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UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

(Reports Open file Series)

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

PROCEDURE FOR PROCESSING
ANALOG STRIP-CHART RECORDS
FROM CREEPMETERS AND STRAINMETERS

by

P. A. Yamashita, D. D. Goodreau and A. C. Jones

Open-file Report
1974

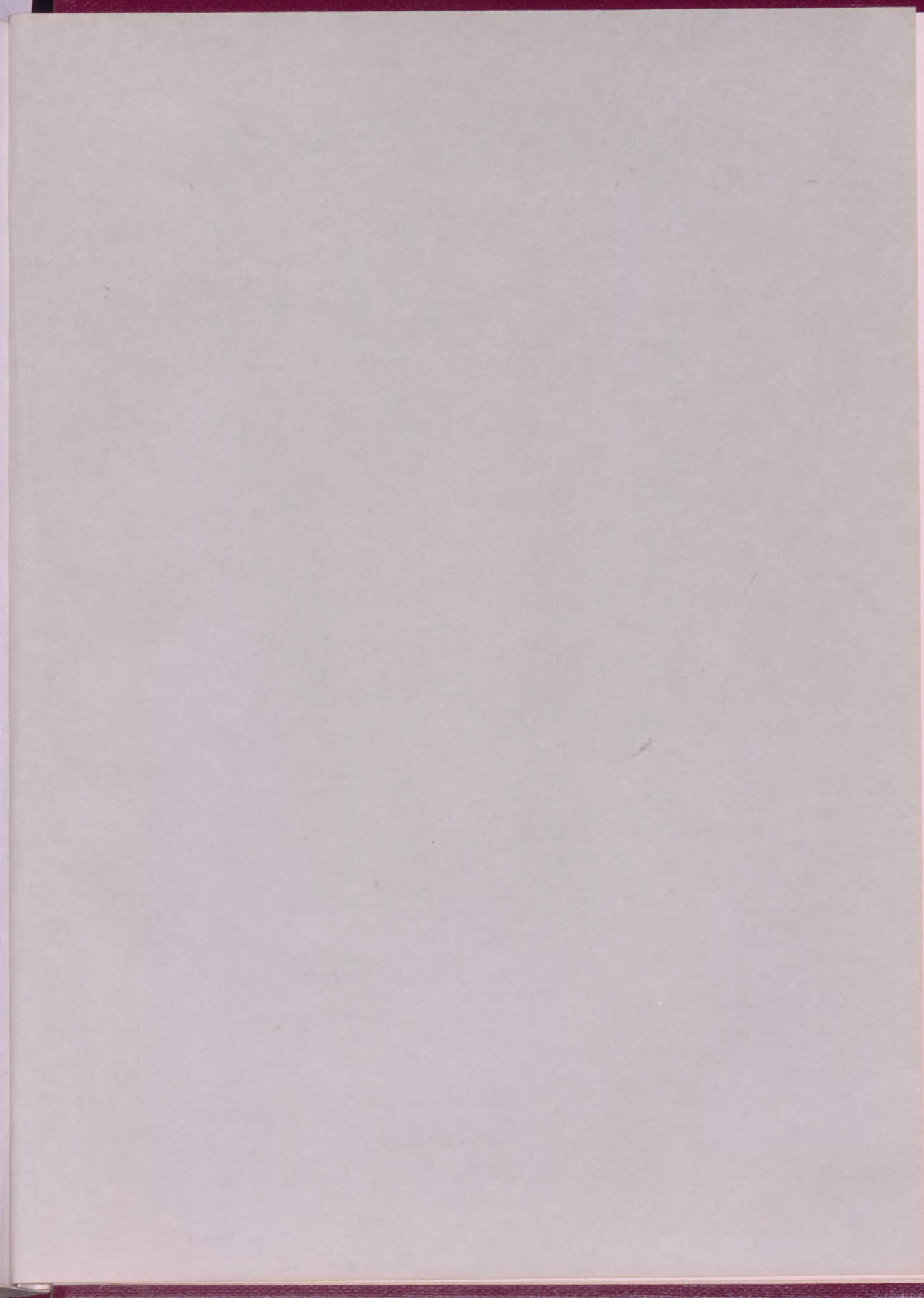
This report is preliminary and has
not been edited or reviewed for
conformity with Geological Survey
standards and nomenclature.

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U.S. GEOLOGICAL SURVEY
12201 Sunrise Valley Drive
Reston, Virginia, 22092

For release MAY 2, 1974

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1. Some geotechnical facts that affect development, Hayward shoreline area, California, by S. D. McDonald and D. R. Nichols. 2 sheets, scale 1:24,000. 504 Custom House, San Francisco, Calif. 94111; 7638 Federal Bldg., Los Angeles, Calif. 90012; California Div. Mines and Geology, 118 Resources Bldg., 1416 9th St., Sacramento, Calif. 95814; Ferry Bldg., San Francisco, Calif. 94111; State Office Bldg., 107 So. Broadway, Los Angeles, Calif. 90012.

2. Procedure for processing analog strip-chart records from creepmeters and strainmeters, by P. A. Yamashita, D. D. Goodreau, and A. C. Jones. 78 p. [See depositories listed following No. 1, above. Material from which copy can be made at private expense is available in the San Francisco, Menlo Park, and Los Angeles offices of the U.S. Geological Survey.]

3. Generalized geologic map of the southern part of the Mantua quadrangle, Weber County, Utah, by Martin L. Sorensen and Max D. Crittenden, Jr. 1 sheet, scale 1:24,000. 8102 Federal Office Bldg., Salt Lake City, Utah 84111; 1012 Federal Bldg., Denver, Colo. 80202.

(*) Due to move of USGS Library from Washington, D.C., to the USGS Natl. Headquarters in Reston, Va., the announced reports will not be available to the public at this address until mid-May 1974.

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INTRODUCTION

The NCER wire extensometers provide a means to measure small horizontal movements between two fixed points near the surface of the earth. A segment of Invar wire is stretched between two vertical pipes 10 m or more apart. The pipes are imbedded in concrete. One end of the wire is clamped to an adjustable anchor point attached to one pipe, and the other end is run via a knife-edge pivot to the ferrite core of a displacement transducer. A steel rod is used to tie the lower end of the core to a 2 kg steel weight (Figure 1). A more complete description of the general instrument is contained in an open-file report by Yamashita and Burford (1973).

The wire extensometers have been installed both as creepmeters and as near-field strainmeters. Creepmeters are installed at an angle of 30 degrees across the traces of active fault segments, while strainmeters are installed near such traces, but within unfaulted material. Both types of installation consist of basically the same mechanical and electronic components. Readings from the creepmeter installations are converted to equivalent fault-slip values.

The horizontal component of relative displacement between the pipes is transmitted mechanically to the ferrite core. The transducer produces an electrical signal (voltage level) which is proportional to core displacement. The DC voltage level from the transducer is amplified and transferred to an onsite Rustrak recorder. In some cases the signal is also sent back to Menlo Park on a telephone line. The amplified DC signal

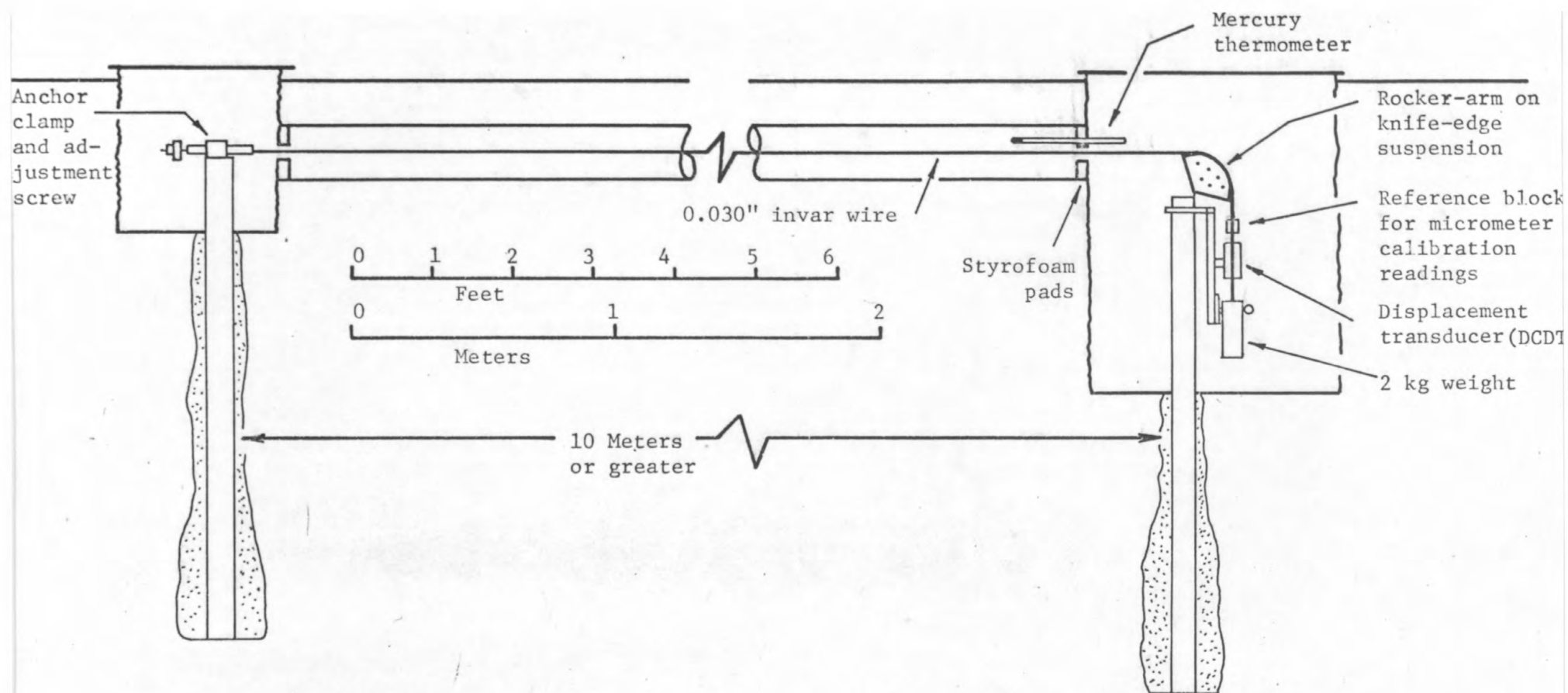


Figure 1. Cross-section sketch of 1969 creepmeter installation showing adjustable anchor point and arrangement of mechanical and electronic measurement devices in the instrument enclosure.

changes the frequency of an onsite voltage-controlled oscillator (VCO). These oscillators provide FM signals that can be transmitted on phone lines. In Menlo Park the FM tones are converted back to DC voltage signals by discriminators.

To maintain an expanded scale on the small Rustrak recorder, a stepper circuit is used. Five comparators are pre-set to voltages corresponding to the voltages necessary to deflect the recorder pen to near the edge of the paper. The stepper unit provides for five full widths of record from the Rustrak recorder, 5 mm displacement full scale for each of five steps, corresponding to a total range of ± 12.5 mm.

Power to run the onsite recorder and transmitter package for approximately six months is provided by two "air cell" batteries connected in series for a 5-volt, 1000 amp-hour supply.

The following procedure description was written primarily as a guide for the routine processing of Rustrak onsite records from creepmeters and strainmeters maintained by NCER. The methods presented here are quite general and can be easily adapted to the processing of data from other types of analog strip-chart records.

PROCEDURE

Special forms for the input of field data are the primary source of readings used in processing the Rustrak records (Figures 2 and 3). The information contained on these field sheets consists of the station name and code, GMT date and time, temperature in the pit, mean micrometer reading, reader's initials and remarks. These data are checked, punched on computer cards, and filed. The field sheets are filed and kept available

WIRE CREEPMETER STATION NAME Melendy Ranch

STATION
CODE

KMR1

MO

7

DAY

10

YEAR

13

TIME

16

TEMP °F

22

MICRO

READING

29

READER

37

13.348 M SEU

Time code:

GMT = G

PST = S

PDT = D

Enter "1" if reset

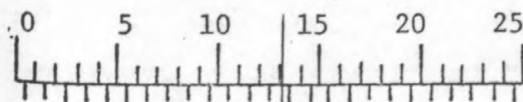
Strip chart location for this reading:

Start 1816 GMT

Middle GMT

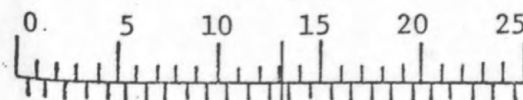
End 1809 GMT

Reading No. 1

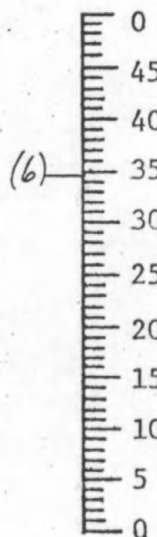
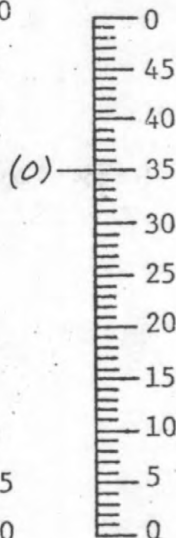
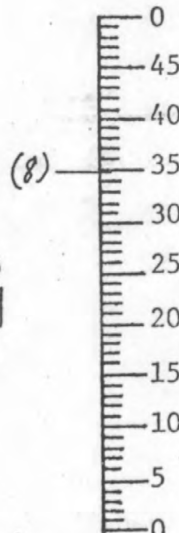
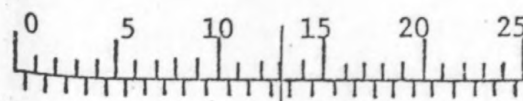


13.3

Reading No. 2



Reading No. 3



Reading No. 1: 13.348 mm

Reading No. 2: 13.350

Reading No. 3: 13.346

Total mm

Mean 13.348 mm

MARKS:

Figure 2. Form used for collecting data from field sites. Contains start data for the Melendy Ranch record used as an example: The numbers above the main line of information denote column numbers for punching data on the computer cards.

WIRE CREEPMETER STATION NAME Melendy Ranch

STATION
CODE

MR1

MO DAY YEAR TIME
7 10 13 16
07 18 73G 2130

TEMP °F
22
83.2

MICRO READING READER
29 37
16.564 M SE4

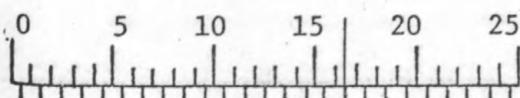
Time code: GMT = G
PST = S
PDT = D

Enter "1" if reset

Strip chart location for this reading:

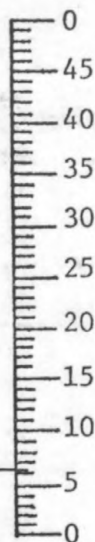
Start _____ GMT
Middle _____ GMT
End 2133 GMT

Reading No. 1

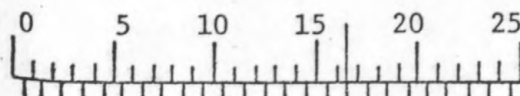


16.5

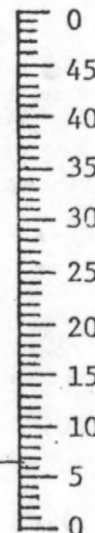
(4)



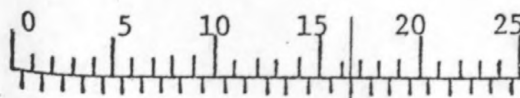
Reading No. 2



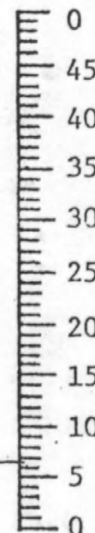
(5)



Reading No. 3



(5)



Reading No. 1: 16.564 mm
Reading No. 2: 16.562
Reading No. 3: 16.565

Total _____ mm

Mean 16.564 mm

MARKS:

Figure 3. Form used for collecting data from field sites, with end data for the Melendy Ranch record used as an example.

for the processing of the incoming Rustrak records and as a part of the permanent record for the instrument. Periodically the cards are submitted with the creepmeter calibration program. The computer-generated cards are then combined with the creep plot program for a 30-inch plot on which the calibration readings from 10 to 15 stations may be entered.

A calibrated grid is placed on each Rustrak record by numbering the grid lines on the chart paper that most nearly represent one day. Most of the upper half of the observation sheet (Figures 4 and 5) can be completed as the record is being read. The chart speed and the chart factor are calculated from the simple formulas given on the bottom half of the observation sheet. The chart speed is assumed constant for each chart and usually remains quite constant for the recorder unit at each station. An average chart speed determined for each recording station is used for estimating the end time of the recorder trace if a failure occurs. Chart factors are also assumed constant and the averages are used to estimate the end micrometer reading when necessary.

Creep events and anomalous behavior are noted on a special sheet (Figure 6) by the origin time according to the calibrated grid. The overall trace excursion is also measured. The event onset times are then estimated to the nearest minute and the "slip" is determined to the nearest hundredth of a millimeter. Fault slip values from creepmeter records are derived by the following formula: chart factor times trace excursion divided by the cosine of 30° (0.86603). Xerox copies of Rustrak records showing creep events are filed for analysis (see open-file report by Yamashita and Burford, 1973).

As each record is read, entries are made on an evaluation sheet as

STATION NAME Walerdy RanchDATE 6/14/23 → 7/18/23

comments

START TIME (T_o) 23:165:18:16 GMT
 T START position (0 x12) + 1.191 T-div
 "d" START position 6.00 d-div
 START MIC. READING 13.348 mm
 1st PLOT POINT TIME (T_p) 23:165:19:52 GMT
 ACTUAL START MIC. 13.348 mm
 ACTUAL END MIC. 16.564 mm
 AVERAGE CHART FACTOR .5516 mm/d-div

END TIME (T_f) 23:199:21:23 GMT
 T END position (34 x12) + 2.008 T-div
 "d" END position 1.97 + 9.61 + 0.12 = 11.70 d-div 11.70
 END MIC. READING 16.564 mm
 ACTUAL END TIME 23:199:21:23 GMT
 RESET 60.573 mm

LAPSED TIME T_f 23:199:21:23
 $-T_o$ 23:165:18:16 = 819.117 Total hours
34 03 07

CHART LENGTH = [(34 - 0) x 12] + 2.008 - 1.191 = 408.817 T-div
 CHART SPEED (CS) = 2.00362753 hrs/T-div
 MIC. DIFFERENCE = 16.564 - 13.348 = 3.216 mm
 "d" POSITION DIFF = 11.70 - 6.00 = 5.70 d-div
 "d" CHART FACTOR = 0.5642 mm/d-div
 "S" (Slip) FACTOR = ("d" FACTOR / .86603)

Strip chart calculations pertaining to: STA. CODE XFL 1 8CHART NO. 1STATION NAME Frank Lewis LongDATE 4/23/73 → ≈ 6/15/73

comments

START TIME (T_0)	<u>73:113:23:50</u>	GMT	
T START position	(<u>0</u> x 12) + <u>10.616</u>	T-div	
"d" START position	<u>4.96</u>	d-div	
START MIC. READING	<u>12.536</u>	mm	
1st PLOT POINT TIME (T_p)	<u>73:114:02:36</u>	GMT	
ACTUAL START MIC.	<u>12.536</u>	mm	
ACTUAL END MIC.	<u>14.198</u>	mm	
AVERAGE CHART FACTOR	<u>0.5000</u>	mm/d-div	
END TIME (T_f)	<u>73:166:07:43</u>	GMT	<u>time estimated</u>
T END position	(<u>53</u> x 12) + <u>0.750</u>	T-div	<u>paper ran out</u>
"d" END position	<u>8.02</u>	d-div	
END MIC. READING	<u>14.066 E</u>	mm	<u>estimated</u>
ACTUAL END TIME	<u>73:173:23:36</u>	GMT	
RESET	<u>-12.345</u>	mm	

LAPSED TIME T_f 73:166:07:43
 $-T_0$ 73:113:23:50 = 1255.890 Total hours
≈ 52 07 53

CHART LENGTH = [(53 - 0) x 12] + 0.750 - 10.616 = 626.134 T-div
 CHART SPEED (CS) = 2.0057839 (average) hrs/T-div
 MIC. DIFFERENCE = 14.066 - 12.536 = 1.53 mm
 "d" POSITION DIFF = 8.02 - 4.96 = 3.06 d-div
 "d" CHART FACTOR = 0.5000 (average) mm/d-div
 "s" (Slip) FACTOR = _____ ("d" FACTOR / .86603)

good record

Figure 5. Observation sheet for assembling data from an onsite analog record and field sheets. This record terminated before normal collection time.

to the overall performance of the electronics or any unusual behavior seen by the reader, for the benefit of the field crew who are unable to check each record. Xerox copies of Rustrak records showing questionable behavior may accompany this sheet to call attention to specific long-term anomalies.

The data trace is sampled at approximate four-hour intervals on the chart paper grid. The GMT date and time of the first plotted point is calculated for the computer. The GMT dates and times of all subsequently plotted points are determined by the computer with an accumulated error limited to ± 2 minutes on the last plotted point for any length of record. The plot samples are punched directly from the plot sheet (Figures 7a and 7b) onto computer cards.

The decks of plotted data are submitted to the computer with two header cards in the front of each deck of station data and a blank card after each deck. The information for the header cards is contained on the upper half of the observation sheets and is punched in the order as written. The reset enables the plots of two separate charts of the same creepmeter station to be continuous when submitted separately.

There is one basic Rustrak FORTRAN program that can be altered. The various changes that can be made are the tolerance "window" for the chart factor, slip calculations for various extensometer angles to the fault trace, and a punch or no-punch option. Compiled decks in machine language from the source program, after the various options have been decided, are recommended for normal usage because of the awkward bulk of the FORTRAN source. The chart-factor "window" is used to force any unusual chart factor to be deleted and the average to be used. This can be overridden

STATION NAME XMR 1 11CHART NUMBER 12DATE 6/14 + 7/18/23PLOT SHEET NO. 10.480 / 60 = 0.800 $T_p = T_o +$ 1 hr 36 minTIME OF FIRST PLOTTED POINT 23:165:19:52

T-DIV	T-DIV 12	T-DIV 2	T-DIV 4	T-DIV 6	T-DIV 8	T-DIV 10	
00		597	597	600	600	601	
01	601	600	598	600	600	600	
02	599	598	598	600	601	602	
03	602	600	598	600	601	602	
04	602	599	598	600	601	602	
05	602	598	597	599	601	601	
06	601	598	597	599	601	602	
07	603	605	618	621	624	625	
08	624	621	620	622	624	627	
09	627	625	622	625	630	632	
10	627	623	623	633	635	638	
11	635	624	621	628	632	633	
12	630	621	622	629	630	635	
13	634	622	622	627	635	637	
14	635	629	628	638	639	639	
15	639	634	635	640	640	640	
16	640	638	638	640	640	641	
17	641	639	640	642	643	643	
18	642	640	641	647	652	658	
19	681	681	681	687	690	692	
20	692	684	684	692	696	697	
21	695	689	690	697	698	700	
22	700	698	698	701	701	703	
23	701	700	701	702	704	708	
24	703	701	701	702	703	704	
25	704	701	701	705	713	713	
26	708	703	705	717	720	720	
27	720	716	718	719	720	720	

Figure 7a. Plot data for Melendy Ranch record. First column pertains to calibrated grid. Other six columns denote chart paper grid lines at approximate four-hour intervals.

Figure 7b: Continuation of Figure 7a.

by entering any desired chart factor. The data decks are first submitted to the computer on the no-punch option for preliminary checking of errors.

Although the slip values are derived from the micrometer readings through a constant factor (secant 30 degrees), two plots are printed due to the scale difference. After necessary corrections are made, the data cards are combined with a Rustrak program with a punch option. The corrected printer output and the computer-generated cards are combined with previous data and filed.

These computer-generated cards are periodically entered into a printer-plot program that plots a continuous slip graph of the data for a continuity check before the cards are submitted with the UCC plot program for a time-compressed micrometer display and analysis plot of 20 days/inch.

Examples of program and data input, and data output are included in the appendix.

ACKNOWLEDGEMENTS

Special thanks are given to Frederick W. Lester, Paul G. Bauer, Phillip W. Harsh, Paul C. Weisner, Kenneth M. Yamashita, Stephen E. Urbani, Carl E. Mortensen, Ralph J. Lamson, Gary D. Hamilton, William K. Gawthrop, Willie T. Kinoshita, and R. O. Burford for their work in maintaining the instruments, gathering the mechanical readings and Rustrak records, and making the standardization of these procedures and the computer program development a necessity.

Paul C. Weisner developed the Creep Calibration, Creep Plot, and Standard Creep Time Calendar FORTRAN programs.

Special thanks are due R. O. Burford for formulating the basic routines and the data analysis procedure.

REFERENCES

Yamashita, P. A., and Burford, R. O., 1973, Open-file report of preliminary results from an 18-station creepmeter network along the San Andreas fault system in central California.

APPENDIX: LISTINGS OF THE FORTRAN COMPUTER PROGRAMS, THE INPUT FOR AND
OUTPUT FROM THEM AS USED FOR PROCESSING ANALOG STRIP-CHART RECORDS FROM
CREEPMETERS AND STRAINMETERS

(Fortran IV is the language used for programming)

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The continuous time base for wire creepmeter and creepmeter calibration plot programs is called "standard creep time" in our analysis scheme. A creep calendar starting with a nonleap year consisting of universal calendar days, Julian days, and continuous creep time can be generated by the standard creep time calendar program.

Only one record from the Melendy Ranch station (XMRL) is used for an example throughout the various computer programs. An example of how a record is treated when it terminates before the normal collection time is shown by a chart from a Frank Lewis Ranch station.

WIRE CREEPMETER PROGRAM

tial program for wire creepmeter field readings including sample data.

```

MOD 04/05/73 BY DAVE GOODREAU
REAL*4 K,Y(500)
REAL*8 X(500)
INTEGER NAMES(6),FAULT(4),LAT(3),LONG(3),MAT(4),CODE,DAY,YR,TIME,
1 READER,REMARK(10),COUNT,ZONE,ADJ,ECARD
DATA L,ECARD/'PUNC','END '/'
99 IC = 0
K = 0
READ(5,2) NAMES,FAULT,DIST,LAT,LONG
IF(NAMES(1).EQ.ECARD) GO TO 100
READ(5,3) GL,ANGLE,MAT,TC
98 READ(5,4) CODE,MO,DAY,YR,ZONE,TIME,TEMP,TR,MEAS,ADJ,READER,REMARK
IF(MO.EQ.9999) GO TO 99
IF(MO.EQ.1000) CALL STEP (TR,K,TEMP,TC,MAT,REMARK)
IF(MO.EQ.1000) GO TO 98
YR= 1900 + YR
CALL CALC (ANGLE,DA,DS,DSC,K,TEMP,TR,TC,ZONE,ADJ,MEAS)
CALL TAB (MO,DAY,YR,IC,NAMES,FAULT,DIST,LAT,LONG,GL,ANGLE,MAT,JD,
1 TIME,TEMP,DA,DS,DSC,TC,K,READER,REMARK,Y,X,TR,MEAS,ZONE)
GO TO 98
99 YZERO = TR
IF(REMARK(1).EQ.L) CALL CARDS(NAMES,X,Y,IC,YZERO)
GO TO 399
2 FORMAT (10A4,F8.0,6X,3I3,5X,3I3)
3 FORMAT(2E6.0,4A4,F10.0)
4 FORMAT(A4,I4,2I3,A1,I4,F6.6,F9.0,A1,I1,11A4)
00 STOP
END
SUBROUTINE STEP (TR,K,TEMP,TC,MAT,REMARK)
REAL K
INTEGER MAT(4),REMARK(10)
V=ABS(TR)
IF(V.GT.1.E-04) K = K+TR
V=ABS(TEMP)
IF(V.GT.1.E-08) TC= TEMP
DATA L/' '/'
IF(REMARK(1)-L) 99,101,99
99 DO 100 I =1,4
MAT(I) = REMARK(I)
10 CONTINUE
11 RETURN
END
SUBROUTINE CALC (ANGLE,DA,DS,DSC,K,TEMP,TR,TC,ZONE,ADJ,MEAS)
INTEGER*4 ADJ,ZONE

```

WIRE CREEPMETER PROGRAM, cont.

```

REAL K
DATA L1,TDS/'M',0./
A = ANGLE*3.14159265/180.
DC = TC*(TEMP-68.)/COS(A)*25.400005
IF MILLIMETERS USED, 0 TEMPERATURE CORRECTION WILL SET DC=0.0*****
IF(ADJ.GT.1) GO TO 100
99 DA = (TR/COS(A))*25.40005
IF(MEAS.EQ.L1) DA = (TR/COS(A))
DS= DA+DC
IF(ADJ.EQ.1) K = K+(TDS-DS)
TDS = DS
DSC= DS+K
GO TO 101
100 TTR = TR
TDA = (TR/COS(A))*25.40005
DST = TDA+DC
IF(ADJ.EQ.2) TTR = TTR+0.5
IF(ADJ.EQ.3) TTR = TTR-0.5
TDA = (TTR/COS(A))*25.40005
DST1 = TDA+DC
K = K+(DST1-DST)
GO TO 99
101 RETURN
END
SUBROUTINE TAB (MO,DAY,YR,IC,NAMES,FAULT,DIST,LAT,LONG,GL,ANGLE,
1 MAT,JD,TIME,TEMP,DA,DS,DSC,TC,K,READER,REMARK,Y,X,TR,MEAS,ZONE)
DIMENSION NAMES (6),FAULT(4),LAT(3),LONG(3),MAT(4),Y(500)
INTEGER TIME, READER, REMARK(10),FAULT,YR,ZONE,DAY
REAL K
REAL*8 X(500)
DATA L1,L2,L3,L4,L5/'G','S',' ','D','M'/
LONE=L1
JD= JDC(MO,DAY,YR)
IC = IC + 1
Y(IC)= DSC
L=(TIME/100)*100
M= TIME -L
L = L/100
H=(L +(M/60.))/24.
ENTER STANDARD CREEP TIME START YEAR (NON-LEAP) ON NEXT 2 CAPDS*****
STANDARD CREEP TIME 0 DAY = JAN1, 1961 *****
X(IC) = H + (JD-1) + (YR-1961)*365 + (YR-1961)/4
IF(ZONE.EQ.L2.OR.ZONE.EQ.L3) X(IC) = X(IC)+(8./24.)
IF(ZONE.EQ.L4) X(IC) = X(IC)+(7./24.)
IF(ZONE.EQ.L2.OR.ZONE.EQ.L3.OR.ZONE.EQ.L4)

```

WIRE CREEPMETER PROGRAM, cont.

```

1    CALL SCTJD(X(IC),YR,MO,DAY,TIME,NDM,JD)
    = OF LINES PER PAGE AFTER HEADING...50 FOR STANFORD, 35 FOR AMES
NQ = 35
IP = (IC/NQ)*NQ - IC
IF(IC.EQ.1.OP.IP.EQ.0) GO TO 100
GO TO 101
100 WRITE(6,1) NAMES,FAULT,DIST,LAT,LONG,GL,ANGLE,MAT
1    FORMAT(1H1,54X,'WIPE CREEPMETER RECORD'///,' SITE NAME: ',6A4,
1'   POSITION ON ',4A4,' FAULT ... ',F7.1,' KILOMETERS',/
2'   LATITUDE: ',3I3,' NORTH. LONGITUDE: ',3I3,' WEST. '/
3'   GAGE LENGTH: ',F5.1,' METERS. ANGLE TO FAULT: ',F6.1,' DEG.
3WIRE MATERIAL: ',4A4//1X,'YEAR',6X,
4    'SCT JD GMT TEMP GAGE R APPARENT CORRECT ACCUMULAT
5ED TEMP SLIP READ REMARKS'/
6 25X,'DEG F SLIP MM SLIP MM',2X,'SLIP --- MM CONST
7  CONST BY'//)
101 XIC = X(IC)
    IF(MEAS.EQ.L5) GO TO 102
    WRITE(6,2) YR, XIC,JD,TIME,TEMP,YR,DA,DS,DSC,TC,K,READER,REMARK
2    FORMAT(1X,I4,F9.3,I5,I5,F6.1,F8.4,F9.3,F9.3,3X,F10.2,F9.4,F9.3,
1 1X,11A4)
    GO TO 103
102 WRITE(6,3) YR, XIC,JD,TIME,TEMP,YR,DA,DS,DSC,TC,K,READER,REMARK
3    FORMAT(1X,I4,F9.3,I5,I5,F6.1,F8.3,F9.3,F9.3,3X,F10.2,F9.4,F9.3,
1 1X,11A4)
103 RETURN
END
FUNCTION JDC(MO,DAY,YR)
INTEGER DAY,YR
JDC=(MO-1)*31+DAY
IF(MO-3) 9,1,1
1 JDC = JDC-3
IF(MO-5) 9,2,2
2 JDC = JDC-1
IF(MO-7) 9,3,3
3 JDC = JDC-1
IF(MO-10) 9,4,4
4 JDC = JDC-1
IF(MO-12) 9,5,9
5 JDC = JDC-1
9 IF((MOD(YR,4).EQ.0).AND.(MO.GT.2)) JDC =JDC+1
RETURN
END
SUBROUTINE CARDS (NAMES,X,Y,IC,YZERO)
DIMENSION NAMES(6),Y(500)

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WIRE CREEPMETER PROGRAM, cont.

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REAL*8 X(500),DEND
WRITE(7,2) NAMES,YZERO
2 FORMAT(6A4,10X,F10.1)
WRITE(7,3) (X(I),Y(I),I=1,IC)
3 FORMAT(3(D16.9,F10.4))
WRITES AN END OF STATION DATA FLAG ON CARD
DEND = -1.0000
WRITE(7,3) DEND
RETURN
END
SUBROUTINE SCTJD(X,YR,MO,DAY,TIME,NDM,JD)
DIMENSION J(12)
INTEGER*4 YR,MO,DAY,TIME,JD
REAL*8 X
DATA J/'JAN','FEB','MAR','APR','MAY','JUN','JUL','AUG','SEP',
1'OCT','NOV','DEC'/
IX = X+1.D-6
ENTER STANDARD CREEP TIME START YEAR (NON-LEAP) ON NEXT 2 CARDS*****
YR = 1961 + ((IX-(IX/1460))/365
JD = 1 + IX - ((YR-1961)*365+(YR-1961)/4)
NDM = 31
IF(JD.LE.31) MO = J(1)
IF(JD.LE.31) DAY = JD
M = MOD(YR,4)
IF(M.EQ.0) GO TO 100
IF(JD.GE. 32.AND.JD.LE. 59) MO = J(2)
IF(JD.GE. 32.AND.JD.LE. 59) DAY = JD - 31
IF(JD.GE. 32.AND.JD.LE. 59) NDM = 28
IF(JD.GE. 60.AND.JD.LE. 90) MO = J(3)
IF(JD.GE. 60.AND.JD.LE. 90) DAY = JD-59
IF(JD.GE. 91.AND.JD.LE.120) MO = J(4)
IF(JD.GE. 91.AND.JD.LE.120) DAY = JD-90
IF(JD.GE. 91.AND.JD.LE.120) NDM = 30
IF(JD.GE.121.AND.JD.LE.151) MO = J(5)
IF(JD.GE.121.AND.JD.LE.151) DAY = JD-120
IF(JD.GE.152.AND.JD.LE.181) MO = J(6)
IF(JD.GE.152.AND.JD.LE.181) DAY = JD-151
IF(JD.GE.152.AND.JD.LE.181) NDM = 30
IF(JD.GE.182.AND.JD.LE.212) MO = J(7)
IF(JD.GE.182.AND.JD.LE.212) DAY = JD-181
IF(JD.GE.213.AND.JD.LE.243) MO = J(8)
IF(JD.GE.213.AND.JD.LE.243) DAY = JD-212
IF(JD.GE.244.AND.JD.LE.273) MO = J(9)
IF(JD.GE.244.AND.JD.LE.273) DAY = JD-243
IF(JD.GE.244.AND.JD.LE.273) NDM = 30

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WIRE CREEPMETER PROGRAM, cont.

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IF(JD.GE.274.AND.JD.LE.304) MO = J(10)
IF(JD.GE.274.AND.JD.LE.304) DAY = JD-273
IF(JD.GE.305.AND.JD.LE.334) MO = J(11)
IF(JD.GE.305.AND.JD.LE.334) DAY = JD-304
IF(JD.GE.305.AND.JD.LE.334) NDM = 30
IF((JD.GE.335).AND.(JD.LE.365)) MO = J(12)
IF(JD.GE.335.AND.JD.LE.365) DAY = JD-334
GO TO 101

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```

100 IF(JD.GE. 32.AND.JD.LE. 60) MO = J(2)
IF(JD.GE. 32.AND.JD.LE. 60) DAY = JD-31
IF(JD.GE. 32.AND.JD.LE. 60) NDM = 29
IF(JD.GE. 61.AND.JD.LE. 91) MO = J(3)
IF(JD.GE. 61.AND.JD.LE. 91) DAY = JD-60
IF(JD.GE. 92.AND.JD.LE.121) MO = J(4)
IF(JD.GE. 92.AND.JD.LE.121) DAY = JD-91
IF(JD.GE. 92.AND.JD.LE.121) NDM = 30
IF(JD.GE.122.AND.JD.LE.152) MO = J(5)
IF(JD.GE.122.AND.JD.LE.152) DAY = JD-121
IF(JD.GE.153.AND.JD.LE.182) MO = J(6)
IF(JD.GE.153.AND.JD.LE.182) DAY = JD-152
IF(JD.GE.153.AND.JD.LE.182) NDM = 30
IF(JD.GE.183.AND.JD.LE.213) MO = J(7)
IF(JD.GE.183.AND.JD.LE.213) DAY = JD-182
IF(JD.GE.214.AND.JD.LE.244) MO = J(8)
IF(JD.GE.214.AND.JD.LE.244) DAY = JD-213
IF(JD.GE.245.AND.JD.LE.274) MO = J(9)
IF(JD.GE.245.AND.JD.LE.274) DAY = JD-244
IF(JD.GE.245.AND.JD.LE.274) NDM = 30
IF(JD.GE.275.AND.JD.LE.305) MO = J(10)
IF(JD.GE.275.AND.JD.LE.305) DAY = JD-274
IF(JD.GE.306.AND.JD.LE.335) MO = J(11)
IF(JD.GE.306.AND.JD.LE.335) DAY = JD-305
IF(JD.GE.306.AND.JD.LE.335) NDM = 30
IF(JD.GE.336.AND.JD.LE.366) MO = J(12)
IF(JD.GE.336.AND.JD.LE.366) DAY = JD-335

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101 HR = (X-IX)*24.+1.D-6
MIN = (HR-AINT(HR))*60.+1.E-6
TIME = INT(HR)*100 + MIN
RETURN
END

```

XMRI	MELENDY RANCH	SAN ANDREAS	-350.8 KM.	036 35 42 N.	121 11 12 W.
10.	+ 30. INVAP WIRE				
XMRI1000		42.69			
XMRI	01 27 72G0217 47.0	7.520MPCW	DCDI & MICROMETER INSTALLED		
XMRI	01 31 72G2300 68.0	7.820M	EXTRA POINT		

WIRE CREEPMETER SAMPLE DATA

XMR1	02	01	72G0040	68.0	9.970M	EXTRA POINT
XMR1	02	02	72G0152	44.9	10.182M PCW	
XMR1	02	24	72G1556	68.0	10.921M	EXTRA POINT
XMR1	02	24	72G1656	68.0	11.696M	EXTRA POINT
XMR1	02	24	72G2211	53.9	11.696M PCW	
XMR1	02	24	72G2233	54.2	11.692M1PCW	AFTER REMOVING ANCHOR END BAFFLE
XMR1	02	29	72G0115	57.4	11.767M PCW	
XMR1	03	08	72G1615	58.5	11.879M PCW	BEFORE MAINTENANCE
XMR1	03	08	72G1750	59.0	11.377M1PCW	AFTER MAINTENANCE
XMR1	03	13	72G2021	68.0	11.484M	EXTRA POINT
XMR1	03	13	72G2121	68.0	13.328M	EXTRA POINT
XMR1	03	28	72G1604	55.5	13.700M CEM	
XMR1	03	28	72G1625	59.5	12.700M1CEM	AFTER ONE MM OFFSET
XMR1	04	14	72G1907	60.5	13.355M CEM	
XMR1	04	28	72G0111	68.0	13.874M	EXTRA POINT
XMR1	04	28	72G0211	68.0	16.125M	EXTRA POINT
XMR1	05	12	72G2214	77.0	16.649M CEM	
XMR1	06	08	72G2000	77.9	17.133M CEM	READ BEFORE MAINTAINACE
XMR1	06	08	72G2100	83.0	17.129M CEM	READ AFTER MAINTAINANCE
XMR1	07	02	72G0735	68.0	17.797M	EXTRA POINT
XMR1	07	02	72G0835	68.0	19.806M	EXTRA POINT
XMR1	07	03	72G1954	81.9	19.880M CEM	
XMR1	07	07	72G1606	77.0	19.980M SEU	BEFORE MICROMETER RESET
XMR1	07	07	72G1647	77.0	11.477M1SEU	AFTER MICROMETER RESET
XMR1	08	08	72G2022	83.8	11.803M CEM	
XMR1	09	03	72G2143	68.0	12.583M	EXTRA POINT
XMR1	09	03	72G2243	68.0	15.052M	EXTRA POINT
XMR1	09	05	72D1631	80.1	15.115M SEU	
XMR1	09	11	72G2041	74.2	15.047M ROB	BEFORE CALIBRATION OFFSET
XMR1	09	11	72G2106	74.2	05.489M1ROB	AFTER CALIBRATION OFFSET
XMR1	10	10	72D1331	68.0	06.040M SEU	
XMR1	10	26	72G0937	68.0	06.400M	EXTRA POINT
XMR1	10	26	72G1037	68.0	08.721M	EXTRA POINT
XMR1	12	04	72S1423	51.0	9.572M SEU	
XMR1	01	09	73G2110	46.4	10.522M SEU	ELECTRONICS DRY, MORE DESSICANT ADDED
XMR1	01	11	73G0312	68.0	10.600M	EXTRA POINT
XMR1	01	11	73G0412	68.0	13.112M	EXTRA POINT
XMR1	02	07	73G1952	50.0	17.929M SEU	
XMR1	03	08	73G2201	51.8	21.219M SEU	NEW AIRCELLS
XMR1	03	08	73G2230	52.0	12.566M1SEU	WIPE RESET
XMR1	04	04	73G2034	58.6	12.691M SEU	BEFORE NEW CARDS IN AND ZEROED
XMR1	04	05	73G0119	68.0	12.713M	EXTRA POINT
XMR1	04	05	73G0219	68.0	14.861M	EXTRA POINT
XMR1	04	05	73G2010	55.8	14.906M SEU	BEFORE CALIBRATION
XMR1	04	05	73G2143	60.0	11.880M1SEU	AFTER CALIBRATION

WIRE CREEPMETER SAMPLE DATA, cont.

XMR1	04	17	73G1850	57.5	12.059M	ALJ	BEFORE CALIBRATION
XMR1	04	17	73G2002	61.0	12.188M	ALJ	AFTER CALIBRATION
XMR1	04	26	73G2203	64.5	12.513M	SEU	
XMR1	06	14	73G1804	73.2	13.348M	SEU	
XMR1	07	16	73G1209	68.0	14.359M		EXTRA POINT
XMR1	07	16	73G1309	68.0	16.524M		EXTRA POINT
XMR1	07	18	73G2130	83.2	16.564M	SEU	
XMR1	08	01	73G1940	86.0	16.800M	SEU	
XMR1	09	13	73G2127	77.0	17.235M	SEU	DEBUGGED - MODIFIED EVENT MARK
XMR1	11	08	73G0127	64.6	20.635M	PWH	
XMR1	11	08	73G0235	63.3	09.850M	1PWH	WIRE RESET
XMR1	11	14	73G2242	59.9	09.929M	ROB	COUPLERS REPLACED
XMR1	11	15	73G0045	59.0	09.978M	ROB	AFTER UNLOCKING TUBE CLAMPS & REPAIRS.
XMR1	12	20	73G1814	50.0	10.422M	PWH	
XMR19999				10.0			PUNCH

The computer generated cards from this program are submitted with the
 Creepmeter Calibration Program for a 30 inch display plot.

PRINTER OUTPUT FROM WIRE CREEPMETER PROGRAM

WIRE CREEPMETER RECORD

SITE NAME: XMRI MELENDY RANCH. POSITION ON SAN ANDREAS FAULT ... -350.8 KILOMETERS
 LATITUDE: 36 35 42 NORTH. LONGITUDE: 121 11 12 WEST.
 GAGE LENGTH: 10.0 METERS. ANGLE TO FAULT: 30.0 DEG. WIRE MATERIAL: INVAR ROD

YEAR	SCT	JD	GMT	TEMP DEG F	GAGE R	APPARENT SLIP MM	CORRECT SLIP MM	ACCUMULATED SLIP --- MM	TEMP CONST	SLIP READ CONST BY	REMARKS
1972	4043.095	27	217	47.0	7.520	8.683	8.683	42.69	0.0	34.007 PCW	DCOT & MICROMETER INSTALLED
1972	4047.958	31	2300	68.0	7.820	9.030	9.030	43.04	0.0	34.007	EXTRA POINT
1972	4048.028	32	40	68.0	9.970	11.512	11.512	45.52	0.0	34.007	EXTRA POINT
1972	4049.078	33	152	44.9	10.182	11.757	11.757	45.76	0.0	34.007 PCW	
1972	4071.664	55	1556	68.0	10.921	12.610	12.610	46.62	0.0	34.007	EXTRA POINT
1972	4071.705	55	1656	68.0	11.696	13.505	13.505	47.51	0.0	34.007	EXTRA POINT
1972	4071.924	55	2211	53.9	11.696	13.505	13.505	47.51	0.0	34.007 PCW	
1972	4071.939	55	2233	54.2	11.692	13.501	13.501	47.51	0.0	34.011 PCW	AFTER REMOVING ANCHOR END BAFFLE
1972	4076.052	60	115	57.4	11.767	13.587	13.587	47.60	0.0	34.011 PCW	
1972	4084.677	68	1615	58.5	11.879	13.717	13.717	47.73	0.0	34.011 PCW	BEFORE MAINTENANCE
1972	4084.743	68	1750	59.0	11.377	13.137	13.137	47.73	0.0	34.591 PCW	AFTER MAINTENANCE
1972	4089.848	73	2021	68.0	11.484	13.261	13.261	47.85	0.0	34.591	EXTRA POINT
1972	4089.889	73	2121	68.0	13.328	15.390	15.390	49.98	0.0	34.591	EXTRA POINT
1972	4104.668	88	1604	55.5	13.700	15.819	15.819	50.41	0.0	34.591 CEM	
1972	4104.684	88	1625	59.5	12.700	14.665	14.665	50.41	0.0	35.746 CEM	AFTER ONE MM OFFSET
1972	4121.793	105	1907	60.5	13.355	15.421	15.421	51.17	0.0	35.746 CEM	
1972	4135.047	119	111	68.0	13.874	16.020	16.020	51.77	0.0	35.746	EXTRA POINT
1972	4135.090	119	211	68.0	16.125	18.620	18.620	54.37	0.0	35.746	EXTRA POINT
1972	4149.926	133	2214	77.0	16.649	19.225	19.225	54.97	0.0	35.746 CEM	
1972	4176.832	160	2000	77.9	17.133	19.783	19.783	55.53	0.0	35.746 CEM	READ BEFORE MAINTAINACE
1972	4176.875	160	2100	83.0	17.129	19.779	19.779	55.52	0.0	35.746 CEM	READ AFTER MAINTAINANCE
1972	4200.313	184	735	68.0	17.797	20.550	20.550	56.30	0.0	35.746	EXTRA POINT
1972	4200.355	184	835	68.0	19.806	22.870	22.870	58.62	0.0	35.746	EXTRA POINT
1972	4201.878	185	1954	81.9	19.880	22.955	22.955	58.70	0.0	35.746 CEM	
1972	4205.668	189	1606	77.0	19.980	23.071	23.071	58.82	0.0	35.746 SEU	BEFORE MICROMETER RESET
1972	4205.699	189	1647	77.0	11.477	13.252	13.252	58.82	0.0	45.564 SEU	AFTER MICROMETER RESET
1972	4237.848	221	2022	83.8	11.803	13.629	13.629	59.19	0.0	45.564 CEM	
1972	4263.902	247	2143	68.0	12.583	14.530	14.530	60.09	0.0	45.564	EXTRA POINT
1972	4263.945	247	2243	68.0	15.052	17.381	17.381	62.94	0.0	45.564	EXTRA POINT
1972	4265.977	249	2330	80.1	15.115	17.453	17.453	63.02	0.0	45.564 SEU	
1972	4271.859	255	2041	74.2	15.047	17.375	17.375	62.94	0.0	45.564 ROB	BEFORE CALIRPATION OFFSET
1972	4271.879	255	2106	74.2	5.489	6.338	6.338	62.94	0.0	56.601 ROB	AFTER CALIBRATION OFFSET
1972	4300.852	284	2030	68.0	6.040	6.974	6.974	63.57	0.0	56.601 SEU	
1972	4316.398	300	937	68.0	6.400	7.390	7.390	63.99	0.0	56.601	EXTRA POINT

PRINTER OUTPUT FROM WIRE CREEPMETER PROGRAM, cont.

WIRE CREEPMETER RECORD

SITE NAME: XMRI MELENDY RANCH. POSITION ON SAN ANDREAS FAULT ... -350.8 KILOMETERS
 LATITUDE: 36 35 42 NORTH. LONGITUDE: 121 11 12 WEST.
 GAGE LENGTH: 10.0 METERS. ANGLE TO FAULT: 30.0 DEG. WIRE MATERIAL: INVAR ROD

YEAR	SCT	JD	GMT	TEMP DEG F	GAGE R	APPARENT SLIP MM	CORRECT SLIP MM	ACCUMULATED SLIP --- MM	TEMP CONST	SLIP READ CONST BY	REMARKS
1972	4316.441	300	1037	68.0	8.721	10.070	10.070	66.67	0.0	56.601	EXTRA POINT
1972	4355.930	339	2220	51.0	9.572	11.053	11.053	67.65	0.0	56.601 SEU	
1973	4391.879	9	2110	46.4	10.522	12.150	12.150	68.75	0.0	56.601 SEU	ELECTRONICS DRY, MORE DESSICANT ADDED
1973	4393.133	11	312	68.0	10.600	12.240	12.240	68.84	0.0	56.601	EXTRA POINT
1973	4393.172	11	412	68.0	13.112	15.140	15.140	71.74	0.0	56.601	EXTRA POINT
1973	4420.824	38	1952	50.0	17.929	20.703	20.703	77.30	0.0	56.601 SEU	
1973	4449.914	67	2201	51.8	21.219	24.502	24.502	81.10	0.0	56.601 SEU	NEW AIRCELLS
1973	4449.938	67	2230	52.0	12.566	14.510	14.510	81.10	0.0	66.592 SEU	WIRE RESET
1973	4476.855	94	2034	58.6	12.691	14.654	14.654	81.25	0.0	66.592 SEU	BEFORE NEW CARDS IN AND ZEROED
1973	4477.055	95	119	68.0	12.713	14.680	14.680	81.27	0.0	66.592	EXTRA POINT
1973	4477.094	95	219	68.0	14.851	17.160	17.160	83.75	0.0	66.592	EXTRA POINT
1973	4477.840	95	2010	55.8	14.906	17.212	17.212	83.80	0.0	66.592 SEU	BEFORE CALIBRATION
1973	4477.902	95	2143	60.0	11.880	13.718	13.718	83.80	0.0	70.086 SEU	AFTER CALIBRATION
1973	4489.781	107	1850	57.5	12.059	13.925	13.925	84.01	0.0	70.086 ALJ	BEFORE CALIBRATION
1973	4489.932	107	2002	61.0	12.198	14.073	14.073	84.01	0.0	69.937 ALJ	AFTER CALIBRATION
1973	4498.918	116	2203	64.5	12.513	14.449	14.449	84.39	0.0	69.937 SEU	
1973	4547.750	165	1804	73.2	13.348	15.413	15.413	85.35	0.0	69.937 SEU	
1973	4579.504	197	1209	68.0	14.359	16.580	16.580	86.52	0.0	69.937	EXTRA POINT
1973	4579.547	197	1309	68.0	16.524	19.080	19.080	89.02	0.0	69.937	EXTRA POINT
1973	4581.895	199	2130	83.2	16.564	19.126	19.126	89.06	0.0	69.937 SEU	
1973	4595.816	213	1940	86.0	16.800	19.399	19.399	89.34	0.0	69.937 SEU	
1973	4638.891	256	2127	77.0	17.235	19.901	19.901	89.84	0.0	69.937 SEU	DEBUGGED - MODIFIED EVENT MARK
1973	4694.059	312	127	64.6	20.635	23.827	23.827	93.76	0.0	69.937 PWH	
1973	4694.105	312	235	63.3	9.850	11.374	11.374	93.76	0.0	82.391 PWH	WIRE RESET
1973	4700.945	318	2242	59.9	9.929	11.465	11.465	93.86	0.0	82.391 ROB	COUPLERS REPLACED
1973	4701.031	319	45	59.0	9.978	11.522	11.522	93.91	0.0	82.391 ROB	AFTER UNLOCKING TUBE CLAMPS & REPAIRS.
1973	4736.758	354	1814	50.0	10.422	12.034	12.034	94.43	0.0	82.391 PWH	

CREEPMETER CALIBRATION PLOT

Display plot of wire creepmeter readings with data samples.

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MCD04/10/73 BY DAVE GOODREAU
DIMENSION NVERT(5), NAMES(6), X(500), Y(500), YT(3)
INTEGER*4 YR, DAY, TIME
REAL*8 XD(500), TBEGIN, TEND, XDT(3)
READ(5,1) N, TB, TE, VERT, NVERT
1  FORMAT(15,3F10.0,5X,5A4)
   TBEGIN = AINT(TB+1.E-5)
   TEND = AINT(TE+1.E-5)
   CALL STRIP1(29)
   CALL SYMBL1(7.0,6.3,0.5,NVERT,0.,20)
   CALL SYMBL1(2.,6.3,0.5,'1 INCH = ',0.,9)
   CALL SYMBL1(1.,7.0,0.5,'VERTICAL SCALE:',0.,15)
   CALL SYMBL1(1.,23.6,1.,'RECORDS',0.,7)
   CALL SYMBL1(1.,24.8,1.,'CREEPMETER',0.,10)
   CALL SYMBL1(1.,26.,1.,'WIRE',0.,4)
   WRITE(6,500)
900  FORMAT(' WIRE CREEPMETER RECORDS HEADING PLOTTED')
   CALL PLCT1(12.,0.,23)
   YLINE = 26.5
   CALL AXIS2(TBEGIN,TEND,YLINE)
   WRITE(6,501)
901  FORMAT(' TCP AXIS PLOTTED (MONTHS OF THE YEAR)')
   DO 101 J=1,N
   READ(5,2) NAMES, PLUS
2  FORMAT(6A4,10X,F10.0)
   IC = 0
   READ DATA POINTS IN GROUPS OF 3 AND CHECK FOR BLANKS & END OF DATA FLAG
97  READ(5,3) ((XDT(K),YT(K)),K=1,3)
3  FORMAT(3(016.9,F10.4))
   DO 99 L=1,3
   IGNORE BLANK FIELDS
   IF(XDT(L).LT.1.0-3.AND.XDT(L).GT.-1.0-2) GO TO 99
   IF X FIELD CONTAINS A NUMBER LESS THAN -1.0-3, THEN END OF DATA
   IF(XDT(L).LT.-1.0-3) GO TO 98
   IC = IC+1
   XD(IC) = XDT(L)
   Y(IC) = YT(L)
99  CONTINUE
   GO TO 97
98  Y1 = Y(1)
   DO 100 I=1,IC
   X(I) = (XD(I)-TBEGIN)/20.
   Y(I) = (Y(1)-Y1)/VERT + PLUS
   IF(Y(I).LT.0.5) Y(I) = 0.5

```

CREEPMETER CALIBRATION PLOT, cont.

```

IF(Y(I).GT.28.5) Y(I) = 28.5
100 CONTINUE
ICP1= IC+1
X(ICP1)=C.
Y(ICP1)=C.
ICP1 =IC+2
X(ICP1)=1.
Y(ICP1)=1.
CALL LINE1(X,Y,IC,1,0,0)
CALL LINE1 GIVES PLOT WITHOUT X MARKING EACH MICROMETER DATA POINT
CALL VECTOR (X,Y,IC,1,1,4HX )
CALL VECTOR GIVES PLOT WITH X MARKING EACH MICROMETER DATA POINT
XM =X(IC)+0.2
YM =Y(IC)-0.1
WRITE(6,502) NAMES(1)
902 FORMAT(' LATEST STATION PLOTTED: ',A4)
CALL SYMBL1(XM,YM,0.2,NAMES,0.,4)
101 CONTINUE
S =(TEND-TBEGIN)/20.
CALL AXIS1(0.,.5,'STANDARD CREEP TIME. 1 INCH = 20 DAYS',-38,S,
1 0.,TBEGIN,20.,20.)
WRITE(6,503)
903 FORMAT(' LOWER (SCT) AXIS PLOTTED, END OF PROGRAM')
CALL ENDP1
SPLUS = S+3.
CALL ENPLT(SPLUS,0.)
STOP
END
SUBROUTINE AXIS2(TBEGIN,TEND,YLINE)
INTEGER*4 YR,DAY,TIME
REAL*8 TBEGIN, TEND, XTID
DIMENSION X(5),Y(5)
XT1 = TBEGIN
XTID = XT1
100 CALL SCTJD(XTID,YR,MO,DAY,TIME,NDM,JD)
XT2 = AINT(XT1) + (NDM-DAY) + 1.E-6 + 1
IF(XT2.GT.TEND) GO TO 102
X(1) = (XT1-TBEGIN)/20.
Y(1) = YLINE
X(2) = (XT2-TBEGIN)/20.
Y(2) = YLINE
X(3) = (XT2-TBEGIN)/20.
Y(3) = YLINE - 0.1
X(4) = 0.
Y(4) = 0.

```

STANFORD
AMES
AMES

CREEPMETER CALIBRATION PLOT, cont.

```

X(5) = 1.
Y(5) = 1.
CALL LINE1(X,Y,3,1,0,0)
XT3 = (XT2-21.-TBEGIN)/20.
IF(XT3.LT.1.E-8) GO TO 101
YS = YLINE + 0.1
CALL SYMBL1(XT3,YS,0.12,MO,0.,4)
XT3 = XT3 + 0.4
YEAR = YR - 1900 + 1.E-6
CALL NUMBRI(XT3,YS,0.12,YEAR,0.,-1)
101 XT1 = XT2
    XT1D = XT2
    GO TO 100
102 XT2 = TEND
    X(1) = (XT1-TBEGIN)/20.
    X(2) = (XT2-TBEGIN)/20.
    X(3) = 0.
    Y(3) = 0.
    X(4) = 1.
    Y(4) = 1.
    CALL LINE1(X,Y,2,1,0,0)
    XT3 = (XT1+21.)
    IF(XT3.GT.TEND) GO TO 103
    YS = YLINE + 0.1
    XT3 = (XT3-TBEGIN)/20.
    CALL SYMBL1(XT3,YS,0.12,MU,0.,4)
    XT3 = XT3 + 0.4
    YEAR = YR - 1900+1.E-6
    CALL NUMBRI(XT3,YS,0.12,YEAR,0.,-1)
103 RETURN
END
SUBROUTINE SCIJDX,YR,MO,DAY,TIME,NDM,JD)
DIMENSION J(12)
INTEGER*4 YR,MO,DAY,TIME,JD
REAL*8 X
DATA J/'JAN','FEB','MAR','APR','MAY','JUN','JUL','AUG','SEP',
1'OCT','NOV','DEC'/
IX = X+1.D-6
ENTER STANDARD CREEP TIME START YEAR (NON-LEAP) ON NEXT 3 CARDS*****
STANDARD CREEP TIME 0 DAY = JAN 1, 1961*****
YR = 1961 + (IX-(IX/1460))/365
JD = 1 + IX - ((YR-1961)*365+(YR-1961)/4)
NDM = 31
IF(JC.LE.31) MO = J(1)
IF(JD.LE.31) DAY= JD

```

CREEPMETER CALIBRATION PLOT, cont.

M = MOD(YR,4)

IF(M.EQ.0) GO TO 100

IF(JC.GE. 32.AND.JD.LE. 59) MO = J(2)

IF(JD.GE. 32.AND.JD.LE. 59) DAY = JD - 31

IF(JD.GE. 32.AND.JD.LE. 59) NDM = 28

IF(JC.GE. 60.AND.JD.LE. 90) MO = J(3)

IF(JD.GE. 60.AND.JD.LE. 90) DAY = JD-59

IF(JD.GE. 91.AND.JD.LE.120) MO = J(4)

IF(JD.GE. 91.AND.JD.LE.120) DAY = JD-90

IF(JD.GE. 91.AND.JD.LE.120) NDM = 30

IF(JC.GE.121.AND.JD.LE.151) MO = J(5)

IF(JD.GE.121.AND.JD.LE.151) DAY = JD-120

IF(JC.GE.152.AND.JD.LE.181) MO = J(6)

IF(JD.GE.152.AND.JD.LE.181) DAY = JD-151

IF(JD.GE.152.AND.JD.LE.181) NDM = 30

IF(JC.GE.182.AND.JD.LE.212) MO = J(7)

IF(JD.GE.182.AND.JD.LE.212) DAY = JD-181

IF(JC.GE.213.AND.JD.LE.243) MO = J(8)

IF(JD.GE.213.AND.JD.LE.243) DAY = JD-212

IF(JC.GE.244.AND.JD.LE.273) MO = J(9)

IF(JD.GE.244.AND.JD.LE.273) DAY = JD-243

IF(JD.GE.244.AND.JD.LE.273) NDM = 30

IF(JC.GE.274.AND.JD.LE.304) MO = J(10)

IF(JD.GE.274.AND.JD.LE.304) DAY = JD-273

IF(JD.GE.305.AND.JD.LE.334) MO = J(11)

IF(JC.GE.305.AND.JD.LE.334) DAY = JD-304

IF(JD.GE.305.AND.JD.LE.334) NDM = 30

IF((JD.GE.335).AND.(JD.LE.365)) MO = J(12)

IF(JD.GE.335.AND.JD.LE.365) DAY = JD-334

GO TO 101

100 IF(JD.GE. 32.AND.JD.LE. 60) MO = J(2)

IF(JD.GE. 32.AND.JD.LE. 60) DAY = JD-31

IF(JD.GE. 32.AND.JD.LE. 60) NDM = 29

IF(JD.GE. 61.AND.JD.LE. 91) MO = J(3)

IF(JD.GE. 61.AND.JD.LE. 91) DAY = JD-60

IF(JD.GE. 92.AND.JD.LE.121) MO = J(4)

IF(JD.GE. 92.AND.JD.LE.121) DAY = JD-91

IF(JC.GE. 92.AND.JD.LE.121) NDM = 30

IF(JD.GE.122.AND.JD.LE.152) MO = J(5)

IF(JC.GE.122.AND.JD.LE.152) DAY = JD-121

IF(JD.GE.153.AND.JD.LE.182) MO = J(6)

IF(JD.GE.153.AND.JD.LE.182) DAY = JD-152

IF(JC.GE.153.AND.JD.LE.182) NDM = 30

IF(JD.GE.183.AND.JD.LE.213) MO = J(7)

IF(JD.GE.183.AND.JD.LE.213) DAY = JD-182

CREEPMETER CALIBRATION PLOT, cont.

```

IF(JD.GE.214.AND.JD.LE.244) MO = J(8)
IF(JD.GE.214.AND.JD.LE.244) DAY = JD-213
IF(JD.GE.245.AND.JD.LE.274) MO = J(9)
IF(JD.GE.245.AND.JD.LE.274) DAY = JD-244
IF(JD.GE.245.AND.JD.LE.274) NDM = 30
IF(JD.GE.275.AND.JD.LE.305) MO = J(10)
IF(JD.GE.275.AND.JD.LE.305) DAY = JD-274
IF(JD.GE.306.AND.JD.LE.335) MO = J(11)
IF(JD.GE.306.AND.JD.LE.335) DAY = JD-305
IF(JD.GE.306.AND.JD.LE.335) NDM = 30
IF(JD.GE.336.AND.JD.LE.366) MO = J(12)
IF(JD.GE.336.AND.JD.LE.366) DAY = JD-335
101 HR = (X-IX)*24.+1.D-6
MIN = (HR-AINT(HR))*60.+1.E-6
TIME = INT(HR)*100 + MIN
RETURN
END
SUBROUTINE SIRTPI(N)
WRITE(6,1) N
1 FORMAT(1H1,15,' INCH WIDE PLOT. AMES RESEARCH PLOTTER.')
RETURN
END
SUBROUTINE SYMBL1(X,Y,HEIGHT,BCD,THETA,N)
INTEGER*4 BCD(10),N
REAL*4 X,Y,HEIGHT,THETA
CALL URAL(THETA)
CALL CHAR(X,Y,THETA,HEIGHT,BCD,N)
RETURN
END
SUBROUTINE PLOT1(X,Y,IC)
REAL*4 X,Y
INTEGER*4 IC
IF(IC.GT.20) IC = -(IC-20)
CALL PLT(X,Y,IC)
RETURN
END
SUBROUTINE LINE1(X,Y,N,K,J,L)
REAL*4 X(500),Y(500)
INTEGER*4 N,K,J,L
CALL VECTOR(X,Y,N,K,J,L)
RETURN
END
SUBROUTINE NUMBRI(X,Y,HEIGHT,FPN,THETA,N)
REAL*4 X,Y,HEIGHT,FPN,THETA
INTEGER*4 N

```

CREEPMETER CALIBRATION PLOT, cont.

and

SAMPLE DATA

```

THETA = CRAD(THETA)
CALL NUMPLT(X,Y,THETA,HEIGHT,FPN,N)
RETURN
END
SUBROUTINE AXIS1(X,Y,BCD,NC,S,THETA,XMIN,DX,DIV)
REAL*4 X,Y,S,THETA,XMIN,DX,DIV,AR(2)
INTEGER*4 BCD(20),NC,NTC
THETA = CRAD(THETA)
AR(1) = XMIN
AR(2) = XMIN+DIV*S
CALL DIMEN(AR,2,1,1,S)
NTC = 2.*S+1.00001
CALL AXIS(X,Y,BCD,NC,S,NTC,1,THETA)
RETURN
END

```

DEFINITIONS OF HEADER CARD IN FRONT OF COMPUTER GENERATED DATA*****

C=01 TBEG=3070 TEND=4640 VERT.SC=5 VSC=5 MM
 = NUMBER OF STATIONS BEING READ INTO THE CREEP PLCT PROGRAM. COLUMN. 1-5
 T BEG = START TIME OF STATIONS IN STANDARD CREEP TIME. COLUMN. 6-15
 T END = END TIME OF STATIONS IN STANDARD CREEP TIME. COLUMN. 16-25
 VERT SC = PLOTTED MM VERTICAL SCALE (5MM/INCH). COLUMN 26-35
 V. SC= PRINTED MM VERTICAL SCALE (5MM/INCH). LEFT JUSTIFY. COLUMNS 41-60
 BOTH SCALING NUMBERS MUST AGREE FOR ANY SCALE SETTING

01	3070	4640	5	5 MM	10.0
MELENDY RANCH					
0.404309497D C4	42.6900	0.404795825D	04	43.0364	0.404802759D 04
0.404507764D C4	45.7638	0.407166382D	04	46.6171	0.407170532D 04
0.407192407D C4	47.5120	0.407193945D	04	47.5120	0.407605200D 04
0.408467700D C4	47.7279	0.408474292D	04	47.7279	0.408584790D 04
0.408588940D C4	49.9807	0.410466797D	04	50.4103	0.410466359D 04
0.412179297D C4	51.1666	0.413504688D	04	51.7659	0.413508984D 04
0.414952578D C4	54.9702	0.417683203D	04	55.5291	0.417687500D 04
0.420031250D C4	56.2956	0.420035547D	04	58.6156	0.420182613D 04
0.420566797D C4	58.8165	0.420569922D	04	58.8165	0.423784766D 04
0.426390234D C4	60.0936	0.426394531D	04	62.9445	0.426597917D 04
0.427185938D C4	62.9388	0.427187891D	04	62.9388	0.430085417D 04
0.431639844D C4	63.9907	0.431644141D	04	66.6707	0.435553099D 04
0.439187891D C4	68.7504	0.439313281D	04	68.8404	0.439317188D 04
0.442082422D C4	77.3032	0.444951406D	04	81.1022	0.444953750D 04
0.447685547D C4	81.2465	0.447705469D	04	81.2719	0.447709575D 04
0.447783984D C4	83.8042	0.447790234D	04	83.8042	0.448976125D 04
0.448983203D C4	84.0108	0.449891797D	04	84.3861	0.454775000D 04
0.457550391D C4	86.5177	0.457954688D	04	89.0176	0.458189453D 04
0.459581641D C4	89.3363	0.463889063D	04	89.8386	0.465405859D 04
0.469410547D C4	93.7646	0.470054531D	04	93.8558	0.470103125D 04
0.100000000D 01					

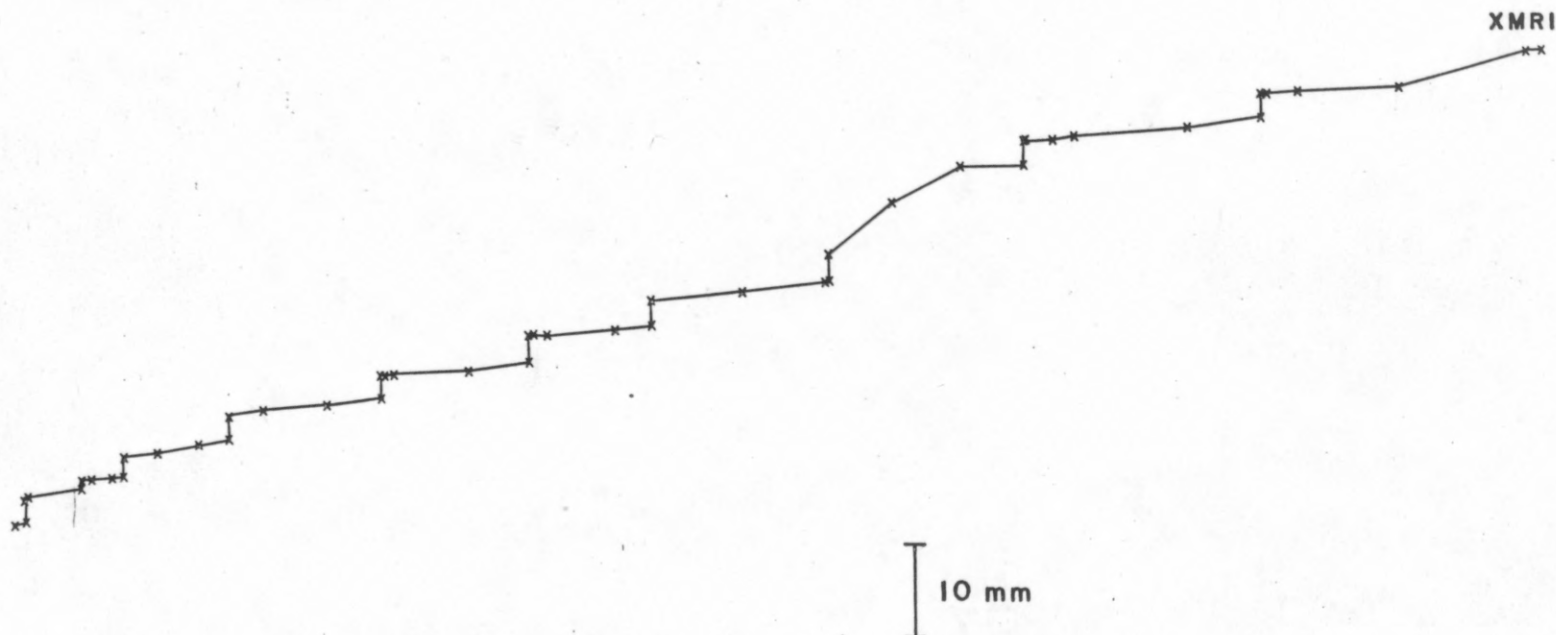
PRINTER OUTPUT FROM THE CREEPMETER CALIBRATION PLOT PROGRAM

29 INCH WIDE PLOT. AMES RESEARCH PLOTTER.
WIRE CREEPMETER RECORDS HEADING PLOTTED
TOP AXIS PLOTTED (MONTHS OF THE YEAR)
LATEST STATION PLOTTED: XMR1
LOWER (SCT) AXIS PLOTTED, END OF PROGRAM

Submit tape for a display plot.

WIRE
CREEPMETER
RECORD

WIRE
CREEPMETER
RECORD



0000.00 0002.00 0004.00 0006.00 0008.00 0010.00 0012.00 0014.00 0016.00 0018.00 0020.00 0022.00 0024.00 0026.00 0028.00 0030.00 0032.00 0034.00 0036.00 0038.00 0040.00 0042.00 0044.00 0046.00 0048.00 0050.00 0052.00 0054.00 0056.00 0058.00 0060.00 0062.00 0064.00 0066.00 0068.00 0070.00 0072.00 0074.00 0076.00 0078.00 0080.00 0082.00 0084.00 0086.00 0088.00 0090.00 0092.00 0094.00 0096.00 0098.00 0100.00 0102.00 0104.00 0106.00 0108.00 0110.00 0112.00 0114.00 0116.00 0118.00 0120.00 0122.00 0124.00 0126.00 0128.00 0130.00 0132.00 0134.00 0136.00 0138.00 0140.00 0142.00 0144.00 0146.00 0148.00 0150.00 0152.00 0154.00 0156.00 0158.00 0160.00 0162.00 0164.00 0166.00 0168.00 0170.00

Output from Creepmeter Calibration Plot tape.

STANDARD CREEP TIME CALENDAR PROGRAM

```

INTEGER*4 YR,MO,DAY,TIME,JD,YEND,IDAY(31),IJD(31)
REAL*8 X
REAL*4 XSCT(31)
YEND = 1984
X = 0.
K = 1
1000 IF(K.EQ.1.OR.MOD(K-1,2).EQ.0) WRITE(6,1)
1  FORMAT(1H1)
  CALL SCTJD(X,YR,MO,DAY,TIME,NDM,JD)
  IF(YEND.EQ.YR) GO TO 9999
  WRITE(6,2) MO,YR,MO,YR,MO,YR
2  FORMAT(///3(30X,A3,15)/)
  DO 100 I=1,NDM
    IDAY(I) = 1
    IJD(I) = JD
    XSCT(I) = X
    JD = JD+1
    X = X+1.0000001
100 CONTINUE
  WRITE(6,3) (IDAY(I),I=1,10),(IJD(I),I=1,10),(XSCT(I),I=1,10)
3  FORMAT(' DAY OF MONTH ',10I10/' JULIAN DAY ',10I10/
1' STD. CREEP TIME',10F10.0/)
  WRITE(6,3) (IDAY(I),I=11,20),(IJD(I),I=11,20),(XSCT(I),I=11,20)
  IF(NDM.GE.30) GO TO 200
  IF(NDM.EQ.29) GO TO 199
  IF(NDM.EQ.28) GO TO 198
198 WRITE(6,4) (IDAY(I),I=21,28),(IJD(I),I=21,28),(XSCT(I),I=21,28)
4  FORMAT(' DAY OF MONTH ',8I10/' JULIAN DAY ',8I10/
1' STD. CREEP TIME',8F10.0/)
  GO TO 300
199 WRITE(6,5) (IDAY(I),I=21,29),(IJD(I),I=21,29),(XSCT(I),I=21,29)
5  FORMAT(' DAY OF MONTH ',9I10/' JULIAN DAY ',9I10/
1' STD. CREEP TIME',9F10.0/)
  GO TO 300
200 WRITE(6,3) (IDAY(I),I=21,30),(IJD(I),I=21,30),(XSCT(I),I=21,30)
  IF(NDM.EQ.30) GO TO 300
  WRITE(6,6) IDAY(31),IJD(31),XSCT(31)
6  FORMAT(' DAY OF MONTH ',11I10/' JULIAN DAY ',11I10/
1' STD. CREEP TIME',F10.0/)
300 K = K+1
  GO TO 1000
999 STOP
END

```

CALENDAR PROGRAM, cont.

```

SUBROUTINE SCTJDIX,YR,MO,DAY,TIME,NDM,JD)
DIMENSION J(12)
INTEGER*4 YR,MO,DAY,TIME,JD
REAL*8 X
DATA J/'JAN','FEB','MAR','APR','MAY','JUN','JUL','AUG','SEP',
1'OCT','NOV','DEC'/
IX = X+1.0-6
ENTER STANDARD CREEP TIME START YEAR (NON-LEAP) ON NEXT 3 CARDS*****
STANDARD CREEP TIME 0 DAY = JAN 1, 1961*****
YR = 1961 + (IX-(IX/1460))/365
JD = 1 + IX - ((YR-1961)*365+(YR-1961)/4)
NDM = 31
IF(JD.LE.31) MO = J(1)
IF(JD.LE.31) DAY= JD
M = MOD(YR,4)
IF(M.EQ.0) GO TO 100
IF(JD.GE. 32.AND.JD.LE. 59) MO = J(2)
IF(JD.GE. 32.AND.JD.LE. 59) DAY = JD - 31
IF(JD.GE. 32.AND.JD.LE. 59) NDM = 28
IF(JD.GE. 60.AND.JD.LE. 90) MO = J(3)
IF(JD.GE. 60.AND.JD.LE. 90) DAY = JD-59
IF(JD.GE. 91.AND.JD.LE.120) MO = J(4)
IF(JD.GE. 91.AND.JD.LE.120) DAY = JD-90
IF(JD.GE. 91.AND.JD.LE.120) NDM = 30
IF(JD.GE.121.AND.JD.LE.151) MO = J(5)
IF(JD.GE.121.AND.JD.LE.151) DAY = JD-120
IF(JD.GE.152.AND.JD.LE.181) MO = J(6)
IF(JD.GE.152.AND.JD.LE.181) DAY = JD-151
IF(JD.GE.152.AND.JD.LE.181) NDM = 30
IF(JD.GE.182.AND.JD.LE.212) MO = J(7)
IF(JD.GE.182.AND.JD.LE.212) DAY = JD-181
IF(JD.GE.213.AND.JD.LE.243) MO = J(8)
IF(JD.GE.213.AND.JD.LE.243) DAY = JD-212
IF(JD.GE.244.AND.JD.LE.273) MO = J(9)
IF(JD.GE.244.AND.JD.LE.273) DAY = JD-243
IF(JD.GE.244.AND.JD.LE.273) NDM = 30
IF(JD.GE.274.AND.JD.LE.304) MO = J(10)
IF(JD.GE.274.AND.JD.LE.304) DAY = JD-273
IF(JD.GE.305.AND.JD.LE.334) MO = J(11)
IF(JD.GE.305.AND.JD.LE.334) DAY = JD-304
IF(JD.GE.305.AND.JD.LE.334) NDM = 30
IF(JD.GE.335.AND.JD.LE.365) MO = J(12)
IF(JD.GE.335.AND.JD.LE.365) DAY = JD-334
GO TO 101
100 IF(JD.GE. 32.AND.JD.LE. 60) MO = J(2)

```


CALENDAR PROGRAM, cont.

```

IF(JD.GE. 32.AND.JD.LE. 60) DAY = JD-31
IF(JD.GE. 32.AND.JD.LE. 60) NDM = 29
IF(JD.GE. 61.AND.JD.LE. 91) MO = J(3)
IF(JD.GE. 61.AND.JD.LE. 91) DAY = JD-60
IF(JD.GE. 92.AND.JD.LE.121) MO = J(4)
IF(JD.GE. 92.AND.JD.LE.121) DAY = JD-91
IF(JD.GE. 92.AND.JD.LE.121) NDM = 30
IF(JD.GE.122.AND.JD.LE.152) MO = J(5)
IF(JD.GE.122.AND.JD.LE.152) DAY = JD-121
IF(JD.GE.153.AND.JD.LE.182) MO = J(6)
IF(JD.GE.153.AND.JD.LE.182) DAY = JD-152
IF(JD.GE.153.AND.JD.LE.182) NDM = 30
IF(JD.GE.183.AND.JD.LE.213) MO = J(7)
IF(JD.GE.183.AND.JD.LE.213) DAY = JD-182
IF(JD.GE.214.AND.JD.LE.244) MO = J(8)
IF(JD.GE.214.AND.JD.LE.244) DAY = JD-213
IF(JD.GE.245.AND.JD.LE.274) MO = J(9)
IF(JD.GE.245.AND.JD.LE.274) DAY = JD-244
IF(JD.GE.245.AND.JD.LE.274) NDM = 30
IF(JD.GE.275.AND.JD.LE.305) MO = J(10)
IF(JD.GE.275.AND.JD.LE.305) DAY = JD-274
IF(JD.GE.306.AND.JD.LE.335) MO = J(11)
IF(JD.GE.306.AND.JD.LE.335) DAY = JD-305
IF(JD.GE.306.AND.JD.LE.335) NDM = 30
IF(JD.GE.336.AND.JD.LE.366) MO = J(12)
IF(JD.GE.336.AND.JD.LE.366) DAY = JD-335
101 HR = (X-1X)*24.+1.D-6
MIN = (HR-AINT(HR))*60.+1.E-6
TIME = INT(HR)*100 + MIN
RETURN
END

```

OUTPUT SAMPLE FROM STANDARD CREEP TIME CALENDAR PROGRAM

	JAN 1961				JAN 1961				JAN 1961	
DAY OF MONTH	1	2	3	4	5	6	7	8	9	10
JULIAN DAY	1	2	3	4	5	6	7	8	9	10
STD. CREEP TIME	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.
DAY OF MONTH	11	12	13	14	15	16	17	18	19	20
JULIAN DAY	11	12	13	14	15	16	17	18	19	20
STD. CREEP TIME	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
DAY OF MONTH	21	22	23	24	25	26	27	28	29	30
JULIAN DAY	21	22	23	24	25	26	27	28	29	30
STD. CREEP TIME	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.
DAY OF MONTH	31									
JULIAN DAY	31									
STD. CREEP TIME	30.									

	FEB 1961				FEB 1961				FEB 1961	
DAY OF MONTH	1	2	3	4	5	6	7	8	9	10
JULIAN DAY	32	33	34	35	36	37	38	39	40	41
STD. CREEP TIME	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
DAY OF MONTH	11	12	13	14	15	16	17	18	19	20
JULIAN DAY	42	43	44	45	46	47	48	49	50	51
STD. CREEP TIME	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
DAY OF MONTH	21	22	23	24	25	26	27	28		
JULIAN DAY	52	53	54	55	56	57	58	59		
STD. CREEP TIME	51.	52.	53.	54.	55.	56.	57.	58.		

OUTPUT SAMPLE FROM CALENDAR PROGRAM, cont.

MAY 1973			MAY 1973			MAY 1973				
DAY OF MONTH	1	2	3	4	5	6	7	8	9	10
JULIAN DAY	121	122	123	124	125	126	127	128	129	130
STD. CREEP TIME	4503.	4504.	4505.	4506.	4507.	4508.	4509.	4510.	4511.	4512.
DAY OF MONTH	11	12	13	14	15	16	17	18	19	20
JULIAN DAY	131	132	133	134	135	136	137	138	139	140
STD. CREEP TIME	4513.	4514.	4515.	4516.	4517.	4518.	4519.	4520.	4521.	4522.
DAY OF MONTH	21	22	23	24	25	26	27	28	29	30
JULIAN DAY	141	142	143	144	145	146	147	148	149	150
STD. CREEP TIME	4523.	4524.	4525.	4526.	4527.	4528.	4529.	4530.	4531.	4532.
DAY OF MONTH	31									
JULIAN DAY	151									
STD. CREEP TIME	4533.									
JUN 1973			JUN 1973			JUN 1973				
DAY OF MONTH	1	2	3	4	5	6	7	8	9	10
JULIAN DAY	152	153	154	155	156	157	158	159	160	161
STD. CREEP TIME	4534.	4535.	4536.	4537.	4538.	4539.	4540.	4541.	4542.	4543.
DAY OF MONTH	11	12	13	14	15	16	17	18	19	20
JULIAN DAY	162	163	164	165	166	167	168	169	170	171
STD. CREEP TIME	4544.	4545.	4546.	4547.	4548.	4549.	4550.	4551.	4552.	4553.
DAY OF MONTH	21	22	23	24	25	26	27	28	29	30
JULIAN DAY	172	173	174	175	176	177	178	179	180	181
STD. CREEP TIME	4554.	4555.	4556.	4557.	4558.	4559.	4560.	4561.	4562.	4563.

OUTPUT SAMPLE FROM CALENDAR PROGRAM, cont.

JUL 1973			JUL 1973			JUL 1973				
DAY OF MONTH	1	2	3	4	5	6	7	8	9	10
JULIAN DAY	182	183	184	185	186	187	188	189	190	191
STD. CREEP TIME	4564.	4565.	4566.	4567.	4568.	4569.	4570.	4571.	4572.	4573.
DAY OF MONTH	11	12	13	14	15	16	17	18	19	20
JULIAN DAY	192	193	194	195	196	197	198	199	200	201
STD. CREEP TIME	4574.	4575.	4576.	4577.	4578.	4579.	4580.	4581.	4582.	4583.
DAY OF MONTH	21	22	23	24	25	26	27	28	29	30
JULIAN DAY	202	203	204	205	206	207	208	209	210	211
STD. CREEP TIME	4584.	4585.	4586.	4587.	4588.	4589.	4590.	4591.	4592.	4593.
DAY OF MONTH	31									
JULIAN DAY	212									
STD. CREEP TIME	4594.									
AUG 1973			AUG 1973			AUG 1973				
DAY OF MONTH	1	2	3	4	5	6	7	8	9	10
JULIAN DAY	213	214	215	216	217	218	219	220	221	222
STD. CREEP TIME	4595.	4596.	4597.	4598.	4599.	4600.	4601.	4602.	4603.	4604.
DAY OF MONTH	11	12	13	14	15	16	17	18	19	20
JULIAN DAY	223	224	225	226	227	228	229	230	231	232
STD. CREEP TIME	4605.	4606.	4607.	4608.	4609.	4610.	4611.	4612.	4613.	4614.
DAY OF MONTH	21	22	23	24	25	26	27	28	29	30
JULIAN DAY	233	234	235	236	237	238	239	240	241	242
STD. CREEP TIME	4615.	4616.	4617.	4618.	4619.	4620.	4621.	4622.	4623.	4624.
DAY OF MONTH	31									
JULIAN DAY	243									
STD. CREEP TIME	4625.									

RUSTRAK PROGRAM

Rustrak Program with sample data.

```

C   MOD 12/10/73 BY DAVE GOODREAU
C   LAST STATEMENT NUMBER USED = 89
REAL*4 BLANK/'  '
REAL*4 END/'END '/
REAL*8 CHART
REAL*8 HRA(2000),DDA,DHR,DDM
REAL*4 RUS/'RUS '/
REAL*4 BLNK/' '/
REAL*4 XMICRO/'MIC '/
COMMON IYRA(2000),JDA(2000),IHRA(2000),MINA(2000)
      DIMENSION IDATA(2000)
      DIMENSION SLIP(2000),DATA(2000),XMIN(2000)
      DIMENSION OUTPUT(6,20)
C   CONVERSION FACTOR FOR DEGREES TO RADIANS
RAD=.017453
C   ANGLE = ANGLE BETWEEN FAULT AND INSTRUMENT
C   ANGLE = 30.0 DEGREES FOR X CREEPMETERS
C   CONVERT DEGREES TO RADIANS
ANGLE=RAD*30.0
ICARD=1
ICARD=0
C   IF ICARD=1 CARDS ARE NOT PUNCHED OUT
C   IF ICARD=0 CARDS ARE PUNCHED OUT
C   SETUP FOR CUMULATION COUNTER
CULMIC=0.0
RESET=0.0
STAOLD=BLANK
XMICLT=0.0
C   READ IN HEADING
C 100 CONTINUE
C   IF( ICARD .NE. 0) GO TO 72
DO 69 I=1,6
  READ (5,4) (OUTPUT(I,J),J=1,20)
  4  FORMAT ( 20A4 )
  WRITE(6,70)
  1  (OUTPUT(I,J),J=1,20)
  70  FORMAT (10X, 20A4)
  69  CONTINUE
  WRITE(6,84) ((OUTPUT(I,J),J=1,20),I=1,6)
  84  FORMAT(20X,20A4)
  72  CONTINUE
  1  CONTINUE
C   ROUTINE TO CLEAR AND SETUP IDATA
I=1

```

RUSTRAK PROGRAM, cont.

```

DO 16 I=1,2000
  IDATA(I)=0
  DATA(I)=0.0
  SLIP(I)=0.0
16 CONTINUE
  READ HEADER CARD
  TDIV= TIME DIVISIONS ON RUSTRAK
  DFACT=AVERAGE DFACTOR
  READ (5,130,END=510 )
  1 STA1,NUM1,IYR11,JD11,IHR11,IMIN11,ITDIV1,TDIV1,DDIV1
  1,
  1 DMICST,EST1,IYR12,JD12,IHR12,IMIN12,DMIC1,DMIC2,DFACT,ICARD1
  IF(STA1.EQ.BLANK ) GO TO 62
  WRITE (6,140) STA1,NUM1,IYR11,JD11,IHR11,IMIN11,ITDIV1,TDIV1,DDIV1
  1,
  1 DMICST,EST1,IYR12,JD12,IHR12,IMIN12,DMIC1,DMIC2,DFACT,ICARD1
  READ (5,130,END=510 )
  1 STA2,NUM2,IYR21,JD21,IHR21,IMIN21,ITDIV2,TDIV2,DDIV2
  1,DMICLT,EST2,IYR22,JD22,IHR22,IMIN22,RESET1,RESET2,RESET3,ICARD2
  IF(STA2.EQ.BLANK ) GO TO 62
  WRITE (6,140) STA2,NUM2,IYR21,JD21,IHR21,IMIN21,ITDIV2,TDIV2,DDIV2
  1,DMICLT,EST2,IYR22,JD22,IHR22,IMIN22,RESET1,RESET2,RESET3,ICARD2
130 FORMAT(      A4,I3,2I3,2I2,2X,I2,5X,F6.3,F6.2,F8.3
  1,A1,2I3,2I2,
  1 2F7.3,F8.4,I1)
140 FORMAT(10X,A4,I3,2I3,2I2,2X,I2,5X,F6.3,F6.2,F8.3
  1,A1,2I3,2I2,
  1 2F7.3,F8.4,I1)
  IF(RESET1.NE..0.0 .AND. STA1.EQ. STAOLD ) RESET=RESET +RESET1
  ROUTINE TO RESET MICROMETER READING TO LAST MICRO READING
  IF(STA1.EQ. STAOLD ) GO TO 500
  RESET=RESET1
  CULMIC=0.0
  STAOLD=BLANK
  XMICLT=0.0
  GO TO 450
500 CONTINUE
  CULMIC=      -1.0*(DMIC1-XMICLT)
450 CONTINUE
  CULMIC=RESET+CULMIC
  DMIC1=DMIC1+CULMIC
  DMIC2=DMIC2+CULMIC
  DMICST=DMICST+CULMIC
  DMICLT=DMICLT+CULMIC
  WRITE (6,460) CULMIC

```

RUSTRAK PROGRAM, cont.

```

460 FORMAT(10X,'CUMULATIVE MICROMETER CORRECTION=',18X,F10.5)
    WRITE (6,470) RESET
470 FORMAT(10X,'RESET VALUE=',39X,F10.5)
    WRITE (6,480) DMIC1
480 FORMAT(10X,'ADJUSTED BEGINNING MICROMETER READING ',14X,F10.5)
    WRITE (6,490) DMIC2
490 FORMAT(10X,'ADJUSTED END          MICROMETER READING ',14X,F10.5)
    SET UP FOR STRIP CHART CALCULATION SHEET
    BEGIN HEADER CARD ERROR CHECK
    IF(NUM1.NE.NUM2) WRITE(6,150)
150 FORMAT(10X,'CHART NO.S DO NO T AGREE ON HEADER CARDS *****'//)
    TIME CHECK
    ICK=IABS(JD11-JD12)
    IF( ICK          .GT.1 ) WRITE(6,160)
160 FORMAT(10X,'CHECK TIME CODE ON FIRST HEADER CARD *****'//)
    IF ( DMIC1.EQ.DMIC1.AND. EST1.NE.BLNK ) WRITE (6,170)
170 FORMAT(10X,'CHECK MICROMETER READINGS ON FIRST CARD *****'//)
    IF ( DMIC1.EQ.DMIC2.AND. EST2.NE.BLNK ) WRITE (6,180)
180 FORMAT(10X,'CHECK MICROMETER READINGS ON ALL CARDS *****'//)
    END OF ERROR CHECK ON HEADER CARD
    WRITE(6,190) STA1
190 FORMAT(10X,'STRIP CHART CALCULATIONS PERTAINING TO:  STA.CODE',
15X,A4)
    WRITE(6,200) NUM1
200 FORMAT(10X,'CHART NUMBER',39X,I3)
    WRITE(6,210) IYP11,JD11,IHR11,IMIN11
210 FORMAT(10X,'START TIME (T SUBO) ',33X,I3,1X,I3,1X,I2,1X,I2)
    WRITE(6,211) ITDIV1,TDIV1
211 FORMAT(10X,'T START POSITION',23X,'(',I3,'X 12)+ ',F10.5)
    WRITE(6,220) DDIV1
220 FORMAT(10X,'D START POSITION',34X,F10.5)
    WRITE (6,230) DMIC1
230 FORMAT(10X,'MIC READING AT START ',31X,F10.5)
    WRITE (6,240) IYR21,JD21,IHR21,IMIN21
240 FORMAT(10X,'END TIME (T SUB F) ',34X,2(I3,1X),2(I2,1X) )
    WRITE (6,250) ITDIV2,TDIV2
250 FORMAT(10X,'T END POSITION' ,25X,'(',I3,'X 12) +',F10.5)
    WRITE (6,260) DDIV2
260 FORMAT(10X,'D END POSITION ',36X,F10.5)
    WRITE (6,270) DMIC2
270 FORMAT(10X,'MIC. READING AT END ',32X,F10.5)
    MINUTES
    ELAPSED TIME CALCULATION
    IF(IMIN21-IMIN11) 280,290,290
280 CONTINUE

```

RUSTRAK PROGRAM, cont.

```

      ANS=60+IMIN21-IMIN11
      ICARRY=-1
      GO TO 300
290  CONTINUE
      ANS=IMIN21-IMIN11
      ICARRY=0
300  CONTINUE
      ELAPS=ANS/60.0
      HOURS
      ANS=IHR21-IHR11+ICARRY
      ICARRY=0
      IF( ANS) 310,320,320
310  CONTINUE
      ANS=ANS+24.0
      ICARRY=-1
      GO TO 330
320  CONTINUE
      ICARRY=0
330  CONTINUE
      ELAPS=ELAPS+ANS
      DAYS
      CHECK FOR LEAP YEAR
      LEAP=365
      M=IYR11/4
      M=M*4
      IF( IYR11 .EQ. M ) LEAP=366
      ANS=JD21-JD11
      1 + ICARRY
      ICARRY=0
      IF(ANS) 340,350,350
340  CONTINUE
      ANS=ANS+LEAP
350  CONTINUE
      ANS=ANS*24.0
      ELAPS=ELAPS+ANS
      WRITE (6,360) ELAPS
360  FORMAT(10X,'LAPSED TIME ',41X,F10.5)
      COMPUTE CHART LENGTH
      TOTDIV= (ITDIV2-ITDIV1)*12.0+ TDIV2-TDIV1
      WRITE(6,370) TOTDIV
370  FORMAT(10X,'CHART LENGTH ',39X,F10.5)
      CHART SPEED=CHART
      CHART=ELAPS/TOTDIV
      WRITE (6,380) CHART
380  FORMAT(10X,'CHART SPEED, HRS/T-DIV ',28X,F15.10)

```


RUSTRAK PROGRAM, cont.

```

      CK =DABS(CHART- 2.000)
      IF( CK          .GT. 0.1) WRITE(6,390)
390  FORMAT(10X,'CHART SPEED IS SICK *****'//)
      C  NEED CHART SPEED AVE. *****
      C  COMPUTE D CHART FACTOR USING END MICROMETER READING (ESTIMED NOT ACTUAL-)
      XICDF= DMICLT-DMICST
      DPOS =DDIV2-DDIV1
      IF(DPOS .NE. 0.0)GO TO 570
      DFACT1=0.0
      GO TO 580
570  CONTINUE
      DFACT1= XICDF/DPOS
580  CONTINUE
      WRITE (6,400)XICDF
400  FORMAT(10X,'MIC. DIFFERENCE ',35X,F10.5)
      WRITE(6,410) DPOS
410  FORMAT(10X,' D POSITION DIFF ',34X,F10.5)
      WRITE (6,420) DFACT1
420  FORMAT(10X,' D CHART FACTOR ',35X,F10.5)
      C  END OF STRIP CHART CALCULATIONS
      C  INSERT STATION NAME IN PLOT LABEL
      STA=STA1
      IF(STA .EQ. END ) GO TO 62
      IF(STA1.NE.STA2 ) WRITE(6,120)
120  FORMAT(10X,'STATION NAMES DO NOT MATCH ON HEADER CARDS *****'//)
      C  OUTPUT(2,6)= STA
      C  DO 7 I=1,2000,12
      READ IN DATA
      III=I+11
      READ(5,60)(IDATA(II ), II=I,III )
60  FORMAT( 2X,6(1X,I5),2X,2X,6(1X,I5))
      WRITE(6,5)(IDATA(II ), II=I,III )
5  FORMAT(10X,2X,6(1X,I5),2X,2X,6(1X,I5))
      C  CHECK FOR BLANK
      C  CHECK FOR FIRST AND LAST DATA VALUE TO BE ZERO
65  CONTINUE
      IF(IDATA(II ) .EQ. 0 .AND. IDATA(I+11) .EQ. 0) GO TO 64
      GO TO 7
64  CONTINUE
      GO TO 6
7  CONTINUE
67  CONTINUE
      READ(5,66) A
66  FORMAT(A4)
      WRITE(6,68 ) A

```

RUSTRAK PROGRAM, cont.

```

68 FORMAT(10X, 'LAST CARD READ IN COL. 1-4 ONLY ', A4)
   IF(A.EQ. BLANK ) GO TO 6
   GO TO 67
6 CONTINUE
   BEGIN TO COMPUTE TIME AND MICROMETER READING FOR DATA SET
   I1ST= LOCATION OF FIRST NONZERO DATA PT IN IDATA
   ILAST=LOCATION OF LAST NONZERO DATA PT IN IDATA
   ROUTINE TO FIND FIRST DATA POINT
   DO 10 I=1,2000
   IF(IDATA(I) .EQ. 0) GO TO 10
   GO TO 11
10 CONTINUE
11 CONTINUE
   I1ST=I
   ROUTINE TO FIND LAST DATA POINT
   DO 14 I=1,2000
   K=2001-I
   IF(IDATA( K) .EQ.0 ) GO TO 14
   GO TO 15
14 CONTINUE
15 CONTINUE
   ILAST=2001-I
   WRITE(6,61) I1ST, ILAST
61 FORMAT(10X, 'I1ST=', I5, 5X, 'ILAST=', I5)
   K=1
   K=LOCATION OF 1ST ENTRY IN OUTPUT DATA SET FOR MICROMETER RDINGS
   FIRST MICROMETER READING
   DATA(K)=DMIC1
   SLIP(K)=DMIC1/COS(ANGLE)
   IYRA(K)=IYR11
   JDA(K) =JD11
   IHRA(K)=IHR11
   MINA(K)=IMIN11
   LAST MICROMETER READING
   K=ILAST-I1ST+3
   DATA(K)=DMIC2
   SLIP(K)=DMIC2/COS(ANGLE)
   IYRA(K)=IYR22
   JDA(K) =JD22
   IHRA(K)=IHR22
   MINA(K)=IMIN22
   ITOT= TOTAL NUMBER OF POINTS IN OUTPUT ARRAY
   ITOT=ILAST-I1ST +2
   ROUTINE TO CHECK TOTAL NUMBER OF PTS LESS THAN 2K
   IF(ITOT .GE. 1999 ) ITOT=1999

```

RUSTRAK PROGRAM, cont.

```

C ROUTINE TO COMPUTE TIME OF EACH DATA POINT
C COMPUTE TIME IN HOURS OF FIRST DATA POINT
C ROUTINE TO GIVE HRS OF EACH ENTRY IN DOUBLE PRECISION
HRA(2)=0.0
DO 17 I=2, ITOT
HRA(I+1)=HRA(I)+2.0000*CHART
C WRITE(6,18) HRA(I),HRA(I+1)
C 18 FORMAT(10X,F15.10,5X,F15.10)
C 17 CONTINUE
C ROUTINE TO CONVERT TOTAL NUMBER OF HRS TO GMT
DO 19 I=2, ITOT
HRA(I)=HRA(I)/24.000
IDA=HRA(I)
HRA(I)=(HRA(I)- IDA)*24.000
IHRA(I)=HRA(I)
DDM=(HRA(I)-IHRA(I) )*60.000
MINA(I)=DDM
C XMIN(I)=DDM
C ADD TIME TO TIME OF FIRST PT.
IYRA(I)=IYR12
JDA(I)=JD12 + IDA
IHRA(I)=IHRA(I)+ IHR12
MINA(I)=MINA(I)+IMIN12
C XMIN(I)=XMIN(I)+IMIN12
C REMOVE MULTIPLES OF 60 MINUTES
M60=MINA(I)/60
IHRA(I)=IHRA(I)+M60
M60=M60*60
MINA(I)=MINA(I)-M60
C XMIN(I)=XMIN(I)-M60
C REMOVE MULTIPLES OF 24 HRS.
M24=IHRA(I)/24.0
JDA(I)=JDA(I)+M24
M24=M24*24
IHRA(I)=IHRA(I)-M24
C CHECK FOR LEAP LEAP AND REMOVE MULTIPLES OF DAY FROM ARRAY JDA
M4=IYRA(I)/4
M4=M4*4
IF(IYRA(I)-M4) 530,540,530
C 540 CONTINUE
C LEAP YEAR
PREVENTS ZERO VALUE IN JULIAN DAY
IF( JDA(I) .EQ. 366 ) GO TO 550
M366=JDA(I)/366
IYRA(I)=IYRA(I)+M366

```

RUSTRAK PROGRAM, cont.

```

M366=M366*366
JDA(I)=JDA(I)-M366
GO TO 550
530 CONTINUE
C PREVENTS ZERO VALUE IN JULIAN DAY
IF( JDA(I) .EQ. 365 ) GO TO 550
M365=JDA(I)/365
IYRA(I)=IYRA(I)+M365
M365=M365*365
JDA(I)=JDA(I)-M365
550 CONTINUE
C WRITE(6,23) IYRA(I),JDA(I),IHRA(I),MINA(I),XMIN(I),I
C 23 FORMAT(10X, 4(5X,I5),5X,F10.7,3X,I5)
C 19 CONTINUE
C DMICX= CHART CONVERSION FACTOR MM/DIV COMPUTED
C DMICX=DMICLT-DMICST
C MAY WISH TO ADD ROUTINE HERE TO CHECK DDIV2 LAST STRIP CHART
C READING AGAINST LAST DATA PT.
C DIFF= DDIV2-DDIV1
C CHECK ON CHART FACTOR CALCULATION
IF( ABS(DIFF) .LE. 0.001) GO TO 88
DFACT1=DMICX/DIFF
GO TO 89
88 CONTINUE
WRITE(6,110)
110 FORMAT(10X, 'AVERAGE VALUE OF CHART FACTOR USED *****'//)
DFACT1=DFACT
89 CONTINUE
DIFF=DFACT-DFACT1
WRITE(6,73) DIFF,DFACT,DFACT1
73 FORMAT(10X, 'DIFFERENCE IN CHART FACTOR-MM/DIV- AND COMPUTED VALUE
11S= ',F10.5/10X, 'GIVEN CHART FACTOR=',F10.5,10X, 'COMPUTED CHART FA
1CTOR=',F10.5)
C IF( DFACT1 .EQ. DFACT ) GO TO 600
C ELIMINATES POSSIBLE CLOSED LOOP
C IF( ABS(DIFF) .GT. 2.00) GO TO 88
C SETS LIMITS ON RANGE OF D CHART FACTOR *****
IF( DFACT1 .GT. 1.0 .OR. DFACT1 .LT. 0.0 ) GO TO 88
600 CONTINUE
C MICROMETER CONVERSION FROM STRIP CHART
J=2
DO 25 I=I1ST, ILAST
IF(IDATA(I+1) .EQ. 0) IDATA(I+1)= IDATA(I)
DATA(J)=IDATA(I)-IDATA(I1ST)
C CHART READINGS ARE TOO LARGE BY FACTOR OF 100X

```


RUSTRAK PROGRAM, cont.

```

DATA(J)= DATA(J)/100.0
DAT=DATA(J)*DFACT1
DATA(J)=DMIC1+ DAT
C WRITE (6,26) DATA(J)
C 26 FORMAT (10X,F10.7)
COS30 = 0.86603 SLIP ANGLE MAY BE CHANGED WHERE THIS NUMBER APPEARS
SLIP(J)=DATA(J)/COS(ANGLE)
J=J+1
C 25 CONTINUE
WRITE DATA ARRAY
WRITE (6,27)
27 FORMAT(10X,
1 'STA YEAR JUL DAY HOUR MINUTE MICROMETER SLIP '/')
J= NUMBER OF DATA POINTS
DO 29 I=1,J
WRITE(6,28) STA,
1 IYRA(I),JDA(I),IHRA(I),MINA(I),DATA(I),SLIP(I),I
28 FORMAT(10X,A4,I5,2X,I5,2X,I5,2X,I5,2X,F10.5,2X,F10.5,I5 )
29 CONTINUE
30 CONTINUE
K=J-1
DIFF=DATA(K)-DMIC2
WRITE(6,31) DIFF,DATA(K),DMIC2
31 FORMAT(10X,'DIFFERENCE IN LAST DATA POINT DATA(J-1)AND DMIC2=',
1 F10.5/10X,'LAST DATA POINT=',F10.5,10X,'LAST MICROMETER READING='
1,F10.5)
C 32 CONTINUE
INTERFACE TO QPLOT HERE
IDA=0
MO=0
TEMP=0.0
ROUTINE TO PUNCH OUT CREEP METER CARDS FROM RUS TRAK
PUNCH OUT FIRST MICROMETER READING
I=1
WRITE(6,33) STA,IYRA(I),JDA(I),IHRA(I),MINA(I),TEMP,DATA(I),
1 XMICRO
IF(ICARD .NE.0 ) GO TO 440
WRITE(9,34) STA,IYRA(I),JDA(I),IHRA(I),MINA(I),TEMP,DATA(I),
1 XMICRO
440 CONTINUE
K=J-1
DO 44 I=2,K
WRITE(6,33) STA,IYRA(I),JDA(I),IHRA(I),MINA(I),TEMP,DATA(I),
1 RUS
33 FORMAT(10X,

```

```

1 A4,I4,1X,I3, 'G',2I2,2X,F6.1,F9.3,'M',1X,A4)
  IF(ICARD.NE.0) GO TO 71
  WRITE(9,34) STA,IYRA(I),JDA(I),IHRA(I),MINA(I),TEMP,DATA(I),
1 RUS
34 FORMAT(
1 A4,I4,1X,I3, 'G',2I2,2X,F6.1,F9.3,'M',1X,A4)
71 CONTINUE
44 CONTINUE
  PUNCH OUT LAST MICROMETER READING
  I=J
  WRITE(6,33) STA,IYRA(I),JDA(I),IHRA(I),MINA(I),TEMP,DATA(I),
1 XMICRO
  IF(ICARD.NE.0) GO TO 430
  WRITE(9,34) STA,IYRA(I),JDA(I),IHRA(I),MINA(I),TEMP,DATA(I),
1 XMICRO
430 CONTINUE

C
C
C
C
PLOT DATA

WRITE HEADING FOR PLOT
  WRITE(6,81)
81 FORMAT(1H1//)
  WRITE(6,85) ((OUTPUT(I,K),K=1,20),I=1,6)
85 FORMAT(20X,20A4/)
  WRITE(6,82)
82 FORMAT(//T60,'MICROMETER READING IN MM')
  CALL QPLOT( J,DATA)
  WRITE(6,82)
  WRITE(6,85) ((OUTPUT(I,K),K=1,20),I=1,6)
  WRITE(6,81)
  WRITE(6,85) ((OUTPUT(I,K),K=1,20),I=1,6)
  WRITE(6,83)
83 FORMAT(//T60,'SLIP READING IN MM ')
  CALL QPLOT( J,SLIP)
  WRITE(6,83)
  WRITE(6,85) ((OUTPUT(I,K),K=1,20),I=1,6)
  WRITE(6,81)
  PUNCH OUT END CARD TO SEPARATE RUNS
  ROUTINE TO STORE LAST MICROMETER READING AND EQUATE IT TO
  FIRST MICROMETER READING OF NEXT DATA SET
  XMICLT=DMIC2
  STAOLD=STA
  RESET=0.0
  GO TO 1
510 CONTINUE

```

RUSTRAK PROGRAM, cont.

```

WRITE(6,520)
520 FORMAT (10X,'END OF CARD INPUT DATA SET          ***          *'//)
62 CONTINUE
WRITE(6,63)
63 FORMAT(10X,'NORMAL END '///)
STOP
END
SUBROUTINE QPLOT( N,DATA)
C
C PLOTS TIME SERIES
C
C I=NO. OF TIME SERIES IN DATA SET
C N=NO. OF DATA POINTS
C DATA(N)=DATASET
C YEARI=INITIAL YEAR
C JDAYI=INITIAL JULIAN DAY
C
C DIMENSION DATA(2000), LINE(100), MNTH(12)
C COMMON IYRA(2000), JDA(2000), IHRA(2000), MINA(2000)
C REAL MIN,MAX
C INTEGER BLANK,SYMBOL,DASH,YEARI,YEAR
C INTEGER DAY,DYPREV,FLAG1
C DATA BLANK,SYMBOL,DASH/' ','#','-'/'
C DATA MNTH/'JAN','FEB','MAR','APR','MAY','JUN','JUL','AUG','SEP',
C 'OCT','NOV','DEC'/'
C YEARI=IYRA(1)
C JDAYI=JDA(1)
C
C COMPUTE MIN,MAX,RANGE
C
C MIN=DATA(1)
C MAX=DATA(1)
C DO 15 I=2,N
C IF (DATA(I).LT.MIN) MIN=DATA(I)
15 IF (DATA(I).GT.MAX) MAX=DATA(I)
C RANGE SET TO 1 MM
C RANGE=1.0
C RANG1=RANGE
C MINIMUM VALUE REDUCE BY 1/2 MM AND THEN ROUNDED TO INTEGER
C MIN1=MIN
C IF (MIN.LT.0.0) MIN1=MIN-1.5
120 CONTINUE
C MAX1=MIN1+ RANGE
C IF (MAX1 .LT. MAX ) GO TO 100
C GO TO 110

```

RUSTRAK PROGRAM, cont.

```

100 CONTINUE
    RANGE=RANGE +RANG1
    GO TO 120
C   NEED CORRECTION TO PROGRAM IF MORE X-AXIS
C   COMPRESSION IS NEEDED
110 CONTINUE
C   NEED DATA CHECK ON DATA FOR WAY OUT PTS
    YEAR=YEARI
    JULDAY=JDAYI
C
C   WRITE PLOT LABELS
C
C   CHECK FOR CHANGE IN SCALE FACTOR ON PLOT
    IF(RANGE .GT. RANG1 ) WRITE(6,90) RANGE
90  FORMAT(20X,'SCALE FACTOR CHANGE      RANGE=', F10.5 )
    WRITE (6,47)
47  FORMAT (1X)
    WRITE(6,80) MIN1, MAX1
80  FORMAT(21X,I3,'MM',95X,I3,'MM')
    WRITE (6,48)
48  FORMAT (T24,'I',T34,'I',T44,'I',T54,'I',T64,'I',T74,'I',T84,'I',
C   T94,'I',T104,'I',T114,'I',T124,'I')
    WRITE (6,50)
50  FORMAT(T24,'-----')
C   -----')
C
C   PLOT LOOP
C
    FLAG1=1
    NN=N
    DO 20 I=1,NN
        IZERO=BLANK
        DO 25 J=1,100
25  LINE(J)=BLANK
        RDATA=(DATA(I)-MIN1)/RANGE
        RDATA=RDATA*100
        ADD .5 FOR CORRECT ROUND OFF
        RDATA=RDATA+.5
        ROUTINE NEEDED TO LABEL PLOT
        IDATA=RDATA
        IF( IDATA .LT. 0.5 ) GO TO 81
        IF (IDATA.LT.1) IDATA=1
        IF (IDATA.GT.100) IDATA=100
        LINE(IDATA)=SYMBOL
        GO TO 82

```


RUSTRAK PROGRAM, cont.

```

C ROUTINE TO GIVE A ZERO ON PLOT
81 CONTINUE
  IZERO=SYMBOL
82 CONTINUE
  IF (I.GT.1) GO TO 75
  FLAG1=2
  YEAR=IYRA(I)
  JULDAY=JDA(I)
  CALL CNVRT1 (YEAR,JULDAY,MONTH,DAY)
  GO TO 70
75 CONTINUE
  MNPREV=MONTH
  DYPREV=DAY
  YEAR=IYRA(I)
  JULDAY=JDA(I)
  CALL CNVRT1 (YEAR,JULDAY,MONTH,DAY)
  IF (MNPREV.EQ.MONTH) FLAG1=0
  IF (MNPREV.LT.MONTH) FLAG1=1
  IF (MNPREV.GT.MONTH) FLAG1=2
70 IF (FLAG1.EQ.0) WRITE (6,30) DAY,IHRA(I),
  2 MINA(I),
  1 IZERO,LINE
  IF (FLAG1.EQ.1) WRITE (6,31) MNTH(MONTH),DAY,IHRA(I),
  2 MINA(I),
  1 IZERO,LINE
  IF (FLAG1.EQ.2) WRITE (6,32) YEAR,MNTH(MONTH),DAY,IHRA(I),
  2 MINA(I),
  1 IZERO,LINE
30 FORMAT (          T14,I2,T17,I2,T20,
  1          I2,' I',T24,101A1,'I')
31 FORMAT (          T10,A3,T14,I2,T17,I2,T20,
  1          I2,' I',T24,101A1,'I')
32 FORMAT (T5,I4,T10,A3,T14,I2,T17,I2,T20,
  1          I2,' I',T24,101A1,'I')
20 CONTINUE
C
C WRITE PLOT LABELS
C
  WRITE (6,50)
  WRITE (6,48)
  WRITE (6,47)
  WRITE (6,80) MIN1, MAX1
  RETURN
  END
  SUBROUTINE CNVRT1 (YEAR,JULDAY,MONTH,DAY)

```

RUSTRAK PROGRAM, cont.

```

C
C CONVERTS JULIAN DAY INTO MONTH, DAY
C
  DIMENSION MNTH(12), MNTHL(12)
  INTEGER YEAR, DAY
  DATA MNTH/31,59,90,120,151,181,212,243,273,304,334,365/
  DATA MNTHL/31,60,91,121,152,182,213,244,274,305,335,366/
  YEAR=YEAR+1900
  LEAP=0
  MLEAP=YEAR/4.0
  MLEAP=MLEAP*4
  IF (YEAR.EQ.MLEAP) LEAP=1
  IF (JULDAY.LE.MNTH(1)) GO TO 15
  DO 10 I=2,12
  II=I
  IF (LEAP.EQ.0.AND.MNTH(I-1).LT.JULDAY.AND.JULDAY.LE.MNTH(I)) GO
C TO 20
  IF (LEAP.EQ.1.AND.MNTHL(I-1).LT.JULDAY.AND.JULDAY.LE.MNTHL(I)) GO
C TO 25
10 CONTINUE
15 MONTH=1
  DAY=JULDAY
  GO TO 30
20 MONTH=II
  DAY=JULDAY-MNTH(II-1)
  GO TO 30
25 MONTH=II
  DAY=JULDAY-MNTHL(II-1)
30 RETURN
  END

```

CREEP METER RUSTRAK PLOT
 DATA FROM STATION
 PLOT INTERVAL 4 HOURS
 SCALE WIDTH - VARIABLE
 SCALE FACTOR - VARIABLE
 COMPUTER RUN DATE 1/25/74

XMR1	12	731651816	(0X12)+	1.191	6.00	13.348	731651952	13.348	16.564	.5516	1
XMR1	12	731992123	(34X12)+	2.008	11.70	16.564	731992123	60.573	.	.	2
00		597	597	600	600	601	01	601	600	598	600
02		599	598	598	600	601	02	602	600	598	600
04		602	599	598	600	601	05	602	598	597	599
06		601	598	597	599	601	07	603	605	618	621
08		624	621	620	622	624	09	627	625	622	625
10		627	623	623	633	635	11	635	624	621	628
12		630	621	622	629	630	13	634	622	627	635

RUSTRAK SAMPLE DATA, cont.

14	635	629	628	638	639	639	15	639	634	635	640	640	641
16	640	638	638	640	640	641	17	641	639	640	642	643	643
18	642	640	641	647	652	658	19	681	681	681	687	690	692
20	692	684	684	692	696	697	21	695	689	690	697	698	700
22	700	698	698	701	701	703	23	701	700	701	702	704	708
24	703	701	701	702	703	704	25	704	701	701	705	713	713
26	708	703	705	717	720	720	27	720	716	718	719	720	720
28	720	719	719	721	722	723	29	720	722	726	736	737	739
30	736	737	738	740	740	740	31	740	741	741	746	749	1135
32	1152	1153	1154	1160	1160	1163	33	1162	1159	1162	1171	1173	1173
34	1173												

BLANK CARD

The computer generated cards from the Rustrak program are the data for the Printer Plot and the UCC Display Plot programs.

Selected examples of Rustrak output follow:

EXAMPLES OF RUSTRAK PROGRAM OUTPUT

55

COMPUTER RUN DATE 10/20/73

```

XMR1 12 731651816 0 1.191 6.00 13.348 731651952 13.348 16.5640.5516 1
XMR1 12 731992123 34 2.008 11.70 16.564 731992123 60.573 0.0 0.0 2
CUMULATIVE MICROMETER CORRECTION= 60.57300
RESET VALUE= 60.57300
ADJUSTED BEGINNING MICROMETER READING 73.92099
ADJUSTED END MICROMETER READING 77.13699
STRIP CHART CALCULATIONS PERTAINING TO: STA.CODE XMR1
CHART NUMBER 12
START TIME (T SUBD) 73 165 18 16
T START POSITION ( 0X 12)+ 1.19100
D START POSITION 6.00000
MIC READING AT START 73.92099
END TIME (T SUB F) 73 199 21 23
T END POSITION ( 34X 12) + 2.00800
D END POSITION 11.70000
MIC. READING AT END 77.13699
LAPSED TIME 819.11646
CHART LENGTH 408.81665
CHART SPEED, HRS/T-DIV 2.0036277771
MIC. DIFFERENCE 3.21600
D POSITION DIFF 5.70000
D CHART FACTOR 0.56421
0 597 597 600 600 601 601 600 598 600 600 600
599 598 598 600 601 602 602 600 598 600 601 602
602 599 598 600 601 602 602 598 597 599 601 601
601 598 597 599 601 602 603 605 618 621 624 625
624 621 620 622 624 627 627 625 622 625 630 632
627 623 623 633 635 638 635 624 621 628 632 633
630 621 622 629 630 635 634 622 622 627 635 637
635 629 628 638 639 639 641 639 640 642 643 643
640 638 638 640 640 641 641 639 640 642 643 643
642 640 641 647 652 658 681 681 681 687 690 692
692 684 684 692 696 697 695 689 690 697 698 700
700 698 698 701 701 703 701 700 701 702 704 708
703 701 701 702 703 704 704 701 701 705 713 713
708 703 705 717 720 720 720 716 718 719 720 720
720 719 719 721 722 723 720 722 726 736 737 739
736 737 738 740 740 740 740 741 741 746 749 1135
1152 1153 1154 1160 1160 1163 1162 1159 1162 1171 1173 1173
1173 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0

```

I1ST= 2 I1AST= 205
 DIFFERENCE IN CHART FACTOR-HM/DIV- AND COMPUTED VALUE IS= -0.01261
 GIVEN CHART FACTOR= 0.55160 COMPUTED CHART FACTOR= 0.56421
 STA YEAR JUL DAY HOUR MINUTE MICROMETER SLIP

```

XMR1 73 165 18 16 73.92099 85.35616 1
XMR1 73 165 19 52 73.92099 85.35616 2
XMR1 73 165 23 52 73.92099 85.35616 3
XMR1 73 166 3 52 73.93791 85.37569 4
XMR1 73 166 7 53 73.93791 85.37569 5
XMR1 73 166 11 53 73.94356 85.38220 6
XMR1 73 166 15 54 73.94356 85.38220 7
XMR1 73 166 19 54 73.93791 85.37569 8
XMR1 73 166 23 55 73.92662 85.36266 9
XMR1 73 167 3 55 73.93791 85.37569 10
XMR1 73 167 7 55 73.93791 85.37569 11
XMR1 73 167 11 56 73.93791 85.37569 12
XMR1 73 167 15 56 73.93227 85.36917 13
XMR1 73 167 19 57 73.92662 85.36266 14
XMR1 73 167 23 57 73.92662 85.36266 15
XMR1 73 168 3 58 73.93791 85.37569 16
XMR1 73 168 7 58 73.94356 85.38220 17
XMR1 73 168 11 58 73.94919 85.38870 18
XMR1 73 168 15 59 73.94919 85.38870 19
XMR1 73 168 19 59 73.93791 85.37569 20
XMR1 73 169 0 0 73.92662 85.36266 21
XMR1 73 169 4 0 73.93791 85.37569 22
XMR1 73 169 8 1 73.94356 85.38220 23
XMR1 73 169 12 1 73.94919 85.38870 24
XMR1 73 169 16 2 73.94919 85.38870 25
XMR1 73 169 20 2 73.93227 85.36917 26
XMR1 73 170 0 2 73.92662 85.36266 27

```

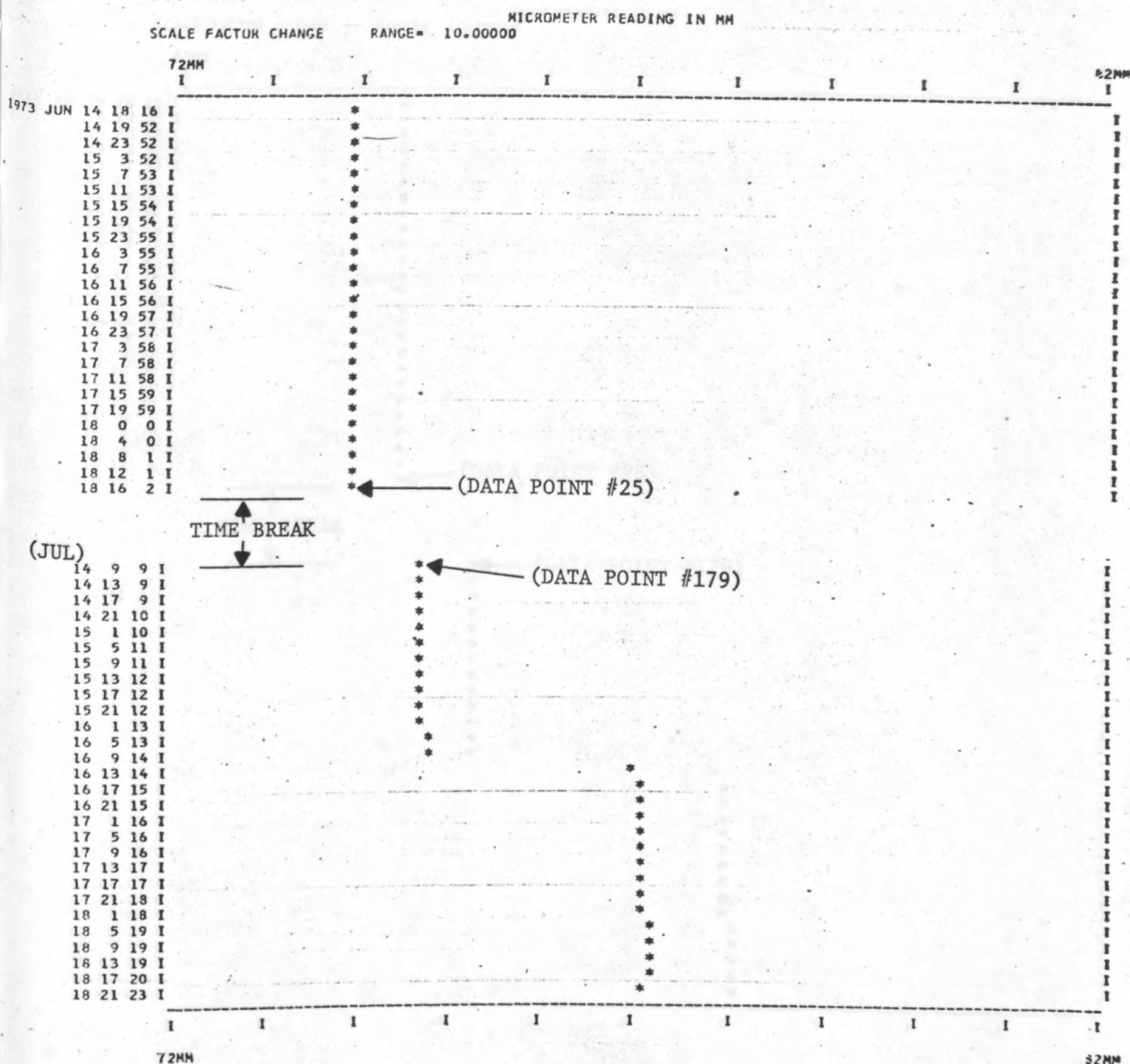

XMR1	73	194	13	6	74.63188	86.17702	174
XMR1	73	194	17	7	74.61496	86.15747	175
XMR1	73	194	21	7	74.62625	86.17052	176
XMR1	73	195	1	8	74.64882	86.19656	177
XMR1	73	195	5	8	74.70523	86.26170	178
XMR1	73	195	9	9	74.71088	86.26822	179
XMR1	73	195	13	9	74.72217	86.28127	180
XMR1	73	195	17	9	74.70523	86.26170	181
XMR1	73	195	21	10	74.71088	86.26822	182
XMR1	73	196	1	10	74.71652	86.27475	183
XMR1	73	196	5	11	74.72780	86.28777	184
XMR1	73	196	9	11	74.72780	86.28777	185
XMR1	73	196	13	12	74.72780	86.28777	186
XMR1	73	196	17	12	74.72780	86.28777	187
XMR1	73	196	21	12	74.73344	86.29428	188
XMR1	73	197	1	13	74.73344	86.29428	189
XMR1	73	197	5	13	74.76166	86.32686	190
XMR1	73	197	9	14	74.77858	86.34641	191
XMR1	73	197	13	14	76.95644	88.86116	192
XMR1	73	197	17	15	77.05235	88.97191	193
XMR1	73	197	21	15	77.05800	88.97844	194
XMR1	73	198	1	16	77.06364	88.98495	195
XMR1	73	198	5	16	77.09749	89.02403	196
XMR1	73	198	9	16	77.09749	89.02403	197
XMR1	73	198	13	17	77.11441	89.04358	198
XMR1	73	198	17	17	77.10878	89.03708	199
XMR1	73	198	21	18	77.09184	89.01752	200
XMR1	73	199	1	18	77.10878	89.03708	201
XMR1	73	199	5	19	77.15956	89.09570	202
XMR1	73	199	9	19	77.17084	89.10873	203
XMR1	73	199	13	19	77.17084	89.10873	204
XMR1	73	199	17	20	77.17084	89.10873	205
XMR1	73	199	21	23	77.13699	89.06966	206

DIFFERENCE IN LAST DATA POINT DATA(J-1) AND DMIC2= 0.03384

LAST DATA POINT= 77.17084 LAST MICROMETER READING= 77.13699

XMR1	73	165G1816	0.0	73.921M	MIC
XMR1	73	165G1952	0.0	73.921M	RUS
XMR1	73	165G2352	0.0	73.921M	RUS
XMR1	73	166G 352	0.0	73.938M	RUS
XMR1	73	166G 753	0.0	73.938M	RUS
XMR1	73	166G1153	0.0	73.944M	RUS
XMR1	73	166G1554	0.0	73.944M	RUS
XMR1	73	166G1954	0.0	73.938M	RUS
XMR1	73	166G2355	0.0	73.927M	RUS
XMR1	73	167G 355	0.0	73.938M	RUS
XMR1	73	167G 755	0.0	73.938M	RUS
XMR1	73	167G1156	0.0	73.938M	RUS
XMR1	73	167G1556	0.0	73.932M	RUS
XMR1	73	167G1957	0.0	73.927M	RUS
XMR1	73	167G2357	0.0	73.927M	RUS
XMR1	73	168G 358	0.0	73.938M	RUS
XMR1	73	168G 758	0.0	73.944M	RUS
XMR1	73	168G1158	0.0	73.949M	RUS
XMR1	73	168G1559	0.0	73.949M	RUS
XMR1	73	168G1959	0.0	73.938M	RUS
XMR1	73	169G 0 0	0.0	73.927M	RUS
XMR1	73	169G 4 0	0.0	73.938M	RUS
XMR1	73	169G 8 1	0.0	73.944M	RUS
XMR1	73	169G12 1	0.0	73.949M	RUS
XMR1	73	169G16 2	0.0	73.949M	RUS
XMR1	73	169G20 2	0.0	73.932M	RUS
XMR1	73	170G 0 2	0.0	73.927M	RUS
XMR1	73	170G 4 3	0.0	73.938M	RUS
XMR1	73	170G 8 3	0.0	73.944M	RUS
XMR1	73	170G12 4	0.0	73.949M	RUS
XMR1	73	170G16 4	0.0	73.949M	RUS
XMR1	73	170G20 5	0.0	73.927M	RUS
XMR1	73	171G 0 5	0.0	73.921M	RUS
XMR1	73	171G 4 5	0.0	73.932M	RUS
XMR1	73	171G 8 6	0.0	73.944M	RUS
XMR1	73	171G12 6	0.0	73.944M	RUS
XMR1	73	171G16 7	0.0	73.944M	RUS
XMR1	73	171G20 7	0.0	73.927M	RUS
XMR1	73	172G 0 8	0.0	73.921M	RUS
XMR1	73	172G 4 8	0.0	73.932M	RUS
XMR1	73	172G 8 8	0.0	73.944M	RUS
XMR1	73	172G12 9	0.0	73.949M	RUS
XMR1	73	172G16 9	0.0	73.955M	RUS
XMR1	73	172G2010	0.0	73.966M	RUS
XMR1	73	173G 010	0.0	74.039M	RUS
XMR1	73	173G 411	0.0	74.056M	RUS

EXAMPLES OF RUSTRAK PROGRAM OUTPUT, cont.

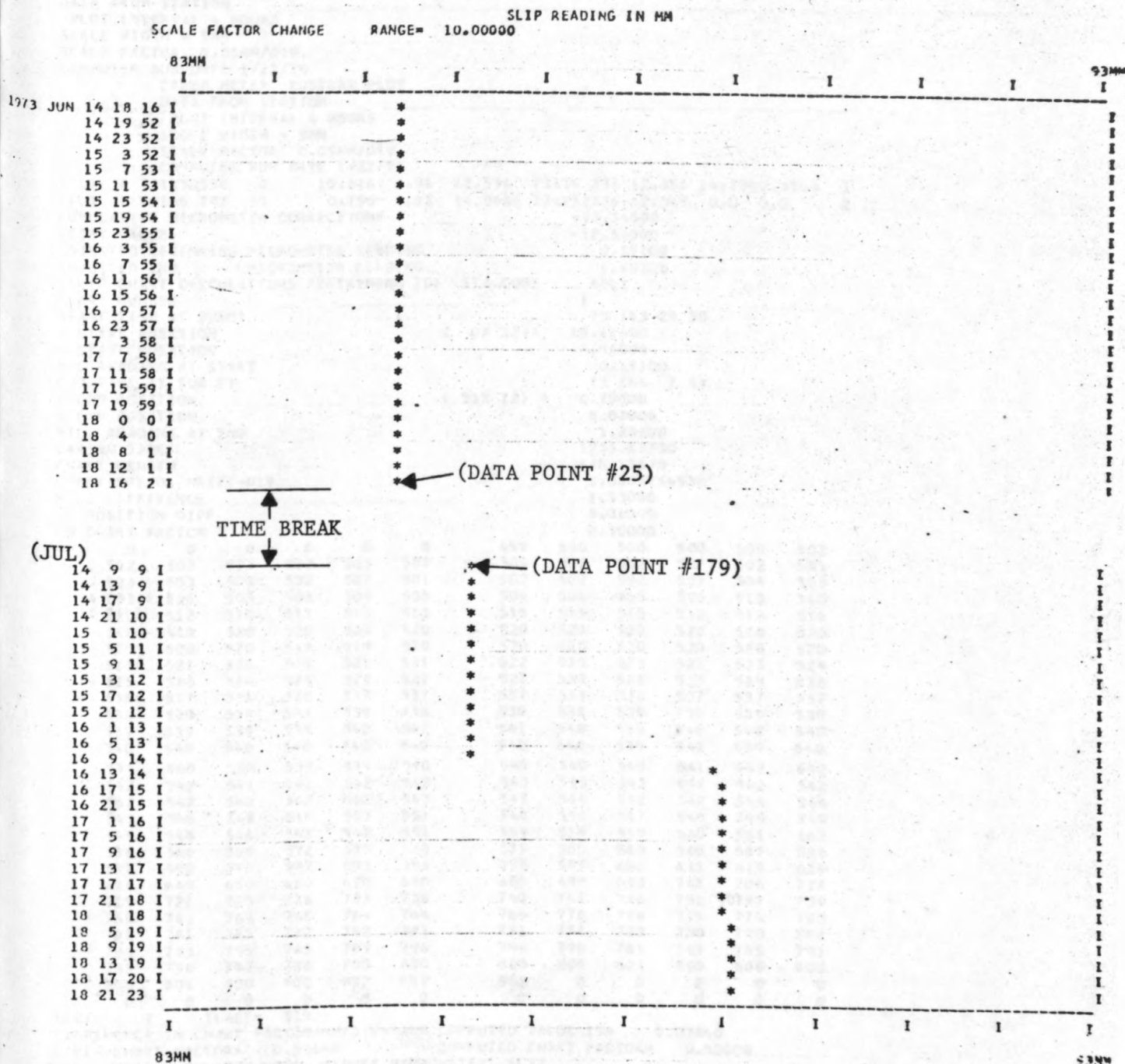


CREEP METER RUSTRAK PLOT
 DATA FROM STATION XMRI
 PLOT INTERVAL 4 HOURS
 SCALE WIDTH = 5MM
 SCALE FACTOR 0.05MM/DIV.
 COMPUTER RUN DATE 10/20/73

MICROMETER READING IN MM

EXAMPLES OF RUSTRAK PROGRAM OUTPUT, cont.

58



CREEP METER RUSTRAK PLOT
 DATA FROM STATION XMRI
 PLOT INTERVAL 4 HOURS
 SCALE WIDTH = 5MM
 SCALE FACTOR 0.05MM/DIV.
 COMPUTER RUN DATE 10/20/73

CREEP METER RUSTRAK PLOT

DATA FROM STATION

PLOT INTERVAL 4 HOURS

SCALE WIDTH = 5MM

SCALE FACTOR 0.05MM/DIV.

COMPUTER RUN DATE 1/22/74

CREEP METER RUSTRAK PLOT

DATA FROM STATION

PLOT INTERVAL 4 HOURS

SCALE WIDTH = 5MM

SCALE FACTOR 0.05MM/DIV.

COMPUTER RUN DATE 1/22/74

XFL1 1 731132350 0 10.616 4.96 12.536 73114 236 12.536 14.1980.5364 1

XFL1 1 73166 743 53 0.750 8.02 14.066E 731732336-12.345 0.0 0.0 2

CUMULATIVE MICROMETER CORRECTION= -12.34500

RESET VALUE= -12.34500

ADJUSTED BEGINNING MICROMETER READING 0.19100

ADJUSTED END MICROMETER READING 1.85300

STRIP CHART CALCULATIONS PERTAINING TO: STA.CODE XFL1

CHART NUMBER 1

START TIME (T SUBO) 73 113 23 50

T START POSITION (OX 12)+ 10.61600

D START POSITION 4.96000

MIC READING AT START 0.19100

END TIME (T SUB F) 73 166 7 43

T END POSITION (53X 12) + 0.75000

D END POSITION 8.02000

MIC. READING AT END 1.85300

LAPSED TIME 1255.88330

CHART LENGTH 626.13379

CHART SPEED, HRS/T-DIV 2.0057744980

MIC. DIFFERENCE 1.53000

D POSITION DIFF 3.06000

D CHART FACTOR 0.50000

0	0	0	0	0	0	499	500	500	500	500	502
502	502	502	502	503	502	503	502	502	502	502	503
503	503	502	502	502	501	502	502	502	503	504	503
503	505	503	503	504	505	504	506	505	505	513	510
510	512	510	513	513	515	515	515	513	512	514	516
518	519	520	520	520	520	520	520	520	520	520	520
520	520	520	519	519	520	520	520	520	520	520	520
521	521	520	520	521	521	522	523	523	523	523	524
525	525	524	525	525	527	527	528	525	525	525	536
536	537	536	538	537	537	537	538	536	537	537	537
538	539	538	538	539	538	539	538	538	538	539	539
539	539	539	539	540	542	541	540	540	540	540	540
540	540	540	540	540	540	540	540	539	540	539	540
539	540	539	539	539	540	540	540	540	541	542	542
542	542	541	541	542	542	543	542	542	542	542	542
542	542	542	542	542	543	543	544	542	542	544	544
545	546	548	548	553	551	548	550	547	548	548	549
549	546	546	546	549	551	555	559	559	560	561	562
566	566	568	572	577	578	579	580	580	580	587	586
587	590	590	592	595	596	598	599	602	611	619	624
634	640	650	660	670	680	685	695	698	701	706	718
719	721	723	726	733	738	740	741	746	752	757	759
760	761	767	765	764	764	764	770	774	775	779	780
781	781	782	782	782	781	781	781	780	780	780	782
789	793	795	795	795	796	794	790	785	785	785	791
793	796	797	799	800	800	800	801	801	800	800	800
800	801	800	800	802	802	802	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

I1ST= 7 I1AST= 319

DIFFERENCE IN CHART FACTOR-MM/DIV- AND COMPUTED VALUE IS= 0.03640

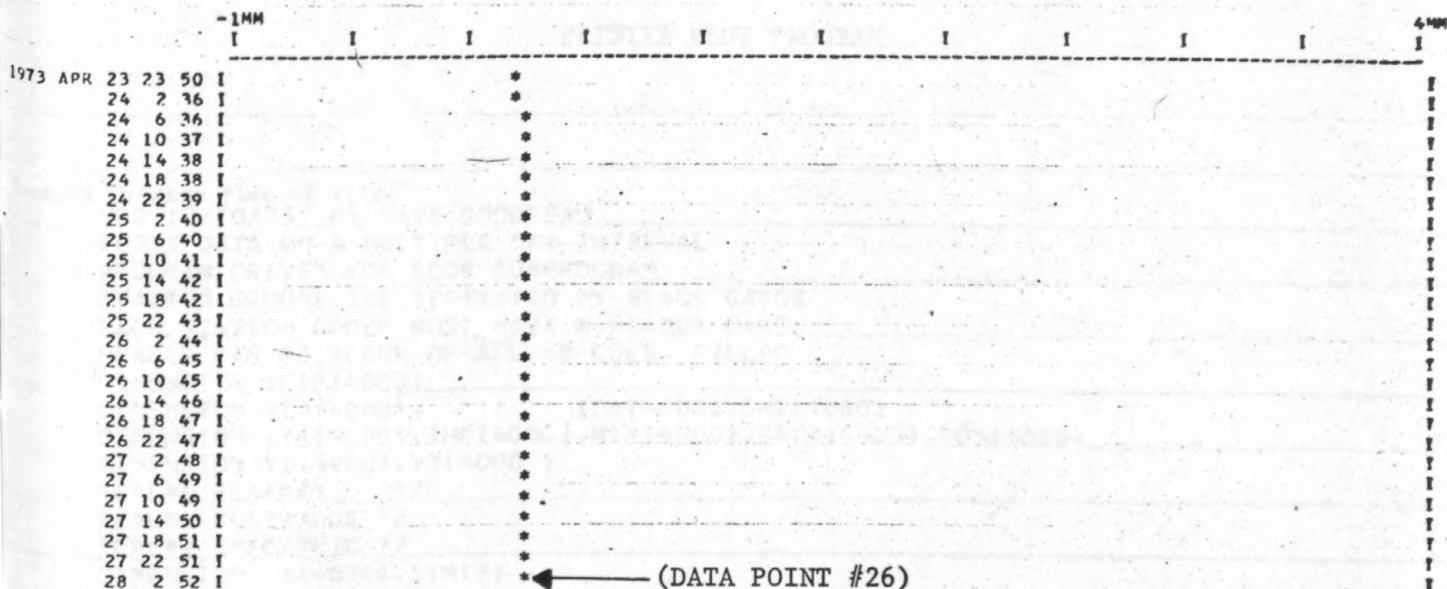
GIVEN CHART FACTOR= 0.53640 COMPUTED CHART FACTOR= 0.50000

STA YEAR JUL DAY HOUR MINUTE MICROMETER SLIP

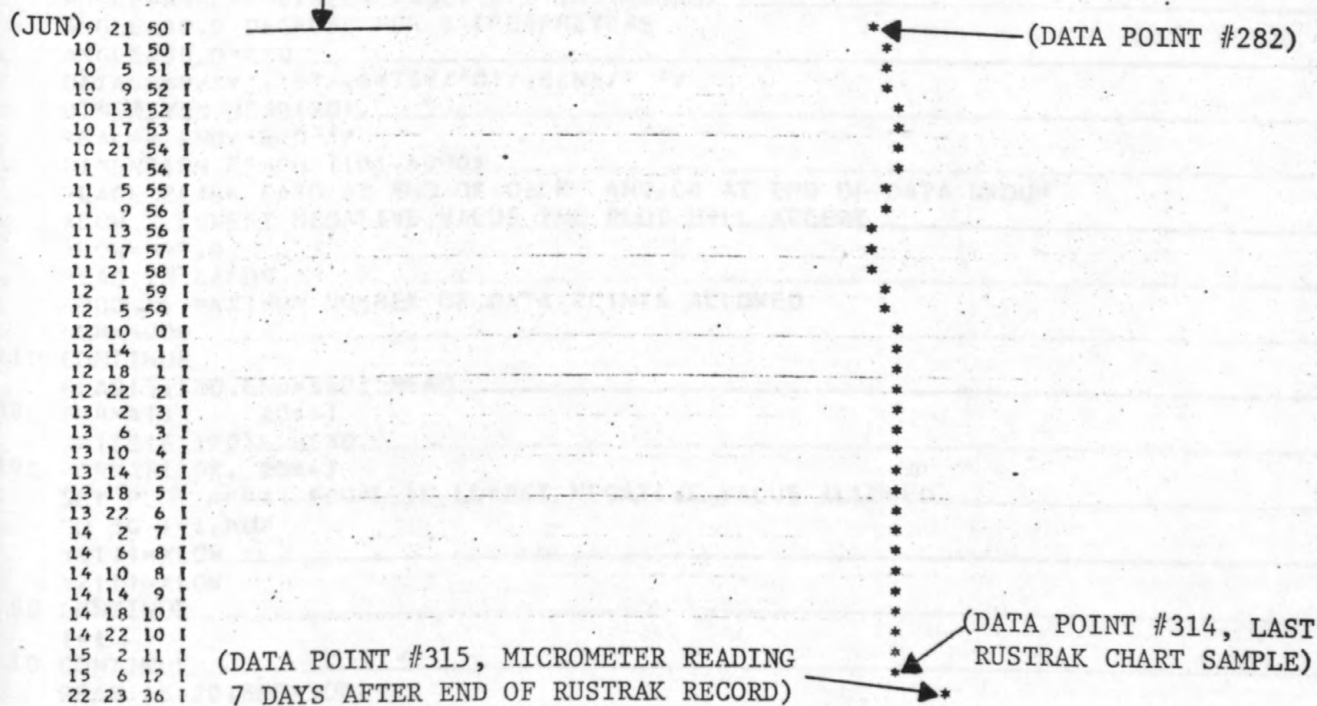
XFL1	73	113	23	50	0.19100	0.22055	1
XFL1	73	114	2	36	0.19100	0.22055	2
XFL1	73	114	6	36	0.19600	0.22632	3
XFL1	73	114	10	37	0.19600	0.22632	4
XFL1	73	114	14	38	0.19600	0.22632	5
XFL1	73	114	18	38	0.19600	0.22632	6
XFL1	73	114	22	39	0.20600	0.23787	7
XFL1	73	115	2	40	0.20600	0.23787	8
XFL1	73	115	6	40	0.20600	0.23787	9
XFL1	73	115	10	41	0.20600	0.23787	10
XFL1	73	115	14	42	0.20600	0.23787	11
XFL1	73	115	18	42	0.21100	0.24364	12
XFL1	73	115	22	43	0.20600	0.23787	13

EXAMPLES OF RUSTRAK PROGRAM OUTPUT, cont.

SLIP READING IN MM



TIME BREAK



CREEP METER RUSTRAK PLOT

DATA FROM STATION XFL1

PLOT INTERVAL 4 HOURS

SCALE WIDTH = 5MM

SCALE FACTOR 0.05MM/DIV.

PRINTER PLOT PROGRAM

```

Rustrak Printer Plot of slip.
C MOD 12/10/73 BY DAVE GOODREAU
C PLOTS DATA ON A MULTIPLE DAY INTERVAL
C PROGRAM DRIVER FOR S009 SUBPROGRAM
C STATION GROUPS ARE SEPARATED BY BLANK CARDS
C EACH STATION GROUP MUST HAVE A HEADER CARD
C HEADER CAN BE BLANK OR ALL 80 COLS. FILLED
C DIMENSION SLIP(4000)
C DIMENSION STA(4000), IDA(4000), GMT(4000)
C DIMENSION IYR(4000), IHR(4000), MIN(4000), DATA(4000), RUS(4000)
C DIMENSION Y1(4000), Y2(4000)
C REAL*4 BLANK/' '//
C REAL*4 RUST/'RUS '//
C REAL*4 XMIC/'MIC '//
C DIMENSION X(4000), SYM(2)
C CONVERSION FACTOR FOR DEGREES TO RADIANS
C RAD=.017453
C ANGLE=ANGLE BETWEEN FAULT AND INSTRUMENT
C ANGLE=30.0 DEGREES FOR X CREEPMETERS
C ANGLE=30.0*RAD
C DATA SYM/'*', '+', GMTSY/'G', BLNK/' '//
C DIMENSION HEAD(20)
C REAL*4 END/'END '//
C DIMENSION GRAPH (101,4000)
C PLACE BLANK CARD AT END OF DECK AND/OR AT END OF DATA GROUP
C XLOW LOWEST NEGATIVE VALUE THE PLOT WILL ACCEPT
C XLOW=-99.0
C READ IN CARDS
C 4000 IS MAXIMUM NUMBER OF DATA POINTS ALLOWED
C NUM=4000
110 CONTINUE
C READ(5,180,END=300) HEAD
180 FORMAT( 20A4)
C WRITE(6,190) HEAD
190 FORMAT(10X, 20A4)
C SET PLOT ARRAY EQUAL TO LOWEST NEGATIVE VALUE ALLOWED
C DO 50 I=1, NUM
C Y1(I)=XLOW
C Y2(I)=XLOW
50 CONTINUE
C I=1
10 CONTINUE
C READ (5,20,END=300)
1 STA(I), IYR(I), IDA(I), GMT(I), IHR(I), MIN(I),
2 DATA(I), RUS(I)

```

PRINTER PLOT PROGRAM, cont.

```

20 FORMAT (   A4,2I4, A1,                2I2,8X,F9.4,2X ,
1 A4 )
  SLIP(I)=DATA(I)/COS(ANGLE)
  WRITE (6,30)
  1   STA(I),IYR(I),IDA(I),      GMT(I),IHR(I),MIN(I),
  IDATA(I),RUS(I),I,SLIP(I)
30 FORMAT (10X,A4,2I4      ,A1,2I2,8X,F9.4,2X,
1A4,I6,2X,F10.4)
  DATA(I)=SLIP(I)
  IF(STA(I).EQ.BLANK .AND. I .EQ. 1 ) GO TO 100
  IF( STA(I) .EQ. BLANK ) GO TO 40
  IF( STA(I) .EQ. END ) GO TO 40
  I=I+1
  GO TO 10
40 CONTINUE
  IF(I.EQ. 1) GO TO 100
  ITOTAL=I-1
  ITOTAL= TOTAL NUMBER OF CARDS READ INTO DATA ARRAY
  IBNG=1
  IEND=ITOTAL
  DO 70 I=IBNG,IEND
  IF( RUS(I) .EQ.RUST ) Y1(I)=DATA(I)
  IF( RUS(I) .EQ.XMIC ) Y2(I)=DATA(I)
  *****
70 CONTINUE
  COMPUTE MAX AND MIN VALUES OF ARRAY Y
  SET YMAX AND YMIN EQUAL TO FIRST VALUE IN ARRAY DATA
  YMAX=DATA(1)
  YMIN=DATA(1)
  DO 150 I=1,ITOTAL
  IF(DATA(I) .GE. YMAX) YMAX=DATA(I)
  IF(DATA(I) .LE. YMIN) YMIN=DATA(I)
150 CONTINUE
  SET YMIN TO NEAREST INTEGER
  IF( YMIN .LT. 0.0 ) YMIN=YMIN-1.5
  IF( YMIN .GT. 0.0 ) YMIN=YMIN+1.5
  IYMIN=YMIN
  YMIN=IYMIN
  ROUTINE TO MAKE Y AXIS SCALE A MULTIPLE OF 10
  RANGE=10.0
140 CONTINUE
  YMAX1=RANGE + YMIN
  IF(YMAX1 .LT. YMAX ) GO TO 120
  GO TO 130
120 CONTINUE

```

```

YMAX1=YMAX1+RANGE
IF(YMAX1 .LT. YMAX ) GO TO 120
130 CONTINUE
YMAX=YMAX1
SETUP FOR X AXIS

CONVERT TIME TAG FROM HRS MIN AND DAYS TO DECIMAL DAY

NOTE - IF YEAR CHANGES - NEED TO ADD 365 OR 366 TO X VALUE
ADD=-1.0
SUBTRACT 1.0 DAYS TO CONVERT TO STANDARD CREEP TIME
DO 220 I=1,ITOTAL
X(I)=IDA(I)+ IHR(I)/24.0+ MIN(I)/1440.0 +ADD
IF(I .GE. ITOTAL ) GO TO 220
IF(IYR(I) .EQ. IYR(I+1) ) GOTO 220
M4=IYR(I)/4
M4=M4*4
IF( IYR(I) .NE. M4 ) ADD=365.0 +ADD
IF(IYR(I).EQ. M4) ADD=366.0+ADD
220 CONTINUE
ASSUME TIME TAGS ARE ORDERED
SELECT START AND END TIME OF PLOT
IXMAX=X(ITOTAL)+1.5
XMAX=IXMAX
IXMIN=X(1)- 1.5
XMIN=IXMIN
LINES=XMAX-XMIN+1

IYDM=NUM
LAST=ITOTAL
DO 210 I=1,ITOTAL
WRITE(6,200) DATA(I),RUS(I),Y1(I),Y2(I),I ,X(I)
200 FORMAT(10X, F10.5,2X,A4,2X, 2( F10.5,1X),15,5X,F10.5)
210 CONTINUE
LOGX=0
LOGY=0
MOST=2
NO=1
WRITE(6,240) XMAX,XMIN,YMAX,YMIN
240 FORMAT(10X,'XMAX=',F10.5,2X,'XMIN=',F10.5,2X,'YMAX=',F10.5,
1 2X,'YMIN=',F10.5 / )
WRITE (6,90)
WRITE(6,190) HEAD
CALL RRPLLOT( Y1,X,YMAX,YMIN,XMAX,XMIN,LINES,GRAPH,LAST,SYM,NO,
1 MOST,LOGX,LOGY)

```


PRINTER PLOT PROGRAM, cont.

```

NO=2
CALL PRPLOT(Y2,X,YMAX,YMIN,XMAX,XMIN,LINES,GRAPH,LAST,SYM,NO,
1 MOST,LOGX,LOGY)
WRITE(6,190) HEAD
WRITE(6,90)
GO TO 110
100 CONTINUE
WRITE(6,80)
80 FORMAT(10X,'NORMAL END'//)
WRITE(6,90)
90 FORMAT(1H1//)
300 CONTINUE
WRITE(6,310)
310 FORMAT(10X,'APORT JOB-NO MORE CARDS IN READER'//)
STOP
END
FTN PRTPLOT, MMAP=Y, CRLIST=Y
SUBROUTINE RPLOT(X,Y,XMAX,XMIN,YMAX,YMIN,LINES,GRAPH,LAST,SYM,NO,
1 MOST,LOGX,LOGY)
PLOT TAKES A SET OF X AND Y VALUES AND PLOTS THEM ON THE PRINTER
ARGUMENTS
X THE ARRAY OF X COORDINATES
Y THE ARRAY OF Y COORDINATES
XMAX THE LARGEST VALUE OF X
XMIN THE SMALLEST VALUE OF X
YMAX THE LARGEST VALUE OF Y
YMIN THE SMALLEST VALUE OF Y
LINES THE NUMBER OF LINES FOR THE Y AXIS
GRAPH THE MATRIX USED FOR STORAGE OF THE ENTIRE GRAPH
BEFORE PRINTING
LAST THE NUMBER OF DATA POINTS
SYM THE SYMBOL TO BE USED AS A POINT ON THE GRAPH
NO,MOST THIS IS CURVE NUMBER NO OF THE MAXIMUM NUMBER
MOST TO BE PRINTED ON THESE AXES
LOGX
=0 X PLOTTED ON A NATURAL SCALE
=1 X PLOTTED ON A LOG 10 SCALE
LOGY
=0 Y PLOTTED ON A NATURAL SCALE
=1 Y PLOTTED ON A LOG 10 SCALE
DATA BORD/1H1/, BLANK/1H /
DIMENSION X(LAST),Y(LAST),ZX(11)
DIMENSION GRAPH (101,4000)
DIMENSION SYM(MOST)

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PRINTER PLOT PROGRAM, cont.

```

DIMENSION STA(4000),      IDA(4000),GMT(4000)
DIMENSION IYR(4000),IHR(4000),MIN(4000)
C IWID= WIDTH OF PLOT IN PRINT POSITIONS
IWID=101
POINT=SYM(NO)
IF( NO .NE. 1 ) GO TO 200
YL=YMAX
YS=YMIN
XS=XMIN
XL=XMAX
IF(LOGX)65,67,65
65 XS=ALOG10(XS)
XL=ALOG10(XL)
67 IF(LOGY)75,85,75
75 YS=ALOG10(YS)
YL=ALOG10(YL)
85 CONTINUE
XSCALE=(XL-XS)/(IWID-1)
A=LINES-1
YSCALE=(YL-YS)/A
IF(NO-1)30,10,30
10 CONTINUE
DO 20 I=1,IWID
DO 20 J=1,LINES
20 GRAPH(I,J)=BLANK
DO 29 I=1,LINES
GRAPH(I,I)=BORD
GRAPH(IWID,I)=BORD
29 CONTINUE
200 CONTINUE
30 DO 40 I=1, LAST
IF(LOGX.EQ.1) GO TO 300
XX=X(I)
GO TO 301
300 XX=ALOG10(X(I))
301 IF(LOGY.EQ.1) GO TO 302
YY=Y(I)
GO TO 303
302 YY=ALOG10(Y(I))
C ROUTINE CHECKS TO MAKE SURE PTS ARE WITHIN GIVEN RANGE
C 40 GIVES POINTS OUT OF RANGE SHOULD LIST THEM *****
303 IF(XL-XX) 40,31,31
31 IF(XX-XS)40,32,32
32 IF(YL-YY) 40,33,33
33 IF(YY-YS) 40,34,34

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PRINTER PLOT PROGRAM, cont.

```

34 IX=(XX-XS)/XSCALE+1.5
   IY=(YY-YS)/YSCALE+1.5
   GRAPH(IX,IY)=POINT
40 CONTINUE
   IF(NC-MOST) 50,51,50
50 RETURN
51 CONTINUE
   DO 52 K=1,11
52 ZX(K)=10.*      (K-1)*XSCALE+XS
   WRITE(6,1)
   WRITE(6,8) YSCALE,XSCALE
   WRITE(6,7) (ZX(K),K=1,11)
   WRITE(6,6)
6  FORMAT(1H ,11X,'Y VALUES',2X,20('I....'),'I' )
   YES=YS-YSCALE
   DO 60 I=1,LINES
   YES=YES+YSCALE
   WRITE(6,4) YES, ( GRAPH(J,I),J=1,IWID ),I
4  FORMAT(1H , 7X, E12.4,2X, 101A1 ,1X,I5)
60 CONTINUE
   WRITE(6,6)
   WRITE(6,7) (ZX(K),K=1,11)
   WRITE(6,8) YSCALE,XSCALE
70 IF(LOGX)912,701,912
701 IF(LOGY)71,80,71
71 WRITE(6,91)
91 FORMAT(      26H Y IS PLOTTED ON LOG SCALE)
   GO TO 80
912 IF(LOGY)73,74,73
73 WRITE(6,93)
93 FORMAT (34H X AND Y ARE PLOTTED ON LOG SCALES)
   GO TO 80
74 WRITE(6,94)
94 FORMAT (      26H X IS PLOTTED ON LOG SCALE)
1  FORMAT(1H1)
7  FORMAT(1H ,16X,1P11E10.2)
8  FORMAT(1H ,11X,'YSCALE=',1PE11.4,4X,'XSCALE=',1PE11.4)
80 CONTINUE
   WRITE (6,1)
   RETURN
   END

```

Submit with the computer generated cards from the Rustrak Program.

OUTPUT FROM PRINTER PLOT PROGRAM

ACAD PRTPL1\$\$

CALL RUSPL1\$\$

COMPUTER PIN	12/18/73	XMR1	SLIP
XMR1 73 165G1816	73.9210	MIC	1 85.3562
XMR1 73 165G1952	73.9210	RUS	2 85.3562
XMR1 73 165G2352	73.9210	RUS	3 85.3562
XMR1 73 166G 352	73.9380	RUS	4 85.3758
XMR1 73 166G 753	73.9380	RUS	5 85.3758
XMR1 73 166G1153	73.9440	RUS	6 85.3827
XMR1 73 166G1554	73.9440	RUS	7 85.3827
XMR1 73 166G1954	73.9380	RUS	8 85.3758
XMR1 73 166G2355	73.9270	RUS	9 85.3631
XMR1 73 167G 355	73.9380	RUS	10 85.3758
XMR1 73 167G 755	73.9380	RUS	11 85.3758
XMR1 73 167G1156	73.9380	RUS	12 85.3758
XMR1 73 167G1556	73.9320	RUS	13 85.3689
XMR1 73 167G1957	73.9270	RUS	14 85.3631
XMR1 73 167G2357	73.9270	RUS	15 85.3631
XMR1 73 168G 358	73.9380	RUS	16 85.3758
XMR1 73 168G 758	73.9440	RUS	17 85.3827
XMR1 73 168G1158	73.9490	RUS	18 85.3885
XMR1 73 168G1559	73.9490	RUS	19 85.3885
XMR1 73 168G1959	73.9380	RUS	20 85.3758
XMR1 73 169G 0 0	73.9270	RUS	21 85.3631
XMR1 73 169G 4 0	73.9380	RUS	22 85.3758
XMR1 73 169G 8 1	73.9440	RUS	23 85.3827
XMR1 73 169G12 1	73.9490	RUS	24 85.3885
XMR1 73 169G16 2	73.9490	RUS	25 85.3885
XMR1 73 169G20 2	73.9320	RUS	26 85.3689
XMR1 73 170G 0 2	73.9270	RUS	27 85.3631
XMR1 73 170G 4 3	73.9380	RUS	28 85.3758
XMR1 73 170G 8 3	73.9440	RUS	29 85.3827
XMR1 73 170G12 4	73.9490	RUS	30 85.3885
XMR1 73 170G16 4	73.9490	RUS	31 85.3885
XMR1 73 170G20 5	73.9270	RUS	32 85.3631
XMR1 73 171G 0 5	73.9210	RUS	33 85.3562
XMR1 73 171G 4 5	73.9320	RUS	34 85.3689
XMR1 73 171G 8 6	73.9440	RUS	35 85.3827
XMR1 73 171G12 6	73.9440	RUS	36 85.3827
XMR1 73 171G16 7	73.9440	RUS	37 85.3827
XMR1 73 171G20 7	73.9270	RUS	38 85.3631
XMR1 73 172G 0 8	73.9210	RUS	39 85.3562
XMR1 73 172G 4 8	73.9320	RUS	40 85.3689
XMR1 73 172G 8 8	73.9440	RUS	41 85.3827
XMR1 73 172G12 9	73.9490	RUS	42 85.3885
XMR1 73 172G16 9	73.9550	RUS	43 85.3954
XMR1 73 172G2010	73.9660	RUS	44 85.4081
XMR1 73 173G 010	74.0390	RUS	45 85.4924

OUTPUT FROM PRINTER PLOT PROGRAM, cont.

XMR1	73	173G	411	74.0560	RUS	46	85.5121
XMR1	73	173G	811	74.0730	RUS	47	85.5317
XMR1	73	173G	1212	74.0790	RUS	48	85.5386
XMR1	73	173G	1612	74.0730	RUS	49	85.5317
XMR1	73	173G	2012	74.0560	RUS	50	85.5121
XMR1	73	174G	013	74.0510	RUS	51	85.5063
XMR1	73	174G	413	74.0620	RUS	52	85.5190
XMR1	73	174G	814	74.0730	RUS	53	85.5317
XMR1	73	174G	1214	74.0900	RUS	54	85.5513
XMR1	73	174G	1615	74.0900	RUS	55	85.5513
XMR1	73	174G	2015	74.0790	RUS	56	85.5386
XMR1	73	175G	015	74.0620	RUS	57	85.5190
XMR1	73	175G	416	74.0790	RUS	58	85.5386
XMR1	73	175G	816	74.1070	RUS	59	85.5709
XMR1	73	175G	1217	74.1180	RUS	60	85.5836
XMR1	73	175G	1617	74.0900	RUS	61	85.5513
XMR1	73	175G	2018	74.0680	RUS	62	85.5259
XMR1	73	176G	018	74.0680	RUS	63	85.5259
XMR1	73	176G	418	74.1240	RUS	64	85.5906
XMR1	73	176G	819	74.1350	RUS	65	85.6033
XMR1	73	176G	1219	74.1520	RUS	66	85.6229
XMR1	73	176G	1620	74.1350	RUS	67	85.6033
XMR1	73	176G	2020	74.0730	RUS	68	85.5317
XMR1	73	177G	021	74.0560	RUS	69	85.5121
XMR1	73	177G	421	74.0960	RUS	70	85.5582
XMR1	73	177G	822	74.1180	RUS	71	85.5836
XMR1	73	177G	1222	74.1240	RUS	72	85.5906
XMR1	73	177G	1622	74.1070	RUS	73	85.5709
XMR1	73	177G	2023	74.0560	RUS	74	85.5121
XMR1	73	178G	023	74.0620	RUS	75	85.5190
XMR1	73	178G	424	74.1020	RUS	76	85.5652
XMR1	73	178G	824	74.1070	RUS	77	85.5709
XMR1	73	178G	1225	74.1350	RUS	78	85.6033
XMR1	73	178G	1625	74.1300	RUS	79	85.5975
XMR1	73	178G	2025	74.0620	RUS	80	85.5190
XMR1	73	179G	026	74.0620	RUS	81	85.5190
XMR1	73	179G	426	74.0900	RUS	82	85.5513
XMR1	73	179G	827	74.1350	RUS	83	85.6033
XMR1	73	179G	1227	74.1470	RUS	84	85.6171
XMR1	73	179G	1628	74.1350	RUS	85	85.6033
XMR1	73	179G	2028	74.1020	RUS	86	85.5652
XMR1	73	180G	029	74.0960	RUS	87	85.5582
XMR1	73	180G	429	74.1520	RUS	88	85.6229
XMR1	73	180G	829	74.1580	RUS	89	85.6298
XMR1	73	180G	1230	74.1580	RUS	90	85.6298
XMR1	73	180G	1630	74.1580	RUS	91	85.6298
XMR1	73	180G	2031	74.1300	RUS	92	85.5975
XMR1	73	181G	031	74.1350	RUS	93	85.6033
XMR1	73	181G	432	74.1640	RUS	94	85.6367
XMR1	73	181G	832	74.1640	RUS	95	85.6367
XMR1	73	181G	1232	74.1690	RUS	96	85.6425

OUTPUT FROM PRINTER PLOT PROGRAM, cont.

XMR1	73	181G1633	74.1640	RUS	97	85.6367
XMR1	73	181G2033	74.1520	RUS	98	85.6229
XMR1	73	182G 034	74.1520	RUS	99	85.6229
XMR1	73	182G 434	74.1640	RUS	100	85.6367
XMR1	73	182G 835	74.1640	RUS	101	85.6367
XMR1	73	182G1235	74.1690	RUS	102	85.6425
XMR1	73	182G1635	74.1690	RUS	103	85.6425
XMR1	73	182G2036	74.1580	RUS	104	85.6298
XMR1	73	183G 036	74.1640	RUS	105	85.6367
XMR1	73	183G 437	74.1750	RUS	106	85.6495
XMR1	73	183G 837	74.1810	RUS	107	85.6564
XMR1	73	183G1238	74.1810	RUS	108	85.6564
XMR1	73	183G1638	74.1750	RUS	109	85.6495
XMR1	73	183G2039	74.1640	RUS	110	85.6367
XMR1	73	184G 039	74.1690	RUS	111	85.6425
XMR1	73	184G 439	74.2030	RUS	112	85.6818
XMR1	73	184G 840	74.2310	RUS	113	85.7141
XMR1	73	184G1240	74.2650	RUS	114	85.7534
XMR1	73	184G1641	74.3950	RUS	115	85.9035
XMR1	73	184G2041	74.3950	RUS	116	85.9035
XMR1	73	185G 042	74.3950	RUS	117	85.9035
XMR1	73	185G 442	74.4290	RUS	118	85.9427
XMR1	73	185G 842	74.4460	RUS	119	85.9624
XMR1	73	185G1243	74.4570	RUS	120	85.9751
XMR1	73	185G1643	74.4570	RUS	121	85.9751
XMR1	73	185G2044	74.4120	RUS	122	85.9231
XMR1	73	186G 044	74.4120	RUS	123	85.9231
XMR1	73	186G 445	74.4570	RUS	124	85.9751
XMR1	73	186G 845	74.4800	RUS	125	86.0016
XMR1	73	186G1245	74.4850	RUS	126	86.0074
XMR1	73	186G1646	74.4740	RUS	127	85.9947
XMR1	73	186G2046	74.4400	RUS	128	85.9554
XMR1	73	187G 047	74.4460	RUS	129	85.9624
XMR1	73	187G 447	74.4850	RUS	130	86.0074
XMR1	73	187G 848	74.4910	RUS	131	86.0143
XMR1	73	187G1248	74.5020	RUS	132	86.0271
XMR1	73	187G1649	74.5020	RUS	133	86.0271
XMR1	73	187G2049	74.4910	RUS	134	86.0143
XMR1	73	188G 049	74.4910	RUS	135	86.0143
XMR1	73	188G 450	74.5080	RUS	136	86.0340
XMR1	73	188G 850	74.5080	RUS	137	86.0340
XMR1	73	188G1251	74.5190	RUS	138	86.0467
XMR1	73	188G1651	74.5080	RUS	139	86.0340
XMR1	73	188G2052	74.5020	RUS	140	86.0271
XMR1	73	189G 052	74.5080	RUS	141	86.0340
XMR1	73	189G 452	74.5130	RUS	142	86.0397
XMR1	73	189G 853	74.5250	RUS	143	86.0536
XMR1	73	189G1253	74.5470	RUS	144	86.0790
XMR1	73	189G1654	74.5190	RUS	145	86.0467
XMR1	73	189G2054	74.5080	RUS	146	86.0340
XMR1	73	190G 055	74.5080	RUS	147	86.0340

OUTPUT FROM PRINTER PLOT PROGRAM, cont.

XMR1	73	190G	455	74.5130	RUS	148	86.0397
XMR1	73	190G	855	74.5190	RUS	149	86.0467
XMR1	73	190G	1256	74.5250	RUS	150	86.0536
XMR1	73	190G	1656	74.5250	RUS	151	86.0536
XMR1	73	190G	2057	74.5080	RUS	152	86.0340
XMR1	73	191G	057	74.5080	RUS	153	86.0340
XMR1	73	191G	458	74.5300	RUS	154	86.0594
XMR1	73	191G	858	74.5750	RUS	155	86.1113
XMR1	73	191G	1259	74.5750	RUS	156	86.1113
XMR1	73	191G	1659	74.5470	RUS	157	86.0790
XMR1	73	191G	2059	74.5190	RUS	158	86.0467
XMR1	73	192G	1 0	74.5300	RUS	159	86.0594
XMR1	73	192G	5 0	74.5980	RUS	160	86.1379
XMR1	73	192G	9 1	74.6150	RUS	161	86.1575
XMR1	73	192G	13 1	74.6150	RUS	162	86.1575
XMR1	73	192G	17 2	74.6150	RUS	163	86.1575
XMR1	73	192G	21 2	74.5920	RUS	164	86.1310
XMR1	73	193G	1 2	74.6040	RUS	165	86.1448
XMR1	73	193G	5 3	74.6090	RUS	166	86.1506
XMR1	73	193G	9 3	74.6150	RUS	167	86.1575
XMR1	73	193G	13 4	74.6150	RUS	168	86.1575
XMR1	73	193G	17 4	74.6150	RUS	169	86.1575
XMR1	73	193G	21 5	74.6090	RUS	170	86.1506
XMR1	73	194G	1 5	74.6090	RUS	171	86.1506
XMR1	73	194G	5 6	74.6210	RUS	172	86.1644
XMR1	73	194G	9 6	74.6260	RUS	173	86.1702
XMR1	73	194G	13 6	74.6320	RUS	174	86.1772
XMR1	73	194G	17 7	74.6150	RUS	175	86.1575
XMR1	73	194G	21 7	74.6260	RUS	176	86.1702
XMR1	73	195G	1 8	74.6490	RUS	177	86.1968
XMR1	73	195G	5 8	74.7050	RUS	178	86.2614
XMR1	73	195G	9 9	74.7110	RUS	179	86.2684
XMR1	73	195G	13 9	74.7220	RUS	180	86.2811
XMR1	73	195G	17 9	74.7050	RUS	181	86.2614
XMR1	73	195G	2110	74.7110	RUS	182	86.2684
XMR1	73	196G	110	74.7170	RUS	183	86.2753
XMR1	73	196G	511	74.7280	RUS	184	86.2880
XMR1	73	196G	911	74.7280	RUS	185	86.2880
XMR1	73	196G	1312	74.7280	RUS	186	86.2880
XMR1	73	196G	1712	74.7280	RUS	187	86.2880
XMR1	73	196G	2112	74.7330	RUS	188	86.2938
XMR1	73	197G	113	74.7330	RUS	189	86.2938
XMR1	73	197G	513	74.7620	RUS	190	86.3273
XMR1	73	197G	914	74.7790	RUS	191	86.3469
XMR1	73	197G	1314	76.9560	RUS	192	88.8607
XMR1	73	197G	1715	77.0520	RUS	193	88.9715
XMR1	73	197G	2115	77.0580	RUS	194	88.9785
XMR1	73	198G	116	77.0640	RUS	195	88.9854
XMR1	73	198G	516	77.0970	RUS	196	89.0235
XMR1	73	198G	916	77.0970	RUS	197	89.0235
XMR1	73	198G	1317	77.1140	RUS	198	89.0431

OUTPUT FROM PRINTER PLOT PROGRAM, cont.

```
YSCALE= 1.0000E 00
```

```
XSCALE= 1.0000E-01
```

8.60E 01 8.70E 01 8.80E 01 8.90E 01 9.00E 01 9.10E 01 9.20E 01 9.30E 01 9.40E 01 9.50E 01 9.60E 01

Y VALUES

.....

0.1630E 03	I	1
0.1640E 03	I	2
0.1650E 03	I	3
0.1660E 03	I	4
0.1670E 03	I	5
0.1680E 03	I	6
0.1690E 03	I	7
0.1700E 03	I	8
0.1710E 03	I	9
0.1720E 03	I	10
0.1730E 03	I	11
0.1740E 03	I	12
0.1750E 03	I	13
0.1760E 03	I	14
0.1770E 03	I	15
0.1780E 03	I	16
0.1790E 03	I	17
0.1800E 03	I	18
0.1810E 03	I	19
0.1820E 03	I	20
0.1830E 03	I	21
0.1840E 03	I	22
0.1850E 03	*	23
0.1860E 03	*	24
0.1870E 03	*	25
0.1880E 03	**	26
0.1890E 03	**	27
0.1900E 03	**	28
0.1910E 03	***	29
0.1920E 03	I**	30
0.1930E 03	I*	31
0.1940E 03	I**	32
0.1950E 03	I*	33
0.1960E 03	I*	34
0.1970E 03	I	35
0.1980E 03	I	36
0.1990E 03	I	37
0.2000E 03	I	38

Y VALUES

.....

8.60E 01 8.70E 01 8.80E 01 8.90E 01 9.00E 01 9.10E 01 9.20E 01 9.30E 01 9.40E 01 9.50E 01 9.60E 01

YSCALE= 1.0000E 00

XSCALE= 1.0000E-01

UCC DISPLAY PLOT PROGRAM

12 inch Display Plot of adjusted micrometer readings for UCC Plotter.

MOD 11/10/73 BY DAVE GOODREAU

PLOTS DATA ON A MULTIPLE DAY INTERVAL

PROGRAM DRIVER FOR S009 SUBPROGRAM

STATION GROUPS ARE SEPARATED BY BLANK CARDS

EACH STATION GROUP MUST HAVE A HEADER CARD

HEADER CAN BE BLANK OR ALL 80 COLS. FILLED

DIMENSION STA(4000), IDA(4000), GMT(4000)

DIMENSION IYR(4000), IHR(4000), MIN(4000), DATA(4000), RUS(4000)

DIMENSION Y1(4000), Y2(4000)

REAL*4 BLANK/' '/

REAL*4 RUS/'RUS '/

REAL*4 XMIC/'MIC '/

DIMENSION X(4000), SYM(2)

DATA SYM/'*', '+', GMTSY/'G', BLNK/' '/

DIMENSION HEAD(20)

REAL*4 END/'END '/

DIMENSION XAX1(4000), YAX1(4000), XAX2(4000), YAX2(4000)

PLACE BLANK CARD AT END OF DECK AND/OR AT END OF DATA GROUP

RAD=.017453

4000 IS MAXIMUM NUMBER OF DATA POINTS ALLOWED.

NUM=4000

XLOW LOWEST NEGATIVE VALUE THE PLOT WILL ACCEPT

XLOW=-99.0

XMAXLG MAXLENGTH OF GRAPH OR XAXIS ALLOWED

XMAXLG=40

XMAXLG=100.0

MAX INCHES=100

YMAXLG MAX LENGTH OF Y-AXIS ALLOWED

YMAXLG=8

READ IN CARDS

110 CONTINUE

CALL RESET

READ(5,180,END=100) HEAD

180 FORMAT(20A4)

WRITE(6,190) HEAD

190 FORMAT(10X, 20A4)

SET PLOT ARRAY EQUAL TO LOWEST NEGATIVE VALUE ALLOWED.

DO 50 I=1, NUM

Y1(I)=XLOW

Y2(I)=XLOW

50 CONTINUE

I=1

10 CONTINUE

UCC DISPLAY PLOT PROGRAM, cont.

```

      READ (5,20,END=100)
      1  STA(I),IYR(I),IDA(I),      GMT(I),IHR(I),MIN(I),
      2 DATA(I),RUS(I)
      20 FORMAT (  A4,2I4, A1,      2I2,8X,F9.4,2X ,
      1 A4 )
      WRITE (6,30)
      1  STA(I),IYR(I),IDA(I),      GMT(I),IHR(I),MIN(I),
      1 DATA(I),RUS(I),I
      30 FORMAT (10X,A4,2I4      ,A1,2I2,8X,F9.4,2X,
      1A4,I6)
      IF(STA(I).EQ.BLANK .AND. I .EQ. 1 ) GO TO 100
      IF( STA(I) .EQ. BLANK ) GO TO 40
      IF( STA(I) .EQ. END ) GO TO 40
      I=I+1
      GO TO 10
      40 CONTINUE
      IF(I.EQ. 1) GO TO 100
      ITOTAL=I-1
      ITOTAL= TOTAL NUMBER OF CARDS READ INTO DATA ARRAY
      IBNG=1
      IEND=ITOTAL
      DO 70 I=IBNG,IEND
      IF( RUS(I) .EQ.RUST ) Y1(I)=DATA(I)
      IF( RUS(I) .EQ.XMIC ) Y2(I)=DATA(I)

      *****

      70 CONTINUE
      COMPUTE MAX AND MIN VALUES OF ARRAY Y
      SET YMAX AND YMIN EQUAL TO FIRST VALUE IN ARRAY DATA
      YMAX=DATA(1)
      YMIN=DATA(1)
      DO 150 I=1,ITOTAL
      IF(DATA(I) .GE. YMAX) YMAX=DATA(I)
      IF(DATA(I) .LE. YMIN) YMIN=DATA(I)
      150 CONTINUE
      SET YMIN TO NEAREST INTEGER
      IF( YMIN .LT. 0.0 ) YMIN=YMIN-0.5
      IF( YMIN .GT. 0.0 ) YMIN=YMIN+0.5
      IYMIN=YMIN
      YMIN=IYMIN
      ROUTINE TO MAKE Y AXIS SCALE A MULTIPLE OF 10
      RANGE=10.0
      140 CONTINUE
      YMAX1=RANGE + YMIN
      IF(YMAX1 .LT. YMAX ) GO TO 120
      GO TO 130

```

UCC DISPLAY PLOT PROGRAM, cont.

```

120 CONTINUE
  YMAX1=YMAX1+RANGE
  IF(YMAX1 .LT. YMAX ) GO TO 120
130 CONTINUE
  YMAX=YMAX1
  SETUP FOR X AXIS

  CONVERT TIME TAG FROM HRS MIN AND DAYS TO DECIMAL DAY

  NOTE IF YEAR CHANGE NEED TOADD 365 OR 366 TO X VALUE
  ADD=-1.0
  SUBTRACT 1.0 DAYS TO CONVERT TO STANDARD CREEP TIME
  DO 220 I=1,ITOTAL
    X(I)=IDA(I)+ IHR(I)/24.0+ MIN(I)/1440.0 +ADD
    IF( I .GE. ITOTAL ) GO TO 220
    IF(IYR(I) .EQ. IYR(I+1) ) GOTO 220
    M4=IYR(I)/4
    M4=M4*4
    IF( IYR(I) .NE. M4 ) ADD=365.0 +ADD
    IF(IYR(I) .EQ. M4) ADD=366.0+ADD
220 CONTINUE
  ASSUME TIME TAGS ARE ORDERED
  SELECT START AND END TIME OF PLOT
  IXMAX=X(ITOTAL)+.5
  XMAX=IXMAX
  IXMIN=X(1)
  XMIN=IXMIN
  WRITE(6,240) XMAX,XMIN,YMAX,YMIN
240 FORMAT(10X,'XMAX=',F10.5,2X,'XMIN=',F10.5,2X,'YMAX=',F10.5,
1 2X,'YMIN=',F10.5 / )

  LAST=ITOTAL
  DO 210 I=1,ITOTAL
    WRITE(6,200) DATA(I),RUS(I),Y1(I),Y2(I),I ,X(I)
200 FORMAT(10X, F10.5,2X,A4,2X, 2( F10.5,1X),I5,5X,F10.5)
210 CONTINUE
  ROUTINE TO REMOVE FROM Y-AXIS ARRAY ALL VALUES SET TO XLOW
  INDEX=1
  DO 270 I=1,ITOTAL
    IF ( Y1(I) .EQ. XLOW ) GOTO 270
    YAX1(INDEX)=Y1(I)
    XAX1(INDEX)=X(I)
    WRITE(6,290) XAX1(INDEX),YAX1(INDEX),INDEX,I
290 FORMAT(10X,2(F10.5,5X),2(I5,5X) )
    INDEX=INDEX+1

```

UCC DISPLAY PLOT PROGRAM, cont.

```

270 CONTINUE
  ITOT1= NUMBER OF POINTS IN ARRAYS XAX1,YAX1
  ITOT1=INDEX-1
  INDEX=1
  DO 280 I=1,ITOTAL
    IF( Y2(I) .EQ. XLOW ) GOTO 280
    YAX2(INDEX)=Y2(I)
    XAX2(INDEX)=X(I)
    WRITE(6,290) XAX2(INDEX),YAX2(INDEX),INDEX,I
    INDEX=INDEX+1
280 CONTINUE
  ITOT2= NUMBER OF POINTS IN ARRAYS XAX2,YAX2
  ITOT2=INDEX-1
  INDEX=1
  NUMDAY=XMAX-XMIN+1
  LSCALE IS SET AT 20 DAYS/INCH *****
  LSCALE=20
  LSCALE IS NUMBER OF DAY PER INCH
  NSCALE=NUMDAY/LSCALE
  NSCALE=NSCALE*LSCALE
  IF(NSCALE .LT. NUMDAY) NSCALE=NSCALE+LSCALE
  XLENG=NSCALE/LSCALE
  XLENG IS LENGTH OF PLOT IN INCHES ALONG X AXIS
  PLOT LENGTH CHECK *****
  IF(XLENG .GT. XMAXLG ) XLENG=XMAXLG
  ITICKX=NSCALE/LSCALE + 1
  ITICKX NUMBER OF TICK MARKS ALONG X AXIS
  YLENG=YMAXLG
  YLENG= IS LENGTH OF PLOT IN INCHES ALONG Y AXIS
  WRITE OUT LENGTH OF XY- AXIS
  WRITE(6,310) XLENG,YLENG
310 FORMAT(10X,'X AXIS LENGTH=',F10.5,10X,'Y AXIS LENGTH=',F10.5/)
  ITICKY=YMAXLG+1.0
  ITICKY=NUMBER OF TICK MARKS ALONG Y AXIS
  ROUTINE TO SETUP PLOT

  SETUP LABEL FOR PLOT

  CALL CHAR (1.5, 8.0, 0.0, 0.2 ,
1 24HWIRE CREEPMETER STATION ,24 )
  CALL CHAR (7.5, 8.0, 0.0, 0.2,STA,4)
  CALL CHAR(1.5,7.0,0.0,0.2,HEAD,80)
  FIND SCALE FACTOR FOR Y AXIS
  CALL DIMEN(YAX2,ITOT2,0,1,YLENG)
  FIND SCALE FACTOR FOR X AXIS

```

UCC DISPLAY PLOT PROGRAM, cont.

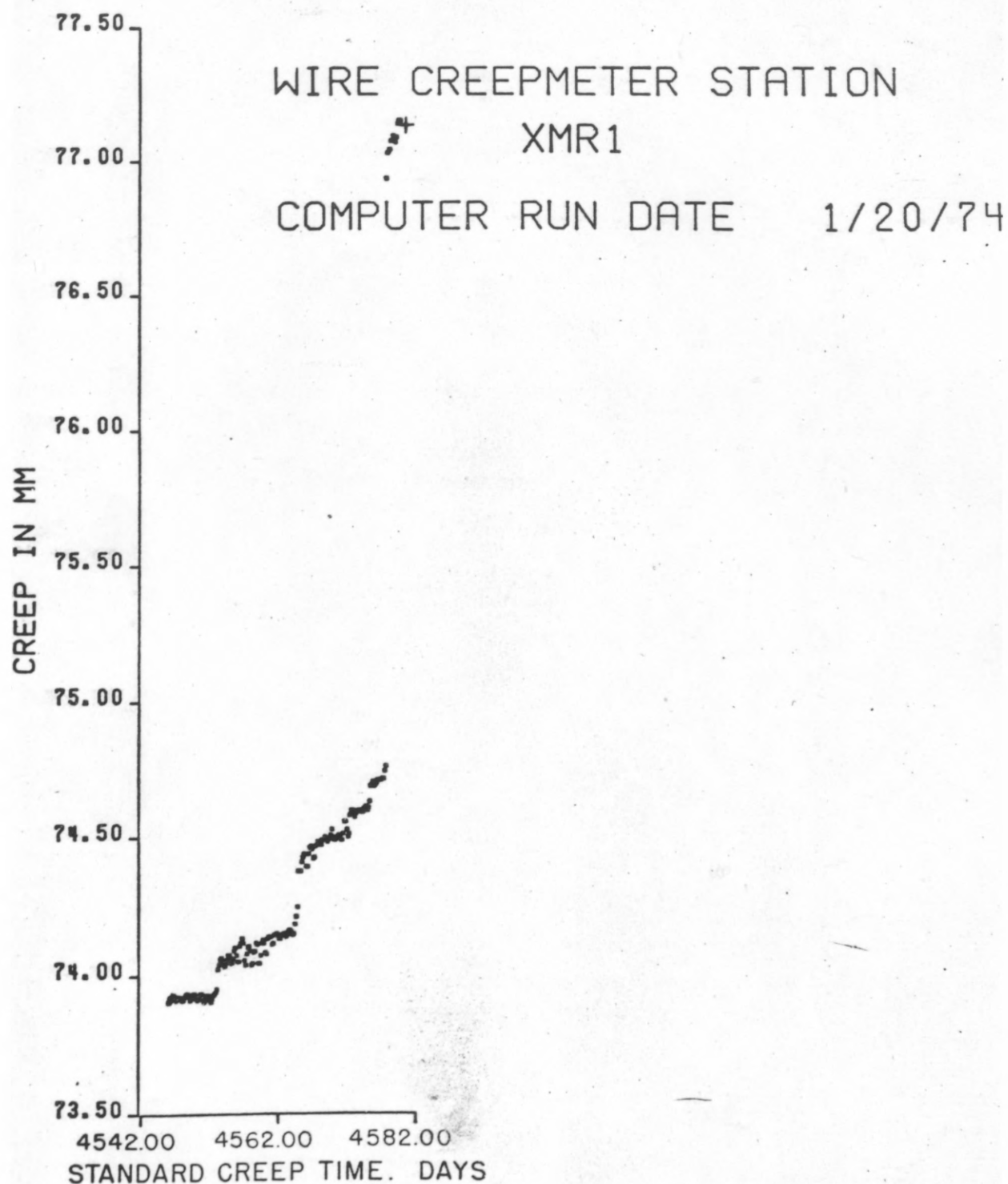
```

IRS=0
CALL SCALF(XSF,YSF,IRS)
CALL OFFST(XOF,YOF,IRS)
XSF=0.05
XOF=(IXMIN/20)*20
IRS=1
CALL SCALF(XSF,YSF,IRS)
CALL OFFST(XOF,YOF,IRS)
IRS=0
WRITE(6,250) XSF,YSF
250 FORMAT(10X,'XSF=',F10.5,10X,'YSF=',F10.5/)
CHECK OFFSET
CALL OFFST(XOF,YOF,IRS)
WRITE(6,300) XOF,YOF
300 FORMAT(10X,'XOF=',F10.5,10X,'YOF=',F10.5/)
DRAW XAXIS

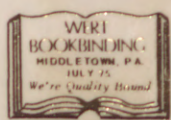
PLOT AXIS ORIGIN LOCATED AT (XXX,YYY)
XXX=0.5
YYY=0.5
ROT=0.0
CALL AXIS (XXX,YYY,10HJULIAN DAY ,-10,XLENG,ITICKX,1,ROT)
DRAW Y AXIS
ROT=90.0*PI
CALL AXIS (XXX,YYY,11HCREEP IN MM ,11,YLENG, ITICKY,0, ROT)
DRAW RUSTRAK DATA AS '+'
IF(ITOT1 .LE. 0 ) GO TO 320
CALL VECTOR (XAX1,YAX1,ITOT1,1,-1,4H. )
320 CONTINUE
DRAW CREEP CALIBRATION READING AS '+'
IF(ITOT2 .LE. 0 ) GO TO 330
CALL VECTOR (XAX2,YAX2,ITOT2,1,-1,4H+ )
330 CONTINUE
CALL RESET
EXITE=10.0+XLENG
CHANGE TERMINATION POINT
CALL ENPLT(EXITE,0.0)
GO TO 110
100 CONTINUE
WRITE (6,80)
80 FORMAT(10X,'NORMAL END'//)
WRITE (6,90)
90 FORMAT(1H1//)
STOP
END

```

Submit with the computer generated cards from the Rustrak Program.



UCC 12" DISPLAY PLOT



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