PDP-15

EAE

IDENTIFICATION

Product Code:	MAINDEC- 15-DØHA-D(D)
Product Name:	EAE Part II
Date Created:	February 6, 197Ø
Maintainer:	Diagnostic Group
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(2)

1. ABSTRACT

Part 2 of the PDP-15 EAE Diagnostic verifies only correct operation of the EAE multiply and divide instructions. Part 2 is written in two sections: Section 1 checks EAE instructions against predetermined results. This ranges from setup operation, through multiply and divide instructions executed back to back; Section 2 is a random-number check of the signed multiply and signed divide instructions.

Hardware malfunctions in Section 1 result in an error halt. Hardware malfunctions in Section 2 result in an error message on the teleprinter.

2. REQUIREMENTS

Storage

The program when loaded occupies locations 20 to 7500.

Subprograms and/or Subroutines

Teletype Output Package

Signed Multiply Subroutine (modified)

Signed Divide Subroutine (modified)

Equipment

Minimum configuration PDP-15 with EAE option installed

3. USAGE

3.1 Loading

a. Set Bank Mode SW on 1
b. Set address SW to 177ØØ
c. Press reset, press READ-IN.

3.2 Calling Sequence

The program halts after loading.

Set address switches to:

2ØØ Section 1 (Constants)
2Ø1 Section 2 (Random numbers)
2Ø3 Switch Setting typeout,

Press Reset, press START.

If 2Ø3 is chosen, program halts at 6622 after typeout.
To continue, set 2ØØ, or 2Ø1 in address switches
Press reset, press START.

3.3 Switch Settings

AC Switches = 0 or Down

With all AC switches down, the program results in the following:

a. Hardware malfunctions detected in Section 1 result in an error halt.

b. Hardware malfunctions detected in Section 2 result in an error typeout.

c. At the completion of the error typeout, the processor halts.

d. The program completes whichever section of test it was started in, sequence from each subtest of the section to the next , without halting.

AC Switches 1 or Up

SW	Operation	Description
0	Delete error typeouts	The program will not type out error messages, but will ring bell on error.
1	Halt after EAE operation	The processor halts after each EAE operation is initiated and its results are verified. (Note: Press CONTINUE to proceed.)
2	Repeat EAE operation (Scope Loop)	The program repeats the last EAE operation, If SW2 is set during an error typeout or halt, the program repeats the operation that caused the error. (Note: SW1 is tested before SW2.)
3	Halt after EAE sequence	The processor halts after each sequence of testing an EAE operation.
4	Repeat EAE sequence	The program repeats the last sequence of testing an EAE operation; i.e., the program repeats the EAE AC sign test and does not proceed to multiply/divide test. (Note: The program tests SW3 before SW4.)
5	Cycle all sections	At the completion of 77 passes through the Set-Up Test, the program proceeds to the Random Multiply and Divide Test. At the completion of passes through Random Test the program repeats the Set-Up Test.
6		Print "OK" after each pass when SW5 =1

3.4 Start-Up and/or Entry

Start up, Section 1

Set AC switches = 000000

Set address = 0200

Press Reset

Press START

Start up, Section 2

Set AC switch = 000000

Set address = 0201

Press Reset

Press START

3.5 Errors in Usage

Hardware malfunctions detected in Section 1 will result in an error halt. Refer to the listing using the address in the memory register to identify the error.

Hardware malfunctions detected in Section 2 will result in an error typeout on the teleprinter, and a processor halt.

a. Error typeouts are in standard format and include the following information.

b. Type of failure, multiply or divide.

c. Initial problem set-up, contents of the AC, MQ, and the divisor and multiplicand.

d. The results of the instruction, i.e., if divide, the quotient and remainder; if multiply, the high and low order product. A comparison of the results (software vs hardware).

e. A printout of the ratio of failure, based on 100 octal iterations.

f. If the ratio is small, it is recommended that CONTINUE be depressed to find a setup that produces a higher failure ratio.

g. Then set the address register equal to the contents of the AC and depress START. This will generate a simulated printout of the EAE failure. After the printout the program will go into a scope loop, executing the instruction that failed.

3.5 (Continued)

The abbreviations used by the header are as follows:

Abbreviation	Meaning
C(L)	The information under this header is the contents of LINK.
C(AC)	The information under this header is the contents of AC.
C(MQ)	The information under this header is the contents of MQ.
C(SC)	The information under this header is the contents of SHIFT COUNT.
(DIVISOR)	The information under this header is the contents of MB- not sign corrected.
(MULTIPLICAND)	The information under this header is the contents of MB- not sign corrected.

Error Typeout Examples:

a. Sign Multiply

MULS FAILED	MULTIPLIER	MULTIPLICAND
	705722	167372
	HIGH ORDER PRODUCT	LOW ORDER PRODUCT
SOFTWARE	762343	133015
HARDWARE	762443	762343

OUT OF 100 CHECKS BAD 1

6443XX (XX = SHIFT COUNT)

b. Sign Divide

DIVS	C(DIVISOR)	C(AC)	C(MQ)
	235012	223506	304176

	QUOTIENT	REMAINDER
SOFTWARE	741320	146136
HARDWARE	741320	146135

OUT OF 100 CHECKS BAD 1

6443XX (XX = SHIFT COUNT)

c. Example of Multiply Simulation

MULS FAILED	MULTIPLIER (AC)	MULTIPLICAND
	235037	534247
	HIGH ORDER PRODUCT	LOW ORDER PRODUCT

SOFTWARE	754134	257305
HARDWARE	754134	57305

OUT OF 100 CHECK BAD 100
657110 (10 SHIFTS)

C(L)	C(AC)	C(MQ)	C(SC)
0	0	235037	70 (2's compliment of 10)
0	121654	116417	71
0	172602	47207	72
0	217155	23503	73
0	231342	411641	74
0	236435	204720	75
0	117216	502350	76
0	47507	241164	77
0	754134	257305	0

d. Example of Divide Simulation

DIVS FAILED	C(DIVISOR)	C(AC)	C(MQ)
	317121	216663	Ø47735
	QUOTIENT	REMAINDER	LINK
SOFTWARE	477353	715731	1
HARDWARE	477353	715731	Ø

OUT OF 1ØØ CHECK BAD 1ØØ
6443Ø3

(Program Halts. Set Address Register equal to AC then START. (3.5.g))

(Print out of simulated Divide)

	C(L)	C(AC)	C(MQ)	C(SC)
	Ø	216663	Ø47735	Ø75 .....Initial AC & MQ after complenting
	Ø	677542	Ø47735	Ø75 .....1st subtract
	1	5773Ø4	117672	Ø76 .....1st shift
ovrflo	1	116425	117672	Ø76 .....2nd subtract-overflow caused
	Ø	235Ø52	237565	Ø77 .....2nd shift
	Ø	715731	237565	Ø77 .....3rd subtract
	Ø	715731	477353	Ø77 .....3rd shift-overflow recognized.
	1	715731	477353	Ø77 .....Last cycle adjust.

3.6 Recovery from such Errors

In Section 1, a malfunction causes a processor halt. In Section 2, a malfunction will generate an error typeout, then halt the processor.

One of the following operations may be necessary if more information about the

3.6 (Continued)

failure is needed to repair the malfunction.

a. Repeat the exact operation that detected the failure (possibly a scope loop).

b. Continue normally in the test to generate more information about the failure.

c. Repeat the sequence of operation, or data patterns that detected the failure.

d. Produce a simulation printout of failing multiply or divide instruction.

AC switch control is built into the program to allow for any of these operations assuming the processor has halted after an error.

These operations may be accomplished as follows:

a. Repeat same operation

Set AC switch 2 up or to a 1

Press CONTINUE

Not that AC switch 0 sllows deletion of error typeout for a scope loop.

b. Continue normally

Press CONTINUE

c. Repeat Sequence

Set AC switch 4 up to a 1

Press CONTINUE

d. Simulation Printout

Set Address Switch = C(AC)

(At completion of Printout the program goes to an automatic scope loop.)

4. PROGRAM DESCRIPTION

4.1 General

The PDP-15 EAE Diagnostic part 2 verifies correct operation of the Multiply and Divide EAE Instruction. Part 2 itself is written in two logical sections as follows:

Section 1 - Set up test using fixed number

Verifies correct operation of all EAE Multiply and Divide instructions with fixed numbers.

4.1 (Continued)

Section 2 - Random Number

Verifies correct operation of signed Multiply and Signed Divide instruction with random numbers.

The above sections are to be run sequentially; that is, Section 1 must run before Section 2.

4.2 Test Description

4.2.1 Section 1 Set-Up Test - The Set-Up Test incrementally verifies correct operation of the multiply and divide instruction.

a. "ADVP" Checks that the memory location following the multiply and/or divide instruction is not modified by the execution of the instruction and that the program address counter is properly incremented during the exectuion of the instruction.

b. "NEAE" Set up check - Checks the set-up of all EAE signed, unsigned, integer and fraction, multiply and divide instructions. These instructions are executed with a shift count of zero.

c. "SHCT" Shift Counter Test- Executes the Multiply instruction sequentially starting at a shift count of 1 and incrementing it up to a shift count of 22.

d. "STMUL" Sign multiply and divide test - Test all signed multiply and divide instructions.

e. "MULTST" Multiply and Divide Test - This test using worse-case number patterns acts as both a EAE and Adder Test.

f. "MSPEED" Speed Multiply and Divide - This test is in three operations: (1) a sequence of multiply instructions are executed back to back, (2) then a sequence of divide instructions are executed, (3) followed by a sequence of MUL, DIV, MUL, and DIV executed back to back.

4.2.2 Section 2 Random Data Multiply and Divide Test - The Random Data Test verifies that the EAE will multiply and divide random numbers at shift counts 1 through maximum (22 for multiply, 23 for divide) and checks that the LINK is set on

4.2.2 (Continued)

divide overflow.

The sequence of testing is as follows:

(a) Test the Multiply

(1) Generate a random number

(2) Do a software divide

(3) Do a software divide

(4) Compare the results of both operations

(5) LOOP BACK TO 1 TILL DONE

4.2.3 Extended Reliability Test -

a. If it is desired to run an extended reliability test on the EAE and the computer is to be left unattended, the halts in Part II Section 2 should be changed.

MULCT-2 --- From a Halt to a NOP (6254)

TIMTEX-2 ---From a Halt to a NOP (6304)

b. There is also a counter that counts pass completes "CTCMPT". This counter is cleared when starting the program or when restarting at "FIRST" or FIRST + 3 (CTCMPT = 7146).

```
                        .TITLE EAE-II
                        /EAE PART II  MULTIPLY AND DIVIDE-FOR PDP 15
                        /
                        /START AT 200 FOR SECTION ONE (CONSTANTS)
                        /START AT 201 FOR SECTION TWO (RANDOM DATA)
                        /START AT 203 FOR SWITCH SETTING TYPEOUTS.
                        /
                                .ABS
00200                           .LOC 200
00200   606624                  JMP RUN+1
00201   606627                  JMP RUN+4
00202   607047                  JMP FIRST
00203   740000          ADVP    NOP
00204   147176                  DZM STEMA#                      /CHECK FOR P HNCREMENT
00205   147177                  DZM STEMB#                      /WITH NO SHIFT
00206   207176                  LAC STEMA
00207   673101                  MUL -21
00210   740040                  HLT         /P NOT INCREMENTED      (105)
00211   741000                  SKP
00212   740040                  HLT         /P OVER INCREMENTED     (107)
00213   447176                  ISZ STEMA
00214   600206                  JMP .-6
00215   147176                  DZM STEMA           /CHECK FOR P INCREMENT
00216   147177                  DZM STEMB           /WITH 22 SHIFT COUNTS
00217   207176                  LAC STEMA
00220   653122                  MUL
00221   740040                  HLT         /P NOT INCREMENTER      (116)
00222   741000                  SKP
00223   740040                  HLT         /P OVER INCREMENTED     (120)
00224   447177                  ISZ STEMB
00225   600217                  JMP .-6
00226   147176                  DZM STEMA           /IS MEMORY RESTORED
00227   147177                  DZM STEMB           /CORRECTLY
00230   207176                  LAC STEMA
00231   653122                  MUL
00232   007177                  STEMB
00233   741000                  SKP
00234   740040                  HLT         /P OVER INCREMENTER     (132)
00235   207177                  LAC STEMB
00236   547176                  SAD STEMA
00237   741000                  SKP
00240   740040                  HLT         /VARIABLE NOT RESTORED CORRECT (136)
00241   447176                  ISZ STEMA
00242   740000                  NOP
00243   447177                  ISZ STEMB
00244   600230                  JMP .-14
00245   740000                  NOP                 /EXIT
                                .EJECT
```

```
                        /BASIC EAE INSTRUCTION /NO SHIFTS /NO GSM
00246   104162  NEAE    JMS LOOP4           /HLT ADDRESS
00247   104157          JMS LOOP2
00250   744002          STL
00251   207205          LAC (070707)
00252   652000          LMQ
00253   207206          LAC (252525)
00254   644100          EAE 4100            /SPECIAL INST 644100
00255   000001          000001
00256   047156          DAC FIAC#
00257   641002          LACQ
00260   047157          DAC FIMQ#
00261   547207          SAD (707070
00262   741000          SKP
00263   740040          HLT         /BAD MQ, GOOD=707070     (160)
00264   207156          LAC FIAC
00265   547210          SAD (525252
00266   741000          SKP
00267   740040          HLT         /BAD AC, GOOD=525252     (164)
00270   104130          JMS HLOOPS
00271   740000          NOP
00272   104157          JMS LOOP2
00273   207205          LAC (070707)
00274   652000          LMQ
00275   207206          LAC (252525)
00276   644100          EAE 4100            /SPECIAL INST 644100
00277   777776          777776
00300   047156          DAC FIAC
00301   641002          LACQ
00302   047157          DAC FIMQ
00303   547205          SAD (070707)
00304   741000          SKP
00305   740040          HLT         /BAD MQ, GOOD=070707     (202)
00306   207156          LAC FIAC
00307   547206          SAD (252525)
00310   741000          SKP
00311   740040          HLT         /BAD AC, GOOD=252525     (206)
00312   104130          JMS HLOOPS
00313   104157          JMS LOOP2
00314   740000          NOP
00315   207207          LAC (707070)
00316   652000          LMQ
00317   207206          LAC (252525)
00320   644100          EAE 4100            /SPECIAL INST 644100
00321   000001          000001
00322   047156          DAC FIAC
00323   641002          LACQ
                        .EJECT
```

```
00324   047157          DAC FIMQ
00325   547207          SAD (707070)
00326   741000          SKP
00327   740040          HLT       /BAD MQ, GOOD=707070      (224)
00330   207156          LAC FIAC
00331   547206          SAD (252525)
00332   741000          SKP
00333   740040          HLT       /BAD AC, GOOD=252525      (230)
00334   104130          JMS HLOOPS
00335   104157          JMS LOOP2
00336   740000          NOP
00337   207207          LAC (707070)
00340   652000          LMQ
00341   207210          LAC (525252)
00342   644100          EAE 4100            /SPECIAL INST 644100
00343   777776          777776
00344   047156          DAC FIAC
00345   641002          LACQ
00346   047157          DAC FIMQ
00347   547207          SAD (707070)
00350   741000          SKP
00351   740040          HLT       /BAD MQ, GOOD=707070      (246)
00352   207156          LAC FIAC
00353   547210          SAD (525252)
00354   741000          SKP
00355   740040          HLT       /BAD AC. GOOD=525252      (252)
00356   104130          JMS HLOOPS
00357   104157          JMS LOOP2
                        .EJECT
```

```
00360   740000      NEAB    NOP
00361   207205              LAC (070707)
00362   652000              LMQ
00363   207206              LAC (252525)
00364   654100              EAE 14100           /SPECIAL INST 654100
00365   000001              000001
00366   047156              DAC FIAC
00367   641002              LACQ
00370   047157              DAC FIMQ
00371   547211              SAD (000000
00372   741000              SKP
00373   740040              HLT       /BAD MQ, GOOD=000000     (270)
00374   207156              LAC FIAC
00375   547206              SAD (252525)
00376   741000              SKP
00377   740040              HLT       /BAD AC, GOOD=252525     (274)
00400   104130              JMS HLOOPS
00401   104157              JMS LOOP2
00402   740000              NOP
00403   207205              LAC (070707)
00404   652000              LMQ
00405   207206              LAC (252525)
00406   654100              EAE 14100           /SPECIAL INST 654100
00407   777776              777776
00410   047156              DAC FIAC
00411   641002              LACQ
00412   047157              DAC FIMQ
00413   547211              SAD (000000
00414   741000              SKP
00415   740040              HLT       /BAD MQ, GOOD=000000     (312)
00416   207156              LAC FIAC
00417   547206              SAD (252525)
00420   741000              SKP
00421   740040              HLT       /BAD AC, GOOD=252525     (316)
00422   104130              JMS HLOOPS
00423   104157              JMS LOOP2
                            .EJECT
```

```
00424   740000          NOP
00425   207207          LAC (707070)
00426   652000          LMQ
00427   654100          EAE 14100           /SPECIAL INST 654100
00430   000001          000001
00431   047156          DAC FIAC
00432   641002          LACQ
00433   047157          DAC FIMQ
00434   547211          SAD (000000
00435   741000          SKP
00436   740040          HLT       /BAD MQ, GOOD=000000     (333)
00437   207156          LAC FIAC
00440   547207          SAD (707070)
00441   741000          SKP
00442   740040          HLT       /BAD AC, GOOD=707070     (337)
00443   104130          JMS HLOOPS
00444   104157          JMS LOOP2
00445   740000          NOP
00446   207207          LAC (707070)
00447   652000          LMQ
00450   207210          LAC (525252)
00451   654100          EAE 14100           /SPECIAL INST 654100
00452   777776          777776
00453   047156          DAC FIAC
00454   641002          LACQ
00455   047157          DAC FIMQ
00456   547211          SAD (000000)
00457   741000          SKP
00460   740040          HLT       /BAD MQ, GOOD=000000     (355)
00461   207156          LAC FIAC
00462   547210          SAD (525252)
00463   741000          SKP
00464   740040          HLT       /BAD AC, GOOD=525252     (361)
00465   104130          JMS HLOOPS
00466   104157          JMS LOOP2
                        .EJECT
```

```
00467   740000      NMUL    NOP                 /MULTIPLY INSTRUCTIONS WITH NO SHIFTS
00470   207205              LAC (070707)        /CHECKING SETUP, THE FIRST ONE IS
00471   652000              LMQ                 /AC     MQ      AC      MQ
00472   207206              LAC (252525)        /(252525)X(,00001)=000000252525
00473   673100              MUL -22
00474   000001              000001
00475   047156              DAC FIAC            /DURING SETUP THE MQ IS SET TO SOME VALUE
00476   641002              LACQ        /THE EAE INSTRUCTION DOES AN AC EUQAL TO MQ TRANSFER
00477   047157              DAC FIMQ
00500   547206              SAD (252525)
00501   741000              SKP
00502   740040              HLT         /BAD MQ, GOOD=252525      (377)
00503   207156              LAC FIAC
00504   547211              SAD (000000)
00505   741000              SKP
00506   740040              HLT         /BAD AC, GOOD=000000      (403)
00507   104130              JMS HLOOPS
00510   104157              JMS LOOP2
00511   740000              NOP
00512   207205              LAC (070707)
00513   652000              LMQ
00514   207206              LAC (252525)
00515   673100              MUL -22
00516   777776              777776
00517   047156              DAC FIAC
00520   641002              LACQ
00521   047157              DAC FIMQ
00522   547206              SAD (252525)
00523   741000              SKP
00524   740040              HLT         /BAD MQ, GOOD=252525      (421)
00525   207156              LAC FIAC
00526   547211              SAD (000000)
00527   741000              SKP
00530   740040              HLT         /BAD AC, GOOD=000000      (425)
00531   104130              JMS HLOOPS
00532   104157              JMS LOOP2
00533   740000              NOP
00534   207207              LAC (707070)
00535   652000              LMQ
00536   207210              LAC (525252)
00537   673100              MUL -22
00540   000001              000001
00541   047156              DAC FIAC
00542   641002              LACQ
00543   047157              DAC FIMQ
00544   547210              SAD (525252)
00545   741000              SKP
00546   740040              HLT         /BAD MQ, GOOD=525252      (443)
00547   207156              LAC FIAC
00550   547211              SAD (000000
00551   741000              SKP
00552   740040              HLT         /BAD AC, GOOD=000000      (447)
00553   104130              JMS HLOOPS
                            .EJECT
```

```
00554   104157          JMS LOOP2
00555   740000          NOP
00556   207207          LAC (707070)
00557   652000          LMQ
00560   207210          LAC (525252)
00561   673100          MUL -22
00562   777776          777776
00563   047156          DAC FIAC
00564   641002          LACQ
00565   047157          DAC FIMQ
00566   547210          SAD (525252)
00567   741000          SKP
00570   740040          HLT       /BAD MQ, GOOD=525252      (465)
00571   207156          LAC FIAC
00572   547211          SAD (000000
00573   741000          SKP
00574   740040          HLT       /BAD AC, GOOD=000000      (471)
00575   104130          JMS HLOOPS
00576   104157          JMS LOOP2
                        .EJECT
```

```
00577   740000      NMULS   NOP
00600   207205              LAC (070707)        /SIGNED MULTIPLY NO SHIFTS
00601   652000              LMQ
00602   207206              LAC (252525)
00603   677100              MULS -22
00604   000001              000001
00605   047156              DAC FIAC
00606   641002              LACQ
00607   047157              DAC FIMQ
00610   547206              SAD (252525)
00611   741000              SKP
00612   740040              HLT       /BAD MQ, GOOD=252525      (507)
00613   207156              LAC FIAC
00614   547211              SAD (000000)
00615   741000              SKP
00616   740040              HLT       /BAD AC, GOOD=000000      (513)
00617   104130              JMS HLOOPS
00620   104157              JMS LOOP2
00621   740000              NOP
00622   207205              LAC (070707)
00623   652000              LMQ
00624   207206              LAC (252525)
00625   677100              MULS -22
00626   777776              777776
00627   047156              DAC FIAC
00630   641002              LACQ
00631   047157              DAC FIMQ
00632   547206              SAD (252525)
00633   741000              SKP
00634   740040              HLT       /BAD MQ, GOOD=252525      (531)
                            .EJECT
```

```
00635   207156          LAC FIAC
00636   547211          SAD (000000)
00637   741000          SKP

00640   740040          HLT       /BAD AC, GOOD=000000     (535)
00641   104130          JMS HLOOPS
00642   104157          JMS LOOP2
00643   740000          NOP
00644   207207          LAC (707070)
00645   652000          LMQ
00646   207210          LAC (525252
00647   677100          MULS -22
00650   000001          000001
00651   047156          DAC FIAC
00652   641002          LACQ
00653   047157          DAC FIMQ
00654   547210          SAD (525252)
00655   741000          SKP
00656   740040          HLT       /BAD MQ, GOOD=525252     (553)
00657   207156          LAC FIAC
00660   547212          SAD (777777)
00661   741000          SKP
00662   740040          HLT       /BAD AC, GOOD=777777     (557)
00663   104130          JMS HLOOPS
00664   104157          JMS LOOP2
00665   740000          NOP
00666   207207          LAC (707070)
00667   652000          LMQ
00670   207210          LAC (525252)
00671   677100          MULS -22
00672   777776          777776
00673   047156          DAC FIAC
00674   641002          LACQ
00675   047157          DAC FIMQ
00676   547210          SAD (525252)
00677   741000          SKP
00700   740040          HLT       /BAD MQ, GOOD=525252     (575)
00701   207156          LAC FIAC
00702   547212          SAD (777777)
00703   741000          SKP
00704   740040          HLT       /BAD AC, GOOD=777777     (601)
00705   104130          JMS HLOOPS
00706   104157          JMS LOOP2
                        .EJECT
```

```
00707   740000      NDIV    NOP                 /DIVIDE INSTRUCTION NO SHIFTS
00710   207205              LAC (070707)        /THE EAE INSTRUCTIONS DOES NOT
                                                /CHANGE THE AC OR THE MQ
00711   652000              LMQ
00712   207206              LAC (252525)
00713   660300              DIV -23
00714   000001              000001
00715   047156              DAC FIAC
00716   641002              LACQ
00717   047157              DAC FIMQ
00720   547205              SAD (070707)
00721   741000              SKP
00722   740040              HLT         /BAD MQ, GOOD=070707      (617)
00723   207156              LAC FIAC
00724   547206              SAD (252525)
00725   741000              SKP
00726   740040              HLT         /BAD AC, GOOD=252525      (623)
00727   104130              JMS HLOOPS
00730   104157              JMS LOOP2
00731   740000              NOP
00732   740000              NOP
00733   207205              LAC (070707
00734   652000              LMQ
00735   207206              LAC (252525
00736   660300              DIV -23
00737   777776              777776
00740   047156              DAC FIAC
00741   641002              LACQ
00742   047157              DAC FIMQ
00743   547205              SAD (070707)
00744   741000              SKP
00745   740040              HLT         /BAD MQ, GOOD=070707    (642)
00746   207156              LAC FIAC
00747   547206              SAD (252525)
00750   741000              SKP         /BAD AC, GOOD=252525      (646)
00751   740040              HLT
00752   104130              JMS HLOOPS
00753   104157              JMS LOOP2
                            .EJECT
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00754   740000          NOP
00755   207207          LAC (707070
00756   652000          LMQ
00757   207210          LAC (525252
00760   660300          DIV -23
00761   000001          000001
00762   047156          DAC FIAC
00763   641002          LACQ
00764   047157          DAC FIMQ
00765   547207          SAD (707070)
00766   741000          SKP
00767   740040          HLT         /BAD MQ, GOOD=707070      (664)
00770   207156          LAC FIAC
00771   547210          SAD (525252
00772   741000          SKP
00773   740040          HLT         /BAD AC, GOOD=525252      (670)
00774   104130          JMS HLOOPS
00775   104157          JMS LOOP2
00776   740000          NOP
00777   207207          LAC (707070
01000   652000          LMQ
01001   207210          LAC (525252
01002   660300          DIV -23
01003   777776          777776
01004   047156          DAC FIAC
01005   641002          LACQ
01006   047157          DAC FIMQ
01007   547207          SAD (707070)
01010   741000          SKP         /BAD MQ, GOOD=707070      (706)
01011   740040          HLT
01012   207156          LAC FIAC
01013   547210          SAD (525252
01014   741000          SKP         /BAD AC, GOOD=525252      (712)
01015   740040          HLT
01016   104130          JMS HLOOPS
01017   104157          JMS LOOP2
                        .EJECT
```

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01020   740000      NDIVS   NOP                     /NO SHIFTS DIVIDE SIGNED
01021   207205              LAC (070707)
01022   652000              LMQ
01023   207206              LAC (252525
01024   664300              DIVS -23
01025   000001              000001
01026   047156              DAC FIAC
01027   641002              LACQ
01030   047157              DAC FIMQ
01031   547205              SAD (070707)
01032   741000              SKP
01033   740040              HLT         /BAD MQ, GOOD=070707      (730)
01034   207156              LAC FIAC
01035   547206              SAD (252525)
01036   741000              SKP
01037   740040              HLT         /BAD AC, GOOD=252525      (734)
01040   104130              JMS HLOOPS
01041   104157              JMS LOOP2
01042   740000              NOP
01043   207205              LAC (070707
01044   652000              LMQ
01045   207206              LAC (252525
01046   664300              DIVS -23
01047   777776              777776
01050   047156              DAC FIAC
01051   641002              LACQ
01052   047157              DAC FIMQ
01053   547205              SAD (070707
01054   741000              SKP
01055   740040              HLT         /BAD MQ, GOOD=070707      (752)
01056   207156              LAC FIAC
01057   547206              SAD (252525)
01060   741000              SKP
01061   740040              HLT         /BAD AC, GOOD=252525      (756)
01062   104130              JMS HLOOPS
                            .EJECT
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01063   104157              JMS LOOP2
01064   740000              NOP
01065   207207              LAC (707070
01066   652000              LMQ
01067   207206              LAC (252525
01070   664300              DIVS -23
01071   000001              000001
01072   641002              LACQ
01073   047157              DAC FIMQ
01074   547207              SAD (707070)
01075   741000              SKP
01076   740040              HLT       /BAD MQ, GOOD=707070     (773)
01077   207156              LAC FIAC
01100   547206              SAD (252525)
01101   741000              SKP
01102   740040              HLT       /BAD AC, GOOD=252525     (777)
01103   104130              JMS HLOOPS
01104   104157              JMS LOOP2
01105   740000              NOP
01106   207207              LAC (707070
01107   652000              LMQ
01110   207210              LAC (525252
01111   664300              DIVS -23
01112   777776              777776
01113   047156              DAC FIAC
01114   641002              LACQ
01115   047157              DAC FIMQ
01116   547207              SAD (707070
01117   741000              SKP
01120   740040              HLT       /BAD MQ, GOOD=707070     (1015)
01121   207156              LAC FIAC
01122   547210              SAD (525252)
01123   741000              SKP
01124   740040              HLT       /BAD AC, GOOD=525252     (1021)
01125   104130              JMS HLOOPS
01126   104157              JMS LOOP2
                    /INTEGER DIVIDE
                    /1 CLEAR MQ
                    /2 AC TO MQ
                    /3 CLEAR AC
                              .EJECT
```

```
01127   740000      NIDIV   NOP                     /NO SHIFT INTEGER DIVIDE
01130   207205              LAC (070707)
01131   652000              LMQ
01132   207206              LAC (252525
01133   673300              IDIV -23
01134   000001              000001
01135   047156              DAC FIAC
01136   641002              LACQ
01137   047157              DAC FIMQ
01140   547206              SAD (252525
01141   741000              SKP
01142   740040              HLT         /BAD MQ, GOOD=252525      (1037)
01143   207156              LAC FIAC
01144   547211              SAD (000000)
01145   741000              SKP
01146   740040              HLT         /BAD AC, GOOD=000000      (1043)
01147   104130              JMS HLOOPS
01150   104157              JMS LOOP2
01151   740000              NOP
01152   207205              LAC (070707
01153   652000              LMQ
01154   207206              LAC (252525
01155   673300              IDIV -23
01156   777776              777776
01157   047156              DAC FIAC
01160   641002              LACQ
01161   047157              DAC FIMQ
01162   547206              SAD (252525
01163   741000              SKP
01164   740040              HLT         /BAD MQ, GOOD=252525      (1061)
01165   207156              LAC FIAC
01166   547211              SAD (000000)
01167   741000              SKP
01170   740040              HLT         /BAD AC, GOOD=000000      (1065)
01171   104130              JMS HLOOPS
01172   104157              JMS LOOP2
                            .EJECT
```

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01173   740000          NOP
01174   207207          LAC (707070
01175   652000          LMQ
01176   207206          LAC (252525)
01177   673300          IDIV -23
01200   000001          000001
01201   047156          DAC FIAC
01202   641002          LACQ
01203   047157          DAC FIMQ
01204   547206          SAD (252525
01205   741000          SKP
01206   740040          HLT       /BAD MQ, GOOD=252525      (1103)
01207   207156          LAC FIAC
01210   547211          SAD (000000
01211   741000          SKP
01212   740040          HLT       /BAD AC, GOOD=000000      (1107)
01213   104130          JMS HLOOPS
01214   104157          JMS LOOP2
01215   740000          NOP
01216   207207          LAC (707070
01217   652000          LMQ
01220   207210          LAC (525252
01221   673300          IDIV -23
01222   777776          777776
01223   047156          DAC FIAC
01224   641002          LACQ
01225   047157          DAC FIMQ
01226   547210          SAD (525252
01227   741000          SKP
01230   740040          HLT       /BAD MQ, GOOD=525252      (1125)
01231   207156          LAC FIAC
01232   547211          SAD (000000)
01233   741000          SKP
01234   740040          HLT       /BAD AC, GOOD=000000      (1131)
01235   104130          JMS HLOOPS
01236   104157          JMS LOOP2
                        .EJECT
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```
01237   740000      NIDIVS  NOP                     /NO SHIFTS INTEGER DIVIDE SIGNED
01240   207205              LAC (070707)
01241   652000              LMQ
01242   207206              LAC (252525
01243   677300              IDIVS -23
01244   000001              000001
01245   047156              DAC FIAC
01246   641002              LACQ
01247   047157              DAC FIMQ
01250   547206              SAD (252525)
01251   741000              SKP
01252   740040              HLT         /BAD MQ, GOOD=252525      (1147)
01253   207156              LAC FIAC
01254   547211              SAD (000000)
01255   741000              SKP
01256   740040              HLT         /BAD AC, GOOD=000000      (1153)
01257   104130              JMS HLOOPS
01260   104157              JMS LOOP2
01261   740000              NOP
01262   207205              LAC (070707
01263   652000              LMQ
01264   207206              LAC (252525
01265   677300              IDIVS -23
01266   777776              777776
01267   047156              DAC FIAC
01270   641002              LACQ
01271   047157              DAC FIMQ
01272   547206              SAD (252525)
01273   741000              SKP
01274   740040              HLT         /BAD MQ, GOOD=252525      (1171)
01275   207156              LAC FIAC
01276   547211              SAD (000000)
01277   741000              SKP
01300   740040              HLT         /BAD AC, GOOD=000000      (1175)
01301   104130              JMS HLOOPS
01302   104157              JMS LOOP2
                            .EJECT
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01303   740000              NOP
01304   207207              LAC (707070
01305   652000              LMQ
01306   207210              LAC (525252
01307   677300              IDIVS -23
01310   000001              000001
01311   047156              DAC FIAC
01312   641002              LACQ
01313   047157              DAC FIMQ
01314   547210              SAD (525252
01315   741000              SKP
01316   740040              HLT       /BAD MQ, GOOD=525252     (1213)
01317   207156              LAC FIAC
01320   547212              SAD (777777
01321   741000              SKP
01322   740040              HLT       /BAD AC, GOOD=777777     (1217)
01323   104130              JMS HLOOPS
01324   104157              JMS LOOP2
01325   740000              NOP
01326   207207              LAC (707070
01327   652000              LMQ
01330   207210              LAC (525252
01331   677300              IDIVS -23
01332   777776              777776
01333   047156              DAC FIAC
01334   641002              LACQ
01335   047157              DAC FIMQ
01336   547210              SAD (525252
01337   741000              SKP
01340   740040              HLT       /BAD MQ, GOOD=525252     (1235)
01341   207156              LAC FIAC
01342   547212              SAD (777777)
01343   741000              SKP
01344   740040              HLT       /BAD AC, GOOD=777777     (1241)
01345   104130              JMS HLOOPS
01346   104157              JMS LOOP2
                    /FRACTION DIVIDE
                    /1 CLEAR MQ
                              .EJECT
```

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01347   740000      NFRDIV   NOP                    /NO SHIFT FRACTION DIVIDE
01350   207205               LAC (070707)
01351   652000               LMQ
01352   207206               LAC (252525
01353   670300               FRDIV -23
01354   000001               000001
01355   047156               DAC FIAC
01356   641002               LACQ
01357   047157               DAC FIMQ
01360   547211               SAD (000000
01361   741000               SKP
01362   740040               HLT        /BAD MQ, GOOD=000000      (1257)
01363   207156               LAC FIAC
01364   547206               SAD (252525)
01365   741000               SKP
01366   740040               HLT        /BAD AC, GOOD=252525      (1263)
01367   104130               JMS HLOOPS
01370   104157               JMS LOOP2
01371   740000               NOP
01372   207205               LAC (070707
01373   652000               LMQ
01374   207206               LAC (252525
01375   670300               FRDIV -23
01376   777776               777776
01377   047156               DAC FIAC
01400   641002               LACQ
01401   047157               DAC FIMQ
01402   547211               SAD (000000)
01403   741000               SKP
01404   740040               HLT        /BAD MQ, GOOD=000000      (1301)
01405   207156               LAC FIAC
01406   547206               SAD (252525)
01407   741000               SKP
01410   740040               HLT        /BAD AC, GOOD=252525      (1305)
01411   104130               JMS HLOOPS
01412   104157               JMS LOOP2
                             .EJECT
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01413   740000              NOP
01414   207207              LAC (707070
01415   652000              LMQ
01416   207206              LAC (252525
01417   670300              FRDIV -23
01420   000001              000001
01421   047156              DAC FIAC
01422   641002              LACQ
01423   047157              DAC FIMQ
01424   547211              SAD (000000)
01425   741000              SKP
01426   740040              HLT       /BAD MQ, GOOD=000000     (1323)
01427   207156              LAC FIAC
01430   547206              SAD (252525)
01431   741000              SKP
01432   740040              HLT       /BAD AC, GOOD=252525     (1327)
01433   104130              JMS HLOOPS
01434   104157              JMS LOOP2
01435   740000              NOP
01436   207207              LAC (707070
01437   652000              LMQ
01440   207210              LAC (525252
01441   670300              FRDIV -23
01442   777776              777776
01443   047156              DAC FIAC
01444   641002              LACQ
01445   047157              DAC FIMQ
01446   547211              SAD (000000)
01447   741000              SKP
01450   740040              HLT       /BAD MQ, GOOD=000000     (1345)
01451   207156              LAC FIAC
01452   547210              SAD (525252)
01453   741000              SKP
01454   740040              HLT       /BAD AC, GOOD=525252     (1351)
01455   104130              JMS HLOOPS
01456   104157              JMS LOOP2
                    /PDP-15 EAE II  -  TAPE 2
                    /
01457   740000      NFRDVS  NOP                 /NO SHIFTS FRACTION DIVIDE SIGNED
01460   207205              LAC (070707)
01461   652000              LMQ
01462   207206              LAC (252525
01463   674300              FRDIVS -23
01464   000001              000001
01465   047156              DAC FIAC
01466   641002              LACQ
01467   047157              DAC FIMQ
01470   547211              SAD (000000)
01471   741000              SKP
01472   740040              HLT       /BAD MQ, GOOD=000000     (1367)
01473   207156              LAC FIAC
01474   547206              SAD (252525)
01475   741000              SKP
01476   740040              HLT       /BAD AC, GOOD=252525     (1373)
01477   104130              JMS HLOOPS
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01500   104157          JMS LOOP2
01501   740000          NOP
01502   207205          LAC (070707
01503   652000          LMQ
01504   207206          LAC (252525
01505   674300          FRDIVS -23
01506   777776          777776
01507   047156          DAC FIAC
01510   641002          LACQ
01511   047157          DAC FIMQ
01512   547211          SAD (000000)
01513   741000          SKP
01514   740040          HLT       /BAD MQ, GOOD=000000      (1411)
01515   207156          LAC FIAC
01516   547206          SAD (252525)
01517   741000          SKP
01520   740040          HLT       /BAD AC,; +99 :252525     (1415)
01521   104130          JMS HLOOPS
01522   104157          JMS LOOP2
                        .EJECT
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01523   740000          NOP
01524   207207          LAC (707070
01525   652000          LMQ
01526   207206          LAC (252525
01527   674300          FRDIVS -23
01530   000001          000001
01531   047156          DAC FIAC
01532   641002          LACQ
01533   047157          DAC FIMQ
01534   547211          SAD (000000)
01535   741000          SKP
01536   740040          HLT       /BAD MQ, GOOD=000000      (1433)
01537   207156          LAC FIAC
01540   547206          SAD (252525)
01541   741000          SKP
01542   740040          HLT       /BAD AC, GOOD=252525      (1437)
01543   104130          JMS HLOOPS
01544   104157          JMS LOOP2
01545   740000          NOP
01546   207207          LAC (707070
01547   652000          LMQ
01550   207210          LAC (525252
01551   674300          FRDIVS -23
01552   777776          777776
01553   047156          DAC FIAC
01554   641002          LACQ
01555   047157          DAC FIMQ
01556   547212          SAD (777777)
01557   741000          SKP
01560   740040          HLT       /BAD MQ, GOOD=777777      (1455)
01561   207156          LAC FIAC
01562   547210          SAD (525252)
01563   741000          SKP
01564   740040          HLT       /BAD AC, GOOD=525252      (1461)
01565   104130          JMS HLOOPS
01566   104134          JMS HLOOPM
01567   104162          JMS LOOP4
01570   104157          JMS LOOP2
                        .EJECT
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                        /SHIFT COUNTER TEST
01571   744000  SHCT1   CLL                     /MULTIPLY WITH SHIFT OF ONE
01572   207212          LAC (777777
01573   673101          MUL -21
01574   000001          000001
01575   047156          DAC FIAC#
01576   547211          SAD (000000
01577   741000          SKP
01600   740040          HLT         /BAD AC, GOOD=000000      (1475)
01601   641002          LACQ
01602   047157          DAC FIMQ#
01603   547212          SAD (777777
01604   741000          SKP
01605   740040          HLT         /BAD MQ, GOOD=777777      (1502)
01606   641001          LACS
01607   740200          SZA
01610   740040          HLT         /BAD SC, GOOD=000000      (1505)
01611   104130          JMS HLOOPS
01612   104157  SHCT2   JMS LOOP2             /MULTIPLY WITH SHIFT OF TWO
01613   207212          LAC (777777
01614   673102          MUL -20
01615   000002          000002
01616   047156          DAC FIAC
01617   547213          SAD (000001
01620   741000          SKP
01621   740040          HLT         /BAD AC, GOOD=000001      (1516)
01622   641002          LACQ
01623   047157          DAC FIMQ
01624   547214          SAD (577777
01625   741000          SKP
01626   740040          HLT         /BAD MQ, GOOD=577777      (1523)
01627   641001          LACS
01630   740200          SZA
01631   740040          HLT         /BAD SC, GOOD=000000      (1526)
01632   104130          JMS HLOOPS
01633   104157  SHCT3   JMS LOOP2             /MULTIPLY WITH SHIFT OF THREE
01634   207212          LAC (777777
01635   673103          MUL -17
01636   000004          000004
01637   047156          DAC FIAC
01640   547215          SAD (000003
01641   741000          SKP
01642   740040          HLT         /BAD AC, GOOD=000003      (1537)
01643   641002          LACQ
01644   047157          DAC FIMQ
01645   547216          SAD (477777
01646   741000          SKP
01647   740040          HLT         /BAD MQ, GOOD=477717      (1544)
01650   641001          LACS
01651   740200          SZA
01652   740040          HLT         /BAD SC, GOOD=000000      (1547)
01653   104130          JMS HLOOPS
                        .EJECT
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01654   104157      SHCT4   JMS LOOP2           /SHIFT OF FOUR
01655   207212              LAC (777777
01656   673104              MUL -16
01657   000010              000010
01660   047156              DAC FIAC
01661   547217              SAD (000007
01662   741000              SKP
01663   740040              HLT         /BAD AC, GOOD=000007      (1560)
01664   641002              LACQ
01665   047157              DAC FIMQ
01666   547220              SAD (437777
01667   741000              SKP
01670   740040              HLT         /BAD MQ, GOOD=437777      (1565)
01671   641001              LACS
01672   740200              SZA
01673   740040              HLT         /BAD SC, GOOD=000000      (1574)
01674   104130              JMS HLOOPS
01675   104157      SHCT5   JMS LOOP2           /SHIFT OF FIVE
01676   207212              LAC (777777
01677   673105              MUL -15
01700   000020              000020
01701   047156              DAC FIAC
01702   547221              SAD (000017
01703   741000              SKP
01704   740040              HLT         /BAD AC, GOOD=000017      (1601)
01705   641002              LACQ
01706   047157              DAC FIMQ
01707   547222              SAD (417777
01710   741000              SKP
01711   740040              HLT         /BAD MQ, GOOD=417777      (1606)
01712   641001              LACS
01713   740200              SZA
01714   740040              HLT         /BAD SC, GOOD=000000      (1611)
01715   104130              JMS HLOOPS
01716   104157      SHCT6   JMS LOOP2           /SHIFT OF SIX
01717   207212              LAC (777777
01720   673106              MUL -14
01721   000040              000040
01722   047156              DAC FIAC
01723   547223              SAD (000037
01724   741000              SKP
01725   740040              HLT         /BAD AC, GOOD=000037      (1622)
01726   641002              LACQ
01727   047157              DAC FIMQ
01730   547224              SAD (407777
01731   741000              SKP
01732   740040              HLT         /BAD MQ, GOOD=407777      (1627)
01733   641001              LACS
01734   740200              SZA
01735   740040              HLT         /BAD SC, GOOD=000000      (1632)
01736   104130              JMS HLOOPS
                            .EJECT
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01737   104157      SHCT7     JMS LOOP2           /SHIFT OF SEVEN
01740   207212                LAC (777777
01741   673107                MUL -13
01742   000100                000100
01743   047156                DAC FIAC
01744   547225                SAD (000077
01745   741000                SKP
01746   740040                HLT       /BAD AC, GOOD=000077     (1643)
01747   641002                LACQ
01750   047157                DAC FIMQ
01751   547226                SAD (403777
01752   741000                SKP
01753   740040                HLT       /BAD MQ, GOOD=403777     (1650)
01754   641001                LACS
01755   740200                SZA
01756   740040                HLT       /BAD SC, GOOD=000000     (1653)
01757   104130                JMS HLOOPS
01760   104157      SHCT10    JMS LOOP2           /SHIFT OF TEN
01761   207212                LAC (777777
01762   673110                MUL -12
01763   000200                000200
01764   047156                DAC FIAC
01765   547227                SAD (000177
01766   741000                SKP
01767   740040                HLT       /BAD AC, GOOD=000177     (1664)
01770   641002                LACQ
01771   047157                DAC FIMQ
01772   547230                SAD (401777
01773   741000                SKP
01774   740040                HLT       /BAD MQ, GOOD=401777     (1671)
01775   641001                LACS
01776   740200                SZA
01777   740040                HLT       /BAD SC, GOOD=000000     (1674)
02000   104130                JMS HLOOPS
02001   104157      SHCT11    JMS LOOP2           /SHIFT OF ELEVEN
02002   207212                LAC (777777
02003   673111                MUL -11
02004   000400                000400
02005   047156                DAC FIAC
02006   547231                SAD (000377
02007   741000                SKP
02010   740040                HLT       /BAD AC, GOOD=000377     (1705)
02011   641002                LACQ
02012   047157                DAC FIMQ
02013   547232                SAD (400777
02014   741000                SKP
02015   740040                HLT       /BAD MQ, GOOD=400777     (1712)
02016   641001                LACS
02017   740200                SZA
02020   740040                HLT       /BAD SC, GOOD=000000     (1715)
02021   104130                JMS HLOOPS
                              .EJECT
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```
02022   104157      SHCT12  JMS LOOP2           /SHIFT OF TWELVE
02023   207212              LAC (777777
02024   673112              MUL -10
02025   001000              001000
02026   047156              DAC FIAC
02027   547233              SAD (000777
02030   741000              SKP
02031   740040              HLT         /BAD AC, GOOD=000777      (1726)
02032   641002              LACQ
02033   047157              DAC FIMQ
02034   547234              SAD (400377
02035   741000              SKP
02036   740040              HLT         /BAD MQ, GOOD=400377      (1733)
02037   641001              LACS
02040   740200              SZA
02041   740040              HLT         /BAD SC, GOOD=000000      (1736)
02042   104130              JMS HLOOPS
02043   104157      SHCT13  JMS LOOP2           /SHIFT OF THIRTEEN
02044   207212              LAC (777777
02045   673113              MUL -7
02046   002000              002000
02047   047156              DAC FIAC
02050   547235              SAD (001777
02051   741000              SKP
02052   740040              HLT         /BAD AC, GOOD=001777      (1747)
02053   641002              LACQ
02054   047157              DAC FIMQ
02055   547236              SAD (400177
02056   741000              SKP
02057   740040              HLT         /BAD MQ, GOOD=400177      (1754)
02060   641001              LACS
02061   740200              SZA
02062   740040              HLT         /BAD SC, GOOD=000000      (1757)
02063   104130              JMS HLOOPS
02064   104157      SHCT14  JMS LOOP2           /SHIFT OF FOURTEEN
02065   207212              LAC (777777
02066   673114              MUL -6
02067   004000              004000
02070   047156              DAC FIAC
02071   547237              SAD (003777
02072   741000              SKP
02073   740040              HLT         /BAD AC, GOOD=003777      (1770)
02074   641002              LACQ
02075   047157              DAC FIMQ
02076   547240              SAD (400077
02077   741000              SKP
02100   740040              HLT         /BAD MQ, GOOD=400077      (1775)
02101   641001              LACS
02102   740200              SZA
02103   740040              HLT         /BAD SC, GOOD=000000      (2000)
02104   104130              JMS HLOOPS
                            .EJECT
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02105   104157      SHCT15  JMS LOOP2           /SHIFT OF FIFTEEN
02106   207212              LAC (777777
02107   673115              MUL -5
02110   010000              010000
02111   047156              DAC FIAC
02112   547241              SAD (007777
02113   741000              SKP
02114   740040              HLT         /BAD AC, GOOD=007777     (2011)
02115   641002              LACQ
02116   047157              DAC FIMQ
02117   547242              SAD (400037
02120   741000              SKP
02121   740040              HLT         /BAD MQ, GOOD=400037     (2016)
02122   641001              LACS
02123   740200              SZA
02124   740040              HLT         /BAD SC, GOOD=000000     (2021)
02125   104130              JMS HLOOPS
02126   104157      SHCT16  JMS LOOP2           /SHIFT OF SIXTEEN
02127   207212              LAC (777777
02130   673116              MUL -4
02131   020000              020000
02132   047156              DAC FIAC
02133   547243              SAD (017777
02134   741000              SKP
02135   740040              HLT         /BAD AC, GOOD=017777     (2032)
02136   641002              LACQ
02137   047157              DAC FIMQ
02140   547244              SAD (400017
02141   741000              SKP
02142   740040              HLT         /BAD MQ, GOOD=400017     (2037)
02143   641001              LACS
02144   740200              SZA
02145   740040              HLT         /BAD SC, GOOD=000000   (2042)
02146   104130              JMS HLOOPS
02147   104157      SHCT17  JMS LOOP2           /SHIFT OF SEVENTEEN
02150   207212              LAC (777777
02151   673117              MUL -3
02152   040000              040000
02153   047156              DAC FIAC
02154   547245              SAD (037777
02155   741000              SKP
02156   740040              HLT         /BAD AC, GOOD=037777     (2053)
02157   641002              LACQ
02160   047157              DAC FIMQ
02161   547246              SAD (400007
02162   741000              SKP
02163   740040              HLT         /BAD MQ, GOOD=400007     (2060)
02164   641001              LACS
02165   740200              SZA
02166   740040              HLT         /BAD SC, GOOD=000000     (2063)
02167   104130              JMS HLOOPS
                            .EJECT
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02170   104157      SHCT20    JMS LOOP2           /SHIFT OF TWENTY
02171   207212                LAC (777777
02172   673120                MUL -2
02173   100000                100000
02174   047156                DAC FIAC
02175   547247                SAD (077777
02176   741000                SKP
02177   740040                HLT       /BAD AC, GOOD=077777     (2074)
02200   641002                LACQ
02201   047157                DAC FIMQ
02202   547250                SAD (400003
02203   741000                SKP
02204   740040                HLT       /BAD MQ, GOOD=400003     (2101)
02205   641001                LACS
02206   740200                SZA
02207   740040                HLT       /BAD SC, GOOD=000000     (2104)
02210   104130                JMS HLOOPS
02211   104157      SHCT21    JMS LOOP2           /SHIFT OF TWENTYONE
02212   207212                LAC (777777
02213   673121                MUL -1
02214   200000                200000
02215   047156                DAC FIAC
02216   547251                SAD (177777
02217   741000                SKP
02220   740040                HLT       /BAD AC, GOOD=177777     (2115)
02221   641002                LACQ
02222   047157                DAC FIMQ
02223   547252                SAD (400001
02224   741000                SKP
02225   740040                HLT       /BAD MQ, GOOD=400001     (2122)
02226   641001                LACS
02227   740200                SZA
02230   740040                HLT       /BAD SC, GOOD=000000     (2125)
02231   104130                JMS HLOOPS
02232   104157      SHCT22    JMS LOOP2           /SHIFT OF TWENTYTWO
02233   207212                LAC (777777)
02234   653122                MUL
02235   400000                400000
02236   047156                DAC FIAC
02237   547253                SAD (377777
02240   741000                SKP
02241   740040                HLT       /BAD AC, GOOD=377777     (2136)
02242   641002                LACQ
02243   047157                DAC FIMQ
02244   547254                SAD (400000
02245   741000                SKP
02246   740040                HLT       /BAD MQ, GOOD=400000     (2143)
02247   641001                LACS
02250   740200                SZA
02251   740040                HLT       /BAD SC, GOOD=000000     (2146)
02252   104130                JMS HLOOPS
02253   104134                JMS HLOOPM
02254   104162                JMS LOOP4
                              .EJECT
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                        /DIVIDE SHIFT TEST
02255   104157  DSC1    JMS LOOP2           /SHIFT OF ONE
02256   207255          LAC (52523
02257   652000          LMQ
02260   207256          LAC (052524
02261   640301          DIV-22
02262   377777          377777
02263   047156          DAC FIAC#
02264   547256          SAD (052524
02265   741000          SKP
02266   740040          HLT                 /BAD AC; GOOD = 052524
02267   641002          LACQ
02270   047157          DAC FIMQ#
02271   547257          SAD (125246
02272   741000          SKP
02273   740040          HLT                 /BAD MQ; GOOD = 125246
02274   104130          JMS HLOOPS
                        /
02275   104157  DSC2    JMS LOOP2           /SHIFT OF TWO
02276   207255          LAC (52523
02277   652000          LMQ
02300   207256          LAC (052524
02301   640302          DIV-21
02302   377777          377777
02303   047156          DAC FIAC
02304   547260          SAD (125250
02305   741000          SKP
02306   740040          HLT                 /BAD AC; GOOD = 125250
02307   641002          LACQ
02310   047157          DAC FIMQ
02311   547261          SAD (252514
02312   741000          SKP
02313   740040          HLT                 /BAD MQ; GOOD = 252514
02314   104130          JMS HLOOPS
                        .EJECT
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02315   104157      DSC3    JMS LOOP2           /SHIFT OF THREE
02316   207255              LAC (52523
02317   652000              LMQ
02320   207256              LAC (052524
02321   640303              DIV-20
02322   377777              377777
02323   047156              DAC FIAC
02324   547262              SAD (252520
02325   741000              SKP
02326   740040              HLT                 /BAD AC; GOOD = 252520
02327   641002              LACQ
02330   047157              DAC FIMQ
02331   547263              SAD (525230
02332   741000              SKP
02333   740040              HLT                 /BAD MQ; GOOD = 525230
02334   104130              JMS HLOOPS
                    /
02335   104157      DSC4    JMS LOOP2           /SHIFT OF FOUR
02336   207255              LAC (52523
02337   652000              LMQ
02340   207256              LAC (052524
02341   640304              DIV-17
02342   377777              377777
02343   047156              DAC FIAC
02344   547264              SAD (125241
02345   741000              SKP
02346   740040              HLT                 /BAD AC; GOOD = 125241
02347   641002              LACQ
02350   047157              DAC FIMQ
02351   547265              SAD (252461
02352   741000              SKP
02353   740040              HLT                 /BAD MQ; GOOD = 252461
02354   104130              JMS HLOOPS
                    /
02355   104157      DSC5    JMS LOOP2           /SHIFT OF FIVE
02356   207255              LAC (52523
02357   652000              LMQ
02360   207256              LAC (052524
02361   640305              DIV-16
02362   377777              377777
02363   047156              DAC FIAC
02364   547266              SAD (252503
02365   741000              SKP
02366   740040              HLT                 /BAD AC; GOOD = 252503
02367   641002              LACQ
02370   047157              DAC FIMQ
02371   547267              SAD (525142
02372   741000              SKP
02373   740040              HLT                 /BAD MQ; GOOD = 525142
02374   104130              JMS HLOOPS
                            .EJECT
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02375   104157      DSC6    JMS LOOP2           /SHIFT OF SIX
02376   207255              LAC (52523
02377   652000              LMQ
02400   207256              LAC (052524
02401   640306              DIV-15
02402   377777              377777
02403   047156              DAC FIAC
02404   547270              SAD (125207
02405   741000              SKP
02406   740040              HLT                 /BAD AC; GOOD = 125207
02407   641002              LACQ
02410   047157              DAC FIMQ
02411   547271              SAD (252305
02412   741000              SKP
02413   740040              HLT                 /BAD MQ; GOOD = 252305
02414   104130              JMS HLOOPS
                    /
02415   104157      DSC7    JMS LOOP2           /SHIFT OF SEVEN
02416   207255              LAC (52523
02417   652000              LMQ
02420   207256              LAC (052524
02421   640307              DIV-14
02422   377777              377777
02423   047156              DAC FIAC
02424   547272              SAD (252417
02425   741000              SKP
02426   740040              HLT                 /BAD AC; GOOD = 252417
02427   641002              LACQ
02430   047157              DAC FIMQ
02431   547273              SAD (524612
02432   741000              SKP
02433   740040              HLT                 /BAD MQ; GOOD = 524612
02434   104130              JMS HLOOPS
                    /
02435   104157      DSC10   JMS LOOP2           /SHIFT OF TEN
02436   207255              LAC (52523
02437   652000              LMQ
02440   207256              LAC (052524
02441   640310              DIV-13
02442   377777              377777
02443   047156              DAC FIAC
02444   547274              SAD (125037
02445   741000              SKP
02446   740040              HLT                 /BAD AC; GOOD = 125037
02447   641002              LACQ
02450   047157              DAC FIMQ
02451   547275              SAD (251425
02452   741000              SKP
02453   740040              HLT                 /BAD MQ; GOOD = 251425
02454   104130              JMS HLOOPS
                            .EJECT
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02455   104157      DSC11   JMS LOOP2           /SHIFT OF ELEVEN
02456   207255              LAC (52523
02457   652000              LMQ
02460   207256              LAC (052524
02461   640311              DIV-12
02462   377777              377777
02463   047156              DAC FIAC
02464   547276              SAD (252077
02465   741000              SKP
02466   740040              HLT                 /BAD AC; GOOD = 252077
02467   641002              LACQ
02470   047157              DAC FIMQ
02471   547277              SAD (523052
02472   741000              SKP
02473   740040              HLT                 /BAD MQ; GOOD = 523052
02474   104130              JMS HLOOPS
                    /
02475   104157      DSC12   JMS LOOP2           /SHIFT OF TWELVE
02476   207255              LAC (52523
02477   652000              LMQ
02500   207256              LAC (052524
02501   640312              DIV-11
02502   377777              377777
02503   047156              DAC FIAC
02504   547300              SAD (124177
02505   741000              SKP
02506   740040              HLT                 /BAD AC; GOOD = 124177
02507   641002              LACQ
02510   047157              DAC FIMQ
02511   547301              SAD (246125
02512   741000              SKP
02513   740040              HLT                 /BAD MQ; GOOD = 246125
02514   104130              JMS HLOOPS
                    /
02515   104157      DSC13   JMS LOOP2 /SHIFT OF THIRTEEN
02516   207255              LAC (52523
02517   652000              LMQ
02520   207256              LAC (052524
02521   640313              DIV-10
02522   377777              377777
02523   047156              DAC FIAC
02524   547302              SAD (250377
02525   741000              SKP
02526   740040              HLT                 /BAD AC; GOOD = 250377
02527   641002              LACQ
02530   047157              DAC FIMQ
02531   547303              SAD (514252
02532   741000              SKP
02533   740040              HLT                 /BAD MQ; GOOD = 514252
02534   104130              JMS HLOOPS
                            .EJECT
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02535   104157      DSC14   JMS LOOP2           /SHIFT OF FOURTEEN
02536   207255              LAC (52523
02537   652000              LMQ
02540   207256              LAC (052524
02541   640314              DIV-7
02542   377777              377777
02543   047156              DAC FIAC
02544   547304              SAD (120777
02545   741000              SKP
02546   740040              HLT             /BAD AC; GOOD = 120777
02547   641002              LACQ
02550   047157              DAC FIMQ
02551   547305              SAD (230525
02552   741000              SKP
02553   740040              HLT             /BAD MQ; GOOD = 230525
02554   104130              JMS HLOOPS
                    /
02555   104157      DSC15   JMS LOOP2           /SHIFT OF FIFTEEN
02556   207255              LAC (52523
02557   652000              LMQ
02560   207256              LAC (052524
02561   640315              DIV-6
02562   377777              377777
02563   047156              DAC FIAC
02564   547306              SAD (241777
02565   741000              SKP
02566   740040              HLT             /BAD AC; GOOD = 241777
02567   641002              LACQ
02570   047157              DAC FIMQ
02571   547307              SAD (461252
02572   741000              SKP
02573   740040              HLT             /BAD MQ; GOOD = 461252
02574   104130              JMS HLOOPS
                    /
02575   104157      DSC16   JMS LOOP2           /SHIFT OF SIXTEEN
02576   207255              LAC (52523
02577   652000              LMQ
02600   207256              LAC (052524
02601   640316              DIV-5
02602   377777              377777
02603   047156              DAC FIAC
02604   547310              SAD (103777
02605   741000              SKP
02606   740040              HLT             /BAD AC;  GOOD = 103777
02607   641002              LACQ
02610   047157              DAC FIMQ
02611   547311              SAD (142525
02612   741000              SKP
02613   740040              HLT             /BAD MQ; GOOD = 142525
02614   104130              JMS HLOOPS
                            .EJECT
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02615   104157      DSC17   JMS LOOP2           /SHIFT OF SEVENTEEN
02616   207255              LAC (52523
02617   652000              LMQ
02620   207256              LAC (052524
02621   640317              DIV-4
02622   377777              377777
02623   047156              DAC FIAC
02624   547312              SAD (207777
02625   741000              SKP
02626   740040              HLT                 /BAD AC; GOOD = 207777
02627   641002              LACQ
02630   047157              DAC FIMQ
02631   547313              SAD (305252
02632   741000              SKP
02633   740040              HLT                 /BAD MQ; GOOD = 305252
02634   104130              JMS HLOOPS
                    /
02635   104157      DSC20   JMS LOOP2           /SHIFT OF TWENTY
02636   207255              LAC (52523
02637   652000              LMQ
02640   207256              LAC (052524
02641   640320              DIV-3
02642   377777              377777
02643   047156              DAC FIAC
02644   547243              SAD (017777
02645   741000              SKP
02646   740040              HLT                 /BAD AC; GOOD = 017777
02647   641002              LACQ
02650   047157              DAC FIMQ
02651   547314              SAD (612525
02652   741000              SKP
02653   740040              HLT                 /BAD MQ; GOOD = 612525
02654   104130              JMS HLOOPS
                    /
02655   104157      DSC21   JMS LOOP2           /SHIFT OF TWENTYONE
02656   207255              LAC (52523
02657   652000              LMQ
02660   207256              LAC (052524
02661   640321              DIV-2
02662   377777              377777
02663   047156              DAC FIAC
02664   547315              SAD (037776
02665   741000              SKP
02666   740040              HLT                 /BAD AC; GOOD = 037776
02667   641002              LACQ
02670   047157              DAC FIMQ
02671   547316              SAD (425252
02672   741000              SKP
02673   740040              HLT                 /BAD MQ; GOOD = 425252
02674   104130              JMS HLOOPS
02675   104134              JMS HLOOPM
02676   104162              JMS LOOP4
                    /EAE PART II  TAPE 2A
                    /EAE SIGN TEST
                    /
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                        /MULS SIGN TEST
                        /EAE AC SIGN FF TEST
                        /
02677   104157  STMUL   JMS LOOP2          /(HLT ADDRESS)
02700   207317          LAC (000002
02701   664000          GSM                /GSM=0  AC=0
02702   653122          MUL
02703   777776          777776
02704   741100          SPA
02705   740040          HLT                /SHOULD BE POSITIVE  (2160)
02706   207320          LAC (777775
02707   664000          GSM                /GSM=1   AC=1
02710   207320          LAC (777775
02711   653122          MUL
02712   777776          777776
02713   740100          SMA
02714   740040          HLT                /SHOULD BE NEGATIVE  (2167)
02715   104130          JMS HLOOPS
02716   104157  STMULS  JMS LOOP2
02717   207213          LAC (000001
02720   664000          GSM                /GSM=0  AC=0
02721   657122          MULS
02722   000002          000002
02723   741100          SPA
02724   740040          HLT                /SHOULD BE POSITIVE  (2177)
02725   207321          LAC (777776
02726   664000          GSM                /GSM=1  AC=0
02727   207317          LAC (000002
02730   657122          MULS
02731   777776          777776
02732   741100          SPA
02733   741000          SKP
02734   740040          HLT                /SHOULD BE NEGATIVE  (2207)
02735   207320          LAC (777775
02736   664000          GSM                /GSM=1  AC=1
02737   207320          LAC (777775
02740   657122          MULS
02741   777776          777776
02742   741100          SPA
02743   740040          HLT                /SHOULD BE POSITIVE  (2216)
02744   207213          LAC (000001
02745   664000          GSM                /GSM=0  AC=1
02746   207320          LAC (777775
02747   657122          MULS
02750   000002          000002
02751   741100          SPA
02752   741000          SKP
02753   740040          HLT                /SHOULD BE NEGATIVE  (2226)
                        .EJECT
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                        /DIVIDE SIGN TEST DIVS
02754   104130                  JMS HLOOPS
02755   104157          STDIVS  JMS LOOP2
02756   207322                  LAC (000005
02757   652000                  LMQ
02760   202764                  LAC .+4
02761   664000                  GSM
02762   207211                  LAC (000000
02763   644323                  DIVS
02764   000004                  000004
02765   741400                  SZL
02766   740040                  HLT         /BAD LINK, GOOD LINK=0    (2241)
02767   047156                  DAC FIAC#
02770   547213                  SAD (000001
02771   741000                  SKP
02772   740040                  HLT         /BAD AC, GOOD=000001      (2245)
02773   641002                  LACQ
02774   047157                  DAC FIMQ#
02775   547213                  SAD (000001
02776   741000                  SKP
02777   740040                  HLT         /BAD MQ, GOOD=000001      (2252)
03000   104130                  JMS HLOOPS
                                .EJECT
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03001   104157      SIGNA   JMS LOOP2
03002   207322              LAC (000005
03003   652000              LMQ
03004   207323              LAC (777773
03005   664000              GSM
03006   207211              LAC (0)
03007   644323              DIVS
03010   000004              000004
03011   741400              SZL
03012   740040              HLT         /BAD LINK, GOOD LINK=0    (2265)
03013   047156              DAC FIAC
03014   547213              SAD (000001
03015   741000              SKP
03016   740040              HLT         /BAD AC, GOOD=000001      (2271)
03017   641002              LACQ
03020   047157              DAC FIMQ
03021   547321              SAD (777776
03022   741000              SKP
03023   740040              HLT         /BAD MQ, GOOD=777776      (2276)
03024   104130              JMS HLOOPS
03025   104157      SIGNB   JMS LOOP2
03026   207324              LAC (777772
03027   652000              LMQ
03030   203034              LAC .+4
03031   664000              GSM
03032   207212              LAC (777777
03033   644323              DIVS
03034   000004              000004
03035   741400              SZL
03036   740040              HLT         /BAD LINK, GOOD LINK=0    (2311)
03037   047156              DAC FIAC#
03040   547321              SAD (777776
03041   741000              SKP
03042   740040              HLT         /BAD AC, GOOD=777776      (2315)
03043   641002              LACQ
03044   047157              DAC FIMQ#
03045   547321              SAD (777776
03046   741000              SKP
03047   740040              HLT         /BAD MQ, GOOD=777776      (2322)
03050   104130              JMS HLOOPS
                            .EJECT
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03051   104157      SIGNC   JMS LOOP2
03052   207324              LAC (777772
03053   652000              LMQ
03054   207323              LAC (777773
03055   664000              GSM
03056   207212              LAC (777777
03057   644323              DIVS
03060   000004              000004
03061   741400              SZL
03062   740040              HLT         /BAD LINK, GOOD LINK=0    (2335)
03063   047156              DAC FIAC
03064   547321              SAD (777776
03065   741000              SKP
03066   740040              HLT         /BAD AC, GOOD=777776      (2341)
03067   641002              LACQ
03070   047157              DAC FIMQ
03071   547213              SAD (000001
03072   741000              SKP
03073   740040              HLT         /BAD MQ, GOOD=000001      (2346)
03074   104130              JMS HLOOPS
                            .EJECT
```

```
                        /DIVIDE SIGN TEST  IDIVS
03075   104157  STIDVS  JMS LOOP2
03076   207212          LAC (777777
03077   652000          LMQ
03100   203104          LAC .+4
03101   664000          GSM
03102   207322          LAC (000005
03103   657323          IDIVS
03104   000004          000004
03105   741400          SZL
03106   740040          HLT     /BAD LINK                   (2361)
03107   047156          DAC FIAC#
03110   547213          SAD (000001
03111   741000          SKP
03112   740040          HLT     /BAD AC, GOOD=000001        (2365)
03113   641002          LACQ
03114   047157          DAC FIMQ#
03115   547213          SAD (000001
03116   741000          SKP
03117   740040          HLT     /BAD MQ, GOOD=000001        (2372)
03120   104130          JMS HLOOPS
03121   104157  SIGND   JMS LOOP2
03122   207211          LAC (000000
03123   652000          LMQ
03124   207321          LAC (777776
03125   664000          GSM
03126   207322          LAC (000005
03127   657323          IDIVS
03130   000004          000004
03131   741400          SZL
03132   740040          HLT     /BAD LINK,                  (2405)
03133   047156          DAC FIAC
03134   547213          SAD (000001
03135   741000          SKP
03136   740040          HLT     /BAD AC, GOOD=000001        (2411)
03137   641002          LACQ
03140   047157          DAC FIMQ
03141   547321          SAD (777776
03142   741000          SKP
03143   740040          HLT     /BAD MQ, GOOD=777776        (2416)
03144   104130          JMS HLOOPS
                        .EJECT
```

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03145   104157      SIGNE   JMS LOOP2
03146   207212              LAC (777777
03147   652000              LMQ
03150   203154              LAC .+4
03151   664000              GSM
03152   207324              LAC (777772
03153   657323              IDIVS
03154   000004              000004
03155   741400              SZL
03156   740040              HLT       /BAD LINK                   (2431)
03157   047156              DAC FIAC#
03160   547321              SAD (777776
03161   741000              SKP
03162   740040              HLT       /BAD AC, GOOD=777776        (2435)
03163   641002              LACQ
03164   047157              DAC FIMQ#
03165   547321              SAD (777776
03166   741000              SKP
03167   740040              HLT       /BAD MQ, GOOD=777776        (2442)
03170   104130              JMS HLOOPS
03171   104157      SIGNF   JMS LOOP2
03172   207212              LAC (777777
03173   652000              LMQ
03174   207323              LAC (777773
03175   664000              GSM
03176   207324              LAC (777772
03177   657323              IDIVS
03200   000004              000004
03201   741400              SZL
03202   740040              HLT       /BAD LINK,                  (2455)
03203   047156              DAC FIAC
03204   547321              SAD (777776
03205   741000              SKP
03206   740040              HLT       /BAD AC, GOOD=777776        (2461)
03207   641002              LACQ
03210   047157              DAC FIMQ
03211   547213              SAD (000001
03212   741000              SKP
03213   740040              HLT       /BAD MQ, GOOD=000001        (2466)
03214   104130              JMS HLOOPS
                            .EJECT
```

```
                        /DIVIDE SIGN TEST  FDIVS
03215   104157  STFDVS  JMS LOOP2
03216   207211          LAC (000000
03217   652000          LMQ
03220   203224          LAC .+4
03221   664000          GSM
03222   207322          LAC (000005
03223   654323          FRDIVS
03224   000004          000004
03225   740400          SNL
03226   740040          HLT       /BAD LINK                   (2501)
03227   047156          DAC FIAC#
03230   547325          SAD (777774
03231   741000          SKP
03232   740040          HLT                 /BAD AC, GOOD=777774    (2505)
03233   641002          LACQ
03234   047157          DAC FIMQ#
03235   547215          SAD (000003
03236   741000          SKP
03237   740040          HLT       /BAD MQ, GOOD=000003      (2512)
03240   104130          JMS HLOOPS
03241   104157  SIGNG   JMS LOOP2
03242   207210          LAC (525252
03243   652000          LMQ
03244   207321          LAC (777776
03245   664000          GSM
03246   207322          LAC (000005
03247   654323          FRDIVS
03250   000001          000001
03251   740400          SNL
03252   740040          HLT       /BAD LINK                   (2525)
03253   047156          DAC FIAC
03254   547326          SAD (000016
03255   741000          SKP
03256   740040          HLT                 /BAC AC, GOOD = 000016  (2531)
03257   641002          LACQ
03260   047157          DAC FIMQ
03261   547320          SAD (777775
03262   741000          SKP
03263   740040          HLT                 /BAD MQ, GOOD = 777775  (2536)
03264   104130          JMS HLOOPS
                        .EJECT
```

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03265   104157      SIGNH   JMS LOOP2
03266   207206              LAC (252525
03267   652000              LMQ
03270   203274              LAC .+4
03271   664000              GSM
03272   207324              LAC (777772
03273   654323              FRDIVS
03274   000004              000004
03275   740400              SNL
03276   740040              HLT       /BAD LINK                 (2551)
03277   047156              DAC FIAC#
03300   547215              SAD (000003
03301   741000              SKP
03302   740040              HLT                 /BAD AC, GOOD = 000003  (2555)
03303   641002              LACQ
03304   047157              DAC FIMQ#
03305   547325              SAD (777774
03306   741000              SKP
03307   740040              HLT                 /BAD MQ, GOOD=777774    (2526)
03310   104130              JMS HLOOPS
03311   104157      SIGNI   JMS LOOP2
03312   207211              LAC (000000
03313   652000              LMQ
03314   207323              LAC (777773
03315   664000              GSM
03316   207324              LAC (777772
03317   654323              FRDIVS
03320   000004              000004
03321   740400              SNL
03322   740040              HLT       /BAD LINK                 (2575)
03323   047156              DAC FIAC
03324   547215              SAD (000003
03325   741000              SKP
03326   740040              HLT                 /BAD AC, GOOD=000003    (2601)
03327   641002              LACQ
03330   047157              DAC FIMQ
03331   547215              SAD (000003
03332   741000              SKP
03333   740040              HLT                 /BAD MQ, GOOD=000003    (2606)
03334   104130              JMS HLOOPS
03335   104134              JMS HLOOPM
                            .EJECT
```

```
                        /MULTIPLY DIVIDE TEST
                        /MULTIPLY TEST USING 22 SHIFTS
03336   104162          JMS LOOP4
03337   104157  MULTST  JMS LOOP2
03340   207212          LAC (777777
03341   652000          LMQ
03342   207210          LAC (525252
03343   653122          MUL
03344   000001          000001
03345   047156          DAC FIAC#
03346   547211          SAD (000000
03347   741000          SKP
03350   740040          HLT       /BAD AC, GOOD=000000     (2623)
03351   641002          LACQ
03352   047157          DAC FIMQ#
03353   547210          SAD (525252
03354   741000          SKP
03355   740040          HLT       /BAD MQ, GOOD=525252     (2630)
03356   104130          JMS HLOOPS
03357   104157  MULA    JMS LOOP2
03360   207212          LAC (777777
03361   652000          LMQ
03362   207212          LAC (777777
03363   653122          MUL
03364   100000          100000
03365   047156          DAC FIAC
03366   547247          SAD (077777)
03367   741000          SKP
03370   740040          HLT       /BAD AC, GOOD=077777     (2643)
03371   641002          LACQ
03372   047157          DAC FIMQ
03373   547327          SAD (700000
03374   741000          SKP
03375   740040          HLT       /BAD MQ, GOOD=700000     (2650)
03376   104130          JMS HLOOPS
                        .EJECT
```

```
03377   104157      MULB    JMS LOOP2
03400   207212              LAC (777777
03401   652000              LMQ
03402   207210              LAC (525252
03403   653122              MUL
03404   777777              777777
03405   047156              DAC FIAC#
03406   547330              SAD (525251
03407   741000              SKP
03410   740040              HLT         /BAD AC, GOOD=525251      (2663)
03411   641002              LACQ
03412   047157              DAC FIMQ#
03413   547331              SAD (252526
03414   741000              SKP
03415   740040              HLT         /BAD MQ, GOOD=252526      (2670)
03416   104130              JMS HLOOPS
03417   104157      MULC    JMS LOOP2
03420   207212              LAC (777777
03421   652000              LMQ
03422   207212              LAC (777777
03423   653122              MUL
03424   252525              252525
03425   047156              DAC FIAC
03426   547332              SAD (252524)
03427   741000              SKP
03430   740040              HLT         /BAD AC, GOOD=252524      (2703)
03431   641002              LACQ
03432   047157              DAC FIMQ
03433   547333              SAD (525253)
03434   741000              SKP
03435   740040              HLT         /BAD MQ, GOOD=525253      (2710)
03436   104130              JMS HLOOPS
                            .EJECT
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03437   104157      MULD    JMS LOOP2
03440   207212              LAC (777777
03441   652000              LMQ
03442   207213              LAC (000001
03443   653122              MUL
03444   777777              777777
03445   047156              DAC FIAC#
03446   547211              SAD (000000)
03447   741000              SKP
03450   740040              HLT       /BAD AC, GOOD=000000     (2723)
03451   641002              LACQ
03452   047157              DAC FIMQ#
03453   547212              SAD (777777)
03454   741000              SKP
03455   740040              HLT       /BAD MQ, GOOD=777777     (2730)
03456   104130              JMS HLOOPS
03457   104157      MULE    JMS LOOP2
03460   207212              LAC (777777
03461   652000              LMQ
03462   207212              LAC (777777
03463   653122              MUL
03464   000001              000001
03465   047156              DAC FIAC
03466   547211              SAD (000000
03467   741000              SKP
03470   740040              HLT       /BAD AC, GOOD=000000     (2743)
03471   641002              LACQ
03472   047157              DAC FIMQ
03473   547212              SAD (777777
03474   741000              SKP
03475   740040              HLT       /BAD MQ, GOOD=777777     (2750)
03476   104130              JMS HLOOPS
                    /PDP-15 EAE II  -  TAPE 3
                    /
                    /DIVIDE TEST USING 23 SHIFTS
                    /
03477   104157      DIVTST  JMS LOOP2
03500   207211              LAC (000000
03501   652000              LMQ
03502   207211              LAC (000000
03503   640323              DIV
03504   000000              000000
03505   047156              DAC FIAC#
03506   547211              SAD (000000
03507   741000              SKP
03510   740040              HLT       /BAD AC, GOOD=000000     (2763)
03511   641002              LACQ
03512   047157              DAC FIMQ#
03513   547317              SAD (000002
03514   741000              SKP
03515   740040              HLT       /BAD MQ, GOOD=000002     (2770)
03516   104130              JMS HLOOPS
03517   104157      DIVA    JMS LOOP2
03520   207212              LAC (777777
03521   652000              LMQ
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03522   207334          LAC (677777
03523   640323          DIV
03524   000000          000000
03525   047156          DAC FIAC
03526   547253          SAD (377777
03527   741000          SKP
03530   740040          HLT             /BAD AC, GOOD=377777    (3003)
03531   641002          LACQ
03532   047157          DAC FIMQ
03533   547321          SAD (777776
03534   741000          SKP
03535   740040          HLT             /BAD MQ, GOOD=777776    (3010)
03536   104130          JMS HLOOPS
                        .EJECT
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```
03537   104157      DIVB    JMS LOOP2
03540   207212              LAC (777777
03541   652000              LMQ
03542   207334              LAC (677777
03543   640323              DIV
03544   000001              000001
03545   047156              DAC FIAC#
03546   547335              SAD (377771
03547   741000              SKP
03550   740040              HLT                 /BAD AC, GOOD=377771    (3023)
03551   641002              LACQ
03552   047157              DAC FIMQ#
03553   547321              SAD (777776
03554   741000              SKP
03555   740040              HLT                 /BAD MQ, GOOD=777776    (3030)
03556   104130              JMS HLOOPS
03557   104157      DIVC    JMS LOOP2
03560   207211              LAC (000000
03561   652000              LMQ
03562   207211              LAC (000000
03563   640323              DIV
03564   000001              000001
03565   047156              DAC FIAC
03566   547211              SAD (000000
03567   741000              SKP
03570   740040              HLT         /BAD AC, GOOD=000000    (3043)
03571   641002              LACQ
03572   047157              DAC FIMQ
03573   547211              SAD (000000)
03574   741000              SKP
03575   740040              HLT         /BAD MQ, GOOD=000000    (3050)
03576   104130              JMS HLOOPS
                            .EJECT
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```
03577   104157      DIVD    JMS LOOP2           /SUB-SUB
03600   207334              LAC (677777
03601   652000              LMQ
03602   207211              LAC (000000
03603   640323              DIV
03604   677777              677777
03605   047156              DAC FIAC#
03606   547211              SAD (000000
03607   741000              SKP
03610   740040              HLT         /BAD AC, GOOD=000000     (3063)
03611   641002              LACQ
03612   047157              DAC FIMQ#
03613   547213              SAD (000001
03614   741000              SKP
03615   740040              HLT         /BAD MQ, GOOD=000001     (3070)
03616   104130              JMS HLOOPS
03617   104157      DIVE    JMS LOOP2           /ADD-ADD
03620   207333              LAC (525253)
03621   652000              LMQ
03622   207332              LAC (252524)
03623   640323              DIV
03624   252525              252525
03625   047156              DAC FIAC
03626   547211              SAD (000000
03627   741000              SKP
03630   740040              HLT         /BAD AC, GOOD=000000     (3103)
03631   641002              LACQ
03632   047157              DAC FIMQ
03633   547212              SAD (777777
03634   741000              SKP
03635   740040              HLT         /BAD MQ, GOOD=777777     (3110)
03636   104130              JMS HLOOPS
                            .EJECT
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03637   104157      DIVF    JMS LOOP2           /ADD-SUB-ADD-SUB
03640   207333              LAC (525253)
03641   652000              LMQ
03642   207332              LAC (252524)
03643   640323              DIV
03644   777777              777777
03645   047156              DAC FIAC#
03646   547211              SAD (000000
03647   741000              SKP
03650   740040              HLT       /BAD AC, GOOD=000000      (3123)
03651   641002              LACQ
03652   047157              DAC FIMQ#
03653   547206              SAD (252525
03654   741000              SKP
03655   740040              HLT       /BAD MQ, GOOD=252525      (3130)
03656   104130              JMS HLOOPS
03657   104157      DIVG    JMS LOOP2
03660   207331              LAC (252526                   /ADD-SUB-ADD-SUB
03661   652000              LMQ
03662   207330              LAC (525251
03663   640323              DIV
03664   777777              777777
03665   047156              DAC FIAC
03666   547211              SAD (0)
03667   741000              SKP
03670   740040              HLT       /BAD AC, GOOD=000000      (3143)
03671   641002              LACQ
03672   047157              DAC FIMQ
03673   547210              SAD (525252
03674   741000              SKP
03675   740040              HLT       /BAD MQ, GOOD=525252      (3150)
03676   104130              JMS HLOOPS
03677   104134              JMS HLOOPM
03700   104162              JMS LOOP4
                            .EJECT
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```
                        /MUL AND DIV INSTRUCTION DONE BACK TO BACK
                        /
                                /SPEED MULTIPLY
03701   104157  MSPEED  JMS LOOP2
03702   207212          LAC (777777
03703   652000          LMQ
03704   207206          LAC (252525
03705   673102          MUL -20
03706   777777          777777
03707   673102          MUL -20
03710   777777          777777
03711   673102          MUL -20
03712   777777          777777
03713   673102          MUL -20
03714   777777          777777
03715   673102          MUL -20
03716   777777          777777
03717   047156          DAC FIAC#
03720   547214          SAD (577777)
03721   741000          SKP
03722   740040          HLT       /BAD AC, GOOD=577777      (3175)
03723   641002          LACQ
03724   047157          DAC FIMQ#
03725   547336          SAD (337777)
03726   741000          SKP
03727   740040          HLT       /BAD MQ, GOOD=337777      (3202)
03730   207206          LAC (252525
03731   653122          MUL
03732   520000          520000
03733   653122          MUL
03734   520000          520000
03735   653122          MUL
03736   520000          520000
03737   653122          MUL
03740   520000          520000
03741   653122          MUL
03742   520000          520000
03743   047156          DAC FIAC
03744   547337          SAD (024613)
03745   741000          SKP
03746   740040          HLT       /BAD AC, GOOD=024613      (3221)
03747   641002          LACQ
03750   047157          DAC FIMQ
03751   547340          SAD (140000)
03752   741000          SKP
03753   740040          HLT       /BAD MQ, GOOD=140000      (3226)
03754   104130          JMS HLOOPS
                        .EJECT
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                                    /SPEED DIVIDE
                          /
03755   104157    DSPEED  JMS LOOP2
03756   207212            LAC (777777
03757   652000            LMQ
03760   207206            LAC (252525
03761   660302            DIV -21
03762   000002            000002
03763   660302            DIV -21
03764   000002            000002
03765   660302            DIV -21
03766   000002            000002
03767   660302            DIV -21
03770   000002            0000002
03771   660302            DIV -21
03772   000002            000002
03773   047156            DAC FIAC
03774   547341            SAD (525005
03775   741000            SKP
03776   740040            HLT                 /BAD AC, GOOD=525005    (3251)
03777   641002            LACQ
04000   047157            DAC FIMQ
04001   547342            SAD (777252
04002   741000            SKP
04003   740040            HLT                 /BAD MQ, GOOD=777252    (3256)
04004   104130            JMS HLOOPS
04005   104157            JMS LOOP2
04006   207206            LAC (252525
04007   652000            LMQ
04010   207206            LAC (252525
04011   640323            DIV
04012   000052            000052
04013   640323            DIV
04014   000052            000052
04015   640323            DIV
04016   000052            000052
04017   640323            DIV
04020   000052            000052
04021   640323            DIV
04022   000052            000052
04023   047156            DAC FIAC
04024   547343            SAD (002651
04025   741000            SKP
04026   740040            HLT                 /BAD AC, GOOD=002651    (3301)
04027   641002            LACQ
04030   047157            DAC FIMQ
04031   547344            SAD (253252
04032   741000            SKP
04033   740040            HLT                 /BAD MQ, GOOD=253252    (3306)
04034   104130            JMS HLOOPS
                          .EJECT
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```
                                /SPEED MULTIPLY AND DIVIDE
                                /
04035   104157          SPMUDV  JMS LOOP2
04036   207212                  LAC (777777
04037   652000                  LMQ
04040   207251                  LAC (177777
04041   664000                  GSM
04042   653122                  MUL
04043   252525                  252525
04044   640323                  DIV
04045   252525                  252525
04046   047156                  DAC FIAC
04047   547211                  SAD (0)
04050   741000                  SKP
04051   740040                  HLT         /BAD AC, GOOD=000000      (3324)
04052   641002                  LACQ
04053   047157                  DAC FIMQ
04054   547251                  SAD (177777)
04055   741000                  SKP
04056   740040                  HLT         /BAD MQ, GOOD=177777      (3331)
04057   104130                  JMS HLOOPS
04060   104157                  JMS LOOP2
04061   207247                  LAC (077777
04062   653122                  MUL
04063   252525                  252525
04064   640323                  DIV
04065   000025                  000025
04066   653122                  MUL
04067   252525                  252525
04070   640323                  DIV
04071   000025                  000025
04072   653122                  MUL
04073   252525                  252525
04074   640323                  DIV
04075   000252                  000252
04076   653122                  MUL
04077   252525                  252525
04100   640323                  DIV
04101   000252                  000252
04102   653122                  MUL
04103   252525                  252525
04104   640323                  DIV
04105   000052                  000052
04106   047156                  DAC FIAC
04107   547345                  SAD (405476
04110   741000                  SKP
04111   740040                  HLT                 /BAD AC, GOOD=405476    (3364)
04112   641002                  LACQ
04113   047157                  DAC FIMQ
04114   547346                  SAD (117162
04115   741000                  SKP
04116   740040                  HLT                 /BAD MQ, GOOD=117162    (3371
04117   104130                  JMS HLOOPS
04120   104134                  JMS HLOOPM
04121   741000                  SKP
```

.EJECT

```
04122   777700      LOOPA   777700
04123   444122              ISZ .-1
04124   600246              JMP NEAE
04125   207347              LAC (777700
04126   044122              DAC LOOPA
04127   620203              JMP* ADVP
                            .EJECT
```

```
                        /INCREMENT ERROR LOCATION ON ERROR
                        /
00020                           .LOC 20
                        /
00020   740040                  HLT
00021   750001                  CLA!CMA
00022   340020                  TAD 20          /SUBTRACT 1 FROM (20)
00023   040025                  DAC .+2
00024   741000                  SKP
00025   740000                  NOP             /ERROR LOCATION
00026   460025                  ISZ* .-1        /INCREMENT
00027   620020                  JMP* 20         /EXIT
                        /
                        /SMALL LOOP HALT
04130                           .LOC LOOPA+6
04130   740040          HLOOPS  HLT
04131   104202                  JMS HLTS
04132   104226                  JMS LOOPS
04133   624130                  JMP* HLOOPS
                        /
                        /MEDIUM HLT LOOP
04134   740040          HLOOPM  HLT
04135   104212                  JMS HLTM
04136   104234                  JMS LOOPM
04137   624134                  JMP* HLOOPM
                        /
                        /LARGE HLT LOOP
04140   740040          HLOOPL  HLT
04141   104143                  JMS LOOPL
04142   624140                  JMP* HLOOPL
                        /
04143   740000          LOOPL   NOP
04144   750004                  LAS
04145   507350                  AND (010000     /SWITCH 5 NOT SET
04146   741200                  SNA
04147   624164                  JMP* LOOP5              /LOOP
04150   624143                  JMP* LOOPL              /CONTINUE
                        /
04151   740040          SWIT6   HLT
04152   750004                  LAS
04153   507254                  AND (400000     /SWITCH ZERO
04154   740200                  SZA
04155   740040                  HLT             /PRINT ROUTINE
04156   624151                  JMP* SWIT6              /CONTINUE
                        /
04157   000000          LOOP2   0
04160   744000                  CLL
04161   624157                  JMP* .-2        /SCOPE LOOP TAG
                        /
04162   000000          LOOP4   0               /SUBROUTINE TAG
04163   624162                  JMP* .-1
04164   000000          LOOP5   0               /ROUTINE TAG
04165   624164                  JMP* .-1
                                .EJECT
```

```
04166   104166      IOR     JMS .
04167   044200              DAC .+11
04170   224166              LAC* IOR
04171   044201              DAC .+10
04172   204200              LAC .+6
04173   740001              CMA
04174   524201              AND* .+5
04175   344200              TAD .+3
04176   444166              ISZ IOR
04177   624166              JMP* IOR
04200   000000              0
04201   000000              0
                    /
04202   740000      HLTS    NOP
04203   750004              LAS
04204   507351              AND (200000         /SW1
04205   741200              SNA
04206   604211              JMP .+3
04207   204202              LAC HLTS
04210   740040              HLT
04211   624202              JMP* HLTS           /CONTINUE
                    /
04212   740000      HLTM    NOP
04213   750004              LAS
04214   507352              AND (040000         /SW3
04215   740200              SZA
04216   740040              HLT
04217   624212              JMP* .-5            /CONTINUE
                    /
04220   740000      HLTL    NOP
04221   750004              LAS
04222   507353              AND (004000         /SW6
04223   740200              SZA
04224   740040              HLT
04225   624220              JMP* .-5            /CONTINUE
                    /
04226   740000      LOOPS   NOP
04227   750004              LAS
04230   507354              AND (100000         /SWITCH 2
04231   744200              SZA!CLL
04232   624157              JMP* LOOP2                      /LOOP
04233   624226              JMP* LOOPS                      /CONTINUE
                    /
04234   740000      LOOPM   NOP
04235   750004              LAS                 /SWITCH 4
04236   507355              AND (020000         /SWITCH 4
04237   740200              SZA
04240   624162              JMP* LOOP4                      /LOOP
04241   624234              JMP* LOOPM                      /CONTINUE
                            .EJECT
```

```
                        /LOOK UP OR HALT
04242   740000  SWIT7   NOP
04243   750004          LAS
04244   507356          AND (002000                     /SWITCH 7
04245   740200          SZA
04246   444242          ISZ SWIT7               /IF SET GO TO P+2
04247   624242          JMP* SWIT7                      /IF NOT SET GO TO P+1
                        /
                        /FILL ERROR LOCATIONS WITH ZERO
04250   740000  FILZER  NOP
04251   205023          LAC LENGTH
04252   047142          DAC ADDCT#                      /FIELD COUNTER
04253   207357          LAC (LAC ERWOR
04254   044255          DAC .+1
04255   204376          LAC ERWOR
04256   047145          DAC CTADD#
04257   167145          DZM* CTADD                      /CURRENT ADDRESS
04260   444255          ISZ .-3
04261   447142          ISZ ADDCT
04262   604255          JMP .-5
04263   624250          JMP* FILZER             /EXIT
                        /
                        /FILL ERROR LOCATION WITH HLT
04264   740000  FILHLT  NOP
04265   205023          LAC LENGTH
04266   047142          DAC ADDCT                       /FIELD COUNTER
04267   207360          LAC (LAC ERWOR
04270   044271          DAC .+1
04271   204376          LAC ERWOR               /ADDRESS OF LHE
04272   047145          DAC CTADD
04273   207361          LAC (HLT
04274   067145          DAC* CTADD                      /CURRENT ADDRESS
04275   444271          ISZ .-4
04276   447142          ISZ ADDCT
04277   604271          JMP .-6
04300   624264          JMP* FILHLT             /EXIT
                        /
                        /SET BIT IN BITWORD IF ERROR
04301   740000  SETBIT  NOP
04302   204376          LAC ERWOR
04303   047145          DAC CTADD
04304   227145          LAC* CTADD                      /CURRENT ADDRESS OF ERROR WORD
04305   741200          SNA
04306   604313          JMP .+5
04307   207155          LAC ERRBIT#
04310   104166          JMS IOR
04311   740040          XX                      /MODIFIED
04312   064311          DAC* .-1
04313   444302          ISZ SETBIT+1
04314   624301          JMP* SETBIT             /EXIT
                        .EJECT
```

```
                        /SCAN FOR 00 OR 77 SET FLAG ON ERROR
04315   740000  SCAN    NOP
04316   750000          CLA
04317   047154          DAC ERFLAG
04320   047143          DAC ASTRIC
04321   205023          LAC LENGTH
04322   047142          DAC ADDCT
04323   207362          LAC (LAC ERWOR
04324   044325          DAC .+1
04325   204376          LAC ERWOR
04326   047145          DAC CTADD
04327   227145          LAC* CTADD
04330   547211          SAD (0                  /CHECK FOR ZERO
04331   604336          JMP .+5                 /YES

04332   547363          SAD (100  /CHECK FOR 100
04333   741000          SKP
04334   447143          ISZ ASTRIC#             /INTERMITTENT
04335   447154          ISZ ERFLAG#             /SET FLAG
04336   444325          ISZ .-11
04337   447142          ISZ ADDCT
04340   604325          JMP .-13
04341   624315          JMP* SCAN
                        /
                        /CHECK FLAG
04342   740000  CKFLAG  NOP
04343   207154          LAC ERFLAG                      /HOW MANY TEST FAILED
04344   741200          SNA
04345   625024          JMP* BEGIN                      /NO ERROR
04346   624342          JMP* CKFLAG             /# OF BIT WORDS
                        /
                        /SET UP COUNTS AND COUNTERS
04347   740000  SETUP   NOP
04350   207364          LAC (WORDA                      /1ST BIT STORAGE LOCATION
04351   044311          DAC SETBIT+10           /CURRENT WORD ADESS
04352   207365          LAC (777755
04353   047144          DAC BITCT               /BIT COUNTER
04354   207254          LAC (400000                     /INITIAL BIT
04355   047155          DAC ERRBIT              /CURRENT BIT POSITION
04356   207366          LAC (LAC ERWOR          /LHE ADDRESS OF FIELD
04357   044302          DAC SETBIT+1            /COUNTER
04360   205023          LAC LENGTH              /LENGTH OF FIELD
04361   047142          DAC ADDCT               /FIELD COUNTER
04362   624347          JMP* SETUP                      /EXIT
                        .EJECT
```

```
                        /ROTATE BIT AND CHECK WORD COUNT
                        /
04363   740000  RBCW    NOP
04364   207155          LAC ERRBIT
04365   740020          RAR
04366   447144          ISZ BITCT#
04367   604374          JMP .+5
04370   444311          ISZ SETBIT+10
04371   207365          LAC (777755
04372   047144          DAC BITCT
04373   207254          LAC (400000
04374   047155          DAC ERRBIT
04375   624363          JMP* RBCW
                        .EJECT
```

```
04376   000263      ERWOR     NEAE 15
04377   000267                NEAE 21
04400   000305                NEAE 37
04401   000311                NEAE 43
04402   000327                NEAE 61
04403   000333                NEAE 65
04404   000351                NEAE 103
04405   000355                NEAE 107
04406   000373                NEAB 13
04407   000377                NEAB 17
04410   000415                NEAB 35
04411   000421                NEAB 41
04412   000436                NEAB 56
04413   000442                NEAB 62
04414   000460                NEAB 100
04415   000464                NEAB 104
04416   000502                NMUL 13
04417   000506                NMUL 17
04420   000524                NMUL 35
04421   000530                NMUL 41
04422   000546                NMUL 57
04423   000552                NMUL 63
04424   000570                NMUL 101
04425   000574                NMUL 105
04426   000612                NMULS 13
04427   000616                NMULS 17
04430   000634                NMULS 35
04431   000640                NMULS 41
04432   000656                NMULS 57
04433   000662                NMULS 63
04434   000700                NMULS 101
04435   000704                NMULS 105
04436   000722                NDIV 13
04437   000726                NDIV 17
04440   000745                NDIV 36
04441   000751                NDIV 42
04442   000767                NDIV 60
04443   000773                NDIV 64
04444   001011                NDIV 102
04445   001015                NDIV 106
04446   001033                NDIVS 13
04447   001037                NDIVS 17
04450   001055                NDIVS 35
04451   001061                NDIVS 41
04452   001076                NDIVS 56
04453   001102                NDIVS 62
04454   001120                NDIVS 100
04455   001124                NDIVS 104
                              .EJECT
```

```
04456   001142          NIDIV 13
04457   001146          NIDIV 17
04460   001164          NIDIV 35
04461   001170          NIDIV 41
04462   001206          NIDIV 57
04463   001212          NIDIV 63
04464   001230          NIDIV 101
04465   001234          NIDIV 105
04466   001252          NIDIVS 13
04467   001256          NIDIVS 17
04470   001274          NIDIVS 35
04471   001300          NIDIVS 41
04472   001316          NIDIVS 57
04473   001322          NIDIVS 63
04474   001340          NIDIVS 101
04475   001344          NIDIVS 105
04476   001362          NFRDIV 13
04477   001366          NFRDIV 17
04500   001404          NFRDIV 35
04501   001410          NFRDIV 41
04502   001426          NFRDIV 57
04503   001432          NFRDIV 63
04504   001450          NFRDIV 101
04505   001454          NFRDIV 105
04506   001472          NFRDVS 13
04507   001476          NFRDVS 17
04510   001514          NFRDVS 35
04511   001520          NFRDVS 41
04512   001536          NFRDVS 57
04513   001542          NFRDVS 63
04514   001560          NFRDVS 101
04515   001564          NFRDVS 105
04516   001600          SHCT1 7
04517   001605          SHCT1 14
04520   001610          SHCT1 17
04521   001621          SHCT2 7
04522   001626          SHCT2 14
04523   001631          SHCT2 17
04524   001642          SHCT3 7
04525   001647          SHCT3 14
04526   001652          SHCT3 17
04527   001663          SHCT4 7
04530   001670          SHCT4 14
04531   001673          SHCT4 17
                        .EJECT
```

```
04532   001704          SHCT5 7
04533   001711          SHCT5 14
04534   001714          SHCT5 17
04535   001725          SHCT6 7
04536   001732          SHCT6 14
04537   001735          SHCT6 17
04540   001746          SHCT7 7
04541   001753          SHCT7 14
04542   001756          SHCT7 17
04543   001767          SHCT10 7
04544   001774          SHCT10 14
04545   001777          SHCT10 17
04546   002010          SHCT11 7
04547   002015          SHCT11 14
04550   002020          SHCT11 17
04551   002031          SHCT12 7
04552   002036          SHCT12 14
04553   002041          SHCT12 17
04554   002052          SHCT13 7
04555   002057          SHCT13 14
04556   002062          SHCT13 17
04557   002073          SHCT14 7
04560   002100          SHCT14 14
04561   002103          SHCT14 17
04562   002114          SHCT15 7
04563   002121          SHCT15 14
04564   002124          SHCT15 17
04565   002135          SHCT16 7
04566   002142          SHCT16 14
04567   002145          SHCT16 17
04570   002156          SHCT17 7
04571   002163          SHCT17 14
04572   002166          SHCT17 17
04573   002177          SHCT20 7
04574   002204          SHCT20 14
04575   002207          SHCT20 17
04576   002220          SHCT21 7
04577   002225          SHCT21 14
04600   002230          SHCT21 17
04601   002241          SHCT22 7
04602   002246          SHCT22 14
04603   002251          SHCT22 17

                        .EJECT
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```
04604   002266          DSC1 10+1
04605   002273          DSC1 15+1
04606   002306          DSC1 27+2
04607   002313          DSC1 34+2
04610   002326          DSC1 46+3
04611   002333          DSC1 53+3
04612   002346          DSC1 65+4
04613   002353          DSC1 72+4
04614   002366          DSC1 104+5
04615   002373          DSC1 111+5
04616   002406          DSC1 123+6
04617   002413          DSC1 130+6
04620   002426          DSC1 142+7
04621   002433          DSC1 147+7
04622   002446          DSC1 161+10
04623   002453          DSC1 166+10
04624   002466          DSC1 200+11
04625   002473          DSC1 205+11
04626   002506          DSC1 217+12
04627   002513          DSC1 224+12
04630   002526          DSC1 236+13
04631   002533          DSC1 243+13
04632   002546          DSC1 255+14
04633   002553          DSC1 262+14
04634   002566          DSC1 274+15
04635   002573          DSC1 301+15
04636   002606          DSC1 313+16
04637   002613          DSC1 320+16
04640   002626          DSC1 332+17
04641   002633          DSC1 337+17
04642   002646          DSC1 351+20
04643   002653          DSC1 356+20
04644   002666          DSC1 370+21
04645   002673          DSC1 375+21
04646   002705          STMUL 6
04647   002714          STMUL 15
04650   002724          STMULS 6
04651   002734          STMULS 16
04652   002743          STMULS 25
04653   002753          STMULS 35
04654   002766          STDIVS 11
04655   002772          STDIVS 15
04656   002777          STDIVS 22
04657   003012          SIGNA 11
04660   003016          SIGNA 15
04661   003023          SIGNA 22
                        .EJECT
```

```
04662   003036          SIGNB 11
04663   003042          SIGNB 15
04664   003047          SIGNB 22
04665   003062          SIGNC 11
04666   003066          SIGNC 15
04667   003073          SIGNC 22
04670   003106          STIDVS 11
04671   003112          STIDVS 15
04672   003117          STIDVS 22
04673   003132          SIGND 11
04674   003136          SIGND 15
04675   003143          SIGND 22
04676   003156          SIGNE 11
04677   003162          SIGNE 15
04700   003167          SIGNE 22
04701   003202          SIGNF 11
04702   003206          SIGNF 15
04703   003213          SIGNF 22
04704   003226          STFDVS 11
04705   003232          STFDVS 15
04706   003237          STFDVS 22
04707   003252          SIGNG 11
04710   003256          SIGNG 15
04711   003263          SIGNG 22
04712   003276          SIGNH 11
04713   003302          SIGNH 15
04714   003307          SIGNH 22
04715   003322          SIGNI 11
04716   003326          SIGNI 15
04717   003333          SIGNI 22
04720   003350          MULTST 11
04721   003355          MULTST 16
04722   003370          MULA 11
04723   003375          MULA 16
04724   003410          MULB 11
04725   003415          MULB 16
04726   003430          MULC 11
04727   003435          MULC 16
04730   003450          MULD 11
04731   003455          MULD 16
04732   003470          MULE 11
04733   003475          MULE 16
04734   003510          DIVTST 11
04735   003515          DIVTST 16
04736   003530          DIVA 11
04737   003535          DIVA 16
04740   003550          DIVB 11
04741   003555          DIVB 16
04742   003570          DIVC 11
04743   003575          DIVC 16
                        .EJECT
```

```
04744   003610                  DIVD 11
04745   003615                  DIVD 16
04746   003630                  DIVE 11
04747   003635                  DIVE 16
04750   003650                  DIVF 11
04751   003655                  DIVF 16
04752   003670                  DIVG 11
04753   003675                  DIVG 16
04754   003722                  MSPEED 21
04755   003727                  MSPEED 26
04756   003746                  MSPEED 45
04757   003753                  MSPEED 52
04760   003776                  DSPEED 21
04761   004003                  DSPEED 26
04762   004026                  DSPEED 51
04763   004033                  DSPEED 56
04764   004051                  SPMUDV 14
04765   004056                  SPMUDV 21
04766   004111                  SPMUDV 54
04767   004116                  SPMUDV 61
04770   004116                  SPMUDV 61
04771   004116                  SPMUDV 61
04776                           .LOC ERWOR+400
04776   000000          WORDA   0           /BUFFER FOR BIT WORDS
05023                           .LOC WORDA+25
05023   777406          LENGTH  777406
                                .EJECT
```

```
05024   740000   BEGIN   NOP
05025   740000           NOP                          /WAS JMS SWIT7(NOT USED)
05026   605047           JMP FACT                     /HERE IF NOT SET
05027   605031           JMP LOOKUP                   /HERE IF SET
                 /
05030   000000           0                            /COUNTER
05031   104250   LOOKUP  JMS FILZER                   /FILL ERROR LOK WITH CAL
05032   105052           JMS CLBUF                    /CL BUFFER
05033   100203           JMS ADVP                     /GO TO MUL, DIV ROUTINES
05034   104315           JMS SCAN                     /SCAN FOR 00 OR 77 FLAG ANY ERROR
05035   104342           JMS CKFLAG
05036   205023           LAC LENGTH
05037   045030           DAC LOOKUP-1
05040   104347           JMS SETUP                    /SET UP COUNTE AND COUNTERS
05041   104301           JMS SETBIT                   /SET BIT IF ERROR
05042   104363           JMS RBCW                     /ROTATE BIT AND CHECK WORD
05043   445030           ISZ LOOKUP-1
05044   605041           JMP .-3
05045   105064           JMS STABUF                   /PRINT OUT ERROR STATUS
05046   625024           JMP* BEGIN
                 /
05047   104264   FACT    JMS FILHLT
05050   100203           JMS ADVP
05051   625024           JMP* BEGIN
                 /
                 /
                 /CL BUFFER
05052   740040   CLBUF   HLT
05053   207364           LAC (WORDA                   /RHE
05054   045063           DAC CLBUF+11
05055   207370           LAC (WORDA+24                /LHE
05056   165063           DZM* CLBUF+11                /DEPOSIT ZEROS
05057   545063           SAD CLBUF+11                 /RHE=LHE
05060   625052           JMP* CLBUF                           /EXIT  YES
05061   445063           ISZ CLBUF+11                 /NO
05062   605056           JMP .-4
05063   000000           0
                         .EJECT
```

```
                        /ROUTINE TO PRINT ERROR BUFFER
                        /
05064   740040  STABUF  HLT
05065   107026          JMS PRINT           /CHECK FOR PRINT
05066   105110          JMS ANDBUF          /AND THEM
05067   105144          JMS IORBUF          /"OR" THEM
05070   105126          JMS TADBUF          /TAD THEM
05071   105412          TIN
05072   205125          LAC ANDBUF+15
05073   105314          JMS OPS             /PRINT THE "AND"
05074   105345          TYT
05075   205143          LAC TADBUF+15
05076   105314          JMS OPS             /PRINT THE "TAD"
05077   105345          TYT
05100   205162          LAC IORBUF+16
05101   105314          JMS OPS             /PRINT THE "IOR"
05102   207143          LAC ASTRIC
05103   741200          SNA
05104   625064          JMP* STABUF         /EXIT
05105   765724          LAW TEXTI /PRINT THE ASTRICT
05106   105225          TSR
05107   625064          JMP* STABUF         /EXIT
                        /
                        /
                        /"AND" ERROR WORDS
05110   740040  ANDBUF  HLT
05111   750001          CLC                 /PERMIT "AND" FUNCTION
05112   045125          DAC ANDBUF+15       /CLEAR TEM STORAGE
05113   207371          LAC (LAC WORDA      /L.L. WORD
05114   045115          DAC .+1
05115   204776          LAC WORDA
05116   505125          AND ANDBUF+15
05117   045125          DAC ANDBUF+15
05120   207372          LAC (LAC WORDA+14   /U.L. WORD
05121   545115          SAD ANDBUF+5        /LL=UL
05122   625110          JMP* ANDBUF         /YES  EXIT
05123   445115          ISZ ANDBUF+5        /NO
05124   605115          JMP ANDBUF+5        /LOOP
05125   000000          0                   /TEMP STORAGE
                        /
                        .EJECT
```

```
                        /TAD ERROR WORDS
05126   740040  TADBUF  HLT
05127   754000          CLL!CLA
05130   045143          DAC TADBUF+15
05131   207371          LAC (LAC WORDA          /U.L.
05132   045133          DAC .+1
05133   204776          LAC WORDA
05134   345143          TAD TADBUF+15           /ADD THEM
05135   045143          DAC TADBUF+15
05136   207373          LAC (LAC WORDA+21       /U.L.
05137   545133          SAD TADBUF+5            /L.L.=U.L.
05140   625126          JMP* TADBUF             /YES  EXIT
05141   445133          ISZ TADBUF+5            /NO
05142   605133          JMP TADBUF+5            /LOOP
05143   000000          0                       /SUM OF ERROR
                        /
                        /
                        /IOR ERROR WORDS
05144   740040  IORBUF  HLT
05145   754000          CLL!CLA
05146   045162          DAC IORBUF+16
05147   207371          LAC (LAC WORDA          /L.L.
05150   045151          DAC .+1
05151   204776          LAC WORDA
05152   104166          JMS IOR                 /"OR"
05153   005162          IORBUF+16
05154   045162          DAC IORBUF+16
05155   207373          LAC (LAC WORDA+21       /U.L.
05156   545151          SAD IORBUF+5            /U.L.=U.L.
05157   625144          JMP* IORBUF             /YES
05160   445151          ISZ IORBUF+5            /NO
05161   605151          JMP IORBUF+5            /LOOP
05162   000000          0                       /INCLUSIVE OR OF WORDS
                        .EJECT
```

```
                        /MULTIPLY SIMULATION CONTROL
05163   740040  MSC     HLT
05164   765710          LAW TEXTH
05165   105225          TSR
05166   207374          LAC (JMS MULSIM
05167   046362          DAC MP4-1
05170   046406          DAC MPSIGN+6
05171   046411          DAC MPZ+2
05172   106065          JMS SOFMUL          /GENERATE SIMULATION
05173   207375          LAC (NOP
05174   046362          DAC MP4-1
05175   046406          DAC MPSIGN+6
05176   046411          DAC MPZ+2
05177   106075          JMS HARMUL
05200   605177          JMP .-1             /LOOP
                        /
                        /
                        /DIVIDE SIMULATION CONTROL
05201   740040  DISC    HLT
05202   765710          LAW TEXTH
05203   105225          TSR
05204   207376          LAC (JMS DIVSIM
05205   046443          DAC DSP1
05206   046465          DAC DSP2
05207   046453          DAC DSP3
05210   046523          DAC DSP4
05211   046531          DAC DSP5
05212   046546          DAC DSP6
05213   106170          JMS SOFDIV          /GENERATE SIMULATION
05214   207375          LAC (NOP
05215   046443          DAC DSP1
05216   046465          DAC DSP2
05217   046453          DAC DSP3
05220   046523          DAC DSP4
05221   046531          DAC DSP5
05222   046546          DAC DSP6
05223   106156          JMS HARDIV
05224   605223          JMP .-1             /LOOP
                        /TAPE 3A
                        /TYPE STRING OF CHARACTERS
                        /EOM=77=?
        657323          IDIVS=657323
05225   605225  TYPTSR  JMP .
05226   507241          AND (7777)
05227   047203          DAC TEMY1#
05230   227203          LAC* TEMY1
05231   447203          ISZ TEMY1
05232   045307          DAC TYPSAV
05233   742020          RTR
05234   742020          RTR
05235   742020          RTR
05236   045310          DAC TYPSAV+1
05237   742020          RTR
05240   742020          RTR
05241   742020          RTR
```

```
05242   105250                  JMS TYPCHR
05243   205310                  LAC TYPSAV+1
05244   105250                  JMS TYPCHR
05245   205307                  LAC TYPSAV
05246   105250                  JMS TYPCHR
05247   605230                  JMP TYPTSR+3
05250   740040  TYPCHR          HLT
05251   045311                  DAC TYPSAV+2        /ACTIVE
05252   205307                  LAC TYPSAV                  /TEST FOR CRLF
05253   507347                  AND (777700
05254   547377                  SAD (151200         /CRLF?
05255   741000                  SKP                 /YES
05256   605264                  JMP .+6             /NO
05257   205307                  LAC TYPSAV                  /CORRECT IT FOR NEXT TIME
05260   507225                  AND (000077
05261   045307                  DAC TYPSAV
05262   105412                  JMS TYCRLF                  /DO CRLF
05263   605245                  JMP TYPCHR-3        /TYPE LAST CHARACTER
05264   205311                  LAC TYPSAV+2
05265   507225                  AND (77
05266   547225                  SAD (77             /END OF MESSAGE?
05267   625225                  JMP* TYPTSR         /YES
05270   741200                  SNA                 /IF ZERO IGNOR
05271   625250                  JMP* TYPCHR         /IGNOR
05272   744001                  CMA!CLL
05273   347400                  TAD (40
05274   741400                  SZL
05275   605302                  JMP .+5
05276   205311                  LAC TYPSAV+2
05277   507225                  AND (77
05300   347401                  TAD (200
05301   605305                  JMP TYPSAV-2
05302   205311                  LAC TYPSAV+2
05303   507225                  AND (77
05304   347402                  TAD (300
05305   106562                  JMS OTY
05306   625250                  JMP* TYPCHR
05307   000000  TYPSAV          0                   /3RD
05310   000000                  0                   /2ND
05311   000000                  0                   /ACTIVE CHAR
05312   000000                  0
05313   000000                  0
                                .EJECT
```

```
                                /TYPE CONTENTS OF THE AC IN OCTAL
05314   605314      TYPCON      JMP .
05315   105360                  JMS DECONT
05316   105401                  JMS TYPOCT
05317   205313                  LAC TYPSAV+4
05320   105401                  JMS TYPOCT
05321   205312                  LAC  TYPSAV+3
05322   105401                  JMS TYPOCT
05323   205311                  LAC TYPSAV+2
05324   105401                  JMS TYPOCT
05325   205310                  LAC TYPSAV+1
05326   105401                  JMS TYPOCT
05327   205307                  LAC TYPSAV
05330   105401                  JMS TYPOCT
05331   105406                  JMS SPACE2
05332   625314                  JMP* TYPCON
                                /TYPE OUT LOWEST 3 CHAR IN OCTAL
05333   605333      TYPC03      JMP .
05334   105360                  JMS DECONT
05335   205311                  LAC TYPSAV+2
05336   105401                  JMS TYPOCT
05337   205310                  LAC TYPSAV+1
05340   105401                  JMS TYPOCT
05341   205307                  LAC TYPSAV
05342   105401                  JMS TYPOCT
05343   105406                  JMS SPACE2
05344   625333                  JMP* TYPC03
05345   605345      TYPTYT      JMP .
05346   105354                  TSP
05347   105354                  TSP
05350   105354                  TSP
05351   105354                  TSP
05352   105354                  TSP
05353   625345                  JMP* TYPTYT
05354   605354      SPAC        JMP .
05355   207403                  LAC (240
05356   106562                  JMS OTY
05357   625354                  JMP* SPAC
                                .EJECT
```

```
05360   605360      DECONT    JMP .
05361   045307                DAC TYPSAV
05362   742020                RTR
05363   740020                RAR
05364   045310                DAC TYPSAV+1
05365   742020                RTR
05366   740020                RAR
05367   045311                DAC TYPSAV+2
05370   742020                RTR
05371   740020                RAR
05372   045312                DAC TYPSAV+3
05373   742020                RTR
05374   740020                RAR
05375   045313                DAC TYPSAV+4
05376   742020                RTR
05377   740020                RAR
05400   625360                JMP* DECONT
05401   605401      TYPOCT    JMP .
05402   507217                AND (7
05403   347404                TAD (260
05404   106562                JMS OTY
05405   625401                JMP* TYPOCT
05406   605406      SPACE2    JMP .
05407   767225                LAW (77
05410   105225                TSR
05411   625406                JMP* SPACE2
05412   605412      TYCRLF    JMP .
05413   207405                LAC (215
05414   106562                JMS OTY
05415   207406                LAC (212
05416   106562                JMS OTY
05417   625412                JMP* TYCRLF
        105401      TDIGIT=JMS TYPOCT
        105354      TSP=JMS SPAC
        105225      TSR=JMS TYPTSR                      /STRING
        105412      TCR=JMS TYCRLF                      /CR,LF
        105412      TIN=TCR
        005314      OPS=TYPCON                  /CONTENTS OF AC IN OCTAL
        105345      TYT=JMS TYPTYT                      /TAB
        005314      OPT=OPS
                    /
                              .EJECT
```

```
05420   151215      TEXTA    .SIXBT    <15><12>'MULTIPLY-DIVIDE TEST,PART 2.
05421   251424
05422   112014
05423   315504
05424   112611
05425   040540
05426   240523
05427   245420
05430   012224
05431   406256
05432   151220               .SIXBT    <15><12>'PART 1 SHOULD BE RUN PRIOR TO THIS SECTION
05433   012224
05434   406140
05435   231017
05436   251404
05437   400205
05440   402225
05441   164020
05442   221117
05443   224024
05444   174024
05445   101123
05446   402305
05447   032411
05450   171600
05451   151223               .SIXBT    <15><12>'SW0=1=DELETE ERROR TYPOUTS.
05452   276075
05453   617504
05454   051405
05455   240540
05456   052222
05457   172240
05460   243120
05461   172524
05462   235600
05463   151223               .SIXBT    <15><12>'SW1=1=HALT AFTER EACH EAE OPERATION.
05464   276175
05465   617510
05466   011424
05467   400106
05470   240522
05471   400501
05472   031040
05473   050105
05474   401720
05475   052201
05476   241117
05477   165600
05500   151223               .SIXBT    <15><12>'SW2=1=REPEAT LAST EAE OPERATION.
05501   276275
05502   617522
05503   052005
05504   012440
05505   140123
05506   244005
```

```
05507   010540
05510   172005
05511   220124
05512   111716
05513   560000
05514   151223          .SIXBT    <15><12>'SW3=1=HALT AFTER EACH EAE SEQUENCE.
05515   276375
05516   617510
05517   011424
05520   400106
05521   240522
05522   400501
05523   031040
05524   050105
05525   402305
05526   212505
05527   160305
05530   560000
05531   151223          .SIXBT    <15><12>'SW4=1=REPEAT EACH EAE SEQUENCE.
05532   276475
05533   617522
05534   052005
05535   012440
05536   050103
05537   104005
05540   010540
05541   230521
05542   250516
05543   030556
05544   151223          .SIXBT    <15><12>'SW5=1=CYCLE COMPLETE TEST.
05545   276575
05546   617503
05547   310314
05550   054003
05551   171520
05552   140524
05553   054024
05554   052324
05555   560000
05556   151223          .SIXBT    <15><12>'SW6=1=PRINT "OK" AT END OF PASS, WHEN SW5=1'<77>
05557   276675
05560   617520
05561   221116
05562   244042
05563   171342
05564   400124
05565   400516
05566   044017
05567   064020
05570   012323
05571   544027
05572   100516
05573   402327
05574   657561
05575   770000
```

```
05576   151215      TEXTB     .SIXBT    <15><12>'MULS FAILED   MULTIPLIER (AC) MULTIPLICAND?'
05577   251423
05600   400601
05601   111405
05602   044040
05603   401525
05604   142411
05605   201411
05606   052240
05607   500103
05610   514015
05611   251424
05612   112014
05613   110301
05614   160477
05615   101107      TEXTC     .SIXBT    'HIGH ORDER PRODUCT  LOW ORDER PRODUCT'<77>
05616   104017
05617   220405
05620   224020
05621   221704
05622   250324
05623   404014
05624   172740
05625   172204
05626   052240
05627   202217
05630   042503
05631   247700
05632   151210      TEXTD     .SIXBT    <15><12>'HARDWARE'<77>
05633   012204
05634   270122
05635   057700
05636   151204      TEXTE     .SIXBT    <15><12>'DIVS FAILED C(DIVISOR)   C(AC)     C(MQ)'<15><12>
05637   112623
05640   400601
05641   111405
05642   044003
05643   500411
05644   261123
05645   172251
05646   404040
05647   035001
05650   035140
05651   404040
05652   400350
05653   152151
05654   151200
05655   770000                .SIXBT    <77>
05656   212517      TEXTF     .SIXBT    'QUOTIENT       REMAINDER  LINK'<15><12>'SOFTWARE?'<77>
05657   241105
05660   162440
05661   404040
05662   404040
05663   220515
05664   011116
```

```
05665   040522
05666   404014
05667   111613
05670   151223
05671   170624
05672   270122
05673   057777
05674   151214      TEXTG     .SIXBT    <15><12>'LINK NOT SET ON DIVIDE OVERFLOW?'<77>
05675   111613
05676   401617
05677   244023
05700   052440
05701   171640
05702   041126
05703   110405
05704   401726
05705   052206
05706   141727
05707   777700
05710   151203      TEXTH     .SIXBT    <15><12>'C(L)   C(AC)      C(MQ)    C(SC)'<77>
05711   501451
05712   404040
05713   035001
05714   035140
05715   404040
05716   404003
05717   501521
05720   514040
05721   404003
05722   502303
05723   517700
05724   520000      TEXTI     .SIXBT    /*/
05725   151217      TEXTJ     .SIXBT    <15><12>'OUT OF 100 CHECK BAD?'
05726   252440
05727   170640
05730   616060
05731   400310
05732   050313
05733   400201
05734   047700
                    /PDP-15 EAE II - TAPE 4
                    /RANDOM CONTROL MUL/DIV
                    /
05735   740000      EXRAN     NOP
05736   740000                NOP                 /SET UP FOR RANDOM LOOP
05737   104162                JMS LOOP4           /SET UP FOR LOOP
05740   105747                JMS MULSHT                  /RANDOM MULTIPLY
05741   104134                JMS HLOOPM          /CHECK FOR HALT AND LOOP
05742   104162                JMS LOOP4           /SET UP FOR LOOP
05743   106120                JMS DIVSHT                  /RANDOM DIVIDE
05744   104134                JMS HLOOPM          /CHECK FOR HALT AND LOOP
05745   740000                NOP                 /CHECK FOR LOOP
05746   625735                JMP* EXRAN
                    /
                    /MULTIPLY SHIFT CONTROL
```

```
05747   740040      MULSHT    XX
05750   207407                LAC (MULS-21          /ONE SHIFT
05751   046334                DAC HMPY+4                    /HARDWARE INSERT
05752   777777                LAW -1                /ONE
05753   046360                DAC MP4-3             /SOFTWARE INSERT
05754   105765                JMS EXMUL             /GO TO MULTIPLY
05755   206334                LAC HMPY+4                    /MULTIPLY INSTRUCTION
05756   547410                SAD (MULS             /22 SHIFTS
05757   625747                JMP* MULSHT           /YES EXIT
05760   446334                ISZ HMPY+4                    /INCREMENT HARDWARE SHIFT
05761   750001                CLC
05762   346360                TAD MP4-3
05763   046360                DAC MP4-3             /INCREMENT SOFTWARE SHIFT
05764   605754                JMP .-10
                  /MULTIPLY RANDOM NUMBERS (RAN2 X RAN3)
05765   740000      EXMUL     NOP
05766   207411                LAC (770000
05767   047147                DAC CTRAN#            /RANDOM NUMBER COUNTER 4096
05770   207412                LAC (003466
05771   046021                DAC RAN1
05772   207413                LAC (153501
05773   046022                DAC RAN2
05774   207414                LAC (210762
05775   046023                DAC RAN3
05776   106007                JMS RAN               /RANDOM NUMBER GENERATOR
05777   104157                JMS LOOP2             /LOOP SET UP
06000   106065                JMS SOFMUL            /SOFTWARE MULTIPLY
06001   106075                JMS HARMUL            /HARDWARE MULTIPLY
06002   106105                JMS MULCOM            /HARDWARE=SOFTWARE
06003   104130                JMS HLOOPS            /HALT-LOOP?
06004   447147                ISZ CTRAN
06005   605776                JMP .-7
06006   625765                JMP* EXMUL                    /EXIT
                              .EJECT
```

```
                        /RANDOM NUMBER GENERATOR
06007   000000  RAN     0
06010   206021          LAC RAN1
06011   106024          JMS RDGEN
06012   046021          DAC RAN1  /FIRST NUMBER
06013   106024          JMS RDGEN
06014   046022          DAC RAN2  /SECOND NUMBER
06015   106024          JMS RDGEN
06016   046023          DAC RAN3  /THIRD NUMBER
06017   626007          JMP* RAN
                        /
06020   335671  RNO     335671
06021   003466  RAN1    003466
06022   153501  RAN2    153501
06023   210762  RAN3    210762
                        /
06024   000000  RDGEN   0
06025   046064          DAC RWRK
06026   206052          LAC RANDEX
06027   547415          SAD (RANTBL+10
06030   741000          SKP
06031   606041          JMP RANTAD
06032   207416          LAC (RANTBL
06033   046052          DAC RANDEX
06034   206051          LAC RANCON
06035   744010          CLL!RAL
06036   741400          SZL
06037   347213          TAD (1
06040   046051          DAC RANCON
06041   226052  RANTAD  LAC* RANDEX
06042   346051          TAD RANCON
06043   066052          DAC* RANDEX
06044   206064          LAC RWRK
06045   740020          RAR
06046   366052          TAD* RANDEX
06047   446052          ISZ RANDEX
06050   626024          JMP* RDGEN
                        .EJECT
```

```
06051   123456      RANCON    123456
06052   006063      RANDEX    RANTBL+10
06053   654321      RANTBL    654321
06054   361416                361416
06055   055363                055363
06056   546060                546060
06057   243035                243035
06060   762572                762572
06061   453237                453237
06062   150214                150214
06063   000000                0
06064   000000      RWRK      0
                              .EJECT
```

```
                        /SOFTWARE MULTIPLY (RAN2 X RAN3)
06065   740000  SOFMUL  NOP
06066   206022          LAC RAN2
06067   136340          JMS MULT
06070   206023          LAC RAN3            /LOW ORDER IN AC HIGH ORDER IN MP5
06071   047164          DAC LPRODS#         /LOW ORDER
06072   207170          LAC MP5
06073   047161          DAC HPRODS          /HIGH ORDER
06074   626065          JMP* SOFMUL         /EXIT
                        /HARDWARE MULTIPLY
06075   740000  HARMUL  NOP
06076   206023          LAC RAN3            /MULTIPLIER
06077   106330          JMS HMPY
06100   206022          LAC RAN2            /MULTIPLICAND
06101   047160          DAC HPRODH          /HIGH ORDER
06102   641002          LACQ
06103   047163          DAC LPRODH          /LOW ORDER
06104   626075          JMP* HARMUL         /EXIT
                        /
                        /COMPARE PRODUCT OF SOFTWARE + HARDWARE
06105   740000  MULCOM  NOP
06106   207160          LAC HPRODH#
06107   547161          SAD HPRODS#
06110   741000          SKP
06111   606115          JMP .+4             /HIGH ORDER NOT EQUAL
06112   207163          LAC LPRODH#
06113   547164          SAD LPRODS
06114   606117          JMP .+3
06115   106750          JMS BADMUL                  /LOW ORDER NOT EQUAL
06116   106256          JMS MULCT           /LOW ORDER NOT EQUAL
06117   626105          JMP* MULCOM
                        /
                        /DIVIDE SHIFT CONTROL
06120   740040  DIVSHT  HLT
06121   207417          LAC (DIVS-22        /ONE SHIFT COUNT
06122   046324          DAC HDIVID+6        /HARDWARE INSERT
06123   777777          LAW -1              /ONE
06124   046436          DAC DV4+4           /SOFTWARE INSERT
06125   106136          JMS EXDIV           /GO TO DIVIDE
06126   206324          LAC HDIVID+6        /DIVIDE INSTRUCTION
06127   547420          SAD (DIVS           /23 SHIFTS
06130   626120          JMP* DIVSHT         /YES  EXIT
06131   446324          ISZ HDIVID+6        /INC HARDWARE SHIFT
06132   750001          CLC
06133   346436          TAD DV4+4           /INC SOFTWARE SHIFT
06134   046436          DAC DV4+4
06135   606125          JMP .-10
                        .EJECT
```

```
                        /DIVIDE RANDOM NUMBERS (RAN1,RAN3)/(RAN2)
06136   740000  EXDIV   NOP
06137   207411          LAC (770000
06140   047147          DAC CTRAN           /RANDOM NUMBER COUNTER 4096
06141   207413          LAC (153501
06142   046022          DAC RAN2
06143   207414          LAC (210762
06144   046023          DAC RAN3
06145   106007          JMS RAN             /RANDOM NUMBER GENERATOR
06146   104157          JMS LOOP2 /LOOP SETUP
06147   106170          JMS SOFDIV          /SOFTWARE DIVIDE
06150   106156          JMS HARDIV          /HARDWARE DIVIDE
06151   106201          JMS DIVCOM          /HARDWARE=SOFTWARE
06152   104130          JMS HLOOPS                  /CHECK HALT LOOP
06153   447147          ISZ CTRAN
06154   606145          JMP .-7
06155   626136          JMP* EXDIV
                        .EJECT
```

```
                        /HARDWARD DIVIDE
06156   740000  HARDIV  NOP
06157   206023          LAC RAN3
06160   652000          LMQ                     /DIVIDEND LOW ORDER
06161   206021          LAC RAN1                /DIVIDEND HIGH ORDER
06162   106316          JMS HDIVID
06163   206022          LAC RAN2                /DIVISOR
06164   047174          DAC REMH                /HARDWARE REMAINDER
06165   641002          LACQ
06166   047172          DAC QUOTH               /HARDWARE QUOTIENT
06167   626156          JMP* HARDIV
                        /
                        /SOFTWARE DIVIDE (RAN1,RAN3)/(RAN2)
06170   740000  SOFDIV  NOP
06171   206021          LAC RAN1                /HIGH ORDER DIVIDEND
06172   106413          JMS DIVIDE
06173   206023          LAC RAN3                /LOW ORDER DIVIDEND
06174   206022          LAC RAN2                /DIVISOR
06175   047173          DAC QUOTS               /SOFTWARE QUOTIENT
06176   207150          LAC DVD
06177   047175          DAC REMS                /SOFTWARE REMAINDER
06200   626170          JMP* SOFDIV
                        /
                        /COMPARE QUOTIENT AND REMAINDERS
06201   740000  DIVCOM  NOP
06202   206156          LAC HARDIV              /GET LINK FROM SOFTWARE DIVIDE
06203   741400          SZL                     /CHECK LINK FROM HARDWARE DIVIDE
06204   740001          CMA                     /HDW LINK=1, SO COMPL SOFW LINK.
06205   741100          SPA                     /AC SHOULD BE PLUSE FOE EQUAL LINKS
06206   606216          JMP DVCMER              /LINKS NOT EQUAL, REPORT ERROR.
06207   207172          LAC QUOTH#
06210   547173          SAD QUOTS#
06211   741000          SKP
06212   606216          JMP .+4                 /QUOTIENT NOT EQUAL
06213   207174          LAC REMH#
06214   547175          SAD REMS#
06215   606220          JMP .+3
06216   106664  DVCMER  JMS BADDIV              /REMAINDER NOT EQUAL
06217   106221          JMS DIVCT               /PERCENT OF TIMES
06220   626201          JMP* DIVCOM
                        /
                        .EJECT
```

```
                        /NUMBER OF TIMES DIVS BAD
06221   740040  DIVCT   HLT
06222   107026          JMS PRINT
06223   207347          LAC (-100               /TIMES CHECK
06224   047153          DAC EAEDON#                     /TIMES COUNTER
06225   147204          DZM XBAD#                       /CL TIMES FOUND BAD
06226   106170          JMS SOFDIV
06227   106156          JMS HARDIV
06230   206156          LAC HARDIV              /GET SFTW LINK
06231   741400          SZL                     /CHECK HDW LINK
06232   740001          CMA                     /HDW LINK=1, SO COMPL SFT LINK
06233   741100          SPA                     /AC MUST BE PLUS FOR EQUAL LINES
06234   606244          JMP DCTER /NOT EQUAL, GO TO ERROR.
06235   207172          LAC QUOTH
06236   547173          SAD QUOTS
06237   741000          SKP                             /GOOD
06240   606244          JMP .+4                         /BAD
06241   207174          LAC REMH
06242   547175          SAD REMS
06243   741000          SKP                             /GOOD
06244   447204  DCTER   ISZ XBAD                        /BAD INCREMENT TIMES FOUND
06245   447153          ISZ EAEDON                      /LIMITS
06246   606226          JMP DIVCT+5                     /LOOP
06247   106306          JMS TIMTEX                      /PRINT ROUTINE
06250   105412          TCR
06251   206324          LAC HDIVID+6
06252   105314          JMS OPT
06253   207421          LAC (DISC+1
06254   740040          HLT
06255   626221          JMP* DIVCT                      /EXIT
                        /
                        /NUMBER OF TIMES MULS BAD
06256   740040  MULCT   HLT
06257   107026          JMS PRINT
06260   207347          LAC (-100               /TIMES CHECK
06261   047153          DAC EAEDON                      /TIMES COUNTER
06262   147204          DZM XBAD                        /CL TIMES FOUND BAD
06263   106065          JMS SOFMUL
06264   106075          JMS HARMUL
06265   207160          LAC HPRODH
06266   547161          SAD HPRODS
06267   741000          SKP                             /GOOD
06270   606274          JMP .+4                         /BAD
06271   207163          LAC LPRODH
06272   547164          SAD LPRODS
06273   741000          SKP                             //GOOD
06274   447204          ISZ XBAD                        /BAD INCREMENT TIMES FOUND
06275   447153          ISZ EAEDON                      /LIMITS
06276   606263          JMP MULCT+5                     /LOOP
06277   106306          JMS TIMTEX                      /PRINT ROUTINE
06300   105412          TCR
06301   206334          LAC HMPY+4
06302   105314          JMS OPT
06303   207422          LAC (MSC+1
06304   740040          HLT
```

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06305   626256          JMP* MULCT              /EXIT
                        .EJECT
```

```
                        /PRINT ROUTINE OF TIME BAD
06306   740040  TIMTEX  HLT
06307   107026          JMS PRINT
06310   765725          LAW TEXTJ                       /OUT OF 100 CHECKS BAD XX.
06311   105225          TSR
06312   105354          TSP
06313   207204          LAC XBAD            /XX
06314   105333          JMS TYPCO3
06315   626306          JMP* TIMTEX         /EXIT
                        /
                        /HARDWARE ARITHMETIC SUBROUTINES
                        /SIGNED DIVIDE SUBROUTINE
                        /CALLING SEQUENCE
                        /DIVIDE IN AC AND MQ
                        /JMS HDIVIDE
                        /PICKUP OTHER FACTOR
                        /
06316   000000  HDIVID  0           /ENTRY TO SUBROUTINE
06317   047202          DAC TEM#
06320   426316          XCT* HDIVID
06321   564000          GSM
06322   046325          DAC HDIVL
06323   207202          LAC TEM
06324   644323          DIVS
06325   000000  HDIVL   0           /LOCATION OF DIVISOR
06326   446316          ISZ HDIVID
06327   626316          JMP* HDIVID
                        .EJECT
```

```
                        /SIGNED MULTIPLY SUBROUTINE
                        /CALLING SEQUENCE.
                        /ONE FACTOR IN AC
                        /JMS HMPY
                        /PICK UP OTHER FACTOR          /LACXXX ON LAC I XXX
                        /
06330   000000  HMPY    0                              /ENTRY TO SUBROUTINE
06331   664000          GSM                            /FIX MULTIPLIER MAGNITUDE
06332   046335          DAC .+3
06333   426330          XCT* HMPY                      /LAC MULTIPLICAND
06334   657122          MULS
06335   000000          0                              /LOCATION OF MULTIPLIER
06336   446330          ISZ HMPY                       /INDEX RETURN
06337   626330          JMP* HMPY
                        .EJECT
```

```
                        /PDP-15 ONE'S COMPLEMENT SINGLE PRECISION MULTIPLICATION SUBROUTINE
                        /HARDWARE SIMULATION
                        /CALLING SEQUENCE:
                                /LAC MULTIPLIER
                                /JMS MULT
                                /LAC MULTIPLICAND
                                /RETURN: LOW ORDER PRODUCT IN AC, HIGH ORDER PRODUCT
                                        /IN MP5
06340   000000  MULT    0
06341   147170          DZM MP#5
06342   741200          SNA
06343   740000          NOP
06344   745100          SPA!CLL
06345   740003          CMA!CML
06346   047165          DAC M#P1
06347   426340          XCT* MULT
06350   741200          SNA
06351   740000          NOP
06352   741100          SPA
06353   740003          CMA!CML
06354   047166          DAC MP#2
06355   207423          LAC (360000
06356   740010          RAL
06357   046400          DAC MPSIGN
06360   777756          LAW -22
06361   047167          DAC MP#3
06362   740000          NOP
06363   207165  MP4     LAC MP1
06364   740020          RAR
06365   207170          LAC MP5
06366   745400          SZL!CLL
06367   347166          TAD MP2
06370   740020          RAR
06371   047170          DAC MP5
06372   207165          LAC MP1
06373   740020          RAR
06374   047165          DAC MP1
06375   207170          LAC MP5
06376   447167          ISZ MP3
06377   606411          JMP MPZ+2
06400   000000  MPSIGN  0
06401   047170          DAC MP5
06402   207165          LAC MP1
06403   740000          NOP
06404   406400          XCT MPSIGN
06405   047165          DAC MP1
06406   740000          NOP
06407   446340  MPZ     ISZ MULT
06410   626340          JMP* MULT
06411   740000          NOP
06412   606363          JMP MP4
                        .EJECT
```

```
                        /PDP-15 ONE'S COMPLEMENT DIVIDE SUBROUTINE HARWARE SIMULATION
                        /CALLING SEQUENCE,
                        /       LAC HIGH ORDER DIVIDEND/      JMS DIVIDE
                        /       LAC LOW ORDER DIVIDEND
                        /       LAC DIVISOR
                        /       RETURN,QUOT. IN AB, REM. IN D#VD
                        /IF HIGH DIVIDEND S GREATER OR EQUAL TO DIVISOR, DIVIDE TAKES
                        /PLACE AND LINK IS SET TO 1.
06413   000000  DIVIDE  0                       /HIGH ORDER DIVIDEND IN AC

06414   745100          SPA!CLL   /IS DIVIDEND POSITIVE
06415   740003          CMA!CML                 /NO, COMPLEMENT AC AND LINK
06416   047150          DAC D#VD                /STORE HIGH ORDER DIVIDEND
06417   426413          XCT* DIVIDE             /FETCH LOW ORDER DIVIDEND
06420   741400          SZL                     /DIVIDEND SIGN BIT POSITIVE?
06421   740001          CMA                     /NO, COMPLEMENT LOW ORDER DIVIDEND
06422   047171          DAC Q#UO                /STORE LOW ORDER DIVIDEND
06423   106424          JMS DV5                 /DEPOSIT DIVIDEND SIGN BIT INTO DV5M
06424   000000  DV5     0                       /REMAINDER HAS SIGN OF DIVIDEND
06425   446413          ISZ DIVIDE
06426   426413          XCT* DIVIDE             /FETCH DIVISOR
06427   741100          SPA                     /SKIP IF SIGN POSITIVE
06430   740003          CMA!CML                 /COMPLEMENT AC AND LINK
06431   106432          JMS DV4                 /DEPOSIT QUOTIENT SIGN BIT INTO DV4
06432   000000  DV4     0                       /CONTAINS SIGN BIT OF QUOTIENT
06433   744000          CLL                     /CLEAR LINK
06434   047151          DAC D#VS                /SAVE DIVISOR
06435   446413          ISZ DIVIDE              /INCREMENT TO EXIT ADDRESS
06436   777755          LAW -23                 /SET UP "STEP COUNTER"
06437   047152          DAC DV#1
06440   206503          LAC SVCB
06441   046476          DAC SVC0  /SET SAVE CARRY SWITCH TO INITIAL
06442   147200          DZM SVCRY /CLEAR SAVED CARRY.
06443   740000  DSP1    NOP
06444   207151          LAC DVS                 /FETCH DIVISOR
06445   606460          JMP DV2A-1              /START DIVISION
                        .EJECT
```

```
06446   206475      DV2     LAC QHIB  /GET SAVED HI QUOTIENT BIT
06447   740010              RAL                 /PUT BIT INTO LINK
06450   207150              LAC DVD             /GET DIVIDEND
06451   740010              RAL                 /INSERT HI QUOT INTO DIVIDEND
06452   047150              DAC DVD             /STORE NEW DIVIDEND
06453   740000      DSP3    NOP
06454   206464              LAC DCRY  /GET LAST CARRY
06455   740010              RAL                 /PUT INTO LINK
06456   207151              LAC DVS             /GET DIVISOR
06457   745400              SZL!CLL             /IF LINK IS 1, ADD NEG DIVISOR,
06460   740031              CMA!IAC             /IF LINK IS 0, ADD POS DIVISOR,
06461   347150      DV2A    TAD DVD             /ADD DIVISOR (+,-) TO DIVIDEND
06462   047150              DAC DVD             /STORE NEW DIVIDEND
06463   106464              JMS .+1
06464   000000      DCRY    0                   /SAVE CARRY
06465   740000      DSP2    NOP
06466   207200              LAC SVCRY /CHECK LAST
06467   741100              SPA                 /CARRY.=1 IF OVERFLOW
06470   740002              CML                 /IF OVERFLOW ERROR LAST CYCLE,
                                                /COMPLEMENT THIS INSERT BIT.
06471   207171              LAC QUO             /GET QUOTIENT
06472   740010              RAL                 /INSERT CARRY INTO QUOTIENT.
06473   047171              DAC QUO             /STORE NEW QUOTIENT.
06474   106475              JMS .+1             /SAVE HI BIT FOR
06475   000000      QHIB    0                   /INSERTION INTO DIVIDEND.
06476   740040      SVC0    HLT
06477   606513              JMP SVC2  /1ST - SAVE EXTRA SIGN BIT
06500   606510              JMP SVC1  /2ND - SAVE SIGN BIT, CHECK XSIGN BIT
06501   606504              JMP SVC1A /3RD - CHECK SIGN BIT.
06502   606516              JMP SVC3  /OTHERS - CONTINUE
06503   606477      SVCB    JMP       SVC0+1
06504   207200      SVC1A   LAC SVCRY
06505   741100              SPA
06506   606550              JMP OVRFLO
06507   606515              JMP SVC3-1
06510   207200      SVC1    LAC S#VCRY          /TEST SAVED SIGN BIT
06511   741100              SPA                 /MUST=0
06512   606550              JMP OVRFLO          /NOT=0, OVERFLOW
06513   206464      SVC2    LAC DCRY
06514   047200              DAC SVCRY /SAVE CARRY FOR TEST NEXT CYCLE
06515   446476              ISZ SVC0  /INCREMENT SWITCH
06516   447152      SVC3    ISZ DV1             /INCREMENT STEP COUNTER
06517   606446              JMP DV2             /GO TO NEXT DIVIDE CYCLE
                            .EJECT
```

```
                                        /STEP COUNTER=0
06520   206464          LAC DCRY  /TEST LAST CARRY
06521   741100          SPA
06522   606527          JMP DV3             /IF=1 NO CORRECTIONS NEEDED
06523   740000  DSP4    NOP
06524   207151          LAC DVS             /WAS 0
                                            /ADD (+) DIVISOR TO CORRECT
06525   347150          TAD DVD             /DVD VALUE FOR REMAINDER
06526   047150          DAC DVD
06527   206424  DV3     LAC DV5             /CHECK DIVIDEND SIGN
06530   740010          RAL                 /
06531   740000  DSP5    NOP
06532   207150          LAC DVD             /
06533   741401          SZL!CMA             /IF MINUS, COMPLEMENT REMAINDER
06534   047150          DAC DVD             /
06535   206432          LAC DV4             /CHECK DIVISOR SIGN
06536   740010          RAL
06537   207171          LAC QUO
06540   741400          SZL                 /IF MINUS, COMPLEMENT QUOTIENT
06541   740001          CMA
06542   047171          DAC QUO
06543   207200          LAC SVCRY /SET LINK TO DETERMINED VALUE
06544   740010          RAL
06545   207171          LAC QUO
06546   740000  DSP6    NOP
06547   626413          JMP* DIVIDE
                                            /OVERFLOW OCCURRED
06550   207152  OVRFLO  LAC DV1
06551   740030          IAC
06552   740100          SMA
06553   606527          JMP DV3
06554   206475          LAC QHIB  /GET SAVED HI QUOTIENT BIT
06555   740010          RAL
06556   207150          LAC DVD             /PUT INTO DIVIDEND
06557   740010          RAL
06560   047150          DAC DVD             /STORE NEW DIVIDEND
06561   606527          JMP DV3             /GO TO ADJUST SIGNS
                        .EJECT
```

```
                        /OUTPUT ROUTINE FOR TTY
06562   000000  OTY     0
06563   707704          LEM
06564   700406          TLS
06565   700401          TSF
06566   606565          JMP .-1
06567   626562          JMP* OTY
                        /
                        /MAKE THREE CHARACTERS OUT OF AN AC WORD
                        /ABCD  ENTRANCE TO SUBROUTINE
                        /XXXX  LHE OF ADDRESS FIELD
                        //XXXX  RHE OF ADDRESS FELD
06570   106570  ABCD    JMS .
06571   047162          DAC IACW
06572   446570          ISZ ABCD
06573   226570          LAC* ABCD
06574   047201          DAC TACW#
06575   446570          ISZ ABCD
06576   227162          LAC* IACW#
06577   446570          ISZ ABCD
06600   227162          LAC* IACW
06601   547201          SAD TACW
06602   626570          JMP* ABCD
06603   447162          ISZ IACW
06604   606576          JMP .-6
                        /
                        /OCTAL OUTPUT SUBROUTINE
                        /OCTOUT  ENTRANCE TO ROUTINE
                        /XXXX    LHE OF ADDRESS FIELD
                        /XXXX    RHE OF ADDRESS FIELD
                        /
06605   106605  OCTOUT  JMS .
06606   226605          LAC* OCTOUT
06607   047162          DAC IACW
06610   446605          ISZ OCTOUT
06611   226605          LAC* OCTOUT
06612   047201          DAC TACW
06613   446605          ISZ OCTOUT
06614   227162          LAC* IACW
06615   105314          JMS OPS
06616   207162          LAC IACW
06617   547201          SAD TACW
06620   626605          JMP* OCTOUT
06621   447162          ISZ IACW
06622   606614          JMP .-6
                        .EJECT
```

```
06623   740040      RUN     HLT
06624   104164              JMS LOOP5           /LOOP SET UP
06625   105024              JMS BEGIN           /TEST WITH CONSTANTS
06626   104140              JMS HLOOPL          /HALT LOOP
06627   104164              JMS LOOP5           /LOOP SET UP
06630   105735              JMS EXRAN           /TEST WITH RANDOMS
06631   104140              JMS HLOOPL          /JMS HLOOPL
06632   106642              JMS PROK
06633   447146              ISZ CTCMPT#                 /PASS COMPLETE COUNTER
06634   606624              JMP RUN+1           /LOOP
06635   606624              JMP     RUN+1
                            /BELL AT END OF PASS
06636   740040      BELL    HLT
06637   207424              LAC (207207                 /RING BELL
06640   106562              JMS OTY
06641   626636              JMP* BELL
                    /
                            /PRINT "OK" AT END OF PASS
06642   740040      PROK    HLT
06643   750004              LAS
06644   507353              AND     (004000
06645   741200              SNA
06646   626642              JMP*    PROK
06647   446663              ISZ     OKCTR
06650   606654              JMP     .+4
06651   105412              TCR
06652   207425              LAC     (-30)
06653   046663              DAC     OKCTR
06654   207426              LAC     (317
06655   106562              JMS     OTY
06656   207427              LAC     (313
06657   106562              JMS     OTY
06660   207403              LAC     (240
06661   106562              JMS     OTY
06662   626642              JMP*    PROK
06663   777777      OKCTR   777777
                            /TEXT FOR BAD DIVS
06664   740040      BADDIV  HLT
06665   107026              JMS PRINT           /PRINT?
06666   105412              TIN
06667   765636              LAW TEXTE           /DIVS FAILED
06670   105225              TSR
06671   105345              TYT
06672   105345              TYT
06673   105354              TSP
06674   105354              TSP
06675   206022              LAC RAN2            /DIVISOR
06676   105314              JMS OPS
06677   105345              TYT
06700   206021              LAC RAN1            /C (AC) HIGH ORDER DIVIDEND
06701   105314              JMS OPS
06702   105345              TYT                 /TAB
06703   206023              LAC RAN3            /C (MQ) LOW ORDER DIVIDEND
06704   105314              JMS OPS
06705   105412              TCR                 /CR, LF
```

```
06706   105345          TYT
06707   105345          TYT
06710   765656          LAW TEXTF               /QUOTIENT
06711   105225          TSR
06712   105354          TSP
06713   105354          TSP
06714   207173          LAC QUOTS               /QUOTIENT (SOFT)
06715   105314          JMS OPS
06716   105345          TYT                     /TAB
06717   105345          TYT
06720   207175          LAC REMS                /REMAINDER (SOFT)
06721   105314          JMS OPS
06722   105345          TYT
06723   206156          LAC HARDIV                      /GET SFTW LINK
06724   740010          RAL
06725   750010          CLA;RAL                         /CLEAR AC AND PUT LINK IN AC17
06726   105401          TDIGIT                          /TYPE
06727   765632          LAW TEXTD
06730   105225          TSR
06731   105354          TSP
06732   105354          TSP
06733   207172          LAC QUOTH               /QUOTIENT (HARD)
06734   105314          JMS OPS
06735   105345          TYT
06736   105345          TYT
06737   207174          LAC REMH                /REMAINDER (HARD)
06740   105314          JMS OPS
06741   105345          TYT
06742   206201          LAC DIVCOM                      /GET HDW LINK
06743   740010          RAL
06744   750010          CLA;RAL                         /CLEAR AC AND PUT LINK IN AC17
06745   105401          TDIGIT                          /TYPE
06746   105412          TCR
06747   626664          JMP* BADDIV
                        .EJECT
```

```
                                 /TEXT FOR BAD MULS
06750   740040   BADMUL  HLT
06751   107026           JMS PRINT          /PRINT?
06752   105412           TIN
06753   765576           LAW TEXTB          /MULS FAILED, MULTIPLIER, MULTIPLICAND
06754   105225           TSR
06755   105412           TCR
06756   105345           TYT
06757   105345           TYT
06760   105345           TYT
06761   206022           LAC RAN2           /MULTIPLIER
06762   105314           JMS OPS
06763   105345           TYT                /TAB
06764   105354           TSP
06765   105345           TYT
06766   206023           LAC RAN3           /MULTIPLICAND
06767   105314           JMS OPS
06770   105412           TCR
06771   105345           TYT
06772   105345           TYT
06773   105345           TYT
06774   765615           LAW TEXTC          /HIGH ORDER, LOW ORDER
06775   105225           TSR
06776   765666           LAW TEXTF+10
06777   105225           TSR                /SOFTWARE
07000   105345           TYT
07001   105345           TYT
07002   207161           LAC HPRODS         /HIGH ORDER PRODUCT SOFT
07003   105314           JMS OPS
07004   105345           TYT                /TAB
07005   105345           TYT
07006   105345           TYT
07007   207164           LAC LPRODS         /LOW ORDER PRODUCT (SOFT)
07010   105314           JMS OPS
07011   765632           LAW TEXTD
07012   105225           TSR
07013   105345           TYT
07014   105345           TYT
07015   207160           LAC HPRODH         /HIGH ORDER PRODUCT (HARD)
07016   105314           JMS OPS
07017   105345           TYT
07020   105345           TYT
07021   105345           TYT                /TAB
07022   207163           LAC LPRODH         /LOW ORDER PRODUCT (HARD)
07023   105314           JMS OPS
07024   105412           TCR
07025   626750           JMP* BADMUL        /RETURN
                         .EJECT
```

```
                                /CHECK FOR PRINTOUT
07026   740000      PRINT       NOP
07027   750004                  LAS
07030   507254                  AND (400000
07031   741200                  SNA
07032   627026                  JMP* PRINT                      /PRINT
07033   207026                  LAC PRINT
07034   347321                  TAD (777776             /SUBTRACT 2
07035   047026                  DAC PRINT
07036   227026                  LAC* PRINT
07037   047026                  DAC PRINT
07040   106636                  JMS BELL                /FOR BELL
07041   627026                  JMP* PRINT                      /EXIT NO PRINT
                        /
                                /TEXT FOR BAD LINK DURING DIVIDE
07042   740040      BALINK      HLT
07043   107026                  JMS PRINT               /PRINT
07044   765674                  LAW TEXTG               /BAD LINK
07045   105225                  TSR
07046   627042                  JMP* BALINK             /EXIT
                        /
                                /INITIAL TEXT
07047   105412      FIRST       TIN
07050   765420                  LAW TEXTA
07051   105225                  TSR
07052   147146                  DZM CTCMPT
07053   606623                  JMP RUN
                                .EJECT
```

```
                        /ROUTINES FOR SIMULATION OF TYPEOUT
                        /SIMULATION SETUP
07054   740040  SETSIM  HLT
07055   105412          TIN
07056   765710          LAW TEXTH               /L C(AC)  C(MQ)     C(SCA)
07057   105225          TSR
07060   627054          JMP* SETSIM
                        /
                        /PRINT OUT MULTIPLY SIMULATION
07061   740040  MULSIM  HLT
07062   107131          JMS STACLK              /STORE AC AND LINK
07063   105412          TIN
07064   207211          LAC (0)                 /LINK=0
07065   105401          TDIGIT
07066   105345          TYT
07067   207170          LAC MP5                 /(AC)
07070   105314          JMS OPS
07071   105345          TYT
07072   207165          LAC MP1                 /(MQ)
07073   105314          JMS OPS
07074   105345          TYT
07075   207167          LAC MP3                 /(SCA)
07076   507225          AND (000077
07077   105333          JMS TYPCO3
07100   107135          JMS FTACLK              /RESTORE AC AND LINK
07101   627061          JMP* MULSIM
                        /
                        /PRINTOUT FOR DIVIDE SIMULATION
07102   740040  DIVSIM  HLT
07103   107131          JMS STACLK              /STORE AC AND LINK
07104   105412          TIN
07105   207102          LAC DIVSIM
07106   740100          SMA
07107   607113          JMP .+4
07110   207213          LAC (1)
07111   105401          TDIGIT
07112   607115          JMP .+3
07113   207211          LAC (0)
                        .EJECT
```

```
07114   105401          TDIGIT
07115   105345          TYT
07116   207150          LAC DVD             /(AC)
07117   105314          JMS OPS
07120   105345          TYT
07121   207171          LAC QUO             /(MQ)
07122   105314          JMS OPS
07123   105345          TYT
07124   207152          LAC DV1             /(SCA)
07125   507225          AND (000077
07126   105333          JMS TYPCO3
07127   107135          JMS FTACLK          /RESTORE AC AND LINK
07130   627102          JMP* DIVSIM
                /
                        /STORE AC AND LINK
07131   740040  STACLK  XX                  /LINK STORED IN MSB
07132   047134          DAC STACLK+3
07133   627131          JMP* STACLK
07134   000000          0                   /STORE AC
                /
                        /FETCH AC AND LINK
07135   740040  FTACLK  XX          /
07136   207131          LAC STACLK          /GET STORED LINK
07137   740010          RAL                 /RESTORE LINK
07140   207134          LAC STACLK+3        /RESTORE AC
07141   627135          JMP* FTACLK         /EXIT
                /
        000000          .END
07205   070707  *L
07206   252525  *L
07207   707070  *L
07210   525252  *L
07211   000000  *L
07212   777777  *L
07213   000001  *L
07214   577777  *L
07215   000003  *L
07216   477777  *L
07217   000007  *L
07220   437777  *L
07221   000017  *L
07222   417777  *L
07223   000037  *L
07224   407777  *L
07225   000077  *L
07226   403777  *L
07227   000177  *L
07230   401777  *L
07231   000377  *L
07232   400777  *L
07233   000777  *L
07234   400377  *L
07235   001777  *L
07236   400177  *L
07237   003777  *L
```

```
07240   400077   *L
07241   007777   *L
07242   400037   *L
07243   217777   *L
07244   400017   *L
07245   037777   *L
07246   400007   *L
07247   077777   *L
07250   400003   *L
07251   177777   *L
07252   400001   *L
07253   377777   *L
07254   400000   *L
07255   052523   *L
07256   052524   *L
07257   125246   *L
07260   125250   *L
07261   252514   *L
07262   252520   *L
07263   525230   *L
07264   125241   *L
07265   252461   *L
07266   252503   *L
07267   525142   *L
07270   125207   *L
07271   252305   *L
07272   252417   *L
07273   524612   *L
07274   125037   *L
07275   251425   *L
07276   252077   *L
07277   523052   *L
07300   124177   *L
07301   246125   *L
07302   250377   *L
07303   514252   *L
07304   120777   *L
07305   230525   *L
07306   241777   *L
07307   461252   *L
07310   103777   *L
07311   142525   *L
07312   207777   *L
07313   305252   *L
07314   612525   *L
07315   037776   *L
07316   425252   *L
07317   000002   *L
07320   777775   *L
07321   777776   *L
07322   000005   *L
07323   777773   *L
07324   777772   *L
07325   777774   *L
07326   000016   *L
```

```
07327   700000   *L
07330   525251   *L
07331   252526   *L
07332   252524   *L
07333   525253   *L
07334   677777   *L
07335   377771   *L
07336   337777   *L
07337   024613   *L
07340   140000   *L
07341   525005   *L
07342   777252   *L
07343   002651   *L
07344   253252   *L
07345   405476   *L
07346   117162   *L
07347   777700   *L
07350   010000   *L
07351   200000   *L
07352   040000   *L
07353   004000   *L
07354   100000   *L
07355   020000   *L
07356   002000   *L
07357   204376   *L
07360   204376   *L
07361   740040   *L
07362   204376   *L
07363   000100   *L
07364   004776   *L
07365   777755   *L
07366   204376   *L
07367   004776   *L
07370   005022   *L
07371   204776   *L
07372   205012   *L
07373   205017   *L
07374   107061   *L
07375   740000   *L
07376   107102   *L
07377   151200   *L
07400   000040   *L
07401   000200   *L
07402   000300   *L
07403   000240   *L
07404   000260   *L
07405   000215   *L
07406   000212   *L
07407   657101   *L
07410   657122   *L
07411   770000   *L
07412   003466   *L
07413   153501   *L
07414   210762   *L
07415   006063   *L
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07416   006053   *L
07417   644301   *L
07420   644323   *L
07421   005202   *L
07422   005164   *L
07423   360000   *L
07424   207207   *L
07425   777750   *L
07426   000317   *L
07427   000313   *L
```

NO ERROR LINES

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ABCD      06570
ADDCT     07142
ADVP      00203
ANDBUF    05110
ASTRIC    07143
BADDIV    06664
BADMUL    06750
BALINK    07042
BEGIN     05024
BELL      06636
BITCT     07144
CKFLAG    04342
CLBUF     05052
CLOF     700004
CLON     700044
CLSF     700001
CTADD     07145
CTCMPT    07146
CTRAN     07147
DCRY      06464
DCTER     06244
DECONT    05360
DISC      05201
DIVA      03517
DIVB      03537
DIVC      03557
DIVCOM    06201
DIVCT     06221
DIVD      03577
DIVE      03617
DIVF      03637
DIVG      03657
DIVIDE    06413
DIVSHT    06120
DIVSIM    07102
DIVTST    03477
DSC1      02255
DSC10     02435
DSC11     02455
DSC12     02475
DSC13     02515
DSC14     02535
DSC15     02555
DSC16     02575
DSC17     02615
DSC2      02275
DSC20     02635
DSC21     02655
DSC3      02315
DSC4      02335
DSC5      02355
DSC6      02375
DSC7      02415
[redacted]PEED    03755
[redacted]1       06443
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DSP2      06465
DSP3      06453
DSP4      06523
DSP5      06531
DSP6      06546
DVCMER    06216
DVD       07150
DVS       07151
DV1       07152
DV2       06446
DV2A      06461
DV3       06527
DV4       06432
DV5       06424
EAEDON    07153
ERFLAG    07154
ERRBIT    07155
ERWOR     04376
EXDIV     06136
EXMUL     05765
EXRAN     05735
FACT      05047
FIAC      07156
FILHLT    04264
FILZER    04250
FIMQ      07157
FIRST     07047
FTACLK    07135
HARDIV    06156
HARMUL    06075
HDIVID    06316
HDIVL     06325
HLOOPL    04140
HLOOPM    04134
HLOOPS    04130
HLTL      04220
HLTM      04212
HLTS      04202
HMPY      06330
HPRODH    07160
HPRODS    07161
IACW      07162
IDIVS    657323
IOR       04166
IORBUF    05144
KRB      700312
KSF      700301
LENGTH    05023
LOOKUP    05031
LOOPA     04122
LOOPL     04143
LOOPM     04234
LOOPS     04226
LOOP2     04157
LOOP4     04162
```

LOOP5	04164
LPRODH	07163
LPRODS	07164
MPSIGN	06400
MPZ	06407
MP1	07165
MP2	07166
MP3	07167
MP4	06363
MP5	07170
MSC	05163
MSPEED	03701
MULA	03357
MULB	03377
MULC	03417
MULCOM	06105
MULCT	06256
MULD	03437
MULE	03457
MULSHT	05747
MULSIM	07061
MULT	06340
MULTST	03337
NDIV	00707
NDIVS	01020
NEAB	00360
NEAE	00246
NFRDIV	01347
NFRDVS	01457
NIDIV	01127
NIDIVS	01237
NMUL	00467
NMULS	00577
OCTOUT	06605
OKCTR	06663
OPS	005314
OPT	005314
OTY	06562
OVRFLO	06550
PCF	700202
PRINT	07026
PROK	06642
PSA	700204
PSB	700244
PSF	700201
QHIB	06475
QUO	07171
QUOTH	07172
QUOTS	07173
RAN	06007
RANCON	06051
RANDEX	06052
RANTAD	06041
[illegible]ANTBL	06053
[illegible]N1	06021

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RAN2      06022
RAN3      06023
RBCW      04363
RCF      700102
RDGEN     06024
REMH      07174
REMS      07175
RNO       06020
RRB      700112
RSA      700104
RSB      700144
RSF      700101
RUN       06623
RWRK      06064
SCAN      04315
SETBIT    04301
SETSIM    07054
SETUP     04347
SHCT1     01571
SHCT10    01760
SHCT11    02001
SHCT12    02022
SHCT13    02043
SHCT14    02064
SHCT15    02105
SHCT16    02126
SHCT17    02147
SHCT2     01612
SHCT20    02170
SHCT21    02211
SHCT22    02232
SHCT3     01633
SHCT4     01654
SHCT5     01675
SHCT6     01716
SHCT7     01737
SIGNA     03001
SIGNB     03025
SIGNC     03051
SIGND     03121
SIGNE     03145
SIGNF     03171
SIGNG     03241
SIGNH     03265
SIGNI     03311
SOFDIV    06170
SOFMUL    06065
SPAC      05354
SPACE2    05406
SPMUDV    04035
STABUF    05064
STACLK    07131
STDIVS    02755
STEMA     07176
STEMB     07177
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```
STFDVS   03215
STIDVS   03075
STMUL    02677
STMULS   02716
SVCB     06503
SVCRY    07200
SVC0     06476
SVC1     06510
SVC1A    06504
SVC2     06513
SVC3     06516
SWIT6    04151
SWIT7    04242
TACW     07201
TADBUF   05126
TCF      700402
TCR      105412
TDIGIT   105401
TEM      07202
TEMY1    07203
TEXTA    05420
TEXTB    05576
TEXTC    05615
TEXTD    05632
TEXTE    05636
TEXTF    05656
TEXTG    05674
TEXTH    05710
TEXTI    05724
TEXTJ    05725
TIMTEX   06306
TIN      105412
TLS      700406
TSF      700401
TSP      105354
TSR      105225
TYCRLF   05412
TYPCHR   05250
TYPCON   05314
TYPC03   05333
TYPOCT   05401
TYPSAV   05307
TYPTSR   05225
TYPTYT   05345
TYT      105345
WORDA    04776
XBAD     07204
```

```
IORBUF   05144
MSC      05163
DISC     05201
TYPTSR   05225
TYPCHR   05250
TYPSAV   05307
OPS     005314
OPT     005314
TYPCON   05314
TYPCO3   05333
TYPTYT   05345
SPAC     05354
DECONT   05360
TYPOCT   05401
SPACE2   05406
TYCRLF   05412
TEXTA    05420
TEXTB    05576
TEXTC    05615
TEXTD    05632
TEXTE    05636
TEXTF    05656
TEXTG    05674
TEXTH    05710
TEXTI    05724
TEXTJ    05725
EXRAN    05735
MULSHT   05747
EXMUL    05765
RAN      06007
RNO      06020
RAN1     06021
RAN2     06022
RAN3     06023
RDGEN    06024
RANTAD   06041
RANCON   06051
RANDEX   06052
RANTBL   06053
RWRK     06064
SOFMUL   06065
HARMUL   06075
MULCOM   06105
DIVSHT   06120
FXDIV    06136
HARDIV   06156
SOFDIV   06170
DIVCOM   06201
DVCMER   06216
DIVCT    06221
DCTER    06244
MULCT    06256
TIMTEX   06306
HDIVID   06316
HDIV!    06325
```

```
HMPY      06330
MULT      06340
MP4       06363
MPSIGN    06400
MP2       06407
DIVIDE    06413
DV5       06424
DV4       06432
DSP1      06443
DV2       06446
DSP3      06453
DV2A      06461
DCRY      06464
DSP2      06465
QHIB      06475
SVC0      06476
SVCB      06503
SVC1A     06504
SVC1      06510
SVC2      06513
SVC3      06516
DSP4      06523
DV3       06527
DSP5      06531
DSP6      06546
OVRFLO    06550
DTY       06562
ABCD      06570
OCTOUT    06605
RUN       06623
BELL      06636
PROK      06642
OKCTR     06663
BADDIV    06664
BADMUL    06750
PRINT     07026
BALINK    07042
FIRST     07047
SETSIM    07054
MULSIM    07061
DIVSIM    07102
STACLK    07131
FTACLK    07135
ADDCT     07142
ASTRIC    07143
BITCT     07144
CTADD     07145
CTCMPT    07146
CTRAN     07147
DVD       07150
DVS       07151
DV1       07152
EAEDON    07153
EBELAG    07154
[redacted]T    07155
```

FIAC	07156
FIMQ	07157
HPRODH	07160
HPRODS	07161
IACW	07162
LPRODH	07163
LPRODS	07164
MP1	07165
MP2	07166
MP3	07167
MP5	07170
QUO	07171
QUOTH	07172
QUOTS	07173
REMH	07174
REMS	07175
STEMA	07176
STEMB	07177
SVCRY	07200
TACW	07201
TEM	07202
TEMY1	07203
XBAD	07204
TSR	105225
TYT	105345
TSP	105354
TDIGIT	105401
TCR	105412
TIN	105412
IDIVS	657323
CLSF	700001
CLOF	700004
CLON	700044
RSF	700101
RCF	700102
RSA	700104
RRB	700112
RSB	700144
PSF	700201
PCF	700202
PSA	700204
PSB	700244
KSF	700301
KRB	700312
TSF	700401
TCF	700402
TLS	700406