P6060

BASIC Software Library

Structural Analysis Series
Three Dimensional Truss Analysis
User Manual

olivetti

LU Code 3972400 P (0)

PREFACE

This publication is addressed to P6060 systems users interested in Structural Engineering Applications.

SUMMARY

This manual contains the user documentation of P6060 Structural Engineering Series Three Dimensional Truss Analysis.

Related Documents:

P6060 - Reference Manual - Code 3941160 L

P6060 - Technical Supplement Linear Elastic Analysis of Skeletal Structures

P6060 - Utilities for Structural Analysis User Manual Code 3973690 L

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CONTENTS

This product is devoted to assist you in performing Structural Engineering.
Particular care should be taken in introducing structure fundamental parameters which means number of members, joints, fixed support joints, loading conditions and combinations; correction is immediately available after the end of the parameters input; the same applies to the list of fixed support joints. Input is divided in several phases to help you in considering only a group of data each time; phases can be called in any order, whenever and as much as is needed. In this program particular attention has been paid to include correction routines of data entry errors, so that each phase has internally correction possibility available.
Operating procedures are handled conversationally, that is as a"question and answer" mode: all required values to be entered are specified by clear messages on the display, errors are controlled and signalled to the user.

Conversational Mode

The programs in this package were written in Olivetti P6060 BASIC, a simple-to-use computer language not requiring extensive professional training in programming. However, the user of the package need not be concerned with the language used at all. This is because the P6060 uses "conversational mode" to ask the operator questions through the visual display and will proceed on the basis of the operator's answers entered on the keyboard. At all times the machine will guide the operator through the required procedure and give him explicit error messages on the display if his responses are not meaningful.
When binary choice is given, the display itself guides you to the correct answer; when multiple choices are given at any point in the program they can be listed with the printer (pressing function key F-16), so the operator will always be informed of what his choices of action are. Note also that this list shows which characters you need to enter.
It is advised that the reader continue reading this manual through the INTRODUCTION and the description of the HELP program before attempting to run the program.

Programs available in this Package

The programs in this package were designed to operate on a machine with 32 K of user memory and dual drive floppy disk unit.
This package is composed of 2 floppy disks:
the first for data input of space truss structures and the second for data manipulation and printout of requested results. Both disks are system floppy disks and must run with the same user disk.
The available programs are the following:

a) for the INPUT disk

*HELP	Description of contents of the disk
*INPUT	Input of all the data of the structure: general parameters and phases. Phases available : joint coordinates, member incidences, material properties, prescribed joints displacements, loadings, loading combinations. Each phase has the following options: modify and print. In order to help user in entering data, some verbs have been created: CHANGE, DELETE, NEW, LIST, FROM TO STEP, ALL. The use of these verbs will be deeply described when needed. Instruction to load calculation disk.

b) for the calculation disk

*HELP	Description of contents of the disk
*CALC	Calculation of the structure.
*PRINT	Printout of all the data of the structure in a formatted print, together with the results.

How this manual is organized

This manual presents the descriptive and procedural information for each program in the package by standard subsections as follows:

Program Title and Mnemonic
Purpose
Method
Function Key Template
Operating Procedure
Error Messages
Sample Program Run

When not relevant, a subsection may be left out. A brief description of what information is contained in each subsection follows:

- Program Title and Mnemonic

  Note that the mnemonic filename which designates the program on the disk file appears in the upper right hand corner enclosed in a box. This will help you find the program you need quickly. Note also that all Olivetti supplied programs (those in Olivetti Package Library) must be preceded by an asterisk (*).

- Purpose

  A short paragraph briefly describing the program's internal purpose scope is given here.

- Method

One or two paragraphs briefly describing the main options available are given in this subsection. If the user needs to know more about mathematical techniques or methods employed a fuller explanation is given in the Technical Supplement, a companion volume to this package.

- Function Key Template

The P6060 keyboard has a row of eight keys at the upper right which are custom-defined by the program being used. (In fact, they are at the user's disposal to define also.) This package has an associated template which should be inserted into the holder just above the keys. In this manual under this subsection you will find a facsimile of this template and an explanation of the function titles.

- Operating Procedure

After a program filename has been selected by the user and executed by the simple command:

RUN * FILENAME

the operating procedure should be clear from the prompting messages displayed. Each message ending with a ? demands a response from the operator before continuing execution. Usually this will be entry of an alphanumeric value (followed by the END OF LINE Key) or pressing an appropriate F-key.

However, we have listed for your convenience a step-by-step operating procedure that parallels this question and response sequence. Each displayed prompting message is indicated by the symbol ◯ and each printed list of options or printed text is indicated by the symbol ▢ . There are in general, two phases to each numbered step:

Question - a prompting message generated by the machine (sometimes with accompanying printed text).

Response - an action required by the operator in response to the prompting message.

- Error Messages

If an operator mistake is made, the machine in most cases will give an explicit error message and return the operator to some previous prompting message at which point a correction can be made. A list of the possible error messages generated by the program is given in this section. Note that in every case the action to be taken by the operator is specified.

- Sample Program Run

There are two reasons for including an actual sample run. First, to have sample data that was tried before and produced output to check your output against. If the results don't agree then somehow your disk has been altered and you do not have a correct program. If the results agree you can be fairly confident that your program is in working

order. Secondly, the sample run serves to illustrate the required operating procedure and may answer certain questions without requiring your time in an actual run.

The program *INPUT contained in the input disk is internally divided , as said before, in 8 phases so this manual presents the descriptive and procedural information for each different phase by standard subsection as follows:

Phase Title and Mnemonic
Purpose
Method
Operating Procedures
Error Messages
Sample Program Run

A brief description of what information is contained in each subsection follows:

- Phase Title and Mnemonic

  Note that the three letter mnemonic code which designates the phase on the input disk appears in the upper right hand corner enclosed in a box. This will help you find the phase you need quickly.

- Purpose

  A short paragraph briefly describing the program's internal purpose scope is given here.

- Method

  One or two paragraphs briefly describing the main options available are given in this subsection.

- Operating Procedure

  After a phase code has been selected by the user, the operating procedure should be clear from the prompting messages displayed. Each message ending with a ? demands a response from the operator before continuing execution. Usually this will be entry of an alphanumeric value(followed by the (END OF LINE) Key) or pressing an appropriate F-key. However also here we have listed for your convenience a step-by-step operating procedure that parallels this question and response sequence. Each displayed prompting message is indicated by the symbol ◯ and each printed list of options or printed text is indicated by the symbol ▭. There are in general two phases to each numbered step:

  Question - a prompting message generated by the machine

  Response - an action required by the operator in response to the prompting message.

  Within each phase there are usually a number of alternative possibilities selected by a simple alphabetic code in response to the prompting message.

- Error Messages

  If an operator mistake is made, the machine in most cases will give an explicit error

message and return the operator to some previous prompting message at which point a correction can be made. A list of the possible error messages generated by the program is given in this section. Note that in every case the action to be taken by the operator is specified.

- Sample Program Run

There is a fundamental reason to give for each phase a sample run, and is to show all the possibilities available in the simple phase. In fact both the operating procedure section, and the sample program run describes you all the points you can reach during the selected phase.

How to Begin

Before starting any routine, read carefully Appendix A. and the user manual belonging to the disk: Utilities for Structural Analysis.

After that, sit in front of your machine, turn on the power and insert the system disk, INPUT together with a USER DISK. After a momentary warm up periqd the machine will display READY, and you are ready to go.

Just hit the key RUN and spell out *HELP on the keyboard, followed by the END OF LINE key. Run any other Olivetti Library program by hitting the key RUN and spell out the corresponding filename (be sure to include the asterisk) followed by the END OF LINE key. It's that simple. Once the program is accessed the machine runs in conversational mode and you are guided by the displayed prompting messages.

How to Enter Data From the Keyboard

All data must first be entered through the keyboard. This is facilitated by input routines supplied in the program. These data are then stored on external data files as well as processed and these stored files can later be used as input.

Single Numbers

A keyboard entry is required whenever a prompting message appears on the display followed by a question mark (?). If it is a single number the program requests, the operator enters it using the numeric keys* in the algebraic section with decimal point used where it appears in the number. If a number is negative simply hit the (−) key before the number. Hit (END OF LINE) to terminate the entry of the number. At this point it will be received by the machine and program execution will continue.

Notice that as the numbers are keyed in, they appear in the display, the first entered replacing the prompting message. A pointer moves along with each added character in the display. If at any time before terminating the entry it is desired to see the prompting display, simply hit (RECALL) and it will re-appear. Hit (RECALL) again to retrieve your

* The numeric keys in the top row of the alphanumeric section and the decimal point in that section can alternatively be used.

unfinished data entry in the display.

Before hitting End-of-Line you may want to check the entry on the visual display. If a mistake has been made in a single digit and you have not yet hit the END OF LINE key, you may move the pointer backward to the erroneous digit using the ← key, hit the CHAR DELETE key, replace the digit in error with a correct one. Move the pointer back to the far right if more digits or numbers are to be added. If no more are required, however, it is sufficient to leave the pointer where it is. Hitting END OF LINE will enter all characters in the display.

Manipulation of the shift pointer and CHAR DELETE keys can also facilitate insertion or deletion of a digit or group of digits. In many cases however simply use the SHIFT CLEAR key to clear out the display and start from scratch.

List of Numbers

If the program requests a list of two or more numbers (always clear from the prompting message) then simply enter the single numbers in the list separated by commas. You can use the comma key in the algebraic section or the one in the alphanumeric section as you prefer.

How Errors Are Recognized and Handled

Data Errors you Catch

If you catch an entry error before hitting END OF LINE you may correct it before it is actually received by the machine as explained above. After hitting END OF LINE you normally have to follow the following procedure: just finish the complete input and select the option modify which allows you to change the previous input giving a new data. If the error occurs in assigning an element to a certain group or set of data, just re-define a different group or set of data assigning it to the correct element and the previous assignment will have no meaning.

Erroneous Options or Data Errors the Program Catches

If you have chosen an option you didn't intend to take usually you must return to the previous selection point. However, if the entered option was not valid or data was unacceptable to the program an error message will generally by given citing the specific reason. This message remains on the display, but by hitting SHIFT → you can retrieve the proper prompting message for entering a valid response and continuing the program.

How to Find Out if Your Disk is the Correct One

In Appendix A of this User's Manual can be found a catalog of programs which constitute Release 1.0 of this software package. By entering the system command CAT S, *, , F (available at any time when machine is in command mode) you should be able to reproduce the catalog listing shown there. Subsequent software releases of this package, however, may supercede this published listing so be sure to obtain the latest software release from your

sales representative.

However the program itself checks whether the data stored on your files corresponds to the same structure of your system disk, an error message appears when this happens, and the program stops running.

Note that all programs in Olivetti Package Libraries have an asterisk which preceeds the filename. Olivetti only supports and maintains those programs in Olivetti Package Libraries.

INPUT DISK HELP PROGRAM

Purpose

This program is designed to assist you use the program in this disk. If you are already familiar with the contents of the package and have previously run the program you may not need to use this program at all. Simply hit the [RUN] key, enter the filename of the program in your disk (*INPUT) and hit [END OF LINE] key.
If you are somewhat familiar with the package but have forgotten the filename mnemonics for the program you want, or simply you ignore to what type of structure belongs your disk then you may use HELP to see the contents of your disk.
If you have never used the package before, then you may use HELP to give you a description of the program and the procedure for accessing it.

Operating Procedure

1. Ensure that machine is in COMMAND MODE. If you are already in COMMAND MODE you will get an audio beep.

2. Enter RUN *HELP

   The Package identifying message will be displayed:

   Example:

   

   HELP FOR INPUT OF SPACE TRUSS

   and the Package Header will be printed:

   

   ```
   Olivetti P6060 STRUCTURAL ANALYSIS SERIES
   THREE-DIMENSIONAL TRUSS ANALYSIS - Code M2601255
   Release 1 - Level 0        May 1977
   Copyright 1977, by Olivetti
   ```

   followed by the program number, his title, his mnemonic and general informations and outline.

3. The message

   

   PRESS : F-1

   will now appear and the machine will automatically exit the HELP program. Simply press the F-1 key and wait for the first message to appear.

Sample Program RUN

```
Olivetti P5060 STRUCTURAL ANALYSIS SERIES
THREE-DIMENSIONAL TRUSS ANALYSIS - Code M26012SS
Release 1 - Level 0        May 1977
Copyright 1977, by Olivetti
```

This disk is one of the structural engineering series, which consists of the following programs:

1) PLANE FRAME
2) PLANE GRID
3) PLANE TRUSS
4) SPACE TRUSS

It should be used with a user disk, in which data files for SPACE TRUSS analysis have been previously created and correctly dimensioned. (This operation can be done with the disk: UTILITIES for STRUCTURAL ANALYSIS).

In particular, with this disk, all the data belonging to a SPACE TRUSS structure can be entered.
To do this just enter the command: RUN *INPUT

Both the display and printer guide you through all the phases of the program, for the questions listed below

SELECT PHASE ?
SELECT OPTION ?
SELECT VERB ?
JOINT-LOAD CODE ?
MEMBER-LOAD CODE ?

the complete set of answers can be obtained just by pressing the fkey F16 (or entering HELP followed by the end of line key).

At the end of the input, the program itself, upon request, will indicate how to load the calculation disk.

PRESS : F-1
****

INPUT DATA

Purpose

This program is used to store all your data on the external data files of your user disk entering them by the keyboard, with the possibility of error detection and of data modification, deletion, addition and/or printout.

Method

All the numeric data handled by this program are in single precision, calculation are made in double precision.

The input of all the data of a structure is divided in 9 different phases, each of which handles his own data and can be called whenever and as much as needed.

In each phase options and verbs are available in order to reduce time necessary to complete the input. The list of available phases can be printed pressing the key F-16 (HELP): this list signals also when an input has already been done, printing a * before the relative phase.

Note that for all alphabetic entries, the only meaningful characters are the first three: this is true every where with the only exception of the load-code entry which must be entered completely and to which a certain number of F-keys are completely devoted.

Function key template

LINEAR DISTORTION		TEMPERATURE	PARTIAL	TRAPEZOIDAL	FROM TO STEP	ALL	HELP
FORCE	MOMENT	UNIFORM	LOCAL	X	Y	Z	END

F1 to define a joint or a member punctual load

F2 to define a joint or a member moment

F3 to specify that a load is uniformly distributed

F4 to specify that a load is in the local coordinates

F5 to specify that a load acts in the X axes

F6 to specify that a load acts in the Y axes

F7 to specify that a load acts in the Z axes

F8 to return to a higher stage

F9 to indicate a linear distortion

F10 no definition

F11 to indicate a variation of temperature

F12 to indicate that a distributed member load is only acting on a portion of the member

F13 to indicate a trapezoidal member load

F14 to list the elements from which and to which applies the previous data, and the step of counting

F15 to indicate that the previous given data applies to all the elements

F16 to get a list of the actual multiple choice

Operating Procedure

1. Ensure that the disk labelled "Input for SPACE TRUSS" is on drive 2 and a user disk with already created files is on drive 1.

2. Enter RUN *INPUT and insert the appropriate template in the holder

THREE DIMENSIONAL TRUSS ANALYSIS

```
Olivetti P6060 STRUCTURAL ANALYSIS SERIES
THREE-DIMENSIONAL TRUSS ANALYSIS - Code M26212SS
Release 1 - La ei 0        May 1977
Copyright 1977 by Olivetti
```

```
DEFINITION OF F-KEYS
********************

F-1    FORCE
F-2    MOMENT
F-3    UNIFORM
F-4    LOCAL
F-5    X
F-6    Y
F-7    Z
F-8    END
F-9    LINEAR DISTORTION
F-11   TEMPERATURE
F-12   PARTIAL
F-13   TRAPEZOIDAL
F-14   FROM TO STEP
F-15   ALL
F-16   HELP
```

STRUCTURE NEW (YES=1 NO=Ø) ?

3. Enter 1 or Ø

If the answer is Ø go to point C.

If the answer is 1

STRUCTURE NEW

FILES INITIALIZATION

JOB IDENTIFICATION : (MAX. 16 CHR) ?

4. Enter job identification - TRUSS EXAMPLE

JOB IDENTIFICATION: .TRUSS EXAMPLE

MEMBERS (MAX. 3ØØ)?

5. Enter number of members - ex. 25

LINE		
1	NUMBER OF MEMBERS	25

JOINTS (MAX. 25Ø) ?

6. Enter number of joints - ex. 21

2	NUMBER OF JOINTS	21

FIXED SUPPORT JOINTS (MAX. 5Ø) ?

7. Enter number of fixed support joints - ex. 7

3	NUMBER OF FIXED SUPPORT JOINTS	7

LOADINGS (MAX. 5) ?

8. Enter number of loadings - ex. 2

4	NUMBER OF LOADINGS	2

LOADING COMBINATIONS (MAX. 5)?

9. Enter number of loading combinations - ex. 1

5	NUMBER OF LOADING COMBINATIONS	1

CORRECTION (YES=1 NO=Ø) ?

10. Enter 1 or Ø. If the answer is Ø go to point A - ex. 1

CORRECTION

LINE TO CORRECT ?

11. Enter number of line to correct. Let's correct the number of members - ex. 1

LINE TO CORRECT 1

MEMBERS (MAX. 3ØØ) ?

12. Enter new number of members - ex. 26

1	NUMBER OF MEMBERS	26

CORRECTION (YES=1 NO=Ø)?

13. If there are more corrections go to point 10. Otherwise enter Ø

A. If the number of fixed support joints indicated in the structure parameters is = Ø go to point B otherwise follow this procedure

FIXED SUPPORT JOINTS

JOINT INDEX?

14. Enter indices of support joints, each one separated by the END-OF-LINE key. Ex. 1

```
LINE      JOINT
  #       INDEX
  1         1
```

```
JOINT INDEX?
```

15. Enter 2nd support. Ex. 5

```
2          5
```

and the program keep asking indices of joints for the number of joints declared as supports. Then it asks

```
CORRECTION  (YES=1  NO=Ø)?
```

16. Enter 1 or Ø. If the answer is Ø go to point B. Ex. 1

```
CORRECTION
LINE TO CORRECT?
```

17. Enter number of line to correct. Ex. 2

```
LINE TO CORRECT  2
JOINT INDEX?
```

18. Enter index of the 2nd support joints. Ex. 4

```
2          JOINT INDEX  4
CORRECTION  (YES=1  NO=Ø)?
```

19. Enter 1 or Ø. If the answer is 1 go to point 16. Ex. Ø. Go to point B.

C. If the answer is Ø for an OLD STRUCTURE

```
JØB IDENTIFICATION:TRUSS EXAMPLE
********************************

NUMBER OF MEMBERS                  16
NUMBER OF JOINTS                   11
NUMBER OF FIXED SUPPORT JOINTS      5
NUMBER OF LOADINGS                  1
NUMBER OF LOADING COMBINATIONS      0

FIXED SUPPORT JOINTS
********************

 1  4  7  10  13  16  19
```

```
MODIFY LOADINGS  (YES=1  NO=Ø)?
```

20. Enter only 1 or Ø. If the answer is Ø go to point D. Ex. 1

```
MODIFY LOADINGS
LOADINGS   (MAX.  5 )?
```

21. Enter new value of loadings. Only if the number of loading is different from the previous one, you must enter also prescribed joint displacements. Ex: 2

```
NUMBERS OF LOADINGS  2
```

FILES INITIALIZATION

CANCELLED ALL PRESCRIBED AND LOADS

D. MODIFY COMBINATIONS (YES = 1 NO = Ø)?

22. Enter only 1 or Ø. If the answer is Ø go to point B. Ex. 1

MODIFY LOADING COMBINATIONS

LOADING COMBINATIONS (MAX. 5)?

23. Enter new values of loading combination - ex. 1

NUMBER OF LOADING COMBINATIONS 1

B. Then the program prints

STORED UNITS
****

LENGTH	(m)
AREA	(cm2)
FORCE	(kg)
YOUNG'S MODULUS	(kg/cm2)
MOMENT	(kgcm)
DISPLACEMENT	(cm)
TEMPERATURE	(Grad C)
ANGLE	(Grad)

DATA STORAGE

PHASES SELECTION
****

SELECT PHASE

24. Enter the selected phase. To get the complete list press F-16. Hereunder is the list of available phases which shows the fundamental three characters to enter and how an input already done is signalled (in this case coordinates)

LIST OF PHASES
****

	PHASE	MEANING AND USE
*	COOrdinates	TO ENTER JOINT COORDINATES
	INCidences	TO ENTER MEMBER INCIDENCES
	MAProperty	TO ENTER MATERIAL PROPERTY SETS
	PREscribed	TO ENTER PRESCRIBED JOINT DISPLACEMENTS
	LOAds	TO ENTER JOINT AND MEMBER LOADS
	COMbinations	TO ENTER LOADING COMBINATIONS
	CALculations	TO START STRUCTURE CALCULATIONS
	STOP	TO STOP PROGRAM RUNNING

* = INPUT ALREADY DONE

SELECT PHASE?

25. Enter the selected phase Ex:-COOrdinates

SELECTED PHASE: JOINT COORDINATES

JOINT COORDINATES

Error Messages

ERROR. RETYPE: >>STRUCTURE NEW (YES=1 NO=Ø)?

The user entered a value different from 1 or Ø.

Action: Enter 1 or Ø

ERROR . RETYPE: >>JOB IDENTIFICATION (MAX 16 CHR)?

The user entered an identification with more than 16 characters.

Action: Enter correct job identification

ERROR . RETYPE: >>MEMBERS (MAX 3ØØ)?

The user entered a negative, a decimal, Ø or a number bigger than 3ØØ

Action: Enter a correct value

ERROR . RETYPE: >>JOINTS (MAX 25Ø)?

The user entered a negative, a decimal, Ø or a number bigger than 25Ø

Action: Enter a correct value

ERROR . RETYPE: >>FIXED SUPPORT JOINTS (MAX 5Ø)?

The user entered a negative, a decimal, a number bigger than 5Ø, or a number bigger than thr total number of joints.

Action: Enter a correct value

ERROR . RETYPE: >>LOADINGS (MAX 5)?

The user entered a negative, a decimal, Ø or a number bigger than 5.

Action: Enter a correct value

ERROR . RETYPE: >>LOADING COMBINATIONS (MAX 5)?

The user entered a negative, a decimal or a number bigger than 5.

Action: Enter a correct value

ERROR . RETYPE: >>JOINT INDEX?

The user entered a negative, a decimal, Ø, a number bigger than the total number of joints, or reentered a joint already defined as support.

Action: Enter a correct value

ERROR . RETYPE: >>MODIFY LOADINGS (YES=1 NO=Ø)?

The user entered a number different than 1 or Ø.

Action: Enter 1 or Ø

ERROR . RETYPE: >>MODIFY COMBINATIONS (YES=1 NO=Ø)?

The user entered a number different than 1 or Ø.

Action: Enter 1 or Ø

ERROR . RETYPE: SELECT PHASE?

The user entered a code which does not identify an existing phase.

Action: Enter an acceptable code.(Press F-16 to get the complete listing.)

Sample Program Run for a NEW Structure

```
Olivetti P6060 STRUCTURAL ANALYSIS SERIES
THREE-DIMENSIONAL TRUSS ANALYSIS - Code M26012SS
Release 1 - Level 0       May 1977
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                    DEFINITION OF F-KEYS
                    ********************

                    F-1    FORCE
                    F-2    MOMENT
                    F-3    UNIFORM
                    F-4    LOCAL
                    F-5    X
                    F-6    Y
                    F-7    Z
                    F-8    END
                    F-9    LINEAR DISTORTION
                    F-11   TEMPERATURE
                    F-12   PARTIAL
                    F-13   TRAPEZOIDAL
                    F-14   FROM TO STEP
                    F-15   ALL
                    F-16   HELP
```

```
STRUCTURE NEW
JOB IDENTIFICATION:                    TRUSS EXAMPLE

LINE
 1              NUMBER OF MEMBERS                        25
 2              NUMBER OF JOINTS                         21
 3              NUMBER OF FIXED SUPPORT JOINTS            7
 4              NUMBER OF LOADINGS                        2
 5              NUMBER OF LOADING COMBINATIONS            1
```

```
CORRECTION
LINE TO CORRECT 1
 1              NUMBER OF MEMBERS                        26

FIXED SUPPORT JOINTS

LINE     JOINT
 #       INDEX
 1         1
 2         5
 3         7
 4        10
 5        13
 6        16
 7        19
```

```
CORRECTION
LINE TO CORRECT 2
 2              JOINT INDEX      4
                          STORED UNITS
                          ************

                        LENGTH                (m)
                        AREA                  (cm2)
                        FORCE                 (kg)
                        YOUNG'S MODULUS       (kg/cm2)
                        MOMENT                (kgcm)
                        DISPLACEMENT          (cm)
                        TEMPERATURE           (Grad C)
                        ANGLE                 (Grad)
```

```
                                PHASES SELECTION
                                ****************
SELECTED PHASE: JOINT COORDINATES
```

Sample Program Run for an OLD Structure

```
Olivetti P6060 STRUCTURAL ANALYSIS SERIES
THREE-DIMENSIONAL TRUSS ANALYSIS - Code M26012S3
Release 1 - Level 0      May 1977
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                    DEFINITION OF F-KEYS
                    ********************

                    F-1    FORCE
                    F-2    MOMENT
                    F-3    UNIFORM
                    F-4    LOCAL
                    F-5    X
                    F-6    Y
                    F-7    Z
                    F-8    END
                    F-9    LINEAR DISTORTION
                    F-11   TEMPERATURE
                    F-12   PARTIAL
                    F-13   TRAPEZOIDAL
                    F-14   FROM TO STEP
                    F-15   ALL
                    F-16   HELP
```

```
JOB IDENTIFICATION:TRUSS EXAMPLE
********************************

NUMBER OF MEMBERS                    26
NUMBER OF JOINTS                     21
NUMBER OF FIXED SUPPORT JOINTS        7
NUMBER OF LOADINGS                    1
NUMBER OF LOADING COMBINATIONS        0

FIXED SUPPORT JOINTS
********************

 1  4  7  10  13  16  19

MODIFY LOADINGS
NUMBER OF LOADINGS                    2
CANCELED ALL PRESCRIBED AND LOADS
MODIFY LOADING COMBINATIONS
NUMBER OF LOADING COMBINATIONS        1

                    STORED UNITS
                    ************

                LENGTH              (M)
                AREA                (cm2)
                FORCE               (kg)
                YOUNG'S MODULUS     (kg/cm2)
                MOMENT              (kgcm)
                DISPLACEMENT        (cm)
                TEMPERATURE         (Grad'C)
                ANGLE               (Grad)

                    PHASES SELECTION
                    ****************
SELECTED PHASE: JOINT COORDINATES
```

Phase 1

JOINT COORDINATES

COO

Purpose

This phase is used to enter coordinates of all the joints declared in the structure. To solve the problem, an itherative sequence is used, therefore no immediate correction is needed until the input sequence is not finished. Remote correction is available at the option stage.

Method

In his first calling this phase starts with the input routine. Options available are MODIFY, PRINT and END which can be listed when needed pressing the key F-16.
The use of the option MODIFY brings you to a selection of verbs which are DELETE, CHANGE, NEW and END and can be listed when needed pressing the key F-16.
DELETE verb can be used to delete a joint from the structure, operation which can modify the structure. (For instance members starting or ending at this joint, will become cantilever beams,or will have no meaning if already cantilever.) CHANGE verb can be used to change the coordinates of one or more joints.
NEW verb can be used when the errors occurred during the input are too many,and user wishes to restart the input, which is quite faster, in this case.
The use of END verb, brings you again to the options selection, a higher stage than the verbs, while the use of END option brings you to the phases selection which again is a higher stage than the options.
The use of the option PRINT is clear.

Operating Procedures

JOINT COORDINATES

JOINT COORDINATES
****

NUMBER OF JOINTS 21

If the input has already been done, go to point 2

JOINT X(m) Y (m) Z (m)

JOINT 1 : X, Y, Z ?

1. Enter coordinates of joint 1 - Ex. Ø,Ø,Ø

1 Ø.ØØØ Ø.ØØØ Ø.ØØØ

JOINT 2: X, Y, Z, ?

and this goes on up to the complete entry of the coordinates of all the joints. When completed the program asks

SELECT OPTION?

2. Enter the selected option. Upon request, the list of available options is obtainable pressing F-16 (HELP)

SELECTED OPTION HELP

LIST OF OPTIONS
****

OPTION	MEANING AND USE
MODify	TO MODIFY STRUCTURE DATA
PRInt	TO PRINT STRUCTURE DATA
END	TO RETURN TO THE PHASES SELECTION

SELECT OPTION?

3. Enter the selected option. Ex. MODify

SELECTED OPTION MODIFY

SELECT VERB?

4. Enter the selected verb. Upon request, the list of available verbs is obtainable pressing F-16 (HELP).

SELECTED VERB HELP

LIST OF VERBS
****

VERB	MEANING AND USE
CHAnge	TO CHANGE STRUCTURE DATA
DELete	TO DELETE STRUCTURE DATA
NEW	TO ADD NEW DATA OR RESTART THE INPUT
END	TO RETURN TO THE OPTIONS SELECTION

SELECT VERB?

5. Enter the selected verb. Ex. CHAnge

SELECTED VERB CHANGE
JOINT X(m) Y(m) Z(m)

JOINT INDEX (F-8 = END)?

6. Enter the index of the joint to whom you want to change coordinates. Ex. 3

JOINT 3 : X, Y, Z ?

7. Enter the coordinates of joint 3. Ex. Ø, 2Ø.ØØØ

3 Ø.ØØØ 2Ø.ØØØ Ø.ØØØ

JOINT INDEX (F-8 = END)?

8. Press F-8 to exit from the change routine

SELECT VERB?

9. Enter the selected verb. Ex. DELete

SELECTED VERB DELETE

JOINT INDEX (F-8 = END)?

10. Enter the index of the joint you want to delete. Ex. 5

DELETED JOINT 5

JOINT INDEX (F-8 = END)?

11. Press F-8 to exit from the delete routine

SELECT VERB?

12. Enter the selected verb. Ex. NEW

SELECTED VERB NEW
JOINT X(m) Y(m) Z(m)

The program restarts the input routine, ending with the select verb question.

JOINT 1 : X, Y, Z ?

13. Enter the coordinates of joint 1. Ex. ø, ø, ø

1 ø.øøø ø.øøø ø.øøø

and this goes on up to the complete entry of the coordinates of all the joints. When completed the program asks

SELECT VERB?

14. Enter the selected verb. Ex. END

SELECTED VERB END

SELECT OPTION?

15. Enter the selected option. Ex. PRInt

SELECTED OPTION PRINT

JOINT COORDINATES
****

JOINT	X(m)	Y(m)	Z(m)
1	0.000	0.000	0.000
2	0.000	10.000	0.000
3	0.000	20.000	0.000
4	10.000	0.000	0.000
5	10.000	10.000	0.000
6	10.000	20.000	0.000
7	20.000	0.000	0.000

8	20.000	10.000	0.000
9	20.000	20.000	0.000
10	0.000	0.000	10.000
11	0.000	10.000	10.000
12	0.000	20.000	10.000
13	10.000	0.000	10.000
14	10.000	10.000	10.000
15	10.000	20.000	10.000
16	20.000	0.000	10.000
17	20.000	10.000	10.000
18	20.000	20.000	10.000
19	20.000	0.000	20.000
20	20.000	10.000	20.000
21	20.000	20.000	20.000

SELECT OPTION?

16. Enter the selected option. Ex. END

SELECTED OPTION END

DATA STORAGE

PHASES SELECTION
****

SELECT PHASE?

17. Enter the selected phase. Ex. INCidences

SELECTED PHASE: MEMBER INCIDENCES

MEMBER INCIDENCES

Error Messages

ERROR . RETYPE: SELECT OPTION?

The user entered a code not identifying an existing option.

Action: Enter a valid option.(Press F-16 to get the complete list)

ERROR . RETYPE : SELECT VERB?

The user entered a code not identifying an existing verb.

Action: Enter a valid verb. (Press F-16 to get the complete list)

ERROR . RETYPE: >>JOINT INDEX (F-8 = END)?

The user to identify a joint entered a negative, a decimal or a number bigger than the total number of joints.

Sample Program Run

```
JOINT COORDINATES
*****************

NUMBER OF JOINTS   21
```

JOINT	X(M)	Y(M)	Z(M)
1	0.000	0.000	0.000
2	0.000	10.000	0.000
3	0.000	0.000	20.000
4	10.000	0.000	0.000
5	10.000	10.000	0.000
6	10.000	20.000	0.000
7	20.000	0.000	0.000
8	20.000	10.000	0.000
9	20.000	20.000	0.000
10	0.000	0.000	10.000
11	0.000	10.000	10.000
12	0.000	20.000	10.000
13	10.000	0.000	10.000
14	10.000	10.000	10.000
15	10.000	20.000	10.000
16	20.000	0.000	10.000
17	20.000	10.000	10.000
18	20.000	20.000	10.000
19	20.000	0.000	20.000
20	20.000	10.000	20.000
21	20.000	20.000	20.000

```
SELECTED OPTION HELP

                    LIST OF OPTIONS
                    ***************

-----------------------------------------------
| OPTION |          MEANING AND USE           |
|--------|------------------------------------|
|        |                                    |
| MODify | TO MODIFY STRUCTURE DATA           |
| PRInt  | TO PRINT STRUCTURE DATA            |
| END    | TO RETURN TO THE PHASES SELECTION  |
|        |                                    |
-----------------------------------------------
```

SELECTED OPTION MODIFY

SELECTED VERB HELP

LIST OF VERBS
****

VERB	MEANING AND USE
CHAnge	TO CHANGE STRUCTURE DATA
DELete	TO DELETE STRUCTURE DATA
NEW	TO ADD NEW DATA OR RESTART THE INPUT
END	TO RETURN TO THE OPTIONS SELECTION

SELECTED VERB CHANGE

JOINT	X(m)	Y(m)	Z(m)
3	0.000	20.000	0.000

SELECTED VERB DELETE

DELETED JOINT 5

SELECTED VERB NEW

JOINT	X(m)	Y(m)	Z(m)
1	0.000	0.000	0.000
2	0.000	10.000	0.000
3	0.000	20.000	0.000
4	10.000	0.000	0.000
5	10.000	10.000	0.000
6	10.000	20.000	0.000
7	20.000	0.000	0.000
8	20.000	10.000	0.000
9	20.000	20.000	0.000
10	0.000	0.000	10.000
11	0.000	10.000	10.000
12	0.000	20.000	10.000
13	10.000	0.000	10.000
14	10.000	10.000	10.000
15	10.000	20.000	10.000
16	20.000	0.000	10.000
17	20.000	10.000	10.000
18	20.000	20.000	10.000
19	20.000	0.000	20.000
20	20.000	10.000	20.000
21	20.000	20.000	20.000

SELECTED VERB END

SELECTED OPTION PRINT

JOINT COORDINATES
****

JOINT	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000
2	0.000	10.000	0.000
3	0.000	20.000	0.000
4	10.000	0.000	0.000
5	10.000	10.000	0.000
6	10.000	20.000	0.000
7	20.000	0.000	0.000
8	20.000	10.000	0.000
9	20.000	20.000	0.000
10	0.000	0.000	10.000
11	0.000	10.000	10.000
12	0.000	20.000	10.000
13	10.000	0.000	10.000
14	10.000	10.000	10.000
15	10.000	20.000	10.000
16	20.000	0.000	10.000
17	20.000	10.000	10.000
18	20.000	20.000	10.000
19	20.000	0.000	20.000
20	20.000	10.000	20.000
21	20.000	20.000	20.000

SELECTED OPTION END

PHASES SELECTION
****

SELECTED PHASE: MEMBER INCIDENCES

MEMBER INCIDENCES INC

Purpose

This phase is used to enter incidences of all the members declared in the structure. To solve the problem an itherative sequence is used, therefore no immediate correction is needed until the input sequence is not finished. Remote correction is available at the option stage.

Method

In his first entry this phase starts with the input routine. Options available are MODIFY, PRINT and END which can be listed when needed pressing the key F-16.
The use of the option MODIFY brings you to a selection of verbs which are CHANGE, DELETE, NEW and END and can be listed when needed pressing the key F-16. DELETE verb can be used to delete a member from the structure, operation which can modify the structure. (For instance joints being start or end of a member can have no meaning if belonging to this member only.) CHANGE verb can be used to change the incidences of one or more members. NEW verb can be used when the errors occurred during the input are too many, and user wishes to restart the input, which is quite faster in this case.
The use of END verb, brings you again to the options selection a higher stage than the verbs, while the use of END option brings you to the phases selection, which again is a higher stage than the options. The use of the option PRINT is clear.

Operating Procedure

MEMBER INCIDENCES

```
MEMBER INCIDENCES
*****************


NUMBER OF MEMBERS    26
NUMBER OF JOINTS     21
```

If the input has already been done go to point 2.

```
        MEMBER          START        END
          #             JOINT        JOINT
```

MEMBER 1 : START, END-JOINT?

1. Enter incidences of member 1. Ex. 1, 2

1 1 2

MEMBER 2 : START, END-JOINT?

and this goes on up to the complete entry of the incidences of all the members. When completed the program asks:

SELECT OPTION?

2. Enter the selected option. Upon request, the list of available options is obtainable pressing F-16 (HELP)

SELECTED OPTION HELP

LIST OF OPTIONS
****

OPTION	MEANING AND USE
MODify	TO MODIFY STRUCTURE DATA
PRInt	TO PRINT STRUCTURE DATA
END	TO RETURN TO THE PHASES SELECTION

SELECT OPTION?

3. Enter the selected option. Ex. MODify

SELECTED OPTION MODIFY

SELECT VERB?

4. Enter the selected verb. Upon request, the list of available verbs is obtainable pressing F-16 (HELP)

SELECTED VERB HELP

LIST OF VERBS
****

VERB	MEANING AND USE
CHAnge	TO CHANGE STRUCTURE DATA
DELete	TO DELETE STRUCTURE DATA
NEW	TO ADD NEW DATA OR RESTART THE INPUT
END	TO RETURN TO THE OPTIONS SELECTION

SELECT VERB?

5. Enter the selected verb. Ex. CHAnge

SELECTED VERB CHANGE

MEMBER #	START JOINT	END JOINT

MEMBER INDEX (F-8 = END) ?

6. Enter the index of the member to whom you want to change incidences. Ex. 3

MEMBER 3 : START, END-JOINT?

7. Enter the incidences of member 3. Ex. 4,5

3 4 5

MEMBER INDEX (F-8=END)?

8. Press F-8 to exit from the change routine

SELECT VERB?

9. Enter the selected verb. Ex. DELete

SELECTED VERB DELETE

MEMBER INDEX (F-8=END)?

10. Enter the index of the member you want to delete . Ex. 5

DELETED MEMBER 5

MEMBER INDEX (F-8=END)?

11. Press F-8 to exit from the delete routine

SELECT VERB?

12. Enter the selected verb. Ex. NEW

SELECTED VERB NEW

MEMBER #	START JOINT	END JOINT

The program restarts the input routine, ending with the select verb question.

MEMBER 1 : START, END-JOINT?

13. Enter the incidences of member 1. Ex. 1, 2

1 1 2

and this goes on up to the complete entry of the incidences of all the members. When completed the program ascks.

SELECT VERB?

14. Enter the selected verb. Ex. END

SELECTED VERB END

SELECT OPTION?

15. Enter the selected option. Ex. PRInt

SELECTED OPTION PRINT

MEMBER INCIDENCES
****

MEMBER #	START JOINT	END JOINT
1	1	2
2	2	3
3	4	5
4	5	6
5	7	8
6	8	9
7	10	11
8	11	12
9	13	14
10	14	15
11	16	17
12	17	18
13	19	20
14	20	21
15	2	5
16	5	8
17	11	14
18	14	17
19	17	20
20	3	6
21	6	9
22	12	15
23	15	18
24	18	21
25	9	12
26	9	11

SELECT OPTION?

16. Enter the selected option. Ex. END

SELECTED OPTION END

DATA STORAGE

PHASES SELECTION
****

SELECT PHASE?

17. Enter the selected phase. Ex. MAP (material properties)

SELECTED PHASE : MATERIAL PROPERTIES

MATERIAL PROPERTIES

Error Messages

ERROR . RETYPE: » MEMBER .... : START, END-JOINT?

The user entered a negative, a decimal, Ø, a number bigger than the total number of joints, or two equal values.

Action: Enter two correct values

ERROR . RETYPE : SELECT OPTION?

The user entered a code not identifying an existing option.

Action: Enter a valid option (Press F-16 to get the complete list)

ERROR . RETYPE : SELECT VERB?

The user entered a code not identifying an existing verb.

Action: Enter a valid verb (Press F-16 to get the complete list)

ERROR . RETYPE: >>MEMBER INDEX (F-8=END)?

The user to identify a member entered a negative, a decimal or a number bigger than the total number of members

ERROR . RETYPE:DELTA K TOO LARGE → MEMBER ..:START, END-JOINT?

The user entered 2 values which made delta K bigger than 15.

Action: Check your structure and enter two correct values.

Sample Program Run

```
MEMBER INCIDENCES
*****************


NUMBER OF MEMBERS   26
NUMBER OF JOINTS    21
```

MEMBER #	START JOINT	END JOINT
1	1	2
2	2	3
3	4	6
4	5	6
5	7	8
6	8	9
7	10	11
8	11	12
9	13	14
10	14	15
11	16	17
12	17	18
13	19	20
14	20	21
15	2	5
16	5	8
17	11	14
18	14	17
19	17	20
20	3	6
21	6	9
22	12	15
23	15	18
24	18	21
25	9	12
26	8	11

SELECTED OPTION HELP *INPUT

LIST OF OPTIONS
****

OPTION	MEANING AND USE
MODify	TO MODIFY STRUCTURE DATA
PRINt	TO PRINT STRUCTURE DATA
END	TO RETURN TO THE PHASES SELECTION

SELECTED OPTION MODIFY

SELECTED VERB HELP

LIST OF VERBS
****

VERB	MEANING AND USE
CHAnge	TO CHANGE STRUCTURE DATA
DELete	TO DELETE STRUCTURE DATA
NEW	TO ADD NEW DATA OR RESTART THE INPUT
END	TO RETURN TO THE OPTIONS SELECTION

SELECTED VERB CHANGE

MEMBER #	START JOINT	END JOINT
3	4	5

SELECTED VERB DELETE

DELETED MEMBER 5

SELECTED VERB NEW

MEMBER #	START JOINT	END JOINT
1	1	2
2	2	3
3	4	5
4	5	6
5	7	8
6	8	9
7	10	11
8	11	12
9	13	14
10	14	15
11	16	17
12	17	18

13	19	20
14	20	21
15	2	5
16	5	8
17	11	14
18	14	17
19	17	20
20	3	6
21	6	9
22	12	15
23	15	18
24	18	21
25	9	12
26	8	11

SELECTED VERB END

SELECTED OPTION PRINT .

MEMBER INCIDENCES
****

MEMBER #	START JOINT	END JOINT
1	1	2
2	2	3
3	4	5
4	5	6
5	7	8
6	8	9
7	10	11
8	11	12
9	13	14
10	14	15
11	16	17
12	17	18
13	19	20
14	20	21
15	2	5
16	5	8
17	11	14
18	14	17
19	17	20
20	3	6
21	6	9
22	12	15
23	15	18
24	18	21
25	9	12
26	8	11

SELECTED OPTION END

PHASES SELECTION
****
SELECTED PHASE: MATERIAL PROPERTIES

Phase 3

MATERIAL PROPERTIES

MAP

Purpose

This phase is used to enter material properties of all the members declared in the structure. To solve the problem a subdivision in groups have been adopted and the members belong to a certain group in accordance to their own properties.
Corrections are possible defining new groups as for each member last defined group is the only valid. Maximum allowed number of groups is 100.

Method

In his first entry this phase starts with the input routine. The first operation is to define a group with certain values, and then assign it to all the belonging members.
In order to help you in assigning this group to certain members a set of verbs is available: LIST, FROM TO STEP, ALL, NEXT, END.
LIST is used when a sequential input of members is needed; this could happen if members with some properties are located in far positions in the structure or have a not sequential index numbering.
When a certain group of members with sequential index numbering has same properties could be helpful the use of FROM TO STEP verb. Three are the needed values: starting and ending member index and the step by which the index must be considered in order to assign members to a same group.
ALL verb is used to assign a same property to all the members of a structure. When called this verb clears all groups already defined, if any.
A correct use of these 3 verbs is very helpful to get the quickest possible input.
Due to the fact that in most structures all the members have the same young's modulus, before starting any group the program ask, if the young's modulus is the same for all of them.
If not, young's modulus will be asked in all groups, if yes it is asked only once during the whole input.
NEXT verb can be used to start definying a next group while END verb brings you to the options selection. The available options are: MODIFY, PRINT and END.
To MODIFY a property of a member just define a new group, giving new values to this member, as last defined value is the only valid. PRINT has a clear meaning and when used lists also the members to whom no property has still been assigned.
END option brings you to the phases selection again. It is strongly suggested to use the option PRINT in order to be sure that all members have their properties defined.

Operating Procedures

MATERIAL PROPERTIES

```
MATERIAL PROPERTIES
*******************

NUMBER OF MEMBERS   26
```

If the input has already been done go to point 2Ø

YOUNG M. ALL MEMBERS (YES=1 NO=Ø)?

1. Enter 1 or Ø

   If the answer is Ø go to point A. Ex. 1

YOUNG'S MODULUS?

2. Enter value of young's modulus. Ex. 2.100.000

```
YOUNG'S MODULUS  2.1000000E+06  ALL
---------------
| GROUP 1     |
---------------
```

AREA?

3. Enter value of area for group 1. Ex. 1.2 E + 03

```
YOUNG'S MODULUS          AREA
.210000E+07          .120000E+04
```

SELECT VERB?

4. Enter selected verb. The list of available verbs can be obtained pressing F-16 (HELP)

```
SELECTED VERB   HELP
```

```
LIST OF VERBS
*************
```

VERB	MEANING AND USE
LISt	TO ENTER DATA SEQUENTIALLY
FROMtostep	TO ENTER DATA SPECIFYING: FROM,TO,STEP
ALL	DATA APPLIES TO THE WHOLE STRUCTURE, NOT AVAILABLE FOR MEMBER-END RELEASES
NEXt	TO DEFINE A DIFFERENT GROUP
END	TO RETURN TO THE OPTIONS SELECTION

SELECT VERB?

5. Enter the selected verb. Ex. ALL

SELECTED VERB ALL

SELECT VERB?

6. Enter the selected verb. Ex. NEXt

```
SELECTED VERB   NEXT

-------------
| GROUP 2   |
-------------
```

AREA?

7. Enter value of area for group 2. Ex. 2 E + 03

```
YOUNG'S MODULUS          AREA
 .210000E+07          .200000E+04
```

SELECT VERB?

8. Enter the selected verb. Ex. FROM TO STEP

SELECTED VERB FROM TO STEP
FROM TO STEP

FROM, TO, STEP (F-8 = END)?

9. Enter from, to, step values. For each three values hit the END-OF-LINE key. Ex. 15,25,1

15 25 1

FROM, TO, STEP (F-8 = END)?

10. When finished press F-8

SELECT VERB?

11. Enter the selected verb. Ex. NEXT

```
SELECTED VERB   NEXT

-------------
| GROUP 3   |
-------------
```

AREA?

12. Enter value of area for group 3. Ex. 2.5 E + 03

YOUNG'S MODULUS .210000E+07 AREA .250000E+04

SELECT VERB?

13. Enter the selected verb. Ex. LISt

SELECTED VERB LIST

MEMBER INDEX (F-8 = END)?

14. Enter the indices of members belonging to the 3rd group, each one followed by the END OF LINE key. Ex; 26

MEMBERS
26

MEMBER INDEX (F-8 = END)?

15. When finished press F-8

SELECT VERB?

16. Enter selected verb. Ex. END

SELECTED VERB END

SELECT OPTION?

Go to point 20

A. If the answer to the first question is ø, the only difference to the previous operations is that in each group you must define also the values of the young 's modulus;all the other operations behaves in the same way.
Follow the instructions from point 3 remembering this main difference.

17. Enter the selected option. To get the complete list press F-16

SELECTED OPTION HELP

LIST OF OPTIONS
****

OPTION	MEANING AND USE
MODify	TO MODIFY STRUCTURE DATA
PRInt	TO PRINT STRUCTURE DATA
END	TO RETURN TO THE PHASES SELECTION

SELECT OPTION?

18. Enter selected option. Ex. MOD ify (this option defines a new group of properties)

SELECTED OPTION MODIFY

GROUP 4

YOUNG 'S MODULUS

19. Enter value of young's modulus for group 4. Ex. 2.1E+06

AREA?

20. Enter value of area for group 4. Ex. 2.2 E + 0.3

```
   YOUNG'S MODULUS          AREA
    .210000E+07          .120000E+04
```

SELECT VERB?

21. Enter selected verb. The verbs in MODIFY option acts as in input routine. You can also press F-8 without assigning any member at all to a group.

SELECTED VERB END

SELECT OPTION?

22. Enter selected option. We can see an example of print in which some members are missing. In this case just entering MODIFY you can enter your missing data. Ex. PRINT

SELECTED OPTION PRINT

```
                MATERIAL PROPERTIES
                ***********************


 -------------
 ! GROUP 1   !
 -------------

 YOUNG'S MODULUS        AREA
     (kg/cm2)           (cm2)

  .210000E+07          .120000E-04

 MEMBERS
   1   3   5   7   9


 -------------
 ! GROUP 2   !
 -------------

 YOUNG'S MODULUS        AREA
     (kg/cm2)           (cm2)

  .210000E+07          .200000E+04

 MEMBERS
   11   12   13   14   15   16   17   18   19   20   21   22   23   24   25
 MISSING MEMBER   2
 MISSING MEMBER   4
 MISSING MEMBER   6
 MISSING MEMBER   8
 MISSING MEMBER   10
 MISSING MEMBER   26
```

SELECT OPTION? *INPUT

23. Enter selected option. Ex. END

SELECTED OPTION END

DATA STORAGE

PHASES SELECTION
****

SELECT PHASE?

24. Enter selected phase. Ex. PREscribed joint displacements

SELECTED PHASE: PRESCRIBED JOINT DISPLACEMENTS

PRESCRIBED JOINT DISPLACEMENTS

Error Messages

ERROR . RETYPE : >> YOUNG M. ALL MEMBERS(YES=1 NO=Ø)?
The user entered a value different from 1 or Ø.
Action: Enter only 1 or Ø

ERROR . RETYPE : SELECT VERB?
The user entered a code not identifying an existing verb.
Action: Enter a valid verb (Press F-16 to get the complete list)

ERROR . RETYPE : SELECT OPTION?
The user entered a code not identifying an existing option.
Action: Enter a valid option (Press F-16 to get the complete list)

ERROR . RETYPE : >> FROM, TO, STEP (F-8=END)?
The user entered for one or more of the three values a negative, a decimal, a Ø or a number bigger than the total number of members.
Action: Enter three correct values (note that the whole input must be repeated)

ERROR . RETYPE : >> MEMBER INDEX (F-8=END)?
The user entered a negative, a decimal, or a number bigger than the total number of members.
Action: Enter a correct value

Sample Program Run

```
 MATERIAL PROPERTIES
 *******************


 NUMBER OF MEMBERS   26




YOUNG'S MODULUS  2.1000000E+06  ALL
-------------
! GROUP 1    !
-------------
YOUNG'S MODULUS          AREA
 .210000E+07          .120000E+04

SELECTED VERB   HELP

                              LIST OF VERBS
                              *************

 ---------------------------------------------------------
 !     VERB     !           MEANING AND USE               !
 !--------------!-----------------------------------------!
 !              !                                         !
 ! LIST         ! TO ENTER DATA SEQUENTIALLY              !
 ! FROMtoSTEP   ! TO ENTER DATA SPECIFYING.               !
 !              ! FROM,TO,STEP                            !
 ! ALL          ! DATA APPLIES TO THE WHOLE               !
 !              ! STRUCTURE.                              !
 ! NEXT         ! TO DEFINE A DIFFERENT GROUP             !
 ! END          ! TO RETURN TO THE OPTIONS SELECTION      !
 !              !                                         !
 ---------------------------------------------------------



SELECTED VERB   ALL
```

```
 SELECTED VERB    NEXT

 -------------
 ! GROUP 2   !
 -------------
 YOUNG'S MODULUS          AREA
  .210000E+07          .200000E+04

 SELECTED VERB    FROM TO STEP

 FROM TO STEP
   15  25  1

 SELECTED VERB    NEXT

 -------------
 ! GROUP 3   !
 -------------
 YOUNG'S MODULUS          AREA
  .210000E+07          .250000E+04

 SELECTED VERB    LIST

 MEMBERS
  25

 SELECTED VERB    END

 SELECTED OPTION HELP

                              LIST OF OPTIONS
                              ***************

 ------------------------------------------------------
 ! OPTION !           MEANING AND USE                  !
 !--------!-------------------------------------------!
 !        !                                           !
 ! MODIFY ! TO MODIFY STRUCTURE DATA                  !
 ! PRINT  ! TO PRINT STRUCTURE DATA                   !
 ! END    ! TO RETURN TO THE PHASES SELECTION         !
 !        !                                           !
 ------------------------------------------------------


 SELECTED OPTION MODIFY

 -------------
 ! GROUP 4   !
 -------------
 YOUNG'S MODULUS          AREA
  .210000E+07          .220000E+04

 SELECTED VERB    END
```

```
SELECTED OPTION PRINT


          MATERIAL PROPERTIES
          *******************


 -------------
 ! GROUP 1   !
 -------------

 YOUNG'S MODULUS        AREA
     (kg/cm2)           (cm2)

  .210000E+07          .120000E+04

 MEMBERS
   1   2   3   4   5   6   7   8   9  10  11  12  13  14


 -------------
 ! GROUP 2   !
 -------------

 YOUNG'S MODULUS        AREA
     (kg/cm2)           (cm2)

  .210000E+07          .200000E+04

 MEMBERS
  15  16  17  18  19  20  21  22  23  24  25


 -------------
 ! GROUP 3   !
 -------------

 YOUNG'S MODULUS        AREA
     (kg/cm2)           (cm2)

  .210000E+07          .250000E+04

 MEMBERS
  26




SELECTED OPTION END

                              PHASES SELECTION
                              ****************
SELECTED PHASE: PRESCRIBED JOINTS DISPLACEMENTS
```

PRESCRIBED JOINTS DISPLACEMENT S

PRE

Purpose

This phase is used to enter prescribed joints displacements. No immediate correction is available during the input phase; a remote correction is available with the use of the options. Maximum allowed number of joints with prescribed displacements is 32.

Method

In his first entry this phase starts with the input routine. The status of each selected joint must be the same for all existing loadings ; the only data which can be changed in different loadings is the value of a fixed joint, in absence of any entered value, a value of Ø is assumed. To alterate values or condition of a joint, use CHANGE or DELETE verb,while to define the status of a joint, never defined before use NEW verb. All this verbs can be entered after the selection of the option MODIFY.
END verb is used to get back to the options selection, while END option is used to get back to the phases selection. The use of the PRINT option is clear.

Operating Procedures

```
PRESCRIBED JOINT DISPLACEMENTS
******************************

NUMBER OF JOINTS      21
NUMBER OF LOADINGS    2
```

If the input has already been done, go to point 17.

```
--------------
+ LOADING 1  +
--------------
```

JOINT INDEX (F-8=END)?

1. Enter the index of the joint with a certain displacement. Ex. 5

JOINT INDEX 5

DISPLACEMENT X FREE (YES=1 NO=Ø)?

2. Enter condition of displacement along X axes. Ex. Ø

VALUE?

3. Enter value of prescribed displacement. Ex. 2

DISPLACEMENT X FIXED VALUE 2

DISPLACEMENT Y FREE (YES=1 NO=Ø)?

4. Enter condition of displacement along Y axes. Ex. 1

DISPLACEMENT Y FREE

DISPLACEMENT Z FREE (YES=1 NO=ø)?

5. Enter condition of displacement along Z axes. Ex. ø

VALUE?

6. Enter value of prescribed displacement along Z axes. Ex. 2.5

DISPLACEMENT Z FIXED VALUE 2.5

JOINT INDEX (F-8=END)?

7. Enter index of joint with certain displacements. Go to point 1. When finished for first loading press F-8.

| LOADING 2 |

JOINT INDEX (F-8=END)?

8. Enter index of joint with certain displacements. Joint can be either an already declared in the previous condition or a never declared one. Let's start with the first case; program will ask only values to change for an already declared first displacement. Ex. 5

JOINT INDEX 5

DISPLACEMENT X: VALUE?

9. Enter value of prescribed displacement along X axes, for the 2nd loading. Ex. 1

DISPLACEMENT X FIXED VALUE 1

DISPLACEMENT Z: VALUE ?

10. Enter value of prescribed displacement along Z axes. Ex. 2

DISPLACEMENT Z FIXED VALUE 2

JOINT INDEX (F-8=END)?

11. Enter index of a joint with certain displacements. Let's consider a joint not declared in the 1st loading. Ex. 8.

JOINT INDEX 8

DISPLACEMENT X FREE (YES=1 NO=ø)?

12. Enter condition of displacement along X axes. Ex. 1

DISPLACEMENT X FREE

DISPLACEMENT Y FREE (YES=1 NO=ø)?

13. Enter condition of displacement along Y axes. Ex. ø

VALUE?

14. Enter value of displacement along Y axes for 2nd loading. Note that the value for the 1st loading will be assumed as Ø. Ex. 1.5.

DISPLACEMENT Y FIXED 1.5

DISPLACEMENT Z FREE (YES=1 NO=Ø)?

15. Enter condition of displacement along Z axes. Ex. 1

DISPLACEMENT Z FREE

JOINT INDEX (F-8=END)?

16. Enter index of joint with certain displacements. When finished press F-8

SELECT OPTION?

17. Enter the selected option. To get the complete list press F-16 (HELP)

SELECTED OPTION HELP

LIST OF OPTIONS
****

OPTION	MEANING AND USE
MODify	TO MODIFY STRUCTURE DATA
PRInt	TO PRINT STRUCTURE DATA
END	TO RETURN TO THE PHASES SELECTION

SELECT OPTION?

18. Enter the selected option. Ex. MODify

SELECTED OPTION MODIFY

SELECT VERB?

19. Enter the selected verb. To get the complete list press F-16 (HELP)

SELECTED VERB HELP

LIST OF VERBS
****

VERB	MEANING AND USE
CHAnge	TO CHANGE STRUCTURE DATA
DELete	TO DELETE STRUCTURE DATA
NEW	TO ADD NEW DATA OR RESTART THE INPUT
END	TO RETURN TO THE OPTIONS SELECTION

SELECT VERB?

20. Enter the selected verb. Ex. DELete

SELECTED VERB DELETE

JOINT INDEX (F-8=END)?

21. Enter index of joints to which cancel all previous declared prescribed, each one followed by the END-OF-LINE key. Ex. 8

JOINT INDEX 8

JOINT INDEX (F-8=END)?

22. When finished press F-8

SELECT VERB?

23. Enter the selected verb. To define a different joint, never declared before use new verb. Ex. NEW

SELECTED VERB NEW

```
--------------
| LOADING 1  |
--------------
```

JOINT INDEX (F-8=END)?

24. Enter index of the joint to whom apply the successive displacements. Ex. 12

JOINT INDEX 12

DISPLACEMENT X FREE (YES=1 NO=Ø)?

25. Enter condition of displacement along X axes for joint 12 in the 1st loading. Ex. 1

DISPLACEMENT X FREE

DISPLACEMENT Y FREE (YES=1 NO=Ø)?

26. Enter condition of displacement along Y axes for joint 12 in the 1st loading. Ex. Ø.

VALUE?

27. Enter value of displacement along Y axes. Ex. 3.5

DISPLACEMENT Y FIXED VALUE 3.5

DISPLACEMENT Z FREE (YES=1 NO=Ø)?

28. Enter condition of displacement along Z axes for joint 12 in the 1st loading. Ex. 1

DISPLACEMENT Z FREE

```
--------------
| LOADING 2  |
--------------
```

JOINT INDEX 12

DISPLACEMENT Y : VALUE?

29. Enter value of displacement along Y axes for joint 12 in the 2nd loading.
Ex. 2

DISPLACEMENT Y FIXED VALUE 2

SELECT VERB?

30. Enter selected verb. Let us consider to change a condition for a joint. Ex. CHAnge

SELECTED VERB CHANGE

| LOADING 1 |

JOINT INDEX (F-8=END)?

31. Enter index of joint to whom change previously declared conditions. Ex. 5

JOINT INDEX 5

DISPLACEMENT X FREE (YES=1 NO=Ø)?

32. Enter changed conditions of displacement along X axes for joint 5 in the 1st loading.
Ex. Ø

VALUE?

33. Enter value of displacement along Y axes for joint 5 on the 1st loading.
Ex. 1.5

DISPLACEMENT X FIXED VALUE 1.5

DISPLACEMENT Y FREE (YES=1 NO=Ø)?

34. Enter changed condition of displacement along Y axes for joint 5 in the 1st loading.
Ex. 1

DISPLACEMENT Y FREE

DISPLACEMENT Z FREE (YES=1 NO=Ø)?

35. Enter changed condition of displacement along Z axes for joint 5 in the 1st loading.
Ex. 2

DISPLACEMENT Z FREE

JOINT INDEX (F-8=END)?

36. When finished to change, press F-8

| LOADING 2 |

JOINT INDEX (F-8=END)?

37. You can change values of prescribed displacements only for loading after the 1st; changing in the 1st loading means enter again the complete conditions of the joint. If there are no more changes in the next loading press F-8.

SELECT VERB?

38. Enter selected verb. Ex. END

SELECTED VERB END

SELECT OPTION?

39. Enter selected option. Ex. PRInt

SELECTED OPTION PRINT

PRESCRIBED JOINT DISPLACEMENTS
****

| LOADING 1 |

JOINT	DISPLACEMENT X (cm)	DISPLACEMENT Y (cm)	DISPLACEMENT Z (cm)
5	1.5000	********	********
12	********	3.5000	********

| LOADING 2 |

JOINT	DISPLACEMENT X (cm)	DISPLACEMENT Y (cm)	DISPLACEMENT Z (cm)
5	0.0000	********	********
12	********	2.0000	********

******** = FREE

SELECT OPTION?

40. Enter selected option. Ex. END

SELECTED OPTION END

DATA STORAGE

PHASES SELECTION
****

SELECT PHASE?

41. Enter selected phase. Ex. LOAdings

SELECTED PHASE: LOADINGS

LOADINGS

Error Messages

ERROR . RETYPE : >> JOINT INDEX (F-8=END)?

The user entered a negative, a decimal or a number bigger than the actual number of joints.

Action: Enter a correct value

ERROR . RETYPE : DELETED JOINT >>JOINT INDEX (F-8=END)?

The user entered a joint which had been previously deleted.

Action: Enter a correct value

ERROR . RETYPE : SUPPORT JOINT >>JOINT INDEX (F-8=END)?

The user entered a joint which was declared fixed.

Action: Enter a correct value

ERROR . RETYPE : >> DISPLACEMENT X FREE (YES=1 NO=Ø)?

The user entered a value different than 1 or Ø.

Action: Enter only 1 or Ø

ERROR . RETYPE : >> DISPLACEMENT Y FREE (YES=1 NO=Ø)?

The user entered a value different than 1 or Ø.

Action: Enter only 1 or Ø

ERROR . RETYPE : >> DISPLACEMENT Z FREE (YES=1 NO=Ø)?

The user entered a value different than 1 or Ø.

Action: Enter only 1 or Ø

ERROR . RETYPE : SELECT OPTION?

The user entered a code not identifying an existing option.

Action: Enter an available option. To get the complete list, press F-16 (HELP)

ERROR . RETYPE : SELECT VERB?

The user entered a code not identifying an existing verb.

Action: Enter an available verb. To get the complete list, press F-16 (HELP)

ALREADY DEFINED JOINT >>JOINT INDEX (F-8=END)?

In the new verb the user entered the index of a joint already having a prescribed condition.

Action: Enter a correct value

NEVER DEFINED JOINT >>JOINT INDEX (F-8=END)?

In the delete or change verb, the user entered the index of a joint, not having an already declared prescribed condition.

Action: Enter a correct value.

MAXIMUM NUMBER OF PRESCRIBED : 32 >SELECT VERB?

The user tried to enter more than 32 joints with prescribed displacement.

Action: Check your structure, maximum allowed number is 32.

Sample Program Run

```
PRESCRIBED JOINT DISPLACEMENTS
******************************


NUMBER OF JOINTS      21
NUMBER OF LOADINGS    2
```

```
-------------
| LOADING 1 |
-------------
JOINT INDEX       5
DISPLACEMENT X    FIXED           VALUE           2
DISPLACEMENT Y    FREE
DISPLACEMENT Z    FIXED           VALUE           3.5


-------------
| LOADING 2 |
-------------
JOINT INDEX       5
DISPLACEMENT X    FIXED           VALUE           1
DISPLACEMENT Z    FIXED           VALUE           2

JOINT INDEX       8
DISPLACEMENT X    FREE
DISPLACEMENT Y    FIXED           VALUE           1.5
DISPLACEMENT Z    FREE


SELECTED OPTION HELP

                          LIST OF OPTIONS
                          ***************

 ---------------------------------------------------
 |  OPTION  |            MEANING AND USE             |
 |----------|-----------------------------------------|
 |          |                                         |
 | MODify   | TO MODIFY STRUCTURE DATA                |
 | PRInt    | TO PRINT STRUCTURE DATA                 |
 | END      | TO RETURN TO THE PHASES SELECTION       |
 |          |                                         |
 ---------------------------------------------------


SELECTED OPTION MODIFY

SELECTED VERB   HELP

                          LIST OF VERBS
                          *************

 ---------------------------------------------------
 |   VERB   |            MEANING AND USE             |
 |----------|-----------------------------------------|
 |          |                                         |
 | CHAnge   | TO CHANGE STRUCTURE DATA                |
 | DELete   | TO DELETE STRUCTURE DATA                |
 | NEW      | TO ADD NEW DATA OR RESTART THE INPUT    |
 | END      | TO RETURN TO THE OPTIONS SELECTION      |
 |          |                                         |
 ---------------------------------------------------


SELECTED VERB   DELETE

JOINT INDEX       8
SELECTED VERB   NEW
```

```
--------------
| LOADING 1  |
--------------
JOINT INDEX          12
DISPLACEMENT X       FREE
DISPLACEMENT Y       FIXED
DISPLACEMENT Z       FREE          VALUE          3.5


--------------
| LOADING 2  |
--------------
JOINT INDEX          12
DISPLACEMENT Y       FIXED         VALUE          2

SELECTED VERB    CHANGE


--------------
| LOADING 1  |
--------------
JOINT INDEX          5
DISPLACEMENT X       FREE
DISPLACEMENT Y       FIXED
DISPLACEMENT Z       FREE          VALUE          1.5


--------------
| LOADING 2  |
--------------

SELECTED VERB    END

SELECTED OPTION PRINT

                PRESCRIBED JOINT DISPLACEMENTS
                ******************************


--------------
| LOADING 1  |
--------------

JOINT      DISPLACEMENT X    DISPLACEMENT Y    DISPLACEMENT Z
             (cm)              (cm)              (cm)

  5        ********          1.5000            ********
 12        ********          3.5000            ********


--------------
| LOADING 2  |
--------------

JOINT      DISPLACEMENT X    DISPLACEMENT Y    DISPLACEMENT Z
             (cm)              (cm)              (cm)

  5        ********          0.0000            ********
 12        ********          2.0000            ********


                ******** =  FREE


SELECTED OPTION END

                                  PHASES SELECTION
                                  ****************
SELECTED PHASE: LOADINGS
```

Phase 5

LOADINGS

LOA

Purpose

This phase is used to enter both joint and member loads. Forces are all loaded in the function keys so a correct use of them helps you in defining your loadings. Loads can be considered both in the global system of reference or in the local one, depending on which is best for your structure. Operating procedures for the LOCAL forces, are the same as for the GLOBAL, although here the GLOBAL only are shown.

Method

In his first entry this phase starts with the input routine. The input ends when all the declared loadings are completed. To assign the elements to the declared loads, a sequen - tial input has been chosen.
The available option are MODIFY, PRINT and END.
MODIFY is used to correct the previous entered value. The procedures to follow are the same adopted for the input routine; the values for the loads to enter must be the exact algebraic sum between the old values and the wished values. The use of the PRINT option is clear.
END is used to return to the phases selection.

Operating Procedures

JOINT and MEMBER LOADS

JOINT and MEMBER LOADS
****

NUMBER OF JOINTS 21
NUMBER OF MEMBERS 26
NUMBER OF LOADINGS 2

If the input has already been done, go to point 59

| LOADING 1 |

JOINT LOAD CODE (F-8=END)?

1. Enter the wished joint load code. To get the complete list just press the key F-16 (HELP)

JOINT LOAD CODE HELP

JOINT LOADS
****

LOAD CODE	VALUE TO BE ENTERED
FORCE X or Y or Z	VALUE OF THE FORCE

JOINT LOAD CODE (F-8=END)?

2. Enter the wished joint load. Ex. FORCE X

JOINT LOAD CODE FORCE X

LOAD VALUE?

3. Enter load value. Ex. 1000

LOAD VALUE 1000
JOINT INDEX

JOINT INDEX (F-8=END)?

4. Enter indices of all the joints to whom applies the previous load, in a sequential way hitting each time the END OF LINE key. Ex. 15

15

JOINT INDEX (F-8=END)?

5. When finished the list, press F-8

JOINT LOAD CODE (F-8=END)?

6. Enter the wished joint load. Ex. FORCE Y

JOINT LOAD CODE FORCE Y

LOAD VALUE?

7. Enter load value. Ex. 2000

LOAD VALUE 2000
JOINT INDEX

JOINT INDEX (F-8=END)?

8. Enter the indices of are the joints to whom applies the previous load, in a sequential way each time hitting the END OF LINE key. Ex. 10

10

JOINT INDEX (F-8=END)?

9. When finished the list press F-8

   JOINT LOAD CODE (F-8=END)?

10. When finished the joint loads, press F-8. Ex. F-8

    MEMBER LOAD CODE (F-8=END)?

11. Enter the wished member load. To get the complete list just press the key F-16 (HELP).

    MEMBER LOAD CODE HELP

MEMBER LOADS
****

LOAD CODE	VALUES TO BE ENTERED
FORCE X or Y or Z (also LOCAL)	a) VALUE OF THE FORCE b) DISTANCE TO LOAD
MOMENT Y or Z LOCAL	a) VALUE OF THE MOMENT b) DISTANCE TO MOMENT
UNIFORM X or Y or Z (also LOCAL)	VALUE OF THE FORCE
TRAPEZOIDAL X or Y or Z (also LOCAL)	a) START VALUE b) END VALUE
PARTIAL UNIFORM X or Y or Z (also LOCAL)	a) DISTANCE OF LOAD FROM START JOINT b) LOAD LENGTH c) LOAD VALUE
PARTIAL TRAPEZOIDAL X or Y or Z (also LOCAL)	a) DISTANCE OF LOAD FROM START JOINT b) LOAD LENGTH c) START VALUE d) END VALUE
LINEAR DISTORTION X TEMPERATURE	DISTORTION VALUE a) VALUE OF TEMPERATURE CHANGE b) VALUE OF THERMAL COEFFICIENT

    MEMBER LOAD CODE (F-8=END)?

12. Enter the wished member load. Ex. FORCE Y

    MEMBER LOAD CODE FORCE Y

    DISTANCE OF LOAD FROM START-J?

13. Enter distance of load from the start joint. Ex. 2

    DISTANCE OF LOAD FROM START-J. 2

    LOAD VALUE?

14. Enter load value. Ex. -1000

    LOAD VALUE -1000
    MEMBER INDEX

    MEMBER INDEX (F-8=END)?

15. Enter the indices of all the members to whom applies the previous load, each time hitting

the END OF LINE key. Ex. 19

19

MEMBER INDEX (F-8=END)?

16. When finished the list, press F-8

MEMBER LOAD CODE (F-8=END)?

17. Enter the wished member load. Ex.MOMENT Z LOCAL

MEMBER LOAD CODE MOMENT Z LOCAL

DISTANCE OF LOAD FROM START-J.?

18. Enter distance of load from start joint. Ex. 1.5

DISTANCE OF LOAD FROM START-J. 1.5

LOAD VALUE?

19. Enter the value of the load. Ex. 70000

LOAD VALUE 70000
MEMBER INDEX

MEMBER INDEX (F-8=END)?

20. Enter indices of all the members to whom applies the previous load, in a sequential way, each one hitting afterthe END OF LINE key. Ex. 2Ø

2Ø

MEMBER INDEX (F-8=END)?

21. When finished the list press F-8

MEMBER LOAD CODE (F-8=END)?

22. Enter next wished member load. Ex. UNIFORM X

MEMBER LOAD CODE UNIFORM X

LOAD VALUE?

23. Enter load value. Ex. 3000

LOAD VALUE 3000
MEMBER INDEX

MEMBER INDEX (F-8=END)?

24. Enter the list of all the members to whom applies the previous load in a sequential way, each one hitting after the END OF LINE key. Ex. 9

9

MEMBER INDEX (F-8=END)?

25. When finished the list, press F-8

MEMBER LOAD CODE (F-8=END)?

26. Enter next wished member load. Ex. PARTIAL UNIFORM Y

MEMBER LOAD CODE PARTIAL UNIFORM Y

DISTANCE OF LOAD FROM START-J. ?

27. Enter distance of load from the start-joint. Ex. 3

DISTANCE OF LOAD FROM START-J. 3

LOAD LENGTH?

28. Enter load length. Ex. 1

LOAD LENGTH 1

LOAD VALUE?

29. Enter load value. Ex. 3200

LOAD VALUE 3200

MEMBER INDEX (F-8=END)?

30. Enter the indices of all the members to whom applies the previous load in a sequential way, each one hitting after the END OF LINE key. Ex. 7

MEMBER INDEX 7

MEMBER INDEX (F-8=END)?

31. When finished the list press F-8

MEMBER LOAD CODE (F-8=END)?

32. Enter next wished member load. Ex. TRAPEZOIDAL X

MEMBER LOAD CODE TRAPEZOIDAL X

START VALUE?

33. Enter start value of the load. Ex. 600

START VALUE 600

END VALUE?

34. Enter final value of the load. Ex. 900

END VALUE 900

MEMBER INDEX (F-8=END)?

35. Enter the indices of all the members to whom apply the previous load, in a sequential way, each one hitting after the END OF LINE key. Ex. 12

12

MEMBER INDEX (F-8=END)?

36. When finished the list, press F-8

MEMBER LOAD CODE (F-8=END)?

37. Enter next wished member load . Ex. PARTIAL TRAPEZOIDAL Y

MEMBER LOAD CODE PARTIAL TRAPEZOIDAL Y

DISTANCE OF LOAD FROM START-J. ?

38. Enter distance of the load from the start joint. Ex. 3.5

DISTANCE OF LOAD FROM START-J. 3.5

LOAD LENGTH?

39. Enter load length. Ex. 1.2

LOAD LENGTH 1.2

START VALUE?

40. Enter start value of the load. Ex. 800

START VALUE 800

END VALUE ?

41. Enter final value of the load. Ex. 1200

END VALUE 1200
MEMBER INDEX

MEMBER INDEX (F-8=END)?

42. Enter the indices of all the members to whom apply the previous load, in a sequential way, each one hitting after the END OF LINE key. Ex. 17

17

MEMBER INDEX (F-8=END)?

43. When finished the list, press F-8

MEMBER LOAD CODE (F-8=END)?

44. Enter next wished member load. Ex. LINEAR DISTORTION X

MEMBER LOAD CODE LINEAR DISTORTION X

DISTORTION VALUE?

45. Enter distortion value. Ex. 1.8

DISTORTION VALUE 1.8
MEMBER INDEX

MEMBER INDEX (F-8=END)?

46. Enter the index of all the members to whom applies the previous load, in a sequential way, each one hitting after the END OF LINE key. Ex. 23

23

MEMBER INDEX (F-8=END)?

47. When finished the list, press F-8

MEMBER LOAD CODE (F-8=END)?

48. Enter next wished member load. Ex. TEMPERATURE

MEMBER LOAD CODE TEMPERATURE

TEMPERATURE VARIATION?

49. Enter the value of the change of temperature. Ex. 1Ø

TEMPERATURE VARIATION 1Ø

THERMAL EXP. COEFFICIENT?

50. Enter thermal expansion coefficient. Ex. Ø.ØØØØ1

THERMAL EXPANSION COEFFICIENT Ø.ØØØØ1
MEMBER INDEX

MEMBER INDEX (F-8=END)?

51. Enter the indices of all the members to whom apply the previous load, in a sequential way, each one hitting after the END OF LINE key. Ex. 14

14

MEMBER INDEX (F-8=END)?

52. When finished the list, press F-8

MEMBER LOAD CODE (F-8=END)?

53. When the wished member load are ended for the first loading, press F-8

| LOADING 2 |

and from here applies the same operating procedures, as for the first loading. At the end of all loadings the display prompts you. Press F-8

SELECT OPTION?

54. Enter the selected option. To get the complete list, just press F-16 (HELP)

SELECTED OPTION HELP

LIST OF OPTIONS
****

OPTION	MEANING AND USE
MODify	TO MODIFY STRUCTURE DATA
PRInt	TO PRINT STRUCTURE DATA
END	TO RETURN TO THE PHASES SELECTION

SELECT OPTION?

55 . Enter the selected option. Ex. MODify

SELECTED OPTION MODIFY

```
--------------
| LOADING 1  |
--------------
```

JOINT LOAD CODE (F-8=END)?

56 . The modification routine follows the same line we have seen for the input routine. To get the final value of a certain load we must apply to a certain element the algebraic sum between the old value and the wished one.
Let us consider one simple example. We have joint number 15 loaded with a FORCEX of value 1000 and we expected to have 500; so we must define a value of - 500, and apply it to see the same joint. So enter FORCEX

JOINT LOAD CODE FORCEX

LOAD VALUE?

57. Enter needed load value. In this case -500

LOAD VALUE -500
JOINT INDEX

JOINT INDEX (F-8=END)?

58. Enter the index of the joint to whom applies this load. In this case 15

15

JOINT INDEX (F-8=END)?

59. As this load applies not to more joints, press F-8

JOINT LOAD CODE (F-8=END)?

60. Let us consider an example of member loads. Press F-8

MEMBER LOAD CODE (F-8=END)?

61. Suppose to have a PARTIAL TRAPEZOIDAL Y load applied on member 1.7 whose start and end values are 800 and 1200 respectively at a certain distance 3.5 and having a length of 1.2. We wish to have the same load, with a start value still of 800 but an end value of 2.000. You need to enter a PARTIAL TRAPEZOIDAL Y load with same length and distance, but with start value ∅ and end value 800.
Enter PARTIAL TRAPEZOIDAL Y

MEMBER LOAD CODE PARTIAL TRAPEZOIDAL Y

DISTANCE OF LOAD FROM START-J.?

62. Enter distance of the load from the start joint. In this case 3.5

DISTANCE OF LOAD FROM START-J. 3.5

LOAD LENGTH?

63. Enter load length. In this case 1.2

LOAD LENGTH 1.2

START VALUE?

64. Enter the needed start value of the load. In this case ø

START VALUE ø

END VALUE?

65. Enter the needed final value of the load. In this case go 800

END VALUE 800
MEMBER INDEX

MEMBER INDEX (F-8=END)?

66. Enter the index of the needed member. In this case

17

MEMBER INDEX (F-8=END)?

67. As there are no more members with this load, press F-8

MEMBER LOAD CODE (F-8=END)?

68. To show you better how modification of loads can be used let us consider the following example in which the error has been made in giving an incorrect load length. For ex. member 7 has a partial uniform load acting in the Y axes with value of 3200 at a distance of 3 from the starting joint and having a length of 1, but the wished value was for the same load having a length of 5.

Enter PARTIAL UNIFORM Y

MEMBER LOAD CODE PARTIAL UNIFORM Y

DISTANCE OF LOAD FROM START-J.?

69. Enter distance of the load from the start joint; in this case 3.5

DISTANCE OF LOAD FROM START-J. 3.5

LOAD LENGTH?

70. Enter load length; in this case 0.5

LOAD LENGTH 0.5

LOAD VALUE?

71. Enter load value. In this case -3200

LOAD VALUE -3200
MEMBER INDEX

MEMBER INDEX (F-8=END)?

72. Enter member index. In this case 7

7

MEMBER INDEX (F-8=END)?

73. Press F-8 to end list of members

MEMBER LOAD CODE (F-8=END)?

74. Press F-8 to end loads modification in 1st loading

```
--------------
| LOADING 2  |
--------------
```

JOINT LOAD CODE (F-8=END)?

75. If there are no modifications for the 2nd loading press F-8

MEMBER LOAD CODE (F-8=END)?

76. Press F-8

SELECT OPTION?

77. Enter the selected option. For ex. PRInt

SELECTED OPTION PRINT

JOINT and MEMBER LOADS

STORED UNITS

FORCE	(kg)
MOMENT	(kg*m)
LENGTH	(m)
TEMPERATURE	(Grad C)
LINEAR DISTORTION	(cm)

```
--------------
| LOADING 1  |
--------------
```

JOINT LOADS

JOINT #	LOAD CODE	LOAD VALUE
15	FORCE X	.100000E+04
10	FORCE Y	.200000E+04
15	FORCE X	-.500000E+03

MEMBER LOADS
****

MEMBER #	LOAD CODE	DISTANCE (M)	LENGTH (M)	START VALUE	END VALUE
7	PAR UNIF Y	3.000	1.000	.32000E+04	
7	PAR UNIF Y	3.500	0.500	-.32000E+04	
8	UNIFORM X			.30000E+04	
12	TRAPEZOIDAL X			.60000E+03	.90000E+03
17	PAR TRAP Y	3.500	1.200	.80000E+03	.12000E+04
17	PAR TRAP Y	3.300	1.200	0.00000E+0	.10000E+04
19	FORCE Y	2.000		-.10000E+04	
20	MOMENT Z LOCAL	1.500		.70000E-05	
22	LIN DIST Y			.10000E+01	

MEMBER #	TEMPERATURE VARIATION	THERMAL EXPANSION COEFFICIENT
14	10.000	.10000E-04

LOADING 2

SELECT OPTION?

78. Enter the selected option. Ex. END

SELECTED OPTION END

DATA STORAGE

PHASES SELECTION
****

SELECT PHASE?

79. Enter the selected phase. For ex. COMbination

SELECTED PHASE: LOADING COMBINATIONS

LOADING COMBINATIONS

Error Messages

ERROR . RETYPE : >> JOINT LOAD CODE (F-8=END)?

The user entered an invalid joint load code.

Action: Enter a correct joint load code. Press F-16 to get the list of available joint load codes

ERROR . RETYPE : >> JOINT INDEX (F-8=END)?

The user entered a negative, a decimal or a number bigger than the total number of joints of the structure.

Action: Enter a correct number

ERROR . RETYPE : >> MEMBER LOAD CODE (F-8=END)?

The user entered an invalid member load code.

Action: Enter a correct member load code. Press F-16 to get the lists of available member loads code

ERROR . RETYPE : >> MEMBER INDEX (F-8=END)?

The user entered a negative, a decimal or a number bigger than the total number of members of the structure.

Action: Enter a correct value.

ERROR . RETYPE : SELECT OPTION?

The user entered a code not identifying an existing option.

Action: Enter a valid option.(Press F-16 to get the complete list)

Sample Program Run

```
JOINT AND MEMBER LOADS
**********************


NUMBER OF JOINTS      21
NUMBER OF MEMBERS     26
NUMBER OF LOADINGS    2
```

```
--------------
! LOADING 1   !
--------------

JOINT LOAD CODE                    HELP

                          JOINT LOADS
                          ***********

-------------------------------------------------
!     LOAD CODE      ! VALUE TO BE ENTERED      !
!--------------------!-------------------------!
!  FORCE X or Y      !                         !
!     or Z           !  VALUE OF THE FORCE     !
!                    !                         !
-------------------------------------------------
```

```
JOINT LOAD CODE                FORCE X
LOAD VALUE              1000
JOINT INDEX
     15

JOINT LOAD CODE                FORCE Y
LOAD VALUE              2000
JOINT INDEX
     10

MEMBER LOAD CODE               HELP
```

MEMBER LOADS
****

LOAD CODE	VALUES TO BE ENTERED
FORCE X or Y or Z (also LOCAL) MOMENT Y or Z LOCAL	a) VALUE OF THE FORCE b) DISTANCE TO LOAD a) VALUE OF THE MOMENT b) DISTANCE TO MOMENT
UNIFORM X or Y or Z (also LOCAL)	VALUE OF THE FORCE
TRAPEZOIDAL X or Y or Z (also LOCAL)	a) START VALUE b) END VALUE c) DISTANCE OF LOAD FROM START JOINT d) LOAD LENGTH
PARTIAL UNIFORM X or Y or Z (also LOCAL)	c) LOAD VALUE d) DISTANCE OF LOAD FROM START JOINT b) LOAD LENGTH
PARTIAL TRAPEZOIDAL X or Y or Z (also LOCAL)	c) START VALUE d) END VALUE
LINEAR DISTORTION X TEMPERATURE	DISTORTION VALUE a) VALUE OF TEMPERATURE CHANGE b) VALUE OF THERMAL COEFFICIENT

```
MEMBER LOAD CODE               FORCE Y
DISTANCE OF LOAD FROM START-J.   2
LOAD VALUE             -1000
MEMBER INDEX
     19

MEMBER LOAD CODE               MOMENT Z LOCAL
DISTANCE OF LOAD FROM START-J.   1.5
LOAD VALUE             T0000
MEMBER INDEX
     20

MEMBER LOAD CODE               UNIFORM X
LOAD VALUE              3000
MEMBER INDEX
      9
```

```
MEMBER LOAD CODE                    PARTIAL UNIFORM Y
DISTANCE OF LOAD FROM START-J.   3
LOAD LENGTH                 .1
LOAD VALUE                  3200
MEMBER INDEX
     7

MEMBER LOAD CODE                    TRAPEZOIDAL X
START VALUE                 500
END VALUE                   900
MEMBER INDEX
     12

MEMBER LOAD CODE                    PARTIAL TRAPEZOIDAL Y
DISTANCE OF LOAD FROM START-J.   3.5
LOAD LENGTH                 1.2
START VALUE                 500
END VALUE                   1200
MEMBER INDEX
     17

MEMBER LOAD CODE                    LINEAR DISTORTION X
DISTORTION VALUE            1.8
MEMBER INDEX
     23

MEMBER LOAD CODE                    TEMPERATURE
TEMPERATURE VARIATION 10
THERMAL EXPANSION COEFFICIENT   .00001
MEMBER INDEX
     14

--------------
| LOADING I  |
--------------

SELECTED OPTION HELP

                        LIST OF OPTIONS
                        ***************

 ---------------------------------------------------------
| OPTION |              MEANING AND USE                   |
|--------|------------------------------------------------|
|        |                                                |
| MODify | TO MODIFY STRUCTURE DATA                       |
| PRInt  | TO PRINT STRUCTURE DATA                        |
| END    | TO RETURN TO THE PHASES SELECTION              |
|        |                                                |
 ---------------------------------------------------------
```

```
SELECTED OPTION MODIFY

--------------
! LOADING 1  !
--------------

JOINT LOAD CODE                FORCE X
LOAD VALUE            -500
JOINT INDEX
     15

MEMBER LOAD CODE               PARTIAL TRAPEZOIDAL Y
DISTANCE OF LOAD FROM START-J.  3.5
LOAD LENGTH             1.2
START VALUE             0
END VALUE               800
MEMBER INDEX
     17

MEMBER LOAD CODE               PARTIAL UNIFORM Y
DISTANCE OF LOAD FROM START-J.  3.5
LOAD LENGTH             .5
LOAD VALUE            -3200
MEMBER INDEX
     7

--------------
! LOADING 2  !
--------------

SELECTED OPTION PRINT

                          JOINT AND MEMBER LOADS
                          **********************



STORED UNITS
************

FORCE                  (kg)
MOMENT                 (kg-m)
LENGTH                 (m)
TEMPERATURE            (Grad C)
LINEAR DISTORTION      (cm)


--------------
! LOADING 1  !
--------------


                               JOINT LOADS
                               ***********

JOINT      LOAD              LOAD
  #        CODE             VALUE

  15     FORCE X          .100000E+04
  10     FORCE Y          .200000E+04
  13     FORCE X         -.500000E+03
```

MEMBER LOADS
****

MEMBER #	LOAD CODE	DISTANCE (m)	LENGTH (m)	START VALUE	END VALUE
7	PAR UNIF Y	3.000	1.000	.32000E+04	
7	PAR UNIF Y	3.500	0.500	-.32000E+04	
9	UNIFORM X			.30000E+04	
12	TRAPEZOIDAL X			.50000E+03	.90000E+03
17	PAR TRAP Y	3.500	1.200	.80000E+03	.12000E+04
17	PAR TRAP Y	3.500	1.200	0.00000E+0	.80000E+03
18	FORCE Y	2.000		-.10000E+04	
20	MOMENT Z LOCAL	1.500		-.70000E+05	
23	LIN DIST X			.19000E+01	

MEMBER #	TEMPERATURE VARIATION	THERMAL EXPANSION COEFFICIENT
14	10.000	.10000E-04

LOADING 2

SELECTED OPTION END

PHASES SELECTION
****
SELECTED PHASE: LOADING COMBINATIONS

Phase 6

LOADING COMBINATIONS

COM

Purpose

This phase is used to enter combinations of loadings. To solve the problem, an itherative sequence is used, therefore no immediate correction is needed until the whole input sequence is not finished. Remote correction is available at the option stage.

Method

In his first calling this phase starts with the input routine. Available options are MODIFY, PRINT and END which can be listed when needed, pressing the key F-16.
The option MODIFY brings you to a selection of verbs which are DELETE, CHANGE, NEW and END and can be listed when needed, pressing the key F-16.
CHANGE verb can be used to change a combination.
DELETE verb can be used to delete completely a combination.
NEW verb can be used when willing to restart the input. The use of END verb brings you to the options selection higher stage than verbs while the use of END option brings you to the phases selection, which again is a higher stage than the options.
The use of the option PRINT is clear.

Operating Procedure

LOADING COMBINATIONS

```
LOADING COMBINATIONS
********************


NUMBER OF LOADINGS                2
NUMBER OF LOADING COMBINATIONS    1
```

If the input has already been done go to point 4.

```
-----------------
! COMBINATION 1 !
-----------------
LOADING                    COEFFICIENT
   #                          VALUE
```

LOADING NUMBER (F-8=END)?

1. Enter loading number. Ex. 1

COEFFICIENT VALUE?

2. Enter his associated value. Ex. 5

1 5.ØØØ

LOADING NUMBER (F-8=END)?

3. When completed press F-8

In this case there is only one combination so the input is ended

SELECT OPTION?

4. Enter the selected option. Upon request the list of available options is obtainable pressing F-16

SELECTED OPTION HELP

LIST OF OPTIONS
****

OPTION	MEANING AND USE
MODify	TO MODIFY STRUCTURE DATA
PRInt	TO PRINT STRUCTURE DATA
END	TO RETURN TO THE PHASES SELECTION

SELECT OPTION?

5. Enter the selected option. Ex. MODify

SELECTED OPTION MODIFY

SELECT VERB?

6. Enter the selected verb. Upon request the list of available verbs is obtainable pressing F-16

SELECTED VERB HELP

LIST OF VERBS
****

VERB	MEANING AND USE
CHAnge	TO CHANGE STRUCTURE DATA
DELete	TO DELETE STRUCTURE DATA
NEW	TO ADD NEW DATA OR RESTART THE INPUT
END	TO RETURN TO THE OPTIONS SELECTION

SELECT VERB?

7. Enter the selected verb. Ex. CHAnge

SELECTED VERB CHANGE

COMBINATION NUMBER (F-8=END)?

8. Enter number of combination to change. Ex. 1

```
-----------------
| COMBINATION 1 |
-----------------
LOADING                    COEFFICIENT
   #                          VALUE
```

LOADING NUMBER (F-8=END)?

9. Enter loading number. Ex. 1

COEFFICIENT VALUE?

10. Enter coefficient value. Ex. 3

1 3.ØØØ

LOADING NUMBER (F-8=END)?

11. When completed press F-8. Ex. F-8

COMBINATION NUMBER (F-8=END)?

12. When completed press F-8. Ex. F-8

SELECT VERB?

13. Enter the selected verb. Ex. DELete

SELECTED VERB DELETE

COMBINATION NUMBER (F-8=END)?

14. Enter combination number. Ex. 1

DELETED COMBINATION 1

COMBINATION NUMBER (F-8=END)?

15. Enter combination number. Ex. F-8

SELECT VERB?

16. Enter the selected verb. Ex. NEW

SELECTED VERB NEW

```
-----------------
| COMBINATION 1 |
-----------------
LOADING                    COEFFICIENT
   #                          VALUE
```

LOADING NUMBER (F-8=END)?

17. Enter loading number. Ex. 1

COEFFICIENT VALUE?

18. Enter associated value. Ex. 4

1 4.ØØØ

LOADING NUMBER (F-8=END)? *INPUT

19. When completed press F-8

SELECT VERB?

20. Enter the selected verb. Ex. END

SELECTED VERB END

SELECT OPTION?

21. Enter the selected option. Ex. PRInt

SELECTED OPTION PRINT

LOADING COMBINATIONS
****

COMBINATION 1

LOADING #	COEFFICIENT VALUE
1	4.000

SELECT OPTION?

22. Enter the selected option. Ex. END

SELECTED OPTION END

DATA STORAGE

PHASES SELECTION
****

SELECT PHASE?

23. Enter the selected phase. Ex. CALculations

Error Messages

ERROR . RETYPE : ≫LOADING NUMBER (F-8=END)?
The user entered a negative, a decimal or a number of a not existing loading.
Action: Enter a correct number

ERROR . RETYPE : SELECT OPTION?
The user entered a code not identifying an existing option.
Action: Enter a valid option (Press F-16 to get the complete list)

ERROR . RETYPE : SELECT VERB?
The user entered a code not identifying an existing verb.
Action: Enter a valid verb (Press F-16 to get the complete list)

ERROR . RETYPE : ≫ COMBINATION NUMBER (F-8=END)?

The user entered a negative, a decimal or a number of not existing combination.

Action: Enter a correct value.

Sample Program Run

```
LOADING COMBINATIONS
********************


NUMBER OF LOADINGS               2
NUMBER OF LOADING COMBINATIONS   1









-----------------
+ COMBINATION 1 +
-----------------
LOADING                      COEFFICIENT
   #                            VALUE
   1                            5.000

SELECTED OPTION HELP

                           LIST OF OPTIONS
                           ***************

-----------------------------------------------
| OPTION |           MEANING AND USE          |
|--------|------------------------------------|
|        |                                    |
| MODify | TO MODIFY STRUCTURE DATA           |
| PRInt  | TO PRINT STRUCTURE DATA            |
| END    | TO RETURN TO THE PHASES SELECTION  |
|        |                                    |
-----------------------------------------------









SELECTED OPTION MODIFY

SELECTED VERB   HELP

                          LIST OF VERBS
                          *************

-------------------------------------------------
|  VERB  |            MEANING AND USE           |
|--------|--------------------------------------|
|        |                                      |
| CHAnge | TO CHANGE STRUCTURE DATA             |
| DELete | TO DELETE STRUCTURE DATA             |
| NEW    | TO ADD NEW DATA OR RESTART THE INPUT |
| END    | TO RETURN TO THE OPTIONS SELECTION   |
|        |                                      |
-------------------------------------------------
```

```
 SELECTED VERB    CHANGE

 -----------------
 ! COMBINATION 1 !
 -----------------
 LOADING                          COEFFICIENT
    #                                VALUE
    1                               3.000

 SELECTED VERB    DELETE

 DELETED COMBINATION 1

 SELECTED VERB    NEW

 -----------------
 ! COMBINATION 1 !
 -----------------
 LOADING                          COEFFICIENT
    #                                VALUE
    1                               4.000

 SELECTED VERB    END

 SELECTED OPTION PRINT


            LOADING COMBINATIONS
            ********************


 -----------------
 ! COMBINATION 1 !
 -----------------

 LOADING                          COEFFICIENT
    #                                VALUE

    1                               4.000



SELECTED OPTION END

                                  PHASES SELECTION
                                  ****************
```

Phase 7

CALCULATIONS

CAL

Purpose

This phase is used in helping you to change system disk and run calculation program. All control is done in order to check whenever a necessary input is missing; if everything is all right function keys are loaded and a message guides you through the operation. Otherwise the control goes back to phases selection, and pressing F-16 you can see which are the input missing.

Method

After the check of the input, the program guides you both with printer and display through the operation.

Operating Procedure

```
TO START CALCULATIONS:  1. PRESS : F-1
                        2. ENTER : CALCULATION DISK
                        3. PRESS : CONTINUE
                        4. PRESS : F-2
```

1. Execute the printed instructions in the exact order in which they are listed.

Press: F-1

Sample Program Run

```
                        PHASES SELECTION
                        ****************

TO START CALCULATIONS : 1.  PRESS : F1
                        2.  ENTER : CALCULATION DISK
                        3.  PRESS : CONTINUE
                        4.  PRESS : F2
```

STOP

STO

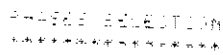
Purpose

This phase allows you to stop the input whenever you want, having all the opportunities to restart when needed.

Method

Just after the user entered STOP the program stops running. To restart just enter the command RUN *INPUT and to the first questions enter Ø as for an old structure, as shown in page 3.4, point C.

Operating Procedures



SELECT PHASE?

1. Enter the selected phase. Upon request the list of available phases can be listed pressing F-16 (HELP). Ex. STOp

READY

*HELP

CALCULATION DISK HELP PROGRAM

Purpose

This program is designed to assist you use the program in this disk. If you are already familiar with the contents of the package and have previously run the program you may not need to use this program at all. Simply hit the [RUN] key, enter the filename of the program in your disk *CALC and hit [END OF LINE] key.

If you are somewhat familiar with the package but have forgotten the filename mnemonics for the program you want, or simply you ignore to what kind of structure belongs your disk then you may use HELP to see the contents of your disk.

If you have never used the package before, then you may use HELP to give you a description of the program and the procedure for accessing it.

Operating Procedures

1. Ensure that the machine is in COMMAND MODE. (If you happen to be at an Input Statement of a program or otherwise running a program, hit [BREAK] The machine will then put you into COMMAND MODE. If you are already in COMMAND MODE you will get an audio beep.)

2. Enter RUN *HELP

   The package identifying message will be displayed:

   Example:

   HELP FOR COMPUTING SPACE TRUSS

   and the Package Header will be printed:

```
Olivetti P6060 STRUCTURAL ANALYSIS SERIES
THREE-DIMENSIONAL TRUSS ANALYSIS - Code M26012SS
Release 1 - Level 0        May 1977
Copyright 1977, by Olivetti
```

   followed by the program number, his title, his mnemonic and general information and outline. The machine will then automatically exit the HELP program.

Sample Program Run

```
Olivetti P6060 STRUCTURAL ANALYSIS SERIES
THREE-DIMENSIONAL TRUSS ANALYSIS - Code M2601255
Release 1 - Level 0       April 1977
Copyright 1977, by Olivetti

    This disk is one of the structural engineering series,
    which consists of the following programs:

                    1) PLANE FRAME
                    2) PLANE GRID
                    3) PLANE TRUSS
                    4) SPACE TRUSS

    It should be used with a user disk, in which data files for
    SPACE TRUSS analysis have been previously filled with all
    the data of the structure ( this operation can be done with
    the disk: INPUT for SPACE TRUSS ).

    In particular, with this disk, displacements, member
    forces and support reactions can be quickly calculated.
    To do this, just enter the command:    RUN *CALC

    If you have already calculated your structure, and you need
    only to have a printout just enter the command:    RUN *PRINT

    Undesired printout can be avoided just using the disk
                UTILITIES for STRUCTURAL ANALYSIS
```

*CALC

CALCULATION OF A SPACE TRUSS STRUCTURE

Purpose

This program is used to calculate the structure whose data are already stored in your user disk with the input disk (see 2-1).

Method

To better know which is the used method you can see the related document P6060 Technical Supplement Linear Elastic analysis of skeletal structures.
For the printout the program prints first the structure parameters, then joint displacements, member-end forces and support reactions.
With the use of the disk: UTILITIES for structure analysis you can change your output and have some unwished data not printed.

Operating Procedures

1. Ensure that the disk labelled "Calculation for Space Truss" is on drive 2.
2. Ensure that a user disk with data belonging to a truss structure is on drive 1.
3. Enter RUN *CALC

CALCULATIONS

```
Olivetti P6060 STRUCTURAL ANALYSIS SERIES
THREE-DIMENSIONAL TRUSS ANALYSIS - Code M2601255
Release 1 - Level 0        May 1977
Copyright 1977, by Olivetti
```

The program starts verifying first if the data of the user disk belong to a plane frame structure. If they don't belong the program prints

SYSTEM DISK FOR SPACE TRUSS ONLY
IMPROPER USER DISK

PRESS : F-1

1. PRESS : F-1
2. ENTER : INPUT DISK FOR SPACE TRUSS
3. PRESS : CONTINUE
4. PRESS : F-2

and stops.
Just follow the procedure shown, and check if your user disk is a space truss or not. If also input disk reject user disk, your structure is not a space truss, but something different. Be carefully not to destroy precious data of your archive.

If data belong to a space truss the program checks if all the input have been entered. If some input is missing the program prints. Ex. MATERIAL PROPERTIES

MISSING INPUT OF MATERIAL PROPERTIES

PRESS : F-1

1. PRESS : F-1

2. ENTER : INPUT DISK FOR SPACE TRUSS

3. PRESS : CONTINUE

4. PRESS : F-2

and stops.

Just follow the previous given procedures and enter with the input disk your missing data. If all the input are all right the program first prints the name of the structure so you can recognize if this is the proper disk, then he checks if the structure is stable. If it is unstable the program prints. Ex. 2

STRUCTURE UNSTABLE IN LOADING : 2

PRESS : F-1

1. PRESS : F-1

2. ENTER : INPUT DISK FOR SPACE TRUSS

3. PRESS : CONTINUE

4. PRESS : F-2

and stops.

Just follow the previous given procedures and check the printed loading.

If the coordinate of a joint have been wrongly entered and happens to have a member with length = Ø the program prints. Ex. 5

LENGTH = Ø IN MEMBER : 5

PRESS : F-1

1. PRESS : F-1

2. ENTER : INPUT DISK FOR SPACE TRUSS

3. PRESS : CONTINUE

4. PRESS : F-2

and stops.

Just follow the previous given procedures and check your joint coordinates.

If the program passes all these tests, it asks:

ENTER DATE (DD/MM/YY)?

4. Enter the date you wish to be printed in your printout, remembering to respect the format shown in the display. Ex. 30/04/77.
Then, the program starts computation

MEMBER - END FORCES

FORCES IN MEMBER : 1

changing member. You may notice a difference in time between members with or without load as the first takes longer to change. If during the input you have entered a load which cannot give any result on a certain axes, ex. a uniform load on x direction acting over a member having the same direction the program prints

ILLEGAL LOAD CODE IN MEMBER : 2

LOAD CODE : UNIFORM X

LOAD NUMBER : 1

UNCOMPUTED LOAD

but continues the computations.
After a certain time depending on the structure dimensions you can see on the display

STIFFNESS MATRIX METHOD

If your joints are all fixed supports go to point A

WAVEFRONT TO JOINT : 1

and the number displayed will change till the last joint will be computed. You may notice during this time the difference between normal joints and support joints, as the time to compute the first will be quite longer than the second which is only a flashing on your display.

A. When all the joints will be computed

BACK - SUBSTITUTION

which will end printing all the data requested, with a formatted printout of 71 lines per page, having a left side margin of 5 characters.
The printout is divided in sectors, the first of which is dedicated to structure parameters. Then comes joint characteristics, member geometrical characteristics, member properties, prescribed joint displacements, if any, loadings and loading combinations, if any.
After this the print of results follows: joint displacements, member-end forces and support reactions.
At the end of the whole printout the program ends and displays

READY

The program now has finished it's job: it's your turn to check results, change any needed value of your input or loadings and restart eventually computations.

Error Messages

SYSTEM DISK FOR SPACE TRUSS ONLY

IMPROPER USER DISK

The user entered a system disk for a space truss and a user disk with data belonging to à different structure.

Action: Follow the given procedures and ensure yourself to what kind of strucure belongs your data.

MISSING INPUT OF : JOINT COORDINATES

The user entered a disk in which the input of joint coordinates was missing.

Action: Follow the given procedures and enter your coordinates

MISSING INPUT OF : MEMBER INCIDENCES

The user entered a disk in which the input of member incidences was missing.

Action: Follow the given procedures and enter your incidences

MISSING INPUT OF : MATERIAL PROPERTIES

The user entered a disk in which the input of material properties was missing.

Action: Follow the given procedures and enter your material properties

MISSING INPUT OF : LOADS/PRESCRIBED JOINTS DISPLACEMENTS

The user entered a disk in which the input of both loads and prescribed was missing.

Action: Follow the given procedures and enter your loads.

MISSING INPUT OF : LOADING COMBINATIONS

The user entered a disk in which the input of loading combinations was missing, although declared in the general parameters.

Action: Follow the given procedures and enter your combinations

STRUCTURE UNSTABLE IN LOADING : 2

The indicated loading is incorrect

Action: Follow the given procedures and check your data

LENGTH = ø IN MEMBER : 5

The indicated member has length = ø

Action: Follow the given procedures and check your coordinates.

ILLEGAL LOAD CODE IN MEMBER : 3

LOAD CODE : UNIFORM X

LOAD NUMBER : 1

UNCOMPUTED LOAD

The user entered an uncomputable load in a certain loading.

Action: At the end of computation verify your loading.

*PRINT

PRINTOUT OF DATA AND RESULTS

Purpose

This program is used to printout all the data of your structure together with the results. It can be used when computation has already run with the same input data and you wish only to get a new copy of all your printout.

Method

This program uses the data previously input, and the displacement already computed by the calculation program. With the use of the disk : UTILITIES for structural analysis you can change your output and have some unwished data not printed.

Operating Procedures

1. Ensure that the system disk labelled "Calculation for Space Truss" is on drive 2.
2. Ensure that a user disk with data belonging to a space truss is on drive 1.
3. Be sure that the data you have entered have already been computed by the calculation program, so that each joint displacements and each member forces are correctly stored on the user disk.
4. RUN *INPUT

   and you will get your results.

   Remember that printing times is not only affected by structure parameters such as number of members, joints and loadings, but also from the number of combinations which does not affect computation time.

Sample Program Run

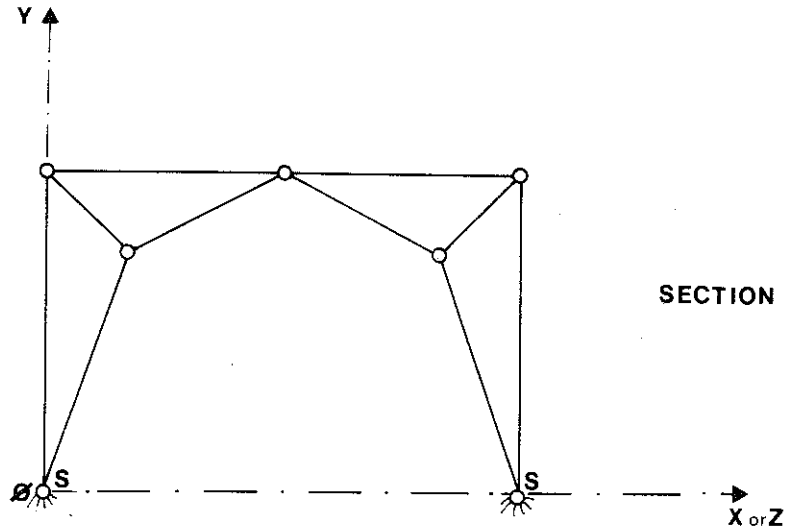
Two structures have been selected to show you some examples both of printout and results. The page format have been entered with the aid of the disk Utilities for Structural Analysis and has a format of 71 lines per page and a left-side margin of 5 characters.
The first structure called "SPACE TRUSS1" shows you some features of the program; the picture help you in detecting the structure which have been entered.
The second structure, is called "SPACE TRUSS2". Of course this are not the maximum sizes which the program can afford.
For both structures here under is also indicated the computation and the printing time, which is a function not only of the structure dimensions, but of course also of the number of loadings and loading combinations, and, for the printout only of the requested data.

SPACE TRUSS1

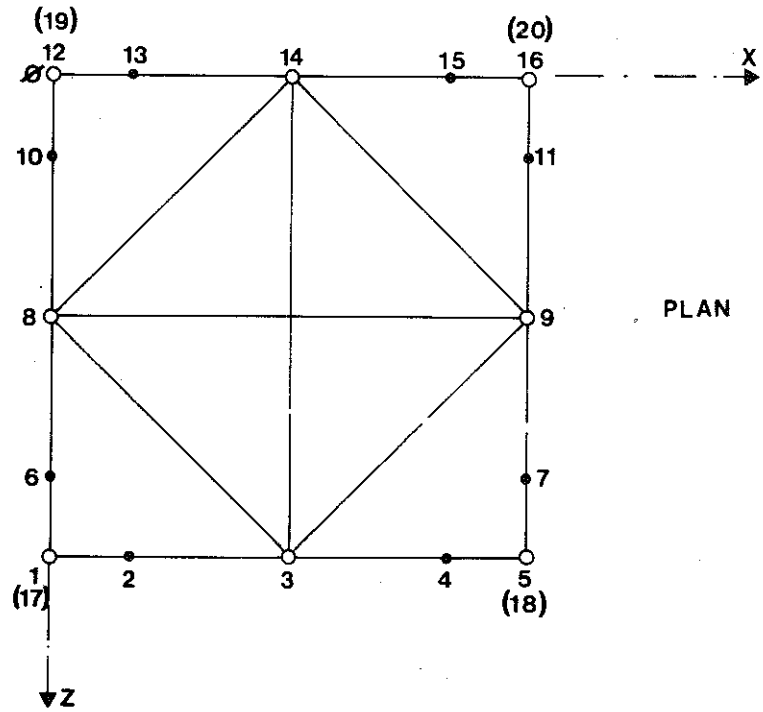
Processing time	24 min.
Printing time	50 min.

SPACE TRUSS2

Processing time	10 min.
Printing time	45 min.



SECTION



PLAN

Ø = origin

S = fixed support joints

PROGRAM:THREE-DIMENSIONAL TRUSS ANALYSIS

1.1 JOB IDENTIFICATION SECTION

JOB NAME: SPACE TRUSS 1

1.2 STRUCTURE PARAMETERS

NUMBER OF MEMBERS	42
NUMBER OF JOINTS	20
NUMBER OF FIXED SUPPORT JOINTS	4
NUMBER OF LOADINGS	4
NUMBER OF LOADING COMBINATIONS	1

1.3 UNITS OF MEASURE

LENGTH	(m)
AREA	(cm2)
FORCE	(kg)
YOUNG'S MODULUS	(kg/cm2)
MOMENT	(kgcm)
DISPLACEMENT	(cm)
TEMPERATURE	(Grad C)
ANGLE	(rad)

2.1 JOINT CHARACTERISTICS

JOINT #	COORDINATES X(m)	Y(m)	Z(m)	FIXED	PRES. DISP.
1	0.000	6.000	9.000		
2	1.500	4.500	9.000		
3	4.500	6.000	9.000		
4	7.500	4.500	9.000		
5	9.000	6.000	9.000		
6	0.000	4.500	7.500		
7	9.000	4.500	7.500		
8	0.000	6.000	4.500		
9	9.000	6.000	4.500		
10	0.000	4.500	1.500		
11	9.000	4.500	1.500		
12	0.000	6.000	0.000		
13	1.500	4.500	0.000		
14	4.500	6.000	0.000		
15	7.500	4.500	0.000		
16	9.000	6.000	0.000		
17	0.000	0.000	9.000	S	
18	9.000	0.000	9.000	S	
19	0.000	0.000	0.000	S	
20	9.000	0.000	0.000	S	

3.1 MEMBER GEOMETRICAL DATA

MEMBER #	START INDEX	END INDEX	LENGTH (m)
1	17	1	.600000E+01
2	17	2	.474341E+01
3	2	1	.212132E+01
4	1	2	.450000E+01
5	2	3	.335410E+01
6	4	3	.335410E+01
7	5	3	.450000E+01
8	4	5	.212132E+01
9	18	4	.474341E+01
10	18	5	.600000E+01
11	19	12	.600000E+01
12	19	13	.474341E+01
13	13	12	.212132E+01
14	12	14	.450000E+01
15	13	14	.335410E+01
16	15	14	.335410E+01
17	15	14	.450000E+01
18	15	15	.212132E+01
19	20	15	.474341E+01
20	20	16	.600000E+01
21	17	6	.474341E+01
22	6	1	.212132E+01
23	1	8	.450000E+01
24	6	8	.335410E+01
25	10	8	.335410E+01
26	12	8	.450000E+01
27	10	12	.212132E+01
28	19	10	.474341E+01
29	18	7	.474341E+01
30	7	5	.212132E+01
31	5	9	.450000E+01
32	7	9	.335410E+01
33	11	9	.335410E+01
34	16	9	.450000E+01
35	11	16	.212132E+01
36	20	11	.474341E+01
37	8	14	.636396E+01
38	9	14	.636396E+01
39	8	3	.636396E+01
40	9	3	.636396E+01
41	3	14	.900000E+01
42	8	9	.900000E+01

3.2 MEMBER PROPERTIES

MEMBER #	YOUNG'S MODULUS (kg/cm2)	AREA (cm2)
1	.210000E+07	.350000E+02

MEMBER #	YOUNG'S MODULUS (kg/cm2)	AREA (cm2)
2	.210000E+07	.200000E+02
3	.210000E+07	.100000E+02
4	.210000E+07	.350000E+02
5	.210000E+07	.200000E+02
6	.210000E+07	.200000E+02
7	.210000E+07	.350000E+02
8	.210000E+07	.100000E+02
9	.210000E+07	.200000E+02
10	.210000E+07	.350000E+02
11	.210000E+07	.350000E+02
12	.210000E+07	.200000E+02
13	.210000E+07	.100000E+02
14	.210000E+07	.350000E+02
15	.210000E+07	.200000E+02
16	.210000E+07	.200000E+02
17	.210000E+07	.350000E+02
18	.210000E+07	.100000E+02
19	.210000E+07	.200000E+02
20	.210000E+07	.350000E+02
21	.210000E+07	.200000E+02
22	.210000E+07	.100000E+02
23	.210000E+07	.350000E+02
24	.210000E+07	.200000E+02
25	.210000E+07	.200000E+02
26	.210000E+07	.350000E+02
27	.210000E+07	.100000E+02
28	.210000E+07	.200000E+02
29	.210000E+07	.200000E+02
30	.210000E+07	.100000E+02
31	.210000E+07	.350000E+02
32	.210000E+07	.200000E+02
33	.210000E+07	.200000E+02
34	.210000E+07	.350000E+02
35	.210000E+07	.100000E+02
36	.210000E+07	.200000E+02
37	.210000E+07	.100000E+02
38	.210000E+07	.100000E+02
39	.210000E+07	.100000E+02
40	.210000E+07	.100000E+02
41	.210000E+07	.100000E+02
42	.210000E+07	.100000E+02

4.1 JOINT and MEMBER LOADS

UNITS OF MEASURE

FORCE	(kg)
MOMENT	(kgcm)
LENGTH	(m)
TEMPERATURE	(Grad C)
LINEAR DISTORTION	(cm)

! LOADING 1 !

MEMBER LOADS

MEMBER #	LOAD CODE	DISTANCE (m)	LENGTH (m)	START VALUE	END VALUE
4	UNIFORM Y			-.10000E+04	
7	UNIFORM Y			-.10000E+04	
14	UNIFORM Y			-.10000E+04	
17	UNIFORM Y			-.10000E+04	
23	UNIFORM Y			-.10000E+04	
26	UNIFORM Y			-.10000E+04	
31	UNIFORM Y			-.10000E+04	
34	UNIFORM Y			-.10000E+04	

! LOADING 2 !

JOINT LOADS

JOINT #	LOAD CODE	LOAD VALUE
3	FORCE Y	-.200000E+04
8	FORCE Y	-.200000E+04
9	FORCE Y	-.200000E+04

JOINT #	LOAD CODE	LOAD VALUE
14	FORCE Y	-.200000E+04

LOADING 3

JOINT LOADS

JOINT #	LOAD CODE	LOAD VALUE
1	FORCE X	.110000E+04
3	FORCE X	.110000E+04
12	FORCE X	.110000E+04
9	FORCE X	.220000E+04
5	FORCE X	.550000E+03
16	FORCE X	.550000E+03

LOADING 4

JOINT LOADS

JOINT #	LOAD CODE	LOAD VALUE
2	FORCE Y	-.500000E+03
4	FORCE Y	-.500000E+03
6	FORCE Y	-.500000E+03
7	FORCE Y	-.500000E+03
10	FORCE Y	-.500000E+03
11	FORCE Y	-.500000E+03
13	FORCE Y	-.500000E+03
15	FORCE Y	-.500000E+03

Date 03/06/77

5.1 LOADING COMBINATIONS

COMBINATION #	LOADING #	COEFFICIENT VALUE
1	1	1.00000
	2	1.00000
	3	1.00000
	4	1.00000

JOINT DISPLACEMENTS

JOINT #	LOADING #	DISPL.X (cm)	DISPL.Y (cm)	DISPL.Z (cm)
1	1	-0.0172205	0.0091809	0.0172023
	2	-0.0076573	0.0204074	0.0076460
	3	0.4933260	-0.0224389	0.0000096
	4	0.0007635	-0.0020409	-0.0007653
2	1	-0.1100600	-0.0268396	0.0000000
	2	-0.0611654	-0.0078464	0.0000000
	3	0.4750420	-0.0962589	0.0000000
	4	0.0004696	-0.0040623	0.0000000
3	1	-0.0000018	-0.3368010	-0.0000113
	2	-0.0000042	-0.1700990	-0.0000036
	3	0.4697630	0.0021080	0.0034500
	4	0.0000002	-0.0039235	0.0000000
4	1	0.1100580	-0.0268402	0.0000000
	2	0.0611569	-0.0078481	0.0000000
	3	0.4725140	0.0954158	0.0000000
	4	-0.0004691	-0.0040622	0.0000000
5	1	0.0172172	0.0091816	0.0172096
	2	0.0076485	0.0204071	0.0076510
	3	0.4899590	0.0224385	0.0000042
	4	-0.0007651	-0.0020408	-0.0007655
6	1	0.0000000	-0.0268425	0.1100440
	2	0.0000000	-0.0078477	0.0611546
	3	0.0000000	-0.0056082	-0.0168200
	4	0.0000000	-0.0040622	-0.0004694
7	1	0.0000000	-0.0268411	0.1100510
	2	0.0000000	-0.0078472	0.0611586
	3	0.0000000	0.0056105	0.0168227
	4	0.0000000	-0.0040622	-0.0004695
8	1	0.0000007	-0.3368020	-0.0000150
	2	-0.0000029	-0.1700960	-0.0000054
	3	0.5280970	0.0280484	0.0000092
	4	0.0000001	-0.0039234	0.0000000
9	1	0.0000007	-0.3368020	-0.0000089
	2	-0.0000028	-0.1700970	-0.0000010
	3	0.5114300	-0.0280471	0.0000042
	4	0.0000001	-0.0039235	-0.0000002
10	1	0.0000000	-0.0268362	-0.1100760
	2	0.0000000	-0.0078458	-0.0611656
	3	0.0000000	-0.0056117	0.0168383
	4	0.0000000	-0.0040621	0.0004694
11	1	0.0000000	-0.0268369	-0.1100700
	2	0.0000000	-0.0078466	-0.0611624

JOINT #	LOADING #	DISPL.X (cm)	DISPL.Y (cm)	DISPL.Z (cm)
	3	0.0000000	0.0056088	-0.0168243
	4	0.0000000	-0.0048621	0.0004691
12	1	-0.0172149	0.0091833	-0.0172349
	2	-0.0076544	0.0204077	-0.0076584
	3	0.4933260	-0.0224399	0.0000092
	4	0.0007654	-0.0020408	0.0007653
13	1	-0.1100570	-0.0268403	0.0000000
	2	-0.0511626	-0.0078469	0.0000000
	3	0.4750420	-0.0962598	0.0000000
	4	0.0004694	-0.0048623	0.0000000
14	1	0.0000036	-0.3368040	-0.0000120
	2	-0.0000014	-0.1700990	-0.0000034
	3	0.4697640	0.0021008	-0.0034449
	4	0.0000000	-0.0039237	0.0000000
15	1	0.1100660	-0.0268386	0.0000000
	2	0.0511597	-0.0078473	0.0000000
	3	0.4725150	0.0954168	0.0000000
	4	-0.0004692	-0.0048622	0.0000000
16	1	0.0172226	0.0091839	-0.0172286
	2	0.0076514	0.0204073	-0.0076548
	3	0.4899610	0.0224384	0.0000046
	4	-0.0007652	-0.0020407	0.0007651

MEMBER-END FORCES

LOADING 1

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	17	-.11247E+04	0.00000E+0	0.00000E+0
	1	.11247E+04	0.00000E+0	0.00000E+0
2	17	.53362E+04	0.00000E+0	0.00000E+0
	2	-.53362E+04	0.00000E+0	0.00000E+0
3	2	.39773E+04	-.10000E-01	0.00000E+0
	1	-.39773E+04	.10000E-01	0.00000E+0
4	1	-.28124E+04	.22500E+04	0.00000E+0
	3	.28124E+04	.22500E+04	0.00000E+0
5	2	.50312E+04	-.30000E-01	0.00000E+0
	3	-.50312E+04	.30000E-01	0.00000E+0
6	4	.50311E+04	-.60000E-01	0.00000E+0
	3	-.50311E+04	.60000E-01	0.00000E+0
7	5	-.28124E+04	.22500E+04	0.00000E+0
	3	.28124E+04	.22500E+04	0.00000E+0
8	4	.39773E+04	0.00000E+0	0.00000E+0
	5	-.39773E+04	0.00000E+0	0.00000E+0
9	18	.53362E+04	0.00000E+0	0.00000E+0
	4	-.53362E+04	0.00000E+0	0.00000E+0
10	18	-.11247E+04	0.00000E+0	0.00000E+0
	5	.11247E+04	0.00000E+0	0.00000E+0
11	19	-.11250E+04	0.00000E+0	0.00000E+0
	12	.11250E+04	0.00000E+0	0.00000E+0
12	19	.53362E+04	0.00000E+0	0.00000E+0
	13	-.53362E+04	0.00000E+0	0.00000E+0
13	13	.39773E+04	0.00000E+0	0.00000E+0
	12	-.39773E+04	0.00000E+0	0.00000E+0
14	12	-.28123E+04	.22500E+04	0.00000E+0
	14	.28123E+04	.22500E+04	0.00000E+0
15	13	.50312E+04	-.70000E-01	0.00000E+0
	14	-.50312E+04	.70000E-01	0.00000E+0
16	15	.50311E+04	-.70000E-01	0.00000E+0
	14	-.50311E+04	.70000E-01	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
17	16	-.28124E+04	.22500E+04	0.00000E+0
	14	.28124E+04	.22500E+04	0.00000E+0
18	15	.39774E+04	0.00000E+0	0.00000E+0
	16	-.39774E+04	0.00000E+0	0.00000E+0
19	20	.53363E+04	0.00000E+0	0.00000E+0
	15	-.53363E+04	0.00000E+0	0.00000E+0
20	20	-.11250E+04	0.00000E+0	0.00000E+0
	16	.11250E+04	0.00000E+0	0.00000E+0
21	17	.53360E+04	0.00000E+0	0.00000E+0
	6	-.53360E+04	0.00000E+0	0.00000E+0
22	6	.39772E+04	0.00000E+0	0.00000E+0
	1	-.39772E+04	0.00000E+0	0.00000E+0
23	1	-.28122E+04	.22500E+04	0.00000E+0
	9	.28122E+04	.22500E+04	0.00000E+0
24	6	.50311E+04	-.50000E-01	0.00000E+0
	8	-.50311E+04	.50000E-01	0.00000E+0
25	10	.50312E+04	-.60000E-01	0.00000E+0
	8	-.50312E+04	.60000E-01	0.00000E+0
26	12	-.28126E+04	.22500E+04	0.00000E+0
	8	.28126E+04	.22500E+04	0.00000E+0
27	10	.39775E+04	-.10000E-01	0.00000E+0
	12	-.39775E+04	.10000E-01	0.00000E+0
28	19	.53364E+04	0.00000E+0	0.00000E+0
	10	-.53364E+04	0.00000E+0	0.00000E+0
29	18	.53361E+04	0.00000E+0	0.00000E+0
	7	-.53361E+04	0.00000E+0	0.00000E+0
30	7	.39773E+04	0.00000E+0	0.00000E+0
	5	-.39773E+04	0.00000E+0	0.00000E+0
31	5	-.28123E+04	.22500E+04	0.00000E+0
	9	.28123E+04	.22500E+04	0.00000E+0
32	7	.50310E+04	-.20000E-01	0.00000E+0
	9	-.50310E+04	.20000E-01	0.00000E+0
33	11	.50312E+04	-.70000E-01	0.00000E+0
	9	-.50312E+04	.70000E-01	0.00000E+0
34	16	-.28125E+04	.22500E+04	0.00000E+0
	9	.28125E+04	.22500E+04	0.00000E+0
35	11	.39774E+04	-.10000E-01	0.00000E+0
	16	-.39774E+04	.10000E-01	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
36	20	.53362E+04	0.00000E+0	0.00000E+0
	11	-.53362E+04	0.00000E+0	0.00000E+0
37	8	.35709E-02	0.00000E+0	0.00000E+0
	14	-.35709E-02	0.00000E+0	0.00000E+0
38	9	-.42469E-02	0.00000E+0	0.00000E+0
	14	.42469E-02	0.00000E+0	0.00000E+0
39	8	-.12500E-01	0.00000E+0	0.00000E+0
	3	.12500E-01	0.00000E+0	0.00000E+0
40	3	.12582E-01	0.00000E+0	0.00000E+0
	3	-.12582E-01	0.00000E+0	0.00000E+0
41	3	-.63000E-04	0.00000E+0	0.00000E+0
	14	.63000E-04	0.00000E+0	0.00000E+0
42	8	-.23330E-03	0.00000E+0	0.00000E+0
	3	.23330E-03	0.00000E+0	0.00000E+0

(LOADING 2)

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	17	-.24999E+04	0.00000E+0	0.00000E+0
	1	.24999E+04	0.00000E+0	0.00000E+0
2	17	.23717E+04	-.30000E-02	0.00000E+0
	2	-.23717E+04	.30000E-02	0.00000E+0
3	2	.17678E+04	-.10000E-02	0.00000E+0
	1	-.17678E+04	.10000E-02	0.00000E+0
4	1	-.12500E+04	0.00000E+0	0.00000E+0
	3	.12500E+04	0.00000E+0	0.00000E+0
5	2	.22360E+04	-.40000E-02	0.00000E+0
	3	-.22360E+04	.40000E-02	0.00000E+0
6	4	.22360E+04	-.40000E-02	0.00000E+0
	3	-.22360E+04	.40000E-02	0.00000E+0
7	5	-.12499E+04	0.00000E+0	0.00000E+0
	3	.12499E+04	0.00000E+0	0.00000E+0
8	4	.17677E+04	-.20000E-02	0.00000E+0
	5	-.17677E+04	.20000E-02	0.00000E+0
9	18	.23716E+04	-.50000E-02	0.00000E+0
	4	-.23716E+04	.50000E-02	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
10	18	-.24999E+04	0.00000E+0	0.00000E+0
	5	.24999E+04	0.00000E+0	0.00000E+0
11	19	-.24999E+04	0.00000E+0	0.00000E+0
	12	.24999E+04	0.00000E+0	0.00000E+0
12	19	.23717E+04	-.40000E-02	0.00000E+0
	13	-.23717E+04	.40000E-02	0.00000E+0
13	13	.17677E+04	-.10000E-02	0.00000E+0
	12	-.17677E+04	.10000E-02	0.00000E+0
14	12	-.12500E+04	0.00000E+0	0.00000E+0
	14	.12500E+04	0.00000E+0	0.00000E+0
15	13	.22360E+04	-.40000E-02	0.00000E+0
	14	-.22360E+04	.40000E-02	0.00000E+0
16	15	.22360E+04	-.40000E-02	0.00000E+0
	14	-.22360E+04	.40000E-02	0.00000E+0
17	16	-.12500E+04	0.00000E+0	0.00000E+0
	14	.12500E+04	0.00000E+0	0.00000E+0
18	15	.17677E+04	-.10000E-02	0.00000E+0
	16	-.17677E+04	.10000E-02	0.00000E+0
19	20	.23716E+04	-.60000E-02	0.00000E+0
	15	-.23716E+04	.60000E-02	0.00000E+0
20	20	-.24999E+04	0.00000E+0	0.00000E+0
	16	.24999E+04	0.00000E+0	0.00000E+0
21	17	.23715E+04	-.70000E-02	0.00000E+0
	6	-.23715E+04	.70000E-02	0.00000E+0
22	6	.17677E+04	-.20000E-02	0.00000E+0
	1	-.17677E+04	.20000E-02	0.00000E+0
23	1	-.12499E+04	0.00000E+0	0.00000E+0
	8	.12499E+04	0.00000E+0	0.00000E+0
24	6	.22359E+04	-.20000E-02	0.00000E+0
	8	-.22359E+04	.20000E-02	0.00000E+0
25	10	.22360E+04	-.30000E-02	0.00000E+0
	8	-.22360E+04	.30000E-02	0.00000E+0
26	12	-.12500E+04	0.00000E+0	0.00000E+0
	8	.12500E+04	0.00000E+0	0.00000E+0
27	10	.17677E+04	-.10000E-02	0.00000E+0
	12	-.17677E+04	.10000E-02	0.00000E+0
28	19	.23717E+04	-.70000E-02	0.00000E+0
	10	-.23717E+04	.70000E-02	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
29	10	.23715E+04	-.50000E-02	0.00000E+0
	7	-.23715E+04	.50000E-02	0.00000E+0
30	7	.17677E+04	-.20000E-02	0.00000E+0
	5	-.17677E+04	.20000E-02	0.00000E+0
31	5	-.12500E+04	0.00000E+0	0.00000E+0
	9	.12500E+04	0.00000E+0	0.00000E+0
32	7	.22360E+04	-.20000E-02	0.00000E+0
	3	-.22360E+04	.20000E-02	0.00000E+0
33	11	.22360E+04	.10000E-02	0.00000E+0
	9	-.22360E+04	-.10000E-02	0.00000E+0
34	16	-.12500E+04	0.00000E+0	0.00000E+0
	9	.12500E+04	0.00000E+0	0.00000E+0
35	11	.17677E+04	-.10000E-02	0.00000E+0
	16	-.17677E+04	.10000E-02	0.00000E+0
36	20	.23717E+04	-.40000E-02	0.00000E+0
	11	-.23717E+04	.40000E-02	0.00000E+0
37	8	.13283E-01	0.00000E+0	0.00000E+0
	14	-.13283E-01	0.00000E+0	0.00000E+0
38	9	-.49140E-02	0.00000E+0	0.00000E+0
	14	.49140E-02	0.00000E+0	0.00000E+0
39	8	-.12298E-01	0.00000E+0	0.00000E+0
	3	.12298E-01	0.00000E+0	0.00000E+0
40	9	.68783E-02	0.00000E+0	0.00000E+0
	3	-.68783E-02	0.00000E+0	0.00000E+0
41	3	.38311E-02	0.00000E+0	0.00000E+0
	14	-.38311E-02	0.00000E+0	0.00000E+0
42	8	-.23566E-02	0.00000E+0	0.00000E+0
	9	.23566E-02	0.00000E+0	0.00000E+0

LOADING 3

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	17	.27488E+04	0.00000E+0	0.00000E+0
	1	-.27488E+04	0.00000E+0	0.00000E+0
2	17	-.52153E+04	.40000E-01	0.00000E+0
	2	.52153E+04	-.40000E-01	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
3	2	-.38874E+04	.10000E-01	0.00000E+0
	1	.38874E+04	-.10000E-01	0.00000E+0
4	1	.38486E+04	0.00000E+0	0.00000E+0
	3	-.38486E+04	0.00000E+0	0.00000E+0
5	2	-.49173E+04	0.00000E+0	0.00000E+0
	3	.49173E+04	0.00000E+0	0.00000E+0
6	4	.49172E+04	.40000E-01	0.00000E+0
	3	-.49172E+04	-.40000E-01	0.00000E+0
7	5	-.32986E+04	0.00000E+0	0.00000E+0
	3	.32986E+04	0.00000E+0	0.00000E+0
8	4	.38873E+04	0.00000E+0	0.00000E+0
	5	-.38873E+04	0.00000E+0	0.00000E+0
9	18	.52153E+04	-.20000E-01	0.00000E+0
	4	-.52153E+04	.20000E-01	0.00000E+0
10	18	-.27487E+04	0.00000E+0	0.00000E+0
	5	.27487E+04	0.00000E+0	0.00000E+0
11	19	.27489E+04	0.00000E+0	0.00000E+0
	12	-.27489E+04	0.00000E+0	0.00000E+0
12	19	-.52152E+04	.50000E-01	0.00000E+0
	13	.52152E+04	-.50000E-01	0.00000E+0
13	13	-.38874E+04	0.00000E+0	0.00000E+0
	12	.38874E+04	0.00000E+0	0.00000E+0
14	12	.38485E+04	0.00000E+0	0.00000E+0
	14	-.38485E+04	0.00000E+0	0.00000E+0
15	13	-.49174E+04	.40000E-01	0.00000E+0
	14	.49174E+04	-.40000E-01	0.00000E+0
16	15	.49172E+04	-.40000E-01	0.00000E+0
	14	-.49172E+04	.40000E-01	0.00000E+0
17	16	-.32989E+04	0.00000E+0	0.00000E+0
	14	.32989E+04	0.00000E+0	0.00000E+0
18	15	.38872E+04	-.10000E-01	0.00000E+0
	16	-.38872E+04	.10000E-01	0.00000E+0
19	20	.52153E+04	-.30000E-01	0.00000E+0
	15	-.52153E+04	.30000E-01	0.00000E+0
20	20	-.27487E+04	0.00000E+0	0.00000E+0
	16	.27487E+04	0.00000E+0	0.00000E+0
21	17	.12965E+00	-.10000E-06	0.00000E+0
	6	-.12965E+00	.10000E-06	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
22	6	.77537E-01	-.10000E-06	0.00000E+0
	7	-.77537E-01	.10000E-06	0.00000E+0
23	1	-.03338E-01	0.00000E+0	0.00000E+0
	3	.03338E-01	0.00000E+0	0.00000E+0
24	5	.10421E+00	.35768E-02	0.00000E+0
	9	-.10421E+00	-.35768E-02	0.00000E+0
25	10	-.11003E+00	.71563E-02	0.00000E+0
	3	.11003E+00	-.71563E-02	0.00000E+0
26	12	0.00000E+0	0.00000E+0	0.00000E+0
	8	0.00000E+0	0.00000E+0	0.00000E+0
27	10	-.48968E-01	0.00000E+0	0.00000E+0
	12	.48968E-01	0.00000E+0	0.00000E+0
28	10	-.31706E-01	.10000E-06	0.00000E+0
	10	.31706E-01	-.10000E-06	0.00000E+0
29	10	.20238E-01	-.63247E-03	0.00000E+0
	7	-.20238E-01	.63247E-03	0.00000E+0
30	7	.17367E-01	-.20000E-07	0.00000E+0
	5	-.17367E-01	.20000E-07	0.00000E+0
31	5	-.56690E-02	0.00000E+0	0.00000E+0
	9	.56690E-02	0.00000E+0	0.00000E+0
32	7	.51561E-01	-.17898E-02	0.00000E+0
	9	-.51561E-01	.17898E-02	0.00000E+0
33	11	-.64083E-01	-.89360E-03	0.00000E+0
	3	.64083E-01	.89360E-03	0.00000E+0
34	16	.55650E-01	0.00000E+0	0.00000E+0
	9	-.55650E-01	0.00000E+0	0.00000E+0
35	11	-.48229E-01	0.00000E+0	0.00000E+0
	16	.48229E-01	0.00000E+0	0.00000E+0
36	20	-.57870E-01	-.31610E-03	0.00000E+0
	11	.57870E-01	.31610E-03	0.00000E+0
37	8	.12805E+04	0.00000E+0	0.00000E+0
	14	-.12805E+04	0.00000E+0	0.00000E+0
38	9	-.10527E+04	0.00000E+0	0.00000E+0
	14	.10527E+04	0.00000E+0	0.00000E+0
39	8	.12806E+04	0.00000E+0	0.00000E+0
	3	-.12806E+04	0.00000E+0	0.00000E+0
40	9	-.10528E+04	0.00000E+0	0.00000E+0
	3	.10528E+04	0.00000E+0	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
41	3	-.16109E+03	0.00000E+0	0.00000E+0
	14	.16109E+03	0.00000E+0	0.00000E+0
42	8	.38890E+03	0.00000E+0	0.00000E+0
	9	-.38890E+03	0.00000E+0	0.00000E+0

LOADING 4

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	17	.25000E+03	0.00000E+0	0.00000E+0
	1	-.25000E+03	0.00000E+0	0.00000E+0
2	17	.39529E+03	.10000E-02	0.00000E+0
	2	-.39529E+03	-.10000E-02	0.00000E+0
3	2	-.17678E+03	.10000E-03	0.00000E+0
	1	.17678E+03	-.10000E-03	0.00000E+0
4	1	.12500E+03	0.00000E+0	0.00000E+0
	3	-.12500E+03	0.00000E+0	0.00000E+0
5	2	.89443E-03	-.44721E-03	0.00000E+0
	3	-.89443E-03	.44721E-03	0.00000E+0
6	4	.24597E-02	.44720E-03	0.00000E+0
	3	-.24597E-02	-.44720E-03	0.00000E+0
7	5	.12500E+03	0.00000E+0	0.00000E+0
	3	-.12500E+03	0.00000E+0	0.00000E+0
8	4	-.17677E+03	.10000E-03	0.00000E+0
	5	.17677E+03	-.10000E-03	0.00000E+0
9	18	.39529E+03	.10000E-02	0.00000E+0
	4	-.39529E+03	-.10000E-02	0.00000E+0
10	18	.25000E+03	0.00000E+0	0.00000E+0
	5	-.25000E+03	0.00000E+0	0.00000E+0
11	19	.25000E+03	0.00000E+0	0.00000E+0
	12	-.25000E+03	0.00000E+0	0.00000E+0
12	19	.39529E+03	.10000E-02	0.00000E+0
	13	-.39529E+03	-.10000E-02	0.00000E+0
13	13	-.17678E+03	.10000E-03	0.00000E+0
	12	.17678E+03	-.10000E-03	0.00000E+0
14	12	.12500E+03	0.00000E+0	0.00000E+0
	14	-.12500E+03	0.00000E+0	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
15	13	.21466E-02	-.17889E-03	0.00000E+0
	14	-.21466E-02	.17889E-03	0.00000E+0
16	15	.22361E-02	0.00000E+0	0.00000E+0
	14	-.22361E-02	0.00000E+0	0.00000E+0
17	16	.12500E+03	0.00000E+0	0.00000E+0
	14	-.12500E+03	0.00000E+0	0.00000E+0
18	15	-.17677E+03	.10000E-03	0.00000E+0
	16	.17677E+03	-.10000E-03	0.00000E+0
19	20	.39528E+03	.10000E-02	0.00000E+0
	15	-.39528E+03	-.10000E-02	0.00000E+0
20	20	.24999E+03	0.00000E+0	0.00000E+0
	16	-.24999E+03	0.00000E+0	0.00000E+0
21	17	.39528E+03	0.00000E+0	0.00000E+0
	6	-.39528E+03	0.00000E+0	0.00000E+0
22	6	-.17678E+03	.10000E-03	0.00000E+0
	1	.17678E+03	-.10000E-03	0.00000E+0
23	1	.12500E+03	0.00000E+0	0.00000E+0
	8	-.12500E+03	0.00000E+0	0.00000E+0
24	6	.71625E-03	.44721E-03	0.00000E+0
	8	-.71625E-03	-.44721E-03	0.00000E+0
25	10	-.40320E-03	.17888E-03	0.00000E+0
	9	.40320E-03	-.17888E-03	0.00000E+0
26	12	.12500E+03	0.00000E+0	0.00000E+0
	9	-.12500E+03	0.00000E+0	0.00000E+0
27	10	-.17677E+03	.10000E-03	0.00000E+0
	12	.17677E+03	-.10000E-03	0.00000E+0
28	19	.39528E+03	0.00000E+0	0.00000E+0
	10	-.39528E+03	0.00000E+0	0.00000E+0
29	18	.39528E+03	0.00000E+0	0.00000E+0
	7	-.39528E+03	0.00000E+0	0.00000E+0
30	7	-.17678E+03	.10000E-03	0.00000E+0
	5	.17678E+03	-.10000E-03	0.00000E+0
31	5	.12500E+03	0.00000E+0	0.00000E+0
	9	-.12500E+03	0.00000E+0	0.00000E+0
32	7	.82591E-03	.26835E-03	0.00000E+0
	3	-.82591E-03	-.26835E-03	0.00000E+0
33	11	.15452E-02	-.18000E-07	0.00000E+0
	9	-.15452E-02	.18000E-07	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
34	16	.12500E+03	0.00000E+0	0.00000E+0
	9	-.12500E+03	0.00000E+0	0.00000E+0
35	11	-.17677E+03	.10000E-03	0.00000E+0
	16	.17677E+03	-.10000E-03	0.00000E+0
36	20	.39528E+03	0.00000E+0	0.00000E+0
	11	-.39528E+03	0.00000E+0	0.00000E+0
37	8	-.52454E-03	0.00000E+0	0.00000E+0
	14	.52454E-03	0.00000E+0	0.00000E+0
38	9	.19600E-03	0.00000E+0	0.00000E+0
	14	-.19600E-03	0.00000E+0	0.00000E+0
39	8	.71005E-03	0.00000E+0	0.00000E+0
	3	-.71005E-03	0.00000E+0	0.00000E+0
40	9	-.52381E-03	0.00000E+0	0.00000E+0
	3	.52381E-03	0.00000E+0	0.00000E+0
41	3	-.13182E-03	0.00000E+0	0.00000E+0
	14	.13182E-03	0.00000E+0	0.00000E+0
42	8	.60670E-04	0.00000E+0	0.00000E+0
	9	-.60670E-04	0.00000E+0	0.00000E+0

! COMBINATION 1 !

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	-.62580E+03	0.00000E+0	0.00000E+0
	.62580E+03	0.00000E+0	0.00000E+0
2	.28879E+04	.38000E-01	0.00000E+0
	-.28879E+04	-.38000E-01	0.00000E+0
3	.16809E+04	-.90000E-03	0.00000E+0
	-.16809E+04	.90000E-03	0.00000E+0
4	-.88771E+02	.22500E+04	0.00000E+0
	.88771E+02	.22500E+04	0.00000E+0
5	.23500E+04	-.34447E-01	0.00000E+0
	-.23500E+04	.34447E-01	0.00000E+0
6	.12184E+05	-.23553E-01	0.00000E+0
	-.12184E+05	.23553E-01	0.00000E+0
7	-.72360E+04	.22500E+04	0.00000E+0
	.72360E+04	.22500E+04	0.00000E+0

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
8	.94555E+04	-.19000E-02	0.00000E+0
	-.94555E+04	.19000E-02	0.00000E+0
9	.13318E+05	-.24000E-01	0.00000E+0
	-.13318E+05	.24000E-01	0.00000E+0
10	-.61233E+04	0.00000E+0	0.00000E+0
	.61233E+04	0.00000E+0	0.00000E+0
11	-.62601E+03	0.00000E+0	0.00000E+0
	.62601E+03	0.00000E+0	0.00000E+0
12	.28879E+04	.47000E-01	0.00000E+0
	-.28879E+04	-.47000E-01	0.00000E+0
13	.16808E+04	-.90000E-03	0.00000E+0
	-.16808E+04	.90000E-03	0.00000E+0
14	-.88820E+02	.22500E+04	0.00000E+0
	.88820E+02	.22500E+04	0.00000E+0
15	.23498E+04	-.34179E-01	0.00000E+0
	-.23498E+04	.34179E-01	0.00000E+0
16	.12184E+05	-.11400E+00	0.00000E+0
	-.12184E+05	.11400E+00	0.00000E+0
17	-.72363E+04	.22500E+04	0.00000E+0
	.72363E+04	.22500E+04	0.00000E+0
18	.94556E+04	-.10900E-01	0.00000E+0
	-.94556E+04	.10900E-01	0.00000E+0
19	.13318E+05	-.35000E-01	0.00000E+0
	-.13318E+05	.35000E-01	0.00000E+0
20	-.61236E+04	0.00000E+0	0.00000E+0
	.61236E+04	0.00000E+0	0.00000E+0
21	.81029E+04	-.70001E-02	0.00000E+0
	-.81029E+04	.70001E-02	0.00000E+0
22	.55682E+04	-.19001E-02	0.00000E+0
	-.55682E+04	.19001E-02	0.00000E+0
23	-.39372E+04	.22500E+04	0.00000E+0
	.39372E+04	.22500E+04	0.00000E+0
24	.72671E+04	-.47976E-01	0.00000E+0
	-.72671E+04	.47976E-01	0.00000E+0
25	.72671E+04	-.55665E-01	0.00000E+0
	-.72671E+04	.55665E-01	0.00000E+0
26	-.39375E+04	.22500E+04	0.00000E+0
	.39375E+04	.22500E+04	0.00000E+0

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
27	.55684E+04	-.10900E-01	0.00000E+0
	-.55684E+04	.10900E-01	0.00000E+0
28	.81032E+04	-.69999E-02	0.00000E+0
	-.81032E+04	.69999E-02	0.00000E+0
29	.81029E+04	-.56325E-02	0.00000E+0
	-.81029E+04	.56325E-02	0.00000E+0
30	.55682E+04	-.19000E-02	0.00000E+0
	-.55682E+04	.19000E-02	0.00000E+0
31	-.39373E+04	.22500E+04	0.00000E+0
	.39373E+04	.22500E+04	0.00000E+0
32	.72671E+04	-.23521E-01	0.00000E+0
	-.72671E+04	.23521E-01	0.00000E+0
33	.72671E+04	-.69894E-01	0.00000E+0
	-.72671E+04	.69894E-01	0.00000E+0
34	-.39374E+04	.22500E+04	0.00000E+0
	.39374E+04	.22500E+04	0.00000E+0
35	.55683E+04	-.10900E-01	0.00000E+0
	-.55683E+04	.10900E-01	0.00000E+0
36	.81031E+04	-.43161E-02	0.00000E+0
	-.81031E+04	.43161E-02	0.00000E+0
37	.12805E+04	0.00000E+0	0.00000E+0
	-.12805E+04	0.00000E+0	0.00000E+0
38	-.10527E+04	0.00000E+0	0.00000E+0
	.10527E+04	0.00000E+0	0.00000E+0
39	.12806E+04	0.00000E+0	0.00000E+0
	-.12806E+04	0.00000E+0	0.00000E+0
40	-.10528E+04	0.00000E+0	0.00000E+0
	.10528E+04	0.00000E+0	0.00000E+0
41	-.16109E+03	0.00000E+0	0.00000E+0
	.16109E+03	0.00000E+0	0.00000E+0
42	.38890E+03	0.00000E+0	0.00000E+0
	-.38890E+03	0.00000E+0	0.00000E+0

SUPPORT REACTIONS

LOADING 1

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
17	.16875E+04	.89999E+04	-.16874E+04
18	-.16875E+04	.89999E+04	-.16874E+04
19	.16874E+04	.89999E+04	.16875E+04
20	-.16875E+04	.89998E+04	.16875E+04

LOADING 2

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
17	.75000E+03	.19999E+04	-.74995E+03
18	-.74998E+03	.20000E+04	-.74997E+03
19	.74999E+03	.20000E+04	.74999E+03
20	-.74998E+03	.20000E+04	.74999E+03

LOADING 3

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
17	-.16493E+04	-.21988E+04	-.41000E-01
18	-.16493E+04	.21990E+04	-.70000E-02
19	-.16493E+04	-.21988E+04	-.29000E-01
20	-.16493E+04	.21989E+04	-.18000E-01

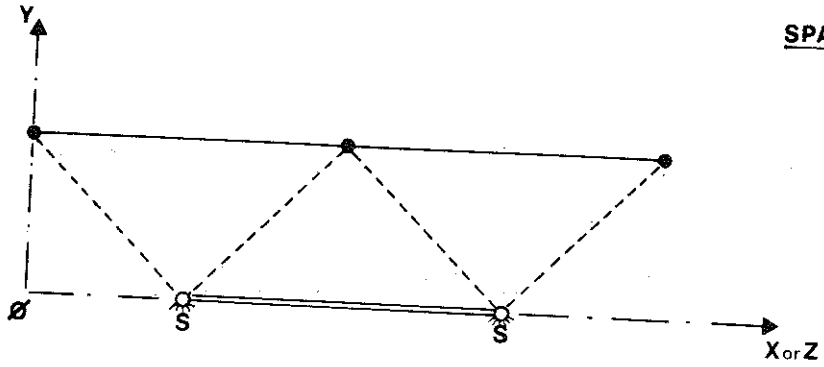
LOADING 4

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
17	.12500E+03	.10000E+04	-.12500E+03
18	-.12500E+03	.10000E+04	-.12500E+03
19	.12500E+03	.10000E+04	.12500E+03
20	-.12500E+03	.99998E+03	.12500E+03

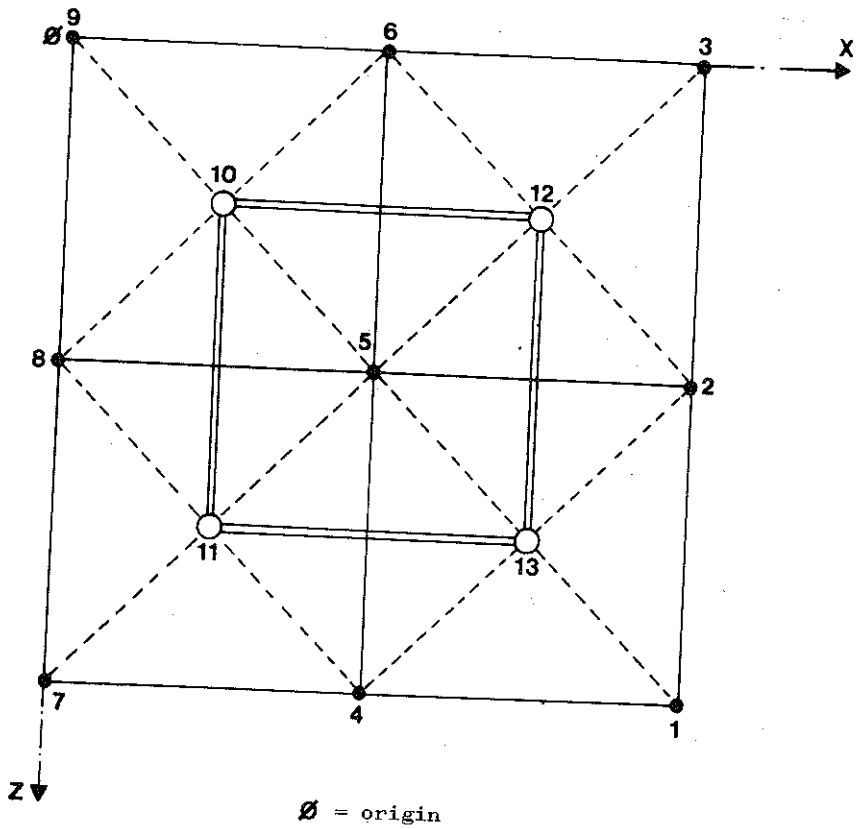
COMBINATION 1

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
17	.31318E+03	.98009E+04	-.25624E+04
18	-.42117E+04	.14198E+05	-.25624E+04
19	.31318E+03	.98009E+04	.25625E+04
20	-.42117E+04	.14198E+05	.25624E+04

SPACE TRUSS 2



SECTION



PLAN

Ø = origin

S = fixed support joints

● = upper joints

○ = lower joints

—— = upper members

═══ = lower members

---- = diagonal members

PROGRAM:THREE-DIMENSIONAL TRUSS ANALYSIS

1.1 JOB IDENTIFICATION SECTION

JOB NAME: SPACE TRUSS 2

1.2 STRUCTURE PARAMETERS

NUMBER OF MEMBERS	32
NUMBER OF JOINTS	13
NUMBER OF FIXED SUPPORT JOINTS	4
NUMBER OF LOADINGS	4
NUMBER OF LOADING COMBINATIONS	3

1.3 UNITS OF MEASURE

LENGTH	(m)
AREA	(cm2)
FORCE	(kg)
YOUNG'S MODULUS	(kg/cm2)
MOMENT	(kgcm)
DISPLACEMENT	(cm)
TEMPERATURE	(Grad C)
ANGLE	(rad)

2.1 JOINT CHARACTERISTICS

JOINT #	COORDINATES X(m)	Y(m)	Z(m)	FIXED	PRES. DISP.
1	12.000	3.000	12.000		
2	12.000	3.000	6.000		
3	12.000	3.000	0.000		
4	6.000	3.000	12.000		
5	6.000	3.000	6.000		
6	6.000	3.000	0.000		
7	0.000	3.000	12.000		
8	0.000	3.000	6.000		
9	0.000	3.000	0.000		
10	3.000	0.000	3.000		
11	3.000	0.000	9.000	S	
12	9.000	0.000	3.000	S	
13	9.000	0.000	9.000	S	

3.1 MEMBER GEOMETRICAL DATA

MEMBER #	START INDEX	END INDEX	LENGTH (m)
1	7	8	.600000E+01
2	8	9	.600000E+01
3	11	10	.600000E+01
4	4	5	.600000E+01
5	5	6	.600000E+01
6	13	12	.600000E+01
7	1	2	.600000E+01
8	2	3	.600000E+01
9	9	6	.600000E+01
10	6	3	.600000E+01
11	10	12	.600000E+01
12	9	5	.600000E+01
13	5	2	.600000E+01
14	11	13	.600000E+01
15	7	4	.600000E+01
16	4	1	.600000E+01
17	9	10	.519615E+01
18	9	10	.519615E+01
19	8	11	.519615E+01
20	7	11	.519615E+01
21	8	10	.519615E+01
22	5	10	.519615E+01
23	5	11	.519615E+01
24	4	11	.519615E+01
25	6	12	.519615E+01
26	5	12	.519615E+01
27	5	13	.519615E+01
28	4	13	.519615E+01
29	3	12	.519615E+01
30	2	12	.519615E+01
31	2	13	.519615E+01
32	1	13	.519615E+01

3.2 MEMBER PROPERTIES

MEMBER #	YOUNG'S MODULUS (kg/cm2)	AREA (cm2)
1	.210000E+07	.200000E+02
2	.210000E+07	.200000E+02
3	.210000E+07	.200000E+02
4	.210000E+07	.200000E+02
5	.210000E+07	.200000E+02
6	.210000E+07	.200000E+02
7	.210000E+07	.200000E+02
8	.210000E+07	.200000E+02
9	.210000E+07	.200000E+02
10	.210000E+07	.200000E+02
11	.210000E+07	.200000E+02

MEMBER #	YOUNG'S MODULUS (kg/cm2)	AREA (cm2)
12	.210000E+07	.200000E+02
13	.210000E+07	.200000E+02
14	.210000E+07	.200000E+02
15	.210000E+07	.200000E+02
16	.210000E+07	.200000E+02
17	.210000E+07	.940000E+01
18	.210000E+07	.940000E+01
19	.210000E+07	.940000E+01
20	.210000E+07	.940000E+01
21	.210000E+07	.940000E+01
22	.210000E+07	.940000E+01
23	.210000E+07	.940000E+01
24	.210000E+07	.940000E+01
25	.210000E+07	.940000E+01
26	.210000E+07	.940000E+01
27	.210000E+07	.940000E+01
28	.210000E+07	.940000E+01
29	.210000E+07	.940000E+01
30	.210000E+07	.940000E+01
31	.210000E+07	.940000E+01
32	.210000E+07	.940000E+01

4.1 JOINT and MEMBER LOADS

UNITS OF MEASURE

FORCE	(kg)
MOMENT	(kgcm)
LENGTH	(m)
TEMPERATURE	(Grad C)
LINEAR DISTORTION	(cm)

LOADING 1

MEMBER LOADS

MEMBER #	LOAD CODE	DISTANCE (m)	LENGTH (m)	START VALUE	END VALUE
1	UNIFORM Y			-.50000E+03	
2	UNIFORM Y			-.50000E+03	
4	UNIFORM Y			-.50000E+03	
5	UNIFORM Y			-.50000E+03	
7	UNIFORM Y			-.50000E+03	
8	UNIFORM Y			-.50000E+03	
9	UNIFORM Y			-.50000E+03	
10	UNIFORM Y			-.50000E+03	
12	UNIFORM Y			-.50000E+03	
13	UNIFORM Y			-.50000E+03	
15	UNIFORM Y			-.50000E+03	
16	UNIFORM Y			-.50000E+03	

LOADING 2

JOINT LOADS

JOINT #	LOAD CODE	LOAD VALUE
1	FORCE Y	-.100000E+04
3	FORCE Y	-.100000E+04
5	FORCE Y	-.100000E+04
7	FORCE Y	-.100000E+04
9	FORCE Y	-.100000E+04

LOADING 3

JOINT LOADS

JOINT #	LOAD CODE	LOAD VALUE
8	FORCE X	.200000E+04
2	FORCE X	.100000E+04
7	FORCE X	.100000E+04
9	FORCE X	.100000E+04
1	FORCE X	.500000E+03
3	FORCE X	.500000E+03

LOADING 4

JOINT LOADS

JOINT #	LOAD CODE	LOAD VALUE
1	FORCE Z	.300000E+03
3	FORCE Z	.300000E+03
7	FORCE Z	.300000E+03
9	FORCE Z	.300000E+03
2	FORCE Z	.600000E+03
4	FORCE Z	.600000E+03
6	FORCE Z	.600000E+03
8	FORCE Z	.600000E+03

JOINT #	LOAD CODE	LOAD VALUE
5	FORCE 2	.120000E+04

5.1 LOADING COMBINATIONS

COMBINATION #	LOADING #	COEFFICIENT VALUE
1	1	1.00000
	2	1.00000
	3	1.00000
2	1	1.00000
	2	1.00000
	4	-1.00000
3	1	1.00000
	2	1.00000
	4	1.00000

JOINT DISPLACEMENTS

JOINT #	LOADING #	DISPL.X (cm)	DISPL.Y (cm)	DISPL.Z (cm)
1	1	0.0428566	-0.3226220	0.0428563
	2	0.0142855	-0.1075410	0.0142856
	3	0.0663685	-0.0663687	0.0000000
	4	-0.0000003	-0.0516662	0.0516665
2	1	0.0642854	-0.2419660	-0.0000004
	2	0.0000000	0.0000000	0.0000000
	3	0.0735123	-0.0735125	0.0000000
	4	0.0000000	0.0000000	0.0473809
3	1	0.0428565	-0.3226220	-0.0428572
	2	0.0142859	-0.1075410	-0.0142857
	3	0.0663685	-0.0663687	0.0000000
	4	0.0000002	0.0516664	0.0516665
4	1	-0.0000004	-0.2419660	0.0642850
	2	0.0000000	0.0000000	0.0000000
	3	0.0592259	0.0000000	0.0000000
	4	-0.0000003	-0.0559527	0.0559527
5	1	0.0000003	-0.1184540	0.0000000
	2	0.0000000	-0.0197424	0.0000000
	3	0.0592268	0.0000000	0.0000000
	4	0.0000000	0.0000000	0.0473814
6	1	-0.0000004	-0.2419650	-0.0642851
	2	0.0000003	0.0000000	0.0000000
	3	0.0592259	0.0000000	0.0000000
	4	0.0000002	0.0559527	0.0559527
7	1	-0.0428574	-0.3226230	0.0428565
	2	-0.0142858	-0.1075410	0.0142858
	3	0.0735115	0.0735114	0.0000000
	4	-0.0000003	-0.0516677	0.0516675
8	1	-0.0642848	-0.2419660	-0.0000005
	2	0.0000000	0.0000000	0.0000000
	3	0.0877979	0.0877976	0.0000000
	4	0.0000000	0.0000000	0.0473818
9	1	-0.0428573	-0.3226220	-0.0428576
	2	-0.0142853	-0.1075400	-0.0142857
	3	0.0735115	0.0735114	0.0000000
	4	0.0000002	0.0516679	0.0516677

MEMBER-END FORCES

| LOADING 1 |

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	7	-.30000E+04	.15000E+04	0.00000E+0
	8	.30000E+04	.15000E+04	0.00000E+0
2	8	-.30000E+04	.15000E+04	0.00000E+0
	9	.30000E+04	.15000E+04	0.00000E+0
3	11	0.00000E+0	0.00000E+0	0.00000E+0
	10	0.00000E+0	0.00000E+0	0.00000E+0
4	4	-.45000E+04	.15000E+04	0.00000E+0
	5	.45000E+04	.15000E+04	0.00000E+0
5	5	-.45000E+04	.15000E+04	0.00000E+0
	6	.45000E+04	.15000E+04	0.00000E+0
6	13	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
7	1	-.30000E+04	.15000E+04	0.00000E+0
	2	.30000E+04	.15000E+04	0.00000E+0
8	2	-.30000E+04	.15000E+04	0.00000E+0
	3	.30000E+04	.15000E+04	0.00000E+0
9	9	-.30000E+04	.15000E+04	0.00000E+0
	6	.30000E+04	.15000E+04	0.00000E+0
10	6	-.30000E+04	.15000E+04	0.00000E+0
	3	.30000E+04	.15000E+04	0.00000E+0
11	10	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
12	8	-.45000E+04	.15000E+04	0.00000E+0
	5	.45000E+04	.15000E+04	0.00000E+0
13	5	-.44999E+04	.15000E+04	0.00000E+0
	2	.44999E+04	.15000E+04	0.00000E+0
14	11	0.00000E+0	0.00000E+0	0.00000E+0
	13	0.00000E+0	0.00000E+0	0.00000E+0
15	7	-.30000E+04	.15000E+04	0.00000E+0
	4	.30000E+04	.15000E+04	0.00000E+0
16	4	-.30000E+04	.15000E+04	0.00000E+0
	1	.30000E+04	.15000E+04	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
17	9	.51961E+04	-.20000E-01	0.00000E+0
	10	-.51961E+04	.20000E-01	0.00000E+0
18	9	.38971E+04	.40000E-02	0.00000E+0
	10	-.38971E+04	-.40000E-02	0.00000E+0
19	8	.38971E+04	.40000E-02	0.00000E+0
	11	-.38971E+04	-.40000E-02	0.00000E+0
20	7	.51961E+04	-.10000E-01	0.00000E+0
	11	-.51961E+04	.10000E-01	0.00000E+0
21	6	.38971E+04	-.40000E-02	0.00000E+0
	10	-.38971E+04	.40000E-02	0.00000E+0
22	5	.25980E+04	.20000E-02	0.00000E+0
	10	-.25980E+04	-.20000E-02	0.00000E+0
23	5	.25980E+04	.20000E-02	0.00000E+0
	11	-.25980E+04	-.20000E-02	0.00000E+0
24	4	.38971E+04	.40000E-02	0.00000E+0
	11	-.38971E+04	-.40000E-02	0.00000E+0
25	6	.38971E+04	-.40000E-02	0.00000E+0
	12	-.38971E+04	.40000E-02	0.00000E+0
26	5	.25980E+04	.20000E-02	0.00000E+0
	12	-.25980E+04	-.20000E-02	0.00000E+0
27	5	.25980E+04	.20000E-02	0.00000E+0
	13	-.25980E+04	-.20000E-02	0.00000E+0
28	4	.38971E+04	.40000E-02	0.00000E+0
	13	-.38971E+04	-.40000E-02	0.00000E+0
29	3	.51961E+04	-.10000E-01	0.00000E+0
	12	-.51961E+04	.10000E-01	0.00000E+0
30	2	.38971E+04	-.40000E-02	0.00000E+0
	12	-.38971E+04	.40000E-02	0.00000E+0
31	2	.38971E+04	-.40000E-02	0.00000E+0
	13	-.38971E+04	.40000E-02	0.00000E+0
32	1	.51961E+04	-.10000E-01	0.00000E+0
	13	-.51961E+04	.10000E-01	0.00000E+0

LOADING 2

MEMBER	JOINT #	AXIAL FORCE X (Kg)	SHEAR FORCE Y (Kg)	SHEAR FORCE Z (Kg)
1	7	-.10000E+04	0.00000E+0	0.00000E+0
	8	.10000E+04	0.00000E+0	0.00000E+0
2	8	-.10000E+04	0.00000E+0	0.00000E+0
	9	.10000E+04	0.00000E+0	0.00000E+0
3	11	0.00000E+0	0.00000E+0	0.00000E+0
	10	0.00000E+0	0.00000E+0	0.00000E+0
4	4	0.00000E+0	0.00000E+0	0.00000E+0
	5	0.00000E+0	0.00000E+0	0.00000E+0
5	5	0.00000E+0	0.00000E+0	0.00000E+0
	6	0.00000E+0	0.00000E+0	0.00000E+0
6	13	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
7	1	-.99999E+03	0.00000E+0	0.00000E+0
	2	.99999E+03	0.00000E+0	0.00000E+0
8	2	-.10000E+04	0.00000E+0	0.00000E+0
	3	.10000E+04	0.00000E+0	0.00000E+0
9	9	-.99999E+03	0.00000E+0	0.00000E+0
	6	.99999E+03	0.00000E+0	0.00000E+0
10	6	-.99998E+03	0.00000E+0	0.00000E+0
	3	.99998E+03	0.00000E+0	0.00000E+0
11	10	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
12	8	0.00000E+0	0.00000E+0	0.00000E+0
	5	0.00000E+0	0.00000E+0	0.00000E+0
13	5	0.00000E+0	0.00000E+0	0.00000E+0
	2	0.00000E+0	0.00000E+0	0.00000E+0
14	11	0.00000E+0	0.00000E+0	0.00000E+0
	13	0.00000E+0	0.00000E+0	0.00000E+0
15	7	-.10000E+04	0.00000E+0	0.00000E+0
	4	.10000E+04	0.00000E+0	0.00000E+0
16	4	-.99999E+03	0.00000E+0	0.00000E+0
	1	.99999E+03	0.00000E+0	0.00000E+0
17	9	.17320E+04	-.20000E-02	0.00000E+0
	10	.17320E+04	.20000E-02	0.00000E+0
18	8	-.21933E-02	-.40000E-08	0.00000E+0
	10	.21933E-02	.40000E-08	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
19	8	.21933E-02	.40000E-08	0.00000E+0
	11	-.21933E-02	-.40000E-08	0.00000E+0
20	7	.17320E+04	-.20000E-02	0.00000E+0
	14	-.17320E+04	.20000E-02	0.00000E+0
21	6	-.65799E-02	.10000E-07	0.00000E+0
	10	.65799E-02	-.10000E-07	0.00000E+0
22	5	.43301E+03	-.10000E-02	0.00000E+0
	10	-.43301E+03	.10000E-02	0.00000E+0
23	5	.43301E+03	-.10000E-02	0.00000E+0
	11	.43301E+03	.10000E-02	0.00000E+0
24	4	.21933E-02	.40000E-08	0.00000E+0
	11	-.21933E-02	-.40000E-08	0.00000E+0
25	6	.65799E-02	-.10000E-07	0.00000E+0
	12	-.65799E-02	.10000E-07	0.00000E+0
26	5	.43301E+03	-.10000E-02	0.00000E+0
	12	-.43301E+03	.10000E-02	0.00000E+0
27	5	.43301E+03	-.10000E-02	0.00000E+0
	13	-.43301E+03	.10000E-02	0.00000E+0
28	4	-.21933E-02	-.40000E-08	0.00000E+0
	13	.21933E-02	.40000E-08	0.00000E+0
29	3	.17320E+04	-.30000E-02	0.00000E+0
	12	-.17320E+04	.30000E-02	0.00000E+0
30	2	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
31	2	0.00000E+0	0.00000E+0	0.00000E+0
	13	0.00000E+0	0.00000E+0	0.00000E+0
32	1	.17321E+04	-.20000E-02	0.00000E+0
	13	-.17321E+04	.20000E-02	0.00000E+0

LOADING 3

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	7	-.10000E-02	0.00000E+0	0.00000E+0
	8	.10000E-02	0.00000E+0	0.00000E+0
2	8	-.17343E-02	0.00000E+0	0.00000E+0
	9	.17343E-02	0.00000E+0	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
3	11	0.00000E+0	0.00000E+0	0.00000E+0
	10	0.00000E+0	0.00000E+0	0.00000E+0
4	4	0.00000E+0	0.00000E+0	0.00000E+0
	5	0.00000E+0	0.00000E+0	0.00000E+0
5	5	0.00000E+0	0.00000E+0	0.00000E+0
	6	0.00000E+0	0.00000E+0	0.00000E+0
6	13	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
7	1	.60225E-02	0.00000E+0	0.00000E+0
	2	-.60225E-02	0.00000E+0	0.00000E+0
8	2	.60960E-02	0.00000E+0	0.00000E+0
	3	-.60960E-02	0.00000E+0	0.00000E+0
9	9	.99999E+03	0.00000E+0	0.00000E+0
	6	-.99999E+03	0.00000E+0	0.00000E+0
10	6	-.49998E+03	0.00000E+0	0.00000E+0
	3	.49998E+03	0.00000E+0	0.00000E+0
11	10	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
12	8	.20000E+04	0.00000E+0	0.00000E+0
	5	-.20000E+04	0.00000E+0	0.00000E+0
13	5	-.99999E+03	0.00000E+0	0.00000E+0
	2	.99999E+03	0.00000E+0	0.00000E+0
14	11	0.00000E+0	0.00000E+0	0.00000E+0
	13	0.00000E+0	0.00000E+0	0.00000E+0
15	7	.99999E+03	0.00000E+0	0.00000E+0
	4	-.99999E+03	0.00000E+0	0.00000E+0
16	4	-.49998E+03	0.00000E+0	0.00000E+0
	1	.49998E+03	0.00000E+0	0.00000E+0
17	9	.55260E-03	0.00000E+0	0.00000E+0
	10	-.55260E-03	0.00000E+0	0.00000E+0
18	8	.17956E-01	-.30000E-07	0.00000E+0
	10	-.17956E-01	.30000E-07	0.00000E+0
19	9	.16685E-01	-.30000E-07	0.00000E+0
	11	-.16685E-01	.30000E-07	0.00000E+0
20	7	.20547E-02	-.20000E-08	0.00000E+0
	11	-.20547E-02	.20000E-08	0.00000E+0
21	6	-.12990E+04	.20000E-02	0.00000E+0
	10	.12990E+04	-.20000E-02	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
22	5	-.12990E+04	.30000E-02	0.00000E+0
	10	.12990E+04	-.30000E-02	0.00000E+0
23	5	-.12990E+04	.30000E-02	0.00000E+0
	11	.12990E+04	-.30000E-02	0.00000E+0
24	4	-.12990E+04	.20000E-02	0.00000E+0
	11	.12990E+04	-.20000E-02	0.00000E+0
25	6	.12990E+04	-.20000E-02	0.00000E+0
	12	-.12990E+04	.20000E-02	0.00000E+0
26	5	.12990E+04	-.30000E-02	0.00000E+0
	12	-.12990E+04	.30000E-02	0.00000E+0
27	5	.12990E+04	-.30000E-02	0.00000E+0
	13	-.12990E+04	.30000E-02	0.00000E+0
28	4	.12990E+04	-.20000E-02	0.00000E+0
	13	-.12990E+04	.20000E-02	0.00000E+0
29	3	.71698E-02	0.00000E+0	0.00000E+0
	12	-.71698E-02	0.00000E+0	0.00000E+0
30	2	.51325E-02	0.00000E+0	0.00000E+0
	12	-.51325E-02	0.00000E+0	0.00000E+0
31	2	.52597E-02	-.20000E-07	0.00000E+0
	13	-.52597E-02	.20000E-07	0.00000E+0
32	1	.70196E-02	-.20000E-07	0.00000E+0
	13	-.70196E-02	.20000E-07	0.00000E+0

! LOADING 4 !

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	7	-.30000E+03	0.00000E+0	0.00000E+0
	8	.30000E+03	0.00000E+0	0.00000E+0
2	8	.30001E+03	0.00000E+0	0.00000E+0
	9	-.30001E+03	0.00000E+0	0.00000E+0
3	11	0.00000E+0	0.00000E+0	0.00000E+0
	10	0.00000E+0	0.00000E+0	0.00000E+0
4	4	-.59999E+03	0.00000E+0	0.00000E+0
	5	.59999E+03	0.00000E+0	0.00000E+0
5	5	.59999E+03	0.00000E+0	0.00000E+0
	6	-.59999E+03	0.00000E+0	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
6	13	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
7	1	-.29999E+03	0.00000E+0	0.00000E+0
	2	.29999E+03	0.00000E+0	0.00000E+0
8	2	.30000E+03	0.00000E+0	0.00000E+0
	3	-.30000E+03	0.00000E+0	0.00000E+0
9	9	-.74300E-04	0.00000E+0	0.00000E+0
	6	.74300E-04	0.00000E+0	0.00000E+0
10	6	.74300E-04	0.00000E+0	0.00000E+0
	3	-.74300E-04	0.00000E+0	0.00000E+0
11	10	0.00000E+0	0.00000E+0	0.00000E+0
	12	0.00000E+0	0.00000E+0	0.00000E+0
12	8	0.00000E+0	0.00000E+0	0.00000E+0
	5	0.00000E+0	0.00000E+0	0.00000E+0
13	5	0.00000E+0	0.00000E+0	0.00000E+0
	2	0.00000E+0	0.00000E+0	0.00000E+0
14	11	0.00000E+0	0.00000E+0	0.00000E+0
	13	0.00000E+0	0.00000E+0	0.00000E+0
15	7	-.17855E-02	0.00000E+0	0.00000E+0
	4	.17855E-02	0.00000E+0	0.00000E+0
16	4	-.31450E-03	0.00000E+0	0.00000E+0
	1	.31450E-03	0.00000E+0	0.00000E+0
17	9	.17321E-02	-.20000E-08	0.00000E+0
	10	-.17321E-02	.20000E-08	0.00000E+0
18	8	-.10392E+04	.10000E-02	0.00000E+0
	10	.10392E+04	-.10000E-02	0.00000E+0
19	8	.10392E+04	-.10000E-02	0.00000E+0
	11	-.10392E+04	.10000E-02	0.00000E+0
20	7	-.17321E-02	.20000E-08	0.00000E+0
	11	.17321E-02	-.20000E-08	0.00000E+0
21	6	-.34641E-02	.20000E-08	0.00000E+0
	10	.34641E-02	-.20000E-08	0.00000E+0
22	5	-.10392E+04	.10000E-02	0.00000E+0
	10	.10392E+04	-.10000E-02	0.00000E+0
23	5	.10392E+04	-.10000E-02	0.00000E+0
	11	-.10392E+04	.10000E-02	0.00000E+0
24	4	.51962E-02	0.00000E+0	0.00000E+0
	11	-.51962E-02	0.00000E+0	0.00000E+0

MEMBER	JOINT #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
25	6	.51962E-02	0.00000E+0	0.00000E+0
	12	-.51962E-02	0.00000E+0	0.00000E+0
26	5	-.10392E+04	.10000E-02	0.00000E+0
	12	.10392E+04	-.10000E-02	0.00000E+0
27	5	.10392E+04	-.10000E-02	0.00000E+0
	13	-.10392E+04	.10000E-02	0.00000E+0
28	4	-.69282E-02	.20000E-07	0.00000E+0
	13	.69282E-02	-.20000E-07	0.00000E+0
29	3	.17321E-02	-.20000E-08	0.00000E+0
	12	-.17321E-02	.20000E-08	0.00000E+0
30	2	-.10392E+04	.20000E-02	0.00000E+0
	12	.10392E+04	-.20000E-02	0.00000E+0
31	2	.10392E+04	-.20000E-02	0.00000E+0
	13	-.10392E+04	.20000E-02	0.00000E+0
32	1	-.17321E-02	.20000E-08	0.00000E+0
	13	.17321E-02	-.20000E-08	0.00000E+0

COMBINATION 1

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
2	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
3	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
4	-.45000E+04	.15000E+04	0.00000E+0
	.45000E+04	.15000E+04	0.00000E+0
5	-.45000E+04	.15000E+04	0.00000E+0
	.45000E+04	.15000E+04	0.00000E+0
6	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
7	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
8	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
9	-.30000E+04 .30000E+04	.15000E+04 .15000E+04	0.00000E+0 0.00000E+0
10	-.44999E+04 .44999E+04	.15000E+04 .15000E+04	0.00000E+0 0.00000E+0
11	0.00000E+0 0.00000E+0	0.00000E+0 0.00000E+0	0.00000E+0 0.00000E+0
12	-.25000E+04 .25000E+04	.15000E+04 .15000E+04	0.00000E+0 0.00000E+0
13	-.54999E+04 .54999E+04	.15000E+04 .15000E+04	0.00000E+0 0.00000E+0
14	0.00000E+0 0.00000E+0	0.00000E+0 0.00000E+0	0.00000E+0 0.00000E+0
15	-.30000E+04 .30000E+04	.15000E+04 .15000E+04	0.00000E+0 0.00000E+0
16	-.45000E+04 .45000E+04	.15000E+04 .15000E+04	0.00000E+0 0.00000E+0
17	.69281E+04 -.69281E+04	-.22000E-01 .22000E-01	0.00000E+0 0.00000E+0
18	.38971E+04 -.38971E+04	.40000E-02 -.40000E-02	0.00000E+0 0.00000E+0
19	.38971E+04 -.38971E+04	.40000E-02 -.40000E-02	0.00000E+0 0.00000E+0
20	.69281E+04 -.69281E+04	-.12000E-01 .12000E-01	0.00000E+0 0.00000E+0
21	.25981E+04 -.25981E+04	-.20000E-02 .20000E-02	0.00000E+0 0.00000E+0
22	.17320E+04 -.17320E+04	.40000E-02 -.40000E-02	0.00000E+0 0.00000E+0
23	.17320E+04 -.17320E+04	.40000E-02 -.40000E-02	0.00000E+0 0.00000E+0
24	.25981E+04 -.25981E+04	.60000E-02 -.60000E-02	0.00000E+0 0.00000E+0
25	.51961E+04 -.51961E+04	-.60000E-02 .60000E-02	0.00000E+0 0.00000E+0
26	.43301E+04 -.43301E+04	-.20000E-02 .20000E-02	0.00000E+0 0.00000E+0
27	.43301E+04 -.43301E+04	-.20000E-02 .20000E-02	0.00000E+0 0.00000E+0

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
28	.51961E+04	.20000E-02	0.00000E+0
	-.51961E+04	-.20000E-02	0.00000E+0
29	.69291E+04	-.13000E-01	0.00000E+0
	-.69291E+04	.13000E-01	0.00000E+0
30	.38971E+04	-.40000E-02	0.00000E+0
	-.38971E+04	.40000E-02	0.00000E+0
31	.38971E+04	-.40000E-02	0.00000E+0
	-.38971E+04	.40000E-02	0.00000E+0
32	.69282E+04	-.12000E-01	0.00000E+0
	-.69282E+04	.12000E-01	0.00000E+0

(COMBINATION 2)

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	-.37000E+04	.15000E+04	0.00000E+0
	.37000E+04	.15000E+04	0.00000E+0
2	-.43000E+04	.15000E+04	0.00000E+0
	.43000E+04	.15000E+04	0.00000E+0
3	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
4	-.39000E+04	.15000E+04	0.00000E+0
	.39000E+04	.15000E+04	0.00000E+0
5	-.50999E+04	.15000E+04	0.00000E+0
	.50999E+04	.15000E+04	0.00000E+0
6	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
7	-.37000E+04	.15000E+04	0.00000E+0
	.37000E+04	.15000E+04	0.00000E+0
8	-.43000E+04	.15000E+04	0.00000E+0
	.43000E+04	.15000E+04	0.00000E+0
9	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
10	-.39999E+04	.15000E+04	0.00000E+0
	.39999E+04	.15000E+04	0.00000E+0
11	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
12	-.45000E+04	.15000E+04	0.00000E+0
	.45000E+04	.15000E+04	0.00000E+0
13	-.44999E+04	.15000E+04	0.00000E+0
	.44999E+04	.15000E+04	0.00000E+0
14	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
15	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
16	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
17	.69281E+04	-.22000E-01	0.00000E+0
	-.69281E+04	.22000E-01	0.00000E+0
18	.49363E+04	.30000E-02	0.00000E+0
	-.49363E+04	-.30000E-02	0.00000E+0
19	.28578E+04	.50000E-02	0.00000E+0
	-.28578E+04	-.50000E-02	0.00000E+0
20	.69281E+04	-.12000E-01	0.00000E+0
	-.69281E+04	.12000E-01	0.00000E+0
21	.38971E+04	-.40000E-02	0.00000E+0
	-.38971E+04	.40000E-02	0.00000E+0
22	.40703E+04	0.00000E+0	0.00000E+0
	-.40703E+04	0.00000E+0	0.00000E+0
23	.19918E+04	.20000E-02	0.00000E+0
	-.19918E+04	-.20000E-02	0.00000E+0
24	.38971E+04	.40000E-02	0.00000E+0
	-.38971E+04	-.40000E-02	0.00000E+0
25	.38971E+04	-.40000E-02	0.00000E+0
	-.38971E+04	.40000E-02	0.00000E+0
26	.40703E+04	0.00000E+0	0.00000E+0
	-.40703E+04	0.00000E+0	0.00000E+0
27	.19918E+04	.20000E-02	0.00000E+0
	-.19918E+04	-.20000E-02	0.00000E+0
28	.38971E+04	.40000E-02	0.00000E+0
	-.38971E+04	-.40000E-02	0.00000E+0
29	.69281E+04	-.13000E-01	0.00000E+0
	-.69281E+04	.13000E-01	0.00000E+0
30	.49363E+04	-.60000E-02	0.00000E+0
	-.49363E+04	.60000E-02	0.00000E+0

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
31	.28579E+04	-.20000E-02	0.00000E+0
	-.28579E+04	.20000E-02	0.00000E+0
32	.69282E+04	-.12000E-01	0.00000E+0
	-.69282E+04	.12000E-01	0.00000E+0

COMBINATION 3

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
1	-.43000E+04	.15000E+04	0.00000E+0
	.43000E+04	.15000E+04	0.00000E+0
2	-.37000E+04	.15000E+04	0.00000E+0
	.37000E+04	.15000E+04	0.00000E+0
3	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
4	-.50999E+04	.15000E+04	0.00000E+0
	.50999E+04	.15000E+04	0.00000E+0
5	-.39000E+04	.15000E+04	0.00000E+0
	.39000E+04	.15000E+04	0.00000E+0
6	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
7	-.42999E+04	.15000E+04	0.00000E+0
	.42999E+04	.15000E+04	0.00000E+0
8	-.37000E+04	.15000E+04	0.00000E+0
	.37000E+04	.15000E+04	0.00000E+0
9	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
10	-.39999E+04	.15000E+04	0.00000E+0
	.39999E+04	.15000E+04	0.00000E+0
11	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0
12	-.45000E+04	.15000E+04	0.00000E+0
	.45000E+04	.15000E+04	0.00000E+0
13	-.44999E+04	.15000E+04	0.00000E+0
	.44999E+04	.15000E+04	0.00000E+0
14	0.00000E+0	0.00000E+0	0.00000E+0
	0.00000E+0	0.00000E+0	0.00000E+0

MEMBER #	AXIAL FORCE X (kg)	SHEAR FORCE Y (kg)	SHEAR FORCE Z (kg)
15	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
16	-.40000E+04	.15000E+04	0.00000E+0
	.40000E+04	.15000E+04	0.00000E+0
17	.69281E+04	-.22000E-01	0.00000E+0
	-.69281E+04	.22000E-01	0.00000E+0
18	.28578E+04	.50000E-02	0.00000E+0
	-.28578E+04	-.50000E-02	0.00000E+0
19	.49363E+04	.30000E-02	0.00000E+0
	-.49363E+04	-.30000E-02	0.00000E+0
20	.69281E+04	-.12000E-01	0.00000E+0
	-.69281E+04	.12000E-01	0.00000E+0
21	.38971E+04	-.40000E-02	0.00000E+0
	-.38971E+04	.40000E-02	0.00000E+0
22	.19918E+04	.20000E-02	0.00000E+0
	-.19918E+04	-.20000E-02	0.00000E+0
23	.40703E+04	0.00000E+0	0.00000E+0
	-.40703E+04	0.00000E+0	0.00000E+0
24	.38971E+04	.40000E-02	0.00000E+0
	-.38971E+04	-.40000E-02	0.00000E+0
25	.38971E+04	-.40000E-02	0.00000E+0
	-.38971E+04	.40000E-02	0.00000E+0
26	.19918E+04	.20000E-02	0.00000E+0
	-.19918E+04	-.20000E-02	0.00000E+0
27	.40703E+04	0.00000E+0	0.00000E+0
	-.40703E+04	0.00000E+0	0.00000E+0
28	.38971E+04	.40000E-02	0.00000E+0
	-.38971E+04	-.40000E-02	0.00000E+0
29	.69281E+04	-.13000E-01	0.00000E+0
	-.69281E+04	.13000E-01	0.00000E+0
30	.28579E+04	-.20000E-02	0.00000E+0
	-.28579E+04	.20000E-02	0.00000E+0
31	.49363E+04	-.60000E-02	0.00000E+0
	-.49363E+04	.60000E-02	0.00000E+0
32	.69282E+04	-.12000E-01	0.00000E+0
	-.69282E+04	.12000E-01	0.00000E+0

SUPPORT REACTIONS

LOADING 1

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
10	-.15000E+04	.83999E+04	-.15000E+04
11	-.15000E+04	.83999E+04	.15000E+04
12	.15000E+04	.83999E+04	-.15000E+04
13	.15000E+04	.83999E+04	.15000E+04

LOADING 2

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
10	-.74998E+03	.12500E+04	-.74998E+03
11	-.74999E+03	.12500E+04	.74998E+03
12	.74999E+03	.12500E+04	-.74999E+03
13	.75000E+03	.12500E+04	.75000E+03

LOADING 3

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
10	-.15000E+04	-.15000E+04	-.10000E-02
11	-.15000E+04	-.15000E+04	.20000E-02
12	-.15000E+04	.15000E+04	.58230E-02
13	.15000E+04	.15000E+04	-.99939E-02

LOADING 4

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
10	.20000E-02	-.12000E+04	-.12000E+04
11	-.10000E-02	.12000E+04	-.12000E+04
12	.40000E-02	-.12000E+04	-.12000E+04
13	-.30000E-02	.12000E+04	-.12000E+04

COMBINATION 1

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
10	-.37499E+04	.87498E+04	-.22499E+04
11	-.37500E+04	.87499E+04	.22500E+04
12	.74999E+03	.11750E+05	-.22500E+04
13	.75001E+03	.11750E+05	.22500E+04

COMBINATION 2

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
10	-.22500E+04	.11450E+05	-.10499E+04
11	-.22500E+04	.90499E+04	.34500E+04
12	.22500E+04	.11450E+05	-.10500E+04
13	.22500E+04	.90499E+04	.34500E+04

COMBINATION 3

JOINT #	FORCE X (kg)	FORCE Y (kg)	FORCE Z (kg)
10	-.22500E+04	.90498E+04	-.34499E+04
11	-.22500E+04	.11450E+05	.10500E+04
12	.22500E+04	.90498E+04	-.34499E+04
13	.22500E+04	.11450E+05	.10500E+04

INSTALLATION

Your package will ordinarily be supplied to you in the form of two system disks which can be found in a plastic holder inserted into a Users Manual for your package.
This package requires the presence of the options (MAT, STR) which should be already loaded on your disks.
Before starting the input routine, just insert the disk "Utilities for Structural Analysis" and a new disk and follow the procedure for creating and dimensioning the data file for your structure.

Obtaining a File Catalog for your package:

1. After making certain that the machine power is on, that proper disks are inserted into the machine and that the message READY appears on the visual display, enter the system command

   CAT $S,*,,F

   followed by (END OF LINE)

2. The result should be the listings shown here:

   Disk 1 - INPUT

```
CAT S.*,,F

  * R E L E A S E  1.1  *

FILE    TYPE  CREAT   LAST MOD  MAX SIZE  USED SIZE  CODE NUMBER

MAPS      P   060477  060477      5888       5888     M2601201
PRES      P   060477  060477      6400       6400     M2601201
HELP      P   060477  060477       896        896     M2601201
COMB      P   060477  060477      4352       4352     M2601201
LOAD      P   060477  060477     13440      13440     M2601201
INPUT     P   060477  060477      6784       6784     M2601201
INCI      P   060477  060477      4352       4352     M2601201
TEHEL     R   060477  060477      3328       3328     M2601201
TESTR     S   060477  060477       512        376     M2601201
COOR      P   060477  060477      3968       3968     M2601201
TELOA     S   060477  060477      2432       2128     M2601201
SELE      P   060477  060477      3200       3200     M2601201
TEINP     S   060477  060477      1536       1256     M2601201
```

```
CAT S,*,,F

  * R E L E A S E  1.1  *
```

FILE	TYPE	CREAT	LAST MOD	MAX SIZE	USED SIZE	CODE NUMBER
TELOC	S	060477	060477	896	352	M2601201
TESTC	S	060477	060477	256	176	M2601201
CALC	F	060477	060477	4992	4992	M2601201
TECAL	S	060477	060477	1152	912	M2601201
PRINT	P	060477	060477	15232	15232	M2601201
PROP	P	060477	060477	2944	2944	M2601201
CRHS	P	060477	060477	6272	6272	M2601201
BSUB	P	060477	060477	3712	3712	M2601201
SOLV	P	060477	060477	8064	8064	M2601201
MEFO	P	060477	060477	11776	11776	M2601201
HELP	P	060477	060477	768	768	M2601201
						M2601201

<u>Note</u>:

Any time the machine is in Command Mode, you may enter the CAT[ALOG] command as directed in step 1 above.

Note that data files and program files not normally accessible to the operator are shown as well as those for operator use. Use this catalog listing simply to verify that your copy of the package is correct. To access programs in the package, follow the procedures outlined in the Introduction of this manual.

See the P 6060 General Reference Manual for general instructions on file copying and relocations and which utility features are available to you.

ERROR . RETYPE : >> STRUCTURE NEW (YES=1 NO=Ø)?

The user entered a value different from 1 or Ø.

Action: Enter 1 or Ø

ERROR . RETYPE : >> JOB IDENTIFICATION (MAX 16 CHR)?

The user entered an identification with more than 16 characters.

Action: Enter correct job identification

ERROR . RETYPE : >> MEMBERS (MAX 3ØØ)?

The user entered a negative, a decimal, Ø, or a number bigger than 3ØØ

Action: Enter a correct number

ERROR . RETYPE : >> JOINTS (MAX 25Ø)?

The user entered a negative, a decimal, Ø or a number bigger than 25Ø

Action: Enter a correct number

ERROR . RETYPE : >> FIXED SUPPORT JOINTS (MAX 5Ø)?

The user entered a negative, a decimal, a number bigger than 5Ø, or a number bigger than the total number of joints.

Action: Enter a correct value

ERROR . RETYPE : >> LOADINGS (MAX 5)?

The user entered a negative, a decimal, Ø or a number bigger than 5.

Action: Enter a correct value

ERROR . RETYPE : >> LOADING COMBINATIONS (MAX 5)?

The user entered a negative, a decimal or a number bigger than 5.

Action: Enter a correct value

ERROR . RETYPE : >> JOINT INDEX?

The user entered a negative, a decimal, Ø, a number bigger than the total number of joints, or reentered a joint already defined as support.

Action: Enter a correct value

ERROR . RETYPE : >> MODIFY LOADINGS (YES=1 NO=Ø)?

The user entered a number different than 1 or Ø.

Action: Enter 1 or Ø

ERROR . RETYPE : >> MODIFY COMBINATIONS (YES=1 NO=Ø)?

The user entered a number different than 1 or Ø.

Action: Enter 1 or Ø

ERROR . RETYPE : SELECT PHASE?

The user entered a code which does not identify an existing phase.

Action: Enter an acceptable code. (Press F-16 to get the complete list.)

ERROR . RETYPE : SELECT OPTION?

The user entered a code not identifying an existing option.

Action: Enter a valid option. (Press F-16 to get the complete list.)

ERROR . RETYPE : SELECT VERB?

The user entered a code not identifying an existing verb.

Action: Enter a valid verb. (Press F-16 to get the complete list.)

ERROR . RETYPE : >> JOINT INDEX (F-8=END)?

The user to identify a joint entered a negative, a decimal or a number bigger than the total number of joints.

Action: Enter a correct value

ERROR . RETYPE: >> MEMBER X : START, END-JOINT?

The user entered a negative, a decimal, ø, a number bigger than the total number of joints, or two equal values, as member incidences

Action: Enter two correct values

ERROR . RETYPE : >> MEMBER INDEX (F-8=END)?

The user to identify a member entered a negative, a decimal or a number bigger than the total number of members

Action: Enter a correct value

ERROR . RETYPE : >> YOUNG M.ALL MEMBERS (YES=1 NO=ø)?

The user entered a value different from 1 or ø.

Action: Enter only 1 or ø

ERROR . RETYPE : >> FROM, TO, STEP, (F-8=END)?

The user entered for one or more of the three values a negative, a decimal, a ø, or a number bigger than the total number of members.

Action: Enter three correct values (note that the whole input must be repeated)

ERROR . RETYPE : DELETED JOINT >> JOINT INDEX (F-8=END)?

The user entered a joint which has been previously deleted.

Action: Enter a correct value

ERROR . RETYPE : SUPPORT JOINT >> JOINT INDEX (F-8=END)?

The user entered a joint which was declared support

Action: Enter a correct value

ERROR . RETYPE : >> DISPLACEMENT X FREE (YES=1 NO=ø)?

The user entered a value different than 1 or ø.

Action: Enter only 1 or ø

ERROR . RETYPE : >> DISPLACEMENT Y FREE (YES=1 NO=ø)?

The user entered a value different than 1 or ø.

Action: Enter only 1 or ø

ERROR . RETYPE : >> DISPLACEMENT Z FREE (YES=1 NO=Ø)?

The user entered a value different than 1 or Ø.

Action: Enter only 1 or Ø

ALREADY DEFINED JOINT >> JOINT INDEX (F-8=END)?

In the new verb the user entered the index of a joint already having prescribed condition.

Action: Enter a correct value

NEVER DEFINED JOINT >> JOINT INDEX (F-8=END)?

In the delete or change verb, the user entered the index of a joint, not having an already declared prescribed condition.

Action: Enter a correct value

ERROR . RETYPE : >> JOINT LOAD - CODE (F-8=END)?

The user entered an invalid joint load-code.

Action: Enter a correct joint load code. Press F-16 to get the list of available joint load code

ERROR . RETYPE : >> MEMBER LOAD-CODE (F-8=END)?

The user entered an invalid member load code.

Action: Enter a correct member load code. Press F-16 to get the list of available member load code

MISSING INPUT OF : JOINT COORDINATES

The input of joint coordinates was missing.

Action: Enter your coordinates before running calculations

MISSING INPUT OF : MEMBER INCIDENCES

The input of member incidences was missing.

Action: Enter your incidences before running calculations.

MISSING INPUT OF : MATERIAL PROPERTIES

The input of material properties was missing.

Action: Enter your material properties before running calculations

MISSING INPUT OF : LOADS/PRESCRIBED JOINT DISPLACEMENTS

The input of both loads and prescribed was missing.

Action: Enter your loads before running calculations

MISSING INPUT OF : LOADING COMBINATIONS

The input of loading combinations was missing although declared in the general parameters.

Action: Enter your combinations

ERROR . RETYPE : >> LOADING NUMBER (F-8=END)?

The user entered a negative, a decimal or a number of a not existing loading

Action: Enter a correct number

ERROR . RETYPE : >> COMBINATION NUMBER (1-8=END)?

The user entered a negative, a decimal or a number of a not existing combination.

Action : Enter a correct value

SYSTEM DISK FOR SPACE TRUSS ONLY

IMPROPER USER DISK

The user entered a system disk for a space truss and a user with data belonging to a different structure.

Action: Follow the given procedures and ensure yourself to what kind of structure belongs your data

STRUCTURE UNSTABLE IN LOADING : 2

The indicated loading is incorrect.

Action: Follow the given procedures and check your data

LENGTH = Ø IN MEMBER : 5

The indicated member has length = Ø.

Action: Follow the given procedures and check your coordinates

ILLEGAL LOAD CODE IN MEMBER : 5

LOAD CODE : UNIFORM X

LOAD NUMBER : 1

UNCOMPUTED LOAD

The user entered an uncomputable load in a certain loading.

Action: at the end of the computation verify your loading.

ERROR . RETYPE : DELTA K TOO LARGE —>MEMBER ... : START, END-JOINT?

The user entered 2 values which makes delta K bigger than 15

Action: Check your structure and enter two correct values

NUMBER UNSTABLE >> START JOINT RELEASED (YES=1 NO=Ø)?

The user entered conditions which make member unstable

Action: Change member - end conditions.

MAXIMUM NUMBER OF PRESCRIBED: 32 >SELECT VERB?

The user tried to enter more than 32 joints with prescribed displacements

Action: Check your structure, maximum allowed number is 32.

D. MESSAGES

To assist you in using the P6060 and to help you identify programming errors quickly, the system issues three types of message

1. advisory messages

2. informational messages

3. error messages: BASIC statement, system command, utility program

A brief discussion of each type of message is provided below. You will find that advisory and informational messages are self-explanatory, but a complete listing of all error messages, with explanations, follows this discussion.

Advisory Messages

Advisory messages are those that explicitly advise you that information has been specified incorrectly. As an example, if you enter too much data in response to an INPUT statement, the system notifies you by issuing the following message:

TOO MUCH INPUT - EXCESS IGNORED

Similarly, if an INPUT statement asks for numeric data and you enter string data, the system displays:

INCORRECT FORMAT - RETYPE LINE

and waits for the corrected data.

Informational Messages

Informational messages provide you with such information as the status of the system, as illustrated by the message:

READY

which indicates that the system is ready to accept a command or, as shown by the message:

PROGRAM program-name READY TO RUN

that your program has been successfully pre-executed, by the PREPARE command.

Informational messages require no response.

Error Messages

These messages identify errors resulting from the use of P6060 commands, utility programs, or BASIC statements. The types of error they identify fall into three categories: syntax, pre-execution, and execution.

1. Syntax Errors: errors in command or BASIC statement structure (e.g., erroneous punctuation)

2. Pre-execution Errors: errors that prevent the start of execution (e.g., invalid nesting, missing END statement, etc.)

3. Execution Errors: errors detected during the execution of a program (e.g., division by zero, discrepancy between argument and operand, improper subscript values, etc.)

The system detects syntax errors as you enter each statement or command and allows you, after you press RECALL, to take immediate corrective action. The system detects pre-execution errors after you issue a PREPARE or RUN command. After notifying you of all such errors, the system switches to command mode, permitting you to make all necessary corrections. The system detects execution errors after you issue a RUN or START command or, if pre-execution has been successful, a PREPARE command. Execution errors are either recoverable or nonrecoverable.

Recoverable errors are those that can be corrected during the execution phase. When a recoverable error is detected, the system interrupts program execution, issues a warning message, and switches to debug mode. Most recoverable errors relate to invalid variable values. In these cases, the system makes an assumption for the value. To give two examples, if an attempt was made to assign the square root of a negative number to a variable, the system assumes the square root of its absolute value; if a numeric variable has not been initialized, the system assumes a value of

zero. At the time the interruption takes place, the variable is given that value. Because you are in debug mode, you have the option of changing the value assumed by the system or of accepting it. In both these cases, you can then restart execution by pressing either the [CONT] or [R/S] button. You may also choose to terminate execution, by pressing the [BREAK] button. After [R/S] is pressed, the system switches to command mode. You can then edit your program as desired.

Nonrecoverable errors are those that cannot be corrected during the execution phase. When a nonrecoverable error is detected, the [CONT] button lights, the system suspends program execution, issues a diagnostic message, and allows you to check the current values of the variables in your program and use calculator-mode facilities -- as you would in debug mode. However, in the case of a nonrecoverable error, you cannot use the other features of debug mode: the START command, the [CONT] button, or the [R/S] button. After a nonrecoverable error occurs, you must press the [BREAK] button to terminate the execution of your program. ([BREAK] can be pressed either before or after checking the contents of the variables in your program -- but it must be pressed.) After [BREAK] is pressed, the system enters command mode so that the necessary corrections may be made.

A numeric code identifies each error message. In the case of pre-execution and execution errors, the code is followed by an identification of the line in which the error was made (for example, ERROR 6 IN LINE 155). The section that follows lists each code and explains the condition or conditions that caused the error. Codes 1 - 13 refer to recoverable errors detected during execution; 40 - 55 to errors that may occur during the pre-execution phase; 65 - 97 to nonrecoverable execution errors. Codes 100 - 128 refer to errors detected during the entry of a BASIC program or the compilation of a text file. Codes 151 - 156 relate to errors that may occur during an access operation to a floppy disk. Errors that may occur during the entry or execution of a system command are identified by codes 181 - 216. Codes 232 - 235 refer to utility programs and commands. The final section, abnormal termination errors, lists errors that can occur from operational malfunctions.

Error Code	Explanation
1	Either a numeric or string variable has not been initialized. The system assumes zero for a numeric variable; "null string" for a string variable.
2	The value of an argument in a built-in string function is not valid. The value returned by the function will vary according to the function specified. (See the section on built-in functions in chapter 4 for additional information.)
3	Numeric overflow. The system assumes the maximum value permitted by internal representation, with the appropriate sign.
4	Numeric underflow. The system assumes zero.
6	An attempt was made to calculate the square root of a negative number. The system assumes the square root of its absolute value.
7	A chaining operation generates a string longer than 1023 characters. The string is truncated after the first 1023 characters.
8	String overflow during the assignment of a string value to a string variable. The string is truncated at the allocation length of the variable to which it is assigned.
9	An attempt was made to calculate the logarithm of a negative number. The system assumes the logarithm of its absolute value.
10	An attempt was made to calculate the logarithm of zero. The system assumes -9.999999999999E+99.
11	An attempt was made to raise a negative number to the power of a non-integer value. The absolute value of the number is assumed and is raised to the specified power.

Recoverable errors that can occur during the execution of a BASIC program (part 1 of 2)

Error Code	Explanation
12	An attempt was made to raise zero to the power of a negative number. The system assumes +9.999999999999E+99.
13	An attempt was made to calculate the inverse of a matrix whose determinant is zero. The result of the operation is unpredictable.

Recoverable errors that can occur during the execution of a BASIC program (part 2 of 2)

Error Code	Explanation
40	A branch specified in one of the following statements is invalid: GOSUB GOTO IF...THEN MAT...READ: MAT...WRITE: ON...GOSUB ON...GOTO READ: WRITE: For complete specification information, see the explanation of the statement in error (Chapter 5).
41	NEXT not preceded by FOR or invalid nesting of two FOR/NEXT loops.
42	A multi-line function definition contains a multi-line function definition.
43	There is a reference to a function that has not been defined.
44	The maximum number of FOR/NEXT nesting levels permitted in a FOR/NEXT loop (15) has been exceeded.

Errors that can occur during the pre-execution of a BASIC program (part 1 of 2)

Error Code	Explanation
45	Use of FN* or FN*$ or FNEND outside a multi-line function definition or use of FN* within a string multi-line function definition or use of FN*$ within a numeric multi-line function definition.
46	Two nested FOR/NEXT loops use the same control variable.
47	FOR statement used with no matching NEXT.
48	A multi-line function definition lacks an FNEND statement.
49	A one- and two-dimensional array have the same name.
50	An END statement appearing in a program is not the last statement.
51	Missing END statement.
52	An attempt has been made to pre-execute a program that contains errors detected during execution of a COMPILE command, but not corrected.
53	A multi-line function definition lacks an FN* or FN*$ statement.
54	Lack of an Image statement that corresponds to a PRINT USING, DISP USING, MAT PRINT USING, or BUILD USING statement.
55	A STOP statement has been used in a multi-line function definition.

Errors that can occur during the pre-execution of a BASIC program (part 2 of 2)

Error Code	Explanation
65	No space is available in user memory to continue execution. After this error is encountered, the system switches to command mode.
66	The subscript of an array variable is invalid.
67	The operation requested would produce invalid new allocation dimensions for the specified matrix.
68	A RUN line-num or START line-num command has been used to begin execution in the middle of a FOR/NEXT loop.
69	The argument specified in a reference to a user defined function does not correspond to the type of parameter of the function.
70	RETURN statement used without GOSUB or an invalid reference has been made to a statement within a multi-line function definition.
71	An attempt has been made to assign more than 238 characters to the function keys.
72	The number of arguments specified in a reference to a user defined function does not match the number of parameters of the function.
73	The actual dimensions of a matrix do not permit the operation requested.
74	The maximum number of references to other single- or multi-line function definitions within a single- or multi-line function definition (256) has been exceeded.
75	Either matrix or string processing is requested, but the required OPTIONS command has not been entered at system initialization time.

Nonrecoverable errors that can occur during the execution of a BASIC program (part 1 of 3)

Error Code	Explanation
76	An attempt has been made to open a file which, during a preceding execution of the program, has not been closed. (To close the file, use the VALIDATE command.)
77	The file designator is either less than one or greater than the maximum number of the files that can be opened by the program at one time.
78	The operation requested for the specified file is invalid.
80	The value specified as the word number in a SETW: statement is greater than the number of words that the file can contain.
82	The requested operation is not compatible with the size of the file.
84	The EOF option has not been specified and, after the end of the file has been reached, a read operation requests additional data or a write operation attempts to continue writing.
85	The numeric expression specified as the argument of a TAB function has been evaluated as less than 1.
86	An attempt has been made to assign a string value to a numeric variable.
87	In a BBUILD statement, the allocation length of the specified string variable is not sufficient to allow the assignement of all the data resulting from the evaluation of its expressions.
88	Either a READ statement has requested additional data and the program's internal file contains no more data or, for an ASSIGN statement, the number of data items resulting from the evaluation of the string expression is less than the number of variables to which they must be assigned.

Nonrecoverable errors that can occur during the execution of a BASIC program (part 2 of 3)

Error Code	Explanation
89	The image field is invalid for data specified in a BUILD USING, DISP USING, MAT PRINT USING, or PRINT USING statement.
90	An attempt has been made to convert a value greater than 255 or less than 0 into an ISO character.
91	In a CONVERT statement, the numeric expression assigned as the value of the LENGTH operand has been evaluated as negative.
92	Invalid file name specified in a CHAIN statement.
93	In a BASSIGN, MAT READ:, or READ: statement, an attempt has been made to assign a string value to a numeric variable or vice versa.
96	The value specified as the word number in a SETW: statement is less than or equal to zero.
97	A SCRATCH: or APPEND: statement refers to a random file.

Nonrecoverable errors that can occur during the execution of a BASIC program (part 3 of 3)

Error Code	Explanation
100	Only a line number has been specified.
101	Invalid line number.
102	Invalid keyword.
103	Invalid operand.
104	Invalid expression.
105	Type discrepancy between operand and operator.
106	The arguments specified in a reference to a function are wrong either in number or type.
107	Invalid file name.
109	Non-interpretable syntax error.
110	The function being defined has already been defined in another DEF statement.
111	An attempt has been made to cross-reference more than 255 lines.
112	The number of numeric or string variables previously referred to in the program is the maximum permitted.
113	Invalid character. (This error may occur in the case of unbalanced parentheses.)
114	Recursive definition in a single-line user-defined function.
115	Invalid reference to a variable or function.
117	No space is available in user memory to accept the keyboard entry.
118	The program already contains a FILES statement.

Errors that can occur when entering a program or compiling a text file or in calculator mode (part 1 of 2)

Error Code	Explanation
119	The number of functions that can be defined or redefined in a program is currently at its maximum.
120	The line number referred to does not exist in the program.
128	Too many operations have been attempted in a single statement.

Errors that can occur when entering a program or compiling a text file or in calculator mode (part 2 of 2)

Error Code	Explanation
151	Operational problem on floppy disk drive 1 (upper drive).
152	Operational problem on floppy disk drive 2 (lower drive).
156	There is no system floppy disk in the unit.

Errors that can occur in access to a floppy disk

Error Code	Explanation
181	Insufficient memory to execute the requested operation.
182	The line number option (#) specified in a TRANSCODE statement is invalid for the requested operation.
183	No space has been allocated for the specified library.
184	The user floppy disk has not been initialized or reference has been made to a user floppy disk when none is in the drive.
185	The system floppy disk has not been initialized to contain an application library.

Errors that can occur during the entry or execution of a system command (part 1 of 3)

Error Code	Explanation
186	The specified file name duplicates the name of an existing file.
187	A specified file cannot be found.
188	Insufficient space available on the floppy disk or in the specified library for the requested operation.
189	Invalid attempt to decrease the size of a file.
190	The command is not recognized.
191	No file name specified.
192	Invalid character specified.
193	A required operand has not been specified.
194	Specified line number cannot be found.
195	An attempt has been made to use the START command for a program that was previously stored without pre-execution.
196	Invalid operand.
197	The line number specified in a START command is part of a multi-line function definition.
198	The space requested exceeds the space available.
199	The requested operation is not accepted for a protected program.
200	The requested operation is not accepted for a protected library.
201	The requested operation requires a double floppy disk unit.

Errors that can occur during the entry or execution of a system command (part 2 of 3)

Error Code	Explanation
202	The requested operation is valid only for systems having a printer.
203	The first line number specified is greater than the second line number.
205	The requested operation is invalid for a protected line.
206	The file present in main memory is not a program.
207	The requested operation is invalid for the file type.
208	The option specified is not available with the system.
209	A line number greater than 9999 has been generated.
210	The X option is invalid for a program.
211	There is no program or file in main memory.
212	The line or lines to be printed do not exist.
213	The length of the line prevents its listing, display, or the compilation.
214	Attempt to link a multi-line function definition that has no DEF statement.
216	A program for which the compilation has been specified contains a branch to a line number that does not exist.

Errors that can occur during the entry or execution of a system command (part 3 of 3)

Error Code	Explanation
232	The sum of $n_1 + n_2 + n_3$ is greater than 14.
234	The name of the utility program has been omitted.
235	Invalid utility program name.

Errors that can occur during the calling or execution of a utility program

Error Code	Explanation
4A *	Main memory is damaged; its contents has been deleted.
12A * 16A *	The system floppy disk is damaged; the contents of the disk are invalid. The contents of main memory are deleted.
ABN FD *	The upper drive of the floppy disk unit is not working properly. (Check if the flap is closed.)
ABN FD**	The lower drive of the floppy disk unit is not working properly. (Check if the flap is closed.)
ABN PRT	The integrated printer is not working properly. (Check the position of the release lever.)

Abnormal termination errors

Note: Other error codes similar in form to those listed above may be issued when the system encounters an abnormal operational condition. In the case of such errors, and of the ones above, pressing the [redacted] button can sometimes correct the error condition. If you press [redacted] and the READY message appears, retry the operation that resulted in the error. If READY fails to appear, try switching off the power, waiting a few seconds, and switching the power back on. If READY does not appear, contact your nearest Olivetti technical representative.

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