A COMPUTER PROGRAM TO ANALYZE BEAM-COLUMNS UNDER MOVABLE LOADS

by

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Research Report Number 56-4

Development of Methods for Computer Simulation
of Beam-Columns and Grid-Beam and Slab Systems

Research Project 3-5-63-56

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The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Bureau of Public Roads.

PREFACE

This report describes a computer program developed to analyze beam-columns subjected to movable static loads. The method incorporates previously developed finite-element beam-column techniques.

The report is one of a series that describes work in Research Project No. 3-5-63-56, "Development of Methods for Computer Simulation of Beam-Columns and Grid-Beam and Slab Systems," and it may be desirable to review Report No. 56-1 (see List of Reports) for background.

The computer program presented here is written for the CDC 1604 and 6600 computers, but it is in FORTRAN language and only minor changes are required to make it compatible with IBM systems. Duplicate copies of the program deck and test data cards for the example problems in this report are available from the Center for Highway Research, The University of Texas at Austin.

The efforts of many people helped to produce the report. The assistance of the Texas Highway Department contact representative, Larry G. Walker, is greatly appreciated. The support of the U. S. Bureau of Public Roads is gratefully acknowledged. The excellent facilities of the Computation Center of The University of Texas and the cooperation of its staff have contributed significantly.

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LIST OF REPORTS

Report No. 56-1, "A Finite-Element Method of Solution for Linearly Elastic Beam-Columns" by Hudson Matlock and T. Allan Haliburton, presents a finite-element solution for beam-columns that is a basic tool in subsequent reports.

Report No. 56-2, "A Computer Program to Analyze Bending of Bent Caps" by Hudson Matlock and Wayne B. Ingram, describes the application of the beam-column solution to the particular problem of bent caps.

Report No. 56-3, "A Finite-Element Method of Solution for Structural Frames" by Hudson Matlock and Berry Ray Grubbs, describes a solution for frames with no sway.

Report No. 56-4, "A Computer Program to Analyze Beam-Columns under Movable Loads" by Hudson Matlock and Thomas P. Taylor, describes the application of the beam-column solution to problems with any configuration of movable non-dynamic loads.

Report No. 56-5, "A Finite-Element Method for Bending Analysis of Layered Structural Systems" by Wayne B. Ingram and Hudson Matlock, describes an alternating-direction iteration method for solving two-dimensional systems of layered grids-over-beams and plates-over-beams.

Report No. 56-6, "Discontinuous Orthotropic Plates and Pavement Slabs" by W. Ronald Hudson and Hudson Matlock, describes an alternating-direction iteration method for solving complex two-dimensional plate and slab problems with emphasis on pavement slabs.

Report No. 56-7, "A Finite-Element Analysis of Structural Frames" by T. Allan Haliburton and Hudson Matlock, describes a method of analysis for rectangular plane frames with three degrees of freedom at each joint.

Report No. 56-8, "A Finite-Element Method for Transverse Vibrations of Beams and Plates" by Harold Salani and Hudson Matlock, describes an implicit procedure for determining the transient and steady-state vibrations of beams and plates, including pavement slabs.

Report No. 56-9, "A Direct Computer Solution for Plates and Pavement Slabs" by C. Fred Stelzer, Jr., and W. Ronald Hudson, describes a direct method for solving complex two-dimensional plate and slab problems.

Report No. 56-10, "A Finite-Element Method of Analysis for Composite Beams" by Thomas P. Taylor and Hudson Matlock, describes a method of analysis for composite beams with any degree of horizontal shear interaction.

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ABSTRACT

A computer program, BMCOL 43, is presented which can efficiently analyze a beam-column subjected to movable static loads. The program is built around the computer simulation of a beam-column subjected to stationary loads which is described in Ref 1.

The methods used in the program are such that a beam-column can be analyzed for any pattern of transverse loads that move across the member. These load patterns may be any diverse system of loadings such as a highway truck, a series of trucks, or possibly a train on a railroad structure. In addition, the effects of fixed loads can be included in the analysis. Furthermore, the effects of various changes in the support history (such as settlement of a support) can be studied. The results of an analysis may include (1) solutions for the member under fixed loads, (2) influence diagrams for movable-load patterns, and (3) envelopes of maximum values of deflection, bending moment, shear, and support reaction that occur due to the loading and support history.

Five example problems that are typical of those encountered by highway structural designers illustrate the uses of the program and the options available.

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NOMENCLATURE

Symbol	Typical Units	Definition
a	-	Coefficient in stiffness matrix
b	-	Coefficient in stiffness matrix
c	-	Coefficient in stiffness matrix
d	-	Coefficient in stiffness matrix
e	-	Coefficient in stiffness matrix
E	$lb/in.^2$	Modulus of elasticity
f	-	Coefficient in load matrix
F	$lb\text{-}in.^2$	Flexural stiffness = EI
h	in.	Increment length
i	-	Station number
I	$in.^4$	Moment of inertia of the cross section
M	in.-lb	Bending moment
P	lb	Axial tension or compression
Q	lb	Concentrated applied transverse load
Q^R	lb	Support reaction
Q^{RR}	lb	Transverse force due to a rotational restraint
Q^T	lb	Transverse force due to an applied couple
Q_f	lb	Fixed load
Q_m	lb	Movable load
R	in.-lb/rad	Concentrated rotational restraint
S	lb/in.	Concentrated transverse spring restraint
T	in.-lb	Concentrated applied couple

Symbol	Typical Units	Definition
V	lb	Shear
w	in.	Transverse deflection
θ	radians	The simple-difference slope of the individual bars
θ^J	radians	The average slope of adjacent bars at a joint

CHAPTER 1. INTRODUCTION

To design a structural member, the engineer needs the extreme values of moment, shear, deflection, and reaction that occur at key points due to any combination of prescribed design loadings. For a complete design, the extreme values at all points in the member must be known. These design maximums are of particular importance to the highway bridge designer who is primarily concerned with moving loads. Static loads that can cause these maximum values are of two types: fixed loads and movable loads. Straightforward methods are available for determining the maximum forces and moments in members that sustain only fixed loads, but approximations and engineering judgment are often necessary to expedite the design of members which sustain movable static loads. The computer program described in this report allows the user to efficiently determine the critical values of the design parameters at any location along the length of a beam-column subjected to fixed and movable loads. The computer program utilizes the finite-element beam-column solution presented in Ref 1.

Purposes and Uses of Program BMCOL 43

Computer Program BMCOL 43 is a finite-element simulation of a linearly elastic beam-column subjected to fixed and movable loads. The program is versatile and efficient for (1) solving beams under fixed loads, (2) computing influence diagrams, and (3) computing envelopes of maximum deflections, bending moments, shears, and reactions that may be accumulated under any desired sequence of fixed and movable loads.

Fixed-Load Solution. BMCOL 43 can be used to determine the deflection, slope, bending moment, and shear at each point of a beam-column loaded with fixed loads. Each support reaction can also be determined.

Envelopes of Maximums. The most important use of the program is the progressive selection and accumulation of the maximum positive and negative values of deflection, bending moment, shear, and reaction at each station along a beam-column for a given load and support history. The collection of

positive and negative maximums for each quantity (deflection, bending moment, etc.) results in an envelope of maximums. Included in the maximum values are the effects of fixed loads, movable loads, and changes in support conditions (such as settlement of a support). Envelopes of maximums provide the information usually needed in design.

Influence Diagrams. BMCOL 43 can be used to determine the influence of the position of a load pattern on the deflection, bending moment, shear, and support reaction at any point along a beam-column. The load pattern can be a unit load, which is conventionally used for computing influence diagrams. On the other hand, any desired pattern of loads may be used, possibly to represent a series of vehicles. The resulting diagrams give the integrated influence of the load pattern more directly and are therefore more convenient to use in actual design problems.

Review of Remaining Chapters

The following chapters describe the various aspects of the movable-load analysis. Chapter 2 presents a solution of a statically loaded beam-column which is very similar to the method presented in Ref 1. The uses of Program BMCOL 43 and the options available to the user are described in Chapter 3. In Chapter 4 a detailed description of the computer program is presented. Example problems are shown in Chapter 5, and Chapter 6 summarizes the uses and capabilities of the program.

CHAPTER 2. SOLUTION OF A STATICALLY LOADED BEAM-COLUMN

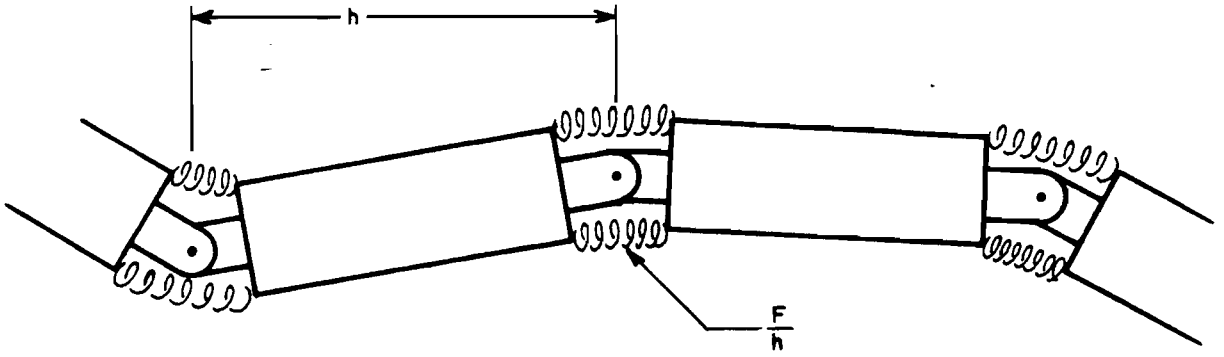
Program BMCOL 43 was developed for the analysis of beam-columns under movable static loads. No dynamic effects are included in the analysis. The program is based on the solution of a beam-column under a stationary load pattern, and, except for slight modifications, the procedures described in Ref 1 are used. The program makes one complete beam-column solution for each of many uniformly spaced locations of a load pattern that moves across the member. A brief review of the beam-column method is included in this chapter.

Computer Simulation of a Beam-Column

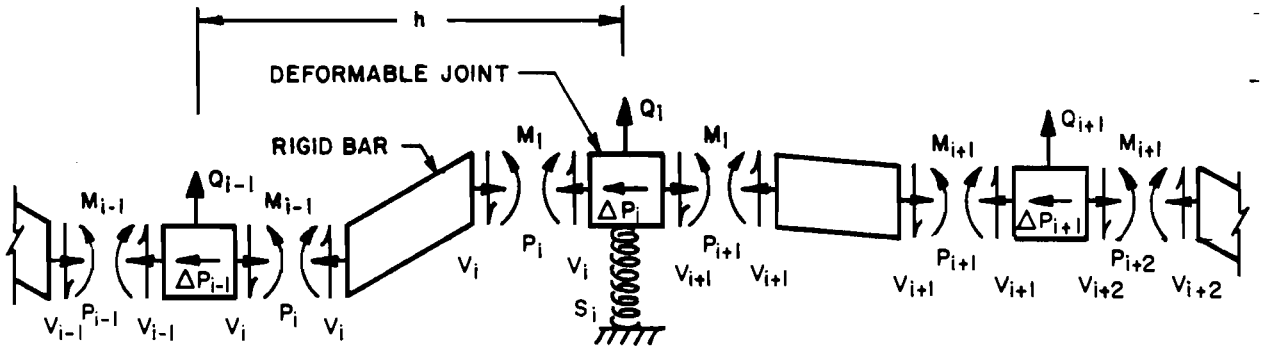
It has been shown in Ref 1 that a model composed of rigid bars and springs (Fig 1a) can be used to simulate a beam-column. In this model, all external loads and restraints are introduced at the joints between the bars. Spring-restrained hinges at the joints represent the flexural stiffness of the actual beam-column. The flexural stiffness is defined as the product EI and is represented by the letter F. The increment length is the distance between joints and is designated by h. All stiffness and load values may vary in a freely discontinuous manner along the model, and equations which describe the model are susceptible to a quick and efficient computer solution.

A representation of the bar-and-spring model with the internal and external forces and restraints acting on Joint i is shown in Fig 1b. The load normal to the axis of the beam-column is represented by Q and a linearly elastic spring support is represented by S. Axial forces applied to a beam-column will develop axial tension or compression P in the bars and joints. The moment M and the shear V are developed in the bars and joints. It should be noted that the shear and axial tension are constant throughout the length of each rigid bar.

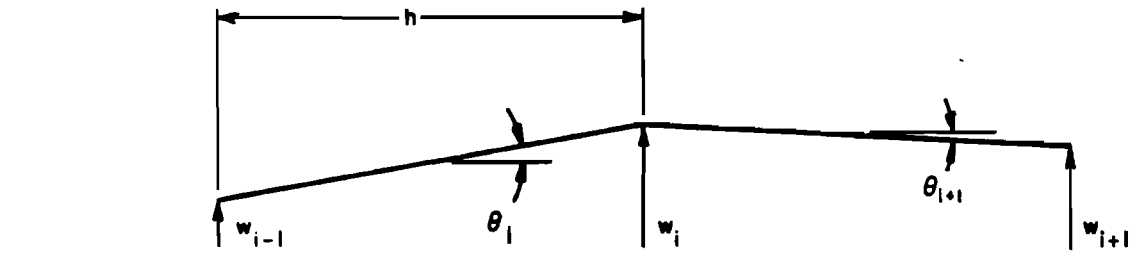
The joint-and-bar numbering system is shown in Fig 1c. Note that the bar to the left of each joint has the same number as that joint. The symbol θ measures the slope of the bars, and w represents the deflection which is positive upward.



(a)



(b)



(c)

Fig 1. Mechanical model of beam-column.

Equilibrium equations of Joint i and Bars i and i+1, combined with the flexure equation, result in the following equation for the deflected shape of a beam-column:

$$a_i w_{i-2} + b_i w_{i-1} + c_i w_i + d_i w_{i+1} + e_i w_{i+2} = f_i \qquad (2.1)$$

where

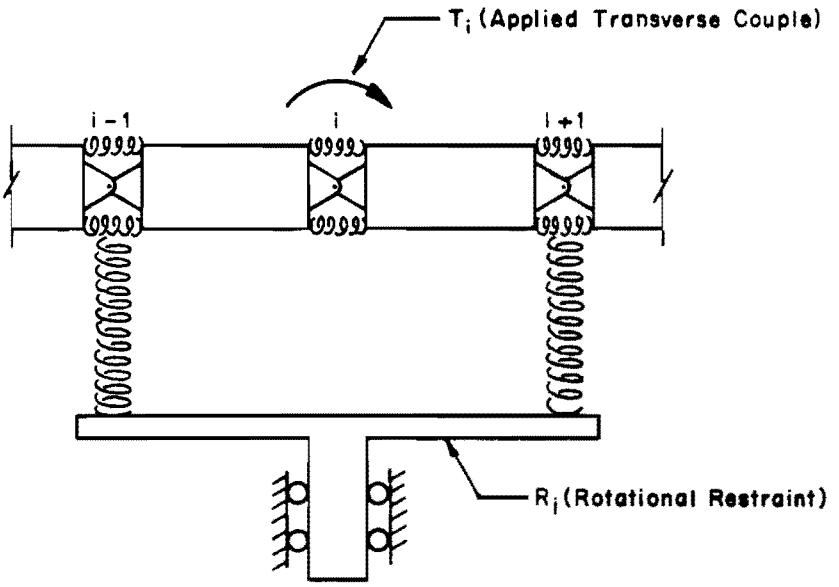
$$\begin{aligned}
a_i &= F_{i-1} - 0.25hR_{i-1} \\
b_i &= -2\,(F_{i-1} + F_i) - h^2 P_i \\
c_i &= F_{i-1} + 4F_i + F_{i+1} + h^3 S_i + 0.25h\,(R_{i-1} + R_{i+1}) \\
&\quad + h^2\,(P_i + P_{i+1}) \qquad (2.2) \\
d_i &= -2\,(F_i + F_{i+1}) - h^2 P_{i+1} \\
e_i &= F_{i+1} - 0.25hR_{i+1} \\
f_i &= h^3 Q_i - 0.5h^2\,(T_{i-1} - T_{i+1})
\end{aligned}$$

The R terms in the above equations represent the effect of a rotational restraint at Station i which is modeled as a differential spring system as shown in Fig 2a. These restraint springs provide a force couple that resists a change in slope of the beam-column, but does not restrain deflection at Station i.

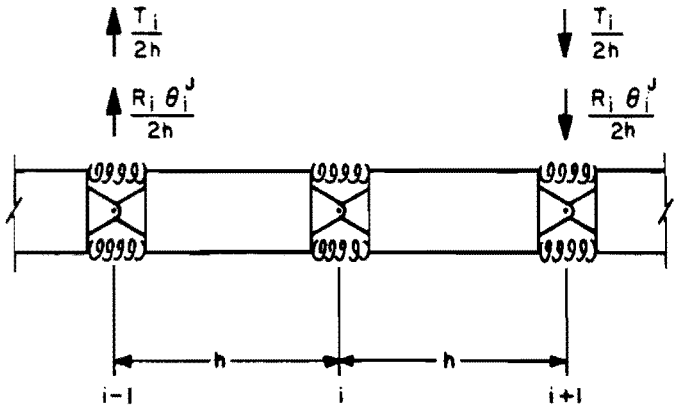
In the last equation above, the T terms represent the effects of externally applied couples at Station i which are felt as equal and opposite transverse loads at the adjacent stations as shown in Fig 2b.

A detailed derivation of Eqs 2.1 and 2.2 is included in Appendix 1.

When Eq 2.1 is written for every joint along the model, the resulting system of equations forms a diagonally banded matrix of stiffness terms. A two-pass, recursive technique described in Ref 1 is used to solve the system of equations for the deflection of every joint. Once the deflected shape of



(a) MECHANICAL MODEL



(b) EQUIVALENT FORCES

Fig 2. Rotational restraint R and applied couple T acting on the mechanical model.

a member is known, the slopes, bending moments, shears, and support reactions for the member can be determined by using the procedures described below.

Slope. Equation 2.3 is the simple-difference expression for slope of the individual Bar i in terms of the deflections of Joints i-1 and i and the increment length (see Fig 1c).

$$\theta_i = \frac{- w_{i-1} + w_i}{h} \tag{2.3}$$

The slope of the bar-and-spring model is not defined at the joint, but the slope of the actual beam represented by the model can be very closely approximated as the average of the slopes of the adjacent bars:

$$\theta_i^J = \frac{\theta_i + \theta_{i+1}}{2} = \frac{- w_{i-1} + w_{i+1}}{2h} \tag{2.4}$$

When the results are visualized in terms of the bar-and-spring model, it is more convenient to deal with the slope of the individual bars. It will be seen in results printed from BMCOL 43 that the slope is printed between stations; this slope is that of the bar between the indicated stations.

Bending Moment. In conventional beams, the bending moment is equal to the product of the flexural stiffness and the curvature. In the finite-element model the flexibility of the beam and the curvature are lumped at the station points. The corresponding relation for bending moment M in the model is

$$M_i = \frac{F_i}{h}\left(\frac{w_{i-1} - 2w_i + w_{i+1}}{h} \right) \tag{2.5}$$

Shear. Shear V_i in the model is found from the equation of moment equilibrium of Bar i (Fig 1). Thus,

$$V_i = \frac{- M_{i-1} + M_i}{h} - P_i\left(\frac{- w_{i-1} + w_i}{h} \right) \tag{2.6}$$

As seen in Fig 1b, V_i is the shear throughout the length of Bar i. Therefore, Program BMCOL 43 is written such that the shear computed in each bar is printed between the adjacent stations. In conventional analysis, the effects of rotational restraints and applied couples are considered as concentrated at a point. In BMCOL 43 they act on the beam as equal and opposite loads separated by two increments as shown in Fig 2b. Therefore, the shear for only the bars

adjacent to stations with applied couples or rotational restraints is affected by these loads and is not the same as conventional shear.

Support Reaction. As described in Ref 1, rotational restraints and applied couples are introduced into the beam-column model as shown in Fig 2. When rotational restraints R and applied couples T act at Joints i-1 and i+1, and a linear spring support S_i resists deflection at Station i, a free-body diagram of Joint i is as shown in Fig 3a. If instead of a spring support S_i, Joint i is supported on a non-yielding support, the free-body diagram of the joint is as shown in Fig 3b.

If Joint i is supported on a linear spring S_i, the reaction Q_i^R is

$$Q_i^R = - S_i w_i \tag{2.7}$$

If Joint i is supported on a non-yielding support (deflection w_i equal to zero), the reaction Q_i^R can be found from equilibrium of vertical forces on the joint shown in Fig 3b. Thus the reaction is

$$Q_i^R = - V_i + V_{i+1} - Q_i - \frac{- T_{i-1} + T_{i+1}}{2h} - \frac{- R_{i-1}\theta^J_{i-1} + R_{i+1}\theta^J_{i+1}}{2h} \tag{2.8}$$

If Eqs 2.3 and 2.6 are substituted into Eq 2.8, the support reaction is

$$Q_i^R = \frac{M_{i-1} - 2M_i + M_{i+1}}{h} - Q_i + \frac{T_{i-1} - T_{i+1}}{2h} - \frac{R_{i-1}w_{i-2} - R_{i-1}w_i - R_{i+1}w_i + R_{i+1}w_{i+2}}{4h^2} - \frac{P_i w_{i-1} - P_i w_i - P_{i+1}w_i + P_{i+1}w_{i+1}}{h} \tag{2.9}$$

Comparison of the Methods of BMCOL 34 and BMCOL 43

The reader who has used Program BMCOL 34 (Ref 1) will notice that the equations used in that program differ slightly from those developed above. In the current development, axial tension and transverse shear are held constant within each bar. In Program BMCOL 34, the changes in these two parameters take place within the bars. It should be re-emphasized, however, that

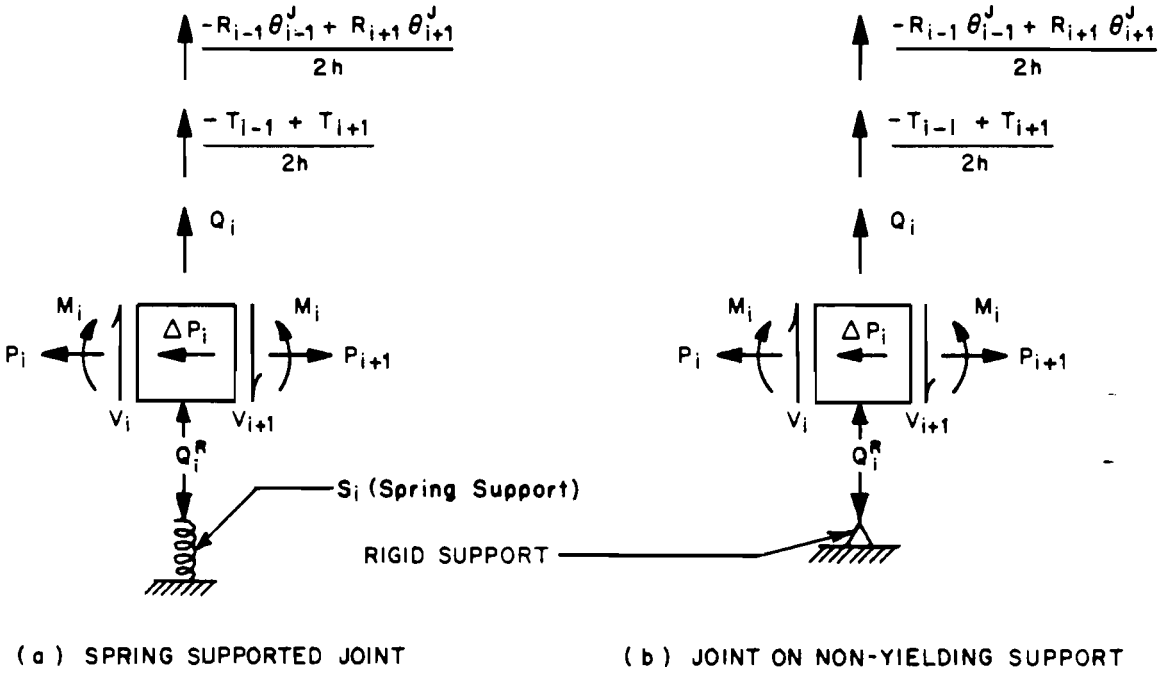


Fig 3. Support reaction at Joint i.

the basic methods and procedures used in formulating the equations in terms of a bar-and-spring model and the recursive technique to solve the system of equations are identical.

CHAPTER 3. FEATURES OF THE PROGRAM

Several different types of results are produced by BMCOL 43. The method of computation and uses of each are explained in this chapter. In addition, the important features of the program are discussed.

Fixed Loads

There are two types of transverse loads that may act on BMCOL 43: fixed loads and movable loads. For the fixed-load solution, only the fixed loads are applied and the beam-column is solved for deflections, slopes, bending moments, shears, and support reactions. The fixed-load solution is a quick and efficient means of solving a beam-column under a particular configuration of loads and restraints.

Movable Loads

The most important feature of BMCOL 43 is its ability to simulate the movement of a load pattern along a beam-column. As shown in Fig 4, the movable-load pattern may be a diverse system of loads. It is described according to its own system of station numbers. The movable-load station system is completely independent of the beam-column station system except that both must have the same increment length. Any desired range of movement may be specified by the user by giving initial and final positions of the movable-load pattern. All positions of the load pattern along the beam-column station system are given in terms of the position of the zero station of the movable-load system.

The movable-load analysis does not include dynamic effects; it is a series of static-load solutions. A load pattern is shifted in steps within the designated range of movement. The number of increments between positions of the movable load is specified by the user. For each position of the load pattern, the movable loads are added to the fixed loads and the beam-column is completely solved. After the beam-column has been solved, the load pattern is moved to the next position and the process is repeated. The results from the movable-load solutions are combined into envelopes of maximums.

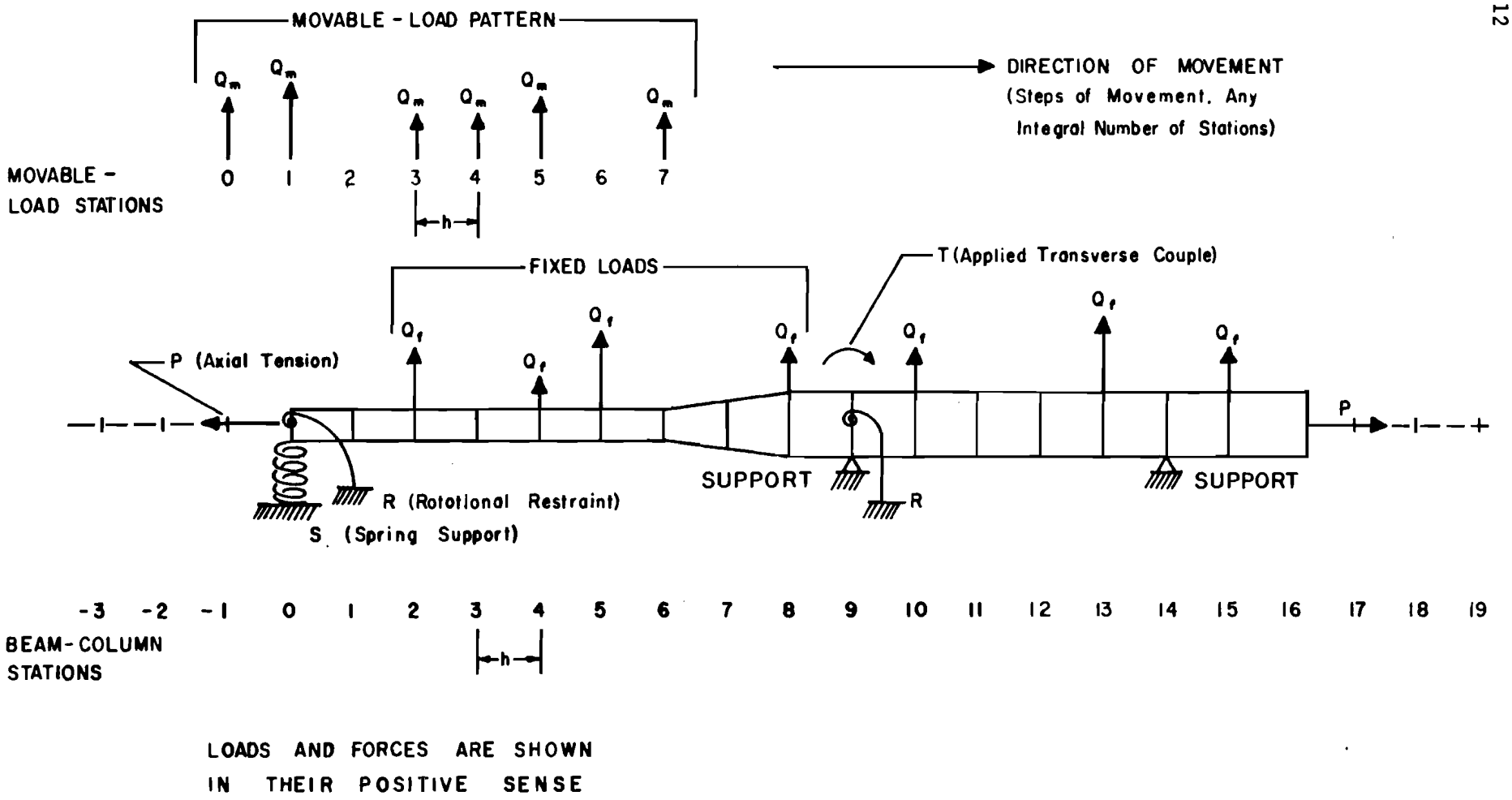


Fig 4. A beam-column with a movable-load pattern.

Envelopes of Maximums

Envelopes of deflection, bending moment, shear, and support reaction are produced by a comparison process. The envelopes of maximums contain the extreme values, both positive and negative, which every station of the beam-column has experienced. Each beam-column solution is compared with the existing envelopes and the envelopes are expanded when a new maximum is encountered at a point.

Envelopes are automatically generated if the movable-load capability is exercised. In addition, an option is available which allows the envelopes to be retained and expanded through a sequence of separate but related independent problems. The option exercised is completely independent of the movable-load capability. This means that the envelopes may be held over a sequence which contains both fixed-load and moving-load problems.

The example problems of Chapter 5 illustrate the usefulness of the envelopes of maximums.

Influence Diagrams

The influence diagrams of BMCOL 43 may be used to study the behavior of a particular point in the beam-column as a load pattern is moved across the member. Influence diagrams may be obtained for deflection, bending moment, shear, or support reaction. Fixed loads are not included in the solutions for influence diagrams. Computation of the influence diagrams is based only on the movable-load. A load pattern is moved, step by step, between the two designated end stations, and the beam-column is solved for each position of the load. The values that are computed for the designated influence-line stations are stored, as well as the location of the movable load that caused each value.

It should be noted that the influence diagrams of BMCOL 43 are much more general than conventional influence diagrams because the beam-column may be solved under any type of support condition and any type of load, including the bending effect of axial loads. Also, any configuration of movable load may be used to generate them. The BMCOL 43 influence diagrams will be equivalent to conventional influence diagrams if the movable-load pattern consists of a concentrated unit load.

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CHAPTER 4. DESCRIPTION OF BMCOL 43

General

Program BMCOL 43 is written in FORTRAN 63 language for the Control Data Corporation 1604 and 6600 computers. With minor changes, the program would be compatible with IBM 7090 computers or with other systems. Four FORTRAN subroutines are included in the program. Compile time is approximately 3 minutes for a FORTRAN version of the program. The program storage requirement is 24,000 words. The definitions of symbols used in the program and a listing of the program are included in Appendix 4 and Appendix 5.

The beam-column must be divided into a number of equal increments which are designated by station numbers. The left end of the beam-column must be located at Station 0. Any number of increments up to 200 can be used. Computation time and the accuracy of the solution both increase with the number of increments that are used. Therefore, it is desirable to use the minimum number of increments that will yield the desired accuracy. Experience will enable the user to select the proper number of increments.

In the finite-element model, all loads and restraints are defined at the station points (joints). Therefore, distributed loads and restraints from one-half of the increment on each side of the station are "lumped" at the station. End stations receive half-values of distributed effects. The input of distributed effects is facilitated by SUBROUTINE INTERP3. This subroutine interpolates linearly between the extreme values of a distribution sequence and stores an interpolated value at each intermediate station. Concentrated loads that occur between stations should be split by the user to the two adjacent stations.

Any system of units may be used to describe the problem (for example, pounds and inches), but the system must be used consistently. The sign convention is shown in Fig 4. Upward deflections are positive.

Procedure for Data Input

A guide for data input is included in Appendix 2. The guide is designed so that additional copies may be furnished as separately bound extracts for

routine use. A parallel study of the guide will help the reader to understand the following discussion.

Any number of problems may be stacked and run together. The sequence of problems is preceded by two cards which describe the run. The first card of each problem contains the problem number and a brief description of the problem. The program continues working problems until a blank problem number or a data error is encountered; then the run is terminated.

Tables of Data Input

Table 1 is the data-control table. It consists of a single card which must be input for each problem. The number of cards in the remaining tables and the program options are specified in this table. The program options will be discussed later in this chapter.

Table 2 contains the following:

(1) number of increments into which the beam-column is divided,
(2) increment length,
(3) number of increments in the movable-load pattern,
(4) start position of the movable-load pattern,
(5) stop position of the movable-load pattern, and
(6) the size (number of increments) of each stepwise movement of the movable-load pattern.

The start position is the beam-column station where the zero station of the movable load is placed for the first movable-load solution. Any positive station may be designated as the start station. A negative start station is permissible if after one stepwise movement of the movable-load pattern, a portion of the pattern is on the beam. The stop station is the last beam-column station where the zero station of the movable-load pattern is placed. It may be any station on the beam-column or any station of no more than one step of movement past the right end of the beam-column. Each stepwise movement of the movable-load pattern may be any integral number of beam-column increments. Larger steps require less computation time. If the number of movable-load steps is specified to be zero, the problem is terminated immediately after the fixed-load solution.

For any station in the beam, a deflection, slope, or both may be specified in Table 3. A specified deflection is equivalent to a single support. A

fixed-end support can be simulated in the computer by the specification of a zero deflection and a zero slope at the same station. The ability to specify a deflection other than zero provides the user with a simple method of studying problems in which the supports settle. Due to the method of simulation (see Fig 2), the specified slope and deflections must conform to the following minimum spacing requirements:

(1) A slope may not be specified closer than three increments from another specified slope.

(2) A deflection may not be specified closer than two increments from a specified slope, except that both a slope and a deflection may be specified at the same station.

Slope and deflection conditions may be specified at no more than 20 stations. Each specification requires a separate card. The cards may be stacked in any order within the tables.

Fixed loads and restraints are described in Table 4. The input values are beam stiffness, fixed loads, applied couples, rotational restraints, support springs, and axial tensions. Couples and rotational restraints appear only as concentrated effects, while axial tensions are usually distributed. The remaining values may be either concentrated or distributed. The method used for the description of distributed data is illustrated in Appendix 2. All of the input values of Table 4 are accumulated algebraically in storage. Therefore there are no restrictions on the order of the cards, except that within a distribution sequence the stations must be in ascending order. Axial tensions must be described in the same manner as other values in this table because there is no provision in the program for automatically distributing the internal effects of an externally applied load. For example, an axial load applied to the ends of the beam-column must be specified as an axial tension at each interior station. The number of cards in Table 4 must not exceed 100.

Table 5 is used to describe the movable load. The description is based on a system of stations which is independent of the beam-column stations, except that both systems must have the same increment length (see Fig 4). Data in this table are input the same as in Table 4. The load pattern is limited by the number of increments in the beam. The maximum allowable number of cards is 100.

Stations selected for influence diagrams are designated in Table 6. Diagrams may be specified for each parameter: deflection, bending moment, shear,

and support reaction. The number of cards in this table is always four (one or more diagrams desired) or zero (no diagrams desired). Because of a core storage limitation, no more than 5 stations may be specified on each parameter card. Each parameter may have a different set of specified stations. Each card contains the following:

(1) number of influence diagram stations (1 to 5),
(2) type of output (results may be plotted, tabulated, or both), and
(3) the stations for which influence diagrams are desired.

The cards must be stacked in the same order as the previous list. If no influence lines are desired for one of the parameters, a blank card must be inserted for that parameter.

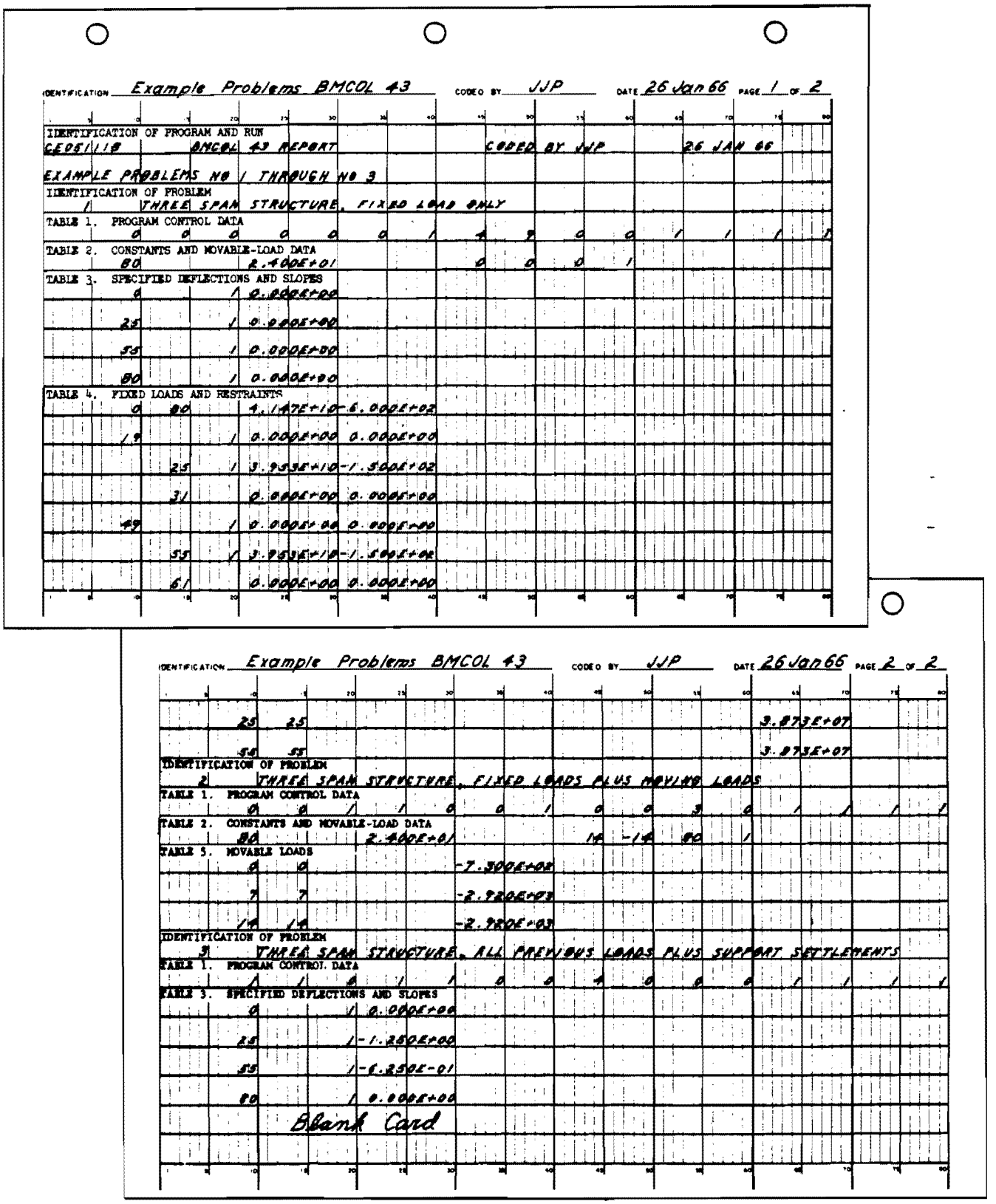
Program Options

The data-hold options, which are contained in Table 1, allow the user to retain any of the data tables from the preceding problem except Table 1. If Table 2, 3, or 6 is held, it may not be modified; the number of added cards specified for it must equal zero. The data in Tables 4 and 5 may be held and modified by the addition of new cards, but the total accumulated number of cards in each of these tables must be less than 100.

The hold options for the various tables are independent of each other, but care must be exercised in order to insure that the data in the various tables are compatible. For example, if a previous 40-increment problem had a distributed load from Station 0 to Station 40, then the user should not change the total number of increments in the new problem to some number less than 40 unless he erases the loads past the end of the new beam.

As explained in Chapter 3, the envelopes of maximums may be retained and modified through a series of problems. If the envelopes are not held, they are set equal to zero before the fixed-load solution of each problem. If the user so specifies, the envelopes of maximums will be automatically plotted in a 4-inch by 10-inch space.

The first three example problems of Chapter 5 are shown on typical coding forms in Fig 5. The user may desire to have specialized forms made for particular types of problems.



IDENTIFICATION Example Problems BMCOL 43 CODED BY JJP DATE 26 Jan 66 PAGE 1 OF 2

IDENTIFICATION OF PROGRAM AND RUN
CE05/118 BMCOL 43 REPORT CODED BY JJP 26 JAN 66
EXAMPLE PROBLEMS NO 1 THROUGH NO 3
IDENTIFICATION OF PROBLEM
1 THREE SPAN STRUCTURE, FIXED LOAD ONLY
TABLE 1. PROGRAM CONTROL DATA
0 0 0 0 0 0 1 4 9 0 0 1 1 1 1
TABLE 2. CONSTANTS AND MOVABLE-LOAD DATA
80 2.400E+01 0 0 0 1
TABLE 3. SPECIFIED DEFLECTIONS AND SLOPES
0 1 0.000E+00
25 1 0.000E+00
55 1 0.000E+00
80 1 0.000E+00
TABLE 4. FIXED LOADS AND RESTRAINTS
0 80 4.147E+10 6.000E+02
19 1 0.000E+00 0.000E+00
25 1 3.953E+10 -1.500E+02
31 0.000E+00 0.000E+00
49 1 0.000E+00 0.000E+00
55 1 3.953E+10 -1.500E+02
61 0.000E+00 0.000E+00

IDENTIFICATION Example Problems BMCOL 43 CODED BY JJP DATE 26 Jan 66 PAGE 2 OF 2

25 25 3.873E+07
55 55 3.873E+07
IDENTIFICATION OF PROBLEM
2 THREE SPAN STRUCTURE, FIXED LOADS PLUS MOVING LOADS
TABLE 1. PROGRAM CONTROL DATA
0 0 1 1 0 0 1 0 0 3 0 1 1 1 1
TABLE 2. CONSTANTS AND MOVABLE-LOAD DATA
80 2.400E+01 14 -14 80 1
TABLE 5. MOVABLE LOADS
0 0 -7.300E+02
7 7 -2.920E+03
14 14 -2.920E+03
IDENTIFICATION OF PROBLEM
3 THREE SPAN STRUCTURE, ALL PREVIOUS LOADS PLUS SUPPORT SETTLEMENTS
TABLE 1. PROGRAM CONTROL DATA
1 1 0 1 1 0 0 4 0 0 0 1 1 1 1
TABLE 3. SPECIFIED DEFLECTIONS AND SLOPES
0 1 0.000E+00
25 1 -1.250E+00
55 1 -6.250E-01
80 1 0.000E+00
Blank Card

Fig 5. Coded input data for first three problems.

Error Messages

Checks for common types of data errors are included in the program. An error message which defines the error is printed if any of the following conditions occur:

(1) the start or stop station for the movable load is improperly specified,

(2) a slope or deflection is specified too close to another slope or deflection,

(3) the allowable number of cards for an input table is exceeded,

(4) data is input at stations beyond the end of the beam-column,

(5) the station numbers in a distribution sequence are out of order, or

(6) the allowable number of influence diagrams is exceeded.

In addition to the specific error messages, a general purpose error message is provided for a number of unlikely errors. If the message "UNDESIGNATED ERROR STOP" is printed, the user must investigate the program to determine what caused the error. Any error detected by the program will cause the entire run to be abandoned.

Description of Problem Results

The output of results is arranged so that the input quantities of Tables 1 through 6 are available for all problems and are printed with explanatory headings. Table 7 presents the fixed-load results prior to any movable-load solutions. Table 8 tabulates the envelopes of maximums for deflection, moment, shear, and reaction that have occurred due to the moving load acting on the beam-column in addition to any fixed loads. Beside each value in the envelopes of maximums, the movable-load location that caused the maximum is tabulated. A location equal to 999 indicates that the maximum was caused by fixed loads. A location indicator followed by an asterisk means that the maximum was created and held from a prior problem. Table 9 presents the scales for the plots of the envelopes of maximums. Tables 10A through 10D are a tabulation of any influence diagrams that have been specified. The influence diagrams are for the movable load only; the effect of fixed loads are not included. Scales for the influence diagrams are printed in Table 11.

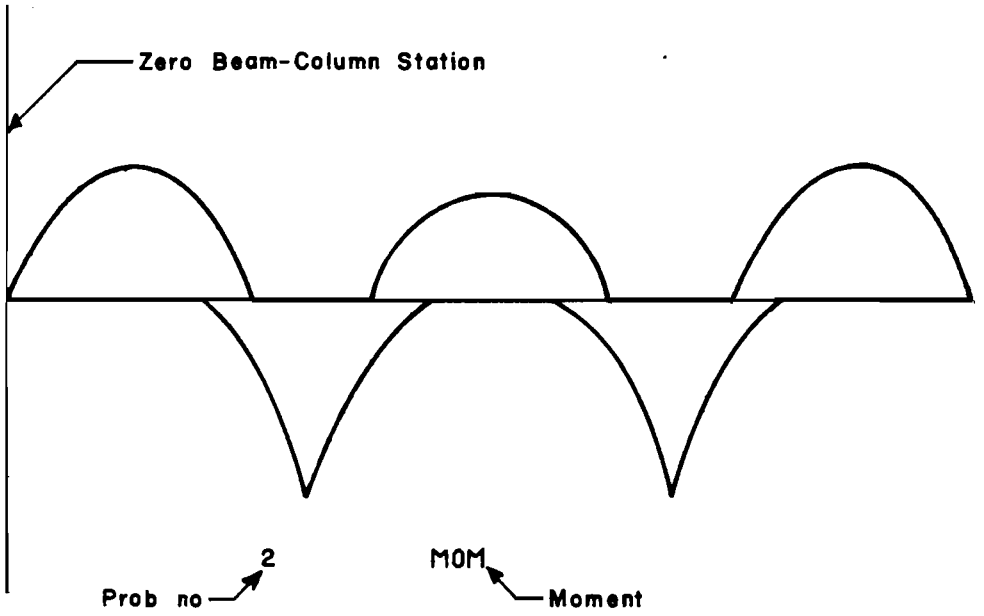
Plots of Results

Options are available which allow the user to obtain plots of the envelopes of maximums and the influence diagrams. Both types of plots fit in a 4-inch by 10-inch space. The optimum scales for the plots, both horizontal and vertical, are automatically selected by the program.

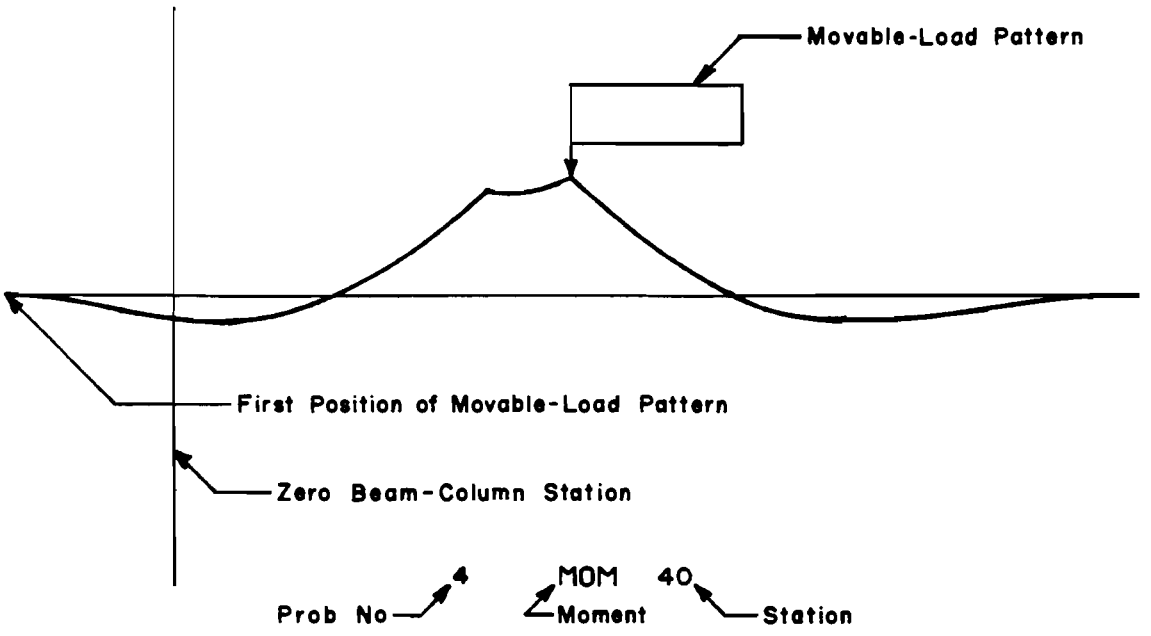
An example plot of an envelope of maximum moments for a 3-span structure subjected to a movable-load pattern is shown in Fig 6a. Beneath the plot, the problem number and an identification of the plot variable are printed. The plot is from Example Problem 2 described in Chapter 5.

A plot of an influence diagram for positive moment in the center span of the same structure is shown in Fig 6b. The left end of the beam-column, Station zero, is designated by the vertical axis. Points to the left of the vertical axis indicate that the zero station of the movable load pattern is not on the beam-column. Figure 6b is an example of this type of plot. The set on the left is the problem number. In the center, DEFL, MOM, SHEAR, or REACT appears, which indicates the plot variable (Deflection, Moment, Shear, Reaction). On the right is the station number for which the influence diagram is plotted. This plot is from Example Problem 1 of Chapter 5.

No special provision is made in the program for plotting results of the fixed-load solution. However, such plots may be obtained by plotting envelopes of maximums that contain nothing but the fixed-load solution.



(a) A TYPICAL ENVELOPE OF MAXIMUM MOMENTS



(b) A TYPICAL MOMENT INFLUENCE DIAGRAM

Fig 6. Typical plots.

CHAPTER 5. EXAMPLE PROBLEMS

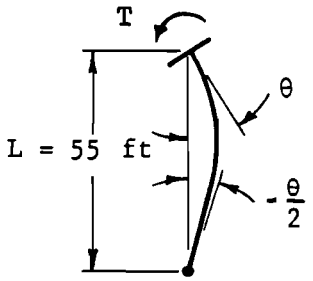
Some of the various uses of BMCOL 43 are illustrated by the following example problems. The same basic structure is used for the first four problems, with varying input data. The coded input data for the first three problems are shown in Fig 5. A listing of input data is included in Appendix 6, and the computer output listing is included in Appendix 7.

Example Problem 1. Three-Span Structure - Fixed Load

Figure 7 shows a three-span concrete slab structure, 42 ft wide, with haunches over the interior supports. Each interior support consists of three rigidly connected concrete columns of 30-inch diameter.

A computer model of a one-foot-wide longitudinal strip of the structure is divided into 80 twenty-four-inch increments. The stiffness of the haunched sections is assumed to vary linearly from 4.147×10^{10} lb-in^2 to 8.100×10^{10} lb-in^2. For a linear taper of beam depth this is not precisely correct for stations between the limits, but the error is negligible.

The estimate of the rotational restraint to the slab provided by the columns is computed as follows:



An assumption is made that the clay offers no side support and the column acts as if pinned at the sand stratum. Therefore, a rotation at the top induces one-half as much rotation at the bottom (see sketch).

The couple T from the conventional slope-deflection equation is

$$T = \frac{4EI}{L}\theta + \frac{2EI}{L}\left(-\frac{\theta}{2}\right) = \frac{3EI}{L}\theta \qquad (5.1)$$

The rotational restraint R is equal to

$$R = \frac{T}{\theta} = \frac{3EI}{L} \qquad (5.2)$$

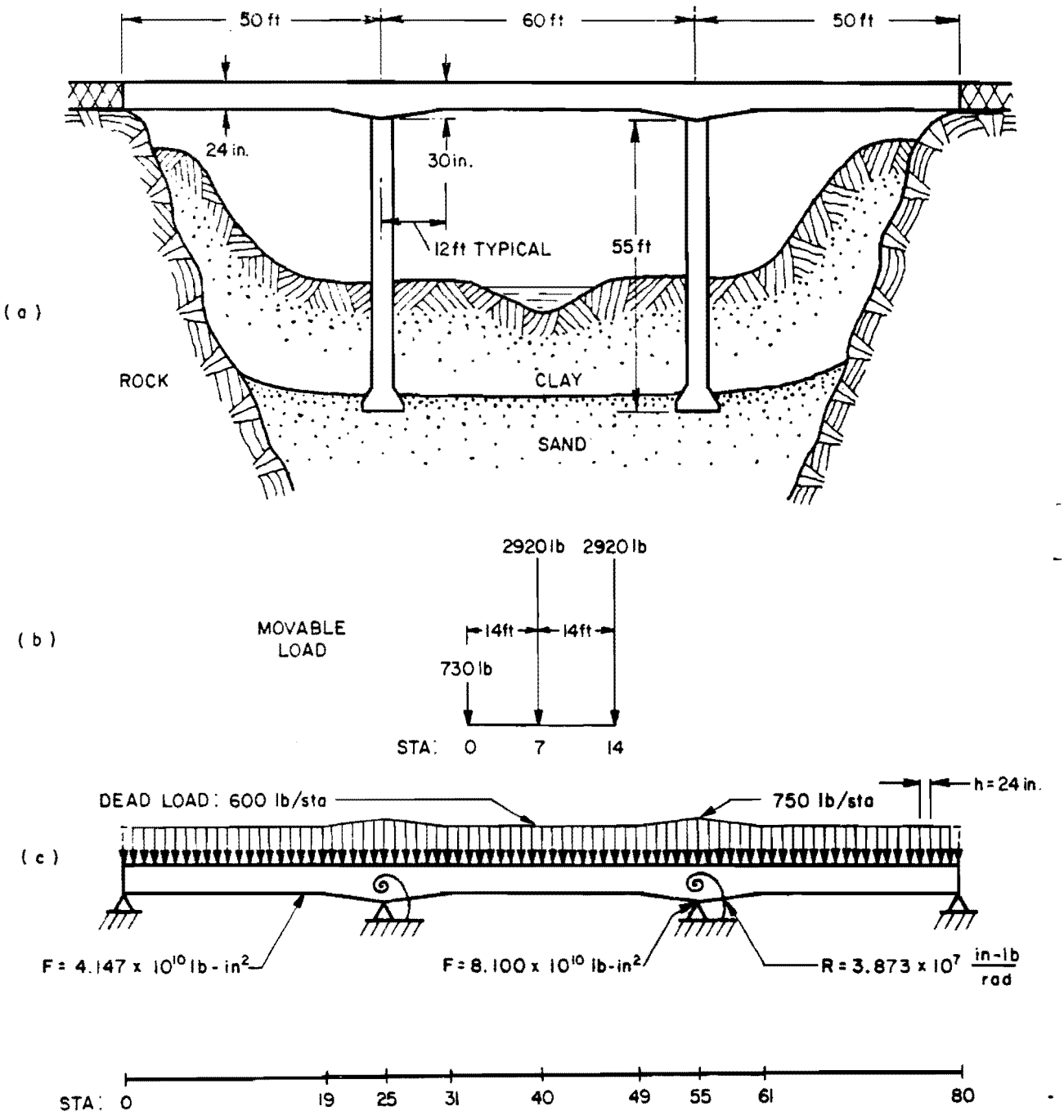


Fig 7. Example Problems 1, 2, 3, and 4.
Concrete slab structure.

$$R = \frac{3(3.0 \times 10^6)\ (3.976 \times 10^4)}{12(55)} = 5.422 \times 10^8 \frac{\text{in-lb}}{\text{radian}}$$

For a one-foot-wide longitudinal slab strip,

$$R = (5.422 \times 10^8) \frac{3 \text{ cols}}{42 \text{ ft}} = 3.873 \times 10^7 \frac{\text{in-lb}}{\text{radian}}$$

Note that if the column had been assumed fixed at the bottom, the restraint would be 4/3 of the computed R when pinned.

Values of shear that are computed in bars immediately adjacent to stations at interior supports should be disregarded because of the rotational restraints at those stations.

This first problem is intended to show the effect of fixed loads (i.e., dead loads) on the structure. Normally it would not be necessary to have a separate fixed-load run since fixed-load results are computed and tabulated in all problems. If a maximum occurs due to dead load only, that maximum is held at that point and the control is listed as 999, which indicates it was caused by fixed loads. This fixed-load solution will give identical results as those that could be obtained by the use of a BMCOL 34 solution (Ref 1) except for the listed values of slope, shear, and support reactions as explained in Chapter 2.

Example Problem 2. Three-Span Structure - Movable Load

This problem demonstrates the effect of a movable load on the structure. The data that describe the support conditions, fixed loads, and beam stiffness are retained from Problem 1 by holding these values in Tables 3 and 4. Table 2 was not retained because of the added movable load. The movable-load pattern is moved completely across the structure by specifying a start station equal to -14 and a stop station equal to 80.

The envelopes of maximums generated in this problem show the maximum positive or negative values experienced by each station along the beam-column. They can be directly used in design since the effect of fixed loads, axial loads (if they had been present), and a single movable load are included. Figure 8 shows the envelope of deflections for this problem.

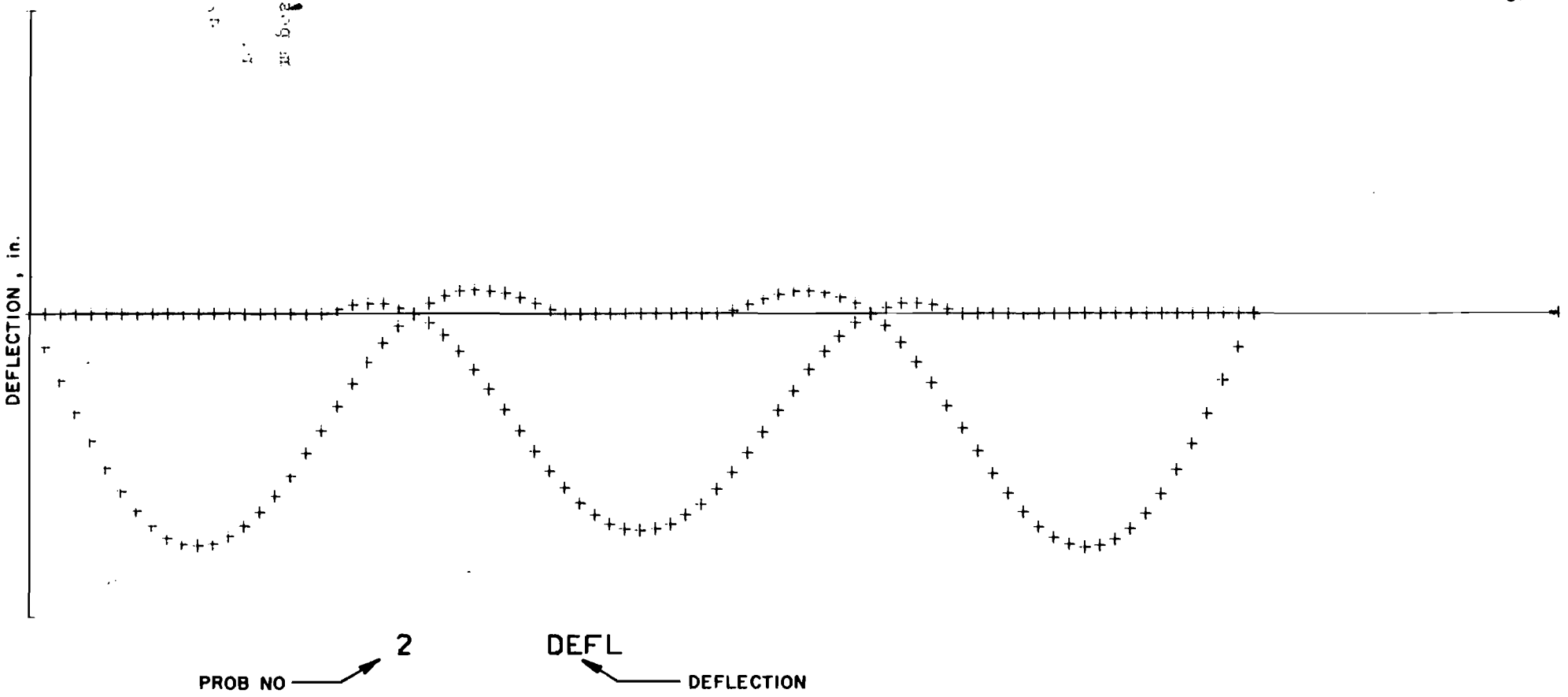


Fig 8. Example Problem 2. Envelope of deflections.

Example Problem 3. Three-Span Structure - Support Settlement

This problem illustrates how BMCOL 43 can be utilized to study settlement of supports. The same fixed loads, beam properties, and movable load are held from Problem 2. In addition, the envelopes of maximums are held so that any greater maximum positive or negative values induced by support settlement will be retained. This process could be extended through several problems so that accumulative envelopes of maximums representing all past loading and support history would be generated.

The first interior support at Station 25 is assumed to settle 1.25 inches and the second interior support at Station 55 settles 0.625 inch. The movable load is again moved completely across the structure. Comparison of the moments (Fig 9), shows that the support settlements with the same moving load caused a slight increase in the negative moment at the second interior support, and an increase in positive moments in the first two spans.

Example Problem 4. Three-Span Structure - Influence Diagrams

This problem demonstrates how the influence diagram feature of the program can be used to determine the number and location of a series of movable-load patterns that will cause the maximum condition at a desired location. From a study of the envelopes of maximums in Problem 2, it is decided to study moments at Stations 9, 25, and 40, and deflections at Stations 11 and 40. Had the location of these key points been previously determined, the influence diagrams could have been computed and plotted in Problem 2. Influence diagrams are generated for these stations by designating them in Table 6 of the input form.

The fixed loads and beam properties are again specified in this problem by using the same Table 7 data as used in Problem 2. The fixed-load results and envelopes of maximums are therefore seen to be the same as previously computed in Problem 2.

The only load placed on the beam-column for the influence diagram solutions is the movable-load pattern shown in Fig 7b. This load is moved entirely across the structure by specifying again as in Problem 2 a start station equal to -14 and a stop equal to 80. The incremental size of each stepwise movement of the pattern was chosen to be one station, although a larger incremental size could

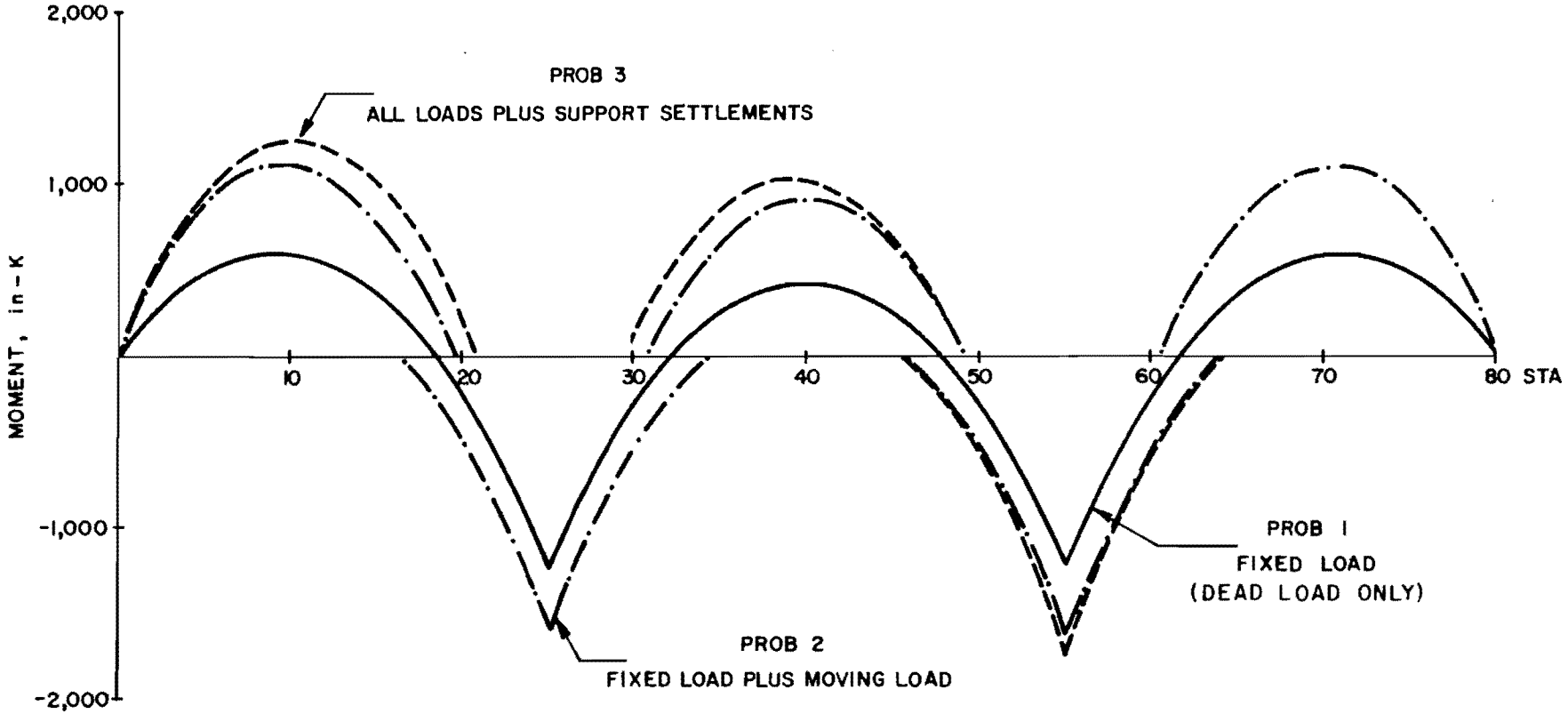


Fig 9. Envelopes of maximum moment.

be used to reduce computation time. To obtain conventional influence diagrams a unit concentrated movable load could be used.

Examination of the influence moment diagram at Station 9 (Fig 10) shows that for a single movable-load pattern, the maximum moment occurs with the zero station of the movable-load pattern at Station 2. This result is seen to agree with that in Problem 2. A worse condition could exist if there were two movable loads with the second one located at Station 57.

The moment influence diagram is loaded with these two movable loads (Fig 10). The zero station of each is the index which is used to place the load pattern on the influence diagram. From Table 10b of the computer results, a load pattern at Station 2 causes a moment of 514.0 in-kips, and a load at Station 57 causes a moment of 35.1 in-kips. The moment at Station 9 from the fixed-load solution in Problem 1 was 599.5 in-kips. The addition of these three moments gives the maximum possible moment at Station 9 of 1148.6 in-kips.

A similar analysis of the other maximums of deflection and moment could be made. Influence diagrams for shear and reaction at particular points could also have been computed if further investigation were necessary.

Example Problem 5. Two-Span Railroad Girder

This problem shows how BMCOL 43 can be used to solve a structure with many movable loads. A rigorous solution of the problem for necessary information for a complete design would require many repeated solutions with programs presently available, or tedious trial-and-error hand solutions.

Figure 11a represents one girder of a two-span continuous railroad structure 86 ft long. The girder, deck system, ballast, and rails place a total dead load of 1000 lb per linear ft on each girder. A "live" or movable load of a portion of one track loading is also carried by each girder. The girder is supported with no restraint at the center support, but the end supports are fixed against translation. Due to temperature expansion, an axial longitudinal force of 33,000 lb is applied to each girder.

The resulting envelopes of maximum deflection and moment are shown in Fig 11d and 11e.

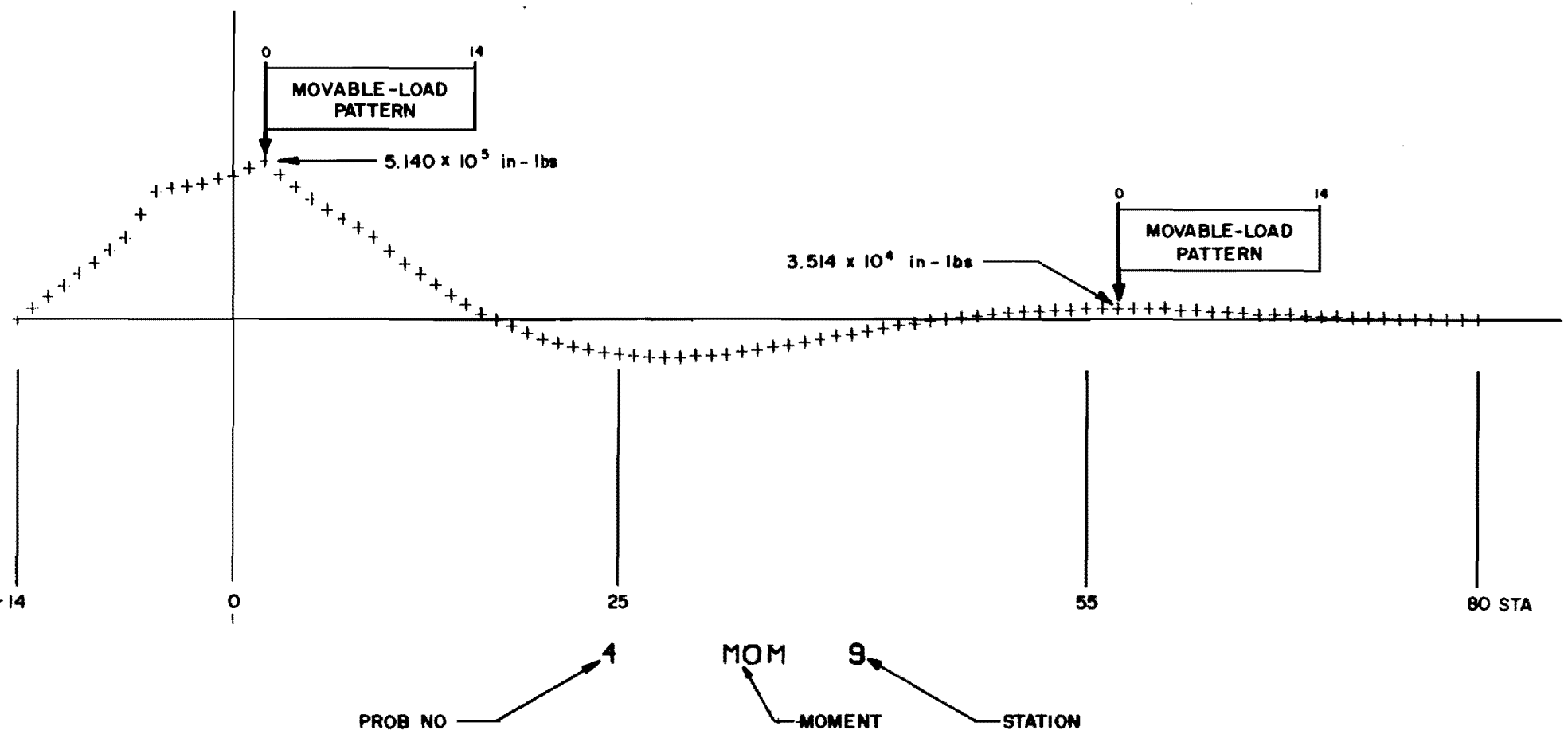


Fig 10. Example Problem 4. Influence diagram for moment at Station 9.

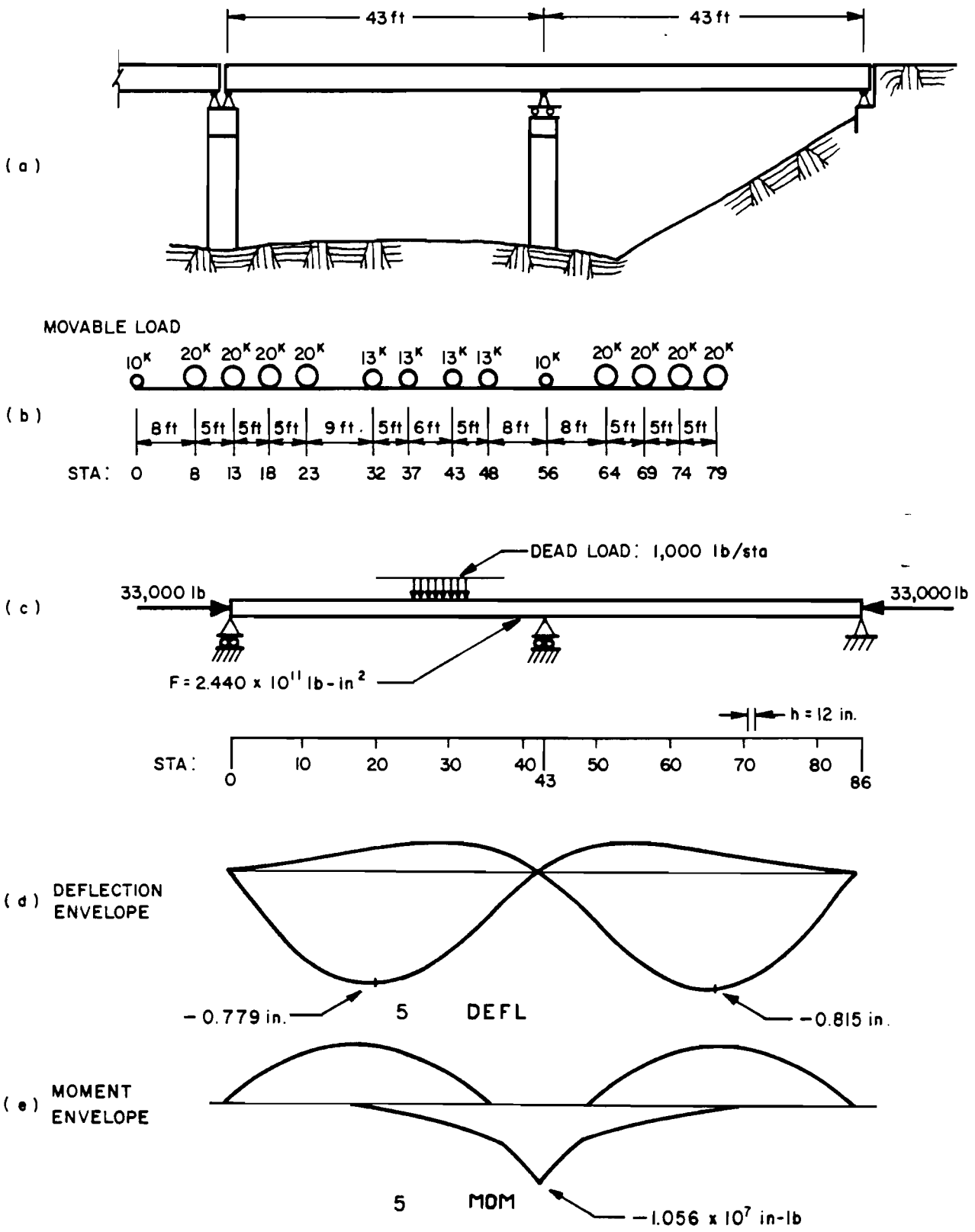


Fig 11. Example Problem 5. Two-span girder structure with railroad loading.

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CHAPTER 6. CONCLUSION

In this report, the finite-element beam-column solution of Ref 1 (BMCOL 34) has been modified and extended to cover the case of a movable load. The solution does not include any dynamic effects; it is a series of static solutions. A computer program, BMCOL 43, has been presented which allows the user to obtain a variety of results.

Problems in which only one loading condition is of interest may be solved by the fixed-load solution which is similar to the BMCOL 34 solution. All of the uses and capabilities of BMCOL 34 have been incorporated in the BMCOL 43 program.

A more thorough investigation of a problem is made possible by the movable-load solution in which envelopes of maximums are generated for deflection, bending moment, shear, and support reaction. The information usually needed in design is provided by the envelopes of maximums. A particularly useful application of BMCOL 43 is its ability to hold results in envelopes of maximums from problem to problem in order to simulate the past or anticipated loading history.

Influence diagrams for any of the parameters may be obtained for any point on the beam-column. The influence diagrams produced by BMCOL 43 may be for any diverse load system. They can be the same as conventional "unit load" influence diagrams, or they can represent "one movable load" influence diagrams.

This report is intended to serve as the basis for using BMCOL 43 as a tool in computer-aided design. Highway structural designers can use it to solve many problems they encounter that presently are solved by rough approximations or by tedious hand calculations.

Further application to particular design problems that are difficult to solve by conventional means can be undertaken. Some of the possible variations include analysis of a bridge structure as foundation supports settle, railroad loadings on continuous spans, the effect of axial loads induced from tractive forces or temperature changes, and approach slabs connected integrally with the bridge structure and supported on elastic foundations. A very important

use that could be made is a study of actual truck loadings to determine a possible alternate loading pattern for the presently used standard trucks.

REFERENCE

1. Matlock, Hudson, and T. Allan Haliburton, "A Finite-Element Method of Solution for Linearly Elastic Beam-Columns," Research Report No 56-1, Center for Highway Research, The University of Texas, Austin, September 1966.

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APPENDIX 1

DERIVATION OF THE FINITE-DIFFERENCE EQUATION FOR THE DEFLECTED SHAPE OF A BEAM-COLUMN

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APPENDIX 1. DERIVATION OF THE FINITE-DIFFERENCE EQUATION FOR THE DEFLECTED SHAPE OF A BEAM-COLUMN

The BMCOL 43 method of handling axial loads is slightly different from the method used by BMCOL 34. Therefore, the relationship between deflection and applied load is derived for a beam-column loaded and supported in a very general manner. A finite-element model is used in the derivation so that the resulting equation will allow freely discontinuous beam-column properties, loads, and restraints.

As is shown in Fig 2, a rotational restraint applied at Station i of a beam-column is introduced into the model as forces at Stations i-1 and i+1. These forces form a couple which has the magnitude $R_i\theta_i^J$. Thus the magnitude of the forces depends upon the increment length h and slope θ_i^J. For example, the magnitude of the transverse force acting at Station i+1 due to rotational restraint at Station i is

$$Q_{i+1}^{RR} = \frac{R_i\theta_i^J}{2h} \tag{A1.1}$$

The value of slope at Station i is approximated on a two-increment basis, i.e.,

$$\theta_i^J = \frac{-w_{i-1} + w_{i+1}}{2h} \tag{A1.2}$$

An applied couple also is introduced into the model as equal and opposite transverse forces (see Fig 2). The magnitude of the force at Station i+1 due to a couple at Station i is

$$Q_{i+1}^{T} = \frac{T_i}{2h} \tag{A1.3}$$

The effects of rotational restraints and applied couples are shown as transverse loads in the free-body diagram of a portion of the finite-element model shown in Fig A1. The equation of moment equilibrium of Bar i is

$$-M_{i-1} + M_i - V_i h - P_i(-w_{i-1} + w_i) = 0 \tag{A1.4}$$

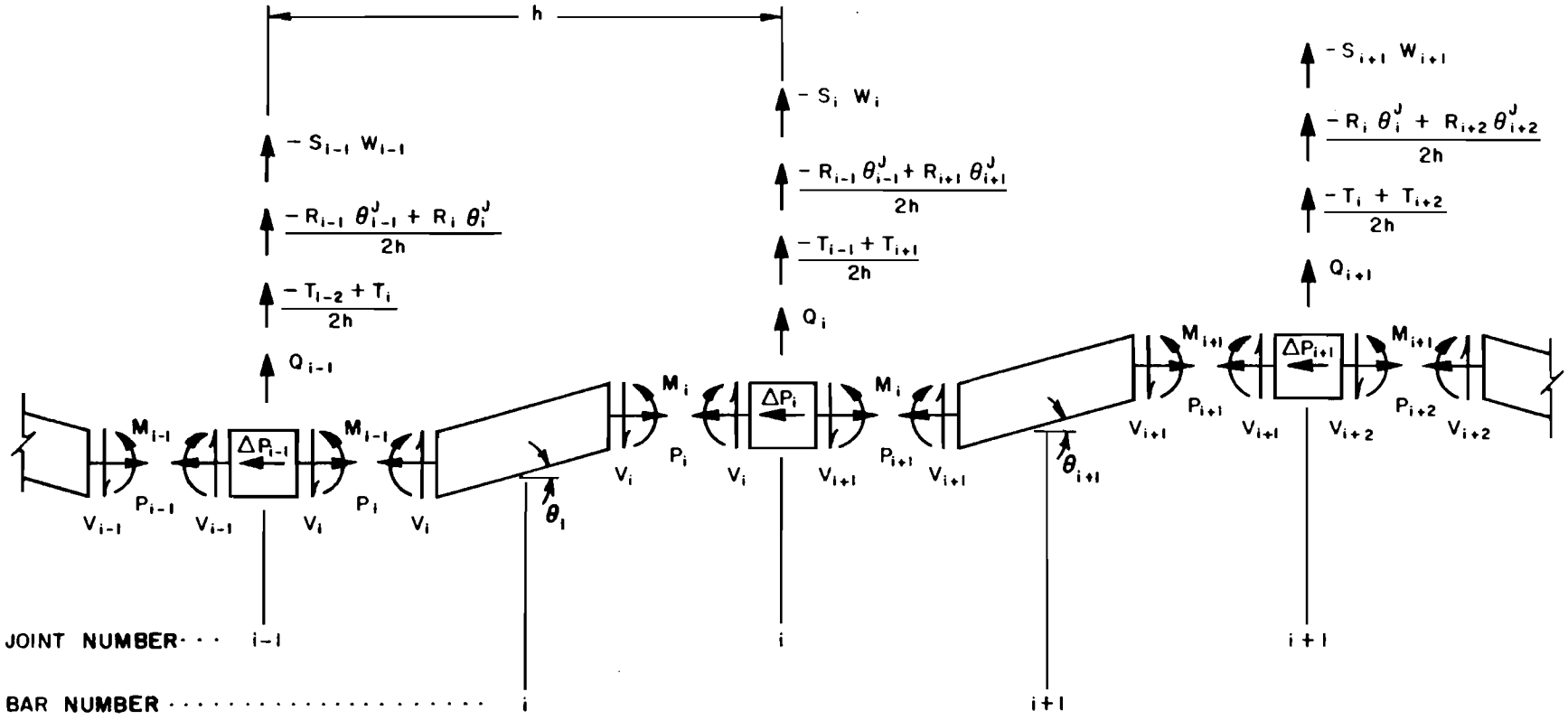

Fig A1. Free-body diagram of a portion of the finite-element model of a beam-column.

Similarly, the equilibrium equation of Bar i+1 is

$$- M_i + M_{i+1} - V_{i+1}h - P_{i+1}(-w_i + w_{i+1}) = 0 \qquad \text{(A1.5)}$$

Subtracting Eq A1.5 from Eq A1.4 gives

$$- M_{i-1} + 2M_i - M_{i+1} = h(V_i - V_{i+1}) - P_i w_{i-1} + (P_i + P_{i+1})w_i - P_{i+1}w_{i+1} \qquad \text{(A1.6)}$$

Equilibrium of vertical forces acting on Joint i yields

$$V_i - V_{i+1} = - Q_i + S_i w_i - \frac{1}{2h}(-T_{i-1} + T_{i+1}) - \frac{1}{2h}(-R_{i-1}\theta^J_{i-1} + R_{i+1}\theta^J_{i+1}) \qquad \text{(A1.7)}$$

Substitution of Eq A1.7 into Eq A1.6 yields

$$- M_{i-1} + 2M_i - M_{i+1} = - hQ_i + hS_i w_i - \frac{1}{2}(-T_{i-1} + T_{i+1}) - \frac{1}{2}(-R_{i-1}\theta^J_{i-1} + R_{i+1}\theta^J_{i+1}) - P_i w_{i-1} + (P_i + P_{i+1})w_i - P_{i+1}w_{i+1} \qquad \text{(A1.8)}$$

Substitution of Eq A1.2 into Eq A1.8 gives

$$M_{i-1} - 2M_i + M_{i+1} = hQ_i - hS_i w_i + \frac{1}{2}(-T_{i-1} + T_{i+1}) + \frac{1}{4h}\left[-R_{i-1}(-w_{i-2} + w_i) + R_{i+1}(-w_i + w_{i+2})\right] + P_i w_{i-1} - (P_i + P_{i+1})w_i + P_{i+1}w_{i+1} \qquad \text{(A1.9)}$$

The bending moment M_i is equal to the product of the lumped bending stiffness and the angle change at Joint i.

$$M_i = \frac{F_i}{h}\left(\frac{w_{i-1} - 2w_i + w_{i+1}}{h}\right) \qquad \text{(A1.10)}$$

When Eq A1.10 is introduced into Eq A1.9, the resulting equation is

$$a_i w_{i-2} + b_i w_{i-1} + c_i w_i + d_i w_{i+1} + e_i w_{i+2} = f_i \qquad (2.1)$$

where

$$a_i = F_{i-1} - 0.25hR_{i-1}$$

$$b_i = -2(F_{i-1} + F_i) - h^2 P_i$$

$$c_i = F_{i-1} + 4F_i + F_{i+1} + h^3 S_i + 0.25h(R_{i-1} + R_{i+1}) + h^2(P_i + P_{i+1}) \qquad (2.2)$$

$$d_i = -2(F_i + F_{i+1}) - h^2 P_{i+1}$$

$$e_i = F_{i+1} - 0.25hR_{i+1}$$

$$f_i = h^3 Q_i - 0.5h^2(T_{i-1} - T_{i+1})$$

When Eq 2.1 is written at every station on a beam-column, a set of simultaneous equations results. The recursive solution described in Ref 1 is used in Program BMCOL 43 to solve the set of equations for the deflection at each station. Once the deflected shape is known, bending moment, shear, and support reaction can be determined using the methods described in Chapter 2.

APPENDIX 2

GUIDE FOR DATA INPUT FOR BMDCOL 4.3

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GUIDE FOR DATA INPUT FOR BMCOL 43

with Supplementary Notes

extract from

A COMPUTER PROGRAM TO ANALYZE
BEAM-COLUMNS UNDER MOVABLE LOADS

by

Hudson Matlock and Thomas P. Taylor

June 1968

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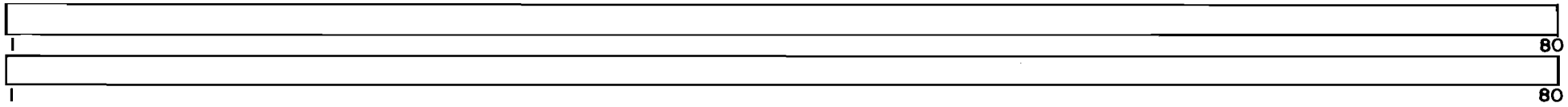
BMCOL 43 GUIDE FOR DATA INPUT -- Card forms

IDENTIFICATION OF PROGRAM AND RUN (2 alphanumeric cards per run)



IDENTIFICATION OF PROBLEM (one card each problem; program stops if PROB NUM is left blank)

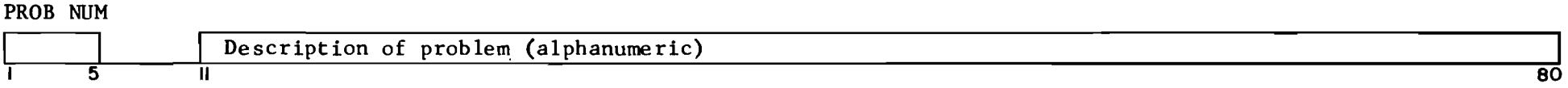


TABLE 1. PROGRAM CONTROL DATA (one card each problem)

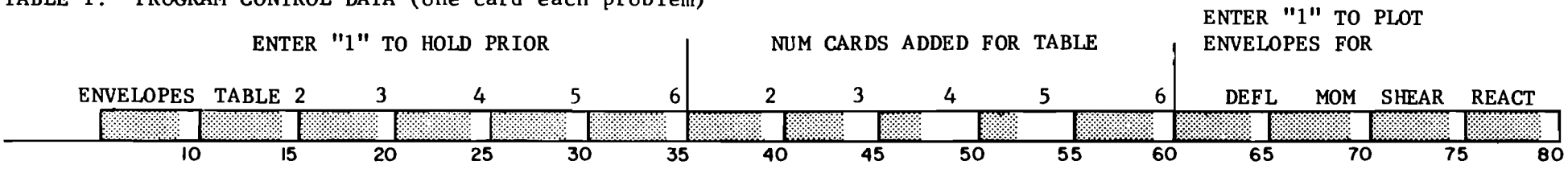


TABLE 2. CONSTANTS AND MOVABLE-LOAD DATA (one card, or none if Table 2 of preceding problem is held)

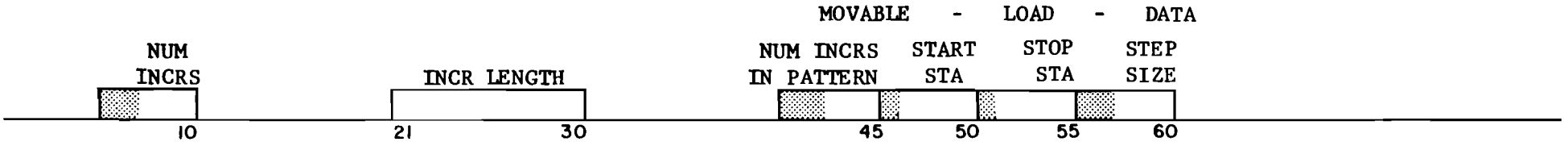


TABLE 3. SPECIFIED DEFLECTIONS AND SLOPES (number of cards according to Table 1; none if preceding Table 3 is held)

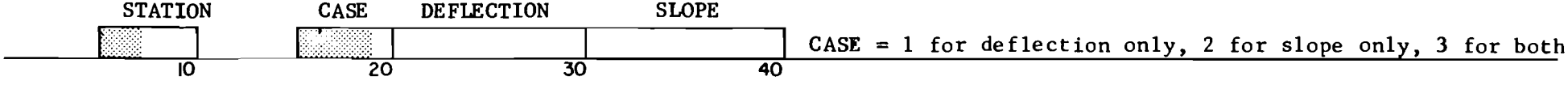


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TABLE 4. FIXED LOADS AND RESTRAINTS, (number of cards according to Table 1). Data added to storage as lumped quantities per increment length, linearly interpolated between values input at indicated end stations, with 1/2-values at each end station. Concentrated effects are established as full values at single stations by setting final station = initial station.

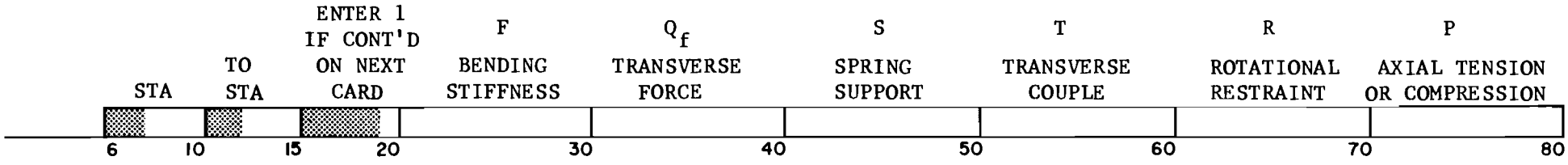


TABLE 5. MOVABLE LOADS, (number of cards according to Table 1). Data added to storage just as in Table 4.

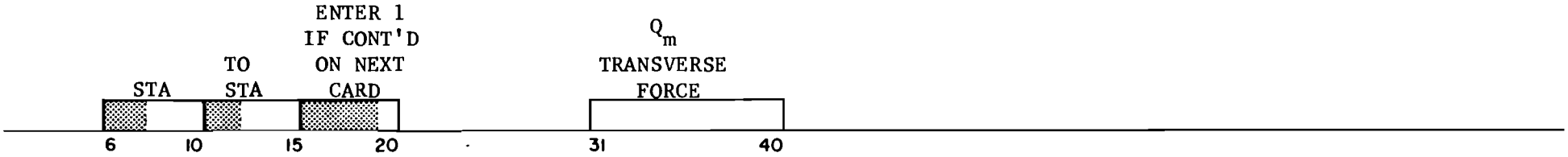
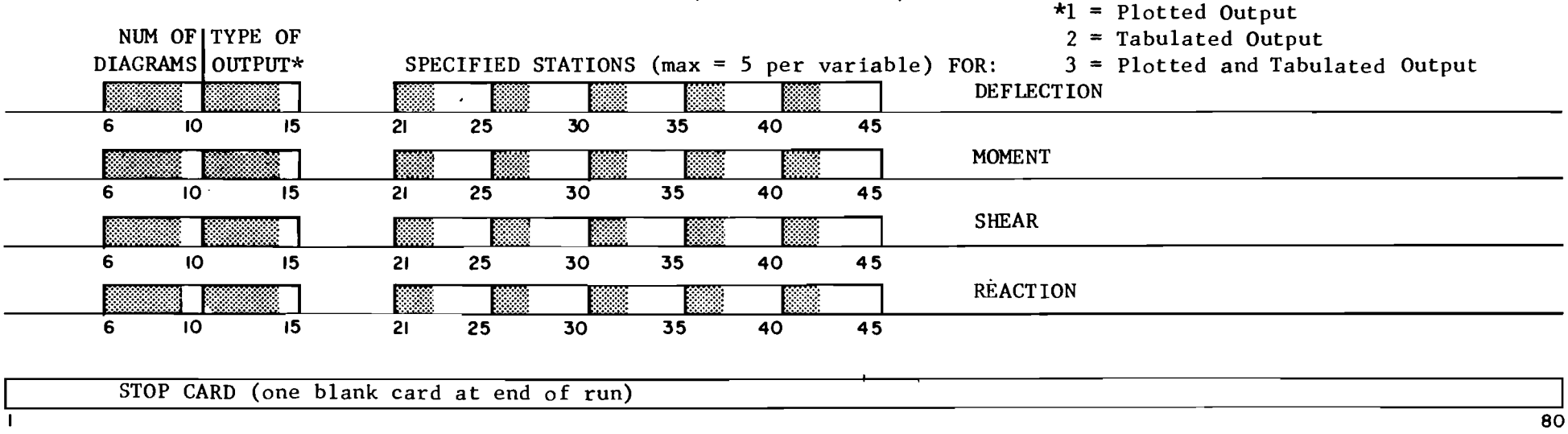


TABLE 6. SPECIFIED STATIONS FOR INFLUENCE DIAGRAMS (4 cards or none).



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GENERAL PROGRAM NOTES

The data cards must be stacked in proper order for the program to run.

A consistent system of units must be used for all input data, for example, kips and inches.

All 5-space or less words are understood to be right justified integers or whole decimal numbers. | -43 |

All 10-space words are right justified floating-point decimal numbers. . . . . | -4.321E+03 |

TABLE 1. PROGRAM-CONTROL DATA

For each of Tables 2, 3, and 6, a choice must be made between holding all of the data from the preceding problem or entering entirely new data. If the hold option for any of these tables is set equal to 1, the number of cards input for that table must be zero. Envelopes may also be held if desired.

For Tables 4 and 5, the data is accumulated in storage by adding to previously stored data. The number of cards input is independent of the hold option, except that the cumulative total of cards can not exceed 100.

Card counts in Table 1 should be rechecked carefully after the coding of each problem is completed.

The plot option for each of the envelopes of maximums is independent of the others. No plots are drawn for those options that are blank or zero. For each plot option that is set equal to 1, a plot is drawn on 4 × 10 in. axes. Only envelopes of maximums are plotted. Fixed loads can be plotted indirectly as discussed in Table 2 below.

TABLE 2. CONSTANTS AND MOVABLE-LOAD DATA

The maximum number of increments into which the beam-column may be divided is 200. Typical units for the value of increment length are inches.

The number of increments in the movable-load pattern may not exceed the number of increments in the beam-column. The start station is the first position at which the zero station of the movable-load pattern is placed.

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Any positive start station for the movable load is permissible. A negative start station is permissable if one step of the load pattern will place some portion of the load pattern on the beam-column.

Any stop station on the beam is allowed. A stop station of no more than one step of movement past the right end of the beam-column is permissible.

The movable-load pattern may be moved across the beam in steps of as many increments as desired.

To plot envelopes of maximum for fixed-load solutions, enter zero increment of pattern length, zero start and stop stations, and 1 for step size. No Table 5 necessary.

TABLE 3. SPECIFIED DEFLECTIONS AND SLOPES

The maximum number of stations at which deflections and slopes may be specified is 20.

A slope may not be specified closer than 3 increments from another specified slope.

A deflection may not be specified closer than 2 increments from a specified slope, except that both a deflection and a slope may be specified at the same station.

TABLE 4. STIFFNESS AND FIXED-LOAD DATA

Typical units,

variables:	F	Q	S	T	R	P
values per station:	$lb \times in^2$	lb	lb/in	in × lb	$\frac{in \times lb}{rad}$	lb

Axial tension or compression values P must be stated at each station in the same manner as any other distributed data; there is no mechanism in the program to automatically distribute the internal effects of an externally applied axial force.

Data should not be entered in this table (nor held from the preceding problem) which would express effects at fictitious stations beyond the ends of the real beam-column.

The left end of the beam-column must be located at Station 0.

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For the interpolation and distribution process, there are four variations in the station numbering and the referencing for continuation to succeeding cards. These variations are explained and illustrated on page 6.

There are no restrictions on the order of cards in Table 4, except that within a distribution sequence the stations must be in regular order.

TABLE 5. MOVABLE-LOAD DATA

The data in Table 5 is governed by the same rules as Table 4.

TABLE 6. SPECIFIED STATIONS FOR INFLUENCE DIAGRAMS

The number of cards in Table 6 is either 4 or 0.

A maximum of 5 stations may be specified for each of the four variables: deflection, bending moment, shear, and support reaction.

The data cards must be stacked in the same order as the above list.

If no influence lines are desired for one variable, a blank card must be inserted for that variable.

Shear is computed one-half increment to the left of the designated station.

If 1 is specified for the type of output, the influence lines are plotted on 4 × 10 in. axes.

If 2 is specified for the type of output, the influence lines are tabulated in numerical form in Table 10.

If 3 is specified for the type of output, the influence lines are tabulated and plotted.

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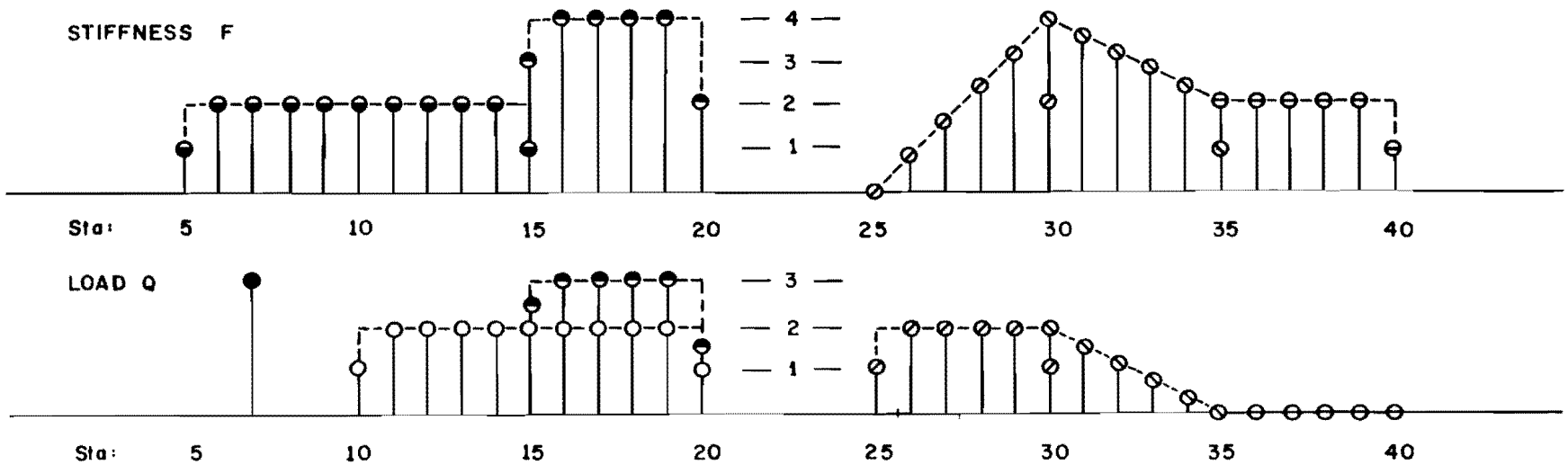
Individual — card Input

	FROM STA	TO STA	CONT'D TO NEXT CARD ?	F	Q	etc...
Case a.1 Data concentrated at one sta	7	7	0=NO		3.0	
Case a.2. Data uniformly distributed	5	15	0=NO	2.0		
	15	20	0=NO	4.0	1.0	
	10	20	0=NO		2.0	

Multiple — card Sequence

Case b. First-of-sequence	25		1=YES	0.0	2.0	
Case c. Interior-of-sequence		30	1=YES	4.0	2.0	
		35	1=YES	2.0	0.0	
Case d. End-of-sequence		40	0=NO	2.0		

Resulting Distribution of Data



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APPENDIX 3

FLOW DIAGRAMS FOR BMCOL 43

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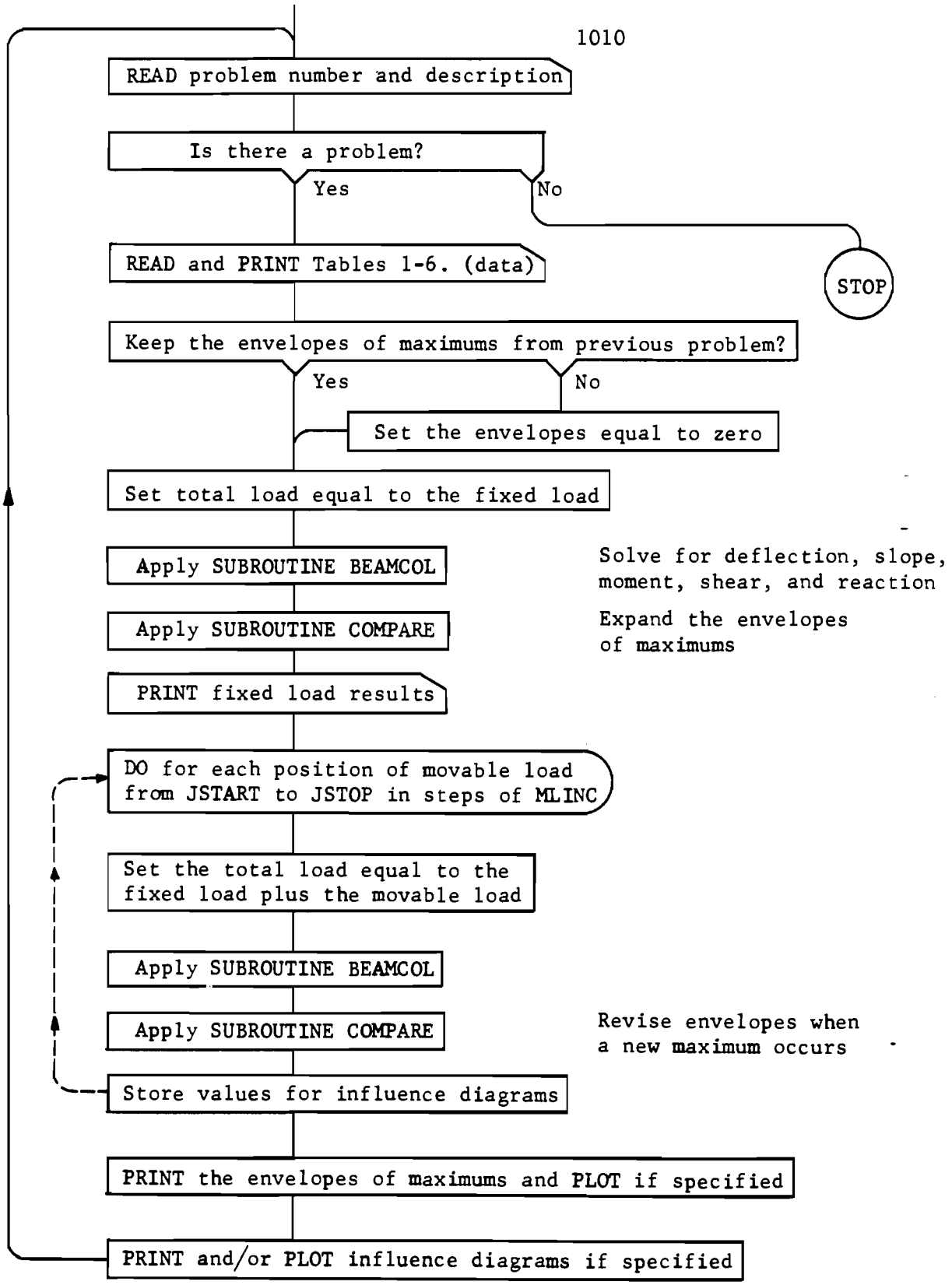
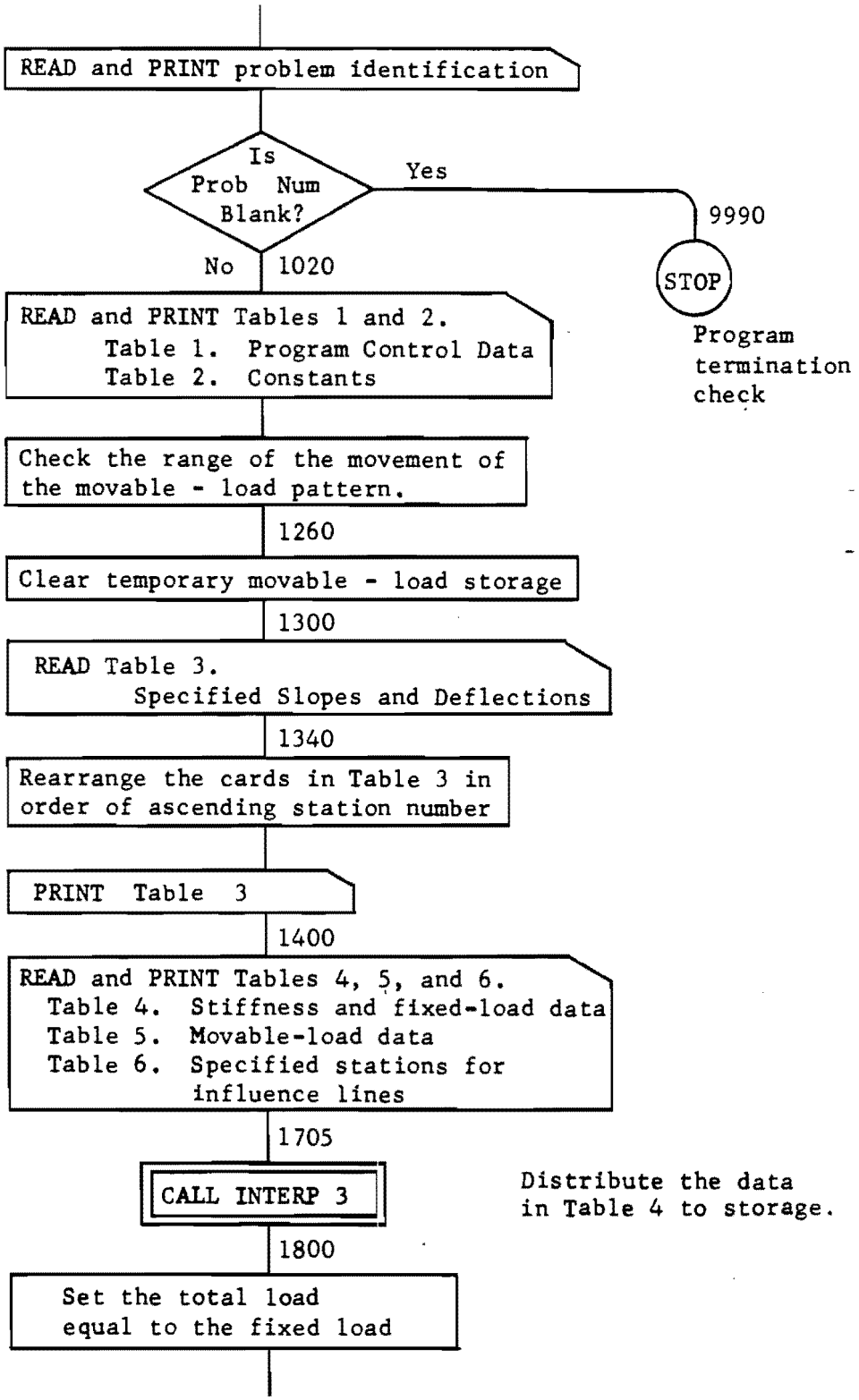
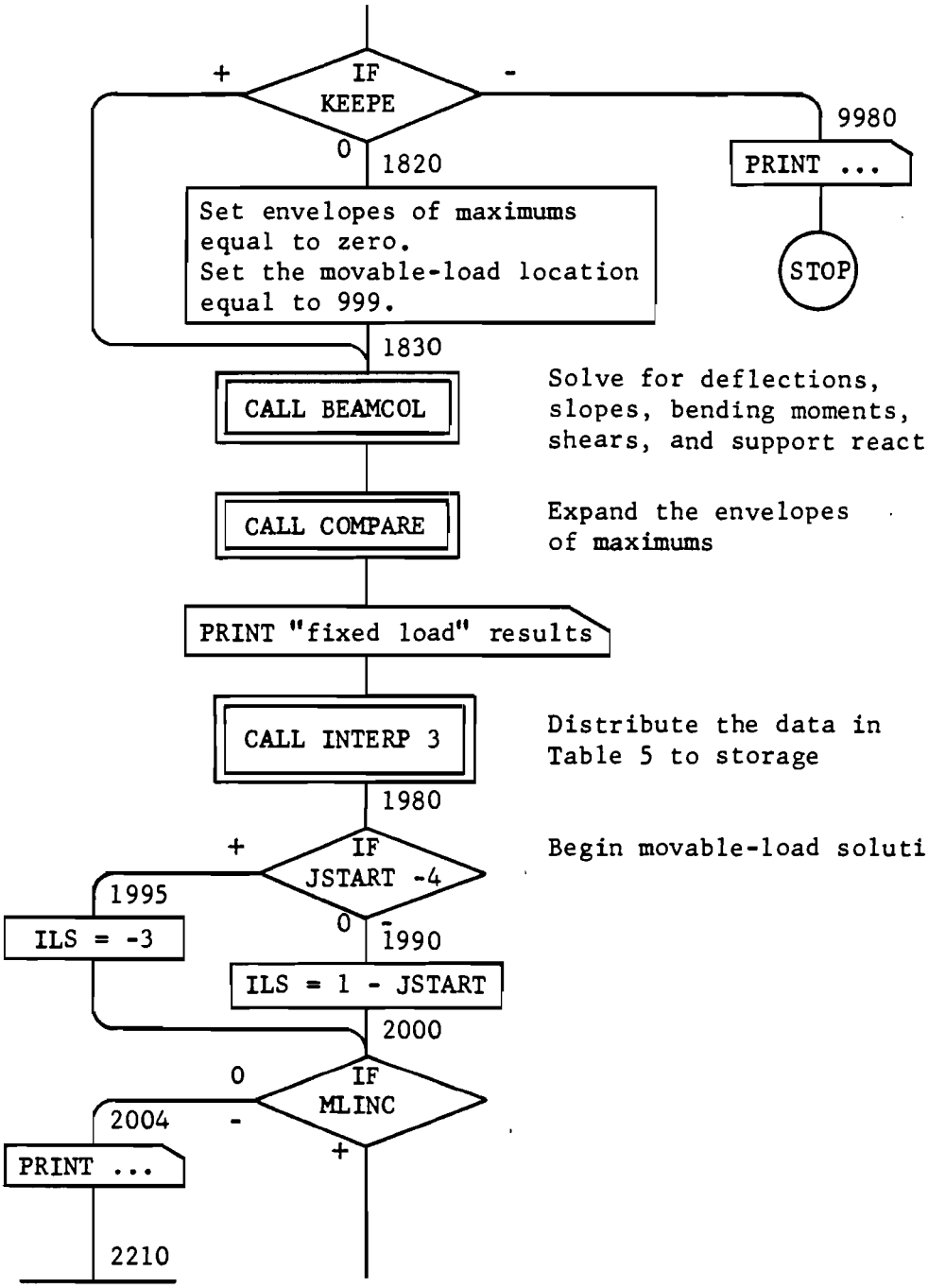
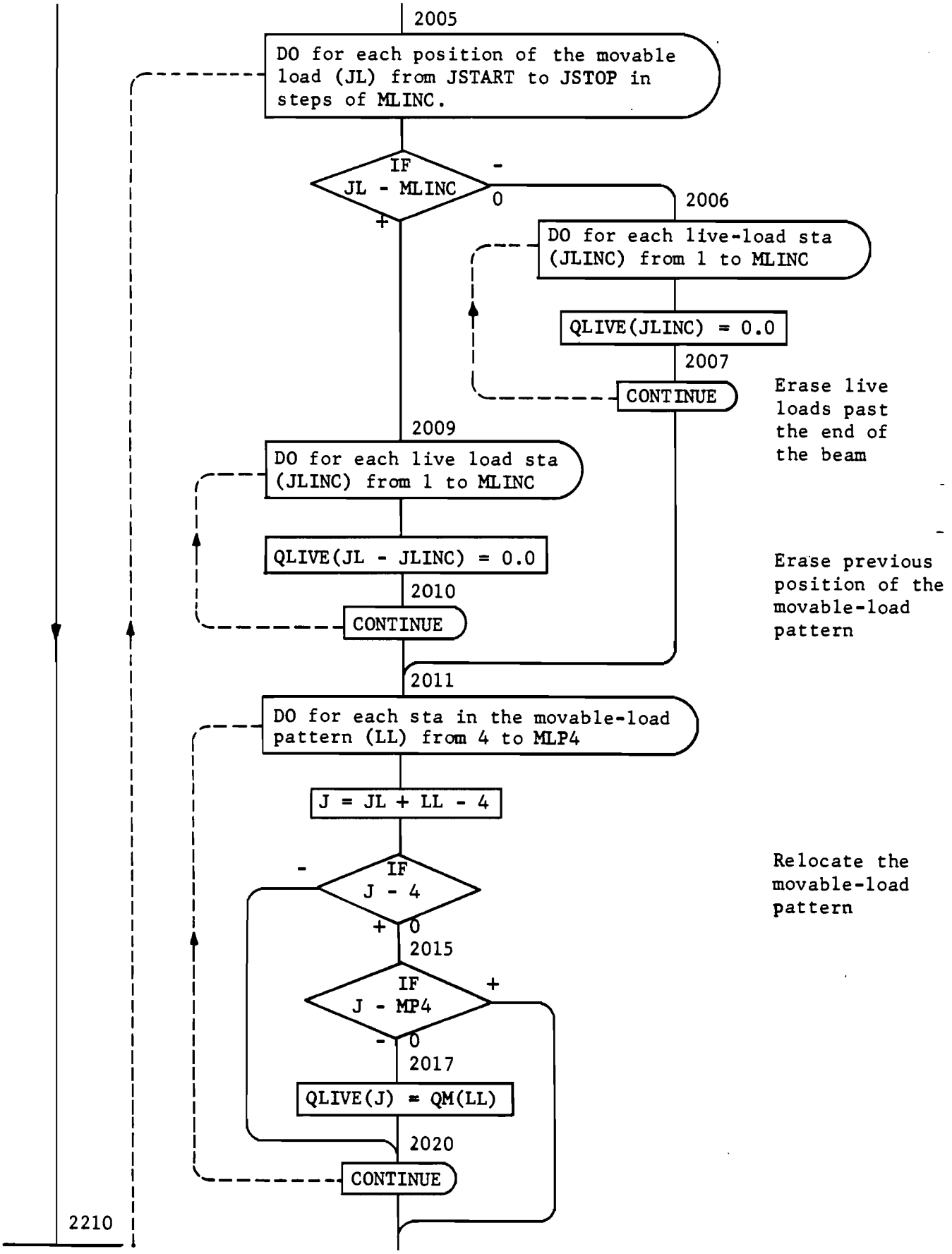
SUMMARY FLOW DIAGRAM FOR PROGRAM BMCOL 43

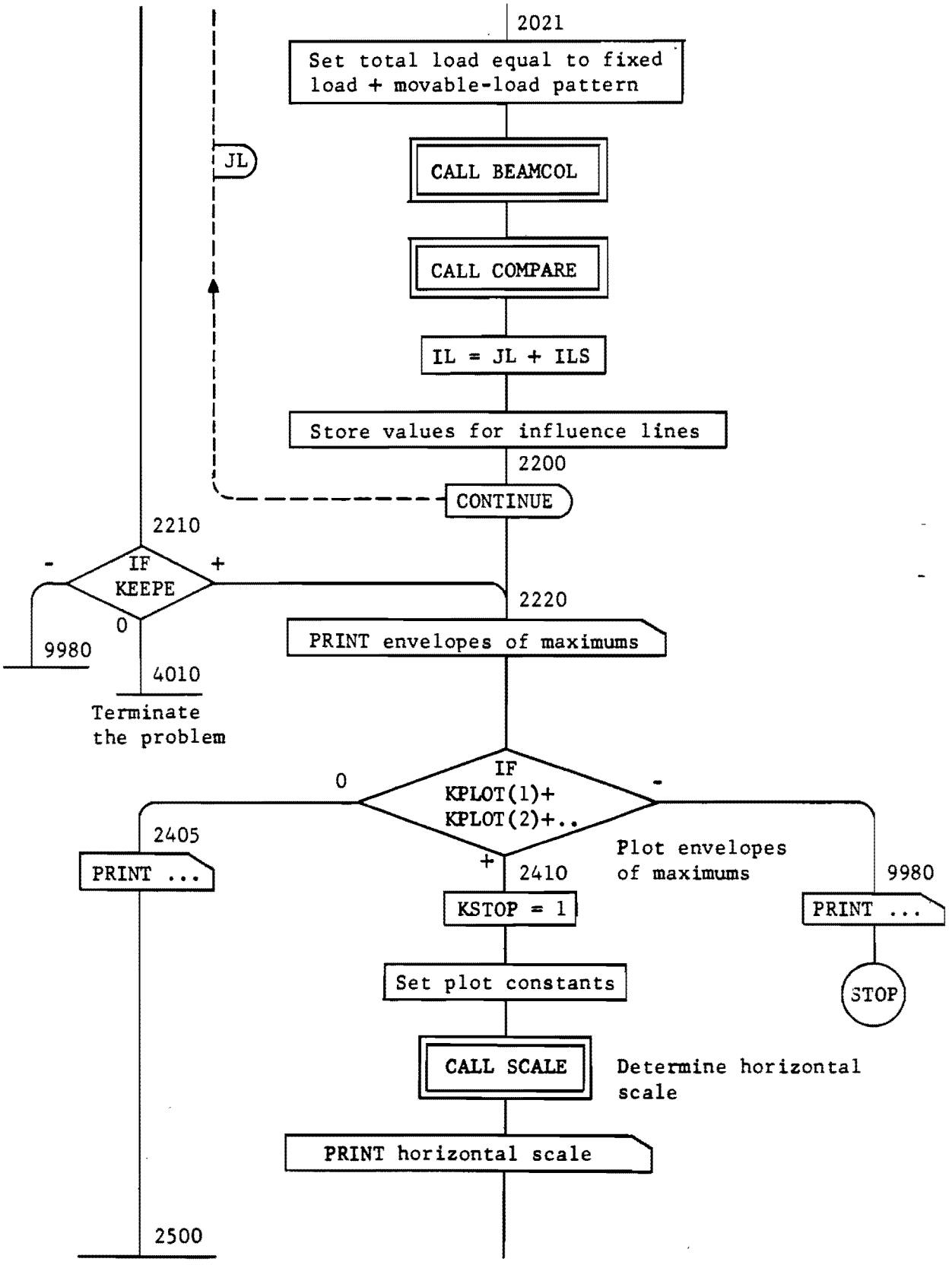


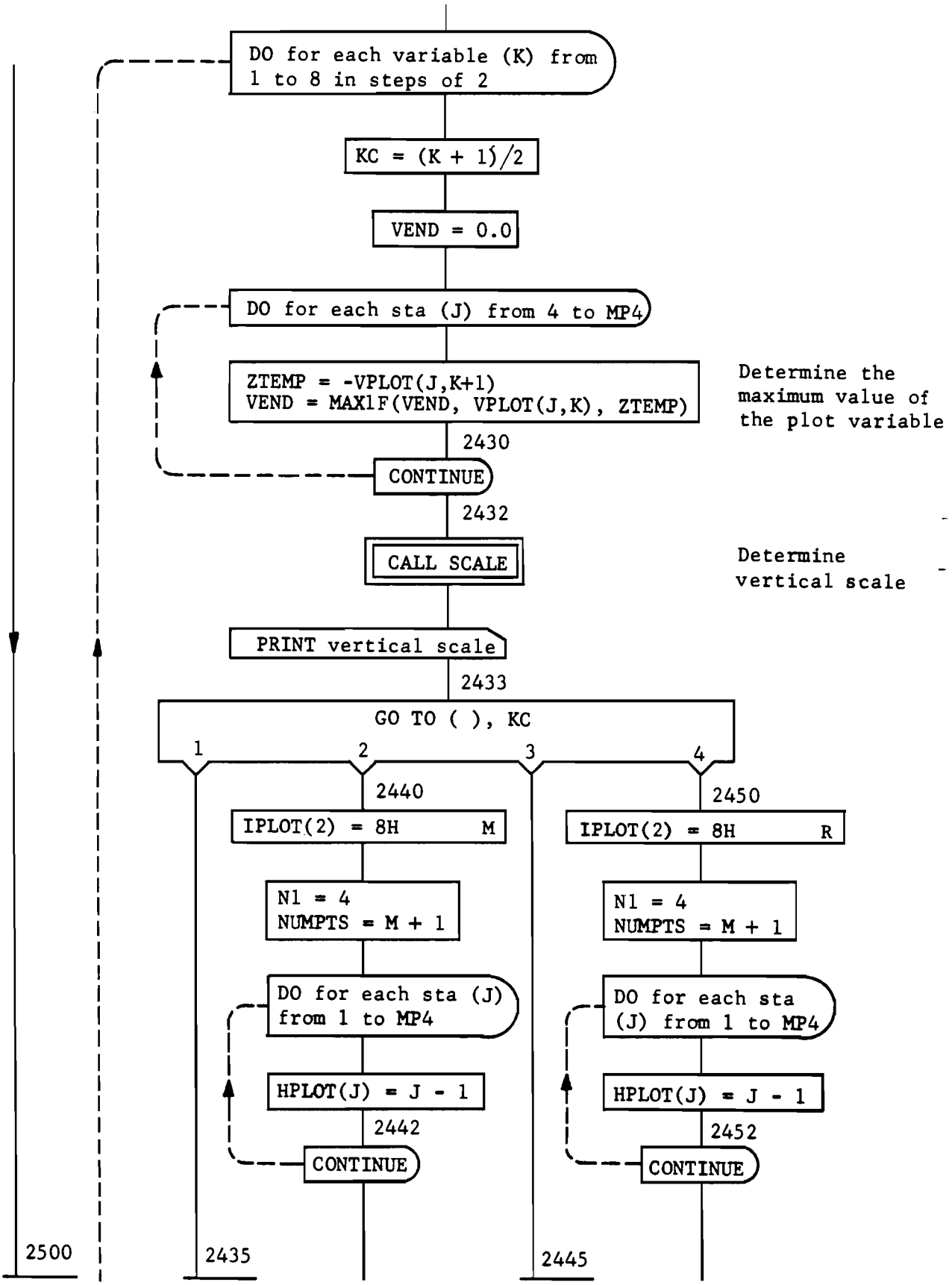
GENERAL FLOW DIAGRAM FOR PROGRAM BMCOL 43

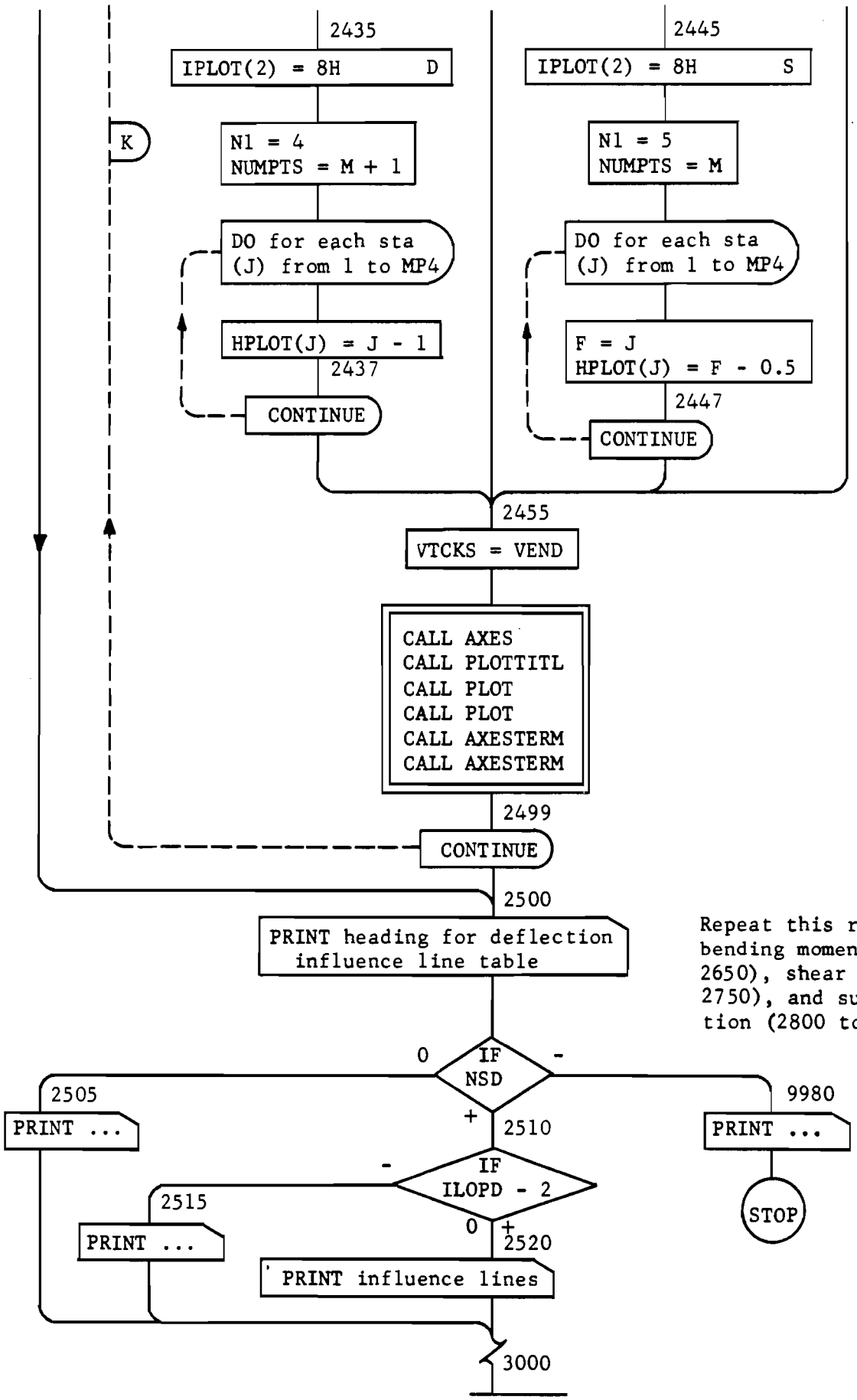



IF
KEEPE
+
-
0
1820
9980
PRINT ...
STOP
Set envelopes of maximums
equal to zero.
Set the movable-load location
equal to 999.
1830
CALL BEAMCOL
Solve for deflections,
slopes, bending moments,
shears, and support reactions
CALL COMPARE
Expand the envelopes
of maximums
PRINT "fixed load" results
CALL INTERP 3
Distribute the data in
Table 5 to storage
1980
IF
JSTART -4
Begin movable-load solutions
+
1995
ILS = -3
0
-
1990
ILS = 1 - JSTART
2000
0
IF
MLINC
2004
-
+
PRINT ...
2210

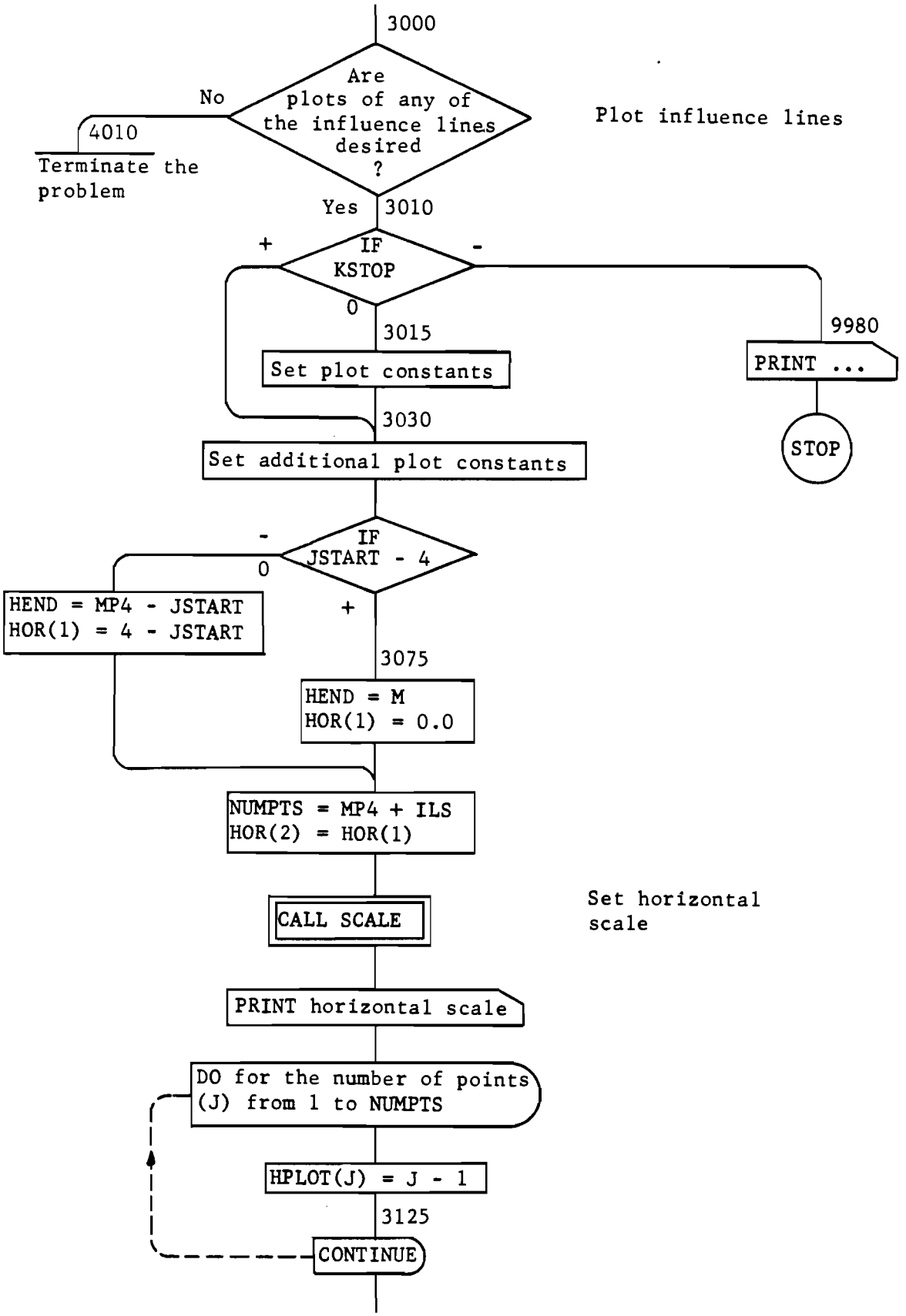

2005
DO for each position of the movable load (JL) from JSTART to JSTOP in steps of MLINC.
IF JL - MLINC
-
0
+
2006
DO for each live-load sta (JLINC) from 1 to MLINC
QLIVE(JLINC) = 0.0
2007
CONTINUE
Erase live loads past the end of the beam
2009
DO for each live load sta (JLINC) from 1 to MLINC
QLIVE(JL - JLINC) = 0.0
2010
CONTINUE
Erase previous position of the movable-load pattern
2011
DO for each sta in the movable-load pattern (LL) from 4 to MLP4
J = JL + LL - 4
IF J - 4
-
+
0
2015
IF J - MP4
+
-
0
2017
QLIVE(J) = QM(LL)
2020
CONTINUE
Relocate the movable-load pattern
2210

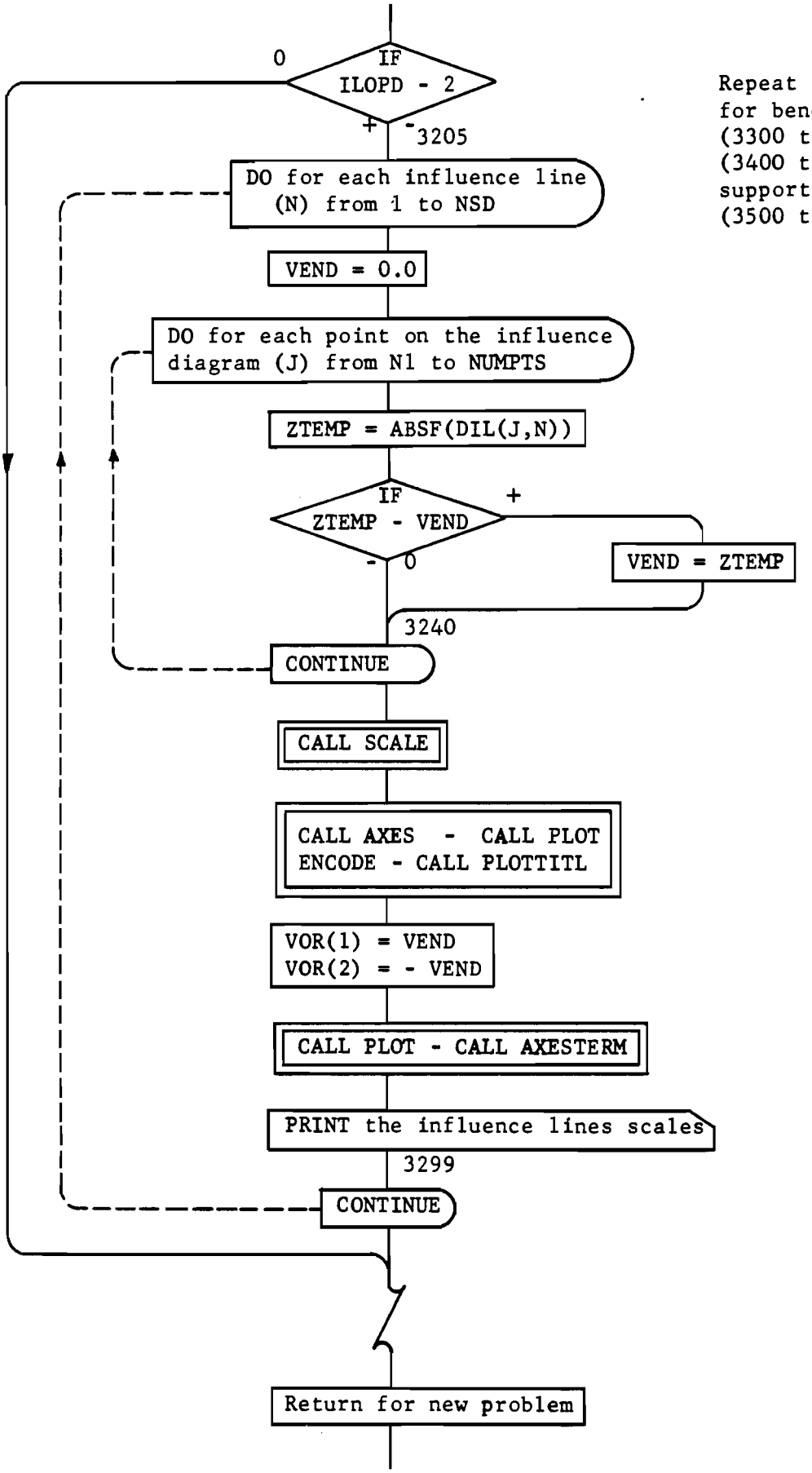

2021
Set total load equal to fixed load + movable-load pattern
JL
CALL BEAMCOL
CALL COMPARE
IL = JL + ILS
Store values for influence lines
2200
CONTINUE
2210
IF KEEPE
-
+
0
9980
4010
Terminate the problem
2220
PRINT envelopes of maximums
IF KPLOT(1)+ KPLOT(2)+..
0
-
+
2405
PRINT ...
2410
KSTOP = 1
Plot envelopes of maximums
9980
PRINT ...
STOP
Set plot constants
CALL SCALE
Determine horizontal scale
PRINT horizontal scale
2500


DO for each variable (K) from 1 to 8 in steps of 2
KC = (K + 1)/2
VEND = 0.0
DO for each sta (J) from 4 to MP4
ZTEMP = -VPLOT(J,K+1)
VEND = MAX1F(VEND, VPLOT(J,K), ZTEMP)
Determine the maximum value of the plot variable
2430
CONTINUE
2432
CALL SCALE
Determine vertical scale
PRINT vertical scale
2433
GO TO ( ), KC
1
2
3
4
2440
IPLOT(2) = 8H M
N1 = 4
NUMPTS = M + 1
DO for each sta (J) from 1 to MP4
HPLOT(J) = J - 1
2442
CONTINUE
2450
IPLOT(2) = 8H R
N1 = 4
NUMPTS = M + 1
DO for each sta (J) from 1 to MP4
HPLOT(J) = J - 1
2452
CONTINUE
2500
2435
2445



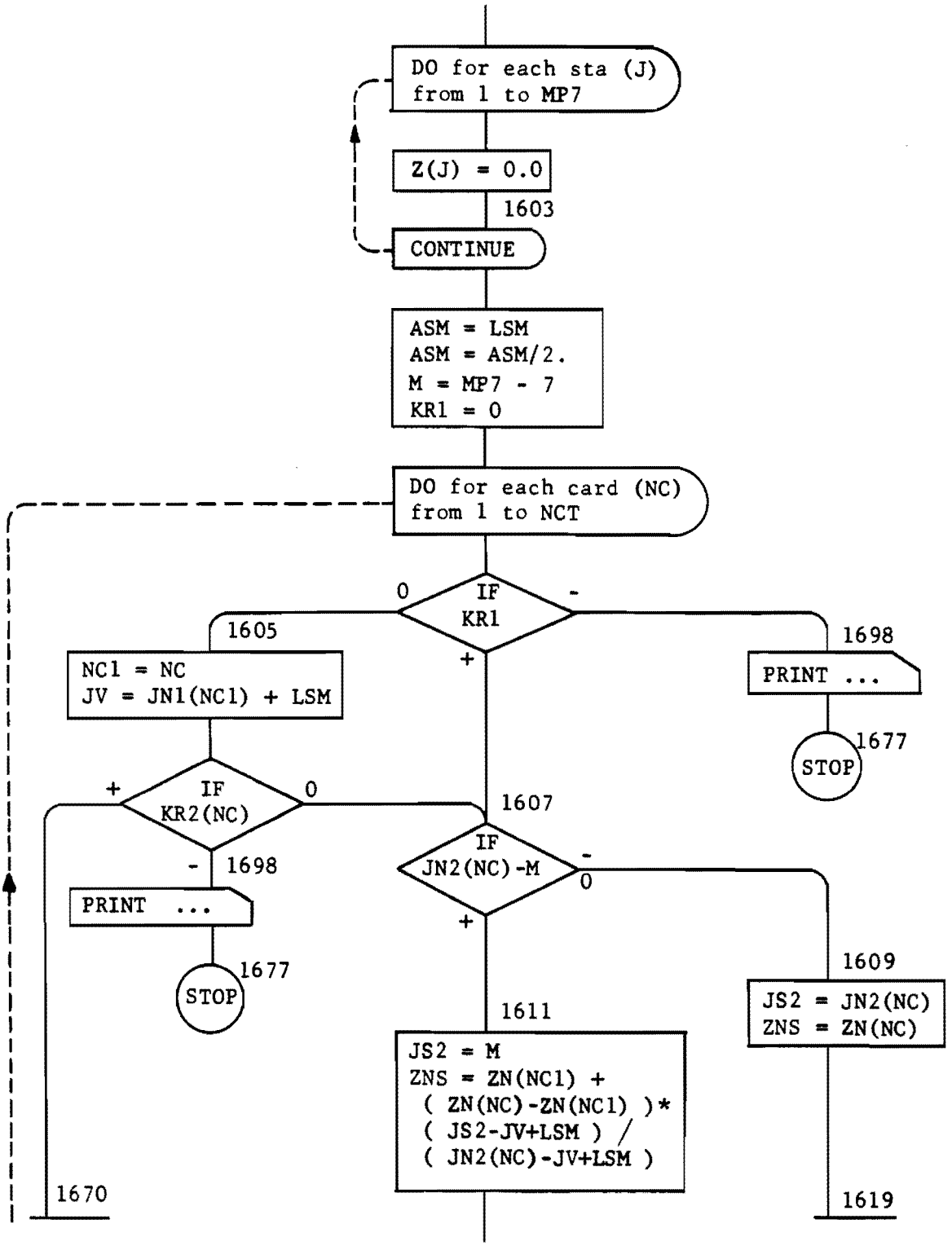
Repeat this routine for bending moment (2600 to 2650), shear (2700 to 2750), and support reaction (2800 to 2850)

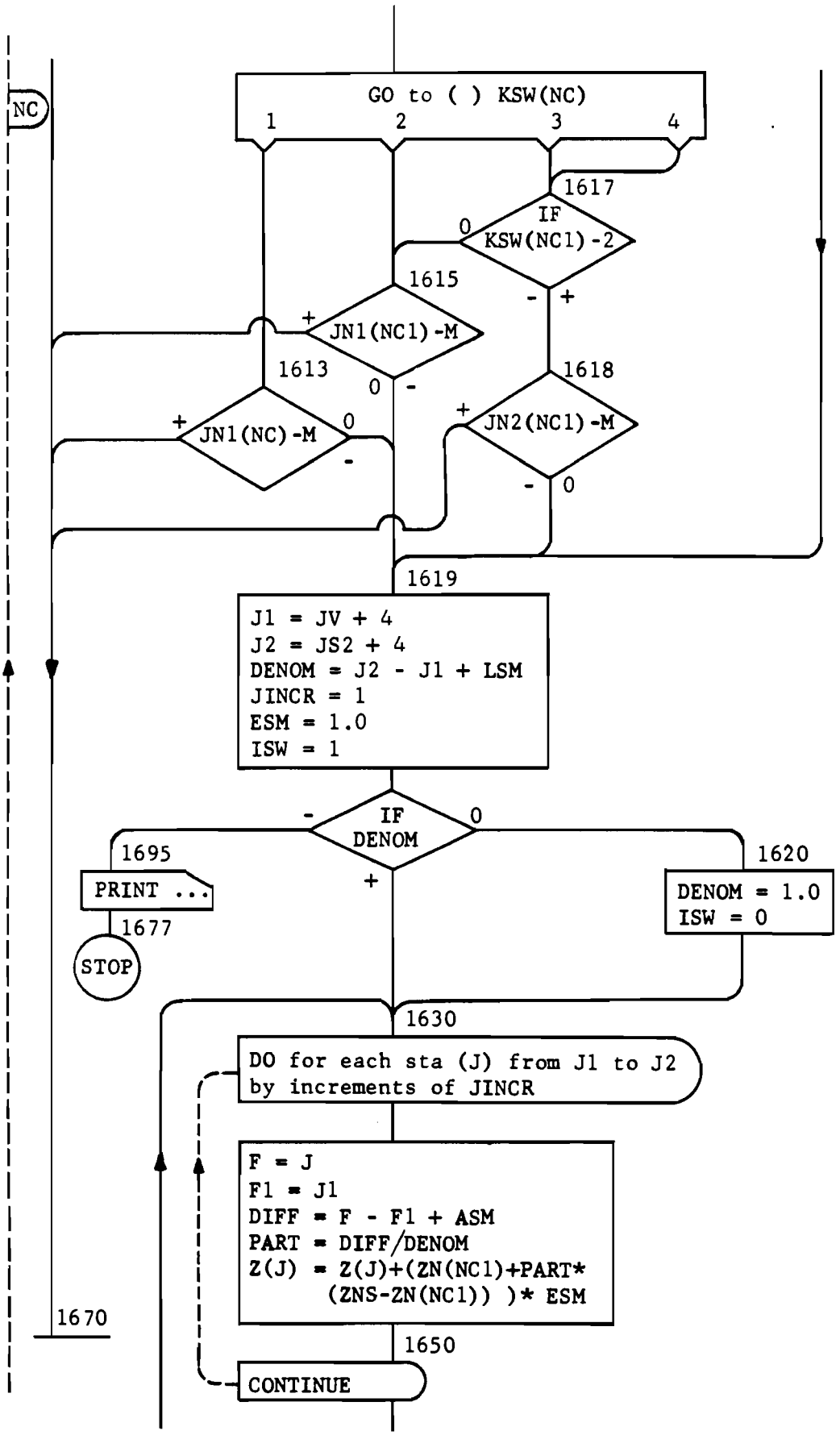

3000
Are plots of any of the influence lines desired ?
No
4010
Terminate the problem
Yes
3010
Plot influence lines
IF KSTOP
+
-
0
9980
PRINT ...
STOP
3015
Set plot constants
3030
Set additional plot constants
IF JSTART - 4
-
0
+
HEND = MP4 - JSTART
HOR(1) = 4 - JSTART
3075
HEND = M
HOR(1) = 0.0
NUMPTS = MP4 + ILS
HOR(2) = HOR(1)
CALL SCALE
Set horizontal scale
PRINT horizontal scale
DO for the number of points (J) from 1 to NUMPTS
HPLOT(J) = J - 1
3125
CONTINUE

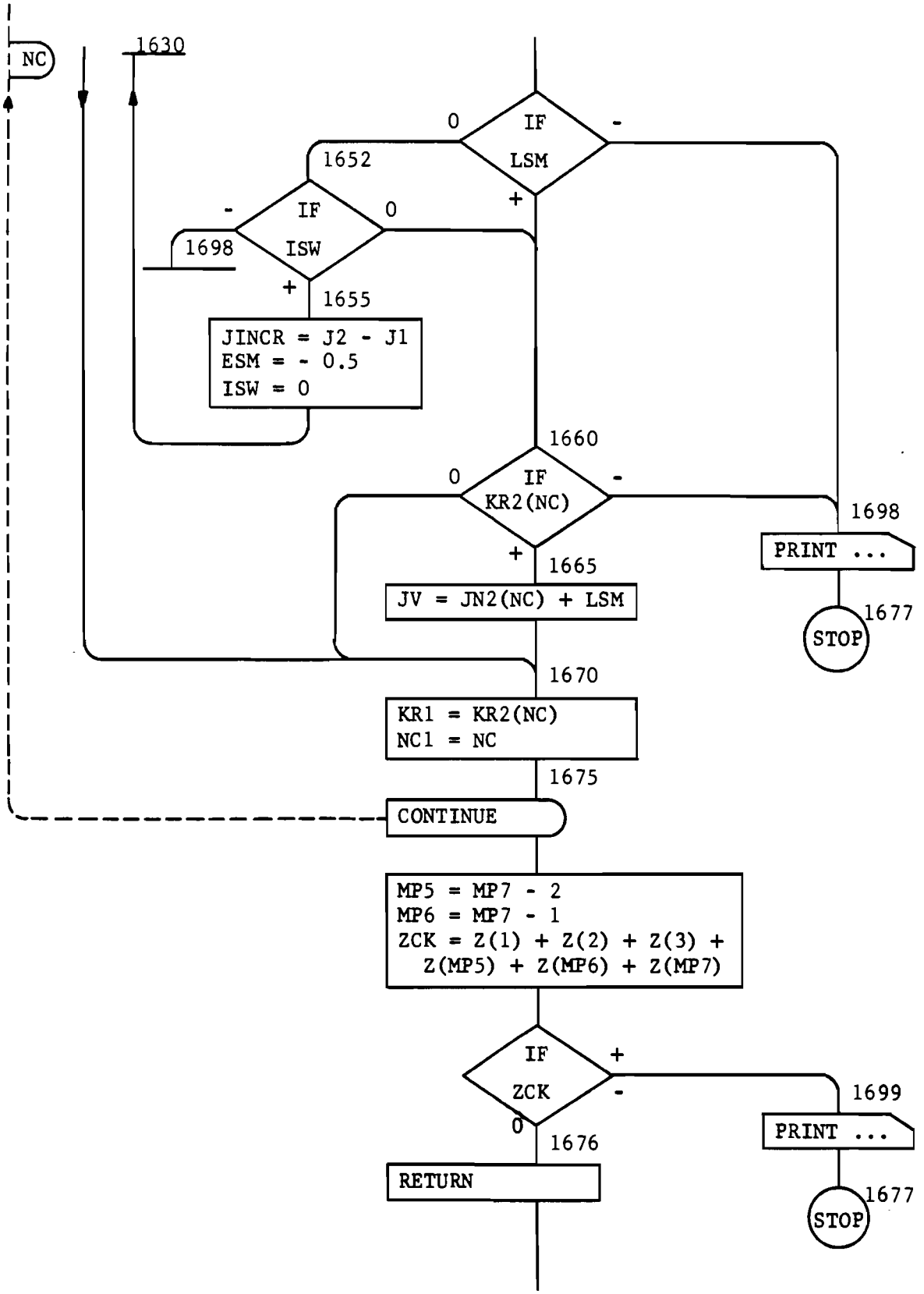


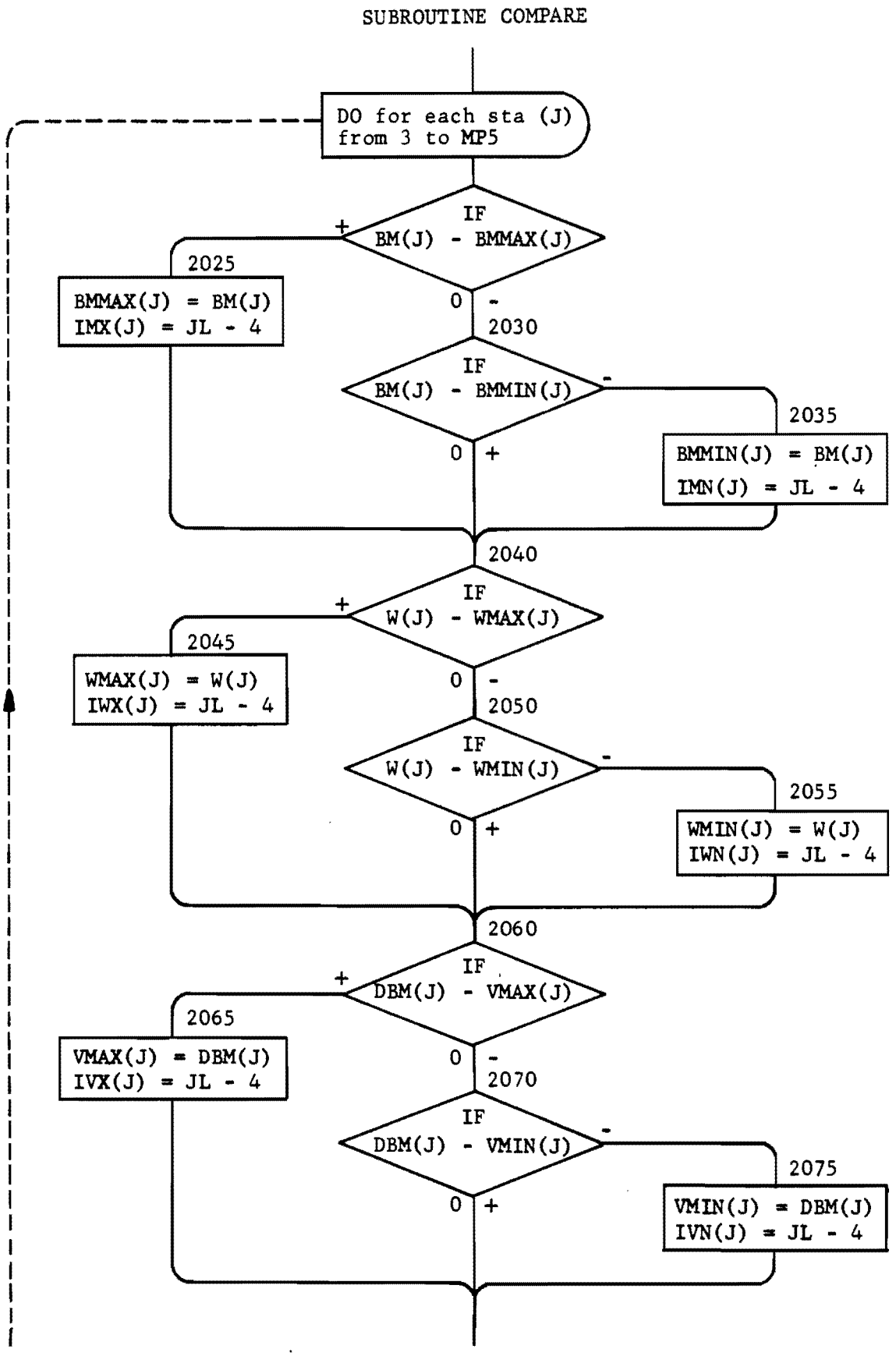
Repeat this routine for bending moment (3300 to 3399), shear (3400 to 3499), and support reaction (3500 to 3599)

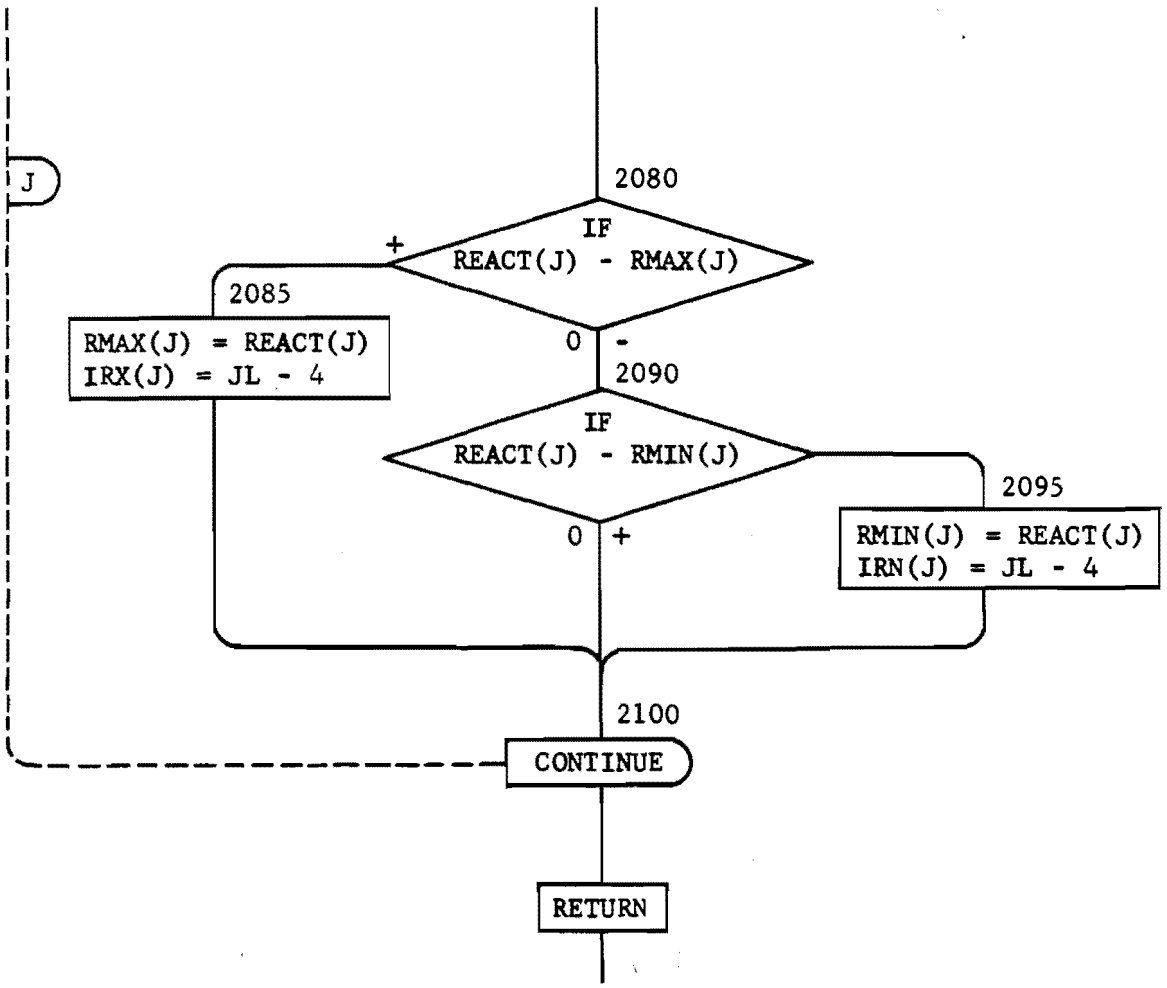
SUBROUTINE INTERP 3



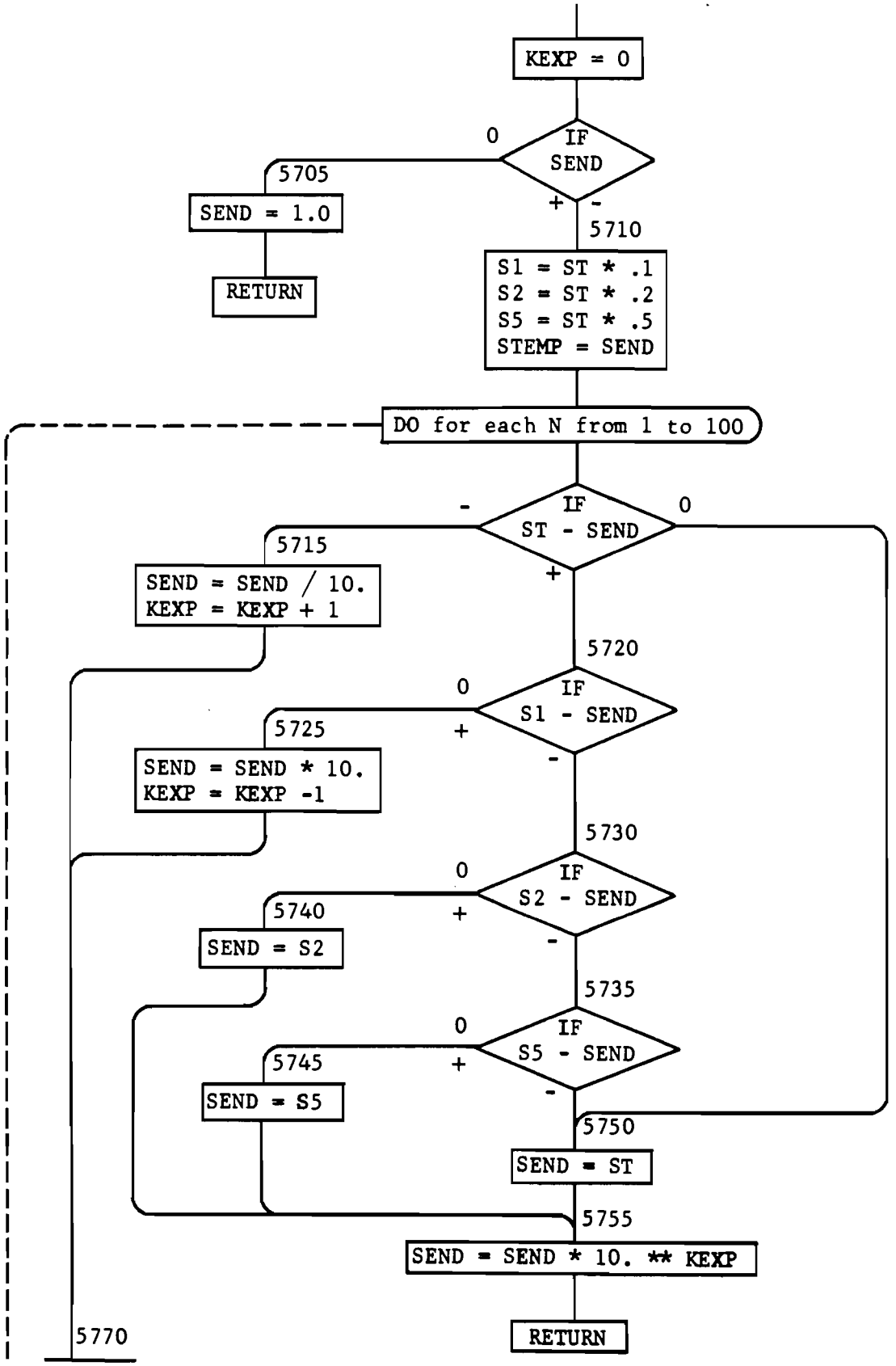

NC
GO to ( ) KSW(NC)
1
2
3
4
1617
IF
KSW(NC1)-2
0
-
+
1615
JN1(NC1)-M
+
0
-
1613
JN1(NC)-M
+
0
-
1618
JN2(NC1)-M
+
-
0
1619
J1 = JV + 4
J2 = JS2 + 4
DENOM = J2 - J1 + LSM
JINCR = 1
ESM = 1.0
ISW = 1
IF
DENOM
-
0
+
1695
PRINT ...
1677
STOP
1620
DENOM = 1.0
ISW = 0
1630
DO for each sta (J) from J1 to J2
by increments of JINCR
F = J
F1 = J1
DIFF = F - F1 + ASM
PART = DIFF/DENOM
Z(J) = Z(J)+(ZN(NC1)+PART*
(ZNS-ZN(NC1)))* ESM
1650
CONTINUE
1670

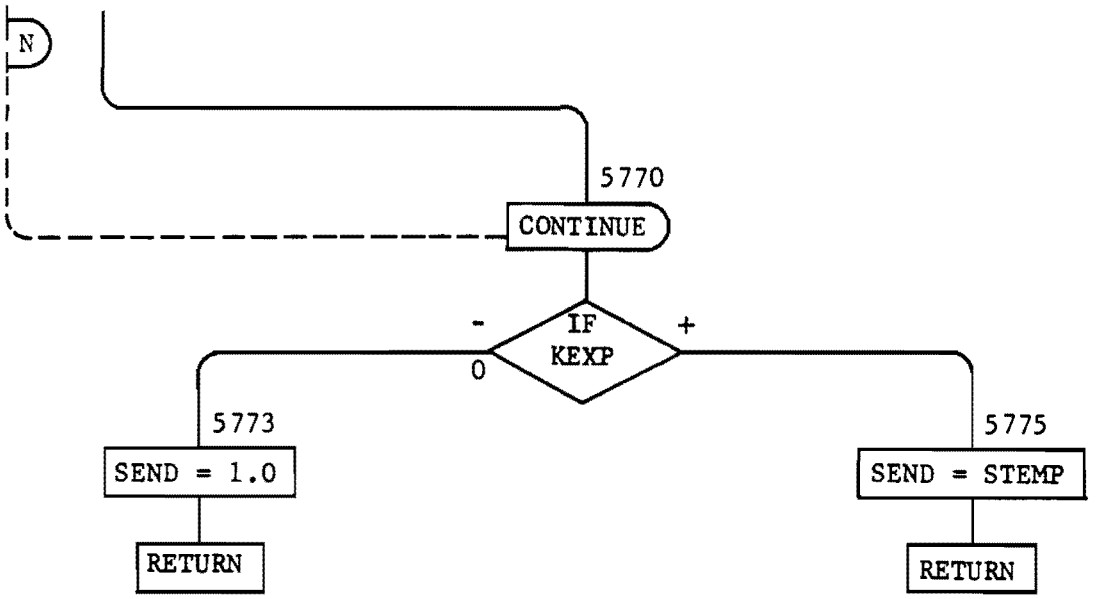

NC
1630
IF
LSM
0
-
+
1652
IF
ISW
-
0
+
1698
1655
JINCR = J2 - J1
ESM = - 0.5
ISW = 0
1660
IF
KR2(NC)
0
-
+
1698
PRINT ...
1665
JV = JN2(NC) + LSM
1677
STOP
1670
KR1 = KR2(NC)
NC1 = NC
1675
CONTINUE
MP5 = MP7 - 2
MP6 = MP7 - 1
ZCK = Z(1) + Z(2) + Z(3) +
Z(MP5) + Z(MP6) + Z(MP7)
IF
ZCK
+
-
0
1699
PRINT ...
1676
RETURN
1677
STOP


SUBROUTINE COMPARE
DO for each sta (J) from 3 to MP5
IF BM(J) - BMMAX(J)
+
2025
BMMAX(J) = BM(J)
IMX(J) = JL - 4
0
-
2030
IF BM(J) - BMMIN(J)
-
2035
BMMIN(J) = BM(J)
IMN(J) = JL - 4
0
+
2040
IF W(J) - WMAX(J)
+
2045
WMAX(J) = W(J)
IWX(J) = JL - 4
0
-
2050
IF W(J) - WMIN(J)
-
2055
WMIN(J) = W(J)
IWN(J) = JL - 4
0
+
2060
IF DBM(J) - VMAX(J)
+
2065
VMAX(J) = DBM(J)
IVX(J) = JL - 4
0
-
2070
IF DBM(J) - VMIN(J)
-
2075
VMIN(J) = DBM(J)
IVN(J) = JL - 4
0
+

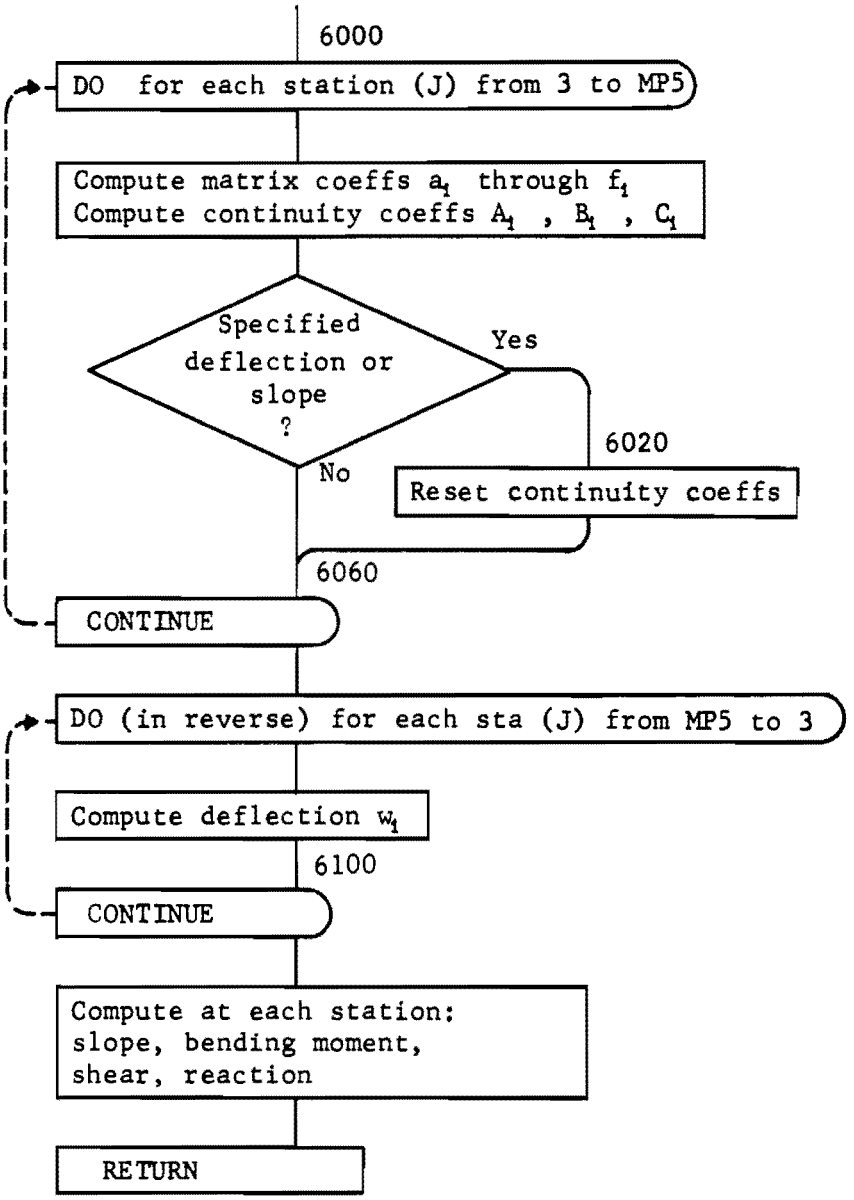

J
2080
IF
REACT(J) - RMAX(J)
+
2085
RMAX(J) = REACT(J)
IRX(J) = JL - 4
0
-
2090
IF
REACT(J) - RMIN(J)
0
+
2095
RMIN(J) = REACT(J)
IRN(J) = JL - 4
2100
CONTINUE
RETURN

SUBROUTINE SCALE




N
5770
CONTINUE
IF
KEXP
-
0
+
5773
SEND = 1.0
RETURN
5775
SEND = STEMP
RETURN

SUBROUTINE BEAMCOL



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APPENDIX 4

GLOSSARY OF NOTATION FOR BMCOL 43

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C-----NOTATION FOR BMCOL 43

C          AN1( ), AN2( )      IDENTIFICATION AND REMARKS (ALPHA-NUM)     07JE5
C          BM( )               BENDING MOMENT                             02JE5
C          BMF( )              FIXED LOAD BENDING MOMENT                  24JA7
C          BMIL( )             INFLUENCE LINE FOR MOMENT                  02JE5
C          BMMAX( )            MAX VALUE OF POSITIVE BENDING MOMENT       02JE5
C          BMMIN( )            MAX VALUE OF NEGATIVE BENDING MOMENT       02JE5
C          DBM( )              SHEAR BETWEEN ADJACENT STATIONS            08MR8
C          DIL( )              INFLUENCE LINE FOR DEFLECTION              02JE5
C          DBMF( )             FIRST DERIV OF FIXED LOAD BENDING MOMENT   24JA7
C          DW( )               FIRST DERIV OF BMCOL DEFL                  07JE5
C          DWS( )              VALUE OF SPECIFIED SLOPE                   02JE5
C          DWSAV               TEMPORARY VALUE OF DWS( )                  07JE5
C          F( )                FLEXURAL STIFFNESS ( TOTAL PER STA )       02JE5
C          FN2( )              FLEXURAL STIFFNESS ( INPUT )               02JE5
C          H                   INCREMENT LENGTH                           12JE3
C          HCOR                HORIZONTAL COORDINATE OF THE FIRST SYMBOL  15JL4
C                              IN THE PLOT TITLE                          15JL4
C          HEND                VALUE ASSIGNED TO END OF HORIZONTAL-AXIS   200C5
C          HE2                 H SQUARED                                  12JE3
C          HE3                 H CUBED                                    12JE3
C          HNEG                LENGTH, IN INCHES, OF THE NEGATIVE H-AXIS.14AP4
C                              THIS VARIABLE MUST NOT ITSELF BE NEGATIVE.14AP4
C          HOR                 LOCATION OF THE VERTICAL AXIS              02JE5
C          HPLOT( )            NAME OF ARRAY TO BE PLOTTED ON H-AXIS      02JE5
C          HPOS                LENGTH, IN INCHES, OF THE POSITIVE H-AXIS  14AP4
C          HTCKS               INCREMENT LENGTH BETWEEN TICK MARKS ON     14AP4
C                              H-AXIS IN TERMS OF HEND                    27AP4
C          HT2                 H TIMES 2                                  12JE3
C          IL                  INFLUENCE LINE STORAGE LOCATION RELATED    04JE5
C                              TO THE POSITION OF THE MOVABLE LOAD        04JE5
C          ILOPD, ILOPM,       INFLUENCE LINE OUTPUT OPTIONS              200C5
C          ILOPR, ILOPV             IF = 1, PLOT THE INFLUENCE DIAGRAM    24JA7
C                                   IF = 2, TABULATE THE INFLUENCE LINE   200C5
C                                   IF = 3, PLOT AND TABULATE THE         200C5
C                                           INFLUENCE LINE                200C5
C          ILS                 INTERNAL ADJUSTMENT FOR THE POSITION OF    02JE5
C                              MOVABLE LOAD WHICH PREVENTS TABULATION OF  02JE5
C                              INFLUENCE LINES AT NEG STORAGE LOCATIONS   02JE5
C          IMN( )              LOCATION OF MOVABLE-LOAD STA ZERO THAT     02JE5
C                              PRODUCES THE MAX NEGATIVE BENDING MOMENT   12FE5
C          IMX( )              LOCATION OF MOVABLE-LOAD STA ZERO THAT     02JE5
C                              PRODUCES THE MAX POSITIVE BENDING MOMENT   12FE5
C          INSAV               TEMPORARY VALUE OF IN13( )                 02JE5
C          IN13( )             EXTERNAL STA NUMBER FOR SPECIFIED SLOPE    02JE5
C                              OR DEFLECTION                              12FE5
C          IN14( )             INITIAL EXTERNAL STA USED IN TABLE 4       02JE5
C          IN15( )             INITIAL EXTERNAL STA USED IN TABLE 5       02JE5
C          IN24( )             FINAL EXTERNAL STA USED IN TABLE 4         02JE5
C          IN25( )             FINAL EXTERNAL STA USED IN TABLE 5         02JE5
C          IOR                 ORIENTATION OF THE TITLE, = PARALLEL TO    15JL4
C                              THE AXIS                                   15JL4
C          IPLOT( )            VARIABLE USED TO PLOT TITLES ON PLOTS      10JE5
C          IRN( )              LOCATION FOR MAX NEGATIVE REACTION         02JE5
```

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C          IRX( )              LOCATION FOR MAX POSITIVE REACTION          02JE5
C          ISD( )              DESIGNATED STAS FOR INFLUENCE LINES FOR     02JE5
C                              DEFLECTION                                  02JE5
C          ISIZE               SIZE OF THE LETTERS IN THE PLOT TITLE       15JL4
C          ISM( )              DESIGNATED STAS FOR INFLUENCE LINES FOR     02JE5
C                              MOMENT                                      02JE5
C          ISR( )              DESIGNATED STAS FOR INFLUENCE LINES FOR     03JE5
C                              SUPPORT REACTION                            03JE5
C          ISTA                OUTPUT VALUE OF STA NUMBER                  03JE5
C          ISV( )              DESIGNATED STAS FOR INFLUENCE LINES FOR     03JE5
C                              SHEAR                                       03JE5
C          ITEST               = 5 ALPHANUMERIC BLANKS USED TO TERMINATE   12FE5
C                              THE PROGRAM                                 12FE5
C          IT1S                PLOT SYMBOL (-8), PRODUCES A LINE PLOT      10JE5
C          IVN( )              LOCATION FOR MAX NEGATIVE SHEAR             03JE5
C          IVX( )              LOCATION FOR MAX POSITIVE SHEAR             03JE5
C          IWN( )              LOCATION FOR MAX NEGATIVE DEFLECTION        03JE5
C          IWX( )              LOCATION FOR MAX POSITIVE DEFLECTION        03JE5
C          J                   DO LOOP INDEX, = STA NUMBER                 03JE5
C          JA                  INDEX IN TABLE 3 SORTING PROCEDURE          12FE5
C          JL                  POSITION OF MOVABLE-LOAD STA ZERO           12FE5
C          JLINC               INDEX USED IN MOVING THE MOVABLE LOAD       10JE5
C          JM1                 JA - 1                                      12FE5
C          JS                  STA OF SPECIFIED DEFLECTION OR SLOPE        05JE3
C          JSTA                EXTERNAL VALUE OF JSTART                    12FE5
C          JSTART              INITIAL POSITION OF MOVABLE-LOAD STA ZERO   12FE5
C          JSTO                EXTERNAL VALUE OF JSTOP                     12FE5
C          JSTOP               FINAL POSITION OF MOVABLE-LOAD STA ZERO     12FE5
C          K                   DO LOOP INDEX                               03JE5
C          KASE                CASE NUM FOR SPECIFIED CONDITIONS           07JE3
C          KASS                TEMPORARY VALUE FOR KASE, KSW4, OR KSW5     24JA7
C          KAXES               INDEX USED TO DESCRIBE MANNER IN WHICH      10JL4
C                              AXES SHOULD BE PLACED ON PAPER              14AP4
C          KC                  NUMBER OF PLOT VARIABLE                     03JE5
C          KEEPE               IF = 1, KEEP PRIOR ENVELOPES OF MAXIMUMS    10JE5
C          KEEP2 THRU KEEP6    IF = 1, KEEP PRIOR DATA, TABLES 2-6         24JA7
C          KEY( )              ROUTING SWITCH FOR SPECIFIED CONDITIONS     24JA7
C          KPLOT( )            PLOT OPTIONS FOR THE ENVELOPES OF MAXIMUMS  03JE5
C          KPS                 PLOT SYMBOL TO BE USED                      14AP4
C                              1 DENOTES SMALL PLUS SIGN                   14AP4
C                              2 DENOTES SMALL X                           14AP4
C                              3 DENOTES SMALL SQUARE                      14AP4
C                              4 DENOTES SMALL STAR (COMBINATION OF 1, 2)  14AP4
C                              8 DENOTES NO SYMBOL TO BE PLOTTED, BUT      14AP4
C                                        PEN TO BE MOVED                   16AP4
C                              9 DENOTES LARGE PLUS SIGN                   14AP4
C                              10 DENOTES LARGE X.                         14AP4
C                              11 DENOTES LARGE SQUARE                     14AP4
C                              12 DENOTES LARGE STAR (COMBINATION OF 9     16AP4
C                                        AND 10)                           16AP4
C                              A NEGATIVE NUMBER WILL MAKE THE SAME        14AP4
C                              SYMBOLS AS THE POSITIVE NUMBERS, BUT THE    14AP4
C                              POINTS WILL BE CONNECTED WITH STRAIGHT      14AP4
C                              LINES.  THUS IF KPS = -8 THE POINTS WILL    16AP4
C                              BE CONNECTED BY STRAIGHT LINES WITHOUT      16AP4
C                              THE POINTS BEING MARKED BY PLOT SYMBOLS     16AP4
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C       KR1                 PRIOR VALUE OF KR2                              19MR4
C       KR24( ), KR25( )    CONTINUE SWITCHES IN TABLES 4 AND 5             03JE5
C       KSAV                TEMPORARY VALUE OF KASE( )                      03JE5
C       KSTOP               ROUTING SWITCH TO SKIP PLOT TAPE                07JE5
C       KSW4( ), KSW5( )    ROUTING SWITCH IN TABLES 4 AND 5                03JE5
C       LL                  MOVABLE-LOAD STA                                03JE5
C       LSM                 SWITCH WHICH CAUSES THE AXIAL LOADS TO BE       03JE5
C                           DISTRIBUTED TO HALF-STAS                        03JE5
C       M                   TOTAL NUMBER OF INCREMENTS OF BMCOL             12JE3
C       ML                  TOTAL MOVABLE-LOAD WIDTH IN INCREMENTS          12FE5
C       MLINC               NUMBER OF STAS BETWEEN EACH POSITION OF         12FE5
C                           MOVABLE LOAD                                    10JE5
C       MLP4                ML + 4                                          12FE5
C       MP4 THRU MP7        M + 4  THRU  M + 7                              12JE3
C       N                   MISCL INDEX                                     12JE3
C       NAME( )             VARIABLE NAME - OUTPUT IN TABLES 9 AND 11       03JE5
C       NCD2 THRU NCD6      NUM CARDS IN TABLES 2 THRU 6, THIS PROB         03JE5
C       NCT3, NCT4, NCT5    TOTAL NUMBER OF CARDS IN THE PARTICULAR         12FE5
C                           TABLE                                           12FE5
C       NC14, NC15          INITIAL INDEX VALUE FOR THE INPUT TO THE        24JA7
C                           PARTICULAR TABLE                                12FE5
C       NPROB               PROBLEM NUMBER (PROG STOPS IF BLANK )           24JA7
C       NPTS                NUMBER OF POINTS TO BE PLOTTED, = 2             10JE5
C       NSD                 NUMBER OF DEFLECTION INFLUENCE LINES            03JE5
C       NSM                 NUMBER OF MOMENT INFLUENCE LINES                03JE5
C       NSR                 NUMBER OF SUPPORT REACTION INFLUENCE LINES      03JE5
C       NSV                 NUMBER OF SHEAR INFLUENCE LINES                 03JE5
C       NSYMB               NUM OF SYMBOLS TO BE PLOTTED IN THE TITLE       15JL4
C       NUMPTS              NUMBER OF POINTS TO BE PLOTTED                  14AP4
C       N1                  STORAGE LOCATION OF FIRST PLOT POINT            07JE5
C       P( )                AXIAL FORCE ( TOTAL PER STA )                   03JE5
C       PN2( )              AXIAL FORCE ( INPUT )                           03JE5
C       Q( )                TRANSVERSE FORCE ( TOTAL PER STA )              03JE5
C       QD( )               FIXED LOAD ( TOTAL PER STA )                    03JE5
C       QDN2( )             INPUT VALUE OF FIXED LOAD                       10JE5
C       QLIVE( )            TEMPORARY STORAGE FOR MOVABLE-LOAD PATTERN      10FE6
C       QM( )               MOVABLE LOAD ( TOTAL PER STA )                  03JE5
C       QMN2( )             INPUT VALUE OF MOVABLE LOAD                     10JE5
C       R( )                ROTATIONAL RESTRAINT ( TOTAL PER STA )          03JE5
C       REACT( )            SUPPORT REACTION                                24JA7
C       REACTF( )           FIXED LOAD SUPPORT REACTION                     24JA7
C       RIL( )              INFLUENCE LINE FOR SUPPORT REACTION             03JE5
C       RMAX( )             MAX VALUE OF POSITIVE REACTION                  03JE5
C       RMIN( )             MAX VALUE OF NEGATIVE REACTION                  03JE5
C       RN2( )              ROTATIONAL RESTRAINT ( INPUT )                  03JE5
C       S( )                SPRING SUPPORT STIFFNESS ( TOTAL PER STA )      03JE5
C       SN2( )              SPRING SUPPORT STIFFNESS ( INPUT )              03JE5
C       SPACE               DISTANCE, IN INCHES, FROM LEFT EDGE OF          14AP4
C                           PAPER TO END OF NEGATIVE H-AXIS                 14AP4
C       T( )                TRANSVERSE TORQUE ( TOTAL PER STA )             03JE5
C       TN2( )              TRANSVERSE TORQUE ( INPUT )                     03JE5
C       T1 THRU T5          PLACES BLANK OR ASTERICK BESIDE LOCATION        24JA7
C                           INDICATOR IN ENVELOPES OF MAXIMUMS              24JA7
C       VCOR                VERTICAL COORDINATE OF THE BOTTOM OF THE        15JL4
C                           PLOT TITLE                                      15JL4
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C       VEND            VERTICAL AXIS VALUE AT 2 INCHES                 24AP4
C       VIL( )          INFLUENCE LINE FOR SHEAR                        03JE5
C       VMAX( )         MAX VALUE OF POSITIVE SHEAR                     03JE5
C       VMIN( )         MAX VALUE OF NEGATIVE SHEAR                     03JE5
C       VNEG            LENGTH, IN INCHES, OF THE NEGATIVE V-AXIS.      14AP4
C                       THIS VARIABLE MUST NOT ITSELF BE NEGATIVE.      14AP4
C       VOR             VALUE AT THE END OF THE VERTICAL AXIS           03JE5
C       VPLOT           NAME OF ARRAY TO BE PLOTTED ON V-AXIS           03JE5
C       VPOS            LENGTH, IN INCHES, OF THE POSITIVE V-AXIS       14AP4
C       VTCKS           INCREMENT LENGTH BETWEEN TICK MARKS ON          14AP4
C                       V-AXIS IN TERMS OF VEND                         16AP4
C       W( )            LATERAL DEFLECTION OF BMCOL AT STA J            03JE5
C       WF( )           FIXED LOAD LATERAL DEFLECTION                   24JA7
C       WMAX( )         MAX VALUE OF POSITIVE DEFLECTION                03JE5
C       WMIN( )         MAX VALUE OF NEGATIVE DEFLECTION                03JE5
C       WS( )           SPECIFIED VALUE OF DEFL AT STA JS               03JE5
C       WSAV            TEMPORARY VALUE OF WS( )                        07JE5
C       X               DISTANCE ALONG THE BMCOL                        30MY3
C       ZTEMP           TEMPORARY MAX VALUE                             10JE5
C       Z1              DECIMAL VALUE FOR ISTA                          25JL3
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C-----NOTATION FOR SUBROUTINE INTERP 3                                  03JE5

C          ASM                  FACTOR ADDED TO THE STA NUMBER SO THAT THE03JE5
C                               AXIAL LOADS WILL BE TABULATED AT HALF-STAS03JE5
C          DENOM                DENOMINATOR                              07JE3
C          DIFF                 DIFFERENCE                               12JE3
C          ESM                  MULTIPLIER FOR HALF VALUES AT END STAS   03JE5
C          F                    FLOATING POINT STA NUM                   03JE5
C          F1                   FLOATING POINT VALUE OF J1               03JE5
C          ISW                  ROUTING SWITCH                           03JE5
C          J                    DO LOOP INDEX, = STA NUMBER              03JE5
C          JINCR                INCREMENTATION INDEX                     03JE5
C          JS2                  TEMPORARY VALUE OF JN2() USED FOR ERASING 10FE6
C                               LOADS PAST THE END OF THE BEAM           10FE6
C          JV                   INITIAL STA NUMBER ON THE PREVIOUS CARD  03JE5
C          J1                   INITIAL STA IN THE DISTRIBUTION SEQUENCE 03JE5
C          J2                   FINAL STA IN THE DISTRIBUTION SEQUENCE   03JE5
C          JN1( )               INITIAL EXTERNAL STA                     07JE5
C          JN2( )               FINAL EXTERNAL STA                       03JE5
C          KASS                 TEMPORARY VALUE FOR KASE, KSW4, OR KSW5  24JA7
C          KR2( )               CONTINUE SWITCH                          03JE5
C          KR1                  PRIOR VALUE OF KR2( )                    03JE5
C          KSW( )               VALUE OF KSW4( ) OR KSW5( ) IN SUBROUTINE 24JA7
C          LSM                  SWITCH WHICH CAUSES THE AXIAL LOADS TO BE 03JE5
C                               DISTRIBUTED TO HALF-STAS                 03JE5
C          M                    TOTAL NUMBER OF INCREMENTS OF BMCOL      12JE3
C          MP7                  NUMBER OF INCREMENTS + 7                 03JE5
C          MP5                  MP7 - 2                                  03JE5
C          MP6                  MP7 - 1                                  03JE5
C          NC                   NUMBER OF CARD THAT IS BEING INTERPOLATED 07JE5
C          NCT                  NUMBER OF CARDS TO BE INTERPOLATED       03JE5
C          NC1                  PREVIOUS CARD NUMBER                     03JE5
C          PART                 INTERPOLATION FRACTION                   03JE5
C          Z( )                 INTERPOLATED VALUE                       03JE5
C          ZCK                  SUM OF THE VALUES AT THE OUTRIGGER STA   10JE5
C          ZN( )                INPUT VALUE                              03JE5
C          ZNS                  TEMPORARY VALUE OF ZN2() USED FOR ERASING 10FE6
C                               LOADS PAST THE END OF THE BEAM           10FE6
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C-----NOTATION FOR SUBROUTINE COMPARE                                    08MR8

C          BM( )               BENDING MOMENT                            02JE5
C          BMMAX( )            MAX VALUE OF POSITIVE BENDING MOMENT      02JE5
C          BMMIN( )            MAX VALUE OF NEGATIVE BENDING MOMENT      02JE5
C          DBM( )              SHEAR BETWEEN ADJACENT STATIONS           08MR8
C          DW( )               FIRST DERIV OF BMCOL DEFL                 07JE5
C          DWS( )              VALUE OF SPECIFIED SLOPE                  02JE5
C          F( )                FLEXURAL STIFFNESS ( TOTAL PER STA )      02JE5
C          H                   INCREMENT LENGTH                          12JE3
C          HE2                 H SQUARED                                 12JE3
C          HE3                 H CUBED                                   12JE3
C          HT2                 H TIMES 2                                 12JE3
C          IMN( )              LOCATION OF MOVABLE-LOAD STA ZERO THAT    02JE5
C                              PRODUCES THE MAX NEGATIVE BENDING MOMENT  12FE5
C          IMX( )              LOCATION OF MOVABLE-LOAD STA ZERO THAT    02JE5
C                              PRODUCES THE MAX POSITIVE BENDING MOMENT  12FE5
C          IRN( )              LOCATION FOR MAX NEGATIVE REACTION        02JE5
C          IRX( )              LOCATION FOR MAX POSITIVE REACTION        02JE5
C          IVN( )              LOCATION FOR MAX NEGATIVE SHEAR           03JE5
C          IVX( )              LOCATION FOR MAX POSITIVE SHEAR           03JE5
C          IWN( )              LOCATION FOR MAX NEGATIVE DEFLECTION      03JE5
C          IWX( )              LOCATION FOR MAX POSITIVE DEFLECTION      03JE5
C          J                   DO LOOP INDEX, = STA NUMBER               03JE5
C          JL                  POSITION OF MOVABLE-LOAD STA ZERO         12FE5
C          KEY( )              ROUTING SWITCH FOR SPECIFIED CONDITIONS   24JA7
C          M                   TOTAL NUMBER OF INCREMENTS OF BMCOL       12JE3
C          MP4, MP5            M + 4 ,  M + 5                            24JA7
C          REACT( )            NET REACTION ON THE BMCOL AT EACH STA     10JE5
C          P( )                AXIAL FORCE ( TOTAL PER STA )             03JE5
C          Q( )                TRANSVERSE FORCE ( TOTAL PER STA )        03JE5
C          R( )                ROTATIONAL RESTRAINT ( TOTAL PER STA )    03JE5
C          RMAX( )             MAX VALUE OF POSITIVE REACTION            03JE5
C          RMIN( )             MAX VALUE OF NEGATIVE REACTION            03JE5
C          S( )                SPRING SUPPORT STIFFNESS ( TOTAL PER STA )03JE5
C          T( )                TRANSVERSE TORQUE ( TOTAL PER STA )       03JE5
C          VMAX( )             MAX VALUE OF POSITIVE SHEAR               03JE5
C          VMIN( )             MAX VALUE OF NEGATIVE SHEAR               03JE5
C          W( )                LATERAL DEFLECTION OF BMCOL AT STA J      03JE5
C          WMAX( )             MAX VALUE OF POSITIVE DEFLECTION          03JE5
C          WMIN( )             MAX VALUE OF NEGATIVE DEFLECTION          03JE5
C          WS(  )              SPECIFIED VALUE OF DEFL AT STA JS         03JE5
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C-----NOTATION FOR SUBROUTINE SCALE                                      08MR8

C          KEXP                EXPONENT OF THE MAX VALUE OF THE VARIABLE 03JE5
C          N                   DO LOOP INDEX                             200C5
C          SEND                MAXIMUM VALUE OF THE VARIABLE             03JE5
C          ST                  LENGTH OF THE AXIS                        03JE5
C          STEMP               TEMPORARY VALUE OF SEND                   10JE5
C          S1                  ST * .1                                   03JE5
C          S2                  ST * .2                                   03JE5
C          S5                  ST * .5                                   03JE5
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C-----NOTATION FOR SUBROUTINE BEAMCOL                                  08MR8

C          A( ), ATEMP, AREV    CONTINUITY COEFFICIENT                 02JE5
C          AA                   COEFF IN STIFFNESS MATRIX              12JE3
C          B( ), BTEMP, BREV    CONTINUITY COEFFICIENT                 02JE5
C          BB                   COEFF IN STIFFNESS MATRIX              12JE3
C          BM( )                BENDING MOMENT                         02JE5
C          BMMAX( )             MAX VALUE OF POSITIVE BENDING MOMENT   02JE5
C          BMMIN( )             MAX VALUE OF NEGATIVE BENDING MOMENT   02JE5
C          C( ), CTEMP, CREV    CONTINUITY COEFFICIENT                 02JE5
C          CC                   COEFF IN STIFFNESS MATRIX              12JE3
C          D, DTEMP, DREV       MULTIPLIER IN CONTINUITY COEFF EQS      12JE3
C          DBM( )               SHEAR BETWEEN ADJACENT STATIONS        08MR8
C          DD                   COEFF IN STIFFNESS MATRIX              12JE3
C          DENOM                DENOMINATOR                            07JE3
C          DW( )                FIRST DERIV OF BMCOL DEFL              07JE5
C          DWS( )               VALUE OF SPECIFIED SLOPE               02JE5
C          E                    TERM IN CONTINUITY COEFF EQS           12JE3
C          EE                   COEFF IN STIFFNESS MATRIX              12JE3
C          F( )                 FLEXURAL STIFFNESS ( TOTAL PER STA )   02JE5
C          FF                   COEFF IN LOAD MATRIX                   12JE3
C          H                    INCREMENT LENGTH                       12JE3
C          HE2                  H SQUARED                              12JE3
C          HE3                  H CUBED                                12JE3
C          HT2                  H TIMES 2                              12JE3
C          IMN( )               LOCATION OF MOVABLE-LOAD STA ZERO THAT 02JE5
C                               PRODUCES THE MAX NEGATIVE BENDING MOMENT 12FE5
C          IMX( )               LOCATION OF MOVABLE-LOAD STA ZERO THAT 02JE5
C                               PRODUCES THE MAX POSITIVE BENDING MOMENT 12FE5
C          IRN( )               LOCATION FOR MAX NEGATIVE REACTION     02JE5
C          IRX( )               LOCATION FOR MAX POSITIVE REACTION     02JE5
C          IVN( )               LOCATION FOR MAX NEGATIVE SHEAR        03JE5
C          IVX( )               LOCATION FOR MAX POSITIVE SHEAR        03JE5
C          IWN( )               LOCATION FOR MAX NEGATIVE DEFLECTION   03JE5
C          IWX( )               LOCATION FOR MAX POSITIVE DEFLECTION   03JE5
C          J                    DO LOOP INDEX, = STA NUMBER            03JE5
C          JL                   POSITION OF MOVABLE-LOAD STA ZERO      12FE5
C          KEY( ), KEYJ         ROUTING SWITCH FOR SPECIFIED CONDITIONS 03JE5
C          L                    MISCL INDEX                            12JE3
C          M                    TOTAL NUMBER OF INCREMENTS OF BMCOL    12JE3
C          MP4, MP5             M + 4 , M + 5                          24JA7
C          NS                   INDEX NUM FOR SPECIFIED CONDITIONS     05JE3
C          P( )                 AXIAL FORCE ( TOTAL PER STA )          03JE5
C          Q( )                 TRANSVERSE FORCE ( TOTAL PER STA )     03JE5
C          R( )                 ROTATIONAL RESTRAINT ( TOTAL PER STA ) 03JE5
C          REACT( )             NET REACTION ON THE BMCOL AT EACH STA  10JE5
C          RMAX( )              MAX VALUE OF POSITIVE REACTION         03JE5
C          RMIN( )              MAX VALUE OF NEGATIVE REACTION         03JE5
C          S( )                 SPRING SUPPORT STIFFNESS ( TOTAL PER STA )03JE5
C          T( )                 TRANSVERSE TORQUE ( TOTAL PER STA )    03JE5
C          VMAX( )              MAX VALUE OF POSITIVE SHEAR            03JE5
C          VMIN( )              MAX VALUE OF NEGATIVE SHEAR            03JE5
C          VPLOT                NAME OF ARRAY TO BE PLOTTED ON V-AXIS  03JE5
C          W( )                 LATERAL DEFLECTION OF BMCOL AT STA J   03JE5
C          WMAX( )              MAX VALUE OF POSITIVE DEFLECTION       03JE5
C          WMIN( )              MAX VALUE OF NEGATIVE DEFLECTION       03JE5
C          WS( )                SPECIFIED VALUE OF DEFL AT STA JS      03JE5
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APPENDIX 5

LISTING OF PROGRAM DECK OF BMCOL 43

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      PROGRAM BMCOL 43 (INPUT,OUTPUT)

C-----FOR COMPUTERS WITH LESS THAN ELEVEN DIGIT ACCURACY, IT IS
C          RECOMMENDED THAT THE FOLLOWING VARIABLES BE MADE DOUBLE
C          PRECISION IN THE MAIN PROGRAM AND IN SUBROUTINE BEAMCOL.
C          W, DW, BM, DBM, REACT, DENOM, A, B, C, D, E, ATEMP,
C          BTEMP, CTEMP, DTEMP, AREV, BREV, CREV, DREV

    1 FORMAT (    52H     PROGRAM BMCOL 43 -        -  MATLOCK-TAYLOR  - 03137
     1                              284  REVISION DATE = 08 MAR 68 )
      DIMENSION      AN1(32), AN2(14),                                      18FE5 ID
     1               F(207), Q(207), S(207), T(207), R(207), P(207),        13MR5
     2               KEY(207), IN13(20), KASE(20), WS(20), DWS(20),         13MR5
     3               IN14(100), IN24(100), KR24(100), FN2(100),             13JA5
     4               QDN2(100), SN2(100), TN2(100), RN2(100), PN2(100),     23OC4
     5               KSW4(100), IN15(100), IN25(100), KR25(100),            13JA5
     6               QMN2(100), KSW5(100), QD(207), QM(207),                13MR5
     7               QLIVE(207), BM(207), W(207), DBM(207), REACT(207)      25MR5
      DIMENSION      IMX(207), IMN(207), IWX(207), IWN(207), IVX(207),      25MR5
     1               IVN(207), IRX(207), IRN(207), DW(207),                 25MY5
     2               KPLOT(4), IPLOT(3), HPLOT(407), VPLOT(207,8),          25MY5
     3               NAME(4),ISM(5),ISD(5),ISV(5),ISR(5),                   27MR5
     4               BMIL(407,5),DIL(407,5),VIL(407,5),RIL(407,5),          08JE5
     5               HOR(2), VOR(2),WF(5),BMF(5),DBMF(5),REACTF(5)          20DE66
      COMMON F, Q, S, T, R, P, KEY, WS, DWS, W, DW, BM, DBM, REACT,         26OC4
     2       IMX, IMN, IWX, IWN, IVX, IVN, IRX, IRN, JL, H, HE2, HE3,       27MR5
     3       HT2, M, MP4, MP5                                               27MR5
      COMMON/A/VPLOT                                                        18JA7
   10 FORMAT (     5H      , 80X, 10HI-----TRIM )                          27FE4 ID
   11 FORMAT (     5H1     , 80X, 10HI-----TRIM )                          27FE4 ID
   12 FORMAT (   16A5  )                                                   04MY3 ID
   13 FORMAT (         5X, 16A5 )                                          27FE4 ID
   14 FORMAT ( A5, 5X, 14A5 )                                              18FE5 ID
   15 FORMAT (///10H     PROB , /5X, A5, 5X, 14A5 )                        18FE5 ID
   16 FORMAT (///17H     PROB (CONTD), /5X, A5, 5X, 14A5 )                 18FE5 ID
   19 FORMAT (///48H     RETURN THIS PAGE TO TIME RECORD FILE -- HM )       12MR5 ID
   20 FORMAT ( 5X, 15I5 )                                                  13MR5
   21 FORMAT ( 5X, I5, 10X, E10.3, 10X, 4I5 )                              16FE5
   31 FORMAT ( 2(5X, I5), 2E10.3 )                                         23MR4
   41 FORMAT ( 5X, 3I5, 6E10.3 )                                           23MR4
   51 FORMAT ( 5X, 3I5, 10X, E10.3 )                                       25MR5
   60 FORMAT ( I5 )                                                        22MR5
  100 FORMAT (///35H     TABLE 1 - PROGRAM-CONTROL DATA                    24JA4*
     1    /  43X, 35H     ENVELOPES          TABLE NUMBER                  15MR5
     2    /  43X, 40H     OF MAXIMUMS   2    3    4    5    6             15MR5
     3   //       46H          HOLD FROM PRECEDING PROBLEM (1=HOLD), 4X,   13MR5
     4              I5, 3X, 5I5,                                           13MR5
     5    /       38H          NUM CARDS INPUT THIS PROBLEM, 20X, 5I5 )   13MR5
  101 FORMAT ( / 58X, 25H      DEFL  MOM  SHR  RCT                        23MR5
     1         /  5X, 47H     OPTION (IF=1) TO PLOT ENVELOPES OF MAXIMUM15MR5
     2              1HS, 10X, 4I5 )                                        23MR5
  110 FORMAT (///51H     TABLE 10A -- INFLUENCE DIAGRAMS FOR DEFLECTION)10FE6
  111 FORMAT (///50H     TABLE 10B -- INFLUENCE DIAGRAMS FOR MOMENT    )10FE6
  112 FORMAT (///50H     TABLE 10C -- INFLUENCE DIAGRAMS FOR SHEAR      10FE6
     1    / 15X, 45H    ( SHEAR IS COMPUTED ONE HALF INCREMENT          20AG5
     2    / 15X, 45H      TO THE LEFT OF THE DESIGNATED STATION )  )     20AG5
  113 FORMAT (///52H     TABLE 10D -- INFLUENCE DIAGRAMS FOR SUPPORT REA10FE6
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   1            5HCTION )                                                    10FE6
115 FORMAT ( / 52H         LOCATION              DESIGNATED STATIONS FO29MY5
   1           21HR INFLUENCE DIAGRAMS    /                                10FE6
   2           52H          OF LOAD       STA         STA          STA 23JA67
   3           25H        STA         STA       )                        29MY5
117 FORMAT (   15X,                5( 7X, I5 ) )                          23JA67
118 FORMAT ( 10X, I5, 5X, 5E12.3 )                                        29MY5
120 FORMAT (///51H     TABLE 11 -- SCALES FOR INFLUENCE DIAGRAM PLOTS)10FE6
123 FORMAT (   30H          HORIZONTAL SCALE     /                        25MY5
   1           24H             10 INCHES =, F4.0, 9H STATIONS )          24MR5
124 FORMAT ( / 30H          VERTICAL SCALES      /                        25MY5
   1           49H                                  LENGTH     MAXIMUM  /  24MR5
   2           49H            STA  VARIABLE    OF AXIS      VALUE   / )24MR5
125 FORMAT ( 10X, I5, 2X, A8, 12H  2 INCHES =, E10.3 )                    24MR5
200 FORMAT (///24H     TABLE 2 - CONSTANTS / )                            23MR4*
201 FORMAT (   28H          NUM INCREMENTS    , 50X, I5,                  31MR4*
   1   /       28H          INCREMENT LENGTH  , 45X, E10.3,               26OC4
   2   /       47H          NUMBER OF INCREMENTS FOR MOVABLE LOAD,        23OC4
   331X, I5, / 51H          INITIAL POSITION OF MOVABLE LOAD STA ZERO,     23OC4
   427X, I5, / 49H          FINAL POSITION OF MOVABLE LOAD STA ZERO,       23OC4
   529X, I5, / 52H          NUMBER OF INCREMENTS BETWEEN EACH POSITION23OC4
   6           16H OF MOVABLE LOAD, 10X, I5 )                             23OC4
300 FORMAT (///47H     TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES         20JA4*
   1  //   5X, 48H     STA      CASE       DEFLECTION        SLOPE  ) 25MY5
311 FORMAT (       10X, I3, 7X, I2, 8X, E10.3, 9X, 4HNONE, 5X, A5 )      02FE5
312 FORMAT (       10X, I3, 7X, I2, 11X, 4HNONE, 8X, E10.3, 5X, A5 )     02FE5
313 FORMAT (       10X, I3, 7X, I2, 3X, 2(5X, E10.3), 5X, A5 )           02FE5
400 FORMAT (///48H     TABLE 4  -  STIFFNESS AND FIXED-LOAD DATA          23OC4
   1  //       51H     FROM TO CONTD     F          QF          S         09FE5
   2           28H     T          R          P / )                       13JE3
411 FORMAT (       5X, 2I4, I3, 1X, 6E11.3 )                             23MR4*
412 FORMAT (       5X, I4, 4X, I3, 1X, 6E11.3 )                          23MR4*
413 FORMAT (       9X, I4, I3, 1X, 6E11.3 )                              23MR4*
500 FORMAT (///40H     TABLE 5  -  MOVABLE-LOAD DATA                      23OC4
   1         //25H     FROM TO CONTD    QM  / )                          23OC4
600 FORMAT (///47H     TABLE 6 - SPECIFIED STATIONS FOR INFLUENCE         27MR5
   1            9H DIAGRAMS                                              10FE6
   2    /  5X, 51H          ( SHEAR IS COMPUTED ONE HALF INCREMENT        20AG5
   3    / 10X, 45H      TO THE LEFT OF THE DESIGNATED STATION ) / )       20AG5
601 FORMAT (   40H                        NUM OF    TYPE OF       /       24JA67
   1           52H          VARIABLE   DIAGRAMS  OUTPUT       DESIGNAT24JA67
   2           15HED STATIONS              /    )                         24JA67
605 FORMAT ( 5X, 2I5, 5X,  5I5 )                                          24JA67
610 FORMAT ( 10X, A8, 2X, 2 ( I5, 5X) , 5I5 )                             16JA67
690 FORMAT ( / 43H     ALLOWABLE NUMBER OF INFLUENCE DIAGRAMS             10FE6
   1           10H EXCEEDED  )                                            10FE6
700 FORMAT (// 35H     TABLE 7 - FIXED-LOAD RESULTS  )                    29MR5
701 FORMAT ( / 48H     STA I      DIST        DEFL       SLOPE            25FE6
   1           36H   MOM        SHEAR    SUP REACT     / )               25FE6
711 FORMAT ( 5X, I4, 2X, 2E12.3, 10X, E12.3, 10X, E12.3 )                 06MY5
712 FORMAT ( 34X, E12.3, 10X, E12.3 )                                     03MY5
800 FORMAT (///40H     TABLE 8A- ENVELOPES OF MAXIMUMS                    07JA67
   1           40H * = HELD FROM PRIOR PROBLEM                 )         07JA67
801 FORMAT ( / 52H       STA    MAX  +DEFL LOC     MAX  -DEFL LOC      M10FE6
   1           30HAX  +MOM LOC      MAX  -MOM LOC     )                  10FE6
810 FORMAT ( 5X, I5, 4X,  4( E10.3, I4, A1, 3X )/)                        24JA67
820 FORMAT (///40H     TABLE 8B- ENVELOPES OF MAXIMUMS                    07JA67
   1           40H * = HELD FROM PRIOR PROBLEM                 )         07JA67
830 FORMAT ( / 52H       STA    MAX +SHEAR LOC     MAX -SHEAR LOC     MA27AP5
   1           30HX +REACT LOC     MAX -REACT LOC  )                     27A75
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  835 FORMAT ( 5X, I5, 40X, 2( E10.3, I4, A1, 3X ) )                        24JA67
  840 FORMAT ( 14X, 2 ( E10.3, I4, A1, 3X ) )                               24JA67
  900 FORMAT ( //50H     TABLE 9 -- SCALES FOR PLOTS OF THE ENVELOPES       25MY5
     1           12HOF MAXIMUMS   / )                                       25MY5
  901 FORMAT ( / 30H          VERTICAL SCALES      /                        25MY5
     1           45H                                LENGTH      MAXIMUM  /  25MY5
     2           45H              VARIABLE   OF AXIS       VALUE   / )     26MY5
  902 FORMAT ( 13X, A8, 12H  2 INCHES =, E10.3 )                            25MY5
  903 FORMAT ( / 25H                        NONE )                          04FE4*
  904 FORMAT (// 40H     TOO MUCH DATA FOR AVAILABLE STORAGE // )            04FE4*
  905 FORMAT (   46H          USING DATA FROM THE PREVIOUS PROBLEM )         05FE4*
  907 FORMAT ( / 52H     ERROR STOP -- SLOPES AND DEFLECTIONS IMPROPERLY    31DE4
     1           10H SPECIFIED  )                                           31DE4
  909 FORMAT ( //50H          TABULATION OF INFLUENCE DIAGRAMS OMITTED )    10FE6
  910 FORMAT (   43H          ADDITIONAL DATA FOR THIS PROBLEM  )           31DE4
  911 FORMAT (   30H          NO PLOTS SPECIFIED      )                     19AG5
  940 FORMAT ( //36H     MOVABLE LOAD SOLUTIONS OMITTED   )                 07JA5
  950 FORMAT ( //52H     ALLOWABLE RANGE OF MOVEMENT OF MOVABLE LOAD EXC    12NO4
     1            5HEEDED   )                                              12NO4
  980 FORMAT (///50H     UNDESIGNATED ERROR STOP                           )31DE4
C-----START EXECUTION OF PROGRAM - SEE GENERAL FLOW DIAGRAM                 10FE6
               ITEST = 5H                                                   18FE5 ID
               KSTOP = 0                                                    12MR5
               NCT3 = 0                                                     18NO4
               NCT4 = 0                                                     19OC4
               NCT5 = 0                                                     23OC4
               NSD = 0                                                      01JE5
               NSM = 0                                                      01JE5
               NSV = 0                                                      01JE5
               NSR = 0                                                      01JE5
               ILOPD = 0                                                    11JE5
               ILOPM = 0                                                    11JE5
               ILOPV = 0                                                    11JE5
               ILOPR = 0                                                    11JE5
 1000 PRINT 10                                                              12JL3 ID
      CALL TIC TOC (1)                                                      08MR8
C-----PROGRAM AND PROBLEM IDENTIFICATION                                    04MY3 ID
      READ  12, ( AN1(N), N = 1, 32 )                                       18FE5 ID
 1010 READ  14,  NPROB, ( AN2(N), N = 1, 14 )                               28AG3 ID
         IF ( NPROB - ITEST ) 1020, 9990, 1020                              26FE5 ID
 1020 PRINT 11                                                              26AG3 ID
      PRINT 1                                                               18FE5 ID
      PRINT 13, ( AN1(N), N = 1, 32 )                                       18FE5 ID
      PRINT 15, NPROB, ( AN2(N), N = 1, 14 )                                26AG3 ID
C-----INPUT TABLE 1                                                         10JE3
 1100 READ 20, KEEPE, KEEP2, KEEP3, KEEP4, KEEP5, KEEP6, NCD2, NCD3,       13MR5
     1         NCD4, NCD5, NCD6, ( KPLOT(N), N = 1, 4 )                     13MR5
      PRINT 100, KEEPE, KEEP2, KEEP3, KEEP4, KEEP5, KEEP6, NCD2, NCD3,     13MR5
     1           NCD4, NCD5, NCD6                                           13MR5
      PRINT 101, ( KPLOT(N), N = 1, 4 )                                     13MR5
C-----INPUT TABLE 2                                                         10JE3
 1200 PRINT 200                                                             13JE3
         IF ( KEEP2 ) 9980, 1210, 1255                                      15JA5
 1210 READ 21, M, H, ML, JSTART, JSTOP, MLINC                               19OC4
C-----COMPUTE CONSTANTS AND INDEXES                                         10JE3
               HT2 = H + H                                                  11JA5
               HE2 = H * H                                                  30MY3
               HE3 = H * HE2                                                30MY3
               MP4 = M + 4                                                  30MY3
               MP5 = M + 5                                                  30MY3
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                MP6 = M + 6                                                    10JE3
                MP7 = M + 7                                                    30MY3
                MLP4 = ML + 4                                                  31DE4
                JSTA = JSTART                                                  19JA5
                JSTO = JSTOP                                                   19JA5
                JSTART = JSTART + 4                                            15JA5
                JSTOP = JSTOP + 4                                              11NO4
                NAME(1) = 8HDEFLECT                                            25MY5
                NAME(2) = 8HMOMENT                                             25MY5
                NAME(3) = 8HSHEAR                                              13MR5
                NAME(4) = 8HREACTION                                           13MR5
C-----LIMIT THE RANGE OF MOVEMENT OF MOVABLE-LOAD TO REASONABLE VALUES         01JE5
          IF ( JSTART + ML + MLINC - 4 ) 1235, 1225, 1225                      15JA5
 1225     IF ( JSTOP - JSTART ) 1235, 1230, 1230                               15JA5
 1230     IF ( JSTOP - M - MLINC - 4 ) 1260, 1260, 1235                        15JA5
 1235 PRINT 950                                                                15JA5
          GO TO 9990                                                           26MR5
 1255 PRINT 905                                                                15JA5
 1260 PRINT 201, M, H, ML, JSTA, JSTO, MLINC                                   19JA5
          DO 1270  J = 1, MP7                                                  18NO4
               QLIVE(J) = 0.0                                                  11NO4
 1270     CONTINUE                                                             18NO4
C-----INPUT TABLE 3                                                            01JE5
      PRINT 300                                                                11JA5
          DO 1303  J = 1, MP7                                                  23FE5
               KEY(J) = 1                                                      03JE3
 1303     CONTINUE                                                             23FE5
          IF ( KEEP3 ) 9980, 1310, 1305                                        26MY5
 1305 PRINT 905                                                                26MY5
          GO TO 1326                                                           26MY5
 1310     IF ( NCD3 - 20 ) 1312, 1312, 1311                                    25MY5
 1311 PRINT 904                                                                25MY5
          GO TO 9990                                                           25MY5
 1312          NCT3 = NCD3                                                     25MY5
          IF ( NCT3 - 1 ) 1326, 1320, 1320                                     08MR8
 1320     DO 1325  N = 1, NCT3                                                 26SE7
      READ 31, IN13(N), KASE(N), WS(N), DWS(N)                                 18NO4
 1325     CONTINUE                                                             02FE5
 1326     IF ( NCT3 ) 9980, 1327, 1328                                         25MY5
 1327 PRINT 903                                                                25MY5
          GO TO 1400                                                           25MY5
 1328     IF ( NCT3 - 2 ) 1355, 1329, 1329                                     08MR8
 1329     DO 1350  JA = 2, NCT3                                                08MR8
               JM1 = JA - 1                                                    31DE4
          DO 1345  N = JA, NCT3                                                02FE5
          IF ( IN13(JM1) - IN13(N) ) 1345, 1330, 1340                          02FE5
 1330 PRINT 907                                                                25MY5
          GO TO 9990                                                           25MY5
C-----ARRANGE THE CARDS IN ASCENDING ORDER OF STA NUMBER                       01JE5
 1340          INSAV = IN13(JM1)                                               02FE5
               KSAV = KASE(JM1)                                                31DE4
               WSAV = WS(JM1)                                                  31DE4
               DWSAV = DWS(JM1)                                                31DE4
               IN13(JM1) = IN13(N)                                             31DE4
               KASE(JM1) = KASE(N)                                             31DE4
               WS(JM1) = WS(N)                                                 31DE4
               DWS(JM1) = DWS(N)                                               31DE4
               IN13(N) = INSAV                                                 31DE4
               KASE(N) = KSAV                                                  31DE4
               WS(N) = WSAV                                                    31DE4
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                DWS(N) = DWSAV                                          31DE4
 1345       CONTINUE                                                    02FE5
 1350       CONTINUE                                                    02FE5
 1355       DO 1380  N = 1, NCT3                                        23JA67
                JS = IN13(N) + 4                                        31DE4
            IF( KASE(N) - 2 ) 1360,1365,1370                            26SE7
 1360           KEY(JS)= 2                                              25MY5
       PRINT 311, IN13(N), KASE(N), WS(N)                               26MY5
            GO TO 1380                                                  02FE5
 1365       IF( KEY(JS-1) - 1 ) 9980, 1366, 1375                        02FE5
 1366       IF ( KEY(JS) - 1 ) 9980, 1367, 1375                         02FE5
 1367  PRINT 312, IN13(N), KASE(N), DWS(N)                               26MY5
                KEY(JS-1) = 3                                           02FE5
                KEY(JS+1) = 5                                           05JE3
            GO TO 1380                                                  02FE5
 1370       IF( KEY(JS-1) - 1 ) 9980, 1371, 1375                        02FE5
 1371       IF ( KEY(JS) - 1 ) 9980, 1372, 1375                         02FE5
 1372  PRINT 313, IN13(N), KASE(N), WS(N), DWS(N)                        26MY5
                KEY(JS-1) = 3                                           02FE5
                KEY(JS) = 4                                             05JE3
                KEY(JS+1) = 5                                           05JE3
            GO TO 1380                                                  02FE5
 1375  PRINT 907                                                        02FE5
            GO TO 9990                                                  26MR5
 1380       CONTINUE                                                    02FE5
C-----INPUT TABLE 4                                                     10JE3
 1400  PRINT 400                                                        04JE3
            IF ( KEEP4 ) 9980, 1401, 1410                               04JA5
 1401           NC14 = 1                                                26MR5
                NCT4 = NCD4                                             19OC4
             GO TO 1430                                                 04JA5
 1410  PRINT 905                                                        04JA5
            IF( NCT4 - 1 ) 1426,1411,1411                               26SE7
 1411        DO 1425  N = 1, NCT4                                       26SE7
            IF( KSW4(N) - 2 ) 1413,1417,1421                            26SE7
 1413  PRINT 411, IN14(N), IN24(N), KR24(N), FN2(N), QDN2(N), SN2(N),    04JA5
     1           TN2(N), RN2(N), PN2(N)                                 04JA5
             GO TO 1425                                                 04JA5
 1417  PRINT 412, IN14(N), KR24(N), FN2(N), QDN2(N), SN2(N), TN2(N),     04JA5
     1           RN2(N), PN2(N)                                         04JA5
             GO TO 1425                                                 04JA5
 1421  PRINT 413, IN24(N), KR24(N), FN2(N), QDN2(N), SN2(N), TN2(N),     04JA5
     1           RN2(N), PN2(N)                                         04JA5
 1425        CONTINUE                                                   04JA5
 1426       CONTINUE                                                    21SE66
       PRINT 910                                                        04JA5
                NC14 = NCT4 + 1                                         21OC4
                NCT4 = NCT4 + NCD4                                      19OC4
 1430        IF ( NCT4 - 100 ) 1435, 1435, 1433                         04JA5
 1433  PRINT 904                                                        04JA5
            GO TO 9990                                                  26MR5
 1435        IF ( NCD4 ) 9980, 1437, 1440                               04JA5
 1437  PRINT 903                                                        04JA5
             GO TO 1500                                                 04JA5
 1440           KR1 = 0                                                 04JA5
            IF( NCT4 - NC14 ) 1500,1445,1445                            26SE7
 1445        DO 1470  N = NC14, NCT4                                    26SE7
       READ 41, IN14(N), IN24(N), KR24(N), FN2(N), QDN2(N), SN2(N),     19OC4
     1           TN2(N), RN2(N), PN2(N)                                 19OC4
                KSW4(N) = 1 + KR24(N) + 2 * KR1                         23OC4
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                KR1 = KR24(N)                                                   06ND4
            IF( KSW4(N) - 2 ) 1450,1455,1460                                    26SE7
 1450 PRINT 411, IN14(N), IN24(N), KR24(N), FN2(N), QDN2(N), SN2(N),            04JA5
     1           TN2(N), RN2(N), PN2(N)                                         04JA5
            GO TO 1470                                                          04JA5
 1455 PRINT 412, IN14(N), KR24(N), FN2(N), QDN2(N), SN2(N), TN2(N),             04JA5
     1           RN2(N), PN2(N)                                                 19OC4
            GO TO 1470                                                          04JA5
 1460 PRINT 413, IN24(N), KR24(N), FN2(N), QDN2(N), SN2(N), TN2(N),             04JA5
     1           RN2(N), PN2(N)                                                 03ND4
 1470       CONTINUE                                                           04JA5
C-----INPUT TABLE 5                                                             01JE5
 1500 PRINT 500                                                                 19OC4
            IF ( KEEP5 ) 9980, 1501, 1510                                       04JA5
 1501           NC15 = 1                                                        26MR5
                NCT5 = NCD5                                                     19OC4
            GO TO 1530                                                          04JA5
 1510 PRINT 905                                                                 04JA5
           IF( NCT5 - 1 ) 1526,1511,1511                                        26SE7
 1511       DO 1525  N = 1, NCT5                                                26SE7
           IF( KSW5(N) - 2 ) 1513,1517,1521                                     26SE7
 1513 PRINT 411, IN15(N), IN25(N), KR25(N), QMN2(N)                             04JA5
            GO TO 1525                                                          04JA5
 1517 PRINT 412, IN15(N), KR25(N), QMN2(N)                                      04JA5
            GO TO 1525                                                          04JA5
 1521 PRINT 413, IN25(N), KR25(N), QMN2(N)                                      04JA5
 1525       CONTINUE                                                           04JA5
 1526      CONTINUE                                                            21SE66
      PRINT 910                                                                 20JA5
                NC15 = NCT5 + 1                                                 06ND4
                NCT5 = NCT5 + NCD5                                              19OC4
 1530       IF ( NCT5 - 100 ) 1535, 1535, 1533                                 04JA5
 1533 PRINT 904                                                                 04JA5
           GO TO 9990                                                           26MR5
 1535       IF ( NCD5 ) 9980, 1537, 1540                                       04JA5
 1537 PRINT 903                                                                 04JA5
           GO TO 1600                                                           07JE5
 1540           KR1 = 0                                                        04JA5
            DO 1570  N = NC15, NCT5                                             04JA5
      READ 51, IN15(N), IN25(N), KR25(N), QMN2(N)                               13MR5
                KSW5(N) = 1 + KR25(N) + 2 * KR1                                 19OC4
                KR1 = KR25(N)                                                   06ND4
           IF( KSW5(N) - 2 ) 1550,1555,1560                                     26SE7
 1550 PRINT 411, IN15(N), IN25(N), KR25(N), QMN2(N)                             04JA5
            GO TO 1570                                                          04JA5
 1555 PRINT 412, IN15(N), KR25(N), QMN2(N)                                      07JA5
            GO TO 1570                                                          04JA5
 1560 PRINT 413, IN25(N), KR25(N), QMN2(N)                                      04JA5
 1570       CONTINUE                                                           04JA5
C-----INPUT TABLE 6                                                             01JE5
 1600 PRINT 600                                                                 07JE5
           IF ( KEEP6 ) 9980, 1605, 1602                                        29MR5
 1602 PRINT 905                                                                 29MR5
           GO TO 1619                                                           01JE5
 1605      IF ( NCD6 ) 9980, 1660, 1610                                        29MR5
 1610 READ 605, NSD, ILOPD, ( ISD(N), N = 1, NSD )                              25MY5
      READ 605, NSM, ILOPM, ( ISM(N), N = 1, NSM )                              25MY5
      READ 605, NSV, ILOPV, ( ISV(N), N = 1, NSV )                              25MY5
      READ 605, NSR, ILOPR, ( ISR(N), N = 1, NSR )                              26MY5
           IF ( NSD - 5 ) 1612, 1612, 1615                                      01JE5
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 1612      IF ( NSM - 5 ) 1613, 1613, 1615                                  01JE5
 1613      IF ( NSV - 5 ) 1614, 1614, 1615                                  01JE5
 1614      IF ( NSR - 5 ) 1619, 1619, 1615                                  01JE5
 1615 PRINT 690                                                             18MR5
           GO TO 9990                                                       29MR5
 1619 PRINT 601                                                             01JE5
      PRINT 610, NAME(1), NSD, ILOPD, ( ISD(N), N = 1, NSD )                16JA67
      PRINT 610, NAME(2), NSM, ILOPM, ( ISM(N), N = 1, NSM )                16JA67
      PRINT 610, NAME(3), NSV, ILOPV, ( ISV(N), N = 1, NSV )                16JA67
      PRINT 610, NAME(4), NSR, ILOPR, ( ISR(N), N = 1, NSR )                16JA67
 1620      DO 1640  N = 1, 5                                                18MR5
           DO 1630  J = 1, MP7                                              31MR5
                DIL(J,N) = 0.0                                              18MR5
                BMIL(J,N) = 0.0                                             18MR5
                VIL(J,N) = 0.0                                              18MR5
                RIL(J,N) = 0.0                                              18MR5
 1630      CONTINUE                                                         18MR5
 1640      CONTINUE                                                         18MR5
           GO TO 1700                                                       18MR5
 1660 PRINT 903                                                             24MR5
                NSD = 0                                                     18MR5
                NSM = 0                                                     24MR5
                NSV = 0                                                     18MR5
                NSR = 0                                                     18MR5
                ILOPD = 0                                                   11JE5
                ILOPM = 0                                                   11JE5
                ILOPV = 0                                                   11JE5
                ILOPR = 0                                                   11JE5
C-----INTERPOLATE AND DISTRIBUTE VALUES FROM TABLE 4                        01JE5
 1700           LSM = 0                                                     16JE5
 1705 CALL INTERP3 ( MP7, NCT4, IN14, IN24, KR24, FN2, F, LSM, KSW4 )       09MR6
      CALL INTERP3 ( MP7, NCT4, IN14, IN24, KR24, QDN2, QD, LSM, KSW4 )     09MR6
      CALL INTERP3 ( MP7, NCT4, IN14, IN24, KR24, SN2, S, LSM, KSW4 )       09MR6
      CALL INTERP3 ( MP7, NCT4, IN14, IN24, KR24, TN2, T, LSM, KSW4 )       09MR6
      CALL INTERP3 ( MP7, NCT4, IN14, IN24, KR24, RN2, R, LSM, KSW4 )       09MR6
                LSM = 1                                                     12AP5
      CALL INTERP3 ( MP7, NCT4, IN14, IN24, KR24, PN2, P, LSM, KSW4 )       09MR6
C-----SET TOTAL LOAD EQUAL TO FIXED LOAD                                    10FE6
 1800      DO 1810  J = 1, MP7                                              20DC4
                Q(J) = QD(J)                                                20DC4
 1810      CONTINUE                                                         20DC4
           IF ( KEEPE ) 9980, 1820, 1828                                    11JA67
C-----THE VARIABLE VPLOT IS A 207 X 8 ARRAY WHERE EACH COLUMN IS            23JA67
C     RESPECTIVELY EQUAL TO THE 207 X 1 ARRAYS WMAX,WMIN,BMMAX,BMMIN,       23JA67
C     VMAX,VMIN,RMAX,RMIN  THEREFORE VPLOT( N*207 + 1 ) = WMAX(  1)         23JA67
C     FOR N=0, WMIN(  1) FOR N=1,  ETC ......, RMIN(  1) FOR N=7            23JA67
 1820      DO 1825  J = 1, MP7                                              09FE5
                VPLOT(J) =0.0                                               20JA67
                VPLOT(J+ 207) = 0.0                                         20JA67
                VPLOT(J+ 414) = 0.0                                         20JA67
                VPLOT(J+ 621) = 0.0                                         20JA67
                VPLOT(J+ 828) = 0.0                                         20JA67
                VPLOT(J+1035) = 0.0                                         20JA67
                VPLOT(J+1242) = 0.0                                         20JA67
                VPLOT(J+1449) = 0.0                                         20JA67
                IMX(J) = 999                                                26MR5
                IMN(J) = 999                                                26MR5
                IWX(J) = 999                                                26MR5
                IWN(J) = 999                                                26MR5
                IVX(J) = 999                                                26MR5
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                IVN(J) = 999                                                    26MR5
                IRX(J) = 999                                                    26MR5
                IRN(J) = 999                                                    26MR5
 1825       CONTINUE                                                           09FE5
            GO TO 1830                                                         17JA67
C-----THESE INDICATORS ADDED FOR ASTERICKS, STATEMENTS 2220 THRU 2350          24JA67
 1828       DO 1829  J = 1, MP7                                                11JA67
                IMX(J) = IMX(J) + 10000                                         11JA67
                IMN(J) = IMN(J) + 10000                                         11JA67
                IWX(J) = IWX(J) + 10000                                         11JA67
                IWN(J) = IWN(J) + 10000                                         11JA67
                IVX(J) = IVX(J) + 10000                                         11JA67
                IVN(J) = IVN(J) + 10000                                         11JA67
                IRX(J) = IRX(J) + 10000                                         11JA67
                IRN(J) = IRN(J) + 10000                                         11JA67
 1829       CONTINUE                                                           11JA67
C-----FIXED-LOAD SOLUTION                                                       24JA67
 1830 CALL BEAMCOL                                                              09FE5
                JL = 999 + 4                                                    26MR5
      CALL COMPARE                                                              13JA67
C-----PRINT FIXED LOAD RESULTS                                                  24JA67
      PRINT 11                                                                  08MY3 ID
      PRINT 1                                                                   18FE5 ID
      PRINT 13, ( AN1(N), N = 1, 32 )                                           18FE5 ID
      PRINT 16, NPROB, ( AN2(N), N = 1, 14 )                                    28AG3 ID
      PRINT 700                                                                 27MR5
      PRINT 701                                                                 27MR5
                ISTA = -1                                                       09AP5
                Z1 = ISTA                                                       09AP5
                X = Z1 * H                                                      09AP5
      PRINT 711, ISTA, X, W(3), BM(3), REACT(3)                                 09AP5
          DO 1850  J = 4, MP5                                                   09AP5
                ISTA = J - 4                                                    23OC4
                Z1 = ISTA                                                       26OC4
                X = Z1 * H                                                      26OC4
C-----STORE FIXED LOAD VALUES AT INFLUENCE LINE STATIONS                        24JA67
          IF( NSD )9980,1834,1831                                               24JA67
 1831       DO 1833 N = 1,NSD                                                  20DE66
            IF ( ISTA - ISD(N) ) 1833,1832,1833                                 20DE66
 1832           WF(N) = W(J)                                                    20DE66
            GO TO 1834                                                          20DE66
 1833       CONTINUE                                                           20DE66
 1834       IF( NSM )9980,1838,1835                                            13JA67
 1835       DO 1837 N = 1,NSM                                                  20DE66
            IF ( ISTA - ISM(N) ) 1837,1836,1837                                 20DE66
 1836           BMF(N) = BM(J)                                                  20DE66
            GO TO 1838                                                          20DE66
 1837       CONTINUE                                                           20DE66
 1838       IF( NSV )9980,1842,1839                                            13JA67
 1839       DO 1841 N = 1,NSV                                                  20DE66
            IF ( ISTA - ISV(N) ) 1841,1840,1841                                 20DE66
 1840           DBMF(N) = DBM(J)                                                20DE66
            GO TO 1842                                                          20DE66
 1841       CONTINUE                                                           20DE66
 1842       IF( NSR )9980,1847,1843                                            13JA67
 1843       DO 1846 N = 1,NSR                                                  20DE66
            IF ( ISTA - ISR(N) ) 1846,1844,1846                                 20DE66
 1844           REACTF(N) = REACT(J)                                            20DE66
            GO TO 1847                                                          20DE66
 1846       CONTINUE                                                           20DE66
```

```
 1847 PRINT 712, DW(J), DBM(J)                                          09AP5
      PRINT 711, ISTA, X, W(J), BM(J), REACT(J)                         09AP5
 1850      CONTINUE                                                     230C4
C-----INTERPOLATE AND DISTRIBUTE VALUES FROM TABLE 5                    02JE5
 1900           LSM = 0                                                 16JE5
      CALL INTERP3 ( MP7, NCT5, IN15, IN25, KR25, QMN2, QM, LSM, KSW5 ) 09MR6
C-----MOVABLE-LOAD SOLUTIONS                                            01JE5
 1980      IF ( JSTART - 4 ) 1990, 1990, 1995                           03JE5
 1990           ILS = 1 - JSTART                                        25MY5
           GO TO 2000                                                   25MY5
 1995           ILS = -3                                                25MY5
 2000      IF ( MLINC ) 2004, 2004, 2005                                09FE5
 2004 PRINT 940                                                         13JA5
           GO TO 2210                                                   13JA5
 2005      DO 2200  JL = JSTART, JSTOP, MLINC                           13JA5
C-----CLEAR MOVABLE-LOAD VALUES FROM TEMPORARY LIVE LOAD STORAGE         01JE5
           IF ( JL - MLINC ) 2006, 2006, 2009                           12NO4
 2006      DO 2007  JLINC = 1, MLINC                                    12NO4
                QLIVE(JLINC) = 0.0                                      12NO4
 2007      CONTINUE                                                     12NO4
           GO TO 2011                                                   12NO4
2009       DO 2010  JLINC = 1, MLINC                                    12NO4
                QLIVE(JL - JLINC) = 0.0                                 200C4
2010       CONTINUE                                                     200C4
C-----RELOCATE MOVABLE-LOAD PATTERN                                     01JE5
2011       DO 2020  LL = 4, MLP4                                        12NO4
                J = JL + LL - 4                                         200C4
           IF(J - 4) 2020, 2015, 2015                                   12NO4
 2015      IF ( J - MP4 ) 2017, 2017, 2021                              12NO4
 2017           QLIVE(J) = QM(LL)                                       12NO4
 2020      CONTINUE                                                     200C4
C-----SET TOTAL LOAD EQUAL TO FIXED LOAD PLUS THE MOVABLE-LOAD PATTERN  10FE6
 2021      DO 2022  J = 1, MP7                                          02JE5
                Q(J) = QD(J) + QLIVE(J)                                 200C4
 2022      CONTINUE                                                     200C4
      CALL BEAMCOL                                                      210C4
      CALL COMPARE                                                      13JA67
C-----STORE VALUES OF INFLUENCE LINES AND SUBTRACT FIXED LOADS          02JE5
                IL = JL + ILS                                           25MY5
           IF( NSD - 1 ) 2041,2035,2035                                 26SE7
 2035      DO 2040  N = 1, NSD                                          28SE7
                ISTA = ISD(N) + 4                                       06AP5
                DIL(IL,N) = W(ISTA) - WF(N)                             13JA67
 2040      CONTINUE                                                     18MR5
 2041      IF( NSM - 1 ) 2051,2045,2045                                 28SE7
 2045      DO 2050  N = 1, NSM                                          26SE7
                ISTA = ISM(N) + 4                                       06AP5
                BMIL(IL,N) = BM(ISTA)  - BMF(N)                         13JA67
 2050      CONTINUE                                                     18MR5
 2051      IF( NSV - 1 ) 2061,2055,2055                                 26SE7
 2055      DO 2060  N = 1, NSV                                          26SE7
                ISTA = ISV(N) + 4                                       06AP5
                VIL(IL,N) = OBM(ISTA)   - OBMF(N)                       13JA67
 2060      CONTINUE                                                     18MR5
 2061      IF( NSR - 1 ) 2200,2065,2065                                 26SE7
 2065      DO 2070  N = 1, NSR                                          26SE7
                ISTA = ISR(N) + 4                                       06AP5
                RIL(IL,N) = REACT(ISTA) - REACTF(N)                     13JA67
 2070      CONTINUE                                                     18MR5
 2200      CONTINUE                                                     200C4
```

```
          GO TO 2220                                                          09FE5
 2210     IF ( KEEPE ) 9980, 4010, 2220                                       27MR5
C-----PRINT ENVELOPES OF MAXIMUMS                                            10FE6
 2220 PRINT 11                                                               08MY3 ID
      PRINT 15, NPROB, ( AN2(N), N = 1, 14 )                                 28AG3 ID
      PRINT 800                                                              27MR5
      PRINT 801                                                              27MR5
          DO 2299  J = 3, MP5                                                13MR5
               T1 = 1H                                                       04JA67
               T2 = 1H                                                       04JA67
               T3 = 1H                                                       04JA67
               T4 = 1H                                                       04JA67
               ISTA = J - 4                                                  23DC4
          IF (IWX(J)- 8000)2230,2230,2225                                    11JA67
 2225          IWX(J) = IWX(J) - 10000                                       11JA67
               T1 = 1H*                                                      04JA67
 2230      IF(IWN(J)-8000 )2240,2240,2235                                    04JA67
 2235          IWN(J) = IWN(J) - 10000                                       11JA67
               T2 = 1H*                                                      04JA67
 2240      IF(IMX(J)-8000 )2250,2250,2245                                    04JA67
 2245          IMX(J) = IMX(J) - 10000                                       11JA67
               T3 = 1H*                                                      04JA67
 2250      IF(IMN(J)- 8000 ) 2260,2260,2255                                  04JA67
 2255          IMN(J) = IMN(J) - 10000                                       11JA67
               T4 = 1H*                                                      04JA67
 2260 PRINT 810,ISTA,VPLOT(J),IWX(J),T1,VPLOT(J+207),IWN(J),T2,              20JA67
     1         VPLOT(J+414),IMX(J),T3,VPLOT(J+621),IMN(J),T4                 20JA67
 2299     CONTINUE                                                           13MR5
      PRINT 820                                                              27MR5
      PRINT 830                                                              27MR5
               ISTA = -1                                                     09AP5
               IRX(3) = 999                                                  17JA67
               IRN(3) = 999                                                  17JA67
          IF(KEEPE ) 9980,2300,2301                                          13JA67
 2300          T5 =  1H                                                      13JA67
          GO TO 2302                                                         13JA67
 2301          T5 = 1H*                                                      17JA67
 2302 PRINT 835,ISTA,VPLOT(1245),IRX(3),T5,VPLOT(1452),IRN(3),T5             20JA67
          DO 2399  J = 4, MP5                                                09AP5
               T1 = 1H                                                       04JA67
               T2 = 1H                                                       04JA7
               ISTA = J - 4                                                  23DC4
          IF(IVX(J)-8000 )2305,2305,2303                                     13JA67
 2303          IVX(J) = IVX(J) - 10000                                       11JA67
               T1 = 1H*                                                      04JA67
 2305      IF(IVN(J)-8000 ) 2315,2315,2310                                   04JA67
 2310          IVN(J) = IVN(J) - 10000                                       11JA67
               T2 = 1H*                                                      04JA67
 2315 PRINT 840, VPLOT(J+828),IVX(J),T1,VPLOT(J+1035),IVN(J),T2              20JA67
               T1 = 1H                                                       04JA67
               T2 = 1H                                                       04JA67
          IF( IRX(J)-8000) 2340,2340,2335                                    04JA67
 2335          IRX(J) = IRX(J) - 10000                                       11JA67
               T1 = 1H*                                                      04JA67
 2340      IF(IRN(J)-8000 ) 2350,2350,2345                                   04JA67
 2345          IRN(J) = IRN(J) - 10000                                       11JA66
               T2 = 1H*                                                      04JA67
 2350 PRINT 835, ISTA,VPLOT(J+1242),IRX(J),T1,VPLOT(J+1449),IRN(J),T2        20JA67
 2399     CONTINUE                                                           13MR5
C-----PLOT ENVELOPES OF MAXIMUMS                                             01JE5
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      PRINT 900                                                          29MY5
          IF( KPLOT(1) + KPLOT(2) + KPLOT(3) + KPLOT(4) )9980,2405,2410 29MY5
 2405 PRINT 911                                                          29MY5
          GO TO 2500                                                     29MY5
C-----SET PLOT CONSTANTS                                                 10FE6
 2410           KSTOP = 1                                               29MY5
                HPOS = 10.0                                             12MR5
                HNEG = 0.0                                              12MR5
                SPACE = 0.5                                             12MR5
                VPOS = 2.0                                              12MR5
                VNEG = 2.0                                              12MR5
                KAXES = 0                                               12MR5
                HEND = M                                                15MR5
                NSYMB = 20                                              23JA67
                IOR = 0                                                 12MR5
                ISIZE = 2                                               12MR5
                HCOR = 2.0                                              12MR5
                VCOR = -2.25                                            12MR5
                KPS = 9                                                 12MR5
                IPLOT(1) = NPROB                                        27MR5
C-----FOLLOWING CARD IS ADDED FOR MICROFILM PLOT ON CDC 6600. THE USER
C     MAY PULL OUT THIS CARD FOR PLOT ON PAPER.
      CALL FILMSET                                                       08MR8
C-----DETERMINE HORIZONTAL SCALE                                         10FE6
      CALL SCALE ( HEND, HPOS )                                          12MR5
                HTCKS = HEND                                            12MR5
      PRINT 123, HEND                                                    27MY5
      PRINT 901                                                          25MY5
          DO 2499  K = 1, 8, 2                                           12MR5
                KC = ( K + 1 ) / 2                                      12MR5
          IF ( KPLOT(KC) ) 9980, 2499, 2420                             12MR5
 2420           VEND = 0.0                                              12MR5
C-----DETERMINE THE MAXIMUM VALUE OF THE PLOT VARIABLE                   02JE5
          DO 2430  J = 4, MP4                                           12MR5
                ZTEMP = -VPLOT(J,K+1)                                   02JE5
                VEND = MAX1F( VEND, VPLOT(J,K), ZTEMP )                 02JE5
 2430     CONTINUE                                                      12MR5
 2432 CALL SCALE ( VEND, VPOS )                                         23MR5
      PRINT 902, NAME(KC), VEND                                         25MY5
 2433     GO TO ( 2435, 2440, 2445, 2450 ), KC                         23MR5
 2435           IPLOT(2) =10H      DEFL                                23JA67
                N1 = 4                                                  12AP5
                NUMPTS = M + 1                                          12AP5
          DO 2437  J = 1, MP4                                           12AP5
                HPLOT(J) = J - 1                                        12AP5
 2437     CONTINUE                                                      12AP5
          GO TO 2455                                                    12MR5
 2440           IPLOT(2) =10H       MOM                                23JA67
                N1 = 4                                                  12AP5
                NUMPTS = M + 1                                          12AP5
          DO 2442  J = 1, MP4                                           12AP5
                HPLOT(J) = J - 1                                        12AP5
 2442     CONTINUE                                                      12AP5
          GO TO 2455                                                    12MR5
 2445           IPLOT(2) =10H     SHEAR                                23JA67
                N1 = 5                                                  12AP5
                NUMPTS = M                                              12AP5
          DO 2447  J = 1, MP4                                           12AP5
                F = J                                                   12AP5
                HPLOT(J) = F - 0.5                                      12AP5
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 2447      CONTINUE                                                          12AP5
           GO TO 2455                                                        12MR5
 2450           IPLOT(2) =10H     REACT                                    23JA67
                N1 = 4                                                      12AP5
                NUMPTS = M + 1                                              12AP5
           DO 2452  J = 1, MP4                                              12AP5
                HPLOT(J) = J - 1                                            12AP5
 2452      CONTINUE                                                          12AP5
 2455           VTCKS = VEND                                                27MR5
      CALL AXES ( HEND, HPOS, HNEG, SPACE, VEND, VPOS, VNEG, HTCKS,         12MR5
     1            VTCKS, KAXES )                                           12MR5
      CALL PLOTITL  ( IPLOT, NSYMB, IOR, ISIZE, HCOR, VCOR )                05JA67
      CALL PLOT ( HPLOT, VPLOT(N1,K), NUMPTS, KPS )                         12AP5
      CALL PLOT ( HPLOT, VPLOT(N1,K+1), NUMPTS, KPS )                       12AP5
      CALL AXTERM   ( 1 )                                                   05JA67
      CALL AXTERM   ( 1 )                                                   05JA67
 2499      CONTINUE                                                          12MR5
C-----TABULATE THE INFLUENCE DIAGRAMS                                       10FE6
 2500 PRINT 11                                                              08MY3 ID
      PRINT 15, NPROB, ( AN2(N), N = 1, 14 )                                28AG3 ID
      PRINT 110                                                             29MY5
      PRINT 115                                                             27MY5
           IF( NSD )9980,2555,2503                                          23JA67
 2503 PRINT 117, ( ISD(N), N = 1, NSD )                                     23JA67
 2510      IF ( ILOPD - 2 ) 2515, 2520, 2520                                25MY5
 2515 PRINT 909                                                             25MY5
           GO TO 2600                                                       25MY5
 2520      DO 2550  JL = JSTART, JSTOP                                      25MY5
                IL = JL + ILS                                               25MY5
                ISTA = JL - 4                                               25MY5
      PRINT 118, ISTA, ( DIL(IL,N), N = 1, NSD )                            25MY5
 2550      CONTINUE                                                         25MY5
           GO TO 2600                                                       25MY5
 2555 PRINT 903                                                             23JA67
 2600 PRINT 111                                                             25MY5
      PRINT 115                                                             27MY5
           IF( NSM )9980,2655,2603                                          23JA67
 2603 PRINT 117, ( ISM(N), N = 1, NSM )                                     23JA67
 2610      IF ( ILOPM - 2 ) 2615, 2620, 2620                                25MY5
 2615 PRINT 909                                                             25MY5
           GO TO 2700                                                       25MY5
 2620      DO 2650  JL = JSTART, JSTOP                                      25MY5
                IL = JL + ILS                                               25MY5
                ISTA = JL - 4                                               25MY5
      PRINT 118, ISTA, ( BMIL(IL,N), N = 1, NSM )                           25MY5
 2650      CONTINUE                                                         25MY5
           GO TO 2700                                                       25MY5
 2655 PRINT 903                                                             23JA67
 2700 PRINT 112                                                             25MY5
      PRINT 115                                                             27MY5
           IF( NSV )9980,2755,2703                                          23JA67
 2703 PRINT 117, ( ISV(N), N = 1, NSV )                                     23JA67
 2710      IF ( ILOPV - 2 ) 2715, 2720, 2720                                26MY5
 2715 PRINT 909                                                             25MY5
           GO TO 2800                                                       25MY5
 2720      DO 2750  JL = JSTART, JSTOP                                      25MY5
                IL = JL + ILS                                               25MY5
                ISTA = JL - 4                                               25MY5
      PRINT 118, ISTA, ( VIL(IL,N), N = 1, NSV )                            25MY5
 2750      CONTINUE                                                         25MY5
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          GO TO 2800                                                    25MY5
 2755 PRINT 903                                                         23JA67
 2800 PRINT 113                                                         25MY5
      PRINT 115                                                         27MY5
          IF( NSR )9980,2855,2803                                       23JA67
 2803 PRINT 117, ( ISR(N), N = 1, NSR )                                 23JA67
 2810     IF ( ILOPR - 2 ) 2815, 2820, 2820                             25MY5
 2815 PRINT 909                                                         25MY5
          GO TO 3000                                                    25MY5
 2820     DO 2850  JL = JSTART, JSTOP                                   25MY5
               IL = JL + ILS                                            25MY5
               ISTA = JL - 4                                            25MY5
      PRINT 118, ISTA, ( RIL(IL,N), N = 1, NSR )                        25MY5
 2850     CONTINUE                                                      25MY5
          GO TO 3000                                                    25MY5
 2855 PRINT 903                                                         23JA67
C-----PLOT INFLUENCE LINES                                              01JE5
 3000     IF ( NSM + NSD + NSV + NSR ) 9980, 4010, 3002                 19AG5
 3002     IF ( ILOPD - 2 ) 3010, 3004, 3010                             19AG5
 3004     IF ( ILOPM - 2 ) 3010, 3006, 3010                             19AG5
 3006     IF ( ILOPV - 2 ) 3010, 3008, 3010                             19AG5
 3008     IF ( ILOPR - 2 ) 3010, 3009, 3010                             19AG5
 3009 PRINT 120                                                         19AG5
      PRINT 911                                                         19AG5
          GO TO 4010                                                    19AG5
 3010     IF ( KSTOP ) 9980, 3015, 3030                                 22MR5
C-----SET PLOT CONSTANTS                                                10FE6
 3015          KSTOP = 1                                                22MR5
               HPOS = 10.0                                              22MR5
               HNEG = 0.0                                               22MR5
               SPACE = 0.5                                              22MR5
               VPOS = 2.0                                               22MR5
               VNEG = 2.0                                               22MR5
               IOR = 0                                                  22MR5
               ISIZE = 2                                                22MR5
               VCOR = -2.25                                             22MR5
               KPS = 9                                                  22MR5
 3030          IPLOT(1) = NPROB                                         25MY5
               KAXES = 16                                               25MY5
               N1 = 1                                                   25MY5
               IT1S = -8                                                07JE5
               NPTS = 2                                                 07JE5
               NSYMB = 30                                               23JA67
          IF ( JSTART - 4 ) 3050, 3050, 3075                            25MY5
 3050          HEND = MP4 - JSTART                                      25MY5
               HOR(1) = 4 - JSTART                                      07JE5
          GO TO 3100                                                    25MY5
 3075          HEND = M                                                 25MY5
               HOR(1) = 0.0                                             07JE5
 3100          NUMPTS = MP4 + ILS                                       31MY5
               HOR(2) = HOR(1)                                          07JE5
C-----SET HORIZONTAL SCALE                                              10FE6
      CALL SCALE ( HEND, HPOS )                                         22MR5
               HTCKS = HEND                                             28MY5
               HCOR = 10. * HOR / HEND + 2.0                            03JE5
      PRINT 120                                                         25MY5
      PRINT 123, HEND                                                   25MY5
      PRINT 124                                                         25MY5
          DO 3125  J = 1, NUMPTS                                        25MY5
               HPLOT(J) = J - 1                                         25MY5
```

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 3125     CONTINUE                                                          25MY5
          IF ( ILOPD - 2 ) 3205, 3300, 3205                                 26MY5
 3205          IPLOT(2) =10H      DEFL                                      23JA67
          IF ( NSD ) 9980, 3300, 3206                                       24JA67
 3206     DO 3299 N = 1, NSD                                                21JA67
               VEND = 0.0                                                   25MY5
          DO 3240  J = N1, NUMPTS                                           25MY5
              ZTEMP = ABSF ( DIL(J,N) )                                     22MR5
          IF ( ZTEMP - VEND ) 3240, 3240, 3235                              25MY5
 3235          VEND = ZTEMP                                                25MY5
 3240     CONTINUE                                                          25MY5
C-----SET VERTICAL SCALE                                                   10FE6
      CALL SCALE ( VEND, VPOS )                                             22MR5
               VTCKS = VEND                                                 22MR5
      CALL AXES ( HEND, HPOS, HNEG, SPACE, VEND, VPOS, VNEG, HTCKS,         22MR5
     1            VTCKS, KAXES )                                          22MR5
      CALL PLOT ( HPLOT, DIL(N1,N), NUMPTS, KPS )                           12AP5
      ENCODE (10, 60, IPLOT(3) ) ISD(N)                                     23JA67
      CALL PLOTITL  ( IPLOT, NSYMB, IOR, ISIZE, HCOR, VCOR )                05JA67
               VOR(1) = VEND                                                07JE5
               VOR(2) = -VEND                                               07JE5
      CALL PLOT ( HOR, VOR, NPTS, IT1S )                                    25MY5
      CALL AXTERM    ( 1 )                                                  05JA67
      CALL AXTERM    ( 1 )                                                  05JA67
      PRINT 125, ISD(N), NAME(1), VEND                                      27MY5
 3299     CONTINUE                                                          26MY5
 3300     IF ( ILOPM - 2 ) 3305, 3400, 3305                                 26MY5
 3305          IPLOT(2) =10H       MOM                                     23JA67
          IF( NSM ) 9980, 3400, 3306                                        24JA67
 3306     DO 3399 N = 1, NSM                                                21JA67
               VEND = 0.0                                                   22MR5
          DO 3340  J = N1, NUMPTS                                           25MY5
               ZTEMP = ABSF ( BMIL(J,N) )                                   22MR5
          IF ( ZTEMP - VEND ) 3340,  3340, 3335                             25MY5
 3335          VEND = ZTEMP                                                25MY5
 3340    CONTINUE                                                           25MY5
      CALL SCALE ( VEND, VPOS )                                             22MR5
               VTCKS = VEND                                                 22MR5
      CALL AXES ( HEND, HPOS, HNEG, SPACE, VEND, VPOS, VNEG, HTCKS,         22MR5
     1            VTCKS, KAXES )                                          22MR5
      CALL PLOT ( HPLOT, BMIL(N1,N), NUMPTS, KPS )                          12AP5
      ENCODE (10, 60, IPLOT(3) ) ISM(N)                                     23JA67
      CALL PLOTITL  ( IPLOT, NSYMB, IOR, ISIZE, HCOR, VCOR )                05JA67
               VOR(1) = VEND                                                07JE5
               VOR(2) = -VEND                                               07JE5
      CALL PLOT ( HOR, VOR, NPTS, IT1S )                                    25MY5
      CALL AXTERM    ( 1 )                                                  05JA67
      CALL AXTERM    ( 1 )                                                  05JA67
      PRINT 125, ISM(N), NAME(2), VEND                                      27MY5
 3399     CONTINUE                                                          26MY5
 3400     IF ( ILOPV - 2 ) 3405, 3500, 3405                                 27MY5
 3405          IPLOT(2) =10H      SHEAR                                     23JA67
          IF( NSV ) 9980, 3500, 3406                                        24JA67
 3406     DO 3499 N = 1, NSV                                                21JA67
               VEND = 0.0                                                   22MR5
          DO 3440  J = N1, NUMPTS                                           25MY5
               ZTEMP = ABSF ( VIL(J,N) )                                    27MY5
          IF ( ZTEMP - VEND ) 3440, 3440, 3435                              25MY5
 3435          VEND = ZTEMP                                                25MY5
 3440     CONTINUE                                                          25MY5
```

```
      CALL SCALE ( VEND, VPOS )                                          22MR5
           VTCKS = VEND                                                  22MR5
      CALL AXES ( HEND, HPOS, HNEG, SPACE, VEND, VPOS, VNEG, HTCKS,      22MR5
     1            VTCKS, KAXES )                                         22MR5
      CALL PLOT ( HPLOT, VIL(N1,N), NUMPTS, KPS )                        12AP5
      ENCODE (10, 60, IPLOT(3) ) ISV(N)                                  23JA67
      CALL PLOTITL  ( IPLOT, NSYMB, IOR, ISIZE, HCOR, VCOR )             05JA67
           VOR(1) = VEND                                                 07JE5
           VOR(2) = -VEND                                                07JE5
      CALL PLOT ( HOR, VOR, NPTS, IT1S )                                 25MY5
      CALL AXTERM   ( 1 )                                                05JA67
      CALL AXTERM   ( 1 )                                                05JA67
      PRINT 125, ISV(N), NAME(3), VEND                                   24MR5
 3499     CONTINUE                                                        26MY5
 3500     IF ( ILOPR - 2 ) 3505, 4010, 3505                               27MY5
 3505          IPLOT(2) =10H     REACT                                   23JA67
          IF( NSR ) 9980, 4010, 3506                                      24JA67
 3506     DO 3599 N = 1, NSR                                              21JA67
           VEND = 0.0                                                     22MR5
          DO 3540  J = N1, NUMPTS                                         25MY5
           ZTEMP = ABSF ( RIL(J,N) )                                      27MY5
          IF ( ZTEMP - VEND ) 3540, 3540, 3535                            25MY5
 3535      VEND = ZTEMP                                                   25MY5
 3540     CONTINUE                                                        25MY5
      CALL SCALE ( VEND, VPOS )                                          22MR5
           VTCKS = VEND                                                  22MR5
      CALL AXES ( HEND, HPOS, HNEG, SPACE, VEND, VPOS, VNEG, HTCKS,      22MR5
     1            VTCKS, KAXES )                                         22MR5
      CALL PLOT ( HPLOT, RIL(N1,N), NUMPTS, KPS )                        12AP5
      ENCODE (10, 60, IPLOT(3) ) ISR(N)                                  23JA67
      CALL PLOTITL  ( IPLOT, NSYMB, IOR, ISIZE, HCOR, VCOR )             05JA67
           VOR(1) = VEND                                                 07JE5
           VOR(2) = -VEND                                                07JE5
      CALL PLOT ( HOR, VOR, NPTS, IT1S )                                 25MY5
      CALL AXTERM   ( 1 )                                                05JA67
      CALL AXTERM   ( 1 )                                                05JA67
      PRINT 125, ISR(N), NAME(4), VEND                                   24MR5
 3599     CONTINUE                                                        26MY5
 4010 CALL TIC TOC (4)                                                   08MR8
C-----RETURN TO TAKE NEXT PROBLEM                                        10JE3
          GO TO 1010                                                     26AG3 ID
 9980 PRINT 980                                                          31DE4
C-----COMPLETION OF RUN                                                  10JE3
 9990     CONTINUE                                                        12MR5 ID
          IF ( KSTOP ) 9995, 9995, 9992                                  22MR5
 9992 CALL AXTERM   ( 0 )                                                05JA67
 9995     CONTINUE                                                        22MR5
 9999     CONTINUE                                                        04MY3 ID
      PRINT 11                                                           08MY3 ID
      PRINT 1                                                            18FE5 ID
      PRINT 13, ( AN1(N), N = 1, 32 )                                    18FE5 ID
      PRINT 19                                                           26AG3 ID
      END                                                                04MY3 ID
```

```
      SUBROUTINE INTERP3 ( MP7, NCT, JN1, JN2, KR2, ZN, Z, LSM, KSW )   10FE6

      DIMENSION JN1(100), JN2(100), KR2(100), ZN(100), Z(207), KSW(100) 10FE6
  905 FORMAT ( //40H     ERROR STOP -- STATIONS NOT IN ORDER )          14MY5
  908 FORMAT ( //43H     UNDESIGNATED ERROR STOP IN SUBROUTINE  )       14MY5
  909 FORMAT ( //46H     ERROR -- NON-ZERO DATA BEYOND END OF BEAM  )   14MY5
          DO 1603  J = 1, MP7                                           26MR5
              Z(J) = 0.0                                                26MR5
 1603     CONTINUE                                                      26MR5
              ASM = LSM                                                 12AP5
              ASM = ASM / 2.                                            09AP5
              M = MP7 - 7                                               10FE6
              KR1 = 0                                                   12JA5
          IF( NCT - 1 ) 1674,1604,1604                                  28SE7
 1604     DO 1675  NC = 1, NCT                                          26SE7
          IF ( KR1 ) 1698, 1605, 1607                                   10FE6
 1605         NC1 = NC                                                  12JA5
              JV = JN1(NC1) + LSM                                       12AP5
          IF ( KR2(NC) ) 1698, 1607, 1670                               10FE6
 1607     IF ( JN2(NC) - M ) 1609, 1609, 1611                           24FE6
 1609         JS2 = JN2(NC)                                             10FE6
              ZNS = ZN(NC)                                              21FE6
          GO TO 1619                                                    10FE6
 1611         JS2 = M                                                   10FE6
              ZNS = ZN(NC1) + ( ZN(NC) - ZN(NC1) ) * ( JS2 - JV + LSM )10MR6
     1              / ( JN2(NC) - JV + LSM )                            10MR6
              KASS = KSW(NC)                                            21SE66
          GO TO  ( 1613, 1615, 1617, 1617 ), KASS                       21SE66
 1613     IF ( JN1(NC) - M ) 1619, 1619, 1670                           10FE6
 1615     IF ( JN1(NC1) - M ) 1619, 1619, 1670                          10FE6
 1617     IF ( KSW(NC1) - 2 ) 1618, 1615, 1618                          09MR6
 1618     IF ( JN2(NC1) - M ) 1619, 1619, 1670                          09MR6
 1619         J1 = JV + 4                                               10FE6
              J2 = JS2 + 4                                              10FE6
              DENOM = J2 - J1 + LSM                                     12AP5
              JINCR = 1                                                 12JA5
              ESM = 1.0                                                 12JA5
              ISW = 1                                                   12JA5
          IF ( DENOM ) 1695, 1620, 1630                                 12JA5
 1620         DENOM = 1.0                                               12JA5
              ISW = 0                                                   12JA5
          IF ( J2 - J1 ) 1651, 1630, 1630                               08MR8
 1630     DO 1650  J = J1, J2, JINCR                                    12JA5
              F = J                                                     09AP5
              F1 = J1                                                   09AP5
              DIFF = F - F1 + ASM                                       09AP5
              PART = DIFF / DENOM                                       12JA5
              Z(J) = Z(J) + ( ZN(NC1) + PART * ( ZNS - ZN(NC1) )) * ESM10FE6
 1650     CONTINUE                                                      12JA5
 1651     IF ( LSM ) 1698, 1652, 1660                                   08MR8
 1652     IF ( ISW ) 1698, 1660, 1655                                   09AP5
 1655         JINCR = J2 - J1                                           12JA5
              ESM = -0.5                                                12JA5
              ISW = 0                                                   12JA5
          GO TO 1630                                                    12JA5
 1660     IF ( KR2(NC) ) 1698, 1670, 1665                               12JA5
 1665         JV = JN2(NC) + LSM                                        12AP5
 1670         KR1 = KR2(NC)                                             12JA5
              NC1 = NC                                                  12JA5
```

```
 1675      CONTINUE                                                          12JA5
 1674      CONTINUE                                                          21SE66
                MP5 = MP7 - 2                                               20MY5
                MP6 = MP7 - 1                                               20MY5
C-----TEST FOR DATA ERRONEOUSLY STORED BEYOND ENDS OF REAL BEAM             08MR8
                ZCK = Z(1) + Z(2) + Z(3) + Z(MP5) + Z(MP6) + Z(MP7)         14MY5
           IF ( ZCK ) 1699, 1676, 1699                                      14MY5
 1676 RETURN                                                                14MY5
 1695 PRINT 905                                                             14MY5
           GO TO 1799                                                       05JA67
 1698 PRINT 908                                                             14MY5
           GO TO 1799                                                       05JA67
 1699 PRINT 909                                                             14MY5
 1799      CONTINUE                                                         05JA67
      END                                                                   12JA5
```

```
      SUBROUTINE COMPARE                                                13JA67

      DIMENSION F(207), Q(207), S(207), T(207), R(207), P(207), WS(20), 13MR5
     1          DWS(20), KEY(207), W(207), DW(207), BM(207), DBM(207),  13MR5
     2          REACT(207), BMMAX(207), BMMIN(207), WMAX(207),          13MR5
     3          WMIN(207), VMAX(207), VMIN(207), RMAX(207), RMIN(207),  13MR5
     4          IMX(207), IMN(207), IWX(207), IWN(207), IVX(207),       13MR5
     5          IVN(207), IRX(207), IRN(207)                            28MY5
      COMMON F, Q, S, T, R, P, KEY, WS, DWS, W, DW, BM, DBM, REACT,     26OC4
     2       IMX, IMN, IWX, IWN, IVX, IVN, IRX, IRN, JL, H, HE2, HE3,  27MR5
     3       HT2, M, MP4, MP5                                          27MR5
      COMMON/A/WMAX,WMIN,BMMAX,BMMIN,VMAX,VMIN,RMAX,RMIN                28JA7
          DO 2100  J = 3, MP5                                           26OC4
          IF ( BM(J) - BMMAX(J) ) 2030, 2030, 2025                      20OC4
2025           BMMAX(J) = BM(J)                                         20OC4
               IMX(J) = JL - 4                                          26MR5
          GO TO 2040                                                    20OC4
2030      IF ( BM(J) - BMMIN(J) ) 2035, 2040, 2040                      20OC4
2035           BMMIN(J) = BM(J)                                         20OC4
               IMN(J) = JL - 4                                          26MR5
2040      IF ( W(J) - WMAX(J) ) 2050, 2050, 2045                        20OC4
2045           WMAX(J) = W(J)                                           20OC4
               IWX(J) = JL - 4                                          26MR5
          GO TO 2060                                                    20OC4
2050      IF ( W(J) - WMIN(J) ) 2055, 2060, 2060                        20OC4
2055           WMIN(J) = W(J)                                           20OC4
               IWN(J) = JL - 4                                          26MR5
2060      IF ( DBM(J) - VMAX(J) ) 2070, 2070, 2065                      20OC4
2065           VMAX(J) = DBM(J)                                         20OC4
               IVX(J) = JL - 4                                          26MR5
          GO TO 2080                                                    20OC4
2070      IF ( DBM(J) - VMIN(J) ) 2075, 2080, 2080                      20OC4
2075           VMIN(J) = DBM(J)                                         20OC4
               IVN(J) = JL - 4                                          26MR5
2080      IF ( REACT(J) - RMAX(J) ) 2090, 2090, 2085                    20OC4
2085           RMAX(J) = REACT(J)                                       20OC4
               IRX(J) = JL - 4                                          26MR5
          GO TO 2100                                                    20OC4
2090      IF ( REACT(J) - RMIN(J) ) 2095, 2100, 2100                    20OC4
2095           RMIN(J) = REACT(J)                                       20OC4
               IRN(J) = JL - 4                                          26MR5
2100      CONTINUE                                                      20OC4
      RETURN
      END                                                               30ND4
```

```
      SUBROUTINE SCALE ( SEND, ST )                                    14MY5

                KEXP = 0                                               11MR5
           IF ( SEND ) 5710, 5705, 5710                                12AP5
5705            SEND = 1.0                                             12AP5
      RETURN                                                           12AP5
5710            S1 = ST * .1                                           14MY5
                S2 = ST * .2                                           11MR5
                S5 = ST * .5                                           11MR5
                STEMP = SEND                                           29AP5
           DO 5770  N = 1, 100                                         11MR5
           IF ( ST - SEND ) 5715, 5750, 5720                           11MR5
5715            SEND = SEND / 10.                                      11MR5
                KEXP = KEXP + 1                                        11MR5
           GO TO 5770                                                  11MR5
5720       IF ( S1 - SEND ) 5730, 5725, 5725                           11MR5
5725            SEND = SEND * 10.                                      11MR5
                KEXP = KEXP - 1                                        11MR5
           GO TO 5770                                                  11MR5
5730       IF ( S2 - SEND ) 5735, 5740, 5740                           11MR5
5735       IF ( S5 - SEND ) 5750, 5745, 5745                           11MR5
5740            SEND = S2                                              11MR5
           GO TO 5755                                                  11MR5
5745            SEND = S5                                              11MR5
           GO TO 5755                                                  11MR5
5750            SEND = ST                                              11MR5
5755            SEND = SEND * 10. ** KEXP                              11MR5
      RETURN                                                           11MR5
5770       CONTINUE                                                    11MR5
           IF ( KEXP ) 5773, 5773, 5775                                12AP5
5773            SEND = 1.0                                             12AP5
      RETURN                                                           27AP5
5775            SEND = STEMP                                           28AP5
      RETURN                                                           12AP5
      END                                                              11MR5
```

```
      SUBROUTINE BEAMCOL                                                    21OC4

      DIMENSION F(207), Q(207), S(207), T(207), R(207), P(207), WS(20),  13MR5
     1          DWS(20), KEY(207), W(207), DW(207), BM(207), DBM(207),   15MR5
     2          REACT(207), BMMAX(207), BMMIN(207), WMAX(207),           13MR5
     3          WMIN(207), VMAX(207), VMIN(207), RMAX(207), RMIN(207),   13MR5
     4          IMX(207), IMN(207), IWX(207), IWN(207), IVX(207),        13MR5
     5          IVN(207), IRX(207), IRN(207), A(207), B(207), C(207),    28MY5
     6          VPLOT(207,8)                                             28MY5
      COMMON F, Q, S, T, R, P, KEY, WS, DWS, W, DW, BM, DBM, REACT,      26OC4
     2       IMX, IMN, IWX, IWN, IVX, IVN, IRX, IRN, JL, H, HE2, HE3,    27MR5
     3       HT2, M, MP4, MP5                                            27MR5
C-----START OF BEAM-COLUMN SOLUTION                                      10JE3
 6000          NS = 1                                                    04JE3
               A(1) = 0                                                  01SE66
               A(2) = 0                                                  01SE66
               B(1) = 0                                                  01SE66
               B(2) = 0                                                  01SE66
               C(1) = 0                                                  01SE66
               C(2) = 0                                                  01SE66
          DO 6060 J = 3, MP5                                             04JE3
C-----COMPUTE MATRIX COEFFS AT EACH STA J                                10JE3
               AA = F(J-1) - .25 * H * R(J-1)                            14AP5
               BB = -2.0 * ( F(J-1) + F(J) ) - HE2 * P(J)                14AP5
               CC = F(J-1) + 4.0 * F(J) + F(J+1) + HE3 * S(J) +          14AP5
     1              .25 * H * ( R(J-1) + R(J+1) ) + HE2 * ( P(J) +      19AP5
     2              P(J+1) )                                            19AP5
               DD = -2.0 * ( F(J) + F(J+1) ) - HE2 * P(J+1)              14AP5
               EE = F(J+1) - .25 * H * R(J+1)                            14AP5
               FF = HE3 * Q(J) - 0.5 * HE2 * ( T(J-1) - T(J+1) )         14JE3
C-----COMPUTE RECURSION OR CONTINUITY COEFFS AT EACH STA                  10JE3
               E = AA * B(J-2) + BB                                      28MY3
               DENOM = E * B(J-1) + AA * C(J-2) + CC                     28MY3
          IF ( DENOM ) 6010, 6005, 6010                                  28MY3
C-----NOTE IF DENOM IS ZERO, BEAM DOES NOT EXIST, D = 0 SETS DEFL = 0.   10JE3
 6005          D = 0.0                                                   28MY3
          GO TO 6015                                                     28MY3
 6010          D = - 1.0 / DENOM                                         28MY3
 6015          C(J) = D * EE                                             28MY3
               B(J) = D * ( E * C(J-1) + DD )                            28MY3
               A(J) = D * ( E * A(J-1) + AA * A(J-2) - FF )              28MY3
C-----CONTROL RESET ROUTINES FOR SPECIFIED CONDITIONS                    10JE3
               KEYJ = KEY(J)                                             04JE3
          GO TO ( 6060, 6020, 6030, 6020, 6050 ), KEYJ                   20JA4
C-----RESET FOR SPECIFIED DEFLECTION                                     20JA4
 6020          C(J) = 0.0                                                05JE3
               B(J) = 0.0                                                28MY3
               A(J) = WS(NS)                                             05JE3
          IF ( KEYJ - 3 ) 6059, 6030, 6060                               20JA4
C-----RESET FOR SPECIFIED SLOPE AT NEXT STA                              17JA4
 6030          DTEMP = D                                                 05JE3
               CTEMP = C(J)                                              28MY3
               BTEMP = B(J)                                              28MY3
               ATEMP = A(J)                                              28MY3
               C(J) = 1.0                                                28MY3
               B(J) = 0.0                                                28MY3
               A(J) = - HT2 * DWS(NS)                                    05JE3
          GO TO 6060                                                     04JE3
C-----RESET FOR SPECIFIED SLOPE AT PRECEDING STATION                     23MR4
```

```
 6050           DREV = 1.0 / ( 1.0 - ( BTEMP * B(J-1) + CTEMP - 1.0 ) *  05JE3
     1                  D / DTEMP )                                      04JE3
                CREV = DREV * C(J)                                       28MY3
                BREV = DREV * ( B(J) + ( BTEMP * C(J-1) ) * D / DTEMP )  28MY3
                AREV = DREV * ( A(J) + ( HT2 * DWS(NS) + ATEMP + BTEMP   05JE3
     1                  * A(J-1) ) * D / DTEMP )                         04JE3
                C(J) = CREV                                              28MY3
                B(J) = BREV                                              28MY3
                A(J) = AREV                                              28MY3
 6059           NS = NS+1                                                19AG6
 6060      CONTINUE                                                      19AG6
C-----COMPUTE DEFLECTIONS                                               19AG6
                W(M+6) = 0                                               30MR7
                W(M+7) = 0                                               30MR7
           DO 6100  L = 3, MP5                                           19AG6
                J = M + 8 - L                                            19AG6
                W(J) = A(J) + B(J) * W(J+1) + C(J) * W(J+2)              19AG6
 6100      CONTINUE                                                      19AG6
                W(2) = 2.0 * W(3) - W(4)                                 19AG6
                W(M+6) = 2.0 * W(MP5) - W(MP4)                           19AG6
           DO 8100  J = 3, MP5                                           19AG6
                DW(J) = ( -W(J-1) + W(J) ) / H                           19AG6
                BM(J) = F(J) * ( W(J-1) - 2.0 * W(J) + W(J+1) ) / HE2    19AG6
 8100      CONTINUE                                                      19AG6
                BM(2) = 0.0                                              19AG6
                BM(M+6) = 0.0                                            19AG6
           DO 8200  J = 3, MP5                                           19AG6
                DBM(J) = ( -BM(J-1) + BM(J) ) / H                        19AG6
     1                     -P(J) * ( -W(J-1) + W(J) ) / H                19AG6
                KEYJ = KEY(J)                                            23SE66
           GO TO ( 8140, 8120, 8140, 8120, 8140 ), KEYJ                  23SE66
 8120           REACT(J) = ( BM(J-1) - 2.0 * BM(J) + BM(J+1) ) / H       19AG6
     1                      - Q(J) + ( T(J-1) - T(J+1) ) / ( 2.0 * H )   19AG6
     2                      - ( R(J-1) * W(J-2) - R(J-1) * W(J) - R(J+1) 19AG6
     3                      * W(J) + R(J+1)*W(J+2) ) / ( 4.0 * HE2 )     19AG6
     4                      - ( P(J) * W(J-1) - P(J) * W(J) - P(J+1)     19AG6
     5                      * W(J) + P(J+1) * W(J+1) ) / H               19AG6
           GO TO 8200                                                    19AG6
 8140           REACT(J) =-S(J) * W(J)                                   30MR7
 8200      CONTINUE                                                      19AG6
      RETURN
      END                                                               19AG6
```

```
      SUBROUTINE TIC TOC (J)                                                240C66

C----- TIC TOC (1) = COMPILE TIME                                           08MR8
C      TIC TOC (2) = ELAPSED CPU TIME                                        08MR8
C      TIC TOC (3) = TIME FOR THIS PROBLEM                                   08MR8
C      TIC TOC (4) = TIME FOR THIS PROBLEM AND ELAPSED CPU TIME              08MR8
   10 FORMAT(///30X19HELAPSED CPU TIME = I5,8H MINUTESF9.3,8H SECONDS )     25SE66
   11 FORMAT(///30X15HCOMPILE TIME = ,I5,8H MINUTES,F9.3,8H SECONDS    )    25SE66
   12 FORMAT(///30X24HTIME FOR THIS PROBLEM = ,I5,8H MINUTES,F9.3,          25SE66
     1        8H SECONDS  )                                                 25SE66
              I = J - 2                                                     240C66
          IF( I-1 ) 40,30,30                                                25SE66
   30         FI4 = F                                                       25SE66
   40 CALL SECOND (F)                                                       25SE66
              II1 = F                                                       25SE66
              I1 = III / 60                                                 25SE66
              FI2 =  F - I1*60                                              25SE66
          IF( I ) 50,70,60                                                  25SE66
   50 PRINT 11, I1,FI2                                                      25SE66
          GO TO 990                                                         25SE66
   60         FI3 = F - FI4                                                 25SE66
              I2 = FI3 / 60                                                 25SE66
              FI3 = FI3 - I2*60                                             25SE66
      PRINT 12, I2, FI3                                                     25SE66
          IF( I-1 ) 990,990,70                                              25SE66
   70 PRINT 10, I1,FI2                                                      25SE66
  990 CONTINUE                                                              25SE66
      RETURN                                                                25SE66
      END                                                                   25SE66
```

APPENDIX 6

LISTING OF DATA FOR EXAMPLE PROBLEMS

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```
CHG CE244010          CODED BY JJP                                RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT
    1      THREE SPAN STRUCTURE, FIXED LOAD ONLY
                                                1    4    9    0    0    1    1    1    1
        80              2.400E+01                    0    0    0    1
         0          1 0.000E+00
        25          1 0.000E+00
        55          1 0.000E+00
        80          1 0.000E+00
         0   80       4.147E+10-6.000E+02
        19          1 0.000E+00 0.000E+00
             25     1 3.953E+10-1.500E+02
             31       0.000E+00 0.000E+00
        49          1 0.000E+00 0.000E+00
             55     1 3.953E+10-1.500E+02
             61       0.000E+00 0.000E+00
        25   25                                                  3.873E+07
        55   55                                                  3.873E+07
    2      THREE SPAN STRUCTURE, FIXED LOADS PLUS MOVING LOADS
         0    0    1    1    0    0    1    0    0    3    0    1    1    1    1
        80              2.400E+01                   14  -14   80    1
         0    0                 -7.300E+02
         7    7                 -2.920E+03
        14   14                 -2.920E+03
    3      THREE SPAN STRUCTURE, ALL PREVIOUS LOADS PLUS SUPPORT SETTLEMENTS
         1    1    0    1    1    0    0    4    0    0    0    1    1    1    1
         0          1 0.000E+00
        25          1-1.250E+00
        55          1-6.250E-01
        80          1 0.000E+00
    4      THREE SPAN STRUCTURE, INFLUENCE DIAGRAMS FOR ONE MOVING LOAD
                                                1    4    9    3    4    0    0    0    0
        80              2.400E+01                   14  -14   80    1
         0          1 0.000E+00
        25          1 0.000E+00
        55          1 0.000E+00
        80          1 0.000E+00
         0   80       4.147E+10-6.000E+02
        19          1 0.000E+00 0.000E+00
             25     1 3.953E+10-1.500E+02
             31       0.000E+00 0.000E+00
        49          1 0.000E+00 0.000E+00
             55     1 3.953E+10-1.500E+02
             61       0.000E+00 0.000E+00
        25   25                                                  3.873E+07
        55   55                                                  3.873E+07
         0    0                 -7.300E+02
         7    7                 -2.920E+03
        14   14                 -2.920E+03
         2    3          11   40
         3    3           9   25   40
         0    0
         0    0
```

```
5     TWO SPAN GIRDER, RAILROAD LOADING
                                          1     3     1    14     0     1     1     1     1
 86              1.200E+01                      79   -80    86     2
  0            1 0.000E 00
 43            1 0.000E 00
 86            1 0.000E 00
  0    86         2.440E 11-1.000E 03                                                -3.300E 04
  0     0                  -1.000E 04
  8     8                  -2.000E 04
 13    13                  -2.000E 04
 18    18                  -2.000E 04
 23    23                  -2.000E 04
 32    32                  -1.300E 04
 37    37                  -1.300E 04
 43    43                  -1.300E 04
 48    48                  -1.300E 04
 56    56                  -1.000E 04
 64    64                  -2.000E 04
 69    69                  -2.000E 04
 74    74                  -2.000E 04
 79    79                  -2.000E 04
```

APPENDIX 7

COMPUTED RESULTS FOR EXAMPLE PROBLEMS

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PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB
1 THREE SPAN STRUCTURE, FIXED LOAD ONLY

TABLE 1 - PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4	5	6
HOLD FROM PRECEDING PROBLEM (1=HOLD)	0	0	0	0	0	0
NUM CARDS INPUT THIS PROBLEM		1	4	9	0	0

	DEFL	MOM	SHR	RCT
OPTION (IF=1) TO PLOT ENVELOPES OF MAXIMUMS	1	1	1	1

TABLE 2 - CONSTANTS

NUM INCREMENTS	80
INCREMENT LENGTH	2.400E+01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	0
INITIAL POSITION OF MOVABLE LOAD STA ZERO	0
FINAL POSITION OF MOVABLE LOAD STA ZERO	0
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	1

TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES

STA	CASE	DEFLECTION	SLOPE
0	1	0.	NONE
25	1	0.	NONE
55	1	0.	NONE
80	1	0.	NONE

TABLE 4 - STIFFNESS AND FIXED-LOAD DATA

FROM	TO	CONTD	F	QF	S	T	R	P
0	80	-0	4.147E+10	-6.000E+02	-0.	-0.	-0.	-0.
19		1	0.	0.	-0.	-0.	-0.	-0.
	25	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	31	-0	0.	0.	-0.	-0.	-0.	-0.
49		1	0.	0.	-0.	-0.	-0.	-0.
	55	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	61	-0	0.	0.	-0.	-0.	-0.	-0.
25	25	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.
55	55	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.

TABLE 5 - MOVABLE-LOAD DATA

FROM TO CONTD QM

NONE

TABLE 6 - SPECIFIED STATIONS FOR INFLUENCE DIAGRAMS
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

NONE

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB (CONTD)
1 THREE SPAN STRUCTURE, FIXED LOAD ONLY

TABLE 7 - FIXED-LOAD RESULTS

STA I	DIST	DEFL	SLOPE	MOM	SHEAR	SUP REACT
-1	-2.400E+01	6.103E-02		0.		-0.
			-2.543E-03		-3.331E-10	
0	0.	0.		-7.993E-09		5.476E+03
			-2.543E-03		5.176E+03	
1	2.400E+01	-6.103E-02		1.242E+05		-0.
			-2.471E-03		4.576E+03	
2	4.800E+01	-1.203E-01		2.340E+05		-0.
			-2.336E-03		3.976E+03	
3	7.200E+01	-1.764E-01		3.294E+05		-0.
			-2.145E-03		3.376E+03	
4	9.600E+01	-2.279E-01		4.105E+05		-0.
			-1.908E-03		2.776E+03	
5	1.200E+02	-2.737E-01		4.771E+05		-0.
			-1.631E-03		2.176E+03	
6	1.440E+02	-3.128E-01		5.293E+05		-0.
			-1.325E-03		1.576E+03	
7	1.680E+02	-3.446E-01		5.671E+05		-0.
			-9.969E-04		9.756E+02	
8	1.920E+02	-3.685E-01		5.905E+05		-0.
			-6.552E-04		3.756E+02	
9	2.160E+02	-3.843E-01		5.995E+05		-0.
			-3.082E-04		-2.244E+02	
10	2.400E+02	-3.917E-01		5.941E+05		-0.
			3.564E-05		-8.244E+02	
11	2.640E+02	-3.908E-01		5.744E+05		-0.
			3.680E-04		-1.424E+03	
12	2.880E+02	-3.820E-01		5.402E+05		-0.
			6.807E-04		-2.024E+03	
13	3.120E+02	-3.656E-01		4.916E+05		-0.
			9.651E-04		-2.624E+03	
14	3.360E+02	-3.425E-01		4.286E+05		-0.
			1.213E-03		-3.224E+03	
15	3.600E+02	-3.134E-01		3.512E+05		-0.
			1.416E-03		-3.824E+03	
16	3.840E+02	-2.794E-01		2.594E+05		-0.
			1.567E-03		-4.424E+03	
17	4.080E+02	-2.418E-01		1.532E+05		-0.
			1.655E-03		-5.024E+03	
18	4.320E+02	-2.020E-01		3.265E+04		-0.
			1.674E-03		-5.624E+03	
19	4.560E+02	-1.619E-01		-1.023E+05		-0.
			1.615E-03		-6.224E+03	
20	4.800E+02	-1.231E-01		-2.517E+05		-0.
			1.489E-03		-6.849E+03	
21	5.040E+02	-8.736E-02		-4.161E+05		-0.
			1.306E-03		-7.499E+03	

22	5.280E+02	-5.601E-02	-5.961E+05		-0.
		1.073E-03		-8.174E+03	
23	5.520E+02	-3.026E-02	-7.923E+05		-0.
		7.925E-04		-8.874E+03	
24	5.760E+02	-1.124E-02	-1.005E+06		-0.
		4.683E-04		-9.369E+03	
25	6.000E+02	0.	-1.230E+06		1.942E+04
		1.038E-04		9.306E+03	
26	6.240E+02	2.491E-03	-1.007E+06		-0.
		-2.209E-04		8.350E+03	
27	6.480E+02	-2.811E-03	-8.064E+05		-0.
		-5.063E-04		7.650E+03	
28	6.720E+02	-1.496E-02	-6.228E+05		-0.
		-7.503E-04		6.975E+03	
29	6.960E+02	-3.297E-02	-4.554E+05		-0.
		-9.503E-04		6.325E+03	
30	7.200E+02	-5.578E-02	-3.036E+05		-0.
		-1.102E-03		5.700E+03	
31	7.440E+02	-8.222E-02	-1.668E+05		-0.
		-1.198E-03		5.100E+03	
32	7.680E+02	-1.110E-01	-4.437E+04		-0.
		-1.224E-03		4.500E+03	
33	7.920E+02	-1.404E-01	6.363E+04		-0.
		-1.187E-03		3.900E+03	
34	8.160E+02	-1.689E-01	1.572E+05		-0.
		-1.096E-03		3.300E+03	
35	8.400E+02	-1.952E-01	2.364E+05		-0.
		-9.595E-04		2.700E+03	
36	8.640E+02	-2.182E-01	3.012E+05		-0.
		-7.852E-04		2.100E+03	
37	8.880E+02	-2.370E-01	3.516E+05		-0.
		-5.817E-04		1.500E+03	
38	9.120E+02	-2.510E-01	3.876E+05		-0.
		-3.573E-04		9.000E+02	
39	9.360E+02	-2.596E-01	4.092E+05		-0.
		-1.205E-04		3.000E+02	
40	9.600E+02	-2.625E-01	4.164E+05		-0.
		1.205E-04		-3.000E+02	
41	9.840E+02	-2.596E-01	4.092E+05		-0.
		3.573E-04		-9.000E+02	
42	1.008E+03	-2.510E-01	3.876E+05		-0.
		5.817E-04		-1.500E+03	
43	1.032E+03	-2.370E-01	3.516E+05		-0.
		7.852E-04		-2.100E+03	
44	1.056E+03	-2.182E-01	3.012E+05		-0.
		9.595E-04		-2.700E+03	
45	1.080E+03	-1.952E-01	2.364E+05		-0.
		1.096E-03		-3.300E+03	
46	1.104E+03	-1.689E-01	1.572E+05		-0.
		1.187E-03		-3.900E+03	
47	1.128E+03	-1.404E-01	6.363E+04		-0.
		1.224E-03		-4.500E+03	
48	1.152E+03	-1.110E-01	-4.437E+04		-0.
		1.198E-03		-5.100E+03	
49	1.176E+03	-8.222E-02	-1.668E+05		-0.
		1.102E-03		-5.700E+03	
50	1.200E+03	-5.578E-02	-3.036E+05		-0.
		9.503E-04		-6.325E+03	
51	1.224E+03	-3.297E-02	-4.554E+05		-0.
		7.503E-04		-6.975E+03	
52	1.248E+03	-1.496E-02	-6.228E+05		-0.

			5.063E-04		-7.650E+03	
53	1.272E+03	-2.811E-03		-8.064E+05		-0.
			2.209E-04		-8.350E+03	
54	1.296E+03	2.491E-03		-1.007E+06		-0.
			-1.038E-04		-9.306E+03	
55	1.320E+03	0.		-1.230E+06		1.942E+04
			-4.683E-04		9.369E+03	
56	1.344E+03	-1.124E-02		-1.005E+06		-0.
			-7.925E-04		8.874E+03	
57	1.368E+03	-3.026E-02		-7.923E+05		-0.
			-1.073E-03		8.174E+03	
58	1.392E+03	-5.601E-02		-5.961E+05		-0.
			-1.306E-03		7.499E+03	
59	1.416E+03	-8.736E-02		-4.161E+05		-0.
			-1.489E-03		6.849E+03	
60	1.440E+03	-1.231E-01		-2.517E+05		-0.
			-1.615E-03		6.224E+03	
61	1.464E+03	-1.619E-01		-1.023E+05		-0.
			-1.674E-03		5.624E+03	
62	1.488E+03	-2.020E-01		3.265E+04		-0.
			-1.655E-03		5.024E+03	
63	1.512E+03	-2.418E-01		1.532E+05		-0.
			-1.567E-03		4.424E+03	
64	1.536E+03	-2.794E-01		2.594E+05		-0.
			-1.416E-03		3.824E+03	
65	1.560E+03	-3.134E-01		3.512E+05		-0.
			-1.213E-03		3.224E+03	
66	1.584E+03	-3.425E-01		4.286E+05		-0.
			-9.651E-04		2.624E+03	
67	1.608E+03	-3.656E-01		4.916E+05		-0.
			-6.807E-04		2.024E+03	
68	1.632E+03	-3.820E-01		5.402E+05		-0.
			-3.680E-04		1.424E+03	
69	1.656E+03	-3.908E-01		5.744E+05		-0.
			-3.564E-05		8.244E+02	
70	1.680E+03	-3.917E-01		5.941E+05		-0.
			3.082E-04		2.244E+02	
71	1.704E+03	-3.843E-01		5.995E+05		-0.
			6.552E-04		-3.756E+02	
72	1.728E+03	-3.685E-01		5.905E+05		-0.
			9.969E-04		-9.756E+02	
73	1.752E+03	-3.446E-01		5.671E+05		-0.
			1.325E-03		-1.576E+03	
74	1.776E+03	-3.128E-01		5.293E+05		-0.
			1.631E-03		-2.176E+03	
75	1.800E+03	-2.737E-01		4.771E+05		-0.
			1.908E-03		-2.776E+03	
76	1.824E+03	-2.279E-01		4.105E+05		-0.
			2.145E-03		-3.376E+03	
77	1.848E+03	-1.764E-01		3.294E+05		-0.
			2.336E-03		-3.976E+03	
78	1.872E+03	-1.203E-01		2.340E+05		-0.
			2.471E-03		-4.576E+03	
79	1.896E+03	-6.103E-02		1.242E+05		-0.
			2.543E-03		-5.176E+03	
80	1.920E+03	0.		0.		5.476E+03
			2.543E-03		0.	
81	1.944E+03	6.103E-02		0.		-0.

PROB (CONTD)
1 THREE SPAN STRUCTURE, FIXED LOAD ONLY

TABLE 8A- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +DEFL	LOC	MAX -DEFL	LOC	MAX +MOM	LOC	MAX -MOM	LOC
-1	6.103E-02	999	0.	999	0.	999	0.	999
0	0.	999	0.	999	0.	999	-7.993E-09	999
1	0.	999	-6.103E-02	999	1.242E+05	999	0.	999
2	0.	999	-1.203E-01	999	2.340E+05	999	0.	999
3	0.	999	-1.764E-01	999	3.294E+05	999	0.	999
4	0.	999	-2.279E-01	999	4.105E+05	999	0.	999
5	0.	999	-2.737E-01	999	4.771E+05	999	0.	999
6	0.	999	-3.128E-01	999	5.293E+05	999	0.	999
7	0.	999	-3.446E-01	999	5.671E+05	999	0.	999
8	0.	999	-3.685E-01	999	5.905E+05	999	0.	999
9	0.	999	-3.843E-01	999	5.995E+05	999	0.	999
10	0.	999	-3.917E-01	999	5.941E+05	999	0.	999
11	0.	999	-3.908E-01	999	5.744E+05	999	0.	999
12	0.	999	-3.820E-01	999	5.402E+05	999	0.	999
13	0.	999	-3.656E-01	999	4.916E+05	999	0.	999
14	0.	999	-3.425E-01	999	4.286E+05	999	0.	999
15	0.	999	-3.134E-01	999	3.512E+05	999	0.	999
16	0.	999	-2.794E-01	999	2.594E+05	999	0.	999
17	0.	999	-2.418E-01	999	1.532E+05	999	0.	999
18	0.	999	-2.020E-01	999	3.265E+04	999	0.	999
19	0.	999	-1.619E-01	999	0.	999	-1.023E+05	999
20	0.	999	-1.231E-01	999	0.	999	-2.517E+05	999
21	0.	999	-8.736E-02	999	0.	999	-4.161E+05	999
22	0.	999	-5.601E-02	999	0.	999	-5.961E+05	999
23	0.	999	-3.026E-02	999	0.	999	-7.923E+05	999

24	0.	999	-1.124E-02	999	0.	999	-1.005E+06	999
25	0.	999	0.	999	0.	999	-1.230E+06	999
26	2.491E-03	999	0.	999	0.	999	-1.007E+06	999
27	0.	999	-2.811E-03	999	0.	999	-8.064E+05	999
28	0.	999	-1.496E-02	999	0.	999	-5.228E+05	999
29	0.	999	-3.297E-02	999	0.	999	-4.554E+05	999
30	0.	999	-5.578E-02	999	0.	999	-3.036E+05	999
31	0.	999	-8.222E-02	999	0.	999	-1.668E+05	999
32	0.	999	-1.110E-01	999	0.	999	-4.437E+04	999
33	0.	999	-1.404E-01	999	6.363E+04	999	0.	999
34	0.	999	-1.689E-01	999	1.572E+05	999	0.	999
35	0.	999	-1.952E-01	999	2.364E+05	999	0.	999
36	0.	999	-2.182E-01	999	3.012E+05	999	0.	999
37	0.	999	-2.370E-01	999	3.516E+05	999	0.	999
38	0.	999	-2.510E-01	999	3.876E+05	999	0.	999
39	0.	999	-2.596E-01	999	4.092E+05	999	0.	999
40	0.	999	-2.625E-01	999	4.164E+05	999	0.	999
41	0.	999	-2.596E-01	999	4.092E+05	999	0.	999
42	0.	999	-2.510E-01	999	3.876E+05	999	0.	999
43	0.	999	-2.370E-01	999	3.516E+05	999	0.	999
44	0.	999	-2.182E-01	999	3.012E+05	999	0.	999
45	0.	999	-1.952E-01	999	2.364E+05	999	0.	999
46	0.	999	-1.689E-01	999	1.572E+05	999	0.	999
47	0.	999	-1.404E-01	999	6.363E+04	999	0.	999
48	0.	999	-1.110E-01	999	0.	999	-4.437E+04	999
49	0.	999	-8.222E-02	999	0.	999	-1.668E+05	999
50	0.	999	-5.578E-02	999	0.	999	-3.036E+05	999
51	0.	999	-3.297E-02	999	0.	999	-4.554E+05	999
52	0.	999	-1.496E-02	999	0.	999	-5.228E+05	999
53	0.	999	-2.811E-03	999	0.	999	-8.064E+05	999

54	2.491E-03	999	0.	999	0.	999	-1.007E+06	999
55	0.	999	0.	999	0.	999	-1.230E+06	999
56	0.	999	-1.124E-02	999	0.	999	-1.005E+06	999
57	0.	999	-3.026E-02	999	0.	999	-7.923E+05	999
58	0.	999	-5.601E-02	999	0.	999	-5.961E+05	999
59	0.	999	-8.736E-02	999	0.	999	-4.161E+05	999
60	0.	999	-1.231E-01	999	0.	999	-2.517E+05	999
61	0.	999	-1.619E-01	999	0.	999	-1.023E+05	999
62	0.	999	-2.020E-01	999	3.265E+04	999	0.	999
63	0.	999	-2.418E-01	999	1.532E+05	999	0.	999
64	0.	999	-2.794E-01	999	2.594E+05	999	0.	999
65	0.	999	-3.134E-01	999	3.512E+05	999	0.	999
66	0.	999	-3.425E-01	999	4.286E+05	999	0.	999
67	0.	999	-3.656E-01	999	4.916E+05	999	0.	999
68	0.	999	-3.820E-01	999	5.402E+05	999	0.	999
69	0.	999	-3.908E-01	999	5.744E+05	999	0.	999
70	0.	999	-3.917E-01	999	5.941E+05	999	0.	999
71	0.	999	-3.843E-01	999	5.995E+05	999	0.	999
72	0.	999	-3.685E-01	999	5.905E+05	999	0.	999
73	0.	999	-3.446E-01	999	5.671E+05	999	0.	999
74	0.	999	-3.128E-01	999	5.293E+05	999	0.	999
75	0.	999	-2.737E-01	999	4.771E+05	999	0.	999
76	0.	999	-2.279E-01	999	4.105E+05	999	0.	999
77	0.	999	-1.764E-01	999	3.294E+05	999	0.	999
78	0.	999	-1.203E-01	999	2.340E+05	999	0.	999
79	0.	999	-6.103E-02	999	1.242E+05	999	0.	999
80	0.	999	0.	999	0.	999	0.	999
81	6.103E-02	999	0.	999	0.	999	0.	999

TABLE 8B- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +SHEAR	LOC	MAX -SHEAR	LOC	MAX +REACT	LOC	MAX -REACT	LOC
-1					0.	999	0.	999
	0.	999	-3.331E-10	999				
0					5.476E+03	999	0.	999
	5.176E+03	999	0.	999				
1					0.	999	0.	999
	4.576E+03	999	0.	999				
2					0.	999	0.	999
	3.976E+03	999	0.	999				
3					0.	999	0.	999
	3.376E+03	999	0.	999				
4					0.	999	0.	999
	2.776E+03	999	0.	999				
5					0.	999	0.	999
	2.176E+03	999	0.	999				
6					0.	999	0.	999
	1.576E+03	999	0.	999				
7					0.	999	0.	999
	9.756E+02	999	0.	999				
8					0.	999	0.	999
	3.756E+02	999	0.	999				
9					0.	999	0.	999
	0.	999	-2.244E+02	999				
10					0.	999	0.	999
	0.	999	-8.244E+02	999				
11					0.	999	0.	999
	0.	999	-1.424E+03	999				
12					0.	999	0.	999
	0.	999	-2.024E+03	999				
13					0.	999	0.	999
	0.	999	-2.624E+03	999				
14					0.	999	0.	999
	0.	999	-3.224E+03	999				
15					0.	999	0.	999
	0.	999	-3.824E+03	999				
16					0.	999	0.	999
	0.	999	-4.424E+03	999				
17					0.	999	0.	999
	0.	999	-5.024E+03	999				
18					0.	999	0.	999
	0.	999	-5.624E+03	999				
19					0.	999	0.	999
	0.	999	-6.224E+03	999				
20					0.	999	0.	999
	0.	999	-6.849E+03	999				
21					0.	999	0.	999
	0.	999	-7.499E+03	999				
22					0.	999	0.	999
	0.	999	-8.174E+03	999				
23					0.	999	0.	999
	0.	999	-8.874E+03	999				
24					0.	999	0.	999
	0.	999	-9.369E+03	999				
25					1.942E+04	999	0.	999
	9.306E+03	999	0.	999				
26					0.	999	0.	999
	8.350E+03	999	0.	999				
27					0.	999	0.	999
	7.650E+03	999	0.	999				
28					0.	999	0.	999
	6.975E+03	999	0.	999				

29					0.	999	0.	999
	6.325E+03	999	0.	999				
30					0.	999	0.	999
	5.700E+03	999	0.	999				
31					0.	999	0.	999
	5.100E+03	999	0.	999				
32					0.	999	0.	999
	4.500E+03	999	0.	999				
33					0.	999	0.	999
	3.900E+03	999	0.	999				
34					0.	999	0.	999
	3.300E+03	999	0.	999				
35					0.	999	0.	999
	2.700E+03	999	0.	999				
36					0.	999	0.	999
	2.100E+03	999	0.	999				
37					0.	999	0.	999
	1.500E+03	999	0.	999				
38					0.	999	0.	999
	9.000E+02	999	0.	999				
39					0.	999	0.	999
	3.000E+02	999	0.	999				
40					0.	999	0.	999
	0.	999	-3.000E+02	999				
41					0.	999	0.	999
	0.	999	-9.000E+02	999				
42					0.	999	0.	999
	0.	999	-1.500E+03	999				
43					0.	999	0.	999
	0.	999	-2.100E+03	999				
44					0.	999	0.	999
	0.	999	-2.700E+03	999				
45					0.	999	0.	999
	0.	999	-3.300E+03	999				
46					0.	999	0.	999
	0.	999	-3.900E+03	999				
47					0.	999	0.	999
	0.	999	-4.500E+03	999				
48					0.	999	0.	999
	0.	999	-5.100E+03	999				
49					0.	999	0.	999
	0.	999	-5.700E+03	999				
50					0.	999	0.	999
	0.	999	-6.325E+03	999				
51					0.	999	0.	999
	0.	999	-6.975E+03	999				
52					0.	999	0.	999
	0.	999	-7.650E+03	999				
53					0.	999	0.	999
	0.	999	-8.350E+03	999				
54					0.	999	0.	999
	0.	999	-9.306E+03	999				
55					1.942E+04	999	0.	999
	9.369E+03	999	0.	999				
56					0.	999	0.	999
	8.874E+03	999	0.	999				
57					0.	999	0.	999
	8.174E+03	999	0.	999				
58					0.	999	0.	999
	7.499E+03	999	0.	999				
59					0.	999	0.	999

	6.849E+03	999	0.	999			
60					0.	999	0.	999
	6.224E+03	999	0.	999			
61					0.	999	0.	999
	5.624E+03	999	0.	999			
62					0.	999	0.	999
	5.024E+03	999	0.	999			
63					0.	999	0.	999
	4.424E+03	999	0.	999			
64					0.	999	0.	999
	3.824E+03	999	0.	999			
65					0.	999	0.	999
	3.224E+03	999	0.	999			
66					0.	999	0.	999
	2.624E+03	999	0.	999			
67					0.	999	0.	999
	2.024E+03	999	0.	999			
68					0.	999	0.	999
	1.424E+03	999	0.	999			
69					0.	999	0.	999
	8.244E+02	999	0.	999			
70					0.	999	0.	999
	2.244E+02	999	0.	999			
71					0.	999	0.	999
	0.	999	-3.756E+02	999			
72					0.	999	0.	999
	0.	999	-9.756E+02	999			
73					0.	999	0.	999
	0.	999	-1.576E+03	999			
74					0.	999	0.	999
	0.	999	-2.176E+03	999			
75					0.	999	0.	999
	0.	999	-2.776E+03	999			
76					0.	999	0.	999
	0.	999	-3.376E+03	999			
77					0.	999	0.	999
	0.	999	-3.976E+03	999			
78					0.	999	0.	999
	0.	999	-4.576E+03	999			
79					0.	999	0.	999
	0.	999	-5.176E+03	999			
80					5.476E+03	999	0.	999
	0.	999	0.	999			
81					0.	999	0.	999

TABLE 9 -- SCALES FOR PLOTS OF THE ENVELOPES OF MAXIMUMS

HORIZONTAL SCALE
10 INCHES = 100 STATIONS

VERTICAL SCALES

VARIABLE	LENGTH OF AXIS	MAXIMUM VALUE
DEFLECT	2 INCHES	= 4.000E-01
MOMENT	2 INCHES	= 2.000E+06
SHEAR	2 INCHES	= 1.000E+04
REACTION	2 INCHES	= 2.000E+04

PROB (CONTD)
1 THREE SPAN STRUCTURE, FIXED LOAD ONLY

TABLE 10A -- INFLUENCE DIAGRAMS FOR DEFLECTION

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS STA	STA	STA	STA	STA
NONE					

TABLE 10B -- INFLUENCE DIAGRAMS FOR MOMENT

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS STA	STA	STA	STA	STA
NONE					

TABLE 10C -- INFLUENCE DIAGRAMS FOR SHEAR
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

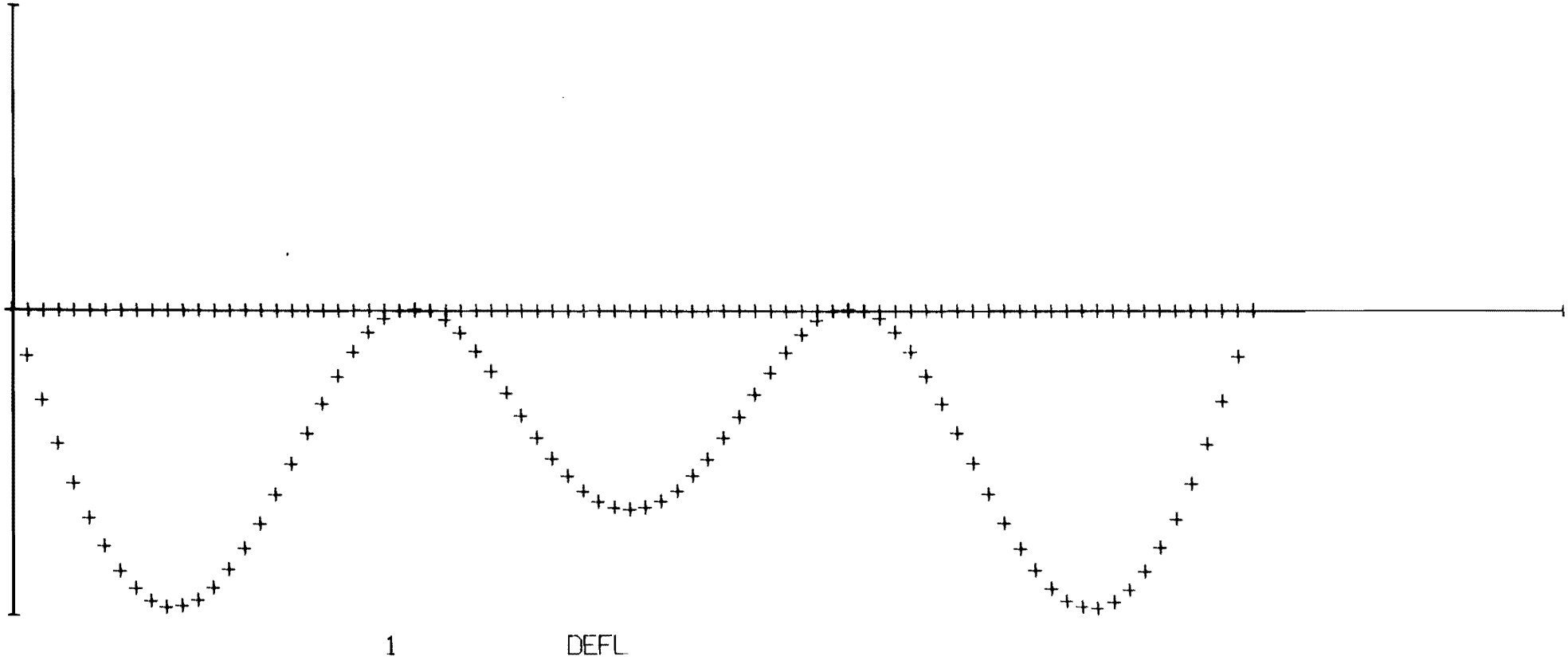
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS STA	STA	STA	STA	STA
NONE					

TABLE 10D -- INFLUENCE DIAGRAMS FOR SUPPORT REACTION

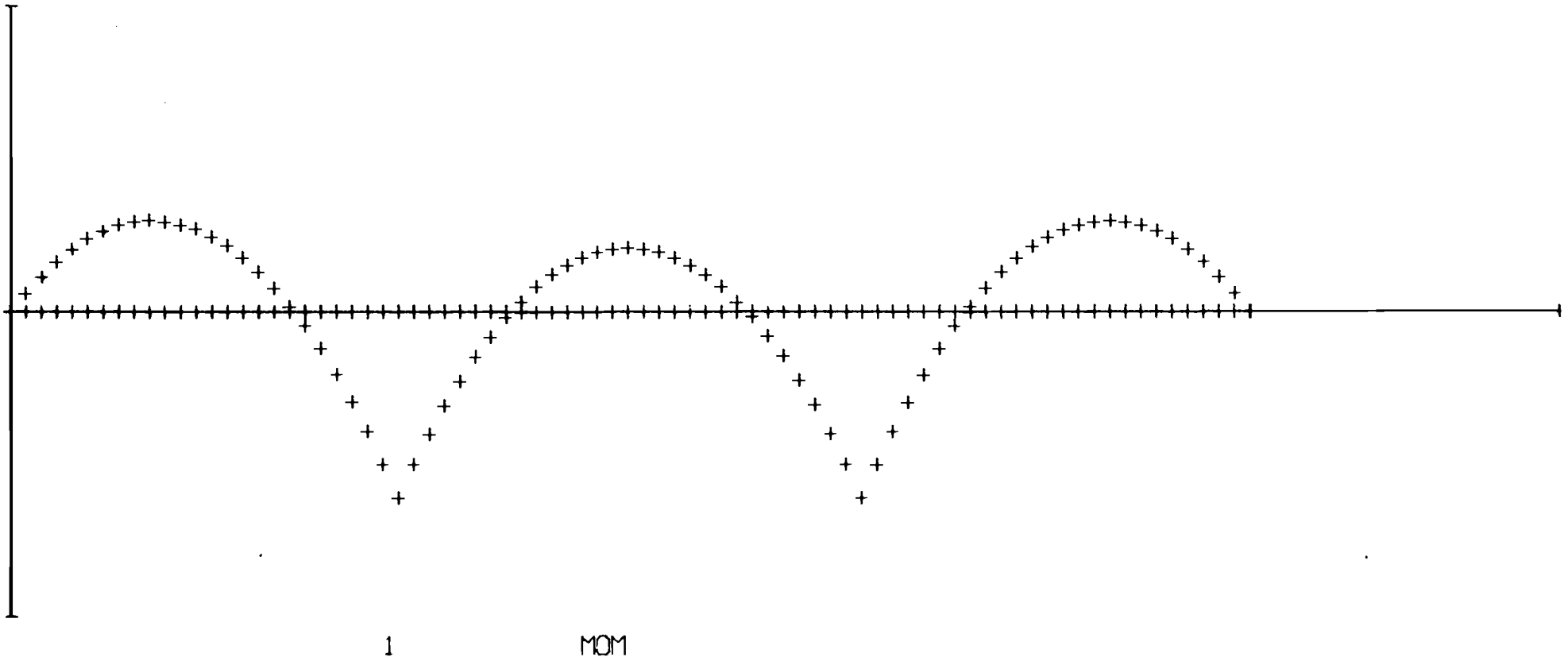
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS STA	STA	STA	STA	STA
NONE					

TIME FOR THIS PROBLEM = 0 MINUTES 3.258 SECONDS

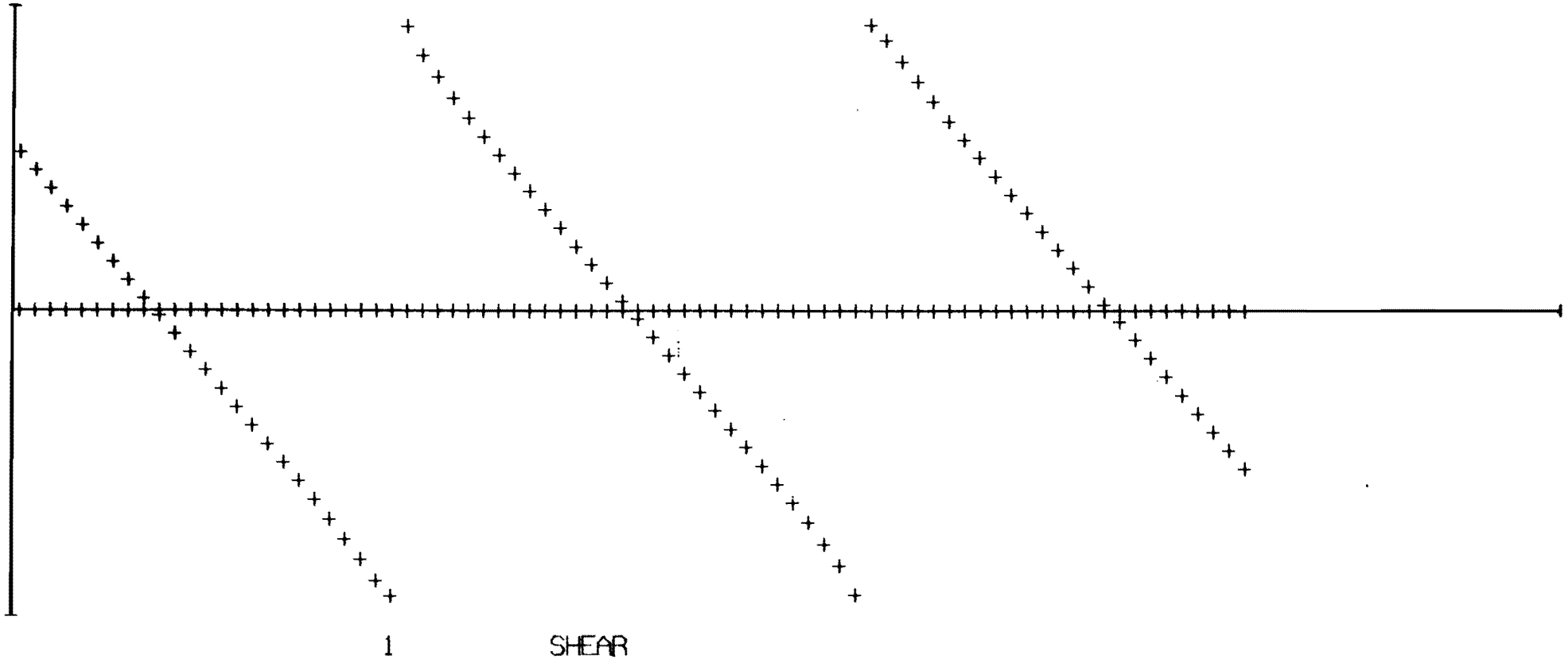
ELAPSED CPU TIME = 0 MINUTES 17.277 SECONDS



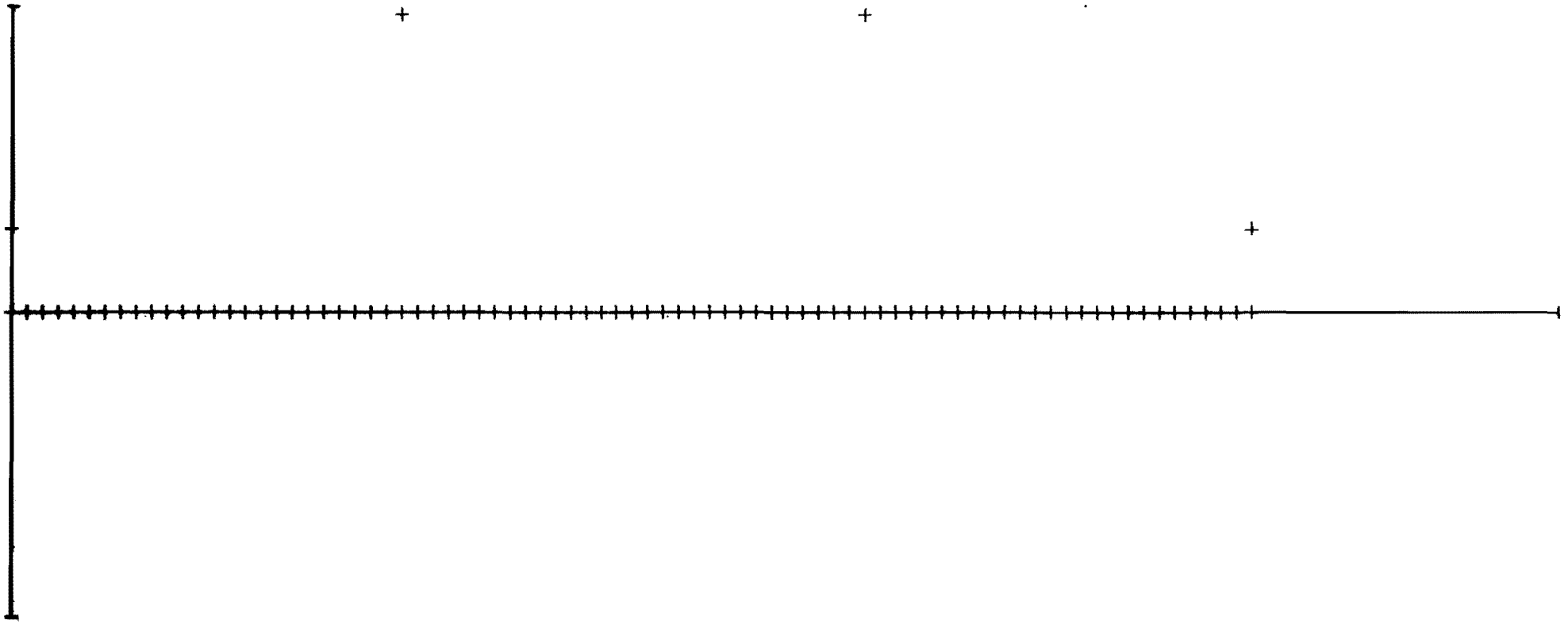
Prob 1. Three-span structure, fixed load only.
Envelope of maximum deflections.



Prob 1. Three-span structure, fixed load only.
Envelope of maximum moments.



Prob 1. Three-span structure, fixed load only.
Envelope of maximum shears.



Prob 1. Three-span structure, fixed load only.
Envelope of maximum reactions.

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB
2 THREE SPAN STRUCTURE, FIXED LOADS PLUS MOVING LOADS

TABLE 1 - PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4	5	6
HOLD FROM PRECEDING PROBLEM (1=HOLD)	0	0	1	1	0	0
NUM CARDS INPUT THIS PROBLEM		1	0	0	3	0

	DEFL	MOM	SHR	RCT
OPTION (IF=1) TO PLOT ENVELOPES OF MAXIMUMS	1	1	1	1

TABLE 2 - CONSTANTS

NUM INCREMENTS	80
INCREMENT LENGTH	2.400E+01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	14
INITIAL POSITION OF MOVABLE LOAD STA ZERO	-14
FINAL POSITION OF MOVABLE LOAD STA ZERO	80
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	1

TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES

STA	CASE	DEFLECTION	SLOPE
USING DATA FROM THE PREVIOUS PROBLEM			
0	1	0.	NONE
25	1	0.	NONE
55	1	0.	NONE
80	1	0.	NONE

TABLE 4 - STIFFNESS AND FIXED-LOAD DATA

FROM	TO	CONTD	F	QF	S	T	R	P
USING DATA FROM THE PREVIOUS PROBLEM								
0	80	-0	4.147E+10	-6.000E+02	-0.	-0.	-0.	-0.
19		1	0.	0.	-0.	-0.	-0.	-0.
	25	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	31	-0	0.	0.	-0.	-0.	-0.	-0.
49		1	0.	0.	-0.	-0.	-0.	-0.
	55	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	61	-0	0.	0.	-0.	-0.	-0.	-0.
25	25	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.
55	55	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.

ADDITIONAL DATA FOR THIS PROBLEM

NONE

TABLE 5 - MOVABLE-LOAD DATA

FROM	TO	CONTD	QM
0	0	-0	-7.300E+02
7	7	-0	-2.920E+03
14	14	-0	-2.920E+03

TABLE 6 - SPECIFIED STATIONS FOR INFLUENCE DIAGRAMS
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

NONE

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB (CONTD)
2 THREE SPAN STRUCTURE, FIXED LOADS PLUS MOVING LOADS

TABLE 7 - FIXED-LOAD RESULTS

STA I	DIST	DEFL	SLOPE	MOM	SHEAR	SUP REACT
-1	-2.400E+01	6.103E-02		0.		-0.
			-2.543E-03		-3.331E-10	
0	0.	0.		-7.993E-09		5.476E+03
			-2.543E-03		5.176E+03	
1	2.400E+01	-6.103E-02		1.242E+05		-0.
			-2.471E-03		4.576E+03	
2	4.800E+01	-1.203E-01		2.340E+05		-0.
			-2.336E-03		3.976E+03	
3	7.200E+01	-1.764E-01		3.294E+05		-0.
			-2.145E-03		3.376E+03	
4	9.600E+01	-2.279E-01		4.105E+05		-0.
			-1.908E-03		2.776E+03	
5	1.200E+02	-2.737E-01		4.771E+05		-0.
			-1.631E-03		2.176E+03	
6	1.440E+02	-3.128E-01		5.293E+05		-0.
			-1.325E-03		1.576E+03	
7	1.680E+02	-3.446E-01		5.671E+05		-0.
			-9.969E-04		9.756E+02	
8	1.920E+02	-3.685E-01		5.905E+05		-0.
			-6.552E-04		3.756E+02	
9	2.160E+02	-3.843E-01		5.995E+05		-0.
			-3.082E-04		-2.244E+02	
10	2.400E+02	-3.917E-01		5.941E+05		-0.
			3.564E-05		-8.244E+02	
11	2.640E+02	-3.908E-01		5.744E+05		-0.
			3.680E-04		-1.424E+03	
12	2.880E+02	-3.820E-01		5.402E+05		-0.
			6.807E-04		-2.024E+03	
13	3.120E+02	-3.656E-01		4.916E+05		-0.
			9.651E-04		-2.624E+03	
14	3.360E+02	-3.425E-01		4.286E+05		-0.
			1.213E-03		-3.224E+03	
15	3.600E+02	-3.134E-01		3.512E+05		-0.
			1.416E-03		-3.824E+03	
16	3.840E+02	-2.794E-01		2.594E+05		-0.
			1.567E-03		-4.424E+03	
17	4.080E+02	-2.418E-01		1.532E+05		-0.
			1.655E-03		-5.024E+03	
18	4.320E+02	-2.020E-01		3.265E+04		-0.
			1.674E-03		-5.624E+03	
19	4.560E+02	-1.619E-01		-1.023E+05		-0.
			1.615E-03		-6.224E+03	
20	4.800E+02	-1.231E-01		-2.517E+05		-0.
			1.489E-03		-6.849E+03	
21	5.040E+02	-8.736E-02		-4.161E+05		-0.
			1.306E-03		-7.499E+03	

22	5.280E+02	-5.601E-02		-5.961E+05		-0.
			1.073E-03		-8.174E+03	
23	5.520E+02	-3.026E-02		-7.923E+05		-0.
			7.925E-04		-8.874E+03	
24	5.760E+02	-1.124E-02		-1.005E+06		-0.
			4.683E-04		-9.369E+03	
25	6.000E+02	0.		-1.230E+06		1.942E+04
			1.038E-04		9.306E+03	
26	6.240E+02	2.491E-03		-1.007E+06		-0.
			-2.209E-04		8.350E+03	
27	6.480E+02	-2.811E-03		-8.064E+05		-0.
			-5.063E-04		7.650E+03	
28	6.720E+02	-1.496E-02		-6.228E+05		-0.
			-7.503E-04		6.975E+03	
29	6.960E+02	-3.297E-02		-4.554E+05		-0.
			-9.503E-04		6.325E+03	
30	7.200E+02	-5.578E-02		-3.036E+05		-0.
			-1.102E-03		5.700E+03	
31	7.440E+02	-8.222E-02		-1.668E+05		-0.
			-1.198E-03		5.100E+03	
32	7.680E+02	-1.110E-01		-4.437E+04		-0.
			-1.224E-03		4.500E+03	
33	7.920E+02	-1.404E-01		6.363E+04		-0.
			-1.187E-03		3.900E+03	
34	8.160E+02	-1.689E-01		1.572E+05		-0.
			-1.096E-03		3.300E+03	
35	8.400E+02	-1.952E-01		2.364E+05		-0.
			-9.595E-04		2.700E+03	
36	8.640E+02	-2.182E-01		3.012E+05		-0.
			-7.852E-04		2.100E+03	
37	8.880E+02	-2.370E-01		3.516E+05		-0.
			-5.817E-04		1.500E+03	
38	9.120E+02	-2.510E-01		3.876E+05		-0.
			-3.573E-04		9.000E+02	
39	9.360E+02	-2.596E-01		4.092E+05		-0.
			-1.205E-04		3.000E+02	
40	9.600E+02	-2.625E-01		4.164E+05		-0.
			1.205E-04		-3.000E+02	
41	9.840E+02	-2.596E-01		4.092E+05		-0.
			3.573E-04		-9.000E+02	
42	1.008E+03	-2.510E-01		3.876E+05		-0.
			5.817E-04		-1.500E+03	
43	1.032E+03	-2.370E-01		3.516E+05		-0.
			7.852E-04		-2.100E+03	
44	1.056E+03	-2.182E-01		3.012E+05		-0.
			9.595E-04		-2.700E+03	
45	1.080E+03	-1.952E-01		2.364E+05		-0.
			1.096E-03		-3.300E+03	
46	1.104E+03	-1.689E-01		1.572E+05		-0.
			1.187E-03		-3.900E+03	
47	1.128E+03	-1.404E-01		6.363E+04		-0.
			1.224E-03		-4.500E+03	
48	1.152E+03	-1.110E-01		-4.437E+04		-0.
			1.198E-03		-5.100E+03	
49	1.176E+03	-8.222E-02		-1.668E+05		-0.
			1.102E-03		-5.700E+03	
50	1.200E+03	-5.578E-02		-3.036E+05		-0.
			9.503E-04		-6.325E+03	
51	1.224E+03	-3.297E-02		-4.554E+05		-0.
			7.503E-04		-6.975E+03	
52	1.248E+03	-1.496E-02		-6.228E+05		-0.

			5.063E-04		-7.650E+03	
53	1.272E+03	-2.811E-03		-8.064E+05		-0.
			2.209E-04		-8.350E+03	
54	1.296E+03	2.491E-03		-1.007E+06		-0.
			-1.038E-04		-9.306E+03	
55	1.320E+03	0.		-1.230E+06		1.942E+04
			-4.683E-04		9.369E+03	
56	1.344E+03	-1.124E-02		-1.005E+06		-0.
			-7.925E-04		8.874E+03	
57	1.368E+03	-3.026E-02		-7.923E+05		-0.
			-1.073E-03		8.174E+03	
58	1.392E+03	-5.601E-02		-5.961E+05		-0.
			-1.306E-03		7.499E+03	
59	1.416E+03	-8.736E-02		-4.161E+05		-0.
			-1.489E-03		6.849E+03	
60	1.440E+03	-1.231E-01		-2.517E+05		-0.
			-1.615E-03		6.224E+03	
61	1.464E+03	-1.619E-01		-1.023E+05		-0.
			-1.674E-03		5.624E+03	
62	1.488E+03	-2.020E-01		3.265E+04		-0.
			-1.655E-03		5.024E+03	
63	1.512E+03	-2.418E-01		1.532E+05		-0.
			-1.567E-03		4.424E+03	
64	1.536E+03	-2.794E-01		2.594E+05		-0.
			-1.416E-03		3.824E+03	
65	1.560E+03	-3.134E-01		3.512E+05		-0.
			-1.213E-03		3.224E+03	
66	1.584E+03	-3.425E-01		4.286E+05		-0.
			-9.651E-04		2.624E+03	
67	1.608E+03	-3.656E-01		4.916E+05		-0.
			-6.807E-04		2.024E+03	
68	1.632E+03	-3.820E-01		5.402E+05		-0.
			-3.680E-04		1.424E+03	
69	1.656E+03	-3.908E-01		5.744E+05		-0.
			-3.564E-05		8.244E+02	
70	1.680E+03	-3.917E-01		5.941E+05		-0.
			3.082E-04		2.244E+02	
71	1.704E+03	-3.843E-01		5.995E+05		-0.
			6.552E-04		-3.756E+02	
72	1.728E+03	-3.685E-01		5.905E+05		-0.
			9.969E-04		-9.756E+02	
73	1.752E+03	-3.446E-01		5.671E+05		-0.
			1.325E-03		-1.576E+03	
74	1.776E+03	-3.128E-01		5.293E+05		-0.
			1.631E-03		-2.176E+03	
75	1.800E+03	-2.737E-01		4.771E+05		-0.
			1.908E-03		-2.776E+03	
76	1.824E+03	-2.279E-01		4.105E+05		-0.
			2.145E-03		-3.376E+03	
77	1.848E+03	-1.764E-01		3.294E+05		-0.
			2.336E-03		-3.976E+03	
78	1.872E+03	-1.203E-01		2.340E+05		-0.
			2.471E-03		-4.576E+03	
79	1.896E+03	-6.103E-02		1.242E+05		-0.
			2.543E-03		-5.176E+03	
80	1.920E+03	0.		0.		5.476E+03
			2.543E-03		0.	
81	1.944E+03	6.103E-02		0.		-0.

PROB (CONTD)
2 THREE SPAN STRUCTURE, FIXED LOADS PLUS MOVING LOADS

TABLE 8A- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +DEFL	LOC	MAX -DEFL	LOC	MAX +MOM	LOC	MAX -MOM	LOC
-1	1.129E-01	1	0.	999	0.	999	0.	999
0	0.	999	0.	999	0.	999	-1.599E-08	-13
1	0.	999	-1.129E-01	1	2.320E+05	-6	0.	999
2	0.	999	-2.230E-01	1	4.354E+05	-5	0.	999
3	0.	999	-3.279E-01	1	6.107E+05	-4	0.	999
4	0.	999	-4.255E-01	1	7.581E+05	-3	0.	999
5	0.	999	-5.138E-01	1	8.781E+05	-2	0.	999
6	0.	999	-5.910E-01	1	9.712E+05	-1	0.	999
7	0.	999	-6.557E-01	1	1.038E+06	0	0.	999
8	0.	999	-7.071E-01	2	1.089E+06	1	0.	999
9	0.	999	-7.441E-01	2	1.114E+06	2	0.	999
10	0.	999	-7.657E-01	2	1.112E+06	3	0.	999
11	0.	999	-7.721E-01	2	1.085E+06	4	0.	999
12	0.	999	-7.638E-01	2	1.034E+06	5	0.	999
13	0.	999	-7.417E-01	2	9.602E+05	6	0.	999
14	0.	999	-7.067E-01	3	8.797E+05	0	0.	999
15	0.	999	-6.604E-01	3	7.803E+05	1	0.	999
16	0.	999	-6.036E-01	3	6.554E+05	2	0.	999
17	0.	999	-5.380E-01	3	5.061E+05	3	-9.202E+04	28
18	0.	999	-4.654E-01	3	3.333E+05	4	-2.270E+05	28
19	0.	999	-3.890E-01	4	1.382E+05	5	-3.764E+05	28
20	1.376E-02	28	-3.120E-01	4	0.	999	-5.403E+05	28
21	2.813E-02	28	-2.368E-01	4	0.	999	-7.191E+05	28
22	3.493E-02	28	-1.659E-01	4	0.	999	-9.135E+05	28
23	3.314E-02	28	-1.016E-01	4	0.	999	-1.124E+06	28

24	2.180E-02	28	-4.577E-02	4	0.	999	-1.352E+06	28
25	0.	999	0.	999	0.	999	-1.619E+06	28
26	3.437E-02	4	-3.331E-02	28	0.	999	-1.338E+06	4
27	5.838E-02	4	-7.690E-02	28	0.	999	-1.122E+06	4
28	7.286E-02	4	-1.293E-01	28	0.	999	-9.231E+05	4
29	7.866E-02	4	-1.887E-01	28	0.	999	-7.403E+05	4
30	7.665E-02	4	-2.536E-01	28	0.	999	-5.732E+05	4
31	6.778E-02	4	-3.218E-01	28	4.513E+04	24	-4.210E+05	4
32	5.305E-02	4	-3.909E-01	28	2.263E+05	25	-2.832E+05	4
33	3.440E-02	4	-4.587E-01	29	3.871E+05	26	-1.598E+05	4
34	1.352E-02	4	-5.226E-01	29	5.268E+05	27	-5.087E+04	4
35	0.	999	-5.802E-01	29	6.450E+05	28	0.	999
36	0.	999	-6.294E-01	29	7.411E+05	29	0.	999
37	0.	999	-6.694E-01	30	8.149E+05	30	0.	999
38	0.	999	-6.989E-01	30	8.662E+05	31	0.	999
39	0.	999	-7.166E-01	30	8.950E+05	32	0.	999
40	0.	999	-7.224E-01	30	9.013E+05	33	0.	999
41	0.	999	-7.169E-01	31	8.853E+05	34	0.	999
42	0.	999	-7.000E-01	31	8.473E+05	35	0.	999
43	0.	999	-6.716E-01	31	7.992E+05	29	0.	999
44	0.	999	-6.325E-01	31	7.296E+05	30	0.	999
45	0.	999	-5.840E-01	32	6.373E+05	31	0.	999
46	1.027E-02	57	-5.278E-01	32	5.226E+05	32	-4.715E+04	57
47	3.128E-02	57	-4.644E-01	32	3.857E+05	33	-1.558E+05	57
48	5.012E-02	57	-3.963E-01	33	2.271E+05	34	-2.789E+05	57
49	6.510E-02	57	-3.269E-01	33	4.745E+04	35	-4.164E+05	57
50	7.429E-02	57	-2.580E-01	33	0.	999	-5.683E+05	57
51	7.666E-02	57	-1.922E-01	33	0.	999	-7.352E+05	57
52	7.129E-02	57	-1.317E-01	33	0.	999	-9.177E+05	57
53	5.728E-02	57	-7.842E-02	33	0.	999	-1.116E+06	57

54	3.380E-02	57	-3.403E-02	33	0.	999	-1.340E+06	32
55	0.	999	0.	999	0.	999	-1.626E+06	33
56	2.247E-02	33	-4.515E-02	57	0.	999	-1.358E+06	33
57	3.442E-02	33	-1.003E-01	57	0.	999	-1.131E+06	33
58	3.677E-02	33	-1.639E-01	57	0.	999	-9.199E+05	33
59	3.046E-02	33	-2.340E-01	57	0.	999	-7.252E+05	33
60	1.651E-02	33	-3.087E-01	57	0.	999	-5.461E+05	33
61	0.	999	-3.856E-01	57	1.313E+05	54	-3.820E+05	33
62	0.	999	-4.619E-01	57	3.292E+05	55	-2.323E+05	33
63	0.	999	-5.352E-01	58	5.061E+05	56	-9.696E+04	33
64	0.	999	-6.024E-01	58	6.611E+05	57	0.	999
65	0.	999	-6.610E-01	58	7.932E+05	58	0.	999
66	0.	999	-7.086E-01	58	9.013E+05	59	0.	999
67	0.	999	-7.439E-01	58	9.846E+05	60	0.	999
68	0.	999	-7.668E-01	59	1.042E+06	61	0.	999
69	0.	999	-7.757E-01	59	1.073E+06	62	0.	999
70	0.	999	-7.701E-01	59	1.090E+06	56	0.	999
71	0.	999	-7.495E-01	59	1.101E+06	57	0.	999
72	0.	999	-7.140E-01	59	1.088E+06	58	0.	999
73	0.	999	-6.636E-01	59	1.049E+06	59	0.	999
74	0.	999	-5.989E-01	60	9.833E+05	60	0.	999
75	0.	999	-5.217E-01	60	8.907E+05	61	0.	999
76	0.	999	-4.326E-01	60	7.703E+05	62	0.	999
77	0.	999	-3.336E-01	60	6.216E+05	63	0.	999
78	0.	999	-2.269E-01	60	4.440E+05	64	0.	999
79	0.	999	-1.148E-01	60	2.369E+05	65	0.	999
80	0.	999	0.	999	7.993E-09	27	-1.599E-08	59
81	1.148E-01	60	0.	999	0.	999	0.	999

TABLE 88- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +SHEAR	LOC	MAX -SHEAR	LOC	MAX +REACT	LOC	MAX -REACT	LOC
-1					0.	999	0.	999
	0.	999	-6.661E-10	-13				
0					1.026E+04	-7	0.	999
	9.665E+03	-6	0.	999				
1					0.	999	0.	999
	8.771E+03	-5	0.	999				
2					0.	999	0.	999
	7.882E+03	-4	0.	999				
3					0.	999	0.	999
	6.997E+03	-3	0.	999				
4					0.	999	0.	999
	6.118E+03	-2	0.	999				
5					0.	999	0.	999
	5.244E+03	-1	0.	999				
6					0.	999	0.	999
	4.378E+03	0	0.	999				
7					0.	999	0.	999
	3.481E+03	1	-7.855E+01	-7				
8					0.	999	0.	999
	2.593E+03	2	-9.754E+02	-6				
9					0.	999	0.	999
	1.714E+03	3	-1.869E+03	-5				
10					0.	999	0.	999
	8.449E+02	4	-2.758E+03	-4				
11					0.	999	0.	999
	0.	999	-3.643E+03	-3				
12					0.	999	0.	999
	0.	999	-4.522E+03	-2				
13					0.	999	0.	999
	0.	999	-5.396E+03	-1				
14					0.	999	0.	999
	0.	999	-6.262E+03	0				
15					0.	999	0.	999
	0.	999	-7.159E+03	1				
16					0.	999	0.	999
	0.	999	-8.047E+03	2				
17					0.	999	0.	999
	0.	999	-8.926E+03	3				
18					0.	999	0.	999
	0.	999	-9.795E+03	4				
19					0.	999	0.	999
	0.	999	-1.065E+04	5				
20					0.	999	0.	999
	0.	999	-1.152E+04	6				
21					0.	999	0.	999
	0.	999	-1.241E+04	7				
22					0.	999	0.	999
	0.	999	-1.331E+04	8				
23					0.	999	0.	999
	0.	999	-1.422E+04	9				
24					0.	999	0.	999
	0.	999	-1.414E+04	10				
25					2.575E+04	15	0.	999
	1.396E+04	19	0.	999				
26					0.	999	0.	999
	1.336E+04	20	0.	999				
27					0.	999	0.	999
	1.247E+04	21	0.	999				
28					0.	999	0.	999
	1.159E+04	22	0.	999				

29					0.	999	0.	999
	1.072E+04	23	0.	999				
30					0.	999	0.	999
	9.878E+03	24	0.	999				
31					0.	999	0.	999
	9.047E+03	25	0.	999				
32					0.	999	0.	999
	8.210E+03	26	0.	999				
33					0.	999	0.	999
	7.366E+03	27	0.	999				
34					0.	999	0.	999
	6.518E+03	28	0.	999				
35					0.	999	0.	999
	5.666E+03	29	0.	999				
36					0.	999	0.	999
	4.812E+03	30	0.	999				
37					0.	999	0.	999
	3.957E+03	31	0.	999				
38					0.	999	0.	999
	3.103E+03	32	-7.621E+02	24				
39					0.	999	0.	999
	2.251E+03	33	-1.593E+03	25				
40					0.	999	0.	999
	1.402E+03	34	-2.430E+03	26				
41					0.	999	0.	999
	5.588E+02	35	-3.274E+03	27				
42					0.	999	0.	999
	0.	999	-4.122E+03	28				
43					0.	999	0.	999
	0.	999	-4.974E+03	29				
44					0.	999	0.	999
	0.	999	-5.828E+03	30				
45					0.	999	0.	999
	0.	999	-6.683E+03	31				
46					0.	999	0.	999
	0.	999	-7.537E+03	32				
47					0.	999	0.	999
	0.	999	-8.389E+03	33				
48					0.	999	0.	999
	0.	999	-9.238E+03	34				
49					0.	999	0.	999
	0.	999	-1.008E+04	35				
50					0.	999	0.	999
	0.	999	-1.094E+04	36				
51					0.	999	0.	999
	0.	999	-1.182E+04	37				
52					0.	999	0.	999
	0.	999	-1.272E+04	38				
53					0.	999	0.	999
	0.	999	-1.363E+04	39				
54					0.	999	0.	999
	0.	999	-1.400E+04	40				
55					2.575E+04	46	0.	999
	1.408E+04	49	0.	999				
56					0.	999	0.	999
	1.394E+04	50	0.	999				
57					0.	999	0.	999
	1.305E+04	51	0.	999				
58					0.	999	0.	999
	1.218E+04	52	0.	999				
59					0.	999	0.	999

	1.132E+04	53	0.	999				
60					0.	999	0.	999
	1.048E+04	54	0.	999				
61					0.	999	0.	999
	9.643E+03	55	0.	999				
62					0.	999	0.	999
	8.797E+03	56	0.	999				
63					0.	999	0.	999
	7.941E+03	57	0.	999				
64					0.	999	0.	999
	7.074E+03	58	0.	999				
65					0.	999	0.	999
	6.197E+03	59	0.	999				
66					0.	999	0.	999
	5.312E+03	60	0.	999				
67					0.	999	0.	999
	4.418E+03	61	0.	999				
68					0.	999	0.	999
	3.516E+03	62	-1.638E+02	54				
69					0.	999	0.	999
	2.606E+03	63	-9.975E+02	55				
70					0.	999	0.	999
	1.691E+03	64	-1.843E+03	56				
71					0.	999	0.	999
	7.700E+02	65	-2.699E+03	57				
72					0.	999	0.	999
	0.	999	-3.566E+03	58				
73					0.	999	0.	999
	0.	999	-4.443E+03	59				
74					0.	999	0.	999
	0.	999	-5.328E+03	60				
75					0.	999	0.	999
	0.	999	-6.222E+03	61				
76					0.	999	0.	999
	0.	999	-7.124E+03	62				
77					0.	999	0.	999
	0.	999	-8.034E+03	63				
78					0.	999	0.	999
	0.	999	-8.949E+03	64				
79					0.	999	0.	999
	0.	999	-9.870E+03	65				
80					1.050E+04	66	0.	999
	6.661E-10	59	-3.331E-10	27				
81					0.	999	0.	999

TABLE 9 -- SCALES FOR PLOTS OF THE ENVELOPES OF MAXIMUMS

HORIZONTAL SCALE
10 INCHES = 100 STATIONS

VERTICAL SCALES

VARIABLE	LENGTH OF AXIS	MAXIMUM VALUE
DEFLECT	2 INCHES =	1.000E+00
MOMENT	2 INCHES =	2.000E+06
SHEAR	2 INCHES =	2.000E+04
REACTION	2 INCHES =	4.000E+04

PROB (CONTD)
2 THREE SPAN STRUCTURE, FIXED LOADS PLUS MOVING LOADS

TABLE 10A -- INFLUENCE DIAGRAMS FOR DEFLECTION

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10B -- INFLUENCE DIAGRAMS FOR MOMENT

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10C -- INFLUENCE DIAGRAMS FOR SHEAR
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

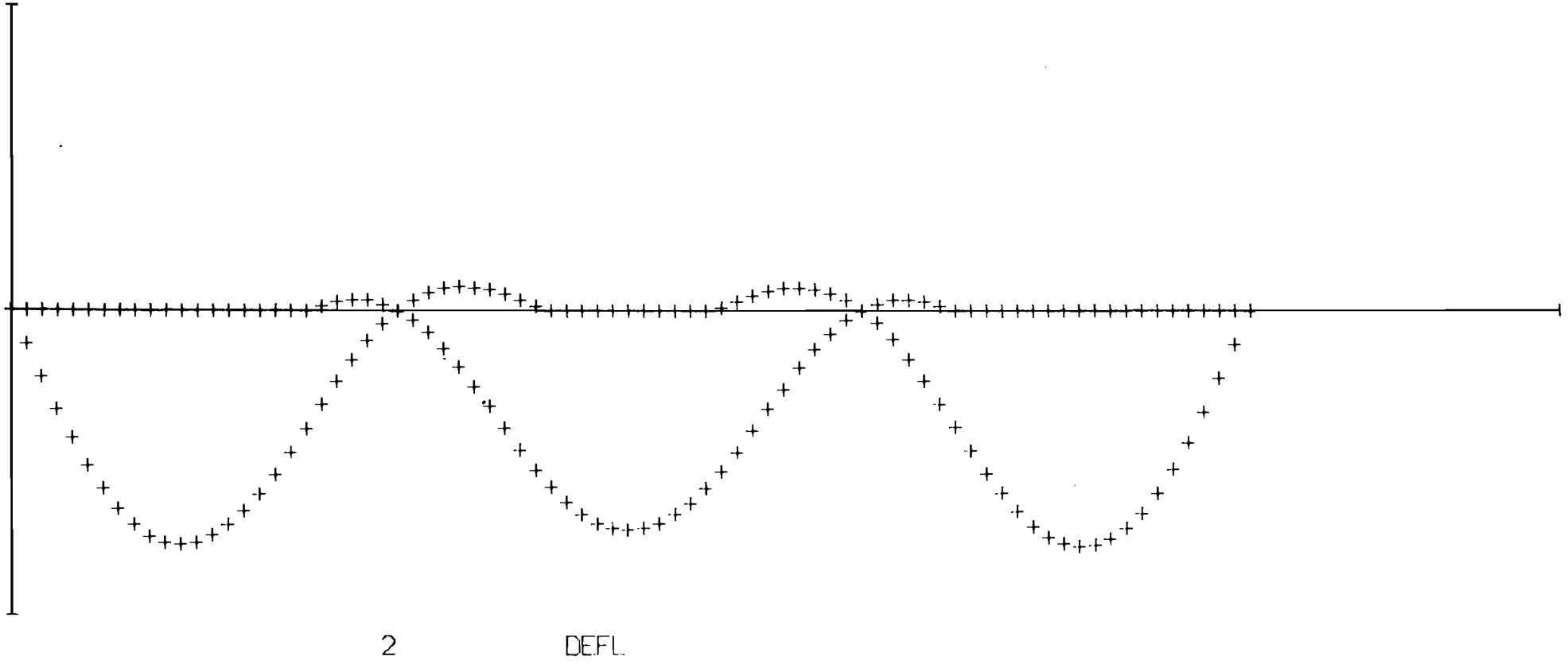
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10D -- INFLUENCE DIAGRAMS FOR SUPPORT REACTION

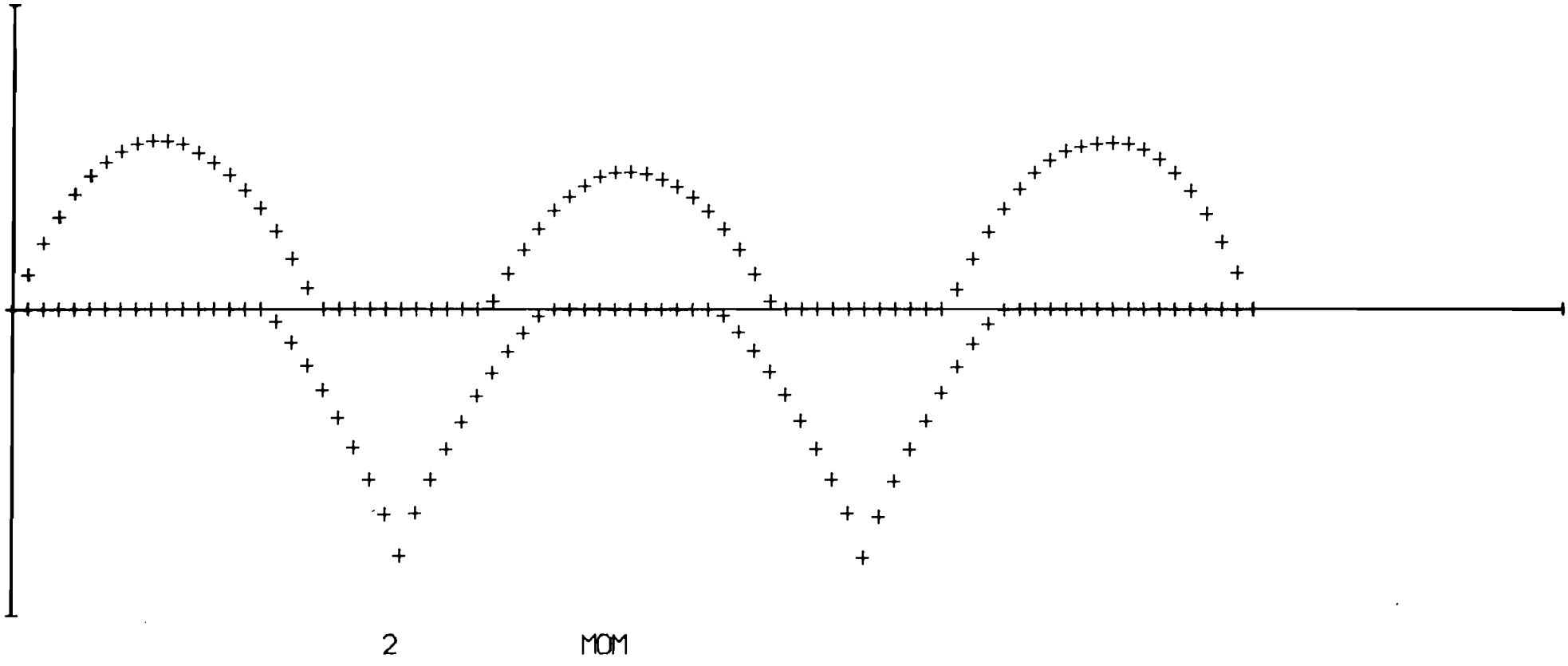
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TIME FOR THIS PROBLEM = 0 MINUTES 5.081 SECONDS

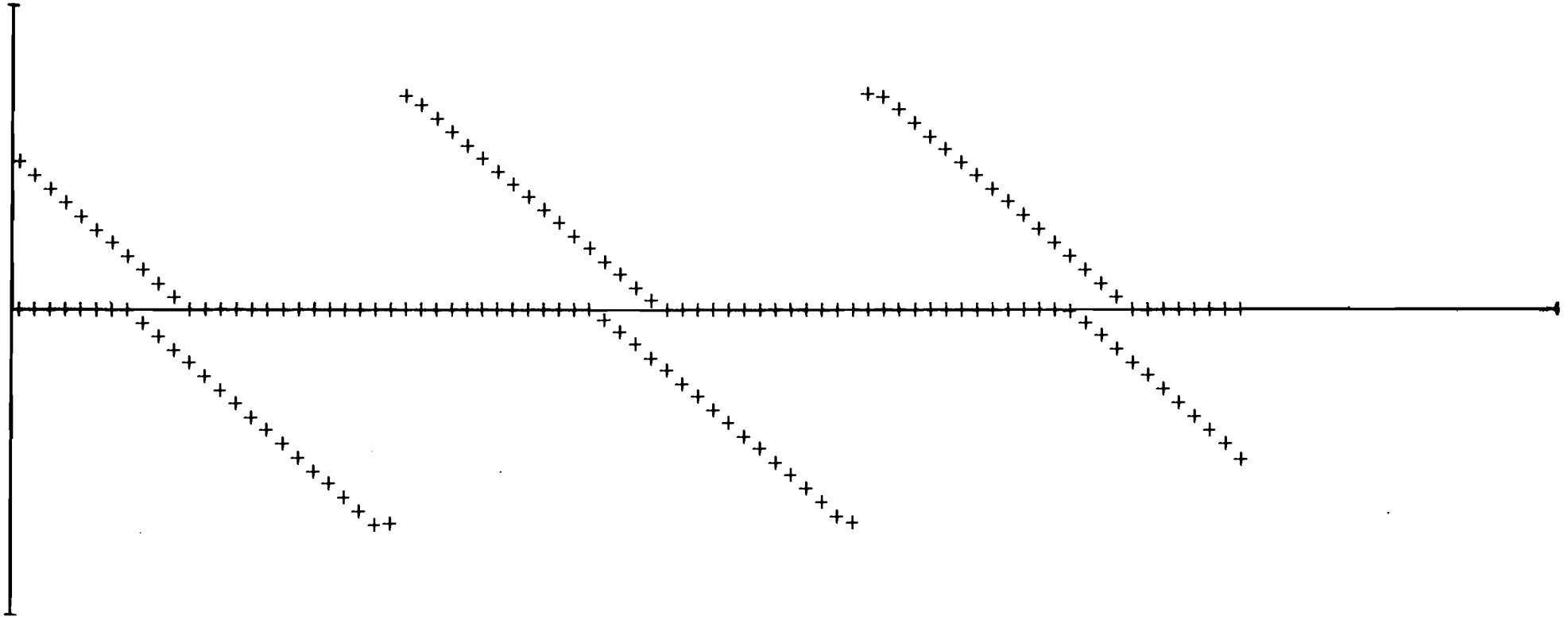
ELAPSED CPU TIME = 0 MINUTES 22.358 SECONDS



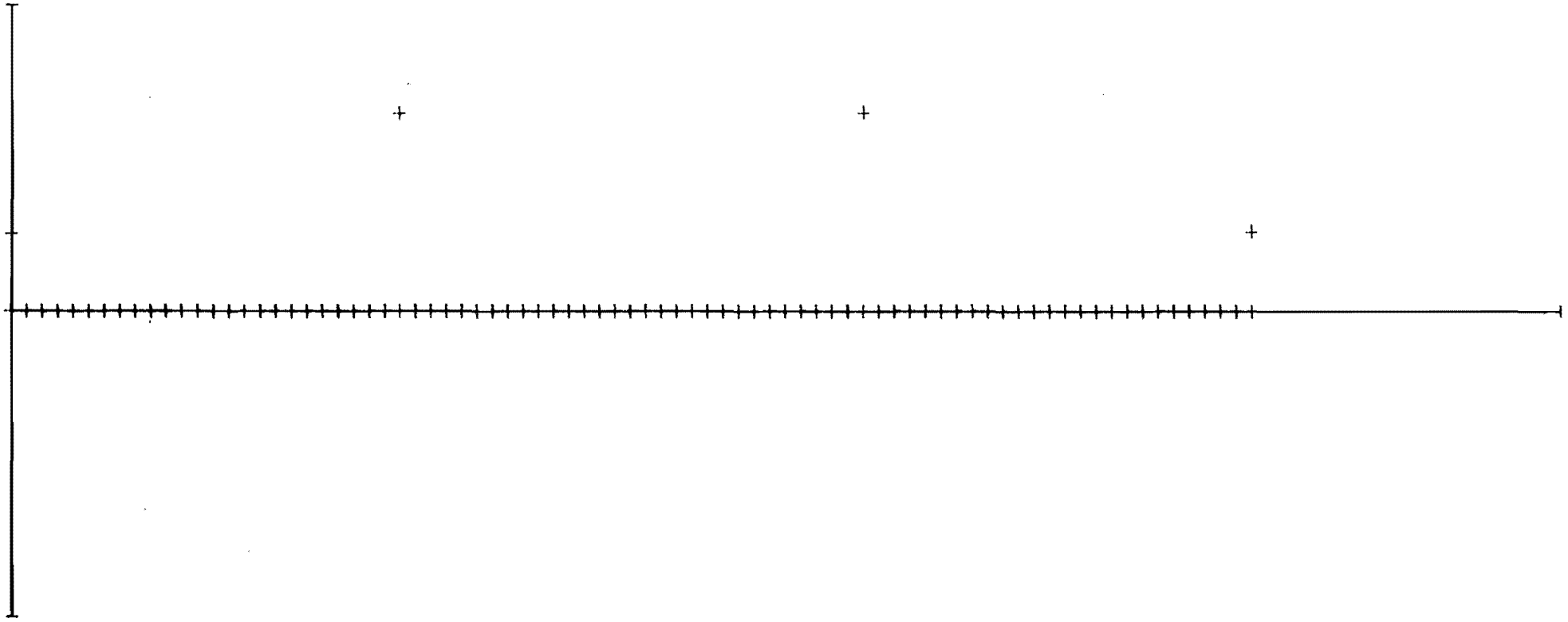
Prob 2. Three-span structure, fixed loads plus moving loads.
Envelope of maximum deflections.



Prob 2. Three-span structure, fixed loads plus moving loads.
Envelope of maximum moments.



Prob 2. Three-span structure, fixed loads plus moving loads.
Envelope of maximum shears.



Prob 2. Three-span structure, fixed loads plus moving loads.
Envelope of maximum reactions.

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB
3 THREE SPAN STRUCTURE, ALL PREVIOUS LOADS PLUS SUPPORT SETTLEMENTS

TABLE 1 - PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4	5	6
HOLD FROM PRECEDING PROBLEM (1=HOLD)	1	1	0	1	1	0
NUM CARDS INPUT THIS PROBLEM		0	4	0	0	0

	DEFL	MOM	SHR	RCT
OPTION (IF=1) TO PLOT ENVELOPES OF MAXIMUMS	1	1	1	1

TABLE 2 - CONSTANTS

USING DATA FROM THE PREVIOUS PROBLEM

NUM INCREMENTS	80
INCREMENT LENGTH	2.400E+01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	14
INITIAL POSITION OF MOVABLE LOAD STA ZERO	-14
FINAL POSITION OF MOVABLE LOAD STA ZERO	80
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	1

TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES

STA	CASE	DEFLECTION	SLOPE
0	1	0.	NONE
25	1	-1.250E+00	NONE
55	1	-6.250E-01	NONE
80	1	0.	NONE

TABLE 4 - STIFFNESS AND FIXED-LOAD DATA

FROM	TO	CONTD	F	OF	S	T	R	P
USING DATA FROM THE PREVIOUS PROBLEM								
0	80	-0	4.147E+10	-6.000E+02	-0.	-0.	-0.	-0.
19		1	0.	0.	-0.	-0.	-0.	-0.
	25	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	31	-0	0.	0.	-0.	-0.	-0.	-0.
49		1	0.	0.	-0.	-0.	-0.	-0.
	55	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	61	-0	0.	0.	-0.	-0.	-0.	-0.
25	25	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.
55	55	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.

ADDITIONAL DATA FOR THIS PROBLEM

NONE

TABLE 5 - MOVABLE-LOAD DATA

FROM	TO	CONTD	QM
USING DATA FROM THE PREVIOUS PROBLEM			
0	0	-0	-7.300E+02
7	7	-0	-2.920E+03
14	14	-0	-2.920E+03
ADDITIONAL DATA FOR THIS PROBLEM			

NONE

TABLE 6 - SPECIFIED STATIONS FOR INFLUENCE DIAGRAMS
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

NONE

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
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EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB (CONTD)
3 THREE SPAN STRUCTURE, ALL PREVIOUS LOADS PLUS SUPPORT SETTLEMENTS

TABLE 7 - FIXED-LOAD RESULTS

STA I	DIST	DEFL	SLOPE	MOM	SHEAR	SUP REACT
-1	-2.400E+01	1.323E-01		0.		-0.
			-5.514E-03		-1.332E-09	
0	0.	0.		-3.197E-08		6.111E+03
			-5.514E-03		5.811E+03	
1	2.400E+01	-1.323E-01		1.395E+05		-0.
			-5.434E-03		5.211E+03	
2	4.800E+01	-2.627E-01		2.645E+05		-0.
			-5.281E-03		4.611E+03	
3	7.200E+01	-3.895E-01		3.752E+05		-0.
			-5.063E-03		4.011E+03	
4	9.600E+01	-5.110E-01		4.714E+05		-0.
			-4.791E-03		3.411E+03	
5	1.200E+02	-6.260E-01		5.533E+05		-0.
			-4.470E-03		2.811E+03	
6	1.440E+02	-7.333E-01		6.207E+05		-0.
			-4.111E-03		2.211E+03	
7	1.680E+02	-8.319E-01		6.738E+05		-0.
			-3.721E-03		1.611E+03	
8	1.920E+02	-9.212E-01		7.125E+05		-0.
			-3.309E-03		1.011E+03	
9	2.160E+02	-1.001E+00		7.367E+05		-0.
			-2.882E-03		4.107E+02	
10	2.400E+02	-1.070E+00		7.466E+05		-0.
			-2.450E-03		-1.893E+02	
11	2.640E+02	-1.129E+00		7.420E+05		-0.
			-2.021E-03		-7.893E+02	
12	2.880E+02	-1.177E+00		7.231E+05		-0.
			-1.602E-03		-1.389E+03	
13	3.120E+02	-1.216E+00		6.897E+05		-0.
			-1.203E-03		-1.989E+03	
14	3.360E+02	-1.244E+00		6.420E+05		-0.
			-8.318E-04		-2.589E+03	
15	3.600E+02	-1.264E+00		5.799E+05		-0.
			-4.962E-04		-3.189E+03	
16	3.840E+02	-1.276E+00		5.033E+05		-0.
			-2.049E-04		-3.789E+03	
17	4.080E+02	-1.281E+00		4.124E+05		-0.
			3.376E-05		-4.389E+03	
18	4.320E+02	-1.280E+00		3.070E+05		-0.
			2.114E-04		-4.989E+03	
19	4.560E+02	-1.275E+00		1.873E+05		-0.
			3.198E-04		-5.589E+03	
20	4.800E+02	-1.268E+00		5.315E+04		-0.
			3.464E-04		-6.214E+03	
21	5.040E+02	-1.259E+00		-9.600E+04		-0.
			3.042E-04		-6.864E+03	

22	5.280E+02	-1.252E+00	2.020E-04	-2.607E+05	-7.539E+03	-0.
23	5.520E+02	-1.247E+00	4.573E-05	-4.417E+05	-8.239E+03	-0.
24	5.760E+02	-1.246E+00	-1.605E-04	-6.394E+05	-9.197E+03	-0.
25	6.000E+02	-1.250E+00	-4.154E-04	-8.601E+05	8.185E+03	1.813E+04
26	6.240E+02	-1.260E+00	-6.294E-04	-6.637E+05	7.692E+03	-0.
27	6.480E+02	-1.275E+00	-7.989E-04	-4.791E+05	6.992E+03	-0.
28	6.720E+02	-1.294E+00	-9.209E-04	-3.113E+05	6.317E+03	-0.
29	6.960E+02	-1.316E+00	-9.911E-04	-1.597E+05	5.667E+03	-0.
30	7.200E+02	-1.340E+00	-1.003E-03	-2.364E+04	5.042E+03	-0.
31	7.440E+02	-1.364E+00	-9.465E-04	9.738E+04	4.442E+03	-0.
32	7.680E+02	-1.387E+00	-8.284E-04	2.040E+05	3.842E+03	-0.
33	7.920E+02	-1.407E+00	-6.570E-04	2.962E+05	3.242E+03	-0.
34	8.160E+02	-1.423E+00	-4.406E-04	3.740E+05	2.642E+03	-0.
35	8.400E+02	-1.433E+00	-1.874E-04	4.374E+05	2.042E+03	-0.
36	8.640E+02	-1.438E+00	9.414E-05	4.865E+05	1.442E+03	-0.
37	8.880E+02	-1.435E+00	3.957E-04	5.211E+05	8.424E+02	-0.
38	9.120E+02	-1.426E+00	7.090E-04	5.413E+05	2.424E+02	-0.
39	9.360E+02	-1.409E+00	1.026E-03	5.471E+05	-3.576E+02	-0.
40	9.600E+02	-1.384E+00	1.337E-03	5.385E+05	-9.576E+02	-0.
41	9.840E+02	-1.352E+00	1.636E-03	5.155E+05	-1.558E+03	-0.
42	1.008E+03	-1.313E+00	1.912E-03	4.782E+05	-2.158E+03	-0.
43	1.032E+03	-1.267E+00	2.159E-03	4.264E+05	-2.758E+03	-0.
44	1.056E+03	-1.215E+00	2.368E-03	3.602E+05	-3.358E+03	-0.
45	1.080E+03	-1.158E+00	2.529E-03	2.796E+05	-3.958E+03	-0.
46	1.104E+03	-1.098E+00	2.636E-03	1.846E+05	-4.558E+03	-0.
47	1.128E+03	-1.034E+00	2.680E-03	7.525E+04	-5.158E+03	-0.
48	1.152E+03	-9.701E-01	2.652E-03	-4.854E+04	-5.758E+03	-0.
49	1.176E+03	-9.064E-01	2.544E-03	-1.867E+05	-6.358E+03	-0.
50	1.200E+03	-8.454E-01	2.374E-03	-3.393E+05	-6.983E+03	-0.
51	1.224E+03	-7.884E-01	2.152E-03	-5.069E+05	-7.633E+03	-0.
52	1.248E+03	-7.368E-01		-6.901E+05		-0.

			1.881E-03		-8.308E+03	
53	1.272E+03	-6.916E-01		-8.895E+05		-0.
			1.566E-03		-9.008E+03	
54	1.296E+03	-6.540E-01		-1.106E+06		-0.
			1.210E-03		-8.914E+03	
55	1.320E+03	-6.250E-01		-1.320E+06		2.019E+04
			8.188E-04		1.052E+04	
56	1.344E+03	-6.053E-01		-1.067E+06		-0.
			4.746E-04		8.982E+03	
57	1.368E+03	-5.940E-01		-8.514E+05		-0.
			1.734E-04		8.282E+03	
58	1.392E+03	-5.898E-01		-6.527E+05		-0.
			-8.244E-05		7.607E+03	
59	1.416E+03	-5.918E-01		-4.701E+05		-0.
			-2.889E-04		6.957E+03	
60	1.440E+03	-5.987E-01		-3.032E+05		-0.
			-4.403E-04		6.332E+03	
61	1.464E+03	-6.093E-01		-1.512E+05		-0.
			-5.278E-04		5.732E+03	
62	1.488E+03	-6.219E-01		-1.364E+04		-0.
			-5.357E-04		5.132E+03	
63	1.512E+03	-6.348E-01		1.095E+05		-0.
			-4.723E-04		4.532E+03	
64	1.536E+03	-6.461E-01		2.183E+05		-0.
			-3.460E-04		3.932E+03	
65	1.560E+03	-6.544E-01		3.126E+05		-0.
			-1.650E-04		3.332E+03	
66	1.584E+03	-6.584E-01		3.926E+05		-0.
			6.216E-05		2.732E+03	
67	1.608E+03	-6.569E-01		4.582E+05		-0.
			3.273E-04		2.132E+03	
68	1.632E+03	-6.491E-01		5.093E+05		-0.
			6.221E-04		1.532E+03	
69	1.656E+03	-6.341E-01		5.461E+05		-0.
			9.381E-04		9.316E+02	
70	1.680E+03	-6.116E-01		5.684E+05		-0.
			1.267E-03		3.316E+02	
71	1.704E+03	-5.812E-01		5.764E+05		-0.
			1.601E-03		-2.684E+02	
72	1.728E+03	-5.428E-01		5.699E+05		-0.
			1.930E-03		-8.684E+02	
73	1.752E+03	-4.965E-01		5.491E+05		-0.
			2.248E-03		-1.468E+03	
74	1.776E+03	-4.425E-01		5.139E+05		-0.
			2.546E-03		-2.068E+03	
75	1.800E+03	-3.814E-01		4.642E+05		-0.
			2.814E-03		-2.668E+03	
76	1.824E+03	-3.139E-01		4.002E+05		-0.
			3.046E-03		-3.268E+03	
77	1.848E+03	-2.408E-01		3.217E+05		-0.
			3.232E-03		-3.868E+03	
78	1.872E+03	-1.632E-01		2.289E+05		-0.
			3.365E-03		-4.468E+03	
79	1.896E+03	-8.244E-02		1.216E+05		-0.
			3.435E-03		-5.068E+03	
80	1.920E+03	0.		0.		5.368E+03
			3.435E-03		0.	
81	1.944E+03	8.244E-02		0.		-0.

PROB (CONTD)
3 THREE SPAN STRUCTURE, ALL PREVIOUS LOADS PLUS SUPPORT SETTLEMENTS

TABLE 8A- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +DEFL	LOC	MAX -DEFL	LOC	MAX +MOM	LOC	MAX -MOM	LOC
-1	1.842E-01	1	0.	999*	0.	999*	0.	999*
0	0.	999*	0.	999*	0.	999*	-3.197E-08	999
1	0.	999*	-1.842E-01	1	2.472E+05	-6	0.	999*
2	0.	999*	-3.654E-01	1	4.659E+05	-5	0.	999*
3	0.	999*	-5.409E-01	1	6.564E+05	-4	0.	999*
4	0.	999*	-7.086E-01	1	8.191E+05	-3	0.	999*
5	0.	999*	-8.661E-01	1	9.543E+05	-2	0.	999*
6	0.	999*	-1.011E+00	1	1.063E+06	-1	0.	999*
7	0.	999*	-1.143E+00	1	1.145E+06	0	0.	999*
8	0.	999*	-1.260E+00	2	1.211E+06	1	0.	999*
9	0.	999*	-1.360E+00	2	1.251E+06	2	0.	999*
10	0.	999*	-1.444E+00	2	1.264E+06	3	0.	999*
11	0.	999*	-1.510E+00	2	1.253E+06	4	0.	999*
12	0.	999*	-1.559E+00	2	1.217E+06	5	0.	999*
13	0.	999*	-1.592E+00	2	1.158E+06	6	0.	999*
14	0.	999*	-1.609E+00	3	1.093E+06	0	0.	999*
15	0.	999*	-1.611E+00	3	1.009E+06	1	0.	999*
16	0.	999*	-1.601E+00	3	8.993E+05	2	0.	999*
17	0.	999*	-1.578E+00	3	7.652E+05	3	-9.202E+04	28*
18	0.	999*	-1.544E+00	3	6.077E+05	4	-2.270E+05	28*
19	0.	999*	-1.503E+00	4	4.279E+05	5	-3.764E+05	28*
20	1.376E-02	28*	-1.457E+00	4	2.269E+05	6	-5.403E+05	28*
21	2.813E-02	28*	-1.409E+00	4	4.947E+03	7	-7.191E+05	28*
22	3.493E-02	28*	-1.362E+00	4	0.	999*	-9.135E+05	28*
23	3.314E-02	28*	-1.319E+00	4	0.	999*	-1.124E+06	28*

24	2.180E-02	28*	-1.281E+00	4	0.	999*	-1.352E+06	28*
25	0.	999*	-1.250E+00	999	0.	999*	-1.619E+06	28*
26	3.437E-02	4*	-1.296E+00	28	0.	999*	-1.338E+06	4*
27	5.838E-02	4*	-1.349E+00	28	0.	999*	-1.122E+06	4*
28	7.286E-02	4*	-1.409E+00	28	0.	999*	-9.231E+05	4*
29	7.866E-02	4*	-1.472E+00	28	0.	999*	-7.403E+05	4*
30	7.665E-02	4*	-1.538E+00	28	1.244E+05	23	-5.732E+05	4*
31	6.778E-02	4*	-1.604E+00	28	3.093E+05	24	-4.210E+05	4*
32	5.305E-02	4*	-1.667E+00	28	4.746E+05	25	-2.832E+05	4*
33	3.440E-02	4*	-1.725E+00	29	6.197E+05	26	-1.598E+05	4*
34	1.352E-02	4*	-1.776E+00	29	7.436E+05	27	-5.087E+04	4*
35	0.	999*	-1.818E+00	29	8.460E+05	28	0.	999*
36	0.	999*	-1.849E+00	29	9.264E+05	29	0.	999*
37	0.	999*	-1.868E+00	30	9.844E+05	30	0.	999*
38	0.	999*	-1.874E+00	30	1.020E+06	31	0.	999*
39	0.	999*	-1.866E+00	30	1.033E+06	32	0.	999*
40	0.	999*	-1.844E+00	30	1.023E+06	33	0.	999*
41	0.	999*	-1.810E+00	31	9.916E+05	34	0.	999*
42	0.	999*	-1.762E+00	31	9.379E+05	35	0.	999*
43	0.	999*	-1.702E+00	31	8.740E+05	29	0.	999*
44	0.	999*	-1.630E+00	31	7.886E+05	30	0.	999*
45	0.	999*	-1.547E+00	32	6.805E+05	31	0.	999*
46	1.027E-02	57*	-1.457E+00	32	5.500E+05	32	-4.715E+04	57*
47	3.128E-02	57*	-1.358E+00	32	3.973E+05	33	-1.558E+05	57*
48	5.012E-02	57*	-1.255E+00	33	2.271E+05	34*	-2.831E+05	57
49	6.510E-02	57*	-1.151E+00	33	4.745E+04	35*	-4.364E+05	57
50	7.429E-02	57*	-1.048E+00	33	0.	999*	-6.041E+05	57
51	7.666E-02	57*	-9.476E-01	33	0.	999*	-7.867E+05	57
52	7.129E-02	57*	-8.535E-01	33	0.	999*	-9.850E+05	57
53	5.728E-02	57*	-7.672E-01	33	0.	999*	-1.200E+06	57

54	3.380E-02	57*	-6.906E-01	33	0.	999*	-1.439E+06	32
55	0.	999*	-6.250E-01	999	0.	999*	-1.716E+06	33
56	2.247E-02	33*	-6.393E-01	57	0.	999*	-1.420E+06	33
57	3.442E-02	33*	-6.640E-01	57	0.	999*	-1.190E+06	33
58	3.677E-02	33*	-6.976E-01	57	0.	999*	-9.765E+05	33
59	3.046E-02	33*	-7.384E-01	57	0.	999*	-7.792E+05	33
60	1.651E-02	33*	-7.843E-01	57	0.	999*	-5.975E+05	33
61	0.	999*	-8.330E-01	57	1.313E+05	54*	-4.308E+05	33
62	0.	999*	-8.818E-01	57	3.292E+05	55*	-2.786E+05	33
63	0.	999*	-9.282E-01	58	5.061E+05	56*	-1.407E+05	33
64	0.	999*	-9.692E-01	58	6.611E+05	57*	-1.720E+04	33
65	0.	999*	-1.002E+00	58	7.932E+05	58*	0.	999*
66	0.	999*	-1.024E+00	58	9.013E+05	59*	0.	999*
67	0.	999*	-1.035E+00	58	9.846E+05	60*	0.	999*
68	0.	999*	-1.034E+00	59	1.042E+06	61*	0.	999*
69	0.	999*	-1.019E+00	59	1.073E+06	62*	0.	999*
70	0.	999*	-9.900E-01	59	1.090E+06	56*	0.	999*
71	0.	999*	-9.465E-01	59	1.101E+06	57*	0.	999*
72	0.	999*	-8.883E-01	59	1.088E+06	58*	0.	999*
73	0.	999*	-8.155E-01	59	1.049E+06	59*	0.	999*
74	0.	999*	-7.286E-01	60	9.833E+05	60*	0.	999*
75	0.	999*	-6.294E-01	60	8.907E+05	61*	0.	999*
76	0.	999*	-5.186E-01	60	7.703E+05	62*	0.	999*
77	0.	999*	-3.980E-01	60	6.216E+05	63*	0.	999*
78	0.	999*	-2.698E-01	60	4.440E+05	64*	0.	999*
79	0.	999*	-1.362E-01	60	2.369E+05	65*	0.	999*
80	0.	999*	0.	999*	1.599E-08	0	-1.599E-08	59*
81	1.362E-01	60	0.	999*	0.	999*	0.	999*

TABLE 88- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +SHEAR	LOC	MAX -SHEAR	LOC	MAX +REACT	LOC	MAX -REACT	LOC
-1					0.	999*	0.	999*
	0.	999*	-1.332E-09	999				
0					1.090E+04	-7	0.	999*
	1.030E+04	-6	0.	999*				
1					0.	999*	0.	999*
	9.406E+03	-5	0.	999*				
2					0.	999*	0.	999*
	8.517E+03	-4	0.	999*				
3					0.	999*	0.	999*
	7.632E+03	-3	0.	999*				
4					0.	999*	0.	999*
	6.753E+03	-2	0.	999*				
5					0.	999*	0.	999*
	5.880E+03	-1	0.	999*				
6					0.	999*	0.	999*
	5.013E+03	0	0.	999*				
7					0.	999*	0.	999*
	4.117E+03	1	-7.855E+01	-7*				
8					0.	999*	0.	999*
	3.228E+03	2	-9.754E+02	-6*				
9					0.	999*	0.	999*
	2.349E+03	3	-1.869E+03	-5*				
10					0.	999*	0.	999*
	1.480E+03	4	-2.758E+03	-4*				
11					0.	999*	0.	999*
	6.220E+02	5	-3.643E+03	-3*				
12					0.	999*	0.	999*
	0.	999*	-4.522E+03	-2*				
13					0.	999*	0.	999*
	0.	999*	-5.396E+03	-1*				
14					0.	999*	0.	999*
	0.	999*	-6.262E+03	0*				
15					0.	999*	0.	999*
	0.	999*	-7.159E+03	1*				
16					0.	999*	0.	999*
	0.	999*	-8.047E+03	2*				
17					0.	999*	0.	999*
	0.	999*	-8.926E+03	3*				
18					0.	999*	0.	999*
	0.	999*	-9.795E+03	4*				
19					0.	999*	0.	999*
	0.	999*	-1.065E+04	5*				
20					0.	999*	0.	999*
	0.	999*	-1.152E+04	6*				
21					0.	999*	0.	999*
	0.	999*	-1.241E+04	7*				
22					0.	999*	0.	999*
	0.	999*	-1.331E+04	8*				
23					0.	999*	0.	999*
	0.	999*	-1.422E+04	9*				
24					0.	999*	0.	999*
	0.	999*	-1.414E+04	10*				
25					2.575E+04	15*	0.	999*
	1.396E+04	19*	0.	999*				
26					0.	999*	0.	999*
	1.336E+04	20*	0.	999*				
27					0.	999*	0.	999*
	1.247E+04	21*	0.	999*				
28					0.	999*	0.	999*
	1.159E+04	22*	0.	999*				

29					0.	999*	0.	999*
	1.072E+04	23*	0.	999*				
30					0.	999*	0.	999*
	9.878E+03	24*	0.	999*				
31					0.	999*	0.	999*
	9.047E+03	25*	0.	999*				
32					0.	999*	0.	999*
	8.210E+03	26*	0.	999*				
33					0.	999*	0.	999*
	7.366E+03	27*	0.	999*				
34					0.	999*	0.	999*
	6.518E+03	28*	0.	999*				
35					0.	999*	0.	999*
	5.666E+03	29*	0.	999*				
36					0.	999*	0.	999*
	4.812E+03	30*	0.	999*				
37					0.	999*	0.	999*
	3.957E+03	31*	-5.979E+02	23				
38					0.	999*	0.	999*
	3.103E+03	32*	-1.420E+03	24				
39					0.	999*	0.	999*
	2.251E+03	33*	-2.250E+03	25				
40					0.	999*	0.	999*
	1.402E+03	34*	-3.088E+03	26				
41					0.	999*	0.	999*
	5.588E+02	35*	-3.932E+03	27				
42					0.	999*	0.	999*
	0.	999*	-4.780E+03	28				
43					0.	999*	0.	999*
	0.	999*	-5.632E+03	29				
44					0.	999*	0.	999*
	0.	999*	-6.486E+03	30				
45					0.	999*	0.	999*
	0.	999*	-7.340E+03	31				
46					0.	999*	0.	999*
	0.	999*	-8.195E+03	32				
47					0.	999*	0.	999*
	0.	999*	-9.047E+03	33				
48					0.	999*	0.	999*
	0.	999*	-9.895E+03	34				
49					0.	999*	0.	999*
	0.	999*	-1.074E+04	35				
50					0.	999*	0.	999*
	0.	999*	-1.160E+04	36				
51					0.	999*	0.	999*
	0.	999*	-1.248E+04	37				
52					0.	999*	0.	999*
	0.	999*	-1.338E+04	38				
53					0.	999*	0.	999*
	0.	999*	-1.429E+04	39				
54					0.	999*	0.	999*
	0.	999*	-1.400E+04	40*				
55					2.652E+04	46	0.	999*
	1.523E+04	49	0.	999*				
56					0.	999*	0.	999*
	1.405E+04	50	0.	999*				
57					0.	999*	0.	999*
	1.316E+04	51	0.	999*				
58					0.	999*	0.	999*
	1.229E+04	52	0.	999*				
59					0.	999*	0.	999*

	1.143E+04	53	0.	999•				
60					0.	999•	0.	999•
	1.058E+04	54	0.	999•				
61					0.	999•	0.	999•
	9.750E+03	55	0.	999•				
62					0.	999•	0.	999•
	8.904E+03	56	0.	999•				
63					0.	999•	0.	999•
	8.048E+03	57	0.	999•				
64					0.	999•	0.	999•
	7.181E+03	58	0.	999•				
65					0.	999•	0.	999•
	6.305E+03	59	0.	999•				
66					0.	999•	0.	999•
	5.419E+03	60	0.	999•				
67					0.	999•	0.	999•
	4.525E+03	61	0.	999•				
68					0.	999•	0.	999•
	3.623E+03	62	-1.638E+02	54•				
69					0.	999•	0.	999•
	2.714E+03	63	-9.975E+02	55•				
70					0.	999•	0.	999•
	1.798E+03	64	-1.843E+03	56•				
71					0.	999•	0.	999•
	8.771E+02	65	-2.699E+03	57•				
72					0.	999•	0.	999•
	0.	999•	-3.566E+03	58•				
73					0.	999•	0.	999•
	0.	999•	-4.443E+03	59•				
74					0.	999•	0.	999•
	0.	999•	-5.328E+03	60•				
75					0.	999•	0.	999•
	0.	999•	-6.222E+03	61•				
76					0.	999•	0.	999•
	0.	999•	-7.124E+03	62•				
77					0.	999•	0.	999•
	0.	999•	-8.034E+03	63•				
78					0.	999•	0.	999•
	0.	999•	-8.949E+03	64•				
79					0.	999•	0.	999•
	0.	999•	-9.870E+03	65•				
80					1.050E+04	66•	0.	999•
	6.661E-10	59•	-6.661E-10	0				
81					0.	999•	0.	999•

TABLE 9 -- SCALES FOR PLOTS OF THE ENVELOPES OF MAXIMUMS

HORIZONTAL SCALE
10 INCHES = 100 STATIONS

VERTICAL SCALES

VARIABLE	LENGTH OF AXIS	MAXIMUM VALUE
DEFLECT	2 INCHES =	2.000E+00
MOMENT	2 INCHES =	2.000E+06
SHEAR	2 INCHES =	2.000E+04
REACTION	2 INCHES =	4.000E+04

PROB (CONTD)
3 THREE SPAN STRUCTURE, ALL PREVIOUS LOADS PLUS SUPPORT SETTLEMENTS

TABLE 10A -- INFLUENCE DIAGRAMS FOR DEFLECTION

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10B -- INFLUENCE DIAGRAMS FOR MOMENT

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10C -- INFLUENCE DIAGRAMS FOR SHEAR
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

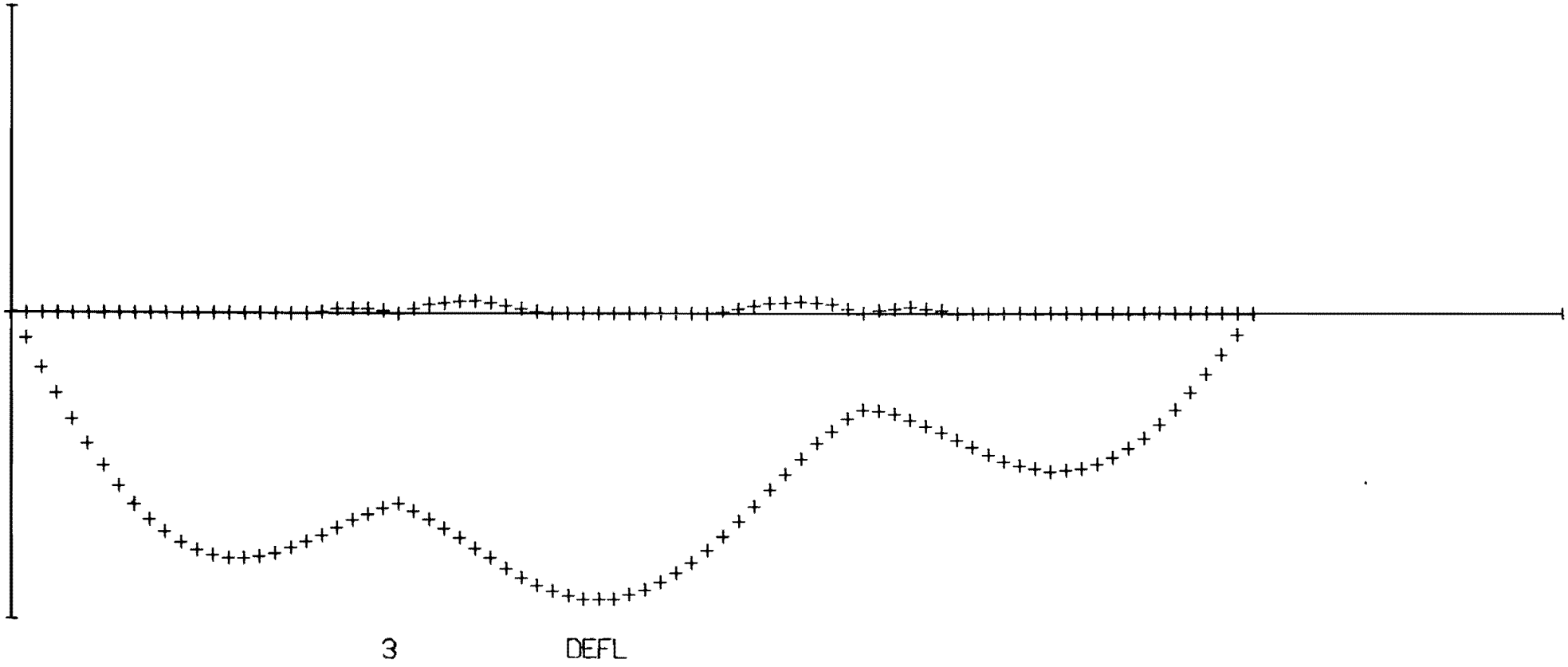
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10D -- INFLUENCE DIAGRAMS FOR SUPPORT REACTION

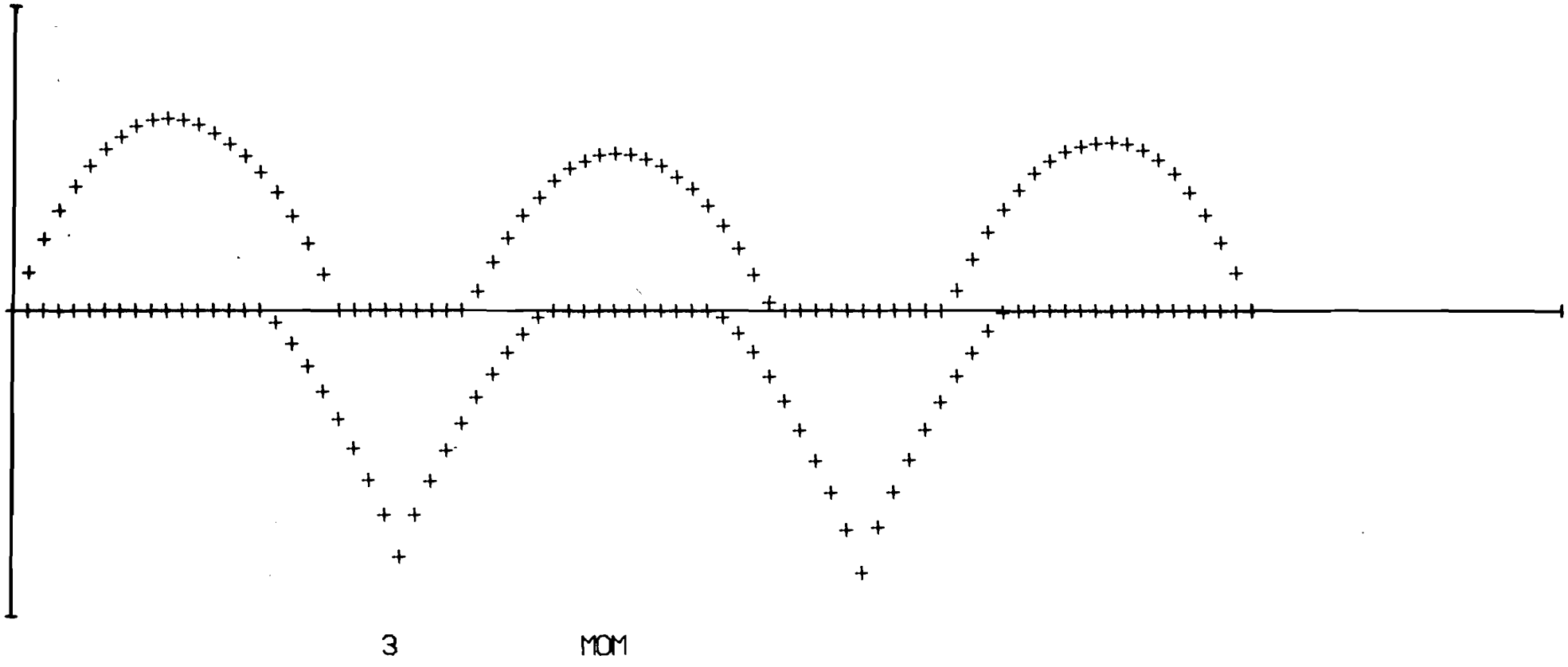
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TIME FOR THIS PROBLEM = 0 MINUTES 5.083 SECONDS

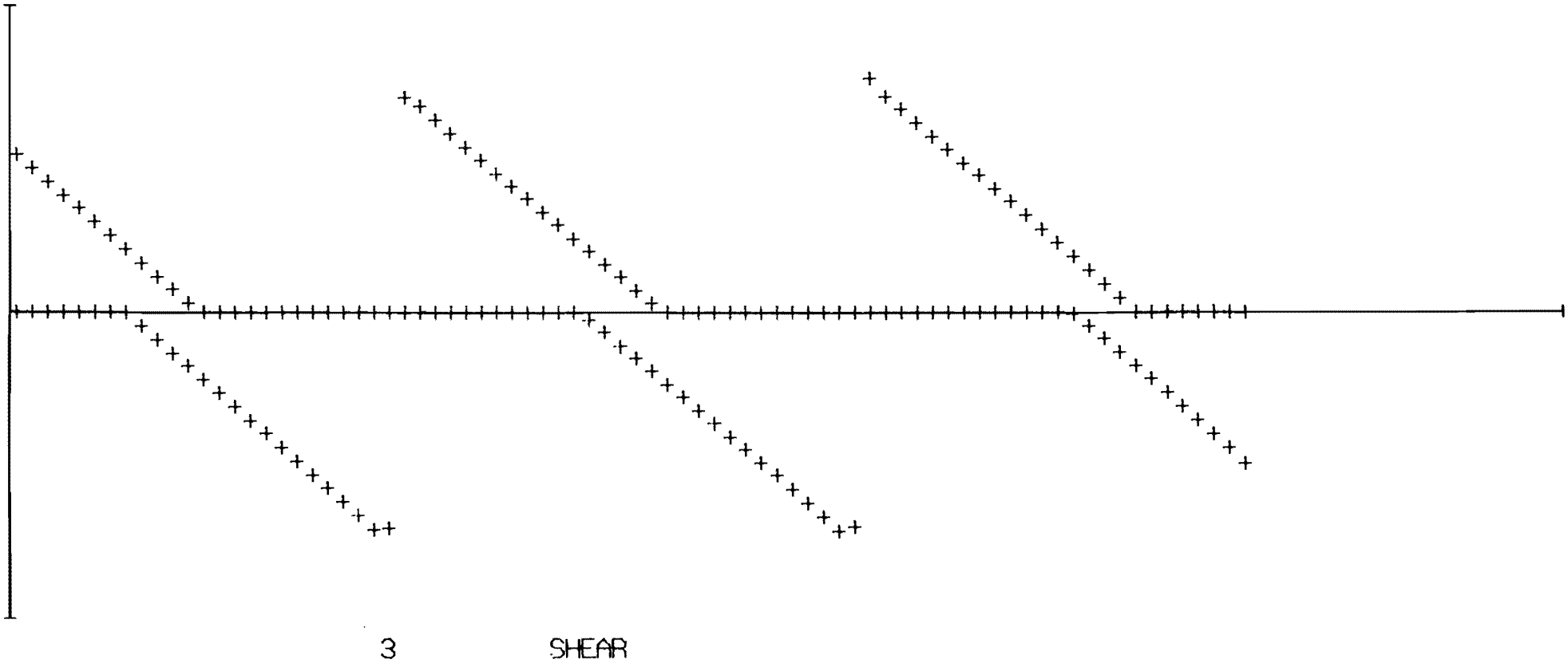
ELAPSED CPU TIME = 0 MINUTES 27.441 SECONDS



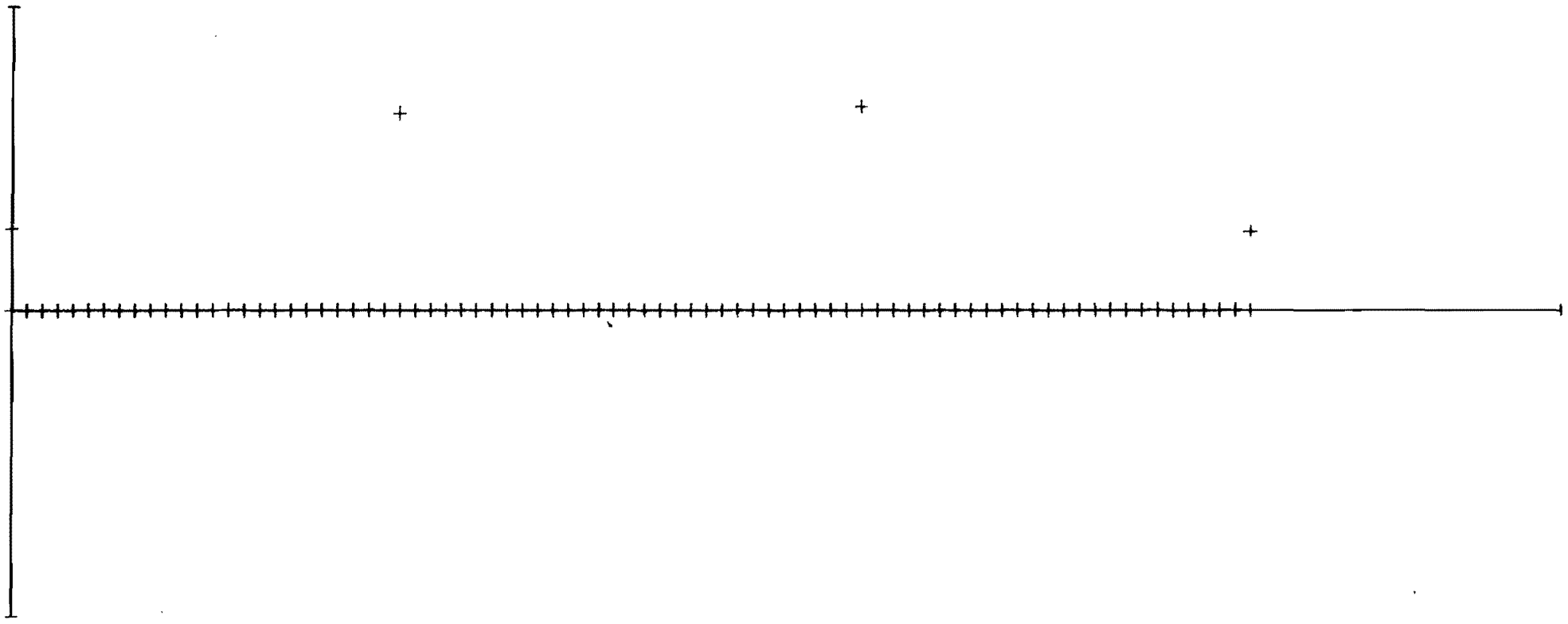
Prob 3. Three-span structure, all previous loads plus support settlements.
Envelope of maximum deflections.



Prob 3. Three-span structure, all previous loads plus support settlements. Envelope of maximum moments.



Prob 3. Three-span structure, all previous loads plus support settlements.
Envelope of maximum shears.



Prob 3. Three-span structure, all previous loads plus support settlements.
Envelope of maximum reactions.

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB
4 THREE SPAN STRUCTURE, INFLUENCE DIAGRAMS FOR ONE MOVING LOAD

TABLE 1 - PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4	5	6
HOLD FROM PRECEDING PROBLEM (1=HOLD)	0	0	0	0	0	0
NUM CARDS INPUT THIS PROBLEM		1	4	9	3	4

	DEFL	MOM	SHR	RCT
OPTION (IF=1) TO PLOT ENVELOPES OF MAXIMUMS	0	0	0	0

TABLE 2 - CONSTANTS

NUM INCREMENTS	80
INCREMENT LENGTH	2.400E+01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	14
INITIAL POSITION OF MOVABLE LOAD STA ZERO	-14
FINAL POSITION OF MOVABLE LOAD STA ZERO	80
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	1

TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES

STA	CASE	DEFLECTION	SLOPE
0	1	0.	NONE
25	1	0.	NONE
55	1	0.	NONE
80	1	0.	NONE

TABLE 4 - STIFFNESS AND FIXED-LOAD DATA

FROM	TO	CONTD	F	QF	S	T	R	P
0	80	-0	4.147E+10	-6.000E+02	-0.	-0.	-0.	-0.
19		1	0.	0.	-0.	-0.	-0.	-0.
	25	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	31	-0	0.	0.	-0.	-0.	-0.	-0.
49		1	0.	0.	-0.	-0.	-0.	-0.
	55	1	3.953E+10	-1.500E+02	-0.	-0.	-0.	-0.
	61	-0	0.	0.	-0.	-0.	-0.	-0.
25	25	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.
55	55	-0	-0.	-0.	-0.	-0.	3.873E+07	-0.

TABLE 5 - MOVABLE-LOAD DATA

FROM	TO	CONTD	QM
0	0	-0	-7.300E+02
7	7	-0	-2.920E+03
14	14	-0	-2.920E+03

TABLE 6 - SPECIFIED STATIONS FOR INFLUENCE DIAGRAMS
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

VARIABLE	NUM OF DIAGRAMS	TYPE OF OUTPUT	DESIGNATED STATIONS		
DEFLECT	2	3	11	40	
MOMENT	3	3	9	25	40
SHEAR	0	0	-0		
REACTION	0	0	-0		

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB (CONTD)
4 THREE SPAN STRUCTURE, INFLUENCE DIAGRAMS FOR ONE MOVING LOAD

TABLE 7 - FIXED-LOAD RESULTS

STA I	DIST	DEFL	SLOPE	MOM	SHEAR	SUP REACT
-1	-2.400E+01	6.103E-02		0.		-0.
			-2.543E-03		-3.331E-10	
0	0.	0.		-7.993E-09		5.476E+03
			-2.543E-03		5.176E+03	
1	2.400E+01	-6.103E-02		1.242E+05		-0.
			-2.471E-03		4.576E+03	
2	4.800E+01	-1.203E-01		2.340E+05		-0.
			-2.336E-03		3.976E+03	
3	7.200E+01	-1.764E-01		3.294E+05		
			-2.145E-03			
4	9.600E+01	-2.279E-01				
5	1.200E+02					
6						

The tabulated output from Tables 7, 8A, and 8B is omitted since it is identical to that in Problem 2.

				59			999
		999	-5.328E+03	60	0.	999	0.
	0.	999	-6.222E+03	61	0.	999	0.
76							
	0.	999	-7.124E+03	62	0.	999	0.
77							
	0.	999	-8.034E+03	63	0.	999	0.
78							
	0.	999	-8.949E+03	64	0.	999	0.
79							
	0.	999	-9.870E+03	65	0.	999	0.
80							
	6.661E-10	59	-3.331E-10	27	1.050E+04	66	0.
81							
					0.	999	0.

TABLE 9 -- SCALES FOR PLOTS OF THE ENVELOPES OF MAXIMUMS

NO PLOTS SPECIFIED

PROB (CONTD)
4 THREE SPAN STRUCTURE, INFLUENCE DIAGRAMS FOR ONE MOVING LOAD

TABLE 10A -- INFLUENCE DIAGRAMS FOR DEFLECTION

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS STA 11	STA 40	STA	STA	STA
-14	0.	0.			
-13	-2.791E-02	9.629E-03			
-12	-5.538E-02	1.916E-02			
-11	-8.198E-02	2.850E-02			
-10	-1.073E-01	3.756E-02			
-9	-1.308E-01	4.623E-02			
-8	-1.522E-01	5.443E-02			
-7	-1.709E-01	6.205E-02			
-6	-2.145E-01	7.862E-02			
-5	-2.541E-01	9.434E-02			
-4	-2.889E-01	1.090E-01			
-3	-3.181E-01	1.224E-01			
-2	-3.407E-01	1.344E-01			
-1	-3.568E-01	1.448E-01			
0	-3.666E-01	1.533E-01			
1	-3.771E-01	1.623E-01			
2	-3.813E-01	1.690E-01			
3	-3.792E-01	1.733E-01			
4	-3.708E-01	1.749E-01			
5	-3.562E-01	1.736E-01			
6	-3.362E-01	1.693E-01			
7	-3.118E-01	1.619E-01			
8	-2.838E-01	1.515E-01			
9	-2.531E-01	1.381E-01			
10	-2.202E-01	1.215E-01			
11	-1.859E-01	1.018E-01			
12	-1.506E-01	7.884E-02			
13	-1.149E-01	5.248E-02			
14	-7.967E-02	2.306E-02			
15	-4.538E-02	-9.105E-03			
16	-1.262E-02	-4.367E-02			
17	1.810E-02	-8.024E-02			
18	4.631E-02	-1.183E-01			
19	7.189E-02	-1.575E-01			
20	9.484E-02	-1.973E-01			
21	1.151E-01	-2.370E-01			
22	1.326E-01	-2.758E-01			
23	1.472E-01	-3.130E-01			
24	1.589E-01	-3.478E-01			
25	1.676E-01	-3.791E-01			
26	1.736E-01	-4.061E-01			
27	1.769E-01	-4.277E-01			
28	1.778E-01	-4.439E-01			
29	1.765E-01	-4.547E-01			
30	1.731E-01	-4.599E-01			
31	1.679E-01	-4.595E-01			
32	1.610E-01	-4.535E-01			

33	1.527E-01	-4.415E-01
34	1.432E-01	-4.237E-01
35	1.327E-01	-4.007E-01
36	1.214E-01	-3.735E-01
37	1.096E-01	-3.428E-01
38	9.744E-02	-3.094E-01
39	8.507E-02	-2.738E-01
40	7.266E-02	-2.367E-01
41	6.038E-02	-1.986E-01
42	4.834E-02	-1.602E-01
43	3.667E-02	-1.220E-01
44	2.547E-02	-8.468E-02
45	1.486E-02	-4.873E-02
46	4.924E-03	-1.466E-02
47	-4.245E-03	1.707E-02
48	-1.255E-02	4.600E-02
49	-1.998E-02	7.205E-02
50	-2.657E-02	9.523E-02
51	-3.229E-02	1.155E-01
52	-3.715E-02	1.327E-01
53	-4.112E-02	1.468E-01
54	-4.420E-02	1.578E-01
55	-4.635E-02	1.655E-01
56	-4.764E-02	1.701E-01
57	-4.811E-02	1.718E-01
58	-4.782E-02	1.707E-01
59	-4.681E-02	1.671E-01
60	-4.513E-02	1.611E-01
61	-4.283E-02	1.529E-01
62	-3.994E-02	1.426E-01
63	-3.653E-02	1.304E-01
64	-3.266E-02	1.166E-01
65	-2.839E-02	1.013E-01
66	-2.377E-02	8.486E-02
67	-2.157E-02	7.701E-02
68	-1.913E-02	6.828E-02
69	-1.646E-02	5.878E-02
70	-1.362E-02	4.863E-02
71	-1.063E-02	3.796E-02
72	-7.529E-03	2.688E-02
73	-4.345E-03	1.551E-02
74	-3.811E-03	1.361E-02
75	-3.237E-03	1.156E-02
76	-2.630E-03	9.390E-03
77	-1.996E-03	7.126E-03
78	-1.342E-03	4.791E-03
79	-6.743E-04	2.407E-03
80	0.	0.

TABLE 10B -- INFLUENCE DIAGRAMS FOR MOMENT

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS STA 9	STA 25	STA 40	STA	STA
-14	0.	0.	0.		
-13	3.692E+04	-2.055E+04	-6.380E+03		
-12	7.392E+04	-4.090E+04	-1.270E+04		
-11	1.111E+05	-6.083E+04	-1.889E+04		
-10	1.485E+05	-8.016E+04	-2.489E+04		

-9	1.862E+05	-9.867E+04	-3.063E+04
-8	2.243E+05	-1.162E+05	-3.606E+04
-7	2.629E+05	-1.324E+05	-4.111E+04
-6	3.389E+05	-1.678E+05	-5.209E+04
-5	4.157E+05	-2.013E+05	-6.251E+04
-4	4.232E+05	-2.326E+05	-7.223E+04
-3	4.318E+05	-2.613E+05	-8.112E+04
-2	4.415E+05	-2.869E+05	-8.906E+04
-1	4.526E+05	-3.090E+05	-9.593E+04
0	4.652E+05	-3.272E+05	-1.016E+05
1	4.887E+05	-3.463E+05	-1.075E+05
2	5.140E+05	-3.606E+05	-1.120E+05
3	4.712E+05	-3.698E+05	-1.148E+05
4	4.307E+05	-3.732E+05	-1.159E+05
5	3.924E+05	-3.706E+05	-1.150E+05
6	3.568E+05	-3.613E+05	-1.122E+05
7	3.236E+05	-3.456E+05	-1.073E+05
8	2.929E+05	-3.234E+05	-1.004E+05
9	2.647E+05	-2.947E+05	-9.148E+04
10	2.216E+05	-2.594E+05	-8.052E+04
11	1.810E+05	-2.173E+05	-6.747E+04
12	1.431E+05	-2.385E+05	-5.224E+04
13	1.077E+05	-2.525E+05	-3.459E+04
14	7.497E+04	-2.595E+05	-1.452E+04
15	4.473E+04	-2.595E+05	8.016E+03
16	1.703E+04	-2.525E+05	3.312E+04
17	-8.101E+03	-2.384E+05	6.095E+04
18	-3.059E+04	-2.170E+05	9.173E+04
19	-5.062E+04	-2.586E+05	1.255E+05
20	-6.826E+04	-2.932E+05	1.624E+05
21	-8.358E+04	-3.210E+05	2.025E+05
22	-9.664E+04	-3.421E+05	2.460E+05
23	-1.075E+05	-3.568E+05	2.929E+05
24	-1.161E+05	-3.648E+05	3.434E+05
25	-1.224E+05	-3.663E+05	3.978E+05
26	-1.268E+05	-3.792E+05	4.561E+05
27	-1.292E+05	-3.865E+05	4.482E+05
28	-1.298E+05	-3.884E+05	4.443E+05
29	-1.289E+05	-3.856E+05	4.443E+05
30	-1.264E+05	-3.783E+05	4.483E+05
31	-1.227E+05	-3.669E+05	4.564E+05
32	-1.176E+05	-3.519E+05	4.686E+05
33	-1.116E+05	-3.337E+05	4.849E+05
34	-1.046E+05	-3.129E+05	4.352E+05
35	-9.691E+04	-2.899E+05	3.897E+05
36	-8.869E+04	-2.653E+05	3.483E+05
37	-8.006E+04	-2.395E+05	3.107E+05
38	-7.117E+04	-2.129E+05	2.768E+05
39	-6.213E+04	-1.859E+05	2.464E+05
40	-5.307E+04	-1.588E+05	2.195E+05
41	-4.410E+04	-1.319E+05	1.783E+05
42	-3.531E+04	-1.056E+05	1.403E+05
43	-2.678E+04	-8.012E+04	1.054E+05
44	-1.861E+04	-5.566E+04	7.340E+04
45	-1.086E+04	-3.248E+04	4.423E+04
46	-3.597E+03	-1.076E+04	1.777E+04
47	3.101E+03	9.276E+03	-6.029E+03
48	9.163E+03	2.741E+04	-2.714E+04
49	1.460E+04	4.367E+04	-4.579E+04
50	1.941E+04	5.806E+04	-6.205E+04
51	2.359E+04	7.056E+04	-7.601E+04

52	2.713E+04	8.117E+04	-8.773E+04
53	3.004E+04	8.986E+04	-9.724E+04
54	3.228E+04	9.658E+04	-1.046E+05
55	3.386E+04	1.013E+05	-1.096E+05
56	3.480E+04	1.041E+05	-1.127E+05
57	3.514E+04	1.051E+05	-1.138E+05
58	3.493E+04	1.045E+05	-1.131E+05
59	3.419E+04	1.023E+05	-1.107E+05
60	3.296E+04	9.861E+04	-1.068E+05
61	3.128E+04	9.358E+04	-1.013E+05
62	2.917E+04	8.727E+04	-9.447E+04
63	2.668E+04	7.982E+04	-8.641E+04
64	2.385E+04	7.136E+04	-7.725E+04
65	2.073E+04	6.203E+04	-6.715E+04
66	1.736E+04	5.194E+04	-5.623E+04
67	1.576E+04	4.714E+04	-5.103E+04
68	1.397E+04	4.179E+04	-4.524E+04
69	1.203E+04	3.598E+04	-3.894E+04
70	9.949E+03	2.976E+04	-3.222E+04
71	7.766E+03	2.323E+04	-2.515E+04
72	5.499E+03	1.645E+04	-1.781E+04
73	3.173E+03	9.494E+03	-1.028E+04
74	2.784E+03	8.328E+03	-9.015E+03
75	2.365E+03	7.074E+03	-7.658E+03
76	1.921E+03	5.747E+03	-6.221E+03
77	1.458E+03	4.362E+03	-4.722E+03
78	9.801E+02	2.932E+03	-3.174E+03
79	4.925E+02	1.473E+03	-1.595E+03
80	0.	0.	0.

TABLE 10C -- INFLUENCE DIAGRAMS FOR SHEAR
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA

NONE

TABLE 10D -- INFLUENCE DIAGRAMS FOR SUPPORT REACTION

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA

NONE

TABLE 11 -- SCALES FOR INFLUENCE DIAGRAM PLOTS

HORIZONTAL SCALE

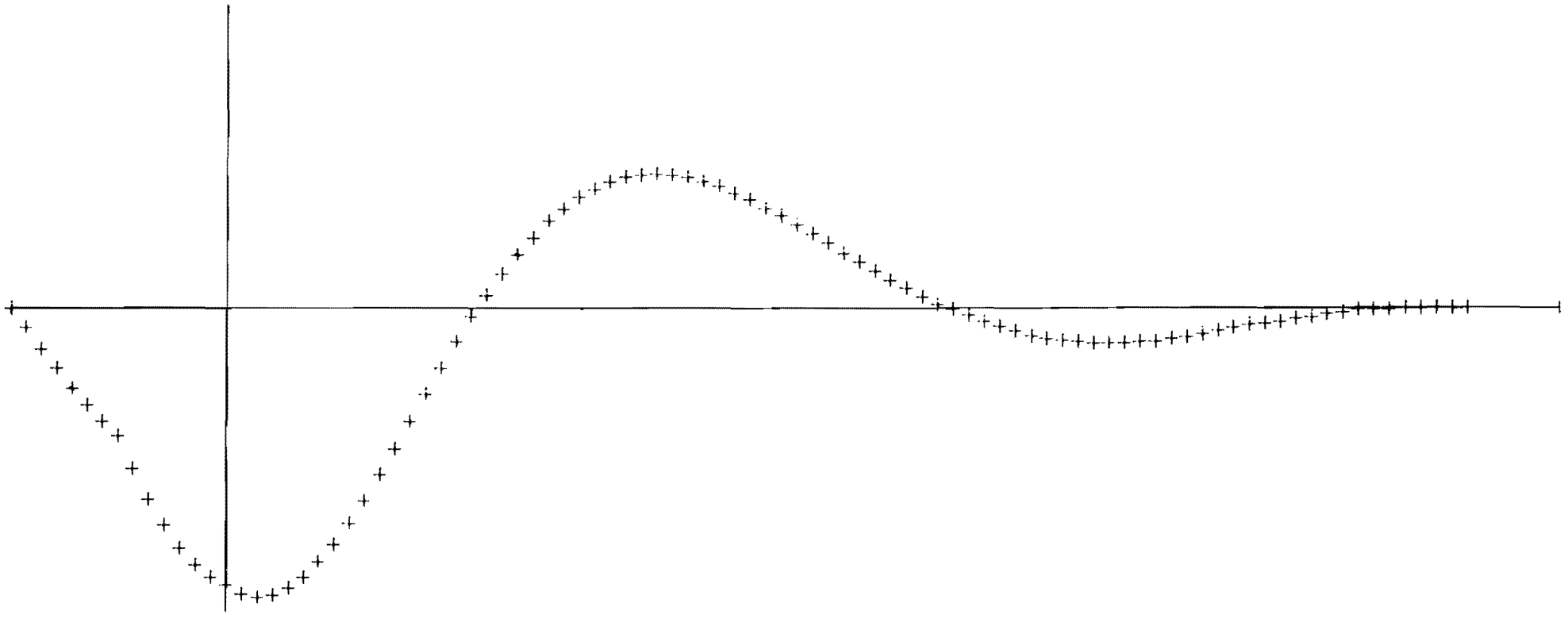
10 INCHES = 100 STATIONS

VERTICAL SCALES

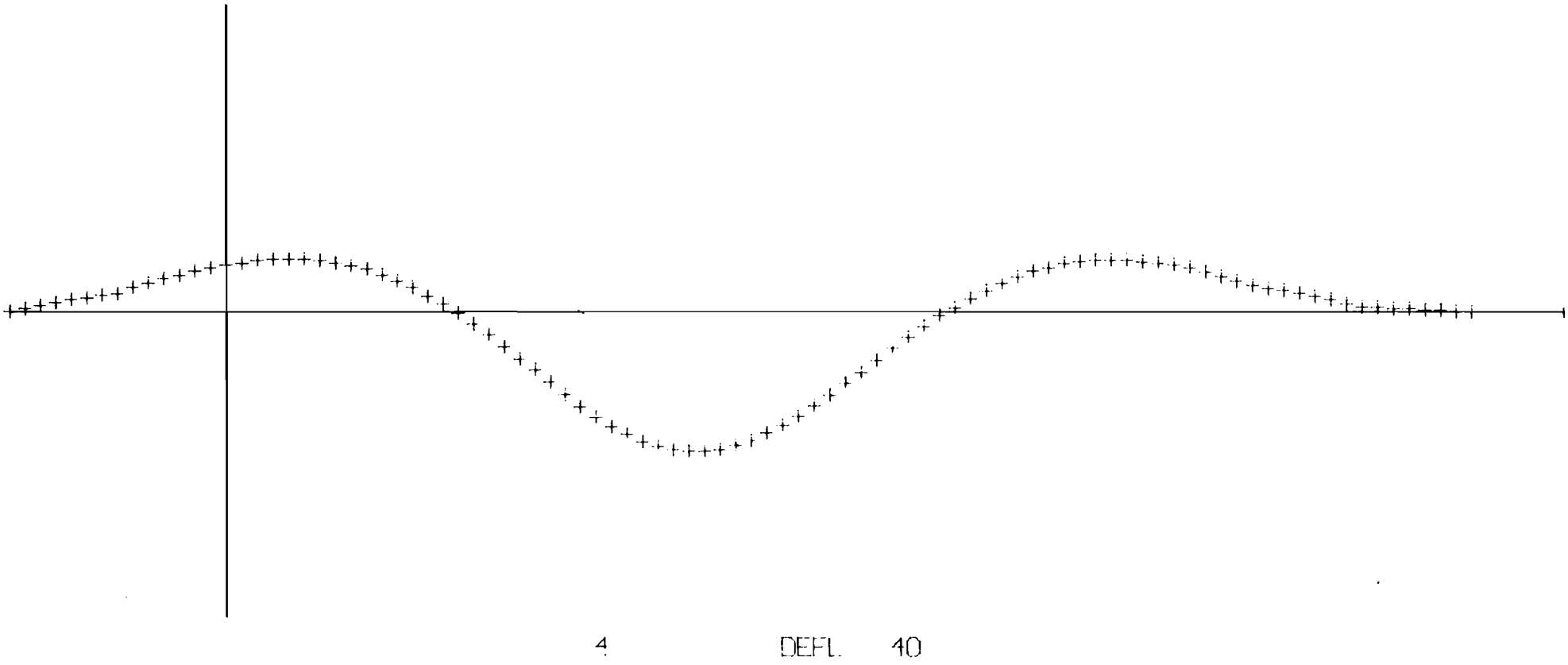
STA	VARIABLE	LENGTH OF AXIS	MAXIMUM VALUE
11	DEFLECT	2 INCHES =	4.000E-01
40	DEFLECT	2 INCHES =	1.000E+00
9	MOMENT	2 INCHES =	1.000E+06
25	MOMENT	2 INCHES =	4.000E+05
40	MOMENT	2 INCHES =	1.000E+06

TIME FOR THIS PROBLEM = 0 MINUTES 4.905 SECONDS

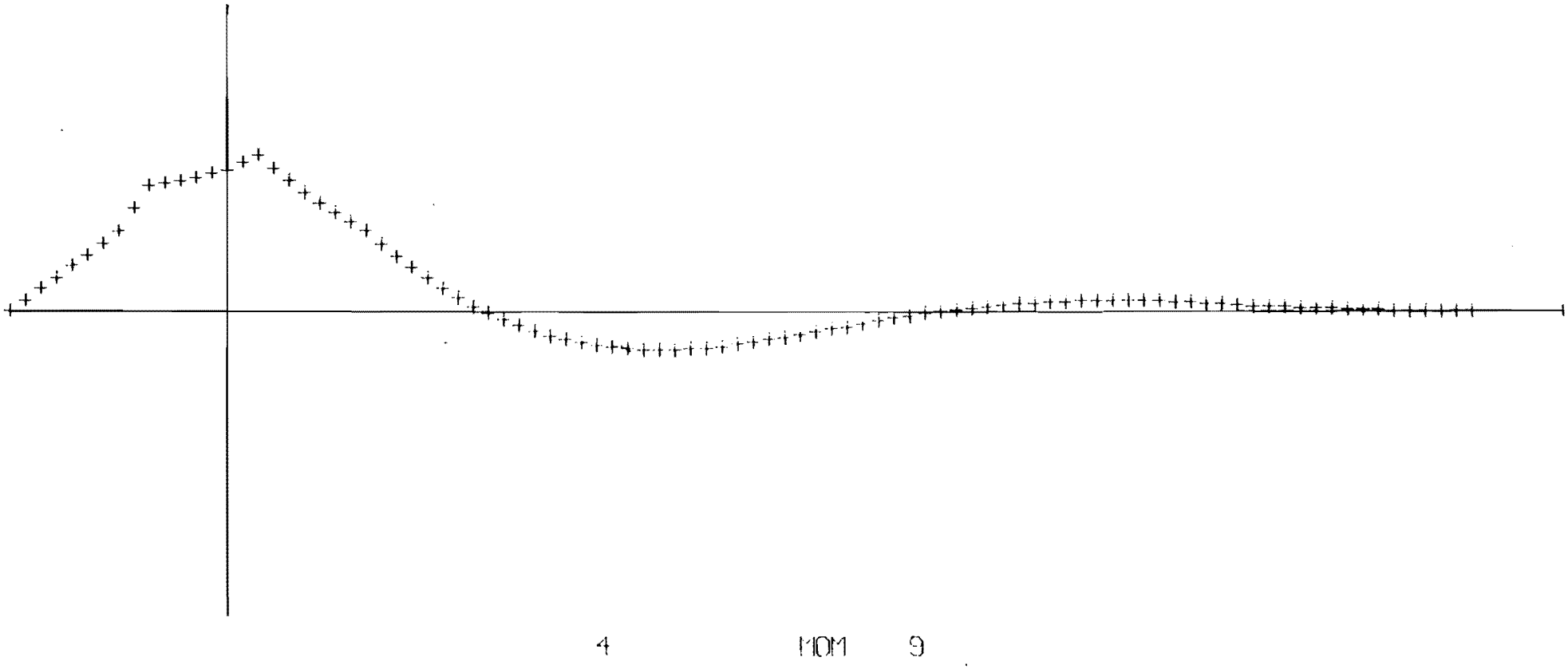
ELAPSED CPU TIME = 0 MINUTES 32.346 SECONDS



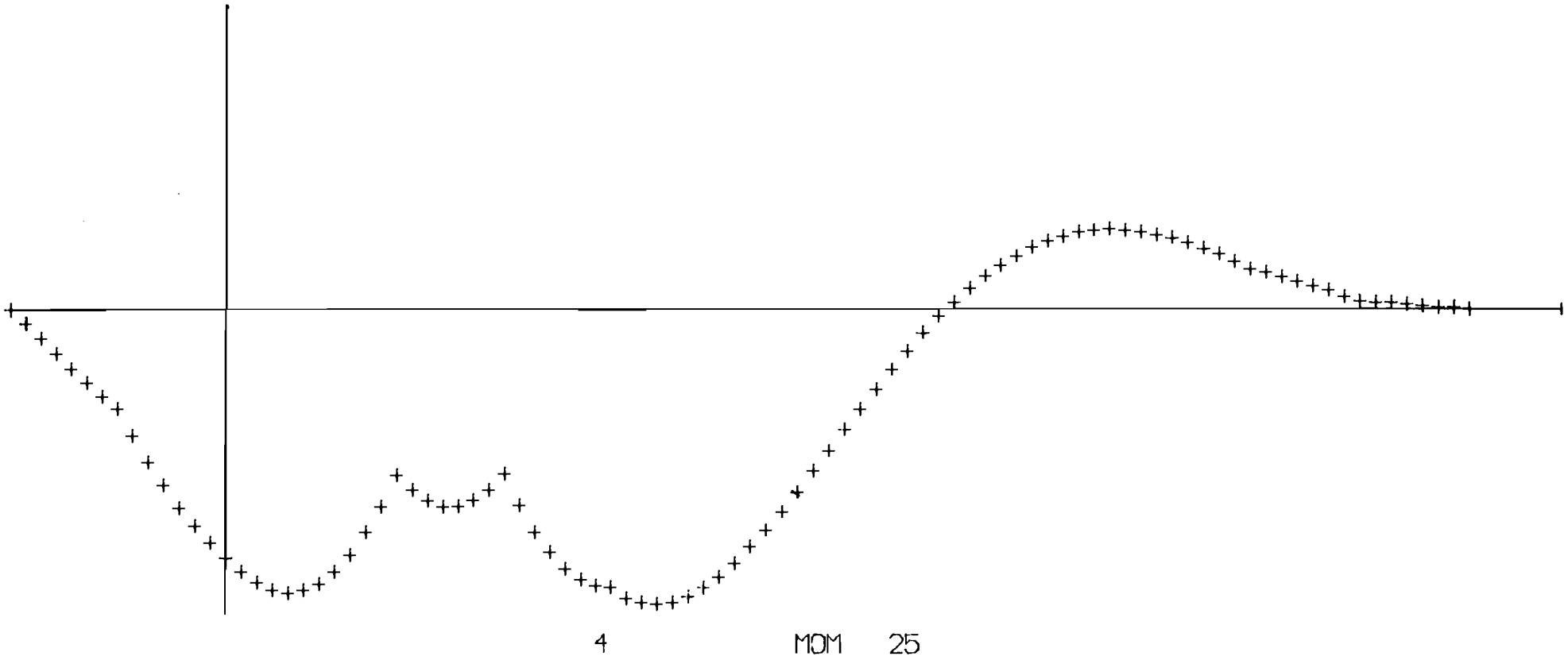
Prob 4. Three-span structure, influence diagrams for one moving load.
Influence diagram for deflection at Station 11.



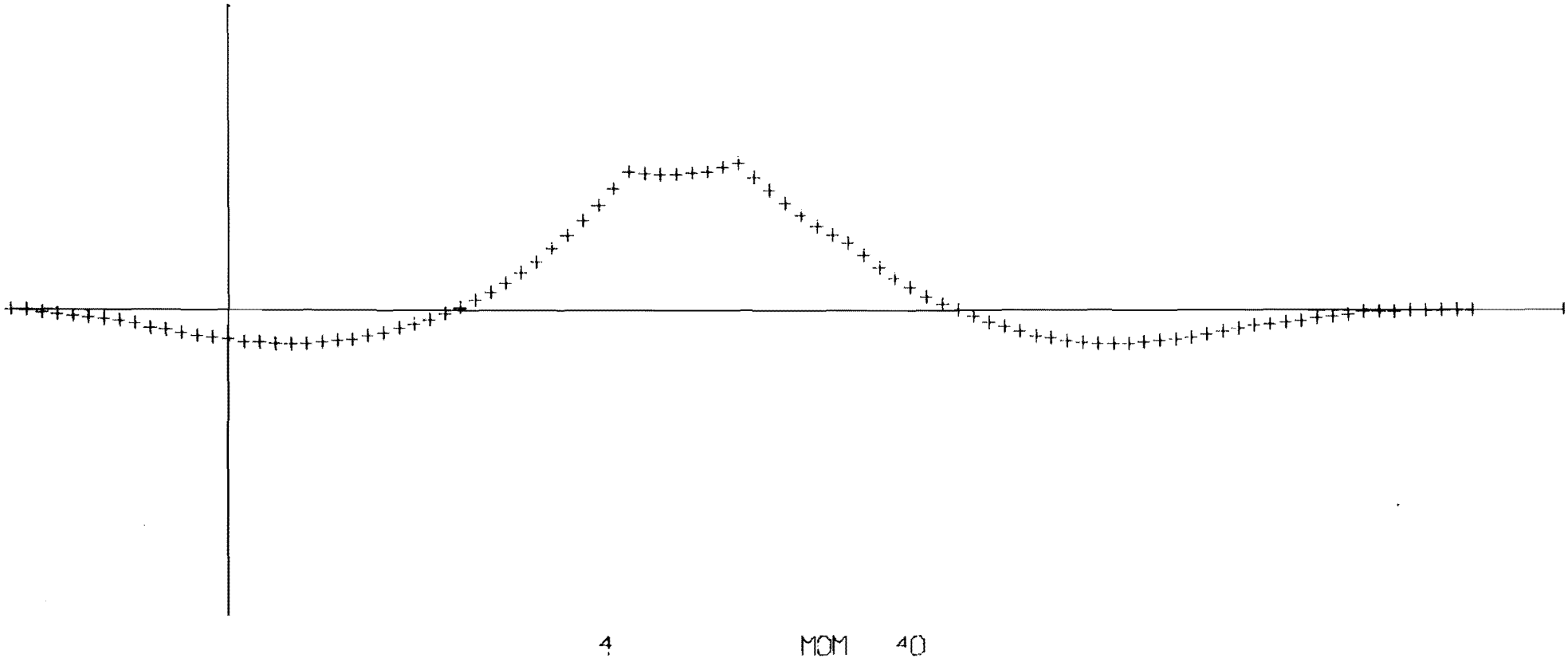
Prob 4. Three-span structure, influence diagrams for one moving load. Influence diagram for deflection at Station 40.



Prob 4. Three-span structure, influence diagrams for one moving load.
Influence diagram for moment at Station 9.



Prob 4. Three-span structure, influence diagrams for one moving load.
Influence diagram for moment at Station 25.



Prob 4. Three-span structure, influence diagrams for one moving load.
Influence diagram for moment at Station 40.

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-- CTR Library Digitization Team

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 68
CHG CE244010 CODED BY JJP RUN ON 23 APR 68
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB
5 TWO SPAN GIRDER, RAILROAD LOADING

TABLE 1 - PROGRAM-CONTROL DATA

	ENVELOPES OF MAXIMUMS	TABLE NUMBER 2	3	4	5	6
HOLD FROM PRECEDING PROBLEM (1=HOLD)	0	0	0	0	0	0
NUM CARDS INPUT THIS PROBLEM		1	3	1	14	0

	DEFL	MOM	SHR	RCT
OPTION (IF=1) TO PLOT ENVELOPES OF MAXIMUMS	1	1	1	1

TABLE 2 - CONSTANTS

NUM INCREMENTS	86
INCREMENT LENGTH	1.200E+01
NUMBER OF INCREMENTS FOR MOVABLE LOAD	79
INITIAL POSITION OF MOVABLE LOAD STA ZERO	-80
FINAL POSITION OF MOVABLE LOAD STA ZERO	86
NUMBER OF INCREMENTS BETWEEN EACH POSITION OF MOVABLE LOAD	2

TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES

STA	CASE	DEFLECTION	SLOPE
0	1	0.	NONE
43	1	0.	NONE
86	1	0.	NONE

TABLE 4 - STIFFNESS AND FIXED-LOAD DATA

FROM	TO	CONTD	F	QF	S	T	R	P
0	86	-0	2.440E+11	-1.000E+03	-0.	-0.	-0.	-3.300E+04

TABLE 5 - MOVABLE-LOAD DATA

FROM	TO	CONTD	QM
0	0	-0	-1.000E+04
8	8	-0	-2.000E+04
13	13	-0	-2.000E+04
18	18	-0	-2.000E+04
23	23	-0	-2.000E+04

32	32	-0	-1.300E+04
37	37	-0	-1.300E+04
43	43	-0	-1.300E+04
48	48	-0	-1.300E+04
56	56	-0	-1.000E+04
64	64	-0	-2.000E+04
69	69	-0	-2.000E+04
74	74	-0	-2.000E+04
79	79	-0	-2.000E+04

TABLE 6 - SPECIFIED STATIONS FOR INFLUENCE DIAGRAMS
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

NONE

PROGRAM BMCOL 43 - - MATLOCK-TAYLOR - REVISION DATE = 08 MAR 58
CHG CE244010 CODED BY JJP RUN ON 23 APR 58
EXAMPLE PROBLEMS FOR BMCOL43 FINAL REPORT

PROB (CONTD)
5 TWO SPAN GIRDER, RAILROAD LOADING

TABLE 7 - FIXED-LOAD RESULTS

STA I	DIST	DEFL	SLOPE	MOM	SHEAR	SUP REACT
-1	-1.200E+01	1.175E-02		0.		-0.
			-9.796E-04		-7.838E-09	
0	0.	0.		-9.406E-08		1.612E+04
			-9.796E-04		1.562E+04	
1	1.200E+01	-1.175E-02		1.879E+05		-0.
			-9.703E-04		1.462E+04	
2	2.400E+01	-2.340E-02		3.637E+05		-0.
			-9.524E-04		1.362E+04	
3	3.600E+01	-3.483E-02		5.276E+05		-0.
			-9.265E-04		1.262E+04	
4	4.800E+01	-4.595E-02		6.794E+05		-0.
			-8.931E-04		1.162E+04	
5	6.000E+01	-5.666E-02		8.192E+05		-0.
			-8.528E-04		1.062E+04	
6	7.200E+01	-6.690E-02		9.471E+05		-0.
			-8.062E-04		9.623E+03	
7	8.400E+01	-7.657E-02		1.063E+06		-0.
			-7.539E-04		8.623E+03	
8	9.600E+01	-8.562E-02		1.167E+06		-0.
			-6.966E-04		7.623E+03	
9	1.080E+02	-9.398E-02		1.258E+06		-0.
			-6.347E-04		6.623E+03	
10	1.200E+02	-1.016E-01		1.338E+06		-0.
			-5.689E-04		5.623E+03	
11	1.320E+02	-1.084E-01		1.406E+06		-0.
			-4.997E-04		4.623E+03	
12	1.440E+02	-1.144E-01		1.461E+06		-0.
			-4.279E-04		3.623E+03	
13	1.560E+02	-1.196E-01		1.505E+06		-0.
			-3.538E-04		2.623E+03	
14	1.680E+02	-1.238E-01		1.537E+06		-0.
			-2.783E-04		1.623E+03	
15	1.800E+02	-1.271E-01		1.556E+06		-0.
			-2.017E-04		6.229E+02	
16	1.920E+02	-1.296E-01		1.564E+06		-0.
			-1.248E-04		-3.771E+02	
17	2.040E+02	-1.311E-01		1.559E+06		-0.
			-4.812E-05		-1.377E+03	
18	2.160E+02	-1.316E-01		1.543E+06		-0.
			2.776E-05		-2.377E+03	
19	2.280E+02	-1.313E-01		1.514E+06		-0.
			1.022E-04		-3.377E+03	
20	2.400E+02	-1.301E-01		1.474E+06		-0.
			1.747E-04		-4.377E+03	
21	2.520E+02	-1.280E-01		1.421E+06		-0.
			2.446E-04		-5.377E+03	

22	2.640E+02	-1.250E-01		1.357E+06		-0.
			3.113E-04		-6.377E+03	
23	2.760E+02	-1.213E-01		1.280E+06		-0.
			3.743E-04		-7.377E+03	
24	2.880E+02	-1.168E-01		1.191E+06		-0.
			4.329E-04		-8.377E+03	
25	3.000E+02	-1.116E-01		1.091E+06		-0.
			4.865E-04		-9.377E+03	
26	3.120E+02	-1.058E-01		9.778E+05		-0.
			5.346E-04		-1.038E+04	
27	3.240E+02	-9.937E-02		8.531E+05		-0.
			5.765E-04		-1.138E+04	
28	3.360E+02	-9.245E-02		7.163E+05		-0.
			6.118E-04		-1.238E+04	
29	3.480E+02	-8.511E-02		5.676E+05		-0.
			6.397E-04		-1.338E+04	
30	3.600E+02	-7.743E-02		4.068E+05		-0.
			6.597E-04		-1.438E+04	
31	3.720E+02	-6.952E-02		2.340E+05		-0.
			6.712E-04		-1.538E+04	
32	3.840E+02	-6.146E-02		4.921E+04		-0.
			6.736E-04		-1.638E+04	
33	3.960E+02	-5.338E-02		-1.476E+05		-0.
			6.664E-04		-1.738E+04	
34	4.080E+02	-4.538E-02		-3.564E+05		-0.
			6.488E-04		-1.838E+04	
35	4.200E+02	-3.760E-02		-5.772E+05		-0.
			6.204E-04		-1.938E+04	
36	4.320E+02	-3.015E-02		-8.099E+05		-0.
			5.806E-04		-2.038E+04	
37	4.440E+02	-2.318E-02		-1.055E+06		-0.
			5.287E-04		-2.138E+04	
38	4.560E+02	-1.684E-02		-1.311E+06		-0.
			4.642E-04		-2.238E+04	
39	4.680E+02	-1.127E-02		-1.580E+06		-0.
			3.865E-04		-2.338E+04	
40	4.800E+02	-6.628E-03		-1.861E+06		-0.
			2.950E-04		-2.438E+04	
41	4.920E+02	-3.088E-03		-2.153E+06		-0.
			1.891E-04		-2.538E+04	
42	5.040E+02	-8.187E-04		-2.458E+06		-0.
			6.823E-05		-2.638E+04	
43	5.160E+02	0.		-2.775E+06		5.375E+04
			-6.823E-05		2.638E+04	
44	5.280E+02	-8.187E-04		-2.458E+06		-0.
			-1.891E-04		2.538E+04	
45	5.400E+02	-3.088E-03		-2.153E+06		-0.
			-2.950E-04		2.438E+04	
46	5.520E+02	-6.628E-03		-1.861E+06		-0.
			-3.865E-04		2.338E+04	
47	5.640E+02	-1.127E-02		-1.580E+06		-0.
			-4.642E-04		2.238E+04	
48	5.760E+02	-1.684E-02		-1.311E+06		-0.
			-5.287E-04		2.138E+04	
49	5.880E+02	-2.318E-02		-1.055E+06		-0.
			-5.806E-04		2.038E+04	
50	6.000E+02	-3.015E-02		-8.099E+05		-0.
			-6.204E-04		1.938E+04	
51	6.120E+02	-3.760E-02		-5.772E+05		-0.
			-6.488E-04		1.838E+04	
52	6.240E+02	-4.538E-02		-3.564E+05		-0.

			-6.664E-04		1.738E+04
53	6.360E+02	-5.338E-02		-1.476E+05	-0.
			-6.736E-04		1.638E+04
54	6.480E+02	-6.146E-02		4.921E+04	-0.
			-6.712E-04		1.538E+04
55	6.600E+02	-6.952E-02		2.340E+05	-0.
			-6.597E-04		1.438E+04
56	6.720E+02	-7.743E-02		4.068E+05	-0.
			-6.397E-04		1.338E+04
57	6.840E+02	-8.511E-02		5.676E+05	-0.
			-6.118E-04		1.238E+04
58	6.960E+02	-9.245E-02		7.163E+05	-0.
			-5.765E-04		1.138E+04
59	7.080E+02	-9.937E-02		8.531E+05	-0.
			-5.346E-04		1.038E+04
60	7.200E+02	-1.058E-01		9.778E+05	-0.
			-4.865E-04		9.377E+03
61	7.320E+02	-1.116E-01		1.091E+06	-0.
			-4.329E-04		8.377E+03
62	7.440E+02	-1.168E-01		1.191E+06	-0.
			-3.743E-04		7.377E+03
63	7.560E+02	-1.213E-01		1.280E+06	-0.
			-3.113E-04		6.377E+03
64	7.680E+02	-1.250E-01		1.357E+06	-0.
			-2.446E-04		5.377E+03
65	7.800E+02	-1.280E-01		1.421E+06	-0.
			-1.747E-04		4.377E+03
66	7.920E+02	-1.301E-01		1.474E+06	-0.
			-1.022E-04		3.377E+03
67	8.040E+02	-1.313E-01		1.514E+06	-0.
			-2.776E-05		2.377E+03
68	8.160E+02	-1.316E-01		1.543E+06	-0.
			4.812E-05		1.377E+03
69	8.280E+02	-1.311E-01		1.559E+06	-0.
			1.248E-04		3.771E+02
70	8.400E+02	-1.296E-01		1.564E+06	-0.
			2.017E-04		-6.229E+02
71	8.520E+02	-1.271E-01		1.556E+06	-0.
			2.783E-04		-1.623E+03
72	8.640E+02	-1.238E-01		1.537E+06	-0.
			3.538E-04		-2.623E+03
73	8.760E+02	-1.196E-01		1.505E+06	-0.
			4.279E-04		-3.623E+03
74	8.880E+02	-1.144E-01		1.461E+06	-0.
			4.997E-04		-4.623E+03
75	9.000E+02	-1.084E-01		1.406E+06	-0.
			5.689E-04		-5.623E+03
76	9.120E+02	-1.016E-01		1.338E+06	-0.
			6.347E-04		-6.623E+03
77	9.240E+02	-9.398E-02		1.258E+06	-0.
			6.966E-04		-7.623E+03
78	9.360E+02	-8.562E-02		1.167E+06	-0.
			7.539E-04		-8.623E+03
79	9.480E+02	-7.657E-02		1.063E+06	-0.
			8.062E-04		-9.623E+03
80	9.600E+02	-6.690E-02		9.471E+05	-0.
			8.528E-04		-1.062E+04
81	9.720E+02	-5.666E-02		8.192E+05	-0.
			8.931E-04		-1.162E+04
82	9.840E+02	-4.595E-02		6.794E+05	-0.
			9.265E-04		-1.262E+04

83	9.960E+02	-3.483E-02		5.276E+05		-0.
			9.524E-04		-1.362E+04	
84	1.008E+03	-2.340E-02		3.637E+05		-0.
			9.703E-04		-1.462E+04	
85	1.020E+03	-1.175E-02		1.879E+05		-0.
			9.796E-04		-1.562E+04	
86	1.032E+03	0.		4.703E-08		1.612E+04
			9.796E-04		-3.919E-09	
87	1.044E+03	1.175E-02		0.		-0.

PROB (CONTD)
5 TWO SPAN GIRDER, RAILROAD LOADING

TABLE 8A- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +DEFL	LOC	MAX -DEFL	LOC	MAX +MOM	LOC	MAX -MOM	LOC
-1	6.229E-02	-52	-6.313E-03	46	0.	999	0.	999
0	0.	999	0.	999	4.703E-08	38	-3.762E-07	-68
1	6.313E-03	46	-6.229E-02	-52	8.906E+05	-6	0.	999
2	1.268E-02	46	-1.241E-01	-52	1.769E+06	-6	0.	999
3	1.914E-02	46	-1.851E-01	-52	2.472E+06	-60	0.	999
4	2.574E-02	46	-2.448E-01	-52	3.272E+06	-60	0.	999
5	3.250E-02	46	-3.028E-01	-52	3.820E+06	-60	0.	999
6	3.945E-02	46	-3.588E-01	-52	4.522E+06	-58	0.	999
7	4.661E-02	46	-4.124E-01	-52	4.994E+06	-58	0.	999
8	5.399E-02	46	-4.633E-01	-52	5.522E+06	-56	0.	999
9	6.158E-02	46	-5.111E-01	-52	5.918E+06	-56	0.	999
10	6.939E-02	46	-5.557E-01	-52	6.450E+06	-54	0.	999
11	7.740E-02	46	-5.967E-01	-52	6.764E+06	-54	0.	999
12	8.559E-02	46	-6.340E-01	-50	7.115E+06	-52	0.	999
13	9.394E-02	46	-6.678E-01	-50	7.381E+06	-56	0.	999
14	1.024E-01	46	-6.975E-01	-50	7.635E+06	-54	0.	999
15	1.110E-01	46	-7.227E-01	-50	7.901E+06	-54	0.	999
16	1.196E-01	46	-7.433E-01	-50	7.979E+06	-52	-2.807E+04	46
17	1.282E-01	46	-7.594E-01	-50	8.165E+06	-52	-1.319E+05	46
18	1.367E-01	46	-7.707E-01	-50	8.098E+06	-52	-2.477E+05	46
19	1.450E-01	46	-7.773E-01	-50	8.183E+06	-50	-3.754E+05	46
20	1.532E-01	46	-7.790E-01	-50	8.038E+06	-50	-5.152E+05	46
21	1.610E-01	46	-7.760E-01	-50	7.969E+06	-48	-6.670E+05	46
22	1.684E-01	46	-7.684E-01	-50	7.746E+06	-48	-8.307E+05	46
23	1.754E-01	46	-7.562E-01	-50	7.638E+06	-46	-1.006E+06	46

24	1.817E-01	46	-7.416E-01	-46	7.335E+06	-50	-1.194E+06	46
25	1.874E-01	46	-7.230E-01	-46	7.067E+06	-44	-1.394E+06	46
26	1.922E-01	46	-7.002E-01	-46	6.735E+06	-48	-1.606E+06	46
27	1.961E-01	46	-6.735E-01	-46	6.338E+06	-46	-1.829E+06	46
28	1.989E-01	46	-6.431E-01	-46	5.982E+06	-46	-2.065E+06	46
29	2.005E-01	46	-6.091E-01	-46	5.437E+06	-44	-2.312E+06	46
30	2.007E-01	46	-5.720E-01	-46	4.999E+06	-44	-2.572E+06	46
31	1.994E-01	46	-5.320E-01	-46	4.336E+06	-42	-2.843E+06	46
32	1.964E-01	46	-4.896E-01	-46	3.813E+06	-42	-3.127E+06	46
33	1.916E-01	46	-4.452E-01	-46	3.038E+06	-42	-3.422E+06	46
34	1.847E-01	46	-3.991E-01	-46	2.419E+06	-40	-3.729E+06	46
35	1.757E-01	46	-3.519E-01	-46	1.557E+06	-40	-4.049E+06	46
36	1.642E-01	46	-3.046E-01	-44	8.166E+05	-38	-4.380E+06	46
37	1.502E-01	46	-2.570E-01	-44	0.	999	-4.723E+06	46
38	1.334E-01	46	-2.098E-01	-44	0.	999	-5.228E+06	-2
39	1.136E-01	46	-1.636E-01	-44	0.	999	-6.208E+06	-2
40	9.060E-02	46	-1.188E-01	-44	0.	999	-7.217E+06	0
41	6.415E-02	46	-7.623E-02	-44	0.	999	-8.285E+06	0
42	3.403E-02	46	-3.642E-02	-44	0.	999	-9.386E+06	2
43	0.	999	0.	999	0.	999	-1.056E+07	-2
44	3.239E-02	-44	-3.817E-02	46	0.	999	-9.460E+06	-2
45	6.098E-02	-44	-7.984E-02	46	0.	999	-8.387E+06	0
46	8.603E-02	-44	-1.243E-01	46	0.	999	-7.371E+06	0
47	1.077E-01	-44	-1.710E-01	46	0.	999	-6.398E+06	-4
48	1.264E-01	-44	-2.194E-01	46	0.	999	-5.488E+06	-2
49	1.421E-01	-44	-2.688E-01	46	0.	999	-4.603E+06	-2
50	1.551E-01	-44	-3.187E-01	46	5.727E+05	42	-4.212E+06	-44
51	1.657E-01	-44	-3.686E-01	46	1.439E+06	38	-3.885E+06	-44
52	1.739E-01	-44	-4.179E-01	46	2.216E+06	40	-3.571E+06	-44
53	1.801E-01	-44	-4.662E-01	46	3.063E+06	40	-3.268E+06	-44

54	1.843E-01	-44	-5.128E-01	46	3.711E+06	42	-2.977E+05 -44
55	1.867E-01	-44	-5.572E-01	46	4.465E+06	42	-2.699E+06 -44
56	1.876E-01	-44	-5.992E-01	46	4.984E+06	44	-2.432E+06 -44
57	1.870E-01	-44	-6.383E-01	46	5.648E+06	44	-2.177E+06 -44
58	1.852E-01	-44	-6.742E-01	46	6.060E+06	44	-1.934E+06 -44
59	1.822E-01	-44	-7.065E-01	46	6.617E+06	46	-1.703E+06 -44
60	1.782E-01	-44	-7.349E-01	46	6.940E+06	46	-1.484E+06 -44
61	1.733E-01	-44	-7.593E-01	46	7.335E+06	48	-1.277E+06 -44
62	1.677E-01	-44	-7.793E-01	46	7.585E+06	44	-1.082E+06 -44
63	1.614E-01	-44	-7.949E-01	46	7.837E+06	50	-8.989E+05 -44
64	1.546E-01	-44	-8.058E-01	46	8.110E+06	46	-7.279E+05 -44
65	1.474E-01	-44	-8.127E-01	48	8.190E+06	48	-5.688E+05 -44
66	1.398E-01	-44	-8.149E-01	48	8.374E+06	48	-4.217E+05 -44
67	1.320E-01	-44	-8.121E-01	48	8.338E+06	50	-2.866E+05 -44
68	1.240E-01	-44	-8.044E-01	48	8.433E+06	50	-1.634E+05 -44
69	1.160E-01	-44	-7.919E-01	48	8.290E+06	52	-5.233E+04 -44
70	1.079E-01	-44	-7.746E-01	48	8.299E+06	52	0. 999
71	9.978E-02	-44	-7.525E-01	48	8.056E+06	52	0. 999
72	9.178E-02	-44	-7.258E-01	48	7.893E+06	54	0. 999
73	8.390E-02	-44	-6.951E-01	50	7.566E+06	56	0. 999
74	7.619E-02	-44	-6.601E-01	50	7.408E+06	56	0. 999
75	6.866E-02	-44	-6.209E-01	50	6.997E+06	56	0. 999
76	6.135E-02	-44	-5.778E-01	50	6.663E+06	58	0. 999
77	5.427E-02	-44	-5.311E-01	50	6.172E+06	58	0. 999
78	4.742E-02	-44	-4.811E-01	50	5.692E+06	56	0. 999
79	4.082E-02	-44	-4.281E-01	50	5.233E+06	56	0. 999
80	3.445E-02	-44	-3.724E-01	50	4.623E+06	58	0. 999
81	2.831E-02	-44	-3.142E-01	50	4.083E+06	58	0. 999
82	2.237E-02	-44	-2.540E-01	50	3.290E+06	58	0. 999
83	1.660E-02	-44	-1.921E-01	50	2.660E+06	60	0. 999
84	1.098E-02	-44	-1.288E-01	50	1.785E+06	60	0. 999

85	5.463E-03	-44	-6.462E-02	50	9.577E+05	62	0.	999
86	0.	999	0.	999	3.762E-07	56	-2.352E-08	-48
87	6.462E-02	50	-5.463E-03	-44	0.	999	0.	999

TABLE 8B- ENVELOPES OF MAXIMUMS * = HELD FROM PRIOR PROBLEM

STA	MAX +SHEAR	LOC	MAX -SHEAR	LOC	MAX +REACT	LOC	MAX -REACT	LOC
-1					0.	999	0.	999
	3.919E-09	38	-3.135E-08	-68				
0					8.096E+04	-8	0.	999
	7.408E+04	-6	0.	999				
1					0.	999	0.	999
	7.308E+04	-6	0.	999				
2					0.	999	0.	999
	6.753E+04	-60	0.	999				
3					0.	999	0.	999
	6.653E+04	-60	0.	999				
4					0.	999	0.	999
	6.116E+04	-58	0.	999				
5					0.	999	0.	999
	6.016E+04	-58	0.	999				
6					0.	999	0.	999
	5.487E+04	-56	0.	999				
7					0.	999	0.	999
	5.387E+04	-56	0.	999				
8					0.	999	0.	999
	4.810E+04	-54	-6.257E+02	46				
9					0.	999	0.	999
	4.710E+04	-54	-1.626E+03	46				
10					0.	999	0.	999
	4.143E+04	-52	-2.626E+03	46				
11					0.	999	0.	999
	4.043E+04	-52	-5.748E+03	-68				
12					0.	999	0.	999
	3.488E+04	-50	-6.748E+03	-68				
13					0.	999	0.	999
	3.388E+04	-50	-1.116E+04	-66				
14					0.	999	0.	999
	2.847E+04	-48	-1.216E+04	-66				
15					0.	999	0.	999
	2.747E+04	-48	-1.654E+04	-64				
16					0.	999	0.	999
	2.145E+04	-46	-1.754E+04	-64				
17					0.	999	0.	999
	2.045E+04	-46	-2.304E+04	-62				
18					0.	999	0.	999
	1.460E+04	-44	-2.404E+04	-62				
19					0.	999	0.	999
	1.360E+04	-44	-3.095E+04	-4				
20					0.	999	0.	999
	7.545E+03	-42	-3.195E+04	-4				
21					0.	999	0.	999
	6.545E+03	-42	-3.863E+04	-2				
22					0.	999	0.	999
	3.090E+02	-40	-3.963E+04	-2				

23					0.	999	0.	999
	0.	999	-4.596E+04	0				
24					0.	999	0.	999
	0.	999	-4.696E+04	0				
25					0.	999	0.	999
	0.	999	-5.353E+04	2				
26					0.	999	0.	999
	0.	999	-5.453E+04	2				
27					0.	999	0.	999
	0.	999	-6.074E+04	4				
28					0.	999	0.	999
	0.	999	-6.174E+04	4				
29					0.	999	0.	999
	0.	999	-6.760E+04	6				
30					0.	999	0.	999
	0.	999	-6.860E+04	6				
31					0.	999	0.	999
	0.	999	-7.423E+04	8				
32					0.	999	0.	999
	0.	999	-7.523E+04	8				
33					0.	999	0.	999
	0.	999	-8.063E+04	10				
34					0.	999	0.	999
	0.	999	-8.163E+04	10				
35					0.	999	0.	999
	0.	999	-8.668E+04	12				
36					0.	999	0.	999
	0.	999	-8.768E+04	12				
37					0.	999	0.	999
	0.	999	-9.261E+04	14				
38					0.	999	0.	999
	0.	999	-9.361E+04	14				
39					0.	999	0.	999
	0.	999	-9.821E+04	16				
40					0.	999	0.	999
	0.	999	-9.921E+04	16				
41					0.	999	0.	999
	0.	999	-1.037E+05	-38				
42					0.	999	0.	999
	0.	999	-1.047E+05	-38				
43					1.920E+05	2	0.	999
	1.109E+05	36	0.	999				
44					0.	999	0.	999
	1.039E+05	38	0.	999				
45					0.	999	0.	999
	1.029E+05	38	0.	999				
46					0.	999	0.	999
	9.645E+04	40	0.	999				
47					0.	999	0.	999
	9.545E+04	40	0.	999				
48					0.	999	0.	999
	8.875E+04	42	0.	999				
49					0.	999	0.	999
	8.775E+04	42	0.	999				
50					0.	999	0.	999
	8.196E+04	-12	0.	999				
51					0.	999	0.	999
	8.096E+04	-12	0.	999				
52					0.	999	0.	999
	7.644E+04	-10	0.	999				
53					0.	999	0.	999

	7.544E+04	-10	0.	999				
54					0.	999	0.	999
	7.059E+04	-8	0.	999				
55					0.	999	0.	999
	6.959E+04	-8	0.	999				
56					0.	999	0.	999
	6.464E+04	-6	0.	999				
57					0.	999	0.	999
	6.364E+04	-6	0.	999				
58					0.	999	0.	999
	5.834E+04	-4	0.	999				
59					0.	999	0.	999
	5.734E+04	-4	0.	999				
60					0.	999	0.	999
	5.170E+04	-2	0.	999				
61					0.	999	0.	999
	5.070E+04	-2	0.	999				
62					0.	999	0.	999
	4.471E+04	0	-8.606E+02	-18				
63					0.	999	0.	999
	4.371E+04	0	-4.636E+03	-16				
64					0.	999	0.	999
	3.748E+04	2	-5.636E+03	-16				
65					0.	999	0.	999
	3.648E+04	2	-9.733E+03	-14				
66					0.	999	0.	999
	2.990E+04	4	-1.073E+04	-14				
67					0.	999	0.	999
	2.890E+04	4	-1.579E+04	44				
68					0.	999	0.	999
	2.198E+04	6	-1.679E+04	44				
69					0.	999	0.	999
	2.098E+04	6	-2.317E+04	46				
70					0.	999	0.	999
	1.428E+04	8	-2.417E+04	46				
71					0.	999	0.	999
	1.328E+04	8	-3.073E+04	48				
72					0.	999	0.	999
	6.814E+03	10	-3.173E+04	48				
73					0.	999	0.	999
	5.814E+03	10	-3.808E+04	50				
74					0.	999	0.	999
	3.238E+03	-44	-3.908E+04	50				
75					0.	999	0.	999
	2.238E+03	-44	-4.522E+04	52				
76					0.	999	0.	999
	1.238E+03	-44	-4.622E+04	52				
77					0.	999	0.	999
	2.378E+02	-44	-5.249E+04	54				
78					0.	999	0.	999
	0.	999	-5.349E+04	54				
79					0.	999	0.	999
	0.	999	-5.913E+04	56				
80					0.	999	0.	999
	0.	999	-6.013E+04	56				
81					0.	999	0.	999
	0.	999	-6.588E+04	58				
82					0.	999	0.	999
	0.	999	-6.688E+04	58				
83					0.	999	0.	999
	0.	999	-7.273E+04	60				

84					0.	999	0.	999
	0.	999	-7.373E+04	60				
85					0.	999	0.	999
	0.	999	-7.966E+04	62				
86					8.016E+04	62	0.	999
	1.960E-09	-48	-3.135E-08	56				
87					0.	999	0.	999

TABLE 9 -- SCALES FOR PLOTS OF THE ENVELOPES OF MAXIMUMS

HORIZONTAL SCALE
10 INCHES = 100 STATIONS

VERTICAL SCALES

VARIABLE	LENGTH OF AXIS	MAXIMUM VALUE
DEFLECT	2 INCHES =	1.000E+00
MOMENT	2 INCHES =	2.000E+07
SHEAR	2 INCHES =	2.000E+05
REACTION	2 INCHES =	2.000E+05

PROB (CONTD)
5 TWO SPAN GIRDER, RAILROAD LOADING

TABLE 10A -- INFLUENCE DIAGRAMS FOR DEFLECTION

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10B -- INFLUENCE DIAGRAMS FOR MOMENT

LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10C -- INFLUENCE DIAGRAMS FOR SHEAR
(SHEAR IS COMPUTED ONE HALF INCREMENT
TO THE LEFT OF THE DESIGNATED STATION)

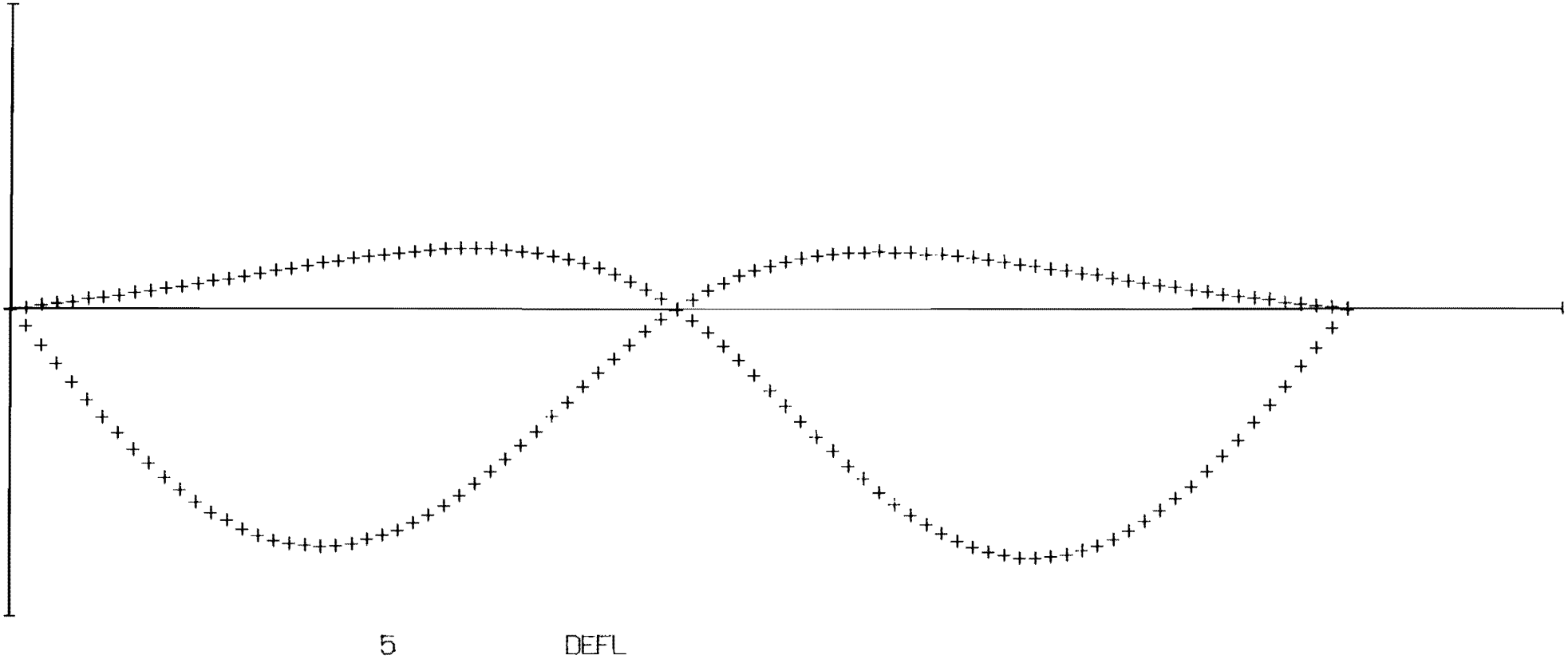
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TABLE 10D -- INFLUENCE DIAGRAMS FOR SUPPORT REACTION

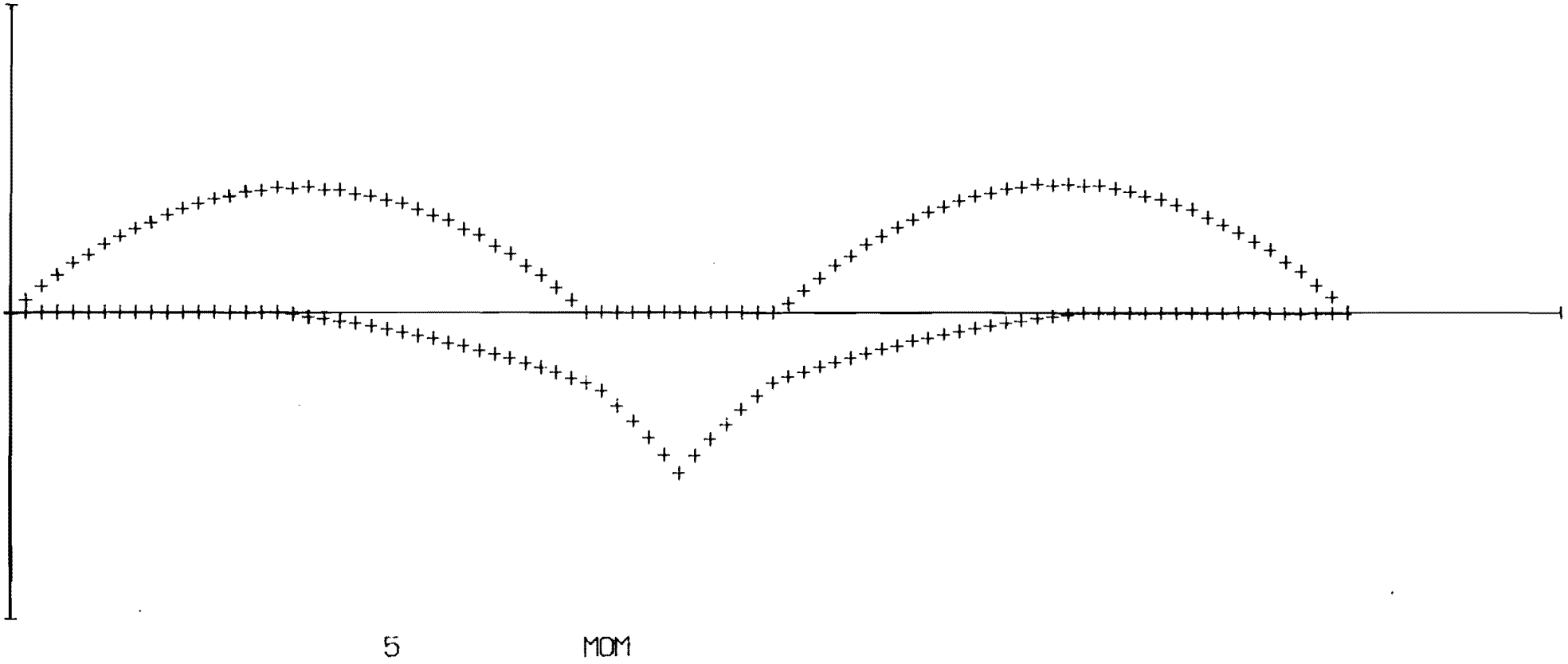
LOCATION OF LOAD	DESIGNATED STATIONS FOR INFLUENCE DIAGRAMS				
	STA	STA	STA	STA	STA
NONE					

TIME FOR THIS PROBLEM = 0 MINUTES 5.207 SECONDS

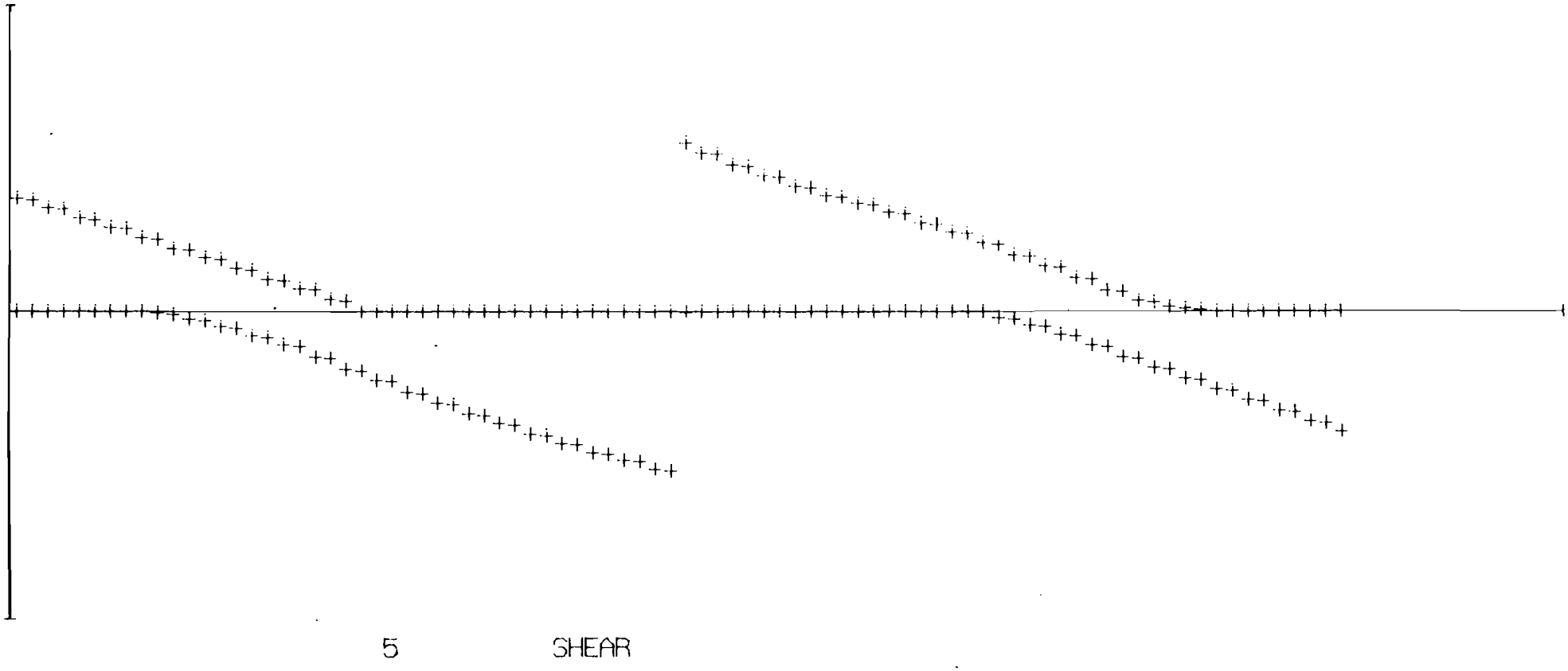
ELAPSED CPU TIME = 0 MINUTES 37.553 SECONDS



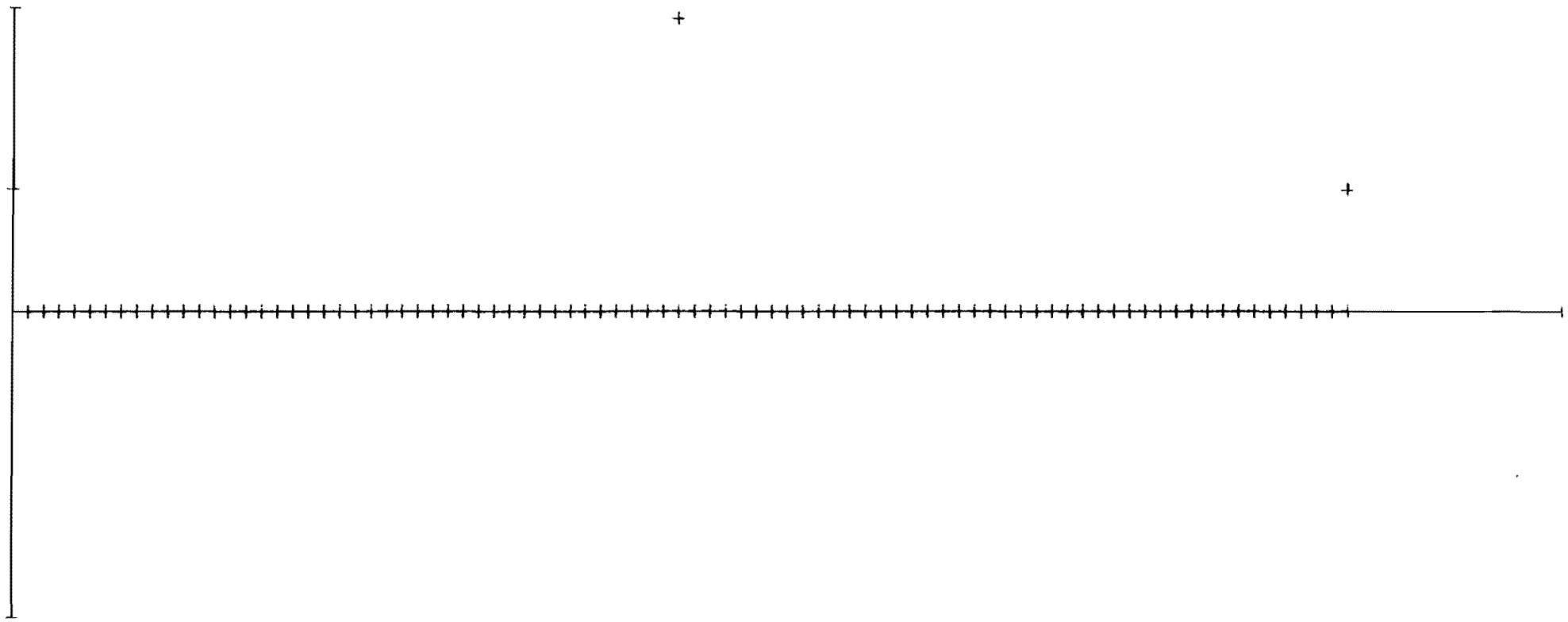
Prob 5. Two-span girder, railroad loading.
Envelope of maximum deflections.



Prob 5. Two-span girder, railroad loading.
Envelope of maximum moments.



Prob 5. Two-span girder, railroad loading.
Envelope of maximum shears.



Prob 5. Two-span girder, railroad loading.
Envelope of maximum reactions.