

DECUS NO.

8-316

TITLE

CORR (Compute Correlation Matrix)

AUTHOR

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COMPANY

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DATE

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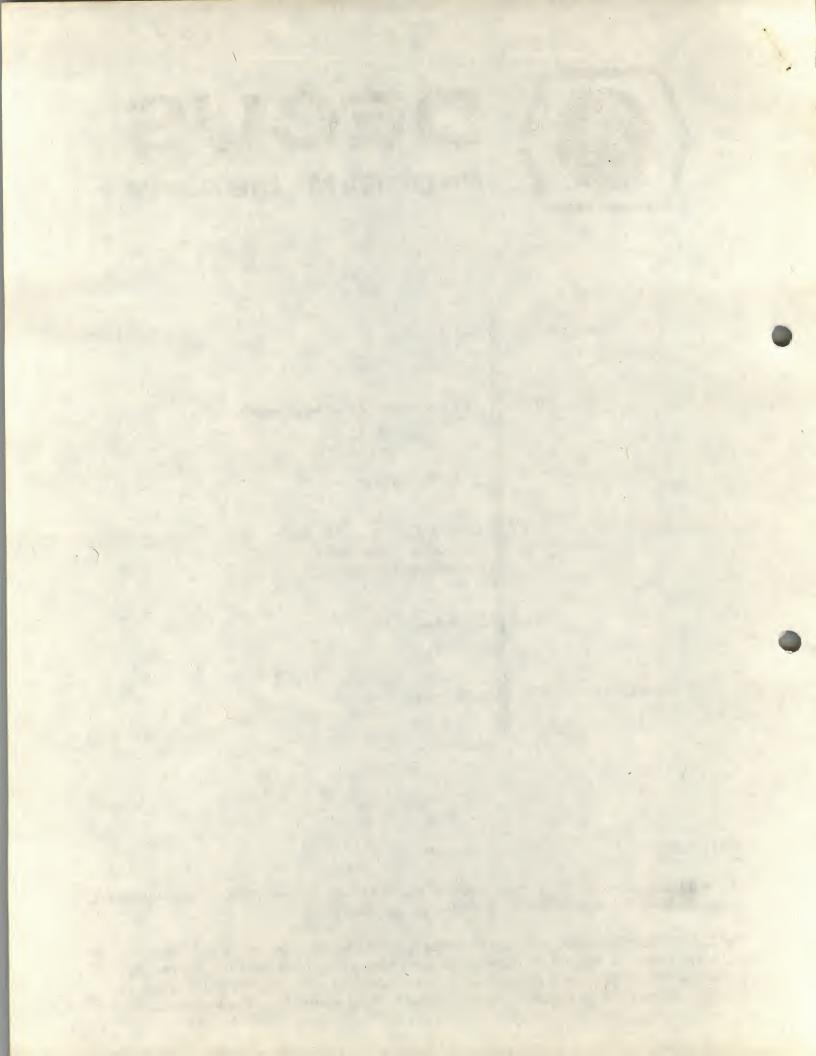
SOURCELANGUAGE

FORTRAN D

ATTENTION

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CORR (COMPUTE CORRELATION MATRIX)

DECUS Program Library Write-up

DECUS No. 8-316

ABSTRACT

This program computes the means and standard deviations, and the matrix of correlation coefficients, for multivariate data.

A separate version of the program transforms the data to their common logarithms before computing means, sums of squares, etc.

TAPES REQUIRED

- 1. Form of program tape The program is written in the PDP-8 FORTRAN-D language, and is in the source language.
- 2. Form of data tape The data tape should contain the values of each variable, in a standard order, for each point (set). The data may be regarded as a matrix with the variables in the columns and the sets in the rows.

OPERATING INSTRUCTIONS

Source program in high-speed reader

*OUT-S:CORR

*T

*IN-R:

Data tape in high-speed reader

*READY

Switch on high-speed punch

The program will request the entry of the number of variables and the number of sets in the data matrix. These numbers should be entered in sequence on the teletype, and terminated by "Return."

If an output tape is required, switch on the low-speed punch before typing "Return."

If the program has already been compiled onto the disk, it may be called into store as follows:

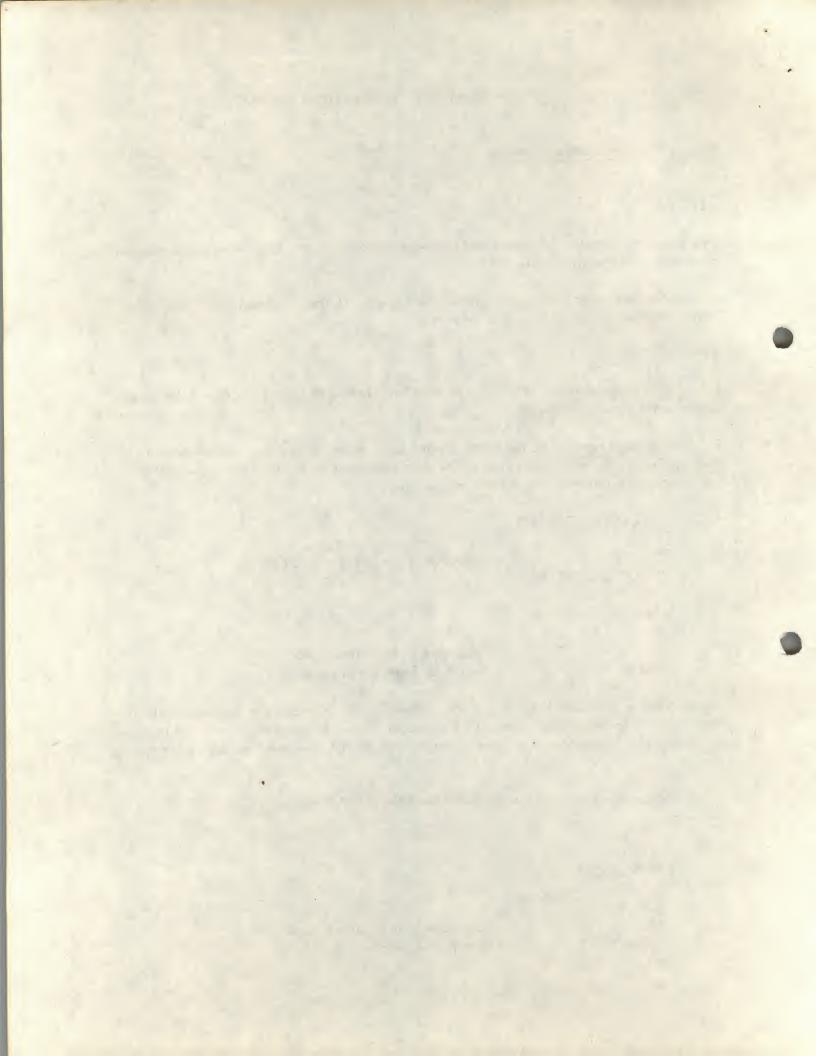
*IN-S:CORR

*OPT
*T

Data tape in high-speed reader
*READY

Switch on high-speed punch

T



The operation of the program then follows as usual.

OUTPUT

The program prints the mean and standard deviation of each variable. The complete correlation matrix is punched on tape through the high-speed punch. This tape is suitable as input for the calculation of eigenvalues, etc.

STORAGE

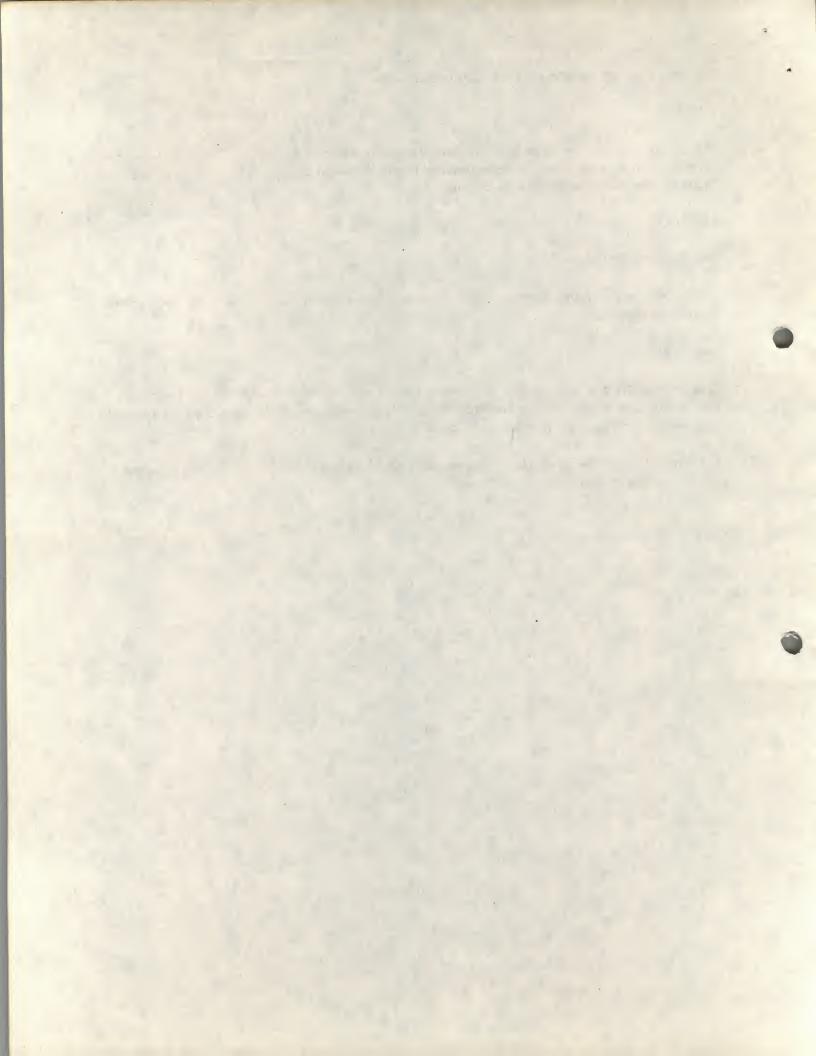
Normal for FORTRAN-D.

For the 4K version, the number of variables must not exceed 12. There is no limit on the number of sets.

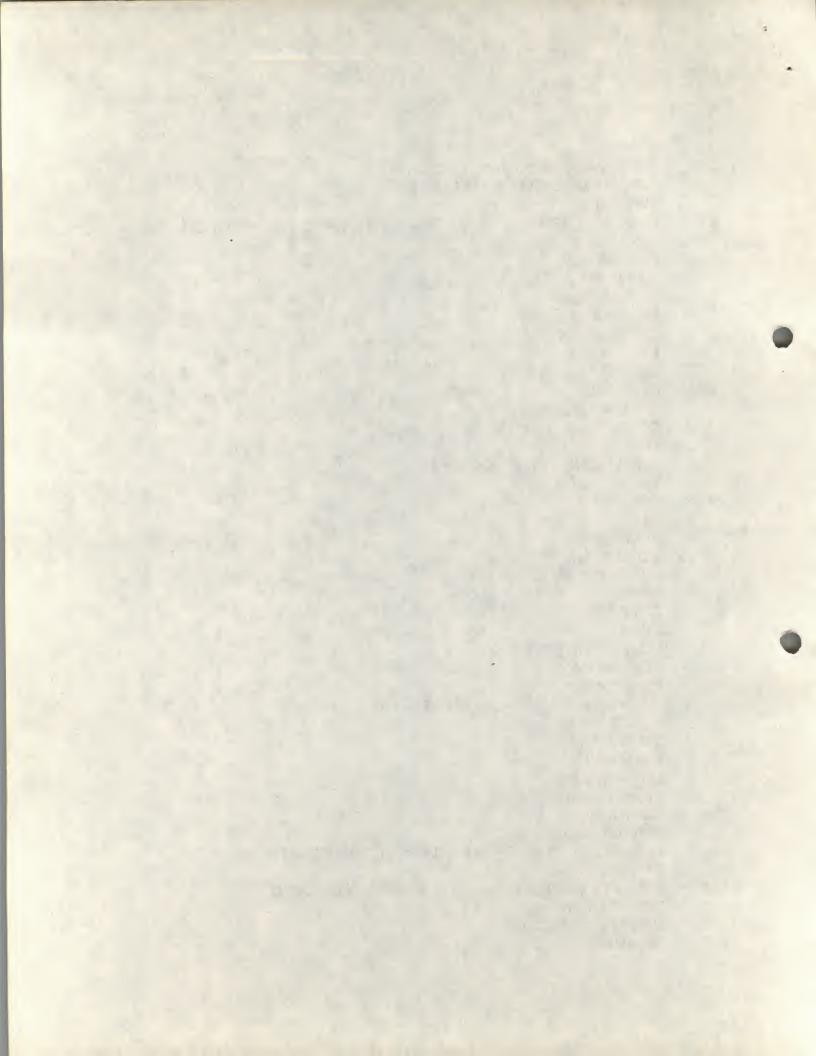
METHOD

The usual method of calculating arithmetic means and standard deviations has been used. The full matrix of correlation coefficients is calculated, so that the program does not make very economical use of the available space.

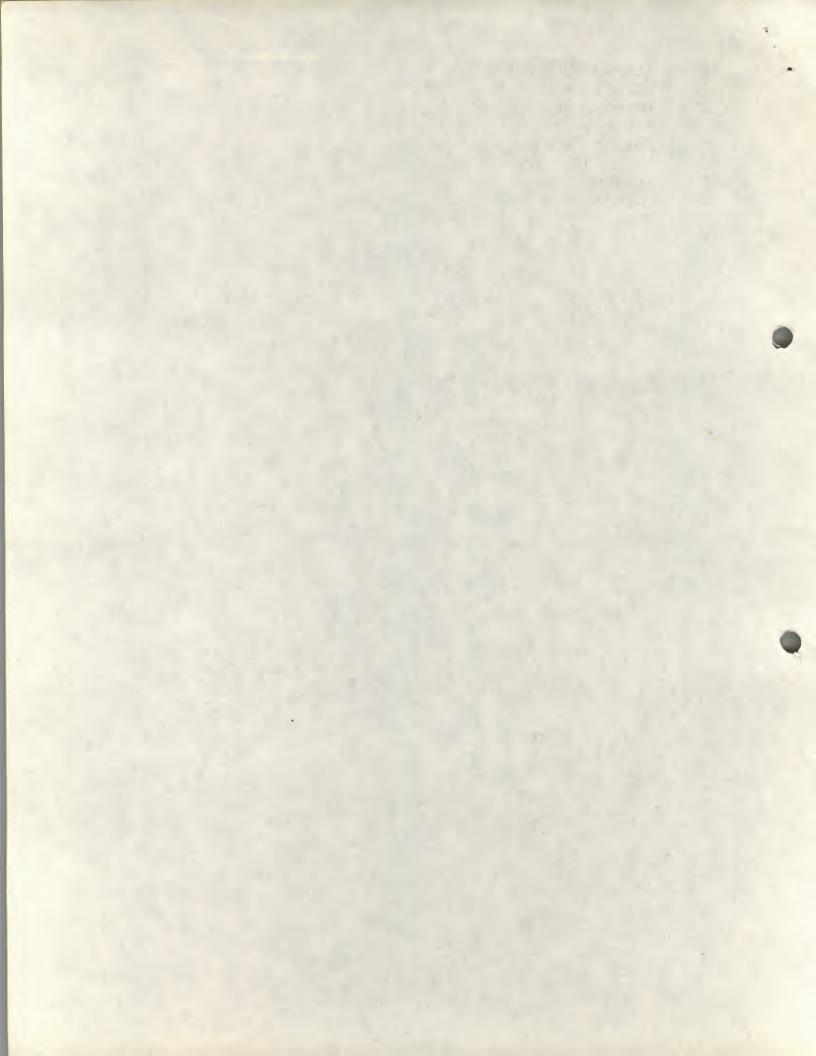
Transformation of the basic data to common logarithms is available by use of a separate version of the program.



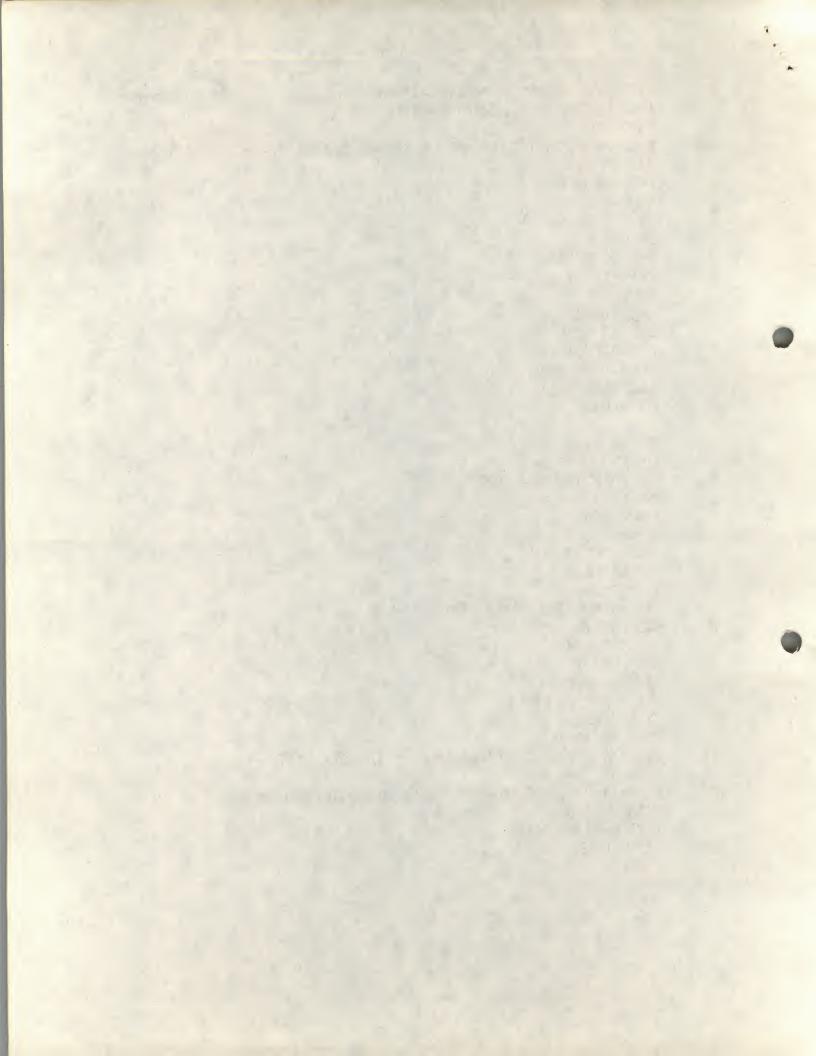
```
*OPT-
                                                                   CORR
                                                                   (Log transformation)
 *R
 *L
 C
         PRINCIPAL COMPONENTS PROGRAM
         DIMENSION SX(12), SS(144), X(12)
         TYPE 501
         FORMAT (/, "ENTER THE NO OF VARIABLES AND THE NO OF SETS",/)
5Ø1
         ACCEPT 5, M, N
5
         FORMAT (I, I)
         MM=M*M
         DO 100 1=1, M
         SX(I)=\emptyset.\emptyset
         DO 100 J=1, M
         K=I+M*(J-1)
         SS(K)=Ø.Ø
1ØØ
         CONTINUE
         DO 16 I=1, N
         DO 20 J=1, M
         READ 2,105,X(J)
         X(J)=LOGF(X(J)+1.\emptyset)*\emptyset.43429 4
         SX(J)=SX(J)+X(J)
2Ø
         CONTINUE
         N\emptyset=1
        DO 16 J=1, M
        DO 16 K=1, M
        SS(N\emptyset)=SS(N\emptyset)+X(J)*X(K)
        NØ=NØ+1
16
        CONTINUE
        EN=N
        DO 30 1=1, M
        DO 30 J=1, M
        K=I+M*(J-1)
        SS(K)=(SS(K)-SX(I)*SX(J)/EN)/(EN-1.\emptyset)
3Ø
        CONTINUE
        DO 35 I=1, M
        K=I+M*(I-1)
        SX(I)=SX(I)/EN
        X(I)=SQTF(SS(K))
35
        CONTINUE
        TYPE 101, M, N
1Ø1
        FORMAT (/,/, "NO OF VARIABLES =", I, "NO OF SETS =", I)
        TYPE 1Ø2
        FORMAT (/,/, "NO MEAN
1Ø2
                                        STANDARD DEVIATION")
        DO 103 I=1, M
        TYPE 104, I, SX(I), X(I)
1Ø3
        CONTINUE
```



1,04	FORMAT (/, I, E, E)
	DO 60 I=1, M
	DO 60 J=1, M
	K=I+M*(J-1)
	SS(K)=SS(K)/(X(I)*X(J))
	WRITE 2, 105, SS(K)
6Ø	CONTINUE
1,Ø5	FORMAT (E)
	END



```
L
                                                                  CORR
 C
         PRINCIPAL COMPONENTS PROGRAM
                                                                  (No transformation)
         DIMENSION SX(12), SS(144 ), X(12)
         TYPE 501
 5Ø1
         FORMAT (/, "ENTER THE NO OF VARIABLES AND THE NO OF SETS", /)
         ACCEPT 5, M, N
 5
         FORMAT (I, I)
         MM=M*M
         DO 100 1=1, M
         SX(I)=\emptyset.\emptyset
         DO 100 J=1, M
         K=I+M*(J-1)
         SS(K)=Ø.Ø
1ØØ
         CONTINUE
         DO 16 =1, N
         DO 20 J=1, M
         READ 2, 105, X(J)
         SX(J)=SX(J)+X(J)
20
         CONTINUE
         NØ=1
         DO 16 J=1, M
         DO 16 K=1, M
        SS(N\emptyset)=SS(N\emptyset)+X(J)*X(K)
         NØ=NØ+1
16
         CONTINUE
         EN=N
         DO 30 1=1, M
         DO 30 J=1, M
         K=I+M*(J-1)
        SS(K)=(SS(K)-SX(I)*SX(J)/EN)/(EN-1.\emptyset)
3Ø
        CONTINUE
        DO 35 I=1, M
        K=I+M*(I-1)
        SX(I)=SX(I)/EN
        X(I)=SQTF(SS(K))
35
        CONTINUE
        TYPE 101, M, N
101
        FORMAT (/,/, "NO OF VARIABLES =", I, "NO OF SETS =", I)
        TYPE 1Ø2
        FORMAT (/,/, "NO MEAN
1Ø2
                                       STANDARD DEVIATION")
        DO 103 I=1, M
        TYPE 1\emptyset4, I, SX(I), X(I)
1Ø3
        CONTINUE
```



1ø4	FORMAT (/, I, E, E)
	DO 60 I=1, M
	DO 60 J=1, M
	K=I+M*(J-1)
	SS(K)=SS(K)/(X(I)*X(J))
	WRITE 2, 105, SS(K)
6Ø	CONTINUE
1Ø5	FORMAT (E)
	FND

