NOISY MODE SUBROUTINE

Purpose:

To simulate twenty noisy mode floating point type instructions on the 704.

Noisy Mode Instructions:

The following list gives the symbolic code and a brief explanation of each instruction. All noisy mode instructions operate with the accumulator and the storage location specified by the address of the instruction.

Symbolic Code	Instruction
ASN	Add-same sign-normalized
AON	Add-opposite sign-normalized
ASU	Add-same sign-unnormalized
AOU	Add-opposite sign-unnormalized
MSN	Multiply-same sign-normalized
MNO	Multiply-opposite sign-normalized
MSU	Multiply-same sign-unnormalized
MOU	Multiply-opposite sign-unnormalized
DSN	Divide-same sign-normalized
DON	Divide-opposite sign-normalized
DSU	Divide-same sign-unnormalized
DOU	Divide-opposite sign-unnormalized
LSN	Load-same sign-normalized
LON	Load-opposite sign-normalized
LSU	Load-same sign-unnormalized
LOU	Load-opposite sign-unnormalized
SSN	Store-same sign-normalized
SON	Store-opposite sign-normalized
SSU	Store-same sign-unnormalized
SOU	Store-opposite sign-unnormalized

Noise Insertion:

There are two cases of noise that can be inserted. Case 1 is inserted during the operation of the arithmetic instructions. Case 2 is inserted if a left shift is required in order to normalize the number. There are two types of noise. The first type inverts the bit in question and the second type sets the bit to zero.

Usage:

The subroutine occupies locations $0\text{-}1200_8$. The noisy mode instructions can be used by entering the subroutine by means of the TSX instruction immediately preceeding the noisy mode instruction. A sample sequence of instructions could be the following:

```
TSX  I, 4

LSN  A

AON  B

SSN  C
```

Restrictions in programming the main routine are:

(1) Noisy mode instructions can be indexed with registers 1 or 2 only. (no multiple indexing).

(2) A TIX or TNX instruction can not immediately follow a noisy mode instruction.

Control Card:

A control card is used to specify the kind of noise that is to be inserted. The format of the control card is as follows:

Column 1	0-no noise 1-case 1 2-case 2
Column 2	0-set nth bit to zero 1-invert nth bit
Column 3, 4	n-where n is any number from 1 to 35 corresponding to the bit position of the accumulator from left to right.

The noise is inserted in the fractional part of the number which must be shifted right 8 places to allow for the characteristic, hence only the bit positions 1 thru 27 have meaning.

Multiple control cards can be used for changing the kind of noise that is to be inserted without rereading the deck. To do this, the main program must transfer to location 62_8 to read the next control card which must be followed by a transfer card for the main routine.

Deck:

The binary deck format should be as follows:

1) PEBBLE (loader)

2) Noisy Mode Subroutine

3) Control Card

4) Main Program

5) Transfer card for Main Program

6) Control Card

7) Transfer Card for Main Program

Steps 6) and 7) can be repeated as often as desired. The main program can contain any binary or octal card format that PEBBLE will load.

The symbolic deck for the main program must contain a set of OPD cards defining the noisy mode instruction and a SYN card for I. The subroutine also contains a block of 26 COMMON storage. This list of cards is:

```
I    SYN    106

COMMON SYN 554
```

ASN	OPD	+200001 000000
AON	OPD	-200001 000000
ASU	OPD	+000001 000000
AOU	OPD	-000001 000000
MSN	OPD	+200002 000000
MNO	OPD	-200002 000000
MSU	OPD	+000002 000000
MOU	OPD	-000002 000000
DSN	OPD	+200003 000000
DON	OPD	-200003 000000
DSU	OPD	+000003 000000
DOU	OPD	-000003 000000
LSN	OPD	+200004 000000
LON	OPD	-200004 000000
LSU	OPD	+000004 000000
LOU	OPD	-000004 000000
SSN	OPD	+200005 000000
SON	OPD	-200005 000000
SSU	OPD	+000005 000000
SOU	OPD	-000005 000000

Program Stops:

There are several program stops due to overflow or underflow conditions that might occur in the subroutine:

307_8 HPR	Characteristic overflow or underflow.
765_8 HPR	Characteristic overflow or underflow during a store operation.
425 HTR	Fractional overflow in an unnormalized Add Operation.

Caution:

If the noise inserter sets the fractional part of the number to zero after the test for zero has been made in the subroutine and if the current instruction is a normalized instruction the program will hang in the normalizing loop.

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