PLIBIT: A PL/I program for data analysis and regression source list

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STUDIES IN COMPUTER APPLICATIONS

PLIBIT

A PL/I Program for Data Analysis And Regression

Source List

By

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PLIBIT

This booklet contains the source listing of a multi-purpose data-manipulation and regression program called PLIBIT. PLIBIT was written for use at the Social Welfare Regional Research Institute, Boston College, and was funded by the Employment Probability Analysis Project (Social and Rehabilitation Services, Department of Health, Education, and Welfare, 1976).

The principal function of PLIBIT is cross section and time series regression analysis. The program performs both ordinary least squares and generalized least squares for time series involving serially-correlated residuals. PLIBIT also provides numerous transgeneration and arithmetic routines which are especially useful for simple statistical analysis and the preparation of data for regression analysis. In general PLIBIT gives the user the opportunity to read into, write from, manipulate, and then analyze any portion of an M by N matrix. The program optimizes on input/output time; when large amounts of data are to be analyzed, it is much more efficient than corresponding FORTRAN algorithms. All internal storage in PLIBIT is initialized at run time. (A similar program, called DAMBIT, is available in FORTRAN.)

This program must be compiled with an IBM PL/I compiler. The version contained in this booklet was compiled with the PL/I optimizing compiler. Procedure PLIBIT (MAIN) contains two subroutine call statements which may result in unresolved external references on other installations. These subroutines provide a run date for the output and may be eliminated. A suggested overlay structure is given at the end of the source listing.

The documentation and instruction booklet which details how to use PLIBIT is available from the Social Welfare Regional Research Institute. It is called PLIBIT.

For further information contact Dr. Lynn B. Ware, Senior Research Associate, Social Welfare Regional Research Institute, Boston College, Chestnut Hill, Massachusetts, 02167.

```
PLIBIT: PROC OPTIONS(MAIN)REORDER;                                      1
        OPEN FILE(SYSPRINT)LINESIZE(132);                               1
        ON ENDPAGE(SYSPRINT)                                            1
        ;                                                               1
        DCL ONCHAR BUILTIN;                                             1
        ON CONV                                                         1
          BEGIN;                                                        2
          PUT SKIP(2)EDIT('CONVERSION OF "',ONCHAR,'" NOT TRIED--RETRY'  2
          )(COL(1),A,A(1),A);                                           2
          STOP;                                                         2
          END;                                                          2
        DCL(MUREN,PLNT,IO,ARITH,TRNSGEN,UTILITY)ENTRY;                  1
        DCL SYSDAT ENTRY(FIXED BIN(31),FIXED BIN(31)),A398A ENTRY(FIXED 1
         BIN(31),FIXED BIN(31),FIXED BIN(31),FIXED BIN(31))OPTIONS(FORT 1
        RAN);                                                           1
        DCL OP_NAME(32)CHAR(4)INIT('MREG','PLOT','MAIN','READ','WRTE',' 1
        RWND','PNCH','SUBV','ARTH','OPER','MDAT','LCOM','FACT','LAGS',' 1 >
        MOVE','SCLE','LEAD','DIFF','PCHG','DLTM','DLTN','SHFT','CLRX',' 1 if
        TIME','CONS','STAT','SKIP','SORT','DUMY','SRCH','DELT','QUIT')S 1 'i
        TATIC;                                                          1
        DCL OP_NO(32)FIXED BIN(15)INIT(1,3,4,6,7,8,9,11,16,17,18,19,20, 1
        26,27,28,29,30,31,36,37,38,39,40,41,42,43,44,45,46,47,51)STATIC 1
        ;                                                               1
        DCL(IYEAR,MONTH,IDAY1,IDAY2)FIXED BIN(31)INIT(0),NP(20)FIXED BI 1
        N(15);                                                          1
        DCL TITLE CHAR(72),OPRN CHAR(4)INIT('    ');                    1
        GET SKIP EDIT(TITLE,MPARM,NPARM)(COL(1),A(72),2 F(4));          1
          IF MPARM=0 THEN                                               2
          MPARM=40;                                                     2
          IF NPARM=0 THEN                                               2 1
          NPARM=252;                                                    2
          BEGIN;                                                        2
          DCL X(NPARM,MPARM)INIT((NPARM*MPARM)0)FLOAT DEC(6);           2
          DCL(LC(*),LD(*),IPIVOT(*),INDEX(*,*))FIXED BIN(15)CTL;        2
          DCL(AM(*,*),B(*,*),PIVOT(*),A(*,*),ADJ(*),SOSS(*))FLOAT DEC(1 2
          6)CTL;                                                        2
          DCL(CO(*,*),BE(*),AV(*),SIGBE(*),TR(*),BETA(*),ST(*))FLOAT DE 2
          C(6)CTL;                                                      2
          DCL SYMBOL(*)CHAR(1)CTL,FOT(*)CHAR(10)CTL,(TEXQ(*),TEXD(*))CH 2
          AR(6)CTL;                                                     2
DEFAULT RANGE(I:                                                        2
          N)FIXED BIN VALUE(FIXED BIN(15));                             2
          CALL SYSDAT(IDAY2,IYEAR);                                     2
          CALL A398A(IYEAR,MONTH,IDAY1,IDAY2);                          2
          PUT PAGE EDIT('SOCIAL WELFARE REGIONAL RESEARCH INSTITUTE','P 2
          LIBIT **(ROWS=',NPARM,', COLS=',MPARM,')** RUNDATE:',MONTH,'/ 2
          ',IDAY1,'/',IYEAR,'L.B.WARE')(COL(1),A,COL(53),2(A,F(4)),A,F( 2
          3),2(A,F(2)),COL(124),A);                                     2
          M=1;                                                          2
          N=0;                                                          2
          X(*,1)=1;                                                     2
          PUT SKIP(4)EDIT(TITLE)(COL(1),A(72));                         2
            DO WHILE(OPRN¬=OP_NAME(32));                                3
            NP(1)=99;                                                   3
            GET SKIP EDIT(OPRN,(NP(I)DO I=2 TO 20))(COL(1),A(4),19 F(4) 3
            );                                                          3
              DO I=1 TO 32;                                             4
                IF OPRN=OP_NAME(I)THEN                                  5
```

```
         DO;                                                          6
         NP(1)=OP_NO(I);                                              6
         I=32;                                                        6
         END;                                                         6
      END;                                                            4
      IF NP(1)=99 THEN                                                4
        DO;                                                           5
        PUT SKIP(2)EDIT('ERROR: "',OPRN,'" IS NOT IN THE CATALO       5
        G')(COL(1),A,A(4),A);                                         5
        STOP;                                                         5
        END;                                                          5
      ELSE                                                            4
        IF NP(1)=1 THEN                                               5
          DO;                                                         6
            IF ALLOCATION(A)=0 THEN                                   7
            ALLOCATE A(MPARM,MPARM),ADJ(MPARM),SOSS(MPARM);           7
            IF NP(2)=0 THEN                                           7
              DO;                                                     8
              NP(3)=1;                                                8
                IF NP(8)=0 THEN                                       9
                  DO;                                                10
                  PUT SKIP(2)EDIT('ERROR:  COL(32) = 0 IN MREG       10
                  CORRELATION OPTION')(COL(1),A);                    10
                  STOP;                                              10
                  END;                                               10
              END;                                                    8
            ELSE                                                      7
              IF NP(5)>0&NP(6)=0 THEN                                 8
              NP(6)=1;                                                8
          CALL MUREN(X,NP,LC,LD,TEXQ,TEXD,B,A,ADJ,AM,SOSS,SIGBE       6
          ,BE,TR,ST,BETA,AV,CO,M,N,PIVOT,IPIVOT,INDEX,MPARM,NPA       6
          RM,MONTH,IDAY1,IYEAR);                                      6
          END;                                                        6
        ELSE                                                          5
          IF NP(1)=3 THEN                                             6
            DO;                                                       7
            L=7;                                                      7
            MD=NP(2)+1;                                               7
              IF NP(5)=0 THEN                                         8
                DO;                                                   9
                L=8;                                                  9
                MD=NP(2);                                             9
                NP(2)=NP(2)-1;                                        9
                END;                                                  9
            ALLOCATE CO(NPARM,MD);                                    7
              DO I=1 TO NP(2);                                        8
                DO K=NP(6)TO NP(7);                                   9
                CO(K,I)=X(K,NP(I+L));                                 9
                END;                                                  9
              END;                                                    8
              IF NP(5)=0 THEN                                         8
                DO K=NP(6)TO NP(7);                                   9
                CO(K,MD)=X(K,NP(8));                                  9
                END;                                                  9
            CALL PLNT(NP(3),NP(2),MD,NP,CO,X);                        7
            FREE CO;                                                  7
            END;                                                      7
          ELSE                                                        6
```

```
                    IF NP(1)>15&NP(1)<16 THEN                                   7
                    CALL IO(NP,N,M,NPARM,MPARM,X,CO,FOT,SYMBOL);                7
                    ELSE                                                        7
                      IF NP(1)>15&NP(1)<26 THEN                                 8
                      CALL ARITH(NP,N,M,X,ST,SYMBOL);                           8
                      ELSE                                                      8
                        IF NP(1)>25&NP(1)<36 THEN                               9
                        CALL TRNSGEN(NP,N,M,NPARM,X,ST);                        9
                        ELSE                                                    9
                        CALL UTILITY(NP,N,M,X,ST);                              9
                IF M>MPARM|N>NPARM THEN                                         4
                  DO;                                                           5
                  PUT SKIP EDIT('ERROR:  TRANSGENERATED VALUE OF M >',MPA       5
                  RM,' OR N >',NPARM)(COL(1),2(A,F(4)));                        5
                  STOP;                                                         5
                  END;                                                          5
              END;                                                              3
            PUT PAGE EDIT('NORMAL END OF JOB')(COL(1),A);                       2
            STOP;                                                               2
            END;                                                                2
          END PLIBIT;                                                           1
*PROCESS;
```

```
IO:     PROC(NP,N,M,NPARM,MPARM,X,CO,FOT,COMMENT)RECORDER;                    1
        DCL ONCHAR BUILTIN;                                                   1
        ON CONV                                                               1
          BEGIN;                                                              2
            IF ONCHAR=' ' THEN                                                3
              DO;                                                             4
              ONCHAR='O';                                                     4
              PUT SKIP(2)EDIT('EMBEDDED BLANK VAR',I,' OBS',K,' --> "O"       4
              ')(COL(1),A,F(4),A,F(4),A);                                     4
              END;                                                            4
            ELSE                                                              3
              DO;                                                             4
              PUT SKIP(2)EDIT('CONVERSION OF CHAR =',ONCHAR,'" NOT TRIE       4
              D')(COL(1),A,A(1),A);                                           4
              STOP;                                                           4
              END;                                                            4
          END;                                                                2
        DCL(IN,INS)FILE STREAM INPUT,OUT FILE STREAM OUTPUT;                  1
        DCL DATER ENTRY;                                                      1
        DCL(BEGYEAR,HALF,PERS)FIXED BIN(15);                                  1
        DCL(C1,C2,REC,REP,W,D,COM)FIXED BIN(15),FILEX(0:2)CHAR(4)INIT('       1
        CARD','DISK','TAPE'),NP(*)FIXED BIN(15)CONN,X(*,*)FLOAT DEC(6)C       1
        ONN;                                                                  1
        DCL CO(*,*)FLOAT DEC(6)CTL,FOT(*)CHAR(10)CTL,COMMENT(*)CHAR(1)C       1
        TL;                                                                   1
DEFAULT RANGE(I:                                                              1
        N)FIXED BIN VALUE(FIXED BIN(15));                                     1
          IF NP(1)=6 THEN                                                     2
            DO;                                                               3
              IF NP(7)=0 THEN                                                 4
                DO;                                                           5
                M1=2;                                                         5
                M2=NP(4)+1;                                                   5
                END;                                                          5
              ELSE                                                            4
                IF NP(7)=1 THEN                                               5
                  DO;                                                         6
                  M1=M+1;                                                     6
                  M2=M+NP(4);                                                 6
                  END;                                                        6
                ELSE                                                          5
                  DO;                                                         6
                  M1=NP(7);                                                   6
                  M2=M1+NP(4)-1;                                              6
                  END;                                                        6
              IF NP(8)=0 THEN                                                 4
                DO;                                                           5
                N1=1;                                                         5
                N2=NP(3);                                                     5
                END;                                                          5
              ELSE                                                            4
                IF NP(8)=1 THEN                                               5
                  DO;                                                         6
                  N1=N+1;                                                     6
                  N2=N+NP(3);                                                 6
                  END;                                                        6
                ELSE                                                          5
                  DO;                                                         6
```

```
            N1=NP(8);                                                    6
            N2=N1+NP(3)-1;                                               6
            END;                                                         6
        M=M2;                                                            3
        N=N2;                                                            3
          IF NP(10)>0 THEN                                               4
          M=NP(10);                                                      4
          IF NP(11)>0 THEN                                               4
          N=NP(11);                                                      4
          IF NP(2)=0 THEN                                                4
            DO;                                                          5
              IF NP(5)=0 THEN                                            6
                DO I=M1 TO M2;                                           7
                GET SKIP LIST((X(K,I)DO K=N1 TO N2));                    7
                END;                                                     7
              ELSE                                                       6
                DO K=N1 TO N2;                                           7
                GET SKIP LIST((X(K,I)DO I=M1 TO M2));                    7
                END;                                                     7
            PUT SKIP(2)EDIT('LIST INPUT:  V(S)',M1,' ->',M2,'   OBS      5
            ',N1,' ->',N2,'  M=',M,'  N=',N)(COL(1),6(A,F(4)));          5
            END;                                                         5
          ELSE                                                           4
            DO;                                                          5
              IF NP(2)=1 THEN                                            6
                DO;                                                      7
                GET SKIP EDIT(C1,C2,REC,REP,W,D)(6 F(4));                7
                  IF REC=0 THEN                                          8
                  REC=NP(3)/REP;                                         8
                REC=REC+1;                                               7
                END;                                                     7
              ELSE                                                       6
              GET SKIP EDIT(C1,REP,W,D)(4 F(4));                         6
              IF NP(9)=1|NP(2)=1 THEN                                    6
              ALLOCATE FOT(MPARM);                                       6
              IF NP(9)=1 THEN                                            6
              GET SKIP EDIT((FOT(I)DO I=M1 TO M2))(COL(1),8 A(10));      6
              IF NP(2)=1 THEN                                            6
                DO I=M1 TO M2;                                           7
                  IF NP(6)=0 THEN                                        8
                  GET SKIP EDIT(FOT(I),(X(K,I)DO K=N1 TO N2))(COL(C      8
                  1),A(10),(REC)(COL(C2),(REP)F(W,D)));                  8
                  ELSE                                                   8
                  GET FILE(IN)SKIP EDIT(FOT(I),(X(K,I)DO K=N1 TO N2      8
                  ))(COL(C1),A(10),(REC)(COL(C2),(REP)F(W,D)));          8
                END;                                                     7
              ELSE                                                       6
                IF NP(2)=2 THEN                                          7
                  DO I=M1 TO M2;                                         8
                    IF NP(6)=0 THEN                                      9
                    GET SKIP EDIT((X(K,I)DO K=N1 TO N2))(COL(C1),(R      9
                    EP)(E(W,D)));                                        9
                    ELSE                                                 9
                    GET FILE(IN)SKIP EDIT((X(K,I)DO K=N1 TO N2))(CO      9
                    L(C1),(REP)(E(W,D)));                                9
                  END;                                                   8
                ELSE                                                     7
                  IF NP(2)=3 THEN                                        8
```

```
                    DO K=M1 TO M2;                                          9
                      IF NP(6)=0 THEN                                       10
                      GET SKIP EDIT((X(K,I)DO I=M1 TO M2))(COL(C1),         10
                      (REP)(E(W,D)));                                       10
                      ELSE                                                  10
                      GET FILE(IN)EDIT((X(K,I)DO I=M1 TO M2))(COL(C         10
                      1),(REP)(E(W,D)));                                    10
                    END;                                                    9
                PUT SKIP(2)EDIT('FMTD INPUT FROM(',FILEX(NP(6)),'):  VI     5
                S)',M1,' ->',M2,'   OBS',N1,' ->',N2,' M=',M,' N=',N)(C     5
                OL(1),A,A(4),6(A,F(4)));                                    5
                  IF NP(2)=1 THEN                                           6
                  PUT SKIP(2)EDIT('FORMAT:  (COL(',C1,'),A(10),(',REC,'     6
                  )(COL(',C2,'),(',REP,')F(',W,',',D,'))')(COL(1),7(A,      6
                  F(4)));                                                   6
                  ELSE                                                      6
                  PUT SKIP(2)EDIT('FORMAT:  (COL(',C1,'),(',REP,')(E(',     6
                  W,',',D,'))')(COL(1),5(A,F(4)));                          6
                END;                                                        5
              IF NP(9)=1|NP(2)=1 THEN                                       4
                DO;                                                         5
                PUT SKIP(2);                                                5
                  DO J=M1 TO M2;                                            6
                  PUT SKIP EDIT(J,' --> ',FOT(J))(COL(11),F(4),A,A(10))     6
                  ;                                                         6
                  END;                                                      6
                END;                                                        5
            IF ALLOCATION(FOT)=1 THEN                                       4
              FREE FOT;                                                     4
          END;                                                              3
        ELSE                                                                2
          IF NP(1)=7 THEN                                                   3
            DO;                                                             4
              IF NP(4)=0 THEN                                               5
              NP(4)=1;                                                      5
              IF NP(5)=0 THEN                                               5
              NP(5)=N;                                                      5
              IF NP(5)-NP(4)>10 THEN                                        5
              PUT PAGE;                                                     5
              IF NP(2)>0 THEN                                               5
                DO;                                                         6
                  IF NP(8)=0 THEN                                           7
                  NP(8)=12;                                                 7
                  IF NP(9)=0 THEN                                           7
                  NP(9)=4;                                                  7
                REP=120/NP(8);                                              6
                MNP=NP(3)-NP(2)+1;                                          6
                MPR=MNP/REP;                                                6
                  IF MPR*REP<MNP THEN                                       7
                  MPR=MPR+1;                                                7
                  IF NP(6)>0 THEN                                           7
                    DO;                                                     8
                    MD=1;                                                   8
                    ALLOCATE CO(NPARM,MD);                                  8
                      IF NP(7)=0 THEN                                       9
                      NP(7)=12;                                             9
                    CALL DATER(NP(4),NP(5),NP(6),NP(7),MD,CO);              8
                    END;                                                    8
```

```
                DO I=1 TO MPR;                                          7
                IA=I*REP+NP(2)-REP;                                     7
                IE=IA+REP-1;                                            7
                  IF IE>MNP+NP(2)THEN                                   8
                    IE=MNP+NP(2)-1;                                     8
                  PUT SKIP(2)EDIT((J DO J=IA TO IE))(COL(7),(REP)F(NP   7
                  (8)));                                                7
                  PUT SKIP(2);                                          7
                    DO K=NP(4)TO NP(5);                                 8
                    PUT SKIP EDIT(K,(X(K,J)DO J=IA TO IE))(COL(1),F(4   8
                    ),X(6),(REP)F(NP(8),NP(9)));                        8
                      IF NP(6)>0 THEN                                   9
                        DO;                                             10
                          PUT SKIP(0)EDIT(CO(K,MD))(COL(6),F(6,2));     10
                          END;                                          10
                    END;                                                8
                  PUT SKIP(2)EDIT((J DO J=IA TO IE))(COL(7),(REP)F(NP   7
                  (8)));                                                7
                  END;                                                  7
                PUT PAGE;                                               6
                  IF ALLOCATION(CO)=1 THEN                              7
                  FREE CO;                                              7
                RETURN;                                                 6
                END;                                                    6
              IF NP(3)>10 THEN                                          5
                DO;                                                     6
                PUT SKIP EDIT('SELECTIVE DUMP>10')(COL(1),A);           6
                STOP;                                                   6
                END;                                                    6
            PUT SKIP EDIT((NP(6+J-1)DO J=1 TO NP(3)))(COL(7),10 F(12)   4
            );                                                          4
            PUT SKIP(2);                                                4
              DO K=NP(4)TO NP(5);                                       5
              PUT SKIP EDIT(K,(X(K,NP(6+J-1))DO J=1 TO NP(3)))(COL(1)   5
              ,F(4),X(6),10 F(12,4));                                   5
              END;                                                      5
            PUT SKIP(2)EDIT((NP(6+J-1)DO J=1 TO NP(3)))(COL(7),10 F(1   4
            2));                                                        4
            END;                                                        4
          ELSE                                                          3
            IF NP(1)=8 THEN                                             4
              DO;                                                       5
                IF NP(2)=1 THEN                                         6
                  DO;                                                   7
                  OPEN FILE(IN);                                        7
                  PUT SKIP(2)EDIT('FILE(IN) OPENED')(COL(1),A);         7
                  END;                                                  7
                IF NP(2)=2 THEN                                         6
                  DO;                                                   7
                  CLOSE FILE(IN);                                       7
                  PUT SKIP(2)EDIT('FILE(IN) CLOSED')(COL(1),A);         7
                  END;                                                  7
                IF NP(3)=1 THEN                                         6
                  DO;                                                   7
                  OPEN FILE(OUT);                                       7
                  PUT SKIP(2)EDIT('FILE(OUT) OPENED')(COL(1),A);        7
                  END;                                                  7
                IF NP(3)=2 THEN                                         6
```

```
                DO;                                                    7
                CLOSE FILE(OUT);                                       7
                PUT SKIP(2)EDIT('FILE(OUT) CLOSED')(COL(1),A);         7
                END;                                                   7
              IF NP(4)=1 THEN                                          6
                DO;                                                    7
                OPEN FILE(INS);                                        7
                PUT SKIP(2)EDIT('FILE(INS) OPENED')(COL(1),A);         7
                END;                                                   7
              IF NP(4)=2 THEN                                          6
                DO;                                                    7
                CLOSE FILE(INS);                                       7
                PUT SKIP(2)EDIT('FILE(INS) CLOSED')(COL(1),A);         7
                END;                                                   7
            END;                                                       5
          ELSE                                                         4
            IF NP(1)=9 THEN                                            5
              DO;                                                      6
                IF NP(7)=0 THEN                                        7
                NP(7)=1;                                               7
                IF NP(8)=0 THEN                                        7
                NP(8)=N;                                               7
                IF NP(4)=3 THEN                                        7
                GET SKIP EDIT(C1,REP,W,D,COM)(5 F(4));                 7
                ELSE                                                   7
                GET SKIP EDIT(C1,C2,REP,W,D,COM,HALF,BEGYEAR,PERS)(    7
                6 F(4),2 F(2),F(4));                                   7
                IF COM=0 THEN                                          7
                COM=1;                                                 7
                IF COM<0 THEN                                          7
                COM=-1*COM;                                            7
              ALLOCATE COMMENT(COM);                                   6
                IF REP=0 THEN                                          7
                REP=NP(8)-NP(7)+1;                                     7
                IF NP(4)<2 THEN                                        7
                  DO;                                                  8
                  JK=NP(3);                                            8
                    IF NP(6)=1 THEN                                    9
                      DO;                                             10
                        IF HALF¬=1&HALF¬=7 THEN                       11
                          DO;                                         12
                          PUT SKIP(2)EDIT('ERROR:  MONTH IN DATE OP   12
                          TION NOT "1" OR "7"')(COL(1),A);            12
                          STOP;                                       12
                          END;                                        12
                        IF FLOAT((NP(7)+REP)/REP)*REP>TRUNC((NP(7)+   11
                        REP)/REP)*REP THEN                            11
                        NP(7)=TRUNC((NP(7)+REP)/REP)*REP-REP+1;       11
                        ELSE                                          11
                        NP(7)=NP(7)-REP+1;                            11
                      ALLOCATE CO(TRUNC((NP(8)-NP(7)+1)/REP)+1,1);    10
                        IF PERS=0 THEN                                11
                        PERS=12;                                      11
                        IF HALF<7 THEN                                11
                        HALF=6;                                       11
                        ELSE                                          11
                        HALF=12;                                      11
                        IF NP(7)-TRUNC(NP(7)/PERS)*PERS=1 THEN        11
```

```
                    J1=6;                                                  11
                    ELSE                                                   11
                    J1=12;                                                 11
                    IF J1=12&HALF=6 THEN                                   11
                    HALF=12;                                               11
                    ELSE                                                   11
                      IF J1=12&HALF=12 THEN                                12
                        DO;                                                13
                        HALF=6;                                            13
                        BEGYEAR=BEGYEAR+1;                                 13
                        END;                                               13
                  L=0;                                                     10
                    IF COM>15 THEN                                         11
                    COM=15;                                                11
                    IF C1>1 THEN                                           11
                    C1=1;                                                  11
                    IF C2<21 THEN                                          11
                    C2=21;                                                 11
                    DO J1=BEGYEAR+TRUNC(NP(7)/PERS)TO BEGYEAR+T            11
                    RUNC(NP(7)/PERS)+TRUNC((NP(8)-NP(7)+1)/PERS            11
                    );                                                     11
                      DO J2=1 TO TRUNC(PERS/REP);                          12
                      L=L+1;                                               12
                      CO(L,1)=J1*10+J2;                                    12
                      END;                                                 12
                    END;                                                   11
                  END;                                                     10
                DO J=1 TO NP(3);                                           9
                  IF NP(2)=0 THEN                                          10
                  LV=NP(J+8);                                              10
                  ELSE                                                     10
                  LV=NP(9)+J-1;                                            10
                  IF NP(4)=0 THEN                                          10
                    DO;                                                    11
                      IF COM>0 THEN                                        12
                      GET SKIP EDIT((COMMENT(JJ)DO JJ=1 TO COM)            12
                      )((COM)(A(1)));                                      12
                      ELSE                                                 12
                        DO K=1 TO COM;                                     13
                        COMMENT(K)=' ';                                    13
                        END;                                               13
                      IF NP(6)=0 THEN                                      12
                      PUT FILE(OUT)SKIP EDIT(((COMMENT(J1)DO J1            12
                      =1 TO COM),(X(J2,LV)DO J2=K TO K+REP-1)DO            12
                       K=NP(7)TO NP(8)BY REP))(COL(C1),(COM)(A(             12
                      1)),COL(C2),(REP)(F(W,D)));                          12
                      ELSE                                                 12
                      PUT FILE(OUT)SKIP EDIT(((COMMENT(J1)DO J1            12
                      =1 TO COM),CO(TRUNC((K-NP(7)+HALF)/REP),1            12
                      ),(X(J2,LV)DO J2=K TO K+REP-1)DO K=NP(7)T            12
                      O NP(8)BY REP))(COL(C1),(COM)(A(1)),COL(1            12
                      7),F(3),COL(C2),(REP)(F(W,D)));                      12
                    END;                                                   11
                  IF NP(4)=1 THEN                                          10
                  PUT FILE(OUT)SKIP EDIT((X(K,LV)DO K=NP(7)TO N            10
                  P(8)))(COL(C1),(REP)(E(W,D)));                           10
                END;                                                       9
              PUT SKIP(2)EDIT('VAR ORDER EDIT PUNCH FILE(',FILE            8
```

```
                X(NP(5)),'):  OBS',NP(7),' ->',NP(8))(COL(1),A,A(   8
               4),2(A,F(4)));                                       8
                 IF NP(2)=0 THEN                                    9
                 PUT SKIP EDIT('VAR(S) =',(NP(JJ+8)DO JJ=1 TO NP    9
                 (3)))(COL(1),A,(JK)(F(4)));                        9
                 ELSE                                               9
                 PUT SKIP EDIT('VAR(S) =',(NP(9)+J-1 DO J=1 TO N    9
                 P(3)))(COL(1),A,(JK)(F(4)));                       9
                 IF NP(4)=0 THEN                                    9
                 PUT SKIP(2)EDIT('FORMAT:  (COL(',C1,'),(',COM,'    9
                 )(A(1)),COL(',C2,'),(',REP,')(F(',W,',',D,'))))'   9
                 )(COL(1),7(A,F(4)));                               9
                 ELSE                                               9
                 PUT SKIP(2)EDIT('FORMAT:  COL(',C1,'),(',REP,')    9
                 (E(',W,',',D,'))))')(COL(1),6(A,F(4)));            9
                 IF ALLOCATION(COMMENT)=1 THEN                      9
                 FREE COMMENT;                                      9
                 IF ALLOCATION(CO)=1 THEN                           9
                 FREE CO;                                           9
               END;                                                 8
             ELSE                                                   7
               DO;                                                  8
                 DO K=NP(7)TO NP(8);                                9
                   IF NP(2)=0 THEN                                 10
                   PUT FILE(OUT)SKIP EDIT((X(K,NP(J+8))DO J=1 TO   10
                    NP(3)))(COL(C1),(REP)(E(W,D)));                10
                   ELSE                                            10
                   PUT FILE(OUT)SKIP EDIT((X(K,NP(9)+J-1)DO J=1    10
                   TO NP(3)))(COL(C1),(REP)(E(W,D)));              10
                 END;                                               9
               PUT SKIP(2)EDIT('OBS ORDER EDIT PUNCH FILE(',FILE    8
               X(NP(5)),'):  VAR(S)',NP(9),' ->',NP(9)+NP(3)-1,'    8
                 OBS',NP(7),' ->',NP(8))(COL(1),A,A(4),4(A,F(4))    8
               );                                                   8
               PUT SKIP(2)EDIT('FORMAT: (COL(',C1,'),(',REP,')(E    8
               (',W,',',D,'))))')(COL(1),6(A,F(4)));                8
               END;                                                 8
           END;                                                     6
         ELSE                                                       5
           IF NP(1)=11 THEN                                         6
             DO;                                                    7
             ALLOCATE CO(NP(6),1);                                  7
               IF NP(3)=0 THEN                                      8
               GET SKIP LIST((CO(K,1)DO K=1 TO NP(6)));             8
               ELSE                                                 8
                 DO;                                                9
                 GET SKIP EDIT(C1,REP,W,D)(4 F(4));                 9
                   IF NP(4)=0 THEN                                 10
                   GET SKIP EDIT((CO(K,1)DO K=1 TO NP(6)))(COL(C   10
                   1),(REP)(E(W,D)));                              10
                   ELSE                                            10
                   GET FILE(INS)SKIP EDIT((CO(K,1)DO K=1 TO NP(6   10
                   )))(COL(C1),(REP)(E(W,D)));                     10
                 END;                                               9
               IF NP(5)=0 THEN                                      8
                 DO;                                                9
                   IF NP(7)>M THEN                                 10
                   M=NP(7);                                        10
```

```
                    DO J=1 TO NP(2)*2 BY 2;                                 10
                      DO K=NP(J+7)TO NP(J+7)+NP(6)-1;                       11
                      X(K,NP(7))=CO(K-NP(J+7)+1,1);                         11
                      END;                                                  11
                      IF NP(J+7)+NP(6)-1>N THEN                             11
                      N=NP(J+7)+NP(6)-1;                                    11
                    PUT SKIP(2)EDIT('OBS',NP(J+7),' ->',NP(J+7)+N           10
                    P(6)-1,' --> V',NP(7),' M=',M,' N=',N)(COL(1)           10
                    ,5(A,F(4)));                                            10
                    END;                                                    10
                  END;                                                      9
                ELSE                                                        8
                  DO;                                                       9
                    DO J=1 TO NP(2)*2 BY 2;                                 10
                      IF NP(J+6)>M THEN                                     11
                      M=NP(J+6);                                            11
                      DO K=NP(J+7)TO NP(J+7)+NP(6)-1;                       11
                      X(K,NP(J+6))=CO(K-NP(J+7)+1,1);                       11
                      END;                                                  11
                      IF NP(J+7)+NP(6)-1>N THEN                             11
                      N=NP(J+7)+NP(6)-1;                                    11
                    PUT SKIP(2)EDIT('OBS',NP(J+7),' ->',NP(J+7)+N           10
                    P(6)-1,' --> V',NP(7),' M=',M,' N=',N)(COL(1)           10
                    ,5(A,F(4)));                                            10
                    END;                                                    10
                  END;                                                      9
                FREE CO;                                                    7
                  IF NP(3)>0 THEN                                           8
                  PUT SKIP EDIT('FORMAT:  (COL(',C1,'),(',REP,')(E(         8
                  ',W,',',D,'))')'(COL(1),5(A,F(4)));                       8
                END;                                                        7
        END IO;                                                             1
*PROCESS;
```

```
DATER:   PROC(L2,L3,L22,L33,MD,CO)REORDER;                              1
         DCL CO(*,*)FLOAT DEC(16)CTL;                                   1
DEFAULT RANGE(I:                                                        1
         N)FIXED BIN VALUE(FIXED BIN(15));                              1
           IF L33=1 THEN                                                2
             DO;                                                        3
             LL5=L22+L2-1;                                              3
               DO K=L2 TO L3;                                           4
               CO(K,MD)=TRUNC(LL5/100);                                 4
               LL5=LL5+1;                                               4
               END;                                                     4
             END;                                                       3
           ELSE                                                         2
             DO;                                                        3
             LL1=L22;                                                   3
             LL2=L33*100+100;                                           3
             LL3=L2/L33;                                                3
             LL5=(L2-LL3*L33)*100-100+LL1+LL3;                          3
             LL6=0;                                                     3
             LL7=LL5-TRUNC(LL5/100)*100;                                3
               DO K=L2 TO L3;                                           4
                 IF LL5>=LL2 THEN                                       5
                   DO;                                                  6
                   LL6=LL6+1;                                           6
                   LL5=LL7+LL6+100;                                     6
                   END;                                                 6
               CO(K,MD)=LL5;                                            4
               CO(K,MD)=CO(K,MD)/100;                                   4
               LL5=LL5+100;                                             4
               END;                                                     4
             END;                                                       3
         END DATER;                                                     1
*PROCESS;
```

```
ARITH:  PROC(NP,N,M,X,POW,SYMBOL)REORDER;                                1
        DCL NP(*)FIXED BIN(15)CONN,X(*,*)FLOAT DEC(6)CONN,POW(*)FLOAT D  1
        EC(6)CTL,SYMBOL(*)CHAR(1)CTL;                                    1
        DCL(SUM,SUMSQ)FLOAT DEC(6);                                      1
DEFAULT RANGE(I:                                                         1
        N)FIXED BIN VALUE(FIXED BIN(15));                                1
          IF NP(1)=16 THEN                                               2
            DO;                                                          3
              DO J=1 TO NP(4);                                           4
                IF NP(3)=1 THEN                                          5
                  DO;                                                    6
                  M=M+1;                                                 6
                  JL=M;                                                  6
                  END;                                                   6
                ELSE                                                     5
                JL=NP(2*J+3);                                            5
                IF NP(2)=0 THEN                                          5
                  DO;                                                    6
                    DO K=1 TO N;                                         7
                    X(K,JL)=X(K,NP(2*J+3))+X(K,NP(2*J+4));               7
                    END;                                                 7
                  PUT SKIP(2)EDIT('V',NP(2*J+3),' +',NP(2*J+4),' -->',J  6
                  L)(COL(1),3(A,F(4)));                                  6
                  END;                                                   6
                IF NP(2)=1 THEN                                          5
                  DO;                                                    6
                    DO K=1 TO N;                                         7
                    X(K,JL)=X(K,NP(2*J+3))-X(K,NP(2*J+4));               7
                    END;                                                 7
                  PUT SKIP(2)EDIT('V',NP(2*J+3),' -',NP(2*J+4),' -->',J  6
                  L)(COL(1),3(A,F(4)));                                  6
                  END;                                                   6
                ELSE                                                     5
                  IF NP(2)=2 THEN                                        6
                    DO;                                                  7
                      DO K=1 TO N;                                       8
                      X(K,JL)=X(K,NP(2*J+3))*X(K,NP(2*J+4));             8
                      END;                                               8
                    PUT SKIP(2)EDIT('V',NP(2*J+3),' *',NP(2*J+4),' -->'  7
                    ,JL)(COL(1),3(A,F(4)));                              7
                    END;                                                 7
                  ELSE                                                   6
                    IF NP(2)=3 THEN                                      7
                      DO;                                                8
                        DO K=1 TO N;                                     9
                          IF X(K,NP(2*J+4))=0 THEN                      10
                            DO;                                         11
                            X(K,JL)=10**6;                              11
                            PUT SKIP EDIT('ERROR:  ZERO ARG.  10**6 --> 11
                             X(',K,',',JL,')')(COL(1),3(A,F(4)));       11
                            END;                                        11
                          ELSE                                          10
                            X(K,JL)=X(K,NP(2*J+3))/X(K,NP(J*2+4));      10
                        END;                                             9
                      PUT SKIP(2)EDIT('V',NP(2*J+3),' /',NP(2*J+4),' --  8
                      >',JL)(COL(1),3(A,F(4)));                          8
                      END;                                               8
            END;                                                         4
```

```
        END;                                                                    3
      ELSE                                                                      2
        IF NP(1)=17 THEN                                                        3
          DO;                                                                   4
            DO J=1 TO NP(4);                                                    5
              IF NP(3)=1 THEN                                                   6
                DO;                                                             7
                M=M+1;                                                          7
                JL=M;                                                           7
                END;                                                            7
              ELSE                                                              6
              JL=NP(J+4);                                                       6
              IF NP(2)=1 THEN                                                   6
                DO;                                                             7
                  DO K=1 TO N;                                                  8
                    IF X(K,NP(J+4))>0 THEN                                      9
                    X(K,JL)=LOG(X(K,NP(J+4)));                                  9
                    ELSE                                                        9
                      DO;                                                       10
                      PUT SKIP EDIT('ERROR:  ARG LOG(X(',K,',',NP(J             10
                      +4),')<=0')(COL(1),3(A,F(4)));                            10
                      STOP;                                                     10
                      END;                                                      10
                  END;                                                          8
                PUT SKIP(2)EDIT('LOG(E) V',NP(J+4),' -->',JL)(COL(1             7
                ),2(A,F(4)));                                                   7
                END;                                                            7
              ELSE                                                              6
                IF NP(2)=2 THEN                                                 7
                  DO;                                                           8
                    DO K=1 TO N;                                                9
                    X(K,JL)=EXP(X(K,NP(J+4)));                                  9
                    END;                                                        9
                  PUT SKIP(2)EDIT('EXP(E) V',NP(J+4),' -->',JL)(COL             8
                  (1),2(A,F(4)));                                               8
                  END;                                                          8
          END;                                                                  5
        END;                                                                    4
      ELSE                                                                      3
        IF NP(1)=18 THEN                                                        4
          DO;                                                                   5
          ALLOCATE POW(2);                                                      5
            IF NP(5)=0 THEN                                                     6
            NP(5)=1;                                                            6
            IF NP(6)=0 THEN                                                     6
            NP(6)=N;                                                            6
            DO J=1 TO NP(4);                                                    6
              IF NP(3)=0 THEN                                                   7
              L1=NP(J+6);                                                       7
              ELSE                                                              7
              L1=NP(7)+J-1;                                                     7
            SUM=0;                                                              6
            SUMSQ=0;                                                            6
            POW(1)=X(NP(5),L1);                                                 6
            POW(2)=POW(1);                                                      6
              DO K=NP(5)TO NP(6);                                               7
                IF X(K,L1)>POW(1)THEN                                           8
                POW(1)=X(K,L1);                                                 8
```

```
                IF X(K,L1)<POW(2)THEN                                    8
                POW(2)=X(K,L1);                                          8
              SUM=SUM+X(K,L1);                                           7
              SUMSQ=SUMSQ+X(K,L1)*X(K,L1);                               7
              END;                                                       7
              IF NP(2)=1 THEN                                            7
                DO;                                                      8
                PUT SKIP(2)EDIT('V',L1,' (',NP(5),',',NP(6),'):          8
                MEAN=',SUM/(NP(6)-NP(5)+1),' VAR=',((NP(6)-NP(5)+        8
                1)*SUMSQ-SUM*SUM)/(NP(6)-NP(5)+1)*(NP(6)-NP(5)),'        8
                 STDDEV=',SQRT(((NP(6)-NP(5)+1)*SUMSQ-SUM*SUM)/(N        8
                P(6)-NP(5)+1)*(NP(6)-NP(5))),' DF=N-1=',NP(6)-NP(        8
                5))(COL(1),3(A,F(4)),3(A,E(20,6,6)),A,F(4));             8
                PUT SKIP EDIT('MAX=',POW(1),' MIN=',POW(2))(COL(1        8
                ),2(A,E(20,6,6)));                                       8
                END;                                                     8
              ELSE                                                       7
              PUT SKIP(2)EDIT('V',L1,' (',NP(5),',',NP(6),'):  SU        7
              M=',SUM)(COL(1),3(A,F(4)),A,E(20,6,6));                    7
            END;                                                         6
          FREE POW;                                                      5
          END;                                                           5
        ELSE                                                             4
          IF NP(1)=19 THEN                                               5
            DO;                                                          6
            ALLOCATE SYMBOL(NP(4)),POW(NP(4));                           6
              IF NP(2)=0 THEN                                            7
                DO;                                                      8
                M=M+1;                                                   8
                NP(2)=M;                                                 8
                END;                                                     8
              ELSE                                                       7
                IF NP(2)>M THEN                                          8
                M=NP(2);                                                 8
              IF NP(3)>0 THEN                                            7
                DO K=1 TO N;                                             8
                X(K,NP(2))=X(K,NP(3));                                   8
                END;                                                     8
              ELSE                                                       7
                DO K=1 TO N;                                             8
                X(K,NP(2))=0;                                            8
                END;                                                     8
            GET SKIP EDIT((SYMBOL(I),POW(I)DO I=1 TO NP(4)))(COL(        6
            1),8(A(1),F(9,0)));                                          6
            ;                                                            6
              DO I=1 TO NP(4);                                           7
                IF SYMBOL(I)=' ' THEN                                    8
                  DO K=1 TO N;                                           9
                  X(K,NP(2))=X(K,NP(2))+POW(I);                          9
                  END;                                                   9
                ELSE                                                     8
                  IF SYMBOL(I)='*' THEN                                  9
                    DO K=1 TO N;                                        10
                    X(K,NP(2))=X(K,NP(2))+X(K,NP(4+I))*POW(I);          10
                    END;                                                10
                  ELSE                                                   9
                    IF SYMBOL(I)='/' THEN                               10
                      DO K=1 TO N;                                      11
```

```
                    X(K,NP(2))=X(K,NP(2))+X(K,NP(4+I))/POW(I);          11
                    END;                                                11
                PUT SKIP(2)EDIT('LIN.COM V',NP(4+I),SYMBOL(I),POW(I      7
                ),' -->',NP(2))(COL(1),A,F(4),X(1),A(1),X(1),E(13,6      7
                ,6),A,F(4));                                             7
                END;                                                     7
              FREE SYMBOL,POW;                                           6
              END;                                                       6
            ELSE                                                         5
              IF NP(1)=20 THEN                                           6
                DO;                                                      7
                ALLOCATE POW(NP(4));                                     7
                GET SKIP EDIT((POW(J)DO J=1 TO NP(4)))(8 F(10,0));       7
                  DO J=1 TO NP(4);                                       8
                    IF NP(3)=1 THEN                                      9
                      DO;                                               10
                      M=M+1;                                            10
                      JL=M;                                             10
                      END;                                              10
                    ELSE                                                 9
                    JL=NP(J+4);                                          9
                    IF NP(2)=0 THEN                                      9
                      DO;                                               10
                        DO K=1 TO N;                                    11
                        X(K,JL)=X(K,NP(J+4))+POW(J);                    11
                        END;                                            11
                      PUT SKIP(2)EDIT('V',NP(J+4),' +',POW(J),' -->     10
                      ',JL)(COL(1),2(A,F(4),A,E(13,6,6)));              10
                      END;                                              10
                    ELSE                                                 9
                      IF NP(2)=1 THEN                                   10
                        DO;                                             11
                          DO K=1 TO N;                                  12
                          X(K,JL)=X(K,NP(J+4))-POW(J);                  12
                          END;                                          12
                        PUT SKIP(2)EDIT('V',NP(J+4),' -',POW(J),' -     11
                        ->',JL)(COL(1),2(A,F(4),A,E(13,6,6)));          11
                        END;                                            11
                      ELSE                                              10
                        IF NP(2)=2 THEN                                 11
                          DO;                                           12
                            DO K=1 TO N;                                13
                            X(K,JL)=X(K,NP(J+4))*POW(J);                13
                            END;                                        13
                          PUT SKIP(2)EDIT('V',NP(J+4),' *',POW(J),'     12
                          -->',JL)(COL(1),2(A,F(4),A,E(13,6,6)));       12
                          END;                                          12
                        ELSE                                            11
                          IF NP(2)=3 THEN                               12
                            DO;                                         13
                              DO K=1 TO N;                              14
                              X(K,JL)=X(K,NP(J+4))/POW(J);              14
                              END;                                      14
                            PUT SKIP(2)EDIT('V',NP(J+4),' /',POW(J)     13
                            ,' -->',JL)(COL(1),2(A,F(4),A,E(13,6,6)     13
                            ));                                         13
                            END;                                        13
                          ELSE                                          12
```

```
                              IF NP(2)=4 THEN                          13
                              DO;                                      14
                                DO K=1 TO N;                           15
                                X(K,JL)=-X(K,NP(J+4))+POW(J);          15
                                END;                                   15
                              PUT SKIP(2)EDIT(POW(J),' - V',NP(J+4)    14
                              ,' -->',JL)(COL(1),E(13,6,6),2(A,F(4)    14
                              ));                                      14
                              END;                                     14
                 END;                                                   8
               FREE POW;                                                7
               END;                                                     7
      END ARITH;                                                        1
*PROCESS;
```

```
TRNSGEN: PROC(NP,N,M,NPARM,X,XL)RECURSIVE;                                  1
         DCL NP(*)FIXED BIN(15)CONN,X(*,*)FLOAT DEC(6)CONN,XL(*)FLOAT DE    1
         C(6)CTL;                                                           1
DEFAULT RANGE(I:                                                            1
         N)FIXED BIN VALUE(FIXED BIN(15));                                  1
           IF NP(1)=26 THEN                                                 2
             DO;                                                            3
               DO J=1 TO NP(2);                                             4
               ALLOCATE XL(NP(2*J+2));                                      4
               GET SKIP EDIT((XL(K)DO K=1 TO NP(2*J+2)))(8 F(10,0));        4
                 IF NP(3)=0 THEN                                            5
                 JL=NP(2*J+3);                                              5
                 ELSE                                                       5
                   DO;                                                      6
                   M=M+1;                                                   6
                   JL=M;                                                    6
                   END;                                                     6
                 DO K=N TO NP(2*J+2)+1 BY-1;                                5
                 X(K,JL)=X(K-NP(2*J+2),NP(2*J+3));                          5
                 END;                                                       5
                 DO K=1 TO NP(2*J+2);                                       5
                 X(NP(2*J+2)-K+1,JL)=XL(K);                                 5
                 END;                                                       5
               PUT SKIP(2)EDIT('V',NP(2*J+3),' LAGGED',NP(2*J+2),' PER(S    4
               ) -->',JL)(COL(1),3(A,F(4)));                                4
               FREE XL;                                                     4
               END;                                                         4
             END;                                                           3
           ELSE                                                             2
             IF NP(1)=27 THEN                                               3
               DO;                                                          4
                 DO I=1 TO NP(2);                                           5
                   IF NP(3)=0 THEN                                          6
                   JL=NP(2*I+3);                                            6
                   ELSE                                                     6
                     DO;                                                    7
                     M=M+1;                                                 7
                     JL=M;                                                  7
                       DO K=2 TO N;                                         8
                       X(K,JL)=0;                                           8
                       END;                                                 8
                     X(1,JL)=X(1,NP(2*I+3));                                7
                     END;                                                   7
                 ALLOCATE XL(NP(2*I+2));                                    5
                 GET SKIP EDIT((XL(J)DO J=1 TO NP(2*I+2)))(8 F(10,0));      5
                   DO K=1 TO NP(2*I+2)-1;                                   6
                     DO J=K TO NP(2*I+2)-1;                                 7
                     XL(K)=XL(K)+XL(J);                                     7
                     END;                                                   7
                   END;                                                     6
                   DO K=N TO NP(2*I+2)BY-1;                                 6
                     DO J=K+NP(3)-1 TO K-NP(2*I+2)+1 BY-1;                  7
                     X(K,JL)=X(K,JL)+X(J,NP(2*I+3));                        7
                     END;                                                   7
                   END;                                                     6
                   DO K=NP(2*I+2)-1 TO 2 BY-1;                              6
                     DO J=K+NP(3)-1 TO 1 BY-1;                              7
                     X(K,JL)=X(K,JL)+X(J,NP(2*I+3));                        7
```

```
                END;                                                    7
              END;                                                      6
              DO K=1 TO NP(2*I+2)-1;                                    6
              X(K,JL)=X(K,JL)+XL(K);                                    6
              END;                                                      6
              DO K=1 TO N;                                              6
              X(K,JL)=X(K,JL)/NP(2*I+2);                                6
              END;                                                      6
            PUT SKIP(2)EDIT(NP(2*I+2),' PER.MOV.AVG. V',NP(2*I+3),'     5
             -->',JL)(COL(1),3(F(4),A));                                5
            FREE XL;                                                    5
            END;                                                        5
          END;                                                          4
        ELSE                                                            3
          IF NP(1)=28 THEN                                              4
            DO;                                                         5
            ALLOCATE XL(NP(2));                                         5
              IF NP(4)=0 THEN                                           6
              NP(4)=1;                                                  6
              IF NP(5)=0 THEN                                           6
              NP(5)=N;                                                  6
              DO I=1 TO NP(2);                                          6
                IF NP(3)=0 THEN                                         7
                JL=NP(I+6);                                             7
                ELSE                                                    7
                  DO;                                                   8
                  M=M+1;                                                8
                  JL=M;                                                 8
                  END;                                                  8
                IF NP(6)=0 THEN                                         7
                  DO;                                                   8
                  XL(I)=X(NP(4),NP(I+6));                               8
                    DO J=NP(4)TO NP(5);                                 9
                      IF ABS(X(J,NP(I+6)))>ABS(XL(I))THEN              10
                        XL(I)=X(J,NP(I+6));                            10
                    END;                                                9
                  END;                                                  8
                ELSE                                                    7
                XL(I)=X(NP(6),NP(I+6));                                 7
                DO J=NP(4)TO NP(5);                                     7
                X(J,JL)=X(J,NP(I+6))/XL(I);                             7
                END;                                                    7
              PUT SKIP(2)EDIT('V',NP(I+6),' (',NP(4),' ->',NP(5),')     6
               SCALED BY',XL(I),' -->',JL)(COL(1),3(A,F(4)),A,E(13,     6
              6,6),A,F(4));                                             6
              END;                                                      6
            FREE XL;                                                    5
            END;                                                        5
          ELSE                                                          4
            IF NP(1)=29 THEN                                            5
              DO;                                                       6
                DO J=1 TO NP(2);                                        7
                ALLOCATE XL(NP(2*J+2));                                 7
                GET SKIP EDIT((XL(K)DO K=1 TO NP(2*J+2)))(8 F(10,0)     7
                );                                                      7
                  IF NP(3)=0 THEN                                       8
                  JL=NP(2*J+3);                                         8
                  ELSE                                                  8
```

```
                        DO;                                                 9
                        M=M+1;                                              9
                        JL=M;                                               9
                        END;                                                9
                      DO K=1 TO N-NP(2*J+2);                                8
                      X(K,JL)=X(K+NP(2*J+2),NP(2*J+3));                     8
                      END;                                                  8
                      DO K=1 TO NP(2*J+2);                                  8
                      X(N-NP(2*J+2)+K,JL)=XL(K);                            8
                      END;                                                  8
                    PUT SKIP(2)EDIT('V',NP(2*J+3),' LEAD',NP(2*J+2),' P     7
                    ER(S) -->',JL)(COL(1),3(A,F(4)));                       7
                    FREE XL;                                                7
                    END;                                                    7
                  END;                                                      6
                ELSE                                                        5
                  IF NP(1)=30 THEN                                          6
                    DO;                                                     7
                      DO J=1 TO NP(2);                                      8
                        IF NP(3)=0 THEN                                     9
                        JL=NP(2*J+3);                                       9
                        ELSE                                                9
                          DO;                                              10
                          M=M+1;                                           10
                          JL=M;                                            10
                          END;                                             10
                        DO K=N TO NP(2*J+2)+1 BY-1;                         9
                        X(K,JL)=X(K,NP(2*J+3))-X(K-NP(2*J+2),NP(2*J+3))     9
                        ;                                                   9
                        END;                                                9
                      PUT SKIP(2)EDIT('ORDER',NP(2*J+3),' DIFF V',NP(2*     8
                      J+2),' -->',JL)(COL(1),3(A,F(4)));                    8
                      END;                                                  8
                    END;                                                    7
                  ELSE                                                      6
                    IF NP(1)=31 THEN                                        7
                      DO;                                                   8
                      ALLOCATE XL(NP(2));                                   8
                      GET SKIP EDIT((XL(K)DO K=1 TO NP(2)))(8 F(10,0));     8
                        DO J=1 TO NP(2);                                    9
                          IF NP(3)=0 THEN                                  10
                          JL=NP(J+3);                                      10
                          ELSE                                             10
                            DO;                                            11
                            M=M+1;                                         11
                            JL=M;                                          11
                            END;                                           11
                          DO K=2 TO N;                                     10
                          X(K,JL)=(X(K,NP(J+3))-X(K-1,NP(J+3)))/X(K-1,N    10
                          P(J+3));                                         10
                          END;                                             10
                        X(1,JL)=(X(2,NP(J+3))-XL(J))/X(2,NP(J+3));          9
                        PUT SKIP(2)EDIT('%CHG V',NP(J+3),' -->',JL)(COL     9
                        (1),2(A,F(4)));                                     9
                        END;                                                9
                      FREE XL;                                              8
                      END;                                                  8
    END TRNSGEN;                                                            1

*PROCESS;
```

```
UTILITY:PROC(NP,N,M,X,POW)RECORDER;                                    1
        DCL IN FILE STREAM INPUT;                                      1
        DCL NP(*)FIXED BIN(15)CONN,X(*,*)FLOAT DEC(6)CONN,POW(*)FLOAT D  1
        EC(6)CTL;                                                      1
DEFAULT RANGE(I:                                                       1
        N)FIXED BIN VALUE(FIXED BIN(15));                              1
          IF NP(1)=36 THEN                                             2
            DO;                                                        3
            M=NP(2);                                                   3
            PUT SKIP(2)EDIT('M -->',M)(COL(1),A,F(4));                 3
            END;                                                       3
          ELSE                                                         2
            IF NP(1)=37 THEN                                           3
              DO;                                                      4
              N=NP(2);                                                 4
              PUT SKIP(2)EDIT('N -->',N)(COL(1),A,F(4));               4
              END;                                                     4
            ELSE                                                       3
              IF NP(1)=38 THEN                                         4
                DO;                                                    5
                  IF NP(2)>0 THEN                                      6
                    DO;                                                7
                      DO I=1 TO 2*NP(2)-1 BY 2;                        8
                        DO J=1 TO N;                                   9
                        X(J,NP(3+I))=X(J,NP(2+I));                     9
                        END;                                           9
                      PUT SKIP(2)EDIT('V',NP(2+I),' -->',NP(3+I))(COL(1  8
                      ),2(A,F(4)));                                    8
                      END;                                             8
                    RETURN;                                            7
                    END;                                               7
                  DO I=1 TO M;                                         6
                    DO J=1 TO N-NP(3)+1;                               7
                    X(NP(4)-NP(3)+N-J+1,I)=X(N-J+1,I);                 7
                    END;                                               7
                  END;                                                 6
                PUT SKIP(2)EDIT(N-NP(3)+1,' OBS IN',M,' V(S) -->',NP(4)  5
                -NP(3),' SPACES IN X:  OBS',NP(3),' -> OBS',NP(4),' N='  5
                ,NP(4)-NP(3)+N)(COL(1),6(F(4),A));                     5
                N=NP(4)-NP(3)+N;                                       5
                END;                                                   5
              ELSE                                                     4
                IF NP(1)=39 THEN                                       5
                  DO;                                                  6
                    DO I=NP(2)TO NP(3);                                7
                      DO K=NP(4)TO NP(5);                              8
                      X(K,I)=0;                                        8
                      END;                                             8
                    END;                                               7
                  PUT SKIP(2)EDIT('X(',NP(2),'->',NP(3),',',NP(4),'->',  6
                  NP(5),')=0')(COL(1),5(A,F(4)));                      6
                  END;                                                 6
                ELSE                                                   5
                  IF NP(1)=40 THEN                                     6
                    DO;                                                7
                      IF NP(2)=0 THEN                                  8
                      NP(2)=1;                                         8
                      IF NP(3)=0 THEN                                  8
```

```
                NP(3)=N;                                                    8
              M=M+1;                                                        7
                DO K=NP(2)TO NP(3);                                         8
                X(K,M)=K-NP(4)*(NP(2)-1);                                   8
                END;                                                        8
              PUT SKIP(2)EDIT('TREND (',NP(2),' ->',NP(3),') -->'           7
              ,M,':  INIT(',NP(2)-NP(4)*(NP(2)-1),',',NP(3)-NP(4)           7
              *(NP(2)-1),')')(COL(1),6(A,F(4)));                            7
              END;                                                          6
            ELSE                                                            7
              IF NP(1)=41 THEN                                              8
                DO;                                                         8
                ALLOCATE POW(1);                                            8
                M=M+1;                                                      8
                GET SKIP EDIT(POW(1))(F(10,0));                             9
                  IF NP(2)=0 THEN                                           10
                    DO;                                                     11
                      DO K=1 TO N;                                          11
                      X(K,M)=POW(1);                                        11
                      END;                                                  11
                    PUT SKIP(2)EDIT('CONST:',POW(1),' -->',M,'  (           10
                     1,',N,')')(COL(1),A,E(13,6,6),3(A,F(4)));              10
                    END;                                                    10
                  ELSE                                                      9
                    DO;                                                     10
                      DO J=1 TO NP(2);                                      11
                        DO K=NP(2*J+1)TO NP(2*J+2);                         12
                        X(K,M)=POW(1);                                      12
                        END;                                                12
                      PUT SKIP(2)EDIT('CONST:',POW(1),' -->',M,'            11
                      (',NP(2*J+1),',',NP(2*J+2),')')(COL(1),A,E(           11
                      13,6,6),4(A,F(4)));                                   11
                      END;                                                  11
                    END;                                                    10
                FREE POW;                                                   8
                END;                                                        8
              ELSE                                                          7
                IF NP(1)=42 THEN                                            8
                  DO;                                                       9
                  PUT SKIP(2)EDIT('M =',M,' N =',N)(COL(1),2(A,F(           9
                  4)));                                                     9
                  END;                                                      9
                ELSE                                                        8
                  IF NP(1)=43 THEN                                          9
                    DO;                                                     10
                    GET FILE(IN)SKIP(NP(2));                                10
                    PUT SKIP(2)EDIT('BYPASS: ',NP(2),' RECORDS')(           10
                    COL(1),2(A,F(4)));                                      10
                    END;                                                    10
                  ELSE                                                      9
                    IF NP(1)=44 THEN                                        10
                      DO;                                                   11
                      ALLOCATE POW(1);                                      11
                        IF NP(3)=0 THEN                                     12
                        NP(3)=1;                                            12
                        IF NP(4)=0 THEN                                     12
                        NP(4)=N;                                            12
                        DO I=NP(3)TO NP(4);                                 12
```

```
                    POW(1)=X(1,NP(2));                                  12
                    MIN=1;                                              12
                      DO J=I TO NP(4);                                  13
                        IF X(J,NP(2))<POW(1)THEN                        14
                          DO;                                           15
                          POW(1)=X(J,NP(2));                            15
                          MIN=J;                                        15
                          END;                                          15
                      END;                                              13
                      DO K=1 TO M;                                      13
                      POW(1)=X(I,K);                                    13
                      X(I,K)=X(MIN,K);                                  13
                      X(MIN,K)=POW(1);                                  13
                      END;                                              13
                    END;                                                12
                  PUT SKIP(2)EDIT(M,' V(S) (',NP(3),' ->',NP(           11
                  4),') SORTED BY V',NP(2))(COL(1),4(F(4),A))           11
                  ;                                                     11
                  FREE POW;                                             11
                  END;                                                  11
                ELSE                                                    10
                  IF NP(1)=45 THEN                                      11
                    DO;                                                 12
                    ALLOCATE POW(2*NP(4));                              12
                      IF NP(3)=0 THEN                                   13
                      NP(3)=M+1;                                        13
                      IF NP(3)>M THEN                                   13
                      M=NP(3);                                          13
                    GET SKIP EDIT((POW(J)DO J=1 TO 2*NP(4)))(           12
                    8 F(10,0));                                         12
                    LL=0;                                               12
                      DO J=1 TO NP(4);                                  13
                        DO K=1 TO N;                                    14
                          IF NP(5)=1 THEN                               15
                          X(K,NP(3))=0;                                 15
                          IF NP(6)=1&X(K,NP(2))>POW(J+LL)THEN           15
                                                                        15
                          X(K,NP(3))=POW(J+LL+1);                       15
                          IF NP(6)=2&X(K,NP(2))<POW(J+LL)THEN           15
                                                                        15
                          X(K,NP(3))=POW(J+LL+1);                       15
                          IF NP(6)=3&X(K,NP(2))=POW(J+LL)THEN           15
                                                                        15
                          X(K,NP(3))=POW(J+LL+1);                       15
                          IF NP(6)=4&X(K,NP(2))>=POW(J+LL)THE           15
                          N                                             15
                          X(K,NP(3))=POW(J+LL+1);                       15
                          IF NP(6)=5&X(K,NP(2))<=POW(J+LL)THE           15
                          N                                             15
                          X(K,NP(3))=POW(J+LL+1);                       15
                        END;                                            14
                      MIN=0;                                            13
                        DO K=1 TO N;                                    14
                          IF X(K,NP(3))=POW(J+LL+1)THEN                 15
                          MIN=MIN+1;                                    15
                        END;                                            14
                      PUT SKIP(2)EDIT('BLK',J,' OPTIONS',NP(6           13
                      ),NP(5),'  # CRIT.VALS=(',POW(J+LL),')            13
```

```
                                    IN V',NP(2),MIN,' (',POW(J+LL+1),') -- 13
                                   >',NP(J+2),' IS =',M)(COL(1),A,F(3),A,2 F( 13
                                   2),A,E(13,6,6),A,F(4),F(6),A,E(13,6,6), 13
                                   2(A,F(4))); 13
                                   LL=LL+1; 13
                                   END; 13
                                 FREE POW; 12
                                 END; 12
                               ELSE 11
                                 IF NP(1)=46 THEN 12
                                   DO; 13
                                   ALLOCATE POW(NP(2)); 13
                                   GET SKIP EDIT((POW(I)DO I=1 TO NP(2)))( 13
                                   8 F(10,0)); 13
                                     DO J=1 TO NP(2); 14
                                       DO K=1 TO N; 15
          IF X(K,NP(J+2))>=POW(J)THEN 16
            DO; 17
            PUT SKIP(2)EDIT('V',NP(J+2),' @ OBS',K,' GE',POW(J))(COL(1), 17
            2(A,F(4)),A,E(13,6,6)); 17
            END; 17
                                       END; 15
                                     END; 14
                                   FREE POW; 13
                                   END; 13
                                 ELSE 12
                                   IF NP(1)=47 THEN 13
                                     DO; 14
                                     ALLOCATE POW(1); 14
                                     K=0; 14
                                     GET SKIP EDIT(POW(1))(F(10,0)); 14
                                       DO KK=1 TO N; 15
          IF X(KK,NP(2))¬=POW(1)THEN 16
            DO; 17
            K=K+1; 17
              DO J=1 TO M; 18
              X(K,J)=X(KK,J); 18
              END; 18
            END; 17
                                       END; 15
                                     N=K; 14
                                     PUT SKIP(2)EDIT(M,' V(S) COMPRSD TO', 14
                                     N,' OBS ] V',NP(2),' ¬=',POW(1))(COL( 14
                                     1),3(F(4),A),E(13,6,6)); 14
                                     FREE POW; 14
                                     END; 14
        END UTILITY; 1
*PROCESS;
```

```
MUREN:  PROC(X,NP,LC,LD,TEXQ,TEXD,B,A,ADJ,AM,SOSS,SIGBE,BE,TR,ST,BETA,A   1
        V,CO,M,N,PIVOT,IPIVOT,INDEX,MPARM,NPARM,MONTH,IDAY1,IYEAR)REORD   1
        ER;                                                               1
        DCL(MOMENTS,CORREL,MATINV,RDMP,RESID)ENTRY;                       1
        DCL(MONTH,IDAY1,IYEAR)FIXED BIN(31);                              1
        DCL X(*,*)FLOAT DEC(6)CONN;                                       1
        DCL NP(*)FIXED BIN(15)CONN;                                       1
        DCL(TEXQ(*),TEXD(*))CHAR(6)CTL,DEP CHAR(6);                       1
        DCL(SIGBE(*),BE(*),TR(*),BETA(*),AV(*),ST(*))FLOAT DEC(6)CTL;     1
        DCL(A(*,*),B(*,*),AM(*,*),ADJ(*),SOSS(*),PIVOT(*))FLOAT DEC(16)   1
        CTL;                                                              1
        DCL(LC(*),LD(*),IPIVOT(*),INDEX(*,*))FIXED BIN(15)CTL;            1
        DCL(AVY,REDA)FLOAT DEC(6);                                        1
        DCL(CO(*,*))FLOAT DEC(6)CTL;                                      1
        DCL(D,RSQ,AML,RSQBAR,SE,SEE,SEB,SEEB,SCT,ZRHO)FLOAT DEC(16);      1
        DCL T CHAR(80);                                                   1
        DCL PLNT ENTRY(FIXED BIN(15),FIXED BIN(15),FIXED BIN(15),(*)FIX   1
        ED BIN(15),(*,*)FLOAT DEC(6),(*,*)FLOAT DEC(6));                  1
DEFAULT RANGE(I:                                                          1
        N)FIXED BIN VALUE(FIXED BIN(15));                                 1
          IF NP(10)=0 THEN                                                2
          NP(10)=1;                                                       2
          IF NP(11)=0 THEN                                                2
          NP(11)=N;                                                       2
        IEQ=1;                                                            1
        LUST=M;                                                           1
        LGLSQ=0;                                                          1
        LUSTY=M;                                                          1
        ITER8=0;                                                          1
        MVM=0;                                                            1
        IL=1;                                                             1
        ZRHO=0;                                                           1
          IF NP(6)>2 THEN                                                 2
          ITER8=1;                                                        2
          IF NP(16)=0 THEN                                                2
          CALL MOMENTS(IL,M,NP,LGLSQ,X,A,ADJ,SOSS);                       2
          IF NP(3)=0 THEN                                                 2
          RETURN;                                                         2
          IF NP(2)=0 THEN                                                 2
            DO;                                                           3
            ALLOCATE AM(NP(8),NP(8)),ST(NP(8)),TEXD(NP(8)),LD(NP(8));     3
            CALL CORREL(M,MVM,MPARM,IEQ,TEXQ,TEXD,NP,LC,LD,A,AM,ADJ,X,S   3
            T);                                                           3
            FREE AM,ST,TEXD,LD;                                           3
            RETURN;                                                       3
            END;                                                          3
          IF ALLOCATION(LC)=0 THEN                                        2
          ALLOCATE TEXQ(MPARM),LC(MPARM);                                 2
          DO WHILE(IEQ<=NP(4));                                           2
            IF LGLSQ=0 THEN                                               3
              DO;                                                         4
              GET SKIP EDIT(DEP,NVDEP,MVM,(TEXQ(J),LC(J)DO J=1 TO MVM))   4
              (COL(1),A(6),2 F(2),7(X(2),A(6),F(2)),(TRUNC(MVM/8))(COL(   4
              1),8(X(2),A(6),F(2))));                                     4
              LC(MVM+1)=NVDEP;                                            4
              TEXQ(MVM+1)=DEP;                                            4
                DO J=1 TO MVM+1;                                          5
                  IF LC(J)<1|LC(J)>M|LC(J)>MPARM THEN                     6
```

```
                    DO;                                                    7
                    PUT SKIP EDIT('ERROR:  V=',LC(J),' IN REG.SPEC.CARD    7
                     IS (0,>M,>MPARM)')(COL(1),A,F(3),A);                  7
                    STOP;                                                  7
                    END;                                                   7
                  END;                                                     5
                  IF NP(18)=1 THEN                                         5
                  GET SKIP EDIT(T)(COL(1),A(80));                          5
                ALLOCATE AM(MVM+1,MVM+1),B(MVM,2),PIVOT(MVM),IPIVOT(MVM),  4
                INDEX(MVM,2),LD(MVM+1),TEXD(MVM+1),SIGBE(MVM),BE(MVM),TR(  4
                MVM),BETA(MVM),AV(MVM),ST(MVM),COI(NPARM,4);               4
                END;                                                       4
              DO I=1 TO MVM;                                               3
              B(I,2)=0;                                                    3
              B(I,1)=A(LC(MVM+1),LC(I));                                   3
                DO J=1 TO MVM;                                             4
                AM(J,I)=A(LC(J),LC(I));                                    4
                END;                                                       4
              END;                                                         3
            D=1;                                                           2
            CALL MATINV(MVM,D,AM,B,PIVOT,IPIVOT,INDEX);                    2
            RSQ=0;                                                         2
              IF LC(1)>1 THEN                                              3
                DO;                                                        4
                  DO I=1 TO MVM;                                           5
                  RSQ=RSQ+B(I,1)*A(1,LC(I));                               5
                  END;                                                     5
                RSQ=(RSQ-A(1,LC(MVM+1)))*A(1,LC(MVM+1));                   4
                END;                                                       4
              DO I=1 TO MVM;                                               3
                IF LC(I)=1 THEN                                            4
                B(I,2)=0;                                                  4
                ELSE                                                       4
                B(I,2)=A(LC(I),LC(I))-A(1,LC(I))*A(1,LC(I));               4
              RSQ=RSQ+B(I,1)*(A(LC(MVM+1),LC(I))-A(1,LC(I))*A(1,LC(MVM+1)  3
              ));                                                          3
              END;                                                         3
            AML=A(LC(MVM+1),LC(MVM+1))-A(1,LC(MVM+1))*A(1,LC(MVM+1));      2
            RSQ=RSQ/AML;                                                   2
            RSQBAR=1-(1-RSQ)*(NP(11)-NP(10))/(NP(11)-NP(10)-MVM+1);        2
              IF RSQBAR<0 THEN                                             3
              RSQBAR=0;                                                    3
            SE=AML*(1-RSQ)/(NP(11)-NP(10)+1);                              2
            SEB=AML*(1-RSQBAR)/(NP(11)-NP(10));                            2
              IF SE<0 THEN                                                 3
              SEE=SE/ADJ(LC(MVM+1));                                       3
              ELSE                                                         3
              SEE=SQRT(SE)/ADJ(LC(MVM+1));                                 3
              IF SEB<0 THEN                                                3
              SEEB=SEB/ADJ(LC(MVM+1));                                     3
              ELSE                                                         3
              SEEB=SQRT(SEB)/ADJ(LC(MVM+1));                               3
              DO I=1 TO MVM;                                               3
                IF AM(I,I)*SEB<0 THEN                                      4
                SIGBE(I)=-999999999;                                       4
                ELSE                                                       4
                SIGBE(I)=SQRT(AM(I,I)*SEB)*ADJ(LC(I))/ADJ(LC(MVM+1));      4
              BE(I)=B(I,1)*ADJ(LC(I))/ADJ(LC(MVM+1));                      3
```

```
      TR(I)=ABS(BE(I)/SIGBE(I));                                          3
      ST(I)=TR(I)*TR(I)*SEEB*SEEB;                                        3
       IF B(I,2)/AML<0 THEN                                               4
       BETA(I)=0;                                                         4
        ELSE                                                              4
        BETA(I)=BE(I)*SQRT(B(I,2)/AML)*ADJ(LC(MVM+1))/ADJ(LC(I));         4
      AV(I)=A(1,LC(I))/((NP(11)-NP(10)+1)*ADJ(LC(I))*ADJ(1));             3
       END;                                                               3
    AVY=A(1,LC(MVM+1))/((NP(11)-NP(10)+1)*ADJ(LC(MVM+1))*ADJ(1));         2
      IF MVM>1 THEN                                                       3
      REDA=RSQ*(NP(11)-NP(10)-MVM+1)/((1-RSQ)*(MVM+1));                   3
      ELSE                                                                3
      REDA=TR(MVM)*TR(MVM);                                               3
    CALL RDMP(IEQ,MVM,LUSTY,D,RSQ,RSQBAR,SE,SEB,AVY,SEE,SEEB,SOSS         2
    ,NP,LC,TEXQ,M,BE,SIGBE,AV,TR,BETA,ST,MPARM,NPARM,REDA,ITER8,L          2
    GLSQ,ZRHO,MONTH,IDAY1,IYEAR,T);                                        2
      IF NP(7)>0 THEN                                                     3
      CALL CORREL(M,MVM,MPARM,IEQ,TEXQ,TEXD,NP,LC,LD,A,AM,ADJ,X,S        3
      T);                                                                 3
    IVBEEN=0;                                                             2
    SCT=0;                                                                2
      IF NP(2)=2 THEN                                                     3
      CALL RESID(MVM,N,M,MPARM,IEQ,ITER8,IVBEEN,LOUT,NVDEP,NP,LC,         3
      SCT,ZRHO,CO,X,BE);                                                  3
    SCT=4;                                                                2
      IF NP(5)>0 THEN                                                     3
        DO;                                                               4
          IF NP(5)¬=3 THEN                                                5
            DO;                                                           6
            LOUT=1;                                                       6
            CALL RESID(MVM,N,M,MPARM,IEQ,ITER8,IVBEEN,LOUT,NVDEP,         6
            NP,LC,SCT,ZRHO,CO,X,BE);                                      6
            IVBEEN=1;                                                     6
            CALL PLNT(IEQ,2,4,NP,CO,X);                                   6
            END;                                                          6
          ELSE                                                            5
            DO;                                                           6
            LOUT=2;                                                       6
            CALL RESID(MVM,N,M,MPARM,IEQ,ITER8,IVBEEN,LOUT,NVDEP,         6
            NP,LC,SCT,ZRHO,CO,X,BE);                                      6
            IVBEEN=1;                                                     6
            END;                                                          6
        END;                                                              4
    LOUT=3;                                                               2
      IF NP(6)¬=0|NP(14)¬=0 THEN                                          3
        DO;                                                               4
        CALL RESID(MVM,N,M,MPARM,IEQ,ITER8,IVBEEN,LOUT,NVDEP,NP,L         4
        C,SCT,ZRHO,CO,X,BE);                                              4
          IF NP(6)>2 THEN                                                 5
            DO;                                                           6
              IF ITER8>0 THEN                                             7
                DO;                                                       8
                ITER8=ITER8-1;                                            8
                LGLSQ=1;                                                  8
                LUSTY=M;                                                  8
                IEQ=IEQ-1;                                                8
                IL=M-MVM;                                                 8
                CALL MOMENTS(IL,M,NP,LGLSQ,X,A,ADJ,SOSS);                 8
```

```
                    END;                                                    8
                  ELSE                                                      7
                    DO;                                                     8
                    M=M-MVM-1;                                              8
                    IL=1;                                                   8
                    NP(10)=NP(10)-1;                                        8
                      DO J=IL TO M;                                         9
                      A(J,1)=0;                                             9
                        DO K=NP(10)TO NP(11);                               10
                        A(J,1)=A(J,1)+X(K,J);                               10
                        END;                                                10
                      A(1,J)=A(J,1);                                        9
                      END;                                                  9
                    ADJ(1)=1/SQRT(A(1,1));                                  8
                      DO I=IL TO M;                                         9
                      A(I,1)=A(I,1)*ADJ(I)*ADJ(1);                          9
                      A(1,I)=A(I,1);                                        9
                      END;                                                  9
                    ITER8=1;                                                8
                    LGLSQ=0;                                                8
                    LUSTY=M;                                                8
                    END;                                                    8
                END;                                                        6
            END;                                                            4
          IEQ=IEQ+1;                                                        2
            IF LGLSQ=0 THEN                                                 3
            FREE AM,B,PIVOT,IPIVOT,INDEX,LD,TEXD,SIGBE,BE,TR,BETA,AV,ST     3
            ,CO;                                                            3
        END;                                                                2
      PUT PAGE;                                                             1
      END MUREN;                                                            1
*PROCESS;
```

*io:^*

```
MOMENTS:PROC(IL,M,NP,LGLSQ,X,A,ADJ,SOSS)REORDER;                    1
        DCL X(*,*)FLOAT DEC(6)CONN,(A(*,*),ADJ(*),SOSS(*))FLOAT DEC(16)  1
        CTL;                                                        1
        DCL NP(*)FIXED BIN(15)CONN;                                 1
DEFAULT RANGE(I:                                                    1
        N)FIXED BIN VALUE(FIXED BIN(15));                           1
          DO I=IL TO M;                                             2
            DO J=I TO M;                                            3
            A(J,I)=0;                                               3
              DO K=NP(10)TO NP(11);                                 4
              A(J,I)=A(J,I)+X(K,I)*X(K,J);                          4
              END;                                                  4
            END;                                                    3
          END;                                                      2
          IF LGLSQ>0 THEN                                           2
            DO;                                                     3
              DO J=IL TO M;                                         4
              A(J,1)=0;                                             4
                DO K=NP(10)TO NP(11);                               5
                A(J,1)=A(J,1)+X(K,J);                               5
                END;                                                5
              A(1,J)=A(J,1);                                        4
              END;                                                  4
            A(1,1)=NP(11)-NP(10)+1;                                 3
            ADJ(1)=1/SQRT(A(1,1));                                  3
            END;                                                    3
          DO I=IL TO M;                                             2
          SOSS(I)=A(I,I)-(A(I,1)*A(I,1)/A(1,1));                    2
            IF A(I,I)>0 THEN                                        3
            ADJ(I)=1/SQRT(A(I,I));                                  3
            ELSE                                                    3
              DO;                                                   4
              ADJ(I)=1;                                             4
              PUT SKIP(2)EDIT('VARIANCE V',I,' = 0.  2ND MOMENT FOR THI  4
              S VARIABLE IS GARBAGE')(COL(1),A,F(4),A);             4
              END;                                                  4
          END;                                                      2
          IF NP(17)=1 THEN                                          2
            DO;                                                     3
            PUT PAGE;                                               3
            PUT SKIP EDIT('XPX(0)')(COL(1),A);                      3
            PUT SKIP(4);                                            3
              DO I=IL TO M;                                         4
              PUT SKIP(2);                                          4
              PUT SKIP EDIT(' J',I)(COL(1),A,F(3));                 4
              PUT SKIP EDIT((A(J,I)DO J=I TO M))(COL(1),7(E(17,8))); 4
              END;                                                  4
            PUT SKIP(2);                                            3
            PUT SKIP EDIT((SOSS(I)DO I=IL TO M))(COL(1),7(E(17,8))); 3
            END;                                                    3
          IF NP(3)=1 THEN                                           2
            DO;                                                     3
              DO I=IL TO M;                                         4
                DO J=I TO M;                                        5
                A(J,I)=A(J,I)*ADJ(I)*ADJ(J);                        5
                A(I,J)=A(J,I);                                      5
                END;                                                5
              END;                                                  4
```

```
            IF LGLSQ>0 THEN                                                    4
              DO;                                                              5
                DO I=IL TO M;                                                  6
                A(I,I)=A(1,I)*ADJ(I)*ADJ(1);                                   6
                A(I,1)=A(1,I);                                                 6
                END;                                                           5
              END;                                                             4
            IF NP(17)=1 THEN                                                   5
              DO;                                                              5
              PUT PAGE;                                                        5
              PUT SKIP EDIT('R(0)')(COL(1),A);                                 5
              PUT SKIP(4);                                                     6
                DO I=IL TO M;                                                  6
                PUT SKIP(2);                                                   6
                PUT SKIP EDIT(' J',I)(COL(1),A,F(3));                          6
                PUT SKIP EDIT((A(J,I)DO J=I TO M))(COL(1),7(E(13,6)))          6
                ;                                                              6
                END;                                                           5
              END;                                                             3
          END;                                                                 1
      END MOMENTS;
*PROCESS;
```

```
MATINV: PROC(MVM,DETERM,AM,B,PIVOT,IPIVOT,INDEX)ORDER;                    1
        DCL(AM(*,*),B(*,*),PIVOT(*)FLOAT DEC(16)CTL,(AMAX,DETERM,SWAP,    1
        T)FLOAT DEC(16);                                                  1
        DCL(IPIVOT(*),INDEX(*,*))FIXED BIN(15)CTL;                        1
DEFAULT RANGE(I:                                                          1
        N)FIXED BIN VALUE(FIXED BIN(15));                                 1
        DETERM=1;                                                         1
        IPIVOT=0;                                                         1
          DO I=1 TO MVM;                                                  2
          AMAX=0;                                                         2
            DO J=1 TO MVM;                                                3
              IF IPIVOT(J)¬=1 THEN                                        4
                DO;                                                       5
                  DO K=1 TO MVM;                                          6
                    IF IPIVOT(K)>1 THEN                                   7
                    RETURN;                                               7
                    IF IPIVOT(K)<1 THEN                                   7
                      DO;                                                 8
                        IF ABS(AMAX)<ABS(AM(K,J))THEN                     9
                          DO;                                            10
                          IROW=J;                                        10
                          ICOLUM=K;                                      10
                          AMAX=AM(K,J);                                  10
                          END;                                           10
                      END;                                                8
                  END;                                                    6
                END;                                                      5
            END;                                                          3
          IPIVOT(ICOLUM)=IPIVOT(ICOLUM)+1;                                2
            IF IROW¬=ICOLUM THEN                                          3
              DO;                                                         4
              DETERM=-DETERM;                                             4
                DO L=1 TO MVM;                                            5
                SWAP=AM(L,IROW);                                          5
                AM(L,IROW)=AM(L,ICOLUM);                                  5
                AM(L,ICOLUM)=SWAP;                                        5
                END;                                                      5
              SWAP=B(IROW,1);                                             4
              B(IROW,1)=B(ICOLUM,1);                                      4
              B(ICOLUM,1)=SWAP;                                           4
              END;                                                        4
          INDEX(I,1)=IROW;                                                2
          INDEX(I,2)=ICOLUM;                                              2
          PIVOT(I)=AM(ICOLUM,ICOLUM);                                     2
          DETERM=DETERM*PIVOT(I);                                         2
          AM(ICOLUM,ICOLUM)=1;                                            2
            DO L=1 TO MVM;                                                3
            AM(L,ICOLUM)=AM(L,ICOLUM)/PIVOT(I);                           3
            END;                                                          3
          B(ICOLUM,1)=B(ICOLUM,1)/PIVOT(I);                               2
            DO L1=1 TO MVM;                                               3
              IF L1¬=ICOLUM THEN                                          4
                DO;                                                       5
                T=AM(ICOLUM,L1);                                          5
                AM(ICOLUM,L1)=0;                                          5
                  DO L=1 TO MVM;                                          6
                  AM(L,L1)=AM(L,L1)-AM(L,ICOLUM)*T;                       6
                  END;                                                    6
```

```
                B(L1,1)=B(L1,1)-B(ICOLUM,1)*T1                          5
                END;                                                    5
              END;                                                      3
            END;                                                        2
            DO I=1 TO MVM;                                              2
            L=MVM-I+1;                                                  2
              IF INDEX(L,1)¬=INDEX(L,2)THEN                             3
                DO;                                                     4
                JROW=INDEX(L,1);                                        4
                JCOLUM=INDEX(L,2);                                      4
                  DO K=1 TO MVM;                                        5
                  SWAP=AM(JROW,K);                                      5
                  AM(JROW,K)=AM(JCOLUM,K);                              5
                  AM(JCOLUM,K)=SWAP;                                    5
                  END;                                                  5
                END;                                                    4
            END;                                                        2
          END MATINV;                                                   1
*PROCESS;
```

```
RDMP:    PROC(IEQ,MVM,LUSTY,D,RSQ,RSQBAR,SE,SEB,AVY,SEE,SEEB,SOSS,NP,LC,
         TEXQ,M,BE,SIGBE,AV,TR,BETA,ST,MPARM,NPARM,REDA,ITER8,LGLSQ,ZRHO
         ,MONTH,IDAY1,IYEAR,T)REORDER;
         DCL SOSS(*)FLOAT DEC(16)CTL,(NP(*))FIXED BIN(15)CONN,LC(*)FIXED
          BIN(15)CTL;
         DCL(RSQ,RSQBAR,SE,SEB,SEE,SEEB,D,ZRHO)FLOAT DEC(16),(REDA,AVY)F
         LOAT DEC(6),TEXQ(*)CHAR(6)CTL,T CHAR(80);
         DCL(BE(*),SIGBE(*),AV(*),TR(*),BETA(*),ST(*))FLOAT DEC(6)CTL;
         DCL PARAM FILE STREAM OUTPUT,(IYEAR,MONTH,IDAY1)FIXED BIN(31);
DEFAULT  RANGE(I:
         N)FIXED BIN VALUE(FIXED BIN(15));
         PUT PAGE;
         PUT SKIP EDIT('PLIBIT  **(',NPARM,',',MPARM,')**  RUNDATE: ',MO
         NTH,'/',IDAY1,'/',IYEAR)(COL(19),2(A,F(4)),3(A,F(2)));
         PUT SKIP(2)EDIT('SOCIAL WELFARE REGIONAL RESEARCH INSTITUTE')(C
         OL(19),A);
         PUT SKIP EDIT('L.B.WARE')(COL(36),A);
         PUT SKIP EDIT('BOSTON COLLEGE')(COL(33),A);
         LL=3;
           IF NP(18)=1 THEN
             DO;
             LL=1;
             PUT SKIP(3)EDIT(T)(COL(1),A(80));
             END;
         PUT SKIP(LL)EDIT('EQN NO.',IEQ,NP(11)-NP(10)+1,' OBSERVATIONS (
         ',NP(10),'->',NP(11),')')(COL(1),A,F(3),X(2),3(F(4),A));
         PUT SKIP EDIT('DEP VAR(',LC(MVM+1),'): ',TEXQ(MVM+1))(COL(1),A,
         F(3),A,A(6));
         PUT SKIP EDIT('INDEPENDENT VAR(S):',MVM)(COL(1),A,F(4));
         PUT SKIP EDIT('V(S) IN XPX=',LUSTY,'  M=',M-LGLSQ*(MVM+1))(COL(
         1),2(A,F(3)));
         PUT SKIP EDIT('DETERMINANT=',D)(COL(1),A,E(18,7,7));
           IF LGLSQ=1 THEN
           PUT SKIP EDIT('RHO=',ZRHO)(COL(1),A,E(18,7,7));
           IF RSQ<0 THEN
           PUT SKIP EDIT('WARNING: NEG RSQ')(COL(1),A);
           IF RSQBAR<0 THEN
           PUT SKIP EDIT('WARNING: NEG RSQBAR')(COL(1),A);
           IF SE<0 THEN
           PUT SKIP EDIT('WARNING: NEG STD ERR EST')(COL(1),A);
           IF SEB<0 THEN
           PUT SKIP EDIT('WARNING: NEG STD ERR EST BAR')(COL(1),A);
           IF NP(14)>0 THEN
             DO;
             MNEW1=M+1;
               IF ITER8=0&NP(6)>1 THEN
                 MNEW1=M-MVM;
             PUT SKIP EDIT('RESIDUALS --> V',MNEW1,' (',NP(10),',',NP(11
             ),')')(COL(1),F(3),3(A,F(4)));
             END;
         PUT SKIP(2)EDIT('INDEP.VAR.','REGR.COEFF.','STD.ERR.','T-RATIO'
         ,'MEAN','BETA','SUM OF SQUARES')(COL(6),A,X(5),A,X(6),A,X(7),A,
         X(10),A,X(10),A,X(9),A);
         PUT SKIP(2)EDIT('(',LC(MVM+1),')',AVY,SOSS(LC(MVM+1)))(COL(2),A
         ,F(3),A,X(53),E(14,4,4),X(23),E(14,7,7));
         PUT SKIP(2)EDIT(('(',LC(I),')',TEXQ(I),BE(I),SIGBE(I),TR(I),AV(
         I),BETA(I),ST(I))DO I=1 TO MVM);(COL(2),A,F(3),A,X(3),A(6),X(2),
         2 E(14,6,6),3 E(14,4,4),X(9),E(14,7,7));
```

```
      PUT SKIP(2)EDIT('RSQBAR=',RSQBAR,' RSQ=',RSQ,'    SEE=',SEE,' SE
      EBAR=',SEEB)(COL(1),A,F(9,4),A,F(9,4),A,E(14,7,7),A,E(14,7,7));
      PUT SKIP(2)EDIT('TSS=',SOSS(LC(MVM+1)),' RSS=',(1-RSQ)*SOSS(LC(
      MVM+1)),'    FSTAT(',MVM-1,',',NP(11)-NP(10)-MVM+1,')=',REDA)(C
      OL(1),A,E(14,7,7),X(2),A,E(14,7,7),X(2),A,F(2),A,F(3),A,E(14,7,
      7));
        IF NP(13)>0 THEN
          DO;
          PUT FILE(PARAM)SKIP EDIT((BE(I)DO I=1 TO MVM))(COL(6),5(E(1
          3,6),X(2)));
          PUT FILE(PARAM)SKIP EDIT((SIGBE(I)DO I=1 TO MVM))(COL(6),5(
          E(13,6),X(2)));
          END;
      END RDMP;
*PROCESS;
```

```
RESID:  PROC(MVM,N,M,MP,ARM,IEQ,ITER8,IVBEEN,LOUT,NVDEP,NP,LC,SCT,ZRHO,C   1
        O,X,BE)REORDER;                                                    1
        DCL X(*,*)FLOAT DEC(6)CONN;                                        1
        DCL(BE(*),CO(*,*))FLOAT DEC(6)CTL;                                 1
        DCL(Y1,ER,ER1,ER2)FLOAT DEC(6);                                    1
        DCL(SCT,ZRHO,TDEN,TNUM)FLOAT DEC(16);                              1
        DCL NP(*)FIXED BIN(15)CONN;                                        1
        DCL LC(*)FIXED BIN(15)CTL;                                         1
DEFAULT RANGE(I:                                                           1
        N)FIXED BIN VALUE(FIXED BIN(15));                                  1
          IF NP(2)=2 THEN                                                  2
            DO;                                                            3
              IF SCT=0 THEN                                                4
                DO;                                                        5
                  IF NP(11)+1>N THEN                                       6
                  RETURN;                                                  6
                PUT SKIP(2)EDIT('UNCONDITIONAL FORECASTS')(COL(1),A);      5
                PUT SKIP(2)EDIT('N','ACTUAL','FITTED','ERROR','%ERROR')    5
                (COL(11),A,X(9),A,X(9),A,X(10),A,X(9),A);                  5
                PUT SKIP;                                                  5
                  IF NP(6)>2&ITER8=1 THEN                                  6
                  ZRHO=0;                                                  6
                ER1=0;                                                     5
                ER2=0;                                                     5
                  DO K=NP(11)+1 TO N;                                      6
                  ER=0;                                                    6
                  CO(K,1)=X(K,LC(MVM+1))+ZRHO*X(K-1,NVDEP);                6
                    IF K>NP(11)+1 THEN                                     7
                      CO(K,2)=CO(K-1,2)*ZRHO;                              7
                      ELSE                                                 7
                      CO(K,2)=ZRHO*X(K-1,NVDEP);                           7
                      DO I=1 TO MVM;                                       7
                      CO(K,2)=CO(K,2)+X(K,LC(I))*BE(I);                    7
                      END;                                                 7
                    CO(K,3)=CO(K,1)-CO(K,2);                               6
                      IF CO(K,1)¬=0 THEN                                   7
                      ER=CO(K,3)/CO(K,1);                                  7
                    ER1=ER1+ER;                                            6
                    ER2=ER2+ABS(ER);                                       6
                    PUT SKIP EDIT(K,(CO(K,I)DO I=1 TO 3),ER*100)(COL(8),F  6
                    (4),4(X(2),F(13,4)));                                  6
                    END;                                                   6
                PUT SKIP(2)EDIT('SIGNED MEAN %ERROR',100*ER1/(N-NP(11))    5
                )(COL(1),A,COL(59),F(13,4));                               5
                PUT SKIP EDIT('ABS MEAN %ERROR',100*ER2/(N-NP(11)))(COL    5
                (1),A,COL(59),F(13,4));                                    5
                RETURN;                                                    5
                END;                                                       5
            END;                                                           3
          IF IVBEEN=0 THEN                                                 2
            DO;                                                            3
            CO=0;                                                          3
              DO K=NP(10)TO NP(11);                                        4
              CO(K,1)=X(K,LC(MVM+1));                                      4
                DO I=1 TO MVM;                                             5
                CO(K,2)=CO(K,2)+X(K,LC(I))*BE(I);                          5
                END;                                                       5
              CO(K,3)=CO(K,1)-CO(K,2)                                      4
```

```
          END;                                                                    4
        END;                                                                      3
      IF NP(6)¬=0&IVBEEN=0 THEN                                                   2
        DO;                                                                       3
        TDEN=0;                                                                   3
        TNUM=0;                                                                   3
          DO K=NP(10)TO NP(11);                                                   4
        TDEN=TDEN+CO(K,3)*CO(K,3);                                                4
          IF K>NP(10)THEN                                                         5
          TNUM=TNUM+(CO(K,3)-CO(K-1,3))*(CO(K,3)-CO(K-1,3));                      5
        END;                                                                      4
        IF NP(6)>2 THEN                                                           4
          DO;                                                                     5
            IF ITER8=0 THEN                                                       6
              DO K=NP(10)TO NP(11);                                               7
              CO(K,1)=CO(K,1)+ZRHO*X(K-1,NVDEP);                                  7
              CO(K,2)=CO(K,2)+ZRHO*X(K-1,NVDEP);                                  7
              CO(K,3)=CO(K,1)-CO(K,2);                                            7
              END;                                                                7
          END;                                                                    5
        SCT=TNUM/TDEN;                                                            3
        ZRHO=((NP(11)-NP(10)+1)*(NP(11)-NP(10)+1)*(2-SCT)+2*MVM*MVM               3
        -2)/(2*(NP(11)-NP(10)+1)*(NP(11)-NP(10)+1)-2*MVM*MVM-1);                  3
        PUT SKIP(2)EDIT('DW STAT:',SCT,' RHO:',ZRHO)(COL(1),A,F(8,4               3
        ),A,F(12,8));                                                             3
          IF NP(6)>1 THEN                                                         4
            DO;                                                                   5
              IF NP(6)¬=3 THEN                                                    6
                DO;                                                               7
                PUT PAGE EDIT('RESID DUMP (EQN',IEQ,')')(COL(1),A,F               7
                (3),A);                                                           7
                PUT SKIP(2)EDIT('N','ACTUAL','FITTED','ERROR','%ERR               7
                OR')(COL(7),A,X(6),A,X(10),A,X(10),A);                            7
                PUT SKIP(2);                                                      7
                  DO K=NP(10)TO NP(11);                                           8
                  ER=0;                                                           8
                    IF CO(K,1)¬=0 THEN                                            9
                    ER=CO(K,3)/CO(K,1);                                           9
                    IF NP(5)=3&LOUT=2 THEN                                        9
                    PUT SKIP EDIT(X(K,NP(12)),(CO(K,I)DO I=1 TO 3),               9
                    ER)(COL(1),F(13,4),4(X(2),F(13,4)));                          9
                    ELSE                                                          9
                    PUT SKIP EDIT(K,(CO(K,I)DO I=1 TO 3),ER)(COL(8)               9
                    ,F(4),4(X(2),F(13,4)));                                       9
                  END;                                                            8
                END;                                                              7
            END;                                                                  5
        END;                                                                      3
      IF NP(14)¬=0 THEN                                                           2
        DO;                                                                       3
          IF LOUT>2 THEN                                                          4
            DO;                                                                   5
              IF ITER8=0&NP(6)=3 THEN                                             6
                DO;                                                               7
                M=M+1;                                                            7
                  DO K=NP(10)TO NP(11);                                           8
                  X(K,M-NVM+1)=CO(K,3);                                           8
                  END;                                                            8
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                    END;                                                    7
                  ELSE                                                      6
                    DO;                                                     7
                    M=M+1;                                                  7
                      DO K=NP(10)TO NP(11);                                 8
                      X(K,M)=CO(K,3);                                       8
                      END;                                                  8
                    END;                                                    7
                END;                                                        5
            END;                                                            3
          IF NP(6)<3 THEN                                                   2
          RETURN;                                                           2
          IF LOUT<3 THEN                                                    2
          RETURN;                                                           2
          IF ITER8=0 THEN                                                   2
          RETURN;                                                           2
          IF M+MVM+1>MPARM THEN                                             2
            DO;                                                             3
            PUT SKIP(2)EDIT('ERROR:  GLSQ STORAGE >',MPARM)(COL(1),A,F(     3 %
            4));                                                            3
            STOP;                                                           3
            END;                                                            3
          IF NP(15)=1 THEN                                                  2
          GET SKIP EDIT(ZRHO)(COL(1),F(10,0));                              2
        NVDEP=LC(MVM+1);                                                    1
        IEND1=NP(11);                                                       1
          IF NP(2)=2 THEN                                                   2
          IEND1=N;                                                          2
        NP(10)=NP(10)+1;                                                    1
          DO I=1 TO MVM+1;                                                  2
          M=M+1;                                                            2
            DO J=NP(10)TO IEND1;                                            3
            X(J,M)=X(J,LC(I))-ZRHO*X(J-1,LC(I));                            3
            END;                                                            3
          LC(I)=M;                                                          2
          END;                                                              2
        END RESID;                                                          1
*PROCESS;
```

```
CORREL: PROC(M,MVM,MPARM,[illegible],NP,LC,LD,A,AM,ADJ,X,SD)REORDER;                1
        DCL NP(*)FIXED BIN(15)CONN;                                                 1
        DCL(LC(*),LD(*))FIXED BIN(15)CTL,(TEXQ(*),TEXD(*))CHAR(6)CTL;               1
        DCL(A(*,*),ADJ(*),AM(*,*))FLOAT DEC(16)CTL;                                 1
        DCL X(*,*)FLOAT DEC(6)CONN,SD(*)FLOAT DEC(6)CTL;                            1
DEFAULT RANGE(I:                                                                    1
        N)FIXED BIN VALUE(FIXED BIN(15));                                           1
          IF NP(2)=0 THEN                                                           2
            DO;                                                                     3
            LL=NP(8);                                                               3
            GET SKIP EDIT((TEXD(J),LD(J)DO J=1 TO NP(8)))((COL(1),8(X(2)            3
            ,A(6),F(2)));                                                           3
              DO J=1 TO LL;                                                         4
                IF LD(J)<=0|LD(J)>M|LD(J)>MPARM THEN                                5
                  DO;                                                               6
                  PUT SKIP EDIT('ERROR:  V=',LD(J),' IN CORREL,SPEC CAR             6
                  D IS (0,>M,>MPARM)')(COL(1),A,F(3),A);                            6
                  STOP;                                                             6
                  END;                                                              6
              END;                                                                  4
            END;                                                                    3
          ELSE                                                                      2
            DO;                                                                     3
            LL=1;                                                                   3
              DO J=1 TO MVM+1;                                                      4
                IF LC(J)>1 THEN                                                     5
                  DO;                                                               6
                    IF LL=99 THEN                                                   7
                      DO;                                                           8
                      LD(J-1)=LC(J);                                                8
                      TEXD(J-1)=TEXQ(J);                                            8
                      END;                                                          8
                    ELSE                                                          7
                      DO;                                                           8
                      LD(J)=LC(J);                                                  8
                      TEXD(J)=TEXQ(J);                                              8
                      END;                                                          8
                  END;                                                              6
                ELSE                                                              5
                LL=99;                                                            5
              END;                                                                  4
              IF LL=99 THEN                                                         4
              LL=MVM;                                                               4
              ELSE                                                                  4
              LL=MVM+1;                                                             4
            END;                                                                    3
          DO I=1 TO LL;                                                             2
            DO J=I TO LL;                                                           3
            AM(J,I)=A(LD(J),LD(I))/(ADJ(LD(J))*ADJ(LD(I)));                         3
            END;                                                                    3
          SD(I)=0;                                                                  2
            DO K=NP(10)TO NP(11);                                                   3
            SD(I)=SD(I)+X(K,LD(I));                                                 3
            END;                                                                    3
          END;                                                                      2
          DO I=1 TO LL;                                                             2
            DO J=I TO LL;                                                           3
            AM(J,I)=AM(J,I)-SD(I)*SD(J)/(NP(11)-NP(10)+1);                          3
```

```
            AM(I,J)=AM(J,I);                                                3
            END;                                                            3
            IF AM(I,I)>0 THEN                                               3
            SD(I)=1/SQRT(AM(I,I));                                          3
            ELSE                                                            3
            SD(I)=0;                                                        3
          END;                                                              2
        MVMF=LL/10;                                                         1
          IF MVMF*10<LL THEN                                                2
          MVMF=MVMF+1;                                                      2
          IF NP(2)=0 THEN                                                   2
            DO;                                                             3
              DO I=1 TO LL;                                                 4
                DO J=I TO LL;                                               5
                AM(J,I)=AM(J,I)*SD(I)*SD(J);                                5
                AM(I,J)=AM(J,I);                                            5
                END;                                                        5
              END;                                                          4
            PUT PAGE;                                                       3
            PUT SKIP EDIT('SIMPLE R (XPX ABOUT MEAN)')(COL(1),A);           3
            END;                                                            3
          ELSE                                                              2
            DO;                                                             3
              IF NP(7)>1 THEN                                               4
                DO;                                                         5
                PUT SKIP(2);                                                5
                PUT SKIP EDIT('CENTRAL MOMENTS:  EQN',IEQ)(COL(1),A,F(3      5
                ));                                                         5
                  DO I=1 TO MVMF;                                           6
                  IA=I*10-9;                                                6
                  IE=IA+9;                                                  6
                    IF IE>=LL+1 THEN                                        7
                    IE=LL;                                                  7
                  PUT SKIP(1);                                              6
                  PUT SKIP EDIT((TEXD(J)DO J=IA TO IE))(COL(8),10(X(6),     6
                  A(6)));                                                   6
                  PUT SKIP(1);                                              6
                    DO K=1 TO LL;                                           7
                    PUT SKIP EDIT(TEXD(K),(AM(K,J)DO J=IA TO IE))(COL(1     7
                    ),A(6),X(1),10 E(12,5,5));                              7
                    END;                                                    7
                  PUT SKIP(1);                                              6
                  END;                                                      6
                END;                                                        5
              DO I=1 TO LL;                                                 4
                DO J=I TO LL;                                               5
                AM(J,I)=AM(J,I)*SD(I)*SD(J);                                5
                AM(I,J)=AM(J,I);                                            5
                END;                                                        5
              END;                                                          4
              IF LL>10 THEN                                                 4
              PUT PAGE;                                                     4
            PUT SKIP(2)EDIT('SIMPLE R (XPX ABOUT MEAN):  EQN',IEQ)(COL(     3
            1),A,F(3));                                                     3
            PUT SKIP(1);                                                    3
            END;                                                            3
          DO I=1 TO MVMF;                                                   2
          IA=I*10-9;                                                        2
```

```
                                                                        2
          IE=IA+9;                                                      3
            IF IE>=LL+1 THEN                                            3
            IE=LL;                                                      2
          PUT SKIP EDIT((TEXD(J)DO J=IA TO IE))(COL(8),10(X(6),A(6)));  2
                                                                        2
          PUT SKIP(1);                                                  3
            DO K=1 TO LL;                                               3
            PUT SKIP EDIT(TEXD(K),(AM(K,J)DO J=IA TO IE))(COL(1),A(6),X 3
            (1),10 E(12,5,5));                                          3
            END;                                                        3
          PUT SKIP(2);                                                  2
          END;                                                          2
        END CORREL;                                                     1
*PROCESS;
```

```
PLNT:    PROC(NO,M,MD,NP,CO,X)REORDER;                                    1
         DCL X(*,*)FLOAT DEC(6)CONN,CO(*,*)FLOAT DEC(6)CTL;               1
         DCL DATER ENTRY;                                                 1
         DCL(YPR(11),F,YMIN,YMAX,YSCAL)FLOAT DEC(6);                      1
         DCL(OUT(101),ANG(9))CHAR(1),NP(*)FIXED BIN(15)CONN,(BEGOBS,ENDO  1
         BS)FIXED BIN(15);                                                1
DEFAULT  RANGE(I:                                                         1
         N)FIXED BIN VALUE(FIXED BIN(15));                                1
         PUT PAGE;                                                        1
            IF NP(1)=1 THEN                                               2
               DO;                                                        3
               BEGOBS=NP(10);                                             3
               ENDOBS=NP(11);                                             3
               ANG(1)='Y';                                                3
               ANG(2)='H';                                                3
               PUT SKIP EDIT('CHART/EQN',NO)(COL(61),A,F(3));             3
               PUT SKIP(2);                                               3
                  IF NP(5)=1 THEN                                         4
                     DO K=BEGOBS TO ENDOBS;                               5
                     CO(K,MD)=K;                                          5
                     END;                                                 5
                  ELSE                                                    4
                     IF NP(5)=3 THEN                                      5
                        DO K=BEGOBS TO ENDOBS;                            6
                        CO(K,MD)=X(K,NP(12));                             6
                        END;                                              6
                     ELSE                                                 5
                        IF NP(5)>3 THEN                                   6
                           DO;                                            7
                           L22=NP(5);                                     7
                              IF NP(9)=0 THEN                             8
                              NP(9)=12;                                   8
                           CALL DATER(NP(10),NP(11),L22,NP(9),MD,CO);     7
                           END;                                           7
               END;                                                       3
            ELSE                                                          2
               DO;                                                        3
               BEGOBS=NP(6);                                              3
               ENDOBS=NP(7);                                              3
                  IF NP(3)=0 THEN                                         4
                     DO;                                                  5
                     GET SKIP EDIT((OUT(I)DO I=1 TO 80))(COL(1),80 A(1))  5
                     ;                                                    5
                     PUT SKIP EDIT((OUT(I)DO I=1 TO 80))(COL(1),80 A(1))  5
                     ;                                                    5
                     PUT SKIP(2);                                         5
                     END;                                                 5
                  ELSE                                                    4
                     DO;                                                  5
                     PUT SKIP EDIT('FIGURE',NO)(COL(63),A,F(3));          5
                     PUT SKIP(2);                                         5
                     END;                                                 5
               GET SKIP EDIT((ANG(J)DO J=1 TO M))(COL(1),(M)A(1));        3
                  IF NP(5)=1 THEN                                         4
                     DO K=BEGOBS TO ENDOBS;                               5
                     CO(K,MD)=K;                                          5
                     END;                                                 5
                  ELSE                                                    4
```

```
                IF NP(11)>1 THEN                                        5
                    CALL DATER(NP(6),NP(7),NP(5),NP(4),MD,CO);          5
            END;                                                        3
        YMIN=CO(BEGOBS,1);                                              1
        YMAX=YMIN;                                                      1
            DO K=BEGOBS TO ENDOBS;                                      2
                DO J=1 TO M;                                            3
                    IF CO(K,J)<YMIN THEN                                4
                    YMIN=CO(K,J);                                       4
                    IF CO(K,J)>YMAX THEN                                4
                    YMAX=CO(K,J);                                       4
                END;                                                    3
            END;                                                        2
        YSCAL=(YMAX-YMIN)/100;                                          1
        YPR(1)=YMIN;                                                    1
        YPR(11)=YMAX;                                                   1
            DO J=2 TO 10;                                               2
            YPR(J)=YPR(J-1)+YSCAL*10;                                   2
            END;                                                        2
        PUT SKIP EDIT((YPR(J)DO J=1 TO 11))(COL(10),11 F(10,3));        1
        PUT SKIP EDIT('.',(10)'+++++++++.')(COL(16),A,A);               1
            IF NP(1)=1 THEN                                             2
                DO;                                                     3
                PUT SKIP(0)EDIT('RESID')(COL(125),A);                   3
                    IF NP(5)=3 THEN                                     4
                    PUT SKIP(0)EDIT('BASE V(',NP(12),')')(COL(1),A,F(2),A)  4
                    ;                                                   4
                    ELSE                                                4
                    PUT SKIP(0)EDIT('TIME/DATE')(COL(1),A);             4
                END;                                                    3
            ELSE                                                        2
                DO;                                                     3
                    IF NP(5)<2 THEN                                     4
                    PUT SKIP(0)EDIT('BASE V(',NP(8),')')(COL(1),A,F(2),A);  4
                    ELSE                                                4
                    PUT SKIP(0)EDIT('TIME/DATE')(COL(1),A);             4
                END;                                                    3
            DO K=BEGOBS TO ENDOBS;                                      2
            OUT=' ';                                                    2
                DO J=1 TO M;                                            3
                JP=(CO(K,J)-YMIN)/YSCAL;                                3
                JP=JP+1;                                                3
                    IF OUT(JP)¬=' ' THEN                                4
                    OUT(JP)='*';                                        4
                    ELSE                                                4
                    OUT(JP)=ANG(J);                                     4
                END;                                                    3
                IF NP(1)=1 THEN                                         3
                PUT SKIP EDIT(CO(K,MD),'.',STRING(OUT),'.',CO(K,MD-1))(CO  3
                L(1),F(10,4),X(2),A,X(2),A(101),X(2),A,F(10,3));        3
                ELSE                                                    3
                PUT SKIP EDIT(CO(K,MD),'.',STRING(OUT),'.')(COL(1),F(10,4  3
                ),X(2),A,X(2),A(101),X(2),A);                           3
            END;                                                        2
        PUT SKIP EDIT('.',(10)'+++++++++.')(COL(16),A,A);               1
        PUT SKIP EDIT((YPR(J)DO J=1 TO 11))(COL(10),11 F(10,3));        1
            IF NP(1)=1 THEN                                             2
                DO;                                                     3
```

```
            PUT PAGE;                                                    3
            RETURN;                                                      3
            END;                                                         3
         ELSE                                                            2
            DO;                                                          3
            LV=8;                                                        3
               IF NP(5)>1 THEN                                           4
               LV=7;                                                     4
            PUT SKIP(4);                                                 3
            PUT SKIP EDIT('LEGEND')(COL(7),A);                           3
            PUT SKIP(2);                                                 3
               DO I=1 TO M;                                              4
               PUT SKIP EDIT('V',NP(LV+I),' = ',ANG(I))(COL(6),A,F(4)    4
               ,A,A(1));                                                 4
               END;                                                      4
            PUT PAGE;                                                    3
            END;                                                         3
      END PLNT;                                                          1
```

PLIBIT

OVERLAY

```
//LKED.SYSLMOD DD DSN=SYS1.USERLIB,DISP=SHR
 INCLUDE SYSLMOD(PLIBITV1)
  OVERLAY A
   INSERT *****IO1,*****IO2
  OVERLAY A
   INSERT **ARITH1,**ARITH2
  OVERLAY A
   INSERT TRNSGEN1,TRNSGEN2
  OVERLAY A
   INSERT UTILITY1,UTILITY2
  OVERLAY A
   INSERT **MUREN1,**MUREN2
  OVERLAY B
   INSERT MOMENTS1,MOMENTS2
  OVERLAY B
   INSERT *MATINV1,*MATINV2
  OVERLAY B
   INSERT ***RDMP1,***RDMP2
  OVERLAY B
   INSERT *CORREL1,*CORREL2
  OVERLAY B
   INSERT **RESID1,**RESID2
  ENTRY PLISTART
  NAME PLIBITV1(R)
```