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586

MURA - 586

IDENTIFICATION:

MODIFIED BESSEL FUNCTIONS OF THE FIRST KIND, ORDER ZERO
Bud Cristal - August 15, 1960
Midwestern Universities Research Association
Madison, Wisconsin

PURPOSE:

A FORTRAN floating point program to compute $I_0(x)$.

REMARKS:

This program computes:

$I_0(x)$	$0.01 \leq x < 3.75$	; $x = 0.0$
$I_0(x)\sqrt{x}e^{-x}$	$3.75 \leq x < 10^4$	

No error return is provided for $x < .01$ or $> 10^4$.
An accuracy of 7 significant figures is claimed by the author.(1)

CALLING SEQUENCE:

A = BIZF(x)

STORAGE AND TIMING:

Cells 64

Timing	$I_0(x)$	$0.01 \leq x < 3.75$	$T \approx 1.5$ m sec.
	$I_0(x)\sqrt{x}e^{-x}$	$3.75 \leq x < 10^4$	$T \approx 1.2$ m sec.

(1) Allen, E. E. "Polynomial Approx. to some Modified Bessel Function", MTAC, Vol. X, 1956, pp. 162 - 164.

```
                                  REL
                  00000           ORG 0
00000 -0 63400 1 00021   BIZ      SXD BB,1                    BLS10001
00001  0 60100 0 00073           STO ARG                     BLS10002
00002  0 30200 0 00065   XX       FSB B1                      BLS10003
00003  0 12000 0 00022           TPL QQ                      BLS10004
00004  0 50000 0 00066           CLA B2                      BLS10005
00005  0 60100 0 00074           STO IZ                      BLS10006
00006  0 50000 0 00067           CLA B3                      BLS10007
00007 -0 73400 1 00000   SS       PDX 0,1                     BLS10008
00010  0 50000 0 00073           CLA ARG                     BLS10009
00011  0 24000 0 00065           FDH B1                      BLS10010
00012 -0 60000 0 00073           STQ ARG                     BLS10011
00013  0 26000 0 00073           FMP ARG                     BLS10012
00014  0 60100 0 00073           STO ARG                     BLS10013
00015  0 60100 0 00072           STO FF                      BLS10014
00016  0 50000 0 00055   VV       CLA A2                      BLS10015
00017  0 50000 0 00016           CLA VV                      BLS10016
00020  0 62100 0 00034           STA PP                      BLS10017
00021  1 00000 0 00034   BB       TXI PP,0                    BLS10018
00022  0 50000 0 00070   QQ       CLA B4                      BLS10019
00023  0 60100 0 00074           STO IZ                      BLS10020
00024  0 50000 0 00071           CLA B5                      BLS10021
00025 -0 73400 1 00000           PDX 0,1                     BLS10022
00026  0 50000 0 00002           CLA XX                      BLS10023
00027  0 62100 0 00034           STA PP                      BLS10024
00030  0 50000 0 00065           CLA B1                      BLS10025
00031  0 24000 0 00073           FDH ARG                     BLS10026
00032 -0 60000 0 00073           STQ ARG                     BLS10027
00033 -0 60000 0 00072           STQ FF                      BLS10028
00034  0 56000 1 00000   PP       LDQ **,1                    BLS10029
00035  0 26000 0 00073           FMP ARG                     BLS10030
00036  0 30000 0 00074           FAD IZ                      BLS10031
00037  0 60100 0 00074           STO IZ                      BLS10032
00040  0 56000 0 00073           LDQ ARG                     BLS10033
00041  0 26000 0 00072           FMP FF                      BLS10034
00042  0 60100 0 00073           STO ARG                     BLS10035
00043  2 00001 1 00034           TIX PP,1,1                  BLS10036
00044 -0 53400 1 00021           LXD BB,1                    BLS10037
00045  0 50000 0 00074           CLA IZ                      BLS10038
00046  0 02000 4 00001           TRA 1,4                     BLS10039
00047 +202701777671      A1       DEC 3.5156229               BLS10040
00050 +202613406356              DEC 3.0899424               BLS10041
00051 +201464733017              DEC 1.2067492               BLS10042
00052 +177420266435              DEC 0.2659732               BLS10043
00053 +174447425042              DEC 0.0360768               BLS10044
00054 +171454172726              DEC 0.0045813               BLS10045
00055 +172663264546      A2       DEC 0.013285917             BLS10046
00056 +170447250643              DEC 0.002253187             BLS10047
00057 -167635035420              DEC -0.00157569             BLS10048
00060 +172454176321              DEC 0.009162808             BLS10049
00061 -173521104724              DEC -0.020577063            BLS10050
00062 +173657634704              DEC 0.026355372             BLS10051
00063 -173415745356              DEC -0.016476329            BLS10052
00064 +171401113613              DEC 0.003923767             BLS10053
00065 +202740000000      B1       DEC 3.75                    BLS10054
00066 +201400000000      B2       DEC 1.0                     BLS10055
00067 +000006000000      B3       OCT 000006000000            BLS10056
00070 +177630410514      B4       DEC 0.39894228              BLS10057
00071 +000010000000      B5       OCT 000010000000            BLS10058
00072  0 00000 0 00000   FF       HTR 0                       BLS10059
```

```
      00073  0 00000 0 00000  ARG    HTR 0                                  BLS10060
      00074  0 00000 0 00000  IZ     HTR 0                                  BLS10061
A                      00000         END                                    BLS10062
```

SH E ASSEMBLER STATISTICS

TAPE	TOTAL	1 FAIL	2 FAIL	3 FAIL	4 FAIL
INP	0	0	0	0	0
LIB	0	0	0	0	0
COL	64	0	0	0	0

NUMBER OF ON-LINE INPUT RECORDS 64

NUMBER OF OFF-LINE PRINT RECORDS 0

NUMBER OF SYMBOLS, DEF 17,DEFOP 0,UNDEF 0