

UNIVERSITY OF ILLINOIS
DIGITAL COMPUTER

LIBRARY ROUTINE 04 - 161

TITLE: Fast Fraction Display, 4 x 6 Raster (DOI or SADOI)
 NUMBER OF WORDS: 68
 DURATION: about 11 milliseconds per digit
 PURPOSE: To display $N(A)$ as an n-digit fraction.
 A 4 x 6 format with the closest spacing is used.
 ACCURACY: Error between 0 and -0.6×2^{-39} . Decimal round-off is not included.
 TEMPORARY STORAGE: S4 through 4S4.
 METHOD OF USE: Enter thus with fraction to be displayed in A:

| | | | |
|----|------|---|---|
| p | x0 n | } | x = 5 : sign displayed |
| 50 | p | | x = J : no sign n decimal digits displayed |
| 26 | | | |

Also the L.H. 16 digits of $N(S3)$ must define the position of the display on the scope, such that if $N(S3)$ were in A, an 82 16F order would display a spot at the lower left-hand corner of the first character (i.e. the sign, or first decimal digit if no sign). The remaining digits of $N(S3)$ must all be zeroes. $N(S3)$ is not altered by this routine.


PRESET PARAMETERS: S3: see method of use.
 S4: see temporary storage.

NOTE: One column is left blank between digits, i.e., the horizontal spacing is 5 points per digit.

DATE 11/29/54 RT: 3/4/60
 PROGRAMMED BY Stanley Gill
 APPROVED BY J. P. Nash

| LOCATION | ORDER | NOTES | PAGE 1 | 0 4 |
|----------|---------------------------|---------------|--|-----------------------------|
| 0 | OOK(04) 40 S4 | | x to S4 | |
| 1 | L5 S3 L4 36L 40 1S4 | | base x, y to 1S4, 2S4 (modified) | |
| 2 | L0 37L 40 2S4 | | | |
| 3 | K5 F 46 38L | | store n in 38L | |
| 4 | 42 8L 50 1S4 | | set link | |
| 5 | J0 39L 32 31L | | form base y in Q | |
| 6 | S5 F 40 3S4 | | test sign or no sign | |
| 7 | L5 38L L0 40L | from 29' | base y to 3S4 | |
| 8 | 46 38L 32 F | by 4 | count digits | |
| 9 | L7 S4 10 2F | | x . 10/8 | |
| 10 | L6 S4 32 13L | | | test for exceeding capacity |
| 11 | L4 41L 40 S4 | | transfer to Q, with q ₀ = 0 and overflow digit (if any) in A | |
| 12 | F5 41L 50 S4 | | | |
| 13 | 22 14L 40 S4 | from 10' | integer in A, remainder in Q | |
| 14 | 51 S4 00 3F | from 13 | | |
| 15 | L4 31L 42 20L | from 34', 35' | set to extract digit pattern from table | |
| 16 | L4 39L 42 19L | | | |
| 17 | S5 F 40 S4 | | remainder to S4 | |

| LOCATION | ORDER | | NOTES | PAGE 2 |
|----------|-------------------|---------------|--|------------------|
| 18 | L5 2S4 L4 37L | | | |
| 19 | 40 2S4 L5 (F) | by 16' | advance x co-ordinate second word to 1S4 | |
| 20 | 40 1S4 50 (F) | by 15' | | |
| 21 | S5 F 40 4S4 | from 31 | first word to Q and 4S4 | |
| 22 | 10 3F J0 42L | | appropriate digits to A | |
| 23 | S5 F 50 1S4 | | appropriate digits to Q | |
| 24 | J0 43L 26 27L | | | |
| 25 | F0 41L 36 29L | from 27 | test for last co-ordinate | |
| 26 | L4 2S4 82 16F | | add base display new x, y | |
| 27 | 36 25L L4 3S4 | from 24', 28' | test end of column add base y | display cycle |
| 28 | 82 8F 26 27L | | display new y | |
| 29 | F1 4S4 36 7L | from 25' | | |
| 30 | 50 1S4 40 1S4 | | interchange words of pattern, complement N(4S4) and test its sign | |
| 31 | 22 21L S5 44L | from 5' | base y to 3S4 | |
| 32 | 40 3S4 50 S4 | | x to Q | |
| 33 | L5 S4 36 35L | | test sign of x | |
| 34 | F5 38L 22 15L | | prepare to display - | |
| 35 | L5 38L 22 15L | from 33' | prepare to display + | |

| LOCATION | ORDER | | NOTES | PAGE 3 |
|----------|----------------------|--|--------------------------|-----------------------|
| 36 | 7L F 00 1F | | | |
| 37 | 00 80F 00 F | | | |
| 38 | 80 (F) 00 54L | by 3', 8 | | |
| 39 | LL F 00 12F | | | |
| 40 | 00 1F 00 F | | | |
| 41 | 80 F 00 F | | | |
| 42 | 87 2168F 78 1927F |  | = 10000111100001111.... | |
| 43 | 43 3132F 3N 963F | | = 010000111100001111.... | |
| 44 | 12 89F J6 2027F | | 0 | |
| 45 | 4S 3325F 7J 4067F | | 1 | |
| 46 | 4K 90F 94 3019F | | 2 | |
| 47 | 52 3171F 20 2251F | | 3 | |
| 48 | 19 13F SN 4067F | | 4 | |
| 49 | 52 98F 4F 4083F | | 5 | first word of pattern |
| 50 | 12 1149F LF 2027F | | 6 | |
| 51 | 73 3135F 3N 3019F | | 7 | |
| 52 | 52 97F J6 3019F | | 8 | |
| 53 | 21 1150F SJ 3019F | | 9 | |

| LOCATION | ORDER | | NOTES | PAGE 4 |
|----------|----------|--|-------|------------------------|
| 54 | 5S 3133F | | + | |
| | 3N 4059F | | | |
| 55 | 5S 3133F | | - | |
| | SN 3035F | | | |
| 56 | 08 2383F | | 0 | |
| | 31 24F | | | |
| 57 | 42 3120F | | 1 | |
| | 00 F | | | |
| 58 | 49 1393F | | 2 | |
| | N3 8F | | | |
| 59 | 4K 1394F | | 3 | |
| | 42 3120F | | | |
| 60 | 09 2517F | | 4 | |
| | 69 3104F | | | |
| 61 | 08 2382F | | 5 | |
| | 67 784F | | | second word of pattern |
| 62 | 4S 330F | | 6 | |
| | 0J 536F | | | |
| 63 | 29 1495F | | 7 | |
| | 1N 579F | | | |
| 64 | 08 3430F | | 8 | |
| | 73 16F | | | |
| 65 | 4S 473F | | 9 | |
| | 55 3872F | | | |
| 66 | 42 24F | | + | |
| | 10 F | | | |
| 67 | 01 24F | | - | |
| | 18 F | | | |