


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

National Center for Earthquake Research
345 Middlefield Road
Menlo Park, California 94025

DOCUMENTATION OF PROGRAMS THAT COMPUTE

- 1) STATIC TILTS FOR A SPATIALLY VARIABLE SLIP DISTRIBUTION, AND
- 2) QUASI-STATIC TILTS PRODUCED BY AN EXPANDING DISLOCATION LOOP
WITH A SPATIALLY VARIABLE SLIP DISTRIBUTION

Stuart McHugh



Open-File Report #76-578

This report is preliminary and has not been
edited or reviewed for conformity with Geological
Survey standards and nomenclature.

Note: Some of the pages in this report may be difficult to read. This is
the best copy that can be made from the original.

OCT 14 1976

ABSTRACT

The material in this report is concerned with the effects of a vertically oriented rectangular dislocation loop on the tilts observed at the free surface of an elastic half-space. Part I examines the effect of a spatially variable static strike-slip distribution across the slip surface. The tilt components as a function of distance parallel, or perpendicular, to the strike of the slip surface are displayed for different slip-versus-distance profiles. Part II examines the effect of spatially and temporally variable slip distributions across the dislocation loop on the quasi-static tilts at the free surface of an elastic half space. The model discussed in part II may be used to generate theoretical tilt versus time curves produced by creep events.

INTRODUCTION:

Program RCTNGL computes the tilt-versus-distance profiles observed for a variable strike-slip distribution across a slip surface. The model assumes a vertically oriented rectangular dislocation loop embedded in an elastic half-space. The distance axis of the profile may be parallel or perpendicular to the strike of the slip surface. The position of the slip surface relative to the position of the profile is arbitrary, and various slip distributions may be modelled by changing a few lines in the program.

Program SLPPRP also assumes a vertically oriented rectangular dislocation loop embedded in an elastic half-space to generate a quasi-static tilt-time profile produced by spatially and temporally variable slip distributions. This program may be used to model creep-related tilt changes; and provides a self-consistent method of separating the tilt changes produced by propagation effects of the boundaries of the slip surface from the tilt changes produced by time variations in the slip distribution across the slip surface.

CONTENTS	PAGE
1) RCTNGL	
a) Documentation	1-1
b) Figures	1-5
c) Appendix A	1-6
d) Examples of program operation	1-7
e) Program listing	1-39
2) SLPPRP/STRTCH	
a) Documentation of SLPPRP	2-1
b) Documentation of STRTCH	2-10
c) Appendix A - Flags used in program	2-11
d) Figures	2-12
e) References	2-18
f) Examples of program operation (SLPPRP)	2-19
g) Program Listing (SLPPRP)	2-60
h) Example of program operation (STRTCH)	2-70
i) Program listing (STRTCH)	2-93

DOCUMENTATION OF PROGRAM RCTNGL

PART I

DOCUMENTATION FOR PROGRAM RCTNGL

INTRODUCTION:

The tilts, produced by a vertically oriented rectangular dislocation loop, observed at the free surface of an elastic half-space depend upon the source-station geometry, the amount and type of slip, and the slip distribution. This program uses the expressions for tilt given in Press (1965), and allows the user to select the profile desired and the distribution of slip. The output consists of the tilt components and tilt amplitude and azimuth versus distance. With this program, the user may, for example, examine the dependence of the surface tilts on the spatial frequency of the slip distribution.

INPUT:

The geometry and notation assumed are shown in Figures 1.1 and 1.2, and definitions of the parameters used are provided in Appendix A. Although this program assumes strike slip displacement, dip-slip displacement may be used by changing the expressions in subroutine TILT to conform to those given in Press (1965). This program also assumes a cosinusoidal slip distribution with spatial frequencies $FREQX1$ in the $X1$ direction and $FREQX3$ in the $X3$ direction. If other slip distributions are desired, lines 57 - 59 in the main program may be altered. For example, if line 59 is deleted, the slip will be alternately right- and left-lateral across the slip surface (if line 59 is retained, the absolute magnitude of the cosinusoidal slip distribution is computed). If, for example, lines 57 through 59 are changed to:

```
ALPHA = + .5* SQRT (((I-(N2/2.))**2)+((J-(N1/2.))**2))
```

```
U = UMAX * (-1. + EXP (ALPHA))
```

the slip distribution will increase exponentially away from the center of the slip zone. Or, if lines 57-59 are changed to:

```
ALPHA = -.5* SQRT (((I-(N2/2.))**2)+((5-(N1/2.))**2))
```

```
U = -UMAX * ((N2 + N1)/2.)* EXP (ALPHA)
```

the slip distribution will decrease exponentially away from the center of the slip zone. (The value of .5 and the pre-exponential factor were arbitrarily chosen to scale the slip magnitude.) The subrectangles are labelled as shown in Figure 1.3. Notice that the slip is constant across each subrectangle, but may vary from subrectangle to subrectangle.

The program is intended for use on the LBL 6600 B or C machine and the Tektronix 4010-1 terminal. It requires 40K of core and may be accessed using

```
^LOAD, RCTNGL, MCHUGH .
```

It will automatically link to the appropriate plotting subroutines, and the ^LOAD command may be followed by a ^RUN. The computer responds as follows:

1) 1 = plot vs. X1, 2 = plot vs. X2

Enter 1 or 2 to select the profile desired.

2) Specify initial and final points of plot.

Enter the beginning and end points of the profile in kilometers.

3) Specify value of {X1, X2} that profile is computed for.

Enter the X1 (X2) position of the X2 (X1) profile in kilometers.

4) Specify C1X1FN, C1X3FN, C2X3FN, C3X1FN

Enter the 4 endpoints of the slip zone.

- 5) Specify number of points in profile,
Number of columns and rows,
Spatial frequency of slip in X1 direction,
Spatial frequency of slip in X3 direction
And maximum slip

Enter the 5 quantities required.

- 6) Specify angle of fault to NS axis, in degrees.

Enter the angle between the strike of the slip surface and north.

OUTPUT:

- 1) MIN/MAX values of EW component (numerical values)
MIN/MAX values of NS component (numerical values)
MIN/MAX values of amplitude (numerical values)
MIN/MAX values of azimuth (numerical values)

(Note tilt amplitudes are in microradians azimuth in degrees)

The following are plots of the EW and NS components of tilt
and the tilt amplitude and azimuth (measured clockwise from
north).

0 = Re-Start, 1 = Continue

Entering a zero causes the program to start at step (1). In the
Input section, a 1 causes the program to continue.

- 2) Write plot title, 80 characters

Enter up to 80 alphanumeric characters.

- 3) Set horizontal scale? Y or N (= Blank)

Entering a Y causes the computer to respond:

MIN/MAX X values

Entering an N or (blank) causes the horizontal scale to terminate at
the endpoints selected in part 2 of Input.

4) Set vertical scale? Y or N (= Blank)

The procedure is the same as in part 3 above.

The output consists of a sequence of plots of the EW tilt component (equivalent to $\frac{\partial W}{\partial X_2}$ if theta equals zero), the NS component (equivalent to $\frac{\partial W}{\partial X_1}$ if theta equals zero), the tilt amplitude, and the tilt azimuth. The profiles are parallel to the X1 or X2 directions as specified in part 1 in Input.

RESULTS:

Examples of the variation in tilt for the profiles and slip distributions indicated are shown in the 'Examples' section. The examples are shown on pages 1-7 through 1-38. The major points to be noted are that 1) as the spatial frequency of slip is increased the surface tilts approach those expected for constant displacement across the slip zone and 2) as the slip distribution is confined to some small region of the slip surface, the tilts approach those expected for a point source at the region of maximum slip. In principle, at least, the surface tilt field may provide some information about spatial variations in the slip distribution.

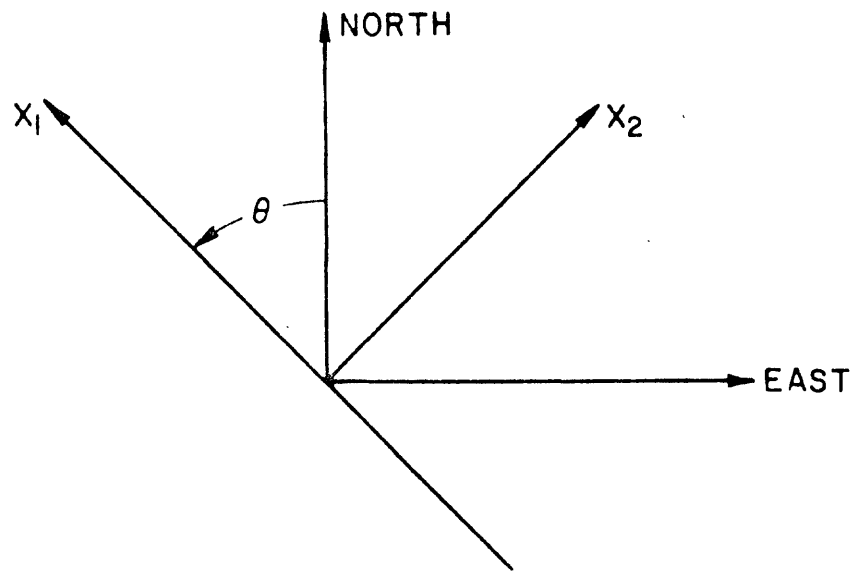


FIG. 1.1 SLIP SURFACE ORIENTATION RELATIVE TO OBSERVER

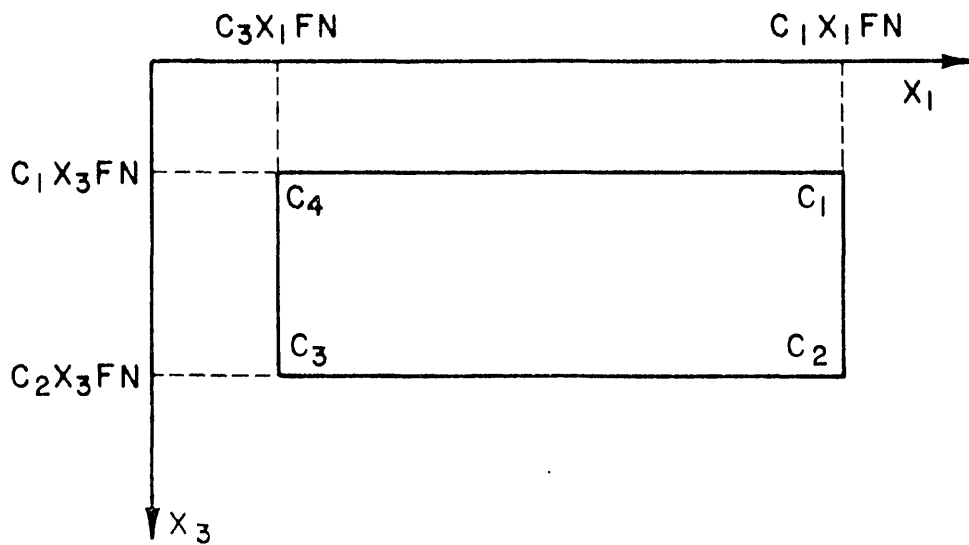


FIG. 1.2 POSITION OF SLIP SURFACE BOUNDARIES

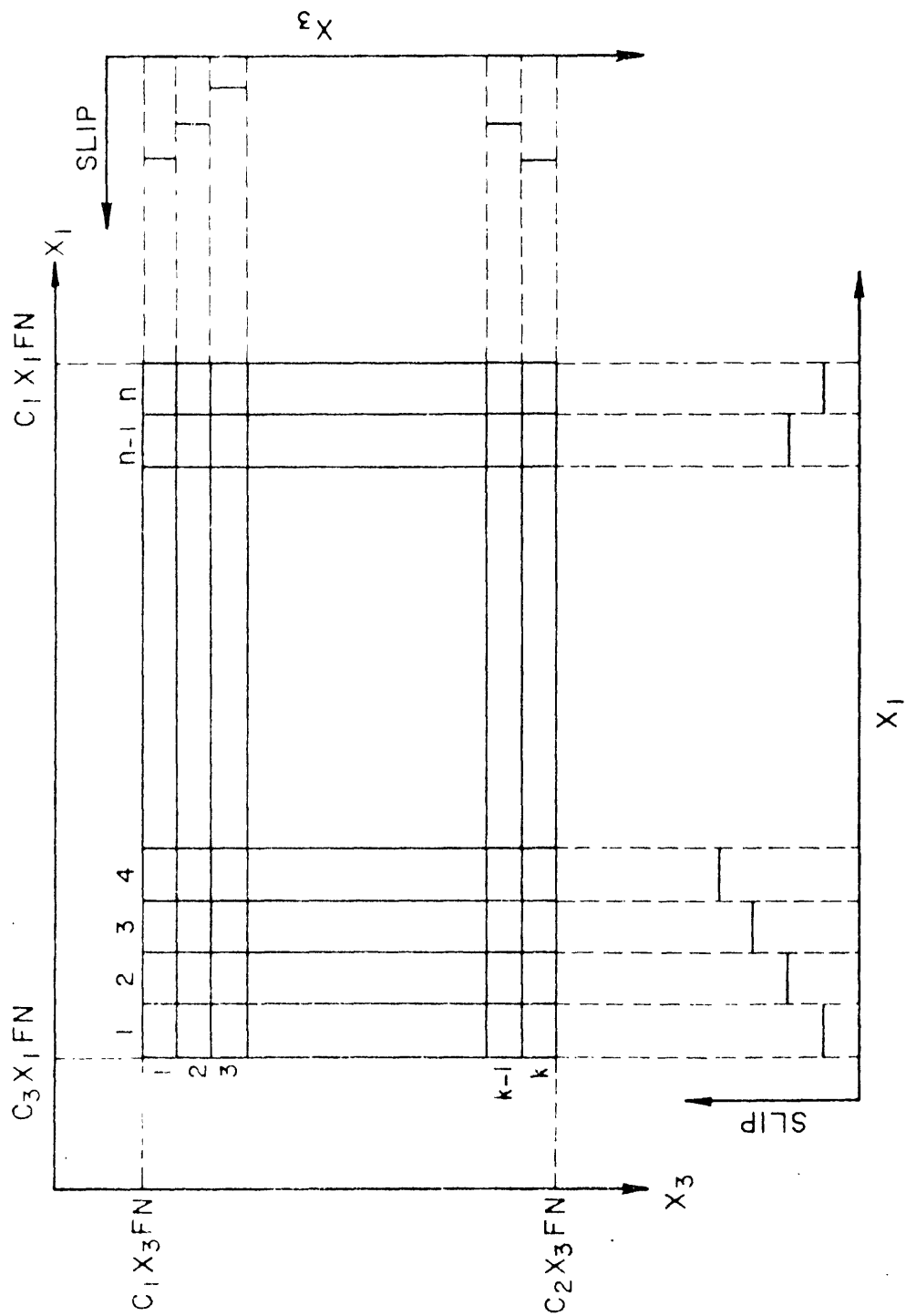


FIG. 13 LABELLING OF SUBRECTANGLES AND A
HYPOTHETICAL SLIP DISTRIBUTION

APPENDIX A

Parameters used in RCTNGL:

IFLAG - determines whether tilt profile is parallel to the X1 or X2 the axis

BEGIN, END - endpoints of the tilt profile

CNSTNT - position of profile

C1X1FN, C1X3FN, C2X3FN, C3X1FN - coordinates of slip surface

M - number of points in tilt profile

N1, N2 - number of columns and rows respectively that comprise slip surface

FREQX1, FREQX3 - spatial frequencies in X1 and X3 directions respectively

UMAX - maximum displacement on slip surface

Theta - angle between strike of fault and north

EXAMPLES OF RCTNGL

RCTNGL

Cosinusoidal Slip Distribution

The slip distribution across the slip zone is specified in lines 57-59 of the documentation for RCTNGL' (Page 1-39). Note that the absolute value of the slip is used in these examples.

```

*RUN!
1= PLOT US, X1, 2= PLOT US, X2
1= MIN/MAX Y VALUES
-5 5
SPECIFY INITIAL AND FINAL POINTS OF PLOT
-5 5
SPECIFY VALUE OF X2 THAT PROFILE IS COMPUTED FOR
51
SPECIFY C1X1FN,C1X3FN,C2Y3FN,C3X1FN
1 0 1 -11
SPECIFY NUMBER OF POINTS IN PROFILE,
NUMBER OF COLUMNS AND ROWS,
SPATIAL FREQUENCY OF SLIP IN X1 DIRECTION,
SPATIAL FREQUENCY OF SLIP IN X2 DIRECTION,
AND MAXIMUM SLIP
200 20 1 8 0 11
SPECIFY ANGLE OF FAULT TO NS AXIS, IN DEGREES
451
MIN/MAX VALUES OF EW COMPONENT -3 423E-02 3 587E-02
MIN/MAX VALUES OF NS COMPONENT -3 587E-02 3 423E-02
MIN/MAX VALUES OF AMPLITUDE 7 125E-04 3 781E-02
MIN/MAX VALUES OF AZIMUTH 5 975 358 148
(CHOICE: TILT AMPLITUDES ARE IN MICROGRADUANS
AZIMUTH IN DEGREES)
THE FOLLOWING ARE PLOTS OF THE EW AND NS
COMPONENTS OF TILT, AND THE TILT AMPLITUDE
AND AZIMUTH (MEASURED CLOCKWISE FROM NORTH).
0=RE-START, 1=CONTINUE
11
WRITE PLOT TITLE, 80 CHARACTERS
U = -UMAX*COX(WIT1)*COS(W3T3)
SET HORIZONTAL SCALE? Y OR N*(BLANK)
Y1
MIN/MAX X VALUES
-5 51
SET VERTICAL SCALE? Y OR N*(BLANK)

```

```

U = -UMAX*COX(WIT1)*COS(W3T3)
0=RE-START, 1=NEW PLOT
Y1
SET HORIZONTAL SCALE? Y OR N*(BLANK)
Y1
MIN/MAX X VALUES
-5 51
SET VERTICAL SCALE? Y OR N*(BLANK)

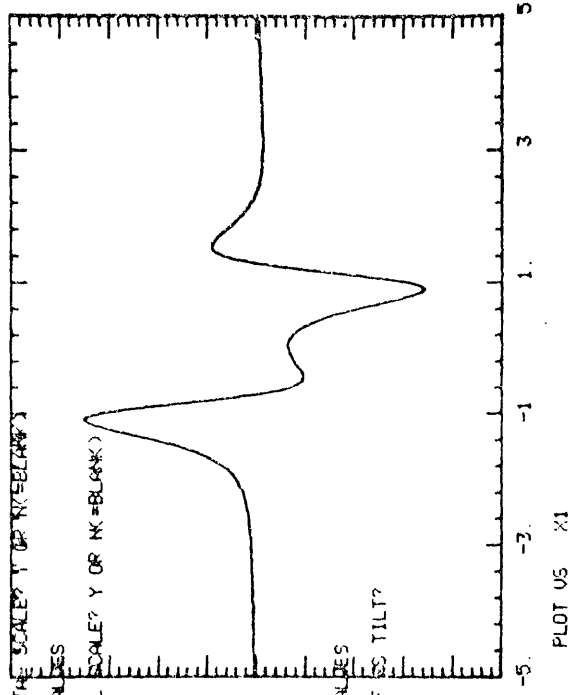
```

E W T I L T

```

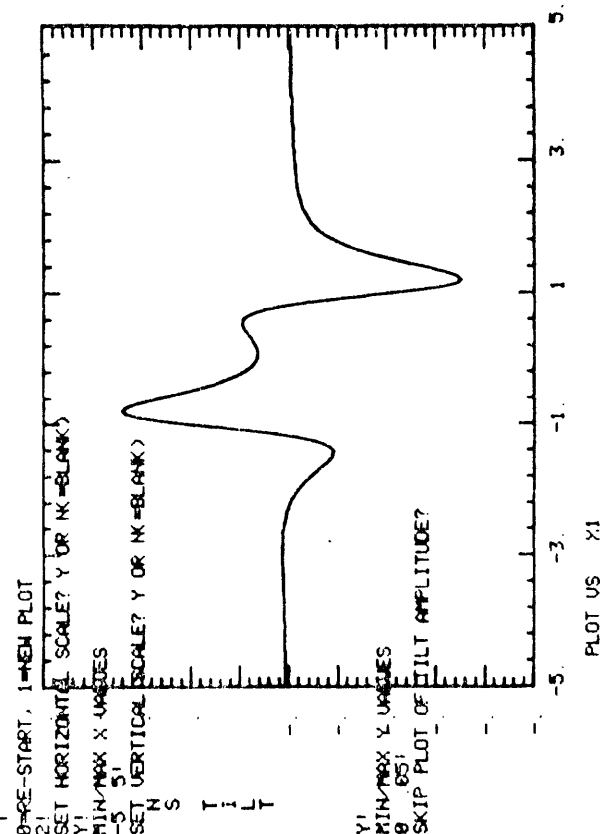
Y1
MIN/MAX Y VALUES
-85 851
SKIP PLOT OF NS TILT?

```



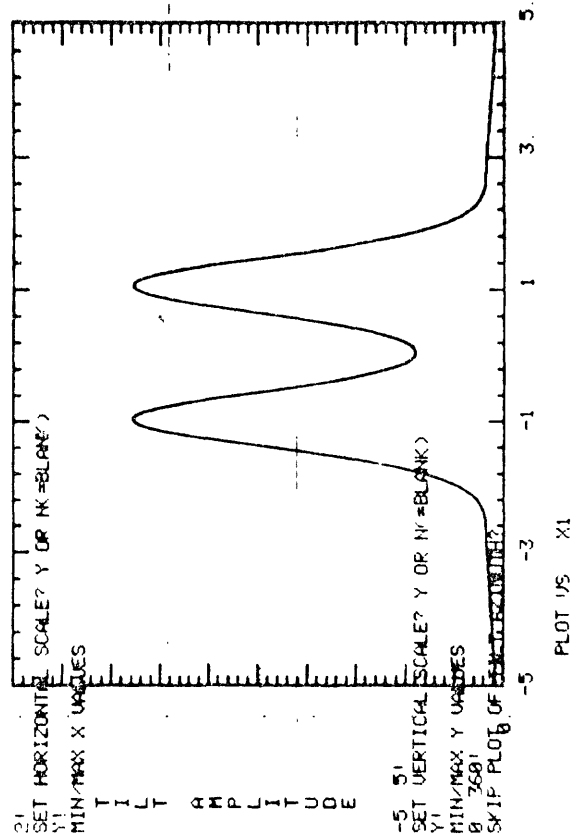
1-11

U = -UMAX*DCOS(W1T1)*COS(W3T3)
 0=RE-START, 1=NEW PLOT

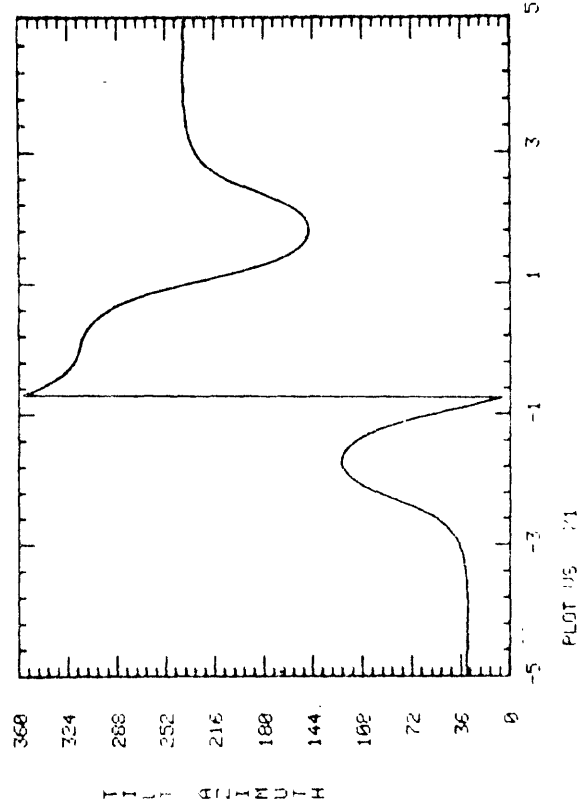


1-1

U = -UMAX*DCOS(W1T1)*COS(W3T3)
 0=RE-START, 1=NEW PLOT



U = -UMAX*ACOS(W1/1.405/W2*3)



1 PLOT US X1, 2=PLOT US X2 SLIP PLOT OF EW TILT?
 1 SPECIFY INITIAL AND FINAL POINTS OF PLOT
 -5 5
 5 SPECIFY VALUE OF X1 THAT PROFILE IS COMPUTED FOR
 5
 5 SPECIFY CIX1FN,CIX3FN,C3X1FN
 1 0 1 -1
 5 SPECIFY NUMBER OF POINTS IN PROFILE,
 NUMBER OF COLUMNS AND ROWS,
 SPATIAL FREQUENCY OF SLIP IN X1 DIRECTION,
 SPATIAL FREQUENCY OF SLIP IN X3 DIRECTION,
 AND MAXIMUM SLIP
 200 20 20 4 4 1
 5 SPECIFY ANGLE OF FAULT TO NS AXIS, IN DEGREES
 0
 5 MIN /MAX VALUES OF EW COMPONENT -1 893E-01 3 412E+10
 MIN /MAX VALUES OF NS COMPONENT -2 607E-02 1 365E+11
 MIN /MAX VALUES OF AMPLITUDE 5 454E-04 1 407E+11
 MIN /MAX VALUES OF AZIMUTH 852 359 240
 5 (NOTE: TILT AMPLITUDES ARE IN MICROFADJANS
 AZIMUTH IN DEGREES,
 THE FOLLOWING ARE PLOTS OF THE EW AND NS
 COMPONENTS OF TILT, AND THE TILT AMPLITUDE
 AND AZIMUTH (MEASURED CLOCKWISE FROM NORTH)
 0=RE-START, 1=CONTINUE
 1
 5 WRITE PLOT TITLE, 80 CHARACTERS
 U = -UMAX*ACOS(W1/1.405/W2*3)
 5 SET HORIZONTAL SCALE? Y OR N=BLANK
 Y
 5 MIN/MAX X VALUES
 -5 5
 5 SET VERTICAL SCALE? Y OR N=BLANK
 Y

1-16

```

0=RE-START, 1=NEW PLOT
1.
SET HORIZONTAL SCALE? Y OR N(=BLANK)
Y.
MIN/MAX X VALUES
-5 5
SET VERTICAL SCALE? Y OR N(=BLANK)
Y.
MIN/MAX Y VALUES
-1 1
SKIP PLOT OF EM TILT?

```

1-15

U = -ABS(UMAX)*COS(W1X1)*COS(W3X3))

*1915.

*5723.

*9532.

*3348

*7149

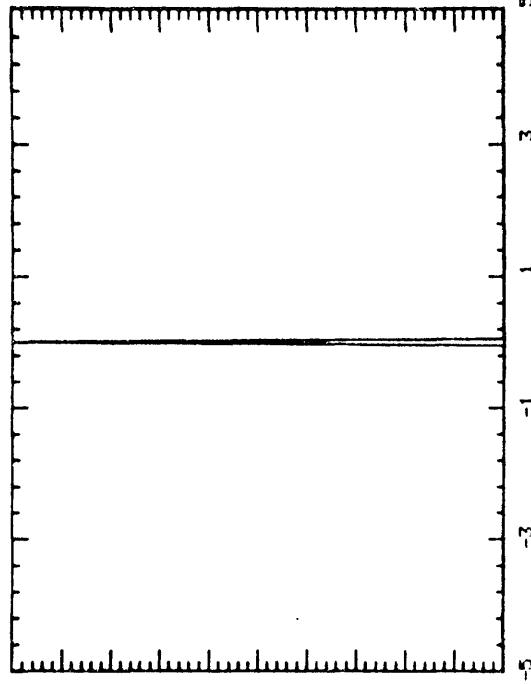
*8957.

*4766.

*8574.

*2382

*6191



PLOT VS. X2

```
U = -HES(U*MAX(COS(MIX1)*COS(W3X3))
```

```
0=PE-START, 1=NEW PLOT
```

```
SET HORIZONTAL SCALE? Y OR N<=BLANK>
```

```
Y1
```

```
MIN-MAX X VALUES
```

```
-5 51
```

```
SET VERTICAL SCALE? Y OR N<=BLANK>
```

```
W
```

```
T
```

```
I
```

```
L
```

```
T
```

```
Y1
```

```
MIN-MAX Y VALUES
```

```
-1 11
```

```
SKIP PLOT OF INS TILT?
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

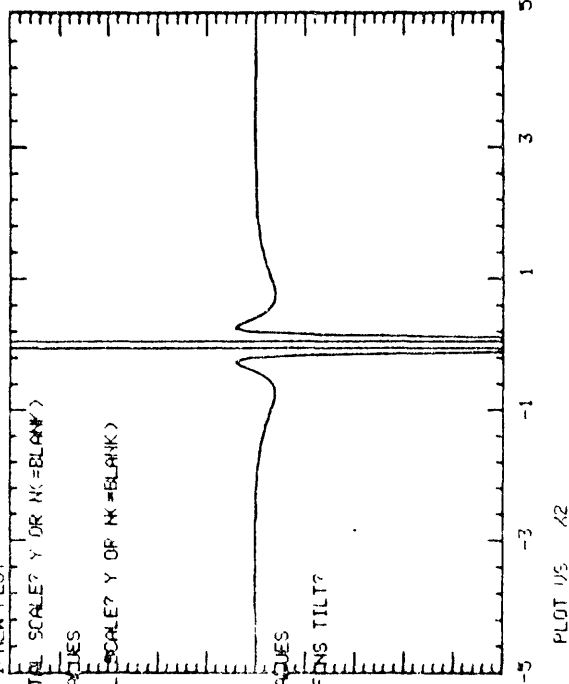
```
-
```

```
-
```

```
-
```

```
-
```

```
-
```



```
U = -HES(U*MAX(COS(MIX1)*COS(W3X3))
```

```
0=PE-START, 1=NEW PLOT
```

```
SET HORIZONTAL SCALE? Y OR N<=BLANK>
```

```
Y1
```

```
MIN-MAX X VALUES
```

```
-5 51
```

```
SET VERTICAL SCALE? Y OR N<=BLANK>
```

```
W
```

```
T
```

```
I
```

```
L
```

```
T
```

```
Y1
```

```
MIN-MAX Y VALUES
```

```
-1 11
```

```
SKIP PLOT OF TILT AMPLITUDE?
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

```
-
```

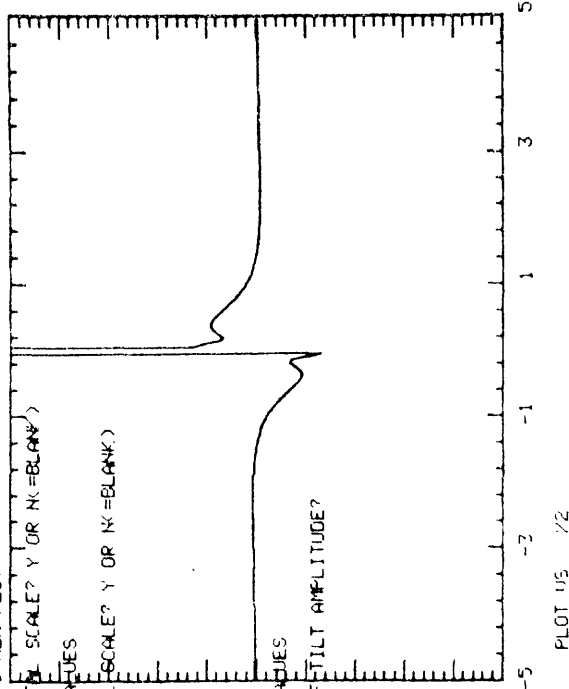
```
-
```

```
-
```

```
-
```

```
-
```

```
-
```



1-19

U = -ABS(U*MAX(COS(W1X1)*COS(W3X3)))

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR N=BLANK

Y1 MIN/MAX X VALUES

-5 5

1 SET VERTICAL SCALE? Y OR N=BLANK

AMPLITUDE

Y1 MIN/MAX Y VALUES

0 360

SKIP PLOT OF TILT AZIMUTH?

0

5

3

1

-1

-3

-5

PLOT VS X2

0

5

3

1

-1

-3

-5

PLOT VS X2

0

5

3

1

-1

-3

-5

1-20

U = -ABS(U*MAX(COS(W1X1)*COS(W3X3)))

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR N=BLANK

Y1 MIN/MAX X VALUES

-5 5

1 SET VERTICAL SCALE? Y OR N=BLANK

AMPLITUDE

Y1 MIN/MAX Y VALUES

0 360

SKIP PLOT OF TILT AZIMUTH?

0

5

3

1

-1

-3

-5

PLOT VS X2

0

5

3

1

-1

-3

-5

PLOT VS X2

0

5

3

1

-1

-3

-5

PLOT VS X2

0

5

1-2

```

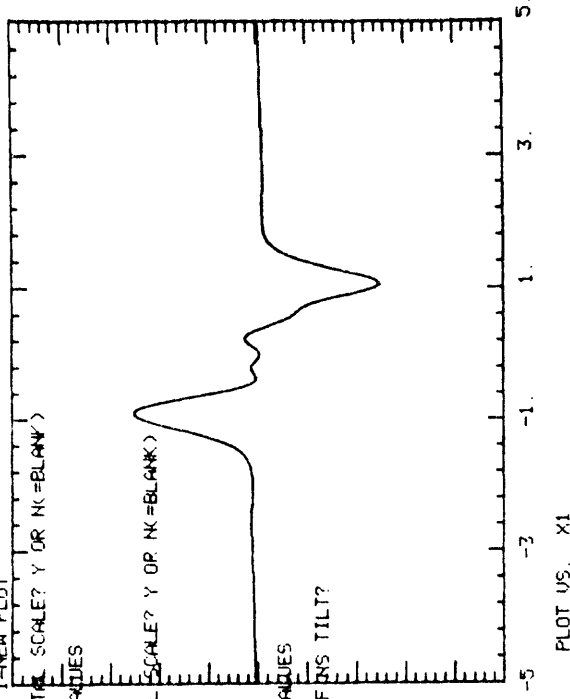
1 0=RE-START, 1=NEW PLOT
81
1 1=PLOT VS X1, 2=PLOT VS X2
11
SPECIFY INITIAL AND FINAL POINTS OF PLOT
-5 51 SKIP PLOT OF EW TILT?
51 SPECIFY VALUE OF X2 THAT PROFILE IS COMPUTED FOR
51
SPECIFY C1X1FN,C1X3FN,C2X3FN,C3X1FN
1 0 1 -11
SPECIFY NUMBER OF POINTS IN PROFILE,
NUMBER OF COLUMNS AND ROWS,
SPATIAL FREQUENCY OF SLIP IN X1 DIRECTION,
SPATIAL FREQUENCY OF SLIP IN X3 DIRECTION,
AND MAXIMUM SLIP
2 3 1 2 0 11
SPECIFY ANGLE OF FAULT TO NS AXIS, IN DEGREES
81
MIN./MAX. VALUES OF EW COMPONENT -4.974E-02 5.024E-02
MIN./MAX. VALUES OF NS COMPONENT -3.221E-02 3.809E-02
MIN./MAX. VALUES OF AMPLITUDE 9.266E-04 5.067E-02
MIN./MAX. VALUES OF AZIMUTH 945 357.370
(NOTE: TILT AMPLITUDES ARE IN MICROGRADUANS
AZIMUTH IN DEGREES)
THE FOLLOWING ARE PLOTS OF THE EW AND NS
COMPONENTS OF TILT, AND THE TILT AMPLITUDE
AND AZIMUTH (MEASURED CLOCKWISE FROM NORTH).
0=RE-START, 1=CONTINUE
11
WRITE PLOT TITLE, 80 CHARACTERS
U = -ABS(UMAX)*COS(W1X1)*COS(W2X3))1
SET HORIZONTAL SCALE? Y OR N=BLANK)
Y1
MIN/MAX X VALUES

```

```

U = -ABS(UMAX)*COS(W1X1)*COS(W2X3))1
0=RE-START, 1=NEW PLOT
21
SET HORIZONTAL SCALE? Y OR N=BLANK)
Y1
MIN/MAX X VALUES
-5 51
E
SET VERTICAL SCALE? Y OR N=BLANK)
T
T
T
Y1
MIN/MAX Y VALUES
-1 11
SKIP PLOT OF NS TILT?
- - -
- - -
- - -

```



1-24

U = -ABS(XMAX+COS(WIX1)*COS(W3X3))

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR N<BLANK>

Y1 MIN/MAX X VALUES

-5 51

SET VERTICAL SCALE? Y OR N<BLANK>

T

L

A

M

P

L

I

T

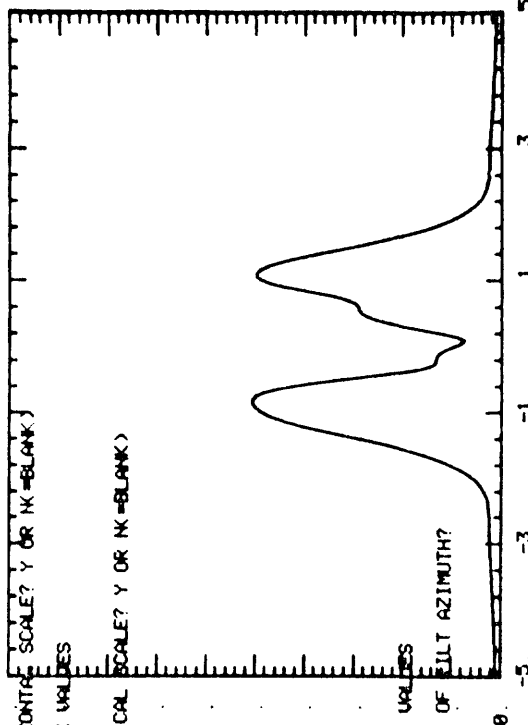
U

Y1

MIN/MAX Y VALUES

0 3601

SKIP PLOT OF TILT AZIMUTH?



PLOT US. X1

1-23

U = -ABS(XMAX+COS(WIX1)*COS(W3X3))

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR N<BLANK>

Y1 MIN/MAX X VALUES

-5 51

SET VERTICAL SCALE? Y OR N<BLANK>

S

T

L

A

M

P

L

I

T

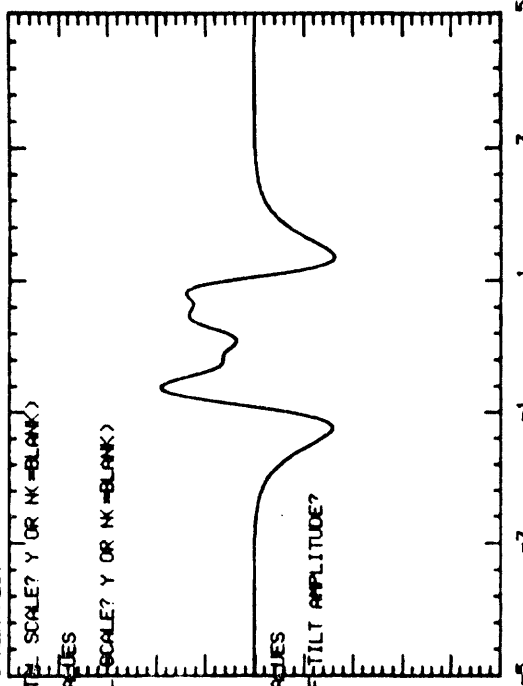
U

Y1

MIN/MAX Y VALUES

0 11

SKIP PLOT OF TILT AMPLITUDE?



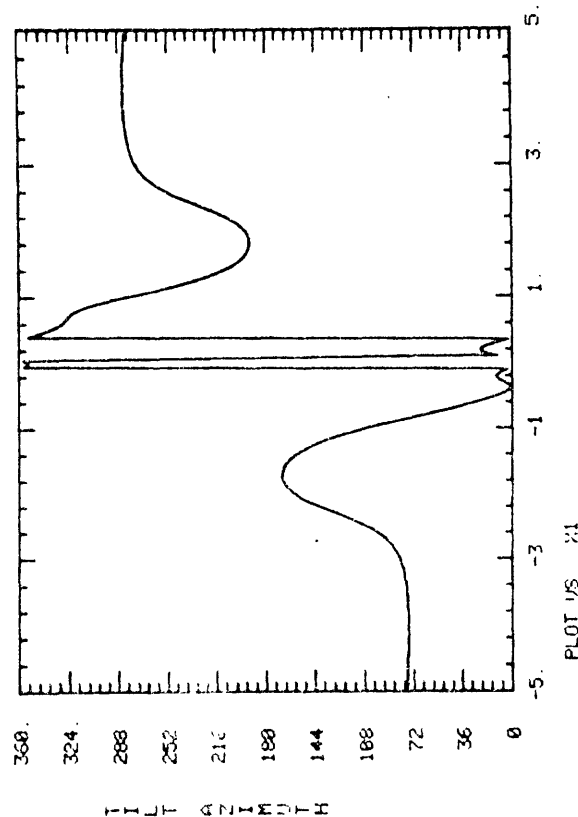
PLOT US. X1

```

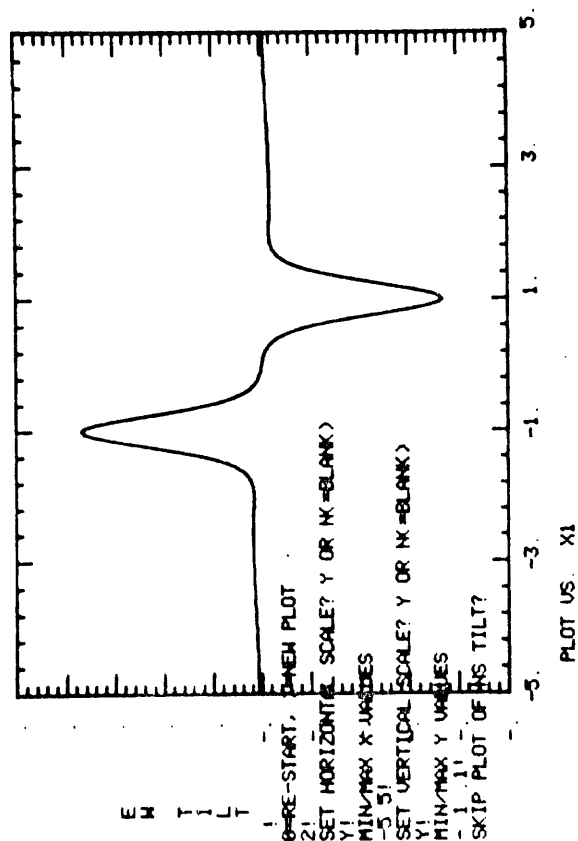
01 RE-START, 1=NEW PLOT
01 SET VERTICAL SCALE? Y OR N=BLANK
Y1
11 MIN/MAX Y VALUES
11 PLOT US X1, 2=PLOT US X2
11 SPECIFY INITIAL AND FINAL POINTS OF PLOT
-5 51
51 SKIP PLOT OF EW TILT?
51 SPECIFY VALUE OF X2 THAT PROFILE IS COMPUTED FOR
51 SPECIFY CIX1FN, CIX3FN, CX3FN, CX1FN
1 0 1 -11
SPECIFY NUMBER OF POINTS IN PROFILE,
NUMBER OF COLUMNS AND ROWS,
SPATIAL FREQUENCY OF SLIP IN X1 DIRECTION,
SPATIAL FREQUENCY OF SLIP IN X3 DIRECTION,
AND MAXIMUM SLIP
200 1 1 8 0 11
SPECIFY ANGLE OF FAULT TO NS AXIS, IN DEGREES
01
MIN /MAX VALUES OF EW COMPONENT -7.383E-02 7.383E-02
MIN /MAX VALUES OF NS COMPONENT -4.813E-02 4.813E-02
MIN /MAX VALUES OF AMPLITUDE 1.468E-03 7.19
MIN /MAX VALUES OF AZIMUTH 719 360.000
(NOTE: TILT AMPLITUDES ARE IN MICRORADIANS)
AZIMUTH IN DEGREES
THE FOLLOWING ARE PLOTS OF THE EW AND NS
COMPONENTS OF TILT, AND THE TILT AMPLITUDE
AND AZIMUTH (MEASURED CLOCKWISE FROM NORTH)
0=PE-START, 1=CONTINUE
11
WRITE PLOT TITLE, 80 CHARACTERS
RECTANGLE/UNIFORM SLIP
SET HORIZONTAL SCALE? Y OR N=BLANK
Y1
MIN/MAX X VALUES

```

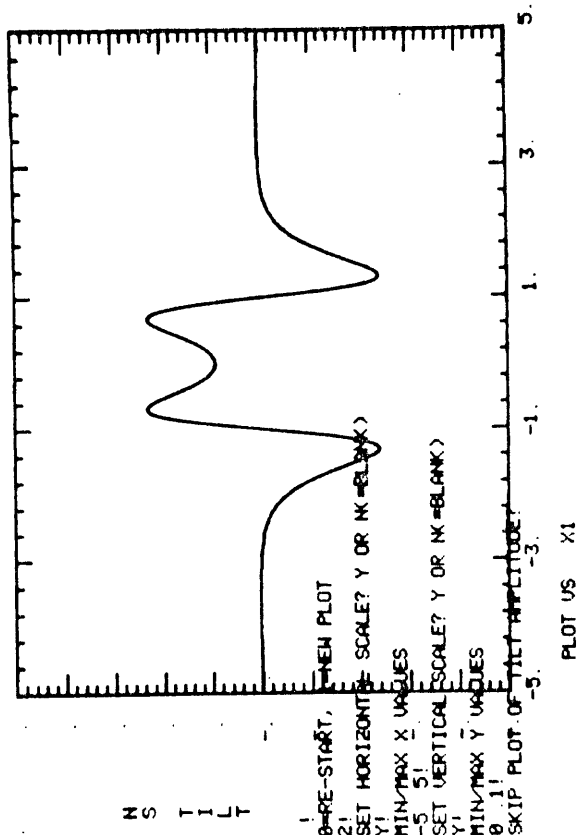
$$U = -PBS(LMAX * COS(W1X1) * COS(W3X3))$$



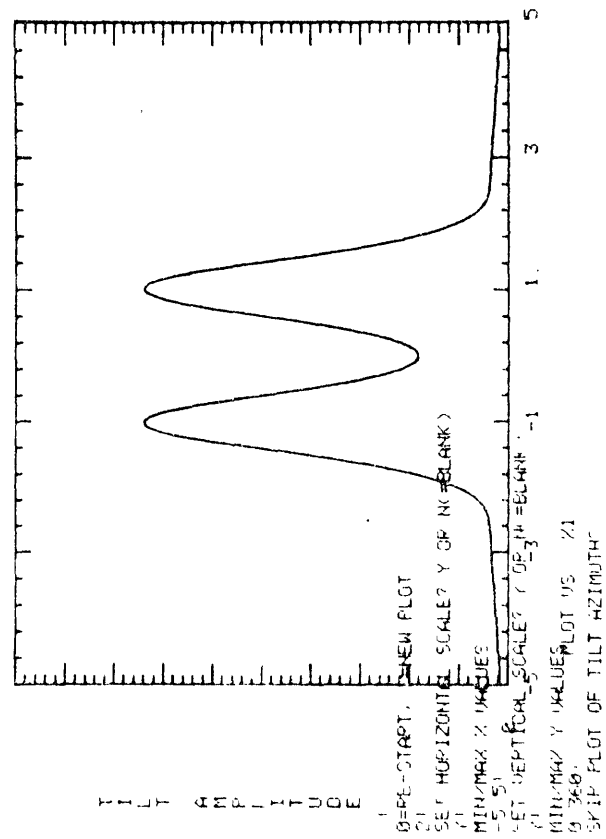
RECTANGLE/UNIFORM SLIP



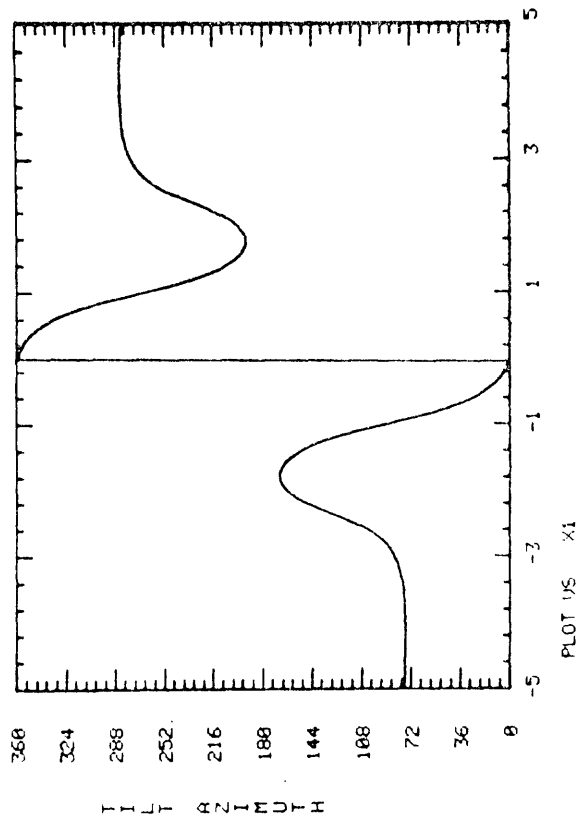
RECTANGLE/UNIFORM SLIP



RECTANGLE UNIFORM SLIP



RECTANGLE UNIFORM SLIP



RCTNGL

Exponential Slip Distribution

Lines 57-59 have been changed to the exponential slip distribution indicated on the following page. Note that the tilt amplitude is not symmetric (page 1-37). The lack of symmetry is caused by the slip distribution specifying a larger displacement at the right-hand margin than at the left-hand margin of the slip zone.

1-34

EXPONENTIAL SLIP DISTRIBUTION

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR N=<BLANK>

Y1 MIN/MAX X VALUES

-5 51

SET VERTICAL SCALE? Y OR N=<BLANK>

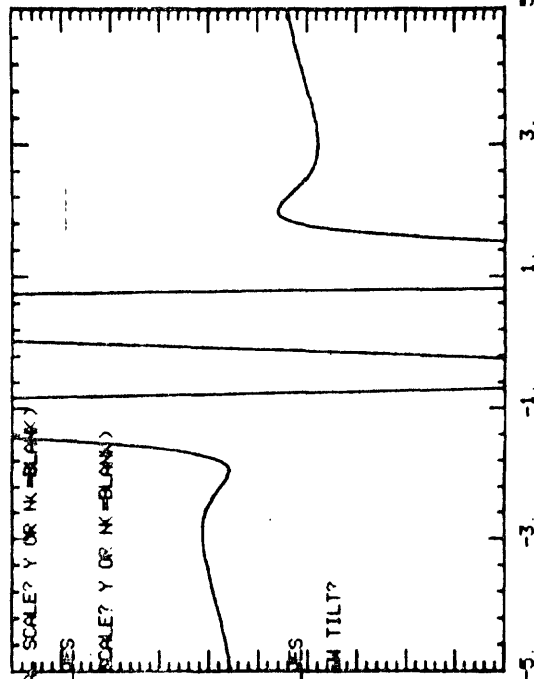
E W

T I L T

Y1 MIN/MAX Y VALUES

-1 11

SKIP PLOT OF 24 TILT?



PLOT VS X1

1-35

EXPONENTIAL SLIP DISTRIBUTION

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR N=<BLANK>

Y1 MIN/MAX X VALUES

-5 51

SET VERTICAL SCALE? Y OR N=<BLANK>

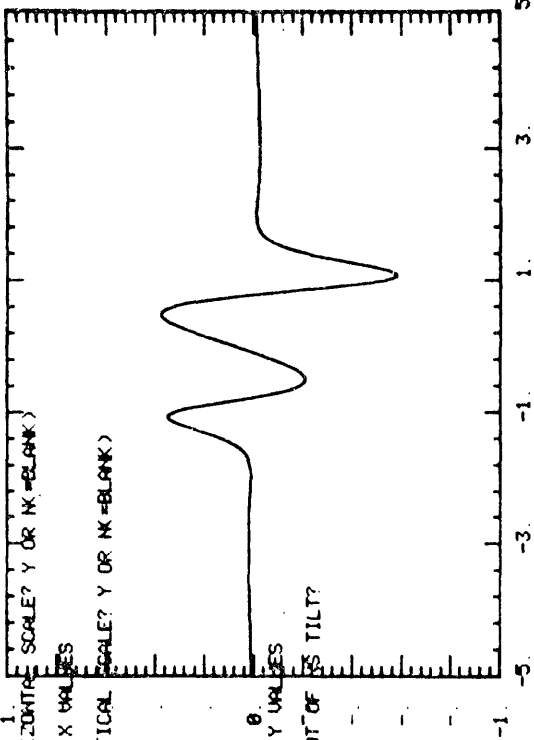
E W

T I L T

Y1 MIN/MAX Y VALUES

-1 11

SKIP PLOT OF 25 TILT?



PLOT VS X1

EXPONENTIAL SLIP DISTRIBUTION

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR NK=BLANK)

Y1 MIN/MAX X VALUES

-5 51

SET VERTICAL SCALE? Y OR NK=BLANK)

N S

T I

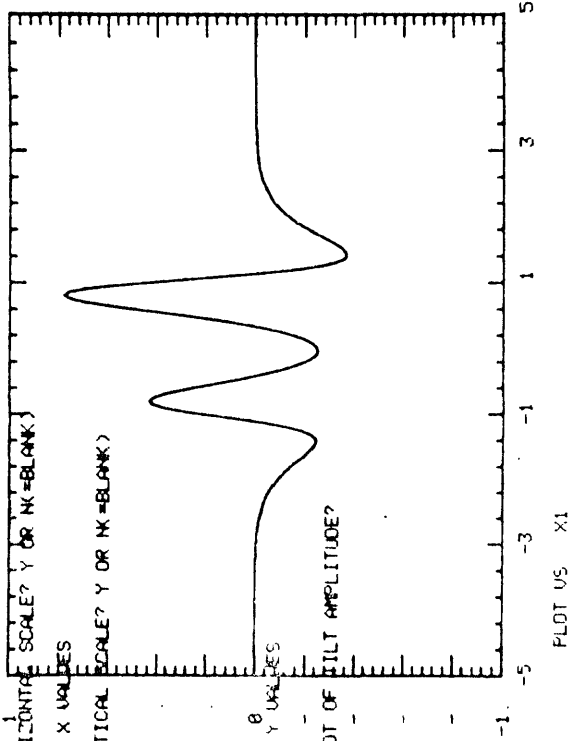
L T

Y1 0

MIN/MAX Y VALUES

-1 1

SKIP PLOT OF TILT AMPLITUDE?



EXPONENTIAL SLIP DISTRIBUTION

0=RE-START, 1=NEW PLOT

21 SET HORIZONTAL SCALE? Y OR NK=BLANK)

Y1 MIN/MAX X VALUES

-5 51

SET VERTICAL SCALE? Y OR NK=BLANK)

N S

T I

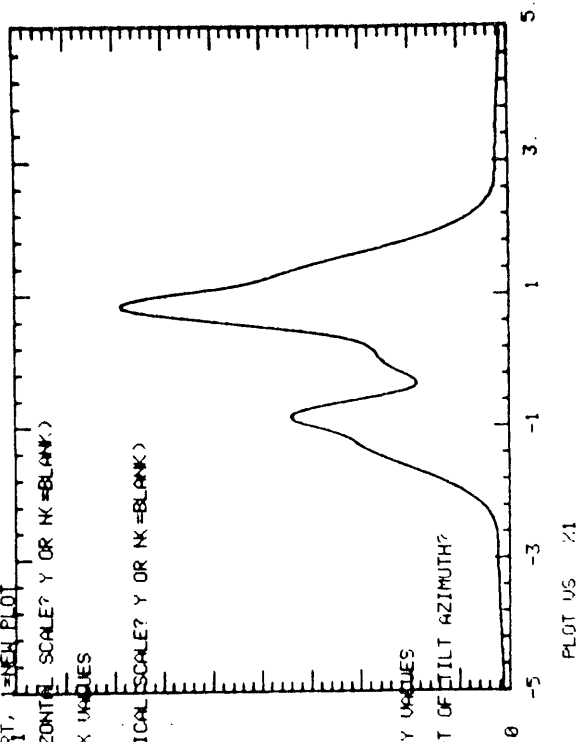
L T

Y1 0

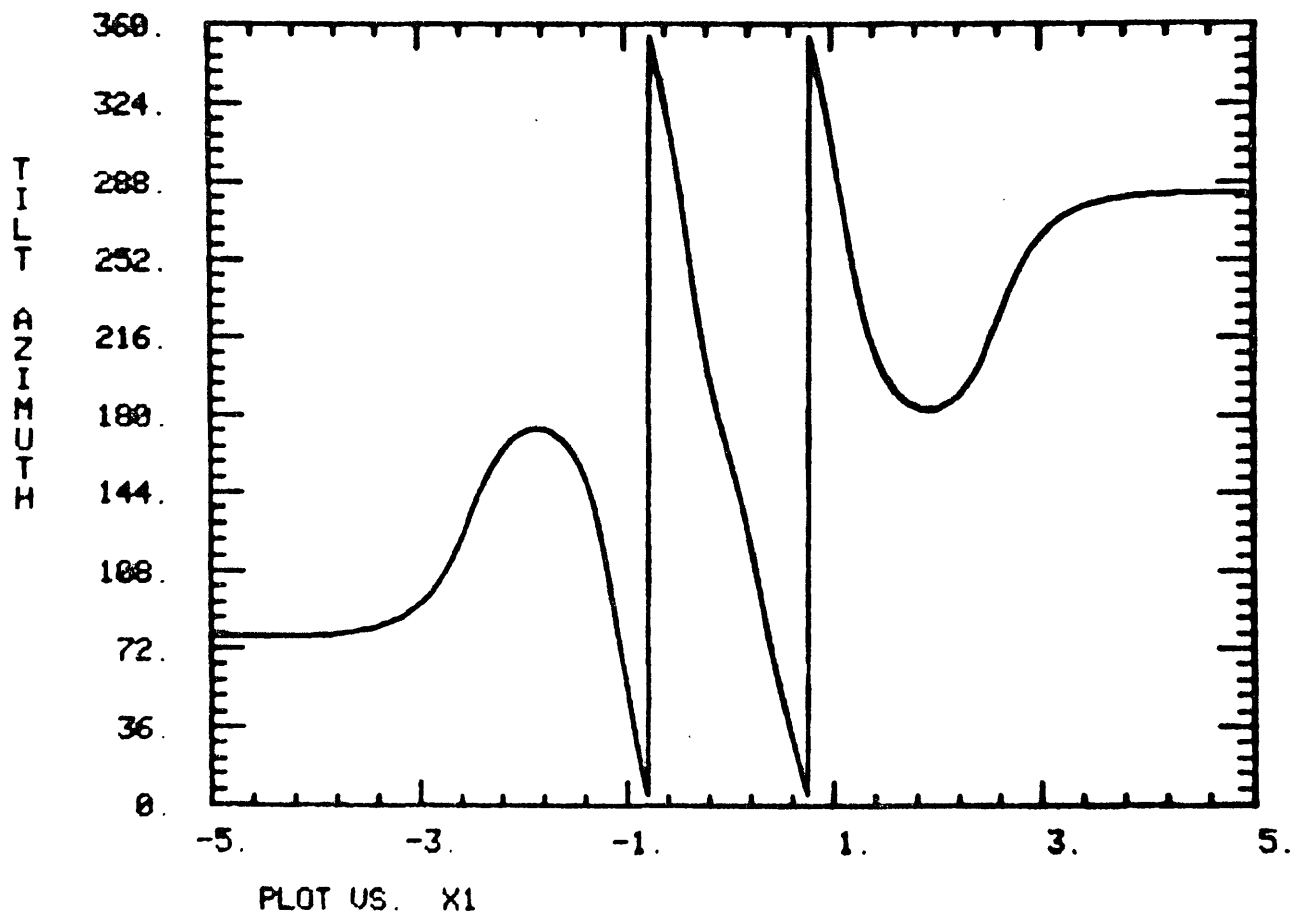
MIN/MAX Y VALUES

-1 1

SKIP PLOT OF TILT AZIMUTH?



EXPONENTIAL SLIP DISTRIBUTION



DOCUMENTATION OF RCTNGL

18 JUN 76 09.44.15 MCHUGH .RCINGL

```

1  DELETE(LGG,CUTPUT,RCINGL)
2  RCINGL.
3  EXIT.
4  LIBCOPY(GRAPHIC,TXLOG/RR,TALGO)
5  LIBCOPY(JURAT,NPLGO/RR,NPLGC)
6  DELETE(LGG,CUTPUT,RCINGL)
7  RUN76(L)
8  LINK(F=LG),F=TXLGO,F=NPLGO,B=RCINGL)
9  RCINGL.
10 FIN.
11 EOF
12      PROGRAM RCINGL(TAPE1TY=201,FILM=TAPE1TY,TAPE7=TAPE1TY)
13      COMMON/TVPOOL/TVPOL(3)
14      COMMON/TVTUNE/ITUNE(30)
15      COMMON/JPLCT/XLT,XRT,YLO,YUP,MAJX,MAJY,KX(2),KY(2),
16      1LTITL(3),LG,LTF,ENLGX,ENLGY,NCLX,NCLY,LTITL2(8)
17      DIMENSION IFET(8)
18      DIMENSION AX1(200),AX2(200),THETA1(20,20),THETA2(20,20)
19      DIMENSION TNL(200),TLW(200),TAMP(200),TAZM(200),T(200),AB(20)
20      CALL FET(5LTAPL7,IFET,6)
21      IFET(2)=IFET(2).OR.0000 0010 0000 0000 0000B
22      IFET(3)=IFET(3).OR.4000 0000 0000 0000 0000B
23      CALL FET(5LTAPL7,IFET,-8)
24      113 CONTINUE
25      AAA=1.234E-20 3WRITE(7,3)
26      3  FORMAT(*1=PLOT VS. X1, 2=PLOT VS. X2*)
27      CALL GETNUM(AB) 3IFLAG=AB(1) 3WRITE(7,9)
28      9  FORMAT(*SPECIFY INITIAL AND FINAL POINTS OF PLOT*)
29      CALL GETNUM(AB) 3BEGIN=AB(1) 3END=AB(2)
30      IF(IFLAG.EQ.1)KHOLD=2HX2 3IF(IFLAG.EQ.2)KHOLD=2HX1
31      WRITE(7,10)KHOLD 3CALL GETNUM(AB) 3CONSTN=AB(1)
32      10  FORMAT(*SPECIFY VALUE OF *,A2,* THAT PROFILE IS COMPUTED FOR*)
33      WRITE(7,11)
34      11  FORMAT(*SPECIFY C1X1FN,C1X3FN,C2X3FN,C3X1FN*)
35      CALL GETNUM(AB) 3C1X1FN=AB(1) 3C1X3FN=AB(2) 3C2X3FN=AB(3)
36      3C3X1FN=AB(4) 3WRITE(7,12)
37      12  FORMAT(*SPECIFY NUMBER OF POINTS IN PROFILE,*,/,
38      1  *NUMBER OF COLUMNS AND ROWS,*,/,
39      1  *SPATIAL FREQUENCY OF SLIP IN X1 DIRECTION,*,/,
40      1  *SPATIAL FREQUENCY OF SLIP IN X3 DIRECTION,*,/,
41      1  *AL MAXIMUM SLIP*)
42      CALL GETNUM(AB) 3M=AB(1) 3N1=AB(2) 3N2=AB(3) 3FREQX1=AB(4)
43      3FREQX3=AB(5) 3UMAX=AB(6) 3WRITE(7,13)
44      13  FORMAT(*SPECIFY ANGLE OF FAULT TO NS AXIS, IN DEGREES*)
45      CALL GETNUM(AB) 3THETA=AB(1) 3AL=C1X1FN-C3X1FN
46      3W=C2X3FN-C1X3FN 3CT=COS(THETA*.01745) 3ST=SIN(THETA*.01745)
47      DO 1 K=1,M
48      XINC=(END-BEGIN)/M
49      IF(IFLAG.EQ.1)AX1(K)=BEGIN+(XINC*(K-1))
50      IF(IFLAG.EQ.1)AX2(K)=CONSTN
51      IF(IFLAG.EQ.2)AX1(K)=CONSTN
52      IF(IFLAG.EQ.2)AX2(K)=BEGIN+(XINC*(K-1))
53      DO 2 I=1,N2
54      DO 3 J=1,N1
55      C1X1=C3X1FN+((AL/N1)*J) 3C1X3=C1X3FN+((W/N2)*(I-1))
56      C2X3=C1X3+(W/N2) 3C3X1=C1X1-(AL/N1)
57      U=-C1AX*COS(((C1X1-C3X1FN)/AL)*2.*3.14159*FREQX1)*
58      1  COS(((C2X3-C1X3FN)/W)*2.*3.14159*FREQX3)

```


18 JUN 76

03.44.15

MCHUGH .RCCTNGL

PAGE 2

```

59      U=-ABS(U)
60      X1=AX1(K)  &X2=AX2(K)
61      CALL CUMTILT(U,X1,X2,C1X1,C1X3,C2X3,C3X1,A,E)
62      THETA1(I,J)=A
63      THETA2(I,J)=B
64      2 CONTINUE
65      SUM1=SUM2=0.
66      DO 4 I=1,N2
67      DO 5 J=1,N1
68      TNS(K)=THETA1(I,J)+SUM1
69      TEW(K)=THETA2(I,J)+SUM2
70      SUM1=TNS(K)
71      SUM2=TEW(K)
72      4 CONTINUE
73      A=TNS(K)  &B=TEW(K)
74      TNS(K)=A*CT+B*ST
75      TEW(K)=-A*ST+B*CT
76      TAMP(K)=SQRT((TEW(K)**2)+(TNS(K)**2))
77      IF (TNS(K).EQ.0.) TNS(K)=1.E-20
78      TAZ1(K)=(ATAN(TEW(K)/TNS(K)))*(180./3.1415926)
79      IF (TNS(K).LT.0.) TAZH(K)=TAZH(K)+180.
80      IF (TAZM(K).LT.0.) TAZM(K)=TAZM(K)+360.
81      1 IF (TAZM(K).GT.360.) TAZM(K)=TAZM(K)-360.
82      DO 7 I=1,N
83      IF (IFLAG.EQ.1) T(I)=AX1(J)
84      IF (IFLAG.EQ.2) T(I)=AX2(J)
85      TEWMIN=TEW(1)  &TNSMIN=TNS(1)  &TAMPMD=TAMP(1)  &TAZMMD=TAZM(1)
86      TEWMAX=TEW(NAX)  &TNSMAX=TNS(NAX)  &TNSMIN=TNS(1)
87      TAMPMD=TAMP(NAX)  &TAZMMD=TAZM(NAX)  &TAZMMD=TAZM(1)
88      DO 150 I=1,4
89      IF (TEW(I) .LT. TEWMIN) TEWMIN=TEW(I)
90      IF (TEW(I) .GT. TEWMAX) TEWMAX=TEW(I)
91      IF (TNS(I) .LT. TNSMIN) TNSMIN=TNS(I)
92      IF (TNS(I) .GT. TNSMAX) TNSMAX=TNS(I)
93      IF (TAMP(I) .LT. TAMPMD) TAMPMD=TAMP(I)
94      IF (TAMP(I) .GT. TAMPMD) TAMPMD=TAMP(I)
95      IF (TAZ(I) .LT. TAZMMD) TAZMMD=TAZ(I)
96      IF (TAZ(I) .GT. TAZMMD) TAZMMD=TAZ(I)
97      150 CONTINUE
98      WRITE(7,17) TEWMIN,TEWMAX,TNSMIN,TNSMAX,TAMPMD,TAMPMD,TAZMMD,TAZMMD
99      17 FORMAT(*MIN./MAX. VALUES OF EW COMPONENT*,2X,E10.3,2X,E10.3,/,
100      1 *MIN./MAX. VALUES OF NS COMPONENT*,2X,E10.3,2X,E10.3,/,
101      1 *MIN./MAX. VALUES OF AMPLITUDE*,5X,E10.3,2X,E10.3,/,
102      1 *MIN./MAX. VALUES OF AZIMUTH*,3X,F10.3,2X,F10.3,/,
103      1 *(NOTE: TILT AMPLITUDES ARE IN MICRORADIANS*,/,
104      1 *AZIMUTH IN DEGREES)*)
105      WRITE(7,170)
106      170 FORMAT(*THE FOLLOWING ARE PLOTS OF THE EW AND NS *,/,
107      1 *COMPONENTS OF TILT, AND THE TILT AMPLITUDE*,/,
108      1 *AND AZIMUTH (MEASURED CLOCKWISE FROM NORTH).*,/,
109      1 *END-STAR, 1=CONTINUE*)
110      CALL GETNOM(AB)  &KFLAG=AB(1)
111      IF (KFLAG.EQ. 0) GO TO 113
112      DD=7  &BNCLX=1  &BNCLY=1  &BNCLX=2  &BNCLY=2
113      WRITE(7,133)
114      133 FORMAT(*WRITE PLOT TITLE, 30 CHARACTERS*)
115      READ(7,200) (LTITLE(JM),JM=1,5)
116      200 FORMAT(8A10)

```

18 JUN 76

09.44.15

MCHUGH .RCTNGL

PAGE 3

```

117      IF (IFLAG.EQ.1) KX(2)=10HX1
118      IF (IFLAG.EQ.2) KX(2)=10HX2
119      KX(1)=10HPLOT VS.
120      KY(1)=10H EW TILT
121      KY(2)=10H          $MAJX=5 $MAJY=10 $LTITLE(1)=1
122 900  XLT=T(1) $XRT=T(M)  $YLO=TEWMIN  $YUP=TEWMAX
123      WRITE(7,70)
124      70  FORMAT(*$LT HORIZONTAL SCALE? Y OR N(=BLANK)* )
125      READ(7,66)CHARAC  $IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H )GO TO 71
126      WRITE(7,72)
127      72  FORMAT(*MIN/MAX X VALUES*)
128      CALL GETNUM(AB)  $XLT=AB(1)  $XRT=AB(2)
129      71  WRITE(7,73)
130      73  FORMAT(*$LT VERTICAL SCALE? Y OR N(=BLANK)* )
131      READ(7,66)CHARAC  $IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H )GO TO 74
132      WRITE(7,75)
133      75  FORMAT(*MIN/MAX Y VALUES*)
134      CALL GETNUM(AB)  $YLO=AB(1)  $YUP=AB(2)
135      74  IF (TEWMIN.LT.TEWMAX) YLO=YUP-1.
136          IF (TEWMIN.LT.TEWMAX) YUP=YUP+1.
137      WRITE(7,109)
138 109  FORMAT(*SKIP PLOT OF EW TILT?*)
139      READ(7,66)IUVAR
140      66  FORMAT(A1)
141      IF (IUVAR.EQ.1HN.OR.IUVAR.EQ.1H )CALL PLOTS(TEW,T,1,M)
142      WRITE(7,19) $CALL GETNUM(AB) $IKFLAG=AB(1)
143      IF (IKFLAG.EQ.0)GOTO113$IF (IKFLAG.EQ.1)GOTO903
144 900  KY(1)=10H NS TILT  $XLT=T(1) $XRT=T(M)
145      KY(2)=10H
146      YLO=TNSMIN  $YUP=TNSMAX $WRITE(7,76) $READ(7,66)CHARAC
147      IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H )GOTO710
148      WRITE(7,70)$CALL GETNUM(AB) $XLT=AB(1) $XRT=AB(2)
149 710  WRITE(7,73)$READ(7,66)CHARAC
150      IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H )GOTO740
151      WRITE(7,75)$CALL GETNUM(AB) $YLO=AB(1) $YUP=AB(2)
152 740  IF (YLO.LT.YUP) AAA=YLO$IF (YLO.EQ.AAA) YUP=YUP+1.
153      IF (YLO.EQ.AAA) YLO=YLO-1.
154      WRITE(7,910) $READ(7,66)IUVAR
155 910  FORMAT(*SKIP PLOT OF NS TILT?*)
156      IF (IUVAR.EQ.1HN.OR.IUVAR.EQ.1H )CALL PLOTS(TNS,T,1,M)
157      WRITE(7,19)
158 19  FORMAT(*$LT=START, 1=NEW PLOT*)
159      CALL GETNUM(AB)  $IKFLAG=AB(1)
160      IF (IKFLAG.EQ.0)GO TO 113 $IF (IKFLAG.EQ.1)GOTO900
161 911  KY(1)=10HTILT AMPLI  $XLT=T(1) $XRT=T(M)
162      KY(2)=10HTODI
163      YLO=TAMPMIN  $YUP=TAMPMAX $WRITE(7,76) $READ(7,66)CHARAC
164      IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H )GOTO741
165      WRITE(7,70)$CALL GETNUM(AB)  $XLT=AB(1) $XRT=AB(2)
166 741  WRITE(7,73) $READ(7,66)CHARAC
167      IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H )GOTO742
168      WRITE(7,75) $CALL GETNUM(AB) $YLO=AB(1) $YUP=AB(2)
169 742  IF (YLO.LT.YUP) AAA=YLO$IF (YLO.EQ.AAA) YUP=YUP+1.
170      IF (YLO.EQ.AAA) YLO=YLO-1.
171      WRITE(7,912) $READ(7,66)IUVAR
172 912  FORMAT(*SKIP PLOT OF TILT AMPLITUDE?*)
173      IF (IUVAR.EQ.1HN.OR.IUVAR.EQ.1H )CALL PLOTS(TAMP,T,1,M)
174      WRITE(7,19) $CALL GETNUM(AB) $IKFLAG=AB(1)

```

18 JUN 76 09.44.15

MCHUGH .RCTNGL

PAGE 4

```

175      IF (IKFLAG.EQ.0) GOTO 113 IF (IKFLAG.EQ.1) GOTO 911
176 913 KY(1)=10HTILT AZIMU $XLT=T(1)$XRT=T(M)
177      KY(2)=10HTH $YLC=TAZMMN $YUP=TAZMMX
178      WRITE(7,70) READ(7,60) CHARAC
179      IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H) GOTO 743
180      WRITE(7,72) $CALL GETNUM(AB)$XLT=AB(1)$XRT=AB(2)
181 743 WRITE(7,73) $READ(7,60) CHARAC
182      IF (CHARAC.EQ.1HN.OR.CHARAC.EQ.1H) GOTO 744
183      WRITE(7,75) $CALL GETNUM(AB)$YLO=AB(1)$YUP=AB(2)
184 744 IF (YLO.EQ.YUP) AAA=YLO IF (YLO.EQ.AAA) YUP=YUP+1.
185      IF (YLO.EQ.AAA) YLO=YLO-1.
186      WRITE(7,814) $READ(7,60) IJVAR
187 914 FORMAT(*SKIP PLOT OF TILT AZIMUTH?*)
188      IF (IJVAR.EQ.1HN.OR.IJVAR.EQ.1H) CALL PLOTS(TAZM,T,1,M)
189      WRITE(7,19) $CALL GETNUM(AB) $IF(AB(1).EQ.0.) GOTO 113
190      STOP ENCL
191      SUBROUTINE CMPTILT(U,X1,X2,C1X1,C1X3,C2X3,C3X1,T1,T2)
192      A1=A2=A3=A4=B1=B2=B3=B4=0.
193      X5=1.02X1=C1X1+C3X3-C2X3 $C4X1=C3X1 $C4X3=C1X3
194      CALL TILT(U,X1,X2,X3,C2X1,C2X3,A1,B1)
195      CALL TILT(U,X1,X2,X3,C1X1,C1X3,A2,B2)
196      CALL TILT(U,X1,X2,X3,C3X1,C3X3,A3,B3)
197      CALL TILT(U,X1,X2,X3,C4X1,C4X3,A4,B4)
198      T1=A1+A2-A3+A4
199      T2=1-B2-B3+B4
200      RETURN
201      END
202      SUBROUTINE TILT(U1,X1,X2,X3,P1,P3,T1,T2)
203      R=SQRT((X1-P1)**2+X2**2+(X3-P3)**2)
204      RP=R+P3
205      T1=(U1/12.0004)*(X2*(X1-P1)*(R*RP-(R+2.*P3)*(2.*R+P3)))/
206      1 (-**3*RP**2)
207      T2=(U1/12.0004)*(X2**2*(R*RP-(R+2.*P3)*(2.*R+P3))/(R**3*RP**2)
208      1 +(1+2.*P3)/(R*RP))
209      RETURN
210      END
211      SUBROUTINE GETNUM(R)
212      DIMENSION L(1),L(40)
213      READ(7,3)L $ L=J=0
214      0 J=J+1 $ N=J=J $ M=J=1
215      1 L=1 $ IF(I.GT.40) RETURN $ J=L(I) $ K=4
216      IF(L.GT.30) K=2 $ IF(L.GT.27.AND.LT.30) K=1
217      IF(L.GT.47) K=3 $ K=K+5 $ GOTO(1,2,3,5,1,4,3,4) K
218      1 N=N*10+D-27 $ S=4 $ GOTO 5
219      2 M=M-1 $ S=4 $ GOTO 5
220      3 P=L $ S=4 $ GOTO 5
221      4 IF(P.GT.0) F=10.**(I-P-1) $ F(J)=N/F*M $ GOTO 6
222      5 FORMAT(30F1)
223      ENCL

```

PROGRAM SLPPRP

PART 2

DOCUMENTATION FOR PROGRAM SLPPRP

INTRODUCTION:

Creep-related tilt changes can be approximated by modeling the slip distribution on the fault plane as an expanding dislocation loop with spatially and temporally varying displacement as discussed in McHugh and Johnston (1976) and McHugh (1976). The program and model in this section (which will be referred to as Model II) is an extension of the programs XPND/XPND01/XPND02 (which will be referred to as Model I) discussed in McHugh (1976).

Model I reproduces the creep-related tilt changes by computing the quasi-static tilts, at the free surface of an elastic medium, associated with a vertically oriented rectangular dislocation loop (Press, 1965). The slip distribution is constant, at any given instant, across the slip surface; but varies in time. This particular approximation however does not reproduce the entire slip distribution as a function of time as shown in figure 2.1. Notice that when the slip surface encompasses rectangle HIJD the displacement versus time profile seen by a creepmeter is a single point.

Model II (figure 2.2) uses a somewhat more realistic approximation to reproduce the creep-related tilts. In this model, the entire slip versus time function is computed for each rectangle as the dislocation loop expands. With this procedure the effect of the propagating boundary is somewhat independent of the effect of the slip as a function of time at points within the slip zone. Because the medium is elastic the rule of superposition can be used to express the tilt at a point on

the free surface. If θ is the tilt component, \underline{i} is the time after the start of the slip zone expansion, and \underline{j} is the time after initiation of slip at a point \underline{m} , the tilt versus time profiles will appear as in figure 2.3. The tilt, T_k , (either $\frac{\partial w}{\partial x}$ or $\frac{\partial w}{\partial y}$ at a time \underline{k} after the start of the zone expansion) is given by

$$T_k = \sum_{j=1}^k \theta_{j, k-j+1} - \sum_{j=1}^{j=k-1} \theta_{j, k-j} .$$

For example, the tilt at $t=3$ units after the zone starts to expand (figure 2.3) is:

$$\begin{aligned} T_3 &= \theta_{1,3} + (\theta_{2,2} - \theta_{1,2}) + (\theta_{3,1} - \theta_{2,1}) \\ &= (\theta_{1,3} + \theta_{2,2} + \theta_{3,1}) - (\theta_{2,1} + \theta_{1,2}) . \end{aligned}$$

INPUT:

The working arrays, examples of various slip distributions, and notation used are given in McHugh (1976). The expressions used to compute the tilts are given in Press (1965). Unlike Model I, the slip zone expansion velocity need not be constant but can be exponential or some combination of exponential and constant velocities. The positions of the boundaries of the slip zones (strike-slip or dip-slip) can be incremented exponentially (eg. curve P Q R, figure 2.2) and/or linearly (eg. curve TUV, figure 2.2). The slip-time function may be linear or exponential (profiles PP' through VV' - figure 2.2), and will be the same for each slip rectangle (eg. rectangles ABCD, EFGD, and HIJD - figure 2.2). Notice too that curve PQR (figure 2.2) physically corresponds to

creep onset-times that decay exponentially, while curve TUV produces a linear creep onset-time distribution. To produce a reference line on the tilt-time displays, the slip zone is fixed at its initial position for the first N units after the start of the computations and fixed in its final position for the last 'NRCPT-N3' units (figure 2.4). The tilts produced by a strike-slip zone and a dip-slip zone may be combined as discussed in McHugh (1976) for Model I. Provision is also made in Model II for one zone to trigger the other's growth.

Model II is intended for use at the Tektronix 4010-1 terminal and is stored at LBL. Once the user is logged onto the 6600 B or C machine with 100 K of core, Model II may be accessed using:

^LOAD, SLPPRP, MCHUGH

The program links automatically to the necessary plotting routines so that the ^LOAD command may be followed immediately by:

^RUN

Examples of the program in operation are given on pages 2-19 to 2-59. The following is a step-by-step list of the input the computer requires.

1) 1 = Zone Expands, 2 = Zone Contracts

Entering a 1 causes the zone to grow from its initial to its final values; a 2 causes the reverse to occur (ie. the zone appears to 'collapse').

2) 1/2 = Slip incremented exponentially/linearly

Strike-Slip/Dip-Slip

Enter 2 numbers (eg. 1 (space) 1). The first number causes the displacement on the strike-slip zone to be incremented linearly (2) or exponentially (1), while the second number controls the slip-time function on the dip-slip zone.

3) 0 = Increment corners separately

1/2 = Increment all corners exponentially/linearly

Strike - slip/Dip-slip

Enter 2 numbers (eg. 1 (space) 0). The corners of the strike-slip zone (controlled by the first number) and dip-slip zone (second number) will be incremented exponentially (1) or linearly (2); or the corners may be controlled individually by entering a zero. If both numbers are a 1 or a 2, the program skips to part 4 below. If a zero is entered the computer responds:

a) 1 = Variable incremented exponentially

2 = Variable incremented linearly

b) activated if the second number is zero

D1X1, D1X3, D2X3, D3X1

Enter 4 numbers.

c) activated if the first number is zero

C1X1, C1X3, C2X3, C3X1

Enter 4 numbers.

4) 'U1>0' = left-lateral strike-slip

'U3>0' = 'X2>0' side down

U1IN, U1FN, U3IN, U3FN

Enter 4 numbers for the initial (IN) and final (FN) slip values. The slip will be incremented between its initial and final values in a linear or exponential fashion depending upon which options were selected in part 2 above.

5) 'TRIGGER' option desired?

Enter a yes (Y) or no (N). This option is the same as discussed in programs XPND/XPND01/XPND02 (McHugh, 1976). If N is entered, the

program moves to part 6 below.

a) $0 = D(I1) > C(I2)$, $1 = D(I1) < C(I2)$

The '0' option is equivalent to the trigger option in programs XPND/XPND01, the '1' option to program XPND02 (McHugh, 1976). When the corner designated by D(I1) is greater than (0) or less than (1) the corner designated by C(I2), the appropriate zone is triggered (ie. starts 'growing').

b) $0 = \text{Strike-slip}/1 = \text{Dip-slip zone triggered}$

Entering a zero causes the dip slip zone to trigger the strike-slip zone; a 1 causes the strike-slip zone to trigger the dip-slip zone.

c) Specify I1 and I2

Enter 2 numbers corresponding to numbers of the C and D arrays as shown in part 5a above. The C and D arrays are given in McHugh (1976).

6)

a) activated if U1IN and U1FN in part 4 are both non-zero

C1X1IN, C1X3IN, C2X3IN, C3X1IN, C1X1FN, C1X3FN, C2X3FN, C3X1FN

Enter the 8 coordinates required for the strike-slip zone.

b) activated if U3IN and U3FN in part 4 are both non-zero.

D1X1IN, D1X3IN, D2X3IN, D3X1IN, D1X1FN, D1X3FN, D2X3FN, D3X1FN

Enter the 8 coordinates required for the dip-slip zone.

7) Enter station coordinates - (X1, X2)

Enter the X1 and X2 coordinates of the station.

8) Specify 2 corners of dislocation surface for display

1 = D1X1 = D2X1 2 = D1X3 = D4X3

4 = D2X3 = D3X3 5 = D3X1 = D4X1

9 = C1X1 = C2X1 10 = C1X3 = C4X3

12 = C2X3 = C3X3 13 = C3X1 = C4X1

Enter 2 numbers to display the position of the desired corners as a function of time.

9) To display slip as a function of time

Enter zone index, Caution -

Index must be between 1 and (INDEX)

(INDEX) is the total number of slip rectangles used in the computation.

Enter the number corresponding to the slip zone desired. This number will cause the slip as a function of time for that slip zone to be displayed in the output.

10) Theta = angle between strike of fault

And north = (NUMBER) Degrees

No response required. The value of theta is printed.

11) MIN/MAX values of EW component (numerical values)

MIN/MAX values of NS component (" ")

MIN/MAX values of amplitude (" ")

MIN/MAX values of azimuth (" ")

(Note: Tilt amplitudes are in microradians, azimuth in degrees)

The following are plots of the EW and NS components of tilt, and the tilt amplitude and azimuth (measured clockwise from north).

0 = Re-start, 1 = Continue

Enter a zero or one as desired. A zero will cause all the output to be skipped and the program to be re-started. The following occur if a 1 is entered.

12) Write plot title, 80 characters

Enter up to 80 alphanumeric characters.

13) The procedure for scaling the graphs in the output are the same as discussed in McHugh (1976) and will not be discussed here.

14) The graphs are displayed automatically once the scaling and 'skip' options are selected.

OUTPUT:

The plots occur in the following order:

- 1) EW tilt component versus time
- 2) NS tilt component versus time
- 3) Theta 2 versus time
- 4) Theta 1 versus time
- 5) Strike-slip versus time
- 6) Dip-slip versus time
- 7) Tilt amplitude versus time
- 8) Tilt azimuth versus time
- 9) Corner 1 versus time
- 10) Corner 2 versus time
- 11) Strike-slip area versus time
- 12) Dip-slip area versus time

'Time' in parts 1, 2 and 7 through 12 is the time after the start of the slip zone expansion, and corresponds to the individual rectangles for which the tilts, $\Theta_{i,j}^m$, are computed, 'Time' in parts 3 through 6 is the time after the start of slip on the individual slip zone. Theta 1 and Theta 2 are $\frac{\partial w}{\partial x_1}$ and $\frac{\partial w}{\partial x_2}$ in Press' (1965) notation and correspond to $\Theta_{i,j}^m$ in figure 2.3. Corners 1 and 2 correspond to the corners selected in part 8 of the Input section.

After the dip-slip area has been displayed, or if the '0 = Re-start' option is selected, the C array is printed out as follows:

C(1)	C(2) . . .	C(6)
⋮		⋮
C(30)	C(36)

The C array contains the initial and final values of the coordinates and slip (McHugh, 1976). This array is followed by:

ICRNR(1)	ICRNR(8)		
:		:		
ICRNR(9)	ICRNR(16)		
IT(1)	. . .	IT(4)	ITIME	
KFLAGS	KFLAGD	LFLAG	MFLAG	IFLAG
NRECPT	N	N1	N2	N3

Definitions of these variables will be found in Appendix A (page 2- 11). A list of options for re-starting the program follows these variables:

- 1 = Re-start with all new values
- 2 = Re-start with new strike-slip value and zone coordinates
- 3 = Re-start with new dip-slip value and zone coordinates
- 4 = Re-start with new strike-slip value only
- 5 = Re-start with new dip-slip value only
- 6 = Re-start with new tiltmeter coordinates only
- 7 = Stop

Entering a 1 through 6 will re-start the program with the changes specified above. The computer will request the information it needs. A 7 causes the program to stop.

RESULTS AND DISCUSSION:

Examples of the program operation start on page 2-19, and the program listing starts on page 2- 60. Appendix A (page 2- 11) lists some of the flags and their definitions.

The tilts from Model II are nearly the same as those from Model I if

- 1) the slip is constant in time (ie. $U1IN = UIFN$ and $U3IN = U3FN$) and
- 2) the corners of the slip zone are incremented linearly. If the slip is constant in time, but the corners are incremented exponentially, the tilt-time curve (from Model II) will be compressed in time accordingly. If the slip is not constant in time and the corners are incremented exponentially and/or linearly, the tilt-time curve (Model II) will be reduced in total amplitude and stretched or compressed compared to Model I. The reduction in amplitude occurs because the slip is no longer constant over the entire slip zone but rather varies from near-zero at the edges to its maximum in the center. When the rectangle (slip zone) has stopped expanding, the slip at its margins is still increasing to the final slip value; consequently the tilt approaches its final value more slowly than the corresponding case in Model I.

Discontinuities may appear if the 'trigger' parameters allow the triggered and triggering zones to be meshed improperly (eg. if the slip on the triggered zone increases from its initial to final value discontinuously). If the tilt-time curves are continuous, the discontinuity near the start of the tilt azimuth curve is produced by zeroes in the initial values of the north-south tilt component. This particular discontinuity is an artifact of the computational procedure and does not represent an actual discontinuity in the tilt field.

STRTCH

Program STRTCH is a variation of SLPPRP that computes the maximum tilt amplitude seen at a station (with coordinates X1, X2) as a function of depth to the lower edge of the slip zone. STRTCH requires 100k of core and is accessed by: ^LOAD, STRTCH, MCHUGH. The geometry and notation in, operation of, and input to STRTCH is the same as SLPPRP. The only new parameters are DEPTH1 (the depth to the lower boundary of the slip zone) and DELTAX (the amount by which DEPTH1 is incremented). The initial and final values of the lower boundary are fixed for each computation (ie. C(4) = C(6) = C(12) = C(14) = C(20) = C(22) = C(28) = C(30) = DEPTH1). Although the lower edge is fixed, the other boundaries are free; and the tilt components at the station are computed in the same fashion as in SLPPRP. The maximum amplitude of the waveform is computed for each value of DEPTH1. The output is a display of the maximum tilt amplitude in microradians versus depth to the lower boundary of the slip zone in kilometers (examples are provided on pages 2-70 to 2-92, the program listing starts on page 2-93).

Note: Although the program requires specification of C2X3 and D2X3, the position of the lower boundary is actually determined by DELTAX and the maximum value of KTEST (line 217). Further, the position of the lower boundaries of the strike-slip and dip-slip zones are set equal to one another (lines 79-80). Each cycle through the program requires approximately 160 c.u.'s.

APPENDIX A

Flags Used In SLPPRP

Iflag: determines whether zone expands or contracts

Kflags, Kflagd: determines whether strike-slip (kflags) and dip-slip (kflagd) are incremented linearly or exponentially as a function of time

Lflag: determines whether all the strike-slip zone boundaries are incremented linearly or exponentially or are controlled separately

Mflag: acts in the same fashion as Lflag, but is used to control the dip-slip zone expansion

IT(1): determines whether triggered zone starts expanding when $D(IT(3)) > C(IT(4))$ or when $D(IT(3)) < C(IT(4))$

IT(2): determines whether the strike-slip or the dip-slip zone is triggered

IT(3), IT(4): determines which coordinates cause triggering (see IT(1))

ITIME: time, after start of triggering zone's expansion, that triggered zone's expansion starts; if not used, ITIME will have a value of 99999.

ICRNR: controls growth of zone coordinates (exponential = 1, linear = 2), index of ICRNR corresponds to index of D array

NRECPT: number of subrectangles used in computations (corresponds to number of time points after computations begin)

NSLPPT: number of time points in slip versus time profile

N, N1, N2, N3: indices used internally to scale zone expansion (see figure 2.4)

C and D arrays: defined in Appendix A of McHugh (1976); C is the array of initial and final values, D is the working array.

FIGURE CAPTIONS

2.1) Model I: Model of creep event used to predict tilt versus time profile. Dislocation loop expands from ABCD to HIJD. Corner A moves to position H linearly in time (indicated by line PQR). Only a point at position D 'sees' the entire slip versus time profile (PP'). Other points (eg. E and H) 'see' only a portion of the slip-time profile (QQ' and RR'). FN is the final slip value.

2.2) Model II: Model of creep event used to predict tilt versus time behavior. Dislocation loop expands in 'Distance-Depth' plane from ABCD to EFGD to HIJD. Curve PQR indicates that the position of the boundaries AB, EF, and HI vary exponentially in time (ie. the creep onset-times are distributed exponentially). Curve TUV indicates that the position of the lower boundary varies linearly with time. Curves PP' through VV' are the slip versus time profiles for the dislocation loop positions indicated. The slip as a function of position at a given instant can be determined by noting the slip, on profiles PP' through RR' or TT' through VV', along a constant-time line.

2.3) Model II: Tilts, $\Theta_{i,j}^m$, generated by expansion of dislocation. Subscript 'i' denotes time after start of rupture, 'j' denotes time after start of slip at position 'm'. Time lines designated by ' T_i ' indicate tilts produced by spatially variable slip distribution; time lines designated by ' ΔT_i ' indicate tilts produced by temporally variable slip distribution.

2.4) Model II: Slip versus time profiles used in program SLPPRP. The slip and zone coordinates are constant for the first N units after the computations begin. The slip zone coordinates are fixed at their final positions for computations steps N3 through NRECPT.

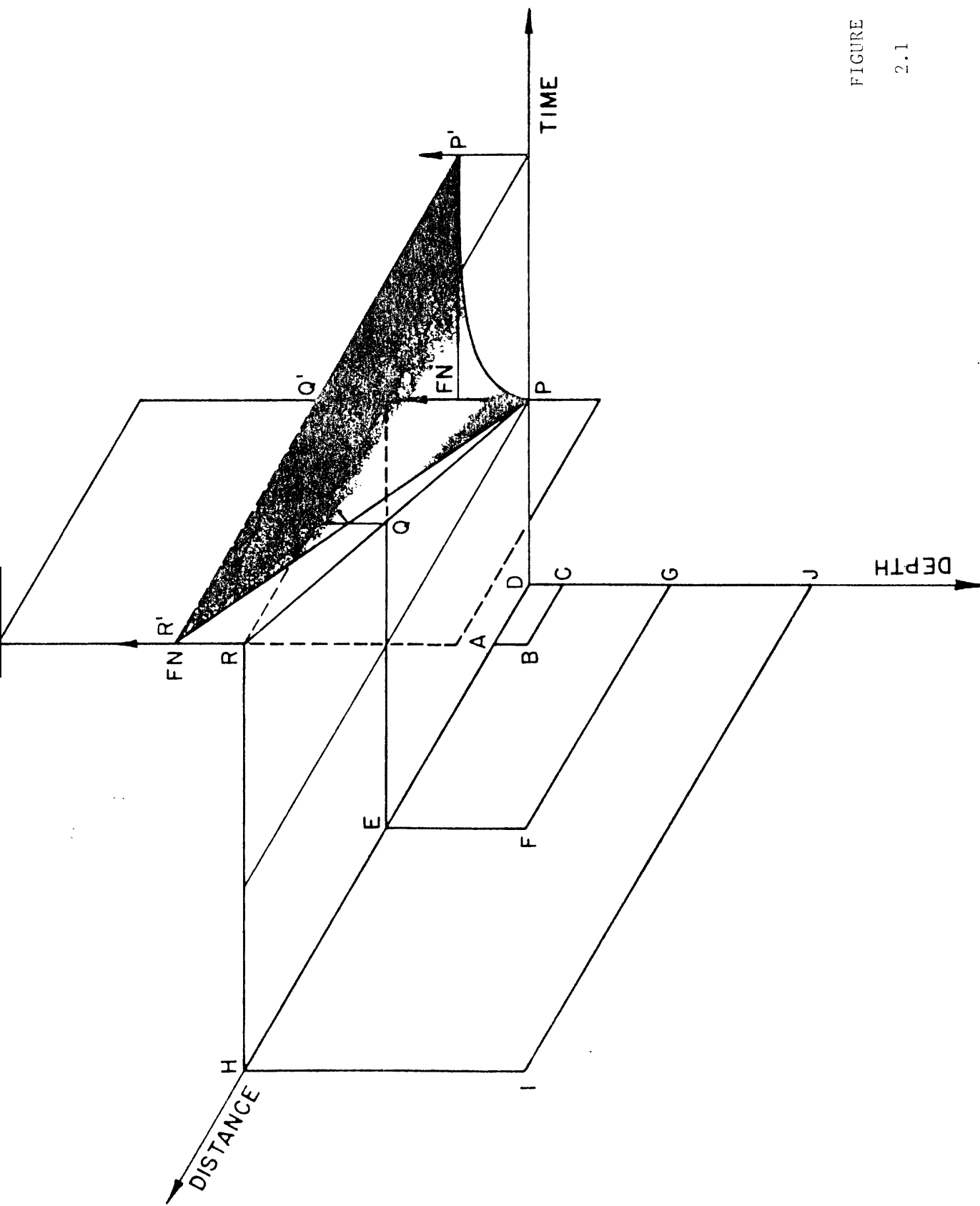
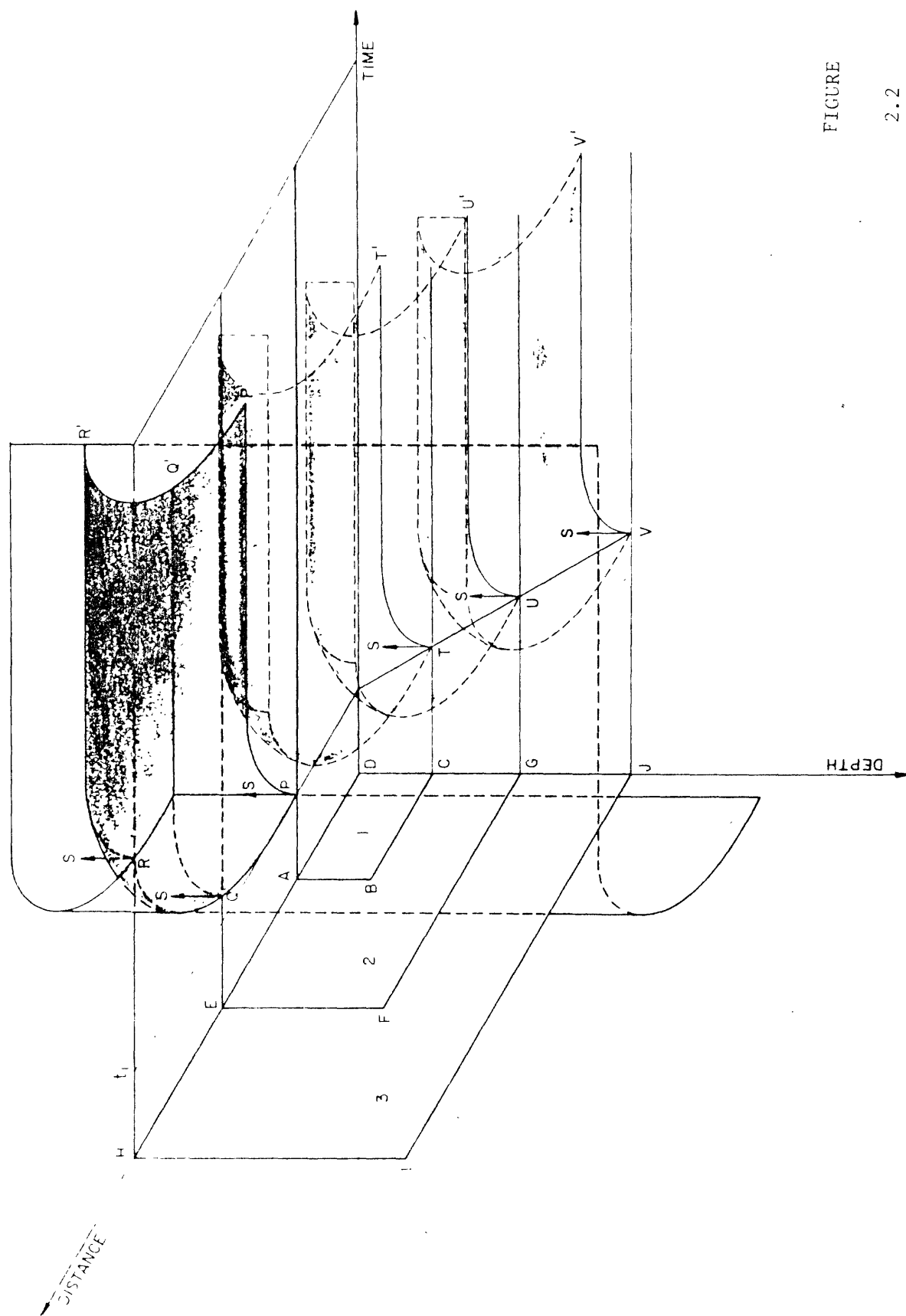
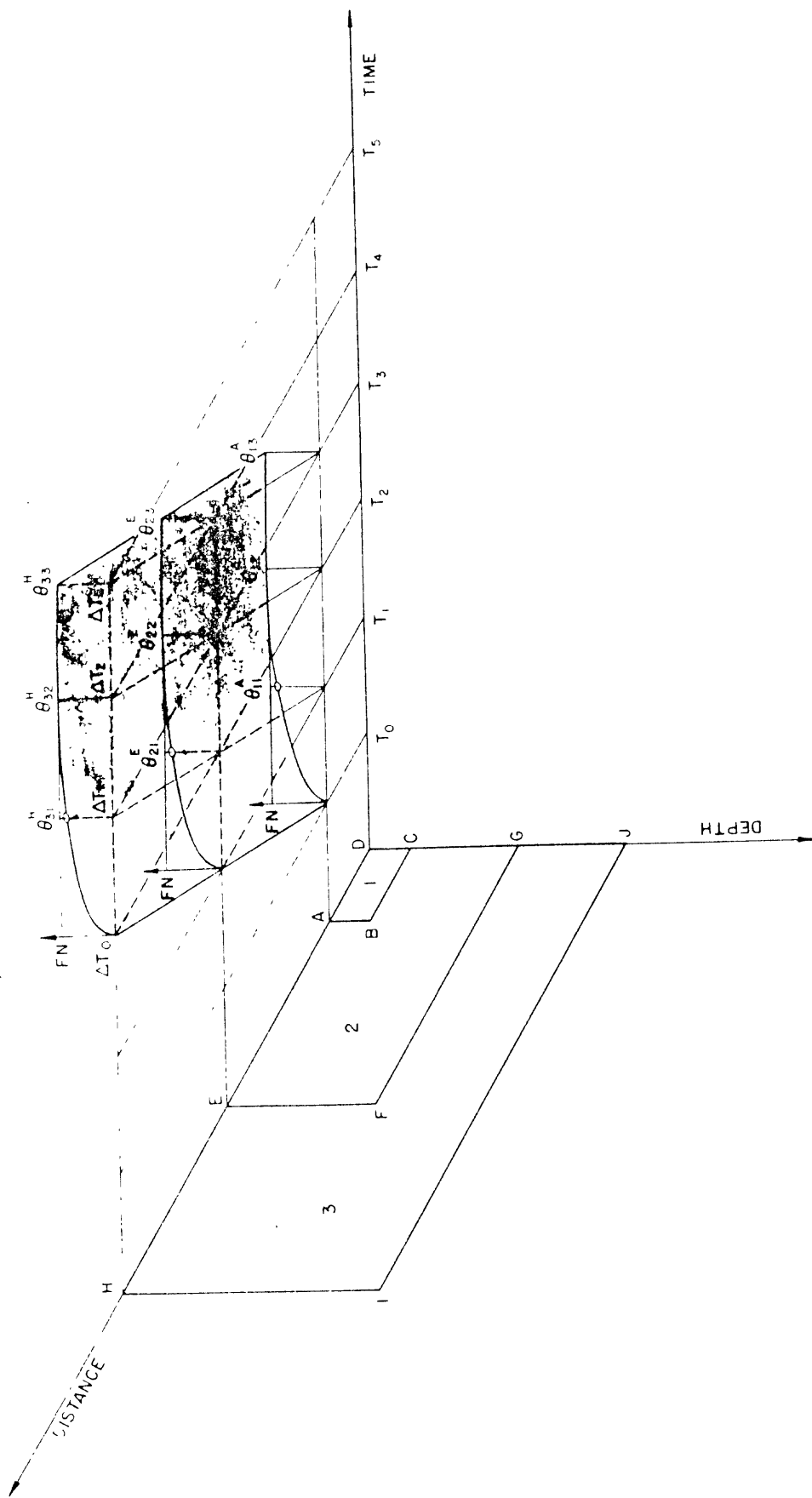


FIGURE
2.1

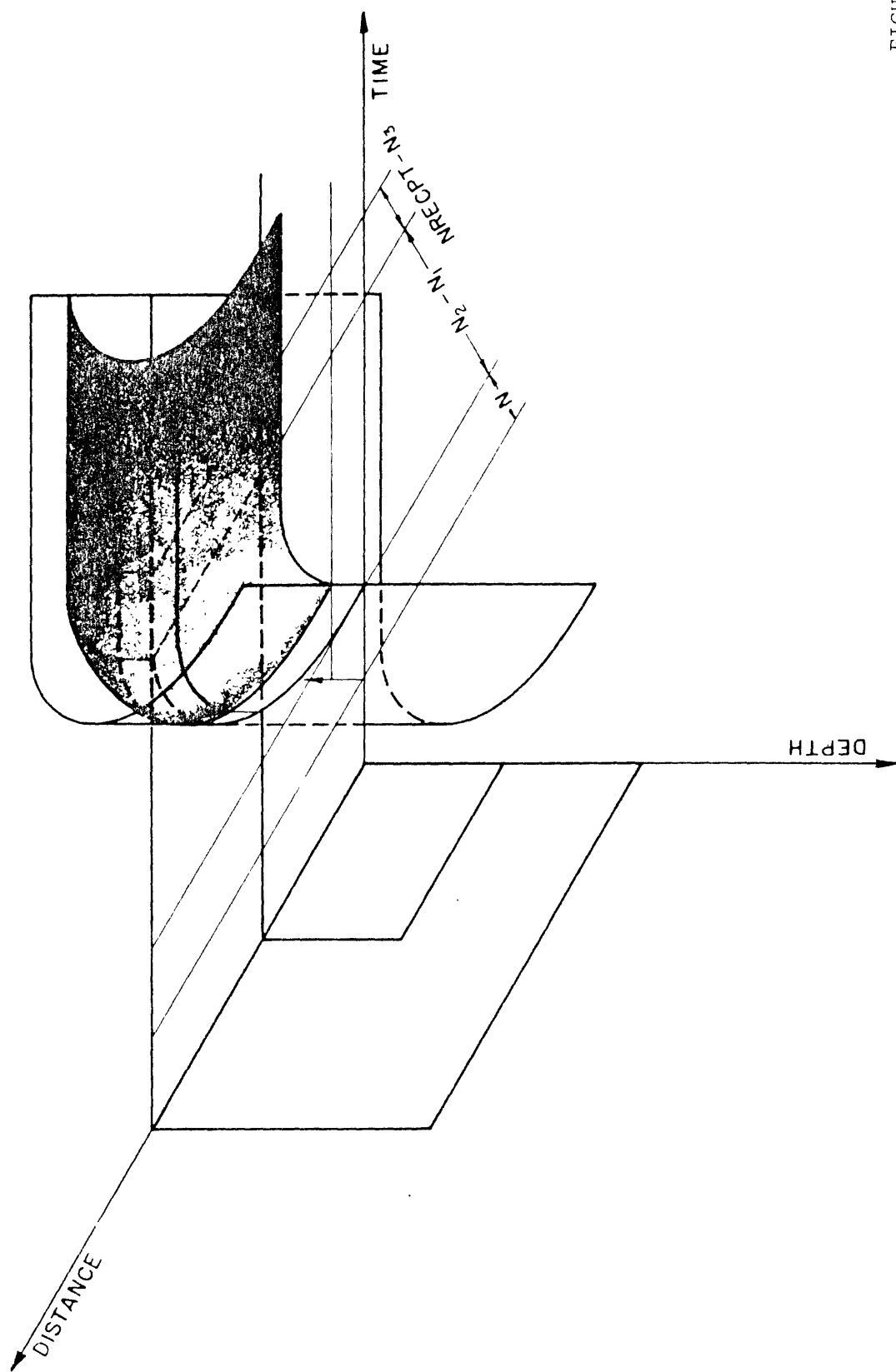


FIGURE



FIGURE

2.3



FIGURE

REFERENCES

- McHugh, Stuart and Malcolm J. S. Johnston. Some short period nonseismic tilt perturbations and their relation to episodic slip on the San Andreas fault in central California, J.G.R., in press, 1976.
- McHugh, Stuart. Documentation of programs that compute 1) quasi-static tilts produced by an expanding dislocation loop in an elastic and viscoelastic material, and 2) surface shear stresses, strains and shear displacements produced by screw dislocations in a vertical slab with modulus contrast, U.S. Geol. Survey Open-File Report, 76-484
- Press, Frank, Displacements, strains, and tilts at teleseismic distances, J.G.R., 70, 2395-2412, 1965.

EXAMPLES OF SLPPRP

```

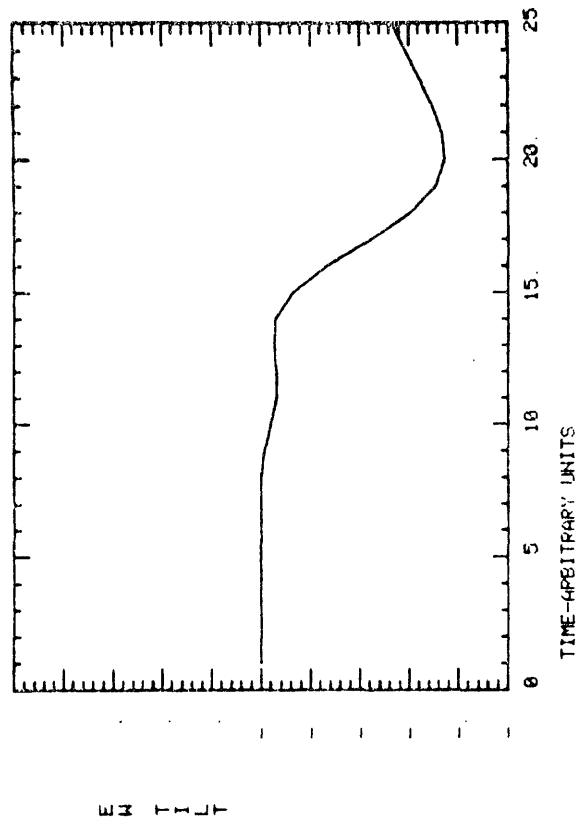
ALOAD,SUPPR!
LOAD COMPLETE, ENTERING ^EDIT
OK - ^EDIT
^RUN!
1) =ZONE EXPANDS, 2-ZONE CONTRACTS
1) 1/2=SLIP INCREMENTED EXponentially/LINEARLY
STRIKE-SLIP/OIF-SLIP
1) 1)
0) =INCREMENT CORNERS SEPARATELY
1/2=INCENTMENT ALL CORNERS EXponentialLy/LINEARly
STRIKE-SLIP/OIF-SLIP
1) 1)
UN(X,Y) = LEFT-LATERAL STRIKE-SLIP
X=X+Y * X2X8' SIDE DOWN
LINE VIEW USING UCSN
1) 1) 0 0
TRIGGER? OPTION DESIRED?
NI
C1XIIN,CIXZIN,C2XJIN,C3XIIN,C1XIFN,C1X3FN,C2X3FN,C3XIFN
0 0 0 2 0 1 0'
ENTER STATION COOR-DINATES--(X1,X2)
1) 1) 5)
SPECIFY 2 CORNERS OF DISLOCATION SURFACE FOR DISPLAY
1=DIXI=OZXI      2=O1X3=CAX3
4=DZXG=C3X3       5=OX3I=D4XI
9=C1XI=C2XI       10=C3X3=C4XI
12=C2X3=C3X3      13=C3XI=C4XI
          9 12)
TO DISPLAY SLIP AS A FUNCTION OF TIME
ENTER ZONE INDEX, CAUTION---
INDEX MUST BE BETWEEN 1 AND 100
58

```

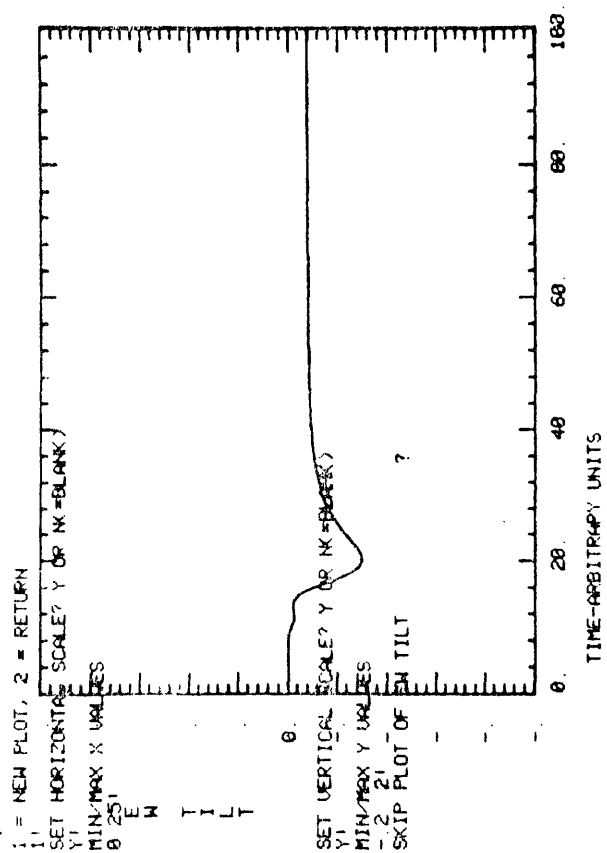
```

THE TILT-ANGLE FROM STRIKE OF FAULT
AND NORTH = 45 000 DEGREES
MIN-MAX VALUES OF EW COMPONENT
-1 493E-01 0.
MIN-MAX VALUES OF NS COMPONENT
-1 292E-01 4. 127E-02
MIN-MAX VALUES OF AMPLITUDE
8 1 703E-01
MIN-MAX VALUES OF AZIMUTH
0 315.000
(NOTE---TILT AMPLITUDES ARE IN MICROSECONDS,
AZIMUTH IN DEGREES)
THE FOLLOWING ARE PLOTS OF THE EW AND NS COMPONENTS
OF TILT, AND THE TILT AMPLITUDE
AND AZIMUTH (MEASURE CLOCKWISE FROM NORTH).
0=RE-START, 1=CONTINUE
1.
WRITE PLOT TITLE, 80 CHARACTERS
LATITUDE AND VERTICAL MIGRATION/CONSTANT SLIP!
SET HORIZONTAL SCALE? Y OR N=BLANK)
1
SET VERTICAL SCALE? Y OR N=BLANK)
Y1
MIN-MAX Y VALUES
-5.51
SKIP PLOT OF EW TILT
?
```


LATERAL AND VERTICAL MIGRATION-CONSTANT SLIP



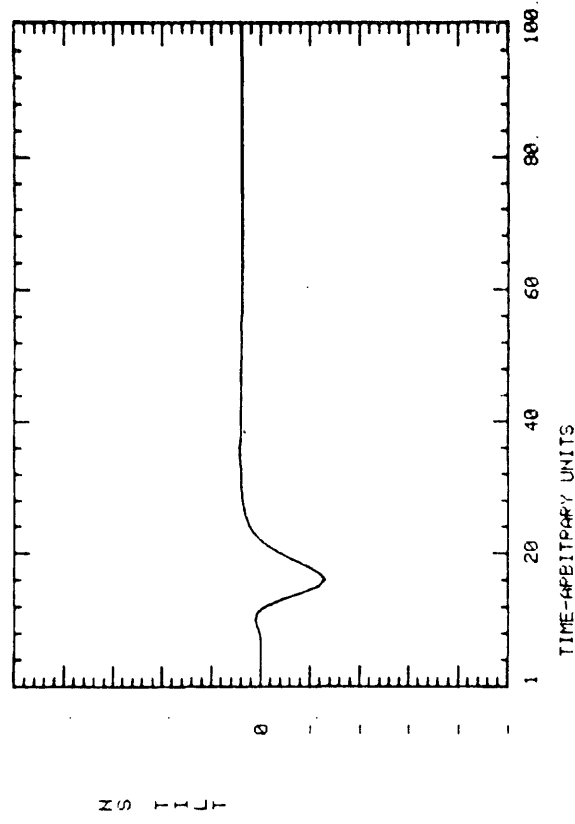
LATERAL AND VERTICAL MIGRATION-CONSTANT SLIP



LATERAL AND VERTICAL MIGRATION/CONSTANT SLIP

```

1 = NEW PLOT, 2 = RETURN
21 0=RE-START
21 SET HORIZONTAL SCALE? Y OR N<=BLANK>
X'X'
1 SET VERTICAL SCALE? Y OR N<=BLANK>
Y1 MIN/MAX Y VALUES
-5 51
SKIP PLOT OF NS TILT
?
```



1 = NEW PLOT, 2 = RETURN

21 ENTER ZONE INDEX, CAUTION--VALUE MUST BE 1 = NEW PLOT, 2 = RETURN

21 SET HORIZONTAL SCALE? Y OR NK=BLANK

Y!	MIN/MAX Y VALUES
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

SKIP PLOT OF TILT AMPLITUDE

MIN/MAX STRIKE-SLIP VALUES	-3.000E+00	-3.000E+00
MIX/MAX DTP-SLIP VALUES	0	0

SET VERTICAL SCALE? Y OR N=BLANK

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

1
SET HORIZONTAL SCREEN? Y OR N (BLANK)

1 = NEW PLOT, 2 = RETURN

21
SET HORIZONTAL SCALE? Y

100

ΣΤΕΦΑΝΟΣ

11

11

MIN/MAX Y VALORES
0 360!

0. 1. 2.

LATERAL AND VERTICAL MIGRATION/CONSTANT SLIP

1 = NEW PLOT, 2 = RETURN

21 SET HORIZONTAL SCALE? Y OR NK=BLANK

21 SET VERTICAL SCALE? Y OR NK=BLANK

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

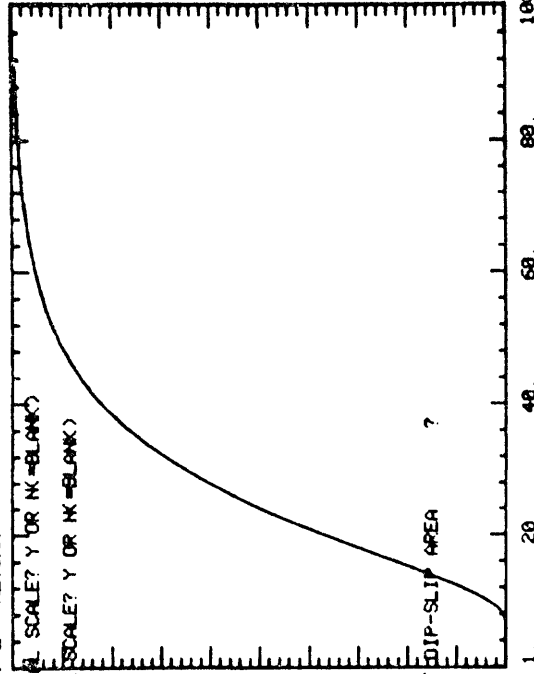
1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA



LATERAL AND VERTICAL MIGRATION/CONSTANT SLIP

1 = NEW PLOT, 2 = RETURN

21 SET HORIZONTAL SCALE? Y OR NK=BLANK

21 SET VERTICAL SCALE? Y OR NK=BLANK

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

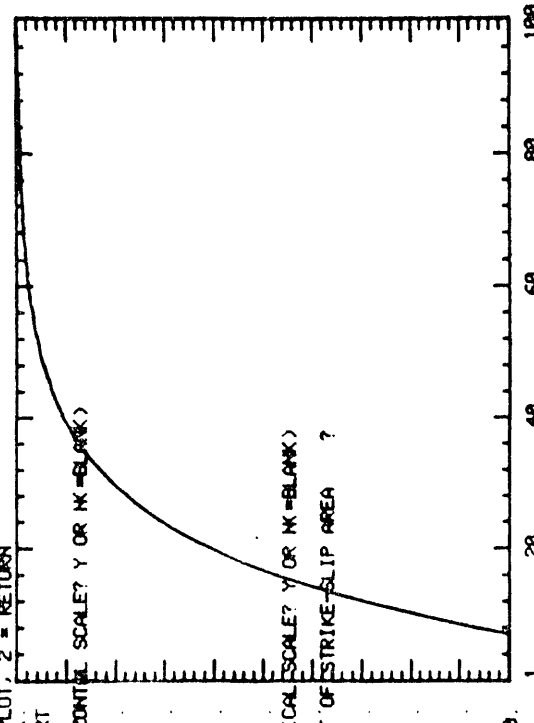
1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

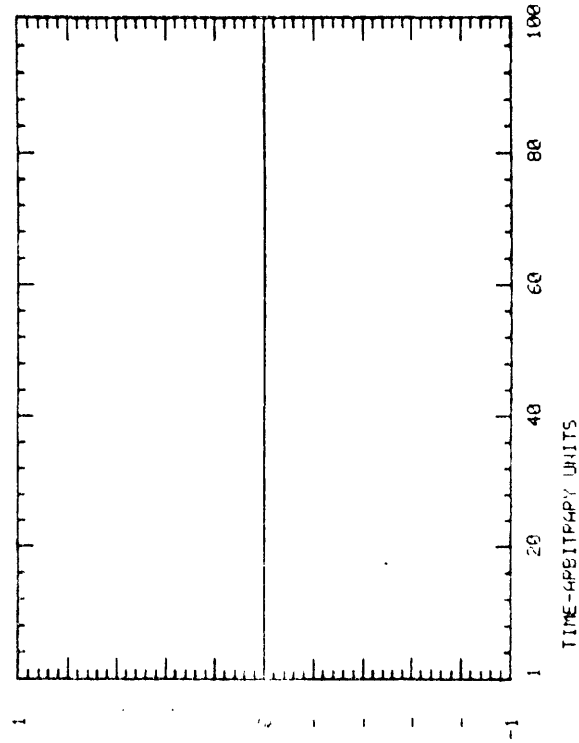
1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA

1. STRIKE-SLIP AREA



LATERAL AND VERTICAL MIGRATION/CONSTANT SLIP



```

1 = NEW PLOT, 2 = RETURN
2 = RE-START
3 = RE-START WITH ALL NEW VALUES
4 = RE-START WITH NEW STRIKE-SLIP VALUE AND ZONE COORDINATES
5 = RE-START WITH NEW DIP-SLIP VALUE AND ZONE COORDINATES
6 = RE-START WITH NEW STRIKE-SLIP VALUE ONLY
7 = RE-START WITH NEW DIP-SLIP VALUE ONLY
8 = RE-START WITH NEW TILTMETER COORDINATES ONLY
9 = STOP
10 = STOP
11 = STOP
12 = STOP
13 = STOP
14 = STOP
15 = STOP
16 = STOP
17 = STOP
18 = STOP
19 = STOP
20 = STOP
21 = STOP
22 = STOP
23 = STOP
24 = STOP
25 = STOP
26 = STOP
27 = STOP
28 = STOP
29 = STOP
30 = STOP
31 = STOP
32 = STOP
33 = STOP
34 = STOP
35 = STOP
36 = STOP
37 = STOP
38 = STOP
39 = STOP
40 = STOP
41 = STOP
42 = STOP
43 = STOP
44 = STOP
45 = STOP
46 = STOP
47 = STOP
48 = STOP
49 = STOP
50 = STOP
51 = STOP
52 = STOP
53 = STOP
54 = STOP
55 = STOP
56 = STOP
57 = STOP
58 = STOP
59 = STOP
60 = STOP
61 = STOP
62 = STOP
63 = STOP
64 = STOP
65 = STOP
66 = STOP
67 = STOP
68 = STOP
69 = STOP
70 = STOP
71 = STOP
72 = STOP
73 = STOP
74 = STOP
75 = STOP
76 = STOP
77 = STOP
78 = STOP
79 = STOP
80 = STOP
81 = STOP
82 = STOP
83 = STOP
84 = STOP
85 = STOP
86 = STOP
87 = STOP
88 = STOP
89 = STOP
90 = STOP
91 = STOP
92 = STOP
93 = STOP
94 = STOP
95 = STOP
96 = STOP
97 = STOP
98 = STOP
99 = STOP
100 = STOP

```

```

1 SPECIFY 2 CORNERS OF DISLOCATION SURFACE FOR DISPLAY
1 1=01X1=02X1 2=01X3=04X3
1 4=02X3=03X3 5=03X1=04X1
1 9=01X1=02X1 10=02X3=04X3
1 12=02X3=03X3 13=03X1=04X1
1 1 1
1 TO DISPLAY SLIP AS A FUNCTION OF TIME
1 ENTER ZONE INDEX, CAUTION---
1 INDEX MUST BE BETWEEN 1 AND 100
1 501
1 THETA=ANGLE BETWEEN STRIKE OF FAULT
1 AND NORTH = 45 000 DEGREES
1 MIN/MAX VALUES OF EW COMPONENT -3.373E-01 0 1.52E-03
1 MIN/MAX VALUES OF NS COMPONENT -2.935E-01 0 4.343E-01
1 MIN/MAX VALUES OF AMPLITUDE 0 0 310 803
1 MIN/MAX VALUES OF AZIMUTH 0 0 310 803
1 (NOTE--TILT AMPLITUDES ARE IN MICRORADIANS,
1 AZIMUTH IN DEGREES)
1 THE FOLLOWING ARE PLOTS OF THE EW AND NS COMPONENTS
1 OF TILT, AND THE TILT AMPLITUDE
1 AND AZIMUTH (MEASURE CLOCKWISE FROM NORTH).
1 0=PE-START, 1=CONTINUE
1 1
1 WRITE PLOT TITLE, 80 CHARACTERS
1 STIPITYPE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION!
1 SET HORIZONTAL SCALE? Y OR N(=BLANK)
1
1 SET VERTICAL SCALE? Y OR N(=BLANK)
1
1 MIN/MAX Y VALUES
1 - 5 51
1 SKIP PLOT OF EW TILT
1 ?

```

```

1 1=ZONE EXPANDS, 2=ZONE CONTRACTS
1 1
1 1=SLIP INCREMENTED EXPONENTIALLY/LINEARLY
1 STRIKE-SLIP/DIP-SLIP
1 1 1
1 0 1=INCREMENT CORNERS SEPARATELY
1 1=INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY
1 STRIKE-SLIP/DIP-SLIP
1 0 1
1 VARIABLE INCREMENTED EXPONENTIALLY
1 2=VARIABLE INCREMENTED LINEARLY
1 01X1, 01X3, 02X3, 03X1
1 1 2 1 21
1 01X1, 01X3, 02X3, 03X1
1 21 21 1 1
1 'U1X0' = LEFT-LATERAL STRIKE-SLIP
1 'U2X0' = 'X2X0' SIDE DOWN
1 U1IN, U1FN, U3IN, U3FN
1 0 -3 0 1
1 'TRIGGER' OPTION DESIRED?
1 Y!
1 0 = D(11) > C(12), 1 = D(11) < C(12)
1 0
1 0 = STRIKE-SLIP/1 = DIP-SLIP ZONE TRIGGERED
1
1 SPECIFY 11 AND 12
1 51
1 01X1IN, 01X3IN, 02X3IN, 03X1IN, 01X1FN, 01X3FN, 02X3FN, 03X1FN
1 0 0 0 2 0 1 01
1 01X1IN, 01X3IN, 02X3IN, 03X1IN, 01X1FN, 01X3FN, 02X3FN, 03X1FN
1 5 0 0 5 1 5 0 1 51
1 ENTER STATION COORDINATES--(X1,X2,
1 1 5

```

STRIKE- AND DIP-SLIP LATERAL AND VERTICAL MIGRATION

1 = NEW PLOT, 2 = RETURN

SET HORIZONTAL SCALE? Y OR NK=BLANK)

E
W
T
I
L
T

1

SET VERTICAL SCALE? Y OR NK=BLANK)

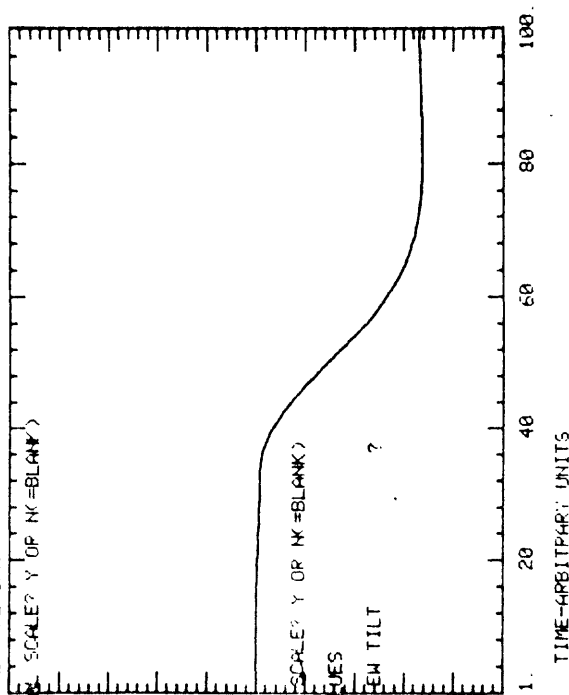
Y1

MIN/MAX Y VALUES

-4 41

SKIP PLOT OF NEW TILT

?



STRIKE- AND DIP-SLIP LATERAL AND VERTICAL MIGRATION

1 = NEW PLOT, 2 = RETURN

TYPE-START

SET HORIZONTAL SCALE? Y OR NK=BLANK)

E
W
T
I
L
T

1

SET VERTICAL SCALE? Y OR NK=BLANK)

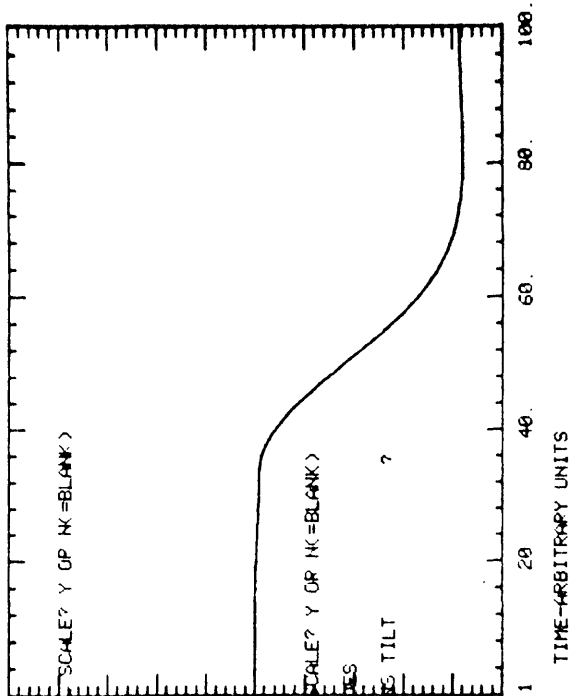
Y1

MIN/MAX Y VALUES

-5 51

SKIP PLOT OF NEW TILT

?



STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION

1 = NEW PLOT, 2 = RETURN

0=RE-START

21 ENTER ZONE INDEX, CAUTION--VALUE MUST BE BETWEEN 1 AND 100, 9999=CONTINUE

N

S

T

T

L

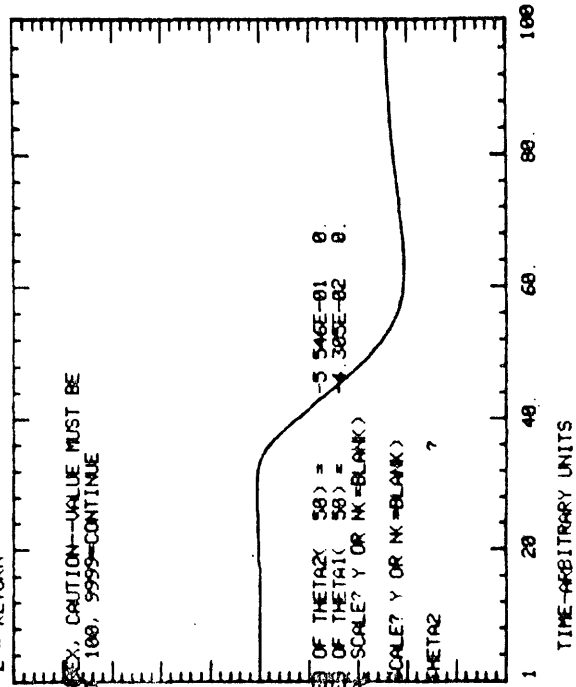
501 MIN/MAX VALUES OF THETA2(50) = -5 546E-01 0
MIN/MAX VALUES OF THETA1(50) = -4 305E-02 0

SET HORIZONTAL SCALE? Y OR N=BLANK)

SET VERTICAL SCALE? Y OR N=BLANK)

SKIP PLOT OF THETA2

?



STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION

1 = NEW PLOT, 2 = RETURN

0=RE-START

21 SET HORIZONTAL SCALE? Y OR N=BLANK)

T

H

E

T

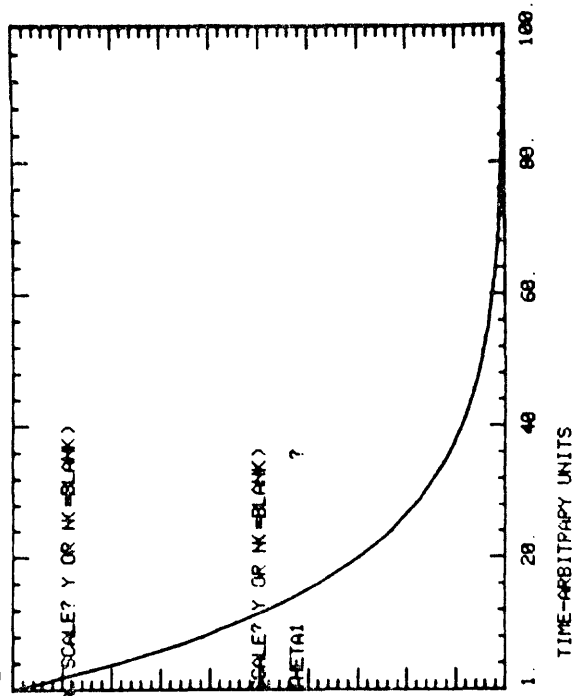
A

2

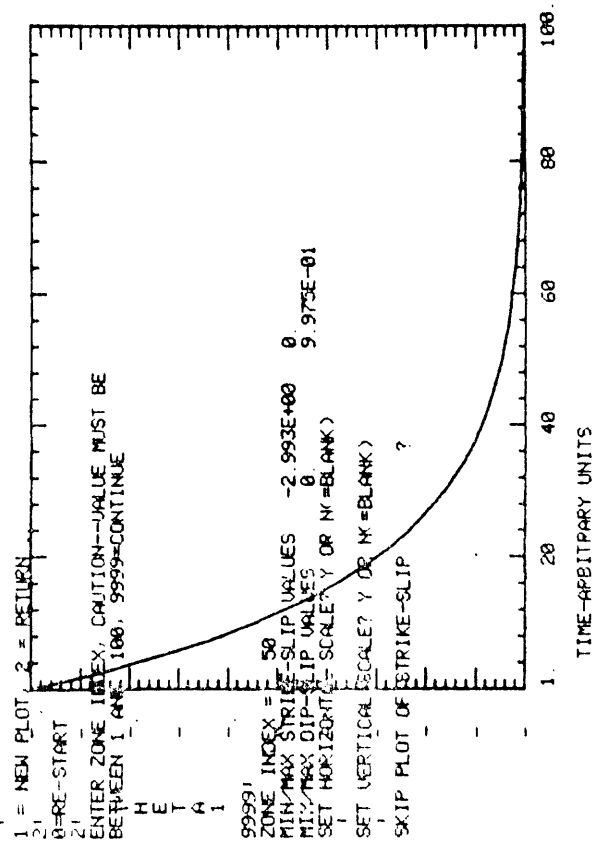
SET VERTICAL SCALE? Y OR N=BLANK)

SKIP PLOT OF THETA1

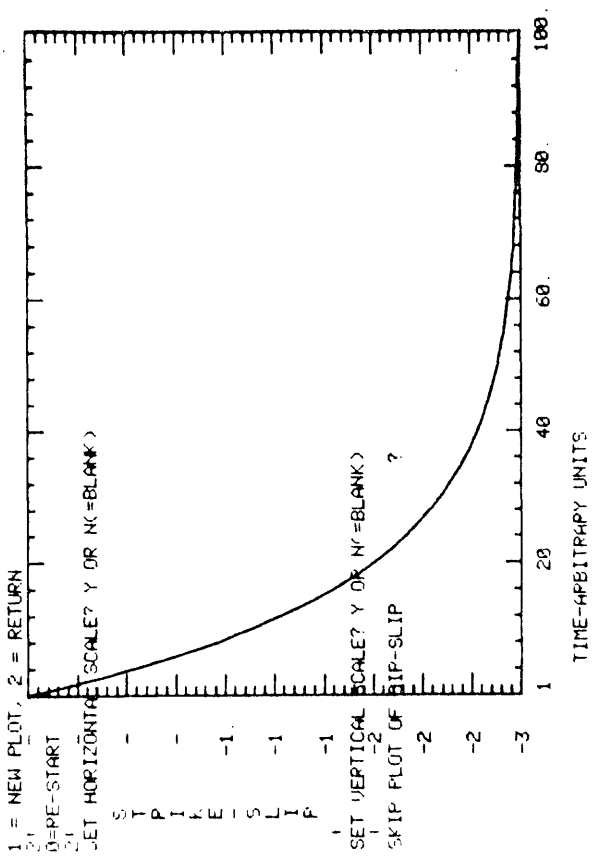
?



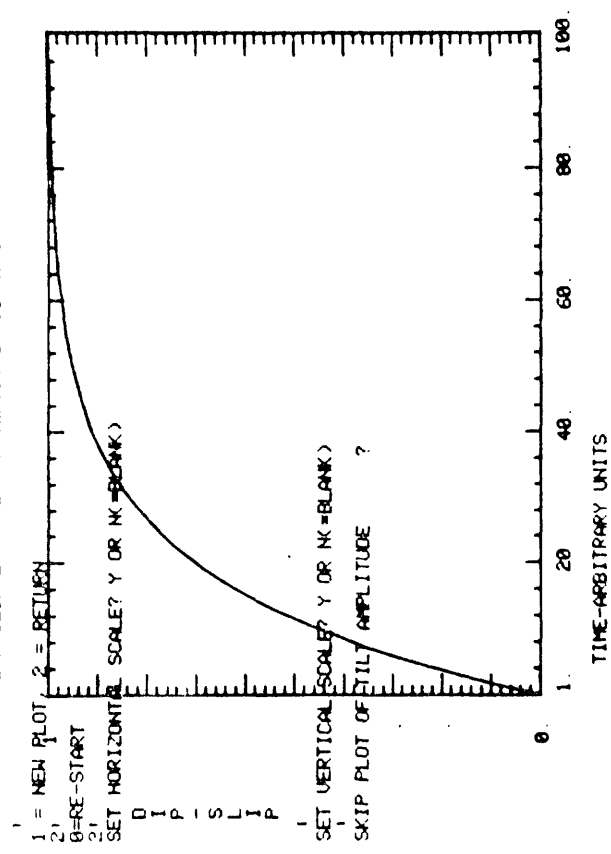
STRIKE- AND DIP-SLIP LATERAL AND VERTICAL MIGRATION



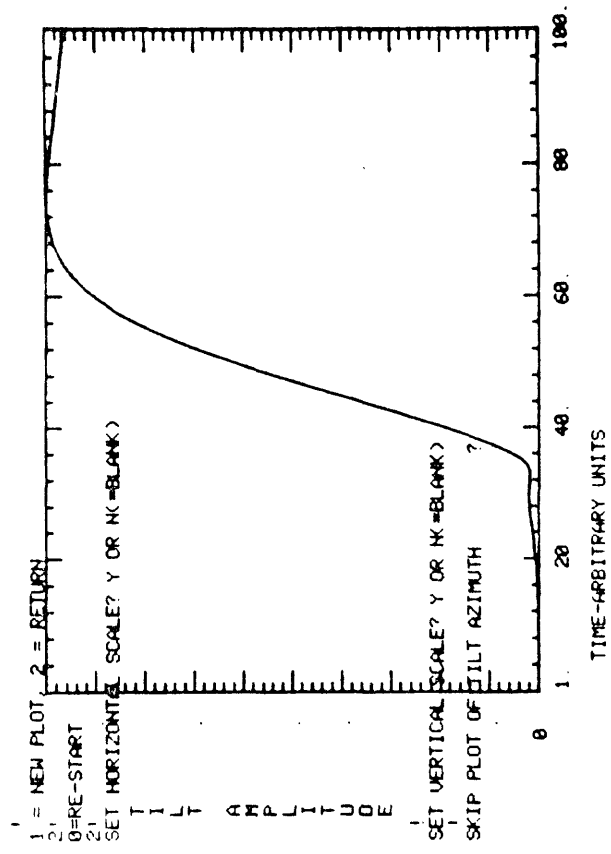
STRIKE- AND DIP-SLIP LATERAL AND VERTICAL MIGRATION



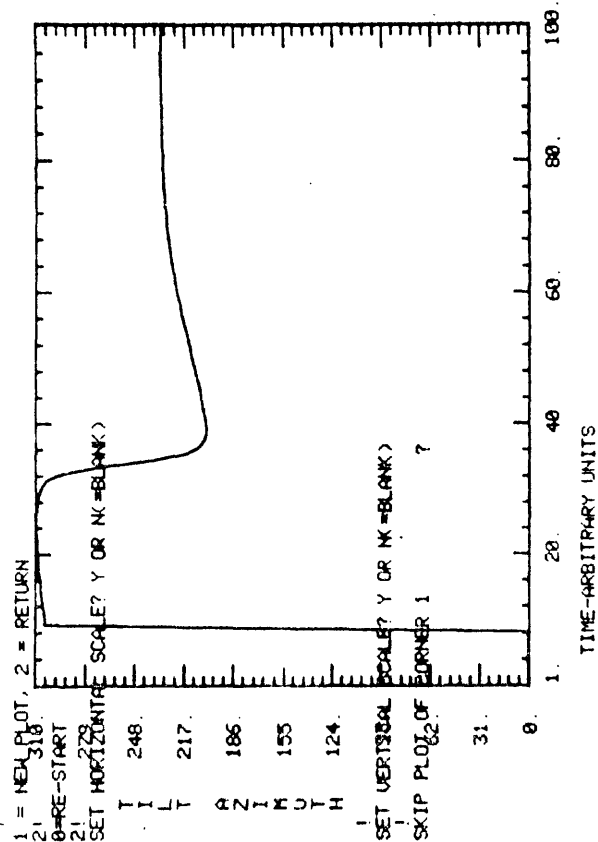
STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION



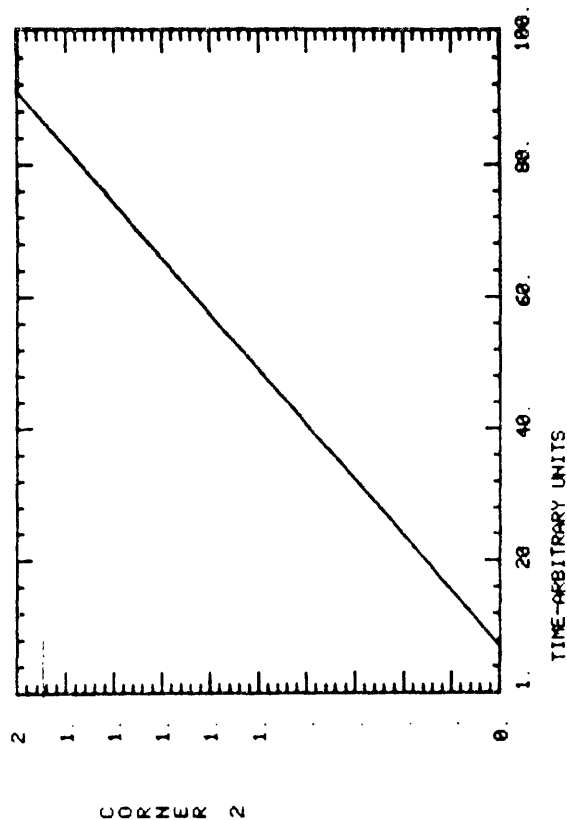
STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION



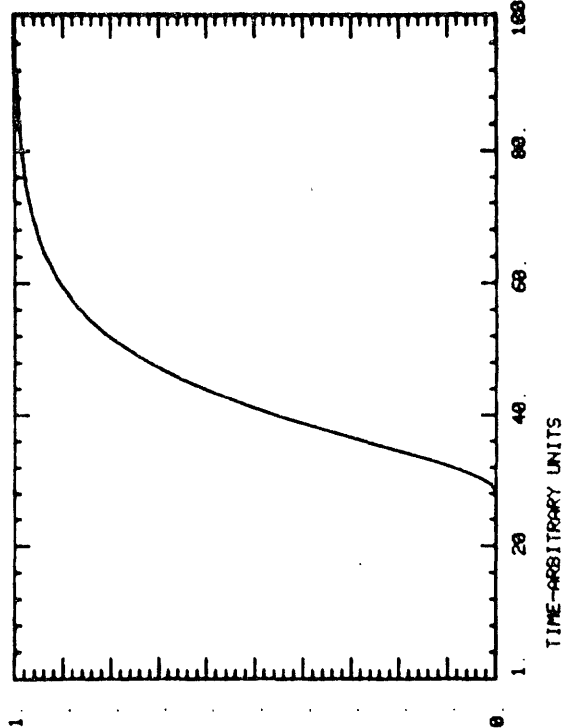
STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION



STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION



STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION



STRIKE- AND DIP-SLIP/LATERAL AND VERTICAL MIGRATION

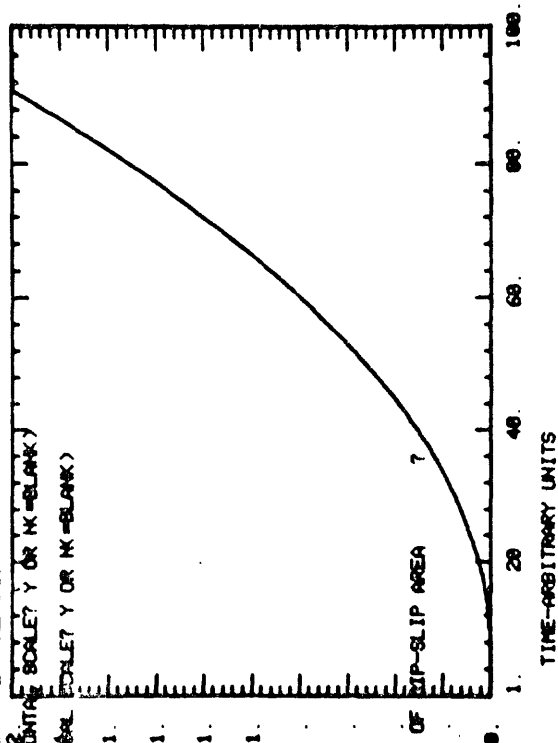
1 = NEW PLOT, 2 = RETURN

21 SET HORIZONTAL SCALE? Y OR N (=BLANK)

1 SET VERTICAL SCALE? Y OR N (=BLANK)

STRIKE-SLIP AREA

SKIP PLOT OF DIP-SLIP AREA



1 = NEW PLOT, 2 = RETURN

21

0-RE-START

21

500	0	500	0	500	0	500	0
500	0	1.500	0	1.500	0	1.500	0
500	0	1.000	0	1.000	0	1.000	0
0	0	0	0	0	0	0	0
2.000	0	2.000	1.000	0	0	1.000	0
0	0	0	-3.000	0	0	1.000	0

1	2	1	1	2	1	2	2
2	1	2	2	1	2	1	1

0	1	9	5	25
1	1	0	0	1
100	7	91	92	92

1-RE-START WITH ALL NEW VALUES

2-RE-START WITH NEW STRIKE-SLIP VALUE AND ZONE COORDINATES

3-RE-START WITH NEW DIP-SLIP VALUE AND ZONE COORDINATES

4-RE-START WITH NEW STRIKE-SLIP VALUE ONLY

5-RE-START WITH NEW DIP-SLIP VALUE ONLY

6-RE-START WITH NEW TILTMETER COORDINATES ONLY

7-STOP

1

1=ZONE EXPANDS, 2=ZONE CONTRACTS
11
1/2=SLIP INCREMENTED EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
111
0 = INCREMENT CORNERS SEPARATELY
1/2=INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
0
1=VARIABLE INCREMENTED EXPONENTIALLY
2=VARIABLE INCREMENTED LINEARLY
D1X1, D1X3, D2X3, D3X1
1 2 1 21
C1X1, C1X3, C2X3, C3X1
2 1 2 11
'U1X0' = LEFT-LATERAL STRIKE-SLIP
'U2X0' = 'X2X0' SIDE DOWN
U1IN, U1FN, U3IN, U3FN
0 -3 0 0'
'TRIGGER' OPTION DESIRED?
Y1
0 = DX11 > C(12), 1 = D(11) < C(12)
0 = STRIKE-SLIP/1 = DIP-SLIP ZONE TRIGGERED
11
SPECIFY I1 AND I2
9 51
C1X1IN, C1X3IN, C2X3IN, C3X1IN, C1X1FN, C1X3FN, C2X3FN, C3X1FN
0 0 0 2 0 1 0
ENTER STATION COORDINATES--(X1,X2)
1 1.5

```

1 SPECIFY 2 CORNERS OF DISLOCATION SURFACE FOR DISPLAY
1=01X1=02X1 2=01X3=02X3
4=02X3=03X3 5=03X1=04X1
9=01X1=02X1 10=03X3=04X3
12=02X3=03X3 13=03X1=04X1
1 121
TO DISPLAY SLIP AS A FUNCTION OF TIME
ENTER ZONE INDEX CAUTION---
INDEX MUST BE BETWEEN 1 AND 100
331
THETA=ANGLE BETWEEN STRIKE OF FAULT
AND NORTH = 45.000 DEGREES
MIN/MAX VALUES OF EN COMPONENT -9.754E-02 0 2.788E-02
MIN/MAX VALUES OF NS COMPONENT -7.030E-02 0 1.675E-01
MIN/MAX VALUES OF AMPLITUDE 0 310.803
(NOTE--TILT AMPLITUDES ARE IN MICROGRADIANS,
AZIMUTH IN DEGREES)
THE FOLLOWING ARE PLOTS OF THE EN AND NS COMPONENTS
OF TILT, AND THE TILT AMPLITUDE
AND AZIMUTH (MEASURE CLOCKWISE FROM NORTH).
0=RE-START, 1=CONTINUE
11
WRITE PLOT TITLE, 80 CHARACTERS
SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=0.01
SET HORIZONTAL SCALE? Y OR N(=BLANK)
1
SET VERTICAL SCALE? Y OR N(=BLANK)
Y1
MIN/MAX Y VALUES
-2 21
SKIP PLOT OF EN TILT
?
```

SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=0.0

1 = NEW PLOT, 2 = RETURN

0 = RE-START

21

SET HORIZONTAL SCALE? Y OR N(=BLANK)

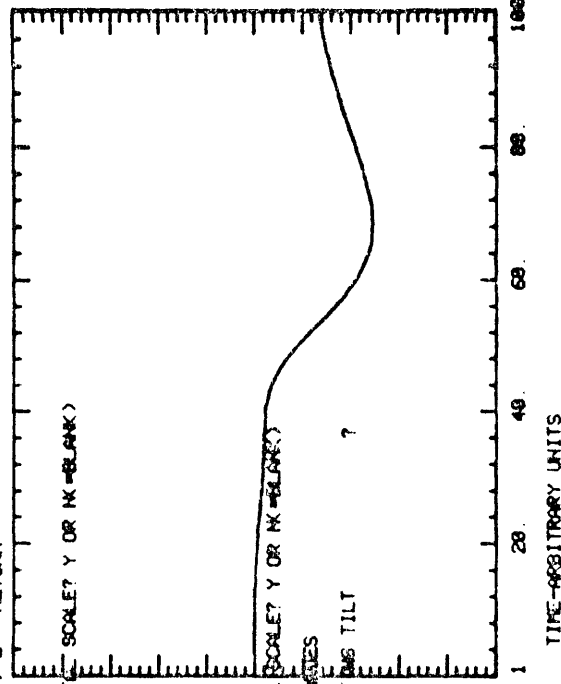
Y1

MIN/MAX Y VALUES

-2 21

SKIP PLOT OF NS TILT

?



SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=0.0

```

1 = NEW PLOT, 2 = RETURN
21 0=RE-START
21 SKIP PLOT OF DIP-SLIP
21 ENTER ZONE INDEX, CAUTION--VALUE MUST BE
    BETWEEN 1 AND 100, 9999=CONTINUE
S
1 1
1 I
1 T
10001
ZONE INDEX = 33
MIN/MAX STRIKE-SLIP VALUES -2.93E+05 6.
MIN/MAX DIP-SLIP VALUES 0
SET HORIZONTAL SCALE? Y OR N=BLANK)
1 SET VERTICAL SCALE? Y OR N=BLANK)
1 SET VERTICAL SCALE? Y OR N=BLANK)
SKIP PLOT OF STRIKE-SLIP ?
Y'
1 = NEW PLOT, 2 = RETURN
21 0=RE-START
21 SET HORIZONTAL SCALE? Y OR N=BLANK)
21 SET VERTICAL SCALE? Y OR N=BLANK)

```

SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=8 0

1 = NEW PLOT, 2 = RETURN

0 = KE-START

21

21

SET HORIZONTAL SCALE? Y OR NK = BLANK

TILT AMPLITUDE

SET VERTICAL SCALE? Y OR NK = BLANK

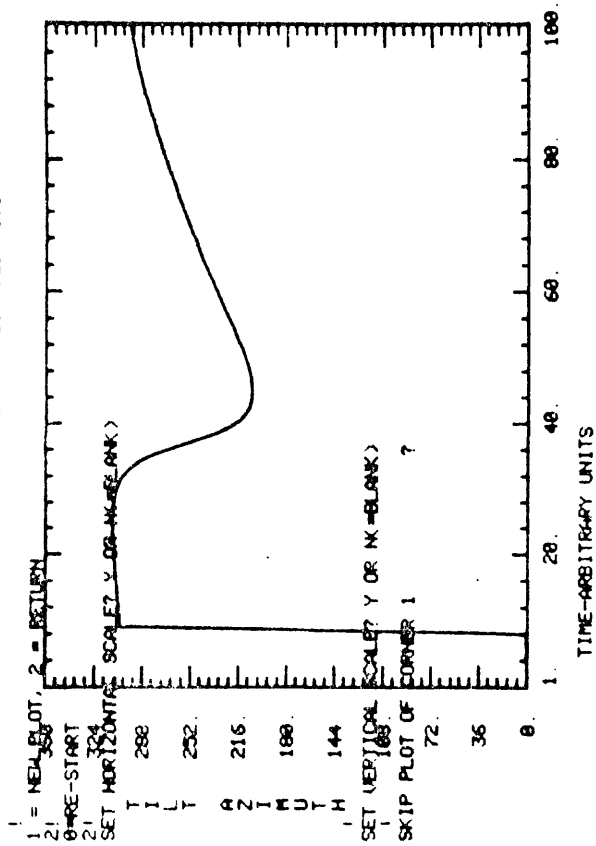
MIN/MAX Y VALUES

0.3581

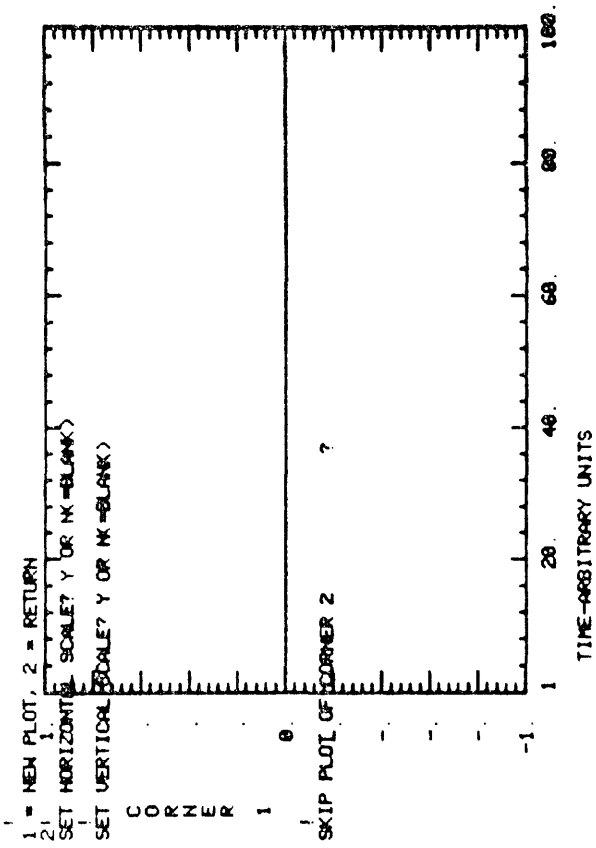
SKIP PLOT OF TILT AZIMUTH

TIME-ARBITRARY UNITS

SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=0.0



SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=0.0



SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=9 0

1 = NEW PLOT, 2 = RETURN

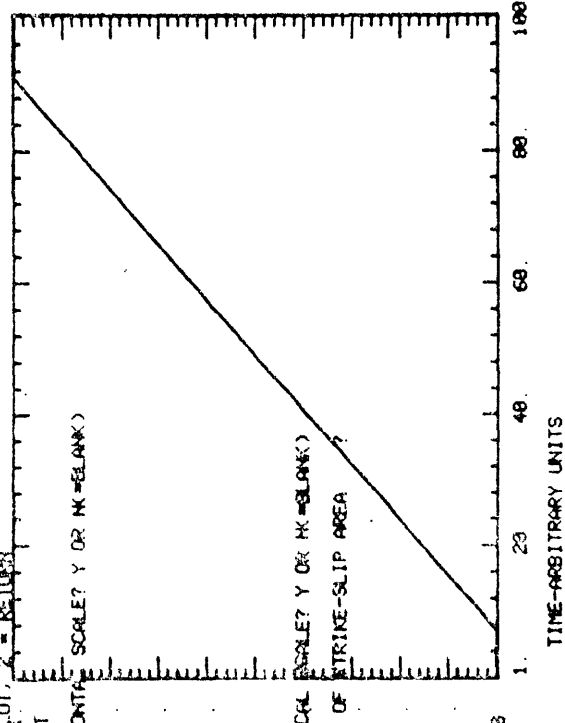
21 = START

21 SET HORIZONTAL SCALE? Y OR N (=BLANK)

Y
N
OR
NUMBER 2

21 SET VERTICAL SCALE? Y OR N (=BLANK)

SKIP PLOT OF STRIKE-SLIP AREA



SAME VALUES AS PREVIOUS CASE, EXCEPT THAT DIP-SLIP=0 0

1 = NEW PLOT, 2 = RETURN

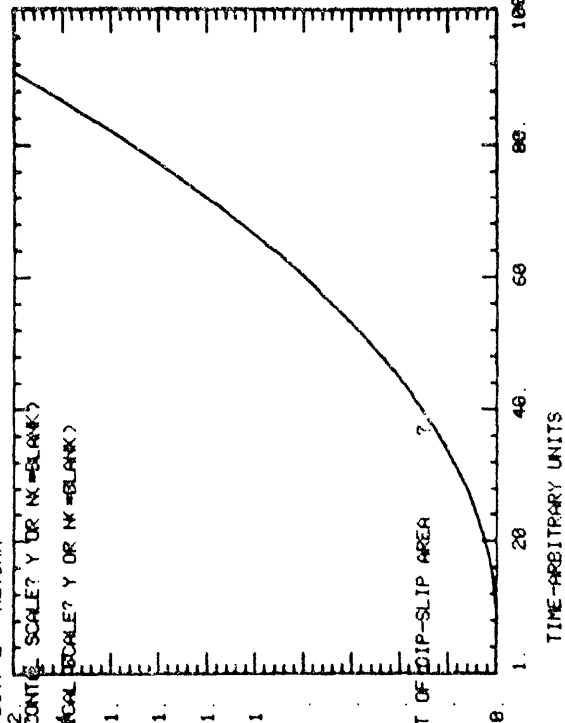
21 = START

21 SET HORIZONTAL SCALE? Y OR N (=BLANK)

Y
N
OR
NUMBER 2

21 SET VERTICAL SCALE? Y OR N (=BLANK)

SKIP PLOT OF STRIKE-SLIP AREA



PROGRAM LISTING FOR SLPPRP

17 JUN 76

10.33.34

MCHUGH .SLPPRP

2 -61

```

1  DELETE(LGO,OUTPUT,SLPPRP)
2  SLPPRP.
3  EXIT.
4  LIBCOPY(GRAPHIC, TXLGO/RR, TXLGO)
5  LIBCOPY(JDRAT, NPLGO/RR, NPLGO)
6  DELETE(LGO,OUTPUT,SLPPRP)
7  RUN70(S)
8  LINK(F=LGO, F=TXLGO, F=NPLGO, B=SLPPRP)
9  SLPPRP.
10 FIN.
11 EOF
12      PROGRAM SLPPRP(TAPETTY=201,FILM=TAPETTY,TAPE7=TAFETTY)
13      COMMON/TVPUCL/TVPUCL(8)
14      COMMON/TVTUNE/ITUNE(30)
15      COMMON/JFLCT/XLT,XRT,YLC,YCP,MAJX,MAJY,KX(2),KY(2),
16      1LTITLE(3),LC,LTF,LNLGX,LNLGY,NCLX,NCLY,LTITLE2(8)
17      DIMENSION IFET(8)
18      DIMENSION TX(100),TY(100),T(100),CORN1(100),CORN2(100)
19      DIMENSION D(20),C(40),A(30),IT(4),ICNR(16),STSLIP(100)
20      DIMENSION DIPSLP(100),SSAREA(100),CSAREA(100)
21      DIMENSION THETA1(100,100),THETA2(100,100)
22      DIMENSION TAMP(100),TAZH(100)
23      CALL FET(5LTAPE7,IFET,8)
24      IFET(2)=IFET(2).OR.0000 0010 0000 0000 0000B
25      IFET(8)=IFET(8).OR.4000 0000 0000 0000 0000B
26      CALL FET(5LTAPE7,IFET,-8)
27      DO 101 J=1,18
28          D(J)=0.  BC(J+18)=0.  BC(J)=0.
29      101 CONTINUE
30      WRITE(7,1)
31      1  FORMAT(*1=ZONE EXPANDS, 2=ZONE CONTRACTS*)
32      CALL GETNUM(A)  $IFLAG=A(1)  $WRITE(7,2)
33      2  FORMAT(*1/2=SLIP INCREMENTED EXPONENTIALLY/LINEARLY*,/,
34      1      *STRIKE-SLIP/DIP-SLIP*)
35      CALL GETNUM(A)  $KFLAG=A(1)  $KFLAGB=A(2)  $WRITE(7,3)
36      3  FORMAT(*0 =INCREMENT CORNERS SEPARATELY*,/,
37      1      *1/2=INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY*,/,
38      1      *STRIKE-SLIP/DIP-SLIP*)
39      CALL GETNUM(A)  $LFLAG=A(1)  $MFLAG=A(2)
40      DO 110 I=1,4
41          IT(I)=5
42      110 CONTINUE
43      DO 4 I=1,16
44          4  ICNR(I)=1
45          IF(LFLAG.EQ.0.OR.MFLAG.EQ.0)CALL SLPCRN(LFLAG,MFLAG,ICNR)
46          IF(LFLAG.EQ.2)GOTO 5  $GOTO6
47          5  DO 7 I=9,16
48              7  ICNR(I)=2
49          6  IF(MFLAG.EQ.2)GOTO8  $GOTO9
50          5  DO 10 I=1,8
51          10  ICNR(I)=2
52          9  WRITE(7,11)  $CALL GETNUM(A)  $C(33)=A(1)  $C(34)=A(2)
53      11  FORMAT(*U1>0* = LEFT-LATERAL STRIKE-SLIP*,/,
54      1      *U3>0* = *X2>0* SIDE DOWN*,/,
55      1      *U1IN, U1FN, U3IN, U3FN*)
56      C(35)=A(3)  $C(36)=A(4)  $WRITE(7,12)
57      12  FORMAT(*TRIGGER* OPTION DESIRED?*)
58      READ(7,13)TRIG  $IF(TRIG.EQ.1HY)CALL TRIGGR(IT)

```

17 JUN 76

10.33.34

MCHUGH ,SLPPRP

PAGE 2

```

59 13 FORMAT(A1)
60 IF (C(33).EQ.0..AND.C(34).EQ.0.)GOTO14
61 WRITE(7,15) $CALL GETNUM(A) $C(17)=C(19)=A(1)
62 15 FORMAT(*C1X1IN,C1X3IN,C2X3IN,C3X1IN,C1X1FN,C1X3FN,C2X3FN,C3X1FN*)
63 C(18)=C(24)=A(2) $C(20)=C(22)=A(3) $C(21)=C(23)=A(4)
64 C(25)=C(27)=A(5) $C(26)=C(32)=A(6) $C(28)=C(30)=A(7)
65 C(29)=C(31)=A(8)
66 14 IF (C(35).EQ.0..AND.C(36).EQ.0.)GOTO16
67 WRITE(7,17) $CALL GETNUM(A) $C(1)=C(3)=A(1) $C(2)=C(8)=A(2)
68 17 FORMAT(*D1X1IN,D1X3IN,D2X3IN,D3X1IN,D1X1FN,D1X3FN,D2X3FN,D3X1FN*)
69 C(4)=C(6)=A(3) $C(5)=C(7)=A(4) $C(9)=C(11)=A(5)
70 C(10)=C(16)=A(6) $C(12)=C(14)=A(7) $C(13)=C(15)=A(8)
71 16 WRITE(7,18) $CALL GETNUM(A) $X1=A(1) $X2=A(2)
72 18 FORMAT(*ENTER STATION COORDINATES--(X1,X2)*)
73 X3=C. $NRECPT=100 $N=(.075*NRECPT) $NSLPPT=NRECPT
74 N1=N+1 $N2=NRECPT-(.075*NRECPT)-1
75 N3=N2+1 $THETA=45. $PI=3.1415926 $WRITE(7,30)
76 $NSLPP=NSLPPT $RN1=N1 $RN2=N2 $ONE=1. $ITIME=99999
77 30 FORMAT(*SPECIFY 2 CORNERS OF DISLOCATION SURFACE FOR DISPLAY*,/,
78 1 * 1=D1X1=D2X1 2=D1X3=D4X3*,/,
79 1 * 4=D2X3=D3X3 5=D3X1=D4X1*,/,
80 1 * 9=C1X1=C2X1 10=C3X3=C4X3*,/,
81 1 *12=C2X3=C3X3 13=C3X1=C4X1*)
82 CALL GETNUM(A) $M1=A(1) $M2=A(2)
83 $WRITE(7,113)$NRECPT $CALL GETNUM(A) $INDEX=A(1)
84 113 FORMAT(*TO DISPLAY SLIP AS A FUNCTION OF TIME*,/,
85 1 *ENTER ZONE INDEX, CAUTION---*,/,
86 1 *INDEX MUST BE BETWEEN 1 AND *,I4)
87 75 CONTINUE
88 DO 21 J=1,3
89 C(J)=C(J) $D(J+3)=C(J+16)
90 21 CONTINUE
91 C(17)=C(33) $D(18)=C(35)
92 DO 19 I=1,N
93 T(I)=1
94 22 DO 63 K=1,NSLPPT
95 CALL CMPTLT(D,X1,X2,X3,T1,T2)
96 THETA1(I,K)=T1 $THETA2(I,K)=T2
97 IF (I.EQ.INDEX)STSLIP(K)=C(17) $IF (I.EQ.INDEX)DIPSLP(K)=D(18)
98 63 CONTINUE
99 CORNR1(I)=D(M1) $CORNR2(I)=D(M2)
100 $SAREA(I)=ABS((D(15)-D(9))*(D(12)-D(10)))
101 $DSAREA(I)=ABS((D(7)-D(1))*(D(4)-D(2)))
102 19 CONTINUE
103 DO 24 J=1,8
104 C(J)=C(J+6) $D(J+8)=C(J+24)
105 24 CONTINUE
106 C(17)=C(34) $D(18)=C(36)
107 DO 23 I=N3,NRECPT
108 T(I)=1
109 DO 64 K=1,NSLPPT
110 RK=K $CALL XPNSHL(C(33),C(34),ONE,RNSLPP,RK,Y1)
111 CALL XPNSHL(C(35),C(36),ONE,RNSLPP,RK,Y2)
112 IF (KFLAG$NE.1)CALL ALINAR(C(33),C(34),ONE,RNSLPP,RK,Y1)
113 IF (KFLAG$NE.1)CALL ALINAR(C(35),C(36),ONE,RNSLPP,RK,Y2)
114 D(17)=Y1 $D(18)=Y2
115 CALL CMPTLT(D,X1,X2,X3,T1,T2)
116 THETA1(I,K)=T1 $THETA2(I,K)=T2

```

17 JUN 76

10.35.34

MCHUGF .SLPPRP

PAGE 3

```

117      IF (I.EQ.INDEX) STSLIP(K)=D(17)  $IF (I.EQ.INDEX) DIPSLP(K)=D(18)
118      64 CONTINUE
119      CORNR1(I)=D(M1)  $CORNR2(I)=D(M2)
120      SSAREA(I)=ABS((D(15)-D(9))*(D(12)-D(10)))
121      LSAREA(I)=ABS((D(7)-D(1))*(D(4)-D(2)))
122      23 CONTINUE
123      IFGRCC=0
124      DO 25 I=N1,N2
125      I(I)=I  $RI=I
126      DO 65 K=1,NSLPPT
127      RK=K
128      IF (TRIG.EQ.1HY) GOTO26
129      DO 27 J=1,6
130      JB=J+4  $A1=C(J)  $B=C(J8)  $E=C(J8+8)  $F=C(J+24)
131      CALL XPNSHL(A1,B,RN1,RN2,RI,Y1)
132      CALL XPNSHL(E,F,RN1,RN2,RI,Y2)
133      IF (ICNR(J).EQ.2) CALL ALINAR(A1,B,RN1,RN2,RI,Y1)
134      IF (ICNR(J8).EQ.2) CALL ALINAR(E,F,RN1,RN2,RI,Y2)
135      C(J)=Y1  $D(J8)=Y2
136      27 CONTINUE
137      CALL XPNSHL(C(33),C(34),ONE,RNSLPP,RK,Y1)
138      CALL XPNSHL(C(35),C(36),ONE,RNSLPP,RK,Y2)
139      IF (KFLAGC.NE.1) CALL ALINAR(C(33),C(34),ONE,RNSLPP,RK,Y1)
140      IF (KFLAGC.NE.1) CALL ALINAR(C(35),C(36),ONE,RNSLPP,RK,Y2)
141      L(17)=Y1  $D(18)=Y2  $GOTO28
142      28 IF (IT(2).EQ.1.AND.KFLAGC.EQ.1) CALL XPNSHL(C(33),C(34),ONE,
143      1 FNSLPP,RK,Y)
144      IF (IT(2).EQ.1.AND.KFLAGC.NE.1) CALL ALINAR(C(33),C(34), ONE,
145      1 FNSLPP,RK,Y)
146      IF (IT(2).EQ.0.AND.KFLAGC.EQ.1) CALL XPNSHL(C(35),C(36),ONE,
147      1 FNSLPP,RK,Y)
148      IF (IT(2).EQ.0.AND.KFLAGC.NE.1) CALL ALINAR(C(35),C(36),ONE,
149      1 FNSLPP,RK,Y)
150      IF (IT(2).EQ.0) D(18)=Y  $IF (IT(2).EQ.1) D(17)=Y
151      DO 32 J=1,6
152      JB=J+8  $A1=C(J)  $B=C(J8)  $E=C(J8+8)  $F=C(J+24)
153      CALL XPNSHL(A1,B,RN1,RN2,RI,Y1)
154      CALL XPNSHL(E,F,RN1,RN2,RI,Y2)
155      IF (ICNR(J).EQ.2) CALL ALINAR(A1,B,RN1,RN2,RI,Y1)
156      IF (ICNR(J8).EQ.2) CALL ALINAR(E,F,RN1,RN2,RI,Y2)
157      C(J)=Y1  $D(J8)=Y2
158      32 CONTINUE
159      MIT3=IT(3)  $MIT4=IT(4)  $IF (IT(1).EQ.1) GOTO29
160      IF (D(MIT3).LT.C(MIT4).AND.IT(2).EQ.0) D(17)=C(33)
161      IF (D(MIT3).LT.C(MIT4).AND.IT(2).EQ.1) D(18)=C(35)
162      IF (D(MIT3).LT.C(MIT4).AND.IT(2).EQ.1) GOTO33
163      IF (D(MIT3).GE.C(MIT4)) GOTO35
164      DO 40 J=9,16
165      40 D(J)=C(J+8)
166      GOTO28
167      29 IF (D(MIT3).GT.C(MIT4).AND.IT(2).EQ.0) D(17)=C(33)
168      IF (D(MIT3).GT.C(MIT4).AND.IT(2).EQ.1) D(18)=C(35)
169      IF (D(MIT3).GT.C(MIT4).AND.IT(2).EQ.1) GOTO33
170      IF (D(MIT3).LE.C(MIT4)) GOTO35
171      DO 34 J=9,16
172      34 D(J)=C(J+8)
173      GOTO28
174      33 DO 36 J=1,6

```

17 JUN 76

10.33.34

MCFUGH .SLPPRP

PAGE 4

```

175 36 D(J)=C(J)
176    GO 1028
177 35 IFGREC=IFGREC+1
178    IF (IFGREC.EQ.1) ITIME=I
179    IF (IFGREC.EQ.1) RITIME=ITIME
180    IF (IT(2).EQ.0.AND.KFLAGS.EQ.1) CALL XPNSHL(C(33),C(34),ONE,
181    1 RNSLPP,RK,Y)
182    IF (IT(2).EQ.0.AND.KFLAGS.NE.1) CALL ALINAR(C(33),C(34),ONE,
183    1 RNSLPP,RK,Y)
184    IF (IT(2).EQ.1.AND.KFLAGD.EQ.1) CALL XPNSHL(C(35),C(36),ONE,
185    1 RNSLPP,RK,Y)
186    IF (IT(2).EQ.1.AND.KFLAGD.NE.1) CALL ALINAR(C(35),C(36),ONE,
187    1 RNSLPP,RK,Y)
188    IF (IT(2).EQ.1) D(18)=Y $IF (IT(2).EQ.0) D(17)=Y
189    IF (IT(2).EQ.1) GOT037
190    DO 38 J=9,16
191    A1=C(J+8) $B=C(J+16) $CALL XPNSHL(A1,B,RITIME,RN2,RI,Y)
192    IF (ICNR(J).EQ.2) CALL ALINAR(A1,B,RITIME,RN2,RI,Y)
193 38 D(J)=Y
194    GO 1028
195 37 DO 39 J=1,8
196    E=C(J) $F=C(J+8) $CALL XPNSHL(E,F,RITIME,RN2,RI,Y)
197    IF (ICNR(J).EQ.2) CALL ALINAR(E,F,RITIME,RN2,RI,Y)
198 39 D(J)=Y
199 28 CALL CMPTLT(D,X1,X2,X3,T1,T2)
200    THETA1(I,K)=T1 $THETA2(I,K)=T2
201    IF (I.EQ.INDEX) STSLIP(K)=D(17) $IF (I.EQ.INDEX) DIPSLP(K)=D(18)
202 65 CONTINUE
203    CORNR1(I)=D(M1) $CORNR2(I)=D(M2)
204    SSAREA(I)=ABS((D(15)-D(9))*(D(12)-D(10)))
205    LSAREA(I)=ABS((D(7)-D(1))*(D(4)-D(2)))
206 25 CONTINUE
207    DO 41 I=1,NRECPT
208    SUM11=SUM12=SUM21=SUM22=0.
209    DO 42 J=1,I
210    AT=THETA1(J,I+1-J) $B=THETA2(J,I+1-J) $SUM11=AT+SUM11
211    SUM21=B+SUM21
212 42 CONTINUE
213    LM=I-1 $IF (LM.LT.1) GOT043
214    DO 44 J=1,LM
215    AT=THETA1(J,I-J) $B=THETA2(J,I-J) $SUM12=AT+SUM12 $SUM22=B+SUM22
216 44 CONTINUE
217 43 TX(I)=SUM21-SUM22 $TY(I)=SUM11-SUM12
218 41 CONTINUE
219    IF (IFLAG.EQ.2) GOT046
220    AR=TX(1) $B=TY(1)
221    DO 47 I=1,NRECPT
222    TX(I)=TX(I)-AR
223 47 TY(I)=TY(I)-B
224    GOT048
225 46 DO 49 I=1,NRECPT
226    TX(I)=TX(NRECPT)-TX(I)
227 49 TY(I)=TY(NRECPT)-TY(I)
228 48 CT=COS(THETA*(PI/180.))
229    ST=SIN(THETA*(PI/180.))
230    DO 50 I=1,NRECPT
231    B=TX(I) $AR=TY(I)
232    TY(I)=AR*CT + B*ST $TX(I)=-AR*ST + B*CT

```


17 JUN 76

10.33.34

MCHUGH .SLPPRP

PAGE 5

```

233      TAMP(I)=SQRT((TX(I)**2)+(TY(I)**2))
234      IF (TY(I).EQ.0.)TY(I)=1.E-20
235      TAZM(I)=(ATAN(TX(I)/TY(I)))*(180./PI)
236      IF (TY(I).LT.0.)TAZM(I)=TAZM(I)+180.
237      IF (TAZM(I).LT.0.)TAZM(I)=TAZM(I)+360.
238      IF (TAZM(I).GT.360.)TAZM(I)=TAZM(I)-360.
239      50 CONTINUE
240      WRITE(7,61)THETA
241      61 FORMAT(*THETA=ANGLE BETWEEN STRIKE OF FAULT*,/,
242      1      *AND NORTH = *,F10.3,* DEGREES*)
243      CALL AMINMX(TX,NREOPT,TXMIN,TXMAX)
244      CALL AMINMX(TY,NREOPT,TYMIN,TYMAX)
245      CALL AMINMX(TAMP,NREOPT,TAMPMN,TAMPMX)
246      CALL AMINMX(TAZM,NREOPT,TAZMNM,TAZMXX)
247      WRITE(7,51)TXMIN,TXMAX,TYMIN,TYMAX,TAMPMN,TAMPMX,TAZMNM,TAZMXX
248      51 FORMAT(*MIN/MAX VALUES OF EW COMPONENT*,2X,E10.3,2X,E10.3,/,
249      1      *MIN/MAX VALUES OF NS COMPONENT*,2X,E10.3,2X,E10.3,/,
250      1      *MIN/MAX VALUES OF AMPLITUDE*,5X,E10.3,2X,E10.3,/,
251      1      *MIN/MAX VALUES OF AZIMUTH*,3X,F10.3,2X,F10.3,/,
252      1      *(NOTE--TILT AMPLITUDES ARE IN MICRORADIANS*,/,
253      1      *AZIMUTH IN DEGREES*)
254      WRITE(7,52) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
255      52 FORMAT(*THE FOLLOWING ARE PLOTS OF THE EW AND NS COMPONENTS*,/,
256      1      *OF TILT, AND THE TILT AMPLITUDE*,/,
257      1      *AND AZIMUTH (MEASURE CLOCKWISE FROM NORTH).*,/,
258      1      *U=RE-START, 1=CONTINUE*)
259      LU=7 $LNLCX=1 $NLCLY=1 $INCLX=2 $INCLY=2
260      DO 200 KM=1,4
261      200 LTITL2(KM)=10H
262      WRITE(7,53) $HEAD(7,54)(LTITL(I),I=1,8)
263      53 FORMAT(*WRITE PLOT TITLE, 80 CHARACTERS*)
264      54 FORMAT(8A10)
265      MAUX=5 $MAUY=10 $KTER1=10H$EW TILT $KTER2=10H
266      CALL AGRAPH(TX,T,TXMIN,TXMAX,NREOPT,KTER1,KTER2)
267      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
268      55 FORMAT(*U=RE-START*)
269      KTER1=10HNS TILT $KTER2=10H
270      CALL AGRAPH(TY,T,TYMIN,TYMAX,NREOPT,KTER1,KTER2)
271      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
272      KTER1=10H$THETA2
273      56 WRITE(7,57)$NSLPPT
274      57 FORMAT(*ENTER ZONE INDEX, CAUTION--VALUE MUST BE*,/,
275      1      *BETWEEN 1 AND *,I4,*, 9999=CONTINUE*)
276      CALL GETNUM(A) $I=A(1) $IF(I.EQ.9999)GOTC58
277      IF(I.GT.$NSLPPT)GOTC56 $IKJ=I
278      DO 59 K=1,$NSLPPT
279      TY(K)=THETA1(IKJ,K)
280      59 TX(K)=THETA2(IKJ,K)
281      CALL AMINMX(TX,$NSLPPT,TXMIN,TXMAX)
282      CALL AMINMX(TY,$NSLPPT,TYMIN,TYMAX)
283      WRITE(7,60)IKJ,TXMIN,TXMAX,IKJ,TYMIN,TYMAX
284      60 FORMAT(*MIN/MAX VALUES OF THETA2(*,I4,*) = *,5X,E10.3,2X,E10.3,/,
285      1      *MIN/MAX VALUES OF THETA1(*,I4,*) = *,5X,E10.3,2X,E10.3)
286      CALL AGRAPH(TX,T,TXMIN,TXMAX,$NSLPPT,KTER1,KTER2)
287      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
288      KTER1=10H$THETA1
289      CALL AGRAPH(TY,T,TYMIN,TYMAX,$NSLPPT,KTER1,KTER2)
290      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100

```

17 JUN 76

10.33.34

MCHUGH .SLPPRP

PAGE 6

```

291      GO1056
292      58 CALL AMINMX(STSLIP,NSLFPT,SSMIN,SSMAX)
293      CALL AMINMX(DIPSLP,NSLFPT,DSMIN,DSMAX)
294      WRITE(7,114)INDEX,SSMIN,SSMAX,DSMIN,DSMAX
295      114 FORMAT(*ZONE INDEX = *,I4,/,
296      1          *MIN/MAX STRIKE-SLIP VALUES *,2X,E10.3,2X,E10.3,/,
297      1          *MIX/MAX DIF-SLIP VALUES *,5X,E10.3,2X,F10.3)
298      KTER1=10HSTRIKE-SLI $KTER2=10HP
299      CALL AGRAPH(STSLIP,T,SSMIN,SSMAX,NSLPPT,KTER1,KTER2)
300      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
301      KTER1=10HDIP-SLIP $KTER2=10H
302      CALL AGRAPH(DIPSLP,T,DSMIN,DSMAX,NSLPPT,KTER1,KTER2)
303      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
304      68 KTER1=10HTILT AMPL1 $KTER2=10HTUDE
305      CALL AGRAPH(TAMP,T,TAMPX,TAMPMX,NRECPT,KTER1,KTER2)
306      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
307      KTER1=10HTILT AZIMU $KTER2=10HTH
308      CALL AGRAPH(TAZM,T,TAZMN,TAZMMX,NRECPT,KTER1,KTER2)
309      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
310      KTER1=10HCCORNER 1 $KTER2=10H
311      CALL AMINMX(CORNR1,NRECPT,CMIN,CMAX)
312      CALL AGRAPH(CORNR1,T,CMIN,CMAX,NRECPT,KTER1,KTER2)
313      KTER1=10HCCORNER 2
314      CALL AMINMX(CORNR2,NRECPT,CMIN,CMAX)
315      CALL AGRAPH(CORNR2,T,CMIN,CMAX,NRECPT,KTER1,KTER2)
316      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
317      KTER1=10HSTRIKE-SLI $KTER2=10HP AREA
318      CALL AMINMX(SSAREA,NRECPT,CMIN,CMAX)
319      CALL AGRAPH(SSAREA,T,CMIN,CMAX,NRECPT,KTER1,KTER2)
320      KTER1=10HDIP-SLIP A $KTER2=10HREA
321      CALL AMINMX(OSAREA,NRECPT,CMIN,CMAX)
322      CALL AGRAPH(OSAREA,T,CMIN,CMAX,NRECPT,KTER1,KTER2)
323      WRITE(7,55) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO100
324      100 WRITE(7,93)(C(I),I=1,36)
325      93 FORMAT(6(6F10.3,/) )
326      WRITE(7,115)(ICNR(I),I=1,16)
327      WRITE(7,117)(IT(I),I=1,4),ITIME
328      WRITE(7,117)KFLAGS,KFLAGD,LFLAG,MFLAG,IFLAG
329      WRITE(7,117)NRECPT,N,N1,N2,N3
330      115 FORMAT(2(8I6,/) )
331      117 FORMAT(5I10)
332      WRITE(7,66) $CALL GETNUM(A)
333      66 FORMAT(*1=RE-START WITH ALL NEW VALUES*,/,
334      1          *2=RE-START WITH NEW STRIKE-SLIP VALUE AND ZONE COORDINATES*,/,
335      1          *3=RE-START WITH NEW DIP-SLIP VALUE AND ZONE COORDINATES*,/,
336      1          *4=RE-START WITH NEW STRIKE-SLIP VALUE ONLY*,/,
337      1          *5=RE-START WITH NEW DIP-SLIP VALUE ONLY*,/,
338      1          *6=RE-START WITH NEW TILTMETER COORDINATES ONLY*,/,
339      1          *7=STOP*)
340      IF(A(1).EQ.1.)GOTO67 $IF(A(1).EQ.2.)GOTO62
341      IF(A(1).EQ.3.)GOTO76 $IF(A(1).EQ.4.)GOTO70
342      IF(A(1).EQ.5.)GOTO71 $IF(A(1).EQ.6.)GOTO72
343      IF(A(1).EQ.7.)GOTO73 $GOTO67
344      62 WRITE(7,74)
345      74 FORMAT(*U1IN, U1FN*)
346      CALL GETNUM(A) $C(33)=A(1) $C(34)=A(2)
347      WRITE(7,15)$CALL GETNUM(A)
348      C(17)=C(19)=A(1) $C(18)=C(24)=A(2) $C(20)=C(22)=A(3)

```

17 JUN 76

10.33.34

MCFUGH .SLPPRP

PAGE 7

```

349      C(21)=C(23)=A(4)  $C(25)=C(27)=A(5)  $C(26)=C(32)=A(6)
350      C(28)=C(30)=A(7)  $C(29)=C(31)=A(8)  $WRITE(7,3)
351      CALL GETNUM(A)  $LFLAG=A(1)  $MFLAG=A(2)
352      DO 85 I=1,8
353      85 ICRNR(I)=1
354      IF (LFLAG.EQ.0.OR.MFLAG.EQ.0)CALL SLPCRN(LFLAG,MFLAG,ICRNR)
355      IF (LFLAG.EQ.2)GOTO 86  $GOTO87
356      86 DO 88 I=9,16
357      88 ICRNR(I)=2
358      87 IF (MFLAG.EQ.2)GOTO39  $GOTO90
359      89 DO 91 I=1,8
360      91 ICRNR(I)=2
361      90 GOTO75
362      76 WRITE(7,77)
363      77 FORMAT(*UBIN, USFN*)
364      CALL GETNUM(A)  $C(35)=A(1)  $C(36)=A(2)
365      WRITE(7,17)  $CALL GETNUM(A)
366      C(1)=C(3)=A(1)  $C(2)=C(8)=A(2)
367      C(4)=C(6)=A(3)  $C(5)=C(7)=A(4)  $C(9)=C(11)=A(5)
368      C(10)=C(16)=A(6)  $C(12)=C(14)=A(7)  $C(13)=C(15)=A(8)
369      WRITE(7,3)  $CALL GETNUM(A)  $LFLAG=A(1)  $MFLAG=A(2)
370      DO 78 I=1,8
371      78 ICRNR(I)=1
372      IF (LFLAG.EQ.0.OR.MFLAG.EQ.0)CALL SLPCRN(LFLAG,MFLAG,ICRNR)
373      IF (LFLAG.EQ.2)GOTO79  $GOTO80
374      79 DO 81 I=9,16
375      81 ICRNR(I)=2
376      80 IF (MFLAG.EQ.2)GOTO32  $GOTO83
377      82 DO 84 I=1,8
378      84 ICRNR(I)=2
379      83 GOTO75
380      70 WRITE(7,74)  $CALL GETNUM(A)  $C(33)=A(1)  $C(34)=A(2)  $GOTO75
381      71 WRITE(7,77)  $CALL GETNUM(A)  $C(35)=A(1)  $C(36)=A(2)
382      GOTO75
383      72 WRITE(7,16)  $CALL GETNUM(A)  $X1=A(1)  $X2=A(2)
384      GOTO75
385      73 STOP  $END
386      SUBROUTINE XPNSHL(P,Q,R1,S1,T,Y)
387      S=(T-R1)*6.  $R=S1-R1  $IF (R.EQ.0.)R=1.E-20  $ALPHA=-S/R
388      Y=((Q-P)*(1.-EXP(ALPHA)))+P
389      RETURN  $END
390      SUBROUTINE ALINAR(P,Q,R,S,T,Y)
391      Y=((Q-P)*(T-R))/(S-R) + P
392      RETURN  $END
393      SUBROUTINE SLPCRN(LFLAG,MFLAG,ICRNR)
394      DIMENSION A(20),ICRNR(16)
395      WRITE(7,1)
396      1  FORMAT(*1=VARIABLE INCREMENTED EXPONENTIALLY*,/,
397      1  *2=VARIABLE INCREMENTED LINEARLY*)
398      IF (MFLAG.NE.0)GOTO2
399      WRITE(7,3)  $CALL GETNUM(A)  $ICRNR(1)=ICRNR(3)=A(1)
400      3  FORMAT(*D1X1, D1X3, D2X3, D3X1*)
401      ICRNR(2)=ICRNR(3)=A(2)  $ICRNR(4)=ICRNR(6)=A(3)
402      ICRNR(5)=ICRNR(7)=A(4)
403      2  IF (LFLAG.NE.0)RETURN
404      WRITE(7,4)  $CALL GETNUM(A)  $ICRNR(9)=ICRNR(11)=A(1)
405      4  FORMAT(*C1X1, C1X3, C2X3, C3X1*)
406      ICRNR(10)=ICRNR(16)=A(2)  $ICRNR(12)=ICRNR(14)=A(3)

```

17 JUN 76

10.33.34

MCFUGH .SLPPRP

PAGE 8

```

407      ICRNR(13)=ICRNR(15)=A(4)  $RETURN  $END
408      SUBROUTINE TRIGGR(IT)
409      DIMENSION A(20),IT(4)
410      WRITE(7,1)  $CALL GETNUM(A)  $IT(1)=A(1)  $WRITE(7,2)
411      1  FORMAT(*0 = D(I1) > C(I2), 1 = D(I1) < C(I2)*)
412      2  FORMAT(*0 = STRIKE-SLIP/1 = DIP-SLIP ZONE TRIGGERED*)
413      CALL GETNUM(A)  $IT(2)=A(1)  $WRITE(7,3)
414      3  FORMAT(*SPECIFY I1 AND I2*)
415      CALL GETNUM(A)  $IT(3)=A(1)  $IT(4)=A(2)
416      RETURN  $END
417      SUBROUTINE AGRAPH(R,T,A1,B,NRECPT,K1,K2)
418      COMMON/JPLCT/XLT,XRT,YLO,YUP,MAJ,MAJY,KX(2),KY(2),
419      1  LTITL(8),LU,LTFL,LNLGX,LN LGY,NCLX,NCLY,LTITL2(8)
420      DIMENSION R(50),T(50),A(20),KX(2),KY(2)
421      KX(1)=10*TIME-ARBIT  $KX(2)=10*HRYR Y UNITS
422      XLT=T(1)  $XRT=T(NRECPT)  $KY(1)=K1  $KY(2)=K2
423      YLC=A1  $YUP=B
424      13 WRITE(7,3)  $READ(7,4)CH  $IF(CH.EQ.1HN.OR.CH.EQ.1H )GOTO5
425      3  FORMAT(*SET HORIZONTAL SCALE? Y OR N(=BLANK)*)
426      4  FORMAT(A1)
427      WRITE(7,6)  $CALL GETNUM(A)  $XLT=A(1)  $XRT=A(2)
428      6  FORMAT(*MIN/MAX X VALUES*)
429      5  WRITE(7,7)  $READ(7,4)CH  $IF(CH.EQ.1HN.OR.CH.EQ.1H )GOTO8
430      WRITE(7,9)  $CALL GETNUM(A)  $YLO=A(1)  $YUP=A(2)
431      7  FORMAT(*SET VERTICAL SCALE? Y OR N(=BLANK)*)
432      9  FORMAT(*MIN/MAX Y VALUES*)
433      8  AA=YUP  $IF(YLO.EQ.AA)YUP=YUP+1.  $IF(YLO.EQ.AA)YLC=YLO-1.
434      WRITE(7,10)KY(1),KY(2)
435      10  FORMAT(*SKIP PLOT (F *,2A10,*?*)
436      READ(7,4)IJVAR
437      IF(IJVAR.EQ.1HN.OR.IJVAR.EQ.1H )CALL PLOTS(R,T,1,NRECPT)
438      WRITE(7,12)  $CALL GETNUM(A)  $IRS=A(1)  $IF(IRS.EQ.1)GOTO13
439      12  FORMAT(*1 = NEW PLOT, 2 = RETURN*)
440      RETURN  $END
441      SUBROUTINE AMINMX(F,NRECPT,B,A)
442      DIMENSION R(50)
443      AMIOPT=((R(NRECPT)-R(1))/2.) + R(1)
444      A = B = AMIOPT
445      DO 1 I=1,NRECPT
446      IF(R(I).GT.A)A=R(I)
447      IF(R(I).LT.B)B=R(I)
448      1  CONTINUE
449      RETURN  $END
450      SUBROUTINE CPTILT(D,X1,X2,X3,T1,T2)
451      DIMENSION D(20)
452      A1=A2=A3=A4=B1=B2=B3=B4=0.
453      DA1=DA2=DA3=DA4=DB1=DB2=DB3=DB4=0.
454      U1=D(17)  $U3=D(18)
455      IF(U1.EQ.0.)GO TO 1
456      CALL TILT(D(17),X1,X2,X3,D(11),D(12),A1,B1)
457      CALL TILT(D(17),X1,X2,X3,D(9),D(10),A2,B2)
458      CALL TILT(D(17),X1,X2,X3,D(13),D(14),A3,B3)
459      CALL TILT(D(17),X1,X2,X3,D(15),D(16),A4,B4)
460      1  IF(U3.EQ.0.)GO TO 2
461      CALL DPSPTL(D(18),X1,X2,X3,D(3),D(4),DA1,DB1)
462      CALL DPSPTL(D(18),X1,X2,X3,D(1),D(2),DA2,DB2)
463      CALL DPSPTL(D(18),X1,X2,X3,D(5),D(6),DA3,DB3)
464      CALL DPSPTL(D(18),X1,X2,X3,D(7),D(8),DA4,DB4)

```

17 JUN 76

10.33.34

MCHUGH .SLPPRP

PAGE 9

```

465      2 T1=A1-A2-A3+A4+DA1-DA2-DA3+DA4
466      T2=B1-B2-B3+B4+DB1-DB2-DB3+DB4
467      RETURN $END
468      SUBROUTINE TILT(U1,X1,X2,X3,P1,P3,T1,T2)
469      R=SQRT((X1-P1)**2+X2**2+(X3-P3)**2)
470      RP=R+P3
471      T1=(U1/12.5664)*(X2*(X1-P1)*(R*RP-(R+2.*P3)*(2.*R+P3)))/
472      1 (R**3*RP**2)
473      T2=(U1/12.5664)*(X2**2*(R*RP-(R+2.*P3)*(2.*R+P3)))/(R**3*RP**2)
474      1 +(R+2.*P3)/(R*RP))
475      RETURN $END
476      SUBROUTINE DPSPTL(U3,X1,X2,X3,P1,P3,DT1,DT2)
477      R=SQRT(((X1-P1)**2)+(X2**2)+((X3-P3)**2))
478      DT1=(U3/6.28318)*(((X2*P3)/R)*((1./(R**2))-(1./(((X1-P1)
479      1 **2)+(X2**2)))))
480      DT2=(U3/6.28318)*(((X1-P1)*P3)/((X2**2)+(P3**2)))*(((P3**2)
481      1 -(X2**2))/(R*((X2**2)+(P3**2)))+(((X1-P1)**2)+(P3**2))
482      1 /(R**3))+((X2**2)+(P3**2))/(R*((X1-P1)**2)+(X2**2))))
483      RETURN $END
484      SUBROUTINE GETNUM(R)
485      DIMENSION A(1),L(80)
486      CLAU(7,9)L $ I=J=0
487      6 J=J+1 $ N=P=S=J $ M=F=1
488      5 I=I+1 $ IF(I.GT.80)RETURN $ D=L(I) $ K=4
489      IF(J.EQ.38)K=2 $ IF(D.GE.27.A.D.LE.36)K=1
490      IF(D.EQ.47)K=3 $ K=K+S $ GOTO(1,2,3,5,1,4,3,4)K
491      1 N=N*10+D-27 $ S=4 $ GOTO 5
492      2 M=-1 $ S=4 $ GOTO 5
493      3 P=I $ S=4 $ GOTO 5
494      4 IF(P.NE.U)F=10.**(-P-1) $ R(J)=N/F*M $ GOTO 6
495      9 FORMAT(80R1)
496      END

```

EXAMPLE OF STRTCH

```

*RUN!
1=ZONE EXPANDS, 2=ZONE CONTRACTS
1!
1/2=SLIP INCREMENTED EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
1 1!
0 =INCREMENT CORNERS SEPARATELY
1/2=INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
1 1!
'U1X0' = LEFT-LATERAL STRIKE-SLIP
'U3X0' = 'X2X0' SIDE DOWN
U1IN, U1FN, U3IN, U3FN
-1 -1 0 0!
'TRIGGER' OPTION DESIRED?
N!
C1X1IN,C1X3IN,C2X3IN,C3X1IN,C1X3FN,C2X3FN,C3X1FN
0 0 0 2 0 1 0!
ENTER STATION COORDINATES--(X1,X2)
1 .5

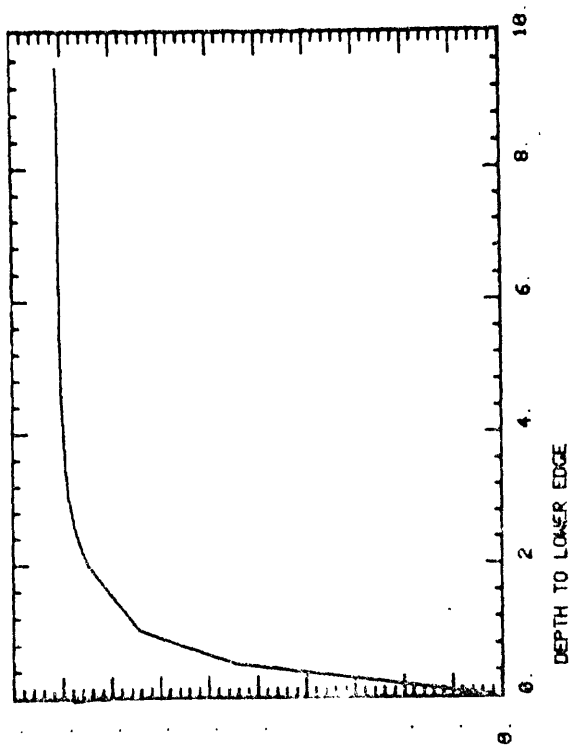
```

```

!
WRITE PLOT TITLE, 80 CHARACTERS
PROGRAM STRICH/STRIKE-SLIP = -1 MM.1
MIN/MAX VALUES OF TILT AMPLITUDE = 0
SET HORIZONTAL SCALE? Y OR N=<BLANK>
<<
Y!
MIN/MAX X VALUES
0 10!
SET VERTICAL SCALE? Y OR N=<BLANK>
Y!
MIN/MAX Y VALUES
0 1 1!
SKIP PLOT OF TILT AMPLITUDE ?

```

PROGRAM STRICH/STRIKE-SLIP = -1 MM.
MAXIMUM TILT AMPLITUDE



1 = NEW PLOT, 2 = RETURN
2 = RE-START, 1 = SPECIFY NEW DELTA X AND CONTINUE
0 =
1 = ZONE EXPANDS, 2 = ZONE CONTRACTS
1 =
1/2 = SLIP INCREMENTED EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
1 1
0 = INCREMENT CORNERS SEPARATELY
1/2 = INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
1 1
'U1X0' = LEFT-LATERAL STRIKE-SLIP
'U3X0' = 'X2X0' SIDE DOWN
U1IN, U1FN, U3IN, U3FN
0 0 1 1
'TRIGGER' OPTION DESIRED?
N
D1X1IN, D1X3IN, D2X3IN, D3X1IN, D1X1FN, D1X3FN, D2X3FN, D3X1FN
0 0 0 2 0 1 0
ENTER STATION COORDINATES--(X1, X2)
1 1 .5

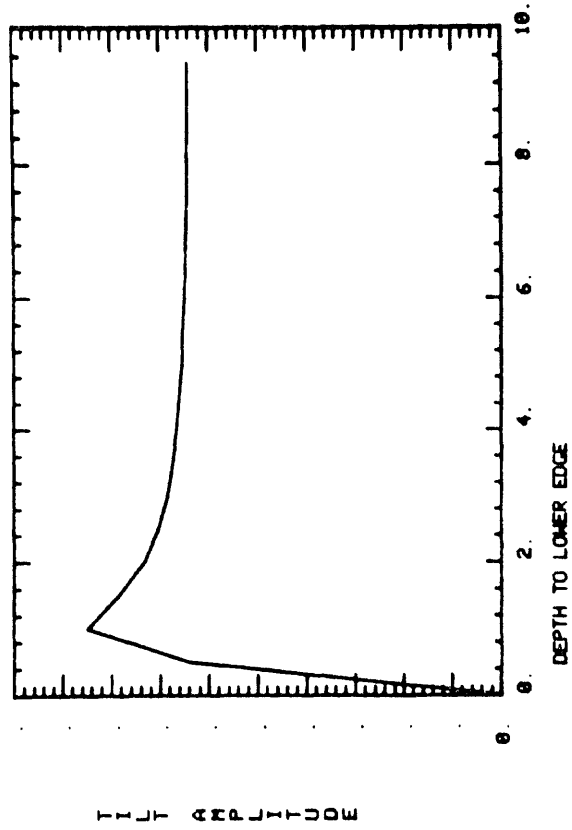

```

! WRITE PLOT TITLE, 80 CHARACTERS
PROGRAM STITCH/DIP-SLIP = 1 MM.
MIN/MAX VALUES OF TILT AMPLITUDE = 0.
SET HORIZONTAL SCALE? Y OR N (=BLANK)
Y1
0 10
MIN/MAX X VALUES
SET VERTICAL SCALE? Y OR N (=BLANK)
Y1
0 51
MIN/MAX Y VALUES
SKIP PLOT OF TILT AMPLITUDE ?

```

4.247E-01

PROGRAM STITCH/DIP-SLIP = 1 MM.
MAXIMUM TILT AMPLITUDE

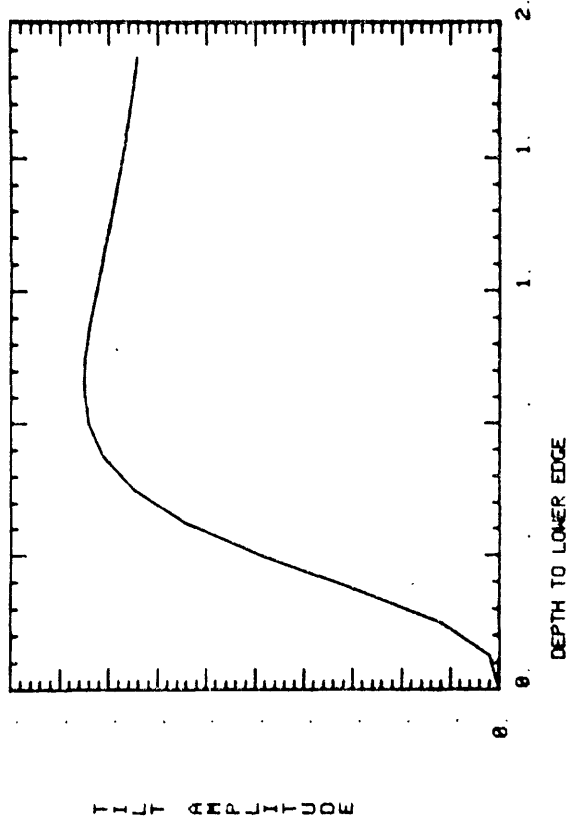


```

1 1 = NEW PLOT, 2 = RETURN
2 1
3 0=RE-START, 1=SPECIFY NEW DELTAX AND CONTINUE
1 1
4 ENTER NEW DELTAX
.1 1
5 0=RE-START WITH ALL NEW VALUES
1=RE-START WITH PREVIOUS VALUES AND NEW DELTAX
1 1
6 WRITE PLOT TITLE, 80 CHARACTERS
PROGRAM STRICH/DIP-SLIP=1 MM., DELTAX=.1
MIN/MAX VALUES OF TILT AMPLITUDE = 9.
SET HORIZONTAL SCALE? Y OR N=<BLANK>
Y 1
MIN/MAX X VALUES
0.2 1
8 SET VERTICAL SCALE? Y OR N=<BLANK>
Y 1
MIN/MAX Y VALUES
0 .5 1
9 SKIP PLOT OF TILT AMPLITUDE 7

```

PROGRAM STRICH/DIP-SLIP=1 MM., DELTAX=.1
MAXIMUM TILT AMPLITUDE



```

1 1 = NEW PLOT, 2 = RETURN
21
0=RE-START, 1=SPECIFY NEW DELTAX AND CONTINUE
11
ENTER NEW DELTAX
21
0=RE-START WITH ALL NEW VALUES
1=RE-START WITH PREVIOUS VALUES AND NEW DELTAX
21
1=ZONE EXPANDES, 2=ZONE CONTRACTS
11
1/2-SLIP INCREMENTED EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
1 11
0 = INCREMENT CORNERS SEPARATELY
1/2-INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
0 01
1-VARIABLE INCREMENTED EXPONENTIALLY
2-VARIABLE INCREMENTED LINEARLY
D1X1, D1X3, D2X3, D3X1
1 2 1 21
C1X1, C1X3, C2X3, C3X1
2 1 2 11
'U1X0' = LEFT-LATERAL STRIKE-SLIP
'U3X0' = 'X2X0' SIDE DOWN
U1IN, U1FN, U3IN, U3FN
0 -5 0 11
'TRIGGER' OPTION DESIRED?
Y

```

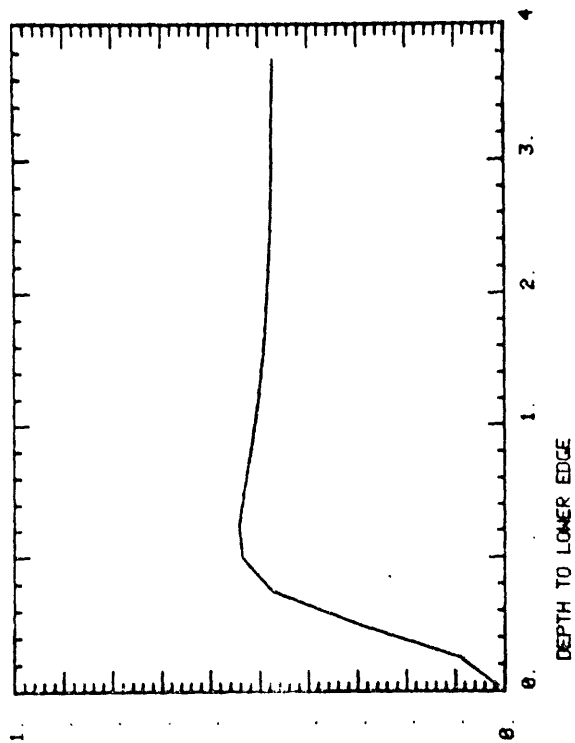
```

1
0 = D(11) > D(12), 1 = D(11) < D(12)
01
0 = STRIKE-SLIP/1 = DIP-SLIP ZONE TRIGGERED
11
SPECIFY I1 AND I2
9 51
C1X1IN, C1X3IN, C2X3IN, C3X1IN, C1X1FN, C1X3FN, C2X3FN, C3X1FN
0 0 0 2 0 1 01
D1X1IN, D1X3IN, D2X3IN, D3X1IN, D1X1FN, D1X3FN, D2X3FN, D3X1FN
5 0 0 5 1 5 0 1 51
ENTER STATION COORDINATES--(X1,X2)
1 51
PROGRAM STRIKE-STRIKE-SLIP AND DIP-SLIP
WRITE PLOT TITLE, 88 CHARACTERS
MIN/MAX VALUES OF TILT AMPLITUDE = 0.
MIN/MAX VALUES OF DEPTH = 0.
SET HORIZONTAL SCALE? Y OR N (=BLANK)
Y1
MIN/MAX X VALUES
0 41
SET VERTICAL SCALE? Y OR N (=BLANK)
Y1
MIN/MAX Y VALUES
0 11
SKIP PLOT OF TILT AMPLITUDE 7

```

5.4285E-01
3.6285E-03

PROGRAM STRICH/STRIKE-SLIP AND DIP-SLIP
MAXIMUM TILT AMPLITUDE

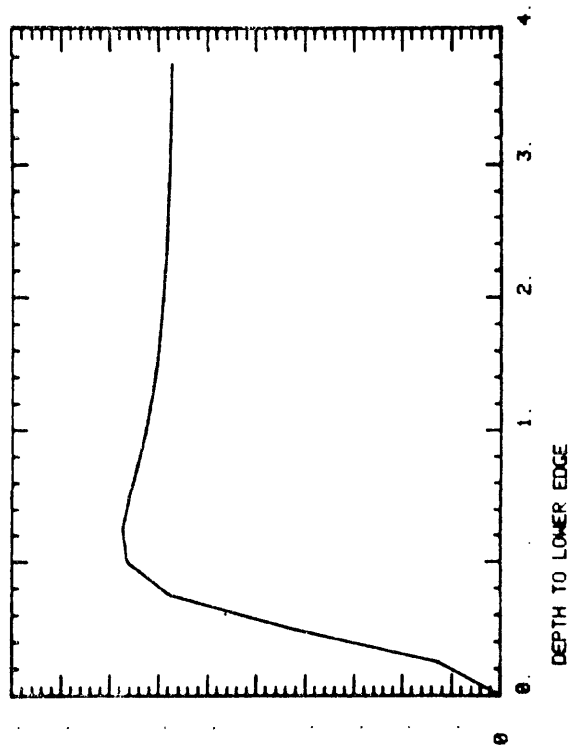


```

1. = NEW PLOT, 2 = RETURN
1.1 SET HORIZONTAL SCALE? Y OR N<BLANK>
Y!
MIN/MAX X VALUES
0 4!
SET VERTICAL SCALE? Y OR N<BLANK>
Y!
MIN/MAX Y VALUES
0 7!
SKIP PLOT OF TILT AMPLITUDE ?

```

PROGRAM STITCH/STRIKE-SLIP AND DIP-SLIP
MAXIMUM TILT AMPLITUDE

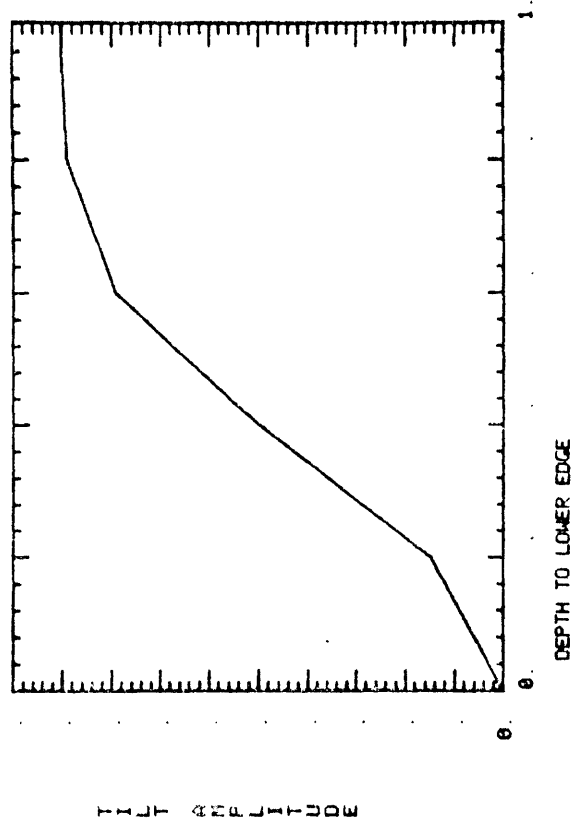


```

1 = NEW PLOT, 2 = RETURN
11
SET HORIZONTAL SCALE? Y OR N=<BLANK>
Y1
MIN/MAX X VALUES
0 11
SET VERTICAL SCALE? Y OR N=<BLANK>
Y1
MIN/MAX Y VALUES
0 61
SKIP PLOT OF TILT AMPLITUDE ?

```

PROGRAM STRICH-STRIKE-SLIP AND DIP-SLIP
MAXIMUM TILT AMPLITUDE



```

1  = NEW PLOT, 2 = RETURN
2  = RE-START, 1=SPECIFY NEW DELTAX AND CONTINUE
1  = ENTER NEW DELTAX
5  = RE-START WITH ALL NEW VALUES
1  = RE-START WITH PREVIOUS VALUES AND NEW DELTAX
8

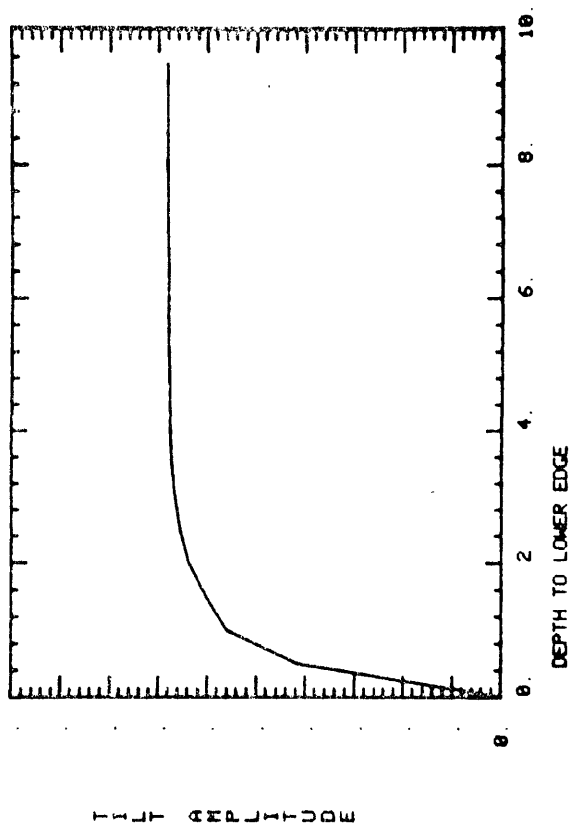
```

```

1=ZONE EXPANDS, 2=ZONE CONTRACTS
2 1
1/2=SLIP INCREMENTED EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
2 2 1
0 = INCREMENT CORNERS SEPARATELY
1/2=INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY
STRIKE-SLIP/DIP-SLIP
2 2 1
'U1,X1' = LEFT LATERAL STRIKE-SLIP
'U3,X3' = 'X2,X1' SIDE DOWN
U1IN, U1FN, U3IN, U3FN
-3 -3 0 0
'TRIGGER' OPTION DESIRED?
N1
C1X1IN,C1X3IN,C2X3IN,C3X1IN,C1X1FN,C1X3FN,C2X3FN,C3X1FN
0 0 0 0 2 0 1 0
ENTER STATION COORDINATES--(X1,X2)
1 51
WRITE PLOT TITLE, 80 CHARACTERS
STRIKE-SLIP/LINEAR INCREMENTING
MIN/MAX VALUES OF TILT AMPLITUDE = 0.
MIN/MAX VALUES OF DEPTH = 0.
SET HORIZONTAL SCALE? Y OR N=(BLANK)
Y1
MIN/MAX X VALUES
0 10
SET VERTICAL SCALE? Y OR N=(BLANK)
Y1
MIN/MAX Y VALUES
0 41
SKIP PLOT OF TILT AMPLITUDE ?

```

STRIKE-SLIP/LINEAR INCREMENTING
MAXIMUM TILT AMPLITUDE



2.731E-01
9.500E-00

```

1 1 = NEW PLOT, 2 = RETURN
2 0=RE-START, 1=SPECIFY NEW DELTAX AND CONTINUE
1 1 ENTER NEW DELTAX
1 1 0=RE-START WITH ALL NEW VALUES
1 1 1=RE-START WITH PREVIOUS VALUES AND NEW DELTAX
1 1 WRITE PLOT TITLE, 88 CHARACTERS
1 1 STRIKE-SLIP/LINEAR INCREMENTING/DELTAX= 1 1
1 1 MIN/MAX VALUES OF TILT AMPLITUDE = 0
1 1 MIN/MAX VALUES OF DEPTH = 6
1 1 SET HORIZONTAL SCALE? Y OR N<=BLANK>
Y1
MIN/MAX X VALUES
0 2 1
SET VERTICAL SCALE? Y OR N<=BLANK>
Y1
MIN/MAX Y VALUES
0 3 1
SKIP PLOT OF TILT AMPLITUDE 7

```

```

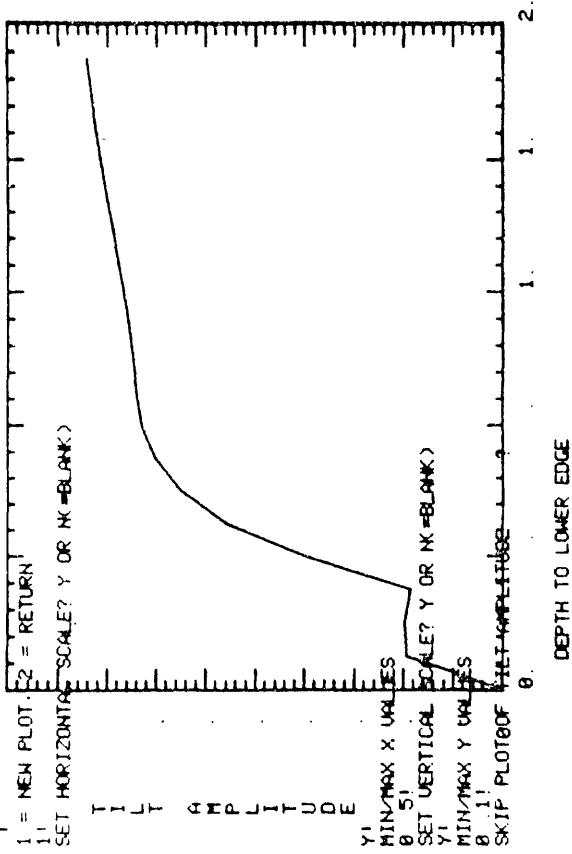
2 50GE-01
1.50GE+00

```

```

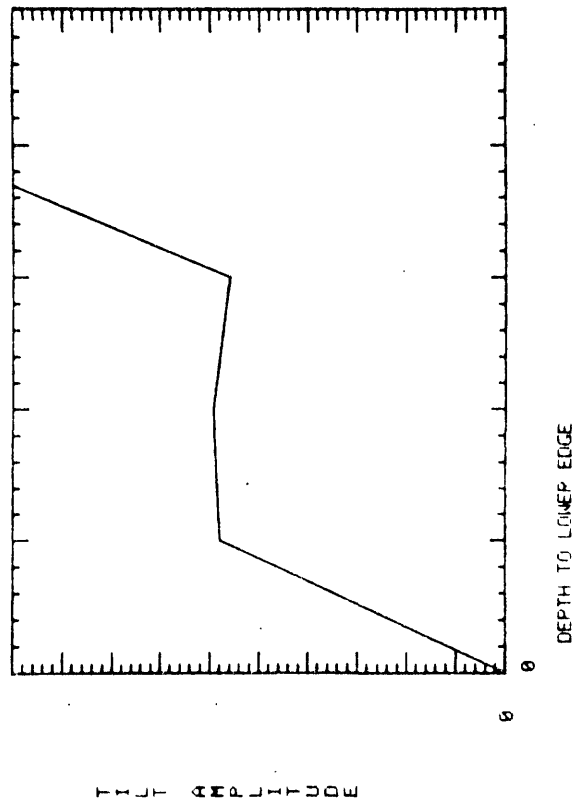
1 STRIKE-SLIP/LINEAR INCREMENTING/DELTAX= 1
1 MINIMUM TILT AMPLITUDE

```



00

STRIKE-SLIP/LINEAR INCREMENTING DELTA= 1
MAXIMUM TILT AMPLITUDE



1 = NEW PLOT, 2 = RETURN
0 = RE-START, 1 = SPECIFY NEW DELTA AND CONTINUE
2 = OK - ^EDIT

PROGRAM LISTING FOR STRTCH

```

1  DELETE(LGO,OUTFUT,STRTCH)
2  STRTCH.
3  CXIT.
4  LIBCOPY (GRAPHIC, TXLGO/RR, TXLGO)
5  LIBCOPY (JDRAT, NPLGO/RR, NPLGO)
6  DELETE(LGO,OUTPUT,STRTCH)
7  RUN76(S)
8  LINK(F=LGO,F=TXLGO,F=NPLGO,B=STRTCH)
9  STRTCH.
10 FIN.
11 EOR
12     PROGRAM STRTCH(TAPE7=201,FILM=TAPE7,TAPE7=TAPE7)
13     COMMON/TAPECOL/TVPUL(8)
14     COMMON/TVTUNE/ITUNE(30)
15     COMMON/JPLCT/XLT,XRT,YLO,YUP,MAJX,MAJY,KX(2),KY(2),
16     1LTITL(8),LU,LTF,LNLGX,LNLGY,NCLX,NCLY,LTITL2(8)
17     DIMENSION IFET(8)
18     DIMENSION IX(50),TY(50),T(50)
19     DIMENSION C(20),C(40),A(30),IT(4),ICRNR(16)
20     DIMENSION AMPMAX(50),DEPTH(50)
21     DIMENSION THETA1(50,50),THETA2(50,50)
22     DIMENSION TAMP(50),TAZM(50)
23     CALL FET(5LTAPE7,IFET,8)
24     IFET(2)=IFET(2).OR.0000 0010 0000 0000 0000B
25     IFET(8)=IFET(8).OR.4000 0000 0000 0000 0000B
26     CALL FET(5LTAPE7,IFET,-8)
27     KTEST=1 $DELTA=.5 $CASE=-DELTA
28     67 DO 101 J=1,18
29     D(J)=0. $C(J+18)=0. $C(J)=0.
30     101 CONTINUE
31     WRITE(7,1)
32     1 FORMAT(*1=ZONE EXPANDS, 2=ZONE CONTRACTS*)
33     CALL GETNUM(A) $IFLAG=A(1) $WRITE(7,2)
34     2 FORMAT(*1/2=SLIP INCREMENTED EXPONENTIALLY/LINEARLY*,/,
35     1 *STRIKE-SLIP/DIF-SLIP*)
36     CALL GETNUM(A) $KFLAG=A(1) $KFLAGC=A(2) $WRITE(7,3)
37     3 FORMAT(*0 =INCREMENT CORNERS SEPARATELY*,/,
38     1 *1/2=INCREMENT ALL CORNERS EXPONENTIALLY/LINEARLY*,/,
39     1 *STRIKE-SLIP/DIF-SLIP*)
40     CALL GETNUM(A) $LFLAG=A(1) $MFLAG=A(2)
41     DO 110 I=1,4
42     IT(I)=5
43     110 CONTINUE
44     DO 4 I=1,16
45     4 ICRNR(I)=1
46     IF(LFLAG.EQ.0.OR.MFLAG.EQ.0)CALL SLPCRN(LFLAG,MFLAG,ICRNR)
47     IF(LFLAG.EQ.2)GOTO 5 $GOTO6
48     5 DO 7 I=9,16
49     7 ICRNR(I)=2
50     6 IF(MFLAG.EQ.2)GOTO8 $GOTO9
51     8 DO 10 I=1,8
52     10 ICRNR(I)=2
53     9 WRITE(7,11) $CALL GETNUM(A) $C(33)=A(1) $C(34)=A(2)
54     11 FORMAT(*U1>0* = LEFT-LATERAL STRIKE-SLIP*,/,
55     1 *U3>0* = *X2>0* SIDE DOWN*,/,
56     1 *U1IN, U1FN, U3IN, U3FN*)
57     C(35)=A(3) $C(36)=A(4) $WRITE(7,12)
58     12 FORMAT(*TRIGGER* OPTION DESIRED?*)

```

```

59      READ(7,13)TRIG $IF(TRIG.EQ.1HY)CALL TRIGGR(IT)
60      13  FORMAT(A1)
61      IF(C(33).EQ.0..AND.C(34).EQ.0.)GOTO14
62      WRITE(7,15) $CALL GETNUM(A) $C(17)=C(19)=A(1)
63      15  FORMAT(*C1X1IN,C1X3IN,C2X3IN,C3X1IN,C1X1FN,C1X3FN,C2X3FN,C3X1FN*)
64      C(18)=C(24)=A(2) $C(20)=C(22)=A(3) $C(21)=C(23)=A(4)
65      C(25)=C(27)=A(5) $C(26)=C(32)=A(6) $C(28)=C(30)=A(7)
66      C(29)=C(31)=A(8)
67      14  IF(C(35).EQ.0..AND.C(36).EQ.0.)GOTO16
68      WRITE(7,17) $CALL GETNUM(A) $C(1)=C(3)=A(1) $C(2)=C(8)=A(2)
69      17  FORMAT(*D1X1IN,D1X3IN,D2X3IN,D3X1IN,D1X1FN,D1X3FN,D2X3FN,D3X1FN*)
70      C(4)=C(6)=A(3) $C(5)=C(7)=A(4) $C(9)=C(11)=A(5)
71      C(10)=C(16)=A(6) $C(12)=C(14)=A(7) $C(13)=C(15)=A(8)
72      16  WRITE(7,18) $CALL GETNUM(A) $X1=A(1) $X2=A(2)
73      18  FORMAT(*ENTER STATION COORDINATES--(X1,X2)*)
74      X3=0. $NRECPT=50 $N=(.075*NRECPT) $NSLPPT=NRECPT
75      N1=N+1 $N2=NRECPT-(.075*NRECPT)-1
76      N3=N2+1 $PI=3.1415926 $DEPTHL=CASE
77      RNSLPP=NSLPPT $RN1=N1 $RN2=N2 $ONE=1. $ITIME=99999
78      75  CONTINUE
79      DEPTHL=DEPTHL+DELTAX $C(28)=DEPTHL $C(20)=C(22)=C(30)=C(28)
80      C(4)=C(12)=C(6)=C(14)=C(28)
81      DO 21 J=1,8
82      D(J)=C(J) $D(J+8)=C(J+16)
83      21  CONTINUE
84      J(17)=C(33) $D(18)=C(35)
85      DO 19 I=1,N
86      T(I)=I
87      DO 63 K=1,NSLPPT
88      CALL CMPTLT(D,X1,X2,X3,T1,T2)
89      THETA1(I,K)=T1 $THETA2(I,K)=T2
90      63  CONTINUE
91      19  CONTINUE
92      DO 24 J=1,8
93      D(J)=C(J+8) $D(J+8)=C(J+24)
94      24  CONTINUE
95      C(17)=C(34) $D(18)=C(36)
96      DO 23 I=N3,NRECPT
97      T(I)=I
98      DO 64 K=1,NSLPPT
99      RK=K $CALL XPNSHL(C(33),C(34),ONE,RNSLPP,RK,Y1)
100     CALL XPNSHL(C(35),C(36),ONE,RNSLPP,RK,Y2)
101     IF(KFLAGS.NE.1)CALL ALINAR(C(33),C(34),ONE,RNSLPP,FK,Y1)
102     IF(KFLAGC.NE.1)CALL ALINAR(C(35),C(36),ONE,RNSLPP,FK,Y2)
103     D(17)=Y1 $D(18)=Y2
104     CALL CMPTLT(D,X1,X2,X3,T1,T2)
105     THETA1(I,K)=T1 $THETA2(I,K)=T2
106     64  CONTINUE
107     23  CONTINUE
108     IFGPEC=0
109     DO 25 I=N1,N2
110     T(I)=I $RI=I
111     DO 65 K=1,NSLPPT
112     RK=K
113     IF(TRIG.EQ.1HY)GOTO26
114     DO 27 J=1,8
115     J8=J+8 $A1=C(J) $B=C(J8) $E=C(J8+8) $F=C(J+24)
116     CALL XPNSHL(A1,B,RN1,RN2,RI,Y1)

```

07 JUL 76

08.37.44

MCHUGH .STRICH

PAGE 3

```

117 CALL XPNSHL(E,F,RN1,RN2,RI,Y2)
118 IF(ICRNR(J).EQ.2)CALL ALINAR(A1,B,RN1,RN2,RI,Y1)
119 IF(ICRNR(J8).EQ.2)CALL ALINAR(E,F,RN1,RN2,RI,Y2)
120 D(J)=Y1 $D(J8)=Y2
121 27 CONTINUE
122 CALL XPNSHL(C(33),C(34),ONE,RNSLPP,RK,Y1)
123 CALL XPNSHL(C(35),C(36),ONE,RNSLPP,RK,Y2)
124 IF(KFLAGS.NE.1)CALL ALINAR(C(33),C(34),ONE,RNSLPP,RK,Y1)
125 IF(KFLAGD.NE.1)CALL ALINAR(C(35),C(36),ONE,RNSLPP,RK,Y2)
126 D(17)=Y1 $C(18)=Y2 $GOTO28
127 26 IF(IT(2).EQ.1.AND.KFLAGS.EQ.1)CALL XPNSHL(C(33),C(34),ONE,
128 1 RNSLPP,RK,Y)
129 IF(IT(2).EQ.1.AND.KFLAGS.NE.1)CALL ALINAR(C(33),C(34),ONE,
130 1 RNSLPP,RK,Y)
131 IF(IT(2).EQ.0.AND.KFLAGD.EQ.1)CALL XPNSHL(C(35),C(36),ONE,
132 1 RNSLPP,RK,Y)
133 IF(IT(2).EQ.0.AND.KFLAGD.NE.1)CALL ALINAR(C(35),C(36),ONE,
134 1 RNSLPP,RK,Y)
135 IF(IT(2).EQ.0)D(18)=Y $IF(IT(2).EQ.1)D(17)=Y
136 DO 32 J=1,8
137 J8=J+8 $A1=C(J) $B=C(J8) $E=C(J8+8) $F=C(J+24)
138 CALL XPNSHL(A1,B,RN1,RN2,RI,Y1)
139 CALL XPNSHL(E,F,RN1,RN2,RI,Y2)
140 IF(ICRNR(J).EQ.2)CALL ALINAR(A1,B,RN1,RN2,RI,Y1)
141 IF(ICRNR(J8).EQ.2)CALL ALINAR(E,F,RN1,RN2,RI,Y2)
142 D(J)=Y1 $D(J8)=Y2
143 32 CONTINUE
144 MIT3=IT(3) $MIT4=IT(4) $IF(IT(1).EQ.1)GOTO29
145 IF(D(MIT3).LT.C(MIT4).AND.IT(2).EQ.0)D(17)=C(33)
146 IF(D(MIT3).LT.C(MIT4).AND.IT(2).EQ.1)D(18)=C(35)
147 IF(D(MIT3).LT.C(MIT4).AND.IT(2).EQ.1)GOTO33
148 IF(D(MIT3).GE.C(MIT4))GOTO35
149 DO 40 J=9,16
150 D(J)=C(J+8)
151 GOTO28
152 29 IF(D(MIT3).GT.C(MIT4).AND.IT(2).EQ.0)D(17)=C(33)
153 IF(D(MIT3).GT.C(MIT4).AND.IT(2).EQ.1)D(18)=C(35)
154 IF(D(MIT3).GT.C(MIT4).AND.IT(2).EQ.1)GOTO33
155 IF(D(MIT3).LE.C(MIT4))GOTO35
156 DO 34 J=9,16
157 34 D(J)=C(J+8)
158 GOTO28
159 33 DO 36 J=1,8
160 36 D(J)=C(J)
161 GOTO28
162 35 IFGREC=IFGFEC+1
163 IF(IFGREC.EQ.1)ITIME=I
164 IF(IFGREC.EQ.1)RITIME=ITIME
165 IF(IT(2).EQ.0.AND.KFLAGS.EQ.1)CALL XPNSHL(C(33),C(34),ONE,
166 1 RNSLPP,RK,Y)
167 IF(IT(2).EQ.0.AND.KFLAGS.NE.1)CALL ALINAR(C(33),C(34),ONE,
168 1 RNSLPP,RK,Y)
169 IF(IT(2).EQ.1.AND.KFLAGD.EQ.1)CALL XPNSHL(C(35),C(36),ONE,
170 1 RNSLPP,RK,Y)
171 IF(IT(2).EQ.1.AND.KFLAGD.NE.1)CALL ALINAR(C(35),C(36),ONE,
172 1 RNSLPP,RK,Y)
173 IF(IT(2).EQ.1)D(18)=Y $IF(IT(2).EQ.0)D(17)=Y
174 IF(IT(2).EQ.1)GOTO37

```

```

175      DO 38 J=9,16
176      A1=C(J+8) $B=C(J+16) $CALL XPNSHL(A1,B,RITIME,RN2,RI,Y)
177      IF(ICRNR(J).EQ.2)CALL ALINAR(A1,B,RITIME,RN2,RI,Y)
178      38 D(J)=Y
179      GOTO28
180      37 DO 39 J=1,8
181      E=C(J) $F=C(J+8) $CALL XPNSHL(E,F,RITIME,RN2,RI,Y)
182      IF(ICRNR(J).EQ.2)CALL ALINAR(E,F,RITIME,RN2,RI,Y)
183      39 D(J)=Y
184      28 CALL CMPTLT(D,X1,X2,X3,T1,T2)
185      THETA1(I,K)=T1 $THETA2(I,K)=T2
186      65 CONTINUE
187      25 CONTINUE
188      DO 41 I=1,NRECPT
189      SUM11=SUM12=SUM21=SUM22=0.
190      DO 42 J=1,I
191      AT=THETA1(J,I+1-J) $B=THETA2(J,I+1-J) $SUM11=AT+SUM11
192      SUM21=B+SUM21
193      42 CCNTINUE
194      LM=I-1 $IF(LM.LT.1)GOTO43
195      DO 44 J=1,LM
196      AT=THETA1(J,I-J) $B=THETA2(J,I-J) $SUM12=AT+SUM12 $SUM22=B+SUM22
197      44 CONTINUE
198      43 TX(I)=SUM21-SUM22 $TY(I)=SUM11-SUM12
199      41 CONTINUE
200      IF(IFLAG.EQ.2)GOTO46
201      AR=TX(1) $B=TY(1)
202      DO 47 I=1,NRECPT
203      TX(I)=TX(I)-AR
204      47 TY(I)=TY(I)-B
205      GOTO48
206      46 DO 49 I=1,NRECPT
207      TX(I)=TX(NRECPT)-TX(I)
208      49 TY(I)=TY(NRECPT)-TY(I)
209      48 CONTINUE
210      DO 50 I=1,NRECPT
211      TAMP(I)=SQRT((TX(I)**2)+(TY(I)**2))
212      50 CONTINUE
213      CALL AMINMX(TAMP,NRECPT,TAMPMN,TAMPMX)
214      AMPMAX(KTEST)=TAMPMX
215      DEPTH(KTEST)=C(28)
216      KTEST=KTEST+1
217      IF(KTEST.LE.20)GOTO75
218      KTEST=20 $DEPTHL=CASE
219      LU=7 $LNLGX=1 $LNLCY=1 $NCLX=2 $NCLY=2
220      DO 200 KM=4,8
221      200 LTITL2(KM)=10H
222      LTITL2(1)=10HMAXIMUM TI $LTITL2(2)=10HLT AMPLITU
223      LTITL2(3)=10HDL
224      WRITE(7,53) $READ(7,54)(LTITL(I),I=1,8)
225      53 FORMAT(*WRITE PLOT TITLE, 80 CHARACTERS*)
226      54 FORMAT(8A10)
227      MAJX=5 $MAJY=10
228      CALL AMINMX(AMPMAX,KTEST,A1,A2)
229      CALL AMINMX(DEPTH,KTEST,B1,B2)
230      WRITE(7,52)A1,A2,B1,B2
231      52 FORMAT(*MIN/MAX VALUES OF TILT AMPLITUDE = *,E10.3,5X,E10.3,/,
232      1 *MIN/MAX VALUES OF DEPTH = *,E10.3,5X,E10.3)

```

```

233      68 KTER1=10HTILT AMPLI $KTER2=10HTUDE
234      CALL AGRAPH(AMPMAX,DEPTH,A1,A2,KTEST,KTER1,KTER2)
235      WRITE(7,1234) $CALL GETNUM(A) $IF(A(1).EQ.1.)WRITE(7,1235)
236 1234  FORMAT(*Q=RE-START, 1=SPECIFY NEW DELTAX AND CONTINUE*)
237 1235  FORMAT(*ENTER NEW DELTAX*)
238      KTEST=1 $IF(A(1).EQ.0.)GOTO67 $IF(A(1).EQ.1.)GOTO1236
239      GOTO73
240 1236  CALL GETNUM(A) $DELTAX=A(1) $DEPTH=L=CASE=-DELTAX $KTEST=1
241      WRITE(7,1237) $CALL GETNUM(A) $IF(A(1).EQ.0.)GOTO67
242 1237  FORMAT(*Q=RE-START WITH ALL NEW VALUES*,/,
243      1 *1=RE-START WITH PREVIOUS VALUES AND NEW DELTAX*)
244      GOTO75
245      73  STOP $END
246      SUBROUTINE XPNSHL(P,Q,R1,S1,T,Y)
247      S=(T-R1)*6. $K=S1-R1 $IF(R.EQ.0.)R=1.E-2( $ALPHA=-S/R
248      Y=((Q-P)*(1.-EXP(ALPHA)))+P
249      RETURN $END
250      SUBROUTINE ALINAR(P,Q,R,S,T,Y)
251      Y=((Q-P)*(T-R))/(S-R) + P
252      RETURN $END
253      SUBROUTINE SLPCRN(LFLAG,MFLAG,ICNR)
254      DIMENSION A(20),ICNR(16)
255      WRITE(7,1)
256      1  FORMAT(*1=VARIABLE INCREMENTED EXPONENTIALLY*,/,
257      1 *2=VARIABLE INCREMENTED LINEARLY*)
258      IF(MFLAG.NE.0)GOTO2
259      WRITE(7,3) $CALL GETNUM(A) $ICNR(1)=ICNR(3)=A(1)
260      3  FORMAT(*D1X1, D1X3, D2X3, D3X1*)
261      ICNR(2)=ICNR(8)=A(2) $ICNR(4)=ICNR(6)=A(3)
262      ICNR(5)=ICNR(7)=A(4)
263      2  IF(LFLAG.NE.0)RETURN
264      WRITE(7,4) $CALL GETNUM(A) $ICNR(9)=ICNR(11)=A(1)
265      4  FORMAT(*C1X1, C1X3, C2X3, C3X1*)
266      ICNR(10)=ICNR(16)=A(2) $ICNR(12)=ICNR(14)=A(3)
267      ICNR(13)=ICNR(15)=A(4) $RETURN $END
268      SUBROUTINE TRIGGR(IT)
269      DIMENSION A(20),IT(4)
270      WRITE(7,1) $CALL GETNUM(A) $IT(1)=A(1) $WRITE(7,2)
271      1  FORMAT(*O = D(I1) > C(I2), 1 = D(I1) < C(I2)*)
272      2  FORMAT(*O = STRIKE-SLIP/1 = DIP-SLIP ZONE TRIGGERED*)
273      CALL GETNUM(A) $IT(2)=A(1) $WRITE(7,3)
274      3  FORMAT(*SPECIFY I1 AND I2*)
275      CALL GETNUM(A) $IT(3)=A(1) $IT(4)=A(2)
276      RETURN $END
277      SUBROUTINE AGRAPH(R,T,A1,B,NREOPT,K1,K2)
278      COMMON/JPLCT/XLT,XRT,YLC,YUP,MAJX,MAJY,KX(2),KY(2),
279      1 LTITL(8),LU,LTF,LNLGX,LNLGY,NCLX,NCLY,LTITL2(8)
280      DIMENSION R(50),T(50),A(20),KX(2),KY(2)
281      KX(1)=10HDEPTH TO L $KX(2)=10HOWER EDGE
282      XLT=T(1) $XRT=T(NREOPT) $KY(1)=K1 $KY(2)=K2
283      YLC=A1 $YUP=B
284      13  WRITE(7,3) $READ(7,4)CH $IF(CH.EQ.1HN.OR.CH.EQ.1H)GOTO5
285      3  FORMAT(*SET HORIZONTAL SCALE? Y OR N(=BLANK)*)
286      4  FORMAT(A1)
287      WRITE(7,6) $CALL GETNUM(A) $XLT=A(1) $XRT=A(2)
288      6  FORMAT(*MIN/MAX X VALUES*)
289      5  WRITE(7,7) $READ(7,4)CH $IF(CH.EQ.1HN.OR.CH.EQ.1H)GOTO8
290      WRITE(7,9) $CALL GETNUM(A) $YLO=A(1) $YUP=A(2)

```

```

291 7  FORMAT(*SET VERTICAL SCALE? Y OR N(=BLANK)*)
292 9  FORMAT(*MIN/MAX Y VALUES*)
293 8  AA=YUP $IF(YLO.EQ.AA)YUP=YUP+1.  $IF(YLO.EQ.AA)YLC=YLO-1.
294  WRITE(7,10)KY(1),KY(2)
295 10  FORMAT(*SKIP PLOT OF *,2A10,*?)
296  READ(7,4)IJVAR
297  IF(IJVAR.EQ.1HN.OR.IJVAR.EQ.1H )CALL PLOTS(R,T,1,NRECPT)
298  WRITE(7,12) $CALL GETNUM(A)  $IRS=A(1)  $IF(IRS.EQ.1)GOTO13
299 12  FORMAT(*1 = NEW PLCT, 2 = RETURN*)
300  RETURN $ENC
301  SUBROUTINE AMINMX(R,NRECPT,B,A)
302  DIMENSION F(50)
303  AMIDPT=((R(NRECPT)-R(1))/2.) + R(1)
304  A = B =AMIDPT
305  DO 1 I=1,NRECPT
306  IF(R(I).GT.A)A=R(I)
307  IF(R(I).LT.B)B=R(I)
308  1  CONTINUE
309  RETURN $ENC
310  SUBROUTINE CMPTLT(D,X1,X2,X3,T1,T2)
311  DIMENSION C(20)
312  A1=A2=A3=A4=B1=B2=B3=B4=0.
313  DA1=DA2=CA3=DA4=DB1=DB2=DB3=DB4=0.
314  U1=D(17)  $U3=D(18)
315  IF(U1.EQ.C.)GO TO 1
316  CALL TILT(C(17),X1,X2,X3,D(11),D(12),A1,B1)
317  CALL TILT(D(17),X1,X2,X3,D(9),D(10),A2,B2)
318  CALL TILT(C(17),X1,X2,X3,D(13),D(14),A3,B3)
319  CALL TILT(C(17),X1,X2,X3,D(15),D(16),A4,B4)
320  1  IF(U3.EQ.C.)GO TO 2
321  CALL DPSPTL(D(18),X1,X2,X3,D(3),D(4),CA1,DE1)
322  CALL DPSPTL(D(18),X1,X2,X3,D(1),D(2),DA2,DE2)
323  CALL DPSPTL(D(18),X1,X2,X3,D(5),D(6),DA3,DE3)
324  CALL DPSPTL(D(18),X1,X2,X3,D(7),D(8),DA4,DE4)
325  2  T1=A1-A2-A3+A4+DA1-DA2-DA3+DA4
326  T2=B1-B2-B3+B4+DB1-DB2-DB3+DB4
327  RETURN $ENC
328  SUBROUTINE TILT(U1,X1,X2,X3,P1,P3,T1,T2)
329  F=SQRT((X1-P1)**2+X2**2+(X3-P3)**2)
330  RP=R+P3
331  T1=(U1/12.5664)*(X2*(X1-P1)*(R*RP-(R+2.*P3)*(2.*R+P3)))/
332  1  (R**3*RP**2)
333  T2=(U1/12.5664)*(X2**2*(R*RP-(R+2.*P3)*(2.*R+P3)))/(R**3*RP**2)
334  1  +(R+2.*P3)/(R*RP))
335  RETURN $ENC
336  SUBROUTINE DPSPTL(U3,X1,X2,X3,P1,P3,DT1,DT2)
337  R=SQRT(((X1-P1)**2)+(X2**2)+((X3-P3)**2))
338  DT1=(U3/6.28318)*((X2*P3)/R)*((1./(R**2))-(1./(((X1-P1)
339  1  **2)+(X2**2))))
340  DT2=(U3/6.28318)*(((X1-P1)*P3)/((X2**2)+(P3**2)))*(((P3**2)
341  1  -(X2**2))/(R*((X2**2)+(P3**2)))+(1./(((X1-P1)**2)+(P3**2))
342  1  /(R**3))+((X2**2)+(P3**2))/(R*((X1-P1)**2)+(X2**2))))
343  RETURN $ENC
344  SUBROUTINE GETNUM(R)
345  DIMENSION F(1),L(80)
346  READ(7,9)L $ I=J=0
347  6  J=J+1 $ N=P=S=0 $ M=F=1
348  5  I=I+1 $ IF(I.GT.80)RETURN $ D=L(I) $ K=4

```


07 JUL 76

08.37.44

MCHUGH .STRTCH

PAGE 7²⁻¹⁰⁰

```
349      IF(D.EQ.38)K=2 & IF(D.GE.27.A.D.LE.36)K=1
350      IF(D.EQ.47)K=3 & K=K+S & GOTO(1,2,3,5,1,4,3,4)K
351      1 N=N*10+D-27          & S=4          & GO TO 5
352      2 M=-1                 & S=4          & GO TO 5
353      3 P=I                   & S=4          & GO TO 5
354      4 IF(P.NE.0)F=10.** (I-P-1) & R(J)=N/F*M & GO TO 6
355      5 FORMAT(80R1)
356      END
```