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WEBSTER (RONALD L) BRIGHAM CITY UT

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SEAPLT: A GRAPHICS POST-PROCESSOR FOR THE SEADYN PROGRAM. (U)

APR 82 R L WEBSTER

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UNCLASSIFIED

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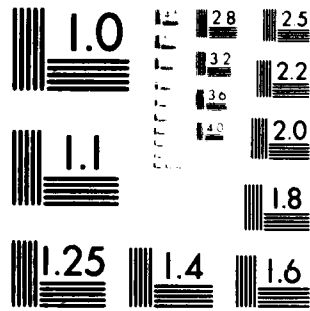
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

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Approximate Conversion from Metric to Imperial

Imperial Unit	Metric Unit	Conversion Factor
1 inch	25.4 mm	1 in = 25.4 mm
1 foot	304.8 mm	1 ft = 304.8 mm
1 yard	914.4 mm	1 yd = 914.4 mm
1 mile	1609.344 m	1 mi = 1609.344 m
1 pound	453.59237 g	1 lb = 453.59237 g
1 ounce	28.3495231 g	1 oz = 28.3495231 g
1 gallon	3.785411784 l	1 gal = 3.785411784 l
1 quart	0.946352946 l	1 qt = 0.946352946 l
1 pint	0.473175473 l	1 pt = 0.473175473 l
1 cup	0.236587237 l	1 c = 0.236587237 l

METRIC CONVERSION FACTORS



Approximate Conversion from Imperial to Metric

Imperial Unit	Metric Unit	Conversion Factor
1 inch	25.4 mm	1 in = 25.4 mm
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Unclassified

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19b. ABSTRACT (Include complete abstract if necessary, and identify by block number) This report describes the computer program named SEAPLT, which is a graphics post-processor to the general purpose cable dynamics computer model named SEADYN. The program is written with CALCOMP compatibility for use with the CDC-Cybernet program UNIPLLOT.		

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## INTRODUCTION

This computer program is written for the purpose of plotting results obtained from the SEADYN computer program and saved on restart files. SEAPLT recognizes the following files generated from SEADYN:

TAPE1: DEAD restart file  
TAPE2: LIVE restart file  
TAPE3: DYN restart file  
TAPE4: any restart file  
TAPE20: MODE output file

This multiplicity of input files is provided to allow direct processing of all restart files created in a SEADYN run immediately following the SEADYN execution.

This program is written with CALCOMP<sup>®</sup> compatibility in mind but with the intention of being post-processed on the CDC-Cybernet program UNIPLOT. This means that the standard CALCOMP calls will lead to the creation of a neutral picture file (NPFIL) which may then be processed on any of the devices supported by UNIPLOT.

SEAPLT creates three general forms of plots; as the present time plotting is permitted from a single restart file only. They are geometry, functions, and cross plots. Geometry plots display the entire structure in any of the saved states viewed from any angle. They also allow superimposed views of any two of the saved states or mode shapes plotted over the reference state. Function plots produce graphs of the desired parameter versus the appropriate load parameter or time. Function plots can be generated only if the restart file contains the needed sequence of records. Multiple curves per graph are allowed if they are of the same parameter at different points or directions (e.g., the tensions in more than one element can be plotted on a single graph). Cross plots represent the merging of two function plots with time or load as a parameter. They allow the plotting of such things as element tension versus element strain over a time sequence or displacement versus point load over a loading sequence.

SEAPLT input is in a free-form format. The following describes the basic free-form rules.

### FREE-FIELD INPUT RULES

The following special characters are recognized by the subroutine FREINP:

- 5      Record Terminator Flag  
Signals no more data is to be read for the card image being processed. Multiple card images (records) may appear on a single card separated by record terminators. Double record terminators signal the end of a card, and any data

following this is treated as a comment. Comments will be listed as part of the card but will not be transmitted to the data file.

Alternate Record Terminator Flag

Performs same function as \$

COLUMN80

Default Record Terminator

Unless a prior termination or continuation is signalled, the end of card (COL80) is taken as a record termination.

Word Delimiter (Separator)

Separates sequences of data entries in a card image. Repeated delimiters produce zeros in the words. An initial comma produces a zero in the first word of the record. All words not explicitly defined are assumed to be 0.0. A comma may be used to signal multiple card records (continuation) when only blanks occur between the last comma and the end of card.

BLANK

Separator/Delimiter

Leading blanks are ignored. Once the beginning of a word is detected, a blank will terminate the word. Any blanks following a delimiter are treated as leading blanks for the next word. The following are equivalent:

xx yy  
xx , yy  
xx,yy

Continuation Flag

Signals a word termination with the next word to be read from the next card. See "," for alternate continuation.

W

Word Position Flag

Use to override the word sequencing and shift to a new word in the record. Input then follows in sequence from the new word location. The new word number is given immediately following the W and before the next "," or blank. The W may be used as a delimiter of the previous word. The combination ",W" is the same as W alone. The first word of a record is not checked for the W flag so ",W" must be used to skip to a new sequence from the first word position. Any W after the first word and before the record terminator will be interpreted as a position flag.

\*

Comment Card Flag

This character anywhere on a card will terminate the record and the remainder of the card is treated as a comment.

\* in column 1 produces no record.

Hollerith (Alpha-Numeric) Field Delimiter

This character is the apostrophe (11-8-5 on the 026 keypunch and 8-5 on the 029 keypunch). It signals the start and end of a character string. The string may be

any length up to a maximum of the number of ten character "words" allowed by the application. This is usually 8, but it may be more or less as the use dictates. Any legal character may be used in the string except the apostrophe. Character strings may continue past column 80 to the next card since the string automatically signals continuation until the terminal apostrophe is found. All blanks in the string are counted as characters.

( Rigid Format Initiator Flag

This in column 1 of any card after the title cards signals that the cards up to the next ")" card are in rigid format. These cards are written on a special data file in BCD format.

) Rigid Format Terminator Flag

This in column 1 signals the end of a sequence of rigid format cards.

Any card with a "\$", ";", or "\*" in column 1 will be treated as a comment card. It will be listed but will produce no data record.

Each free-field input deck is presumed to begin with one or more title cards. Title cards are read and listed until a specific record terminator is detected (\$ or ; but not COLUMN80). The card on which the terminator is detected will be used as a page heading for the run.

The FREINP subroutine processes the entire data deck and translates all of the cards into a series of data records. As noted above, a data record may span more than one card or there may be one or more records on a card. After the title cards, the data is assumed to be arranged in blocks headed by a Flag Record. Each flag record is limited to ten alpha-numeric characters. Usually only the first four characters of the flag record have meaning. For example, the flag record ELEMENTS could be shortened to ELEM to produce the same result. The specific data order applicable to the flag record is then assumed until the next flag record is detected. Flag records must have the flag word in the first position (i.e., ELEM will not be recognized as a flag).

Data records are assumed to be in floating point form unless a character is detected which is inconsistent for a floating point number. In this case, the word will be treated as a Hollerith word. All floating point words assume a decimal at the end of the word if none is given. Words actually intended to be integers are converted to fixed-point form at the time they are used. The maximum length of a data record is determined by the program using the free-field subroutine.

## SEAPLT INPUT INSTRUCTIONS

Title Card(s) At least one card is required. The last title card must be terminated with a \$ or ;. These terminators may not appear anywhere else in the title cards. The last title card will be used for page headings.

### SELECT (flag record SELE)

<u>Word</u>	<u>Variable Name</u>	<u>Contents</u>
1	FORM	Plotter Selection Code NARROW for 10 in. wide field (default) WIDE for 30 in. wide field
2	NTAPE	File code for RESTART file. (1, 2, 3, or 4 ... default is 1)
3	MREC	Maximum number of records on RESTART file.
4	NMODE	0 - no mode requests will be made. >0 - mode set to be used in overplots.
5	LBLCHK	Label check flag 0 - no check 1 - Make comparison of first title word on RESTART file and the check word. Abort if they do not match.
6	CHKWRD	Word to be used in label check.

GEOMETRY (flag record GEOM)

<u>Word</u>	<u>Variable Name</u>	<u>Contents</u>
1	INP(1)	Reference record on RESTART file
2	INP(2)	Overplot record on RESTART file
3	INP(3)	Line type for reference plot - "SOLID" or "DASH" (default is "SOLID")
4	INP(4)	Line type for overplot (default is "DASH")
5	INP(5)	Observer axis - $\pm 1$ , $\pm 2$ , or $\pm 3$ (default = +1)
6	FINP(1)	Observer Distance (default = $10^{10}$ )
7	FINP(2)	Displacement Magnification (default = 1.0). (Displacement is the difference between the nodal positions in the two records.)
8	IBASE	Base Vector Display Flag 0 - plot labelled base vectors at origin 1 - do not

Successive GEOM or MODE records need only words 1 and 2 unless a change in parameters is desired, then only those changed need be given. GEOM followed by ROTA causes rotated views. Observer axes defined as 1, 2, 3, for x, y, z, respectively.

MODE

<u>word</u>	<u>Variable Name</u>	<u>Contents</u>
1	INP(1)	Reference record on RESTART file
2	INP(2)	Mode number on MODE file
3	INP(3)	Line type for reference plot - "SOLID" or "DASH" (default is "SOLID")
4	INP(4)	Line type for mode overplot (default is "DASH")
5	INP(5)	Observer axis - $\pm 1$ , $\pm 2$ , or $\pm 3$ (default = $\pm 1$ )
6	FINP(1)	Observer Distance (default = $10^{10}$ )
7	FINP(2)	Mode scale factor (default = 1.0)
8	IBASE	Base Vector Display Flag 0 - plot labelled base vectors at origin 1 - do not

Successive GEOM or MODE records need only words 1 and 2 unless a change in parameters is desired, then only those changed need be given. MODE followed by ROTA causes rotated views.

The mode shapes are automatically scaled to have the largest component value or have a magnitude of 1.0. The mode scale factor FINP(2) should be given large enough to make the mode shape distortions visible.

## ROTATE

<u>Word</u>	<u>Variable Name</u>	<u>Contents</u>
1	THETA(1)	Rotation about global x axis (degrees)
2	THETA(2)	Rotation about global y axis (degrees)
3	THETA(3)	Rotation about global z axis (degrees)

NOTE: These angles are sequential  $x \rightarrow y \rightarrow z$ . A rotation about x followed by y means that y rotation is about the new orientation of the y axis after the x rotation.

If a rotation about y is desired before a rotation about x, then use two rotation records:

```
ROTA  
0,  $\theta_y$ , 0  
 $\theta_x$ , 0, 0
```

Any number of rotation records may be given and they will all be sequential relative to the last rotation executed.

All rotations follow the right-hand rule relative to the last defined position of the axes.

The default view will show the y-z plane (see INP(5) of the GEOM record).

VIEW

Word

Contents

1 A one card title for the plot. If used, this must be input as a  
up character string which begins and ends with an apostrophe (').  
to 8

VIEW causes the results of a string of rotations to be plotted.  
VIEW followed by ROTA records continues the rotations relative to  
the last position.

Any record flag except ROTA or VIEW following a GEOM or MODE record  
will cause the current view to be plotted with a default heading (i.e., the  
VIEW record is not required).

## FUNCTION

Word	Variable Name	Contents
1	VCODE	Function Code (see CODE list)
2	JNP(1)	Curve code for first curve (solid line) (see Note below)
3	JNP(2)	Curve code for second curve (dashed line) (see Note below)
4	JNP(3)	Curve code for third curve (dotted line) (see Note below)
5	NBEG	Beginning record on RESTART file (default = 1)
6	NLIM	Ending record on RESTART file (default = last one)
7	IACR	Record increment (default = 1)
8	XINCH	Horizontal Plot Length (default = 6 for NARR; 10 for WIDE)
9	IOPT	Curve option 0 - straight lines between points 1 - spline fit
10	PLIHED	Plot title (use character string ' ') maximum of 60 characters

### 1. Horizontal Scale will show:

Time for DYN file  
Load factor (0 to 1.0) for DEAD file  
Load factor for LIVE file (normally)  
Step Number for LIVE VISREL solution  
Heading for LIVE when HEDING > 0  
Time for LIVE with Time Sequenced Static Solutions

### 2. Curve Codes

for element data - element number  
for node data - Packed word (10 times node number plus direction number, e.g., 232 means node 23 y direction)

## CROSS

Word	Variable Name	Contents
1	HCODE	Horizontal function code (see CODE list below)
2	JNP(1)	Horizontal curve code (see Note 2 under FUNC record)
3	VCODE	Vertical function code (see CODE list below)
4	JNP(2)	Vertical curve code (see Note 2 under FUNC record)
5	NBEG	Beginning record on RESTART file (default = 1)
6	NLIM	Ending record on RESTART file (default = last one)
7	INCR	Record Increment (default = 1)
8	XINCH	Horizontal Plot Length (default = 6 for NARR; 10 for WIDE)
9	IOPT	Curve Option 0 - straight line between points 1 - spline fit
10	PLTHED	Plot Title (use character string ' ') maximum of 60 characters

## Function Codes

PDS	Nodal position
DSP	Nodal displacement from position in first record
DIS	Nodal displacement function for current position
VEL	Nodal velocity
ACC	Nodal acceleration
TEN	Element tension
STR	Element strain
LEN	Element length (current)
LEN	Element length (unstretched)
TRK	Element reference tension
FOR	Nodal total force
FRG	Nodal gravity force
FPI	Nodal point load
FLU	Nodal fluid load
VFL	Nodal fluid velocity

END

(no data record)

Terminates data set and closes plot file.

DATE  
FILME  
— 88