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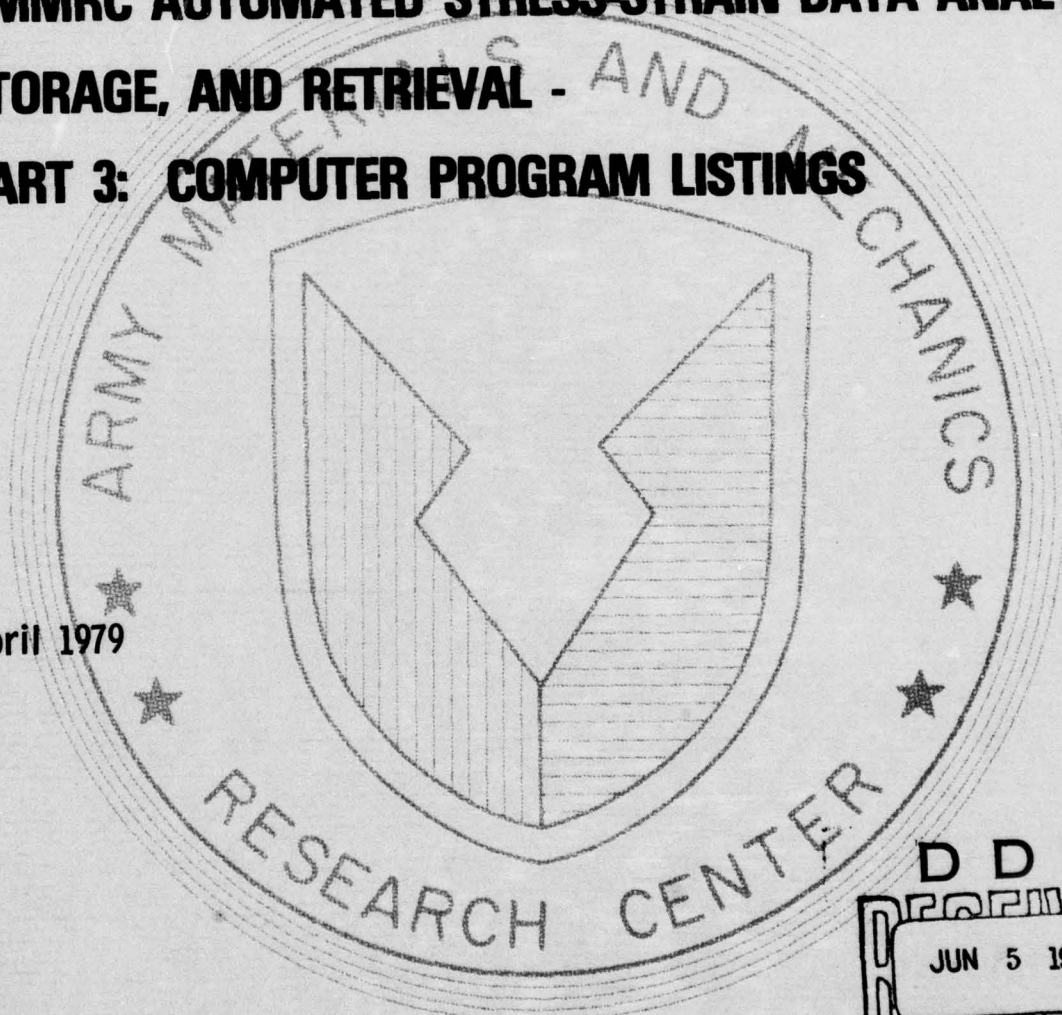
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# AMMRC AUTOMATED STRESS-STRAIN DATA ANALYSIS, STORAGE, AND RETRIEVAL -

# PART 3: COMPUTER PROGRAM LISTINGS

April 1979

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ARMY MATERIALS AND MECHANICS RESEARCH CENTER
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## ABSTRACT

FORTRAN program listings are given for all the computer programs used in the reduction, analysis, storage, and retrieval of experimental stress-strain data. The program files which are listed are R*PICPTS for data reduction, R*EVALRO for data analysis, R*RETRIEVE for retrieval of computer-stored data, and R*FIXBANK for data entry into the computer memory. Description of the procedures for using the programs are given in AMMRC TR 79-16 and AMMRC TR 79-17.

One objective of the developed computer procedures was to make in-house data readily available and hence more useful to the Engineering Standardization Division in their continuous efforts to improve standards and tolerances for material.

# CONTENTS

## INTRODUCTION

A system of computer-assisted stress-strain data reduction analysis, storage, and retrieval was described in the two previous parts of this three-part series of reports.[1,2] In this report, the FORTRAN listings of the computer programs are presented.

FORTRAN symbolic routines and subroutines of four files catalogued in the UNIVAC 1106 machine are listed. The file names and functions are as follows:

R*PICPTS for raw data reduction

R*EVALRO for data analysis

R*RETRIEVE for accessing the data stored in the DATABANK file

R*FIXBANK for updating the LOCATER and DATABANK files.

Two data files, R*LOCATER and R*DATABANK, are not listed.

Two of the files, R*PICPTS and R*RETRIEVE, use graphics subroutines which are part of the TEKTRONIX PLOT-10 package. These subroutines are not listed and neither are a group of subroutines in a BUFFPK package which interfaces the PLOT-10 subroutines with the particular UNIVAC 1106 executive system we use.

Both the PICPTS and the RETRIEVE programs are interactive, requiring entries by the user in response to instructions appearing at the terminal. Provisions have been included in both programs to detect a number of different types of input data errors and to allow the user to make immediate corrections at the terminal.

One objective of the developed computer procedures was to make in-house data readily available and hence more useful to the Engineering Standardization Division in their continuous efforts to improve standards and tolerances for material.

1. PAPIRNO, R. P. *AMMRC Automated Stress-Strain Data Analysis, Storage, and Retrieval - Part 1: Data Analysis Program.* Army Materials and Mechanics Research Center, AMMRC TR 79-16, April 1979.
2. PAPIRNO, R. P. *AMMRC Automated Stress-Strain Data Analysis, Storage, and Retrieval - Part 2: Data Entry and Retrieval Procedures.* Army Materials and Mechanics Research Center, AMMRC TR 79-17, April 1979.

# LISTING OF R*PICPTS

The PICPTS file consists of the following symbolic elements:

| Element | Function |
|---|---|
| MAIN | Main program for reducing raw stress-strain data |
| PICK | Subroutine for digitizing a curve using the TEKTRONIX 4662 interactive plotter |
| BUFFPK | Subroutine package for interfacing the TEKTRONIX PLOT-10 package to the UNIVAC 1106 |
| START | Control routine to prepare for punching output and to start execution of program |
| STOP | Control routine to punch output at a remote UNIVAC 9300 terminal |
| PRINT | Control routine to punch PICPTS output, execute main program of EVALRO and print EVALRO output. Punch and print operations at a remote UNIVAC 9300 terminal. |
| MAP1 | Control routine used to PREP the file, form the absolute (name: PICKEM), PACK the file, and print a list of file elements. |

TEKTRONIX PLOT-10 subroutines which are called but for which no listings are given are as follows:

1. In the element MAIN: INITT, TERM, CHRSIZ, ANMODE, TOUTST, MOVABS, TSEND, BELL, NEWPAG, DCURSR, and FINITT.

2. In the element PICK: TINSTR.

The PLOT-10 subroutines are referenced from the file DAO*TEX and from the BUFFPK package when the absolute program is created.

PICPTS is executed from a TEKTRONIX 4014 graphics terminal coupled to a TEKTRONIX 4662 Interactive Plotter. User instructions and a comprehensive description of the program output are given in Reference 3.

Listings of MAIN are given on pages 3-8 and PICK on page 9. The four control routines are listed, in the order given above, on page 9.

3. PAPIRNO, R. P. *PICPTS Computer Program for Digitizing Testing Machine Autographic Records: User Instructions.* Army Materials and Mechanics Research Center, AMMRC TN 78-6, June 1978.

```
1    C---------------------------------------------------------------
2    C * THIS IS THE MAIN PROGRAM OF THE FILE PICPTS (ABSOLUTE: PICKEM)
3    C---------------------------------------------------------------
4    C
5    C * FILE ALSO INCLUDES SUBROUTINE PICK * GRAPHIC SUBROUTINES NOT LISTED
6    C * GRAPHICS SUBROUTINES FROM TEKTRONIX PLOT 10 PACKAGE
7    C
8    C * INTERACTIVE PROGRAM FOR DATA REDUCTION OF STRESS-STRAIN TEST RESULTS
9    C * EXECUTED ON A TEKTRONIX 4014 COUPLED TO A TEKTRONIX 4662 DIGITAL PLOTTER
10   C
11   C---------------------------------------------------------------
12   C
13         DIMENSION IPLTON(3),IPLTOF(3),S(99),E(99),ICHGE(99),
14        1SS(20),EE(20),II(20),IICHGE(20)
15         DATA IPLTON/27,65,69/
16         DATA IPLTOF/27,65,70/
17         CALL INITT(30)
18         CALL TERM(2,1024)
19         CALL CHRSIZ(3)
20   C
21   C---------------------------------------------------------------
22   C
23   C *   *   *    READ-IN OF IDENTIFYING DATA   *   *   *
24   C
25         CALL ANMODE
26         NRUN=0
27         NPRINT=1
28   C
29   C---------------------------------------------------------------
30   C
31   1     PRINT 200
32         MX=1
33         READ(5,100,ERR=5),SNO
34   2     PRINT 201
35         MX=2
36         READ(5,101,ERR=5),PPL,PULT,AREA,ELONG,RA,RCH,ISET
37         PRINT 202
38         READ 102,ANS
39         IF(ANS.EQ.'YES') GO TO 10
40   3     PRINT 203
41         MX=3
42         READ(5,103,ERR=5),WMTL,XMTL,YMTL,ZMTL,KTEMP,KEDOT
43   4     PRINT 204
44         MX=4
45         READ(5,104,ERR=5),BOOK,NPAGE,NDATE,TYPE
46         GO TO 10
47   C
48   C---------------------------------------------------------------
49   C
50   C *   *   *   *   *   INPUT ERROR CORRECTION ROUTINE   *   *   *   *   *
51   C
52   5     PRINT 400
53         READ 102,ANS
54         IF(ANS.EQ.'YES') GO TO (1,2,3,4,11,32,33,37),MX
55         GO TO 60
56   C
57   C---------------------------------------------------------------
58   C
59   C *   *   *   *   CALIBRATION OF X-Y PLOTTER   *   *   *   *
60   C *   *   IF PREVIOUS CALIBRATION IS VALID THIS ROUTINE IS OMITTED   *
61   C
62   10    PRINT 205
63         READ 102,ANS
64         IF(ANS.EQ.'YES') GO TO 15
65   11    PRINT 206
66         MX=5
67         READ(5,101,ERR=5),CALS,CALE
68         XSTOP=CALE/10.
```

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```
69          YSTOP=CALS
70          PRINT 207
71          KOUNT=0
72    13    KOUNT=KOUNT+1
73          CALL BELL
74          IF(KOUNT.LE.3) GO TO 13
75          CALL TOUTST(3,IPLTON)
76          CALL MOVABS(50,50)
77          CALL TSEND
78          CALL PICK(IE,IS)
79          ICALOE=IE
80          ICALOS=IS
81          LOE=IE/4
82          LOS=IS/4
83          CALL MOVABS(LOE,LOS)
84          CALL TSEND
85          CALL PICK(IE,IS)
86          EUNIT=CALE/(IE-ICALOE)
87          SUNIT=CALS/(IS-ICALOS)
88          CALL TOUTST(3,IPLTOF)
89          KOUNT=0
90    14    KOUNT=KOUNT+1
91          CALL BELL
92          IF(KOUNT.LE.3) GO TO 14
93    C
94    C----------------------------------------------------------------------
95    C
96    C *   *   *   *   *   *   DIGITIZING ROUTINE   *   *   *   *   *   *
97    C *   *   *   *   *   TWO STEP PROCESS FOR EACH POINT *   *   *   *   *   *
98    C *   *   STEP 1 DIGITIZE CURVE ZERO  *   *  STEP 2 DIGITIZE CURVE POINT  *
99    C
100   15    CALL NEWPAG
101         CALL DCURSR(IC,IXD,IYD)
102         CALL ANMODE
103         DO 16 I=1,99
104         ICHGE(I)=0
105         IF(I.GT.20) GO TO 16
106         IICHGE(I)=0
107   16    CONTINUE
108         NEW=0
109         NCHGE=0
110         SOLD=0.
111         EOLD=0.
112         IOUT=0
113         KOUT=0
114         K=0
115         I=0
116         N=0
117         PRINT 208
118         KOE=LOE
119         KOS=LOS
120         KE=LOE+50
121         KS=LOS
122         KOUNT=0
123   17    KOUNT=KOUNT+1
124         CALL BELL
125         IF(KOUNT.LE.3) GO TO 17
126         CALL TOUTST(3,IPLTON)
127   18    I=I+1
128   19    CALL MOVABS(KOE,KOS)
129         CALL TSEND
130         CALL PICK(IE,IS)
131         KOE=IE
132         KOS=IS
133         CALL MOVABS(KE,KS)
134         CALL TSEND
135         CALL PICK(IE,IS)
136         E(I)=EUNIT*(IE-KOE)
```

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```
137        S(I)=SUNIT*(IS-KOS)
138        EOUT=ABS(E(I))
139        SOUT=ABS(S(I))
140        KOE=KOE/4
141        KOS=KOS/4
142        IF(EOUT.LT.XSTOP.AND.SOUT.GT.YSTOP) GO TO 20
143        IF(I.GE.50.AND.MOD(I,5).EQ.0) GO TO 20
144        IF(I.GE.90) GO TO 20
145        KE=IE/4
146        KS=IS/4
147        IF(I.GE.50.AND.K.EQ.0) GO TO 20
148        IF(K.GT.0) GO TO 21
149        GO TO 18
150   20   N=I
151        IF(EOUT.LT.XSTOP.AND.SOUT.GT.YSTOP) N=I-1
152   21   CALL TOUTST(3,IPLTOF)
153        CALL TSEND
154        KOUNT=0
155   22   KOUNT=KOUNT+1
156        CALL BELL
157        IF(KOUNT.LE.3) GO TO 22
158   C
159   C-------------------------------------------------------------------
160   C
161   C *  *  *  *  *  *  *  *   WRITE-OUT OF DATA  *  *  *  *  *  *  *  *  *
162   C
163   30   CALL NEWPAG
164        CALL DCURSR(IC,IXD,IYD)
165        CALL ANMODE
166        PRINT 209,N
167        READ 102,ANS
168        IF(ANS.EQ.'NON') GO TO 32
169        PRINT 210
170        IF(ANS.EQ.'ALL') PRINT 211,(I,S(I),E(I),ICHGE(I),I=1,N)
171        IF(ANS.EQ.'LAS') PRINT 211,N,S(N),E(N),ICHGE(N)
172        IF(ANS.EQ.'COR'.AND.NEW.GT.0) GO TO 31
173        IF(KOUT.GT.0) PRINT 219
174        IF(KOUT.EQ.1) PRINT 211,II(KOUT),SS(KOUT),EE(KOUT),IICHGE(KOUT)
175        IF(KOUT.GT.1)
176       1PRINT 211,(II(KI),SS(KI),EE(KI),IICHGE(KI),KI=1,KOUT)
177        GO TO 32
178   31   PRINT 220,NEW
179        PRINT 211,NEW,SOLD,EOLD,NCHGE
180        PRINT 221
181        PRINT 211,NEW,S(NEW),E(NEW),ICHGE(NEW)
182   C
183   C-------------------------------------------------------------------
184   C
185   C * 7 OPTIONS: PUNCH* ADD* CORRECT* DELETE* RECALIBRATE* REDIGITIZE* DISCARD*
186   C
187   32   PRINT 212
188        MX=6
189        READ(5,101,ERR=5),IANS
190        IF(IANS.EQ.1) GO TO 50
191        IF(IANS.EQ.2) GO TO 35
192        IF(IANS.EQ.4) GO TO 37
193        IF(IANS.EQ.5) GO TO 10
194        IF(IANS.EQ.6) GO TO 15
195        IF(IANS.EQ.7) GO TO 60
196   C
197   C-------------------------------------------------------------------
198   C
199   C *  *  *  *  *  *   OPTION TO CORRECT DATA  *  *  *  *  *  *  *
200   C
201        K=K+1
202   33   PRINT 213
203        MX=7
204        READ(5,101,ERR=5),I
```

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```
205          NEW=I
206          NCHGE=ICHGE(I)
207          SOLD=S(I)
208          EOLD=E(I)
209          ICHGE(I)=ICHGE(I)+1
210          KE=KOE+E(I)/(4*EUNIT)
211          KS=KOS+S(I)/(4*SUNIT)
212          KOUNT=0
213     34   KOUNT=KOUNT+1
214          CALL BELL
215          IF(KOUNT.LE.3) GO TO 34
216          CALL TOUTST(3,IPLTON)
217          GO TO 19
218   C
219   C-------------------------------------------------------------------
220   C
221   C *   *   *   *   *   *        OPTION TO ADD DATA   *   *   *   *   *   *
222   C
223     35   CALL NEWPAG
224          CALL DCURSR(IC,IXD,IYD)
225          CALL ANMODE
226          PRINT 214
227          KE=KOE+E(N)/(4*EUNIT)
228          KS=KOS+S(N)/(4*SUNIT)
229          K=0
230          I=N
231          KOUNT=0
232     36   KOUNT=KOUNT+1
233          CALL BELL
234          IF(KOUNT.LE.3) GO TO 36
235          CALL TOUTST(3,IPLTON)
236          GO TO 18
237   C
238   C-------------------------------------------------------------------
239   C
240   C *   *   *   *   *    OPTION TO DELETE A POINT    *   *   *   *   *   *
241   C
242     37   PRINT 215
243          MX=8
244          READ(5,101,ERR=5),IOUT
245          KOUT=KOUT+1
246          SS(KOUT)=S(IOUT)
247          EE(KOUT)=E(IOUT)
248          II(KOUT)=IOUT
249          IICHGE(KOUT)=-1
250          NX=N-1
251          IF(IOUT.EQ.N) GO TO 40
252          IF(IOUT.EQ.NX) GO TO 39
253          DO 38 I=IOUT,NX
254          E(I)=E(I+1)
255          S(I)=S(I+1)
256          ICHGE(I)=ICHGE(I+1)
257     38   CONTINUE
258          GO TO 40
259     39   E(NX)=E(N)
260          S(NX)=S(N)
261          ICHGE(NX)=ICHGE(N)
262     40   N=NX
263          GO TO 30
264   C
265   C-------------------------------------------------------------------
266   C
267   C *   *   CURVE IDENTIFIERS AND STRESS-STRAIN DATA PUNCHED ON CARDS   *
268   C
269     50   NRUN=NRUN+1
270          IF(NRUN.GT.1) GO TO 51
271          PRINT 216
272          READ 101,NCOPY
```

```
273          PUNCH 302,NPRINT,NCOPY
274   51     PUNCH 300,SNO,WMTL,XMTL,YMTL,ZMTL,BOOK,NPAGE,TYPE,NDATE,
275         1KTEMP,KEDOT,N,PPL,AREA,PULT,ELONG,RA,RCH,ISET
276          PUNCH 301,(S(I),E(I),I,I=1,N)
277   C
278   C-------------------------------------------------------------------
279   C
280   C *    *    *    *    *    CONTINUE WITH ANOTHER CURVE OR STOP    *    *    *
281   C
282   60     CALL NEWPAG
283          CALL DCURSR(IC,IXD,IYD)
284          CALL ANMODE
285          PRINT 217
286          READ 102,ANS
287          IF(ANS.EQ.'YES') GO TO 1
288          PRINT 218
289          CALL FINITT(0,500)
290   C
291   C-------------------------------------------------------------------
292   C
293   C *    *    *    *    *    *    READ FORMATS    *    *    *    *    *    *
294   C
295   100    FORMAT(A6)
296   101    FORMAT( )
297   102    FORMAT(A3)
298   103    FORMAT(2A2,2A4,I5,I2)
299   104    FORMAT(A4,I2,I6,A5)
300   C
301   C-------------------------------------------------------------------
302   C
303   C *    *    *    *    *    *    CRT WRITE-OUT FORMATS    *    *    *    *    *    *    *
304   C
305   200    FORMAT(1H ,/,T2,'REFER TO PICPTS DATA SHEET FOR ENTRIES 1 TO 7',
306         1//,T2,'IF SCREEN ERASES DURING PROGRAM & X-Y AXES APPEAR',/,T2,
307         2'KEY SPACE BAR, THEN KEY RETURN TO CONTINUE',
308         3//,T2,12('*',1X),//,T2,'ENTRY 1: SPECIMEN NUMBER')
309   201    FORMAT(T2,'ENTRY 2: PROP LIMIT AND ULT LOAD IN LBS',/,T2,
310         1'AREA IN SQ-IN, ELONG AND REDUCTION IN AREA IN PCT',/,T2,
311         2'HARDNESS AND SET NO. * ENTER -1. FOR UNAVAILABLE DATA',/,
312         3T2,'EXAMPLE: 6000.,9780...05,10.2,35.6,0.,22')
313   202    FORMAT(T2,'ENTRY 3: IF DESCRIPTORS SAME AS LAST RUN, ENTER YES',
314         1/,T2,'OTHERWISE ENTER NO')
315   203    FORMAT(T2,'ENTRY 4: MATERIAL DESCRIPTORS (2A2,2A4)',/,T2,
316         1'TEST TEMP AND EDOT EXPONENT (I5,I2)',/,T2,
317         2'EXAMPLES * ST1B 52100   20-4')
318   204    FORMAT(T2,'ENTRY 5: NOTEBOOK, PAGE, DATE & TEST TYPE',/,T2,
319         1'USE TENS, COMP, OR SHEAR FOR TEST TYPE ENTRY',/,T2,
320         2'EXAMPLE: 1A46020071977TENS')
321   205    FORMAT(T2,'ENTRY 6: IF PREVIOUS CALIBRATION IS VALID, ENTER YES',
322         1/,T2,'OTHERWISE ENTER NO')
323   206    FORMAT(T2,'ENTRY 7: CALIBRATION VALUES FOR STRESS AND STRAIN',
324         1/,T2,'EXAMPLE * 6000.,.02')
325   207    FORMAT(T2,'* PROCEDURE FOR CALIBRATING PLOTTER *',/T2,
326         1'1. POSITION THE CROSS-HAIRS ON ZERO AND PUSH CALL',/,T2,
327         2'2. WAIT FOR CROSS-HAIRS TO RETURN TO ZERO',/,T2,
328         3'3. POSITION ON CALIBRATION POINT AND PUSH CALL')
329   208    FORMAT(T2,'*PROCEDURE FOR DIGITIZING*',/,T2,
330         1'EACH POINT REQUIRES TWO STEPS',/,T2,
331         2'DIGITIZE ZERO THEN DIGITIZE CURVE POINT',/,T2,
332         3'TO EXIT, DIGITIZE ZERO THEN DIGITIZE EXIT POINT')
333   209    FORMAT(T2,'NUMBER OF POINTS DIGITIZED: N=',I3,/,
334         1T2,'FOR A LISTING OF ALL DIGITIZED DATA ENTER ALL',/,
335         2T2,'FOR LAST POINT ONLY, ENTER LAST',/,
336         3T2,'FOR PRINT OF CORRECTED POINT ONLY, ENTER CORRECT',/,
337         4T2,'FOR PRINT OF DELETED POINT(S) ONLY, ENTER DELETE',/,
338         5T2,'TO OMIT ANY LISTING, ENTER NONE.')
339   210    FORMAT(T2,'** LIST OF DIGITIZED VALUES **',/,T2,
340         1'*NUM CHGS= NUMBER OF TIMES GIVEN POINT HAS BEEN CORRECTED',//,
```

```
341        2T2,'POINT',4X,'LOAD',3X,'STRAIN'3X,'NUM',/,T3,
342        3'NO.',5X,'LBS',4X,'IN/IN',4X,'CHGS',/)
343   211  FORMAT(T3,13,3X,F7.0,1X,F7.5,3X,I2)
344   212  FORMAT(1H ,/,T2,'* MAKE ONE OF SEVEN CHOICES *',/,T2,
345        1'1. ENTER 1 TO PUNCH DATA NOW',/,T2,
346        2'2. ENTER 2 TO ADD MORE DATA POINTS',/,T2,
347        3'3. ENTER 3 TO CORRECT ONE OR MORE POINTS',/,T2,
348        4'4. ENTER 4 TO DELETE ONE OR MORE POINTS',/,T2,
349        5'5. ENTER 5 TO RECALIBRATE & REDIGITIZE',/,T2,
350        6'6. ENTER 6 TO REDIGITIZE THIS CURVE',/,T2,
351        7'7. ENTER 7 TO DISCARD THIS SET OF DATA')
352   213  FORMAT(T2,'ENTER POINT NO. TO BE CORRECTED.',/,T2,
353        1'WAIT FOR CROSS-HAIRS TO MOVE TO ZERO',/,T2,
354        2'USE TWO-STEP PROCEDURE TO CORRECT ONE POINT',/,T2,
355        3'AUTOMATIC EXIT FROM PLOTTER AFTER ONE-POINT CORRECTION')
356   214  FORMAT(1H ,/,T2,'* USE TWO-STEP PROCEDURE TO ADD DATA POINTS *',
357        1/,T2,'CROSS-HAIRS WILL MOVE TO ZERO & THEN TO LAST POINT',
358        2/,T2,'RESUME DIGITIZING',/,T2,
359        3'USE TWO-STEP PROCEDURE FOR EXIT POINT')
360   215  FORMAT(T2,'ENTER POINT NO. TO BE DELETED',/,T2,
361        1'DELETED POINT WILL BE LISTED WITH NUM CHGS=-1')
362   216  FORMAT(T4,'IF A PRINTED PI REPORT IS TO BE PREPARED',/,T2,
363        1'ENTER THE NUMBER OF COPIES REQIRED',/,T2,
364        2'IF NO REPORT REQUIRED, ENTER 1')
365   217  FORMAT(T2,'IF YOU WISH TO DIGITIZE MORE CURVES,ENTER YES',
366        1/,T2,'OTHERWISE ENTER NO')
367   218  FORMAT(T2,'PLEASE SIGN OFF TERMINAL',/,T2,
368        1'1. IF ONLY CARDS REQD: ENTER @ADD R*PICPTS.STOP',/,T2,
369        2'2. IF CARDS & REPORT REQD: ENTER @ADD R*PICPTS.PRINT',/,T2,
370        3'3. WAIT FOR MESSAGE: READY',/,T2,
371        4'IF PRINT REQUESTED, SENT BY T32 WILL ALSO APPEAR',/,T2,
372        5'4. THEN WHEN PROMPT (>) APPEARS ENTER @FIN')
373   219  FORMAT(/,T2,'** FOLLOWING DELETED (ORIGINAL POINT NOS.):')
374   220  FORMAT(T2,'** VALUES FOR POINT',I3,' BEFORE CORRECTION:')
375   221  FORMAT(/,T2,'CORRECTED VALUES:')
376   C
377   C--------------------------------------------------------------------
378   C
379   C *   *   *   *   *   *   *   PUNCH FORMATS   *   *   *   *   *   *   *
380   C
381   300  FORMAT(A6,2A2,3A4,I2,A5,I6,I5,2I2,F7.0,F6.4,F7.0,3F4.1,I4)
382   301  FORMAT(F7.0,F7.5,63X,I3)
383   302  FORMAT(I2,2X,I2)
384   C
385   C-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
386   C
387   C *   *   *   *   *   *   ERROR DIAGNOSTIC FORMAT   *   *   *   *   *   *
388   C
389   400  FORMAT(T2,'*** ERROR IN DATA JUST ENTERED ***',/,T2,
390        1'TO CORRECT, ENTER: YES',/,T2,
391        2'TO TERMINATE EXECUTION ENTER: NO')
392   C
393        END
```

```
1     C---------------------------------------------------------------------------
2           SUBROUTINE PICK(IX,IY)
3     C---------------------------------------------------------------------------
4     C
5     C * DIGITIZES LOAD STRAIN CURVES ON TEKTRONIX 4662 DIGITAL PLOTTER
6     C * FULL SCALE PLOTTER RANGE: X=4095 UNITS AND Y=2731 UNITS
7     C * PLOTTER COORDINATES SCALED TO LOAD AND STRAIN IN MAIN PROGRAM
8     C
9     C---------------------------------------------------------------------------
10    C
11          DIMENSION IN(7)
12          CALL TINSTR(7,IN)
13          IX=0
14          IY=0
15          DO 200 I=1,5,2
16          IDX=MOD(IN(I),32)
17          IX=IX*32+IDX
18          IDY=MOD(IN(I+1),32)
19          IY=IY*32+IDY
20      200 CONTINUE
21          IX=IX/8
22          IY=IY/8
23          RETURN
24    C
25          END
```

```
1     @ASG,UP PUN
2     @FREE PUN
3     @ASG,A PUN
4     @BRKPT PUNCH$/PUN
5     @XQT R*PICPTS.PICKEM
```

```
1     @BRKPT PUNCH$
2     @FREE PUN
3     @SYM,C PUN,,RM9301
```

```
1     @ASG,A R*EVALRO.
2     @BRKPT PUNCH$
3     @FREE PUN
4     @DAO*UTIL.SUSPEND
5     @XQT R*EVALRO.FITDATA
6     @ADD PUN.
7     @DAO*UTIL.RESUME,P RM9301
8     @SYM,C PUN,,RM9301
```

```
1     @PREP R*PICPTS.
2     @MAP,I CIS,R*PICPTS.PICKEM
3     IN R*PICPTS.MAIN
4     IN R*PICPTS.BUFFPK
5     LIB R*PICPTS.
6     LIB DAO*TEX.
7     END
8     @PACK R*PICPTS.
9     @PRT,TL R*PICPTS.
```

9

## LISTING OF R*EVALRO

The EVALRO file consists of the following symbolic elements:

| Element | Function |
|---------|----------|
| MAIN | Main program for analysis of stress-strain data |
| ORDER | Subroutine to arrange the input data in increasing order of strain magnitude |
| LSTSQ | Subroutine to perform a linear least-squares analysis |
| RJA75 | Subroutine for numerical solution of an equation of the form: $Z + AX^n + B = 0$ |
| START | Control routine used to assign LOCATER file to run and to execute the program |
| MAP1 | Control routine used to PREP the file, form the absolute (name: FITDATA), PACK the file, and print a list of file elements. |

EVALRO is a batch process program executed from the UNIVAC 9300 hard-copy terminal using punch card input or from an interactive graphics terminal using a file of punch card images. The hard-copy output on both cases appears at the UNIVAC 9300 terminal.

Listings for the main program and the three subroutines are given on pages 11-25. The two control routines are listed, in the order given above, on page 26.

```
 1   C---------------------------------------------------------------------------
 2   C * THIS IS THE MAIN PROGRAM OF THE FILE R*EVALRO (ABSOLUTE: FITDATA)
 3   C---------------------------------------------------------------------------
 4   C
 5   C * THE FILE ALSO CONTAINS 3 SUBROUTINES
 6   C * THE SUBROUTINES ARE: ORDER, LSTSQ, AND RJA75
 7   C * PROGRAM DOES BEST-FIT R-O ANALYSIS & PREPARES OUTPUT DATA FOR DATA BANK
 8   C
 9   C---------------------------------------------------------------------------
10   C
11         DIMENSION S(99),E(99),P(99),EP(99),X(99),Y(99),CS(10,99),
12        1DBAR(10,5),SBAR(10,5),DEL(10,5),CC(10,5),SEE(10,5),SEEM(10,5),
13        2SY(10),SYM(10),XN(10),ISPTS(10,5),IEP(10),NEP(10),IAPTS(10),
14        3JOUT(10),SPL(10),SY1(10),SPLM(10),SY1M(10),DEV(10,99),KEP(99),
15        4IOUT(99),WA(7),XA(19),LOC(7,19),WOUT(99),XOUT(99),ISOUT(99),
16        5JPCH(99)
17   C
18         DATA WA/'ST','TI','UR','CU','WF','AL','MG'/
19         DATA XA/'ZZ','1A','2A','3A','4A','5A','6A','7A','8A','9A',
20        1'1B','2B','3B','4B','5B','6B','7B','8B','9B'/
21   C
22         SCONV=1.E-3
23         SMETRC=6.89476
24         NRUN=0
25   C
26   C---------------------------------------------------------------------------
27   C
28         READ 100,NPRINT,NPUNCH,NCOPY
29   C
30   C * NPRINT IS A PRINT-OUT OPTION CODE
31   C * NPRINT=0 * ONLY BEST-FIT PARAMETERS AND STATISTICS PRINTED
32   C * NPRINT=1 * PI REPORT * DATA FOR NPRINT=0 AND TABLE
33   C * TABLE LISTS INPUT DATA,CALC STRESS & DEVIATION FOR BEST-FIT ONLY
34   C * NPRINT=2 * ALL TRIAL PARAMETERS AND STATISTICS PRINTED
35   C * NPRINT=3 * PRINT OUT OF NPRINT=2 DATA AND TABLE: LISTING NEXT LINE
36   C * TABLES LIST INPUT DATA, CALC-S, AND PCT DEV OF CALC-S FROM INPUT-S
37   C
38   C * NPUNCH IS PUNCH-OUT OPTION CODE
39   C * NPUNCH=1: PUNCH OUT DATA * NPUNCH=0: NO PUNCH
40   C
41   C * NCOPY INDICATES NUMBER OF COPIES OF NPRINT=1 REQUIRED
42   C * IF NO ENTRY (NCOPY=0) PROGRAM DEFAULTS TO NCOPY=1
43   C
44   C---------------------------------------------------------------------------
45   C
46   C * INITIAL VALUES FOR DATA BANK PREPARATION VARIABLES
47   C * FILE 10 IS THE LOCATER FILE FOR DATABANK
48   C
49         IF(NPUNCH.EQ.0) GO TO 1
50         DEFINE FILE 10(50,80,E,JJ)
51         DO 80 JX=1,7
52         READ(10'JX,502),WA(JX),(LOC(JX,JK),JK=1,19)
53   80    CONTINUE
54         DO 81 JP=1,99
55         JPCH(JP)=0
56         WOUT(JP)=0
57         XOUT(JP)=0
58         ISOUT(JP)=0
59   81    CONTINUE
60   C
61   C---------------------------------------------------------------------------
62   C
63   1     NRUN=NRUN+1
64         NPX=NRUN-1
65         KPRT=0
66   C
67   C---------------------------------------------------------------------------
68   C
```

```
69   C * READ-IN OF MATERIAL AND TEST DESCRIPTORS AND LOAD-STRAIN DATA:
70   C * SNO= SPEC NO; W,X,Y,ZMTL= MATL DESCRIPTORS; BOOK,NPAGE=NOTEBOOK REF;
71   C * TYPE=TENS, COMP, OR SHEAR; NDATE=TEST DATE; KTEMP=TEST TEMP;
72   C * KEDOT= LOG OF STRAIN RATE; N= NO OF DATA POINTS; PPL= PROP LIMIT LOAD;
73   C * AREA=SPEC AREA IN SQ-IN; PULT=ULTIMATE LOAD IN LBS;
74   C * ELONG=ELONGATION & RA=RED'N IN AREA BOTH IN PCT;
75   C * RCH=ROCKWELL C HARDNESS; ISET=DATABANK SET NO.
76   C
77          READ(5,101,END=999),SNO,WMTL,XMTL,YMTL,ZMTL,BOOK,NPAGE,TYPE,
78         1NDATE,KTEMP,KEDOT,N,PPL,AREA,PULT,ELONG,RA,RCH,ISET
79   C
80   C-------------------------------------------------------------------------
81   C
82   C * INITIAL VALUES ESTABLISHED FOR SELECTED VARIABLES
83   C
84          NEND=0
85          DO 3 J=1,10
86          IEP(J)=0
87          NEP(J)=0
88          JOUT(J)=0
89          DO 2 L=1,5
90          SBAR(J,L)=0.
91          DBAR(J,L)=0.
92          DEL(J,L)=0.
93   2      CC(J,L)=0.
94   3      CONTINUE
95   C
96   C-------------------------------------------------------------------------
97   C
98   C * READ-IN OF LOAD-STRAIN DATA AND CONVERSION OF LOAD TO STRESS
99   C * P= LOAD IN POUNDS; S= STRESS IN PSI; E= STRAIN IN IN/IN
100  C
101         DO 4 I=1,N
102         READ 102,P(I),E(I)
103  4      S(I)=P(I)/AREA
104         PPL=PPL/AREA
105         SULT=PULT*SCONV/AREA
106         SULTM=SULT*SMETRC
107  C
108  C-------------------------------------------------------------------------
109  C
110  C * S-E DATA MUST BE ORDERED IN INCREASING VALUES OF STRAIN MAGNITUDE
111  C * IF NOT, SUBROUTINE ORDER REARRANGES S-E DATA
112  C * IF MORE THAN N ITERATIONS REQUIRED FOR ORDERING RUN IS ABORTED
113  C
114         MORDER=0
115         NL=N-1
116         DO 5 I=1,NL
117         IF(E(I).LE.E(I+1)) GO TO 5
118         GO TO 6
119  5      CONTINUE
120         GO TO 7
121  6      CALL ORDER(N,S,E,P,MORDER)
122         IF(MORDER.EQ.0) GO TO 7
123         GO TO 31
124  C
125  C-------------------------------------------------------------------------
126  C
127  C * ELASTIC DATA ANALYSIS FOR MODULUS AND INTERCEPT USING LSTSQ *
128  C * STRAIN INTERCEPT SUBTRACTED FROM ALL STRAINS SO S-E CURVE GOES THRU ZERO
129  C * RESULTING NET STRAIN USED IN CALCULATIONS. CALLED ADJUSTED (ADJ) STRAIN
130  C * EP= PLASTIC STRAIN COMPONENT; EP USED LATER TO CALCULATE R-O PARAMETERS
131  C
132  7      I=0
133  8      I=I+1
134         IF(S(I).GT.PPL.OR.I.EQ.N) GO TO 9
135         GO TO 8
136  9      IPL=I
```

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```
137          IE=IPL-1
138          DO 10 I=1,IE
139          X(I)=E(I)
140    10    Y(I)=S(I)
141          LI=1
142          LJ=IE
143          CALL LSTSQ(X,Y,SL,OF,LI,LJ)
144          EMOD=SL
145          EINT=-OF/SL
146          K=IPL
147          NJ=N
148          DO 11 I=1,N
149          E(I)=E(I)-EINT
150          EP(I)=E(I)-S(I)/EMOD
151          IF(I.LT.K) GO TO 11
152          IF(E(I-1).LE..02.AND.E(I).GT..02) NJ=I-1
153          IF(EP(I).LE.0) K=I+1
154          IF(EP(I).LT..00005) IJ=I+1
155    11    CONTINUE
156          IF(EP(K).GE..00005) IJ=K
157          INTCPT=EINT*1.E+6
158          POF=OF
159          OFM=OF*SCONV*SMETRC
160    C
161    C-----------------------------------------------------------------------
162    C
163    C * IDENTIFICATION OF DATA POINT WHOSE EP VALUE CLOSEST TO .002 IN/IN
164    C * STRESS VALUE OF THIS POINT IS APPROXIMATE GRAPHIC YIELD STRESS
165    C
166    C * LEND= INDICATOR OF EXTENT OF DATA; S(N)=STRESS VALUE OF LAST DATA POINT
167    C * LEND=3 * S(N) LE GRAPHIC YIELD
168    C * LEND=4 * NO MORE THAN 3 DATA POINTS BETWEEN S(N) AND GRAPHIC YIELD
169    C * LEND=5 * AT LEAST 4 DATA POINTS GT GRAPHIC YIELD
170    C
171          IF(EP(N).GE..002) GO TO 12
172          IY=N
173          LEND=3
174          GO TO 16
175    12    I=IE
176    13    I=I+1
177          IF(EP(I)-.002) 13,14,15
178    14    IY=I
179          LEND=3
180          IF(IY.EQ.N) GO TO 16
181    15    IY=I-1
182          NPTS=N-IY
183          IF(NPTS.LT.4) LEND=4
184          IF(NPTS.GE.4) LEND=5
185    C
186    C-----------------------------------------------------------------------
187    C
188    C * TEN PAIRS OF TRIAL VALUES OF XN AND SY COMPUTED BY LOG-LEAST SQUARES
189    C
190    C * SETTING LOWER BOUND VALUES OF EP FOR LOG-LSTSQ ANALYSES
191    C * UPPER BOUND IS INPUT VALUE WHOSE EP IS CLOSEST TO .002
192    C * IF FEWER THAN 8 PTS FOR LOG-LSTSQ, UPPER BOUND EXTENDED TO GET 8 PTS
193    C
194    16    IJ=IJ-1
195          DO 17 J=1,10
196          IJ=IJ+1
197          IEP(J)=IJ
198          NEP(J)=EP(IJ)*1.E6
199    17    CONTINUE
200    C
201    C -----------------------------------------------------------------------
202    C
203    C * LOG-LEAST SQUARES ANALYSES DONE BY SUBROUTINE LSTSQ
204    C
```

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```
205          DO 18 I=K,N
206          X(I)=ALOG(EP(I))
207    18    Y(I)=ALOG(S(I))
208          CONST=ALOG(.002)
209          LJ=IY
210          DO 19 J=1,10
211          LI=IEP(J)
212          NPTS=LJ-LI
213          IF(NPTS.LT.7) LJ=LI+7
214          IF(LJ.GT.N) LJ=N
215          IAPTS(J)=LJ-LI+1
216          CALL LSTSQ(X,Y,SL,OF,LI,LJ)
217          AS=OF+SL*CONST
218          SY(J)=EXP(AS)
219          XN(J)=1./SL
220    19    CONTINUE
221    C
222    C-----------------------------------------------------------------
223    C
224    C * COMPUTATION OF ANALYTIC STRESS VALUES FOR EACH INPUT STRAIN UP TO EPS=.02
225    C * DONE USING A TRIAL AND ERROR PROCEDURE BY SUBROUTINE RJA75
226    C
227    C * COMPUTATION ABORTED FOR ANY ONE OF THREE CONDITIONS
228    C * NO SOLUTION IN 100 ITERATIONS: ITER=100 & JOUT=1
229    C * INCREMENTED VALUE OF Z TOO LARGE: ITER=200 & JOUT=2
230    C * INCREMENTED VALUE OF Z LESS THAN .01: ITER=300 & JOUT=3
231    C * NEND COUNTS THE NUMBER OF J'S THAT ABORT *
232    C
233    C * ABORTS OCCUR ONLY IF MAGNITUDES OF INPUT DATA ARE GROSSLY IN ERROR
234    C
235          LI=K
236          DO 21 J=1,10
237          B=EMOD/SY(J)
238          AA=.002*B
239          XP=XN(J)
240          DO 20 I=LI,NJ
241          Z=1
242          BB=B*E(I)
243          CALL RJA75(Z,XP,BB,AA,ITER)
244          IF(ITER.LT.100.AND.ITER.GE.1) GO TO 20
245          IF(ITER.EQ.0) JOUT(J)=9
246          IF(ITER.EQ.100) JOUT(J)=1
247          IF(ITER.EQ.200) JOUT(J)=2
248          IF(ITER.EQ.300) JOUT(J)=3
249          IOUT(J)=I
250          NEND=NEND+1
251          GO TO 21
252    20    CS(J,I)=Z*SY(J)
253    21    CONTINUE
254    C
255    C-----------------------------------------------------------------
256    C
257    C * STATISTICAL EVALUATION OF FIT OF TEST DATA
258    C
259    C * CC= CORRELATION COEFFICIENT; SEE= STANDARD ERROR OF ESTIMATE
260    C * PREFIX E= ELASTIC DATA
261    C
262    C * L IS INDICATOR OF REGION OF S-E CURVE WHICH IS STATISTICALLY EVALUATED
263    C * MIDPT= NUMBER OF DATA POINT CLOSEST TO MEDIAN STRESS BETWEEN SPL & SY
264    C * L=1 * SPL TO MIDPT
265    C * L=2 * MIDPT TO SY
266    C * L=3 * SPL TO SY (OR TO S(N) IF S(N) LT SY)
267    C * L=4 * SPL TO S(N) (USED ONLY IF LEND GE 4)
268    C * L=5 * SY TO S(N) (USED ONLY IF LEND EQ 5)
269    C
270    C * ELASTIC MODULUS EVALUATION
271    C
272          ECC=0.
```

```
273          ESBAR=0.
274          EDBAR=0.
275          EDEL=0.
276          LJ=K-1
277          DO 22 I=1,LJ
278    22    ESBAR=ESBAR+S(I)/LJ
279          DO 23 I=1,LJ
280          ECS=E(I)*EMOD
281          EDBAR=EDBAR+(S(I)-ESBAR)**2
282    23    EDEL=EDEL+(S(I)-ECS)**2
283          ESEE=SQRT(EDEL/LJ)
284          COR=1.-EDEL/EDBAR
285          IF(COR.GT.0) ECC=SQRT(COR)
286    C
287    C * R-O EQUATION EVALUATION: CALCULATIONS FOR EACH SET OF TRIAL PARAMETERS
288    C
289    C * UPPER LIMIT OF INDEX I IS N, IF E(N) LESS THAN .02
290    C * UPPER LIMIT OF I IS NJ, IF E(N) GREATER THAN .02
291    C * E(NJ) IS VALUE OF STRAIN JUST BELOW OR EQUAL TO .02
292    C
293          IF(NEND.EQ.10) GO TO 29
294          DO 27 J=1,10
295          IF(JOUT(J).GT.0) GO TO 27
296          MIDPT=K+(IY-K)/2
297          DO 26 L=1,LEND
298          IF(L.NE.2.AND.L.NE.5) LI=K
299          IF(L.EQ.2) LI=MIDPT+1
300          IF(L.EQ.5) LI=IY+1
301          IF(L.EQ.1) LJ=MIDPT
302          IF(L.EQ.2.OR.L.EQ.3) LJ=IY
303          IF(L.GE.4) LJ=NJ
304          ISPTS(J,L)=LJ-LI+1
305          DO 24 I=LI,LJ
306    24    SBAR(J,L)=SBAR(J,L)+S(I)/ISPTS(J,L)
307          DO 25 I=LI,LJ
3C8          DBAR(J,L)=DBAR(J,L)+(S(I)-SBAR(J,L))**2
309    25    DEL(J,L)=DEL(J,L)+(S(I)-CS(J,I))**2
310          SEE(J,L)=SQRT(DEL(J,L)/ISPTS(J,L))
311          COR=1.-DEL(J,L)/DBAR(J,L)
312          IF(COR.GT.0) CC(J,L)=SQRT(COR)
313    26    CONTINUE
314    27    CONTINUE
315    C
316    C-------------------------------------------------------------------
317    C
318    C * BEST-FIT CRITERION: TRIAL VALUES OF XN & SY WHICH GIVE MAX CC FOR SPL TO SY
319    C
320  ,        IF(NEND.EQ.10) GO TO 29
321          J1=1
322          COR=0.
323          DO 28 J=1,10
324          IF(JOUT(J).GT.0) GO TO 28
325          CRIT=CC(J,3)
326          IF(CRIT.LE.COR) GO TO 28
327          COR=CRIT
328          J1=J
329    28    CONTINUE
330    C
331    C-------------------------------------------------------------------
332    C
333    C * UNITS CONVERSION FOR PRINT-OUT OF NPRINT=0 OR 1 AND PUNCH-OUT
334    C * S & SEE CONVERTED TO KSI & MPA; MODULUS TO MEGA-PSI & GPA
335    C * TEST TYPE CODED FOR PUNCH-OUT: TYPE TO NTYPE
336    C * PROP-LIM (SPL) AND .1%-YLD (SY1) CALCULATED
337    C
338    29    EMOD=EMOD*1.E-6
339          EMODM=EMOD*SMETRC
340          ESEE=ESEE*SCONV
```

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```
341        ESEEM=ESEE*SMETRC
342        NTYPE=0
343        IF(TYPE.EQ.'TENS ') NTYPE=1
344        IF(TYPE.EQ.'COMP ') NTYPE=2
345        IF(TYPE.EQ.'SHEAR') NTYPE=3
346        IF(NPRINT.GT.1) GO TO 37
347        IF(NEND.EQ.10) GO TO 31
348        SY(J1)=SY(J1)*SCONV
349        SYM(J1)=SY(J1)*SMETRC
350        XP=1./XN(J1)
351        SPL(J1)=SY(J1)*.005**XP
352        SPLM(J1)=SPL(J1)*SMETRC
353        SY1(J1)=SY(J1)*.5**XP
354        SY1M(J1)=SY1(J1)*SMETRC
355        DO 30 L=1,LEND
356        SEE(J1,L)=SEE(J1,L)*SCONV
357  30    SEEM(J1,L)=SEE(J1,L)*SMETRC
358  C
359  C-------------------------------------------------------------------------------
360  C
361  C * PRINT-OUT AND PUNCH OUT ROUTINES
362  C * DATA BANK PREPARATION AND PUNCH-OUT START AT STATEMENT NUMBER 65
363  C
364  C-------------------------------------------------------------------------------
365  C
366  C * NPRINT=0: PRINT-OUT OF BEST-FIT PARAMETERS * FOUR SETS PER PAGE
367  C * NPRINT=1: PI REPORT * BEST-FIT PARAMETERS, STATISTICS, AND TABLE
368  C
369  31    IF(MOD(NPX,4).EQ.0.AND.NPRINT.EQ.0) PRINT 200
370        IF(NPRINT.EQ.1) PRINT 208,AREA
371        KPRT=KPRT+1
372        PRINT 201,SNO,WMTL,XMTL,YMTL,ZMTL,TYPE,NDATE,BOOK,NPAGE,ISET,
373       1KTEMP,KEDOT,SULT,SULTM,ELONG,RA,RCH
374        IF(MORDER.EQ.0) GO TO 32
375        PRINT 300
376        IF(MOD(NRUN,4).EQ.0.OR.NPRINT.EQ.1) PRINT 218
377        GO TO 1
378  32    PRINT 202
379        PRINT 203,INTCPT,EMOD,ESEE,ECC,IE
380        IF(NEND.LT.10) PRINT 204,NEP(J1),SY(J1),XN(J1),IAPTS(J1),SPL(J1),
381       1SY1(J1)
382        PRINT 205 EMODM,ESEEM
383        IF(NEND.LT.10) GO TO 33
384        PRINT 301
385        IF(MOD(NRUN,4).EQ.0.OR.NPRINT.EQ.1) PRINT 218
386        IF(NPRINT.EQ.1) GO TO 53
387        GO TO 65
388  33    KIN=0
389        PRINT 206,SYM(J1),SPLM(J1),SY1M(J1)
390        IF(NEND.EQ.0) GO TO 35
391        DO 34 J=1,10
392        IF(JOUT(J).EQ.0) GO TO 34
393        IF(KIN.EQ.0) PRINT 302,J,JOUT(J),IOUT(J)
394        IF(KIN.EQ.1) PRINT 303,J,JOUT(J),IOUT(J)
395        IF(KIN.EQ.2) PRINT 304,J,JOUT(J),IOUT(J)
396        IF(KIN.EQ.3) PRINT 305,J,JOUT(J),IOUT(J)
397        IF(KIN.EQ.4) PRINT 306,J,JOUT(J),IOUT(J)
398        IF(KIN.EQ.5) PRINT 307,J,JOUT(J),IOUT(J)
399        IF(KIN.EQ.6) PRINT 308,J,JOUT(J),IOUT(J)
400        IF(KIN.EQ.7) PRINT 309,J,JOUT(J),IOUT(J)
401        IF(KIN.EQ.8) PRINT 310,J,JOUT(J),IOUT(J)
402        KIN=KIN+1
403  34    CONTINUE
404  35    IF(KIN.EQ.0) PRINT 207
405        PRINT 210
406        PRINT 211,(SEE(J1,L),CC(J1,L),ISPTS(J1,L),L=1,3)
407        IF(LEND.EQ.4) PRINT 212,SEE(J1,4),CC(J1,4),ISPTS(J1,4)
408        IF(LEND.EQ.5) PRINT 213,(SEE(J1,L),CC(J1,L),ISPTS(J1,L),L=4,5)
```

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```
409          PRINT 214,(SEEM(J1,L),L=1,3)
410          IF(LEND.EQ.4) PRINT 215,SEEM(J1,4)
411          IF(LEND.EQ.5) PRINT 216,(SEEM(J1,L),L=4,5)
412          PRINT 217
413          IF(MOD(NRUN,4).EQ.0.OR.NPRINT.EQ.1) GO TO 36
414          GO TO 65
415   36     PRINT 218
416          IF(NPRINT.EQ.1) GO TO 53
417          GO TO 65
418  C
419  C-------------------------------------------------------------------------
420  C
421  C * ALTERNATE FULL-DATA PRINT-OUT AND OPTIONAL TABLES: NPRINT=2 OR 3
422  C
423  C-------------------------------------------------------------------------
424  C
425  C * DIAGNOSTIC MESSAGE IF ANALYTIC STRESSES CANNOT BE CALCULATED
426  C
427   37     IF(NEND.LT.10) GO TO 38
428          PRINT 400
429          PRINT 401
430          PRINT 201,SNO,WMTL,XMTL,YMTL,ZMTL,TYPE,NDATE,BOOK,NPAGE,ISET,
431         1KTEMP,KEDOT,SULT,SULTM,ELONG,RA,RCH
432          PRINT 402,EMOD,POF,INTCPT,ESEE,ECC,IE
433          PRINT 403,EMODM,OFM,ESEEM
434          PRINT 301
435          IF(NPRINT.EQ.3) PRINT 315
436          PRINT 217
437          GO TO 65
438  C
439  C-------------------------------------------------------------------------
440  C
441  C * UNITS CONVERSION FOR PRINT-OUT OF NPRINT=2 OR 3
442  C * PER-CENT DEVIATIONS CALCULATED ONLY FOR NPRINT=3 *
443  C
444   38     DO 41 J=1,10
445          IF(JOUT(J).GT.0) GO TO 41
446          SY(J)=SY(J)*SCONV
447          SYM(J)=SY(J)*SMETRC
448          XP=1./XN(J)
449          SPL(J)=SY(J)*.005**XP
450          SPLM(J)=SPL(J)*SMETRC
451          SY1(J)=SY(J)*.5**XP
452          SY1M(J)=SY1(J)*SMETRC
453          DO 39 L=1,LEND
454          SEE(J,L)=SEE(J,L)*SCONV
455          SEEM(J,L)=SEE(J,L)*SMETRC
456   39     CONTINUE
457          IF(NPRINT.EQ.1) GO TO 41
458          DO 40 I=K,NJ
459          DEV(J,I)=(CS(J,I)-S(I))*100./S(I)
460          CS(J,I)=CS(J,I)*SCONV
461   40     CONTINUE
462   41     CONTINUE
463          IF(NPRINT.EQ.2) GO TO 43
464          DO 42 I=K,NJ
465          KEP(I)=EP(I)*1.E6
466          S(I)=S(I)*SCONV
467   42     CONTINUE
468  C
469  C-------------------------------------------------------------------------
470  C
471  C * PRINT-OUT OF ALL TRIAL PARAMETERS * ONE PAGE PER DATA SET: NPRINT=2
472  C
473   43     PRINT 400
474          PRINT 401
475          PRINT 201,SNO,WMTL,XMTL,YMTL,ZMTL,TYPE,NDATE,BOOK,NPAGE,ISET,
476         1KTEMP,KEDOT,SULT,SULTM,ELONG,RA,RCH
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477          PRINT 402,EMOD,POF,INTCPT,ESEE,ECC,IE
478          PRINT 403,EMODM,OFM,ESEEM
479          PRINT 404
480          DO 45 J=1,10
481          IF(JOUT(J).GT.0) GO TO 44
482          PRINT 405,J,NEP(J),XN(J),SY(J),SYM(J),SPL(J),SPLM(J),
483         1SY1(J),SY1M(J),IAPTS(J)
484          IF(J.EQ.J1) PRINT 406
485          GO TO 45
486  44      PRINT 316,J,NEP(J),JOUT(J)
487  45      CONTINUE
488  C
489  C * PRINT-OUT OF STATISTICAL DATA FOR ALL TRIAL VALUES OF PARAMETERS *
490  C
491          PRINT 409
492          DO 47 J=1,10
493          IF(JOUT(J).GT.0) GO TO 46
494          PRINT 410,J,NEP(J),(SEE(J,L),SEEM(J,L),CC(J,L),ISPTS(J,L),L=1,3)
495          IF(LEND.EQ.3) PRINT 411
496          IF(LEND.EQ.4) PRINT 412,SEE(J,4),SEEM(J,4),CC(J,4),ISPTS(J,4)
497          IF(LEND.EQ.5) PRINT 413,(SEE(J,L),SEEM(J,L),CC(J,L),ISPTS(J,L),
498         1L=4,5)
499          GO TO 47
500  46      PRINT 317,J,NEP(J),JOUT(J)
501  47      CONTINUE
502  C
503  C---------------------------------------------------------------------
504  C
505  C * PRINT-OUT OF DIAGNOSTIC MESSAGES IF ANALYTIC STRESS CALCULATIONS ABORTED
506  C * MESSAGES APPEAR AT BOTTOM OF ONE-PAGE PRINTOUT OF PARAMETERS *
507  C
508          IF(NEND.GT.0) PRINT 318
509          PRINT 217
510          IF(NPRINT.EQ.2) GO TO 65
511  C
512  C---------------------------------------------------------------------
513  C
514  C * PRINT-OUT OF OPTIONAL TABLES: NPRINT=3
515  C * TABLES IN TWO GROUPS: J=1 TO J=5 AND J=6 TO J=10
516  C * INDEX LIMITS ARE: JK=1 TO JL=5 AND JK=6 TO JL=10
517  C
518          JK=1
519  48      JL=JK+4
520          PRINT 414,SNO
521          IF(JK.EQ.1) PRINT 415
522          IF(JK.EQ.6) PRINT 416
523          PRINT 417,(NEP(J),J=JK,JL)
524          KOUNT=0
525          IF(NEND.GT.0) GO TO 50
526          DO 49 I=K,NJ
527          KOUNT=KOUNT+1
528          PRINT 418,I,E(I),S(I),KEP(I),(CS(J,I),DEV(J,I),J=JK,JL)
529          IF(MOD(KOUNT,5).EQ.0) PRINT 207
530  49      CONTINUE
531          IF(JK.EQ.6) GO TO 65
532          JK=6
533          GO TO 48
534  50      DO 52 I=K,NJ
535          KOUNT=KOUNT+1
536          PRINT 419,I,E(I),S(I),KEP(I)
537          DO 51 J=JK,JL
538          IF(JOUT(J).GT.0) GO TO 51
539          IF(J.EQ.JK) PRINT 420,CS(J,I),DEV(J,I)
540          IF(J.EQ.(JK+1)) PRINT 421,CS(J,I),DEV(J,I)
541          IF(J.EQ.(JK+2)) PRINT 422,CS(J,I),DEV(J,I)
542          IF(J.EQ.(JK+3)) PRINT 423,CS(J,I),DEV(J,I)
543          IF(J.EQ.(JK+4)) PRINT 424,CS(J,I),DEV(J,I)
544  51      CONTINUE
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545          IF(MOD(KOUNT,5).EQ.0) PRINT 207
546   52     CONTINUE
547          PRINT 425
548          IF(JK.EQ.6) GO TO 65
549          JK=6
550          GO TO 48
551   C
552   C ------------------------------------------------------------------
553   C
554   C * PI REPORT UNITS CONVERSION AND TABULAR PRINT-OUT: NPRINT=1
555   C
556   53     IF(KPRT.GT.1) GO TO 57
557          PEMOD=EMOD*1.E6
558          IF(N.LE.60) IJ=N
559          IF(N.GT.60) IJ=60
560          DO 56 I=1,IJ
561          IF(I.GE.K) GO TO 54
562          CS(J1,I)=PEMOD*E(I)
563          KEP(I)=0
564   54     IF(I.GE.K) KEP(I)=EP(I)*1.E6
565          IF(I.GE.K.AND.NEND.EQ.10) GO TO 55
566          IF(I.GT.NJ) GO TO 55
567          DEV(J1,I)=(CS(J1,I)-S(I))*100./S(I)
568          CS(J1,I)=CS(J1,I)*SCONV
569   55     S(I)=S(I)*SCONV
570   56     CONTINUE
571   57     PRINT 217
572          IF(NEND.EQ.10) PRINT 319,SNO
573          IF(NEND.LT.10) PRINT 426,SNO,SY(J1),XN(J1),EMOD
574          IF(N.GT.30) GO TO 59
575          PRINT 427
576          DO 58 I=1,N
577          IF(I.LT.K) PRINT 428,
578         1I,P(I),E(I),KEP(I),S(I),CS(J1,I),DEV(J1,I)
579          IF(I.GE.K.AND.I.LE.NJ.AND.NEND.LT.10) PRINT 428,
580         1I,P(I),E(I),KEP(I),S(I),CS(J1,I),DEV(J1,I)
581          IF(I.GE.K.AND.NEND.EQ.10) PRINT 429,
582         1I,P(I),E(I),KEP(I),S(I)
583          IF(I.GE.K.AND.I.GT.NJ.AND.NEND.LT.10) PRINT 429,
584         1I,P(I),E(I),KEP(I),S(I)
585   58     CONTINUE
586          IF(NEND.GT.0) PRINT 318
587          IF(KPRT.LT.NCOPY) GO TO 31
588          GO TO 65
589   59     PRINT 430
590          IF(N.LE.60) LJ=N
591          IF(N.GT.60) LJ=60
592          DO 64 I=1,30
593          IP=30+I
594          IF(IP.LE.LJ) GO TO 61
595          IF(I.GT.NJ) GO TO 60
596          IF(NEND.EQ.10.AND.I.GE.K) GO TO 60
597          PRINT 428,I,P(I),E(I),KEP(I),S(I),CS(J1,I),DEV(J1,I)
598          GO TO 64
599   60     PRINT 429,I,P(I),E(I),KEP(I),S(I)
600          GO TO 64
601   61     IF(NEND.EQ.10.AND.I.GE.K) GO TO 62
602          IF(NEND.LT.10.AND.I.LE.NJ.AND.IP.GT.NJ) GO TO 63
603          PRINT 431,I,P(I),E(I),KEP(I),S(I),CS(J1,I),
604         1DEV(J1,I),IP,P(IP),E(IP),KEP(IP),S(IP),CS(J1,IP),DEV(J1,IP)
605          GO TO 64
606   62     PRINT 432,I,P(I),E(I),KEP(I),S(I),
607         1IP,P(IP),E(IP),KEP(IP),S(IP)
608          GO TO 64
609   63     PRINT 433,I,P(I),E(I),KEP(I),S(I),CS(J1,I),DEV(J1,I),IP,P(IP),
610         1E(IP),KEP(IP),S(IP)
611   64     CONTINUE
612          IF(N.GT.60) PRINT 434,N
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613          IF(NEND.GT.0.AND.N.LE.60.AND.NJ.GE.N) PRINT 318
614          IF(N.GT.60.AND.N.GT.NJ.AND.NJ.LE.60) PRINT 435
615          IF(N.LE.60.AND.NJ.LT.N) PRINT 436
616          IF(KPRT.LT.NCOPY) GO TO 31
617 C
618 C-------------------------------------------------------------------------
619 C
620 C * PREPARATION OF DATA FOR DATA BANK
621 C * ASSIGNMENT OF NEXT VALUES AND UPDATE OF LOCATER VALUES
622 C
623 65      IF(NPUNCH.EQ.0) GO TO 1
624         NEXT=0
625         JW=0
626         JL=0
627         DO 66 JX=1,7
628         IF(WMTL.NE.WA(JX)) GO TO 66
629         JW=JX
630         GO TO 67
631 66      CONTINUE
632 67      IF(JW.EQ.0) GO TO 70
633         DO 68 LL=1,19
634         IF(XMTL.NE.XA(LL)) GO TO 68
635         JL=LL
636         GO TO 69
637 68      CONTINUE
638         IF(JL.EQ.0) GO TO 70
639 69      NEXT=LOC(JW,JL)
640         LOC(JW,JL)=ISET
641 70      IF(JW.EQ.0.OR.JL.EQ.0) JPCH(NRUN)=1
642 C
643 C-------------------------------------------------------------------------
644 C
645 C * PUNCH-OUT OF DESCRIPTORS AND R-O PARAMETERS
646 C
647         IF(NEND.LT.10) PUNCH 500,SNO,WMTL,XMTL,BOOK,NPAGE,NTYPE,NDATE,
648        1KTEMP,KEDOT,SULT,ELONG,RA,RCH,EMOD,XN(J1),SY(J1),SEE(J1,3),
649        1NEXT,ISET
650         IF(NEND.EQ.10) PUNCH 501,SNO,WMTL,XMTL,BOOK,NPAGE,NTYPE,NDATE,
651        1KTEMP,KEDOT,SULT,ELONG,RA,RCH,EMOD,NEXT,ISET
652         IF(JPCH(NRUN).EQ.0) GO TO 1
653         KPCH=KPCH+1
654         WOUT(NRUN)=WMTL
655         XOUT(NRUN)=XMTL
656         ISOUT(NRUN)=ISET
657         GO TO 1
658 C
659 C-------------------------------------------------------------------------
660 C
661 C * PUNCH OUT OF UPDATED LOCATER FILE
662 C
663 999     IF(NPUNCH.EQ.0) STOP
664         IF(NPRINT.EQ.0.AND.MOD(NPX,4).NE.0) PRINT 218
665         DO 71 JX=1,7
666         PUNCH 502,WA(JX),(LOC(JX,JK),JK=1,19)
667 71      CONTINUE
668         IF(KPCH.EQ.0) STOP
669 C
670 C-------------------------------------------------------------------------
671 C
672 C * PRINT-OUT OF DIAGNOSTIC MESSAGE FOR DATA CODE NOT IN DATA BANK
673 C
674         PRINT 320
675         DO 72 NR=1,NPX
676         IF(JPCH(NR).EQ.0) GO TO 72
677         PRINT 321,ISOUT(NR),WOUT(NR),XOUT(NR)
678 72      CONTINUE
679         STOP
680 C
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681   C------------------------------------------------------------------------
682   C
683   C * READ-IN AND PRINT-OUT FORMAT STATEMENTS *
684   C
685   C------------------------------------------------------------------------
686   C
687   C * DATA READ-IN FORMAT STATEMENTS
688   C
689   100    FORMAT(3I2)
690   101    FORMAT(A6,2A2,3A4,I2,A5,I6,I5,2I2,F7.0,F6.4,F7.0,3F4.1,I4)
691   102    FORMAT(F7.0,F7.5)
692   C
693   C------------------------------------------------------------------------
694   C
695   C * FORMAT STATEMENTS FOR BEST-FIT PRINTOUT: NPRINT=0 OR 1
696   C
697   C * TEST DATA AND R-O PARAMETERS: FORMAT STATEMENTS 200 TO 207
698   C
699   200    FORMAT(1H1,T22,'RAMBERG-OSGOOD BEST FIT PARAMETERS * 0.2% OFFSET Y
700          1IELD AND EXPONENTS',/,T4,124('-'))
701   201    FORMAT(T12,'SPECIMEN NO: ',A6,2X,'MATERIAL: ',A2,'-',A2,
702          1'-',2A4,2X,'TEST TYPE: ',A5,2X,'DATE: ',I6,2X,'NTBK-PG: ',A4,
703          2'-',I2,2X,'SET NO: ',I4,/,T12,'TEMP=',I5,'C',2X,'EDOT=1.0',I2,
704          3' PER-SEC',2X,'S-ULT= ',F7.2,' KSI (',F7.1,' MPA)',2X,'ELONG= ',
705          4F4.1,'%',2X,'RED-A= ',F4.1,'%',2X,'R-CH= ',F4.1,/)
706   202    FORMAT(T20,'UNITS : INCPT',2X,'MODULUS',4X,'SEE',4X,'C-CFT',2X,
707          1'PTS :',1X,'EP-I',2X,'.2%-YLD',3X,'EXPNT',2X,'PTS :',3X,'SPL',
708          23X,'.1%-YLD')
709   203    FORMAT(T20,'ENGL  :',1X,I5,2X,F6.2,3X,F5.2,2X,F7.4,2X,I3,1X,':')
710   204    FORMAT(1H+,T20,46X,I4,2X,2(F7.2,1X),1X,I3,1X,':',2(1X,F7.2))
711   205    FORMAT(T20,'METRC :',8X,F6.1,3X,F5.1,15X,':')
712   206    FORMAT(1H+,T20,52X,F7.1,14X,':',2(1X,F7.1))
713   207    FORMAT(1H )
714   C
715   C------------------------------------------------------------------------
716   C
717   C * PI REPORT HEADING: NPRINT=1
718   C
719   208    FORMAT(1H1,T20,'**PRINCIPAL INVESTIGATOR REPORT ON STRESS-',
720          1'STRAIN TEST AND RAMBERG-OSGOOD ANALYSIS **',/,T10,'BEST-FIT ',
721          2'MODULUS, 0.2% OFFSET-YIELD, AND R-O EXPONENT CALCULATED BY ',
722          3'LEAST SQUARES. (SPEC AREA=',F6.4,' SQ-IN)',/)
723   C
724   C------------------------------------------------------------------------
725   C
726   C * STATISTICS FORMAT STATEMENTS 210 TO 218
727   C
728   210    FORMAT(T16,4X,'SPL TO MPT',8X,'MPT TO SY',9X,'SPL TO SY',9X,'SPL
729          1TO SN',10X,'SY TO SN',/,T16,10X,5(2X,'SEE',3X,'C-CFT',1X,'PTS',1X)
730          2)
731   211    FORMAT(T16,'ENGL ',5X,3(F6.2,F7.4,1X,I3,1X))
732   212    FORMAT(1H+,T16,64X,F6.2,F7.4,1X,I3)
733   213    FORMAT(1H+,T16,64X,2(F6.2,F7.4,1X,I3,1X))
734   214    FORMAT(T16,'METRC',5X,3(F6.1,12X))
735   215    FORMAT(1H+,T16,64X,F6.1)
736   216    FORMAT(1H+,T16,64X,2(F6.1,12X))
737   217    FORMAT(T4,124('-'))
738   218    FORMAT(T10,'** UNITS: MODULUS IN M-PSI OR GPA * .2%-YLD, .1%-YLD,
739          1SPL & SEE IN KSI OR MPA * INTCPT AND EP-I IN MICRO-IN/IN **')
740   C
741   C------------------------------------------------------------------------
742   C
743   C * DIAGNOSTIC MESSAGE PRINT-OUT FORMAT STATEMENTS 300 TO 321
744   C
745   300    FORMAT(/////,T28,'*** DATA FOR THIS SPECIMEN COULD NOT BE ORDERED.
746          1ANALYSES WERE ABORTED.',///////,T4,124('-'))
747   C
748   C * STATEMENTS 301 TO 321 ARE PRINTED WHEN R-O EQUATION CANNOT BE SOLVED
749   C
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750  301    FORMAT(//,T24,'*** THEORETICAL STRESSES COULD NOT BE CALCULATED FO
751             1R ANY OF THE R-O PARAMETERS. ***',/,T24,'STATISTICAL EVALUATION WA
752             2S ABORTED AND NO BEST-FIT PARAMETERS COULD BE DETERMINED.',////,
753             3T4,124('-'))
754  302    FORMAT(T5,'*S-ABORT: J=',I2,'-',I1,'-',I2)
755  303    FORMAT(1H+,T5,20X,'* J=',I2,'-',I1,'-',I2)
756  304    FORMAT(1H+,T5,32X,'* J=',I2,'-',I1,'-',I2)
757  305    FORMAT(1H+,T5,44X,'* J=',I2,'-',I1,'-',I2)
758  306    FORMAT(1H+,T5,56X,'* J=',I2,'-',I1,'-',I2)
759  307    FORMAT(1H+,T5,68X,'* J=',I2,'-',I1,'-',I2)
760  308    FORMAT(1H+,T5,80X,'* J=',I2,'-',I1,'-',I2)
761  309    FORMAT(1H+,T5,92X,'* J=',I2,'-',I1,'-',I2)
762  310    FORMAT(1H+,T5,104X,'* J=',I2,'-',I1,'-',I2)
763  C
764  C * STATEMENTS 315 TO 318 REFER TO NPRINT=2 OR 3 PRINT-OUT
765  C
766  315    FORMAT(T5,'SINCE ANALYSES WERE ABORTED, REQUESTED TABULAR DATA WER
767             1E NOT AVAILABLE AND COULD NOT BE PRINTED',/)
768  316    FORMAT(T25,I3,4X,I5,6X,'*ABORT* ANALYTIC STRESSES COULD NOT BE CAL
769             1CULATED * ABORT CODE=',I2)
770  317    FORMAT(T6,I3,I5,3X,'*ABORT* ANALYTIC STRESSES COULD NOT BE CALCULA
771             1TED * ABORT CODE=',I2)
772  318    FORMAT(T4,124('-'),/,T4,'ABORT MESSAGE: J VALUE-CODE-PT NO',
773             12X,'* ABORT CODE: 1= NO CONVERGENCE* 2= S TOO LARGE*',
774             2' 3= S TOO SMALL* 9= R-O EXPNT LESS THAN 1')
775  C
776  C * PI REPORT TABLE DIAGNOSTIC WHEN R-O ANALYSIS ABORT
777  C
778  319    FORMAT(1H0,T10,'SPEC NO: ',A6,2X,'*DIGITIZED STRESS AND STRAIN ',
779             1'VALUES AND THEORETICAL STRESS DEVIATIONS ',
780             2'FOR ELASTIC DATA',/,T10,'THEORETICAL DATA BEYOND THE PROP',
781             3'ORTIONAL LIMIT WERE NOT AVAILABLE',/)
782  C
783  C* DIAGNOSTIC WHEN TEST MATERIAL CODE NOT ASSIGNED IN DATA BANK
784  C
785  320    FORMAT(1H1,T30,36('*',1X),//,T30,'MATERIAL AND/OR ALLOY CODES',1X,
786             1'HAVE NOT BEEN ASSIGNED IN THE DATA BANK',/,T30,'FOR THE TEST',1X,
787             2'SETS LISTED BELOW. AFTER CODES ARE ASSIGNED, NEXT VALUES',/,T30,
788             3'SHOULD BE ASSIGNED AND PUNCHED AND THE LOCATER FILE SHOULD BE',
789             4' UPDATED',//,T30,36('*',1X),//,T31,'SET',,3X,'MATL',4X,'ALLOY'.
790             5/,T31,'NUM',3X,2('CODE',4X),/)
791  321    FORMAT(T30,I4,4X,2(A2,6X))
792  C
793  C--------------------------------------------------------------------------
794  C
795  C * ALL-TRIAL VALUE DATA AND TABLE PRINT-OUT STATEMENTS: NPRINT=2 OR 3
796  C * FORMAT STATEMENTS 400 TO 406 ARE FOR PARAMETERS * 409 TO 413 FOR STATISTICS
797  C
798  400    FORMAT(1H1,T42,'ANALYTIC APPROXIMATION OF STRESS-STRAIN PROPERTIES
799             1',/,T33,'RAMBERG-OSGOOD PARAMETERS OBTAINED FROM ANALYSES OF EXPER
800             2IMENTAL DATA',/)
801  401    FORMAT(T25,'VALUES OF  0.2-PCT OFFSET-YIELD AND R-O',
802             1' EXPONENT FROM LOG-LEAST SQUARES CALCULATIONS',/)
803  402    FORMAT(T50,'***** ELASTIC PROPERTIES *****',/,T10,'E=',F6.2,,1X,
804             1'MEGA-PSI',3X,'S-INT=',F6.0,' PSI',3X,'E-INT=',I5,' MU-IN/IN',3X,
805             2'SEE=',F6.2,' KSI',3X,'C-CFT=',F7.4,2X,'NO. DATA POINTS=',I3)
806  403    FORMAT(T10,'E=',F6.1,' GPA',8X,'S-INT=',F6.2,' MPA',26X,'SEE=',
807             1F6.1,' MPA',/)
808  404    FORMAT(T51,'***** PLASTIC PARAMETERS *****',/,
809             1T25,'ANAL  INIT-EPS',4X,'R-O EXPNT',4X,
810             2'.2%-YIELD ',7X,'PROP-LIM',9X,'.1%-YIELD',5X,'ANAL',/,T25,
811             3'NO.',2X,'MU-STRAIN',7X,'N',5X,3(3X,'KSI',5X,'MPA',3X),1X,
812             4'PTS.',/)
813  405    FORMAT(T25,1X,I2,4X,I5,5X,F7.2,3X,3(F7.2,1X,F7.1,2X),1X,I3)
814  406    FORMAT(1H+,T23,'**',83X,'BEST-FIT')
815  C
816  409    FORMAT(1H0,T49,'***** STATISTICAL PARAMETERS *****',/,
817             1T5,18X,'SPL TO MPT',12X,'MPT TO SY',13X,'SPL TO SY',13X,
818             2'SPL TO SN',13X,'SY TO SN',/,T5,'ANAL INIT',3X,5(6X,'SEE',5X,'C-C'
819             3,2X,'NO '),/,T5,1X,'NO',3X,'EPS',3X,5(3X,'KSI',2X,'MPA',4X,'R',3X,
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820          4'PTS'),/)
821    410   FORMAT(T6,I2,1X,I5,3X,3(1X,F5.2,F5.1,F7.4,I3,1X))
822    411   FORMAT(1H+,T5,84X,'**INSUFFICIENT DATA BEYOND SY**')
823    412   FORMAT(1H+,T5,79X,F5.2,F5.1,F7.4,I3,3X,'*INSUFFICIENT DATA*')
824    413   FORMAT(1H+,T5,78X,2(1X,F5.2,F5.1,F7.4,I3,1X))
825    C
826    C------------------------------------------------------------------
827    C
828    C * NPRINT=3 OPTIONAL TABLES: FORMAT STATEMENTS  414 TO 425
829    C
830    414   FORMAT(1H1,T7,'SPEC. ',A6,2X,'POINT-BY-POINT DEVIATIONS OF CALCULA
831          1TED STRESSES FROM OBSERVED VALUES USING THE PARAMETERS FOR')
832    415   FORMAT(1H+,T7,110X,'J=1 TO J=5',/)
833    416   FORMAT(1H+,T7,110X,'J=6 TO J=10',/)
834    417   FORMAT(T12,5X,'ADJ',6X,'OBS',2X,'PLASTIC',
835          15(1X,I4,1X,'MU-EPS-I',1X),/,T11,
836          2'PT',3X,'STRAIN',2X,'STRESS',1X,'STRAIN',1X,
837          35(2X,'STRESS',3X,'DEV',1X),/T11,
838          4'NO',3X,'IN/IN',5X,'KSI',2X,'MU-EPS',1X,
839          55(4X,'KSI',4X,'PCT',1X),/)
840    418   FORMAT(T10,I3,2X,F7.6,1X,F7.2,2X,I4,2X,5(1X,F7.2,1X,F5.1,1X))
841    419   FORMAT(T10,I3,2X,F7.6,1X,F7.2,2X,I4)
842    420   FORMAT(1H+,T12,27X,F7.2,1X,F5.1)
843    421   FORMAT(1H+,T12,42X,F7.2,1X,F5.1)
844    422   FORMAT(1H+,T12,57X,F7.2,1X,F5.1)
845    423   FORMAT(1H+,T12,72X,F7.2,1X,F5.1)
846    424   FORMAT(1H+,T12,87X,F7.2,1X,F5.1)
847    425   FORMAT(1H0,T4,124('-'),/,T12,'** BLANK COLUMNS ARE FOR CASES WHERE
848          1 ANALYTIC STRESSES COULD NOT BE CALCULATED. SEE DATA COMPILATION F
849          2OR REASONS',/,T4,124('-'))
850    C
851    C------------------------------------------------------------------
852    C
853    C * PI REPORT (NPRINT=1) TABLE: FORMAT STATEMENTS 426 TO 433
854    C
855    426   FORMAT(1H0,T15,'SPEC NO: ',A6,2X,'*DIGITIZED STRESS AND STRAIN '
856          1'VALUES AND THEORETICAL STRESS AND STRESS DEVIATIONS*',
857          2/,T10,'ANALYTIC DATA CALCULATED USING BEST-FIT RAMBERG-OSGOOD '
858          3'PARAMETERS: SY=',F7.2,' KSI, N=',F7.2,' & E=',F6.2,' M-PSI',/)
859    427   FORMAT(T10,14X,'ADJ',4X,'PLASTIC',4X,'OBS',5X,'CALC',/,T10,'PT',3X,
860          1'LOAD',4X,2('STRAIN',2X),1X,2('STRESS',3X),1X,'DEV',/,T10,'NO',
861          23X,'LBS',5X,'IN/IN',3X,'MU-EPS',5X,'KSI',6X,'KSI',5X,'PCT',/)
862    428   FORMAT(T10,I2,1X,F7.0,2X,F7.5,2X,I5,3X,2(F7.2,2X),F5.1)
863    429   FORMAT(T10,I2,1X,F7.0,2X,F7.5,2X,I5,3X,F7.2)
864    430   FORMAT(T10,2(14X,'ADJ',4X,'PLASTIC',4X,'OBS',5X,'CALC',16X),/,T10,
865          12('PT',3X,'LOAD',4X,2('STRAIN',2X),1X,2('STRESS',3X),1X,'DEV',8X)
866          2,/,T10,2('NO',3X,'LBS',5X,'IN/IN',3X,'MU-EPS',5X,'KSI',6X,'KSI',
867          35X,'PCT',8X),/)
868    431   FORMAT(T10,2(I2,1X,F7.0,2X,F7.5,2X,I5,3X,2(F7.2,2X),F5.1,8X))
869    432   FORMAT(T10,2(I2,1X,F7.0,2X,F7.5,2X,I5,3X,F7.2,24X))
870    433   FORMAT(T10,I2,1X,F7.0,2X,F7.5,2X,I5,3X,2(F7.2,2X),F5.1,8X,I2,1X,
871          1F7.0,2X,F7.5,2X,I5,3X,F7.2)
872    434   FORMAT(T4,124('-'),/,T10,'THERE WERE ',I2,' INPUT DATA POINTS.')
873    435   FORMAT(1H+,T10,33X,'STRESS CALCULATIONS WERE MADE ONLY ',
874          1'FOR DATA WHOSE TOTAL STRAIN WAS LESS THAN .02-IN/IN')
875    436   FORMAT(T4,124('-'),/,T10,'STRESS CALCULATIONS WERE MADE ONLY ',
876          1'FOR DATA WHOSE TOTAL STRAIN WAS LESS THAN .02-IN/IN')
877    C
878    C------------------------------------------------------------------
879    C
880    C * PUNCH-OUT FORMAT STATEMENTS
881    C
882    500   FORMAT(A6,2A2,A4,I2,I1,I6,I5,I2,F6.1,3F4.1,F6.2,2F7.2,F4.1,2I4)
883    501   FORMAT(A6,2A2,A4,I2,I1,A6,I5,I2,F7.2,3F4.1,F6.2,18X,2I4)
884    502   FORMAT(A2,19I4)
885    C
886    C------------------------------------------------------------------
887    C
888          END
```

23

```
1    C---------------------------------------------------------------------
2          SUBROUTINE ORDER(N,S,E,P,MORDER)
3    C---------------------------------------------------------------------
4    C
5    C * SUBROUTINE ARRANGES INPUT DATA IN ORDER OF INCREASING STRAIN MAGNITUDE
6    C * USED ONLY IF CHECK IN MAIN PROGRAM SHOWS INPUT DATA NOT IN ORDER
7    C
8    C---------------------------------------------------------------------
9    C
10         DIMENSION S(1),E(1),P(1)
11         KOUNT=0
12         M=N-1
13   1     NOUT=0
14         DO 2 1=1,M
15         IF(E(I).LE.E(I+1)) GO TO 2
16         NOUT=NOUT+1
17         SA=S(I)
18         EA=E(I)
19         PA=P(I)
20         SB=S(I+1)
21         EB=E(I+1)
22         PB=P(I+1)
23         S(I)=SB
24         E(I)=EB
25         P(I)=PB
26         S(I+1)=SA
27         E(I+1)=EA
28         P(I+1)=PA
29   2     CONTINUE
30         KOUNT=KOUNT+1
31         IF(KOUNT.LT.N) GO TO 3
32         MORDER=1
33         RETURN
34   3     IF(NOUT.GT.0) GO TO 1
35         RETURN
36   C
37         END


1    C---------------------------------------------------------------------
2          SUBROUTINE LSTSQ(X,Y,SL,OF,LI,LJ)
3    C---------------------------------------------------------------------
4    C
.5   C * SUBROUTINE PERFORMS A LINEAR REGRESSION ANALYSIS (LEAST SQUARES)
6    C * FOR MODULUS AND INTERCEPT: X=STRAIN   Y=STRESS
7    C * FOR RAMBERG-OSGOOD PARAMETERS: X=LOG PLASTIC-STRAIN   Y=LOG STRESS
8    C
9    C---------------------------------------------------------------------
10   C
11         DIMENSION X(1),Y(1)
12         ET=0
13         ST=0
14         EET=0
15         EST=0
16         DO 1 I=LI,LJ
17         ET=ET+X(I)
18         ST=ST+Y(I)
19         EET=EET+X(I)**2
20   1     EST=EST+X(I)*Y(I)
21         NC=LJ-LI+1
22         DEN=NC*EET-ET**2
23         ENUM=NC*EST-ET*ST
24         ONUM=ST*EET-ET*EST
25         SL=ENUM/DEN
26         OF=ONUM/DEN
27         RETURN
28   C
29         END
```

24

```
1     C-----------------------------------------------------------------
2            SUBROUTINE RJA75(Z,XP,BB,AA,ITER)
3     C-----------------------------------------------------------------
4     C
5     C * SUBROUTINE CALCULATES NON-D R-O STRESS FOR A GIVEN VALUE OF STRAIN *
6     C * NUMERICAL SOLUTION OF FUNC(Z) WHERE Z=S/SY
7     C
8     C * IF NO SOLUTION IN 100 ITERATIONS, CALCULATIONS ABORTED: ITER=100
9     C
10    C-----------------------------------------------------------------
11    C
12           FUNC(Z)=Z+AA*Z**XP-BB
13           ITER=1
14           IF(XP.LT.1.) GO TO 6
15           RM=1.E-5
16           DZ=.1
17           RZ=FUNC(Z)
18           IF(RZ.GT.O..AND.XP.GE.200.) DZ=.01
19           IF(RZ.LT.O..AND.XP.GE.5000.) GO TO 6
20           IF(RZ.LT.O..AND.XP.LT.5000..AND.XP.GE.1000.) DZ=.0001
21           IF(RZ.LT.O..AND.XP.LT.1000..AND.XP.GE.500.) DZ=.001
22           IF(RZ.LT.O..AND.XP.LT.500..AND.XP.GE.100.) DZ=.01
23    1      IF(ABS(RZ).LE.RM) GO TO 6
24           ITER=ITER+1
25           IF(ITER.EQ.100) GO TO 6
26           IF(RZ.LT.O.)GO TO 3
27           IF(Z.LE..01) GO TO 8
28           IF(Z.LE..1.AND.Z.GT.O.) GO TO 2
29           Z=Z-DZ
30           IF(Z.LE..01) GO TO 8
31           TEST=XP*ALOG10(Z)
32           IF(TEST.LE.-20.) GO TO 9
33           IF(TEST.GE.20.) GO TO 7
34           RZ=FUNC(Z)
35           GO TO 1
36    2      DZ=.1*DZ
37           Z=Z-DZ
38           RZ=FUNC(Z)
39           GO TO 1
40    3      V=Z+DZ
41           TEST=XP*ALOG10(V)
42           IF(TEST.LE.-20.) GO TO 9
43           IF(TEST.GE.20.) GO TO 7
44           RV=FUNC(V)
45           IF(ABS(RV).LE.RM) GO TO 5
46           ITER=ITER+1
47           IF(ITER.EQ.100) GO TO 6
48           IF(RV.LT.O.) GO TO 4
49           DZ=.1*DZ
50           IF(V.GE.1..AND.DZ.LT.RM) GO TO 5
51           GO TO 3
52    4      Z=Z+DZ
53           GO TO 3
54    5      Z=V
55    6      RETURN
56    7      ITER=200
57           RETURN
58    8      ITER=300
59           RETURN
60    9      Z=BB
61           RETURN
62    C
63    C-----------------------------------------------------------------
64    C
65    C * ITER=200 * ABORT: Z-VALUE INCREASING AND FUNC(Z) DIVERGING
66    C * TESTED IN LINES 33 AND 43
67    C
68    C * ITER=300 * ABORT: Z-VALUE BECOMING VANISHINGLY SMALL
69    C * TESTED IN LINES 27 AND 30
70    C
71    C-----------------------------------------------------------------
72    C
73           END
```

```
1    @ASG,A R*EVALRO.
2    @ASG,A R*LOCATER.
3    @USE 10,R*LOCATER.
4    @XQT R*EVALRO.FITDATA



1    @PREP R*EVALRO.
2    @MAP,I CIS,R*EVALRO.FITDATA
3    IN R*EVALRO.MAIN
4    LIB R*EVALRO.
5    END
6    @PACK R*EVALRO.
7    @PRT,TL R*EVALRO.
```

## LISTING OF R*RETRIEVE

The RETRIEVE file consists of the following file elements. Unless otherwise noted, the subroutines are used with both main programs.

| Element | Function |
|---|---|
| PMAIN | Main program for data retrieval of stored data on teletype terminals |
| TMAIN | Main program for data retrieval of stored data on cathode-ray-tube graphics terminals |
| TYCODE | Subroutine of PMAIN for displaying material and alloy code tables and for input of users material/alloy selection |
| CODE | Subroutine of TMAIN with same function as TYCODE |
| RANGE | Finds and prints extreme values of selected retrieval option parameter in the available data for the selected material/alloy |
| COUNT | Counts and prints the number of data sets whose value of the selected retrieval option parameter is within the user-specified limits |
| LONG | Subroutine of TMAIN which retrieves desired data from data file and prints a long form list |
| LPRT | Subroutine of PMAIN with same function as LONG for 132-character line-length teletype terminals |
| SHORT | Subroutine of TMAIN which retrieves desired data from data file and prints a short form list |
| SPRT | Subroutine of PMAIN with same function as SHORT for 132-character line-length teletype terminals |
| PORPRT | Subroutine of PMAIN which retrieves desired data from data file and prints an expanded short form list on 80-character line-length teletype terminals |
| SYSIZE | Subroutine of TMAIN examines yield stress data for sets selected for graphical display and determines which of the sets has the highest yield stress value |
| CALC | Subroutine of TMAIN which calculates the plotting points for a graphical stress-strain curve display |
| BUFFPK | Used in forming the absolute of TMAIN with the same function as in PICPTS (see page 2). |

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There are four elements used for control functions whose listings are also given. These are:

| Control Element | Function |
|---|---|
| TELTYP | Assigns DATABANK and LOCATER files to the run and executes PMAIN |
| CRTUBE | Assigns DATABANK and LOCATER files to the run and executes TMAIN |
| MAPTYP | After edit of PMAIN, used to PREP file and to form the absolute (name: TYP) |
| MAPCRT | After edit of TMAIN, used to PREP file and to form the absolute (name: CRT). |

Element TMAIN uses the following TEKTRONIX PLOT-10 subroutines: INITT, CHRSIZ, ANMODE, NEWPAG, IOWAIT, BINITT, NPTS, CHECK, DSPLAY, LINE, SYMBL, SIZES, CPLOT, MOVABS, and FINITT. No listings have been given for these subroutines. The PLOT-10 subroutines are referenced from the file DAO*TEX and from the BUFFPK package when the absolute for TMAIN is created.

RETRIEVE may be executed interactively on any of three types of terminals: TEKTRONIX 4014 graphics terminals, 132-character carriage-length teletype terminals, or 80-character carriage-length teletype terminals. Data are retrieved by the program from the R*DATABANK file in the computer using the R*LOCATER file as described in Reference 2.

Listings of the two main programs and the subroutines are given on pages 29-53. The four control elements are listed, in the order given above, on page 54.

```
1    C------------------------------------------------------------------
2    C * FILE R*RETRIEVE IS FOR RETRIEVING DATA FROM DATABANK
3    C * THIS IS THE ELEMENT PMAIN (ABSOLUTE: TYP)
4    C------------------------------------------------------------------
5    C
6    C * THIS ELEMENT IS FOR KEYBOARD PRINT TERMINALS
7    C * 132-CHARACTER LINE-LENGTH TERMINALS HERE CALLED TELETYPE
8    C * 80-CHARACTER LINE-LENGTH TERMINALS HERE CALLED PORTABLE
9    C * ANALYZED STRESS-STRAIN DATA LISTED FOR REQUESTED MATERIAL/ALLOY
10   C * THIS IS AN INTERACTIVE PROGRAM REQUIRING RESPONSES FROM USER
11   C
12   C * PROGRAM EXECUTED WITH @ADD R*RETRIEVE.TELTYP
13   C * FILE 20 IS DATABANK
14   C
15         DEFINE FILE 20(9999,80,E,II)
16   C
17   C------------------------------------------------------------------
18   C
19   C * IDENTIFY TYPE AND PREPARE TERMINAL: EXPAND BUFFER TO FULL CAPACITY
20   C
21   1     WRITE(6,300)
22         READ(5,201),TERM
23         IF(TERM.EQ.'TEL') WRITE(6,301)
24         IF(TERM.EQ.'POR') WRITE(6,302)
25         IF(TERM.EQ.'TEL'.OR.TERM.EQ.'POR') GO TO 10
26         WRITE(6,102)
27         READ(5,201),ANS
28         IF(ANS.EQ.'YES') GO TO 1
29         GO TO 50
30   10    READ(5,200)
31   C
32   C------------------------------------------------------------------
33   C
34   C * READ-IN OF MATERIAL/ALLOY CODE OF DATA TO BE LISTED
35   C
36   11    CALL TYCODE(JEND,NI,W,X)
37   C
38   C------------------------------------------------------------------
39   C FOUR OPTIONS OF SELECIVE OF DATA  RETRIEVAL FOR CHOSEN MATL/ALLOY
40   C IDENT=0: ALL DATA SETS
41   C IDENT=1: ONLY DATA WHOSE ULTIMATE STRENGTH IS WITHIN A SELECTED RANGE
42   C IDENT=2: ONLY DATA WHOSE YIELD STRENGTH IS WITHIN A SELECTED RANGE
43   C IDENT=3: ONLY DATA WHOSE ROCKWELL-C HARDNESS IS WITHIN A SELECTED RANGE
44   C
45   C * TWO TELETYPE PRINT-OUT  OPTIONS: LONG-FORM  OR SHORT-FORM
46   C * ONLY EXPANDED SHORT-FORM PRINT-OUT AVAILABLE FOR PORTABLE TERMINALS
47   C
48         IF(JEND.EQ.0) GO TO 50
49         IHOLD=NI
50   C
51   C------------------------------------------------------------------
52   C
53   C * IDENTIFICATION OF SELECTIVE RETRIEVAL OPTION
54   C
55   12    IDENT=0
56         XMAX=0
57         XMIN=0
58         WRITE(6,101)
59         READ(5,201),ANS
60         IF(ANS.EQ.'ALL') GO TO 18
61         IF(ANS.EQ.'ULT') IDENT=1
62         IF(ANS.EQ.'YIE') IDENT=2
63         IF(ANS.EQ.'HAR') IDENT=3
64         IF(IDENT.GT.0) GO TO 13
65         WRITE(6,102)
66         READ(5,201),ANS
67         IF(ANS.NE.'YES') GO TO 50
68         GO TO 12
```

29

```
69   C
70   C-----------------------------------------------------------------------
71   C
72   C ENTRY OF PARAMETER VALUE AND RANGE
73   C SUBROUTINE RANGE FINDS AND PRINTS EXTREMES OF PARAMETER VALUES
74   C
75   13    CALL RANGE(W,X,NI,IDENT,JEND)
76         NI=IHOLD
77         IF(JEND.EQ.0) GO TO 50
78         IF(IDENT.EQ.0) GO TO 18
79   14    WRITE(6,103)
80         READ(5,200,ERR=30),XMIN,XMAX
81         IF(XMAX.GT.XMIN) GO TO 15
82         YMIN=XMAX
83         YMAX=XMIN
84         XMAX=YMAX
85         XMIN=YMIN
86   15    READ(20'NI,202),NTYPE,SULT,RCH,SY,NEXT
87         IF(NTYPE.NE.1) GO TO 16
88         IF(IDENT.EQ.1.AND.SULT.LE.XMAX.AND.SULT.GE.XMIN) GO TO 18
89         IF(IDENT.EQ.2.AND.SY.LE.XMAX.AND.SY.GE.XMIN) GO TO 18
90         IF(IDENT.EQ.3.AND.RCH.LE.XMAX.AND.RCH.GE.XMIN) GO TO 18
91   16    IF(NEXT.EQ.0) GO TO 17
92         NI=NEXT
93         GO TO 15
94   C
95   C-----------------------------------------------------------------------
96   C
97   C * CORRECTION OPTIONS WHEN NO DATA IN DESIRED RANGE OF SELECTED PARAMETER
98   C
99   17    NI=IHOLD
100        WRITE(6,105)
101        READ(5,201),ANS
102        IF(ANS.EQ.'RAN') GO TO 14
103        IF(ANS.EQ.'OPT') GO TO 12
104        IF(ANS.EQ.'NEW') GO TO 11
105        IDENT=0
106        IF(ANS.EQ.'ALL') GO TO 18
107        GO TO 50
108  C
109  C-----------------------------------------------------------------------
110  C
111  C * PRINT-OUT OPTIONS: LONG-FORM OR SHORT-FORM FOR STANDARD TELETYPE
112  C * ONLY EXPANDED SHORT-FORM AVAILABLE FOR PORTABLE TERMINAL
113  C
114  18    NI=IHOLD
115        IF(IDENT.GT.0) CALL COUNT(IDENT,NI,XMIN,XMAX)
116  19    IF(TERM.EQ.'POR') WRITE(6,104)
117        IF(TERM.NE.'POR') WRITE(6,106)
118        READ(5,201),ANS
119        IF(ANS.EQ.'SHO') GO TO 20
120        IF(ANS.EQ.'LON') GO TO 21
121        IF(ANS.EQ.'PRI') GO TO 22
122        IF(ANS.EQ.'CHA') GO TO 12
123        IF(ANS.EQ.'END') GO TO 50
124        WRITE(6,107)
125        GO TO 19
126  C
127  C-----------------------------------------------------------------------
128  C
129  C * PRINT-OUT OF LISTING
130  C
131  20    CALL SPRT(W,X,NI,IDENT,XMIN,XMAX)
132        GO TO 40
133  21    CALL LPRT(W,X,NI,IDENT,XMIN,XMAX)
134        GO TO 40
135  22    CALL PORPRT(W,X,NI,IDENT,XMIN,XMAX)
136        GO TO 40
```

```
137   C
138   C------------------------------------------------------------------
139   C
140   C * ERROR DIAGNOSTIC AND OPTION TO CORRECT WHEN MIN-MAX ENTRY ERROR
141   C
142    30    WRITE(6,107)
143          WRITE(6,400)
144          READ(5,201),ANS
145          IF(ANS.EQ.'YES') GO TO 14
146          GO TO 50
147   C
148   C------------------------------------------------------------------
149   C
150   C * OPTIONS: NEW LISTING OR TERMINATE
151   C
152    40    WRITE(6,108)
153          READ(5,201),ANS
154          IF(ANS.EQ.'NEW') GO TO 11
155   C
156   C------------------------------------------------------------------
157   C
158   C * TERMINATION
159   C
160    50    WRITE(6,109)
161    51    STOP
162   C
163   C------------------------------------------------------------------
164   C
165   101   FORMAT(T2,'TABLE BELOW LISTS RETRIEVAL OPTIONS AND ENTRIES',//,
166         1T2,'RETRIEVAL OPTION',14X,'ENTRY',/,T2,35('-'),/,
167         2T2,'ALL DATA FOR SELECTED MATL',4X,'ALL',/,
168         3T2,'DATA FOR SPECIFIC UTS RANGE',3X,'ULTIMATE',/,
169         4T2,'DATA FOR SPECIFIC SY RANGE',4X,'YIELD',/,
170         5T2,'DATA FOR SPECIFIC RCH RANGE',3X,'HARDNESS',/,
171         6T2,'MAKE YOUR ENTRY NOW',/)
172   102   FORMAT(T2,'ENTRY DID NOT CORRESPOND TO EITHER OF THE ABOVE',/,
173         1T2,'IF YOU WISH TO CORRECT, ENTER YES',/,
174         2T2,'OTHERWISE ENTER END AND RUN WILL TERMINATE')
175   103   FORMAT(/,T2,'DATA WILL BE RETRIEVED FOR A RANGE OF VALUES OF ',
176         1'THE CHOSEN PARAMETER',//,T2,'NEXT ENTRY DEFINES LOWER AND ',
177         2'UPPER BOUNDS OF DESIRED RANGE',
178         3//,T2,'ENTRY UNITS: KSI UNITS FOR  STRENGTH AND ',
179         4'ROCKWELL-C FOR HARDNESS',/,T2,'SEPARATE THE TWO VALUES BY A ',
180         5'COMMA. EXAMPLE: 150.,155.',//,T2,'ENTER BOUND VALUES NOW')
181   104   FORMAT(/,T2,'PRINT NOW, CHANGE RETRIEVAL OPTION, OR TERMINATE',
182         1/,T2,48('-'),/,T2,'1. TO PRINT A DATA-LIST ENTER: PRINT',/,T2,
183         2'2. TO CHANGE RETRIEVAL OPTION ENTER: CHANGE',/,T2,
184         3'3. TO TERMINATE THE PROGRAM ENTER: END',/,T2,
185         4'MAKE YOUR ENTRY NOW')
186   105   FORMAT(T2,'THERE ARE NO DATA IN THE DATA BANK FOR THE'/,T2,,
187         1'SPECIFIED RANGE OF THE SELECTED PARAMETER',/,T2,
188         3'TO CHANGE THE RANGE LIMITS, ENTER: RANGE',/,
189         4T2,'TO LIST ALL THE DATA FOR THE MATERIAL, ENTER: ALL',/,
190         5T2,'TO CHOOSE ANOTHER OPTION, ENTER: OPTION',/,
191         6T2,'TO CHOOSE ANOTHER MATERIAL, ENTER NEW',/,
192         7T2,'OTHERWISE ENTER END AND RUN WILL TERMINATE')
193   106   FORMAT(T2,'PRINT NOW, CHANGE RETRIEVAL OPTION, OR TERMINATE',/,T2,
194         148('-'),/,T2,'1. TO PRINT A LONG-FORM DATA-LIST ENTER: LONG',
195         2/,T2,'2. TO PRINT A SHORT-FORM DATA-LIST ENTER: SHORT',/,T2,
196         3'3. TO CHANGE RETRIEVAL OPTION ENTER: CHANGE',/,T2,
197         4'4. TO TERMINATE THE PROGRAM ENTER: END',/,T2,
198         5'MAKE YOUR ENTRY NOW')
199   107   FORMAT(/,T2,'** ERROR: ENTRY NOT RECOGNIZED **')
200   108   FORMAT(T2,2X,'OPTIONS: MAKE ONE OF TWO ENTRIES',/,T2,2X,31('-'),
201         1/,T2,'FOR A DATA LIST OF ANOTHER MATERIAL ENTER: NEW',/,T2,
202         2'TO TERMINATE THE PROGRAM ENTER: END')
203   109   FORMAT(T2,'RUN IS OVER. WHEN NEXT PROMPT (>) APPEARS ENTER @FIN')
204   C
```

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```
205   200    FORMAT( )
206   201    FORMAT(A3)
207   202    FORMAT(16X,I1,13X,F6.1,8X,F4.1,13X,F7.2,4X,I4)
208   C
209   300    FORMAT(T2,'THIS PROGRAM CAN BE RUN ONLY ON HARD-PRINT TERMINALS',
210          2/,T2,'IDENTIFY THE TERMINAL YOU USING:',/,T2,
211          3'IF ON A 132-CHARACTER TERMINAL ENTER: TELETYPE',/,T2,
212          4'IF ON AN 80-CHARACTER TERMINAL ENTER: PORTABLE',/,T2,
213          5'MAKE ENTRY NOW AND KEY RETURN')
214   301    FORMAT(T2,1X,'PREPARE TERMINAL FOR DATA RETRIEVAL:',//,T2,
215          1'1. ENTER: @@TTY W,132 THEN KEY RETURN',/,T2,
216          2'2. WAIT FOR RESPONSE FROM COMPUTER: -@@COMPLETE',/,T2,
217          3'3. THEN WHEN PROMPT APPEARS KEY RETURN')
218   302    FORMAT(T2,1X,'PREPARE TERMINAL FOR DATA RETRIEVAL:',//,T2,
219          1'1. ENTER: @@TTY W,80 THEN KEY RETURN',/,T2,
220          2'2. WAIT FOR RESPONSE FROM COMPUTER: -@@COMPLETE',/,T2,
221          3'3. THEN WHEN PROMPT APPEARS KEY RETURN')
222   C
223   400    FORMAT(T2,'IF YOU WISH TO CORRECT, ENTER YES',/,
224          1T2,'OTHERWISE ENTER END AND RUN WILL TERMINATE')
225   C
226          END


  1   C-------------------------------------------------------------------
  2   C * FILE R*RETRIEVE IS FOR RETRIEVING DATA FROM DATABANK
  3   C * ELEMENT TMAIN (ABSOLUTE: CRT) FOR TEKTRONIX GRAPHICS TERMINAL
  4   C-------------------------------------------------------------------
  5   C
  6   C * ANALYZED STRESS-STRAIN DATA LISTED FOR REQUESTED MATERIAL/ALLOY
  7   C * OPTIONAL GRAPHICS ROUTINE PLOTS STRESS-STRAIN CURVE FOR ANY SET
  8   C * THIS IS AN INTERACTIVE PROGRAM REQUIRING RESPONSES FROM USER
  9   C
 10   C * PROGRAM EXECUTED WITH @ADD R*RETRIEVE.CRTUBE
 11   C
 12          DIMENSION LOC(19),S(64),E(64),EP(64),SS(3),EE(3)
 13   C
 14   C-------------------------------------------------------------------
 15   C
 16   C * FILE 10 IS LOCATER AND FILE 20 IS DATABANK
 17   C
 18          DEFINE FILE 10(50,80,E,JJ)
 19          DEFINE FILE 20(9999,80,E,II)
 20   C
 21   C-------------------------------------------------------------------
 22   C
 23   C * PREPARE TERMINAL: EXPAND BUFFER TO 132 CHARACTERS
 24   C
 25          CALL INITT(30)
 26          CALL TERM(2,1024)
 27          CALL CHRSIZ(4)
 28          CALL ANMODE
 29          KURVE=0
 30          WRITE(6,100)
 31          READ(5,200)
 32   C
 33   C-------------------------------------------------------------------
 34   C
 35   C * READ-IN OF MATERIAL/ALLOY CODE OF DATA TO BE LISTED
 36   C
 37     1    CALL NEWPAG
 38          CALL IOWAIT(20)
 39          CALL CODE(LOC,JEND,NI,W,X)
 40   C
 41   C-------------------------------------------------------------------
 42   C * FOUR OPTIONS OF SELECIVE OF DATA  RETRIEVAL FOR CHOSEN MATL/ALLOY
```

```
43   C * IDENT=0: ALL DATA SETS
44   C * IDENT=1: ONLY DATA WHOSE ULTIMATE STRENGTH IS WITHIN A SELECTED RANGE
45   C * IDENT=2: ONLY DATA WHOSE YIELD STRENGTH IS WITHIN A SELECTED RANGE
46   C * IDENT=3: ONLY DATA WHOSE ROCKWELL-C HARDNESS IS WITHIN A SELECTED RANGE
47   C
48   C * TWO PRINT-OUT OPTIONS: LONG-FORM PRINT-OUT OR SHORT-FORM PRINT-OUT
49   C
50         IF(JEND.EQ.0) GO TO 50
51         IHOLD=NI
52   C
53   C----------------------------------------------------------------------
54   C
55   C * IDENTIFICATION OF SELECTIVE RETRIEVAL OPTION
56   C
57   2     IDENT=0
58         XMAX=0
59         XMIN=0
60         WRITE(6,101)
61         READ(5,201),ANS
62         IF(ANS.EQ.'ALL') GO TO 8
63         IF(ANS.EQ.'ULT') IDENT=1
64         IF(ANS.EQ.'YIE') IDENT=2
65         IF(ANS.EQ.'HAR') IDENT=3
66         IF(IDENT.GT.0) GO TO 3
67         WRITE(6,102)
68         READ(5,201),ANS
69         IF(ANS.NE.'YES') GO TO 50
70         GO TO 2
71   C
72   C----------------------------------------------------------------------
73   C
74   C * ENTRY OF PARAMETER VALUE AND RANGE
75   C * SUBROUTINE RANGE FINDS AND PRINTS EXTREMES OF PARAMETER VALUES
76   C
77   3     CALL RANGE(W,X,NI,IDENT,JEND)
78         NI=IHOLD
79         IF(JEND.EQ.0) GO TO 50
80         IF(IDENT.EQ.0) GO TO 8
81   4     WRITE(6,103)
82         MX=1
83         READ(5,200,ERR=45),XMIN,XMAX
84         IF(XMAX.GT.XMIN) GO TO 5
85         YMIN=XMAX
86         YMAX=XMIN
87         XMAX=YMAX
88         XMIN=YMIN
89   5     READ(20'NI,202),NTYPE,SULT,RCH,SY,NEXT
90         IF(NTYPE.NE.1) GO TO 6
91         IF(IDENT.EQ.1.AND.SULT.LE.XMAX.AND.SULT.GE.XMIN) GO TO 8
92         IF(IDENT.EQ.2.AND.SY.LE.XMAX.AND.SY.GE.XMIN) GO TO 8
93         IF(IDENT.EQ.3.AND.RCH.LE.XMAX.AND.RCH.GE.XMIN) GO TO 8
94   6     IF(NEXT.EQ.0) GO TO 7
95         NI=NEXT
96         GO TO 5
97   C
98   C----------------------------------------------------------------------
99   C
100  C * CORRECTION OPTIONS WHEN NO DATA IN DESIRED RANGE OF SELECTED PARAMETER
101  C
102  7     NI=IHOLD
103        WRITE(6,105)
104        READ(5,201),ANS
105        IF(ANS.EQ.'RAN') GO TO 4
106        IF(ANS.EQ.'OPT') GO TO 2
107        IF(ANS.EQ.'NEW') GO TO 1
108        IDENT=0
109        IF(ANS.EQ.'ALL') GO TO 8
110        GO TO 50
```

```
111   C
112   C--------------------------------------------------------------
113   C
114   C * PRINT-OUT OPTIONS: LONG-FORM OR SHORT-FORM
115   C
116    8    NI=IHOLD
117         IF(IDENT.GT.C) CALL COUNT(IDENT,NI,XMIN,XMAX)
118    9    WRITE(6,106)
119         READ(5,201),ANS
120         IF(ANS.EQ.'SHO') GO TO 10
121         IF(ANS.EQ.'LON') GO TO 11
122         IF(ANS.EQ.'CHA') GO TO 2
123         IF(ANS.EQ.'END') GO TO 50
124         WRITE(6,107)
125         GO TO 9
126   C
127   C * PRINT-OUT OF LISTING
128   C
129   10    CALL SHORT(W,X,NI,IDENT,XMIN,XMAX)
130         GO TO 20
131   11    CALL LONG(W,X,NI,IDENT,XMIN,XMAX)
132   C--------------------------------------------------------------
133   C
134   C * OPTIONS: NEW LISTING * PLOT OF S-E CURVE * TERMINATE
135   C
136   20    CALL NEWPAG
137         CALL IOWAIT(20)
138         WRITE(6,118)
139         READ(5,201),ANS
140         IF(ANS.EQ.'NEW') GO TO 1
141         IF(ANS.EQ.'CUR') GO TO 30
142         GO TO 50
143   C
144   C--------------------------------------------------------------
145   C
146   C * GRAPHIC DISPLAY OF STRESS STRAIN CURVE
147   C
148   C * PREPARATION OF TERMINAL FOR PLOTTING: REDUCE BUFFER TO 72 CHARACTERS
149   C
150   C * ASSIGNMENT OF PLASTIC STRAIN VALUES USED IN COMPUTATIONS
151   C * STATEMENTS 30 TO 33 DONE ONCE IN RUN (KURVE=0)
152   C
153   30    WRITE(6,119)
154         READ(5,201),ANS
155         IF(KURVE.GT.0) GO TO 34
156         KURVE=KURVE+1
157         NC=64
158         EP(1)=0
159         EP(2)=1.E-5
160         DO 31 I=3,NC
161         IF(I.LE.5) EP(I)=(I-2)*5.E-5
162         IF(I.GT.5) EP(I)=2.E-4+(I-6)*1.E-4
163   31    CONTINUE
164   C
165   C--------------------------------------------------------------
166   C
167   C * IDENTIFICATION OF CURRENT END-OF-FILE SET NUMBER OF DATABANK
168   C
169         IEND=0
170         DO 33 J=1,7
171         READ(10'J,203),AA,(LOC(L),L=1,19)
172         DO 32 L=1,19
173         IF(LOC(L).LT.IEND) GO TO 32
174         IEND=LOC(L)
175   32    CONTINUE
176   33    CONTINUE
177   C
178   C--------------------------------------------------------------
```

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```
179   C
180   C * READ-IN OF SETS TO BE GRAPHED AND CHECK THAT SET NOS. NOT BEYOND EOF
181   C * THREE CURVES ON ONE GRAPH PERMITTED
182   C
183   34    WRITE(6,120)
184         MX=2
185         READ(5,200,ERR=45),IANS
186         IF(IANS.GT.0.AND.IANS.LE.3) GO TO 35
187         WRITE(6,121)
188         READ(5,201),ANS
189         IF(ANS.EQ.'YES') GO TO 34
190         GO TO 51
191   35    ISET1=0
192         ISET2=0
193         ISET3=0
194         WRITE(6,122)
195         MX=3
196         IF(IANS.EQ.1) READ(5,200,ERR=45),ISET1
197         IF(IANS.EQ.2) READ(5,200,ERR=45),ISET1,ISET2
198         IF(IANS.EQ.3) READ(5,200,ERR=45),ISET1,ISET2,ISET3
199         IF(IEND.GE.ISET1.AND.IEND.GE.ISET2.AND.IEND.GE.ISET3) GO TO 36
200         WRITE(6,123),IEND
201         READ(5,201),ANS
202         IF(ANS.EQ.'YES') GO TO 34
203         GO TO 51
204   C
205   C------------------------------------------------------------------
206   C
207   C * COMPUTATIONS AND DISPLAY OF CURVE NUMBER 1
208   C * CURVE NUMBER 1 IS ALWAYS THE DATA-SET WITH MAXIMUM YIELD STRESS
209   C * SUBROUTINE SYSIZE ASSIGNS ISET1 TO SET WITH MAX SY
210   C
211   36    S(1)=0
212         E(1)=0
213         CALL SYSIZE(IANS,ISET1,ISET2,ISET3)
214         IP=ISET1
215         READ(20'IP,204),W1,X1,EMOD,XN,SY
216         EMAX=SY/(EMOD*1.E3)+.004
217         CALL CALC(NC,EMOD,XN,SY,S,E,EP,SS,EE,EMAX,NP)
218         CALL ERASE
219         CALL CHRSIZ(3)
220         CALL BINITT
221         CALL NPTS(NP)
222         CALL CHECK(E,S)
223         CALL DSPLAY(E,S)
224         CALL NPTS(3)
225         CALL LINE(-1)
226         CALL SYMBL(4)
227         CALL SIZES(.8)
228         CALL CPLOT(EE,SS)
229         CALL ANMODE
230         IF(ISET2.EQ.0.OR.IANS.EQ.1) GO TO 40
231   C
232   C * COMPUTATIONS AND DISPLAY OF CURVES 2 AND 3 FROM ALLOY LIST
233   C
234         IP=ISET2
235   37    READ(20'IP,204),WW,XX,EMOD,XN,SY
236         CALL CALC(NC,EMOD,XN,SY,S,E,EP,SS,EE,EMAX,NP)
237         CALL NPTS(NP)
238         IF(IP.EQ.ISET3) GO TO 38
239         W2=WW
240         X2=XX
241         CALL LINE(12)
242         GO TO 39
243   38    W3=WW
244         X3=XX
245         CALL LINE(5212)
246   39    CALL SYMBL(0)
```

```
247        CALL CPLOT(E,S)
248        CALL NPTS(3)
249        CALL LINE(-1)
250        IF(IP.EQ.ISET2) CALL SYMBL(1)
251        IF(IP.NE.ISET2) CALL SYMBL(3)
252        CALL SIZES(.5)
253        CALL CPLOT(EE,SS)
254        CALL ANMODE
255        IF(IANS.EQ.2.OR.IP.EQ.ISET3) GO TO 40
256        IP=ISET3
257        GO TO 37
258   40   CALL MOVABS(250,60)
259        CALL ANMODE
260        WRITE(6,124),W1,X1,ISET1
261        CALL MOVABS(250,45)
262        CALL ANMODE
263        IF(IANS.EQ.1.OR.ISET2.EQ.0) GO TO 41
264        IF(IANS.EQ.2) WRITE(6,125),W2,X2,ISET2
265        IF(IANS.EQ.3) WRITE(6,126),W2,X2,ISET2,W3,X3,ISET3
266        CALL MOVABS(250,30)
267        CALL ANMODE
268   41   WRITE(6,127)
269        READ(5,201)
270   C
271   C--------------------------------------------------------------------
272   C
273   C * OPTIONS: EXAMINE ANOTHER LIST, PLOT ANOTHER CURVE, OR TERMINATE
274   C
275        CALL NEWPAG
276        CALL IOWAIT(20)
277        WRITE(6,118)
278        READ(5,201),ANS
279        IF(ANS.EQ.'NEW') GO TO 42
280        IF(ANS.EQ.'CUR') GO TO 34
281        GO TO 51
282   42   WRITE(6,128)
283        READ(5,201)
284        CALL CHRSIZ(4)
285        GO TO 1
286   C
287   C--------------------------------------------------------------------
288   C
289   C * ENTRY ERROR DIAGNOSTIC AND CORRECTION OPTION
290   C
291   45   WRITE(6,107)
292        WRITE(6,300)
293        READ(5,201),ANS
294        IF(ANS.EQ.'YES') GO TO (4,34,35),MX
295   C
296   C--------------------------------------------------------------------
297   C
298   C * TERMINATION
299   C
300   50   CALL CHRSIZ(3)
301   51   CALL NEWPAG
302        CALL IOWAIT(20)
303        CALL MOVABS(0,700)
304        CALL ANMODE
305        WRITE(6,129)
306        CALL FINITT(0,650)
307        STOP
308   C
309   C--------------------------------------------------------------------
310   C
311   100  FORMAT(T2,1X,'PREPARE TERMINAL FOR DATA RETRIEVAL:',//,T2,
312       1'1. ENTER: @@TTY W.132 THEN KEY RETURN',/,T2,
313       2'2. WAIT FOR RESPONSE FROM COMPUTER: -@@COMPLETE',/,T2,
314       3'3. KEY RETURN AND WAIT FOR PROGRAM TO BEGIN')
```

```
315  101    FORMAT(T2,'TABLE BELOW LISTS RETRIEVAL OPTIONS AND ENTRIES',//,
316         1T2,'RETRIEVAL OPTION',14X,'ENTRY',/,
317         2T2,'ALL DATA FOR SELECTED MATL',4X,'ALL',/,
318         3T2,'DATA FOR SPECIFIC UTS RANGE',3X,'ULTIMATE',/,
319         4T2,'DATA FOR SPECIFIC SY RANGE',4X,'YIELD',/,
320         5T2,'DATA FOR SPECIFIC RCH RANGE',3X,'HARDNESS',/,
321         6T2,'MAKE YOUR ENTRY NOW',/)
322  102    FORMAT(T2,'YOUR ENTRY DID NOT CORRESPOND TO ANY OF THE ABOVE',/,
323         1T2,'IF YOU WISH TO CORRECT, ENTER YES',/,
324         2T2,'OTHERWISE ENTER END AND RUN WILL TERMINATE')
325  103    FORMAT(/,T2,'DATA WILL BE RETRIEVED FOR A RANGE OF VALUES OF ',
326         1'THE CHOSEN PARAMETER',/,T2,'NEXT ENTRY DEFINES LOWER AND UPPER '
327         2'BOUNDS OF DESIRED RANGE',
328         3/,T2,'ENTRY UNITS: KSI FOR   STRENGTH AND ',
329         4'ROCKWELL-C FOR HARDNESS',/,T2,'SEPARATE THE TWO VALUES BY A ',
330         5'COMMA. EXAMPLE: 150.,155.',/,T2,'ENTER BOUND VALUES NOW',/)
331  105    FORMAT(T2,'THERE ARE NO DATA IN THE DATA BANK FOR THE'/,T2,,
332         1'SPECIFIED RANGE OF THE SELECTED PARAMETER',/,T2,
333         3'TO CHANGE THE RANGE LIMITS, ENTER: RANGE',/,
334         4T2,'TO LIST ALL THE DATA FOR THE MATERIAL, ENTER: ALL',/,
335         5T2,'TO CHOOSE ANOTHER OPTION, ENTER: OPTION',/,
336         6T2,'TO CHOOSE ANOTHER MATERIAL, ENTER NEW',/,
337         7T2,'OTHERWISE ENTER END AND RUN WILL TERMINATE')
338  106    FORMAT(T2,'PRINT NOW, CHANGE RETRIEVAL OPTION, OR TERMINATE',/,T2,
339         1'1. TO PRINT A LONG-FORM DATA-LIST ENTER: LONG',/,T2,
340         2'2. TO PRINT A SHORT-FORM DATA-LIST ENTER: SHORT',/,T2,
341         3'3. TO CHANGE RETRIEVAL OPTION ENTER: CHANGE',/,T2,
342         4'4. TO TERMINATE THE PROGRAM ENTER: END',/,T2,
343         5'MAKE YOUR ENTRY NOW')
344  107    FORMAT(/,T2,'** ERROR: ENTRY NOT RECOGNIZED **')
345  118    FORMAT(T2,2X,'OPTIONS: MAKE ONE OF THREE ENTRIES',/,T2,
346         1'FOR A DATA LIST OF ANOTHER MATERIAL ENTER NEW',/,T2,
347         2'FOR A GRAPH OF THE STRESS STRAIN CURVE OF A DATA SET',
348         31X,'ENTER CURVE',/,T2,'TO TERMINATE THE PROGRAM ENTER END')
349  119    FORMAT(T2,1X,//,T2,'PROCEDURE FOR GRAPHIC STRESS/STRAIN CURVE',
350         11X,'DISPLAY',/,T2,'1. ENTER @@TTY W,72 AND KEY RETURN',/,T2,
351         2'2. WAIT FOR RESPONSE FROM COMPUTER: -@@COMPLETE',/,T2,
352         3'3. KEY RETURN AND WAIT FOR NEXT MESSAGE')
353  120    FORMAT(/,T2,'UP TO 3 CURVES MAY BE PLOTTED ON ONE GRAPH',/,T2,
354         1'ENTER THE NUMBER YOU WISH TO PLOT (ENTER 1, 2, OR 3)')
355  121    FORMAT(T2,'YOU ASKED FOR MORE THAN 3 CURVES',/,T2,
356         1'TO MAKE A CORRECTION ENTER YES',/,T2,
357         2'OTHERWISE KEY RETURN AND PROGRAM WILL TERMINATE')
358  122    FORMAT(/,T2,'1. ENTER DATA SET NO(S). TO BE GRAPHED & KEY RETURN',
359         1/,T2,'USE COMMAS BETWEEN SET NOS. IN ENTRY. EXAMPLE: 236,167',
360         2/,T2,'2. WAIT FOR PLOT TO APPEAR',/,T2,'3. TO CONTINUE THE',
361         31X,'PROGRAM AFTER PLOT, KEY RETURN',/,T2,
362         4'4. THE SCREEN WILL ERASE AND OPTIONS TO CONTINUE WILL APPEAR')
363  123    FORMAT(T2,'* SET NUMBER ERROR * ',/,T2,
364         1'SET NUMBERS HIGHER THAN ',I4,' NOT AVAILABLE',//,T2,
365         2'IF YOU WISH TO MAKE A CORRECTION ENTER YES',/,T2,
366         3'OTHERWISE KEY RETURN AND PROGRAM WILL TERMINATE')
367  124    FORMAT(1X,'MATL ',A2,'-',A2,2X,'SOLID CURVE: SET',I4,2X,
368         1'STRESS IN KSI * STRAIN IN IN/IN')
369  125    FORMAT(1X,'DASHED: MATL ',A2,'-',A2,'  SET:',I4)
370  126    FORMAT(1X,'DASHED: MATL ',A2,'-',A2,'  SET:',I4,
371         12X,'BROKEN: MATL ',A2,'-',A2,'  SET:',I4)
372  127    FORMAT(1X,'PROP. LIMIT, 0.1%-YIELD, AND .2%-YIELD IDENTIFIED',
373         11X,'ON CURVES')
374  128    FORMAT(T2,'PROCEDURE FOR NEW LISTING',/,T2,
375         1'1. ENTER @@TTY W,132 AND KEY RETURN',/,T2,
376         2'2. WAIT FOR RESPONSE FROM COMPUTER: -@@COMPLETE',/,T2,
377         3'3. KEY RETURN')
378  129    FORMAT(T2,'RUN IS OVER. KEY RETURN',/,T2,
379         1'WHEN PROMPT (>) APPEARS ENTER @FIN')
380  C
381  C------------------------------------------------------------------
382  C
```

```
383    200     FORMAT( )
384    201     FORMAT(A3)
385    202     FORMAT(16X,I1,13X,F6.1,8X,F4.1,13X,F7.2,4X,I4)
386    203     FORMAT(A2,19I4)
387    204     FORMAT(6X,2A2,38X,F6.2,2F7.2)
388  C
389  C-----------------------------------------------------------------
390  C
391    300     FORMAT(T2,'TO MAKE A CORRECTION ENTER YES',/,T2,
392            1'OTHERWISE KEY RETURN AND PROGRAM WILL TERMINATE')
393  C
394            END


  1  C-----------------------------------------------------------------
  2            SUBROUTINE TYCODE(JEND,NI,W,X)
  3  C-----------------------------------------------------------------
  4  C
  5  C * SUBROUTINE DISPLAYS TABLE OF CONTENTS OF DATA FILE AND CODE DESIGNATORS
  6  C * USED WITH TELETYPE OR PORTABLE TERMINALS
  7  C * USER CHOOSES MATERIAL AND ALLOY FOR DATA RETRIEVAL AND DISPLAY
  8  C * THEN CHOICES ARE CHECKED TO ASSURE THAT THE DATA ARE IN THE FILE
  9  C
 10  C-----------------------------------------------------------------
 11  C
 12            DIMENSION WA(7),XA(19),LOC(19)
 13            DATA WA/'ST','TI','UR','CU','WF','AL','MG'/
 14            DATA XA/'ZZ','1A','2A','3A','4A','5A','6A','7A','8A','9A',
 15            1'1B','2B','3B','4B','5B','6B','7B','8B','9B'/
 16            DEFINE FILE 10(50,80,E,JJ)
 17  C
 18  C-----------------------------------------------------------------
 19  C
 20  C * DISPLAY TABLE OF CONTENTS OF MATERIALS WITH CODE DESIGNATORS
 21  C
 22            WRITE(6,300)
 23            JEND=0
 24  C
 25  C-----------------------------------------------------------------
 26  C
 27  C * READ REQUESTED MATERIAL CODE AND CHECK THAT ENTRY IS CORRECT
 28  C
 29    2       READ(5,400),W
 30            DO 3 J=1,7
 31            IF(W.NE.WA(J)) GO TO 3
 32            JEND=1
 33            NJ=J
 34            GO TO 4
 35    3       CONTINUE
 36            WRITE(6,500),W
 37            READ(5,401),ANS
 38            IF(ANS.NE.'YES') GO TO 11
 39            WRITE(6,501)
 40            GO TO 2
 41  C
 42  C-----------------------------------------------------------------
 43  C
 44  C * DISPLAY TABLE OF ALLOYS AVAILABLE FOR REQUESTED MATERIAL
 45  C * READ REQESTED ALLOY CODE
 46  C
 47    4       IF(NJ.EQ.1) WRITE(6,301)
 48            IF(NJ.EQ.2) WRITE(6,302)
 49            IF(NJ.EQ.3) WRITE(6,303)
 50            IF(NJ.EQ.4) WRITE(6,304)
 51            IF(NJ.EQ.5) WRITE(6,305)
 52            IF(NJ.EQ.6) WRITE(6,306)
```

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53          IF(NJ.EQ.7) WRITE(6,307)
54    5     WRITE(6,308)
55          READ(5,400),X
56 C
57 C------------------------------------------------------------------------
58 C
59 C * CHECK THAT ENTRY FOR ALLOY IS CORRECT AND THAT DATA ARE AVAILABLE
60 C
61          DO 6 L=1,19
62          IF(X.NE.XA(L)) GO TO 6
63          JEND=1
64          NL=L
65          GO TO 7
66    6     CONTINUE
67          WRITE(6,502),X
68          READ(5,401),ANS
69          IF(ANS.EQ.'YES') GO TO 5
70          GO TO 11
71    7     READ(10'NJ,402),(LOC(L),L=1,19)
72          NI=LOC(NL)
73          IF(NI.NE.0) GO TO 10
74 C
75 C------------------------------------------------------------------------
76 C
77 C * OPTIONS: MAKE CORRECTIONS OR TERMINATE THE RUN
78 C
79          WRITE(6,503),X
80          READ(5,401),ANS
81          IF(ANS.EQ.'ALL') GO TO 8
82          IF(ANS.EQ.'BOT') GO TO 9
83          JEND=0
84          GO TO 11
85    8     JEND=0
86          GO TO 5
87    9     WRITE(6,501)
88          GO TO 2
89 C
90 C------------------------------------------------------------------------
91 C
92 C * WRITE TOTAL NUMBER OF ENTRIES IN DATA BANK FOR CHOSEN MATERIAL/ALLOY
93 C * THESE TOTALS STORED IN LOCATER FILE AT N=J+30
94 C
95   10     N=NJ+30
96          READ(10'N,402),(LOC(L),L=1,19)
97          NUM=LOC(NL)
98          WRITE(6,309),W,X,NUM
99   11     RETURN
100 C
101 C------------------------------------------------------------------------
102 C
103 C * WRITE FORMAT STATEMENTS
104 C
105  300    FORMAT(T2,1X,'MATERIAL AND ALLOY ENTRIES MUST BE CODED',//,T2,
106         1'CODE TABLE FOR MATERIALS IN DATA BANK',//,T2,
107         22('MATERIAL   CODE',4X),/,T2,2(14('-'),4X),
108         3/,T2,'STEEL        ST',5X,'TUNGSTEN   WF',
109         4/,T2,'TITANIUM    TI',5X,'ALUMINUM   AL',
110         5/,T2,'URANIUM     UR',5X,'MAGNESIUM  MG',
111         6/,T2,'COPPER      CU',
112         7//,T2,'ENTER MATERIAL CODE NOW')
113  301    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR STEEL',//,T2,
114         12('ALLOY NAME     CODE',6X),/,T2,2(18('-'),6X),/,T2,
115         2'ARMOR UNSPEC',3X,'ZZ',7X,'RARE EARTH',5X,'1B',/,T2,'4340 UNSPEC',
116         34X,'1A',7X,'ARMCO',10X,'2B',/,T2,'MARAGE-250',5X,'2A',7X,'HI ',
117         4'NICKEL',6X,'3B',/,T2,'WC-9 ALLOY',5X,'3A',7X,'1340 UNSPEC',4X
118         5'4B',/,T2,'4140 UNSPEC',4X,'4A',7X,'LOW MANGANESE',2X,'5B',
119         6/,T2,'GILD METAL',5X,'5A',7X,'HF-1 ALLOY',5X,'6B',
120         7/,T2,'4340 ESR',7X,'6A',
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121         8/,T2,'3% NICKEL',6X,'7A',
122         9/,T2,'5% NICKEL',6X,'8A',/,T2,'AF 1410',8X,'9A'/)
123  302    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR TITANIUM',//,T2,
124         1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
125         2'UNSPECIFIED' 4X,'ZZ',/,T2,
126         3'6-6-2 ALLOY',4X,'1A',/,T2,'BASE SECTN',5X,'2A',/)
127  303    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR URANIUM',//,T2,
128         1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
129         2'DEPLETED',7X,'1A',/,T2,'.75-TI ALLOY',3X,'2A',/,T2,
130         3'UNALLOYED',6X,'3A',/)
131  304    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR COPPER',//,T2,
132         1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
133         2'UNSPECIFIED',4X,'ZZ',//,T2,'NO OTHER COPPER DATA AVAILABLE',/)
134  305    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR TUNGSTEN',//,T2,
135         1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
136         2'UNSPECIFIED',4X,'ZZ',/,T2,'PM UNSPEC',6X,'1A',/,T2,'SINTERED',7X,
137         3'2A',/,T2,'W-2 ALLOY',6X,'3A',/)
138  306    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR ALUMINUM',//,T2,
139         1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
140         2'7075-T6',8X,'1A',/,T2,'WHISKER COMP',3X,'2A',/)
141  307    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR MAGNESIUM',//,T2,
142         1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
143         2'AZ-61A',9X,'1A',//,T2,'ONLY DATA FOR MAGNESIUM AVAILABLE',/)
144  308    FORMAT(T2,'ENTER ALLOY CODE NOW')
145  309    FORMAT(/,T2,'TOTAL NUMBER OF DATA SETS FOR MATERIAL ',
146         1A2,'-',A2,' IS',I4,/)
147  C
148  C * READ FORMAT STATEMENTS
149  C
150  400    FORMAT(A2)
151  401    FORMAT(A3)
152  402    FORMAT(2X,19I4)
153  C
154  C * DIAGNOSTIC FORMAT STATEMENTS FOR ERRONEOUS ENTRIES
155  C
156  500    FORMAT(/,T2,'THE MATERIAL CODE ENTERED (',A2,') DOES NOT APPEAR ',
157         1'IN THE CODE TABLE',/,T2,'TO CHANGE YOUR ENTRY TYPE YES',/,T2,
158         2'OTHERWISE TYPE END AND PROGRAM WILL TERMINATE',/)
159  501    FORMAT(T2,'ENTER CORRECTED MATERIAL CODE')
160  502    FORMAT(/,T2,'THE ALLOY CODE ENTERED (',A2,') DOES NOT APPEAR ',
161         1'IN THE CODE TABLE',/,T2,'TO CHANGE YOUR ENTRY TYPE YES',/,T2,
162         2'OTHERWISE TYPE END AND PROGRAM WILL TERMINATE',/)
163  503    FORMAT(T2,'DATA FOR ALLOY CODE (',A2,') ARE NOT YET IN THE DATA',
164         1' BANK',/,T2,'TO CHANGE ALLOY CODE ENTRY ONLY TYPE ALLOY',
165         2/,T2,'TO CHANGE BOTH MATERIAL AND ALLOY ENTRIES TYPE BOTH',/,T2,
166         3'OTHERWISE TYPE END AND PROGRAM WILL TERMINATE',/)
167  C
168         END


  1  C---------------------------------------------------------------
  2            SUBROUTINE CODE(LOC,JEND,NI,W,X)
  3  C---------------------------------------------------------------
  4  C
  5  C * SUBROUTINE DISPLAYS TABLE OF CONTENTS OF DATA FILE AND CODE DESIGNATORS
  6  C  * USED WITH CR-TUBE GRAPHICS TERMINALS
  7  C * USER CHOOSES MATERIAL AND ALLOY FOR DATA RETRIEVAL AND DISPLAY
  8  C * THEN CHOICES ARE CHECKED TO ASSURE THAT THE DATA ARE IN THE FILE
  9  C
 10  C---------------------------------------------------------------
 11  C
 12         DIMENSION WA(7),XA(19),LOC(1)
 13         DATA WA/'ST','TI','UR','CU','WF','AL','MG'/
 14         DATA XA/'ZZ','1A','2A','3A','4A','5A','6A','7A','8A','9A',
 15         1'1B','2B','3B','4B','5B','6B','7B','8B','9B'/
 16         DEFINE FILE 10(50,80,E,JJ)
```

```
17   C
18   C----------------------------------------------------------------
19   C
20   C * DISPLAY TABLE OF CONTENTS OF MATERIALS WITH CODE DESIGNATORS
21   C
22    1     WRITE(6,300)
23          JEND=0
24   C
25   C----------------------------------------------------------------
26   C
27   C * READ REQUESTED MATERIAL CODE AND CHECK THAT ENTRY IS CORRECT
28   C
29    2     READ(5,400),W
30          DO 3 J=1,7
31          IF(W.NE.WA(J)) GO TO 3
32          JEND=1
33          NJ=J
34          GO TO 4
35    3     CONTINUE
36          WRITE(6,500),W
37          READ(5,401),ANS
38          IF(ANS.NE.'YES') GO TO 11
39          WRITE(6,501)
40          GO TO 2
41   C
42   C----------------------------------------------------------------
43   C
44   C * DISPLAY TABLE OF ALLOYS AVAILABLE FOR REQUESTED MATERIAL
45   C * READ REQUESTED ALLOY CODE
46   C
47    4     IF(NJ.EQ.1) WRITE(6,301)
48          IF(NJ.EQ.2) WRITE(6,302)
49          IF(NJ.EQ.3) WRITE(6,303)
50          IF(NJ.EQ.4) WRITE(6,304)
51          IF(NJ.EQ.5) WRITE(6,305)
52          IF(NJ.EQ.6) WRITE(6,306)
53          IF(NJ.EQ.7) WRITE(6,307)
54    5     WRITE(6,308)
55          READ(5,400),X
56   C
57   C----------------------------------------------------------------
58   C
59   C * CHECK THAT ENTRY FOR ALLOY IS CORRECT AND THAT DATA ARE AVAILABLE
60   C
61          DO 6 L=1,19
62          IF(X.NE.XA(L)) GO TO 6
63          JEND=1
64          NL=L
65          GO TO 7
66    6     CONTINUE
67          WRITE(6,502),X
68          READ(5,401),ANS
69          IF(ANS.EQ.'YES') GO TO 5
70          GO TO 11
71    7     READ(10'NJ,402),(LOC(L),L=1,19)
72          NI=LOC(NL)
73          IF(NI.NE.0) GO TO 10
74   C
75   C----------------------------------------------------------------
76   C
77   C * OPTIONS: MAKE CORRECTIONS OR TERMINATE THE RUN
78   C
79          WRITE(6,503),X
80          READ(5,401),ANS
81          IF(ANS.EQ.'ALL') GO TO 8
82          IF(ANS.EQ.'BOT') GO TO 9
83          JEND=0
84          GO TO 11
```

41

```
85     8     JEND=0
86           GO TO 5
87     9     CALL NEWPAG
88           CALL IOWAIT(20)
89           GO TO 1
90   C
91   C---------------------------------------------------------------------------
92   C
93   C * WRITE TOTAL NUMBER OF ENTRIES IN DATA BANK FOR CHOSEN MATERIAL/ALLOY
94   C * THESE TOTALS STORED IN LOCATER FILE AT N=J+30
95   C
96    10     N=NJ+30
97           READ(10'N,402),(LOC(L),L=1,19)
98           NUM=LOC(NL)
99           WRITE(6,309),W,X,NUM
100   11     RETURN
101   C
102   C---------------------------------------------------------------------------
103   C
104   C * WRITE FORMAT STATEMENTS
105   C
106   300    FORMAT(T2,1X,'MATERIAL AND ALLOY ENTRIES MUST BE CODED',//,T2,
107          1'CODE TABLE FOR MATERIALS IN DATA BANK',//,T2,
108          22('MATERIAL   CODE',4X),/,T2,2(14('-'),4X),
109          3/,T2,'STEEL      ST',5X,'TUNGSTEN   WF',
110          4/,T2,'TITANIUM   TI',5X,'ALUMINUM   AL',
111          5/,T2,'URANIUM    UR',5X,'MAGNESIUM  MG',
112          6/,T2,'COPPER     CU',
113          7//,T2,'ENTER MATERIAL CODE NOW')
114   301    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR STEEL',//,T2,
115          12('ALLOY NAME    CODE',6X),/,T2,2(18('-'),6X),/,T2,
116          2'ARMOR UNSPEC',3X,'ZZ',7X,'RARE EARTH',5X,'1B',/,T2,'4340 UNSPEC',
117          34X,'1A',7X,'ARMCO',10X,'2B',/,T2,'MARAGE-250',5X,'2A',7X,'HI ',
118          4'NICKEL',6X,'3B',/,T2,'WC-9 ALLOY',5X,'3A',7X,'1340 UNSPEC',4X
119          5'4B',/,T2,'4140 UNSPEC',4X,'4A',7X,'LOW MANGANESE',2X,'5B',
120          6/,T2,'GILD METAL',5X,'5A',7X,'HF-1 ALLOY',5X,'6B',
121          7/,T2,'4340 ESR',7X,'6A',
122          8/,T2,'3% NICKEL',6X,'7A',
123          9/,T2,'5% NICKEL',6X,'8A',/,T2,'AF 1410',8X,'9A'/)
124   302    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR TITANIUM',//,T2,
125          1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
126          2'UNSPECIFIED',4X,'ZZ',/,T2,
127          3'6-6-2 ALLOY',4X,'1A',/,T2,'BASE SECTN',5X,'2A',/)
128   303    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR URANIUM',//,T2,
129          1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
130          2'DEPLETED',7X,'1A',/,T2,'.75-TI ALLOY',3X,'2A',/,T2,
131          3'UNALLOYED',6X,'3A',/)
132   304    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR COPPER',//,T2,
133          1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
134          2'UNSPECIFIED',4X,'ZZ',//,T2,'NO OTHER COPPER DATA AVAILABLE',/)
135   305    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR TUNGSTEN',//,T2,
136          1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
137          2'UNSPECIFIED',4X,'ZZ',/,T2,'PM UNSPEC',6X,'1A',/,T2,'SINTERED',7X,
138          3'2A',/,T2,'W-2 ALLOY',6X,'3A',/)
139   306    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR ALUMINUM',//,T2,
140          1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
141          2'7075-T6',8X,'1A',/,T2,'WHISKER COMP',3X,'2A',/)
142   307    FORMAT(/,T2,'ALLOYS AND ALLOY CODES FOR MAGNESIUM',//,T2,
143          1'ALLOY NAME    CODE',/T2,18('-'),/,T2,
144          2'AZ-61A',9X,'1A',//,T2,'ONLY DATA FOR MAGNESIUM AVAILABLE',/)
145   308    FORMAT(T2,'ENTER ALLOY CODE NOW')
146   309    FORMAT(/,T2,'TOTAL NUMBER OF DATA SETS FOR MATERIAL ',
147          1A2,'-',A2,' IS',I4,/)
148   C
149   C * READ FORMAT STATEMENTS
150   C
151   400    FORMAT(A2)
152   401    FORMAT(A3)
```

42

```
153  402    FORMAT(2X,19I4)
154  C
155  C * DIAGNOSTIC FORMAT STATEMENTS FOR ERRONEOUS ENTRIES
156  C
157  500    FORMAT(/,T2,'THE MATERIAL CODE ENTERED (',A2,') DOES NOT APPEAR ',
158         1'IN THE CODE TABLE',/,T2,'TO CHANGE YOUR ENTRY TYPE YES',/,T2,
159         2'OTHERWISE TYPE END AND PROGRAM WILL TERMINATE',/)
160  501    FORMAT(T2,'ENTER CORRECTED MATERIAL CODE')
161  502    FORMAT(/,T2,'THE ALLOY CODE ENTERED (',A2,') DOES NOT APPEAR ',
162         1'IN THE CODE TABLE',/,T2,'TO CHANGE YOUR ENTRY TYPE YES',/,T2,
163         2'OTHERWISE TYPE END AND PROGRAM WILL TERMINATE',/)
164  503    FORMAT(T2,'DATA FOR ALLOY CODE (',A2,') ARE NOT YET IN THE DATA',
165         1' BANK',/,T2,'TO CHANGE ALLOY CODE ENTRY ONLY TYPE ALLOY',
166         2/,T2,'TO CHANGE BOTH MATERIAL AND ALLOY ENTRIES TYPE BOTH',/,T2,
167         3'OTHERWISE TYPE END AND PROGRAM WILL TERMINATE',/)
168  C
169         END


  1  C-----------------------------------------------------------------------
  2         SUBROUTINE RANGE(W,X,NI,IDENT,JEND)
  3  C-----------------------------------------------------------------------
  4  C
  5  C * SUBROUTINE FINDS MIN-MAX OF SELECTED PARAMETER FOR ALL STORED DATA
  6  C * FILE 20 IS DATABANK FILE
  7  C
  8         DEFINE FILE 20(9999,80,E,II)
  9         IHOLD=NI
 10   1     NUM=0
 11         GO TO (2,10,20),IDENT
 12  C
 13  C-----------------------------------------------------------------------
 14  C
 15  C * ULTIMATE STRENGTH RANGE
 16  C
 17   2     READ(20'NI,200),SULT,NEXT
 18         NI=NEXT
 19         BIG=SULT
 20         SMA=SULT
 21         NUM=NUM+1
 22         IF(NEXT.EQ.0) GO TO 30
 23   3     READ(20'NI,200),SULT,NEXT
 24         NI=NEXT
 25         IF(SULT.GT.BIG) BIG=SULT
 26         IF(SULT.LT.SMA) SMA=SULT
 27         NUM=NUM+1
 28         IF(NEXT.EQ.0) GO TO 30
 29         GO TO 3
 30  C
 31  C * YIELD STRENGTH RANGE
 32  C
 33   10    READ(20'NI,201),SY,NEXT
 34         NI=NEXT
 35         BIG=SY
 36         SMA=SY
 37         NUM=NUM+1
 38         IF(NEXT.EQ.0) GO TO 30
 39   11    READ(20'NI,201),SY,NEXT
 40         NI=NEXT
 41         IF(SY.GT.BIG) BIG=SY
 42         IF(SY.LT.SMA) SMA=SY
 43         NUM=NUM+1
 44         IF(NEXT.EQ.0) GO TO 30
 45         GO TO 11
 46  C
 47  C * ROCKWELL-C HARDNESS RANGE * CHECK IF HARDNESS DATA ARE AVAILABLE
```

```
48    C
49    20    READ(20'NI,202),RCH,NEXT
50          NI=NEXT
51          IF(RCH.LE.0.AND.NEXT.GT.0) GO TO 20
52          IF(RCH.LE.0.AND.NEXT.EQ.0) GO TO 22
53          BIG=RCH
54          SMA=RCH
55          NUM=NUM+1
56          IF(NEXT.EQ.0) GO TO 30
57    21    READ(20'NI,202),RCH,NEXT
58          NI=NEXT
59          IF(RCH.LE.0.AND.NEXT.GT.0) GO TO 21
60          IF(RCH.LE.0.AND.NEXT.EQ.0) GO TO 30
61          IF(RCH.GT.BIG) BIG=RCH
62          IF(RCH.LT.SMA) SMA=RCH
63          NUM=NUM+1
64          IF(NEXT.EQ.0) GO TO 30
65          GO TO 21
66    C
67    C-----------------------------------------------------------------------
68    C
69    C * CHANGE OF OPTIONS IF NO HARDNESS DATA AVAILABLE
70    C
71    22    WRITE(6,100),W,X
72          IDENT=0
73          READ(5,203),ANS
74          IF(ANS.EQ.'ALL') GO TO 40
75          IF(ANS.EQ.'ULT') IDENT=1
76          IF(ANS.EQ.'YIE') IDENT=2
77          IF(IDENT.GT.0) GO TO 23
78          JEND=0
79          GO TO 40
80    23    NI=IHOLD
81          GO TO 1
82    C
83    C-----------------------------------------------------------------------
84    C
85    C * WRITE RANGE VALUES
86    C
87    30    IF(IDENT.EQ.1) WRITE(6,101),W,X,SMA,BIG,NUM
88          IF(IDENT.EQ.2) WRITE(6,102),W,X,SMA,BIG,NUM
89          IF(IDENT.EQ.3) WRITE(6,103),W,X,SMA,BIG,NUM
90    40    RETURN
91    C
92    C-----------------------------------------------------------------------
93    C
94    100   FORMAT(T2,'** THERE ARE NO HARDNESS DATA AVAILABLE FOR MATERIAL ',
95          1A2,'-',A2,' **',/,T2,'ENTER ANOTHER OPTION FROM THE LIST ABOVE',
96          2/,T2,'OR ENTER END TO TERMINATE RUN',/,T2,'MAKE YOUR ENTRY NOW')
97    101   FORMAT(T2,'RANGE OF ULTIMATE STRENGTH FOR MATL ',A2,'-',A2,
98          1' IS ',F6.1,' TO ',F6.1,' KSI',/,T2,
99          2'THE TOTAL NUMBER OF ENTRIES WITH NON-ZERO DATA IS',I4)
100   102   FORMAT(T2,'RANGE OF YIELD STRENGTH FOR MATL ',A2,'-',A2,
101         1' IS ',F7.2,' TO ',F7.2,' KSI',/,T2,
102         2'THE TOTAL NUMBER OF ENTRIES WITH NON-ZERO DATA IS',I4)
103   103   FORMAT(T2,'RANGE OF ROCKWELL HARDNESS FOR MATL ',A2,'-',A2,
104         1' IS ',F4.1,' TO ',F4.1,/,T2,
105         2'THE TOTAL NUMBER OF ENTRIES WITH NON-ZERO DATA IS',I4)
106   200   FORMAT(30X,F6.1,36X,I4)
107   201   FORMAT(61X,F7.2,4X,I4)
108   202   FORMAT(44X,F4.1,24X,I4)
109   203   FORMAT(A3)
110   C
111         END
```

44

```
 1   C-----------------------------------------------------------------------
 2            SUBROUTINE COUNT(IDENT,NI,XMIN,XMAX)
 3   C-----------------------------------------------------------------------
 4   C
 5   C * COUNTS NUMBER OF DATABANK ENTRIES IN SELECTED MIN-MAX RANGE
 6   C * FILE 20 IS DATABANK FILE
 7   C
 8            DEFINE FILE 20(9999,80,E,II)
 9            NUM=0
10            IHOLD=NI
11            GO TO (1,2,3),IDENT
12   C
13   C-----------------------------------------------------------------------
14   C
15   C * ULTIMATE STRENGTH
16   C
17    1       READ(20'NI,200),SULT,NEXT
18            IF(SULT.GE.XMIN.AND.SULT.LE.XMAX) NUM=NUM+1
19            IF(NEXT.EQ.0) GO TO 4
20            NI=NEXT
21            GO TO 1
22   C
23   C * 0.2%-OFFSET YIELD STRESS
24   C
25    2       READ(20'NI,201),SY,NEXT
26            IF(SY.GE.XMIN.AND.SY.LE.XMAX) NUM=NUM+1
27            IF(NEXT.EQ.0) GO TO 4
28            NI=NEXT
29            GO TO 2
30   C
31   C * ROCKWELL-C HARDNESS
32   C
33    3       READ(20'NI,202),RCH,NEXT
34            IF(RCH.GE.XMIN.AND.RCH.LE.XMAX) NUM=NUM+1
35            IF(NEXT.EQ.0) GO TO 4
36            NI=NEXT
37            GO TO 3
38   C
39   C-----------------------------------------------------------------------
40   C
41   C * WRITE NUMBER OF ENTRIES
42   C
43    4       WRITE(6,100),NUM
44            NI=IHOLD
45            RETURN
46   C
47   C-----------------------------------------------------------------------
48   C
49   100      FORMAT(T2,'THE NUMBER OF ENTRIES WITHIN THE CHOSEN RANGE IS',I4)
50   200      FORMAT(30X,F6.1,36X,I4)
51   201      FORMAT(61X,F7.2,4X,I4)
52   202      FORMAT(44X,F4.1,24X,I4)
53   C
54            END




 1   C-----------------------------------------------------------------------
 2            SUBROUTINE LONG(W,X,NI,IDENT,XMIN,XMAX)
 3   C-----------------------------------------------------------------------
 4   C
 5   C * THIS SUBROUTINE LISTS LONG-FORM DATA ON CRT OF GRAPHICS TERMINAL
 6   C * THERE ARE FOUR OPTIONS FLAGGED BY VALUE OF IDENT
 7   C * IDENT=0: ALL DATA FOR SELECTED MATL/ALLOY
 8   C * IDENT=1: ONLY DATA FOR A USER-SELECTED RANGE OF ULTIMATE STRENGTH
 9   C * IDENT=2: ONLY DATA FOR A USER-SELECTED RANGE OF YIELD STRENGTH
10   C * IDENT=3: ONLY DATA FOR A USER-SELECTED RANGE OF ROCKWELL-C HARDNESS
```

```fortran
11    C
12    C-------------------------------------------------------------------
13    C
14    C * FILE 20 IS DATABANK
15    C
16          DEFINE FILE 20(9999,80,E,II)
17    C
18    C-------------------------------------------------------------------
19    C
20    1     CALL NEWPAG
21          CALL IOWAIT(20)
22          WRITE(6,100),W,X
23          IF(IDENT.EQ.0) GO TO 2
24          IF(IDENT.EQ.1) WRITE(6,101),XMIN,XMAX
25          IF(IDENT.EQ.2) WRITE(6,102),XMIN,XMAX
26          IF(IDENT.EQ.3) WRITE(6,103),XMIN,XMAX
27    2     K=0
28          KI=0
29          WRITE(6,104)
30    3     READ(20'NI,200),SN,BOOK,NPAGE,NTYPE,NDATE,KTEMP,KEDOT,SULT,
31         1ELONG,RA,RCH,EMOD,XN,SY,SEE,NEXT,ISET
32          NI=NEXT
33          IF(NTYPE.NE.1) GO TO 4
34          IF(IDENT.EQ.0) GO TO 5
35          IF(IDENT.EQ.1.AND.SULT.LE.XMAX.AND.SULT.GE.XMIN) GO TO 5
36          IF(IDENT.EQ.2.AND.SY.LE.XMAX.AND.SY.GE.XMIN) GO TO 5
37          IF(IDENT.EQ.3.AND.RCH.LE.XMAX.AND.RCH.GE.XMIN) GO TO 5
38    4     IF(NEXT.EQ.0) GO TO 9
39          GO TO 3
40    5     XP=1./XN
41          SPL=SY*5.E-3**XP
42          SY1=SY*5.E-1**XP
43          WRITE(6,105),ISET,KTEMP,KEDOT,EMOD,XN,SPL,SY1,SY,SULT,SEE,
44         1ELONG,RA,RCH,NDATE,BOOK,NPAGE,SN
45          K=K+1
46          KI=KI+1
47    6     IF(NEXT.EQ.0) GO TO 9
48          IF(K.EQ.56) GO TO 8
49          IF(MOD(KI,5).EQ.0) GO TO 7
50          GO TO 3
51    7     WRITE(6,106)
52          K=K+1
53          GO TO 3
54    8     WRITE(6,107)
55          READ(5,201),ANS
56          GO TO 1
57    9     WRITE(6,108),W,X
58          READ(5,201),ANS
59          RETURN
60    C
61    C-------------------------------------------------------------------
62    C
63    100   FORMAT(T2,'LONG-FORM LIST OF DATA FOR MATL CODE: ',A2,'-',A2)
64    101   FORMAT(T2,'LIST INCLUDES ONLY DATA FOR TESTS WHERE THE ',
65         1'ULTIMATE STRENGTH WAS IN THE RANGE: ',F6.1,' TO ',F6.1,' KSI')
66    102   FORMAT(T2,'LIST INCLUDES ONLY DATA FOR TESTS WHERE THE ',
67         1'YIELD STRENGTH WAS IN THE RANGE: ',F7.2,' TO ',F7.2,' KSI')
68    103   FORMAT(T2,'LIST INCLUDES ONLY DATA FOR TESTS WHERE THE ',
69         1'ROCKWELL-C HARDNESS WAS IN THE RANGE: ',F4.1,' TO ',F4.1,)
70    104   FORMAT(T2,'** MAKE NOTE OF ANY SET NUMBERS TO BE GRAPHED **',//,
71         1T2,' SET   TEMP   LOG MODULUS',4X,'R-O',5X,'P-LIM',2X,
72         2'.1%-YLD',2X,'.2%-YLD',4X,'UTS',4X,'SEE',2X,'ELNG',3X,'R-A',2X,
73         3'ROCK   TEST',4X,'NTBK-',4X,'SPEC',/,T2,' NO   DEG-C  EDOT  '
74         4'M-PSI',4X,'EXPNT',2X,3(3X,'KSI',3X),1X,2(1X,'KSI',3X),'PCT',
75         53X,'PCT',2X,'C-HD',3X,'DATE',4X,'PAGE',6X,'NO',/)
76    105   FORMAT(T2,I4,2X,I5,3X,I2,3X,F6.2,2X,4(F7.2,2X),F6.1,2X,
77         14(F4.1,2X),I6,2X,A4,'-',I2,2X,A6)
78    106   FORMAT(1H )
```

46

```
79  107    FORMAT(/,T2,'**THERE ARE MORE DATA FOR THIS ALLOY IN THE FILE',
80         11X,' * MAKE NOTES NOW AND TO CONTINUE KEY RETURN')
81  108    FORMAT(/,T2,'**LISTING IS COMPLETE FOR MATL ',A2,'-',A2,
82         11X,' * MAKE NOTES NOW AND TO CONTINUE KEY RETURN')
83  C
84  C--------------------------------------------------------------------
85  C
86  200    FORMAT(A6,4X,A4,I2,I1,I6,I5,I2,F6.1,3F4.1,F6.2,2F7.2,F4.1,2I4)
87  201    FORMAT(A3)
88  C
89         END




1   C--------------------------------------------------------------------
2          SUBROUTINE LPRT(W,X,NI,IDENT,XMIN,XMAX)
3   C--------------------------------------------------------------------
4   C
5   C * THIS SUBROUTINE LISTS LONG-FORM DATA ON TELETYPE TERMINAL
6   C * THERE ARE FOUR OPTIONS FLAGGED BY VALUE OF IDENT
7   C * IDENT=0: ALL DATA FOR SELECTED MATL/ALLOY
8   C * IDENT=1: ONLY DATA FOR A USER-SELECTED RANGE OF ULTIMATE STRENGTH
9   C * IDENT=2: ONLY DATA FOR A USER-SELECTED RANGE OF YIELD STRENGTH
10  C * IDENT=3: ONLY DATA FOR A USER-SELECTED RANGE OF ROCKWELL-C HARDNESS
11  C
12  C--------------------------------------------------------------------
13  C
14  C * FILE 20 IS DATABANK
15  C
16         DEFINE FILE 20(9999,80,E,II)
17  C
18  C--------------------------------------------------------------------
19  C
20         WRITE(6,100),W,X
21         IF(IDENT.EQ.0) GO TO 2
22         IF(IDENT.EQ.1) WRITE(6,101),XMIN,XMAX
23         IF(IDENT.EQ.2) WRITE(6,102),XMIN,XMAX
24         IF(IDENT.EQ.3) WRITE(6,103),XMIN,XMAX
25  2      KI=0
26         WRITE(6,104)
27  3      READ(20'NI,200),SN,BOOK,NPAGE,NTYPE,NDATE,KTEMP,KEDOT,SULT,
28         1ELONG,RA,RCH,EMOD,XN,SY,SEE,NEXT,ISET
29         NI=NEXT
30         IF(NTYPE.NE.1) GO TO 4
31         IF(IDENT.EQ.0) GO TO 5
32         IF(IDENT.EQ.1.AND.SULT.LE.XMAX.AND.SULT.GE.XMIN) GO TO 5
33         IF(IDENT.EQ.2.AND.SY.LE.XMAX.AND.SY.GE.XMIN) GO TO 5
34         IF(IDENT.EQ.3.AND.RCH.LE.XMAX.AND.RCH.GE.XMIN) GO TO 5
35  4      IF(NEXT.EQ.0) GO TO 7
36         GO TO 3
37  5      XP=1./XN
38         SPL=SY*5.E-3**XP
39         SY1=SY*5.E-1**XP
40         WRITE(6,105),ISET,KTEMP,KEDOT,EMOD,XN,SPL,SY1,SY,SULT,SEE,
41         1ELONG,RA,RCH,NDATE,BOOK,NPAGE,SN
42         KI=KI+1
43  6      IF(NEXT.EQ.0) GO TO 7
44         IF(MOD(KI,5).EQ.0) WRITE(6,106)
45         GO TO 3
46  7      WRITE(6,107),W,X
47         READ(5,201),ANS
48         RETURN
49  C
50  C--------------------------------------------------------------------
51  C
52  100    FORMAT(//,T2,'LONG-FORM LIST OF DATA FOR MATL CODE: ',A2,'-',A2)
53  101    FORMAT(T2,'LIST INCLUDES ONLY DATA FOR TESTS WHERE THE ',
```

```
54        1'ULTIMATE STRENGTH WAS IN THE RANGE: ',F6.1,' TO ',F6.1,' KSI')
55   102    FORMAT(T2,'LIST INCLUDES ONLY DATA FOR TESTS WHERE THE ',
56        1'YIELD STRENGTH WAS IN THE RANGE: ',F7.2,' TO ',F7.2,' KSI')
57   103    FORMAT(T2,'LIST INCLUDES ONLY DATA FOR TESTS WHERE THE ',
58        1'ROCKWELL-C HARDNESS WAS IN THE RANGE: ',F4.1,' TO ',F4.1,)
59   104    FORMAT(/,T2,112('-'),/,
60        1T2,' SET   TEMP    LOG   MODULUS',4X,'R-O',5X,'P-LIM',2X,
61        2'.1%-YLD',2X,'.2%-YLD',4X,'UTS',4X,'SEE',2X,'ELNG',3X,'R-A',2X,
62        3'ROCK   TEST',4X,'NTBK-',4X,'SPEC',/,T2,' NO   DEG-C EDOT  '
63        4'M-PSI',4X,'EXPNT',2X,3(3X,'KSI',3X),1X,2(1X,'KSI',3X),'PCT',
64        53X,'PCT',2X,'C-HD',3X,'DATE',4X,'PAGE',6X,'NO',/)
65   105    FORMAT(T2,I4,2X,I5,3X,I2,3X,F6.2,2X,4(F7.2,2X),F6.1,2X,
66        14(F4.1,2X),I6,2X,A4,'-',I2,2X,A6)
67   106    FORMAT(1H )
68   107    FORMAT(/,T2,'**LISTING IS COMPLETE FOR MATL ',A2,'-',A2,
69        11X,' * TO CONTINUE THE PROGRAM KEY RETURN')
70   C
71   C------------------------------------------------------------------------
72   C
73   200    FORMAT(A6,4X,A4,I2,I1,I6,I5,I2,F6.1,3F4.1,F6.2,2F7.2,F4.1,2I4)
74   201    FORMAT(A3)
75   C
76        END




 1   C------------------------------------------------------------------------
 2         SUBROUTINE SHORT(W,X,NI,IDENT,XMIN,XMAX)
 3   C------------------  -----------------------------------------------------
 4   C
 5   C * THIS SUBROUTINE LISTS SHORT-FORM DATA ON CRT OF GRAPHICS TERMINAL
 6   C * THERE ARE FOUR OPTIONS FLAGGED BY VALUE OF IDENT
 7   C * IDENT=0: ALL DATA FOR SELECTED MATL/ALLOY
 8   C * IDENT=1: ONLY DATA FOR A USER-SELECTED RANGE OF ULTIMATE STRENGTH
 9   C * IDENT=2: ONLY DATA FOR A USER-SELECTED RANGE OF YIELD STRENGTH
10   C * IDENT=3: ONLY DATA FOR A USER-SELECTED RANGE OF ROCKWELL-C HARDNESS
11   C
12   C------------------------------------------------------------------------
13   C
14         DIMENSION RAC(2),XPC(2),UTC(2),ELC(2),HDC(2),EMC(2),SYC(2),
15        1ISC(2),KTP(2)
16   C
17   C------------------------------------------------------------------------
18   C
19   C * FILE 20 IS DATABANK
20   C
21         DEFINE FILE 20(9999,80,E,II)
22   C
23   C------------------------------------------------------------------------
24   C
25   1     CALL NEWPAG
26         CALL IOWAIT(20)
27         WRITE(6,100),W,X
28         IF(IDENT.EQ.0) GO TO 2
29         IF(IDENT.EQ.1) WRITE(6,101),XMIN,XMAX
30         IF(IDENT.EQ.2) WRITE(6,102),XMIN,XMAX
31         IF(IDENT.EQ.3) WRITE(6,103),XMIN,XMAX
32   2     WRITE(6,104)
33         K=0
34         KI=0
35   3     IX=0
36   4     IX=IX+1
37   5     READ(20'NI,200),NTYPE,KTP(IX),UTC(IX),ELC(IX),RAC(IX),
38        1HDC(IX),EMC(IX),XPC(IX),SYC(IX),NEXT,ISC(IX)
39         NI=NEXT
40         IF(NTYPE.NE.1) GO TO 6
41         IF(IDENT.EQ.0.AND.IX.EQ.2) GO TO 8
```

```
42          IF(IDENT.EQ.0.AND.NEXT.EQ.0) GO TO 8
43          IF(IDENT.EQ.0) GO TO 4
44          IF(IDENT.EQ.1.AND.UTC(IX).LE.XMAX.AND.UTC(IX).GE.XMIN) GO TO 7
45          IF(IDENT.EQ.2.AND.SYC(IX).LE.XMAX.AND.SYC(IX).GE.XMIN) GO TO 7
46          IF(IDENT.EQ.3.AND.HDC(IX).LE.XMAX.AND.HDC(IX).GE.XMIN) GO TO 7
47    6     IF(IX.EQ.1.AND.NEXT.NE.0) GO TO 3
48          IF(IX.EQ.2.AND.NEXT.NE.0) GO TO 5
49          IF(IX.EQ.1) GO TO 11
50          IX=1
51          GO TO 8
52    7     IF(IX.EQ.2) GO TO 8
53          IF(IX.EQ.1.AND.NEXT.EQ.0) GO TO 8
54          GO TO 4
55    8     IF(IX.EQ.2) WRITE(6,105),(ISC(IX),KTP(IX),EMC(IX),
56         1SYC(IX),UTC(IX),XPC(IX),ELC(IX),RAC(IX),HDC(IX),IX=1,2)
57          IF(IX.EQ.1) WRITE(6,106),ISC(IX),KTP(IX),EMC(IX),
58         1SYC(IX),UTC(IX),XPC(IX),ELC(IX),RAC(IX),HDC(IX)
59          K=K+1
60          KI=KI+1
61          IF(NEXT.EQ.0) GO TO 11
62          IF(K.EQ.56) GO TO 10
63          IF(MOD(KI,5).EQ.0) GO TO 9
64          GO TO 3
65    9     WRITE(6,107)
66          K=K+1
67          GO TO 3
68    10    WRITE(6,108)
69          READ(5,201),ANS
70          GO TO 1
71    11    WRITE(6,109),W,X
72          READ(5,201),ANS
73          RETURN
74    C
75    C-------------------------------------------------------------------
76    C
77    100   FORMAT(T2,1X,'LISTING OF SHORT-FORM TEST DATA FOR MATL/ALLOY ',
78         1A2,'-',A2)
79    101   FORMAT(T2,'LIST INCLUDES DATA FOR TESTS WHERE THE ',
80         1'ULTIMATE STRENGTH WAS IN THE RANGE: ',F6.1,' TO ',F6.1,' KSI')
81    102   FORMAT(T2,'LIST INCLUDES DATA FOR TESTS WHERE THE ',
82         1'YIELD STRENGTH WAS IN THE RANGE: ',F7.2,' TO ',F7.2,' KSI')
83    103   FORMAT(T2,'LIST INCLUDES DATA FOR TESTS WHERE THE ',
84         1'ROCKWELL-C HARDNESS WAS IN THE RANGE: ',F4.1,' TO ',F4.1)
85    104   FORMAT(T2,'* MAKE NOTE OF ANY SET NUMBERS TO BE GRAPHED',//,
86         1T2,2(1X,'SET  TEMP   EMOD    .2%-SY',5X,'UTS',5X,'R-O   ELNG',
87         2'  R-A  R-C',3X),/,T2,2(1X,'NO  DEG-C  M-PSI',2X,2(3X,'KSI',
88         33X),1X,'EXPNT',3X,2('PCT',3X),'HRD',3X),/)
89    105   FORMAT(T2,2(I4,1X,I5,2X,F6.2,2X,F7.2,2X,F6.1,2X,F7.2,2X,
90         13(F4.1,2X),1X))
91    106   FORMAT(T2,I4,1X,I5,2X,F6.2,2X,F7.2,2X,F6.1,2X,F7.2,2X,
92         13(F4.1,2X))
93    107   FORMAT(1H )
94    108   FORMAT(/,T2,'**THERE ARE MORE DATA FOR THIS ALLOY IN THE FILE',
95         11X,' * MAKE NOTES NOW AND TO CONTINUE KEY RETURN')
96    109   FORMAT(/,T2,'**LISTING IS COMPLETE FOR MATL ',A2,'-',A2,
97         11X,' * MAKE NOTES NOW AND TO CONTINUE KEY RETURN')
98    C
99    C-------------------------------------------------------------------
100   C
101   200   FORMAT(16X,I1,6X,I5,2X,F6.1,3F4.1,F6.2,2F7.2,4X,
102        12I4)
103   201   FORMAT(A3)
104   C
105         END
```

```
1    C------------------------------------------------------------------------------
2          SUBROUTINE SPRT(W,X,NI,IDENT,XMIN,XMAX)
3    C------------------------------------------------------------------------------
4    C
5    C * THIS SUBROUTINE LISTS SHORT-FORM DATA ON TELETYPE TERMINAL
6    C * THERE ARE FOUR OPTIONS FLAGGED BY VALUE OF IDENT
7    C * IDENT=0: ALL DATA FOR SELECTED MATL/ALLOY
8    C * IDENT=1: ONLY DATA FOR A USER-SELECTED RANGE OF ULTIMATE STRENGTH
9    C * IDENT=2: ONLY DATA FOR A USER-SELECTED RANGE OF YIELD STRENGTH
10   C * IDENT=3: ONLY DATA FOR A USER-SELECTED RANGE OF ROCKWELL-C HARDNESS
11   C
12   C------------------------------------------------------------------------------
13   C
14         DIMENSION RAC(2),XPC(2),UTC(2),ELC(2),HDC(2),EMC(2),SYC(2),
15        1ISC(2),KTP(2)
16   C
17   C------------------------------------------------------------------------------
18   C
19   C * FILE 20 IS DATABANK
20   C
21         DEFINE FILE 20(9999,80,E,II)
22   C
23   C------------------------------------------------------------------------------
24   C
25   1     WRITE(6,100),W,X
26         IF(IDENT.EQ.0) GO TO 2
27         IF(IDENT.EQ.1) WRITE(6,101),XMIN,XMAX
28         IF(IDENT.EQ.2) WRITE(6,102),XMIN,XMAX
29         IF(IDENT.EQ.3) WRITE(6,103),XMIN,XMAX
30   2     WRITE(6,104)
31         KI=0
32   3     IX=0
33   4     IX=IX+1
34   5     READ(20'NI,200),NTYPE,KTP(IX),UTC(IX),ELC(IX),
35        1RAC(IX),HDC(IX),EMC(IX),XPC(IX),SYC(IX),NEXT,ISC(IX)
36         NI=NEXT
37         IF(NTYPE.NE.1) GO TO 6
38         IF(IDENT.EQ.0.AND.IX.EQ.2) GO TO 8
39         IF(IDENT.EQ.0.AND.NEXT.EQ.0) GO TO 8
40         IF(IDENT.EQ.0) GO TO 4
41         IF(IDENT.EQ.1.AND.UTC(IX).LE.XMAX.AND.UTC(IX).GE.XMIN) GO TO 7
42         IF(IDENT.EQ.2.AND.SYC(IX).LE.XMAX.AND.SYC(IX).GE.XMIN) GO TO 7
43         IF(IDENT.EQ.3.AND.HDC(IX).LE.XMAX.AND.HDC(IX).GE.XMIN) GO TO 7
44   6     IF(IX.EQ.1.AND.NEXT.NE.0) GO TO 3
45         IF(IX.EQ.2.AND.NEXT.NE.0) GO TO 5
46         IF(IX.EQ.1) GO TO 9
47         IX=1
48         GO TO 8
49   7     IF(IX.EQ.2) GO TO 8
50         IF(IX.EQ.1.AND.NEXT.EQ.0) GO TO 8
51         GO TO 4
52   8     IF(IX.EQ.2) WRITE(6,105),(ISC(IX),KTP(IX),EMC(IX),
53        1SYC(IX),UTC(IX),XPC(IX),ELC(IX),RAC(IX),HDC(IX),IX=1,2)
54         IF(IX.EQ.1) WRITE(6,106),ISC(IX),KTP(IX),EMC(IX),
55        1SYC(IX),UTC(IX),XPC(IX),ELC(IX),RAC(IX),HDC(IX)
56         KI=KI+1
57         IF(NEXT.EQ.0) GO TO 9
58         IF(MOD(KI,5).EQ.0) WRITE(6,107)
59         GO TO 3
60   9     WRITE(6,108),W,X
61         READ(5,201),ANS
62         RETURN
63   C
64   C------------------------------------------------------------------------------
65   C
66   100   FORMAT(T2,1X,'LISTING OF SHORT-FORM TEST DATA FOR MATL/ALLOY ',
67        1A2,'-',A2)
68   101   FORMAT(T2,'LIST INCLUDES DATA FOR TESTS WHERE THE ',
```

50

```
69        1'ULTIMATE STRENGTH WAS IN THE RANGE: ',F6.1,' TO ',F6.1,' KSI')
70   102  FORMAT(T2,'LIST INCLUDES DATA FOR TESTS WHERE THE ',
71        1'YIELD STRENGTH WAS IN THE RANGE: ',F7.2,' TO ',F7.2,' KSI')
72   103  FORMAT(T2,'LIST INCLUDES DATA FOR TESTS WHERE THE ',
73        1'ROCKWELL-C HARDNESS WAS IN THE RANGE: ',F4.1,' TO ',F4.1)
74   104  FORMAT(/,T2,62('-'),3X,62('-'),/,
75        1T2,2(1X,'SET   TEMP   EMOD    .2%-SY',5X,'UTS',5X,'R-O   ELNG',
76        2'   R-A   R-C',3X),/,T2,2(1X,'NO  DEG-C   M-PSI',2X,2(3X,'KSI',
77        33X),1X,'EXPNT',3X,2('PCT',3X),'HRD',3X),/)
78   105  FORMAT(T2,2(I4,1X,I5,2X,F6.2,2X,F7.2,2X,F6.1,2X,F7.2,2X,
79        13(F4.1,2X),1X))
80   106  FORMAT(T2,I4,1X,I5,2X,F6.2,2X,F7.2,2X,F6.1,2X,F7.2,2X,
81        13(F4.1,2X))
82   107  FORMAT(1H )
83   108  FORMAT(/,T2,'**LISTING IS COMPLETE FOR MATL ',A2,'-',A2,
84        11X' * TO CONTINUE THE PROGRAM KEY RETURN')
85   C
86   C------------------------------------------------------------------------
87   C
88   200  FORMAT(16X,I1,6X,I5,2X,F6.1,3F4.1,F6.2,2F7.2,4X,
89        12I4)
90   201  FORMAT(A3)
91   C
92        END




 1   C------------------------------------------------------------------------
 2          SUBROUTINE PORPRT(W,X,NI,IDENT,XMIN,XMAX)
 3   C------------------------------------------------------------------------
 4   C
 5   C * THIS SUBROUTINE LISTS EXPANDED SHORT-FORM DATA ON PORTABLE TERMINAL
 6   C * THERE ARE FOUR OPTIONS FLAGGED BY VALUE OF IDENT
 7   C * IDENT=0: ALL DATA FOR SELECTED MATL/ALLOY
 8   C * IDENT=1: ONLY DATA FOR A USER-SELECTED RANGE OF ULTIMATE STRENGTH
 9   C * IDENT=2: ONLY DATA FOR A USER-SELECTED RANGE OF YIELD STRENGTH
10   C * IDENT=3: ONLY DATA FOR A USER-SELECTED RANGE OF ROCKWELL-C HARDNESS
11   C
12   C------------------------------------------------------------------------
13   C
14   C * FILE 20 IS DATABANK
15   C
16          DEFINE FILE 20(9999,80,E,II)
17   C
18   C------------------------------------------------------------------------
19   C
20          WRITE(6,100),W,X
21          IF(IDENT.EQ.0) GO TO 2
22          IF(IDENT.EQ.1) WRITE(6,101),XMIN,XMAX
23          IF(IDENT.EQ.2) WRITE(6,102),XMIN,XMAX
24          IF(IDENT.EQ.3) WRITE(6,103),XMIN,XMAX
25   2      KI=0
26          WRITE(6,104)
27   3      READ(20'NI,200),NTYPE,KTEMP,KEDOT,SULT,
28        1ELONG,RA,RCH,EMOD,XN,SY,NEXT,ISET
29          NI=NEXT
30          IF(NTYPE.NE.1) GO TO 4
31          IF(IDENT.EQ.0) GO TO 5
32          IF(IDENT.EQ.1.AND.SULT.LE.XMAX.AND.SULT.GE.XMIN) GO TO 5
33          IF(IDENT.EQ.2.AND.SY.LE.XMAX.AND.SY.GE.XMIN) GO TO 5
34          IF(IDENT.EQ.3.AND.RCH.LE.XMAX.AND.RCH.GE.XMIN) GO TO 5
35   4      IF(NEXT.EQ.0) GO TO 6
36          GO TO 3
37   5      XP=1./XN
38          SPL=SY*5.E-3**XP
39          SY1=SY*.5**XP
40          WRITE(6,105),ISET,KTEMP,KEDOT,EMOD,XN,SPL,SY1,SY,SULT,ELONG,
```

51

```
41        1RA,RCH
42        KI=KI+1
43        IF(NEXT.EQ.0) GO TO 6
44        IF(MOD(KI,5).EQ.0) WRITE(6,106)
45        GO TO 3
46   6    WRITE(6,107),W,X
47        READ(5,201),ANS
48        RETURN
49   C
50   C----------------------------------------------------------------------
51   C
52   100  FORMAT(//,T2,75('-'),//,T2,'EXPANDED SHORT-FORM',
53        1' LIST OF DATA FOR MATL CODE: ',A2,'-',A2,/,T2,
54        2'(FOR A FULL LONG-FORM LIST USE TELETYPE OR CRT TERMINAL)',/)
55   101  FORMAT(T2,'LIST INCLUDES ONLY TESTS WITH ',
56        1'ULTIMATE FROM ',F6.1,' TO ',F6.1,' KSI',/)
57   102  FORMAT(T2,'LIST INCLUDES ONLY TESTS WITH ',
58        1'YIELD FROM ',F7.2,' TO ',F7.2,' KSI',/)
59   103  FORMAT(T2,'LIST INCLUDES ONLY TESTS WITH ',
60        1'R-C HARDNESS FROM ',F4.1,' TO ',F4.1,/)
61   104  FORMAT(T3,
62        1'SET TEMP   LOG   EMOD',5X,'R-O',4X,'P-LIM .1%-YLD .2%-YLD',
63        23X,'UTS  ELNG  R-A ROCK',/,T4,'NO DG-C EDOT  M-PSI   EXPNT',
64        33(4X,'KSI',1X),3X,'KSI',1X,2(2X,'PCT'),1X,'C-HD',/)
65   105  FORMAT(T2,I4,I5,2X,I2,2X,F6.2,4(1X,F7.2),1X,F6.1,
66        13(1X,F4.1))
67   106  FORMAT(1H )
68   107  FORMAT(/,T2,75('-'),//,
69        1T2,'**LISTING IS COMPLETE FOR MATL ',A2,'-',A2,
70        2/,T2,'TO CONTINUE THE PROGRAM KEY RETURN')
71   C
72   C----------------------------------------------------------------------
73   C
74   200  FORMAT(16X,I1,6X,I5,I2,F6.1,3F4.1,F6.2,2F7.2,4X,2I4)
75   201  FORMAT(A3)
76   C
77        END



 1   C----------------------------------------------------------------------
 2        SUBROUTINE SYSIZE(IANS,ISET1,ISET2,ISET3)
 3   C----------------------------------------------------------------------
 4   C
 5   C * FINDS SET WITH MAXIMUM SY AND ASSIGNS ISET1 TO THAT SET
 6   C * ISET1 IS KEY SET TO ESTABLISH GRAPH SIZE FOR S-E CURVE PLOT
 7   C * PROCEDURE ASSURES THAT ALL POINTS OF ALL CURVES WILL BE ON GRAPH
 8   C
 9   C----------------------------------------------------------------------
10   C
11   C * FILE 20 IS DATABANK FILE
12   C
13        DEFINE FILE 20(9999,80,E,II)
14   C
15   C----------------------------------------------------------------------
16   C
17        IF(IANS.GT.1.AND.ISET2.EQ.0) IANS=1
18        IF(IANS.EQ.1) RETURN
19        IF(IANS.EQ.3.AND.ISET3.EQ.0) IANS=2
20        IF(IANS.EQ.2) GO TO 2
21        READ(20'ISET1,200),SY1
22        READ(20'ISET2,200),SY2
23        READ(20'ISET3,200),SY3
24        IF(SY1.GE.SY2.AND.SY1.GE.SY3) RETURN
25        IF(SY2.GE.SY3) GO TO 1
26        IHOLD1=ISET3
27        IHOLD2=ISET1
```

```
28          ISET1=IHOLD1
29          ISET3=IHOLD2
30          RETURN
31    1     IHOLD1=ISET2
32          IHOLD2=ISET1
33          ISET1=IHOLD1
34          ISET2=IHOLD2
35          RETURN
36    2     READ(20'ISET1,200),SY1
37          READ(20'ISET2,200),SY2
38          IF(SY1.GE.SY2) RETURN
39          GO TO 1
40   C
41   C--------------------------------------------------------------------
42   C
43   200    FORMAT(61X,F7.4)
44   C
45          END




 1   C--------------------------------------------------------------------
 2          SUBROUTINE CALC(NC,EMOD,XN,SY,S,E,EP,SS,EE,EMAX,NP)
 3   C--------------------------------------------------------------------
 4   C
 5   C * SUBROUTINE CALCULATES STRESS-STRAIN DATA FROM WHICH CURVE IS PLOTTED
 6   C * PLASTIC STRAIN TERM OF R-O EQUATION USED: EP=.002*(S/SY)**XN
 7   C * EQUATION SOLVED FOR S FOR GIVEN INCREMENTED VALUES OF EP
 8   C * LAST POINT CALCULATED IS VALUE OF S FOR EP=0.006 IN/IN
 9   C * PROPORTL LIMIT & 0.1% YIELD STRESS-STRAIN & 0.2% YIELD STRAIN CALCULATED
10   C
11   C--------------------------------------------------------------------
12   C
13          DIMENSION S(1),E(1),EP(1),SS(1),EE(1)
14          EMOD=EMOD*1.E3
15          XP=1./XN
16          S(2)=SY*5.E-3**XP
17          E(2)=S(2)/EMOD
18          SS(1)=S(2)
19          EE(1)=E(2)
20          SS(2)=SY*5.E-1**XP
21          EE(2)=1.E-3+SS(2)/EMOD
22          SS(3)=SY
23          EE(3)=2.E-3+SY/EMOD
24          DO 1 I=3,NC
25          S(I)=SY*(EP(I)/2.E-3)**XP
26          E(I)=EP(I)+S(I)/EMOD
27          IF(E(I).LT.EMAX) GO TO 1
28          GO TO 2
29    1     CONTINUE
30          NP=NC
31          RETURN
32    2     NP=I
33          RETURN
34   C
35          END
```

```
1   @ASG,A R*LOCATER.
2   @USE 10,R*LOCATER
3   @ASG,A R*DATABANK.
4   @USE 20,R*DATABANK
5   @XQT R*RETRIEVE.TYP


1   @ASG,A R*LOCATER.
2   @USE 10,R*LOCATER
3   @ASG,A R*DATABANK.
4   @USE 20,R*DATABANK
5   @XQT R*RETRIEVE.CRT


1   @PREP R*RETRIEVE.
2   @MAP,I LISS,R*RETRIEVE.TYP
3   IN R*RETRIEVE.PMAIN
4   LIB R*RETRIEVE.
5   END


1   @PREP R*RETRIEVE.
2   @MAP,I CIS,R*RETRIEVE.CRT
3   IN R*RETRIEVE.TMAIN
4   IN R*RETRIEVE.BUFFPK
5   LIB R*RETRIEVE.
6   LIB DAO*TEX.
7   END
```

# LISTING OF R*FIXBANK

The FIXBANK file consists of two main program elements and four control elements as follows:

| Element | Function |
|---------|----------|
| MAIN1 | Print tabular listing of the DATABANK and LOCATER file contents |
| MAIN2 | Add data to DATABANK file, update LOCATER file, and print updated contents of both data files |
| START1 | Control routine to assign DATABANK and LOCATER files and to execute MAIN1 |
| START2 | Control routine same as START1 except executes MAIN2 |
| MAP1 | Control routine used when MAIN1 is revised to PREP the file, to form the absolute (name: PRINT), to PACK the file, and to print a list of file elements |
| MAP2 | Same function as MAP1, but for MAIN2 (absolute name: UPDATE). |

Each FIXBANK program is a batch-process execution from a UNIVAC 9300 hard-copy terminal. The input to MAIN2 consists of the two decks of output cards punched by the EVALRO program (see Reference 1).

Listings of the two main programs are given on pages 56-59. The four control elements are listed, in the order given above, on page 60.

## ACKNOWLEDGMENTS

```
1    C---------------------------------------------------------------------
2    C * FILE R*FIXBANK IS FOR MANAGEMENT OF R*LOCATER AND R*DATABANK FILES
3    C * THIS IS ELEMENT MAIN1 (ABSOLUTE: PRINT)
4    C---------------------------------------------------------------------
5    C
6    C * MAIN1 PRINTS CONTENTS OF R*LOCATER AND R*DATABANK ON 9300 TERMINAL
7    C
8    C---------------------------------------------------------------------
9    C
10         DIMENSION LOC(19)
11   C
12   C---------------------------------------------------------------------
13   C
14   C * FILE 10 IS THE LOCATER FILE
15   C * FILE 20 IS THE DATABANK FILE
16   C
17         DEFINE FILE 10(50,80,E,JJ)
18         DEFINE FILE 20(9999,80,E,II)
19   C
20   C
21   C---------------------------------------------------------------------
22   C
23   C * IDENTIFY SET NUMBER OF LAST DATA BANK ENTRY (LAST SET=NI)
24   C * LAST SET NUMBER IS UPPER LIMIT OF DATA BANK PRINT-OUT DO-LOOP
25   C
26   C * SECTION 1 OF LOCATER FILE PRINTED
27   C
28         NI=0
29         PRINT 203
30         DO 20 J=1,7
31         READ(10'J,102),(LOC(L),L=1,19)
32         PRINT 204,J,W,(LOC(L),L=1,19)
33         DO 10 L=1,19
34         IF(LOC(L).LE.NI) GO TO 10
35         NI=LOC(L)
36   10    CONTINUE
37   20    CONTINUE
38   C
39   C---------------------------------------------------------------------
40   C
41   C * CONTENT OF SECTION 2 OF LOCATER NOW PRINTED
42   C
43         PRINT 205
44         DO 30 J=1,7
45         N=J+30
46         READ(10'N,101),W,(LOC(L),L=1,19)
47         PRINT 204,N,W,(LOC(L),L=1,19)
48   30    CONTINUE
49   C
50   C---------------------------------------------------------------------
51   C
52   C * PRINT-OUT OF DATA BANK
53   C
54         NPAGE=1
55         PRINT 200,NPAGE
56         DO 50 I=1,NI
57         READ(20'I,100),SN,W,X,BK,NPG,NTY,NDA,KT,KE,SU,ELG,RA,RCH,EMOD,
58        1XN,SY,SEE,NEXT,ISET
59         PRINT 201,SN,W,X,BK,NPG,NTY,NDA,KT,KE,SU,ELG,RA,RCH,EMOD,
60        1XN,SY,SEE,NEXT,ISET
61         IF(MOD(I,5).NE.0) GO TO 50
62         IF(MOD(I,45).EQ.0) GO TO 40
63         PRINT 202
64         GO TO 50
65   40    IF(N.EQ.NI) GO TO 50
66         NPAGE=NPAGE+1
67         PRINT 200,NPAGE
68   50    CONTINUE
```

```
69    C
70    C----------------------------------------------------------------------------------
71    C
72    100    FORMAT(A6,2A2,A4,I2,I1,I6,I5,I2,F6.1,3F4.1,F6.2,2F7.2,F4.1,2I4)
73    101    FORMAT(A2,19I4)
74    102    FORMAT(2X,19I4)
75    103    FORMAT(72X,2I4)
76    C
77    C----------------------------------------------------------------------------------
78    C
79    200    FORMAT(1H1,T5,'PAGE NUMBER',I3,/,
80           1             T5,2X,'SN',4X,'WM',2X,'XM',2X,'BOOK',2X,'PG',2X,'T',
81           23X,'DATE',4X,'TEMP',2X,'ED',4X,'ULT',3X,'ELNG',3X,'R-A',3X,'R-C',
82           34X,'EMOD',4X,'EXPNT',5X,'SY',5X,'SEE',2X,'NEXT',2X,'ISET',/)
83    201    FORMAT(T5,A6,2X,2(A2,2X),A4,2X,I2,2X,I1,2X,I6,2X,I5,2X,I2,2X,
84           1F6.1,2X,3(F4.1,2X),F6.2,2X,2(F7.2,2X),F4.1,2(2X,I4))
85    202    FORMAT(1H )
86    203    FORMAT(1H1,T10,'CONTENT OF LOCATER FILE',//,T10,
87           1'NO',2X,'MT',3X,'ZZ',2X,'1A',2X,'2A',2X,'3A',2X,'4A',2X,'5A',2X,
88           2'6A',2X,'7A',2X,'8A',2X,'9A',2X,'1B',2X,'2B',2X,'3B',2X,'4B',
89           32X,'5B',2X,'6B',2X,'7B',2X,'8B',2X,'9B',/)
90    204    FORMAT(T10,I2,2X,A2,1X,19I4)
91    205    FORMAT(/,T10,83('-'),/,T10,'** NUMBER OF ENTRIES FOR EACH MATERIAL
92           1/ALLOY **',/,T10,83('-'),/)
93    C
94           END




1    C----------------------------------------------------------------------------------
2    C * FILE R*FIXBANK IS FOR MANAGEMENT OF R*LOCATER AND R*DATABANK FILES
3    C * THIS IS ELEMENT MAIN2 (ABSOLUTE: UPDATE)
4    C----------------------------------------------------------------------------------
5    C
6    C * MAIN2 UPDATES CONTENTS OF R*LOCATER AND R*DATABANK FILES
7    C * IT ALSO PRINTS OUT THE CONTENTS OF EACH OF THE UPDATED FILES
8    C
9    C * PROGRAM INPUT: CARDS PUNCHED BY ANALYSIS PROGRAM R*EVALRO
10   C * TWO DECKS OF CARDS: ONE FOR DATABANK AND ONE FOR LOCATER FILE
11   C
12   C----------------------------------------------------------------------------------
13   C
14          DIMENSION LOC(19),NLOC(19),NHOLD(10,19),NUM(10,19)
15   C
16   C----------------------------------------------------------------------------------
17   C
18   C * FILE 10 IS THE LOCATER FILE
19   C * FILE 20 IS THE DATABANK FILE
20   C
21          DEFINE FILE 10(50,80,E,JJ)
22          DEFINE FILE 20(9999,80,E,II)
23   C
24   C----------------------------------------------------------------------------------
25   C
26   C * UPDATE OF DATABANK
27   C * EACH LINE OF DATA BANK IS A CARD IMAGE OF A DATA CARD OF EVALRO
28   C * LINE NUMBER IS SAME AS DATA SET NUMBER (I=ISET) AND IS IN COLS 77-80
29   C * SET NUMBER OF LAST PREVIOUS ENTRY FOR SAME MATL/ALLOY IN COLS 73-76
30   C * LAST PREVIOUS ENTRY SET NO IS CALLED NEXT (SET*NEXT)
31   C
32   C----------------------------------------------------------------------------------
33   C
34   C * READ EVALRO DATA CARDS AND WRITE CARD IMAGES IN DATA BANK
35   C * LAST DATA CARD IS A DUMMY WITH SET NO. OF ZERO
36   C
37   1      READ(5,100),SN,W,X,BK,NPG,NTY,NDA,KT,KE,SU,ELG,RA,RCH,EMOD,
38          1XN,SY,SEE,NEXT,ISET
```

```
39          IF(ISET.EQ.0) GO TO 2
40          I=ISET
41          WRITE(20'I,100),SN,W,X,BK,NPG,NTY,NDA,KT,KE,SU,ELG,RA,RCH,EMOD,
42         1XN,SY,SEE,NEXT,ISET
43          GO TO 1
44   C
45   C------------------------------------------------------------------------
46   C
47   C * READ ENTIRE CONTENT OF DATA BANK AND PRINT
48   C
49    2     NI=I
50          NPAGE=1
51          PRINT 200,NPAGE
52          DO 4 I=1,NI
53          READ(20'I,100),SN,W,X,BK,NPG,NTY,NDA,KT,KE,SU,ELG,RA,RCH,EMOD,
54         1XN,SY,SEE,NEXT,ISET
55          PRINT 201,SN,W,X,BK,NPG,NTY,NDA,KT,KE,SU,ELG,RA,RCH,EMOD,
56         1XN,SY,SEE,NEXT,ISET
57          IF(MOD(I,5).NE.0) GO TO 4
58          IF(MOD(I,45).EQ.0) GO TO 3
59          PRINT 202
60          GO TO 4
61    3     NPAGE=NPAGE+1
62          PRINT 200,NPAGE
63    4     CONTINUE
64   C
65   C------------------------------------------------------------------------
66   C
67   C * UPDATE OF LOCATER FILE
68   C
69   C * LOCATER FILE HAS TWO SECTIONS: 1. KEYSET LOCATION AND 2. NUMBER OF ENTRIES
70   C * SECTION 1 (LINES 1-30): SET NO. OF LAST DATABANK ENTRY FOR EACH MATL/ALLOY
71   C * EACH MATERIAL ON A SEPARATE LINE (LINE NO.=J)
72   C * COLS 1 & 2 MATERIAL CODE FOLLOWED BY 19 FOUR-COLUMN GROUPS
73   C * EACH GROUP (L=GROUP NO.) REFERS TO SPECIFIC ALLOY * ENTRY IS LAST SET NO.
74   C * COLS 79-80 BLANK AND RESERVED FOR LATER USE AS CONTINUATION LOCATIONS
75   C * SECTION 2 (LINES 31-50): NUMBER OF DATA ENTRIES FOR EACH MATERIAL/ALLOY
76   C * MATL/ALLOY OF LINE J POSITION L SAME AS FOR LINE J+30 POSITION L
77   C
78   C------------------------------------------------------------------------
79   C
80   C * UPDATE OF SECTION 1 OF LOCATER
81   C * READ EVALRO LOCATER CARDS * READ AND HOLD LOCATER VALUES CURRENTLY IN FILE
82   C
83          PRINT 203
84          J=0
85   10     READ(5,101,END=20),W,(LOC(L),L=1,19)
86          J=J+1
87          READ(10'J,102),(NHOLD(J,L),L=1,19)
88   C
89   C------------------------------------------------------------------------
90   C
91   C ENTER NEW LOCATER VALUES IN FILE AND PRINT FILE CONTENT
92   C
93          WRITE(10'J,101),W,(LOC(L),L=1,19)
94          PRINT 204,J,W,(LOC(L),L=1,19)
95          GO TO 10
96   C
97   C------------------------------------------------------------------------
98   C
99   C * UPDATE OF SECTION 2 OF LOCATER
100  C * NUMBER OF ENTRIES OF EACH MATL/ALLOY JUST ENTERED IN DATABANK COUNTED
101  C * THIS NUMBER ADDED TO CURRENT TOTALS IN SECTION 2 OF LOCATER
102  C * THEN NEW NUMBER OF ENTRIES WRITTEN IN SECTION 2 OF LOCATER TO UPDATE IT
103  C
104  20     NJ=J
105         DO 24 J=1,NJ
106         N=J+30
```

```
107          READ(10'J,101),W,(LOC(L),L=1,19)
108          DO 22 L=1,19
109          NUM(J,L)=0
110          NI=LOC(L)
111          IF(NI.EQ.0) GO TO 22
112    21    READ(20'NI,103),NEXT,ISET
113          IF(ISET.EQ.NHOLD(J,L)) GO TO 22
114          NUM(J,L)=NUM(J,L)+1
115          IF(NEXT.EQ.0.OR.NEXT.EQ.NHOLD(J,L)) GO TO 22
116          NI=NEXT
117          GO TO 21
118    22    CONTINUE
119          READ(10'N,102),(NLOC(L),L=1,19)
120          DO 23 L=1,19
121          NLOC(L)=NLOC(L)+NUM(J,L)
122    23    CONTINUE
123          WRITE(10'N,101),W,(NLOC(L),L=1,19)
124    24    CONTINUE
125    C
126    C------------------------------------------------------------------
127    C
128    C * CONTENT OF SECTION 2 OF LOCATER NOW PRINTED
129    C
130          PRINT 205
131          DO 30 J=1,NJ
132          N=J+30
133          READ(10'N,101),W,(NLOC(L),L=1,19)
134          PRINT 204,N,W,(NLOC(L),L=1,19)
135          PUNCH 101,W,(NLOC(L),L=1,19)
136    30    CONTINUE
137    C
138    C------------------------------------------------------------------
139    C
140   100    FORMAT(A6,2A2,A4,I2,I1,I6,I5,I2,F6.1,3F4.1,F6.2,2F7.2,F4.1,2I4)
141   101    FORMAT(A2,19I4)
142   102    FORMAT(2X,19I4)
143   103    FORMAT(72X,2I4)
144    C
145    C------------------------------------------------------------------
146    C
147   200    FORMAT(1H1,T5,'PAGE NUMBER',I3,/,
148          1              T5,2X,'SN',4X,'WM',2X,'XM',2X,'BOOK',2X,'PG',2X,'T',
149          23X,'DATE',4X,'TEMP',2X,'ED',4X,'ULT',3X,'ELNG',3X,'R-A',3X,'R-C',
150          34X,'EMOD',4X,'EXPNT',5X,'SY',5X,'SEE',2X,'NEXT',2X,'ISET',/)
151   201    FORMAT(T5,A6,2X,2(A2,2X),A4,2X,I2,2X,I1,2X,I6,2X,I5,2X,I2,2X,
152          1F6.1,2X,3(F4.1,2X),F6.2,2X,2(F7.2,2X),F4.1,2(2X,I4))
153   202    FORMAT(1H )
154   203    FORMAT(1H1,T10,'CONTENT OF LOCATER FILE',//,T10,
155          1'NO',2X,'MT',3X,'ZZ',2X,'1A',2X,'2A',2X,'3A',2X,'4A',2X,'5A',2X,
156          2'6A',2X,'7A',2X,'8A',2X,'9A',2X,'1B',2X,'2B',2X,'3B',2X,'4B',
157          32X,'5B',2X,'6B',2X,'7B',2X,'8B',2X,'9B',/)
158   204    FORMAT(T10,I2,2X,A2,1X,19I4)
159   205    FORMAT(/,T10,83('-'),/,T10,'** NUMBER OF ENTRIES FOR EACH MATERIAL
160          1/ALLOY **',/,T10,83('-'),/)
161    C
162          END
```

```
1    @ASG,A R*DATABANK
2    @USE 20,R*DATABANK
3    @ASG,A R*LOCATER
4    @USE 10,R*LOCATER
5    @XQT R*FIXBANK.PRINT


1    @ASG,A R*DATABANK
2    @USE 20,R*DATABANK
3    @ASG,A R*LOCATER
4    @USE 10,R*LOCATER
5    @XQT R*FIXBANK.UPDATE


1    @PREP R*FIXBANK.
2    @MAP,I CISSY,R*FIXBANK.PRINT
3    IN R*FIXBANK.MAIN1
4    END
5    @PACK R*FIXBANK.
6    @PRT,TL R*FIXBANK.


1    @PREP R*FIXBANK.
2    @MAP,I CIS,R*FIXBANK.UPDATE
3    IN R*FIXBANK.MAIN2
4    END
5    @PACK R*FIXBANK.
6    @PRT,TL R*FIXBANK.
```

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63 pp - AMCMS Code 728012.12

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