  0000            0000

7336  4000            4000                    /1 0000 7777
7337  0000            0000
7340  7777            7777

7341  0000            0                       /0 0000 0000
7342  0000            0000
7343  0000            0000

7344  4000            4000                    /1 7777 7777
7345  7777            7777
7346  7777            7777

7347  4000            4000                    /1 2525 5252
7350  2525            2525
```

```
7351  5252                5252

7352  4000                4000                /1 5252 2525
7353  5252                5252
7354  2525                2525

                  /MESSAGES:

7355  0350    CAC,        0350                /C(AC)
7356  0103                0103
7357  5100                5100
7360  0100                0100
7361  0350    CMQ,        0350                /C(MQ)
7362  1521                1521
7363  5100                5100
7364  0100                0100
7365  0350    CL,         0350                /C(L)
7366  1451                1451
7367  0001                0001
7370  2022    PROBLM,     2022
7371  1702                1702
7372  1405                1405
7373  1500                1500
7374  0100                0100

7375  2311    SIMULT,     2311                /SIMULATED
7376  1525                1525
7377  1401                1401
7400  2405                2405
7401  0400                0400
7402  0100                0100

7403  0103    ACTUAL,     0103                /ACTUAL
7404  2425                2425
7405  0114                0114
7406  0001                0001

7407  0350    CSC,        0350                /C(SC)
7410  2303                2303
7411  5100                5100
7412  0100                0100
7413  2310    ZSHL,       2310                /SHL
7414  1400                1400
7415  0100                0100
7416  2405    TEST,       2405                /TEST
7417  2324                2324
7420  0001                0001
7421  6000    ZERO,       6000                /0
7422  0100                0100
7423  6100    ZONE,       6100                /"1"
7424  0100                0100
7425  2310    SHIFTS,     2310                /SHIFTS
7426  1106                1106
7427  2423                2423
7430  0001                0001
```

```
7431  1423    ZLSR,   1423                    /LSR
7432  2200            2200
7433  0100            0100
7434  0350    CGT,    0350                    /C(GT)
7435  0724            0724
7436  5100            5100
7437  0100            0100
7440  0123    ZASR,   0123                    /ASR
7441  2200            2200
7442  0100            0100
7443  0420    ZDPSZ,  0420                    /DPSZ
7444  2332            2332
7445  0001            0001
7446  0420    ZDPIC,  0420                    /DPIC
7447  1103            1103
7450  0001            0001
7451  0403    ZDCM,   0403                    /DCM
7452  1500            1500
7453  0100            0100
7454  0401    ZDAD,   0401                    /DAD
7455  0400            0400
7456  0100            0100
7457  0423    ZDST,   0423                    /DST
7460  2400            2400
7461  0100            0100
7462  0205    BEFORE, 0205                    /BEFORE
7463  0617            0617
7464  2205            2205
7465  0001            0001
7466  0106    AFTER,  0106                    /AFTER
7467  2405            2405
7470  2200            2200
7471  0100            0100
7472  0350    CMSH,   0350                    /C(MSH)
7473  1523            1523
7474  1051            1051
7475  0001            0001
7476  0350    CLSH,   0350                    /C(LSH)
7477  1423            1423
7500  1051            1051
7501  0001            0001

7502  2301    ZSAM,   2301                    /"SAM"
7503  1500            1500
7504  0100            0100

7505  2205    REG,    2205                    /"REG"
7506  0700            0700
7507  0100            0100

7510  1305    KE8SP1, 1305                    /"KE8 1"
7511  7040            7040
7512  6100            6100
7513  0100            0100
```

```
 514  2417    TOBEAD, 2417                    /TO     \DOED'.
 515  4002            4002
7516  0540            0540
7517  0104            0104
7520  0405            0405
7521  0400            0400
7522  0100            0100

7523  2313    SO,     2313                    /SKIP OCCURED'.
7524  1120            1120
7525  4017            4017
7526  0303            0303
7527  2522            2522
7530  0504            0504
7531  0001            0001

7532  1617    NSO,    1617                    /NO SKIP OCCURED'.
7533  4023            4023
7534  1311            1311
7535  2040            2040
7536  1703            1703
7537  0325            0325
7540  2205            2205
7541  0400            0400
7542  0100            0100


7543  2205    DATER,  2205                    /REG MODIFIED'.
7544  0740            0740
7545  1517            1517
7546  0411            0411
7547  0611            0611
7550  0504            0504
7551  0001            0001


                      $

0165  0031
0166  3777
0167  4000
0170  0037
0171  0032
0172  0041
0173  2525
0174  5252
0175  7741
0176  6704
0177  5000
```

```
0000  11110000  11110000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11000000  00000111  11111111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

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  11111000  00011111  11111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111110  00000000  00000000  00000001  11111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11000000  00000000  00000000  01111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11000000  00000000  00000000  01111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111110  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  11111110  00000000  00000000  00000011  11111111

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  10000000  00000111  11111111

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11000000  00000111  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  11111110  00000000  00000000  00000001

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00011111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111110  00000000  00000000  00000000  00000000  00000000  01111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00000000

6000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6100  11111111  11111111  11111111  11111111  11111111  11111111  11110000  00000001

6200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6300  11111111  11111111  11111111  11111111  11111111  11111111  11110000  00000000

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  11000000  00000000  00000000

7600
7700
```

```
A       0075    C2A     6362    DEC12   4331    ESAM1   1431
A0ERR   2122    CAC     7355    DI0ERR  2643    ESCL1   5025
A0ERR1  2131    CAF     6007    DI1ERR  2711    ESCL10  5122
A0INC   2115    CAM     7621    DIGIT   6470    ESCL11  5131
A1ERR   2232    CGT     7434    DLD     7663    ESCL12  5141
A1ERR1  2241    CHKAC   4531    DM0ERR  3040    ESCL13  5151
AC      0325    CHKMQ   4532    DPI0    2601    ESCL2   5034
ACIND   0010    CHKSCA  4533    DPI1    2654    ESCL3   5043
ACL     7701    CKDATA  2276    DPIC    7573    ESCL4   5052
ACNMI   4060    CL      7365    DPIS0H  2621    ESCL5   5061
ACNMIN  3707    CLAM    7601    DPIS1H  2667    ESCL6   5070
ACNMIX  3704    CLRL4   1133    DPISIM  6264    ESCL7   5077
ACP     0062    CLSH    7476    DPITS0  2600    ESCL8   5106
ACS     7403    CMPCTR  6363    DPITS1  2653    ESCL9   5113
ACS1    5152    CMQ     7361    DPSZ    7451    EXEN    3731
ACS2    5165    CMSH    7472    DPSZ0   2254    EXINMI  3672
ACTOCK  0033    CNTR1   2473    DPSZ0H  2400    FADDR   6423
ACTUAL  7403    CNTR2   2474    DPSZPR  5512    FLAG    6665
ADDR    0046    CNTR3   2475    DPSZS0  2252    FORDAD  7230
ADDRZA  6462    CNVCTR  6471    DPZPR1  5515    GEN     5600
AFTER   7466    COMP    6334    DS0ERR  3440    GENNMI  4273
AGAIN   4536    COMPA   6344    DS1ERR  3542    GENX    0064
AMQAT3  1233    COMTAB  7333    DST     7445    GEX     4403
ANCMIQ  3727    COMTST  4600    DST0    3315    GTF     6004
ANYUSE  0115    COUNT   0116    DST0A   3326    GTSIM   0045
APMQAT  1230    COUNTX  0103    DST0B   3327    GTTOCK  0036
ARROW   6443    CP      0263    DST0GN  3400    GTTST1  5200
ASCOMP  0134    CR      0067    DST1    3451    GTTST2  5210
ASR     7415    CRLF    0120    DST1A   3462    GTTST3  5220
ASR0    2053    CRLF2   0121    DST1B   3463    GTTST4  5226
ASR0SH  6242    CSC     7407    DST1RN  3505    GTTST5  5233
ASR1    2201    DA0ERR  3153    DSTHED  7204    GXEN    3712
ASR030  6250    DA1ERR  3304    DSTREG  7106    HEADIN  6733
ASRS0H  2101    DAD     7443    DSTS0H  3413    HKE     6505
ASRS1H  2221    DAD0    3051    DSTS1H  3517    HLT     7402
ASRSIM  6200    DAD1    3201    DSTTAB  7263    HSE     0246
ASRTS0  2052    DADGEN  3076    DSTTS0  3314    HSE1    0427
ASRTS1  2200    DADJMS  7044    DSTTS1  3450    HSE2    0540
AT      0632    DADS0H  3112    DSZJMS  7045    HSE2A   0563
AT3     1066    DADS1H  3226    DZERR0  2523    HSE3    0704
B0DIFF  6045    DADSIM  6320    DZINC   2426    HSE4    1032
BACK    0055    DADTAB  7302    E3A     5250    HSE5    1200
BACP    0066    DADTS0  3050    EDAD0   3132    HSENM   4261
BDCNV   6426    DADTS1  3200    EDAD1   3263    HSENMI  3657
BEFORE  7462    DATER   7543    EDCM0   3031    INCOR   0110
BITSTR  0105    DCM     7575    EDPI0   2634    IOF     6002
BLXP    0065    DCM0    2722    EDPI1   2702    ION     6001
BSW     7002    DCMGEN  3000    EDPSZ0  2512    K260    6472
C       0076    DCMS0H  3013    EDST0   3431    K7740   0117
C1      6357    DCMSIM  6302    EDST1   3533    KE8SP1  7510
C1A     6361    DCMTS0  2721    ENQAT2  1063            0313
C2      6360    DDZ     7665    ESAM0   1276    L0ERR   1722
```

```
.RR1    1731    MQIND   0011    P1B     0151    SI0SET  5300
L0INC   1715    MQL     7421    PA25    4302    SIERR   1632
L1ERR   2032    MQLT    0203    PACP    0364    SIERR1  1641
L1ERR1  2041    MQLT1   0400    PAT00   4526    SAM     7457
LDGT    0147    MQNMI   4074    PAT01   4525    SAM0    1246
LDREG   0145    MQNMIN  3706    PATCH   4545    SAM1    1337
LDSC    0152    MQNMIQ  3730    PBACP   0372    SAMGEN  1243
LDSC1   5470    MQNMIX  3705    PBLXP   0351    SAMRGN  1400
LF      0070    MQTOCK  0034    PC      5430    SAMS0H  1315
LINK    0101    MSH     0042    PLAMGS  7046    SAMSIH  1414
LKTOCK  0032    MT2ER   4513    PLINK   0123    SAMSIM  6013
LL      0073    N       5447    PLXP    0334    SAMTAB  7244
LNPR2   1051    NBASR0  2067    PMQAT   0600    SAMTS0  1245
LPAR    5435    NBASR1  2207    PMQLT   0256    SAMTS1  1336
LSW     0043    NBLSR0  1667    PNORM   4132    SASR1   6215
LSHIFT  6135    NBLSR1  2007    PRCHG   7002    SASR1A  6230
LSIM    0041    NBSHL0  1464    PREGS   0133    SASR2   6232
LSR     7417    NBSHL1  1607    PRINT   6653    SASR3   6236
LSR0    1653    NEXNMI  4324    PRNMI   4000    SAVREG  0135
LSR0SH  6151    NEXT    0056    PROBLM  7370    SCA     7441
LSR1    2001    NM2525  4320    PRXLOP  0122    SCANM   4534
LSRA    6142    NM5252  4321    PSPC    6670    SCAST   3700
LSRO30  6160    NM7776  4323    PSTEP   5412    SCASTX  3703
LSRS0H  1701    NMERR   4333    PSTEPT  5423    SCATXX  5403
LSRS1H  2021    NMFLG   4322    PTHREE  1240    SCAXX   5407
LSRSIM  6120    NMI     7411    PTO     0357    SCC23   3702
LSRTS0  1652    NMIERR  3650    PTWO    1126    SCL     7403
LSRTS1  2000    NMIODD  3701    Q       0072    SCL1    5020
LXP     0063    NMITPR  4126    RANCON  6536    SCL10   5114
M       0071    NMIXX   5400    RANDAD  5245    SCL11   5123
MQTR    6425    NMIS1   4450    RANDAT  5724    SCL12   5132
MQSEL   5263    NMIS3   4522    RANDEX  6555    SCL13   5142
MQTST   5001    NOP     7400    RANDOM  0144    SCL2    5026
MESSG   0125    NOPM    7401    RANGEN  6525    SCL3    5035
MQDA    2464    NOPR    0724    RANSAV  6571    SCL4    5044
MQDE    0114    NOPR3   1217    RANTAD  6542    SCL5    5053
MQDEX   6717    NORMT   3600    RANTBL  6557    SCL6    5062
MQDSEL  0131    NORMT1  4200    RANTND  6570    SCL7    5071
MQVE    6400    NORMT2  4400    RDF     6214    SCL8    5100
MQVEA   6413    NOSKIP  2306    REG     7505    SCL9    5107
MQ      0304    NOSKP   2274    RIF     6224    SCOMP   5473
MQ1     0444    NSO     7532    RL2     0523    SCOUNT  0113
MQ1SW   0437    NUMSH   7070    RL4     1021    SCSIM   0044
MQA     7501    NUMSHF  0143    RNDATA  0146    SCTOCK  0035
MQA1    0605    OBV     6524    ROTGEN  2476    SEMIT   6145
MQAER1  0714    OBVERS  6473    RPAR    5442    SET     6006
MQAER2  1042    ONE     0077    RTF     6005    SHIFT0  6113
MQAER3  1210    ONEP    0127    RTFX    0150    SHIFTS  7425
MQAT    0503    ONLYB   0132    RXLOP   5624    SHL     7413
MQAT1   0650    ONZER   0126    S0ERR   1517    SHL0    1451
MQAT2   1000    OPEN    0000    S0ERR1  1526    SHL1    1601
MQAT3   1135    P12BIT  7200    S0INC   1512    SHLA    6076
```

```
SHLO31  6107            TSHIF   0030            XTYPST  0047
SHLSIM  6051            TST25   4315            YA      0641
SHLTS0  1450            TSTSW0  0137            YESSKP  2275
SHLTS1  1600            TSTSW1  0140            YSKIP   2317
SIMULT  7375            TSTSW2  0141            ZASR    7440
SKB     7671            TSTSW3  0142            ZDAD    7454
SKIPMA  6666            TT      0074            ZDCM    7451
SKIPPA  6667            TWO     0112            ZDPIC   7446
SLTS0H  1476            TYMOD   6704            ZDPSZ   7443
SLTS1H  1621            TYPAT   6630            ZDST    7457
SM0ERR  1305            TYPSP   6634            ZER0    7421
SM1ERR  1440            TYPST   6600            ZERO    0100
SO      7523            TYTST   0130            ZEROR   0124
SPACE1  6723            U1SPC   0053            ZLSR    7431
SPACE2  6727            U2SPC   0054            ZONE    7423
SPAT00  4527            UCOMP   0051            ZSAM    7502
SPAT01  4530            UCRLF   5611            ZSHL    7413
SPCTR   6703            UCRLF2  5620
STRCNT  0104            UGEN    0136
SW0TST  5314            ULDGT   5753
SW1TST  5322            ULDREG  5743
SW2TST  5331            ULDSC   5436
SW3TST  5340            UMESSG  5655
SWAB    7431            UMOVE   0052
SWBA    7447            UONEP   5644
SWITCH  6655            UONLYB  5306
SWP     7521            UONZER  5637
T       0320            UPIBIT  5720
TAC     0026            UPLINK  5632
TADDR   6424            UPREGS  7000
TEMPA   0037            UPRONE  5675
TEMPB   0040            UPSPC   0050
TEMPQ   6662            USVREG  5350
TEMQ    6663            UTYTST  5701
TEMR    6664            UZERDR  5650
TENPWR  6463            VALUE   6467
TEST    7416            VOR     1121
TGT     0031            WILCHG  7016
THREE   0111            XACNMI  0012
TLINK   0025            XCP     0467
TMQ     0027            XMQ1    0455
TO      0102            XMQAT   0060
TOAC    0021            XMQAT1  0061
TOBEAD  7514            XMQAT2  0106
TOGT    0024            XMQAT3  0107
TOLINK  0020            XMQLT1  0057
TOMQ    0022            XMQNMI  0013
TOSHIF  0023            XNORMT  4143
TPFLAG  4537            XONE    0473
TSC1    6606            XPACP   0342
TSC2    6617            XPMQAT  1062
TSCL    5000            XRTF    6000
```

ERRORS DETECTED: 0

LINKS GENERATED: 156

RUN-TIME: 42 SECONDS

3K CORE USED