COSMIC/NASTRAN FREE-FIELD INPUT

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ABSTRACT

This paper serves as a user's guide to the COSMIC/NASTRAN free-field input for the Bulk Data section of the NASTRAN program. The free-field input is designed to be user-friendly and under no circumstances snould the user be forced out of the computer system due to input errors. It is easy to use, with only a few simple rules to follow. A stand-alone version of the COSMIC/NASTRAN free-field input is also available. The use of free-field input is illustrated by a number of examples.

INTRODUCTION

With the advance of real-time terminal usage in computer applications, the need for COSMIC/NASTRAN free-field input for the Bulk Data section is long overdue. Beginning in the April '84 COSMIC/NASTRAN release, free-field input becomes available in all four machines (CDC, IBM, UNIVAC, and VAX). The relaxation of the rigid 8-column input format will not only benefit all real-time terminal users, but also the batch-job users will find it helpful in reducing possible fatal errors due to mis-punching data in the wrong columns. In addition, another long sought feature is also available - that is, the ability to duplicate similar input cards with minor changes in one or more selected fields automatically. The COSMIC/NASTRAN free-field input offers several options that can be invoked at any time during a free-field input session - options to make terminal keyboard data entry easier, to allow a user to execute NASTRAN LINK 1 only, and to punch out generated card images.

This work was originally developed for the Sperry version of NAS-TRAN. It is now available to the COSMIC/NASTRAN with improved capabilities.

FREE-FIELD CAPABILITY

The free-field capability is best understood by stating the following rules and program features:

1. Free-field input is available only after a 'BEGIN BULK' card is read, and is disabled automatically when 'ENDDATA' is entered.

2. Free-field input is activated by one or more commas (,) or an equal sign (=) in the first 10 columns of the input card.

3. Only small-field cards can be created.

4. Data items must be separated with a comma, one or more blanks, or the combination of a comma and blanks.

5. Duplication of fields from the preceding card is accomplisned by coding an equal sign (=) in the appropriate field.

6. Two equal signs (==) indicate duplication of all the trailing fields from the preceding card.

7. Increment of a value from the previous input card is indicated by coding *(i), where i is the value ot the increment (integer or floating point number) and * is the increment character. This feature is field dependent in the input card.

8. Increment of a value from the previous input card to an ending value is indicated by coding %(E), where E is the ending value (integer or floating point number) in the last card to be generated, and % is the ending character. This feature is also field dependent.

9. Repeated duplication is indicated by coding =(N), where N is the number of card images to be generated using the value of the increment on the preceding card (or current card) by *(i), or the computed incremental value on the preceding card by %(E). The last generated card is also displayed on the terminal screen if the prompt option (see 17 below) has been turned on.

10. A field index and value can be coded by n)X, where n is the field index and X the value.

11. The symbol)+ is equivalent to 10)+, where 10 is the tenth field of the input card, which is normally the continuation ID field.

12. A right bracket) in column 1 indicates the duplication of the tenth field of the preceding card into the first field of the current card being generated.

13. Continuation ID (in field 1 or 10) is automatically increased (by 1) in the repeated-duplication operation. The ID must be in the form of +A-X, where A is one or more alphanumeric characters preceded by a plus, and followed by a minus sign. X is an unsigned integer to be used as the initial value for increment. A maximum of eight characters (including signs) is allowed, with no embedded blank(s). An '=(1)' in the first input field is needed for single card duplication.

14. Data in field 10, not in the form of +A-X, is replaced by blanks during repeated-duplication operation.

15. The ECHO card (described in the Case Control section of the Users' Manual) can be input (or re-defined) at any time during the free-field input session.

16. A new option, 'ECHO=LINK1', can be entered at any time to alter the NASTRAN execution sequence to that of 'link-one-only', and to skip BANDIT grid-point resequencing.

17. A prompt command, PROMPT=ON, PROMPT=OFF, PROMPT=YES, can be entered any time during the free-field input session so that the computer will display (or not display) on the terminal screen a prompt symbol (either a '>' or 'ENTER:') when it is ready to receive input data. The PROMPT=YES option will also display the generated card image on screen in addition to the prompt symbol.

18. Floating-point numbers in the forms of 1.23E+04, 1.23+4, or 12300. are acceptable.

19. Both upper-case and lower-case letters are acceptable. (NASTRAN, not in free-field input mode, accepts only upper-case input cards. If lower-case letters are used in the Executive and the Case Control sections of NASTRAN, the first 8 columns of an input card must contain at least one lower-case letter, that would trigger the free-field routine to convert all lower-case letters in the current input card to upper-case automatically. This requirement is not needed in the Bulk Data input section).

20. Both BCD and EBCDIC character sets are acceptable. This is required for some EBCDIC machines (e.g. IBM) with BCD input cards.

21. The dollar sign ($) can be used freely as described in NASTRAN Users' Manual.

22. Embedded blank(s) are not allowed in all double-character free-field input commands such as: =(, *(, %(,)+, and ==.

23. A stand-alone version of NASTRAN free-field input is available to the user by executing NASTRAN LINKFF.

24. Two additional commands are available only in the stand-alone version. They are:

(a) SCALE/8 or SCALE/10 - to display a scale based on 8-column format, or 10-column format, on screen to aid input spacing.

(b) CANCEL=n - to cancel n previously generated cards.

25. The ECHO command is not available in the stand-alone version.

26. The punch option and catalog file (to save generated card images) are set at the beginning of the stand-alone version.

27. A 'NASTRAN TITLEOPT=-2' card is recommended to be the very first line of input for all terminal users executing NASTRAN LINK1 (not the stand-alone version of LINKFF). It suppresses the printout of the NASTRAN title pages on screen. This card is required for UNIVAC terminal users executing LINK1, which also reassigns the alternate print file (the log-message file) to avoid system crashing.

EXAMPLES

The following examples illustrate the use of free-field input.

Example 1.

```
GRID,  2,  3,    1.0  2.0,,   4,316
=,   *(1),  =,  *(.2),  == $
=(3)
```

The above free-field cards will generate the following bulk data cards in NASTRAN 8-column-field format:

1	2	3	4	5	6	7	8
GRID	2	3	1.0	2.0		4	316
GRID	3	3	1.2	2.0		4	316
GRID	4	3	1.4	2.0		4	316
GRID	5	3	1.6	2.0		4	316
GRID	6	3	1.8	2.0		4	316

Example 2:

```
grid,2,3,1.0,2.0,,4,316
=(4),*(1),=,%(1.8),==
```

The above cards will generate the same bulk data cards as in Example 1.

Example 3:

```
Grid, 2 3 1.0 2.0, 7) 4,   316
```

6

This example will generate the same first card as in Example 1.

Example 4:

```
     Tabled3,62, 126.9, 30.0   10)+abc
     ),  1.23e+4,  5.67+8, 1234567.  endt
```


This example will generate the following bulk data cards:

```
    1       2       3       4       5       6       7           10
--------+++++++--------+++++++--------+++++++--------- ~ ~ ~+++++
TABLED3 62      126.9   30.0                                  +ABC
+ABC    1.23E+4 5.67+8  1234567.ENDT
```


Example 5:

```
     taBLed3,  62    126.9   30.0     )+aBc
```


This example will generate the same first card as in Example 4.

Example 6:

```
     This   is only a test
     THIS   IS only a test
     This,  is only a test
```


The different results of the above 3 input lines are shown by the
generated card images below:

```
    1       2       3       4       5       6       7
--------+++++++--------+++++++--------+++++++---------~ ~
THIS    IS ONLY A TEST
THIS    IS only a test
THIS        IS      ONLY    A       TEST
```

Example 7:

```
PBAR, 3, 4, 5.0 , 6.0, )+ABC-1
= , *(1), =, *(2.)   ==
=(2)
+ABC-1,  7.7  8.8  9  )+DEF-22
=(3),==
```

This example will generate the following 8 cards with continuation ID fields automatically increased by 1.

1	2	3	4	5	6	9	10
PBAR	3	4	5.0	6.0			+ABC-1
PBAR	4	4	7.0	6.0			+ABC-2
PBAR	5	4	9.0	6.0			+ABC-3
PBAR	6	4	11.0	6.0			+ABC-4
+ABC-1	7.7	8.8	9				+DEF-22
+ABC-2	7.7	8.8	9				+DEF-23
+ABC-3	7.7	8.8	9				+DEF-24
+ABC-4	7.7	8.8	9				+DEF-25

Example 8:

```
CQUAD2,  101  1        11  12  16  15
CQUAD2,  102  1        12  13  17  16
CQUAD2,  103  1        13  14  18  17
```

This example shows the combination of free-field and tabulation input. The requirement of 8-columns per field does not apply here.

Example 9:

This example is the actual input cards used in COSMIC/NASTRAN demonstration problem No. 1-6-1b. It gives the same sorted input data as Problem No. 1-6-1a, which uses the regular fixed-field input format.

```
ID        D01061,BNASTRAN
APP       DISP
SOL       1,1
TIME      5
CEND
TITLE = SOLID DISC WITH RADIALLY VARYING THERMAL LOAD
        (FREE-FIELD INPUT)
SUBTITLE = NASTRAN DEMONSTRATION PROBLEM NO. 1-6-1B
LABEL = TRAPEZOIDAL RING ELEMENTS
ECHO  = BOTH
SPC   = 16
TEMPERATURE(LOAD) = 16
    OUTPUT
    SET 1 = 1,3,5,7,9,11,13,15,17,19,21,23,25,26
    DISP  = 1
    ELSTRESS = ALL
BEGIN BULK
CTRAPRG, 1,1,3,4,2,.0,12
=(11), *(1) *(2) *(2) *(2) *(2), ==
GRDSET, 8)2456
GRID,1,,.0
=(3),*(2),,*(.005)
GRID,2,,.0,,.01
=(3),*(2),,*(.005),==
GRID,9,,.02
=(8),*(2),,%(.10)
GRID,10,,.02,,.01
=(8),*(2),,%(.10),==
MAT1,12,1.0+7,,,.3,.2587-3,1.0-7,.0
SPC,16,1,13,.0,2,1,.0
TEMP,16,1,100.,2,100.,3,99.75
=,=,4,99.75,5,99.0,6,99.0
=,=,7,97.75,8,97.75,9,96.0
=,=,10,96.0,11,91.0,12,91.0
=,=,13,84.0,14,84.0,15,75.0
=,=,16,75.0,17,64.0,18,64.0
=,=,19,51.0,20,51.0,21,36.0
=,=,22,36.0,23,19.0,24,19.0
=,=,25,.0,26,.0
ENDDATA
```

LIMITATION

Embedded blank(s) are not allowed in field 10, which is sometimes used as a comment field.

The ability to duplicate generated cards repeatedly as shown in Example 1 is indeed only one dimensional. Presently, there is no intention to expand this useful feature into two- or three-dimensional duplications, which would undoubtedly require more complicated input rules and procedures.

CONCLUSION

COSMIC/NASTRAN free-field input is accomplished by replacing one simple subroutine (XREAD) with a new routine that handles free-field input logic. It is designed to be simple to use, and user-friendly. It is intended only to be an instrument to aid NASTRAN bulk data input, and to avoid possible fatal errors. It is not intended to become a mesh-generation and modeling tool.