A POWERFUL ENHANCEMENT TO THE DMAP ALTER CAPABILITY

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SUMMARY

A powerful enhancement to the DMAP alter capability has been developed by RPK Corporation and is available on all RPK-supported versions of COSMIC/NASTRAN. This enhancement involves the addition of two new alter control cards, called INSERT and DELETE, to the Executive Control Deck. These cards allow for DMAP alters to be made by referencing DMAP statements by their module names rather than by their statement numbers in the rigid format DMAP sequence. This allows for increased user convenience and flexibility and makes alters more meaningful to the user. In addition, DMAP alter packages employing the new alter control cards will be much less susceptible to future changes in rigid format DMAPs than alter packages employing the standard ALTER control cards. The usage of the new cards is illustrated by examples.

INTRODUCTION

The most general way of using NASTRAN is by means of a user-written Direct Matrix Abstraction Program (DMAP). However, in order to relieve the user of the burden of constructing DMAP sequences for each of his analyses, standard DMAP sequences, called rigid formats, are provided with NASTRAN to handle different types of analyses.

It is often desirable for the user to make changes to the DMAP sequences in the rigid formats. This can be accomplished by using the DMAP alter capability (see Reference 1). Typical situations that may call for using DMAP alters are to schedule an exit prior to completion, to request additional intermediate output, to schedule diagnostic printing of tables and/or matrices and to modify the standard solution sequences by the addition and/or deletion of functional modules.

DESCRIPTION OF THE STANDARD ALTER FEATURE

DMAP alters to the rigid formats are accomplished by means of ALTER control cards in the Executive Control Deck (Reference 1). ALTER control cards are of two types.

An ALTER control card of the form

ALTER n $

indicates that DMAP instructions following this card are to be inserted after DMAP instruction

number n in the rigid format under consideration.

An ALTER control card of the form

ALTER n1,n2 $ (n1 <= n2)

indicates that DMAP instructions in the range n1 through n2 (inclusive) in the rigid format are to be deleted and replaced by any DMAP instructions that may follow this card.

The ALTER control cards serve a very useful purpose. However, the usage of these cards has the following two distinct disadvantages:

* The ALTER control cards refer to DMAP statements by their numbers in the rigid format DMAP sequence. This does not give a "feel" for the DMAP changes as the numbers do not have any particular significance to the user. In other words, the ALTER control cards are by design really more programmer-oriented than user-oriented.

* Because the ALTER control cards refer to DMAP statements by numbers, they are very susceptible to changes in rigid formats from one release to a subsequent one. Thus, even minor changes in a rigid format, particularly in the earlier portion of the DMAP sequence, may require wholesale revamping of the ALTER cards in an alter package.

DESCRIPTION OF THE ENHANCED ALTER FEATURES

In order to overcome the above shortcomings, RPK has developed a very attractive enhancement to the DMAP alter capability. This enhancement involves the addition of two new alter control cards, called INSERT and DELETE, for use in the Executive Control Deck. This feature is available on all RPK-supported versions of COSMIC/NASTRAN, beginning with the 1988 release.

Detailed descriptions of the INSERT and DELETE cards are given in Appendix A. An updated description of the ALTER card that takes into account the existence of the INSERT and DELETE cards is also given in that appendix.

The INSERT control card identifies a specific module in the rigid format DMAP sequence after which DMAP instructions following the INSERT card are to be inserted. The DELETE control card identifies a specific module (or a range of modules) in the rigid format DMAP sequence which is (or are) to be deleted and replaced by any DMAP instructions that may follow the DELETE card.

The INSERT control card is specified as follows:

INSERT specmod $

where specmod has the following general form:

nommod [(r)] [, n]

The various terms in the above specification have the following meanings and connotations:

nommod — is the nominal module (alphanumeric value, no default). This must be a valid name of a module in the rigid format DMAP sequence. (It must be recognized in this context that every DMAP instruction or DMAP statement is a module with a specific name.)

r — is the occurrence flag (integer > 0, default = 1). The r^{th} occurrence of the nominal module in the rigid format DMAP sequence (counting from the beginning of the DMAP sequence) defines the reference module.

The default value of 1 for the occurrence flag implies that the reference module is the first occurrence of the nominal module in the rigid format DMAP sequence.

n — is the offset flag (integer, default = 0). The DMAP module that is offset from the reference module by n DMAP statements in the rigid format DMAP sequence defines the specified module.

Depending upon the sign of the offset flag n, the specified module may follow (n positive) or precede (n negative) the reference module in the rigid format DMAP sequence. The default value of 0 for the offset flag implies that the reference module is the specified module.

specmod — is the module defined as per the above scheme after which DMAP statements following the INSERT card are to be inserted.

The DELETE control card is specified as follows:

DELETE $specmod_1$ [, $specmod_2$] $

where $specmod_i$ has the following general form:

$$nommod_i \ [(r_i)] \ [, n_i]$$

The various terms in the above specification have the same meanings and connotations as in the case of the INSERT control card.

If only $specmod_1$ is specified on a DELETE card, it identifies a single specified module that is to be deleted and replaced by any DMAP statements that may follow the DELETE card. If both $specmod_1$ and $specmod_2$ are specified, they identify a range of specified modules that are to be deleted and replaced by any DMAP statements that may follow the DELETE card.

USAGE OF THE ENHANCED ALTER FEATURES

The new INSERT and DELETE cards described above and the existing ALTER card together form a triad of alter control cards available to the user on all RPK-supported versions of COSMIC/NASTRAN. When using these cards, the most important requirement that must be satisfied is the one that has always existed with the usage of the standard ALTER control cards, namely, that the DMAP statements (or modules) that are referenced on the ALTER, INSERT and DELETE control cards in an alter package (either explicitly or implicitly, when a range is specified) must be referenced in ascending order of their occurrence in the rigid format DMAP.

The new INSERT and DELETE cards can be used in conjunction with standard ALTER control cards and any combination of the three control cards is acceptable. As a corollary, RPK-supported versions of COSMIC/NASTRAN also support alter packages containing only ALTER control cards. This ensures compatibility with standard versions of COSMIC/NASTRAN.

Table 1 lists several examples of the usage of alter control cards on RPK-supported versions of COSMIC/NASTRAN. For each example, the table shows an alter using standard ALTER control cards and indicates suggested usages by which the same alter can be accomplished by employing equivalent INSERT or DELETE control cards. (All of the examples in the table refer to the DMAP sequence of Rigid Format 3 - Displacement Approach, Release 1988, that is given in Appendix B.)

RPK encourages the users of its versions of COSMIC/NASTRAN to use the new alter control cards. In order to demonstrate their usage, RPK has modified the data for all NASTRAN Demonstration Problems that contain ALTER cards by commenting out all such cards and replacing them by equivalent INSERT and/or DELETE cards. This is reflected in the data and the output of the NASTRAN Demonstration Problems that are delivered to RPK's clients.

ADVANTAGES OF THE ENHANCED ALTER FEATURES

The new alter control cards have several distinct advantages over the standard ALTER control card. Some of these are obvious from the examples in Table 1. These advantages are discussed in detail below.

1. Increased User Friendliness and Convenience

Unlike standard ALTER control cards, which refer to DMAP instructions by their statement numbers in the rigid format DMAP, the new INSERT and DELETE control cards refer to DMAP statements by their module names. This is certainly more user friendly and convenient as DMAP module names are clearly more meaningful to the user than DMAP statement numbers. The user thus has a better "feel" for the alters.

2. Increased Flexibility

The general manner in which the specified module is identified on the INSERT and DELETE control cards gives tremendous flexibility to the user.

Using ALTER cards, a given alter can be accomplished only by a very specific and unique ALTER card. However, by using INSERT (or DELETE) cards, the same alter can be accomplished in several apparently different, but equivalent, ways. The user thus has a choice of ways in which he can specify a given alter.

The above point can be best illustrated by an example. Consider Example 2 in Table 1 which indicates that alters are to be made by inserting new DMAP statements after DMAP statement no. 69 (the PARAM module just before the READ module) in the DMAP.

By using ALTER control cards, the above alter can be accomplished only by using the following very specific and unique alter:

```
ALTER 69 $
```

However, by using INSERT control cards, the above alter can be accomplished in many different ways. The following are some ways of achieving this (the first two alters given below are shown in Table 1 for this example):

```
INSERT DPD,2 $
INSERT READ,-1 $
INSERT RBMG4,4 $
INSERT SDR1,-5 $
INSERT BEGIN,68 $
INSERT END,-30 $
```

All of the above INSERT cards (the last two INSERTs shown above are admittedly extreme examples), though different in appearance, are all equivalent since they identify the same specified module, namely, the PARAM module just before the READ module in the DMAP. They differ from one another in that each of them employs a different reference module in conjunction with a correspondingly different offset flag.

In a similar manner, if alters involve the deletion of DMAP modules, DELETE control cards can be used to accomplish it in more than one way.

Assume that the number of DMAP statements in a rigid format DMAP sequence is m. Then, by using INSERT control cards, a given alter of the form

```
ALTER n $     or   ALTER n,n $
```

can be accomplished in m different, but equivalent, ways by selecting each of the m DMAP modules in the rigid format as a reference module with an appropriate offset flag.

In a similar manner, a given alter of the form

```
ALTER n1,n2 $   (n1 # n2)
```

can be accomplished in m^2 different ways since each of n1 and n2 can be specified in m different,

but equivalent, ways.

3. Reduced Susceptibility to Future Changes in Rigid Format DMAPs

Because the new alter control cards refer to DMAP statements by their module names, alter packages that contain these new cards will be much less susceptible to future changes in rigid formats than if standard ALTER cards were used.

Consider, for instance, Example 1 in Table 1. This involves the insertion of new DMAP statements after the SDR2 module. (This is the normal alter that is used to obtain NASTRAN output for subsequent interface with post-processing programs like PATRAN.)

The only way of accomplishing the above alter by using standard ALTER control cards is to use the following alter :

```
ALTER 79 $
```

The above alter will no longer be valid if future changes to the rigid format involve additions or deletions to the DMAP ahead of the SDR2 module. In that case, the new DMAP statement number for the SDR2 module must be used in the above alter.

By using INSERT control cards, the above alter can be accomplished by the following alter:

```
INSERT SDR2 $
```

Because the above alter refers to the DMAP module by name, it will be unaffected by any future additions or deletions to the DMAP.

CONCLUDING REMARKS

This paper has described a powerful enhancement to the DMAP alter capability that has been developed by RPK Corporation and that is available on all RPK-supported versions of COSMIC/ NASTRAN. This enhancement involves the addition of two new alter control cards, called INSERT and DELETE, to the Executive Control Deck. These cards allow for DMAP alters to be made by referencing DMAP statements by their module names rather than by their statement numbers in the rigid format DMAP sequence. This allows for increased user convenience and flexibility and makes alters more meaningful to the user. In addition, DMAP alter packages employing the new alter control cards will be much less susceptible to future changes in rigid format DMAPs than alter packages employing the standard ALTER control cards. The usage of the new cards is illustrated by examples.

REFERENCE

1. The NASTRAN User's Manual, NASA SP-222(08), June 1986.

Table 1. Examples on the Usage of Alter Control Cards
(see Note 1 below)

Example no.	Alters using ALTER cards	Equivalent alters using INSERT or DELETE cards (see Note 2 below)
1	ALTER 79 $	INSERT SDR2 $
2	ALTER 69 $	INSERT DPD,2 INSERT READ,-1 $
3	ALTER 31 $	INSERT EMA(2) $
4	ALTER 30 $	INSERT EMA,2 $ INSERT EMA(2),-1 $
5	ALTER 82,82 $	DELETE SCAN $
6	ALTER 2,3 $	DELETE PRECHK,FILE $
7	ALTER 32,35 $	DELETE GPWG,-1,GPWG,2 $
8	ALTER 84,87 $	DELETE PLOT(2),-1,PLOT(2),2 $

Notes:
1. All of the alters given above refer to the DMAP sequence of Rigid Format 3 - Displacement Approach, Release 1988, given in Appendix B.

2. The equivalent alters using INSERT or DELETE cards shown above are only suggested usages. As explained in the paper, alters using INSERT or DELETE control cards are not unique and can be accomplished in more than one way.

APPENDIX A

Description of Alter Control Cards

Executive Control Card ALTER - Rigid Format DMAP Sequence Alteration Request

Description: Requests the Direct Matrix Abstraction Program (DMAP) sequence of a rigid format to be changed by additions, deletions or substitutions.

Format and Examples:

ALTER{K1 [, K2]}$

ALTER 22 $

ALTER 5,5 $

ALTER 38,45 $

ALTER 25,19 $

Option

K1 only	DMAP statement number (Integer > 0) after which DMAP instructions following the ALTER card are to be inserted
K1 and K2	DMAP statement numbers (Integer > 0) identifying a single DMAP statement or a range of DMAP statements to be deleted and replaced by any DMAP instructions that may follow the ALTER card. See Remark 5.

Remarks:

1. See the descriptions of the INSERT and DELETE cards for alternate ways of specifying DMAP sequence alteration requests.
2. The DMAP statements referenced on ALTER, INSERT and DELETE cards (either explicitly or implicitly, when a range is specified) must be referenced in ascending order of their occurrence in the rigid format DMAP.
3. See Volume 2, Sections 2, 3 and 4 for the listings of all rigid format DMAP sequences.
4. See Volume 2, Section 1.1.5 for the manner in which DMAP alters are handled in restarts.
5. If both K1 and K2 are specified and K1 $\neq$ K2, a range of DMAP statements is implied and either of them can be less than the other. If K1 = K2, a single DMAP statement is implied.

Executive Control Card DELETE - Rigid Format DMAP Sequence Alteration Request

Description: Requests the Direct Matrix Abstraction Program (DMAP) sequence of a rigid format to be changed by deletions or substitutions.

Format and Examples:

DELETE $specmod_1$ [, $specmod_2$] $

where $specmod_i$ has the following general form:

$nommod_i$ [(r_i)] [, n_i]

DELETE SSG1 $

DELETE EMA(2) $

DELETE READ,1 $

DELETE SDR2(2),-1 $

DELETE SSG3,REPT $

DELETE GP2,GP3,-1 $

DELETE SMA3,1,TA1,-1 $

DELETE REPT,2,REPT,3 $

Option	
$nommod_i$	Nominal module (Alphanumeric value, no default). See Remark 5.
r_i	Occurrence flag (Integer > 0, default = 1). The r_i^{th} occurrence of the nominal module in the rigid format DMAP sequence (counting from the beginning of the DMAP sequence) defines the reference module. See Remark 6.
n_i	Offset flag (Integer, default = 0). The DMAP module that is offset from the reference module by n_i DMAP statements in the rigid format DMAP sequence defines the specified module. See Remark 7.
$specmod_1$ only	Specified module defined as per the above scheme that is to be deleted and replaced by any DMAP instructions that may follow the DELETE card
$specmod_1$ and $specmod_2$	Range of specified modules defined as per the above scheme that are to be deleted and replaced by any DMAP instructions that may follow the DELETE card. See Remark 8.

Remarks:

1. See the description of the ALTER card for an alternate way of specifying DMAP sequence deletions and substitutions.
2. The DMAP statements referenced on ALTER, INSERT and DELETE cards (either explicitly or implicitly, when a range is specified) must be referenced in ascending order of their occurrence in the rigid format DMAP.

3. See Volume 2, Sections 2, 3 and 4 for the listings of all rigid format DMAP sequences.

4. See Volume 2, Section 1.1.5 for the manner in which DMAP alters are handled in restarts.

5. The nominal module $nommod_i$ must be a valid name of a DMAP module in the rigid format DMAP sequence.

6. The default value of 1 for the occurrence flag r_i implies that the reference module is the first occurrence of the nominal module in the rigid format DMAP sequence.

7. The value of the offset flag n_i may be positive, negative or 0. A positive value means that the specified module follows the reference module by n_i DMAP statements in the rigid format DMAP sequence. A negative value indicates that the specified module precedes the reference module by n_i DMAP statements in the DMAP sequence. A value of 0 (the default) implies that the reference module is the specified module.

8. If both $specmod_1$ and $specmod_2$ are specified, it implies a range of DMAP statements and either of them can precede the other in the rigid format DMAP sequence.

Executive Control Card INSERT - Rigid Format DMAP Sequence Alteration Request

Description: Requests the Direct Matrix Abstraction Program (DMAP) sequence of a rigid format to be changed by additions.

Format and Examples:

```
INSERT  specmod $
```

where specmod has the following general form:

```
nommod [(r)] [, n]
```

```
INSERT GP4 $

INSERT EMA(2) $

INSERT READ,1 $

INSERT SDR2(2),-1 $
```

Option

nommod	Nominal module (Alphanumeric value, no default). See Remark 5.
r	Occurrence flag (Integer > 0, default = 1). The r^{th} occurrence of the nominal module in the rigid format DMAP sequence (counting from the beginning of the DMAP sequence) defines the reference module. See Remark 6.
n	Offset flag (Integer, default = 0). The DMAP module that is offset from the reference module by n DMAP statements in the rigid format DMAP sequence defines the specified module. See Remark 7.
specmod	Specified module defined as per the above scheme after which DMAP statements following the INSERT card are to be inserted.

Remarks:

1. See the description of the ALTER card for an alternate way of specifying DMAP sequence additions.
2. The DMAP statements referenced on ALTER, INSERT and DELETE cards (either explicitly or implicitly, when a range is specified) must be referenced in ascending order of their occurrence in the rigid format DMAP.
3. See Volume 2, Sections 2, 3 and 4 for the listings of all rigid format DMAP sequences.
4. See Volume 2, Section 1.1.5 for the manner in which DMAP alters are handled in restarts.
5. The nominal module nommod must be a valid name of a DMAP module in the rigid format DMAP sequence.
6. The default value of 1 for the occurrence flag r implies that the reference module is the first occurrence of the nominal module in the rigid format DMAP sequence.

7. The value of the offset flag n may be positive, negative or 0. A positive value means that the specified module follows the reference module by n DMAP statements in the rigid format DMAP sequence. A negative value indicates that the specified module precedes the reference module by n DMAP statements in the DMAP sequence. A value of 0 (the default) implies that the reference module is the specified module.

APPENDIX B

DMAP Listing of Rigid Format 3 - Displacement Approach, Release 1988

OPTIONS IN EFFECT GO ERR=2 LIST NODECK NOREF NOOSCAR

```
    1 BEGIN     DISP 03 - NORMAL MODES ANALYSIS - APR. 1988 $
    2 PRECHK    ALL$
    3 FILE      LAMA=APPEND/PHIA=APPEND $
    4 PARAM     //*MPY*/CARDNO/0/0 $
    5 GP1       GEOM1,GEOM2,/GPL,EQEXIN,GPDT,CSTM,BGPDT,SIL/S,N,LUSET/
                NOGPDT/ALWAYS=-1 $
    6 PLTTRAN   BGPDT,SIL/BGPDP,SIP/LUSET/S,N,LUSEP $
    7 GP2       GEOM2,EQEXIN/ECT $
    8 PARAML    PCDB//*PRES*////JUMPPLOT $
    9 PURGE     PLTSETX,PLTPAR,GPSETS,ELSETS/JUMPPLOT $
   10 COND      P1,JUMPPLOT $
   11 PLTSET    PCDB,EQEXIN,ECT/PLTSETX,PLTPAR,GPSETS,ELSETS/S,N,NSIL/
                S,N,JUMPPLOT $
   12 PRTMSG    PLTSETX// $
   13 PARAM     //*MPY*/PLTFLG/1/1 $
   14 PARAM     //*MPY*/PFILE/0/0 $
   15 COND      P1,JUMPPLOT $
   16 PLOT      PLTPAR,GPSETS,ELSETS,CASECC,BGPDT,EQEXIN,SIL,,ECT,,,,/PLOTX1/
                NSIL/LUSET/S,N,JUMPPLOT/S,N,PLTFLG/S,N,PFILE  $
   17 PRTMSG    PLOTX1//$
   18 LABEL     P1 $
   19 GP3       GEOM3,EQEXIN,GEOM2/,GPTT/NOGRAV $
   20 TA1       ECT,EPT,BGPDT,SIL,GPTT,CSTM,MPT/EST,GEI,GPECT,,,MPTX,PCOMPS,
                EPTX/LUSET/S,N,NOSIMP/1/S,N,NOGENL/GENEL/S,N,COMPS $
   21 EQUIV     MPTX,MPT/COMPS/EPTX,EPT/COMPS $
   22 COND      ERROR4,NOSIMP $
   23 PARAM     //*ADD*/NOKGGX/1/0 $
   24 PARAM     //*ADD*/NOMGG/1/0 $
```


C-3

```
25  EMG       EST,CSTM,MPT,DIT,GEOM2,/KELM,KDICT,MELM,MDICT,,,/S,N,NOKGGX/
              S,N,NOMGG////C,Y,COUPMASS/C,Y,CPBAR/
              C,Y,CPROD/C,Y,CPQUAD1/C,Y,CPQUAD2/C,Y,CPTRIA1/C,Y,CPTRIA2/
              C,Y,CPTUBE/C,Y,CPQDPLT/C,Y,CPTRPLT/C,Y,CPTRBSC/
              C,Y,VOLUME/C,Y,SURFACE $

26  PURGE     KGGX/NOKGGX $

27  COND      JMPKGG,NOKGGX $

28  EMA       GPECT,KDICT,KELM/KGGX $

29  LABEL     JMPKGG $

30  COND      ERROR1,NOMGG $

31  EMA       GPECT,MDICT,MELM/MGG/-1/C,Y,WTMASS=1.0 $

32  COND      LGPWG,GRDPNT $

33  GPWG      BGPDP,CSTM,EQEXIN,MGG/OGPWG/V,Y,GRDPNT=-1/C,Y,WTMASS $

34  OFP       OGPWG,,,,,//S,N,CARDNO $

35  LABEL     LGPWG $

36  EQUIV     KGGX,KGG/NOGENL $

37  COND      LBL11,NOGENL $

38  SMA3      GEI,KGGX/KGG/LUSET/NOGENL/NOSIMP $

39  LABEL     LBL11 $

40  GPSTGEN   KGG,SIL/GPST $

41  PARAM     //*MPY*/NSKIP/0/0 $

42  GP4       CASECC,GEOM4,EQEXIN,GPDT,BGPDT,CSTM,GPST/RG,YS,USET,
              ASET,OGPST/LUSET/S,N,MPCF1/S,N,MPCF2/S,N,SINGLE/S,N,OMIT/
              S,N,REACT/S,N,NSKIP/S,N,REPEAT/S,N,NOSET/S,N,NOL/S,N,NOA/
              C,Y,ASETOUT/C,Y,AUTOSPC $

43  OFP       OGPST,,,,,//S,N,CARDNO $

44  COND      ERROR3,NOL $

45  PURGE     KRR,KLR,DM,MLR,MR/REACT/GM/MPCF1/GO/OMIT/KFS/SINGLE/QG/NOSET $

46  EQUIV     KGG,KNN/MPCF1/MGG,MNN/MPCF1 $

47  COND      LBL2,MPCF1 $

48  MCE1      USET,RG/GM $

49  MCE2      USET,GM,KGG,MGG,,/KNN,MNN,, $
```

```
50 LABEL    LBL2 $
51 EQUIV    KNN,KFF/SINGLE/MNN,MFF/SINGLE $
52 COND     LBL3,SINGLE $
53 SCE1     USET,KNN,MNN,,/KFF,KFS,,MFF,, $
54 LABEL    LBL3 $
55 EQUIV    KFF,KAA/OMIT $
56 EQUIV    MFF,MAA/OMIT $
57 COND     LBL5,OMIT $
58 SMP1     USET,KFF,,,/GO,KAA,KOO,LOO,,,,, $
59 SMP2     USET,GO,MFF/MAA $
60 LABEL    LBL5 $
61 COND     LBL6,REACT $
62 RBMG1    USET,KAA,MAA/KLL,KLR,KRR,MLL,MLR,MRR $
63 RBMG2    KLL/LLL $
64 RBMG3    LLL,KLR,KRR/DM $
65 RBMG4    DM,MLL,MLR,MRR/MR $
66 LABEL    LBL6 $
67 DPD      DYNAMICS,GPL,SIL,USET/GPLD,SILD,USETD,,,,,,,EED,EQDYN/
            LUSET/LUSETD/NOTFL/NODLT/NOPSDL/NOFRL/
            NONLFT/NOTRL/S,N,NOEED//NOUE $
68 COND     ERROR2,NOEED $
69 PARAM    //*MPY*/NEIGV/1/-1 $
70 READ     KAA,MAA,MR,DM,EED,USET,CASECC/LAMA,PHIA,MI,OEIGS/*MODES*/
            S,N,NEIGV $
71 OFP      OEIGS,,,,,//S,N,CARDNO $
72 COND     FINIS,NEIGV $
73 OFP      LAMA,,,,,//S,N,CARDNO $
74 SDR1     USET,,PHIA,,,GO,GM,,KFS,,/PHIG,,QG/1/*REIG* $
75 COND     NOMPCF,GRDEQ $
76 EQMC     CASECC,EQEXIN,GPL,BGPDT,SIL,USET,KGG,GM,PHIG,LAMA,QG,CSTM/
            OQM1/V,Y,OPT=0/V,Y,GRDEQ/-1 $
```

```
77  OFP         OQM1,,,,,//S,N,CARDNO $

78  LABEL       NOMPCF $

79  SDR2        CASECC,CSTM,MPT,DIT,EQEXIN,SIL,,,BGPDP,LAMA,QG,PHIG,EST,,,
                PCOMPS/,OQG1,OPHIG,OES1,OEF1,PPHIG,OES1L,OEF1L/
                *REIG*////COMPS $

80  OFP         OPHIG,OQG1,OEF1,OES1,,//S,N,CARDNO $

81  OFP         OEF1L,OES1L,,,,//S,N,CARDNO $

82  SCAN        CASECC,OES1,OEF1/OESF1/*RF* $

83  OFP         OESF1,,,,,//S,N,CARDNO $

84  COND        P2,JUMPPLOT $

85  PLOT        PLTPAR,GPSETS,ELSETS,CASECC,BGPDT,EQEXIN,SIP,,PPHIG,GPECT,OES1,
                OES1L,/PLOTX2/NSIL/LUSEP/JUMPPLOT/PLTFLG/S,N,PFILE $

86  PRTMSG      PLOTX2// $

87  LABEL       P2 $

88  JUMP        FINIS $

89  LABEL       ERROR1 $

90  PRTPARM     //-1/*MODES* $

91  LABEL       ERROR2 $

92  PRTPARM     //-2/*MODES* $

93  LABEL       ERROR3 $

94  PRTPARM     //-3/*MODES* $

95  LABEL       ERROR4 $

96  PRTPARM     //-4/*MODES* $

97  LABEL       FINIS $

98  PURGE       DUMMY/ALWAYS $

99  END         $
```