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PROGRAM NUMBER

087003

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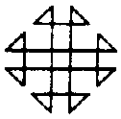


CONTRIBUTED PROGRAM LIBRARY SUBMI
(for IBM S/360, 1130 and 1800)

SHARE Program Library Agency
Triangle Universities Computation Center
P. O. Box 12076
Research Triangle Park, N. C. 27709

This form should be completed and submitted with the program package to PID at the address shown above. Standards and instructions for submitting programs are in your *User Group Reference Manual* or the *Contributed Program Submittal Standards Manual* available from PID.

(1) **Program Order Number** *(to be filled in by PID)* 360D-08.7.003

(2) **System Type** *(machine)* 360

(3) **Search Key** . . . . . /PRINTS A/ONE-PAGE HISTOGRAM/OF AN/ARRAY/SHOWING /MEAN, QUARTILES, ST.DEVS ./AND/FREQUENCIES

(4) **Name of Author** *(if different than submitter's)* . . . . .

(5) **Submitter's Name** *(direct technical inquiries to)* . .

(6) **Submitter's Address** . . . . . Dr. D. Ashler
Office of Res. & Evaluation, Rm 400
School District of Philadelphia
21st St. & Benj. Franklin Parkway
Philadelphia, PA 19103

(7) **Title of Program** . . . . HISTOGRAM DISPLAY SUBROUTINE

(8) **Submitter's User Group Affiliation Code and Installation Code** . . . . . S CUP

(9) **Submitter's Own Program Identification and Suffix** *(optional)* . . . . . HIST

(10) **Primary Subject Code** 08.7

(11) **Secondary Subject Codes** 08.6

(12) **Operating or Monitor System Required** OS360

(13) **New or Revision Code** *(if revision, show prior Program Order Number in item 1)* . . . . . N

(14) **Year Completed** 67

(15) **Date of Submittal** 042968

(16) **Documentation** *(number of original pages submitted)* . . . . . .

(17) **Abstract** *(should contain sufficient information for a reader to determine the value of the program). Listed on the reverse side of this form are subjects which may serve as a guide for a descriptive abstract.*

CONTRIBUTED PROGRAM LIBRARY SUBMITTAL FORM

Subject Guide

a. Purpose
b. Programming Language used
c. Version and modification level or release number of IBM Programming System used, or program order number for non-IBM authored program used
d. Field of application
e. Type of routine (main program, subroutine, etc.)
f. Specific description of machine requirements
g. Engineering Changes (EC) level of equipment (if pertinent)

ABSTRACT

Subroutine HIST may be called to obtain the mean, standard deviation, quartiles, and a histogram of a distribution. The call must supply the name and the length of a one-dimensional array of REAL*4 numbers; HIST sorts these numbers in place, subdivides their range into fourteen equal intervals, and prints a 14-bar histogram on a single page. The mean and the quartile boundaries are marked on the histogram. The values of the fourteen frequencies are printed above it; the values of the interval boundaries and of the mean, quartile boundaries, and the standard deviation are printed below it. Provision is also made for displaying a legend at the bottom of the page and in the upper left corner.

(Please attach additional pages if necessary) . . . . . **Total pages attached** _____

Permission to Publish

"I hereby give anyone permission to reprint, reproduce, and distribute this program to anyone else."

(18) **Signature of Submitter and Date** David Baker 26 April 1968

(19) **Signature of Installation Addressee** John James Lohr

T4SF

TABLE OF CONTENTS

CARD DECK KEY

Deck #1 Object Deck, sequence 0001 through 0115 in cc 77-80;
HIST in cc 73-76; 115 cards.

Deck #2 Source Deck; sequence 0 through 1540 in cc 77-80;
HIST in cc 73-76; 155 cards.

Subroutine HIST may be called to obtain the mean, standard deviation, quartiles, and a histogram of a distribution. The call must supply the name and the length of a one-dimensional array of REAL*4 numbers; HIST sorts these numbers in place, subdivides their range into fourteen equal intervals, and prints a 14-bar histogram on a single page. The mean and the quartile boundaries are marked on the histogram. The values of the fourteen frequencies are printed above it; the values of the interval boundaries and of the mean, quartile boundaries, and the standard deviation are printed below it. Provision is also made for displaying a legend at the bottom of the page and in the upper left corner.

Usage:

CALL HIST (X, N)

CALL HIST (X, N, XTITLE, NX)

CALL HIST (X, N, XTITLE, NX, YTITLE, NY)

Arguments:

X - a one-dimensional array of REAL*4 numbers whose distribution is to be analyzed.

N - an INTEGER*4 constant or variable which specifies the length of the X array.

XTITLE - a string of up to 131 EBCDIC characters enclosed in apostrophes.

NX - an INTEGER*4 constant or variable equal to the number of characters in XTITLE.

YTITLE - a string of up to 49 EBCDIC characters enclosed in apostrophes.

NY - an INTEGER*4 constant or variable equal to the number of characters in YTITLE.

All of the calls shown are valid. If HIST is called with two arguments, a one-page histrogram will be printed, without titles. To place a title at the bottom of the page, four arguments must be supplied. By supplying six arguments, one may also place a title in the upper left corner, printed vertically.

HIST does an in-place sort of an array X, computes its range, and divides the range into fourteen equal intervals. The histogram will therefore have fourteen bars. At the top of the page the fourteen frequencies will be printed. At the bottom of the page will be printed the fifteen interval boundaries. Vertical dotted lines in the histogram will mark the quartile boundaries, and a vertical column of stars will mark the mean. The values of the quartile boundaries, mean, and standard deviation will be printed at the bottom of the histogram, below the title, if any.

To suppress quartile indications, the statement

CALL NOQUAR

should be executed prior to calling HIST. Quartile boundaries will then not be computed. Similarly, the statement

CALL NOMEAN

prior to calling HIST will cause the computation of mean and standard deviation to be bypassed. If desired, both NOQUAR and NOMEAN may be called, in either order

Subroutines Required:

NARGS, a function that may be called within a subprogram to return the number of arguments supplied to the subprogram, is used by HIST to determine the number of arguments supplied to HIST. NARGS was written by Paul A. T. Wolfgang at the University of Pennsylvania and has been submitted to SHARE.

```
                    W A S E   S Y S T E M   L O G

NO MESSAGES LOGGED FOR THIS JOB
```

007

```
//HIST1 JOB (9004,DASH),'ASHLEY',MSGLEVEL=1                          JOB  7
//HISTONE  EXEC FORTGCLG,PARM.FORT=DECK
//FORT.    EXEC  PGM=IEYFORT,REGION=200K                          00000010
//SYSPRINT DD  SYSOUT=A                                           00000020
//SYSPUNCH DD  SYSOUT=B                                           00000030
//SYSLIN DD DSNAME=SYS1.SYSLIN,VOLUME=SER=VOLUMO,UNIT=DISK,MISC=CLO 00000040
//FORT.SYSIN DD *
IEF236I ALLOC. FOR HIST1    FORT     HISTONE
IEF237I SYSPUNCH ON 009
IEF237I SYSLIN   ON 1C0
IEF237I SYSIN    ON 00C
```

008

```
C-----EXERCISE HIST
      REAL X(1000)
      INTEGER J
      DO 10 J=1,1000
   10 X(J)=ARSIN(2.*RANNDS(54321)-1.)/3.14159 + 0.5
      CALL HIST  (X,1000,'RANGE = ZERO TO ONE',19,'FIRST CALL',10)
      DO 20 J=1,1000
   20 X(J)=199.*X(J)-99.5
      CALL HIST(X,1000,'RANGE = (-99.5) TO (+99.5)',26,'SECOND CALL',11)
      DO 30 J=1,1000
      CALL NORMAN
   30 X(J)=10.*X(J)
      CALL HIST  (X,1000,'RANGE = (-995) TO (+995)',26,'THIRD CALL',10)
      DO 40 J=1,1000
   40 X(J)=10.*X(J)
      CALL NORUAR
      CALL HIST  (X,1000,'RANGE = (-9950) TO (+9950)',26,'FOURTH CALL',1
     *1)
      DO 50 J=1,1000
   50 X(J)=X(J)*1.E-5
      CALL HIST  (X,1000,'RANGE = (-.0995) TO (+.0995)',29)
      DO 60 J=1,1000
   60 X(J)=X(J)*0.01
      CALL NORMAN
      CALL NORUAR
      CALL HIST  (X,1000,'RANGE = (-.009950) TO (+.009950)',32,'FIFTH CA
     *LL',10)
      CALL HIST(X,500)
      STOP
      END
```

009

SCALAR MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
J	8C								

ARRAY MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
X	80								

SUBPROGRAMS CALLED

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
RANNDS	1050	HIST	1054	NORMAN	1058	NORUAR	105C	IHCOMH	1060
ARSIN	1064								

TOTAL MEMORY REQUIREMENTS 001478 BYTES

```
FORTRAN IV G LEVEL 1, MOD 0          MAIN          DATE = 68074      02/49/14          PAGE 0001

            C-----EXERCISE HIST
0001              REAL X(1000)
0002              INTEGER J
0003              DO 10 J=1,1000
0004           10 X(J)=ARSIN(2.*PANNOS(54321)-1.)/3.14159 + 0.5
0005              CALL HIST  (X,1000,'RANGE = ZERO TO ONE',19,'FIRST CALL',10)
0006              DO 20 J=1,1000
0007           20 X(J)=199.*X(J)-99.5
0008              CALL HIST(X,1000,'RANGE = (-99.5) TO (+99.5)',26,'SECOND CALL',11)
0009              DO 30 J=1,1000
0010              CALL NORMEAN
0011           30 X(J)=10.*X(J)
0012              CALL HIST  (X,1000,'RANGE = (-995) TO (+995)',24,'THIRD CALL',10)
0013              DO 40 J=1,1000
0014           40 X(J)=10.*X(J)
0015              CALL NORMVAR
0016              CALL HIST  (X,1000,'RANGE = (-9950) TO (+9950)',26,'FOURTH CALL',1
                 *1)
0017              DO 50 J=1,1000
0018           50 X(J)=X(J)*1.E-5
0019              CALL HIST  (X,1000,'RANGE = (-.0095) TO (+.0095)',29)
0020              DO 60 J=1,1000
0021           60 X(J)=X(J)*2.0
0022              CALL NORMEAN
0023              CALL NORMVAR
0024              CALL HIST  (X,1000,'RANGE = (-.019905) TO (+.019905)',33,'SIXTH CA
                 *LL',17)
0025              CALL HIST(X,500)
0026              STOP
0027              END
```

009

```
FORTRAN IV G LEVEL 1, MOD 0          MAIN          DATE = 68074      02/49/14          PAGE 0002

                        SCALAR MAP
SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION
J           00AC

                        ARRAY MAP
SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION
X           0080

                        SUBPROGRAMS CALLED
SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION    SYMBOL    LOCATION
@ANNOS      1050        HIST        1054        NORMEAN     1058        NORMVAR     105C        @SQW@       1060
@ARSIN      1064

   TOTAL MEMORY REQUIREMENTS 001478 BYTES
```

```
IEF285I   SYSOUT                                    SYSOUT
IEF285I   VOL SER NOS=
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.00000130 DELETED
IEF285I   VOL SER NOS=
IEF285I   SYS1.SYSLIN                               KEPT
IEF285I   VOL SER NOS= VOLUMD.
//LKED EXEC PGM=IEWL,REGION=96K,PARM='XREF,LIST',COND=(11,LT,FORT)        00000050
//SYSLIB   DD  DSNAME=SYS1.FORTLIB,VOLUME=SER=VOLUMD,UNIT=DRUM,DISP=OLD  00000060
//SYSLMOD  DD  DSNAME=&GOSET(GO),UNIT=DRUM,SPACE=(1024,(50,20,1)),       X00000070
//             DISP=(MOD,PASS)                                           00000080
//SYSPRINT DD  SYSOUT=A                                                  00000090
//SYSUT1 DD DSNAME=SYS1.UTILITYS,VOLUME=SER=VOLUMD,UNIT=DRUM,DISP=OLD    00000100
//SYSLIN DD DSNAME=SYS1.SYSLIN,VOLUME=SER=VOLUMD,UNIT=DRUM,DISP=OLD      00000110
//         DD  DDNAME=SYSIN                                              00000120
//LKED.SYSIN DD *
IEF236I ALLOC. FOR HIST1    LKED     HISTONE
IEF237I SYSLIB   ON 100
IEF237I SYSLMOD  ON 100
IEF237I SYSUT1   ON 100
IEF237I SYSLIN   ON 100
IEF237I          ON 000
```



```
  E-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LIST
*****00        DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

CROSS REFERENCE TABLE

CONTROL SECTION

NAME	ORIGIN	LENGTH
MAIN#	00	1478
RANNOS *	1478	6C
NARGS	14E8	48
HIST#	1530	3B7C
IHCFCOMH#	4080	F60
IHCUDPT *	5010	*
IHCFPCH *	5018	278
IHCSASCN#	5290	134
IHCSSORT#	53C8	4C
IHCFMAXR#	5478	C9
IHCFCVTH#	5548	107C
IHCFIOSH#	65C8	D08
IHCUATBL#	72D8	148

ENTRY

NAME	LOCATION	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION
MAIN	00						
RESCUS	14A6	SETS	14B0				
HIST	1530	NOMEAN	1560	NOQUAR	1588		
IRCOM#	4080	FDIOCS#	416C	REREAD	4EC6		
ARCOS	5290	ARSIN	52AA				
SQRT	53C8						
MAX1	5478	MIN1	54AF	AMAX1	54A6	AMIN1	54BA
ADCON#	5548	FCVZD	5694	FCVAD	573A	FCVLD	57C4
FCVID	5800	* FCVFD	5EF2	FCVCD	61F4	INTASM	65A9
FIOCS#	65C8						

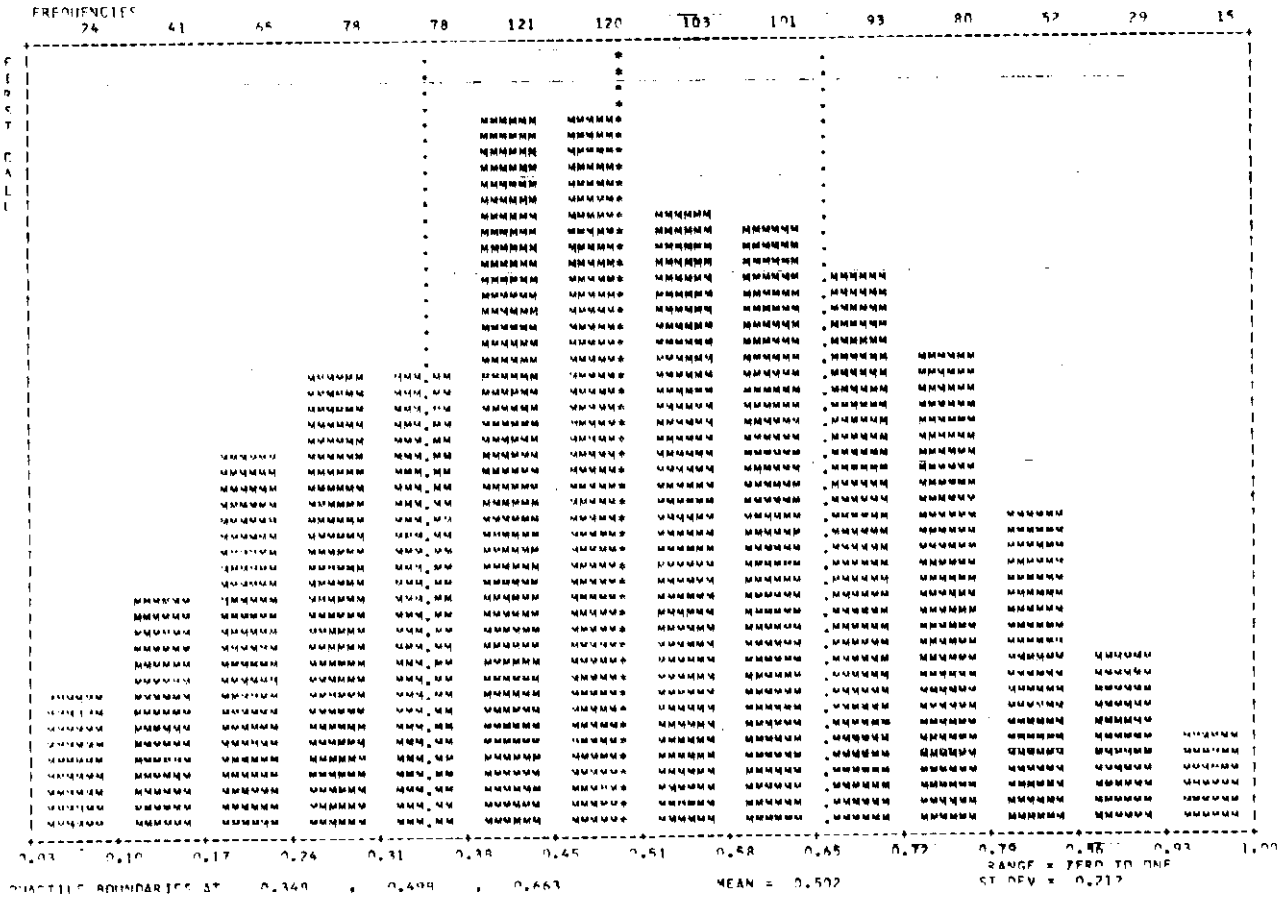
LOCATION REFERS TO SYMBOL IN CONTROL SECTION

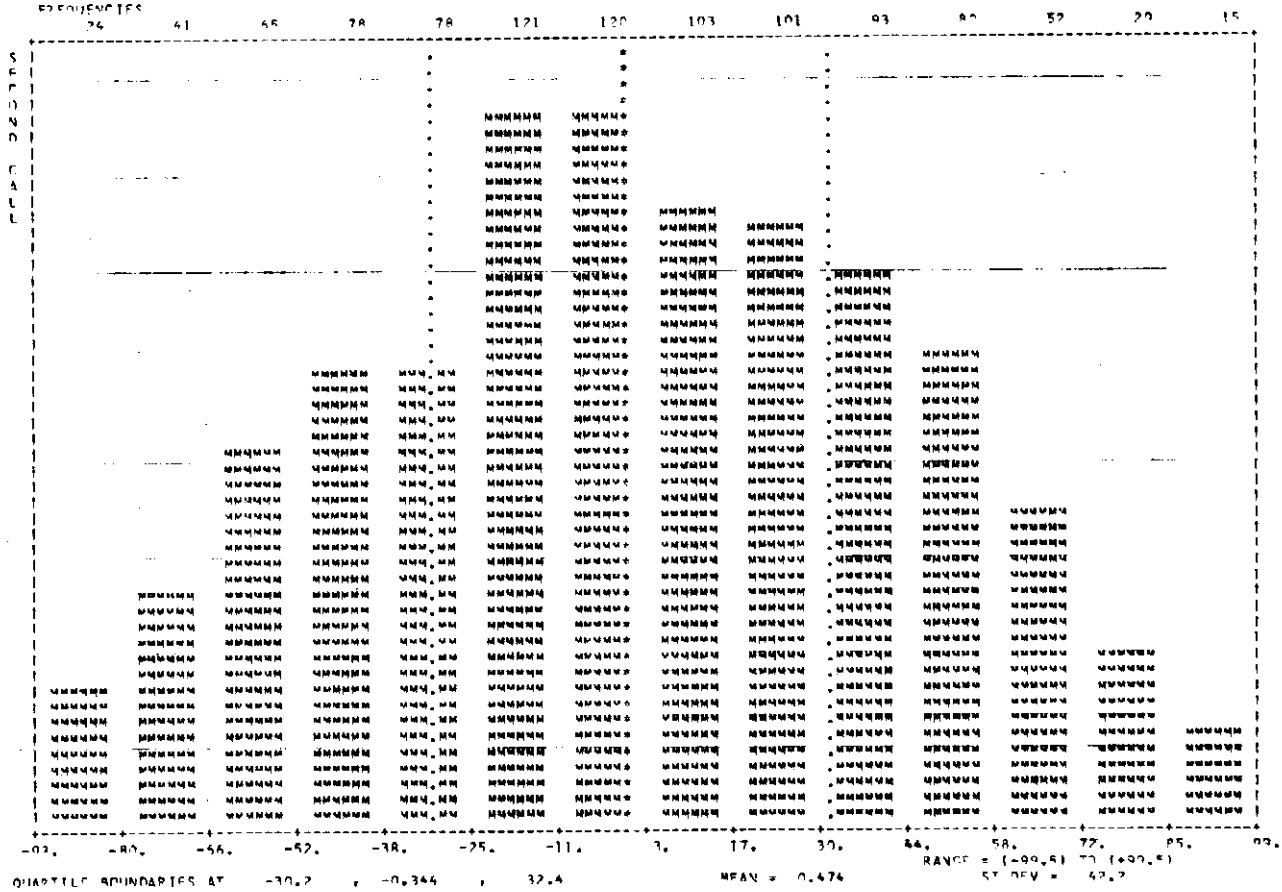
1050	RANNOS	RANNOS
1054	HIST	HIST#
1058	NOMEAN	HIST#
105C	NOQUAR	HIST#
1060	IRCOM#	IHCFCOMH
1064	ARSIN	IHCSASCN
3024	IRCOM#	IHCFCOMH
3028	NARGS	NARGS
302C	SQRT	IHCSSORT
3030	AMAX1	IHCFMAXR
4E64	ADCON#	IHCFCVTH
4E6C	FIOCS#	IHCFIOSH
4D6C	IHCUDPT	IHCUDPT
4E68	FCVFD	IHCFCVTH
4E6C	FCVLD	IHCFCVTH
4E70	FCVID	IHCFCVTH
4E74	FCVCD	IHCFCVTH

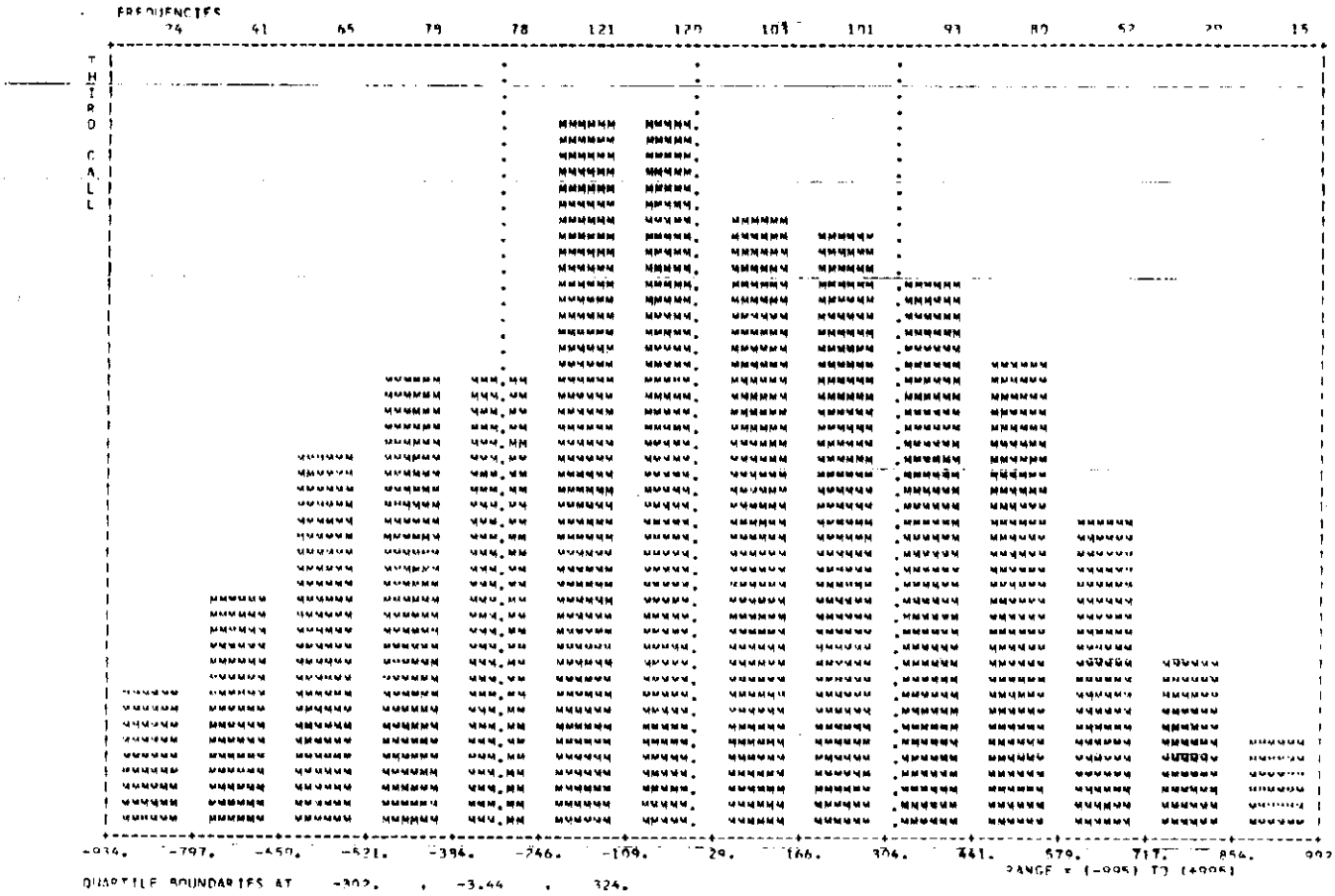
```
 LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION

     4E78          FCVAD          IHCFCVTH
     4E7C          FCVZD          IHCFCVTH
     4F54          IHCTRCH        IHCTRCH
     5194          IRCOM#         IHCFCOMH
     5198          ADCON#         IHCFCVTH
     519C          FIOCS#         IHCFIOSH
     527C          SORT           IHCSSORT
     5378          IRCOM#         IHCFCOMH
     5440          IRCOM#         IHCFCOMH
     6686          IRCOM#         IHCFCOMH
     66E0          IHCUATBL       IHCUATBL
     66EC          IRCOM#         IHCFCOMH
ENTRY ADDRESS      00
TOTAL LENGTH       7430
```

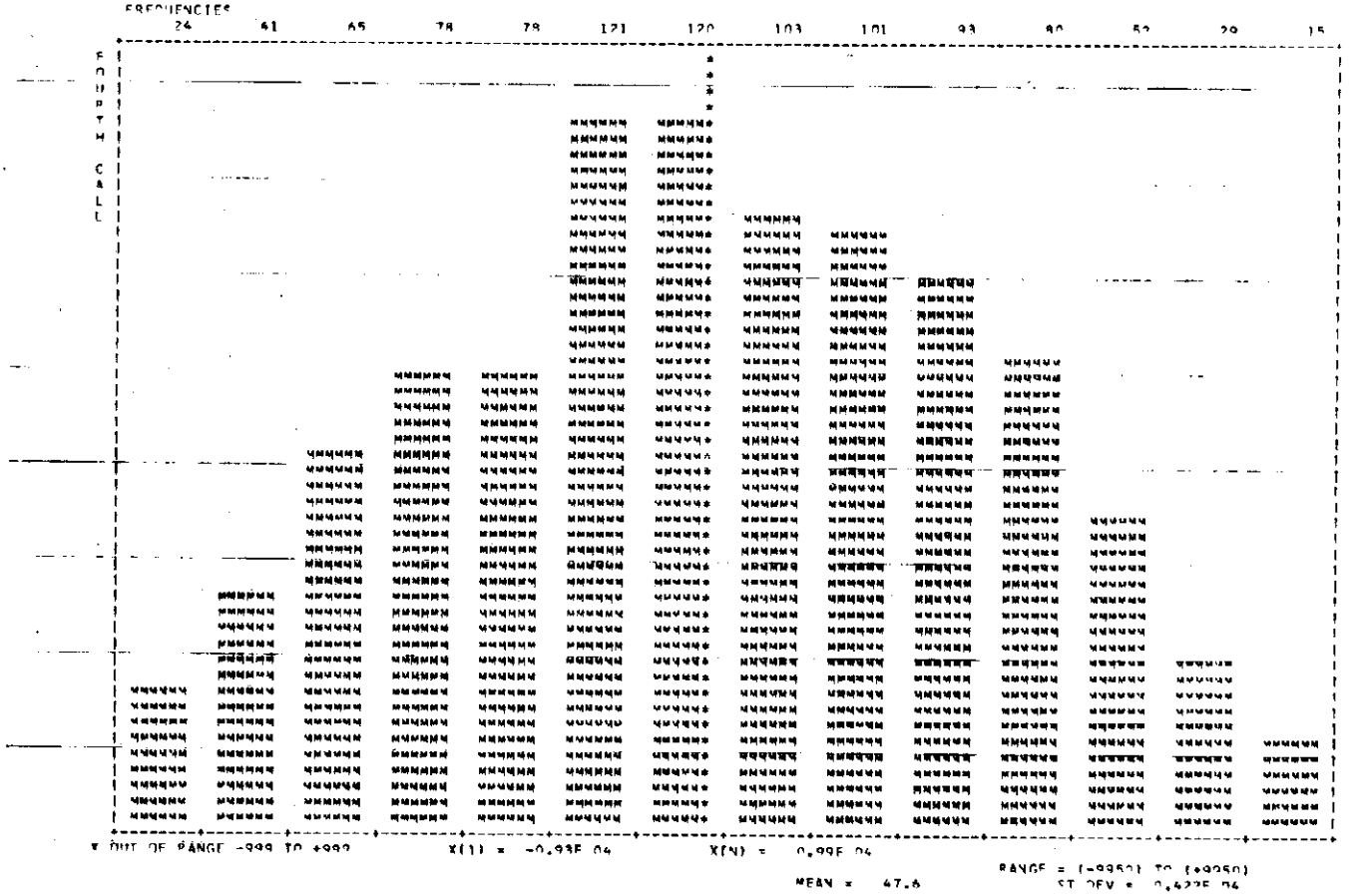


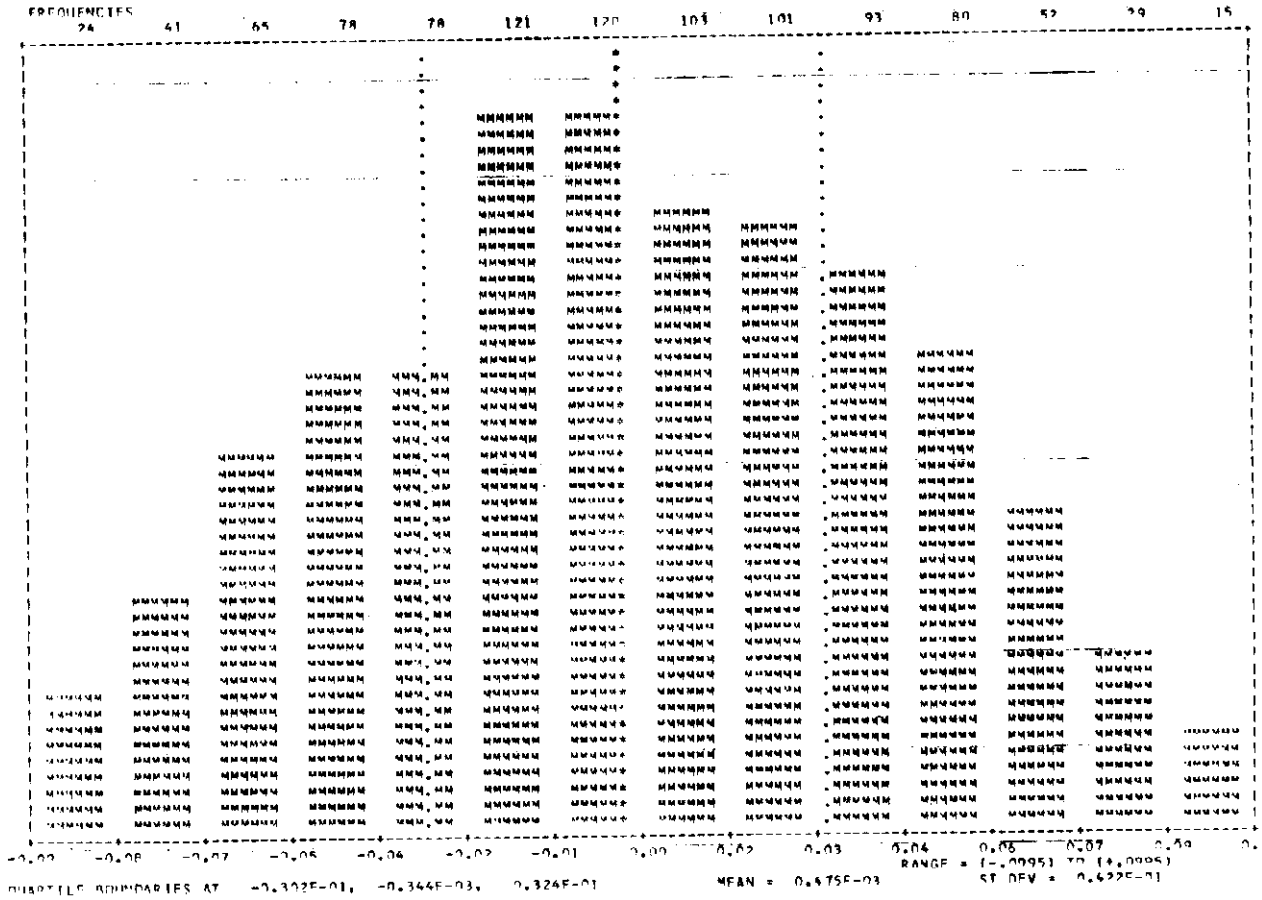
```
IEF285I   SYS1.FORTLIB                                KEPT
IEF285I   VOL SER NOS= VOLUMD.
IEF285I   GOSET.HIST1                                 PASSED
IEF285I   VOL SER NOS= VOLUMD.
IEF285I   SYSOUT                                      SYSOUT
IEF285I   VOL SER NOS=
IEF285I   SYS1.UTILITYS                               KEPT
IEF285I   VOL SER NOS= VOLUMD.
IEF285I   SYS1.SYSLIN                                 KEPT
IEF285I   VOL SER NOS= VOLUMD.
//GO.SYSC DD PGM=*.LKED.SYSLMOD,COND=((1,LT,FORT),(1,LT,LKED))          00000130
//FT05F001 DD  DDNAME=SYSIN                                             00000140
//FT06F001 DD  SYSOUT=A                                                 00000150
//FT07F001 DD  SYSOUT=B                                                 00000160
//
IEF236I ALLOC. FOR HIST1    GO       HISTONE
IEF237I PGM=*.DD ON 100
IEF237I FT07F001 ON 000
```

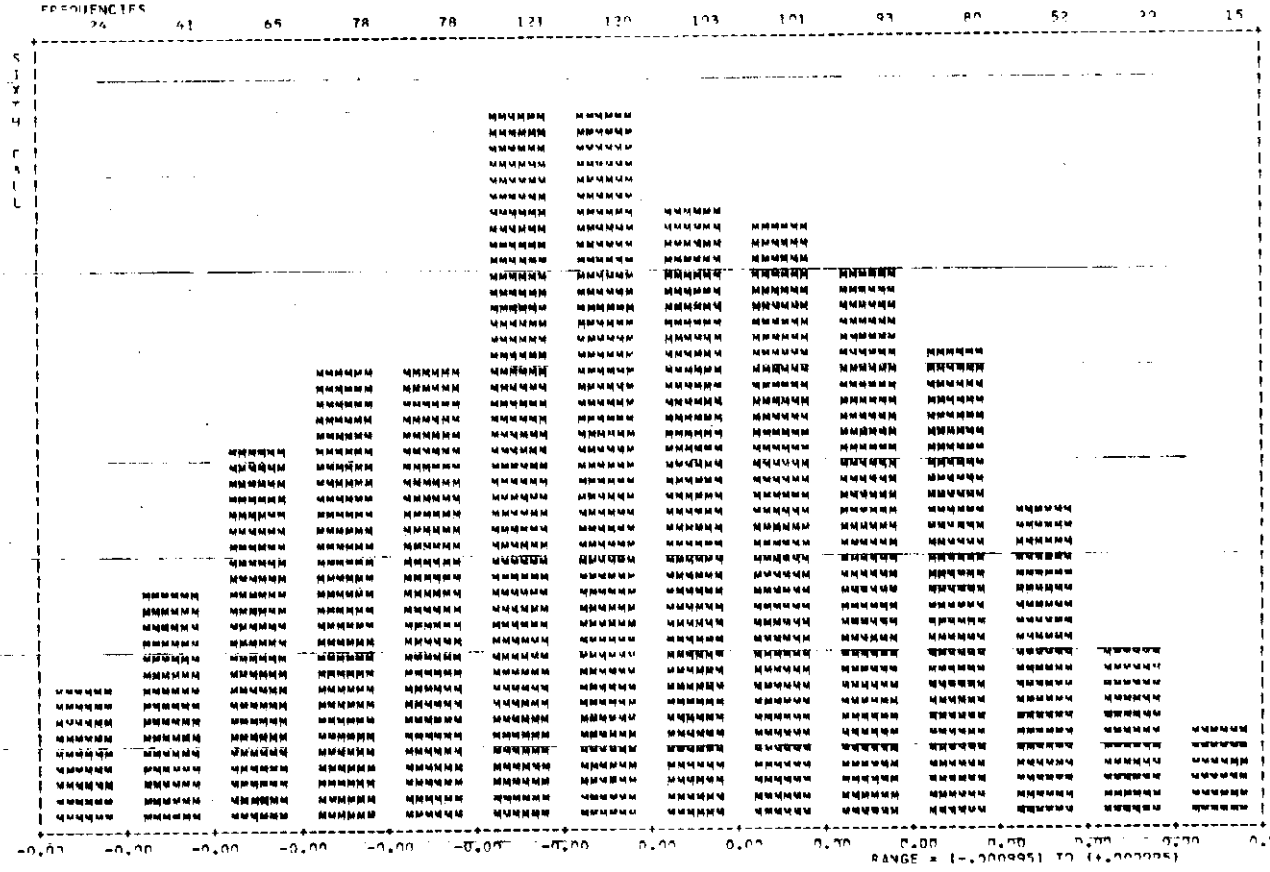

FREQUENCIES
24 41 65 78 78 121 120 103 101 93 80 52 29 15
FIRST CALL
0.03 0.10 0.17 0.24 0.31 0.38 0.45 0.51 0.58 0.65 0.72 0.79 0.86 0.93 1.00
QUARTILE BOUNDARIES AT 0.340 , 0.499 , 0.663
MEAN = 0.502
RANGE = ZERO TO ONE
ST DEV = 0.212

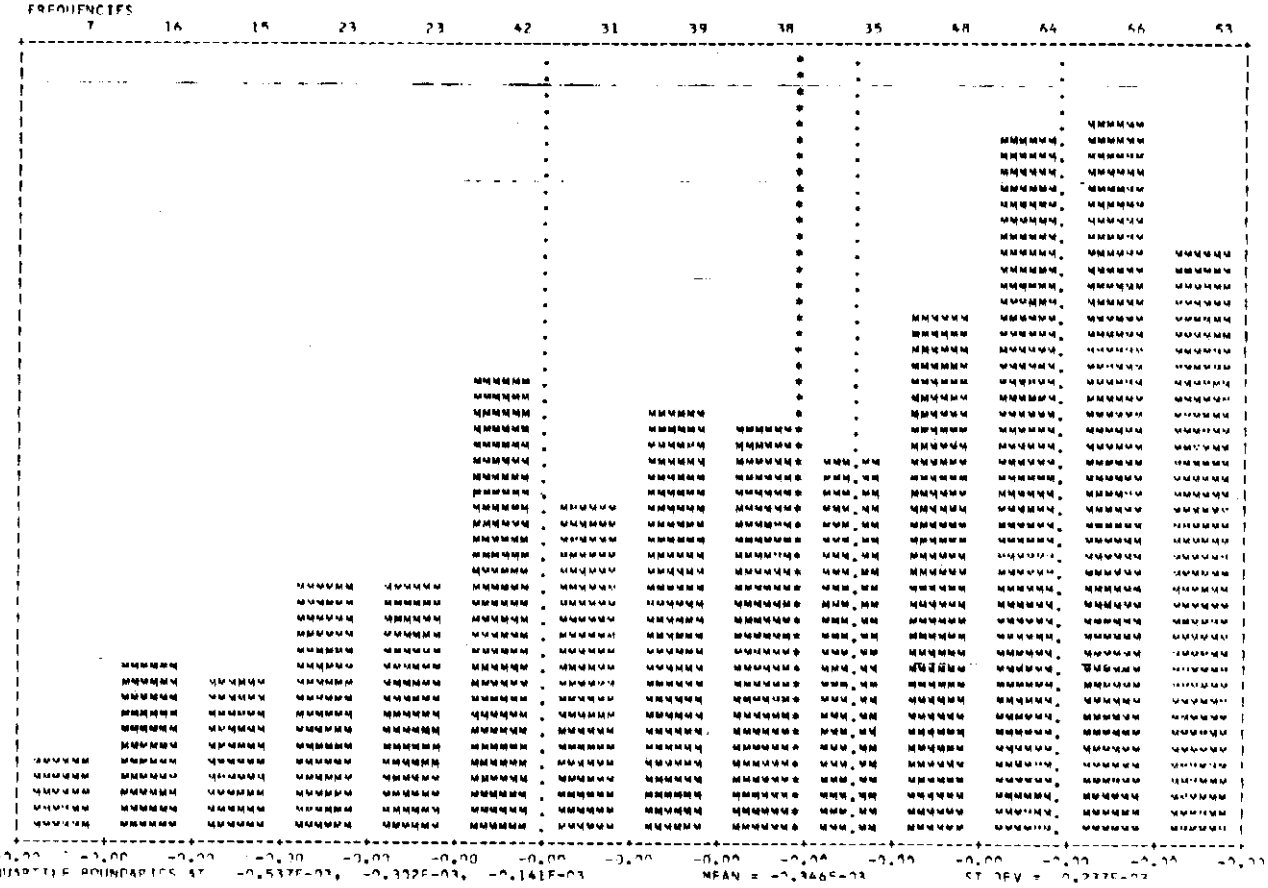

FREQUENCIES
24 41 65 78 78 121 120 103 101 93 80 52 29 15
SECOND CALL
-81. -68. -56. -42. -30. -25. -11. 1. 17. 30. 44. 58. 72. 85. 93.
QUARTILE BOUNDARIES AT -30.2 , -0.344 , 32.4
MEAN = 0.474
RANGE = (-99.5) TO (+99.5)
ST DEV = 43.2


FREQUENCIES
24 41 65 79 78 121 120 103 101 93 80 52 29 15
THIRD CALL
-934. -797. -650. -521. -396. -268. -109. 29. 166. 304. 441. 579. 717. 854. 992.
QUARTILE BOUNDARIES AT -302. , -3.44 , 324.
RANGE = (-995) TO (+995)


FREQUENCIES
24 41 65 78 78 121 120 103 101 93 80 52 29 15
FOURTH CALL
* OUT OF RANGE -999 TO +999
X(1) = -0.99E 04
X(N) = 0.99E 04
MEAN = 47.6
RANGE = (-9950) TO (+9950)
ST DEV = 0.42E 04


FREQUENCIES
24 41 65 78 78 121 120 103 101 93 80 52 29 15
-0.09 -0.08 -0.07 -0.06 -0.04 -0.03 -0.01 0.00 0.02 0.03 0.04 0.06 0.07 0.09 0.10
RANGE = (-.0995) TO (+.0995)
QUARTILE BOUNDARIES AT -0.332E-01, -0.344E-03, 0.324E-01
MEAN = 0.475E-03
ST DEV = 0.432E-01


FREQUENCIES
24 41 65 78 78 121 120 103 101 93 80 52 29 15
SIXTH COL
-0.03 -0.02 -0.01 -0.00 -0.00 -0.00 -0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
RANGE = (-.0009951) TO (+.0029951)




```
IEF285I   GOSET.HIST1                                 PASSED
IEF285I   VOL SER NOS= VOLUMD.
IEF285I   SYSOUT                                      SYSOUT
IEF285I   VOL SER NOS=
IEF285I   GOSET.HIST1                                 DELETED
IEF285I   VOL SER NOS= VOLUMD.
```

H A S P JOB STATISTICS -- 156 CARDS READ -- 573 LINES PRINTED -- 40 CARDS PUNCHED -- 0.55 MINUTES EXECUTION TIME