JSC-12708

"AS-BUILT" DESIGN SPECIFICATION FOR AREAS ADDED TO THE MONTHLY DATA BASES OF TEXAS, MINNESOTA AND THE U.S.S.R.

Job Order 74-963

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For

EARTH OBSERVATIONS DIVISION

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National Aeronautics and Space Administration

LYNDON B. JOHNSON SPACE CENTER

Houston, Texas

March 1977

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AD 63-1347-4963-09

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CONTENTS

1. SCOPE

This document updates the existing monthly weather and yield data bases for the U.S. and the U.S.S.R. by inserting data for additional model areas in both countries. These added areas are in Texas, Minnesota, and marginal wheat-producing areas of the U.S.S.R. The data base designs are identical to those previously documented for the U.S. and the U.S.S.R. in the "As-Built Design Specification for the Yield Estimation Subsystem (YES) Monthly Yield Data Base and Supporting Programs" (JSC-12537/LEC-10034).

2. APPLICABLE DOCUMENTS

- Action Documentation 63-1347-4963-09
- "As-Built" Design Specification for the Yield Estimation Subsystem (YES) Monthly Yield Data Base and Supporting Programs" (JSC-12537/LEC-10034).

3. SYSTEM DESCRIPTION

3.1 HARDWARE DESCRIPTION

These data, and supporting programs previously documented in "As-Built Design Specification" (JSC-12537/LEC-10034), are resident on the IBM 360/195 complex at Suitland, Maryland. They should be transferable to any IBM 360-370 series machine with sufficient disk to handle the data base and main memory to support the PL/I optimizing compiler.

3.2 DATA BASE STRUCTURE

The monthly weather and yield data base is a tree structure, with nodes, or levels, being the country, region, zone and strata (U.S. only). With U.S. data, four levels exist: the United States, the Great Plains, states and crop reporting districts (CRD's). Data from the U.S.S.R. are identified by the first three levels: the U.S.S.R., wheat areas and LACIE crop regions.

3.2.1 DATA BASE STORAGE REQUIREMENTS

The data base storage requirements remain the same as those for the U.S. and the U.S.S.R. described in "As-Built Design Specification."

3.2.2 CONTROL AND DIRECTORY BLOCKS

The format for the control and directory blocks follows that previously defined in "As-Built Design Specification." While the U.S. directory block originally contained the additional CRD's, the U.S.S.R. directory block needed expansion to accommodate the new areas. This was accomplished using existing support programs documented in "As-Built Design Specification."

3.2.3 DATA DESCRIPTORS AND DATA BLOCKS

The format for the data descriptors and data blocks follows that previously defined in "As-Built Design Specification."

3.2.4 MODEL DEFINITION BLOCK

Structure is provided to allow inclusion of model definitions.

4. OPERATION

4.1 DATA BASE INITIALIZATION AND DEFINITION

Data base initialization and definition were accomplished using the supporting programs documented in "As-Built Design Specification" (JSC-12537/LEC-10034).

For Texas and Minnesota, only data descriptor definition was required, as the original U.S. control block and directory definitions had reserved space for these additional CRD's. The U.S.S.R. data base, however, required alteration of the control block and directory definitions, as well as data descriptor definitions for the new model areas.

4.2 DATA CONVERSION (U.S. ONLY)

Data for Texas and Minnesota CRD's located at CCEA in Columbia, Missouri, exist in English units and in a format different from that required for inclusion in the data base. Four programs were written to handle the necessary conversions to the required format:

METONE (Minnesota meteorological data),
METTWO (Texas meteorological data),
MINNYLD (Minnesota yield data),
YLDONE (Texas yield data).

Converted data were stored on a catalogued disk file, and transferred to the data base disk file when all conversions were completed.

Sample listings and flowcharts appear in Appendix C.

4.3 DATA BASE LOADING

Data for new model areas of Texas, Minnesota and the U.S S.R. were loaded using the updating program UPDDATA, documented in "As-Built Design Specification."

4.4 DATA BASE LISTING

Three programs documented in "As-Built Design Specification" accomplish listing of control block and directory information (YESLS02 and YESLS04, respectively) as well as the data itself (LISTJOB).

APPENDIX A

STRUCTURES

A. United States Data Year Entry

There is a maximum of 47 years following the data descriptor entry in a data block for each United States region; each year entry is 128 bytes long.

```
DCL 1 US,
      2 YEAR             FIXED BIN(15,0),
      2 NXTYRREC         FIXED BIN(15,0),
      2 NXTYRDISP        FIXED BIN(15,0),
      2 FILLER           FIXED BIN(15,0),
      2 MEANTEMP(12)     FIXED BIN(15,0),
      2 PRECIP(12)       FIXED BIN(15,0),
      2 DEGREEDAY(12)    FIXED BIN(15,0),
      2 HARVESTED(4)     FIXED BIN(31,0),
      2 PLANTED(4)       FIXED BIN(31,0),
      2 PRODUCTION(4)    FIXED BIN(31,0);
```

B. U.S.S.R. Data Year Entry

There is a maximum of 22 years following the data descriptor entry for each Russian region in a data block; the data for two regions can be placed in each data block. Each year entry is 88 bytes long.

```
DCL 1 USSR,
      2 YEAR             FIXED BIN(15,0),
      2 NXTYRREC         FIXED BIN(15,0),
      2 NXTYRDISP        FIXED BIN(15,0),
      2 FILLER           FIXED BIN(15,0),
      2 MEANTEMP(12)     FIXED BIN(15,0),
      2 PRECIP(12)       FIXED BIN(15,0),
      2 HARVESTED(4)     FIXED BIN(31,0),
      2 PRODUCTION(4)    FIXED BIN(31,0);
```

APPENDIX B

VARIABLE CODES

Meteorological Variables

Precipitation	5
Mean temperature	35
Degree days above	40

Yield Variables

Harvested	101
Planted	102
Production	103

Crops

Spring wheat	201
Winter wheat	202

Units of Measurement

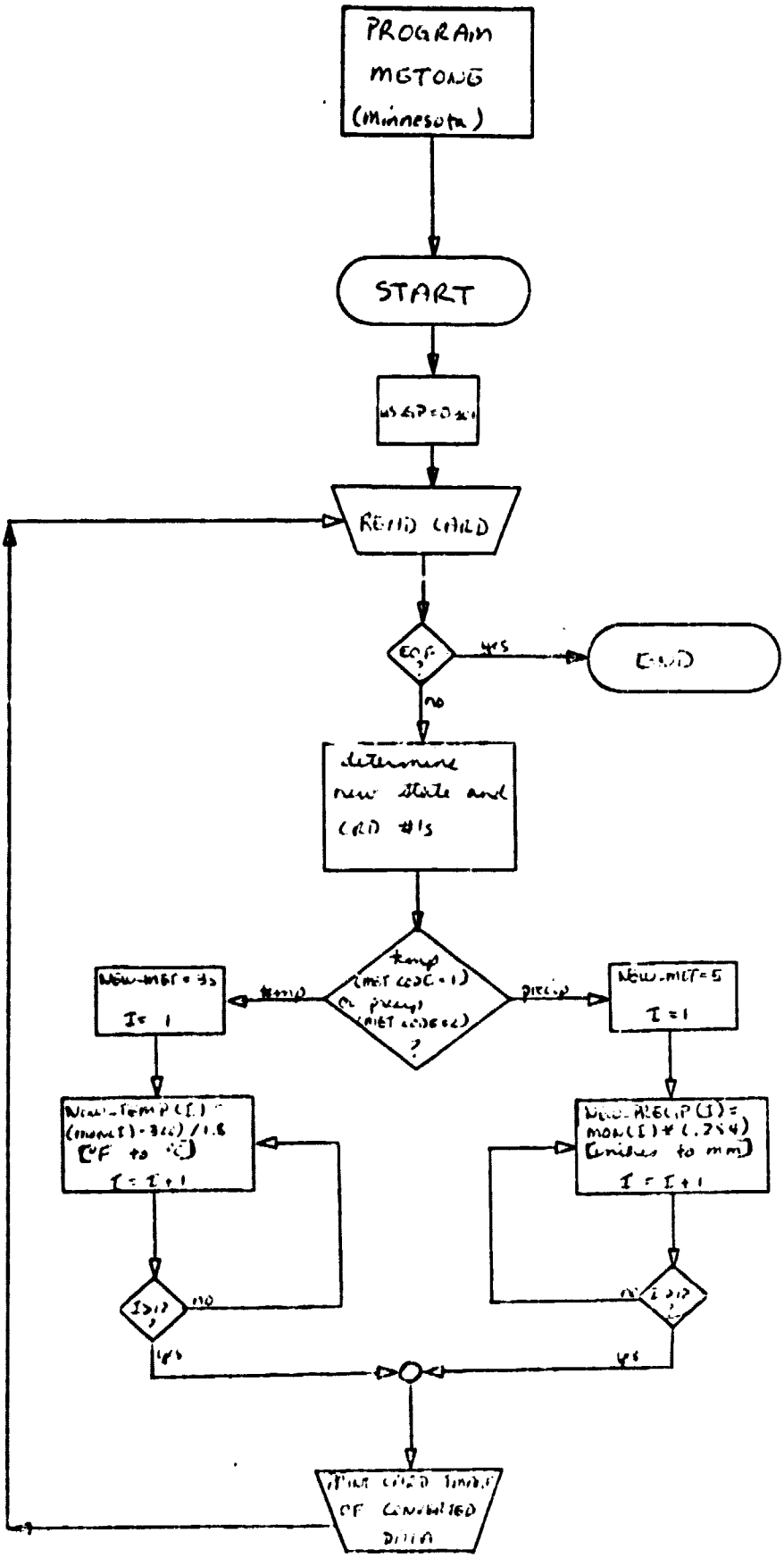
Monthly	5
Millimeters	201
Quintals	228
Hectares	236
Degrees Centigrade	241

Others

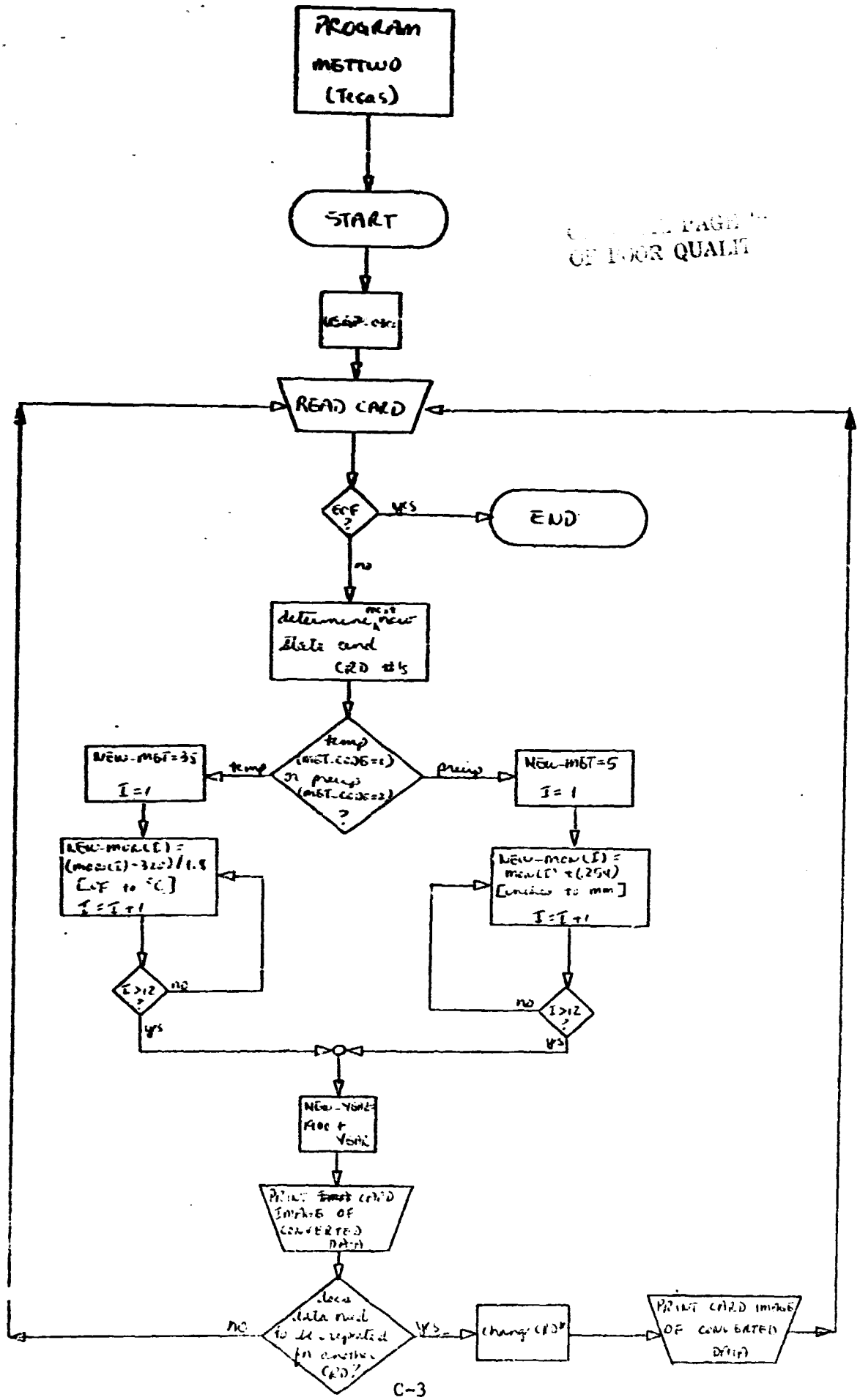
Monthly	26
Year	61
Pointer	90
Record pointer	91
Displacement pointer	92
Filler	99

APPENDIX C

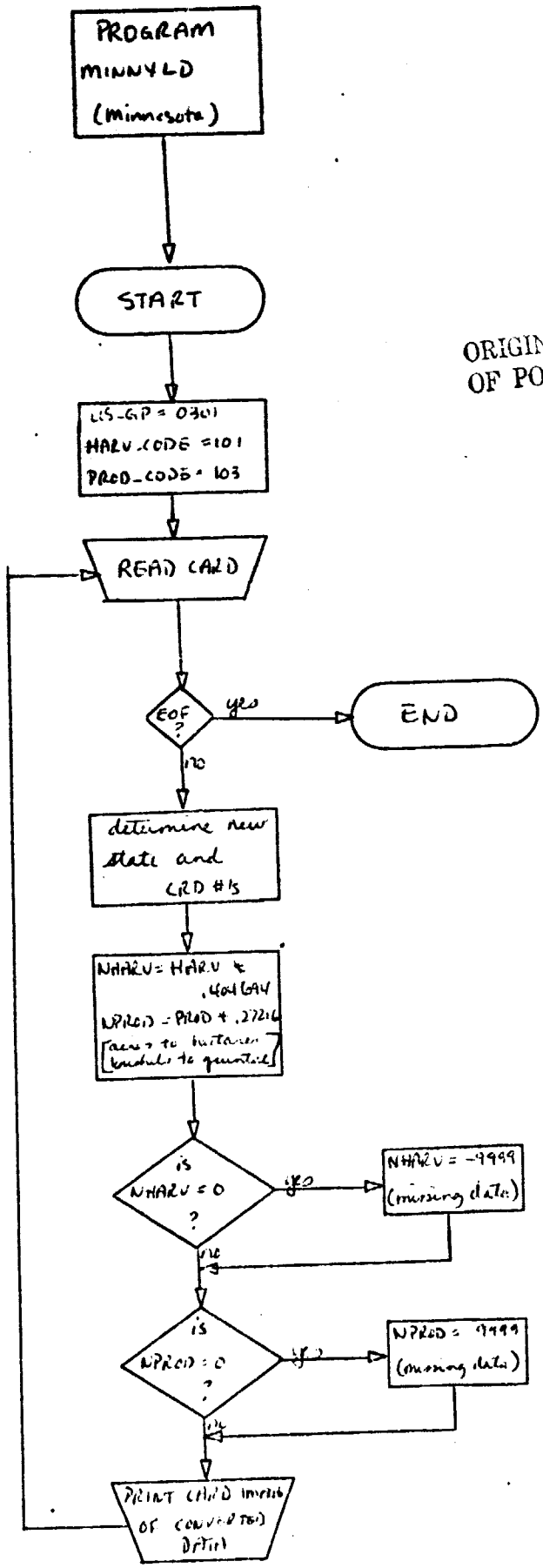
CONVERSION PROGRAM FLOWCHARTS AND LISTINGS


PROGRAM
MGTOMG
(Minnesota)
START
READ CARD
EOF
?
yes
no
determine
new state and
CARD #'s
temp
(MET CODE = 1)
or precip
(MET CODE = 2)
?
temp
precip
I = 1
I = 1
I > 12
?
no
yes
I > 12
?
no
yes

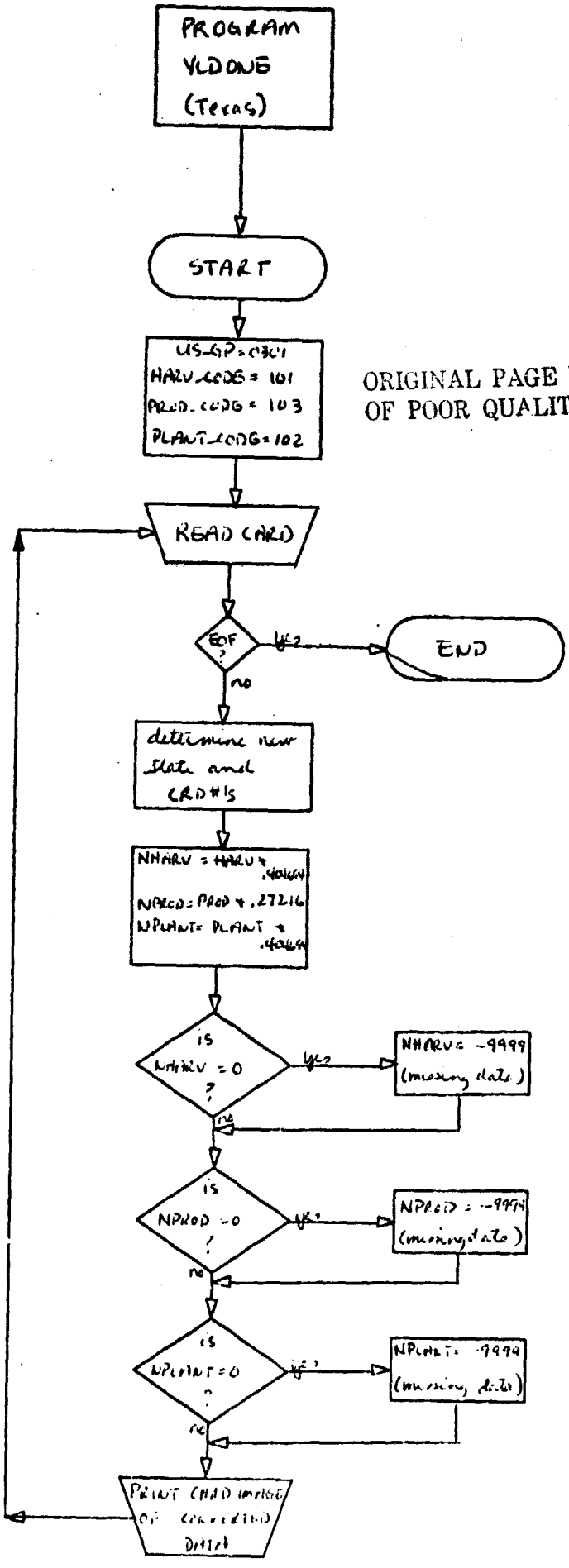
```
METONE:  PROC OPTIONS (MAIN);
    DCL (MET_CODE,STATE,CNTY,YEAR,MON(12)) FIXED(5);
    DCL (NEW_MET,US_GP) FIXED(5);
    DCL (NEW_TEMP(12),NEW_PRECIP(12)) FIXED(7,2);
    DCL NEW_STATE_CNTY FIXED(6);
    DCL SYSPRINT FILE STREAM OUTPUT;
    US_GP = 0301;
READ:   GET SKIP EDIT(MET_CODE,STATE,CNTY,YEAR,(MON(I) DO I=1 TO 12))
        (F(1,0),X(2),F(2,0),F(4,0),12 F(5,0));
    IF STATE = 99 THEN GO TO EOF;
    IF STATE = 21 & CNTY = 2 THEN NEW_STATE_CNTY = 272000;
    IF STATE = 21 & CNTY = 3 THEN NEW_STATE_CNTY = 273000;
    IF STATE = 21 & CNTY = 5 THEN NEW_STATE_CNTY = 275000;
    IF STATE = 21 & CNTY = 6 THEN NEW_STATE_CNTY = 276000;
    IF STATE = 21 & CNTY = 7 THEN NEW_STATE_CNTY = 277000;
    IF STATE = 21 & CNTY = 8 THEN NEW_STATE_CNTY = 278000;
    IF STATE = 21 & CNTY = 9 THEN NEW_STATE_CNTY = 279000;
    IF MET_CODE = 1 THEN DO;
        NEW_MET = 15;
        DO I = 1 TO 12;
            NEW_TEMP(I) = (MON(I)-320)/1.8;
        END;
            PUT EDIT(YEAR,NEW_MET,(NEW_TEMP(I) DO I=1 TO 12),
          US_GP,NEW_STATE_CNTY) (X(2),F(4,0),F(3,0),12 F(5,0),
          F(4,0),F(6,0));
    END;
    ELSE IF MET_CODE = 2 THEN DO;
        NEW_MET = 41;
        DO J = 1 TO 12;
            NEW_PRECIP(J) = (MON(J) * (.254));
        END;
            PUT EDIT(YEAR,NEW_MET,(NEW_PRECIP(J) DO J=1 TO 12),
          US_GP,NEW_STATE_CNTY) (X(2),F(4,0),F(3,0),12 F(5,0),
          F(4,0),F(6,0));
    END;
    GO TO READ;
EOF:  END METONE;
```



```
METTWO: PROC OPTIONS(MAIN);
    DCL (MET_CODE,STATE,CRD#,YEAR,MON(12)) FIXED(5);
    DCL (NEW_MET,NEW_YEAR,US_GP,J) FIXED(5);
    DCL NEW_MON(12) FIXED(7,2);
    DCL (NEW_STATE_CRD,STATE_CRD_NEW) FIXED(6);
    DCL SYSPRINT FILE STREAM OUTPUT;
    US_GP = 0301;  J = 0;
READ: GET SKIP EDIT(MET_CODE,STATE,CRD#,YEAR,(MON(I) DO I =1 TO 12))
      (F(1,0),3 F(2,0),X(1),12 F(5,0));
    IF STATE = 99 THEN GO TO EOF;
    IF STATE = 41 & CRD# =10 THEN NEW_STATE_CRD = 489700;
    IF STATE = 41 & CRD# = 4 THEN NEW_STATE_CRD = 485100;
    IF STATE = 41 & CRD# = 5 THEN NEW_STATE_CRD = 485000;
    IF STATE = 41 & CRD# = 6 THEN NEW_STATE_CRD = 487000;
    IF STATE = 41 & CRD# = 7 THEN NEW_STATE_CRD = 488100;
    IF STATE = 41 & CRD# = 8 THEN NEW_STATE_CRD = 488200;
    IF STATE = 41 & CRD# = 9 THEN NEW_STATE_CRD = 489600;
    NEW_YEAR = 1900 + YEAR;
    IF MET_CODE = 1 THEN DO;
        NEW_MET = 35;
        DO I=1 TO 12;
            NEW_MON(I) = (MON(I)-320)/1.8;
        END;
            PUT EDIT(NEW_YEAR,NEW_MET,(NEW_MON(I) DO I = 1 TO 12),
        US_GP,NEW_STATE_CRD) (X(2),F(4,0),F(3,0),12 F(5,0),
        F(4,0),F(5,0));
    END;
    ELSE IF MET_CODE = 2 THEN DO;
        NEW_MET = 5;
        DO I = 1 TO 12;
            NEW_MON(I) = (MON(I) * (.254));
        END;
            PUT EDIT(NEW_YEAR,NEW_MET,(NEW_MON(I) DO I = 1 TO 12),
        US_GP,NEW_STATE_CRD) (X(2),F(4,0),F(3,0),12 F(5,0),
        F(4,0),F(5,0));
    END;
    IF NEW_STATE_CRD = 485100 THEN DO;
        STATE_CRD_NEW = 485200;
        J = 1;
    END;
    ELSE IF NEW_STATE_CRD = 485200 THEN DO;
        STATE_CRD_NEW = 489000;
        J = 1;
    END;
    IF J = 1 THEN DO;
            PUT EDIT(NEW_YEAR,NEW_MET,(NEW_MON(I) DO I=1 TO 12),
        US_GP,STATE_CRD_NEW) (X(2),F(4,0),F(3,0),12 F(5,0),
        F(4,0),F(5,0));
    END;
    J = 0;
    GO TO READ;
EOF: END METTWO;
*
//GO.SYSPRINT DD DSN=&.EDS.CCEA.GTPLAINS,DISP=MOD
//GO.SYSIN DD *
```



```
MINNYLD: PROC OPTIONS(MAIN);
     DCL (STATE,CRD#,YEAR,US_GP,HARV_CODE,PROD_CODE) FIXED(5);
     DCL NEW_STATE_CRD FIXED(6);
     DCL (HARV,PROD) FIXED(10);
     DCL (NHARV,NPROD) FIXED(12,2);
     DCL SYSPRINT FILE STREAM OUTPUT;
     US_GP = 0301; HARV_CODE = 101; PROD_CODE = 103;
READ: GET SKIP EDIT(STATE,CRD#,YEAR,HARV,PROD)
          (2 F(2,0),F(4,0),X(2),2 F(10,0));
     IF STATE = 99 THEN GO TO EOF;
     IF CRD# = 2 THEN NEW_STATE_CRD = 272000;
     IF CRD# = 3 THEN NEW_STATE_CRD = 273000;
     IF CRD# = 5 THEN NEW_STATE_CRD = 275000;
     IF CRD# = 6 THEN NEW_STATE_CRD = 276000;
     IF CRD# = 7 THEN NEW_STATE_CRD = 277000;
     IF CRD# = 8 THEN NEW_STATE_CRD = 278000;
     IF CRD# = 9 THEN NEW_STATE_CRD = 279000;
     NHARV = HARV * (.404694);
     NPROD = PROD * (.27216);
     IF NHARV = 0 THEN NHARV = -9999;
     IF NPROD = 0 THEN NPROD = -9999;
          PUT EDIT(YEAR, PROD_CODE,NPROD,US_GP,NEW_STATE_CRD)
         (X(2),F(4,0),F(3,0),F(10,0),X(50),F(4,0),F(6,0));
          PUT EDIT(YEAR, HARV_CODE,NHARV,US_GP,NEW_STATE_CRD)
         (X(2),F(4,0),F(3,0),F(10,0),X(50),F(4,0),F(6,0));
     GO TO READ;
EOF: END MINNYLD;
```



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OF POOR QUALITY

```
YLDONE: PROC OPTIONS(MAIN);
     DCL (STATE,CRD#,YEAR) FIXED(5);
     DCL (US_GP,HARV_CODE,PROD_CODE,PLANT_CODE) FIXED(5);
     DCL (HARV,PROD,PLANT) FIXED(10);
     DCL NEW_STATE_CRD FIXED(6);
     DCL (NHARV,NPROD,NPLANT) FIXED(12,2);
     DCL SYSPRINT FILE STREAM OUTPUT;
     US_GP = 0301;
     HARV_CODE = 101; PROD_CODE = 103; PLANT_CODE = 102;
READ: GET SKIP EDIT(STATE,CRD#,YEAR,HARV,PROD,PLANT)
          (2 F(2,0),X(2),F(4,0),3 F(10,0));
     IF STATE = 99 THEN GO TO EOF;
     IF STATE = 41 & CRD# = 7 THEN NEW_STATE_CRD = 485100;
     IF STATE = 41 & CRD# = 8 THEN NEW_STATE_CRD = 485200;
     IF STATE = 41 & CRD# = 9 THEN NEW_STATE_CRD = 486000;
     IF STATE = 41 & CRD# =10 THEN NEW_STATE_CRD = 487000;
     IF STATE = 41 & CRD# =11 THEN NEW_STATE_CRD = 488100;
     IF STATE = 41 & CRD# =12 THEN NEW_STATE_CRD = 488200;
     IF STATE = 41 & CRD# =13 THEN NEW_STATE_CRD = 489000;
     IF STATE = 41 & CRD# =14 THEN NEW_STATE_CRD = 489600;
     IF STATE = 41 & CRD# =15 THEN NEW_STATE_CRD = 489700;
     NHARV = HARV * (.404694);
     NPROD = PROD * (.27216);
     NPLANT = PLANT * (.404694);
     IF NPROD = 0 THEN NPROD = -9999;
     IF NHARV = 0 THEN NHARV = -9999;
     IF NPLANT = 0 THEN NPLANT = -9999;
          PUT EDIT(YEAR,HARV_CODE,NHARV,US_GP,NEW_STATE_CRD)
          (X(2),F(4,0),F(3,0),F(10,0),X(50),F(4,0),F(6,0));
          PUT EDIT(YEAR,PROD_CODE,NPROD,US_GP,NEW_STATE_CRD)
          (X(2),F(4,0),F(3,0),F(10,0),X(50),F(4,0),F(6,0));
          PUT EDIT(YEAR,PLANT_CODE,NPLANT,US_GP,NEW_STATE_CRD)
          (X(2),F(4,0),F(3,0),F(10,0),X(50),F(4,0),F(6,0));
     GO TO READ;
EOF: END YLDONE;
```

APPENDIX D

LISTING OF AMENDED U.S.S.R. DIRECTORY BLOCK

```
**COMMAND=DEFINE      **OPERAND=DIRECTORY                                            0000000
  1   8   550 -550 USSR                              -1   -1    2              B00000000
  2   1   501 -359 WESTERN                            1   12    3              B01000000
  3   1   554 -250 BALTICS                            2    4   -1              B01010000
  3   2   507 -257 BELORUSSIA                         2    5   -1              B01020000
  3   3   500 -252 WEST UKRAINE                       2    6   -1              B01030000
  3   4   499 -302 NORTH CENTRAL UKRAINE              2    7   -1              B01040000
  3   5   500 -350 NORTHEAST UKRAINE                  2    8   -1              B01050000
  3   6   455 -353 EASTERN UKRAINE                    2    9   -1              B01060000
  3   7   453 -303 SOUTHERN UKRAINE                   2   10   -1              B01070000
  3   8   454 -258 MOLDAVIA                           2   11   -1              B01080000
  3   9   450 -400 KRASNODAR                          2   -1   -1              B01090000
  2   2   506 -450 CENTRAL                            1   22   13              B02000000
  3  10   452 -408 NORTHEAST CAUCACUS                12   14   -1              B02100000
  3  11   504 -353 WEST BLACK SOIL ZONE              12   15   -1              B02110000
  3  12   504 -402 EAST BLACK SOIL ZONE              12   16   -1              B02120000
  3  13   551 -355 CENTRAL REGION                    12   17   -1              B02130000
  3  14   552 -454 VOLGA-VYATSK                      12   18   -1              B02140000
  3  15   509 -500 UPPER VOLGA                       12   19   -1              B02150000
  3  16   502 -455 MIDDLE VOLGA                      12   20   -1              B02160000
  3  17   458 -450 LOWER VOLGA                       12   21   -1              B02170000
  3  18   555 -551 NORTHWEST URALS                   12   -1   -1              B02180000
  2   3   551 -701 EAST CENTRAL                       1   33   23              B03000000
  3  19   506 -552 SOUTHERN URALS                    22   24   -1              B03190000
  3  20   602 -700 NORTHEASTERN URALS                22   25   -1              B03200000
  3  21   455 -550 WESTERN KAZAKHSTAN                22   26   -1              B03210000
  3  22   552 -608 KUSTANAY                          22   27   -1              B03220000
  3  23   502 -658 TSELINOGRAD                       22   28   -1              B03230000
  3  24   506 -659 NORTHERN KAZAKHSTAN               22   29   -1              B03240000
  3  25   502 -752 PAVLODAR                          22   30   -1              B03250000
  3  26   552 -800 WESTERN SIBERIA                   22   31   -1              B03260000
  3  27   504 -807 ALTAI KRAY                        22   32   -1              B03270000
  3  29   485 -766 SOUTH KAZAKHSTAN - NORTH          22   -1   -1              B03290000
  2   4   420 -657 SOUTH                              1   37   34              B04000000
  3  28   420 -463 TRANSCAUCASUS                     33   35   -1              B04280000
  3  29   447 -739 SOUTH KAZAKHSTAN - SOUTH          33   36   -1              B04290000
  3  30   400 -665 CENTRAL ASIA                      33   -1   -1              B04300000
  2   5   622-1248 EAST                               1   40   38              B05000000
  3  31   615-1023 EASTERN SIBERIA                   37   39   -1              B05310000
  3  32   603-1352 FAR EAST                          37   -1   -1              B05320000
  2   6   627 -440 NORTHWEST                          1   -1   41              B06000000
  3  33   627 -440 NORTHWEST                         40   -1   -1              B06330000
**END OF COMMAND                                                                0000000
```


P-1