

PLIBIT: A PL/I program for data analysis and regression documentation and instruction booklet

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STUDIES IN COMPUTER APPLICATIONS

PLIBIT

A PL/I Program for Data Analysis

And Regression

Documentation and Instruction
Booklet

By

Lynn B. Ware

Senior Research Associate

SWRRI Publication # 45

Social Welfare Regional Research Institute

Boston College

March 1977

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SOCIAL WELFARE REGIONAL RESEARCH INSTITUTE, BOSTON COLLEGE

PLIBIT REGRESSION AND TRANSGENERATION PROGRAM

PROGRAM SET-UP:

(1) TITLE/MATRIX INITIALIZATION CARD: COLS 1 TO 72 MAY CONTAIN ANY ALPHANUMERIC CHARACTERTERS DESCRIBING THE RUN. COLS 73-80 ARE RESERVED FOR DATA MATRIX INITIALIZATION PARAMETERS. THESE ARE (RIGHT JUSTIFIED):

MPARM -- COLS 73-76 MAXIMUM NUMBER OF VARIABLES (COLUMN VECTORS) IN DATA MATRIX; I.E., THE SUM OF THE CONSTANT TERM (VECTOR 1) + INPUT DATA + TRANSGENERATED VARIABLES. REGRESSIONS INVOLVING RHO-CORRECTION USE THE DATA MATRIX TO STORE RHO-DIFFERENCED DEPENDENT AND INDEPENDENT VARIABLES. HENCE, MPARM MUST BE SET LARGE ENOUGH TO STORE ALL M EXISTING VECTORS + NUMBER OF VARIABLES IN LARGEST EQUATION ORDERED IN "MREG" OPERATION.

NPARM -- COLS 77-80 MAXIMUM NUMBER OF OBSERVATIONS (ROWS) IN ANY VECTOR AT ANY TIME DURING THE RUN.

SEE PAGE 3 FOR A LIST OF DEFAULTS AND DEFINITIONS OF OTHER PARAMETERS IN PROGRAM.

(2) OPERATION CARDS: INPUT/OUTPUT AND STATISTICAL OPERATIONS ARE REQUESTED BY "OPERATION CARDS." SOME OPERATIONS REQUIRE INPUT DATA, VARIABLE TITLES, FACTOR VALUES, REGRESSION OR CORRELATION SPECIFICATION CARDS, ETC. WHEN REQUIRED (OR OPTED FOR), THESE INPUT CARDS MUST FOLLOW IMMEDIATELY BEHIND THE "OPERATION CARD."

***** PL/I FORMAT OF ALL "OPERATION CARDS:" (A(4),19 F(4)) *****

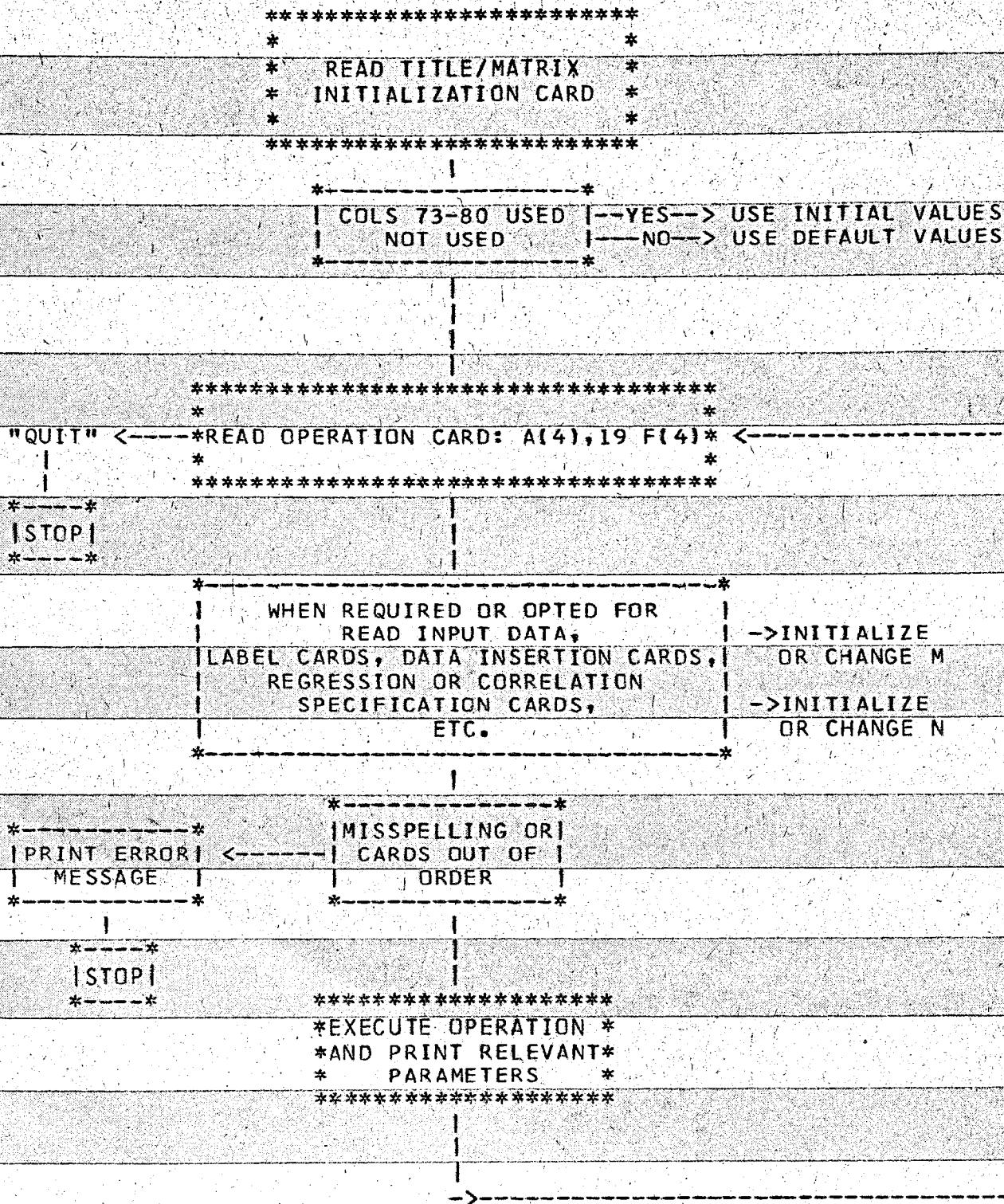
OPERATION NAME: A(4). COLS. 1-4 OF THE OPERATION CARD CONTAIN AN ALPHABETIC CODE DESCRIBING THE REQUESTED OPERATION. THESE ALPHABETIC CODES ARE LISTED IN THIS BOOKLET. MISSPELLED OPERATION NAMES - OR IMPROPERLY ORDERED ADDITIONAL CARDS - WILL BE FLAGGED ON THE LINE PRINTER WITH AN ERROR MESSAGE. (THE PROGRAM IS TERMINATED AT THIS POINT AND THE USER MUST RESUBMIT THE ENTIRE PROGRAM WITH THE CORRECT OPERATION CARD SPELLING, PARAMETERS, OR INPUT DATA.)

OPTIONS LIST: 19 F(4). COLS. 5-80 OF THE OPERATION CARD (FIELDS TWO THROUGH TWENTY) CONTAIN RIGHT-JUSTIFIED INTEGERS SPECIFYING WHICH OPTIONS ARE TO BE EXECUTED FOR THE REQUESTED OPERATION. THE OPTIONS SPECIFIED BY THESE INTEGER VALUES ARE LISTED IN THIS BOOKLET. WHEN REQUIRED, INPUT DATA, FACTOR VALUES, ETC. FOLLOW IMMEDIATELY BEHIND THE OPERATION CARD. AFTER COMPLETELY EXECUTING ONE OPERATION, ANOTHER OPERATION CARD AND THE NECESSARY CARDS THAT FOLLOW ARE READ IN AND EXECUTED.

AFTER COMPLETING EACH OPERATION, VARIOUS PARAMETERS AND INFORMATION ABOUT THE COMPLETED OPERATION ARE RETURNED ON THE LINE PRINTER. THIS GIVES THE USER A STEP-BY-STEP LISTING OF THE OPERATIONS ORDERED.

(3) THE "QUIT" CARD. THE LAST CARD SUBMITTED--SENDS THE PROGRAM TO A TERMINAL STOP.

FLOW CHART OF LOGICAL SEQUENCE IN PLIBIT



SAMPLE JOB FOR PLIBIT PROGRAM

```
//JOB CARD
// EXEC PLIBIT
```

```
... THIS IS A SAMPLE JOB TITLE CARD ... 30 200
READ 0 175 4 1 1
VAR1 VAR2 VAR3 VAR4
      (DATA)
ARTH 2 1 2 2 3 3 4
OPER 1 0 2 2 4
WRTE 2 8 55 150 159 12
MREG 1 1 1 159 1 55 150
DEPVAR0503 CONS01 INDVAR04 INDVAR07
QUIT
/*
```

DEFINITION OF TERMS:

MPARM -- THE MAXIMUM NUMBER OF VECTORS IN DATA MATRIX:
DEFAULT = 40 (IOTA INITIALIZED IN VECTOR 1)

NOTE: MAXIMUM DIM OF MOMENT MATRIX $X'X$ IS MPARM X MPARM
FOR REGRESSION OR CORRELATION $X'X$ IS COMPUTED ON M X M VECTORS
NPARM -- THE MAXIMUM NUMBER OF OBSERVATIONS (CASES) IN DATA MATRIX:
DEFAULT = 252

NOTE: DIM($X'X$) INVERSE MATRIX AND OTHER ARRAYS NEEDED
TO COMPUTE REGRESSION RESULTS ARE INITIALIZED AT THE TIME
OF THE REGRESSION.

M -- THE NUMBER OF VECTORS CURRENTLY USED DATA MATRIX. $M \leq MPARM$.
M IS ORDINARILY INITIALIZED IN THE "READ" OPERATION, HOWEVER,
THIS VALUE MAY BE CHANGED BY OPERATION "DLTM"; SOME OPER-
ATIONS INCREASE VECTOR STORAGE AND M IS INCREASED AUTO-
MATICALLY. THE USER CAN ALSO ARBITRARILY SET THE VALUE OF
M TO FACILITATE PLACEMENT OF TRANSGENERATED VARIABLES IN
CERTAIN INSTANCES (E.G., WHERE THE GENERATED VECTOR IS PLACED
IN THE M-PLUS-FIRST VECTOR, CHANGING M CAN PLACE THE GENER-
ATED VALUE WHERE DESIRED).

N -- THE NUMBER OF OBSERVATIONS (CASES) CURRENTLY USED IN DATA MATRIX.
 $N \leq NPARM$. N IS ORDINARILY INITIALIZED IN THE "READ" OPERATION.
SOME OPERATIONS CHANGE THIS VALUE, OR IT MAY BE DIRECTLY
CHANGED BY OPERATION "DLTN".

THE FOLLOWING PAGES DESCRIBE THE OPERATIONS AVAILABLE IN PLIBIT.
THEY ARE LISTED BY (1) INPUT/OUTPUT, (2) ARITHMETIC, (3) TRANSGENERATION
OR SMOOTHING, (4) MISCELLANEOUS UTILITY, AND (5) REGRESSION/CORRELATION
OPERATIONS. THE TWO-DIGIT INTEGER CODE WRITTEN IN FRONT OF THE FOUR-
LETTER ALPHA CODE IS THE OPERATION'S ADDRESS IN THE SOURCE PROGRAM.

USER ASSISTANCE CONTACT L. WARE

SENIOR RESEARCH ASSOCIATE
SOCIAL WELFARE REGIONAL RESEARCH INSTITUTE
BOSTON COLLEGE

OPERATIONS AVAILABLE IN PLIBIT

(1) INPUT/OUTPUT OPERATIONS:

"READ" -- READ DATA FROM CARDS, DISK OR TAPE INTO DATA MATRIX
"WRTE" -- PRINT DATA FROM DATA MATRIX ON PAPER
"PNCH" -- PUNCH DATA FROM DATA MATRIX TO SPECIFIED OUTPUT
DEVICE. DD CARD REQUIRED. //OUT DD DSN= ...
"PLOT" -- PLOT CROSS VARIABLES AGAINST A BASE VARIABLE
"RWND" -- OPEN AND CLOSE INPUT AND OUTPUT FILES
"SKIP" -- SKIP RECORDS FROM INPUT FILE(IN)
"SUBV" -- GENERATE SUBVECTORS OR BLOCKS OF DATA IN DATA MATRIX

(2) ARITHMETIC OPERATIONS

"ARTH" -- ADD, SUBTRACT, MULTIPLY, OR DIVIDE PAIRS OF VECTORS
"OPER" -- LOG AND EXP IN BASE E.
"FACT" -- ADD, SUBTRACT, MULTIPLY, OR DIVIDE BY CONSTANT FACTOR
"SCLE" -- SCALE VARIABLES BY STATED OBSERVATION OR LARGEST
ABSOLUTE VALUE IN VECTOR

(3) TRANSGENERATION AND SMOOTHING OPERATIONS

"DIFF" -- JTH ORDER DIFFERENCES
"LAGS" -- J PERIOD LAGS
"LEAD" -- J PERIOD LEADS
"MOVE" -- J PERIOD MOVING AVERAGE CENTERED ON LAST OBSERVATION
"PCHG" -- PERCENT CHANGE: $(X(T)-X(T-1))/X(T-1)$

(4) MISCELLANEOUS UTILITY OPERATIONS

"CONS" -- INSERT CONSTANT IN M+1ST VECTOR
"DUMY" -- GENERATE DUMMY VARIATES
"LCOM" -- COMPUTE LINEAR COMBINATION OF VECTORS
"MDAT" -- MEAN, VARIANCE, STANDARD DEVIATION, MAXIMUM,
MINIMUM, OR SUM
"TIME" -- GENERATE TREND VARIABLE
"CLR X" -- REINITIALIZE PORTIONS OF DATA MATRIX TO ZERO
"DELT" -- DELETE OBSERVATIONS CONTAINING STATED VALUE
"DLTM" -- CHANGE VALUE OF M (NUMBER OF COLUMN VECTORS)
"DLTN" -- CHANGE VALUE OF N (NUMBER OF ROWS)
"SHFT" -- SHIFT VARIABLES COLUMN-WISE OR ROW-WISE
"SORT" -- SORT M VARIABLES IN ASCENDING ORDER
"SRCH" -- FIND OBSERVATION AT WHICH STATED VALUE LIES IN
SORTED DATA MATRIX
"STAT" -- PRINT CURRENT VALUES OF M AND N

(5) REGRESSION/CORRELATION OPERATIONS

"MREG" -- OLS REGRESSION, GLSQ REGRESSION, UNCONDITIONAL
FORECASTS, CORRELATION, OR MOMENTS AND SUMS OF
SQUARED DEVIATIONS

6 "READ" READ INPUT DATA AND INITIALIZE WORKING PARAMETERS M AND N
ORDER: 1. OPERATION CARD; 2. FORMAT PARAMETER-SPECIFICATION CARD
(FIELD 2 > 0); 3. VARIABLE LABEL CARDS (FIELD 9 = 1).

JCL IS REQUIRED FOR DISK OR TAPE INPUT: GENERAL FORM IS //IN DD ...

FIELD 1 -- "READ"

FIELD 2 -- 0 LIST DIRECTED INPUT (GET LIST). NO FORMAT PARAMETER
CARD REQUIRED. SEE FIELD 5 FOR REQUIRED OPTIONS.
USE FOR "FREE FORMAT" DATA, I.E., DATA SEPARATED BY BLANKS
WITH NEW VARIABLE OR OBSERVATION BEGINNING NEW RECORD

1 EDIT DIRECTED INPUT (GET EDIT) BY VARIABLE ORDER IN
F-FORMAT WITH ONE VAR-LABEL BEGINNING EACH NEW VARIABLE
FORMAT: (COL(C1),A(10),(REC)(COL(C2),(REP)F(W,D)))

2 EDIT DIRECTED INPUT (GET EDIT) BY VARIABLE ORDER IN
E-FORMAT
FORMAT: (COL(C1),(REP)(E(W,D))) OR USE AS:
(COL(C1),(REP)(F(W,D)))

3 EDIT DIRECTED INPUT (GET EDIT) BY OBSERVATION ORDER
IN E-FORMAT
FORMAT: (COL(C1),(REP)(E(W,D))) OR USE AS:
(COL(C1),(REP)(F(W,D)))

FIELD 3 -- NUMBER OF OBSERVATIONS TO BE READ FROM DATA DECK
MAXIMUM = NPARM OBSERVATIONS

FIELD 4 -- NUMBER OF VARIABLES TO BE READ FROM DATA DECK
MAXIMUM = MPARM VARIABLES (IOTA INITIALIZED IN VECTOR 1)

FIELD 5 -- IF FIELD 2=0 0 LIST BY VARIABLE ORDER
1 LIST BY OBSERVATION ORDER

FIELD 6 -- 0 READ FROM CARDS (DEFAULTS TO //SYSIN DD *)
1 READ FROM DISK (//IN DD UNIT=DISK,DSN=...)
2 READ FROM TAPE (//IN DD UNIT=TAPE, ...)

FIELD 7 -- 0 ==> DATA BEGIN IN VECTOR 2 (INITIAL INPUT LOCATION)
1 ==> DATA BEGIN IN M+1ST VECTOR
- DATA INPUT BEGIN IN STATED VECTOR (NOT 2 OR M+1ST)

FIELD 8 -- 0 ==> DATA BEGIN IN OBSERVATION 1 (INITIAL INPUT LOCATION)
1 ==> DATA BEGIN IN N+1ST OBSERVATION
- DATA INPUT BEGIN IN STATED OBSERVATION (NOT 1 OR N+1ST)

FIELD 9 -- 0 IF NO OPTION (OR IF FIELD 2=1, E.G.)
1 READ AND WRITE VECTOR LABELS (NAMES) IN 8 FIELDS
OF 10--MAXIMUM MPARM A(10) FIELDS. PRECEEDS DATA BUT
FOLLOWS FORMAT PARAMETER SPECIFICATION CARD

FIELD 10 -- VALUE OF M FOLLOWING READ OPERATION IF OTHER THAN THAT
COMPUTED IN FIELDS 4 AND 7 (ONLY WHEN FIELD 7 > 1)

FIELD 11 -- VALUE OF N FOLLOWING READ OPERATION IF OTHER THAN THAT
COMPUTED IN FIELDS 3 AND 8 (ONLY WHEN FIELD 8 > 1)

"READ" OPERATION CONTINUED ON NEXT PAGE

"READ" CONTINUED

FORMAT PARAMETER-SPECIFICATION CARD FOR FIELD 2 OPTIONS
(RIGHT JUSTIFIED INTEGERS)

FIELD 2=1: (COL(C1),A(10),(REC)(COL(C2),(REP)F(W,D)))

VALUES FOR C1, C2, REC, REP, W, D ARE READ IN UNDER FORMAT (6 F(4))
IMMEDIATELY AFTER THE "READ" OPERATION CARD

COLS 1- 4: C1 - BEGINNING COLUMN NUMBER FOR VAR LABEL A(10)
COLS 5 -8: C2 - BEGINNING COLUMN NUMBER FOR DATA F(W,D)

COLS 9-12: REC - NUMBER OF RECORDS PER VARIABLE
DEFAULT=(FIELD 3 / REP)+1

COLS 13-16: REP - NUMBER OF OBSERVATIONS PER RECORD

COLS 17-20: W - WIDTH OF EACH VARIABLE

COLS 21-24: D - NUMBER OF DECIMAL PLACES IN EACH VARIABLE

VAR-LABEL IS READ UNDER FORMAT A(10). THE (FIRST) DATA RECORD
MUST CONTAIN VAR-LABEL OF WIDTH AT LEAST 10. IF WIDTH OF VAR-LABEL
IS GREATER THAN 10, C1 CAN BE USED TO TAB TO SOME COLUMN WITHIN
THE COLUMNS USED BY THE VAR LABEL AND C2 CAN BE USED TO TAB TO
BEGINNING COLUMN FOR DATA.

IF WIDTH OF VAR-LABEL IS LESS THAN 10, USE FIELD 2=2 AND FIELD 9=1
AND SUPPLY VARIABLE LABEL CARD(S).

SEE COMMENT IN "PNCH" OPERATION FOR OUTPUT WITH VAR-LABELS.

FIELD 2=2: (COL(C1),(REP)(E(W,D))) OR USE AS:
(COL(C1),(REP)(F(W,D)))

VALUES FOR C1, REP, W, AND D ARE READ IN UNDER FORMAT (4 F(4))
IMMEDIATELY AFTER THE "READ" OPERATION CARD

COLS 1- 4: C1 - BEGINNING COLUMN NUMBER FOR DATA
COLS 5 -8: REP - NUMBER OF OBSERVATIONS PER RECORD
COLS 9-12: W - WIDTH OF EACH VARIABLE

COLS 13-16: D - NUMBER OF DECIMAL PLACES IN EACH VARIABLE

FIELD 2=3: (COL(C1),(REP)(E(W,D))) OR USE AS:
(COL(C1),(REP)(F(W,D)))

VALUES FOR C1, REP, W, AND D ARE READ IN UNDER FORMAT (4 F(4))
IMMEDIATELY AFTER THE "READ" OPERATION CARD

COLS 1- 4: C1 - BEGINNING COLUMN NUMBER FOR DATA
COLS 5 -8: REP - NUMBER OF VARIABLES PER RECORD
COLS 9-12: W - WIDTH OF EACH VARIABLE

COLS 13-16: D - NUMBER OF DECIMAL PLACES IN EACH VARIABLE

7 "WRTE" PRINT INPUT DATA AND COMPUTED VARIABLES (LINE PRINTER ONLY)

FIELD 1 -- "WRTE"

FIELD 2 -- LOCATION OF FIRST VECTOR TO DUMP

FIELD 3 -- LOCATION OF LAST VECTOR TO DUMP

FIELD 4 -- FIRST OBSERVATION TO DUMP (BLANK ==> 1)

FIELD 5 -- LAST OBSERVATION TO DUMP (BLANK ==> N)

FIELD 6 -- 0 NO OPTION

DATE CORRESPONDING TO FIRST OBSERVATION IN DATA MATRIX
(E.G., IF OBS 1 IS JAN 59, PUNCH 0159; IF JUL 63, 0763)

FIELD 7 -- IF FIELD 6 > 0 MONTHLY DATA = 12

QUARTERLY DATA = 4

ANNUAL DATA = 1

(DEFAULT = 12)

FIELD 8 -- COLUMN WIDTH OF VARIABLES TO BE PRINTED

FIELD 9 -- NUMBER OF DECIMAL PLACES IN EACH VARIABLE PRINTED

PRINT FORMAT: (REP)F(FIELD 8, FIELD 9).

THERE ARE 120 COLUMNS AVAILABLE FOR DATA PRINTOUT.
(COLS 1-12 CONTAIN THE OBSERVATION NUMBER AND THE DATE
IF OPTED IN FILED 6).

THE MAXIMUM NUMBER OF VARIABLES PRINTED PER PAGE
(REP) IS COMPUTED ON THE BASIS OF COLUMN WIDTH
SPECIFIED IN FIELD 8.

DEFAULT PRINT FORMAT IS (10)F(12,4).

OPTIONAL "SELECTIVE VECTOR DUMP"

FIELD 2 -- 0

FIELD 3 -- NUMBER OF VECTORS TO DUMP SELECTIVELY

FIELD 4 -- FIRST OBSERVATION TO DUMP (BLANK ==> 1)

FIELD 5 -- LAST OBSERVATION TO DUMP (BLANK ==> N)

FIELDS 6-15 -- LIST OF VECTORS TO DUMP SELECTIVELY (MAX = 10).

PRINT FORMAT: (10)F(12,4).

THERE IS NO DATE OPTION FOR SELECTIVE VECTOR DUMP.

7 "PNCH" PUNCH CARDS OR WRITE ONTO SPECIFIED DEVICE TYPE

ORDER: 1. OPERATION CARD; 2. FORMAT PARAMETER-SPECIFICATION CARD
3. VARIABLE LABEL CARDS IF OPTED FOR

NECESSARY JCL MUST BE INCLUDED -- SEE FIELD 5 FOR //OUT DD OPTIONS

FIELD 1 -- "PNCH"

FIELD 2 -- 0 IF SINGLE VECTOR SERIES

1 IF BLOCK OF VECTORS

FIELD 3 -- NUMBER OF VECTORS IN SERIES OR BLOCK

FIELD 4 -- 0 PUNCH BY VARIABLE IN F-FORMAT WITH VARIABLE LABELS

1 PUNCH BY VARIABLE IN E-FORMAT WITHOUT VARIABLE LABELS

FIELD 5 -- 2 PUNCH BY OBSERVATION IN E-FORMAT WITHOUT VARIABLE LABELS

0 PUNCH TO CARDS (//OUT DD SYSOUT=B,DCB=LRECL=80)

1 PUNCH TO DISK (//OUT DD UNIT=DISK, ...)

2 PUNCH TO TAPE (//OUT DD UNIT=TAPE, ...)

FIELD 6 -- 0 NO OPTION

1 PUNCH CALENDAR YEAR OF DATA IN COLS. 17-18 AND RECORD
NUMBER OF CARD IN COL. 19 (I.E., FIRST CARD OF YEAR,
SECOND CARD OF YEAR, ETC.)

RESTRICTION: FIRST OBSERVATION IN DATA MATRIX
MUST BE JANUARY OR JULY.

SEE DESCRIPTION OF OPTION IN FIELD 4=0 FORMAT
SPECIFICATION BELOW.

FIELD 7 -- LOCATION OF FIRST OBSERVATION TO PUNCH (BLANK==>1)

FIELD 8 -- LOCATION OF LAST OBSERVATION TO PUNCH (BLANK==>N)

FIELD 9 -- LOCATION OF FIRST VECTOR IN SERIES (OR FIRST IN BLOCK)

FIELDS 10-20 -- LOCATION OF SUBSEQUENT VECTORS IN SINGLE VECTOR
SERIES

FORMAT OPTIONS FOR FIELD 4:

FIELD 4=0 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT IF FIELD 6=0:
(COL(C1),(COM)(A(1)),COL(C2),(REP)(F(W,D)))

FIELD 4=0 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT IF FIELD 6=1:
(COL(1),(COM)(A(1)),COL(17),F(3),COL(21),(REP)(F(W,D))),
WHERE COM<=15

FIELD 4=1 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT:
(COL(C1),(REP)(E(W,D)))

FIELD 4=2 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT:
(COL(C1),(REP)(E(W,D)))

"PNCH" OPERATION CONTINUED ON NEXT PAGE

"PNCH" CONTINUED

PARAMETER VALUES FOR FIELD 4=0 FORMAT:

FIELD 4=0 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT IF FIELD 6=0:
(COL(C1),(COM)(A(1)),COL(C2),(REP)(F(W,D)))

FIELD 4=0 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT IF FIELD 6=1:
(COL(1),(COM)(A(1)),COL(17),F(3),COL(21),(REP)(F(W,D))),
WHERE COM<=15

TWO CARDS REQUIRED FOR THIS OPTION:

CARD (1) FORMAT PARAMETER-SPECIFICATION CARD (RIGHT JUSTIFIED INTEGERS)

VALUES FOR C1, C2, REP, W, D, AND COM (ALSO BEG AND PERS IF
FIELD 6=1) ARE READ IN IMMEDIATELY AFTER THE "PNCH" OPERATION CARD

COLS 1-4: C1 - BEGINNING COLUMN NUMBER FOR VAR LABEL

COLS 5-8: C2 - BEGINNING COLUMN NUMBER FOR DATA

COLS 9-12: REP - NUMBER OF OBSERVATIONS PER RECORD
(BLANK ==> NP(8)-NP(7)+1)

COLS 13-16: W - WIDTH OF EACH VARIABLE (W >= D+2)

COLS 17-20: D - NUMBER OF DECIMAL PLACES IN EACH VARIABLE

COLS 21-24: COM - NUMBER OF COLUMNS USED BY VAR LABEL (MAX=20)

BLANK ==> ONE BLANK COLUMN

A NEGATIVE NUMBER, VIZ., -1 TO -20 PUTS 1 TO 20
BLANKS IN VAR LABEL ON RECORD)

IF FIELD 6=1 THEN PUNCH THE FOLLOWING:

COLS 25-28: BEG - CALENDAR DATE OF FIRST OBSERVATION IN DATA
MATRIX (JAN 59 = 0159; JULY 62 = 0762)

COLS 29-32: PERS - NUMBER OF OBSERVATIONS PER PERIOD (YEARLY=12;
QUARTERLY=4; ANNUAL=1) DEFAULT=12)

NB: IN ORDER TO HAVE "READ" OPERATION HANDLE INPUT PUNCHED UNDER
THIS OPTION, COM MUST BE AT LEAST 10, EVEN THOUGH THE VAR-LABEL
ITSELF MAY BE FEWER THAN 10 NON-BLANK CHARACTERS LONG. SEE
"READ" OPERATION FIELD 2 OPTION 1.

FIELD 6=1:

MONTHLY DATA PUNCHED SIX MONTHS PER OUTPUT RECORD (CARD)
WILL RESULT IN A "1" CARD FOR THE FIRST SIX MONTHS OF A
YEAR AND A "2" CARD FOR THE SECOND SIX MONTHS OF A YEAR.
CALENDAR YEAR IS PUNCHED IN COLS. 17-18, "1" AND "2" IN COL. 19
IF THE BEGINNING OBSERVATION FOR DATA (FIELD 7) IS NOT
JANUARY OR JULY (FIRST DATA POINT ON OUTPUT RECORDS PUNCHED
TWO RECORDS PER YEAR), AN ENTIRE RECORD WILL BE GENERATED
BEGINNING WITH EITHER JANUARY (IF BEGINNING OBSERVATION
IS BETWEEN JANUARY AND JUNE) OR JULY (IF BEGINNING
OBSERVATION IS BETWEEN JULY AND DECEMBER).
OUTPUT RECORDS CONTAINING 12 MONTHS PER YEAR BEGIN IN JANUARY.

CARD (2) VARIABLE LABEL CARDS -- ONE CARD FOR EACH VARIABLE PUNCHED,
WITH VAR-LABEL BEGINNING IN COLUMN 1

"PNCH" OPERATION CONTINUED ON NEXT PAGE

"PNCH" CONTINUED

FORMAT PARAMETER VALUES, CONT.

FIELD 4=1 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT:
(COL(C1), (REP)(E(W,D)))

ONE CARD REQUIRED FOR THIS OPTION

FORMAT PARAMETER-SPECIFICATION CARD (RIGHT JUSTIFIED INTEGERS)

VALUES FOR C1, REP, W, AND D ARE READ IN FORMAT (4 F(4)) IMMEDIATELY
AFTER THE "PNCH" OPERATION CARD.

COLS 1- 4: C1 - BEGINNING COLUMN NUMBER FOR DATA

COLS 1 - 8 REP - NUMBER OF OBSERVATIONS PER RECORD
(BLANK ==> NP(8)-NP(7)+1)

COLS 9-12: W - WIDTH OF EACH VARIABLE (E.G., 13)

COLS 13-16: D - NUMBER OF DECIMAL PLACES IN EACH VARIABLE
(E.G., 6).

FIELD 4=2 PRODUCES OUTPUT WITH THE FOLLOWING FORMAT:
(COL(C1), (REP)(E(W,D)))

ONE CARD REQUIRED FOR THIS OPTION

FORMAT PARAMETER-SPECIFICATION CARD (RIGHT JUSTIFIED INTEGERS)

VALUES FOR C1, REP, W, AND D ARE READ IN FORMAT (4 F(4)) IMMEDIATELY
AFTER THE "PNCH" OPERATION CARD.

COLS 1- 4: C1 - BEGINNING COLUMN NUMBER FOR DATA

COLS 1 - 8 REP - NUMBER OF VARIABLES PER RECORD

COLS 9-12: W - WIDTH OF EACH VARIABLE (E.G., 13)

COLS 13-16: D - NUMBER OF DECIMAL PLACES IN EACH VARIABLE
(E.G., 6).

3 "PLOT" PLOT VALUES OF SELECTED CROSS-VARIABLES AGAINST A SINGLE BASE VARIABLE.

SETUP: 1. OPERATION CARD; 2. TITLE CARD IF OPTED; 3. PLOTTING SYMBOLS CARD (ANY ALPHANUMERIC CHARACTERS, PUNCHED IN COLS. 1, 2, 3, ETC. BLANKS ELSEWHERE)

FIELD 1 -- "PLOT"

FIELD 2 -- TOTAL NUMBER OF VARIABLES; IF TIME OR DATE IS INSERTED AS A BASE VARIABLE, NUMBER OF CROSS-VARIABLES ONLY.

FIELD 3 -- CHART NUMBER (3 DIGITS MAXIMUM)

0 ==> READ A80 TITLE CARD BEFORE PLOTTING

FIELD 4 -- 0 NO OPTION (TIME OR DATA NOT INSERTED AS A BASE VARIABLE)
IF DATE INSERTED, MONTHLY=12; QRTLY=4; YEARLY=1

FIELD 5 -- 0 PRINT BASE VARIABLE "AS IS"

1 INSERT TIME (T) AS BASE VAR, T=FIELD 6 TO FIELD 7
-- DATE CORRESPONDING TO FIRST OBS IN DATA MATRIX

(E.G., IF OBS 1 IN DATA MATRIX IS JAN 59,
PUNCH 0159; IF OBS 1 IS JULY 63, PUNCH 0763)

FIELD 6 -- BEGINNING OBSERVATION IN PLOT

FIELD 7 -- ENDING OBSERVATION IN PLOT

FIELDS 8-20 -- LOCATION OF VECTORS TO BE PLOTTED: FIRST IS
BASE VARIABLE LOCATION (VERTICLE AXIS).

IF TIME OR DATE INSERTED (FIELD 5 OPTIONS)
AS THE BASE VARIABLE, BEGIN WITH CROSS-
VARIABLE LOCATION(S) (HORIZONTAL AXIS).

NOTE: ALL CROSS-VARIABLES ARE PLOTTED ON THE SAME HORIZONTAL SCALE (IN BASE 10). IF THE DIFFERENCE IN SCALE OF THE CROSS-VARIABLES IS "LARGE," USE OPERATION "SCLE" TO SCALE ONE (OR ALL) OF THE CROSS-VARIABLES TO NARROW THE RANGE OF THE CROSS VARIABLES. RANGE OF CROSS-VARIABLES IS MAX VARIATE IN ANY OF CROSS-VARIABLES MINUS MIN VARIATE IN ANY OF THE CROSS VARIABLES DIVIDED BY 100.

8 "RWND" OPEN AND CLOSE INPUT AND OUTPUT FILES

FIELD 1 -- "RWND"

FIELD 2 -- 0 NO OPTION

1 OPEN FILE(IN)--INPUT FILE

2 CLOSE FILE(IN)--INPUT FILE

FIELD 3 -- 0 NO OPTION

1 OPEN FILE(OUT)--OUTPUT FILE

2 CLOSE FILE(OUT)--OUTPUT FILE

FIELD 4 -- 0 NO OPTION

1 OPEN FILE(INS) -- INPUT FILE "SUBV" OPERATION

2 CLOSE FILE(INS) -- INPUT FILE "SUBV" OPERATION

43 "SKIP" SKIP RECORDS FROM INPUT FILE(IN)

FIELD 1 -- "SKIP"

FIELD 2 -- NUMBER OF LOGICAL RECORDS TO BE SKIPPED FROM INPUT
FILE(IN): AN ENTIRE "RECORD LENGTH" IS SKIPPED.

11 "SUBV" GENERATE CONSTANT-LENGTH BLOCKS OF DATA IN ONE OR MORE VECTORS

ORDER: 1. OPERATION CARD; 2. FORMAT PARAMETER-SPECIFICATION CARD
(FIELD 3 OPTION 1); 3. DATA, IF CARD INPUT

FIELD 1 -- "SUBV"

FIELD 2 -- NUMBER OF BLOCKS OF FIELD 6 OBSERVATIONS TO BE ENTERED

FIELD 3 -- 0 DATA READ UNDER GET LIST -- I.E., FREE FORMAT
CARD INPUT ONLY

1 DATA READ UNDER GET EDIT -- FORMATTED INPUT

FORMAT: {COL(C1),(REP){E(W,D)}} OR USE AS:
{COL(C1),(REP){F(W,D)}}

FIELD 4 -- 0 INPUT FROM CARDS (//SYSIN DD * DEFAULT)

1 INPUT FROM DISK (//INS DD CARD ... REQUIRED)

2 INPUT FROM TAPE (//INS DD CARD ... REQUIRED)

FIELD 5 -- 0 FIELD 6 OBSERVATIONS TO BE REPEATED IN SINGLE VECTOR

1 FIELD 6 OBSERVATIONS TO BE REPEATED IN MULTIPLE VECTORS

FIELD 6 -- NUMBER OF OBSERVATIONS IN OBSERVATION BLOCK

(CONSTANT FOR SINGLE OR MULTIPLE VECTOR INPUT)

FIELD 7 -- LOCATION OF FIRST VECTOR INTO WHICH FIELD 6 BLOCK OF
OBSERVATIONS IS TO BE INPUT

FIELD 8 -- BEGINNING OBSERVATION FOR FIELD 6 BLOCK OF OBSERVATIONS
FIELDS 9-20 -- IF FIELD 5 = 0 BEGINNING OBSERVATION(S) FOR REMAINDER
OF FIELD 2 BLOCKS OF OBSERVATIONS

IF FIELD 5 = 1 IN FIELDS OF TWO, LOCATION OF
NEXT VECTOR(S) AND BEGINNING
OBSERVATION(S) FOR REMAINDER OF FIELD
2 BLOCKS OF OBSERVATIONS.

M IS SET TO GREATER OF ORIGINAL VALUE OF M OR M COMPUTED IN
FIELDS 7 AND 9-20. N IS SET TO ORIGINAL VALUE OF N OR VALUE OF N
COMPUTED IN FIELDS 6 AND 9-20.

SEE "READ" OPERATION, FIELD 2 OPTION 2 FOR DESCRIPTION OF FORMAT
SPECIFICATION CARD UNDER FIELD 3 OPTION 1.

16 "ARTH" ARITHMETIC OPERATIONS ON VECTOR PAIRS (MAX 8 PAIRS)

FIELD -- 1 "ARTH"

FIELD -- 2 -- 0 IF ADDITION OF TWO VECTORS (ONE PAIR)

1 IF SUBTRACTION OF ONE VECTOR FROM ANOTHER

2 IF MULTIPLICATION OF TWO VECTORS

3 IF DIVISION OF ONE VECTOR BY ANOTHER

(DIVISION BY ZERO INSERTS 10**6)

FIELD -- 3 -- 0 IF RESULTS STORED IN LOCATION OF FIRST VECTOR
OF EACH PAIR ORDERED

-- 1 IF RESULT STORED IN M+1ST VECTOR

FIELD -- 4 NUMBER OF VECTOR PAIRS IN SERIES OF VECTOR PAIRS (MAX 7)

FIELD -- 5 LOCATION FIRST VECTOR OF FIRST PAIR (MINUEND OR
NUMERATOR)FIELD -- 6 LOCATION OF SECOND VECTOR OF FIRST PAIR (SUBTRA-
HEND OR DENOMINATOR)FIELDS 7-20 -- IN FIELDS OF TWO, LOCATION OF SUBSEQUENT VECTOR
PAIRS IN SINGLE VECTOR SERIES, ORDERED AS IN
FIELDS 5 AND 6

17 "OPER" LOG(E), EXP(E)

(EXPONENTS: USE EXP(EXPONENT*LOG(X)).

FIELD 1 -- "OPER"

FIELD 2 -- 1 LOGARITHMS (BASE E)

LOG(E) OF $X \leq 0$ RESULTS IN TERMINATION OF JOB;
OBSERVATION # AND VECTOR LOCATION ARE RETURNED.

2 ANTILOG(BASE E)

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- NUMBER OF VECTORS IN SERIES (MAX 16)

FIELD 5 -- LOCATION OF FIRST VECTOR IN SERIES

FIELDS 6-20 -- LOCATION OF SUBSEQUENT VECTORS IN SINGLE
VECTOR SERIES

20 "FACT" CONSTANT FACTOR ARITHMETIC OPERATIONS (MAX 14 VECTORS)

USER MUST SUPPLY A SINGLE FACTOR VALUE FOR EACH OF THE FIELD 5
VECTORS NAMED IN FORMAT (8F10.0). VIZ., A VECTOR OF FACTORS CORRES-
PONDING TO EACH VECTOR NAMED IS SUBMITTED ON A MAX OF TWO FACTOR CARDS

FIELD 1 -- "FACT"

FIELD 2 -- 0 IF ADDITION OF CONSTANT FACTOR TO EACH VARIATE IN VECTOR

1 IF SUBTRACTION OF A CONSTANT FACTOR

2 IF MULTIPLICATION BY A CONSTANT FACTOR

3 IF DIVISION BY A CONSTANT FACTOR

4 IF SUBTRACTION OF VECTOR FROM A CONSTANT FACTOR

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- NUMBER OF VECTORS IN SINGLE VECTOR SERIES (MAX 16)

FIELD 5 -- LOCATION OF FIRST VECTOR IN SINGLE VECTOR SERIES

FIELDS 6-20 -- LOCATION OF SUBSEQUENT VECTORS IN SINGLE VECTOR
SERIES

28 "SCLE" SCALE SINGLE VECTORS BY KTH OBSERVATION OR BY LARGEST ABS. VALUE IN GIVEN VECTOR

FIELD 1 -- "SCLE"

FIELD 2 -- NUMBER OF VECTORS IN SERIES (MAX = 14)

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- BEGINNING OBSERVATION FOR ALL VECTORS (BLANK==>1)

FIELD 4 -- ENDING OBSERVATION FOR ALL VECTORS (BLANK==>N)

FIELD 6 -- LOCATION OF OBSERVATION IN ALL VECTORS USED AS SCALE

0 ==> SCALE BY LARGEST ABSOLUTE VALUE IN EACH VECTOR NAMED

FIELD 7 -- LOCATION OF FIRST VECTOR IN SINGLE VECTOR SERIES

FIELDS 8-20 -- LOCATION OF SUBSEQUENT VECTORS IN SINGLE VECTOR SERIES

30 "DIFF" JTH ORDER DIFFERENCE OF SINGLE VECTOR SERIES.
VECTOR, VIZ., $X(T,K) - X(T-J,K) \rightarrow X(T, \text{FIELD 3})$ WHERE J IS ORDER OF DIFF.

FIELD 1 -- "DIFF"

FIELD 2 -- NUMBER OF SINGLE VECTORS IN SERIES (MAX 8)

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- ORDER OF DIFFERENCE (E.G., FIRST-DIFF=1 OR SECOND=2)

FIELD 5 -- LOCATION OF FIRST VECTOR IN SERIES

FIELDS 6-19 -- IN FIELDS OF TWO, ORDER AND LOCATION OF DIFFERENCE
OF SUBSEQUENT VECTORS IN SINGLE VECTOR SERIES

26 "LAGS" SIMPLE LAGS MAXIMUM MPARM OBSERVATION LAG FOR SINGLE VECTORS

USER MUST SUPPLY FOR EACH VECTOR NAMED A SET OF LAGGED VARIATES S.T.
OBSERVATION T-1 IS FIRST VARIATE (PER VECTOR LAGGED) ON DATA INSERTION
CARD(S) SUPPLIED, THEN OBS. T-J, J=2, ORDER OF LAG IN 8 F(10,0) FORMAT

FIELD 1 -- "LAGS"

FIELD 2 -- NUMBER OF VECTORS IN SERIES

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- ORDER OF LAG FOR FIRST VECTOR IN SERIES

FIELD 5 -- LOCATION OF FIRST VECTOR IN SERIES

FIELDS 6-19 -- IN FIELDS OF TWO, ORDER OF LAG AND LOCATION OF
SUBSEQUENT VECTORS IN SINGLE VECTOR SERIES

29 "LEAD" SIMPLE LEAD MAXIMUM MPARM OBSERVATION LEAD ON SINGLE VECTORS

USER MUST SUPPLY FOR EACH VECTOR NAMED A SET OF LEAD VARIATES S.T.
OBSERVATION T+1 IS FIRST VARIATE (PER VECTOR LED) ON DATA INSERTION
CARD(S) SUPPLIED, THEN OBS. T+J, J=2, ORDER OF LEAD IN 8 F(10,0) FORMAT

FIELD 1 -- "LEAD"

FIELD 2 -- NUMBER OF VECTORS IN SERIES (MAXIMUM IS 8)

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- ORDER OF LEAD FOR FIRST VECTOR IN SERIES

FIELD 5 -- LOCATION OF FIRST VECTOR IN SERIES

FIELDS 6-19 -- IN FIELDS OF TWO, ORDER OF LEAD AND LOCATION OF
SUBSEQUENT VECTORS IN SINGLE VECTOR SERIES

27 "MOVE" K-PERIOD MOVING AVERAGE CENTERED ON LAST OBSERVATION

USER MUST SUPPLY DATA INSERTION CARD(S) FOR EACH VECTOR NAMED IN FIELD 2. DATA INSERTION CARD(S) HAS FURTHEST OBSERVATION PUNCHED FIRST ON CARD, THEN IN DECENDING ORDER OF LAG UNTIL ORDER OF MOVING AVERAGE MINUS 1 IS GIVEN IN 8 F(10,0) FORMAT (E.G., 6 PERIOD MOVING AVERAGE REQUIRES 5 VALUES SUBMITTED ON A SINGLE CARD).

FIELD 1 -- "MOVE"

FIELD 2 -- NUMBER OF VECTORS IN SINGLE VECTOR SERIES

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- ORDER OF MOVING AVERAGE FOR FIRST VECTOR IN SERIES

FIELD 5 -- LOCATION OF FIRST VECTOR IN SERIES

FIELDS 6-19 -- IN FIELDS OF TWO, ORDER OF MOVING AVERAGE AND LOCATION OF SUBSEQUENT VECTORS IN SINGLE VECTOR SERIES

31 "PCHG" PERCENT CHANGE IN SINGLE VECTOR SERIES STORED IN M+1ST VECTOR
$$X(T, \text{FIELD } 3) = (X(T, K) - X(T-1, K)) / X(T-1, K), T=1, N$$

DATA CARD(S) FOR INITIAL VALUE $X(0, K)$ FOR VECTOR SERIES SUBMITTED ON MAXIMUM 2 DATA CARDS IN FORMAT 8 F(10,0). VIZ., A VECTOR INITIAL VALUES CORRESPONDING TO THE VECTOR SERIES, NAMED IN FIELDS 4-18

FIELD 1 -- "PCHG"

FIELD 2 -- NUMBER OF VECTORS IN SINGLE VECTOR SERIES

FIELD 3 -- 0 RESULTS STORED IN ORIGINAL VECTOR

1 RESULTS STORED IN M+1ST VECTOR

FIELD 4 -- LOCATION OF FIRST VECTOR IN SERIES

FIELDS 5-20 -- LOCATION OF SUBSEQUENT VECTORS IN SINGLE VECTOR SERIES

41 "CONS" INITIALIZE A SINGLE CONSTANT VALUE IN M+1ST VECTOR

A SINGLE VALUE OF A CONSTANT IS SUPPLIED ON A SINGLE DATA CARD IN F(10,0) FORMAT. WHEN BLOCKS OF THE SINGLE CONSTANT VALUE ARE INSERTED IN M+1ST VECTOR, NON-RELEVANT OBSERVATION VALUES ARE LEFT INTACT.

FIELD 1 -- "CONS"

FIELD 2 -- 0 ==> INSERT CONSTANT FROM OBSERVATION 1 TO N
K -- NUMBER OF BLOCKS OF THE CONSTANT VALUE TO BE ENTERED (MAX. OF 8 BLOCKS PER CONS OPERATION)

FIELD 3 -- BEGINNING OBSERVATION FOR FIRST BLOCK (FIELD 2 > 0)

FIELD 4 -- ENDING OBSERVATION FOR FIRST BLOCK (FIELD 2 > 0)

FIELDS 5-20 -- IN FIELDS OF TWO, BEGINNING AND ENDING OBSERVATIONS FOR SUBSEQUENT BLOCKS IN M+1ST VECTOR

45 "DUMMY" GENERATE A "DUMMY-VALUE" VARIATE IN A NAMED VECTOR.

DEPENDING ON THE "CRITERION" VALUES IN A NAMED VECTOR, SPECIFIED "DUMMY" VARIATE(S) WILL BE ENTERED IN A NAMED VECTOR (OR M+1ST VECTOR)

FIELD 1 -- "DUMMY"

FIELD 2 -- LOCATION OF VECTOR CONTAINING "CRITERION" VALUES

FIELD 3 -- LOCATION OF "DUMMY" VARIATE VECTOR ("DUMMY" VARIATES INSERTED IN M+1ST VECTOR IF BLANK) M IS SET TO GREATER OF THIS FIELD OR ORIGINAL VALUE OF M

FIELD 4 -- NUMBER OF DIFFERENT "DUMMY" VARIATES TO BE INSERTED IN VECTOR NAMED IN FIELD 3 FOR RELATION NAMED IN FIELD 6

MAXIMUM OF 9 "DUMMY" VARIATES (==> 18 VALUES TO BE NAMED ON A MAXIMUM OF 3 DATA CARDS AT 4 PAIRS OF VALUES PER CARD (VIZ., 4 "CRITERION" AND 4 "DUMMY" PER DATA CARD)

DATA INSERTION CARD(S): A "CRITERION" VALUE FOR THE FIELD 2 VECTOR AND THE "DUMMY" VARIATE ARE NAMED SEQUENTIALLY FOR EACH OF THE FIELD 4 "DUMMY" VARIATES TO BE INSERTED. /FORMAT: #VARIATES(2F10.0).

FIELD 5 -- 0 LEAVE VALUES FOUND IN FIELD 3 VECTOR AS IS

1 INSERT 0.0 IN FIELD 3 "DUMMY" VECTOR IF "CRITERION" VALUE FOUND IN FIELD 2 VECTOR FAILS RELATION NAMED IN FIELD 6 (E.G., FOR A ZERO/ONE DUMMY VARIABLE)

FIELD 6 -- 1 IF OBSERVATION VALUE IN VECTOR NAMED GREATER THAN "CRITERION" VALUE ==> INSERT DUMMY VALUE (OTHERWISE INSERT 0.0 OR LEAVE BLANK (AS SPECIFIED IN FIELD 5)

2 IF LESS THAN CRITERION VALUE

3 IF EQUAL TO CRITERION VALUE

4 IF GREATER THAN OR EQUAL TO CRITERION VALUE

5 IF LESS THAN OR EQUAL TO CRITERION VALUE

19 "LCOM" LINEAR COMBINATIONS OF VECTORS. SETUP: OPERATION CARD, FOLLOWED BY SYMBOL/FACTOR CARD.

FIELD 1 -- "LCOM"

FIELD 2 -- 0 STORE RESULTING LIN COMB IN M+1ST VECTOR
- LOCATION OF RESULTING LIN COM (M SET TO GREATER OF THIS LOCATION OR ORIGINAL VALUE OF M)

FIELD 3 -- 0 BEGIN LINEAR COMBINATION WITH 0.0
1 BEGIN LINEAR COMBINATION WITH VALUES IN FIELD 2 VECTOR

FIELD 4 -- NUMBER OF VECTORS AND SCALARS INVOLVED IN LINEAR COMBINATION (TOTAL OF VECTORS IN X PLUS SCALARS)

FIELD 5 -- LOCATION OF FIRST VECTOR IN LINEAR COMBINATION

BLANK ==> ADD OR SUBTRACT SCALAR ONLY
FIELDS 6-20 -- LOCATION OF SUBSEQUENT VECTORS IN LINEAR COMBINATION
BLANK ==> ADD OR SUBTRACT SCALAR ONLY

SYMBOL/FACTOR CARD: IN FIELDS 1, 11, 21, ETC. PUNCH SYMBOL FOR ARITHMETIC OPERATION IN LINEAR COMBINATION. IN FIELDS 2-10, 12-20, 22-30, ETC. PUNCH CORRESPONDING FACTOR (SCALAR OR COEFFICIENT OF VECTOR IN X) IN LINEAR COMBINATION. SYMBOL AND FACTOR ON SYMBOL/FACTOR CARD CORRESPOND TO LIST OF VECTORS IN FIELDS 5-20 ON THE OPERATION CARD.

SYMBOLS: BLANK ==> ADD FACTOR ONLY (CORRESPONDING TO BLANK ON OPERATION CARD).

* ==> MULTIPLY FACTOR TIMES CORRESPONDING VECTOR IN OPERATION CARD LIST

/ ==> DIVIDE CORRESPONDING VECTOR IN OPERATION CARD LIST BY NAMED FACTOR.

EXAMPLE: TO TAKE THE FOLLOWING LINEAR COMBINATION
-4.26 - 2.256(VECTOR 5) + (VECTOR 8)/3.507

INITIALIZED AT 0.0 AND STORED IN VECTOR 16, PUNCH:

LCOM 16 0 3 5 8
-4.26 *-2.256 /3.5007

18 "MDAT" PRINT OUT SUM OF VECTOR OR MEAN, VARIANCE, STD.DEV., MIN & MAX

FIELD 1 -- "MDAT"

FIELD 2 -- 0 IF COMPUTE AND PRINT SUM OF VECTOR ONLY
1 IF COMPUTE AND PRINT MEAN, VARIANCE, STD.DEV., MIN & MAX

FIELD 3 -- 0 IF SINGLE VECTOR SERIES (MAX 14)
1 IF BLOCK OF VECTORS (MAX MPARM)

FIELD 4 -- NUMBER OF VECTORS IN SINGLE VECTOR SERIES (OR TOTAL IN BLOCK)

FIELD 5 -- BEGINNING OBSERVATION (BLANK ==> 1) FOR BLOCK OR SERIES

FIELD 6 -- ENDING OBSERVATION (BLANK ==> N) FOR BLOCK OR SERIES

FIELD 7 -- LOCATION OF FIRST VECTOR IN SERIES (OR FIRST IN BLOCK)

FIELDS 8-20 -- IF SINGLE VECTOR SERIES, LOCATION OF SUBSEQUENT VECTORS IN SERIES

40 "TIME" INSERT LINEAR TREND OR SUB-TREND IN M+1ST VECTOR.

FIELD 1 -- "TIME"

FIELD 2 -- BEGINNING OBS. BLANK ==> 1

FIELD 3 -- ENDING OBS. BLANK ==> N

FIELD 4 -- 0 INITIAL VALUE OF TREND = OBS # IN FIELD 2

1 INITIAL VALUE OF TREND = 1 AT BEGINNING OBS # IN FIELD 2

39 "CLR X" INITIALIZE X(J,K) TO 0.0

FIELD 1 -- "CLR X"

FIELD 2 -- FIRST VECTOR IN DATA MATRIX TO BE SET TO 0.0

FIELD 3 -- LAST VECTOR IN DATA MATRIX TO BE SET TO 0.0

FIELD 4 -- FIRST OBS. IN DATA MATRIX TO BE SET TO 0.0

FIELD 5 -- LAST OBS. IN DATA MATRIX TO BE SET TO 0.0

47 "DELT" DELETE OBSERVATIONS HAVING STATED VALUE IN NAMED VECTOR

RESULTING VALUE OF N IS N MINUS ALL OBSERVATIONS IN WHICH STATED
VALUE IS FOUND. ALL OBSERVATIONS CONTAINING STATED VALUE IN
NAMED VECTOR ARE NOT RECOVERABLE.

STATED VALUE READ IN UNDER FORMAT F10.0 IMMEDIATELY AFTER "DELT" CARD.

FIELD 1 -- "DELT"

FIELD 2 -- LOCATION OF VECTOR CONTAINING STATED VALUE

36 "DLTM" CHANGE PARAMETER DELIMITING THE NUMBER OF VECTORS

FIELD 1 -- "DLTM"

FIELD 2 -- NEW VALUE OF M (NUMBER OF RELEVANT VECTORS IN DATA
MATRIX FOR SUBSEQUENT OPERATIONS)

37 "DLTN" CHANGE PARAMETER DELIMITING THE NUMBER OF OBSERVATIONS

FIELD 1 -- "DLTN"

FIELD 2 -- NEW VALUE OF N (NUMBER OF RELEVANT OBSERVATIONS IN
DATA MATRIX FOR SUBSEQUENT OPERATIONS)

38 "SHFT" VARIABLE OR OBSERVATION SHIFT IN DATA MATRIX

FIELD 1 -- "SHFT"

FIELD 2 -- NUMBER OF VECTORS IN SINGLE VECTOR SERIES (8 PAIRS)

FIELD 3 -- OLD LOCATION OF FIRST VECTOR IN SERIES

FIELD 4 -- NEW LOCATION OF FIRST VECTOR IN SERIES

FIELDS 5-20 -- IN FIELDS OF TWO, OLD LOCATION AND NEW LOCATION
OF SUBSEQUENT VECTORS IN SINGLE VECTOR SERIES

ROW-WISE SHIFT (SHIFTS ALL M VECTORS IN X)

FIELD 2 -- 0

FIELD 3 -- OLD BEGINNING OBSERVATION NUMBER

FIELD 4 -- NEW BEGINNING OBSERVATION NUMBER

44 "SORT" FOR ALL M VECTORS IN ASCENDING ORDER BY A GIVEN VECTOR

FIELD 1 -- "SORT"

FIELD 2 -- LOCATION OF VECTOR TO SORT ON (CRITERION VECTOR)

FIELD 3 -- BEGINNING OBSERVATION (BLANK==>1)

FIELD 4 -- ENDING OBSERVATION (BLANK==>N)

46 "SRCH" FIND OBSERVATION AT WHICH VALUE IN SORTED VECTOR IS

GREATER THAN OR EQUAL TO A STATED VALUE. USE: A DATA SET, SORTED
BY A CRITERION VECTOR, MAY BE PARTITIONED BY OBSERVATIONS
CHOSEN FOR REGRESSION/CORRELATION ANALYSIS BASED ON SOME CRITERION
VALUE. E.G., FOR ALL VALUES GREATER THAN 5.0 IN VECTOR THREE
A REGRESSION IS DESIRED. TO FIND THE OBSERVATION IN THE SORTED
DATA SET, SRCH ON VECTOR THREE FOR A CRITERION VALUE OF 5.0.

THE CORRESPONDING OBSERVATION NUMBER IS PRINTED OUT SUCH THAT ALL
OBSERVATIONS EQUAL TO AND GREATER THAN (TO THE VALUE OF N) HAVE
VARIATE VALUES G/E TO 5.0.

FOR EACH VECTOR IN SERIES A VALUE OF CRITERION FOR GREATER THAN
OR EQUAL TO MUST BE SUPPLIED IN 8F10.0 FORMAT--VIZ. A VECTOR OF
VALUES CORRESPONDING TO THE VECTOR SERIES NAMED IN FIELDS 3-17.

FIELD 1 -- "SRCH"

FIELD 2 -- NUMBER OF VECTORS IN SINGLE VECTOR SERIES (MAX 16)

FIELD 3 -- LOCATION OF FIRST SORTED VECTOR IN SERIES

FIELDS 4-20 -- LOCATION OF SUBSEQUENT SORTED VECTOR(S) IN SERIES

42 "STAT" WRITE M AND N AS CURRENTLY SET IN PROGRAM

FIELD 1 -- "STAT"

1 "MREG" MULTIPLE REGRESSION, CORRELATION AND MOMENT OPTIONS

FIELD NUMBER IN PARENS -- CARD COLS RIGHT JUSTIFIED

(1) COLS 1-4 "MREG"

(2) COL 8 0 CORRELATION ONLY OPTION. FIELDS 10 AND 11 ARE
 OPTIONAL. FIELD 8 IS REQUIRED.
 CORRELATION OPTION READS IN 8(X(2),A(6),F(2))
 NAMES AND VECTOR LOCATIONS TO A MAXIMUM OF MPARM
 VECTORS.

1 OLS/GLSQ REGRESSION OR MOMENTS OPTION

2 CLS OR GLSQ REGRESSION AND UNCONDITIONAL FORECASTS.
 FORECASTS RUN FROM FIELD 11 OBSERVATION NUMBER PLUS
 1 TO CURRENT VALUE OF N AND ARE COMPUTED ON THE
 BASIS OF ESTIMATED COEFFICIENTS IN A REGRESSION
 RUNNING FROM FIELD 10 TO FIELD 11, USING ACTUAL VALUES
 OF EXPLANATORY VARIABLES OVER THE PERIOD FIELD 11 + 1
 TO N. OUTPUT IS IN THE FORM OF A TABLE THAT GIVES
 ACTUAL Y, ESTIMATED Y AND PERCENT ERROR OVER THE
 FORECAST PERIOD. TABLES ARE PRODUCED FOR OLS AND
 GLSQ (RHO-CORRECTED) EQUATIONS (OPTIONS IN FIELD 6).
 THE GLSQ TABLE IS TRANSFORMED TO THE ORIGINAL METRIC
 OF THE DEPENDENT VARIABLE, USING THE ESTIMATED VALUE
 OF RHO FROM THE OLS REGRESSION

(3) COL 12 0 MOMENT AND SUMS OF SQUARED DEVIATION OPTION ONLY
 FIELDS 2 AND 17 = 1. FIELDS 10 AND 11 ARE OPTIONAL.

1 REGRESSION OR CORRELATION OPTION

(4) COL 16 NUMBER OF EQUATIONS (I.E., NUMBER OF REGRESSION
 SPECIFICATIONS TO FOLLOW).

(5) COL 17-20 PLOT 'Y' AND 'YHAT' FOR EACH REGRESSION ORDERED:

0 NO OPTION

1 PLOT TIME TREND AS A BASE VARIABLE AGAINST ACTUAL
 Y AND ESTIMATED Y (RESIDUALS PRINTED FOR EACH
 OBSERVATION)

INITIAL VALUE OF TREND = FIELD 10; ENDING VALUE
 OF TREND = FIELD 11.

2 NO OPTION

3 PLOT VARIABLE NAMED IN FIELD 12 AS A BASE VARIABLE
 AGAINST Y AND ESTIMATED Y

IF FIELD 6=2 PUNCH 3 AND NAME BASE VARIABLE FOR
 TABLE OF Y, Y ESTIMATED AND RESIDUALS IN FIELD 12

DATE PRINTED AS A BASE VARIABLE AGAINST Y AND
 ESTIMATED Y. PUNCH DATE CORRESPONDING TO OBSERVATION

1 IN DATA MATRIX (E.G., IF OBS 1 IS JAN 59 THEN
 PUNCH 0159; JULY 1963 = 0763)

"MREG" CONTINUED

(6) COL 24 RESIDUAL OPERATIONS:

- 0 NO OPTION
- 1 COMPUTE DURBIN WATSON STATISTIC AND ESTIMATED RHO
- 2 COMPUTE DURBIN WATSON STATISTIC, RHO, AND PRINT A TABLE OF Y, ESTIMATED Y, AND RESIDUALS. PUNCHING 2 UNDER OPTION #3 FIELD 5 ALLOWS DUMPING RESIDUALS WITH SPECIFIED VECTOR AS A BASE VARIABLE NAMED IN FIELD 12.
- 3 COMPUTE DURBIN WATSON STATISTIC, RHO, AND PERFORM ONE ITERATION TO CORRECT FOR SERIAL CORRELATION (FIRST ORDER). GLSQ REGRESSION USES ESTIMATED RHO FROM OLS STAGE.
- 4 DO ALL OF ABOVE

(7) COL 28 CORRELATION MATRIX FOR VARIABLES IN REGRESSION AND/OR CENTRAL MOMENTS FOR VARIABLES IN REGRESSION

- 0 NO OPTION FOR REGRESSION OR FIELD 2 = 0.
- 1 PRINT CORRELATION MATRIX OF VARIABLES IN REGRESSION
- 2 PRINT CENTRAL MOMENTS FOR VARIABLES IN REGRESSION AND CORRELATION MATRIX FOR VARIABLES IN REGRESSION

(8) COL 29-32 CORRELATION OPTION ONLY: FIELD 2 = 0

- 0 NO OPTION (FIELD 2=1 OR 2)
- PUNCH NUMBER OF VARIABLES IN CORRELATION MATRIX FOR CORRELATION ONLY OPTION (FIELD 2=0)
- CORREL OPTION READS NAMES AND VECTOR NUMBERS IN FORMAT 8(X(2),A(6),F(2)) UP TO A MAXIMUM OF MPARM VECTORS
- FORMAT: VARIABLE NAME A(6), VECTOR LOCATION F(2)

(9) COL 35-36 DATE OPTION FOR FIELD 5 PLOT OF Y, Y HAT AND RESIDUALS

- 0 NO OPTION
- IF FIELD 5 SPECIFIED RESIDUAL PLOT WITH DATES, PUNCH 4 IF DATA ARE QUARTERLY; PUNCH 1 IF DATA ARE YEARLY; DEFAULT = 12 MONTHLY DATA.

(10) COLS 37-40 BEGINNING OBSERVATION (ANY OPTION) BLANK => 1.

(11) COLS 41-44 ENDING OBSERVATION (ANY OPTION) BLANK => N.

(12) COL 47-48 BASE VARIABLE OPTIONS IN FILEDS 5 AND 6

- 0 NO OPTION
- PUNCH BASE VARIABLE NUMBER FOR OPTION 2 IN RESIDUAL DUMP OPTION (FIELD 6 = 2) OR FOR OPTION 2 IN PLOT OPTION (FIELD 5 = 3)

"MREG" CONTINUED

(13) COL 52 WRITE COEFFICIENTS AND STANDARD ERRORS ONTO FILE(PARAM)

0 NO OPTION

1 PUNCH TO FILE(PARAM) B'S AND STDERR'S IN FORMAT
(COL(6),5(E(13,6),X(2)))

JCL MUST BE INCLUDED: //PARAM DD DSN=...

(14) COL 56 STORE RESIDUALS FROM EACH REGRESSION ORDERED

0 NO OPTION

1 RESIDUAL FROM EACH REGRESSION STORED IN X(M+1)
OLS AND GLSQ REGRESSION RESIDUALS ARE STORED
FROM FIELD 10 OBSERVATION (FIELD 10+1 FOR GLSQ) TO
FIELD 11 OBSERVATION

(15) COL 60 OPTIONAL VALUE OF RHO USED IN GLSQ REGRESSION

0 NO OPTION

1 OWN VALUE OF RHO IS TO BE USED IN GLSQ ITERATION
(FIELD 6 = 3). VALUE OF RHO IS SUBMITTED ON A CARD
IMMEDIATELY BEHIND LAST OF EQUATION SPECIFICATION
CARD(S) FOR EACH REGRESSION ORDERED IN FIELD 4.

RHO VALUE CARD FOLLOWS TITLE CARD IF OPTED IN FIELD 18

(16) COL 64 MOMENTS GENERATION OPTIONS

0 GENERATE MOMENT MATRIX FOR M VECTORS OVER OBSERVATIONS
FIELD 10 TO FIELD 11.

THE FIRST "MREG" OPERATION CARD IN THE RUN MUST
HAVE 0 IN FIELD 16 FOR REGRESSION, CORRELATION, OR
MOMENTS OPTIONS IN FIELDS 2 AND 3

1 USE EXISTING MOMENT MATRIX FOR REGRESSION,
CORRELATION, OR MOMENTS OPTIONS IN FIELDS 2 AND 3.
IF SUBSEQUENT REGRESSIONS INCLUDE ONLY VECTORS
AND OBSERVATIONS INCLUDED IN EXISTING MOMENT MATRIX
THEN NO NEW MOMENTS ARE NEEDED.

(17) COL 68 MOMENTS AND SUMS OF SQUARED DEVIATIONS OPTIONS

0 NO OPTION

1 PRINT OUT MOMENT MATRIX FOR M VECTORS AND SUMS
OF SQUARED DEVIATIONS.
REQUIRED FOR MOMENT ONLY OPTION, OPTIONAL FOR
REGRESSION OPTION (SEE COMMENT FIELD # 3).

(18) COL 72 REGRESSION OUTPUT TITLE OPTION

0 NO OPTION

1 READ AND PRINT TITLE (80 COLS UNDER FORMAT A(80))
TITLE CARD IS PRINTED ON REGRESSION OUTPUT. TITLE CARD
PRECEEDS RHO VALUE CARD (IF OPTED) BUT FOLLOWS AFTER
LAST OF EQUATION SPECIFICATION CARD(S) FOR EACH
REGRESSION ORDERED IN FIELD 4.

"MREG" CONTINUED

FORMAT FOR EQUATION SPECIFICATION CARDS:

CARD(1): (COL(1),A(6),2 F(2),7(X(2),A(6),F(2)))

CARD(2): (COL(1),8(X(2),A(6),F(2)))

CARD(3), ETC.: SAME AS CARD(2)

THE FIRST OF THE EQUATION SPECIFICATION CARD(S) HAS THE NAME OF THE DEPENDENT VARIABLE A(6), FOLLOWED BY ITS LOCATION F(2) AND THE NUMBER OF INDEPENDENT VARIABLES (INCLUDING CONSTANT) TO FOLLOW F(2). THE LIST OF INDEPENDENT VARIABLES FOLLOWS ON THE FIRST OF THE EQUATION SPECIFICATION CARD(S) WITH THE FIRST SEVEN INDEPENDENT VARIABLES LISTED IN FORMAT 7(X(2),A(6),F(2))-- THE NAME OF EACH INDEPENDENT VARIABLE A(6) AND ITS VECTOR LOCATION F(2). IF THERE ARE MORE THAN SEVEN REGRESSORS (INCLUDING THE CONSTANT), ADDITIONAL EQUATION SPECIFICATION CARD(S) ARE REQUIRED. THE LIST OF VARIABLE NAMES AND VECTOR LOCATIONS BEGINS IN COLUMN 3 OF THE SECOND (THIRD, ETC. IF NEEDED) SPECIFICATION CARD(S).

NB: A CONSTANT TERM IS NOT REQUIRED, BUT IF REQUESTED, IT MAY BE LISTED ANYWHERE IN THE ARGUMENT LIST. THE CONSTANT IS INITIALIZED IN VECTOR LOCATION 1.

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