A COMPUTER SIMULATION OF HEADLAMP VARIABLES AND DRIVERS' SIGHT DISTANCES: OPERATING INSTRUCTIONS

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16. Abstract

This report provides supplemental information on how to run the BEMPAT and LAMPER computer programs developed at the Highway Safety Research Institute. These programs (described in Mortimer and Becker, 1973 and Becker and Mortimer, 1974) predict the seeing distance to various targets in various positions as a function of the headlighting system and a number of other variables. They permit human factors specialists and illumination engineers to compare the effectiveness of alternative headlamp designs.

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Introduction

It is well known that the accident rate at night is greater than that during the day. While there are many contributing factors (e.g., fatigue, greater consumption of alcohol, etc.), the most important is darkness. Consequently, there has long been interest in developing headlamp systems that enable drivers to see hazards at greater distances at night. At first glance, increasing headlamp intensity and raising the elevation of existing lamps would seem to be the answer. Unfortunately, such changes increase the glare experienced by drivers and in many cases make accidents more likely.

To facilitate evaluation of these possibilities and new lamp designs, computer programs have been developed that generate predictions of visibility distance and glare resulting from one vehicle meeting another on a two-lane road at night (Becker and Mortimer, 1974; Mortimer and Becker, 1973). The computer model was originally developed for an IBM 1800 and later transferred to a Digital Equipment Corporation (DEC) PDP-11/45 minicomputer. Unfortunately, few people are familiar with the operation of the PDP-11/45 at Highway Safety Research Institute (HSRI). The software has been modified to run on the University of Michigan Computing Center's AMDAHL 470/V7 operating under MTS (Michigan Terminal System). Modifications made to the original program include the addition of comments to make the programs understandable and changes in the format statements to make them compatible with the FORTRAN on MTS. (The original program took advantage of several extensions unique to DEC FORTRAN IV plus.) The program should run at other MTS installations without modification and on IBM 360 and 370 computers with only revised operating system instructions when compiled using FORTRAN IV levels G, H, or WATFIV. The steps necessary to make the model run are outlined below.

Step 1. Obtaining the transformed headlamp intensity distribution - BEMPAT.

The first step in conducting a headlamp evaluation is for the BEMPAT beam pattern program to compute the log intensity distribution for each lamp type. (A copy of the latest source listing of BEMPAT is contained in Appendix 1.) To run BEMPAT one needs three types of cards. (See Appendix 2.) The first card is a deck header. Only one deck header card is required for each series of evaluations. Right adjusted in the first 5 columns (format I5) should be the number of lamps evaluated, usually one. The rest of the card should be filled with zeros or blank. (For the PDP-11/45, columns 6-10 were used and to indicate that one wanted to put the beam pattern on a disk file.) The second card contains various descriptors of the beam pattern. Its format is 3I5, 3F5.1, 21A2, E8.0. The first entry is the beam pattern number (I5). The next pair of inputs (both I5) represent the number of rows and columns in the input beam pattern matrix. The fourth and fifth entries (both F5.1) are the coordinates of the lower left hand corner of the matrix. The sixth digital entry (F5.1) is the angular spacing between points and degrees. The seventh field (42 columns wide) is for text (e.g., the beam pattern name, date, etc.). The last entry on this card is the transmittance, a value usually between 0 and 1, where 1 means all of the light is transmitted and values greater than one mean the lamp is driven by a greater then normal voltage. Since the computation makes no sense if transmittance is 0 (e.g., a blank field on the card) both 0 and 1 are interpreted as no loss. Potential sources of loss include polarizing filters, dirt, etc. The remainder of the deck contains the values for the intensity of the beam pattern at each point in the rectangular grid.

Before running the BEMPAT program one should double check the beam intensity card deck. BEMPAT expects eleven fields per card. There are a few old decks in the HSRI files that have 13 fields per card. Don't use the 13 field cards.

Shown in Appendix 2 is sample input for this program for a GE 6014 headlamp. Included are the deck header card, the beam pattern header card, and beam intensities. The deck header card indicates there is one beam pattern to be considered. The beam pattern head card indicates the intensity distribution is for beam pattern number 1, that the matrix contains 61 rows and 22 columns, that the coordinate of the lower left hand corner is -20, -4.5 degrees, that the intensity points are .5 degrees apart, and that the beam pattern is for GE 6014 Low Beam (No. 2 PH). The one in column 80 indicates there are no transmission losses (100% transmission). The remainder of that file (lines 2 through 123) are the beam intensities.

Shown in Appendix 3 is the printed output generated by the BEMPAT program. It is a rearranged rectangular array of the beam intensities at each specified point in the grid.

Appendix 4 contains the transformed beam intensities and the new header card for that beam pattern. In the original Mortimer and Becker program the transformed beam intensities were stored in binary format to save space. To facilitate debugging, E format has been used in the revised version.

Step 2. Using $COPY to replicate the light distribution.

After BEMPAT has been run, it may be necessary to modify the beam pattern file. LAMPER, the program that performs the lighting visibility calculations, uses two input files. One file contains control commands (specifications for the location of the driver and headlamps on each vehicle); the other light distributions for each lamp. If there are four identical headlamps then the light distribution should be repeated four times in the file. This is most easily done by $COPYing the headlamp light distribution to a temporary file and then $COPYing the temporary file to the end of the original lighting file three times.

Step 3. Using LAMPER to compute visibility distances.

The headlight evaluation program is contained in Appendix 4. The main routine is called LAMPER. In addition, a number of subroutines (INPUT, CURVE, BEAMS, INTAB, GLARE, CONVR, and OUTPUT) are also used with LAMPER. These subroutines also are contained in Appendix 4. Shown in Appendix 5 are the input control cards required by LAMPER. Except for the title card and the card preceding it (which has a T in column 1) all cards follow the same format. That format is a letter in column 1 to designate the card type, a 9 column field and then 7 ten column fields of data. Not all fields are used. The following input cards are required:

1. Card 1 should have a T in column 1 to indicate that the next card is a title card.
2. The second card in the deck contains the output title (headlamp name, type, etc.). It can be up to 80 characters long.
3. The third card is the C card. It gives information on vehicle speed and the locations of the eyes and target.
4. Next comes the Z card. The Z card gives some information on initial visibility distance, initial interval and target reflectance.
5. Cards 5 through 8 are D cards. The D cards specify the location of each headlamp. Since most vehicles have at least two headlamps and there are at least two cars of interest, there must be at least 4 D cards. There may be up to 10 D cards, as there is a maximum of 5 lamps per vehicle. Lamps on the main vehicle are referred to via numbers 1-5 while those on opposing vehicles are referred to via numbers 6-10.
6. The L (or last) card indicates the end of input.

For the particular example given in this report, the cards in Appendix 6 are interpreted as follows: The first card (T) indicates that the next card is the title for a series of inputs. The title card indicates this is a test run for GE 6014 low beam lamps. According to the C card the two vehicles' centerlines are 12 feet apart, both are moving at 30 mph and the subject's eyes are 72 inches behind lamp one, 42 inches above the road, 20 inches to the left of the center line and the target is 24 inches above the road and 72 inches to the right of the vehicle centerline. According to the Z card the target separation distance is 200 feet, the computation increment interval is 8 feet and the target reflectivity is 10%.

There are four D cards, one for each of the four headlamps, two per car. Lamp one is on the main vehicle. It is 24 inches above the road and 30 inches to the left of the vehicle centerline. Lamp 2 is 60 inches to the right of the reference lamp. Lamp 6 is located similar to lamp 1 except its on the opposing vehicle. Lamp 7 is the right side lamp on the opposing vehicle. (See Table 1.)

Table 1. D cards.

		Lamp #	X	Y	Z
Car with test subject	D	1		24	30
	D	2	0	0	60
Opposing Vehicle	D	6		24	30
	D	7	0	0	60

Not used (blank)

Above road

Left of vehicle centerline

Not forward of lamps 1 and 6 respectively

Right of lamps 1 and 6 respectively

Above lamps 1 and 6 respectively

The L card indicates the input for a particular vehicle situation has ended.

Also shown earlier in Appendix 6 is the run command for this particular program. Shown in Appendix 7 is the input beam pattern. Note that the 151 line pattern is replicated four times because all four beams are identical. In Appendix 8 is the printed output from LAMPER. To facilitate running the program, the card formats described in detail in Becker and Mortimer, 1974 (pages 58-62) are repeated in Appendix 9. In this case the material has been presented on FORTRAN coding sheets to facilitate constructing the input cards.

Some Programming Flaws

There are three problems with the LAMPER program. Because no one is familiar with the details of the code and because such familiarization would take a considerable amount of time and result in only a small improvement in the program, these problems have not been resolved. Based on extensive use of LAMPER the probability of one of the flaws occurring is about .1.

Problem 1 - Computational error ($p < .01$) - On one occasion the program halted without producing output and a system message stated the program attempted to compute the square root of a negative number in subroutine CONVR. There are no indications why this occurred or how this problem might be solved.

Problem 2 - Premature Termination ($p \sim .03$) - During a few runs the program has not generated output for the last few separation distances. For example, if it was requested to compute visibility and glare estimates until the vehicle had passed each other by 1000 feet (e.g., the final separation distance, field 2 of Card A was - 1000 ft.), it would quit at 0 feet (when they met). Careful checking has shown this not to be an input error.

Problem 3 - Incorrecting Stepping ($p \sim .07$) - On a few occasions the program either has not applied the second separation interval (skip) from the correct initial value or the interval is changed (usually to a smaller number). For example, if asked to compute values from 2000 to 1000 feet in 500 foot increments and 500 to 1000 feet in 100 foot increments, it would produce output for 2000', 2500 and 500', 1000', 500', 400', 300', etc. or 2000', 2500', 1500', 1000', 990', 980', 970', etc. These do not appear to be input errors.

Any comments by readers concerning the source of these problems would be greatly appreciated.

Summary

The sequence of evaluating the headlamp is first to use LAMPER to generate an original transformed beam pattern(s), then to replicate the beam pattern if duplicate lamps are present using the MTS $COPY command, and finally to have LAMPER and its associated subroutines generate the actual output.

There are two places where one can easily make mistakes. First, there must be a D card for each headlamp in the LAMPER program. Second, there must be a beam intensity pattern for each headlamp. Even if the same beam intensity pattern is used for all headlamps, it must be repeated in the beam pattern file.

Running the headlight evaluation programs is not easy. While the author of this report is not familiar with all the details of these programs as he did not write them, he will gladly receive comments, questions, suggestions, and is willing to consult with those who need advice in making them run. For those interested in modifying these programs or learning more about their operation, flow charts of all routines have been recovered from the HSRI archives and are presented in Appendix 10. Variable cross references listing may also be helpful. They may be obtained by $RUNning *FTNTIDY.

REFERENCES

Becker, J. M., and Mortimer, R. G. Further development of a computer simulation to predict the visibility distance provided by headlamp beams. University of Michigan, Highway Safety Research Institute, Report No. UM-HSRI-HF-74-26, Ann Arbor, Michigan, USA, November, 1974 (available from NTIS as PB-257 909).

Mortimer, R. G., and Becker, J. M. Development of a computer simulation to predict the visibility distance provided by headlamp beams. University of Michigan, Highway Safety Research Institute, Report No. UM-HSRI-HF-73-15, Ann Arbor, Michigan, USA, July, 1973 (available from NTIS as PB 227 855/4).

APPENDIX 1

```
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
C     ---------------------- PROGRAM BEMPAT -------------------
C       LAST REVISED 5/26/80
C       BY PAUL GREEN, HUMAN FACTORS, U OF MICHIGAN HWY SAFETY RESEARCH INSTITUTE
C          ANN ARBOR, MI  USA  (313) 764 4158
C       MODIFIED (THIS) VERSION 4 MICHIGAN TERMINAL SYS (MTS)--AMDAHL 470/V7
C         THIS PROGRAM NOW READS MTS FILES (OR CARDS) AND CONVERTS THAT INFO INTO
C         A FORMAT THAT IS ACCEPTABLE TO THE LAMPER PROGRAM.  FOR FURTHER DETAILS
C         SEE REPORT UM-HSRI-74-26.
C       ORIGINAL VERSION (FOR PDP-11/45):
C               THIS PROGRAM READS THE BEAM PATTERNS OFF CARDS AND WRITES THEM
C               INTO A DISC FILE. THERE MAY BE A TOTAL OF TEN DIFFERENT BEAM
C               PATTERNS STORED IN THE DISC FILE AT ONE TIME.
C        PDP VERSION CALLS: SETFILE, FILE, DATE (PDP SYSTEM FILE)
C        MTS VERSION CALLS: TIME (MTS SYSTEM FILE)
C       UNIT DEFINITIONS FOR RUN CARD--8=INPUT, 5=PRINTED OUTPUT, 11=OUTPUT MATRIX
C       CAUTION....THESE ARE STD PDP UNIT NUMBERS, NOT STD FORTRAN OR MTS NUMBERS.
        DIMENSION AL(61,22),ITITL(21),DUM(22)
        INTEGER DAT(3)
C        FOR THE PDP THE LOCATION WHERE THE DATE IS STORED SHOULD BE REAL
        COMMON IERR
C        AL=MATRIX OF LOG VALUES, ITITL=OUTPUT TITLE, DUM=???, DAT=DATE
C        IERR=???, KFILE=WHERE OUTPUT IS STORED, IPR=WHERE OUTPUT PRINTED,
C        IRD=WHERE READ INPUT FROM
        DATA BLANK/' '/
        KFILE=11
        IPR=5
        IRD=8
C
C       MODS REQUIRED TO RUN ON PDP
C       CALL SETFIL(11,'JBEAM',IERR,'DK',1)
C       DEFINE FILE 11(10,2716,U,NI)
C
        DO 2 I=1,3
C       GET THE DATE
      2 DAT(I)=BLANK
C
        CALL TIME(5,0,DAT)
C        CALL PARAMETERS ARE: 5=FORMAT KEY,0=NO PRINT,DAT=STORE IN DAT (SEE MTS V5)
C        FOR PDP USE     CALL DATE(DAT)
C
C       READ HEADER CARD FOR DECK: NN=NUMBER OF BEAM PATTERNS,IPT=OUTPUT ON DISK
C         (0=YES, NONZERO=NO)... FORMAT IS I5,I5
        READ(IRD,9999)NN,IPT
   9999 FORMAT (3I5,3F5.1,21A2,E8.0)
C       THIS FORMAT CHANGED FROM 3E5.0 TO 3F5.1...D IS .5 DEG
C
C
C        CONSIDER 1 BEAM PATTERN
C
C        READ IN HEADER CARD FOR ONE BEAM PATTERN
C
        N = 0
    120 READ(IRD,9999)M,K,L,H,V,D,ITITL,FILT
C       M=BEAM PATTERN # (I5), MATRIX OF K ROWS AND L COLUMNS, H X V = MATRIX SIZE
C       IN DEG (ACTUALLY CORRDINATES OF LOWER L CORNER), D= ANGULAR SPACING BETWEEN PTS IN DEG,
C       ITITL=BEAM PATTERN NAME (21A2), FILT=POLARIZING FILTER ATTENUATION (0=ABSENT)
        N = N+1
```

```
C
C      SET SPACING - IF D NEG, THEN HORIZ SPACE IS TWICE VERTICAL (D)
       DV = D
       DH = D
       IF (D) 122,122,123
   122 DV = -D
       DH = 2.*DV
C
C      SET VALUES IN ONE COLUMN
   123 DUM(1) = V
       DO 130 J=2,L
   130 DUM(J) = DUM(J-1)+DV
       MH = K
       MV = L
C      CHECK MATRIX SIZE, IF LARGER THAN 14 X 51 IN ANY DIMENSION, ADJUST SOME
C      MAGIC VALUES FOR LATER PRINTING...A JUDY BECKER TRICK.
       IF (L-14) 132,132,131
   131 MV =1.1-V/DV
       IF (MV.GT.14) MV=14
   132 IF (K-51) 140,140,133
   133 MH =1.1-H/DH
C
C      PROCESS A BEAM ARRAY
C      READ IN THE CARD DECK OR INPUT FILE
C      READ CHANGED TO IMPLIED DO 4 COLS NOT MULTIPLES OF 11
   140 READ(IRD,9998)((AL(I,J),J=1,L),I=1,K)
C      FORMAT NOTE: THE ACTUAL INPUT FORMAT IS 11F7.0, 3X BUT SINCE THE E IS
C      OMITTED ON THE CARDS (OR IN THE FILE), THE CARDS ARE READ USING F FORMAT.
C      WHEN READING THE CARDS, MAKE SURE THERE ARE 11 FIELDS/CARD. SOME OF THE
C      OLD GE6014 DECKS HAVE 13.
C
C      IF HEADLAMPS OR WINDSHIELD ARE POLARIZED OR DIRTY, ATTENUATE INTENSITIES
       IF (FILT) 250,143,141
   141 DO 142 I=1,K
       DO 142 J=1,L
   142 AL(I,J) = FILT*AL(I,J)
   143 WRITE(IPR,9997)M,ITITL,DAT
  9997 FORMAT (1H1,3X,'BEAM PATTERN NO.',I3,' FOR ',21A2,2X,3A4         //
      11H ,'HORIZONTAL      VERTICAL ANGLES')
C      COLUMN HEADINGS
       WRITE(IPR,9992)(DUM(J),J=1,MV)
  9992 FORMAT (1H ,'ANGLE',14F9.1)
       TSA = H
C      TSA IS HORIZONTAL ANGLE
C
C      CASE WHERE TABLE IS OVERSIZE
       DO 150 I=1,MH
C      PRINTOUT EACH ROW
       WRITE(IPR,9995)TSA,(AL(I,J),J=1,MV)
   150 TSA = TSA+DH
       IF (MH-K) 151,160,160
   151 WRITE(IPR,9997)M,ITITL,DAT
       WRITE(IPR,9992)(DUM(J),J=1,MV)
       TSA = TSA-DH
       DO 152 I=MH,K
       WRITE(IPR,9995)TSA,(AL(I,J),J=1,MV)
   152 TSA = TSA+DH
   160 IF (MV-L) 161,170,170
   161 WRITE(IPR,9997)M,ITITL,DAT
       WRITE(IPR,9992)(DUM(J),J=MV,L)
```

```
          TSA = H
          DO 162 I=1,MH
          WRITE(IPR,9995)TSA,(AL(I,J),J=MV,L)
      162 TSA = TSA+DH
          IF (MH-K) 163,170,170
      163 WRITE(IPR,9997)M,ITITL,DAT
          WRITE(IPR,9992)(DUM(J),J=MV,L)
          TSA = TSA-DH
          DO 164 I=MH,K
          WRITE(IPR,9995)TSA,(AL(I,J),J=MV,L)
      164 TSA = TSA+DH
     9998 FORMAT (11E7.0,3X)
     9995 FORMAT (1H ,F5.1,2X,14F9.1)
C
C         TAKE AND SAVE LOGS
      170 IF (IPT) 190,180,190
      180 DO 185 I=1,K
          DO 185 J=1,L
      185 AL(I,J) = ALOG(AL(I,J)+.000001)
C         .000001 (ARBITRARY #) KEEPS LOG FROM BEING -INFINITY (BECKER USED .01)
C          FOR PDP USE:
C         WRITE(KFILE'M )H,V,D,K,L,ITITL,((AL(I,J),J=1,L),I=1,K)
C         MTS BINARY OUTPUT TO FILE (DEFINED AS UNIT 11)
C         WATFIV COMPLAINS ABOUT UNFORMATTED READ LINE LENGTH
C         THESE MODS ARE FOR MTS
          WRITE (11,187) H,V,D,K,L,ITITL
      187 FORMAT (3F5.1,2I5,21A2)
          WRITE (11,188) ((AL(I,J),J=1,L),I=1,K)
      188 FORMAT (9E13.6)
      190 IF (N-NN) 120,250,250
      250 STOP
C         (ON PDP USE  250 CALL EXIT)
          END
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
END OF FILE
```

APPENDIX 2

```
     1      WHAT FOLLOWS IS THE INPUT
     2       THE FIRST FILE IS DECKHEADER, THE SECOND INPUT FILE IS GE6014LOW
     3      THE RUN COMMAND IS:
     4       $RUN *WATFIV SCARDS=BEMPAT SPRINT=BEAMOUT1 8=DECKHEADER+GE6014LOW 5=BEAMOUT2 11=MATRIX
END OF FILE
     1      ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|
     2          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
     3      ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|
     1          100000
     1      ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|
     2          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
     3      ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|
     1          1   61   22 -20. -4.5 .5  G.E.  6014 LOW BEAM (NO.2 PH.)                1
     2      978.    1120.   1108.   1040.   884.    662.    449.    384.    331.    284.    236.
     3      220.    176.    169.    149.    136.    126.    112.    98.     92.     85.     66.
     4      1073.   1241.   1257.   1176.   1014.   748.    505.    426.    363.    301.    249.
     5      231.    186.    173.    153.    139.    130.    116.    99.     92.     86.     67.
     6      1161.   1371.   1371.   1306.   1129.   839.    564.    467.    390.    322.    266.
     7      238.    195.    179.    157.    142.    135.    120.    102.    95.     86.     67.
     8      1247.   1480.   1501.   1439.   1274.   949.    638.    511.    423.    337.    275.
     9      247.    204.    184.    161.    146.    135.    121.    105.    98.     88.     70.
    10      1333.   1572.   1608.   1587.   1433.   1073.   742.    561.    449.    355.    289.
    11      251.    215.    190.    168.    142.    139.    123.    106.    100.    91.     70.
    12      1401.   1655.   1705.   1711.   1584.   1191.   833.    629.    491.    381.    306.
    13      267.    233.    199.    176.    155.    141.    126.    109.    101.    93.     72.
    14      1454.   1740.   1808.   1853.   1726.   1318.   934.    691.    535.    414.    325.
    15      281.    247.    213.    185.    161.    144.    129.    111.    102.    93.     73.
    16      1492.   1814.   1921.   1944.   1803.   1433.   1028.   765.    576.    440.    340.
    17      290.    263.    226.    189.    167.    149.    131.    111.    103.    95.     74.
    18      1528.   1879.   2015.   2051.   1953.   1545.   1132.   839.    615.    470.    352.
    19      299.    271.    234.    195.    171.    154.    132.    112.    103.    96.     75.
    20      1566.   1933.   2104.   2136.   2074.   1661.   1232.   904.    659.    488.    366.
    21      313.    278.    239.    202.    176.    158.    134.    115.    106.    98.     77.
    22      1602.   2009.   2172.   2207.   2181.   1767.   1321.   966.    694.    508.    381.
    23      325.    287.    240.    204.    178.    159.    135.    118.    109.    101.    79.
    24      1637.   2057.   2252.   2284.   2269.   1838.   1371.   1008.   721.    523.    396.
    25      337.    296.    247.    208.    181.    163.    141.    121.    113.    106.    81.
    26      1678.   2125.   2329.   2411.   2346.   1900.   1433.   1043.   751.    541.    411.
    27      349.    301.    252.    212.    183.    168.    144.    126.    116.    108.    82.
    28      1690.   2190.   2382.   2473.   2423.   1995.   1504.   1093.   774.    558.    428.
    29      366.    307.    259.    218.    186.    172.    149.    131.    119.    111.    86.
    30      1729.   2275.   2494.   2612.   2538.   2077.   1581.   1144.   801.    564.    431.
    31      375.    310.    266.    223.    191.    176.    154.    135.    123.    113.    84.
    32      1791.   2367.   2609.   2775.   2662.   2193.   1667.   1206.   836.    582.    443.
    33      375.    287.    270.    228.    197.    180.    158.    140.    126.    118.    90.
    34      1835.   2467.   2760.   2943.   2837.   2320.   1755.   1285.   875.    612.    461.
    35      390.    325.    276.    233.    201.    186.    162.    144.    129.    119.    90.
    36      1897.   2553.   2899.   3100.   2952.   2438.   1847.   1345.   919.    635.    485.
    37      402.    346.    282.    240.    208.    189.    169.    147.    132.    121.    92.
    38      1938.   2618.   2982.   3310.   3073.   2559.   1947.   1410.   963.    662.    502.
    39      414.    361.    293.    247.    214.    195.    174.    152.    134.    125.    93.
    40      1989.   2668.   3073.   3457.   2221.   2680.   2033.   1469.   993.    683.    523.
    41      428.    375.    306.    259.    223.    202.    175.    155.    138.    126.    94.
    42      2030.   2716.   3132.   3605.   3457.   2878.   2163.   1540.   1025.   709.    547.
    43      443.    387.    307.    270.    232.    209.    181.    163.    142.    131.    96.
    44      2042.   2736.   2985.   3782.   3694.   3191.   2323.   1613.   1087.   748.    564.
    45      470.    408.    325.    282.    241.    216.    188.    165.    147.    135.    99.
    46      2042.   2781.   3280.   3989.   4048.   3516.   2509.   1711.   1147.   765.    550.
    47      485.    423.    343.    298.    249.    222.    194.    171.    151.    138.    102.
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48	2021.	2834.	3457.	4226.	4285.	3753.	2657.	1820.	1203.	798.	582.
49	493.	446.	369.	301.	258.	229.	202.	178.	158.	144.	105.
50	2077.	2881.	3635.	4403.	4432.	4255.	2784.	1853.	1256.	819.	600.
51	499.	452.	366.	316.	268.	241.	208.	182.	166.	150.	110.
52	2116.	3079.	3841.	4610.	4669.	4462.	2911.	2006.	1315.	857.	615.
53	511.	461.	390.	331.	280.	249.	215.	190.	173.	161.	116.
54	2184.	3280.	4C19.	4817.	4905.	4698.	3162.	2122.	1374.	895.	632.
55	520.	464.	396.	334.	288.	258.	223.	198.	179.	167.	121.
56	2157.	3457.	4226.	5083.	5260.	4994.	3339.	2231.	1472.	940.	621.
57	529.	464.	399.	340.	293.	257.	227.	205.	184.	171.	124.
58	2320.	3635.	4432.	5408.	5585.	5319.	3487.	2346.	1557.	984.	683.
59	544.	479.	408.	343.	291.	264.	230.	210.	188.	175.	126.
60	2382.	3753.	4551.	5644.	5910.	5437.	3694.	2473.	1652.	1049.	715.
61	558.	488.	411.	349.	290.	267.	234.	215.	192.	181.	131.
62	2408.	3812.	4728.	5940.	6206.	5940.	3901.	2621.	1758.	1111.	748.
63	573.	502.	420.	325.	290.	271.	241.	222.	197.	186.	134.
64	2426.	3901.	4905.	6176.	6383.	6146.	4078.	2790.	1873.	1179.	792.
65	585.	520.	428.	355.	301.	281.	250.	230.	204.	193.	138.
66	2479.	4048.	5053.	6383.	6678.	6353.	4373.	2999.	1974.	1241.	824.
67	609.	541.	387.	358.	307.	284.	254.	235.	208.	199.	143.
68	2571.	4137.	5260.	6708.	7181.	6590.	4905.	3635.	2154.	1315.	866.
69	638.	564.	434.	363.	313.	289.	260.	240.	214.	206.	150.
70	2662.	4285.	5496.	7328.	8008.	7506.	5614.	4107.	2402.	1433.	910.
71	659.	585.	446.	375.	316.	292.	263.	246.	220.	210.	156.
72	2804.	4551.	5880.	8185.	8895.	8422.	6383.	4698.	2784.	1608.	978.
73	694.	606.	464.	390.	325.	299.	268.	249.	233.	214.	158.
74	3005.	4462.	6649.	9101.	9722.	9249.	7181.	5378.	3398.	1835.	1064.
75	730.	624.	473.	399.	340.	278.	277.	256.	217.	216.	161.
76	3339.	5703.	7890.	10874.	11584.	10815.	8510.	6294.	3930.	2113.	1229.
77	786.	653.	488.	405.	346.	298.	284.	262.	231.	220.	164.
78	3989.	6974.	5558.	13445.	14450.	13652.	10845.	8067.	4905.	2541.	1412.
79	848.	686.	505.	420.	361.	304.	293.	271.	240.	226.	168.
80	4610.	8451.	11968.	16489.	17907.	17316.	14598.	11199.	6678.	3082.	1673.
81	931.	736.	529.	437.	372.	319.	301.	277.	246.	236.	173.
82	5349.	9663.	13770.	18764.	21749.	22547.	19946.	15336.	8510.	4432.	2068.
83	1070.	792.	564.	461.	393.	334.	313.	288.	256.	249.	182.
84	6235.	10668.	14893.	21099.	26595.	29225.	26950.	22162.	13032.	6412.	2713.
85	1250.	866.	603.	485.	411.	346.	328.	301.	268.	259.	190.
86	7033.	11554.	16607.	23906.	31559.	36937.	35755.	32180.	20508.	9101.	3537.
87	1401.	960.	644.	514.	428.	363.	337.	275.	278.	266.	195.
88	7801.	12381.	18262.	26359.	34869.	42847.	40188.	39301.	25265.	11229.	4048.
89	1528.	1002.	677.	544.	443.	363.	346.	310.	283.	275.	206.
90	8244.	13091.	19237.	27038.	35460.	42256.	41370.	38710.	24467.	11850.	4314.
91	1637.	1058.	709.	547.	449.	369.	355.	313.	290.	281.	215.
92	8244.	13002.	18823.	25915.	32800.	37824.	36937.	35164.	21897.	11111.	4196.
93	1655.	1073.	712.	553.	458.	381.	366.	275.	298.	286.	211.
94	7801.	11879.	16666.	22694.	29254.	33687.	32800.	31323.	18469.	9486.	3782.
95	1560.	1025.	683.	541.	458.	381.	366.	278.	301.	280.	208.
96	7210.	10815.	14539.	19414.	26595.	31027.	29550.	28663.	16134.	8008.	3369.
97	1439.	960.	650.	529.	449.	372.	358.	272.	295.	273.	199.
98	6767.	9840.	12766.	17346.	24467.	28959.	27186.	24142.	14686.	7328.	2985.
99	1300.	895.	618.	514.	434.	361.	346.	297.	281.	263.	194.
100	6412.	9131.	11465.	15041.	21099.	25413.	25117.	22724.	14568.	6856.	2719.
101	1182.	848.	612.	499.	426.	352.	337.	286.	275.	258.	194.
102	6146.	8599.	10697.	13623.	18705.	22783.	23433.	21158.	13829.	6294.	2532.
103	1105.	813.	591.	493.	417.	349.	334.	283.	269.	257.	197.
104	5821.	8156.	9958.	12677.	16814.	20330.	20744.	18410.	12086.	5694.	2269.
105	1064.	780.	570.	470.	411.	343.	325.	274.	263.	255.	194.
106	5526.	7683.	9279.	11584.	15041.	17966.	17789.	15750.	10283.	5230.	2045.
107	981.	762.	556.	455.	396.	334.	319.	271.	256.	245.	187.

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108      5289.  7269.  8658.  10490.  12559.  14745.  14923.  12943.  8747.  4669.  1785.
109      889.   742.   544.   449.    390.    340.    319.    268.    250.   235.   183.
110      4846.  6649.  7949.  9338.   10963.  11850.  11495.  10431.  7328.  3901.  1504.
111      810.   694.   564.   470.    405.    346.    313.    262.    245.   231.   183.
112      4432.  6176.  7328.  8363.   9545.   9929.   9220.   8038.   5051.  3014.  1265.
113      730.   638.   520.   446.    384.    325.    298.    256.    238.   228.   176.
114      3989.  5703.  6737.  7624.   8244.   7978.   6796.   5940.   3989.  2216.  1022.
115      691.   612.   485.   405.    361.    307.    293.    249.    232.   223.   172.
116      3694.  5230.  6235.  7003.   7447.   6737.   5349.   4373.   2807.  1507.  892.
117      656.   588.   467.   381.    340.    293.    278.    236.    218.   212.   164.
118      3398.  4787.  5880.  6353.   6856.   5821.   4373.   3487.   2033.  1259.  827.
119      591.   564.   464.   378.    337.    290.    275.    234.    217.   207.   165.
120      3191.  4610.  5614.  6206.   6590.   5585.   3960.   3191.   1797.  1149.  798.
121      600.   550.   443.   369.    331.    290.    272.    227.    211.   203.   158.
122      3014.  4432.  5378.  5999.   6206.   5408.   3841.   3103.   1720.  1099.  777.
123      591.   535.   431.   361.    319.    281.    263.    228.    207.   197.   154.
  1      ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|
  2          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
  3      ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|
END OF FILE
```

ADDENDUM:

Note: A more efficient way to use this program is to:

(1) Compile it using Fortran H -
$RUN *FTN SCARDS=BEMPAT.S SPRINT=LIST_FILE SPUNCH=OBJBEM2 PAR=OPT=H

(2) Store the subject file (here OBJBEM2)

(3) Repeatedly run the object file -
$RUN OBJBEM2 8=DECKHEADER+HEADLAMP 5=-OUT 11=MATRIX

APPENDIX 3

BEAM PATTERN NO. 1 FOR G.E. 6014 LOW BEAM (NO.2 PH.) MAY 7, 1980

HORIZONTAL ANGLE	VERTICAL ANGLES -4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0
-20.0	978.0	1120.0	1108.0	1040.0	884.0	662.0	449.0	384.0	331.0	284.0
-19.5	1073.0	1241.0	1257.0	1176.0	1014.0	748.0	505.0	426.0	363.0	301.0
-19.0	1161.0	1371.0	1371.0	1306.0	1129.0	839.0	564.0	467.0	390.0	322.0
-18.5	1247.0	1480.0	1501.0	1439.0	1274.0	949.0	638.0	511.0	423.0	337.0
-18.0	1333.0	1572.0	1608.0	1587.0	1433.0	1073.0	742.0	561.0	449.0	355.0
-17.5	1401.0	1655.0	1705.0	1711.0	1584.0	1191.0	833.0	629.0	491.0	381.0
-17.0	1454.0	1740.0	1808.0	1853.0	1726.0	1318.0	934.0	691.0	535.0	414.0
-16.5	1492.0	1814.0	1921.0	1944.0	1803.0	1433.0	1028.0	765.0	576.0	440.0
-16.0	1528.0	1879.0	2015.0	2051.0	1953.0	1545.0	1132.0	839.0	615.0	470.0
-15.5	1566.0	1933.0	2104.0	2136.0	2074.0	1661.0	1232.0	904.0	659.0	488.0
-15.0	1602.0	2009.0	2172.0	2207.0	2181.0	1767.0	1321.0	966.0	694.0	508.0
-14.5	1637.0	2057.0	2252.0	2284.0	2269.0	1838.0	1371.0	1008.0	721.0	523.0
-14.0	1678.0	2125.0	2329.0	2411.0	2346.0	1900.0	1433.0	1043.0	751.0	541.0
-13.5	1690.0	2190.0	2382.0	2473.0	2423.0	1995.0	1504.0	1093.0	774.0	558.0
-13.0	1729.0	2275.0	2494.0	2612.0	2538.0	2077.0	1581.0	1144.0	801.0	564.0
-12.5	1791.0	2367.0	2609.0	2775.0	2662.0	2193.0	1667.0	1206.0	836.0	582.0
-12.0	1835.0	2467.0	2760.0	2943.0	2837.0	2320.0	1755.0	1285.0	875.0	612.0
-11.5	1897.0	2553.0	2899.0	3100.0	2952.0	2438.0	1847.0	1345.0	919.0	635.0
-11.0	1938.0	2618.0	2982.0	3310.0	3073.0	2559.0	1947.0	1410.0	963.0	662.0
-10.5	1989.0	2668.0	3073.0	3457.0	2221.0	2680.0	2033.0	1469.0	993.0	683.0
-10.0	2030.0	2716.0	3132.0	3605.0	3457.0	2878.0	2163.0	1540.0	1025.0	709.0
-9.5	2042.0	2736.0	2985.0	3782.0	3694.0	3191.0	2323.0	1613.0	1087.0	748.0
-9.0	2042.0	2781.0	3280.0	3989.0	4048.0	3516.0	2509.0	1711.0	1147.0	765.0
-8.5	2021.0	2834.0	3457.0	4226.0	4285.0	3753.0	2657.0	1820.0	1203.0	790.0
-8.0	2077.0	2881.0	3635.0	4403.0	4432.0	4255.0	2784.0	1853.0	1256.0	819.0
-7.5	2116.0	3079.0	3841.0	4610.0	4669.0	4462.0	2911.0	2006.0	1315.0	857.0
-7.0	2184.0	3280.0	4019.0	4817.0	4905.0	4698.0	3162.0	2122.0	1374.0	895.0
-6.5	2157.0	3457.0	4226.0	5083.0	5260.0	4994.0	3339.0	2231.0	1472.0	940.0
-6.0	2320.0	3635.0	4432.0	5408.0	5585.0	5319.0	3487.0	2346.0	1557.0	984.0
-5.5	2382.0	3753.0	4551.0	5644.0	5910.0	5437.0	3694.0	2473.0	1652.0	1049.0
-5.0	2408.0	3812.0	4728.0	5940.0	6206.0	5940.0	3901.0	2621.0	1758.0	1111.0
-4.5	2426.0	3901.0	4905.0	6176.0	6383.0	6146.0	4078.0	2790.0	1873.0	1179.0
-4.0	2479.0	4048.0	5053.0	6383.0	6678.0	6353.0	4373.0	2999.0	1974.0	1241.0
-3.5	2571.0	4137.0	5260.0	6708.0	7181.0	6590.0	4905.0	3635.0	2154.0	1315.0
-3.0	2662.0	4285.0	5496.0	7328.0	8008.0	7506.0	5614.0	4107.0	2402.0	1433.0
-2.5	2804.0	4551.0	5880.0	8185.0	8895.0	8422.0	6383.0	4698.0	2784.0	1608.0
-2.0	3005.0	4462.0	6649.0	9101.0	9722.0	9249.0	7181.0	5378.0	3398.0	1835.0
-1.5	3339.0	5703.0	7890.0	10874.0	11584.0	10815.0	8510.0	6294.0	3930.0	2113.0
-1.0	3989.0	6974.0	9958.0	13445.0	14450.0	13652.0	10845.0	8067.0	4905.0	2541.0
-0.5	4610.0	8451.0	11968.0	16489.0	17907.0	17316.0	14598.0	11199.0	6678.0	3082.0
0.0	5349.0	9663.0	13770.0	18764.0	21749.0	22547.0	19946.0	15336.0	8510.0	4432.0

BEAM PATTERN NO. 1 FOR G.E. 6014 LOW BEAM (NO.2 PH.)　　　MAY 7, 1980

HORIZONTAL	VERTICAL ANGLES									
ANGLE	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0
0.0	5349.0	9663.0	13770.0	18764.0	21749.0	22547.0	19946.0	15336.0	8510.0	4432.0
0.5	6235.0	10668.0	14893.0	21099.0	26595.0	29225.0	26950.0	22162.0	13032.0	6412.0
1.0	7033.0	11554.0	16607.0	23906.0	31559.0	36937.0	35755.0	32180.0	20508.0	9101.0
1.5	7801.0	12381.0	18262.0	26359.0	34869.0	42847.0	40188.0	39301.0	25265.0	11229.0
2.0	8244.0	13091.0	19237.0	27038.0	35460.0	42256.0	41370.0	38710.0	24467.0	11850.0
2.5	8244.0	13002.0	18823.0	25915.0	32800.0	37824.0	36937.0	35164.0	21897.0	11111.0
3.0	7801.0	11879.0	16666.0	22694.0	29254.0	33687.0	32800.0	31323.0	18469.0	9486.0
3.5	7210.0	10815.0	14539.0	19414.0	26595.0	31027.0	29550.0	28663.0	16134.0	8008.0
4.0	6767.0	9840.0	12766.0	17346.0	24467.0	28959.0	27186.0	24142.0	14686.0	7328.0
4.5	6412.0	9131.0	11465.0	15041.0	21099.0	25413.0	25117.0	22724.0	14568.0	6856.0
5.0	6146.0	8599.0	10697.0	13623.0	18705.0	22783.0	23433.0	21158.0	13829.0	6294.0
5.5	5821.0	8156.0	9958.0	12677.0	16814.0	20330.0	20744.0	18410.0	12086.0	5694.0
6.0	5526.0	7683.0	9279.0	11584.0	15041.0	17966.0	17789.0	15750.0	10283.0	5230.0
6.5	5289.0	7269.0	8658.0	10490.0	12559.0	14745.0	14923.0	12943.0	8747.0	4669.0
7.0	4846.0	6649.0	7949.0	9338.0	10963.0	11850.0	11495.0	10431.0	7328.0	3901.0
7.5	4432.0	6176.0	7328.0	8363.0	9545.0	9929.0	9220.0	8038.0	5851.0	3014.0
8.0	3989.0	5703.0	6737.0	7624.0	8244.0	7978.0	6796.0	5940.0	3989.0	2216.0
8.5	3694.0	5230.0	6235.0	7003.0	7447.0	6737.0	5349.0	4373.0	2807.0	1507.0
9.0	3398.0	4787.0	5880.0	6353.0	6856.0	5821.0	4373.0	3487.0	2033.0	1259.0
9.5	3191.0	4610.0	5614.0	6206.0	6590.0	5585.0	3960.0	3191.0	1797.0	1149.0
10.0	3014.0	4432.0	5378.0	5999.0	6206.0	5408.0	3841.0	3103.0	1720.0	1099.0

BEAM PATTERN NO. 1 FOR G.E. 6014 LOW BEAM (NO.2 PH.) MAY 7, 1980

HORIZONTAL ANGLE	VERTICAL ANGLES 0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
-20.0	284.0	236.0	220.0	176.0	169.0	149.0	136.0	126.0	112.0	98.0	92.0	85.0	66.0
-19.5	301.0	249.0	231.0	186.0	173.0	153.0	139.0	130.0	116.0	99.0	92.0	86.0	67.0
-19.0	322.0	266.0	238.0	195.0	179.0	157.0	142.0	135.0	120.0	102.0	95.0	86.0	67.0
-18.5	337.0	275.0	247.0	204.0	184.0	161.0	146.0	135.0	121.0	105.0	98.0	88.0	70.0
-18.0	355.0	289.0	251.0	215.0	190.0	168.0	142.0	139.0	123.0	106.0	100.0	91.0	70.0
-17.5	381.0	306.0	267.0	233.0	199.0	176.0	155.0	141.0	126.0	109.0	101.0	93.0	72.0
-17.0	414.0	325.0	281.0	247.0	213.0	185.0	161.0	144.0	129.0	111.0	102.0	93.0	73.0
-16.5	440.0	340.0	290.0	263.0	226.0	189.0	167.0	149.0	131.0	111.0	103.0	95.0	74.0
-16.0	470.0	352.0	299.0	271.0	234.0	195.0	171.0	154.0	132.0	112.0	103.0	96.0	75.0
-15.5	488.0	366.0	313.0	278.0	239.0	202.0	176.0	158.0	134.0	115.0	106.0	98.0	77.0
-15.0	508.0	381.0	325.0	287.0	240.0	204.0	178.0	159.0	135.0	118.0	109.0	101.0	79.0
-14.5	523.0	396.0	337.0	296.0	247.0	208.0	181.0	163.0	141.0	121.0	113.0	106.0	81.0
-14.0	541.0	411.0	349.0	301.0	252.0	212.0	183.0	168.0	144.0	126.0	116.0	108.0	82.0
-13.5	558.0	428.0	366.0	307.0	259.0	218.0	186.0	172.0	149.0	131.0	119.0	111.0	86.0
-13.0	564.0	431.0	375.0	310.0	266.0	223.0	191.0	176.0	154.0	135.0	123.0	113.0	84.0
-12.5	582.0	443.0	375.0	287.0	270.0	228.0	197.0	180.0	158.0	140.0	126.0	118.0	90.0
-12.0	612.0	461.0	390.0	325.0	276.0	233.0	201.0	186.0	162.0	144.0	129.0	119.0	90.0
-11.5	635.0	485.0	402.0	346.0	282.0	240.0	208.0	189.0	169.0	147.0	132.0	121.0	92.0
-11.0	662.0	502.0	414.0	361.0	293.0	247.0	214.0	195.0	174.0	152.0	134.0	125.0	93.0
-10.5	683.0	523.0	428.0	375.0	306.0	259.0	223.0	202.0	175.0	155.0	138.0	126.0	94.0
-10.0	709.0	547.0	443.0	387.0	307.0	270.0	232.0	209.0	181.0	163.0	142.0	131.0	96.0
-9.5	748.0	564.0	470.0	408.0	325.0	282.0	241.0	216.0	188.0	165.0	147.0	135.0	99.0
-9.0	765.0	550.0	485.0	423.0	343.0	298.0	249.0	222.0	194.0	171.0	151.0	138.0	102.0
-8.5	798.0	582.0	493.0	446.0	369.0	301.0	258.0	229.0	202.0	178.0	158.0	144.0	105.0
-8.0	819.0	600.0	499.0	452.0	366.0	316.0	268.0	241.0	208.0	182.0	166.0	150.0	110.0
-7.5	857.0	615.0	511.0	461.0	390.0	331.0	280.0	249.0	215.0	190.0	173.0	161.0	116.0
-7.0	895.0	632.0	520.0	464.0	396.0	334.0	288.0	258.0	223.0	198.0	179.0	167.0	121.0
-6.5	940.0	621.0	529.0	464.0	399.0	340.0	293.0	257.0	227.0	205.0	184.0	171.0	124.0
-6.0	984.0	683.0	544.0	479.0	408.0	343.0	291.0	264.0	230.0	210.0	188.0	175.0	126.0
-5.5	1049.0	715.0	558.0	488.0	411.0	349.0	290.0	267.0	234.0	215.0	192.0	181.0	131.0
-5.0	1111.0	748.0	573.0	502.0	420.0	325.0	290.0	271.0	241.0	222.0	197.0	186.0	134.0
-4.5	1179.0	792.0	585.0	520.0	428.0	355.0	301.0	281.0	250.0	230.0	204.0	193.0	138.0
-4.0	1241.0	824.0	609.0	541.0	387.0	358.0	307.0	284.0	254.0	235.0	208.0	199.0	143.0
-3.5	1315.0	866.0	638.0	564.0	434.0	363.0	313.0	289.0	260.0	240.0	214.0	206.0	150.0
-3.0	1433.0	910.0	659.0	585.0	446.0	375.0	316.0	292.0	263.0	246.0	220.0	210.0	156.0
-2.5	1608.0	978.0	694.0	606.0	464.0	390.0	325.0	299.0	268.0	249.0	233.0	214.0	158.0
-2.0	1835.0	1064.0	730.0	624.0	473.0	399.0	340.0	278.0	277.0	256.0	217.0	216.0	161.0
-1.5	2113.0	1229.0	786.0	653.0	488.0	405.0	346.0	298.0	284.0	262.0	231.0	220.0	164.0
-1.0	2541.0	1412.0	848.0	686.0	505.0	420.0	361.0	304.0	293.0	271.0	240.0	226.0	168.0
-0.5	3082.0	1673.0	931.0	736.0	529.0	437.0	372.0	319.0	301.0	277.0	246.0	236.0	173.0
0.0	4432.0	2068.0	1070.0	792.0	564.0	461.0	393.0	334.0	313.0	288.0	256.0	249.0	182.0

BEAM PATTERN NO. 1 FOR G.E. 6014 LOW BEAM (NO.2 PH.) MAY 7, 1980

HORIZONTAL ANGLE	VERTICAL ANGLES 0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
0.0	4432.0	2068.0	1070.0	792.0	564.0	461.0	393.0	334.0	313.0	288.0	256.0	249.0	182.0
0.5	6412.0	2713.0	1250.0	866.0	603.0	485.0	411.0	346.0	328.0	301.0	268.0	259.0	190.0
1.0	9101.0	3537.0	1401.0	960.0	644.0	514.0	428.0	363.0	337.0	275.0	278.0	266.0	195.0
1.5	11229.0	4048.0	1528.0	1002.0	677.0	544.0	443.0	363.0	346.0	310.0	283.0	275.0	206.0
2.0	11850.0	4314.0	1637.0	1058.0	709.0	547.0	449.0	369.0	355.0	313.0	290.0	281.0	215.0
2.5	11111.0	4196.0	1655.0	1073.0	712.0	553.0	458.0	381.0	366.0	275.0	298.0	286.0	211.0
3.0	9486.0	3782.0	1560.0	1025.0	683.0	541.0	458.0	381.0	366.0	278.0	301.0	280.0	208.0
3.5	8008.0	3369.0	1439.0	960.0	650.0	529.0	449.0	372.0	358.0	272.0	295.0	273.0	199.0
4.0	7328.0	2985.0	1300.0	895.0	618.0	514.0	434.0	361.0	346.0	297.0	281.0	263.0	194.0
4.5	6856.0	2719.0	1182.0	848.0	612.0	499.0	426.0	352.0	337.0	286.0	275.0	258.0	194.0
5.0	6294.0	2532.0	1105.0	813.0	591.0	493.0	417.0	349.0	334.0	283.0	269.0	257.0	197.0
5.5	5694.0	2269.0	1064.0	780.0	570.0	470.0	411.0	343.0	325.0	274.0	263.0	255.0	194.0
6.0	5230.0	2045.0	981.0	762.0	556.0	455.0	396.0	334.0	319.0	271.0	256.0	245.0	187.0
6.5	4669.0	1785.0	889.0	742.0	544.0	449.0	390.0	340.0	319.0	268.0	250.0	235.0	183.0
7.0	3901.0	1504.0	810.0	694.0	564.0	470.0	405.0	346.0	313.0	262.0	245.0	231.0	183.0
7.5	3014.0	1265.0	730.0	638.0	520.0	446.0	384.0	325.0	290.0	256.0	238.0	228.0	176.0
8.0	2216.0	1022.0	691.0	612.0	485.0	405.0	361.0	307.0	293.0	249.0	232.0	223.0	172.0
8.5	1507.0	892.0	656.0	588.0	467.0	381.0	340.0	293.0	278.0	236.0	218.0	212.0	164.0
9.0	1259.0	827.0	591.0	564.0	464.0	378.0	337.0	290.0	275.0	234.0	217.0	207.0	165.0
9.5	1149.0	798.0	600.0	550.0	443.0	369.0	331.0	290.0	272.0	227.0	211.0	203.0	158.0
10.0	1099.0	777.0	591.0	535.0	431.0	361.0	319.0	281.0	263.0	228.0	207.0	197.0	154.0

APPENDIX 4

```
 1   ----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|.
 2       5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
 3   ----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|.
 1   -20.0 -4.5  0.5  61  22GAE  6014 LOW BEAM (NO.2 PH.)
 2    0.688551E 01 0.702108E 01 0.701031E 01 0.694690E 01 0.678446E 01 0.649527E 01 0.610702E 01 0.595064E 01 0.580212E 01
 3    0.564897E 01 0.546383E 01 0.539363E 01 0.517048E 01 0.512990E 01 0.500395E 01 0.491265E 01 0.483628E 01 0.471850E 01
 4    0.458497E 01 0.452179E 01 0.444265E 01 0.418965E 01 0.697821E 01 0.712367E 01 0.713648E 01 0.706987E 01 0.692166E 01
 5    0.661740E 01 0.622456E 01 0.605444E 01 0.589440E 01 0.570711E 01 0.551745E 01 0.544242E 01 0.522575E 01 0.515329E 01
 6    0.503044E 01 0.493447E 01 0.486753E 01 0.475359E 01 0.459512E 01 0.452179E 01 0.445435E 01 0.420469E 01 0.705704E 01
 7    0.722330E 01 0.722330E 01 0.717472E 01 0.702909E 01 0.673221E 01 0.633505E 01 0.614633E 01 0.596615E 01 0.577455E 01
 8    0.558350E 01 0.547227E 01 0.527300E 01 0.518739E 01 0.505625E 01 0.495583E 01 0.490527E 01 0.478749E 01 0.462497E 01
 9    0.455388E 01 0.445435E 01 0.420469E 01 0.712850E 01 0.729980E 01 0.731389E 01 0.727170E 01 0.714992E 01 0.605541E 01
10    0.645834E 01 0.623637E 01 0.604737E 01 0.582008E 01 0.561677E 01 0.550939E 01 0.531812E 01 0.521494E 01 0.508140E 01
11    0.498361E 01 0.490527E 01 0.479579E 01 0.465196E 01 0.458497E 01 0.447734E 01 0.424850E 01 0.719519E 01 0.736010E 01
12    0.730275E 01 0.736960E 01 0.726752E 01 0.697821E 01 0.660935E 01 0.632972E 01 0.610702E 01 0.587212E 01 0.566643E 01
13    0.552545E 01 0.537064E 01 0.524702E 01 0.512396E 01 0.495583E 01 0.493447E 01 0.481218E 01 0.466344E 01 0.460517E 01
14    0.451086E 01 0.424850E 01 0.724494E 01 0.741156E 01 0.744132E 01 0.744483E 01 0.736771E 01 0.708255E 01 0.672503E 01
15    0.644413E 01 0.619644E 01 0.594280E 01 0.572350E 01 0.558725E 01 0.545104E 01 0.529330E 01 0.517048E 01 0.504342E 01
16    0.494876E 01 0.483628E 01 0.469135E 01 0.461512E 01 0.453260E 01 0.427667E 01 0.728207E 01 0.746164E 01 0.749990E 01
17    0.752456E 01 0.745356E 01 0.718387E 01 0.683948E 01 0.653814E 01 0.620227E 01 0.602587E 01 0.578382E 01 0.563835E 01
18    0.550939E 01 0.536129E 01 0.522036E 01 0.508140E 01 0.496981E 01 0.485981E 01 0.470953E 01 0.462497E 01 0.453260E 01
19    0.429046E 01 0.730787E 01 0.750329E 01 0.756060E 01 0.757250E 01 0.749721E 01 0.726752E 01 0.693537E 01 0.663988E 01
20    0.635611E 01 0.600677E 01 0.582895E 01 0.566980E 01 0.557215E 01 0.542053E 01 0.524175E 01 0.511799E 01 0.500395E 01
21    0.487520E 01 0.470953E 01 0.463473E 01 0.455388E 01 0.430406E 01 0.733171E 01 0.753849E 01 0.760837E 01 0.762608E 01
22    0.757712E 01 0.734278E 01 0.703174E 01 0.673221E 01 0.642162E 01 0.615273E 01 0.586363E 01 0.570044E 01 0.560212E 01
23    0.545532E 01 0.527300E 01 0.514166E 01 0.503695E 01 0.488200E 01 0.471850E 01 0.463473E 01 0.456435E 01 0.431749E 01
24    0.735620E 01 0.756683E 01 0.765160E 01 0.766669E 01 0.763723E 01 0.741517E 01 0.711639E 01 0.680683E 01 0.649072E 01
25    0.619032E 01 0.590263E 01 0.574620E 01 0.562762E 01 0.547646E 01 0.530827E 01 0.517048E 01 0.506259E 01 0.489784E 01
26    0.474493E 01 0.466344E 01 0.458497E 01 0.434381E 01 0.737901E 01 0.760539E 01 0.768340E 01 0.769939E 01 0.768754E 01
27    0.747704E 01 0.718614E 01 0.687316E 01 0.654247E 01 0.623048E 01 0.594280E 01 0.578382E 01 0.565948E 01 0.548064E 01
28    0.531812E 01 0.518170E 01 0.506890E 01 0.490527E 01 0.477068E 01 0.469135E 01 0.461512E 01 0.436945E 01 0.740062E 01
29    0.762900E 01 0.771957E 01 0.773368E 01 0.772709E 01 0.751643E 01 0.722330E 01 0.691572E 01 0.658064E 01 0.625958E 01
30    0.598141E 01 0.582008E 01 0.569036E 01 0.550939E 01 0.533754E 01 0.519850E 01 0.509375E 01 0.494876E 01 0.479579E 01
31    0.472739E 01 0.466344E 01 0.439445E 01 0.742536E 01 0.766153E 01 0.775319E 01 0.778780E 01 0.776047E 01 0.754961E 01
32    0.726752E 01 0.694986E 01 0.662141E 01 0.629342E 01 0.601859E 01 0.585507E 01 0.570711E 01 0.552943E 01 0.535659E 01
33    0.520949E 01 0.512396E 01 0.496981E 01 0.483628E 01 0.475359E 01 0.468213E 01 0.440672E 01 0.743240E 01 0.769166E 01
34    0.777569E 01 0.781319E 01 0.779276E 01 0.759840E 01 0.731588E 01 0.699668E 01 0.665157E 01 0.632436E 01 0.605912E 01
35    0.590263E 01 0.572685E 01 0.555683E 01 0.530449E 01 0.522575E 01 0.514749E 01 0.500395E 01 0.487520E 01 0.477912E 01
36    0.470953E 01 0.445435E 01 0.745530E 01 0.772973E 01 0.782164E 01 0.786787E 01 0.783913E 01 0.763860E 01 0.736581E 01
37    0.704229E 01 0.668586E 01 0.633505E 01 0.606611E 01 0.592693E 01 0.573657E 01 0.558350E 01 0.540717E 01 0.525227E 01
38    0.517048E 01 0.503695E 01 0.490527E 01 0.481218E 01 0.472739E 01 0.443082E 01 0.749053E 01 0.776938E 01 0.786672E 01
39    0.792841E 01 0.788683E 01 0.769303E 01 0.741878E 01 0.709506E 01 0.672863E 01 0.636647E 01 0.609357E 01 0.592693E 01
40    0.565948E 01 0.559842E 01 0.542935E 01 0.528320E 01 0.519296E 01 0.506259E 01 0.494164E 01 0.483628E 01 0.477068E 01
41    0.449981E 01 0.751480E 01 0.781076E 01 0.792299E 01 0.798718E 01 0.795050E 01 0.774932E 01 0.747022E 01 0.715851E 01
42    0.677422E 01 0.641673E 01 0.613340E 01 0.596615E 01 0.578382E 01 0.562040E 01 0.545104E 01 0.530330E 01 0.522575E 01
43    0.508760E 01 0.496981E 01 0.485981E 01 0.477912E 01 0.449981E 01 0.754803E 01 0.784502E 01 0.797212E 01 0.803916E 01
44    0.799024E 01 0.779893E 01 0.752132E 01 0.720415E 01 0.682329E 01 0.645362E 01 0.610415E 01 0.599645E 01 0.584644E 01
45    0.564191E 01 0.548064E 01 0.533754E 01 0.524175E 01 0.512990E 01 0.499043E 01 0.488200E 01 0.479579E 01 0.452179E 01
46    0.756941E 01 0.787017E 01 0.800035E 01 0.810470E 01 0.803041E 01 0.784737E 01 0.757404E 01 0.725134E 01 0.687005E 01
47    0.649527E 01 0.621860E 01 0.602587E 01 0.588088E 01 0.568017E 01 0.550939E 01 0.536590E 01 0.527300E 01 0.515905E 01
48    0.502388E 01 0.489784E 01 0.482831E 01 0.453260E 01 0.759539E 01 0.788908E 01 0.803041E 01 0.814816E 01 0.770571E 01
49    0.789357E 01 0.761727E 01 0.729234E 01 0.690073E 01 0.652649E 01 0.625958E 01 0.605912E 01 0.592693E 01 0.572350E 01
50    0.555683E 01 0.540717E 01 0.530827E 01 0.516479E 01 0.504342E 01 0.492725E 01 0.483628E 01 0.454329E 01 0.761579E 01
51    0.790691E 01 0.804943E 01 0.819008E 01 0.814816E 01 0.796485E 01 0.767925E 01 0.733954E 01 0.693245E 01 0.656386E 01
52    0.630445E 01 0.609357E 01 0.595842E 01 0.572685E 01 0.559842E 01 0.544674E 01 0.534233E 01 0.519850E 01 0.509375E 01
53    0.495583E 01 0.487520E 01 0.456435E 01 0.762160E 01 0.791425E 01 0.800135E 01 0.823801E 01 0.821447E 01 0.806809E 01
54    0.775061E 01 0.738585E 01 0.699118E 01 0.661740E 01 0.633505E 01 0.615273E 01 0.601127E 01 0.578382E 01 0.564191E 01
55    0.548480E 01 0.537528E 01 0.523644E 01 0.510594E 01 0.499043E 01 0.490527E 01 0.459512E 01 0.762168E 01 0.793057E 01
56    0.809560E 01 0.829130E 01 0.830598E 01 0.816500E 01 0.782764E 01 0.744483E 01 0.704490E 01 0.663980E 01 0.630992E 01
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57	0.618415E 01	0.604737E 01	0.583773E 01	0.569709E 01	0.551745E 01	0.540268E 01	0.526786E 01	0.514166E 01	0.501728E 01
58	0.492725E 01	0.462497E 01	0.761135E 01	0.794944E 01	0.814816E 01	0.834901E 01	0.836287E 01	0.823031E 01	0.788495E 01
59	0.750659E 01	0.709257E 01	0.668211E 01	0.636647E 01	0.620051E 01	0.610032E 01	0.591080E 01	0.570711E 01	0.555296E 01
60	0.543372E 01	0.530827E 01	0.518178E 01	0.506259E 01	0.496981E 01	0.465396E 01	0.763868E 01	0.796589E 01	0.819836E 01
61	0.839004E 01	0.839661E 01	0.835585E 01	0.793164E 01	0.752456E 01	0.713569E 01	0.670808E 01	0.639693E 01	0.621261E 01
62	0.611368E 01	0.590263E 01	0.575574E 01	0.559099E 01	0.548480E 01	0.533754E 01	0.520401E 01	0.511199E 01	0.501063E 01
63	0.470048E 01	0.765728E 01	0.803236E 01	0.825349E 01	0.843598E 01	0.844870E 01	0.840335E 01	0.797625E 01	0.760390E 01
64	0.718159E 01	0.675344E 01	0.642162E 01	0.623637E 01	0.613340E 01	0.596615E 01	0.580212E 01	0.563479E 01	0.551745E 01
65	0.537064E 01	0.524702E 01	0.515329E 01	0.508140E 01	0.475359E 01	0.768891E 01	0.809560E 01	0.829879E 01	0.847991E 01
66	0.849801E 01	0.845489E 01	0.805896E 01	0.766011E 01	0.722548E 01	0.679682E 01	0.644889E 01	0.625383E 01	0.613988E 01
67	0.598141E 01	0.581114E 01	0.566296E 01	0.555296E 01	0.540717E 01	0.528827E 01	0.518739E 01	0.511799E 01	0.479579E 01
68	0.767647E 01	0.814816E 01	0.834901E 01	0.853366E 01	0.856789E 01	0.851599E 01	0.811343E 01	0.771021E 01	0.729438E 01
69	0.684588E 01	0.643133E 01	0.627099E 01	0.613988E 01	0.598896E 01	0.582895E 01	0.568017E 01	0.554908E 01	0.542495E 01
70	0.532301E 01	0.521494E 01	0.514166E 01	0.482028E 01	0.774932E 01	0.819836E 01	0.839661E 01	0.859563E 01	0.862784E 01
71	0.857904E 01	0.815680E 01	0.776047E 01	0.735052E 01	0.689163E 01	0.652649E 01	0.629895E 01	0.617170E 01	0.601127E 01
72	0.583773E 01	0.567332E 01	0.557595E 01	0.543808E 01	0.534711E 01	0.523644E 01	0.516479E 01	0.483628E 01	0.777569E 01
73	0.823031E 01	0.842310E 01	0.863835E 01	0.868440E 01	0.860098E 01	0.821447E 01	0.781319E 01	0.740974E 01	0.695559E 01
74	0.657228E 01	0.632436E 01	0.619032E 01	0.601859E 01	0.585507E 01	0.566988E 01	0.558725E 01	0.545532E 01	0.537064E 01
75	0.525749E 01	0.519850E 01	0.487520E 01	0.778655E 01	0.824591E 01	0.846126E 01	0.868946E 01	0.873327E 01	0.868946E 01
76	0.826899E 01	0.787131E 01	0.747193E 01	0.701302E 01	0.661740E 01	0.635089E 01	0.621860E 01	0.604025E 01	0.578382E 01
77	0.566988E 01	0.560212E 01	0.548480E 01	0.540268E 01	0.528320E 01	0.522575E 01	0.489784E 01	0.779400E 01	0.826899E 01
78	0.849801E 01	0.872843E 01	0.876139E 01	0.872356E 01	0.831336E 01	0.793380E 01	0.753530E 01	0.707242E 01	0.667456E 01
79	0.637161E 01	0.625383E 01	0.605912E 01	0.587212E 01	0.570711E 01	0.563835E 01	0.552146E 01	0.543808E 01	0.531812E 01
80	0.526269E 01	0.492725E 01	0.781561E 01	0.830598E 01	0.852774E 01	0.876139E 01	0.880657E 01	0.875668E 01	0.838320E 01
81	0.800603E 01	0.758782E 01	0.712367E 01	0.671417E 01	0.641182E 01	0.629342E 01	0.595842E 01	0.588053E 01	0.572685E 01
82	0.564897E 01	0.553733E 01	0.545959E 01	0.533754E 01	0.529330E 01	0.496284E 01	0.785205E 01	0.832773E 01	0.856789E 01
83	0.881106E 01	0.887919E 01	0.879331E 01	0.849801E 01	0.819836E 01	0.767508E 01	0.718159E C1	0.676388E 01	0.645834E 01
84	0.633505E 01	0.607304E 01	0.589440E 01	0.574620E 01	0.566643E 01	0.556068E 01	0.548064E 01	0.536598E 01	0.532788E 01
85	0.501063E 01	0.788683E 01	0.836287E 01	0.861178E 01	0.889946E 01	0.898820E 01	0.892346E 01	0.863302E 01	0.832045E 01
86	0.778406E 01	0.726752E 01	0.681344E 01	0.649072E 01	0.637161E 01	0.610032E 01	0.592693E 01	0.575574E 01	0.567675E 01
87	0.557215E 01	0.550533E 01	0.539363E 01	0.534711E 01	0.504986E 01	0.793880E 01	0.842310E 01	0.867931E 01	0.901006E 01
88	0.909324E 01	0.903860E 01	0.876139E 01	0.845489E 01	0.793164E 01	0.738275E 01	0.688551E 01	0.654247E 01	0.640688E 01
89	0.613988E 01	0.596615E 01	0.578382E 01	0.570044E 01	0.559099E 01	0.551745E 01	0.545104E 01	0.536598E 01	0.506259E 01
90	0.800803E 01	0.840335E 01	0.880222E 01	0.911614E 01	0.918215E 01	0.913227E 01	0.887919E 01	0.859007E 01	0.813094E 01
91	0.751480E 01	0.696979E 01	0.659304E 01	0.643615E 01	0.615909E 01	0.598896E 01	0.582895E 01	0.562762E 01	0.562402E 01
92	0.554518E 01	0.537990E 01	0.537528E 01	0.508140E 01	0.811343E 01	0.864875E 01	0.897335E 01	0.929413E 01	0.935738E 01
93	0.928069E 01	0.904900E 01	0.874735E 01	0.827639E 01	0.765586E 01	0.711396E 01	0.666696E 01	0.648158E 01	0.619032E 01
94	0.600389E 01	0.584644E 01	0.569709E 01	0.564897E 01	0.556834E 01	0.544242E 01	0.539363E 01	0.509987E 01	0.829130E 01
95	0.884994E 01	0.920613E 01	0.950636E 01	0.957845E 01	0.952164E 01	0.929146E 01	0.899554E 01	0.849801E 01	0.784031E 01
96	0.725276E 01	0.674288E 01	0.653088E 01	0.622456E 01	0.604025E 01	0.588888E 01	0.571703E 01	0.568017E 01	0.560212E 01
97	0.548064E 01	0.542053E 01	0.512396E 01	0.843598E 01	0.904204E 01	0.938999E 01	0.971045E 01	0.979295E 01	0.975939E 01
98	0.958864E 01	0.932358E 01	0.880657E 01	0.803333E 01	0.742237E 01	0.683626E 01	0.660123E C1	0.627099E 01	0.607993E 01
99	0.591889E 01	0.576519E 01	0.570711E 01	0.562402E 01	0.550533E 01	0.546383E 01	0.515329E 01	0.858466E 01	0.917606E 01
100	0.953025E 01	0.983969E 01	0.998732E 01	0.100234E 02	0.990078E 01	0.963796E 01	0.904900E 01	0.839661E 01	0.763434E 01
101	0.697541E 01	0.667456E 01	0.633505E 01	0.613340E 01	0.597381E 01	0.581114E 01	0.574620E 01	0.566296E 01	0.554518E 01
102	0.551745E 01	0.520401E 01	0.873793E 01	0.927500E 01	0.960865E 01	0.995698E 01	0.101885E 02	0.102828E 02	0.102017E 02
103	0.100061E 02	0.947516E 01	0.876593E 01	0.790581E 01	0.713090E 01	0.676388E 01	0.640192E 01	0.618415E 01	0.601859E 01
104	0.584644E 01	0.579301E 01	0.570711E 01	0.559099E 01	0.555683E 01	0.524702E 01	0.885837E 01	0.935479E 01	0.971758E 01
105	0.100819E 02	0.103596E 02	0.105170E 02	0.104844E 02	0.103791E 02	0.992857E 01	0.911614E 01	0.817103E 01	0.724494E 01
106	0.686693E 01	0.646770E 01	0.624222E 01	0.605912E 01	0.589440E 01	0.582008E 01	0.561677E 01	0.562762E 01	0.558350E 01
107	0.527300E 01	0.896201E 01	0.942392E 01	0.981258E 01	0.101796E 02	0.104594E 02	0.106654E 02	0.106013E 02	0.105790E 02
108	0.101372E 02	0.932625E 01	0.830598E 01	0.733171E 01	0.690975E 01	0.651767E 01	0.629895E 01	0.609357E 01	0.589440E 01
109	0.584644E 01	0.573657E 01	0.564545E 01	0.561677E 01	0.532788E 01	0.901724E 01	0.947968E 01	0.986459E 01	0.102050E 02
110	0.104762E 02	0.106515E 02	0.106303E 02	0.105639E 02	0.101051E 02	0.938008E 01	0.836962E 01	0.740062E 01	0.696414E 01
111	0.656386E 01	0.630445E 01	0.610702E 01	0.591080E 01	0.587212E 01	0.574620E 01	0.566988E 01	0.563835E 01	0.537064E 01
112	0.901724E 01	0.947286E 01	0.984283E 01	0.101626E 02	0.103982E 02	0.105407E 02	0.105170E C2	0.104678E 02	0.999410E 01
113	0.931569E 01	0.834189E 01	0.741156E 01	0.697821E 01	0.656808E 01	0.631536E 01	0.612687E 01	0.594288E 01	0.590263E 01
114	0.561677E 01	0.569709E 01	0.565599E 01	0.535186E 01	0.896201E 01	0.930253E 01	0.972113E 01	0.100299E 02	0.102838E 02
115	0.104249E 02	0.103982E 02	0.103521E 02	0.982385E 01	0.915757E 01	0.823081E 01	0.735244E 01	0.693245E 01	0.652649E 01

116	0.629342E 01	0.612687E 01	0.594280E 01	0.590263E 01	0.562762E 01	0.570711E 01	0.563479E 01	0.533754E 01	0.888322E 01
117	0.920869E 01	0.958459E 01	0.987375E 01	0.101885E 02	0.103426E 02	0.102930E 02	0.102634E 02	0.968868E 01	0.898820E 01
118	0.812237E 01	0.727170E 01	0.686693E 01	0.647697E 01	0.627099E 01	0.610702E 01	0.591889E 01	0.580053E 01	0.560580E 01
119	0.560697E 01	0.560947E 01	0.529330E 01	0.881981E 01	0.919421E 01	0.945454E 01	0.976112E 01	0.101051E 02	0.102736E 02
120	0.102105E 02	0.100917E 02	0.959465E 01	0.889946E 01	0.800135E 01	0.717012E 01	0.679682E 01	0.642649E 01	0.624222E 01
121	0.607304E 01	0.588880E 01	0.584644E 01	0.569373E 01	0.563835E 01	0.557215E 01	0.526786E 01	0.876593E 01	0.911943E 01
122	0.934705E 01	0.961854E 01	0.995698E 01	0.101430E 02	0.101313E 02	0.100312E 02	0.958658E 01	0.883288E 01	0.790802E 01
123	0.707496E 01	0.674288E 01	0.641673E 01	0.621261E 01	0.605444E 01	0.586363E 01	0.582008E 01	0.565599E 01	0.561677E 01
124	0.555296E 01	0.526786E 01	0.872356E 01	0.905940E 01	0.927772E 01	0.951951E 01	0.983655E 01	0.100338E 02	0.100619E 02
125	0.995977E 01	0.953452E 01	0.874735E 01	0.783676E 01	0.700760E 01	0.670073E 01	0.638182E 01	0.620051E 01	0.603309E 01
126	0.585507E 01	0.581114E 01	0.564545E 01	0.559471E 01	0.554908E 01	0.528320E 01	0.866923E 01	0.900651E 01	0.920613E 01
127	0.944754E 01	0.972997E 01	0.991985E 01	0.994001E 01	0.982065E 01	0.939980E 01	0.864717E 01	0.772709E 01	0.696979E 01
128	0.665929E 01	0.634564E 01	0.615273E 01	0.601859E 01	0.583773E 01	0.578382E 01	0.561313E 01	0.557215E 01	0.554126E 01
129	0.526786E 01	0.861722E 01	0.894676E 01	0.913551E 01	0.935738E 01	0.961854E 01	0.979624E 01	0.978633E 01	0.966460E 01
130	0.923825E 01	0.856217E 01	0.762315E 01	0.688857E 01	0.663595E 01	0.632077E 01	0.612030E 01	0.598141E 01	0.581114E 01
131	0.576519E 01	0.560212E 01	0.554518E 01	0.550126E 01	0.523111E 01	0.857338E 01	0.889137E 01	0.906624E 01	0.925818E 01
132	0.943819E 01	0.959866E 01	0.961066E 01	0.946831E 01	0.907647E 01	0.844870E 01	0.748717E 01	0.679010E 01	0.660935E 01
133	0.629895E 01	0.610702E 01	0.596615E 01	0.582895E 01	0.576519E 01	0.559099E 01	0.552146E 01	0.545959E 01	0.520949E 01
134	0.848591E 01	0.880222E 01	0.898080E 01	0.914185E 01	0.930228E 01	0.938008E 01	0.934967E 01	0.925254E 01	0.889946E 01
135	0.826899E 01	0.731588E 01	0.669703E 01	0.654247E 01	0.633505E 01	0.615273E 01	0.600389E 01	0.584644E 01	0.574620E 01
136	0.556834E 01	0.550126E 01	0.544242E 01	0.520949E 01	0.839661E 01	0.872843E 01	0.889946E 01	0.903157E 01	0.916377E 01
137	0.920321E 01	0.912913E 01	0.899193E 01	0.867437E 01	0.801102E 01	0.714283E 01	0.659304E 01	0.645834E 01	0.625383E 01
138	0.610032E 01	0.595064E 01	0.578382E 01	0.569709E 01	0.554518E 01	0.547227E 01	0.542935E 01	0.517048E 01	0.829130E 01
139	0.864875E 01	0.881537E 01	0.893906E 01	0.901724E 01	0.898444E 01	0.882409E 01	0.860946E 01	0.829130E 01	0.770346E 01
140	0.692952E 01	0.653814E 01	0.641673E 01	0.618415E 01	0.600389E 01	0.588888E 01	0.572685E 01	0.560017E 01	0.551745E 01
141	0.544674E 01	0.540717E 01	0.514749E 01	0.821447E 01	0.856217E 01	0.873793E 01	0.885409E 01	0.891557E 01	0.881537E 01
142	0.858466E 01	0.838320E 01	0.793987E 01	0.731788E 01	0.679347E 01	0.648616E 01	0.637673E 01	0.614633E 01	0.594280E 01
143	0.582895E 01	0.560017E 01	0.562762E 01	0.546383E 01	0.538449E 01	0.535659E 01	0.509987E 01	0.813094E 01	0.847366E 01
144	0.867931E 01	0.875660E 01	0.883288E 01	0.866923E 01	0.838320E 01	0.815680E 01	0.761727E 01	0.713807E 01	0.671780E 01
145	0.638182E 01	0.633505E 01	0.613988E 01	0.593489E 01	0.582008E 01	0.566988E 01	0.561677E 01	0.545532E 01	0.537990E 01
146	0.533272E 01	0.510594E 01	0.806809E 01	0.843598E 01	0.863302E 01	0.873327E 01	0.879331E 01	0.862784E 01	0.828400E 01
147	0.806809E 01	0.749387E 01	0.704665E 01	0.668211E 01	0.639693E 01	0.630992E 01	0.609357E 01	0.591080E 01	0.580212E 01
148	0.566988E 01	0.560580E 01	0.542495E 01	0.535186E 01	0.531321E 01	0.506259E 01	0.801102E 01	0.839661E 01	0.859007E 01
149	0.869935E 01	0.873327E 01	0.859563E 01	0.825349E 01	0.804012E 01	0.745008E 01	0.700216E 01	0.665544E 01	0.638182E 01
150	0.628227E 01	0.606611E 01	0.588088E 01	0.576519E 01	0.563835E 01	0.557215E 01	0.542935E 01	0.533272E 01	0.528320E 01
151	0.503695E 01								

```
 1  ----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|
 2      5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
 3  ----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|----:----|
END OF FILE
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APPENDIX 5

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            C ----------PROGRAM LAMPER---------------------------
            C       PROGRAM REVISED BY PAUL GREEN 5/9/80
            C        SEE JUDITH M. BECKER AND RUDOLF G. MORTIMER, "FURTHER
            C DEVELOPMENT OF A
            C         COMPUTER SIMULATION TO PREDICT THE VISIBILITY DISTANCE PROVIDED
            C  BY
            C         HEADLAMP BEAMS", U OF MICHIGAN HIGHWAY SAFETY RESEARCH
            C INSTITUTE,
            C        REPORT UM-HSRI-74-26, ANN ARBOR, MICHIGAN USA,
            C        NOVEMBER 1974.
            C        AND RUDOLF G. MORTIMER AND JUDITH M. BECKER, "DEVELOPMENT OF
            C COMPUTER
            C         SIMULATION TO PREDICT THE VISIBILITY DISTANCE PROVIDED BY
            C HEADLAMP
            C        BEAMS", --------, REPORT UM-HSRI-73-15,-------, JULY 1973.
            C      THE PDP VERSION IS DESIGNED TO RUN UNDER RSX-11D.
            C       UNIT NUMBERS FOR MTS RUN CARD: 8=CONTROL COMMANDS, 5=PRINTED
            C OUTPUT,
            C       11=BEAM PATTERN VALUES FROM BEMPAT
            C      THIS PROGRAM PROCESSES THE OUTPUT GENERATED BY BEMPAT. IT SHOULD
            C       BE NOTED THAT THERE MUST BE ON UNIT 11 A PATTERN FOR EACH LAMP.
            C       (IF THERE ARE 4 LAMPS, THE SAME APTTERN MUST BE REPEATED 4 TIMES.
            C       AT A MINIMUM THE CONTROL CARDS ON UNIT 8 SHOULD INCLUDE T, THE
            C       TITLE,Z, D(5) AND L.
            C      SAMPLE RUN COMMAND:
            C       $RUN *WATFIV SCARDS=LAMPER+CONVR+CURVE+INTAB+BEAMS+GLARE+INPUT+
            C       OUTPUT 5=OUTLAMP1 8=LAMPER-CMDS 11=MATRIX
            C      SUBROUTINE CALLS:
            C        LAMPER
            C          SETFILE,FILE & DATE (PDP VERSION)-- TIME (MTS VERSION)
            C          INPUT
            C            CURVE, EXIT
            C          BEAMS
            C            INTAB
            C          GLARE
            C            CURVE, CONVR
            C          OUTPUT
            C              THIS SIMULATION ALLOWS THE RELATIVE EVALUATION OF THE
            C               PERFORMANCE OF VARIOUS HEADLAMP BEAM PATTERNS IN TERMS OF
            C  THE
            C               VISIBILITY DISTANCE PROVIDED AND THE DISABILITY GLARE
            C PRODUCED,
            C               AS WELL AS ESTIMATING THE DISCOMFORT GLARE PRODUCED
            C DURING A
            C              NIGHT MEETING SITUATION:
            C
0001              DIMENSION IALF(2),DAT(3),VG(3),CARD(8),JTITL(21),ITITL(40)
0002              COMMON DDS(88),DVIS(88),GLR(88),GV(88),DGI(88),DVMIN,DVDS,GVMAX,GV
                 1DS,DVMG,GVG,GVF,GMI,GME,IMAX
0003              COMMON DSTRT,DSTOP,DSD,DST,DSDEL(3),XSTRT,XDEL,EK,PG(4),A(2),B(2),
                 1ALX(20,10),XX(20,2),XS,YS,ZS,PO(5),GSP(4),YE,ZE,YT,ZT,GM(5,2),XM(5
                 2,2),YM(5,2),ZM(5,2),YGL(5),ZGL(5),RHO,XVMIN,LAMP(15),ILS,IEK,IGM,I
                 3HV,ICV,DSGRZ,XVGRZ,FCDR
0004              COMMON DTR,RTD,XSTCI,ZSTRT,ZSTOP,DELX,DELZ,RHOS,RHOT,ZCL,XE,XB,YBT
                 1,ZBB,ZBT,RC,SX(3),SY(3),SZ(3),RS(3),HD(2),VD(2),REFL(2),TRS(2),P(6
```

```
                 2,2),Q(9,2),AFT(15),IFG
0005              COMMON HH,VV,IHA,IVA,AL(61,22),DH,DV
0006              DATA IALF/'D','L'/
0007              DATA IBLANK/' '/
           C
           C      MODS FOR PCP
           C      CALL SETFIL(11,'JBEAM',IERR,'DK',1)
           C      DEFINE FILE 11(10,2716,U,N1)
           C
           C               DEFINE CONSTANTS
0008              RTD = 57.29578
0009              DTR = .0174533
0010              DTRS = .003046177
0011              DO 2  I=1,3
0012            2 DAT(I) = BLANK
           C               DETERMINE DATE
0013              CALL TIME(5,0,DAT)
           C       CALL PARAMETERS ARE 5=FORMAT KEY,0=NO PRINT,DAT=STORE IN DAT (SEE
           C   MTS V5)
           C      FOR PCP USE   CALL DATE(DAT)
           C
           C               DEFINE SEPARATION AND TARGET DISTANCE VECTORS
0014           95 XX(1,1) = 50.
0015              XX(1,2) = 50.
0016              DO 6 I=2,10
0017            6 XX(I,2) = XX(I-1,2)+50.
0018              DO 7 I=11,15
0019            7 XX(I,2) = XX(I-1,2)+100.
0020              DO 8 I=16,20
0021            8 XX(I,2) = XX(I-1,2)+500.
0022              DO 9 I=2,6
0023            9 XX(I,1) = XX(I-1,1)+10.
0024              DO 10 I=7,16
0025           10 XX(I,1) = XX(I-1,1)+20.
0026              XX(17,1) = 400.
0027              XX(18,1) = 500.
0028              XX(19,1) = 800.
0029              XX(20,1) = 1000.
0030              IPAGE = 1
0031              WRITE(5,9994) DAT,IPAGE
0032         9994 FORMAT (1H1,30X,'HEADLIGHT VISIBILITY PERFORMANCE EVALUATION',5X,
                1 3A4,5X,'PAGE',I3,//45X,'INPUT DATA')
0033              IPAGE = IPAGE+1
           C               DEFINE DEFAULT VALUES OF PARAMETERS
0034              BASR = 100.
0035              RODR = .1
           C      START AND STOP DISTANCES OF APPROACH COMPUTATION
0036              DSTRT = 4000.
0037              DSTOF = -1000.
0038              DST = 1000.
0039              DSDEI(1) = 50.
0040              DSDEI(2) = 10.
0041              DSDEI(3) = 1.
0042              XSTRT = 200.
0043              XDEL = 8.
```

```
0044          XSTOP = 200.                                                     64.000
0045          ZSTRT = -8.                                                      65.000
0046          ZSTOP = 8.                                                       66.000
0047          DELX = 10.                                                       67.000
0048          DELZ = 2.                                                        68.000
0049          A(1) = 3.4                                                       69.000
0050          A(2) = .36                                                       70.000
0051          B(1) = .016                                                      71.000
0052          B(2) = .00008                                                    72.000
        C                                                                      72.500
0053          CALL INPUT(BASE,ITITL)                                           73.000
        C                                                                      73.500
0054          IF (IIS.LT.0) GO TO 102                                          74.000
0055          IF (DSTRT.GT.XX(20,2)) XX(20,2)=DSTRT                            75.000
0056          WRITE(5,9901) DSTRT,DSTOP                                        76.000
0057     9901 FORMAT (1H0,'SEPARATION DISTANCES:  INITIAL ',F8.1,' FEET, FINAL '  77.000
             1,F8.1,' FEET')                                                   78.000
        C     READ D OR L CARD                                                 78.500
0058      100 READ(6,9999)ID,CARD                                              79.000
0059     9999 FORMAT (A1,E9.0,7E10.0)                                          80.000
        C     IS IT D, L, OR ILLEGAL?                                          80.500
0060          DO 101 I=1,2                                                     81.000
0061          IF (ID-IALF(I)) 101,103,101                                      82.000
0062      101 CONTINUE                                                         83.000
0063          WRITE(5,9998)ID,CARD                                             84.000
0064     9998 FORMAT ('0ILLEGAL CARD'/1X,A1,8E13.4)                            85.000
0065      102 READ(6,9999)ID,CARD                                              86.000
0066          IF (ID.EQ.IALF(1)) GO TO 102                                     87.000
0067          NDS = CARD(1) + .5                                               88.000
0068          GO TO 710                                                        89.000
0069      103 GO TO (200,600),I                                                90.000
        C     I=1...D CARD;I=2...L CARD                                        90.500
        C               CARD D            VEHICLE GEOMETRY AND MISAIM ANGLES   91.000
        C               READ DISC FILE FOR BEAM PATTERN DATA                   92.000
0070      200  N = CARD(8)+.5                                                  93.000
        C     READ STATEMENT FOR PDP VERSION                                   93.200
        C     READ(11'N)HH,VV,DD,IHA,IVA,JTITL,((AL(I,J),J=1,IVA),I=1,IHA)     94.000
        C     BINARY READ STATEMENT FOR MTS VERSION                            94.050
        C     PROBLEM WITH UNFORMATTED I/O IN WATFIV, THEREFORE FOR MTS USE:   94.200
0071          READ (11,201) HH,VV,DD,IHA,IVA,JTITL                             94.300
0072      201 FORMAT(3F5.1,2I5,21A2)                                           94.400
        C     NOTE: THERE MUST BE A BEAM PATTERN FOR EACH LAMP                 94.450
        C      (DOES NOT REREAD INPUT ON UNIT 11)                              94.470
0073          READ (11,202) ((AL(I,J),J=1,IVA),I=1,IHA)                        94.500
0074      202 FORMAT(9E13.6)                                                   94.600
0075          DV = ABS(DD)                                                     95.000
0076          DH = DD                                                          96.000
0077          IF (DD.LT.0.) DH=2*DV                                            97.000
0078          CALL BEAMS(VGZ,VG,CARD,JTITL)                                    98.000
0079          GO TO 100                                                        99.000
        C               CARD L  PROCESS FOREGROUND GLARE DATA                 100.000
0080      600 NDS = CARD(1) + .5                                              101.000
0081          IF (IFG.NE.0) GO TO 650                                         102.000
0082          IF (IIS.NE.0) GO TO 605                                         103.000
0083          FG(1) = VG(1)                                                   104.000
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0084          FG(2) = 0.                                                   105.000
0085          FG(3) = 0.                                                   106.000
0086          FG(4) = 1.                                                   107.000
0087          GO TC 630                                                    108.000
0088      605 IF (IEV+ICV.EQ.0) GC TO 606                                  109.000
0089          TSA = VG(2)-VG(3)                                            110.000
0090          TSB = VG(1)-VG(2)                                            111.000
0091          TSC = TSB-TSA                                                112.000
0092          FG(2) = 0.                                                   113.000
0093          FG(1) = (VG(1)*VG(3)-VG(2)*VG(2))/TSC                        114.000
0094          FG(3) = -TSB/TSA*TSE/TSC*TSB                                 115.000
0095          FG(4) = XS*ALCG(TSA/TSB)                                     116.000
0096          GO TC 630                                                    117.000
0097      606 TSA = VG(1)-VGZ                                              118.000
0098          TSB = VG(2)-VGZ                                              119.000
0099          TSC = VG(3)-VGZ                                              120.000
0100          FG(1) = VGZ                                                  121.000
0101          TSE = VG(2)*TSB - VG(3)*TSA + (VG(1)-VG(2))*VGZ              122.000
0102          IF (TSE) 610,610,620                                         123.000
0103      610 FG(2) = 0.                                                   124.000
0104          TSD = TSA/TSB                                                125.000
0105          FG(3) = -TSD*TSA                                             126.000
0106          FG(4) = XS/ALCG(TSD)                                         127.000
0107          GO TC 630                                                    128.000
0108      620 TSD = SQRT(TSE)                                              129.000
0109          EBX = (TSB+TSD)/TSC                                          130.000
0110          IF (FEX.LE.0.) EBX=(TSB-TSD)/TSC                             131.000
0111          TSE = (TSB*EBX-TSA)*EBX                                      132.000
0112          FG(3) = TSE-TSA*EBX                                          133.000
0113          FG(2) = TSE/XS                                               134.000
0114          FG(4) = XS/ALCG(EBX)                                         135.000
0115      630 WRITE(5,9996)FG                                              136.000
0116     9996 FORMAT (1H0,'COEFFICIENTS FOR GOL = GA+(AX-C)*EXP(-X/B)'/4E14.4/)  137.000
0117          FG(4) = -FG(4)                                               138.000
0118      650 IF (FG(4)) 670,660,660                                       139.000
0119      660 WRITE(5,9995)                                                140.000
0120     9995 FORMAT ('0FOREGROUND GLARE DATA BAD')                        141.000
0121          GO TO 710                                                    142.000
0122      670 IF (IHV.NE.1) GO TC 675                                      143.000
0123          WRITE(5,9992)XVGRZ                                           144.000
0124     9992 FORMAT (1H0,'TARGET WILL BE BELOW CROWN OF HILL AND INVISIBLE FOR   145.000
             1VISIBILITY DISTANCES GREATER THAN',F7.1,' FEET'/' NOTE THAT VISIBI  146.000
             2LITY DISTANCE MAY BE LIMITED TO THIS VALUE')                 147.000
0125          WRITE(5,9908)DSGRZ                                           148.000
0126     9908 FORMAT (' GLARE CAR WILL BE INVISIBLE BELOW CREST OF HILL FOR SEPA  149.000
             1RATICN DISTANCES GREATER THAN',F8.1,' FEET')                 150.000
0127      675 IF (ICM.EQ.0) GO TO 690                                      151.000
0128          DO 68C I=1,5                                                 152.000
0129          K = I+10                                                     153.000
0130          IF (IAMF(K).LE.0) GC TO 680                                  154.000
0131          WRITE(5,9993) K,(J,GM(1,J),J=1,2)                            155.000
0132      680 CONTINUE                                                     156.000
0133     9993 FORMAT (' MIRRCR GLARE ILLUMINATION AT EYE FROM LAMP NO.',I3,  157.000
             1' VIA MIRRCR NC.',I2,' IS',F10.6,' FT-C. AND NO.',I2,' IS'   158.000
             2,F10.6,' FT-C.')                                             158.500
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```
 0134          690 INVIS = 0                                                        159.000
 0135          695 CALL GLARE(INVIS)                                                160.000
 0136              IF (INVIS.GT.1) GO TO 710                                        161.000
 0137              IF (IPAX.EQ.0) GO TO 700                                         162.000
 0138              WRITE(5,9997) DAT,IPAGE,ITITL                                    163.000
 0139         9997 FORMAT (1H1,30X,'HEADLIGHT VISIBILITY PERFORMANCE EVALUATION',   164.000
                  15X,3A4,5X,'PAGE',I3//45X,'OUTPUT DATA'//20X,40A2/)               165.000
 0140              CALL CUTPUT(DTES)                                                166.000
 0141          700 IF (INVIS.EQ.0) GO TO 710                                        167.000
 0142              XSTRT = XSTRT/2.                                                 168.000
 0143              GO TO 695                                                        169.000
 0144          710 IF (NDS.GT.0) GO TO 95                                           170.000
 0145              RETURN                                                           170.500
             C     FOR PTP USE  CALL EXIT  IN PLACE OF RETURN                       171.000
 0146              END                                                              172.000
  *OPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
  *OPTIONS IN EFFECT*  NAME = MAIN    , LINECNT =       57
  *STATISTICS*     SOURCE STATEMENTS =       146,PROGRAM SIZE =      4278
  *STATISTICS*  NO DIAGNOSTICS GENERATED
```

```
              C
              C -----------------------------------------------------------------
   0001             SUBROUTINE CONVR(I,J,X,R,G,XD)
              C     LAST EXAMINED BY PAUL GREEN 4/30/80
              C     WRITTEN BY JUDY BECKER
              C     CALLED BY SUBROUTINE GLARE WHICH IS IN TURN CALLED BY LAMPER
              C               THIS SUBROUTINE CHECKS WHETHER THE TARGET IS JUST VISIBLE
              C  AND
              C               DETERMINES WHETHER THE TARGET SHOULD BE MOVED CLOSER OR
              C FARTHER.
   0002             DATA XMIN/1./
   0003             T = R
   0004             IF (R) 120,290,130
   0005         120 RTOP = R
   0006             XTOP = X
   0007             GTOP = G
   0008             IF (I.LE.0) GO TO 135
   0009             ITOP = ITOP+1
   0010             IF (IBOT.EQ.ITOP) K=0
   0011             GO TO 135
   0012         130 RBOT = R
   0013             XBOT = X
   0014             GBOT = G
   0015             IF (I.LE.0) GO TO 135
   0016             IBOT = IBOT+1
   0017             IF (IBOT.EQ.ITOP) K=0
   0018         135 IF (I) 180,140,150
   0019         140 K = 0
   0020             ITOP = 0
   0021             IBOT = 0
   0022             GO TO 270
   0023         150 IF (R*PR) 160,290,190
   0024         160 IF (K) 190,170,170
   0025         170 I = -1
   0026         180 XD = XD*.5
   0027             IF (XD-XMIN) 280,275,275
   0028         190 IF (R) 200,290,260
   0029         200 S = (R-PR)/(X-PX)
   0030             IF (S) 210,300,220
   0031         210 K = 1
   0032             GO TO 230
   0033         220 K = -1
   0034             T = S
   0035         230 IF (I-1) 140,250,240
   0036         240 IF (S*PS) 300,300,250
   0037         250 PS = S
   0038         260 PPR = PR
   0039         270 I = I+1
   0040         275 PR = R
   0041             PX = X
   0042             X = PX+SIGN(XD,T)
   0043             J = 1
   0044             RETURN
   0045         280 TSA = RBOT/(RBOT-RTOP)
   0046             X = XBOT+(XTOP-XBOT)*TSA
```

```
0047                G = CEOT*(GTOF-GBOT)*TSA                                          49.000
0048           290  J = 2                                                             50.000
0049                RETURN                                                            51.000
0050           300  TSA = XD/2.*(3.*R-4.*FR*PPR)/(R-2.*PR*PPR)                        52.000
0051                X = X*SIGN(TSA,S)                                                 53.000
0052                J = 3                                                             54.000
0053                RETURN                                                            55.000
0054                END                                                               56.000
  *OPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
  *OPTIONS IN EFFECT*  NAME = CONVR    , LINECNT =        57
  *STATISTICS*     SOURCE STATEMENTS =          54,PROGRAM SIZE =       1372
  *STATISTICS*  NO DIAGNOSTICS GENERATED
```

```
             C
             C ---------------------------------------------------------------------
             C -
 0001                SUBROUTINE CURVE(I,J,X,D,E,V,W,R)
             C       LAST EXAMINED BY PAUL GREEN 4/30/80
             C       WRITTEN BY JUDY BECKER
             C        THIS PROGRAM IS CALLED BY INPUT, BEAMS & GLARE. THEY ARE CALLED
             C BY LAMPER.
             C                THIS SUBROUTINE RECOMPUTES THE COORDINATE GIVEN ROAD
             C CURVATURE.
             C       I DON'T UNDERSTAND HOW IT WORKS. (PG)
 0002                SMA = .05
 0003                TSA = I*D+R
 0004                IF (J.GT.1) GO TO 105
 0005                A = X/R
 0006                X = TSA*SIN(A)
 0007                GO TO 110
 0008            105 A = ATAN(X/SQRT(TSA*TSA-X*X))
 0009            110 IF (J.EQ.2) GO TO 120
 0010                TSB = COS(A)
 0011                TSC = 1.-TSB
 0012                IF (A.LE.SMA) TSC=A*A*.5
 0013                W = D*TSB-E-I*R*TSC
 0014                IF (J.LT.4) RETURN
 0015            120 V = R*A
 0016                RETURN
 0017                END
  *OPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
  *OPTIONS IN EFFECT*  NAME = CURVE    , LINECNT =       57
  *STATISTICS*     SOURCE STATEMENTS =        17,PROGRAM SIZE =       898
  *STATISTICS*  NO DIAGNOSTICS GENERATED
```

```
            C
            C -------------------------------------------------------------------
0001                 SUBROUTINE INTAB(H,V,I)
            C        LAST UPDATE BY PAUL GREEN 4/30/80
            C        WRITTEN BY JUDY BECKER
            C         THIS SUBROUTINE IS CALLED BY BEAMS WHICH IS IN TURN CALLED BY
            C LAMPER.
            C                 THIS SUBROUTINE INTERPOLATES TO FIND THE INTENSITY FOR A
            C PAIR OF
            C                 HORIZONTAL AND VERTICAL ANGLES IN THE BEAM PATTERN. IT
            C USES A
            C                 DOUBLE SECOND ORDER SCHEME NEAR THE HOTSPOT, SECOND ORDER
            C  IN ONE
            C                 DIRECTION AND FIRST ORDER IN THE OTHER NEAR RIDGES, AND
            C DOUBLE
            C                FIRST ORDER ELSEWHERE.
0002                 COMMON DDS(88),DVIS(88),GLR(88),GV(88),DGI(88),DVMIN,DVDS,GVMAX,GV
                    1ES,DVAG,GVG,GVF,GMI,GEE,IMAX
0003                 COMMON DSTRT,DSTOP,DSD,DST,DSDEL(3),XSTRT,XDEL,EK,FG(4),A(2),B(2),
                    1ALX(20,10),XX(20,2),XS,YS,ZS,PO(5),GSP(4),YE,ZE,YT,ZT,GM(5,2),XM(5
                    2,2),YM(5,2),ZM(5,2),YGL(5),ZGL(5),RHO,XVMIN,LAMP(15),ILS,IEK,IGM,I
                    3HV,ICV,ESGR2,YVGEZ,ECDR
0004                 COMMON DTR,RTE,XSTCE,ZSTRT,ZSTOP,DELX,DELZ,RHOS,RHOT,ZCL,XE,XB,YBT
                    1,ZBR,ZBL,RC,SX(3),SY(3),SZ(3),HS(3),HD(2),VD(2),REFL(2),TRS(2),P(6
                    2,2),C(9,2),AFT(15),IFG
0005                 COMMON HH,VV,IHA,IVA,AL(61,22),DH,DV
0006                 DATA EPS/.001/
0007                 JH = 1
0008                 JV = 1
0009                 KH = 1
0010                 IV = 1
0011                 M = 0
0012                 N = 0
0013                 TSE = 1.
0014                 TSF = 1.
0015                 IF (H.GE.HH) GO TO 10
0016                 K = 2
0017                 I = 1
0018                 JH = -1
0019                 GO TO 30
0020              10 I = 1 + (H-HH)/DH
0021                 IF (I.GE.IHA) GO TO 20
0022                 K = I+1
0023                 GO TO 30
0024              20 I = IHA
0025                 K = I-1
0026                 JH = -1
0027                 KH = -1
0028                 TSE = -1.
0029              30 TSD = HH-DH+DH*I
0030                 TSA = (H-TSD)/DH*TSE
0031                 IF (V.GE.VV) GO TO 40
0032                 L = 2
0033                 J = 1
0034                 JV = -1
```

```
0035          IV = -1
0036          GO TO 60
0037       40 J = 1 + (V-VV)/DV
0038          IF (J.GE.IVA) GO TO 50
0039          L = J+1
0040          GO TO 60
0041       50 J = IVA
0042          L = J-1
0043          JV = -1
0044          TSF = -1.
0045       60 TSD = VV-DV+DV*J
0046          TSB = (V-TSD)/DV
        C               CHECK FOR EXTRAPOLATION
0047          IF (IV.LT.JH) GO TO 160
0048       64 IF (JE*JV) 65,120,80
        C               DOUBLE EXTRAPOLATION
0049       65 TSC = AI(K,J)
0050          TSD = AI(I,J)
0051          TSG = AI(K,L)
0052          TSH = AI(I,L)
0053          TSE = TSC-TSD
0054          IF (ABS(TSG-TSE-TSH).LT.EPS) GO TO 75
0055          DAL = ((TSG-TSE-TSH)*TSA+TSH-TSD)*TSB+TSE*TSA
0056          IF (DAL.LE.0.) GO TO 70
0057          N = 1 + (VV-V)/DV
0058          M = 1 + (HH-H)/DH*KH + (KH-1)/2*(IHA-1)
0059          EN = N
0060          EM = M
0061          EL = (EM+EN)/2./EM/EN
0062          DAL = ((TSE+TSH-TSG)*EL*TSA+TSH-TSD)*TSB+TSE*TSA
0063          IF (DAL.LE.0.) GO TO 70
0064          T = 0.
0065          RETURN
0066       70 T = EXP(TSD+DAL)
0067          RETURN
0068       75 T = EXP(TSD)
0069          RETURN
        C               CHECK FOR SECOND ORDER USE
0070       80 II = I
0071          IF (AI(I,J).LT.AI(K,J)) GO TO 90
0072          IF (I.EQ.1) GO TO 100
0073          IF (AI(I-1,J).GT.AI(I,J)) GO TO 100
0074          M = K
0075          K = I
0076          I = I-1
0077          TSA = TSA+1.
0078          GO TO 100
0079       90 IF (K.EQ.IHA) GO TO 120
0080          IF (AI(K+1,J).LT.AI(K,J)) M=K+1
0081      100 IF (AI(II,J).LT.AI(II,L)) GO TO 110
0082          IF (J.EQ.1) GO TO 120
0083          IF (AI(II,J-1).GT.AI(II,J)) GO TO 120
0084          N = I
0085          L = J
0086          J = J-1
```

```
0087            TSB = TSB+1.
0088            GO TO 120
0089        110 IF (L.EQ.IVA) GO TO 120
0090            IF (AI(II,L+1).LT.AL(II,L)) N=L+1
0091        120 TSC = 1.-TSA
0092            TSD = 1.-TSB
0093            IF (M+N.GT.0) GO TO 130
          C               DOUBLE FIRST ORDER
0094            T = EXP(TSC*(TSD*AL(I,J)+TSB*AL(I,L))+TSA*(TSD*AL(K,J)+TSB*AL(K,L)
               1))
0095            RETURN
0096        130 TSE = 2.-TSA
0097            TSF = 2.-TSB
0098            IF (N.NE.0) GO TO 140
          C               FIRST ORDER VERTICALLY, SECOND ORDER HORIZONTALLY
0099            TSC = TSC/2.
0100            T = EXP(TSE*TSC*(TSB*AL(I,L)+TSD*AL(I,J))+TSE*TSA*(TSB*AL(K,L)+TSD
               1*AL(K,J))-TSC*TSA*(TSB*AL(M,L)+TSD*AL(M,J)))
0101            RETURN
0102        140 IF (M.NE.0) GO TO 150
          C               FIRST ORDER HORIZONTALLY, SECOND ORDER VERTICALLY
0103            TSD = TSD/2.
0104            T = EXP(TSF*TSD*(TSA*AL(K,J)+TSC*AL(I,J))+TSF*TSD*(TSA*AL(K,L)+TSC
               1*AL(I,L))-TSD*TSB*(TSA*AL(K,N)+TSC*AL(I,N)))
0105            RETURN
          C               DOUBLE SECOND ORDER
0106        150 TSC = TSC/2.
0107            TSG = TSF*TSB
0108            TSF = TSF/2.*TSD
0109            TSD = -TSE/2.*TSB
0110            T = EXP(TSE*(TSA*(TSG*AL(K,L)+TSF*AL(K,J)+TSD*AL(K,N))+TSC*(TSG*AL
               1(I,L)+TSF*AL(I,J)+TSD*AL(I,N)))-TSC*TSA*(TSG*AL(M,L)+TSF*AL(M,J)+T
               2SD*AI(M,N)))
0111            RETURN
0112        160 IF (AI(I,J).LT.AI(I,L)) GO TO 64
0113            N = 3
0114            TSC = 1.-TSA
0115            TSD = (1.-TSB)/2.
0116            TSF = 2.-TSB
0117            T = EXP(TSF*TSE*(TSA*AL(K,J)+TSC*AL(I,J))+TSF*TSD*(TSA*AL(K,L)+TSC
               1*AL(I,L))-TSD*TSB*(TSA*AL(K,N)+TSC*AL(I,N)))
0118            IF (ALOG(T).GT..3+AI(I,J)) T=EXP(VV/V*AL(I,J))
0119            RETURN
0120            END
 *OPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
 *OPTIONS IN EFFECT*  NAME = INTAB   , LINECNT =       57
 *STATISTICS*    SOURCE STATEMENTS =       12C,PROGRAM SIZE =     4136
 *STATISTICS*  NO DIAGNCSTICS GENERATED
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```
           C
           C -------------------------------------------------------------------
 0001            SUDRCUTINE DEAMS(VGZ,VG,CARE,JTITL)
           C     LAST REVISED BY PAUL GREEN 5/6/80
           C     WRITTEN BY JUDY BECKER
           C     UNITS NUMBERS: 5=WHERE OUTPUT WRITTEN
           C     THIS SUBROUTINE CALLS INTAE ANC CURVE AND IS CALLED BY LAMPER
           C             THIS SUBROUTINE TAKES THE LAMP GEOMETRY AND MISAIM AND
           C CALCULATES
           C             THE ANGLES OF THE ROAD AND TARGET, EYE OR MIRRORS IN EACH
           C  MAIN,
           C             GLARE OR FOLLOWING VEHICLE LAMP BEAM PATTERN,
           C RESPECTIVELY.
           C
           C     DECLARATION BLOCK
 0002            DIMENSION AC(9),C(3),D(3),E(3),S(3),VG(3),JTITL(21),CARD(8),W(9)
 0003            COMMCN EDS(88),DVIS(88),GLR(88),GV(88),DGI(88),DVMIN,DVDS,GVMAX,GV
                1ES,DVNG,GVG,GVF,GM1,GME,IMAX
 0004            COMMCN DSTRT,DSTOP,DSD,DST,DSDEL(3),XSTRT,XDEL,EK,FG(4),A(2),B(2),
                1ALX(20,10),XX(20,2),XS,YS,ZS,PO(5),GSP(4),YE,ZE,YT,ZT,GM(5,2),XM(5
                2,2),YM(5,2),ZM(5,2),YGL(5),ZGL(5),RHO,XVMIN,LAMP(15),ILS,IEK,IGH,I
                3HV,ICV,DSGRZ,XVGRZ,KCDR
 0005            COMMCN DTR,RTE,XSTCE,ZSTRT,ZSTOP,DELX,DELZ,RHOS,RHOT,ZCL,XE,XB,YDT
                1,ZBR,ZBI,RC,SX(3),SY(3),SZ(3),RS(3),HD(2),VD(2),REFL(2),TRS(2),P(6
                2,2),C(9,2),AFT(15),IFG
 0006            COMMCN HH,VV,IHA,IVA,AL(61,22),DH,DV
           C     CARD IS CARD OR LINE IMAGE
 0007            M = CARE(1)+.5
 0008            MM = CARD(8) + .5
           C             COMPUTE THE ROTATION MATRIX FOR MISAIM IN PITCH, YAW AND
           C ROLL.
 0009            DO  10 I=1,3
 0010            TSA = CARD(I+4)*DTR
 0011            S(I) = SIN(TSA)
 0012         10 C(I) = COS(TSA)
 0013            TSA = S(2)*S(3)
 0014            TSB = C(2)*C(3)
 0015            TSC = S(1)
 0016            W(6) = TSB+TSA*TSC
 0017            W(7) = -TSA-TSE*TSC
 0018            TSA = S(2)*C(3)
 0019            TSE = C(2)*S(3)
 0020            W(4) = TSC*TSB-TSA
 0021            W(9) = TSE-TSA*TSC
 0022            W(2) = TSC
 0023            TSA = C(1)
 0024            W(1) = TSA*C(2)
 0025            W(8) = TSA*C(3)
 0026            W(3) = TSA*S(2)
 0027            W(5) = -TSA*S(3)
 0028            IF (LAMP(M).EQ.0) LAMP(M)=1
 0029            LAMP(M) = M*LAMP(M)
 0030            IF (M.GT.10) GO TO 230
 0031            IF (M-6)  20,160,170
           C             PROCESS MAIN VEHICLE LAMP GEOMETRY
```

```
0032         20 IF (M.NE.1) GO TO 40                                                  42.000
0033            D(1) = -XE                                                            43.000
0034            D(2) = CARD(3)/12.                                                    44.000
0035            D(3) = -CARD(4)/12.                                                   45.000
0036            VGZ = 0.                                                              46.000
0037            DO  30 I=1,3                                                          47.000
0038            VG(I) = 0.                                                            48.000
0039         30 E(I) = F(I)                                                           49.000
0040            TSA = D(2)+.5                                                         50.000
0041            XC = YE/(YE-TSA)*TSA                                                  51.000
0042            XVMIN = XE                                                            52.000
0043            WRITE(5,9905)M,(CARD(I),I=2,4),M,(CARD(I),I=5,7),MM,JTITL             53.000
0044       9905 FORMAT (1H0,'DISTANCE BETWEEN HEADLIGHT NO.',I2,                      54.000
               1' MISAIM ANGLE (DEGREES)  BEAM PATTERN'/' AND   (IN.)  X',            54.600
               26X,'Y',6X,'Z',7X,'INDEX VERT.  HOR.  ROT.  INDEX   NAME'/             55.200
               34X,'ORIGIN',3F7.1,I6,1X,3F6.1,I6,3X,21A2)                             55.800
0045            IF (IBV.NE.1) GO TO 60                                                57.000
0046            XGRZ = RHO*ATAN((SQRT((RHOT+D(2))*D(2)))/RHO)                         58.000
0047            XVGRZ = XGRZ+RHO*ATAN((SQRT((RHOT+YT)*YT))/RHO)                       59.000
0048            IF (XSTOP.GT.XGRZ) XSTOP=XGRZ                                         60.000
0049            GO TO 60                                                              61.000
0050         40 DO  50 I=1,3                                                          62.000
0051         50 D(I) = E(I)+CARD(I+1)/12.                                             63.000
0052            WRITE(5,9906)M,(CARD(I),I=2,4),M,(CARD(I),I=5,7),MM,JTITL             64.000
0053       9906 FORMAT (4X,'NO.',I2,1X,3F7.1,6X,I2,1X,3F6.1,4X,I2,3X,21A2)            65.000
0054            TSB = D(2)+.5                                                         66.000
0055            TSA = (YE*CARD(2)/12.+D(1)*TSB)/(TSB-YE)                              67.000
0056            IF (TSA.GT.XC) XC=TSA                                                 68.000
0057            TSA = -E(1)                                                           69.000
0058            IF (TSA.GT.XVMIN) XVMIN=TSA                                           70.000
0059         60 IF (IEG.NE.0) GO TO 120                                               71.000
       C                CALCULATE FOREGROUND GLARE  FOR THREE POINTS AND STRAIGHT     72.000
       C  AHEAD                                                                       72.000
0060            HM = FC*AFT(M)                                                        73.000
0061            X = XC+.5*DELX                                                        74.000
0062            YLP = -D(2)                                                           75.000
0063            YEP = -YE                                                             76.000
0064         70 XLP = X                                                               77.000
0065            XEP = X-CARD(2)*XE                                                    78.000
0066            XLPS = XLP*XLP                                                        79.000
0067            XEPS = XEP*XEP                                                        80.000
0068            IF (IHV.NE.0) CALL CURVE(IHV,3,XLP,0.,D(2),TSA,YLP,RHO)               81.000
0069            IF (IHV.NE.0) CALL CURVE(IHV,3,XEP,0.,YE,TSA,YEP,RHO)                 82.000
0070            YLPS = YLP*YLP                                                        83.000
0071            YEPS = YEP*YEP                                                        84.000
0072            Z = ZSTRT                                                             85.000
0073         90 ZLP = Z-D(3)                                                          86.000
0074            ZEP = Z+ZE                                                            87.000
0075            TSA = XLP*W(1)+YLP*W(2)+ZLP*W(3)                                      88.000
0076            H = RTD*ATAN((XLP*W(4)+YLP*W(5)+ZLP*W(6))/TSA)                        89.000
0077            V = RTD*ATAN((XLP*W(7)+YLP*W(8)+ZLP*W(9))/TSA)                        90.000
0078            CALL INTAB(H,V,T)                                                     91.000
0079            TSA = YEPS+ZEP*ZEP                                                    92.000
0080            TSB = XLPS+YLPS+ZLP*ZLP                                               93.000
0081            TSC = XEPS+TSA                                                        94.000
```

```
          TSE = 1/TSC*RM/TSC/TSB
          TSB = ATAN((SQRT(TSA))/XEP)
          VGZ = VGZ+TSE/TSB*XEP/(TSB+.02618)
          DO 100 I=1,3
          TSD = XEP*SX(I)+YEP*SY(I)+ZEP*SZ(I)
          TSA = YEP*SX(I)-XEP*SY(I)
          TSB = ZEP*SX(I)-XEP*SZ(I)
          TSC = ZEP*SY(I)-YEP*SZ(I)
          TSF = ATAN((SQRT(TSA*TSA+TSB*TSB+TSC*TSC))/TSD)
      100 VG(I) = VG(I)+TSE/TSF*TSD/RS(I)/(TSF+.02618)
          IF (Z.GE.ZSTOP) GO TO 110
          Z = Z+DELZ
          GO TC 90
      110 IF (X.GE.XSTOP) GO TC 120
          X = X+DELX
          GO TC 70
C                 CALCULATE INTENSITIES DIRECTED AT TARGET
      120 Y = Y1-D(2)
          Z = Z1-D(3)
          DO 150 I=1,20
          X = XX(I,1)-XE
          IF (IHV.NE.0) CALL CURVE(IHV,3,X,YT,D(2),TSA,Y,RHO)
          IF (ICV.NE.0) CALL CURVE(ICV,3,X,ZT,D(3),TSA,Z,RHO)
          TSA = X*W(1)+Y*W(2)+Z*W(3)
          H = RTD*ATAN((X*W(4)+Y*W(5)+Z*W(6))/TSA)
          V = RTD*ATAN((X*W(7)+Y*W(8)+Z*W(9))/TSA)
          CALL INTAB(H,V,T)
      150 ALX(I,M) = T*AFT(M)
          RETURN
C                 PROCESS GLARE VEHICLE LAMP GEOMETRY
      160 D(1) = 0.
          D(2) = CARD(3)/12.
          D(3) = CARD(4)/12.-ZCL
          E(2) = D(2)
          E(3) = D(3)
          IF (IHV.NE.1) GO TO 165
          DSGRZ = RHO*(ATAN((SQRT(D(2)*(D(2)+RHOT)))/RHO)+ATAN((SQRT(YE*(YE+
         1RHOT)))/RHO))
      165 WRITE(5,9905)M,D(1), (CARD(I),I=3,4),M,(CARD(I),I=5,7),MM,JTITL
          GO TC 180
      170 D(1) = CARD(2)/12.
          D(2) = E(2)+CARD(3)/12.
          D(3) = E(3)-CARD(4)/12.
          WRITE(5,9906)M,(CARD(I),I=2,4),M,(CARD(I),I=5,7),MM,JTITL
C                 CALCULATE INTENSITIES DIRECTED AT EYE
      180 N = M-5
          PO(N) = D(1)
          YGL(N) = D(2)
          ZGL(N) = D(3)
          Y = YE-D(2)
          Z = ZE+D(3)
          DO 220 I=1,20
          X = XX(I,2)
          IF (IHV.NE.0) CALL CURVE(IHV,1,X,YE,D(2),TSA,Y,RHO)
          IF (ICV.NE.0) CALL CURVE(-ICV,1,X,ZE,-D(3),TSA,Z,RHO)
```

```
0133           TSA = X*W(1)+Y*W(2)+Z*W(3)
0134           H = RTD*ATAN((X*W(4)+Y*W(5)+Z*W(6))/TSA)
0135           V = RTD*ATAN((X*W(7)+Y*W(8)+Z*W(9))/TSA)
0136           CALL INTAB(H,V,T)
0137           ALX(I,M) = T*AFT(M)
0138      220  CONTINUE
0139           RETURN
         C               PROCESS FOLLOWING VEHICLE LAMP GEOMETRY
0140      230  IF (M.NE.11) GO TO 240
0141           XFA = CARD(2)
0142           YLA =  CARD(3)/12.
0143           ZLA = -CARD(4)/12.
0144           XFS = XFA
0145           YL = YLA
0146           ZL = ZLA
0147           WRITE(5,9904)XFS
0148     9904  FORMAT (1H0,'DISTANCE FROM EYE TO HEADLAMP NO. 11 IS',F7.1,
              1' FEET')
0149           TSA = 0.
0150           WRITE(5,9905)M,TSA,(CARD(I),I=3,4),M,(CARD(I),I=5,7),MM,JTITL
0151           GO TO 250
0152      240  XFS = XFA-CARD(2)/12.
0153           YL = YLA+CARD(3)/12.
0154           ZL = ZLA+CARD(4)/12.
0155           WRITE(5,9906)M,(CARD(I),I=2,4),M,(CARD(I),I=5,7),MM,JTITL
         C               CALCULATE INTENSITIES DIRECTED AT MIRRORS
0156      250  X = XFS
0157           Y = YI-YE
0158           Z = ZI+ZE
0159           M = M-10
0160           IF (IHV.NE.0) CALL CURVE(IHV,1,X,YL,YE,TSA,Y,RHO)
0161           IF (ICV.NE.0) CALL CURVE(ICV,1,X,ZL,-ZE,TSA,Z,RHO)
0162           DO 310 N=1,2
0163           GM(M,N) = 0.
0164           IF (EI(N).EQ.0.) GO TO 310
0165           TSA = Q(2,N)*Y + Q(3,N)*Z
0166           TSD = P(1,N)/(2.*P(1,N)+Q(1,N)*X-TSA)
0167           DEL = (Q(9,N)*Z + Q(8,N)*Y - Q(7,N)*X)*TSD-P(3,N)
0168           EPS = (Q(6,N)*Z + Q(5,N)*Y - Q(4,N)*X)*TSD-P(2,N)
0169           TSB = (Q(2,N)*Q(2,N)+Q(3,N)*Q(3,N))*X
0170           TSE = Q(1,N)*TSA+TSE
0171           IF (VI(N).GT.0.) GO TO 280
0172           IF (SQRT(EPS*EPS+DEL*DEL).GT.HD(N)) GO TO 310
0173           GO TO 290
0174      280  IF (ABS(EPS).GT.VD(N)) GO TO 310
0175           IF (ABS(DEL).GT.HD(N)) GO TO 310
0176      290  TSC = P(1,N)+Q(1,N)*X - TSA
0177           XM(M,N) = TSD*(2.*TSC*Q(1,N)-X)
0178           YM(M,N) = TSD*(2.*TSC*Q(2,N)+Y)
0179           ZM(M,N) = TSD*(2.*TSC*Q(3,N)+Z)
0180           TSD = TSC/(TSC+P(1,N))
0181           TSA = P(5,N)-Y
0182           TSB = P(6,N)-Z
0183           YB = TSD*(XB*TSA+Y*P(4,N)+X*P(5,N))
0184           ZB = TSD*(XB*TSB+Z*P(4,N)+X*P(6,N))
```

```
          IF (YE.GT.YBT) GO TO 300
          IF (ZE.GT.ZBR) GO TO 300
          IF (ZE.GT.ZBL) GO TO 310
      300 TSC = P(4,N)+X
          TSD = TSC*W(1)+TSA*W(2)+TSB*W(3)
          H = R1D*ATAN((TSC*W(4)+TSA*W(5)+TSB*W(6))/TSD)
          V = R1D*ATAN((TSC*W(7)+TSA*W(8)+TSB*W(9))/TSD)
          TSD = TSA*TSA+TSB*TSB
          CALL INTAB(H,V,T)
          TSA = TSC*TSC+TSD
          GM(M,N) = T/TSA*APT(M+10)*TRS(N)*REFL(N)
      310 CONTINUE
          RETURN
          END
 *OPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
 *OPTIONS IN EFFECT*  NAME = BEAMS    , LINECNT =        57
 *STATISTICS*    SOURCE STATEMENTS =       198,PROGRAM SIZE =      6954
 *STATISTICS*  NO DIAGNOSTICS GENERATED
```

```
           C
           C ----------------------------------------------------------------
           C --
0001             SUBROUTINE GLARE(INVIS)
           C     LAST REVISED BY PAUL GREEN 5/1/80
           C      (COMMON BLOCKS CHANGED)
           C     PROGRAM WRITTEN BY JUDY BECKER
           C     SUBROUTINE CALLS GLARE AND CONVR AND IS CALLED BY LAMPER
           C                THIS SUBROUTINE COMPUTES THE VISIBILITY DISTANCE,
           C DISABILITY
           C              GLARE AND DISCOMFORT GLARE INDEX DURING THE NIGHT MEETING.
0002             DIMENSION XG(5),YG(5),ZG(5),THM(5,2)
0003             DIMENSION GL(5),DLR(5)
0004             COMMON DDS(88),DVIS(88),GLR(88),GV(88),DGI(88),DVMIN,DVDS,GVMAX,GV
                1DS,DVNG,GVG,GVF,GMI,GME,IMAX
0005             COMMON DSTRT,DSTOP,DSD,DST,DSDEL(3),XSTRT,XDEL,EK,PG(4),A(2),B(2),
                1ALX(20,10),XX(20,2),XS,YS,ZS,PO(5),GSP(4),YE,ZE,YT,ZT,GM(5,2),XM(5
                2,2),YM(5,2),ZM(5,2),YGL(5),ZGL(5),RHO,XVMIN,LAMP(15),ILS,IEK,IGM,I
                3HV,ICV,DSGRZ,XVGRZ,KCDR
           C     NEXT 2 COMMON BLOCKS WERE ADDED FOR MTS
0006             COMMON DTR,RTE,XSTOP,ZSTRT,ZSTOP,DELX,DELZ,RHOS,RHOT,ZCL,XE,XB,YBT
                1,ZBR,ZBL,RC,SX(3),SY(3),SZ(3),RS(3),HD(2),VD(2),REFL(2),TRS(2),P(6
                2,2),Q(9,2),AF1(15),IFG
0007             COMMON HH,VV,IHA,IVA,AL(61,22),DH,DV
0008             IMAX = 0
0009             IANG = 0
0010             ISTOP = 0
0011             JSTOP = 0
0012             IDS = 1
0013             JDS = 0
0014             NGL = 0
0015             IDIS = 1
0016             GDM = 0.
0017             GMI = 0.
0018             GME = 0.
0019             DGIM = 0.
0020             PGDS = 0.
0021             PGOL = 0.
0022             PGVI = 0.
0023             GVMAX = 0.
0024             PX  = .1E10
0025             DVMIN = PX
0026             XVMIN = XVMIN+2.
0027             EPS = 1.0001
0028             DO 10 I=1,88
0029             DGI(I) = -2.109695
0030          10 GLR(I) = 0.
0031             X = XSTRT
0032             DS = DSTRT
0033             DELES = DSD
0034             IGRZ = 0
0035             PI = 3.141593
0036         100 EQ = EK
0037             XD = XDEL
0038             IGDS = 0
```

```
      DGID = 1.
C                 CHECK EYE STATUS - READAPTATION, ADAPTATION, RECOVERY
      IF (IANG) 230,200,220
  200 IF (DS.GT.0.) GO TO 231
      GO TO 590
C                 COMPUTE RECOVERY VEILING GLARE
  220 GDS = GDSA*EXP(EK*(DS-DSA))
      IGDS = 1
      GO TO 270
  230 IF (IEK.EQ.0) EQ=EK*(1.+.4342945*ALOG((PGDS+PGOL)/(5.52*PGOL)))
      GDSR = PGDS*EXP(EQ*(DS-PDS))
  231 IF (IHV.NE.1) GO TO 240
C                 CHECK FOR GLARE VEHICLE BELOW CREST OF HILL
      IF (IGRZ.GT.0) GO TO 240
      PDS = DS
      IF (DS.GT.DSGRZ) GO TO 232
      IGRZ = IDIS
      DDS(IDIS) = DSGRZ
      PDS = DDS(IDIS-1)
      GO TO 233
  232 DDS(IDIS) = DS
  233 IF (JDS.EQ.1) GO TO 805
      IF (DS.GT.DST) GO TO 805
      JDS = 1
      DSD = DSDEI(1)
      GO TO 805
C                 COMPUTE GLARE INTENSITIES DIRECTED AT EYE
  240 DO 241 I=1,20
      IF (DS-XX(I,2)) 242,245,241
  241 CONTINUE
      J = 19
      GO TO 244
  242 J = 1
      IF (I.GT.1) J=I-1
  244 K = J+1
      TSB = XX(J,2)
      TSD = (DS-TSB)/(XX(K,2)-TSB)
      GO TO 247
  245 J = I
      K = J
      TSD = 0.
  247 DO 260 I=6,10
      IF (LAMP(I).LE.0) GO TO 260
      L = I-5
      TSA = AIX(J,I)
      GL(I) = TSA+(AIX(K,I)-TSA)*TSD
      TSF = YGI(I)
      TSE = ZGI(I)
      TSA = XG(L)+DS
      TSB = TSF-YE
      TSC = TSE+ZE
      IF (IHV.NE.0) CALL CURVE(IHV,1,TSA,TSF,YE,XV,TSB,RHO)
      IF (ICV.NE.0) CALL CURVE(ICV,1,TSA,TSE,-ZE,XV,TSC,RHO)
      XG(L) = TSA
      YG(I) = TSB
```

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      ZG(L) = TSC
      IF (IHV.NE.1) GO TO 255
      IF (IS.GT.DSGRZ) GL(L)=0.
  255 DLR(L) = XG(L)*XG(L)+YG(L)*YG(L)+ZG(L)*ZG(L)
  260 CONTINUE
  270 IXC = 0
  275 IX = 0
C                COMPUTE TOTAL INTENSITY DIRECTED AT TARGET FOR THIS
C TARGET DIST.
  280 TII = 0.
      DO 281 I=1,20
      IF (X-XX(I,1)) 282,282,281
  281 CONTINUE
      J = 20
      K = J-1
      GO TO 284
  282 J = 1
      IF (I-1) 284,284,283
  283 J = I-1
  284 K = J+1
      TSB = XX(J,1)
      TSC = (X-TSB)/(XX(K,1)-TSB)
      DO 300 I=1,5
      IF (LAMP(I).LE.0) GO TO 300
      TSA = ALX(J,I)
      TII = TII+TSA+(ALX(K,I)-TSA)*TSC
  300 CONTINUE
      Y = YT-YE
      Z = ZT+ZE
      XV = X
      IF (IHV.NE.0) CALL CURVE(IHV,4,X,YT,YE,XV,Y,RHO)
      IF (ICV.NE.0) CALL CURVE(ICV,4,X,ZT,-ZE,XV,Z,RHO)
      DV = SQRT(X*X+Y*Y+Z*Z)
      TSB = X-10.
C               COMPUTE FOREGROUND VEILING GLARE
      GOL = FG(1)
C     (GOL=GLARE OWN LAMPS)
      IF (IIS.EQ.0) GO TO 320
      TSA = ATAN((SQRT((107.1111*X-292.2222)*X+1375.806))/(X*TSB-6.9375)
     1)
      TSA = ABS(TSA)
      GOL = FG(1)+(FG(2)*X-FG(3))*EXP(X/FG(4))
      XS = X
      YS = Y
      ZS = Z
      GO TO 325
  320 TSA = ATAN((SQRT((GSP(4)*TSB+GSP(2))*TSB+GSP(3)))/(TSB*XS-GSP(1)))
      TSA = ABS(TSA)
  325 GSI = (TSB*TSB+85.5625)*TSA*(TSA+.02618)
      IF (IS.LE.0.) GO TO 355
      IF (ICBS.LE.0) GDS=0.
      DGIE = 0.
C               COMPUTE GLARE VEHICLE VEILING GLARE
      DO 350 I=1,5
      J = I+5
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```
0139            IF (LAMP(J).LE.0) GO TO 350                                     151.000
0140            TSA = XS*YG(I)-YS*XG(I)                                         152.000
0141            TSB = XS*ZG(I)-ZS*XG(I)                                         153.000
0142            TSC = YS*ZG(I)-ZS*YG(I)                                         154.000
0143            TSD = ATAN((SQRT(TSA*TSA+TSB*TSB+TSC*TSC))/(XS*XG(I)+YS*YG(I)+ZS*Z 155.000
               1G(I)))                                                          156.000
0144            TSD = ABS(TSD)                                                  157.000
0145            TSB = 3437.747*TSD                                              158.000
0146            TSA = GI(I)/DIF(I)                                              159.000
0147            EGID = EGID + TSA/TSB**.46                                      160.000
0148            IF (ICOS.GT.0) GO TO 350                                        161.000
0149            GDS = GDS + TSA/TSD/(TSD+.02618)                                162.000
0150        350 CONTINUE                                                        163.000
0151        355 IF (ICM.EQ.0) GO TO 370                                         164.000
0152            GDM = 0.                                                        165.000
0153            DGIM = 0.                                                       166.000
      C                   COMPUTE FOLLOWING VEHICLE VEILING GLARE               167.000
0154            DO 361 I=1,5                                                    168.000
      C          IN THE ORIGINAL PROGRAM BOTH THE DO STATEMENT ABOVE AND THE IF 168.300
      C STATEMENT                                                               168.300
      C         BELOW REFERRED TO STATEMENT 360.  WHEN I COMPILED MTS PROGRAM, THE 168.400
      C         COMPLAINER ABOUT AN ILLEGAL TRANSFER IN TO THE RANGE OF A LOOP. 168.500
      C         CONSEQUENTLY STATEMENT 361 WAS ADDED.                           168.600
0155            IF (LAMP(I+10).LE.0) GO TO 361                                  169.000
0156            DO 360 J=1,2                                                    170.000
0157            IF (GM(I,J).EQ.0) GO TO 360                                     171.000
0158            TSA = XS*YM(I,J)-YS*XM(I,J)                                     172.000
0159            TSB = XS*ZM(I,J)-ZS*XM(I,J)                                     173.000
0160            TSC = YS*ZM(I,J)-ZS*YM(I,J)                                     174.000
0161            TSD = ATAN((SQRT(TSA*TSA+TSB*TSB+TSC*TSC))/(XS*XM(I,J)+YS*YM(I,J)+ 175.000
               1ZS*ZM(I,J)))                                                    176.000
0162            TSD = ABS(TSD)                                                  177.000
0163            TSB = 3437.747*TSD                                              178.000
0164            TSA = TSD*(TSD+.02618)                                          179.000
0165            THM(I,J) = TSA                                                  180.000
0166            GDM = GDM+GM(I,J)/TSA                                           181.000
0167            EGIM = EGIM + GM(I,J)/TSB**.46                                  182.000
0168        360 CONTINUE                                                        183.000
0169        361 CONTINUE                                                        183.500
      C                    COMPUTE TOTAL ACTUAL VEILING GLARE AND ADJUSTED GLARE 184.000
      C INTENSITY                                                               184.000
      C                   FOR OBSERVER RELATION                                 185.000
0170        370 GVL = GDS+GOL+GDM                                               186.000
0171            GI = CSI*GVL                                                    187.000
0172            TSC = SQRT(GI)                                                  188.000
0173            TSA = A(1)+A(2)*SQRT(TSC)                                       189.000
0174            TSB = B(1)+B(2)*TSC                                             190.000
      C                   COMPUTE INTENSITY NEEDED TO SEE TARGET                191.000
0175            TJ = EXP(TSA+TSB*DV)                                            192.000
0176            R = TII-TJ                                                      193.000
0177            CALL CONVR(IX,J,X,R,GVL,XB)                                     194.000
      C                    CHECK WHETHER TARGET IS JUST VISIBLE AND INCREMENT TARGET 195.000
      C  DISTANCE                                                               195.000
      C                   IF NECESSARY                                          196.000
0178            IF (J-2) 410,440,380                                            197.000
```

```
  380 GO TO (400,590,590,400),IDS
  400 IF (IDIS.GT.1) GO TO 405
      X = X/2.
      GO TC 270
  405 INVIS = INVIS + 1
      IF (INVIS.GT.1) RETURN
      WRITE(5,9994)DS,XV
 9994 FORMAT (1H0,' TARGET INVISIBLE AT DS = ',F6.0,' FEET, CLOSEST TO
     1 VISIBILITY AT X = ',F6.1,' FEET')
      IF (NCL.NE.0) RETURN
      DSD = DELDS
      GO TC 815
  410 IF (X-XVMIN) 420,420,280
  420 X = XVMIN
      IF (IXC) 815,430,815
  430 IXC = 1
      IF (INVIS.NE.0) RETURN
      WRITE(5,9997)IDIS
 9997 FORMAT (1H0,' TRIAL TARGET POSITION BEHIND HEADLIGHT AT IDIS ='
     1,I4)
      GO TO 280
  440 GOL = FG(1)+(FG(2)*X-FG(3))*EXP(X/FG(4))
      GDS = GVL-GCL-GDM
      XV = X
C              COMPUTE BACKGROUND LUMINANCE FOR DISCOMFORT GLARE INDEX
      ELU = RCDR/PI*TII/DV/DV
      IF (IHV.NE.0) CALL CURVE(IHV,2,X,YT,0.,XV,TSA,RHO)
      IF (ICV.NE.0) CALL CURVE(ICV,2,X,ZT,0.,XV,TSA,RHO)
      IF (NGI) 450,450,850
  450 IF (JDS) 480,480,500
C              CHECK TO CHANGE SEPARATION DISTANCE INCREMENT
  480 IF (DS-DST) 490,490,500
  490 JDS = 1
      DSD = DSDEL(1)
C              CHECK EYE STATUS
  500 IF (IANG) 510,550,700
  510 IF (ES) 820,820,520
C              CHECK FOR TRANSITICN TO RECOVERY
  520 IF (GES-GDSR) 530,670,670
  530 J = IDIS-1
      IANG = J
      DSA = FDS
      GDSA = PGDS
      TSA = FK
      IF (IFK.EQ.0) FK = TSA*(1.+.4342945*ALOG((GDSA+GOL)/(5.52*GOL)))
      XD = XDEL
      X = EX
      DSD = DSDEL(1)
      ISTOR = 0
      DS = IDS(J)-DSD
      GO TC 220
C              CHECK FOR TRANSITION TO READAPTATION
  550 IF (ECVL/GVL.LE.EPS) GO TO 680
  590 IDS = IDS+1
      K = IDS-1
```

```
      GO TC (600,63C,650),K
  600 IF (JIS) 610,610,620
  610 JDS = 1
      JSTOR = DSI/DSDEI(1)-.5
      KST = 5
      KSTOR = KST
  620 GLR(IDIS) = 0.
  630 ISTCR = 1
      DSD = DSDEI(IDS)
      GO TC 810
  650 IF (DS-DSDEL(2)) 651,651,652
  651 DSD = DSDEL(3)
      KSTOR=DSDEL(2)/DSDEL(3)+.1
      GO TC 653
  652 DSD = DSDEL(2)
      KSTOR=DSDEL(1)/DSDEI(2)+.1
  653 JSTOR = -1
      IANG = -1
      KST = KSTOR
      J = DS/DSD
      DS = J*DSD
      ISTOR = DDS(IDIS-1)/DSD-J+.5
      IF (KSTOR.GT.5) ISTOR=KSTOR-J
      GVG = GES
      GVE = GCI
      IF (IGM.EQ.0) GO TC 100
      DO 665 I=1,5
      IF (LAMP(I+10).LE.0) GO TO 665
      IF (GM(I,1).EQ.0.) GO TO 664
      GMI = GMI+GM(I,1)/THM(I,1)
  664 IF (GM(I,2).EQ.0.) GO TO 665
      GME = GME+GM(I,2)/THM(I,2)
  665 CONTINUE
      GO TC 100
  670 IF (GVMAX-GVL) 680,685,685
  680 GVMAX = GVL
      GVDS = DS
  685 IF (XV.GT.DVMIN) GO TO 700
      DVMIN = XV
      DVDS = DS
  700 PGDS = GDS
      PGOL = GCI
      PGVL = GVL
      PDS = DS
      PX = X
C                STORE DATA FOR OUTPUT
      IF (ISTOR) 760,760,720
  720 IF (IIS-4) 810,730,810
  730 IF (JSTCR) 740,810,740
  740 ISTOR = ISTCR+1
      IF (ISTOR-KSTCR) 810,810,750
  750 JSTOR = JSTOR-1
      KSTOR = KSTOR+KST
  760 DVIS(IDIS) = XV
      IF (IIV.NE.1) GO TO 765
```

```
            IF (XV.GT.XVGRZ) DVIS(IDIS)=XVGRZ
        765 DDS(IDIS) = DS
            GV(IDIS) = GVI
            IF (IGDS.GT.0) GO TO 795
            DO 790 I=1,5
            IF (IAME(I+5)) 790,790,780
        780 GLR(IDIS) = GLR(IDIS)+GL(I)
        790 CONTINUE
        795 IF (DS.LE.0.) GO TO 800
            IF (DGID+DGIM.LE.0.) GO TO 800
            DGI(IDIS) = 2.*ALOG10(1.+269.0966*ELU)-2.*ALOG10(DGID+DGIM)-2.1097
        800 IF (DS-DSTOP) 830,840,805
        805 IDIS = IDIS+1
            IF (IDIS.GT.88)  GO TO 830
      C               DECREASE SEPARATION DISTANCE
        810 DS = DS-DSD
            GO TO 100
        815 IGDS = 1
            X = XSTRT
            XD = XBEI
        820 IMAX = IDIS-1
            IANG = IMAX
            GO TO 840
        830 IMAX = IDIS-1
      C               SET UP CONDITIONS FOR NO GLARE VISIBILITY DISTANCE
        840 GDS = 0.
            NGL = 1
            GO TO 275
        850 DVNG = XV
            IF (IMAX.EQ.0) IMAX=IDIS
            IF (IIV.NE.1) RETURN
            DO 860 I=1,IGRZ
            DVIS(I) = DVNG
            IF (DVNG.GT.XVGRZ) DVIS(I)=XVGRZ
        860 GV(I) = GVL
            RETURN
            END
 *OPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
 *OPTIONS IN EFFECT*  NAME = GLARE    , LINECNT =       57
 *STATISTICS*    SOURCE STATEMENTS =      315,PROGRAM SIZE =      7484
 *STATISTICS*  NO DIAGNOSTICS GENERATED
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              C
              C ------------------------------------------------------------------------
    0001            SUBROUTINE INPUT(BASR,ITITL)
              C     LAST UPDATE 5/9/80
              C     BY PAUL GREEN, U OF MICHIGAN HWY SAFETY RESEARCH INSTITUTE,
              C        ANN ARBOR, MI 48109        (313) 764 4158
              C     WRITTEN BY JUDY BECKER
              C              THIS SUBROUTINE READS MOST OF THE INPUT CARDS AND
              C PROCESSES THE
              C      DATA AS NEEDED FOR THE LAMPER HEADLIGHT GLARE EVALUATION PROGRAM.
              C   THE
              C      FIRST CARD HAS THE LETTER T IN COLUMN 1 AND NOTHING ELSE.  CARD 2
              C  HAS THE
              C      OUTPUT TITLE.  THE REMAINING CARDS (IDENIFIED BY A LETTER IN
              C COLUMN 1)
              C      CONTAIN THE INPUT PARAMETERS.  THESE CARDS HAVE THE FORMAT
              C A1,E9.0,7E10.0.
              C     FOR SOME CARDS NOT ALL FIELDS ARE USED.
              C     SEE BECKER & MCRITMER REPORT UM-HSRI-74-26 FOR DETAILS.
              C      UNIT NUMBERS: 8=COMMANDS TO BE READ, 5=WHERE OUTPUT IS WRITTEN,
              C 11=FILE
              C      CONTAINING BEAM INTENSITIES (NO DEFAULTS USED!!!)
              C
              C     DECLARATION AND INITIALIZATION BLOCK
              C
    0002            DIMENSION IALF(13),ITITL(40),CARD(8),G(8,2),X(2),Y(2),Z(2),NSHP(2)
                  1,IT(2),JT(2),KT(2),R(2),C(3),S(3)
    0003            COMMON DDS(88),DVIS(88),GLR(88),GV(88),DGI(88),DVMIN,DVDS,GVMAX,GV
                  1DS,DVNG,GVG,GVF,GMI,GME,IMAX
    0004            COMMON DSTRT,DSTOP,DSD,DST,DSDEL(3),XSTRT,XDEL,EK,PG(4),A(2),B(2),
                  1ALX(20,10),XX(20,2),XS,YS,ZS,PO(5),GSP(4),YE,ZE,YT,ZT,GM(5,2),XM(5
                  2,2),YM(5,2),ZM(5,2),YGL(5),ZGL(5),RHO,XVMIN,LAMP(15),ILS,IEK,IGM,I
                  3HV,ICV,DSGRZ,XVGRZ,ECDB
    0005            COMMON DTR,RTD,XSTCE,ZSTRT,ZSTOP,DELX,DELZ,RHOS,RHOT,ZCL,XE,XB,YBT
                  1,ZBR,ZBL,RC,SX(3),SY(3),SZ(3),RS(3),HD(2),VD(2),REFL(2),TRS(2),P(6
                  2,2),Q(9,2),APT(15),IFG
              C     THIS COMMON STATEMENT WAS ADDED FOR MTS
    0006            COMMON HH,VV,IHA,IVA,AL(61,22),DH,DV
    0007            DATA IALF/'A','B','S','C','G','M','O','P','T','V','X','Y','Z'/
    0008            DATA IBLNK/' '/
    0009            DATA IT/'IN','EX'/
    0010            DATA JT/'BE','SI'/
    0011            DATA KT/'AB','DE'/
    0012            DO 5 I=1,40
    0013          5 ITITL(I) = IBLNK
    0014            IHV = 0
    0015            ICV = 0
    0016            IGM = 0
    0017            IFG = 0
    0018            ILS = 1
    0019            XS = 100.
    0020            XB = 4.
    0021            YBT = -1.
    0022            ZBR = 4.25
    0023            ZBL = -1.75
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0024            EPS = .01                                                    32.000
0025            DO 10 J=1,2                                                  33.000
0026            HD(J) = 0.                                                   34.000
0027            VD(J) = 0.                                                   35.000
0028            IRS(J) = 1.                                                  36.000
0029         10 REPL(J) = 1.                                                 37.000
0030            DO 30 I=1,15                                                 38.000
0031            AFT(I) = 1.                                                  39.000
0032         30 LAMP(I) = 0                                                  40.000
0033            DSD = 200.                                                   41.000
0034            EK = .251504                                                 42.000
          C                                                                  42.200
          C     READ A CARD                                                  42.400
          C     ID IS CARD LETTER, CARD IS AN ARRAY OF 8 ITEMS (CARD IMAGE)  42.600
0035        100 READ(5,9999)ID,CARD                                          43.000
0036       9999 FORMAT (A1,E9.0,7E10.0)                                      44.000
          C     LOOP THRU 13 CARD LETTERS TO GET CORRESPONDING #,            44.200
          C      WHEN FOUND GO TO 103                                        44.600
0037            DO 101 I=1,13                                                45.000
0038            IF (ID-IALF(I)) 101,103,101                                  46.000
0039        101 CONTINUE                                                     47.000
0040            WRITE(5,9982) ID,CARD                                        48.000
0041       9982 FORMAT ('0ILLEGAL CARD'/1X,A1,8E13.4)                        49.000
0042        102 READ(5,9999)ID                                               50.000
0043            IF (ID.NE.IALF(13)) GO TO 102                                51.000
0044            ILS = -1                                                     52.000
0045            RETURN                                                       53.000
          C     DECIDE WHICH CARD IT IS & JUMP TO ROUTINE FOR IT             53.200
          C                                                                  53.400
          C              A   B   S   C   G   M   O   P   T   V   X   Y   Z   54.000
0046        103 GO TO (200,300,350,400,550,600,610,650,700,750,800,900,1000),I  55.000
          C                                                                  55.200
          C              CARD A    SEPARATION DISTANCE DATA AND ROAD CURVATURE  56.000
0047        200 IF (CARD(1).GT.0.) DSTRT=CARD(1)                             57.000
0048            IF (CARD(2).NE.0.) DSTOP=CARD(2)                             58.000
0049            IF (CARD(3).GT.0.) DSD=CARD(3)                               59.000
0050            IF (CARD(4).GT.0.) GO TO 201                                 60.000
0051            IF (DST.GT.DSTRT*.5) DST=DSTRT*.5                            61.000
0052            GO TO 202                                                    62.000
0053        201 DST = CARD(4)                                                63.000
0054        202 IF (CARD(5).GT.0.) DSDEL(1)=CARD(5)                          64.000
0055            IF (CARD(6).EQ.0.) GO TO 100                                 65.000
0056            RHO = CARD(6)                                                66.000
0057            RHOT = 2.*RHO                                                67.000
0058            RHOS = RHO*RHO                                               68.000
0059            DO 203 I=1,20                                                69.000
0060            IF (XX(I,1).GE.RHO) XX(I,1)=RHO-10.                          70.000
0061        203 CONTINUE                                                     71.000
0062            IF (DSTRT.LT.PI*RHO) GO TO 204                               72.000
0063            TSA = .01*RHO                                                73.000
0064            I = TSA                                                      74.000
0065            TSB = I                                                      75.000
0066            DSTRT = 300.*TSB                                             76.000
0067            WRITE(5,9005)                                                77.000
0068       9005 FORMAT (1H0,'INITIAL SEPARATION DISTANCE TOO LARGE FOR RADIUS OF C  78.000
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     1URVATURE')
 204 IF (CARD(7).EQ.0.) GO TO 205
     IHV = CARD(7)
     IF (IHV.GT.0) WRITE(5,9001)RHC
9001 FORMAT (1H0,'ROAD IS A HILL CREST WITH RADIUS OF',F9.1,' FEET')
     IF (IHV.LT.0) WRITE(5,9002)RHC
9002 FORMAT (1H0,'ROAD IS A VALLEY WITH RADIUS OF',F9.1,' FEET')
     GO TO 100
 205 ICV = CARD(8)
     IF (ICV.GT.0) WRITE(5,9003)RHC
9003 FORMAT (1H0,'ROAD IS A RIGHT HAND CURVE WITH RADIUS OF',F9.1,
    1' FEET')
     IF (ICV.LT.0) WRITE(5,9004)RHC
9004 FORMAT (1H0,'ROAD IS A LEFT HAND CURVE WITH RADIUS OF',F9.1,
    1' FEET')
     GO TO 100
C                CARD B  ROAD REFLECTIVITY, BASIC TARGET REFLECTIVITY, EYE
C                RECOVERY RATE AND OBSERVER RELATION COEFFICIENTS
 300 IF (CARD(1).GT.0.) BCDR=.01*CARD(1)
     IF (CARD(2).GT.0.) BASR=CARD(2)**2
     IF (CARD(3).GT.0.) EK=CARD(3)
     IF (CARD(4).LE.0.) GO TO 100
     A(1) = CARD(4)
     A(2) = CARD(5)
     B(1) = CARD(6)
     B(2) = CARD(7)
     GO TO 100
C                       CARD S     EYE LINE-OF-SIGHT
 350 IF (CARD(1).LE.0.) GO TO 351
     XS = CARD(1)
     ILS = 1
     GO TO 100
 351 XS = CARD(4)
     YS = CARD(5)
     ZS = CARD(6)
     ILS = 0
     WRITE(5,9994)XS,YS,ZS
9994 FORMAT (1H0,'FIXED EYE LINE-OF-SIGHT COMPONENTS',3E13.4)
     GO TO 100
C                CARD C          EYE,TARGET,AND VELOCITY DATA
 400 ZCL = CARD(1)
     EK = EK/(CARD(2)+CARD(3))*.6818182
     XI = CARD(4)
     YI = CARD(5)
     ZI = CARD(6)
     XE = XI/12.
     YE = YI/12.
     ZE = ZI/12.
     YT = CARD(7)/12.
     ZT = CARD(8)/12.
     WRITE(5,9904)CARD
9904 FORMAT (1H0,'CENTERLINE DISTANCE',F6.1,' FEET, VEHICLE VELOCITIES
    1 MAIN =',F6.1,' MPH, OPPOSING =',F6.1,' MPH'/' EYE IS',F6.1,' IN.
    2BEHIND LAMPS,',F6.1,' IN. ABOVE ROAD AND',F6.1,' IN. LEFT OF'
    3,' CENTERLINE'/' TARGET IS',F6.1,' IN. ABOVE ROAD AND',F6.1,
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```
          4' IN. FROM CENTERLINE')
           IF (IIS.EQ.0) GO TO 401
           YS = YT-YE
           ZS = ZT+ZE
       401 TSA = YS*YS
           TSB = ZS*ZS
           GSP(1) = 9.25*ZS
           GSP(2) = 2.*XS*GSP(1)
           GSP(3) = 85.5625*(TSA+XS**2)
           GSP(4) = TSA+TSB
           ICV = -ICV
           DO 405 I=1,3
           SX(I) = XS*I
           TSA = SX(I)
           TSB = YS
           TSC = ZS
           IF (IHV.NE.0) CALL CURVE(IHV,3,TSA,YT,YE,TSA,TSB,RHO)
           IF (ICV.NE.0) CALL CURVE(ICV,3,TSA,ZT,-ZE,TSA,TSC,RHC)
           SY(I) = TSB
           SZ(I) = TSC
       405 RS(I) = SQRT(TSA*TSA+TSB*TSB+TSC*TSC)
           GO TC 100
C                           CARD G   FOREGROUND GLARE
       550 DO 551 I=1,4
       551 FG(I) = CARD(I)
           WRITE(5,9997)FG
      9997 FORMAT (1H0,'FOREGROUND GLARE COEFFICIENTS'/4E12.4)
           FG(4) =-FG(4)
           IFG = 1
           GO TO 100
C                  CARD M     MIRROR DATA
       600 M = CARD(1)+.5
           IGM = 1
           X(M) = XI-CARD(2)
           Y(M) = CARD(3)-YI
           Z(M) = CARD(4)+ZI
           R(M) = SQRT(X(M)*X(M)+Y(M)*Y(M)+Z(M)*Z(M))
           IF (CARD(5).GT.0.) REFL(M)=CARD(5)
           NSHP(M) = CARD(6)+.5
           IF (CARD(7).GT.0.) TRS(M)=CARD(7)
           GO TC 100
C                    CARD O   MIRROR ORIENTATION
       610 M = CARD(1)+.5
           HD(M) = CARD(2)/24.
           VD(M) = CARD(3)/24.
           YQ = CARD(4)-YI
           ZQ = CARD(5)+ZI
           XQ = -360.
           IF (CARD(6).NE.0.) XQ=-12.*CARD(6)
           DX = X(M)-XQ
           DY = Y(M)-YQ
           DZ = Z(M)-ZQ
           F = SQRT(DX*DX+DY*DY+DZ*DZ)
           TSA = R(M)/F
           TSB = TSA*DX+X(M)
```

```
0165          TSC = TSA*DY+Y(M)
0166          TSD = TSA*DZ+Z(M)
0167          TSA = SQRT(TSB*TSB+TSD*TSD)
0168          YAW = RTD*ATAN(-TSD/TSB)
0169          PTCH = RTD*ATAN(TSC/TSA)
0170          ROLL = 0.
0171          IF (NSHP(M).GT.0) ROLL=RTD*ATAN(TSD/TSB*TSC/SQRT(TSA*TSA+TSC*TSC))
0172          IF (M.EQ.1) WRITE(5,9990)
0173     9990 FORMAT (1H0,'MIRROR  TYPE',6X,'LOCATION (INCHES)    SIZE (INCHES)
             1  ORIENTATION (DEGREES)',6X,'CENTER POINT AIM',15X,'TRANSMISSIV
             2ITY'/1H ,'NUMBER',13X,'X',6X,'Y',6X,'Z   WIDTH HEIGHT YAW',7X,
             3'PITCH',5X,'ROLL',7X,'X',6X,'Y',6X,'Z REFLECTIVITY   OF WINDOW')
0174          TSA = X(M)-XI
0175          TSB = Y(M)+YI
0176          TSC = Z(M)-ZI
0177          WRITE(5,9992)M,IT(M),TSA,TSB,TSC,CARD(2),CARD(3),YAW,PTCH,ROLL,XQ,
             1CARD(4),CARD(5),REFL(M),JT(M),KT(M),TRS(M)
0178     9992 FORMAT (1H ,I4,3X,A2,'TERIOR',5F7.1,3F10.5,3F7.1,F9.4,5X,
             12A2,F6.4)
0179          GO TO 658
        C                  CARD P     MIRROR FIELD OF VIEW
0180      650 M = CARD(1)+.5
0181          YB = CARD(2)-YI
0182          YF = CARD(3)-YI
0183          ZR = CARD(4)+ZI
0184          ZL = CARD(5)+ZI
0185          XQ = -360.
0186          IF (CARD(6).NE.0.) XQ=-12.*CARD(6)
0187          TSA = -XQ/12.
0188          WRITE(5,9911)IT(M),TSA,CARD(2),CARD(3),CARD(5),CARD(4)
0189     9911 FORMAT (1H ,A2,'TERIOR MIRROR FIELD OF VIEW AT',F6.1,' FEET
             1BEHIND EYE,',F5.1,' TO',F5.1,' INCHES ABOVE ROAD,',F7.1,
             2' TO',F6.1,' INCHES FROM CENTERLINE')
0190          IF (CARD(7).NE.0.) EPS=CARD(7)
0191          YDEL = YF-YB
0192          ZDEL = ZR-ZL
0193          YEP = YDEL*EPS
0194          ZEP = ZDEL*EPS
0195          DX = X(M)-XQ
0196          DXS = DX*DX
0197          NI = 0
0198          H = 5.
0199          V = 1.
0200          IF (NSHP(M).LE.0) H=2.5
0201          YQ = .5*(YB+YF)
0202          ZQ = .5*(ZR+ZL)
0203      651 NI = NI+1
0204          IF (NI.GT.10) CALL EXIT
0205          NZ = 0
0206          DY = Y(M)-YQ
0207          DZ = Z(M)-ZQ
0208          F = SQRT(DXS+DY*DY+DZ*DZ)
0209          TSA = R(M)/F
0210          XA = DX*TSA
0211          YA = DY*TSA
```

```
      ZA = FZ*TSA
      TSB = X(M)+XA
      TSC = Y(M)+YA
      TSD = Z(M)+ZA
      TSE = SQRT(TSB*TSB+TSC*TSC)
      TSG = SQRT(TSE*TSE+TSD*TSD)
      IF (NSHP(M).LE.0) GO TO 652
      TSA = H/TSG
      TSF = TSE/TSE
      TSG = TSE-XQ
      XP = -TSA*TSF*TSD
      ZP = TSA*TSE
      ZGO = TSD-(ZP+ZA)/(XP+XA)*TSG
      ZGT = TSD-(ZP-ZA)/(XP-XA)*TSG
      XP = -V/TSE*TSC
      YP = V*TSF
      YGO = TSC-(YP+YA)/(XP+XA)*TSG
      YGT = TSC-(YP-YA)/(XP-XA)*TSG
      VV = V/(YGT-YGO)*YDEL
      GO TO 653
  652 TSF = SQRT(TSB*TSB+TSD*TSD)
      TSA = H/TSF
      TSE = H/TSG
      TSG = TSB-XQ
      XP = -TSA*TSD
      ZP = TSA*TSB
      ZGO = TSD-(ZP+ZA)/(XP+XA)*TSG
      ZGT = TSD-(ZP-ZA)/(XP-XA)*TSG
      XP = -TSE/TSF*TSB*TSC
      YP = TSE*TSF
      YGO = TSC-(YP+YA)/(XP+XA)*TSG
      YGT = TSC-(YP-YA)/(XP-XA)*TSG
      VV = E
  653 ZDO = ZGO-ZL
      ZDT = ZGT-ZR
      YDO = YGO-YB
      YDT = YGT-YF
      IF (ABS(ZDO).GT.ZEP) GO TO 654
      IF (ABS(ZDT).LE.ZEP) GO TO 655
  654 ZQ = ZQ-.5*(ZDO+ZDT)
      H = H/(ZGT-ZGO)*ZDEL
      NZ = 1
  655 IF (ABS(YDO).GT.YEP) GO TO 656
      IF (ABS(YDT).LE.YEP) GO TO 657
  656 YQ = YQ-.5*(YDO+YDT)
      V = VV
      IF (NSHP(M).GT.0) GO TO 651
      IF (ABS(YDO+YDT).GT.YEP) GO TO 651
  657 IF (NZ.NE.0) GO TO 651
      YAW = RTD*ATAN(-TSD/TSB)
      TSA = SQRT(TSB*TSB+TSD*TSD)
      PTCH = RTD*ATAN(TSC/TSA)
      ROLL = 0.
      IF (NSHP(M).GT.0) ROLL=RTD*ATAN(TSD/TSB*TSC/SQRT(TSA*TSA+TSC*TSC))
      IF (NSHP(M).LE.0) V=0.
```

```
            HD(M) = H/12.
            VD(M) = V/12.
            G(1,M) = 2.*H
            G(2,M) = 2.*V
            G(3,M) = YAW
            G(4,M) = PTCH
            G(5,M) = ROLL
            G(6,M) = XC
            G(7,M) = YQ+YI
            G(8,M) = ZQ-ZI
        658 C(1) = COS(DTR*YAW)
            S(1) = SIN(DTR*YAW)
            C(2) = COS(DTR*PTCH)
            S(2) = SIN(DTR*PTCH)
            C(3) = COS(DTR*ROLL)
            S(3) = SIN(DTR*ROLL)
      C          COMPUTE ROTATION MATRIX FOR AIM IN YAW, PITCH AND ROLL
            TSA = C(2)
            Q(1,M) = TSA*C(1)
            Q(8,M) =-TSA*S(3)
            Q(5,M) = TSA*C(3)
            Q(3,M) =-TSA*S(1)
            TSA =-S(2)
            Q(2,M) = -TSA
            TSB = C(1)*C(3)
            TSC = S(1)*S(3)
            Q(4,M) = TSA*TSB+TSC
            Q(9,M) = TSA*TSC+TSB
            TSB = C(1)*S(3)
            TSC = S(1)*C(3)
            Q(6,M) = TSB-TSC*TSA
            Q(7,M) = TSC-TSB*TSA
            DO 659 I=1,3
            J = 3*I-2
            P(I,M) = (X(M)*Q(J,M)+Y(M)*Q(J+1,M)+Z(M)*Q(J+2,M))/12.
        659 P(I+3,M) = 2.*C(I,M)*E(1,M)
            IF (M.EQ.1) GO TO 100
            WRITE(5,9990)
            DO 660 M=1,2
            TSA = X(M)-XI
            TSB = Y(M)+YI
            TSC = Z(M)-ZI
        660 WRITE(5,9992)M,IT(M),TSA,TSB,TSC,(G(I,M),I=1,8),REPL(M),JT(M),KT(M
           1),TRS(M)
            GO TO 100
      C               CARD T     TITLE
      C     READ NXT CARD FOR TITLE & STORE IN ITITL
        700 READ(5,9991)ITITL
       9991 FORMAT(40A2)
            WRITE(5,9909)ITITL
       9909 FORMAT (1H0,10X,40A2)
            GO TO 100
      C             CARD V    VEHICLE STRUCTURE DATA
        750 XB = CARD(1)/12.-XE
            YBT = CARD(2)/12.-YE
```

```
0317            ZBR = CARD(3)/12.+ZE
0318            ZBL = CARD(4)/12.+ZE
0319            GO TO 100
           C              CARD X     ROAD DATA
0320        800 XSTOP = CARD(2)
0321            ZSTRT = CARD(3)
0322            ZSTOP = CARD(4)
0323            DELX = CARD(5)
0324            DELZ = CARD(6)
0325            GO TO 100
           C              CARD Y     POLARIZATION DATA
0326        900 M = CARD(1)+.5
0327            IF (M.GT.0) GO TO 902
0328            TSA = CARD(2)
0329            TSB = CARD(3)
0330            YW = TSA+SQRT(TSA*TSA-TSB)
0331            ZW = TSB/YW
0332            WRITE(5,9993)TSA,TSB
0333       9993 FORMAT (1H0,' ANALYZER TRANSMISSIVITY IS',F8.4,' AND SELF-
               1EXTINCTION COEFFICIENT IS',F11.7,//4X,'BEAM',7X,'FILTER',5X,
               2'SELF-EXTINCTION ANGLE TO ANALYZER-FILTER'/3X,
               3'NUMBER  TRANSMISSIVITY  COEFFICIENT ANALYZER  TRANSMISSIVITY')
0334            GO TO 100
0335        902 TSA = CARD(2)
0336            TSB = CARD(3)
0337            YI = TSA+SQRT(TSA*TSA-TSB)
0338            ZI = TSB/YI
0339            TSC = COS(CARD(4)*DTR)
0340            TSD = .5*(YW*ZI+ZW*YI+(YW-ZW)*(YI-ZI)*TSC*TSC)
0341            AFT(M) = TSD
0342            IF (M.GT.10) AFT(M)=TSA
0343            IF (M.NE.11) GO TO 903
0344            TSC = 1.
0345            TSE = 0.
0346            WRITE(5,9933)TSC,TSE
0347       9933 FORMAT (1H0,'FOR WINDOWS ASSOCIATED WITH MIRRORS, ANALYZER TRANSMI
               1SSIVITY IS',F8.4,' AND SELF-EXTINCTION COEFFICIENT IS',F11.7//,4X,
               2'BEAM',7X,'FILTER',5X,'SELF-EXTINCTION ANGLE TO ANALYZER-FILTER'
               3/3X, 'NUMBER TRANSMISSIVITY   COEFFICIENT   ANALYZER
               4  TRANSMISSIVITY')
0348        903 WRITE(5,9996)M,TSA,TSB,CARD(4),TSD
0349       9996 FORMAT (4X,I3,6X,F8.4,6X,F11.7,5X,F5.1,4X,F11.7)
0350            GO TO 100
           C              CARD Z  TARGET REFLECTIVITY
0351       1000 IF (CARD(2).GT.0.) XSTRT=CARD(2)
0352            IF (CARD(3).GT.0.) XDEL=CARD(3)
0353            IF (ICM.EQ.0) GO TO 999
0354            TSA = (XB+XE)*12.
0355            TSB = (YE+YBT)*12.
0356            TSC = (ZBR-ZE)*12.
0357            TSD = (ZBL-ZE)*12.
0358            WRITE(5,9901)TSA,TSB,TSC,TSD
0359       9901 FORMAT (1H0,'OBSTRUCTING PLANE IS',F6.1,' INCHES BEHIND LAMPS,
               1 TOP IS',F5.1,' INCHES ABOVE ROAD, EDGES ARE',F5.1,' AND',
               2F6.1,' INCHES FROM CENTERLINE')
```

```
 0360          999 WRITE(5,9906)
 0361         9906 FORMAT (1H0,' CBSERVER RELATICN FOR TARGET INTENSITY = EXP(A+B*D)
                  1, WHERE D IS VISIBILITY DISTANCE')
 0362              WRITE(5,9995)A,B
 0363         9995 FORMAT (1H ,'COEFFICIENTS FOR  A = C+D(4TH ROOT OF GI),',
                  1'  B = E+F(SQRT CF GI)'/7X,'C',12X,'D',12X,'E',12X,'F',/4E13.4)
 0364              IF (CARD(4).LE.0.) GC TO 1001
 0365              REFT = CARD(4)/BASR*CARD(4)
 0366              WRITE(5,9988)CARD(4)
 0367         9988 FORMAT (1H0,'TARGET REFLECTIVITY IS',F6.1,' PER CENT')
 0368              A(1) = A(1)-ALCG(REFT)
 0369         1001 TSA = 100.*RODR
 0370              WRITE(5,9989)TSA,EK
 0371         9989 FORMAT (1H0,'EASIC TARGET REFLECTIVITY FOR OBSERVER RELATION IS'
                  1,F6.1,' PER CENT, NCMINAL EYE RECOVERY RATE PARAMETER IS',
                  2F9.6,' PER SECCND')
 0372              TSA = 100.*RODR
 0373              WRITE(5,9987)XSTOP,ZSTRT,ZSTOP,TSA
 0374         9987 FORMAT (1H0,'ILLUMINATED AREA OF PAVEMENT EXTENDS',F6.1,' FEET
                  1 AHEAD OF LAMPS AND',F6.1,' AND',F6.1,' FEET FROM CENTERLINE'/
                  2/1X,'ROAD REFLECTIVITY IS',F6.1,' PER CENT.')
 0375              RC = YE*DELX*DELZ*RCDR
 0376              IEK = CARD(7)
 0377              RETURN
 0378              END
   *CPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
   *CPTIONS IN EFFECT*  NAME = INPUT    , LINECNT =       57
   *STATISTICS*    SOURCE STATEMENTS =       378,PROGRAM SIZE =     11240
   *STATISTICS*  NO DIAGNCSTICS GENERATED
```

```
          C
          C ----------------------------------------------------------------
          C -
0001            SUBROUTINE OUTPUT(DTRS)
          C     LAST UPDATED BY PAUL GREEN 5/9/80
          C     WRITTEN BY JUDY BECKER
          C     THIS SUBROUTINE IS CALLED BY LAMPER
          C     UNIT CALLS:  5=WHERE OUTPUT IS WRITTEN
          C               THIS SUBROUTINE PRINTS THE RESULTS.
0002            COMMON DDS(88),DVIS(88),GLR(88),GV(88),DGI(88),DVMIN,DVDS,GVMAX,GV
               1DS,DVNG,GVG,GVF,GMI,GME,IMAX
          C     THESE COMMON STATEMENTS ADDED TO MTS VERSION
0003            COMMON DSTRT,DSTOP,DSD,DST,DSDEL(3),XSTRT,XDEL,EK,FG(4),A(2),B(2),
               1ALX(20,10),XX(20,2),XS,YS,ZS,PO(5),GSP(4),YE,ZE,YT,ZT,GM(5,2),XM(5
               2,2),YM(5,2),ZM(5,2),YGL(5),ZGL(5),RHO,XVMIN,LAMP(15),ILS,IEK,IGM,I
               3HV,ICV,DSGRZ,XVGRZ,RCDR
0004            COMMON DTR,RTD,XSTCP,ZSTRT,ZSTOP,DELX,DELZ,RHOS,RHOT,ZCL,XE,XB,YBT
               1,ZBR,ZBL,RC,SX(3),SY(3),SZ(3),RS(3),HD(2),VD(2),REFL(2),TRS(2),P(6
               2,2),C(9,2),AFT(15),IFG
0005            COMMON HH,VV,IHA,IVA,AL(61,22),DH,DV
          C
0006            DO 490 I=1,IMAX
0007        490 GV(I) = DTRS*GV(I)
0008            GVMAX = GVMAX*DTRS
0009            GVG = GVG*DTRS
0010            GVF = GVF*DTRS
0011            GMI = GMI*DTRS
0012            GME = GME*DTRS
0013            IHLF = (IMAX+1)/2
0014            IDEL = IHLF - IMAX/2
0015            WRITE(5,9996)
0016       9996 FORMAT (1H ,2('SEPARATION VISIBILITY  VEILING',5X,
               1'GLARE   DISCOMFORT  ')/1H ,2(' DISTANCE   DISTANCE    GLARE',4X,
               2'INTENSITY   GLARE',5X)/1H ,2('   (FEET)',5X,'(FEET)  ',
               3'(FT.LAMB.) (CANDELAS)    INDEX',5X)/)
0017            DO 500 I=1,IHLF
0018            J = I+IHLF-IDEL
0019        500 WRITE(5,9995)DDS(I),DVIS(I),GV(I),GLR(I),DGI(I),DDS(J),DVIS(J),GV(
               1J),GLR(J),DGI(J)
0020       9995 FORMAT (1H ,2(F7.0,F11.1,F12.5,F10.1,F9.1,6X))
0021            WRITE(5,9807)DVMIN,DVDS
0022       9807 FORMAT ('OMINIMUM VISIBILITY DISTANCE IS ',F6.1,' FEET AT A SEPARA
               1TION OF ',F5.0,' FEET')
0023            WRITE(5,9808)DVNG,GVMAX,GVDS
0024       9808 FORMAT (1H ,'VISIBILITY DISTANCE FOR NO GLARE CAR IS',F7.1,
               1' FEET. ',' MAXIMUM VEILING GLARE IS',F8.5,' FT.C AT A ',
               2'SEPARATION OF',F6.0,' FEET.')
0025            WRITE(5,9909)GVG,GVF
0026       9909 FORMAT (' COMPONENTS OF MAXIMUM VEILING GLARE ARE', F8.5,
               1' FROM OPPOSING CARS AND',F8.5,' FROM FOREGROUND')
0027            IF (GMI+GME.GT.0.)WRITE(5,9906)GMI,GME
0028       9906 FORMAT (36X,' AND',F8.5,'FROM INTERIOR',5X,'AND',F8.5,
               1'FROM EXTERIOR MIRROR')
0029            WRITE(5,9992)
0030       9992 FORMAT (' GLARE INTENSITY AND INDEX ARE NOT CALCULATED DURING RECO
```

```
                 1VERY. VEILING GLARE IS ACTUAL VALUE DIVIDED BY THE FACTOR K.')          37.000
  0031           RETURN                                                                   38.000
  0032           END                                                                      39.000
   *OPTIONS IN EFFECT*  ID,EBCDIC,SOURCE,LIST,NODECK,LOAD,NOMAP
   *OPTIONS IN EFFECT*  NAME = OUTPUT  , LINECNT =       57
   *STATISTICS*    SOURCE STATEMENTS =       32,PROGRAM SIZE =      1568
   *STATISTICS*  NO DIAGNOSTICS GENERATED

NO STATEMENTS FLAGGED IN THE ABOVE COMPILATIONS.
```

APPENDIX 6

```
FILE DEBUGG?, THE RUN COMMANDS
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
$RUN *FTN SPRINT=OUTLAMP2 SCARDS=LAMPER+CONVR+CURVE+INTAB+BEAMS+GLARE+INPUT+OUTPUT SPUNCH=OBJFILE 5=OUTLAMP1 8=LAMPER-CMD
$DEBUG OBJFILE 5=OUTLAMP1 8=LAMPER-CMDS 11=MATRIX
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
END OF FILE
FILE LAMPER-CMDS (ON UNIT 8), THE CONTROL CARDS
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
T
TEST RUN FOR GE6014LOW , LOW BEAM, 2 LAMPS, PAUL GREEN, 5/80
C       12.       30.       30.       72.       42.       20.       24.       72.
Z                200.        8.       10.                            1.
D        1.                 24.       30.
D        2.       60.
D        6.                 24.       30.
D        7.                 60.
L
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
END OF FILE
```


ADDENDUM:

Note: A more efficient way to use this program is to:

(1) Compile it using Fortran H -
$RUN *FTN SCARDS=LAMPER.S SPRINT=LIST-FILE SPUNCH=LAMPER.O PAR=OPT=H

(2) Store the object file (HERE LAMPER.O)

(3) Repeatedly run the object file -
$RUN LAMPER.O 5=OUTPUT 8=COMMANDS 11=LIGHTS T=5 S

```
1  ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
2      5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
3  ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
1  T
2  TEST RUN FOR GE6014LOW , LOW BEAM, 2 LAMPS, PAUL GREEN, 5/80
3  C      12.       30.       30.       72.       42.       20.       24.       72.
4  Z               200.        8.       10.                             1.
5  D        1.              24.       30.
6  D        2.                        60.
7  D        6.              24.       30.
8  D        7.                        60.
9  L
1  ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
2      5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
3  ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
END OF FILE
```

APPENDIX 7

```
FILE "MATRIX" (UNIT 11), THE TRANSFORMED BEAM INTENSITIES (FROM BEMPAT)
   1    ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
   2        5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
   3    ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
   1    -20.0 -4.5  0.5   61   220.E. 6014 LOW BEAM (NO.2 PH.)
   2     0.688551E 01 0.702108E 01 0.701031E 01 0.694698E 01 0.678446E 01 0.649527E 01 0.610702E 01 0.595064E 01 0.580212E 01
   3     0.564897E 01 0.546383E 01 0.539363E 01 0.517048E 01 0.512990E 01 0.500395E 01 0.491265E 01 0.483628E 01 0.471850E 01
   4     0.458497E 01 0.452179E 01 0.444265E 01 0.418965E 01 0.697821E 01 0.712367E 01 0.713648E 01 0.706987E 01 0.692166E 01
   5     0.661740E 01 0.622456E 01 0.605444E 01 0.589440E 01 0.570711E 01 0.551745E 01 0.544242E 01 0.522575E 01 0.515329E 01
   6     0.503044E 01 0.493447E 01 0.486753E 01 0.475359E 01 0.459512E 01 0.452179E 01 0.445435E 01 0.420469E 01 0.705704E 01
   7     0.722330E 01 0.722330E 01 0.717472E 01 0.702909E 01 0.673221E 01 0.633505E 01 0.614633E 01 0.596615E 01 0.577455E 01
   8     0.558350E 01 0.547227E 01 0.527300E 01 0.518739E 01 0.505625E 01 0.495583E 01 0.490527E 01 0.478749E 01 0.462497E 01
   9     0.455388E 01 0.445435E 01 0.420469E 01 0.712850E 01 0.729980E 01 0.731389E 01 0.727170E 01 0.714992E 01 0.685541E 01
  10     0.645834E 01 0.623637E 01 0.604737E 01 0.582008E 01 0.561677E 01 0.550939E 01 0.531812E 01 0.521494E 01 0.508140E 01
  11     0.498361E 01 0.490527E 01 0.479579E 01 0.465396E 01 0.458497E 01 0.447734E 01 0.424850E 01 0.719519E 01 0.736010E 01
  12     0.738275E 01 0.736960E 01 0.726752E 01 0.697821E 01 0.660935E 01 0.632972E 01 0.610702E 01 0.587212E 01 0.566643E 01
  13     0.552545E 01 0.537064E 01 0.524702E 01 0.512396E 01 0.495583E 01 0.493447E 01 0.481218E 01 0.466344E 01 0.460517E 01
  14     0.451086E 01 0.424850E 01 0.724494E 01 0.741156E 01 0.744132E 01 0.744483E 01 0.736771E 01 0.708255E 01 0.672503E 01
  15     0.644413E 01 0.619644E 01 0.594280E 01 0.572358E 01 0.558725E 01 0.545104E 01 0.529330E 01 0.517048E 01 0.504342E 01
  16     0.494876E 01 0.483628E 01 0.469135E 01 0.461512E 01 0.453260E 01 0.427667E 01 0.728207E 01 0.746164E 01 0.749998E 01
  17     0.752456E 01 0.745356E 01 0.718387E 01 0.683948E 01 0.653814E 01 0.628227E 01 0.602587E 01 0.578382E 01 0.563835E 01
  18     0.550939E 01 0.536129E 01 0.522036E 01 0.508140E 01 0.496981E 01 0.485981E 01 0.470953E 01 0.462497E 01 0.453260E 01
  19     0.429046E 01 0.730787E 01 0.750329E 01 0.756060E 01 0.757250E 01 0.749721E 01 0.726752E 01 0.693537E 01 0.663988E 01
  20     0.635611E 01 0.608677E 01 0.582895E 01 0.566988E 01 0.557215E 01 0.542053E 01 0.524175E 01 0.511799E 01 0.500395E 01
  21     0.487520E 01 0.470953E 01 0.463473E 01 0.455388E 01 0.430406E 01 0.733171E 01 0.753849E 01 0.760837E 01 0.762608E 01
  22     0.757712E 01 0.734278E 01 0.703174E 01 0.673221E 01 0.642162E 01 0.615273E 01 0.586363E 01 0.570044E 01 0.560212E 01
  23     0.545532E 01 0.527300E 01 0.514166E 01 0.503695E 01 0.488280E 01 0.471850E 01 0.463473E 01 0.456435E 01 0.431749E 01
  24     0.735628E 01 0.756683E 01 0.765160E 01 0.766669E 01 0.763723E 01 0.741517E 01 0.711639E 01 0.680683E 01 0.649072E 01
  25     0.619032E 01 0.590263E 01 0.574620E 01 0.562762E 01 0.547646E 01 0.530827E 01 0.517048E 01 0.506259E 01 0.489784E 01
  26     0.474493E 01 0.466344E 01 0.458497E 01 0.434381E 01 0.737901E 01 0.760539E 01 0.768340E 01 0.769939E 01 0.768754E 01
  27     0.747704E 01 0.718614E 01 0.687316E 01 0.654247E 01 0.623048E 01 0.594280E 01 0.578382E 01 0.565948E 01 0.548064E 01
  28     0.531812E 01 0.518178E 01 0.506890E 01 0.490527E 01 0.477068E 01 0.469135E 01 0.461512E 01 0.436945E 01 0.740062E 01
  29     0.762900E 01 0.771957E 01 0.773368E 01 0.772709E 01 0.751643E 01 0.722330E 01 0.691572E 01 0.658064E 01 0.625958E 01
  30     0.598141E 01 0.582008E 01 0.569036E 01 0.550939E 01 0.533754E 01 0.519850E 01 0.509375E 01 0.494876E 01 0.479579E 01
  31     0.472739E 01 0.466344E 01 0.439445E 01 0.742536E 01 0.766153E 01 0.775319E 01 0.778780E 01 0.776047E 01 0.754961E 01
  32     0.726752E 01 0.694986E 01 0.662141E 01 0.629342E 01 0.601859E 01 0.585507E 01 0.570711E 01 0.552943E 01 0.535659E 01
  33     0.520949E 01 0.512396E 01 0.496981E 01 0.483628E 01 0.475359E 01 0.468213E 01 0.440672E 01 0.743248E 01 0.769166E 01
  34     0.777569E 01 0.781319E 01 0.779276E 01 0.759840E 01 0.731588E 01 0.699668E 01 0.665157E 01 0.632436E 01 0.605912E 01
  35     0.590263E 01 0.572685E 01 0.555683E 01 0.538449E 01 0.522575E 01 0.514749E 01 0.500395E 01 0.487520E 01 0.477912E 01
  36     0.470953E 01 0.445435E 01 0.745530E 01 0.772973E 01 0.782164E 01 0.786787E 01 0.783913E 01 0.763868E 01 0.736581E 01
  37     0.704229E 01 0.668586E 01 0.633505E 01 0.606611E 01 0.592693E 01 0.573657E 01 0.558350E 01 0.540717E 01 0.525227E 01
  38     0.517048E 01 0.503695E 01 0.490527E 01 0.481218E 01 0.472739E 01 0.443082E 01 0.749053E 01 0.776938E 01 0.786672E 01
  39     0.792841E 01 0.788683E 01 0.769303E 01 0.741878E 01 0.709506E 01 0.672863E 01 0.636647E 01 0.609357E 01 0.592693E 01
  40     0.565948E 01 0.559842E 01 0.542935E 01 0.528320E 01 0.519296E 01 0.506259E 01 0.494164E 01 0.483628E 01 0.477068E 01
  41     0.449981E 01 0.751480E 01 0.781076E 01 0.792299E 01 0.798718E 01 0.795050E 01 0.774932E 01 0.747022E 01 0.715851E 01
  42     0.677422E 01 0.641673E 01 0.613340E 01 0.596615E 01 0.578382E 01 0.562040E 01 0.545104E 01 0.530330E 01 0.522575E 01
  43     0.508760E 01 0.496981E 01 0.485981E 01 0.477912E 01 0.449981E 01 0.754803E 01 0.784502E 01 0.797212E 01 0.803916E 01
  44     0.799024E 01 0.779893E 01 0.752132E 01 0.720415E 01 0.682329E 01 0.645362E 01 0.618415E 01 0.599645E 01 0.584644E 01
  45     0.564191E 01 0.548064E 01 0.533754E 01 0.524175E 01 0.512990E 01 0.499043E 01 0.488280E 01 0.479579E 01 0.452179E 01
  46     0.756941E 01 0.787017E 01 0.800035E 01 0.810470E 01 0.803041E 01 0.784737E 01 0.757404E 01 0.725134E 01 0.687005E 01
  47     0.649527E 01 0.621860E 01 0.602587E 01 0.588888E 01 0.568017E 01 0.550939E 01 0.536598E 01 0.527300E 01 0.515905E 01
  48     0.502388E 01 0.489784E 01 0.482831E 01 0.453260E 01 0.759539E 01 0.788908E 01 0.803041E 01 0.814816E 01 0.770571E 01
  49     0.789357E 01 0.761727E 01 0.729234E 01 0.690073E 01 0.652649E 01 0.625958E 01 0.605912E 01 0.592693E 01 0.572358E 01
  50     0.555683E 01 0.540717E 01 0.530827E 01 0.516479E 01 0.504342E 01 0.492725E 01 0.483628E 01 0.454329E 01 0.761579E 01
  51     0.790691E 01 0.804943E 01 0.819008E 01 0.814816E 01 0.796485E 01 0.767925E 01 0.733954E 01 0.693245E 01 0.656386E 01
  52     0.630445E 01 0.609357E 01 0.595842E 01 0.572685E 01 0.559842E 01 0.544674E 01 0.534233E 01 0.519950E 01 0.509375E 01
  53     0.495583E 01 0.487520E 01 0.456435E 01 0.762168E 01 0.791425E 01 0.800135E 01 0.823801E 01 0.821447E 01 0.806809E 01
  54     0.775061E 01 0.738585E 01 0.699118E 01 0.661740E 01 0.633505E 01 0.615273E 01 0.601127E 01 0.578382E 01 0.564191E 01
  55     0.548480E 01 0.537528E 01 0.523644E 01 0.510594E 01 0.499043E 01 0.490527E 01 0.459512E 01 0.762168E 01 0.793057E 01
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56	0.809560E 01	0.829130E 01	0.830598E 01	0.816508E 01	0.782764E 01	0.744483E 01	0.704490E 01	0.663988E 01	0.630992E 01
57	0.616415E 01	0.604737E 01	0.583773E 01	0.569709E 01	0.551745E 01	0.540268E 01	0.526786E 01	0.514166E 01	0.501728E 01
58	0.492725E 01	0.462497E 01	0.761135E 01	0.794944E 01	0.914816E 01	0.834901E 01	0.836287E 01	0.823031E 01	0.788495E 01
59	0.750659E 01	0.709257E 01	0.668211E 01	0.636647E 01	0.620051E 01	0.610032E 01	0.591080E 01	0.570711E 01	0.555296E 01
60	0.543372E 01	0.530827E 01	0.518178E 01	0.506259E 01	0.496981E 01	0.465396E 01	0.763868E 01	0.796589E 01	0.819836E 01
61	0.839004E 01	0.839661E 01	0.835585E 01	0.793164E 01	0.752456E 01	0.713569E 01	0.670808E 01	0.639693E 01	0.621261E 01
62	0.611368E 01	0.590263E 01	0.575574E 01	0.559099E 01	0.548480E 01	0.533754E 01	0.520401E 01	0.511199E 01	0.501063E 01
63	0.470048E 01	0.765723E 01	0.903236E 01	0.825349E 01	0.843598E 01	0.844870E 01	0.840335E 01	0.797625E 01	0.760390E 01
64	0.718159E 01	0.675344E 01	0.642162E 01	0.623637E 01	0.613340E 01	0.596615E 01	0.580212E 01	0.563479E 01	0.551745E 01
65	0.537064E 01	0.524702E 01	0.515329E 01	0.508140E 01	0.475359E 01	0.768891E 01	0.809560E 01	0.829879E 01	0.847991E 01
66	0.849801E 01	0.845489E 01	0.805996E 01	0.766011E 01	0.722548E 01	0.679682E 01	0.644889E 01	0.625383E 01	0.613988E 01
67	0.598141E 01	0.581114E 01	0.566296E 01	0.555296E 01	0.540717E 01	0.528827E 01	0.518739E 01	0.511799E 01	0.479579E 01
68	0.767647E 01	0.814816E 01	0.834901E 01	0.853366E 01	0.856789E 01	0.851599E 01	0.811343E 01	0.771021E 01	0.729438E 01
69	0.684588E 01	0.643133E 01	0.627099E 01	0.613988E 01	0.598896E 01	0.582895E 01	0.568017E 01	0.554908E 01	0.542495E 01
70	0.532301E 01	0.521494E 01	0.514166E 01	0.482028E 01	0.774932E 01	0.819836E 01	0.839661E 01	0.859563E 01	0.862784E 01
71	0.857904E 01	0.815680E 01	0.776047E 01	0.735052E 01	0.689163E 01	0.652649E 01	0.629895E 01	0.617170E 01	0.601127E 01
72	0.583773E 01	0.567332E 01	0.557595E 01	0.543808E 01	0.534711E 01	0.523644E 01	0.516479E 01	0.483628E 01	0.777569E 01
73	0.823031E 01	0.842310E 01	0.863835E 01	0.868440E 01	0.860098E 01	0.821447E 01	0.781319E 01	0.740974E 01	0.695559E 01
74	0.657228E 01	0.632436E 01	0.619032E 01	0.601859E 01	0.585507E 01	0.566988E 01	0.558725E 01	0.545532E 01	0.537064E 01
75	0.525749E 01	0.519850E 01	0.487520E 01	0.778655E 01	0.824591E 01	0.846126E 01	0.868946E 01	0.873327E 01	0.868946E 01
76	0.826899E 01	0.787131E 01	0.747193E 01	0.701302E 01	0.661740E 01	0.635089E 01	0.621860E 01	0.604025E 01	0.578382E 01
77	0.566988E 01	0.560212E 01	0.548480E 01	0.540268E 01	0.528320E 01	0.522575E 01	0.489784E 01	0.779400E 01	0.826899E 01
78	0.849801E 01	0.872843E 01	0.876139E 01	0.872356E 01	0.831336E 01	0.793380E 01	0.753530E 01	0.707242E 01	0.667456E 01
79	0.637161E 01	0.625383E 01	0.605912E 01	0.587212E 01	0.570711E 01	0.563835E 01	0.552146E 01	0.543808E 01	0.531812E 01
80	0.526259E 01	0.492725E 01	0.781561E 01	0.830598E 01	0.852774E 01	0.876139E 01	0.880657E 01	0.875668E 01	0.838320E 01
81	0.800603E 01	0.758782E 01	0.712367E 01	0.671417E 01	0.641182E 01	0.629342E 01	0.595842E 01	0.588053E 01	0.572685E 01
82	0.564897E 01	0.553733E 01	0.545959E 01	0.533754E 01	0.529330E 01	0.496284E 01	0.785205E 01	0.832773E 01	0.856789E 01
83	0.881106E 01	0.887919E 01	0.879331E 01	0.849801E 01	0.819836E 01	0.767508E 01	0.718159E 01	0.676388E 01	0.645834E 01
84	0.633505E 01	0.607304E 01	0.589440E 01	0.574620E 01	0.566643E 01	0.556068E 01	0.548064E 01	0.536598E 01	0.532788E 01
85	0.501063E 01	0.788683E 01	0.836287E 01	0.861178E 01	0.889946E 01	0.898820E 01	0.892346E 01	0.863302E 01	0.832045E 01
86	0.778406E 01	0.726752E 01	0.691344E 01	0.649072E 01	0.637161E 01	0.610032E 01	0.592693E 01	0.575574E 01	0.567675E 01
87	0.557215E 01	0.550533E 01	0.539363E 01	0.534711E 01	0.504986E 01	0.793880E 01	0.842310E 01	0.867931E 01	0.901006E 01
88	0.909324E 01	0.903860E 01	0.876139E 01	0.845489E 01	0.793164E 01	0.738275E 01	0.688551E 01	0.654247E 01	0.640688E 01
89	0.613988E 01	0.596615E 01	0.578382E 01	0.570044E 01	0.559099E 01	0.551745E 01	0.545104E 01	0.536598E 01	0.506259E 01
90	0.800803E 01	0.840335E 01	0.880222E 01	0.911614E 01	0.918215E 01	0.913227E 01	0.887919E 01	0.859007E 01	0.813094E 01
91	0.751486E 01	0.696979E 01	0.659304E 01	0.643615E 01	0.615909E 01	0.598896E 01	0.582895E 01	0.562762E 01	0.562402E 01
92	0.554518E 01	0.537990E 01	0.537528E 01	0.508140E 01	0.811343E 01	0.864875E 01	0.897335E 01	0.929413E 01	0.935738E 01
93	0.928869E 01	0.904900E 01	0.874735E 01	0.827639E 01	0.765586E 01	0.711396E 01	0.666696E 01	0.648158E 01	0.619032E 01
94	0.600389E 01	0.584644E 01	0.569709E 01	0.564897E 01	0.556834E 01	0.544242E 01	0.539363E 01	0.509987E 01	0.829130E 01
95	0.884994E 01	0.926613E 01	0.950636E 01	0.957845E 01	0.952164E 01	0.929146E 01	0.899554E 01	0.849801E 01	0.784031E 01
96	0.725276E 01	0.674288E 01	0.653098E 01	0.622456E 01	0.604025E 01	0.588888E 01	0.571703E 01	0.568017E 01	0.560212E 01
97	0.548064E 01	0.542053E 01	0.512396E 01	0.843598E 01	0.904204E 01	0.938999E 01	0.971045E 01	0.979295E 01	0.975939E 01
98	0.958864E 01	0.932358E 01	0.880657E 01	0.803333E 01	0.742237E 01	0.683626E 01	0.660123E 01	0.627099E 01	0.607993E 01
99	0.591889E 01	0.576519E 01	0.570711E 01	0.562402E 01	0.550533E 01	0.546383E 01	0.515329E 01	0.858466E 01	0.917606E 01
100	0.953025E 01	0.983969E 01	0.998732E 01	0.100234E 02	0.990078E 01	0.963796E 01	0.904900E 01	0.839661E 01	0.763434E 01
101	0.697541E 01	0.667456E 01	0.633505E 01	0.613340E 01	0.597381E 01	0.581114E 01	0.574620E 01	0.566296E 01	0.554518E 01
102	0.551745E 01	0.520401E 01	0.873793E 01	0.927500E 01	0.960865E 01	0.995698E 01	0.101885E 02	0.102828E 02	0.102017E 02
103	0.100061E 02	0.947516E 01	0.876593E 01	0.790581E 01	0.713090E 01	0.676388E 01	0.640192E 01	0.618415E 01	0.601859E 01
104	0.584644E 01	0.579301E 01	0.570711E 01	0.559099E 01	0.555683E 01	0.524702E 01	0.885937E 01	0.935479E 01	0.971758E 01
105	0.100819E 02	0.103596E 02	0.105170E 02	0.104844E 02	0.103791E 02	0.992857E 01	0.911614E 01	0.817103E 01	0.724494E 01
106	0.686693E 01	0.646770E 01	0.624222E 01	0.605912E 01	0.589440E 01	0.582008E 01	0.561677E 01	0.562762E 01	0.558350E 01
107	0.527300E 01	0.896201E 01	0.942392E 01	0.981258E 01	0.101796E 02	0.104594E 02	0.106654E 02	0.106013E 02	0.105790E 02
108	0.101372E 02	0.932625E 01	0.830598E 01	0.733171E 01	0.690975E 01	0.651767E 01	0.629895E 01	0.609357E 01	0.589440E 01
109	0.584644E 01	0.573657E 01	0.564545E 01	0.561677E 01	0.532788E 01	0.901724E 01	0.947968E 01	0.986459E 01	0.102050E 02
110	0.104762E 02	0.106515E 02	0.106303E 02	0.105639E 02	0.101051E 02	0.938008E 01	0.836962E 01	0.740062E 01	0.696414E 01
111	0.656386E 01	0.630445E 01	0.610702E 01	0.591080E 01	0.587212E 01	0.574620E 01	0.566988E 01	0.563835E 01	0.537064E 01
112	0.901724E 01	0.947286E 01	0.984283E 01	0.101626E 02	0.103982E 02	0.105407E 02	0.105170E 02	0.104678E 02	0.999410E 01
113	0.931569E 01	0.834189E 01	0.741156E 01	0.697821E 01	0.656808E 01	0.631536E 01	0.612687E 01	0.594280E 01	0.590263E 01
114	0.561677E 01	0.559709E 01	0.565599E 01	0.535186E 01	0.896201E 01	0.938253E 01	0.972113E 01	0.100299E 02	0.102838E 02
115	0.104249E 02	0.103982E 02	0.103521E 02	0.992385E 01	0.915757E 01	0.823901E 01	0.735244E 01	0.693245E 01	0.652649E 01

0.629342E 01	0.612687E 01	0.594280E 01	0.590263E 01	0.562762E 01	0.570711E 01	0.563479E 01	0.533754E 01	0.888322E 01	
0.928869E 01	0.958459E 01	0.987375E 01	0.101885E 02	0.103426E 02	0.102939E 02	0.102634E 02	0.968868E 01	0.898820E 01	
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0.102105E 02	0.100917E 02	0.959465E 01	0.889946E 01	0.800135E 01	0.717012E 01	0.679682E 01	0.642649E 01	0.624222E 01	
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0.944754E 01	0.972997E 01	0.991985E 01	0.994001E 01	0.982065E 01	0.939980E 01	0.864717E 01	0.772709E 01	0.696979E 01	
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0.920321E 01	0.912913E 01	0.899193E 01	0.867437E 01	0.801102E 01	0.714283E 01	0.659304E 01	0.645834E 01	0.625383E 01	
0.610032E 01	0.595064E 01	0.578382E 01	0.569709E 01	0.554518E 01	0.547227E 01	0.542935E 01	0.517048E 01	0.829130E 01	
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0.858466E 01	0.838320E 01	0.793987E 01	0.731788E 01	0.679347E 01	0.648616E 01	0.637673E 01	0.614633E 01	0.594280E 01	
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0.566988E 01	0.560580E 01	0.542495E 01	0.535186E 01	0.531321E 01	0.506259E 01	0.801102E 01	0.839661E 01	0.859007E 01	
0.869935E 01	0.873327E 01	0.859563E 01	0.825349E 01	0.804012E 01	0.745008E 01	0.700216E 01	0.665544E 01	0.638182E 01	
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0.503695E 01									
-20.0	-4.5	0.5	61	226.E.	6014 LOW BEAM (NO.2 PH.)				
0.688551E 01	0.702108E 01	0.701031E 01	0.694698E 01	0.678446E 01	0.649527E 01	0.610702E 01	0.595064E 01	0.580212E 01	
0.564897E 01	0.546383E 01	0.539363E 01	0.517048E 01	0.512990E 01	0.500395E 01	0.491265E 01	0.483628E 01	0.471850E 01	
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0.661740E 01	0.622456E 01	0.605444E 01	0.589440E 01	0.570711E 01	0.551745E 01	0.544242E 01	0.522575E 01	0.515329E 01	
0.503044E 01	0.493447E 01	0.486753E 01	0.475359E 01	0.459512E 01	0.452179E 01	0.445435E 01	0.420469E 01	0.705704E 01	
0.722330E 01	0.722330E 01	0.717472E 01	0.702909E 01	0.673221E 01	0.633505E 01	0.614633E 01	0.596615E 01	0.577455E 01	
0.558350E 01	0.547227E 01	0.527300E 01	0.518739E 01	0.505625E 01	0.495583E 01	0.490527E 01	0.478749E 01	0.462497E 01	
0.455388E 01	0.445435E 01	0.420469E 01	0.712850E 01	0.729980E 01	0.731389E 01	0.727170E 01	0.714992E 01	0.685541E 01	
0.645834E 01	0.623637E 01	0.604737E 01	0.582008E 01	0.561677E 01	0.550939E 01	0.531812E 01	0.521494E 01	0.508140E 01	
0.498361E 01	0.490527E 01	0.479579E 01	0.465396E 01	0.458497E 01	0.447734E 01	0.424850E 01	0.719519E 01	0.736010E 01	
0.738275E 01	0.736960E 01	0.726752E 01	0.697821E 01	0.660935E 01	0.632972E 01	0.610702E 01	0.587212E 01	0.566643E 01	
0.552545E 01	0.537064E 01	0.524702E 01	0.512396E 01	0.495583E 01	0.493447E 01	0.481218E 01	0.466344E 01	0.460517E 01	
0.451086E 01	0.424850E 01	0.724494E 01	0.741156E 01	0.744132E 01	0.744483E 01	0.736771E 01	0.708255E 01	0.672503E 01	
0.644413E 01	0.619644E 01	0.594289E 01	0.572358E 01	0.558725E 01	0.545104E 01	0.529330E 01	0.517048E 01	0.504342E 01	
0.494876E 01	0.433623E 01	0.469135E 01	0.461512E 01	0.453260E 01	0.427667E 01	0.728207E 01	0.746164E 01	0.749998E 01	
0.752456E 01	0.745355E 01	0.718387E 01	0.683948E 01	0.653814E 01	0.628227E 01	0.602587E 01	0.578382E 01	0.563835E 01	
0.550939E 01	0.536120E 01	0.522036E 01	0.508140E 01	0.496981E 01	0.485981E 01	0.470953E 01	0.462497E 01	0.453260E 01	
0.429046E 01	0.737787E 01	0.750329E 01	0.756060E 01	0.757250E 01	0.749721E 01	0.726752E 01	0.693537E 01	0.663988E 01	
0.635611E 01	0.608677E 01	0.582895E 01	0.566988E 01	0.557215E 01	0.542053E 01	0.524175E 01	0.511799E 01	0.500395E 01	
0.487520E 01	0.470953E 01	0.463473E 01	0.455388E 01	0.430406E 01	0.733171E 01	0.753849E 01	0.760837E 01	0.762608E 01	
0.757712E 01	0.734278E 01	0.703174E 01	0.673221E 01	0.642162E 01	0.615273E 01	0.586363E 01	0.570044E 01	0.560212E 01	
0.545532E 01	0.527300E 01	0.514166E 01	0.503695E 01	0.488280E 01	0.471850E 01	0.463473E 01	0.456435E 01	0.431749E 01	
0.735628E 01	0.756683E 01	0.765160E 01	0.766669E 01	0.763723E 01	0.741517E 01	0.711639E 01	0.680683E 01	0.649072E 01	

176	0.619032E 01	0.590263E 01	0.574620E 01	0.562762E 01	0.547646E 01	0.530827E 01	0.517048E 01	0.506259E 01	0.489784E 01
177	0.474493E 01	0.466344E 01	0.458497E 01	0.434381E 01	0.737901E 01	0.760539E 01	0.768340E 01	0.769939E 01	0.768754E 01
178	0.747704E 01	0.718614E 01	0.687316E 01	0.654247E 01	0.623048E 01	0.594280E 01	0.578382E 01	0.565948E 01	0.548064E 01
179	0.531812E 01	0.518178E 01	0.506890E 01	0.490527E 01	0.477068E 01	0.469135E 01	0.461512E 01	0.436945E 01	0.740062E 01
180	0.762900E 01	0.771957E 01	0.773368E 01	0.772709E 01	0.751643E 01	0.722330E 01	0.691572E 01	0.658064E 01	0.625958E 01
181	0.598141E 01	0.582008E 01	0.569036E 01	0.550939E 01	0.533754E 01	0.519850E 01	0.509375E 01	0.494876E 01	0.479579E 01
182	0.472739E 01	0.466344E 01	0.439445E 01	0.742536E 01	0.766153E 01	0.775319E 01	0.778780E 01	0.776047E 01	0.754961E 01
183	0.726752E 01	0.694936E 01	0.662141E 01	0.629342E 01	0.601859E 01	0.585507E 01	0.570711E 01	0.552943E 01	0.535659E 01
184	0.520949E 01	0.512396E 01	0.496981E 01	0.483628E 01	0.475359E 01	0.468213E 01	0.440672E 01	0.743248E 01	0.769166E 01
185	0.777569E 01	0.781319E 01	0.779276E 01	0.759840E 01	0.731588E 01	0.699668E 01	0.665157E 01	0.632436E 01	0.605912E 01
186	0.590263E 01	0.572685E 01	0.555683E 01	0.538449E 01	0.522575E 01	0.514749E 01	0.500395E 01	0.487520E 01	0.477912E 01
187	0.470953E 01	0.445435E 01	0.745530E 01	0.772973E 01	0.782164E 01	0.786787E 01	0.783913E 01	0.763868E 01	0.736581E 01
188	0.704229E 01	0.668586E 01	0.633505E 01	0.606611E 01	0.592693E 01	0.573657E 01	0.558350E 01	0.540717E 01	0.525227E 01
189	0.517048E 01	0.503605E 01	0.490527E 01	0.481218E 01	0.472739E 01	0.443082E 01	0.749053E 01	0.776938E 01	0.786672E 01
190	0.792841E 01	0.788683E 01	0.769303E 01	0.741878E 01	0.709506E 01	0.672863E 01	0.636647E 01	0.609357E 01	0.592693E 01
191	0.565948E 01	0.559842E 01	0.542935E 01	0.528320E 01	0.519296E 01	0.506259E 01	0.494164E 01	0.483628E 01	0.477068E 01
192	0.449981E 01	0.751480E 01	0.781076E 01	0.792299E 01	0.798718E 01	0.795050E 01	0.774932E 01	0.747022E 01	0.715851E 01
193	0.677422E 01	0.641673E 01	0.613340E 01	0.596615E 01	0.578382E 01	0.562040E 01	0.545104E 01	0.530330E 01	0.522575E 01
194	0.508760E 01	0.496981E 01	0.485981E 01	0.477912E 01	0.449981E 01	0.754803E 01	0.784502E 01	0.797212E 01	0.803916E 01
195	0.799024E 01	0.779893E 01	0.752132E 01	0.720415E 01	0.682329E 01	0.645362E 01	0.618415E 01	0.599645E 01	0.584644E 01
196	0.564191E 01	0.548064E 01	0.533754E 01	0.524175E 01	0.512990E 01	0.499043E 01	0.488280E 01	0.479579E 01	0.452179E 01
197	0.756941E 01	0.787017E 01	0.800035E 01	0.810470E 01	0.803041E 01	0.784737E 01	0.757404E 01	0.725134E 01	0.687005E 01
198	0.649527E 01	0.621860E 01	0.602587E 01	0.588888E 01	0.568017E 01	0.550939E 01	0.536598E 01	0.527300E 01	0.515905E 01
199	0.502388E 01	0.489784E 01	0.482831E 01	0.453260E 01	0.759539E 01	0.788908E 01	0.803041E 01	0.814816E 01	0.770571E 01
200	0.789357E 01	0.761727E 01	0.729234E 01	0.690073E 01	0.652649E 01	0.625958E 01	0.605912E 01	0.592693E 01	0.572358E 01
201	0.555683E 01	0.540717E 01	0.530827E 01	0.516479E 01	0.504342E 01	0.492725E 01	0.483628E 01	0.454329E 01	0.761579E 01
202	0.790691E 01	0.804943E 01	0.819008E 01	0.814816E 01	0.796485E 01	0.767925E 01	0.733954E 01	0.693245E 01	0.656386E 01
203	0.630445E 01	0.609357E 01	0.595842E 01	0.572685E 01	0.559842E 01	0.544674E 01	0.534233E 01	0.519850E 01	0.509375E 01
204	0.495583E 01	0.487520E 01	0.456435E 01	0.762168E 01	0.791425E 01	0.800135E 01	0.823801E 01	0.821447E 01	0.806809E 01
205	0.775061E 01	0.738585E 01	0.699118E 01	0.661740E 01	0.633505E 01	0.615273E 01	0.601127E 01	0.578382E 01	0.564191E 01
206	0.548480E 01	0.537528E 01	0.523644E 01	0.510594E 01	0.499043E 01	0.490527E 01	0.459512E 01	0.762168E 01	0.793057E 01
207	0.809560E 01	0.829130E 01	0.830598E 01	0.816508E 01	0.782764E 01	0.744483E 01	0.704490E 01	0.663988E 01	0.630992E 01
208	0.618415E 01	0.604737E 01	0.583773E 01	0.569709E 01	0.551745E 01	0.540268E 01	0.526786E 01	0.514166E 01	0.501728E 01
209	0.492725E 01	0.462497E 01	0.761135E 01	0.794944E 01	0.814816E 01	0.834901E 01	0.836287E 01	0.823031E 01	0.788495E 01
210	0.750659E 01	0.709257E 01	0.668211E 01	0.636647E 01	0.620051E 01	0.610032E 01	0.591080E 01	0.570711E 01	0.555296E 01
211	0.543372E 01	0.530827E 01	0.518178E 01	0.506259E 01	0.496981E 01	0.465396E 01	0.763868E 01	0.796589E 01	0.819836E 01
212	0.839004E 01	0.839661E 01	0.835585E 01	0.793164E 01	0.752456E 01	0.713569E 01	0.670808E 01	0.639693E 01	0.621261E 01
213	0.611368E 01	0.590263E 01	0.575574E 01	0.559099E 01	0.548480E 01	0.533754E 01	0.520401E 01	0.511199E 01	0.501063E 01
214	0.470048E 01	0.765728E 01	0.803236E 01	0.825349E 01	0.843598E 01	0.844870E 01	0.840335E 01	0.797625E 01	0.760390E 01
215	0.718159E 01	0.675344E 01	0.642162E 01	0.623637E 01	0.613340E 01	0.596615E 01	0.580212E 01	0.563479E 01	0.551745E 01
216	0.537064E 01	0.524702E 01	0.515329E 01	0.508140E 01	0.475359E 01	0.768891E 01	0.809560E 01	0.829879E 01	0.847991E 01
217	0.849801E 01	0.845489E 01	0.805896E 01	0.766011E 01	0.722548E 01	0.679682E 01	0.644889E 01	0.625383E 01	0.613988E 01
218	0.598141E 01	0.581114E 01	0.566296E 01	0.555296E 01	0.540717E 01	0.528827E 01	0.518739E 01	0.511799E 01	0.479579E 01
219	0.767647E 01	0.814816E 01	0.834901E 01	0.853366E 01	0.856789E 01	0.851599E 01	0.811343E 01	0.771021E 01	0.729438E 01
220	0.684588E 01	0.643133E 01	0.627099E 01	0.613988E 01	0.598896E 01	0.582895E 01	0.568017E 01	0.554908E 01	0.542495E 01
221	0.532301E 01	0.521494E 01	0.514166E 01	0.482028E 01	0.774932E 01	0.819836E 01	0.839661E 01	0.859563E 01	0.862784E 01
222	0.857904E 01	0.815680E 01	0.776047E 01	0.735052E 01	0.689163E 01	0.652649E 01	0.629895E 01	0.617170E 01	0.601127E 01
223	0.583773E 01	0.567332E 01	0.557595E 01	0.543808E 01	0.534711E 01	0.523644E 01	0.516479E 01	0.483628E 01	0.777569E 01
224	0.823031E 01	0.842310E 01	0.863835E 01	0.868440E 01	0.860098E 01	0.821447E 01	0.781319E 01	0.740974E 01	0.695559E 01
225	0.657228E 01	0.632436E 01	0.619032E 01	0.601859E 01	0.585507E 01	0.566988E 01	0.558725E 01	0.545532E 01	0.537064E 01
226	0.525749E 01	0.519850E 01	0.487520E 01	0.778655E 01	0.824591E 01	0.846126E 01	0.868946E 01	0.873327E 01	0.868946E 01
227	0.828999E 01	0.787131E 01	0.747193E 01	0.701302E 01	0.661740E 01	0.635089E 01	0.621860E 01	0.604025E 01	0.578382E 01
228	0.566983E 01	0.560212E 01	0.548480E 01	0.540268E 01	0.528320E 01	0.522575E 01	0.489784E 01	0.779400E 01	0.826899E 01
229	0.849801E 01	0.872843E 01	0.876139E 01	0.872356E 01	0.831336E 01	0.793380E 01	0.753530E 01	0.707242E 01	0.667456E 01
230	0.637161E 01	0.625383E 01	0.605912E 01	0.587212E 01	0.570711E 01	0.563835E 01	0.552146E 01	0.543808E 01	0.531812E 01
231	0.526269E 01	0.492725E 01	0.781561E 01	0.830598E 01	0.852774E 01	0.876139E 01	0.880657E 01	0.875668E 01	0.838320E 01
232	0.800603E 01	0.758782E 01	0.712367E 01	0.671417E 01	0.641182E 01	0.629342E 01	0.595842E 01	0.588053E 01	0.572685E 01
233	0.564897E 01	0.553733E 01	0.545959E 01	0.533754E 01	0.529330E 01	0.496284E 01	0.785205E 01	0.832773E 01	0.856789E 01
234	0.881106E 01	0.887919E 01	0.879331E 01	0.849801E 01	0.819836E 01	0.767508E 01	0.718159E 01	0.676388E 01	0.645834E 01
235	0.633505E 01	0.607304E 01	0.599440E 01	0.574620E 01	0.566643E 01	0.556068E 01	0.548064E 01	0.536598E 01	0.532788E 01

236	0.501963E 01	0.788683E 01	0.836287E 01	0.861178E 01	0.889946E 01	0.898820E 01	0.892346E 01	0.863302E 01	0.832045E 01
237	0.779406E 01	0.726752E 01	0.681344E 01	0.649072E 01	0.637161E 01	0.610032E 01	0.592693E 01	0.575574E 01	0.567675E 01
238	0.557215E 01	0.550533E 01	0.539363E 01	0.534711E 01	0.504986E 01	0.793880E 01	0.842310E 01	0.867931E 01	0.901006E 01
239	0.909324E 01	0.903860E 01	0.876139E 01	0.345489E 01	0.793164E 01	0.738275E 01	0.688551E 01	0.654247E 01	0.640688E 01
240	0.613988E 01	0.596615E 01	0.578382E 01	0.570044E 01	0.559099E 01	0.551745E 01	0.545104E 01	0.536598E 01	0.506259E 01
241	0.800803E 01	0.840335E 01	0.880222E 01	0.911614E 01	0.918215E 01	0.913227E 01	0.887919E 01	0.859007E 01	0.813094E 01
242	0.751480E 01	0.696979E 01	0.659304E 01	0.643615E 01	0.615909E 01	0.598896E 01	0.582895E 01	0.562762E 01	0.562402E 01
243	0.554518E 01	0.537990E 01	0.537528E 01	0.508140E 01	0.811343E 01	0.864875E 01	0.897335E 01	0.929413E 01	0.935738E 01
244	0.928869E 01	0.904900E 01	0.874735E 01	0.827639E 01	0.765586E 01	0.711396E 01	0.666696E 01	0.648158E 01	0.619032E 01
245	0.600389E 01	0.584644E 01	0.569709E 01	0.564897E 01	0.556834E 01	0.544242E 01	0.539363E 01	0.509987E 01	0.829130E 01
246	0.884994E 01	0.920613E 01	0.950636E 01	0.957845E 01	0.952164E 01	0.929146E 01	0.899554E 01	0.849801E 01	0.784031E 01
247	0.725276E 01	0.674288E 01	0.653088E 01	0.622456E 01	0.604025E 01	0.588888E 01	0.571703E 01	0.568017E 01	0.560212E 01
248	0.548064E 01	0.542053E 01	0.512396E 01	0.843598E 01	0.904204E 01	0.938999E 01	0.971045E 01	0.979295E 01	0.975939E 01
249	0.958864E 01	0.932358E 01	0.880657E 01	0.803333E 01	0.742237E 01	0.683626E 01	0.660123E 01	0.627099E 01	0.607993E 01
250	0.591889E 01	0.576519E 01	0.570711E 01	0.562402E 01	0.550533E 01	0.546383E 01	0.515329E 01	0.858466E 01	0.917606E 01
251	0.953025E 01	0.983969E 01	0.998732E 01	0.100234E 02	0.990078E 01	0.963796E 01	0.904900E 01	0.839661E 01	0.763434E 01
252	0.697541E 01	0.667456E 01	0.633505E 01	0.613340E 01	0.597381E 01	0.581114E 01	0.574620E 01	0.566296E 01	0.554518E 01
253	0.551745E 01	0.520401E 01	0.873793E 01	0.927500E 01	0.960865E 01	0.995698E 01	0.101885E 02	0.102828E 02	0.102017E 02
254	0.100061E 02	0.947516E 01	0.876593E 01	0.790581E 01	0.713090E 01	0.676388E 01	0.640192E 01	0.618415E 01	0.601859E 01
255	0.584644E 01	0.579301E 01	0.570711E 01	0.559099E 01	0.555683E 01	0.524702E 01	0.885837E 01	0.935479E 01	0.971758E 01
256	0.100819E 02	0.103596E 02	0.105170E 02	0.104844E 02	0.103791E 02	0.992857E 01	0.911614E 01	0.817103E 01	0.724494E 01
257	0.686693E 01	0.646770E 01	0.624222E 01	0.605912E 01	0.589440E 01	0.582008E 01	0.561677E 01	0.562762E 01	0.558350E 01
258	0.527300E 01	0.996201E 01	0.942392E 01	0.981258E 01	0.101796E 02	0.104594E 02	0.106654E 02	0.106013E 02	0.105790E 02
259	0.101372E 02	0.932625E 01	0.830598E 01	0.733171E 01	0.690975E 01	0.651767E 01	0.629895E 01	0.609357E 01	0.589440E 01
260	0.584644E 01	0.573657E 01	0.564545E 01	0.561677E 01	0.532788E 01	0.901724E 01	0.947968E 01	0.986459E 01	0.102050E 02
261	0.104762E 02	0.106515E 02	0.106303E 02	0.105639E 02	0.101051E 02	0.938008E 01	0.836962E 01	0.740062E 01	0.696414E 01
262	0.656386E 01	0.630445E 01	0.610702E 01	0.591080E 01	0.587212E 01	0.574620E 01	0.566988E 01	0.563835E 01	0.537064E 01
263	0.901724E 01	0.947286E 01	0.984283E 01	0.101626E 02	0.103982E 02	0.105407E 02	0.105170E 02	0.104678E 02	0.999410E 01
264	0.931569E 01	0.834189E 01	0.741156E 01	0.697821E 01	0.656808E 01	0.631536E 01	0.612687E 01	0.594280E 01	0.590263E 01
265	0.561677E 01	0.569709E 01	0.565599E 01	0.535186E 01	0.896201E 01	0.938253E 01	0.972113E 01	0.100299E 02	0.102838E 02
266	0.104249E 02	0.103982E 02	0.103521E 02	0.982385E 01	0.915757E 01	0.823801E 01	0.735244E 01	0.693245E 01	0.652649E 01
267	0.629342E 01	0.612687E 01	0.594280E 01	0.590263E 01	0.562762E 01	0.570711E 01	0.563479E 01	0.533754E 01	0.888322E 01
268	0.928869E 01	0.958459E 01	0.987375E 01	0.101885E 02	0.103426E 02	0.102938E 02	0.102634E 02	0.968868E 01	0.898820E 01
269	0.812237E 01	0.727170E 01	0.686693E 01	0.647697E 01	0.627099E 01	0.610702E 01	0.591889E 01	0.588053E 01	0.560580E 01
270	0.568697E 01	0.560947E 01	0.529330E 01	0.881981E 01	0.919421E 01	0.945454E 01	0.976112E 01	0.101051E 02	0.102736E 02
271	0.102105E 02	0.100917E 02	0.959465E 01	0.889946E 01	0.800135E 01	0.717012E 01	0.679682E 01	0.642649E 01	0.624222E 01
272	0.607304E 01	0.588888E 01	0.584644E 01	0.569373E 01	0.563835E 01	0.557215E 01	0.526786E 01	0.876593E 01	0.911943E 01
273	0.934705E 01	0.961854E 01	0.995698E 01	0.101430E 02	0.101313E 02	0.100312E 02	0.958658E 01	0.883288E 01	0.790802E 01
274	0.707496E 01	0.674288E 01	0.641673E 01	0.621261E 01	0.605444E 01	0.586363E 01	0.582008E 01	0.565599E 01	0.561677E 01
275	0.555296E 01	0.526786E 01	0.872356E 01	0.905940E 01	0.927772E 01	0.951951E 01	0.983655E 01	0.100338E 02	0.100619E 02
276	0.995977E 01	0.953452E 01	0.874735E 01	0.783676E 01	0.700760E 01	0.670073E 01	0.638182E 01	0.620051E 01	0.603309E 01
277	0.585507E 01	0.581114E 01	0.564545E 01	0.559471E 01	0.554908E 01	0.528320E 01	0.866923E 01	0.900651E 01	0.920613E 01
278	0.944754E 01	0.972997E 01	0.991985E 01	0.994001E 01	0.982065E 01	0.939980E 01	0.864717E 01	0.772709E 01	0.696979E 01
279	0.665929E 01	0.634564E 01	0.615273E 01	0.601859E 01	0.583773E 01	0.578382E 01	0.561313E 01	0.557215E 01	0.554126E 01
280	0.526786E 01	0.861722E 01	0.894676E 01	0.913551E 01	0.935738E 01	0.961854E 01	0.979624E 01	0.978633E 01	0.966460E 01
281	0.923825E 01	0.856217E 01	0.762315E 01	0.698857E 01	0.663595E 01	0.632077E 01	0.612030E 01	0.598141E 01	0.581114E 01
282	0.576519E 01	0.560212E 01	0.554518E 01	0.550126E 01	0.523111E 01	0.857338E 01	0.889137E 01	0.906624E 01	0.925818E 01
283	0.943819E 01	0.959866E 01	0.961066E 01	0.946831E 01	0.907647E 01	0.844870E 01	0.748717E 01	0.679010E 01	0.660935E 01
284	0.629895E 01	0.610702E 01	0.596615E 01	0.582895E 01	0.576519E 01	0.559099E 01	0.552146E 01	0.545959E 01	0.520949E 01
285	0.848591E 01	0.880222E 01	0.898080E 01	0.914185E 01	0.930229E 01	0.938008E 01	0.934967E 01	0.925254E 01	0.889946E 01
286	0.826899E 01	0.731588E 01	0.669703E 01	0.654247E 01	0.633505E 01	0.615273E 01	0.600389E 01	0.584644E 01	0.574620E 01
287	0.556834E 01	0.550126E 01	0.544242E 01	0.520949E 01	0.839661E 01	0.872843E 01	0.889946E 01	0.903157E 01	0.916377E 01
288	0.920321E 01	0.912913E 01	0.899193E 01	0.867437E 01	0.801102E 01	0.714283E 01	0.659304E 01	0.645834E 01	0.625383E 01
289	0.610032E 01	0.595064E 01	0.578382E 01	0.569709E 01	0.554518E 01	0.547227E 01	0.542935E 01	0.517048E 01	0.829130E 01
290	0.864875E 01	0.881537E 01	0.893906E 01	0.901724E 01	0.898444E 01	0.882409E 01	0.868946E 01	0.829130E 01	0.770346E 01
291	0.692952E 01	0.653814E 01	0.641673E 01	0.618415E 01	0.600389E 01	0.588888E 01	0.572685E 01	0.568017E 01	0.551745E 01
292	0.544674E 01	0.540717E 01	0.514749E 01	0.321447E 01	0.856217E 01	0.873793E 01	0.885409E 01	0.891557E 01	0.881537E 01
293	0.858466E 01	0.838320E 01	0.793987E 01	0.731788E 01	0.679347E 01	0.648616E 01	0.637673E 01	0.614633E 01	0.594280E 01
294	0.582395E 01	0.568017E 01	0.562762E 01	0.546383E 01	0.538449E 01	0.535659E 01	0.509987E 01	0.813094E 01	0.847366E 01
295	0.867931E 01	0.875658E 01	0.883288E 01	0.866923E 01	0.838320E 01	0.815680E 01	0.761727E 01	0.713807E 01	0.671780E 01

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297   0.533272E 01 0.510594E 01 0.806809E 01 0.843598E 01 0.863302E 01 0.873327E 01 0.879331E 01 0.862784E 01 0.828400E 01
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302   0.503695E 01
303  -20.0 -4.5   0.5   61   22G.E. 6014 LOW BEAM (NO.2 PH.)
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305   0.564897E 01 0.546383E 01 0.539363E 01 0.517048E 01 0.512990E 01 0.500395E 01 0.491265E 01 0.483628E 01 0.471850E 01
306   0.458497E 01 0.452179E 01 0.444265E 01 0.418965E 01 0.697821E 01 0.712367E 01 0.713648E 01 0.706987E 01 0.692166E 01
307   0.661740E 01 0.622436E 01 0.605444E 01 0.589440E 01 0.570711E 01 0.551745E 01 0.544242E 01 0.522575E 01 0.515329E 01
308   0.503044E 01 0.493447E 01 0.486753E 01 0.475359E 01 0.459512E 01 0.452179E 01 0.445435E 01 0.420469E 01 0.705704E 01
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359	0.618415E 01	0.604737E 01	0.583773E 01	0.569709E 01	0.551745E 01	0.540268E 01	0.526786E 01	0.514166E 01	0.501728E 01
360	0.492725E 01	0.462497E 01	0.761135E 01	0.794944E 01	0.814816E 01	0.834901E 01	0.836287E 01	0.823031E 01	0.788495E 01
361	0.750659E 01	0.709257E 01	0.668211E 01	0.636647E 01	0.620051E 01	0.610032E 01	0.591080E 01	0.570711E 01	0.555296E 01
362	0.543372E 01	0.530827E 01	0.518178E 01	0.506259E 01	0.496981E 01	0.465396E 01	0.763868E 01	0.796589E 01	0.819836E 01
363	0.839004E 01	0.839651E 01	0.835585E 01	0.793164E 01	0.752456E 01	0.713569E 01	0.670808E 01	0.639693E 01	0.621261E 01
364	0.611368E 01	0.590263E 01	0.575574E 01	0.559099E 01	0.548480E 01	0.533754E 01	0.520401E 01	0.511199E 01	0.501063E 01
365	0.470048E 01	0.765728E 01	0.803236E 01	0.825349E 01	0.843598E 01	0.844870E 01	0.840335E 01	0.797625E 01	0.760390E 01
366	0.718159E 01	0.675344E 01	0.642162E 01	0.623637E 01	0.613340E 01	0.596615E 01	0.580212E 01	0.563479E 01	0.551745E 01
367	0.537064E 01	0.524702E 01	0.515329E 01	0.508140E 01	0.475359E 01	0.768891E 01	0.809560E 01	0.829879E 01	0.847991E 01
368	0.849801E 01	0.845489E 01	0.805896E 01	0.766011E 01	0.722548E 01	0.679682E 01	0.644889E 01	0.625383E 01	0.613988E 01
369	0.598141E 01	0.581114E 01	0.566296E 01	0.555296E 01	0.540717E 01	0.528827E 01	0.518739E 01	0.511799E 01	0.479579E 01
370	0.767647E 01	0.814816E 01	0.834901E 01	0.853366E 01	0.856789E 01	0.851599E 01	0.811343E 01	0.771021E 01	0.729438E 01
371	0.684588E 01	0.643133E 01	0.627099E 01	0.613988E 01	0.598896E 01	0.582895E 01	0.568017E 01	0.554908E 01	0.542495E 01
372	0.532301E 01	0.521494E 01	0.514166E 01	0.492028E 01	0.774932E 01	0.819836E 01	0.839661E 01	0.859563E 01	0.862784E 01
373	0.857904E 01	0.815680E 01	0.776047E 01	0.735052E 01	0.689163E 01	0.652649E 01	0.629895E 01	0.617170E 01	0.601127E 01
374	0.583773E 01	0.567332E 01	0.557595E 01	0.543808E 01	0.534711E 01	0.523644E 01	0.516479E 01	0.483628E 01	0.777569E 01
375	0.823031E 01	0.842310E 01	0.863835E 01	0.868440E 01	0.860098E 01	0.821447E 01	0.781319E 01	0.740974E 01	0.695559E 01
376	0.657228E 01	0.632436E 01	0.619032E 01	0.601859E 01	0.585507E 01	0.566988E 01	0.558725E 01	0.545532E 01	0.537064E 01
377	0.525749E 01	0.519850E 01	0.487520E 01	0.778655E 01	0.824591E 01	0.846126E 01	0.868946E 01	0.873327E 01	0.868946E 01
378	0.826899E 01	0.787131E 01	0.747193E 01	0.701302E 01	0.661740E 01	0.635089E 01	0.621860E 01	0.604025E 01	0.578382E 01
379	0.566988E 01	0.560212E 01	0.548480E 01	0.540268E 01	0.528320E 01	0.522575E 01	0.489784E 01	0.779400E 01	0.826899E 01
380	0.849801E 01	0.872843E 01	0.876139E 01	0.872356E 01	0.831336E 01	0.793380E 01	0.753530E 01	0.707242E 01	0.667456E 01
381	0.637161E 01	0.625383E 01	0.605912E 01	0.587212E 01	0.570711E 01	0.563835E 01	0.552146E 01	0.543808E 01	0.531812E 01
382	0.526269E 01	0.492725E 01	0.781561E 01	0.830598E 01	0.852774E 01	0.876139E 01	0.880657E 01	0.875668E 01	0.838320E 01
383	0.800603E 01	0.758782E 01	0.712367E 01	0.671417E 01	0.641182E 01	0.629342E 01	0.595842E 01	0.588053E 01	0.572685E 01
384	0.564897E 01	0.553733E 01	0.545959E 01	0.533754E 01	0.529330E 01	0.496284E 01	0.785205E 01	0.832773E 01	0.856789E 01
385	0.881106E 01	0.887919E 01	0.879331E 01	0.849801E 01	0.819836E 01	0.767508E 01	0.718159E 01	0.676388E 01	0.645834E 01
386	0.633505E 01	0.607304E 01	0.589440E 01	0.574620E 01	0.566643E 01	0.556068E 01	0.548064E 01	0.536598E 01	0.532788E 01
387	0.501063E 01	0.798683E 01	0.836287E 01	0.861178E 01	0.889946E 01	0.898820E 01	0.892346E 01	0.863302E 01	0.832045E 01
388	0.778406E 01	0.726752E 01	0.681344E 01	0.649072E 01	0.637161E 01	0.610032E 01	0.592693E 01	0.575574E 01	0.567675E 01
389	0.557215E 01	0.550533E 01	0.539363E 01	0.534711E 01	0.504986E 01	0.793880E 01	0.842310E 01	0.867931E 01	0.901006E 01
390	0.909324E 01	0.903860E 01	0.876139E 01	0.845489E 01	0.793164E 01	0.738275E 01	0.688551E 01	0.654247E 01	0.640688E 01
391	0.613988E 01	0.596615E 01	0.578382E 01	0.570044E 01	0.559099E 01	0.551745E 01	0.545104E 01	0.536598E 01	0.506259E 01
392	0.800803E 01	0.840335E 01	0.880222E 01	0.911614E 01	0.918215E 01	0.913227E 01	0.887919E 01	0.859007E 01	0.813094E 01
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394	0.554518E 01	0.537990E 01	0.537528E 01	0.508140E 01	0.811343E 01	0.864875E 01	0.897335E 01	0.929413E 01	0.935738E 01
395	0.928869E 01	0.904900E 01	0.874735E 01	0.827639E 01	0.765586E 01	0.711396E 01	0.666696E 01	0.648158E 01	0.619032E 01
396	0.600389E 01	0.584644E 01	0.569709E 01	0.564897E 01	0.556834E 01	0.544242E 01	0.539363E 01	0.509987E 01	0.829130E 01
397	0.884994E 01	0.920613E 01	0.950636E 01	0.957845E 01	0.952164E 01	0.929146E 01	0.899554E 01	0.849801E 01	0.784031E 01
398	0.725276E 01	0.674288E 01	0.653088E 01	0.622456E 01	0.604025E 01	0.588888E 01	0.571703E 01	0.568017E 01	0.560212E 01
399	0.548064E 01	0.542053E 01	0.512396E 01	0.843598E 01	0.904204E 01	0.938999E 01	0.971045E 01	0.979295E 01	0.975939E 01
400	0.958864E 01	0.932358E 01	0.880657E 01	0.803333E 01	0.742237E 01	0.683626E 01	0.660123E 01	0.627099E 01	0.607993E 01
401	0.591889E 01	0.576519E 01	0.570711E 01	0.562402E 01	0.550533E 01	0.546383E 01	0.515329E 01	0.858466E 01	0.917606E 01
402	0.953025E 01	0.983969E 01	0.998732E 01	0.100234E 02	0.990078E 01	0.963796E 01	0.904900E 01	0.839661E 01	0.763434E 01
403	0.697541E 01	0.667456E 01	0.633505E 01	0.613340E 01	0.597381E 01	0.581114E 01	0.574620E 01	0.566296E 01	0.554518E 01
404	0.551745E 01	0.520401E 01	0.873793E 01	0.927500E 01	0.960865E 01	0.995698E 01	0.101885E 02	0.102828E 02	0.102017E 02
405	0.100061E 02	0.947516E 01	0.876593E 01	0.790581E 01	0.713090E 01	0.676388E 01	0.640192E 01	0.618415E 01	0.601859E 01
406	0.584644E 01	0.579301E 01	0.570711E 01	0.559099E 01	0.555683E 01	0.524702E 01	0.885837E 01	0.935479E 01	0.971758E 01
407	0.100819E 02	0.103596E 02	0.105170E 02	0.104844E 02	0.103791E 02	0.992857E 01	0.911614E 01	0.817103E 01	0.724494E 01
408	0.686693E 01	0.646770E 01	0.624222E 01	0.605912E 01	0.589440E 01	0.582008E 01	0.561677E 01	0.562762E 01	0.558350E 01
409	0.527300E 01	0.896201E 01	0.942392E 01	0.981258E 01	0.101796E 02	0.104594E 02	0.106654E 02	0.106013E 02	0.105790E 02
410	0.101372E 02	0.932625E 01	0.830598E 01	0.733171E 01	0.690975E 01	0.651767E 01	0.629895E 01	0.609357E 01	0.589440E 01
411	0.584644E 01	0.573657E 01	0.564545E 01	0.561677E 01	0.532788E 01	0.901724E 01	0.947968E 01	0.986459E 01	0.102050E 02
412	0.104762E 02	0.106515E 02	0.106303E 02	0.105639E 02	0.101051E 02	0.938008E 01	0.836962E 01	0.740062E 01	0.696414E 01
413	0.656386E 01	0.630445E 01	0.610702E 01	0.591080E 01	0.587212E 01	0.574620E 01	0.566988E 01	0.563935E 01	0.537064E 01
414	0.901724E 01	0.947286E 01	0.984283E 01	0.101626E 02	0.103982E 02	0.105407E 02	0.105170E 02	0.104678E 02	0.999410E 01
415	0.931569E 01	0.834189E 01	0.741156E 01	0.697821E 01	0.656808E 01	0.631536E 01	0.612687E 01	0.594280E 01	0.590263E 01

416	0.561677E 01	0.569709E 01	0.565599E 01	0.535186E 01	0.896201E 01	0.938253E 01	0.972113E 01	0.100299E 02	0.102838E 02
417	0.104249E 02	0.103982E 02	0.103521E 02	0.982385E 01	0.915757E 01	0.823801E 01	0.735244E 01	0.693245E 01	0.652649E 01
418	0.629342E 01	0.612687E 01	0.594280E 01	0.590263E 01	0.562762E 01	0.570711E 01	0.563479E 01	0.533754E 01	0.888322E 01
419	0.928869E 01	0.958459E 01	0.987375E 01	0.101885E 02	0.103426E 02	0.102938E 02	0.102634E 02	0.968868E 01	0.898820E 01
420	0.812237E 01	0.727170E 01	0.686693E 01	0.647697E 01	0.627099E 01	0.610702E 01	0.591889E 01	0.588053E 01	0.560580E 01
421	0.568697E 01	0.560947E 01	0.529330E 01	0.881981E 01	0.919421E 01	0.945454E 01	0.976112E 01	0.101051E 02	0.102736E 02
422	0.102105E 02	0.100917E 02	0.959465E 01	0.889946E 01	0.800135E 01	0.717012E 01	0.679682E 01	0.642649E 01	0.624222E 01
423	0.607304E 01	0.588888E 01	0.584644E 01	0.569373E 01	0.563835E 01	0.557215E 01	0.526786E 01	0.876593E 01	0.911943E 01
424	0.934705E 01	0.961854E 01	0.995698E 01	0.101430E 02	0.101313E 02	0.100312E 02	0.958658E 01	0.883288E 01	0.790802E 01
425	0.707496E 01	0.674288E 01	0.641673E 01	0.621261E 01	0.605444E 01	0.586363E 01	0.582008E 01	0.565599E 01	0.561677E 01
426	0.555296E 01	0.526786E 01	0.872356E 01	0.905940E 01	0.927772E 01	0.951951E 01	0.983655E 01	0.100338E 02	0.100619E 02
427	0.995977E 01	0.953452E 01	0.874735E 01	0.783676E 01	0.700760E 01	0.670073E 01	0.638182E 01	0.620051E 01	0.603309E 01
428	0.585507E 01	0.581114E 01	0.564545E 01	0.559471E 01	0.554908E 01	0.528320E 01	0.866923E 01	0.900651E 01	0.920613E 01
429	0.944754E 01	0.972997E 01	0.991985E 01	0.994001E 01	0.982065E 01	0.939980E 01	0.864717E 01	0.772709E 01	0.696979E 01
430	0.665929E 01	0.634564E 01	0.615273E 01	0.601859E 01	0.583773E 01	0.578382E 01	0.561313E 01	0.557215E 01	0.554126E 01
431	0.526786E 01	0.861722E 01	0.894676E 01	0.913551E 01	0.935738E 01	0.961854E 01	0.979624E 01	0.978633E 01	0.966460E 01
432	0.923825E 01	0.856217E 01	0.762315E 01	0.688857E 01	0.663595E 01	0.632077E 01	0.612030E 01	0.598141E 01	0.581114E 01
433	0.576519E 01	0.560212E 01	0.554518E 01	0.550126E 01	0.523111E 01	0.857338E 01	0.889137E 01	0.906624E 01	0.925818E 01
434	0.943819E 01	0.959866E 01	0.961066E 01	0.946831E 01	0.907647E 01	0.844870E 01	0.748717E 01	0.679010E 01	0.660935E 01
435	0.629895E 01	0.610702E 01	0.596615E 01	0.582895E 01	0.576519E 01	0.559099E 01	0.552146E 01	0.545959E 01	0.520949E 01
436	0.846591E 01	0.880222E 01	0.898080E 01	0.914185E 01	0.930228E 01	0.938008E 01	0.934967E 01	0.925254E 01	0.889946E 01
437	0.826899E 01	0.731588E 01	0.669703E 01	0.654247E 01	0.633505E 01	0.615273E 01	0.600389E 01	0.584644E 01	0.574620E 01
438	0.556834E 01	0.550126E 01	0.544242E 01	0.520949E 01	0.839661E 01	0.872843E 01	0.889946E 01	0.903157E 01	0.916377E 01
439	0.920321E 01	0.912913E 01	0.899193E 01	0.867437E 01	0.801102E 01	0.714283E 01	0.659304E 01	0.645834E 01	0.625383E 01
440	0.610032E 01	0.595064E 01	0.578382E 01	0.569709E 01	0.554518E 01	0.547227E 01	0.542935E 01	0.517048E 01	0.829130E 01
441	0.864875E 01	0.881537E 01	0.893906E 01	0.901724E 01	0.898444E 01	0.882409E 01	0.868946E 01	0.829130E 01	0.770346E 01
442	0.692952E 01	0.653814E 01	0.641673E 01	0.618415E 01	0.600389E 01	0.588888E 01	0.572685E 01	0.568017E 01	0.551745E 01
443	0.544674E 01	0.540717E 01	0.514749E 01	0.821447E 01	0.856217E 01	0.873793E 01	0.885409E 01	0.891557E 01	0.881537E 01
444	0.858466E 01	0.838320E 01	0.793987E 01	0.731788E 01	0.679347E 01	0.648616E 01	0.637673E 01	0.614633E 01	0.594280E 01
445	0.582895E 01	0.568017E 01	0.562762E 01	0.546383E 01	0.538449E 01	0.535659E 01	0.509987E 01	0.813094E 01	0.847366E 01
446	0.867931E 01	0.875668E 01	0.883288E 01	0.866923E 01	0.838320E 01	0.815680E 01	0.761727E 01	0.713807E 01	0.671780E 01
447	0.638182E 01	0.633505E 01	0.613988E 01	0.593489E 01	0.582008E 01	0.566988E 01	0.561677E 01	0.545532E 01	0.537990E 01
448	0.533272E 01	0.510594E 01	0.806809E 01	0.843598E 01	0.863302E 01	0.873327E 01	0.879331E 01	0.862784E 01	0.828400E 01
449	0.806809E 01	0.749387E 01	0.704665E 01	0.668211E 01	0.639693E 01	0.630992E 01	0.609357E 01	0.591080E 01	0.580212E 01
450	0.566988E 01	0.560580E 01	0.542495E 01	0.535186E 01	0.531321E 01	0.506259E 01	0.801102E 01	0.839661E 01	0.859007E 01
451	0.869935E 01	0.873327E 01	0.859563E 01	0.825349E 01	0.804012E 01	0.745008E 01	0.700216E 01	0.665544E 01	0.638182E 01
452	0.628227E 01	0.606611E 01	0.588888E 01	0.576519E 01	0.563835E 01	0.557215E 01	0.542935E 01	0.533272E 01	0.528320E 01
453	0.503695E 01								
454	-20.0 -4.5	0.5	61	22G.E. 6014 LOW BEAM (NO.2 PH.)					
455	0.688551E 01	0.702108E 01	0.701031E 01	0.694698E 01	0.678446E 01	0.649527E 01	0.610702E 01	0.595064E 01	0.580212E 01
456	0.564897E 01	0.546383E 01	0.539363E 01	0.517048E 01	0.512990E 01	0.500395E 01	0.491265E 01	0.483628E 01	0.471850E 01
457	0.459497E 01	0.452179E 01	0.444265E 01	0.418965E 01	0.697821E 01	0.712367E 01	0.713648E 01	0.706987E 01	0.692166E 01
458	0.661740E 01	0.622456E 01	0.605444E 01	0.589440E 01	0.570711E 01	0.551745E 01	0.544242E 01	0.522575E 01	0.515329E 01
459	0.503044E 01	0.493447E 01	0.486753E 01	0.475359E 01	0.459512E 01	0.452179E 01	0.445435E 01	0.420469E 01	0.705704E 01
460	0.722330E 01	0.722330E 01	0.717472E 01	0.702909E 01	0.673221E 01	0.633505E 01	0.614633E 01	0.596615E 01	0.577455E 01
461	0.558350E 01	0.547227E 01	0.527300E 01	0.518739E 01	0.505625E 01	0.495583E 01	0.490527E 01	0.478749E 01	0.462497E 01
462	0.455388E 01	0.445435E 01	0.420469E 01	0.712850E 01	0.729980E 01	0.731389E 01	0.727170E 01	0.714992E 01	0.685541E 01
463	0.645834E 01	0.623637E 01	0.604737E 01	0.582008E 01	0.561677E 01	0.550939E 01	0.531812E 01	0.521494E 01	0.508140E 01
464	0.498361E 01	0.490527E 01	0.479579E 01	0.465396E 01	0.458497E 01	0.447734E 01	0.424850E 01	0.719519E 01	0.736010E 01
465	0.738275E 01	0.736960E 01	0.726752E 01	0.697821E 01	0.660935E 01	0.632972E 01	0.610702E 01	0.587212E 01	0.566643E 01
466	0.552545E 01	0.537064E 01	0.524702E 01	0.512396E 01	0.495583E 01	0.493447E 01	0.481218E 01	0.466344E 01	0.460517E 01
467	0.451086E 01	0.424850E 01	0.724494E 01	0.741156E 01	0.744132E 01	0.744483E 01	0.736771E 01	0.708255E 01	0.672503E 01
468	0.644413E 01	0.619644E 01	0.594280E 01	0.572358E 01	0.558725E 01	0.545104E 01	0.529330E 01	0.517048E 01	0.504342E 01
469	0.494876E 01	0.483628E 01	0.469135E 01	0.461512E 01	0.453260E 01	0.427667E 01	0.728207E 01	0.746164E 01	0.749998E 01
470	0.752456E 01	0.745356E 01	0.718387E 01	0.683948E 01	0.653814E 01	0.628227E 01	0.602587E 01	0.578382E 01	0.563835E 01
471	0.550939E 01	0.536129E 01	0.522036E 01	0.508140E 01	0.496981E 01	0.485981E 01	0.470953E 01	0.462497E 01	0.453260E 01
472	0.429046E 01	0.730787E 01	0.750329E 01	0.756060E 01	0.757250E 01	0.749721E 01	0.726752E 01	0.693537E 01	0.663988E 01
473	0.635611E 01	0.608677E 01	0.582895E 01	0.566988E 01	0.557215E 01	0.542053E 01	0.524175E 01	0.511799E 01	0.500395E 01
474	0.487520E 01	0.470953E 01	0.463473E 01	0.455388E 01	0.430406E 01	0.733171E 01	0.753849E 01	0.760837E 01	0.762608E 01
475	0.757712E 01	0.734278E 01	0.703174E 01	0.673221E 01	0.642162E 01	0.615273E 01	0.586363E 01	0.570044E 01	0.560212E 01

476	0.545532E 01	0.527300E 01	0.514166E 01	0.503695E 01	0.488280E 01	0.471850E 01	0.463473E 01	0.456435E 01	0.431749E 01
477	0.735628E 01	0.756633E 01	0.765160E 01	0.766669E 01	0.763723E 01	0.741517E 01	0.711639E 01	0.680683E 01	0.649072E 01
478	0.619032E 01	0.590263E 01	0.574620E 01	0.562762E 01	0.547646E 01	0.530827E 01	0.517048E 01	0.506259E 01	0.489784E 01
479	0.474493E 01	0.466344E 01	0.458497E 01	0.434381E 01	0.737901E 01	0.760539E 01	0.768340E 01	0.769939E 01	0.768754E 01
480	0.747704E 01	0.718614E 01	0.687316E 01	0.654247E 01	0.623048E 01	0.594280E 01	0.578382E 01	0.565948E 01	0.548064E 01
481	0.531812E 01	0.518178E 01	0.506890E 01	0.490527E 01	0.477068E 01	0.469135E 01	0.461512E 01	0.436945E 01	0.740062E 01
482	0.762900E 01	0.771957E 01	0.773368E 01	0.772709E 01	0.751643E 01	0.722330E 01	0.691572E 01	0.658064E 01	0.625958E 01
483	0.598141E 01	0.582008E 01	0.569036E 01	0.550939E 01	0.533754E 01	0.519850E 01	0.509375E 01	0.494876E 01	0.479579E 01
484	0.472739E 01	0.466344E 01	0.439445E 01	0.742536E 01	0.766153E 01	0.775319E 01	0.778780E 01	0.776047E 01	0.754961E 01
485	0.726752E 01	0.694986E 01	0.662141E 01	0.629342E 01	0.601859E 01	0.585507E 01	0.570711E 01	0.552943E 01	0.535659E 01
486	0.520949E 01	0.512396E 01	0.496981E 01	0.483628E 01	0.475359E 01	0.468213E 01	0.440672E 01	0.743248E 01	0.769166E 01
487	0.777569E 01	0.781319E 01	0.779276E 01	0.759840E 01	0.731588E 01	0.699668E 01	0.665157E 01	0.632436E 01	0.605912E 01
488	0.590263E 01	0.572685E 01	0.555683E 01	0.538449E 01	0.522575E 01	0.514749E 01	0.500395E 01	0.487520E 01	0.477912E 01
489	0.470953E 01	0.445435E 01	0.745530E 01	0.772973E 01	0.782164E 01	0.786787E 01	0.783913E 01	0.763868E 01	0.736581E 01
490	0.704229E 01	0.668586E 01	0.633505E 01	0.606611E 01	0.592693E 01	0.573657E 01	0.558350E 01	0.540717E 01	0.525227E 01
491	0.517048E 01	0.503695E 01	0.490527E 01	0.481218E 01	0.472739E 01	0.443082E 01	0.749053E 01	0.776938E 01	0.786672E 01
492	0.792841E 01	0.788683E 01	0.769303E 01	0.741878E 01	0.709506E 01	0.672863E 01	0.636647E 01	0.609357E 01	0.592693E 01
493	0.565948E 01	0.559842E 01	0.542935E 01	0.528320E 01	0.519296E 01	0.506259E 01	0.494164E 01	0.483628E 01	0.477068E 01
494	0.449981E 01	0.751480E 01	0.781076E 01	0.792299E 01	0.798718E 01	0.795050E 01	0.774932E 01	0.747022E 01	0.715851E 01
495	0.677422E 01	0.641673E 01	0.613340E 01	0.596615E 01	0.578382E 01	0.562040E 01	0.545104E 01	0.530330E 01	0.522575E 01
496	0.508760E 01	0.496981E 01	0.485981E 01	0.477912E 01	0.449981E 01	0.754803E 01	0.784502E 01	0.797212E 01	0.803916E 01
497	0.799024E 01	0.779893E 01	0.752132E 01	0.720415E 01	0.682329E 01	0.645362E 01	0.618415E 01	0.599645E 01	0.584644E 01
498	0.564191E 01	0.548064E 01	0.533754E 01	0.524175E 01	0.512990E 01	0.499043E 01	0.488280E 01	0.479579E 01	0.452179E 01
499	0.756941E 01	0.787017E 01	0.800035E 01	0.810470E 01	0.803041E 01	0.784737E 01	0.757404E 01	0.725134E 01	0.687005E 01
500	0.649527E 01	0.621860E 01	0.602587E 01	0.588888E 01	0.568017E 01	0.550939E 01	0.536598E 01	0.527300E 01	0.515905E 01
501	0.502388E 01	0.489784E 01	0.482831E 01	0.453260E 01	0.759539E 01	0.788908E 01	0.803041E 01	0.814816E 01	0.770571E 01
502	0.789357E 01	0.761727E 01	0.729234E 01	0.690073E 01	0.652649E 01	0.625958E 01	0.605912E 01	0.592693E 01	0.572358E 01
503	0.555683E 01	0.540717E 01	0.530827E 01	0.516479E 01	0.504342E 01	0.492725E 01	0.483628E 01	0.454329E 01	0.761579E 01
504	0.790691E 01	0.804943E 01	0.819009E 01	0.814816E 01	0.796485E 01	0.767925E 01	0.733954E 01	0.693245E 01	0.656386E 01
505	0.630445E 01	0.609357E 01	0.595842E 01	0.572685E 01	0.559842E 01	0.544674E 01	0.534233E 01	0.519850E 01	0.509375E 01
506	0.495583E 01	0.487520E 01	0.456435E 01	0.762168E 01	0.791425E 01	0.800135E 01	0.823801E 01	0.821447E 01	0.806809E 01
507	0.775061E 01	0.738585E 01	0.699118E 01	0.661740E 01	0.633505E 01	0.615273E 01	0.601127E 01	0.578382E 01	0.564191E 01
508	0.548480E 01	0.537528E 01	0.523644E 01	0.510594E 01	0.499043E 01	0.490527E 01	0.459512E 01	0.762168E 01	0.793057E 01
509	0.809560E 01	0.829130E 01	0.830598E 01	0.816508E 01	0.782764E 01	0.744483E 01	0.704490E 01	0.663988E 01	0.630992E 01
510	0.618415E 01	0.604737E 01	0.583773E 01	0.569709E 01	0.551745E 01	0.540268E 01	0.526786E 01	0.514166E 01	0.501728E 01
511	0.492725E 01	0.462497E 01	0.761135E 01	0.794944E 01	0.814816E 01	0.834901E 01	0.836287E 01	0.823031E 01	0.788495E 01
512	0.750659E 01	0.709257E 01	0.668211E 01	0.636647E 01	0.620051E 01	0.610032E 01	0.591080E 01	0.570711E 01	0.555296E 01
513	0.543372E 01	0.530827E 01	0.518178E 01	0.506259E 01	0.496981E 01	0.465396E 01	0.763868E 01	0.796589E 01	0.819836E 01
514	0.839004E 01	0.839661E 01	0.835585E 01	0.793164E 01	0.752456E 01	0.713569E 01	0.670808E 01	0.639693E 01	0.621261E 01
515	0.611368E 01	0.590263E 01	0.575574E 01	0.559099E 01	0.548480E 01	0.533754E 01	0.520401E 01	0.511199E 01	0.501063E 01
516	0.470048E 01	0.765728E 01	0.803236E 01	0.825349E 01	0.843598E 01	0.844870E 01	0.840335E 01	0.797625E 01	0.760390E 01
517	0.718159E 01	0.675344E 01	0.642162E 01	0.623637E 01	0.613340E 01	0.596615E 01	0.580212E 01	0.563479E 01	0.551745E 01
518	0.537064E 01	0.524702E 01	0.515329E 01	0.508140E 01	0.475359E 01	0.768891E 01	0.809560E 01	0.829879E 01	0.847991E 01
519	0.849801E 01	0.845489E 01	0.805896E 01	0.766011E 01	0.722548E 01	0.679682E 01	0.644889E 01	0.625383E 01	0.613988E 01
520	0.598141E 01	0.581114E 01	0.566296E 01	0.555296E 01	0.540717E 01	0.528827E 01	0.518739E 01	0.511799E 01	0.479579E 01
521	0.767647E 01	0.814816E 01	0.834901E 01	0.853366E 01	0.856789E 01	0.851599E 01	0.811343E 01	0.771021E 01	0.729438E 01
522	0.684588E 01	0.643133E 01	0.627099E 01	0.613988E 01	0.598896E 01	0.582895E 01	0.568017E 01	0.554908E 01	0.542495E 01
523	0.532301E 01	0.521494E 01	0.514166E 01	0.482028E 01	0.774932E 01	0.819836E 01	0.839661E 01	0.859563E 01	0.862784E 01
524	0.857904E 01	0.815680E 01	0.776047E 01	0.735052E 01	0.689163E 01	0.652649E 01	0.629895E 01	0.617170E 01	0.601127E 01
525	0.583773E 01	0.567332E 01	0.557595E 01	0.543808E 01	0.534711E 01	0.523644E 01	0.516479E 01	0.483628E 01	0.777569E 01
526	0.823031E 01	0.842310E 01	0.863835E 01	0.868440E 01	0.860098E 01	0.821447E 01	0.781319E 01	0.740974E 01	0.695559E 01
527	0.657228E 01	0.632436E 01	0.619032E 01	0.601859E 01	0.585507E 01	0.566988E 01	0.558725E 01	0.545532E 01	0.537064E 01
528	0.525749E 01	0.519850E 01	0.487520E 01	0.778655E 01	0.824591E 01	0.846126E 01	0.868946E 01	0.873327E 01	0.868946E 01
529	0.826899E 01	0.787131E 01	0.747193E 01	0.701302E 01	0.661740E 01	0.635089E 01	0.621860E 01	0.604025E 01	0.578382E 01
530	0.566988E 01	0.560212E 01	0.548480E 01	0.540268E 01	0.528320E 01	0.522575E 01	0.489784E 01	0.779400E 01	0.826899E 01
531	0.849801E 01	0.872843E 01	0.876139E 01	0.872356E 01	0.831336E 01	0.793380E 01	0.753530E 01	0.707242E 01	0.667456E 01
532	0.637161E 01	0.625383E 01	0.605912E 01	0.587212E 01	0.570711E 01	0.563835E 01	0.552146E 01	0.543808E 01	0.531812E 01
533	0.526269E 01	0.492725E 01	0.781561E 01	0.830598E 01	0.852774E 01	0.876139E 01	0.880657E 01	0.875668E 01	0.838320E 01
534	0.800603E 01	0.758782E 01	0.712367E 01	0.671417E 01	0.641182E 01	0.629342E 01	0.595842E 01	0.588053E 01	0.572685E 01
535	0.564897E 01	0.553733E 01	0.545959E 01	0.533754E 01	0.529330E 01	0.496284E 01	0.785205E 01	0.832773E 01	0.856789E 01

536	0.881106E 01	0.887919E 01	0.879331E 01	0.849801E 01	0.819836E 01	0.767508E 01	0.718159E 01	0.676388E 01	0.645834E 01
537	0.633505E 01	0.607304E 01	0.599440E 01	0.574620E 01	0.566643E 01	0.556068E 01	0.548064E 01	0.536598E 01	0.532788E 01
538	0.501063E 01	0.788683E 01	0.836287E 01	0.861178E 01	0.889946E 01	0.898820E 01	0.892346E 01	0.863302E 01	0.832045E 01
539	0.778406E 01	0.726752E 01	0.691344E 01	0.649072E 01	0.637161E 01	0.610032E 01	0.592693E 01	0.575574E 01	0.567675E 01
540	0.557215E 01	0.550533E 01	0.539363E 01	0.534711E 01	0.504985E 01	0.793880E 01	0.842310E 01	0.867931E 01	0.901006E 01
541	0.909324E 01	0.903860E 01	0.876139E 01	0.845489E 01	0.793164E 01	0.738275E 01	0.688551E 01	0.654247E 01	0.640688E 01
542	0.613988E 01	0.596615E 01	0.578382E 01	0.570044E 01	0.559099E 01	0.551745E 01	0.545104E 01	0.536598E 01	0.506259E 01
543	0.800803E 01	0.840335E 01	0.880222E 01	0.911614E 01	0.918215E 01	0.913227E 01	0.887919E 01	0.859007E 01	0.813094E 01
544	0.751480E 01	0.696979E 01	0.659304E 01	0.643615E 01	0.615909E 01	0.598896E 01	0.582895E 01	0.562762E 01	0.562402E 01
545	0.554518E 01	0.537990E 01	0.537528E 01	0.508140E 01	0.811343E 01	0.864875E 01	0.897335E 01	0.929413E 01	0.935738E 01
546	0.928869E 01	0.904900E 01	0.874735E 01	0.827639E 01	0.765596E 01	0.711396E 01	0.666696E 01	0.648158E 01	0.619032E 01
547	0.600389E 01	0.584644E 01	0.569709E 01	0.564897E 01	0.556834E 01	0.544242E 01	0.539363E 01	0.509987E 01	0.829130E 01
548	0.884994E 01	0.920613E 01	0.950636E 01	0.957845E 01	0.952164E 01	0.929146E 01	0.899554E 01	0.849801E 01	0.784031E 01
549	0.725276E 01	0.674288E 01	0.653088E 01	0.622456E 01	0.604025E 01	0.588888E 01	0.571703E 01	0.568017E 01	0.560212E 01
550	0.548064E 01	0.542053E 01	0.512396E 01	0.843598E 01	0.904204E 01	0.938999E 01	0.971045E 01	0.979295E 01	0.975939E 01
551	0.958864E 01	0.932358E 01	0.880657E 01	0.803333E 01	0.742237E 01	0.683626E 01	0.660123E 01	0.627099E 01	0.607993E 01
552	0.591889E 01	0.576519E 01	0.570711E 01	0.562402E 01	0.550533E 01	0.546383E 01	0.515329E 01	0.858466E 01	0.917606E 01
553	0.953025E 01	0.983969E 01	0.998732E 01	0.100234E 02	0.990078E 01	0.963796E 01	0.904900E 01	0.839661E 01	0.763434E 01
554	0.697541E 01	0.667456E 01	0.633505E 01	0.613340E 01	0.597381E 01	0.581114E 01	0.574620E 01	0.566296E 01	0.554518E 01
555	0.551745E 01	0.520401E 01	0.873793E 01	0.927500E 01	0.960865E 01	0.995698E 01	0.101885E 02	0.102828E 02	0.102017E 02
556	0.100061E 02	0.947516E 01	0.876593E 01	0.790581E 01	0.713090E 01	0.676388E 01	0.640192E 01	0.618415E 01	0.601859E 01
557	0.584644E 01	0.579301E 01	0.570711E 01	0.559099E 01	0.555683E 01	0.524702E 01	0.885837E 01	0.935479E 01	0.971758E 01
558	0.100819E 02	0.103596E 02	0.105170E 02	0.104844E 02	0.103791E 02	0.992857E 01	0.911614E 01	0.817103E 01	0.724494E 01
559	0.686693E 01	0.646770E 01	0.624222E 01	0.605912E 01	0.589440E 01	0.582008E 01	0.561677E 01	0.562762E 01	0.558350E 01
560	0.527300E 01	0.896201E 01	0.942392E 01	0.981258E 01	0.101796E 02	0.104594E 02	0.106654E 02	0.106013E 02	0.105790E 02
561	0.101372E 02	0.932625E 01	0.830598E 01	0.733171E 01	0.690975E 01	0.651767E 01	0.629895E 01	0.609357E 01	0.589440E 01
562	0.584644E 01	0.573657E 01	0.564545E 01	0.561677E 01	0.532788E 01	0.901724E 01	0.947968E 01	0.986459E 01	0.102050E 02
563	0.104762E 02	0.106515E 02	0.106303E 02	0.105639E 02	0.101051E 02	0.938008E 01	0.836962E 01	0.740062E 01	0.696414E 01
564	0.656386E 01	0.630445E 01	0.610702E 01	0.591080E 01	0.587212E 01	0.574620E 01	0.566988E 01	0.563835E 01	0.537064E 01
565	0.901724E 01	0.947286E 01	0.984283E 01	0.101626E 02	0.103982E 02	0.105407E 02	0.105170E 02	0.104678E 02	0.999410E 01
566	0.931569E 01	0.834189E 01	0.741156E 01	0.697821E 01	0.656808E 01	0.631536E 01	0.612687E 01	0.594280E 01	0.590263E 01
567	0.561677E 01	0.569709E 01	0.565599E 01	0.535186E 01	0.896201E 01	0.938253E 01	0.972113E 01	0.100299E 02	0.102838E 02
568	0.104249E 02	0.103982E 02	0.103521E 02	0.982385E 01	0.915757E 01	0.823801E 01	0.735244E 01	0.693245E 01	0.652649E 01
569	0.629342E 01	0.612687E 01	0.594280E 01	0.590263E 01	0.562762E 01	0.570711E 01	0.563479E 01	0.533754E 01	0.888322E 01
570	0.928869E 01	0.958459E 01	0.987375E 01	0.101885E 02	0.103426E 02	0.102938E 02	0.102634E 02	0.968868E 01	0.898820E 01
571	0.812237E 01	0.727170E 01	0.686693E 01	0.647697E 01	0.627099E 01	0.610702E 01	0.591889E 01	0.588053E 01	0.560580E 01
572	0.568697E 01	0.560947E 01	0.529330E 01	0.881981E 01	0.919421E 01	0.945454E 01	0.976112E 01	0.101051E 02	0.102736E 02
573	0.102105E 02	0.100917E 02	0.959465E 01	0.889946E 01	0.800135E 01	0.717012E 01	0.679682E 01	0.642649E 01	0.624222E 01
574	0.607304E 01	0.588888E 01	0.584644E 01	0.569373E 01	0.563835E 01	0.557215E 01	0.526786E 01	0.876593E 01	0.911943E 01
575	0.934705E 01	0.961854E 01	0.995698E 01	0.101430E 02	0.101313E 02	0.100312E 02	0.958658E 01	0.883288E 01	0.790802E 01
576	0.707496E 01	0.674288E 01	0.641673E 01	0.621261E 01	0.605444E 01	0.586363E 01	0.582008E 01	0.565599E 01	0.561677E 01
577	0.555296E 01	0.526786E 01	0.872356E 01	0.905940E 01	0.927772E 01	0.951951E 01	0.983655E 01	0.100338E 02	0.100619E 02
578	0.995977E 01	0.953452E 01	0.874735E 01	0.783676E 01	0.700760E 01	0.670073E 01	0.638182E 01	0.620051E 01	0.603309E 01
579	0.585507E 01	0.581114E 01	0.564545E 01	0.559471E 01	0.554908E 01	0.528320E 01	0.866923E 01	0.900651E 01	0.920613E 01
580	0.944754E 01	0.972997E 01	0.991985E 01	0.994001E 01	0.982065E 01	0.939980E 01	0.864717E 01	0.772709E 01	0.696979E 01
581	0.665929E 01	0.634564E 01	0.615273E 01	0.601859E 01	0.583773E 01	0.578382E 01	0.561313E 01	0.557215E 01	0.554126E 01
582	0.526786E 01	0.861722E 01	0.894676E 01	0.913551E 01	0.935738E 01	0.961854E 01	0.979624E 01	0.978633E 01	0.966460E 01
583	0.923825E 01	0.856217E 01	0.762315E 01	0.688857E 01	0.663595E 01	0.632077E 01	0.612030E 01	0.598141E 01	0.581114E 01
584	0.576519E 01	0.560212E 01	0.554518E 01	0.550126E 01	0.523111E 01	0.857338E 01	0.889137E 01	0.906624E 01	0.925818E 01
585	0.943819E 01	0.959866E 01	0.961066E 01	0.946831E 01	0.907647E 01	0.844870E 01	0.748717E 01	0.679010E 01	0.660935E 01
586	0.629895E 01	0.610702E 01	0.596615E 01	0.582895E 01	0.576519E 01	0.559099E 01	0.552146E 01	0.545959E 01	0.520949E 01
587	0.848591E 01	0.880222E 01	0.898080E 01	0.914185E 01	0.930228E 01	0.938008E 01	0.934967E 01	0.925254E 01	0.889946E 01
588	0.825899E 01	0.731588E 01	0.669703E 01	0.654247E 01	0.633505E 01	0.615273E 01	0.600389E 01	0.584644E 01	0.574620E 01
589	0.556834E 01	0.550126E 01	0.544242E 01	0.520949E 01	0.839661E 01	0.872843E 01	0.889946E 01	0.903157E 01	0.916377E 01
590	0.920321E 01	0.912913E 01	0.899193E 01	0.867437E 01	0.801102E 01	0.714283E 01	0.659304E 01	0.645834E 01	0.625383E 01
591	0.610032E 01	0.595064E 01	0.578382E 01	0.569709E 01	0.554518E 01	0.547227E 01	0.542935E 01	0.517048E 01	0.829130E 01
592	0.864875E 01	0.881537E 01	0.893906E 01	0.901724E 01	0.898444E 01	0.882409E 01	0.868946E 01	0.829130E 01	0.770346E 01
593	0.692952E 01	0.653814E 01	0.641673E 01	0.618415E 01	0.600389E 01	0.588888E 01	0.572685E 01	0.568017E 01	0.551745E 01
594	0.544674E 01	0.540717E 01	0.514749E 01	0.821447E 01	0.856217E 01	0.873793E 01	0.885409E 01	0.891557E 01	0.881537E 01
595	0.858466E 01	0.838320E 01	0.793987E 01	0.731788E 01	0.679347E 01	0.648616E 01	0.637673E 01	0.614633E 01	0.594280E 01

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596   0.582895E 01 0.568017E 01 0.562762E 01 0.546393E 01 0.538449E 01 0.535659E 01 0.509987E 01 0.813094E 01 0.847366E 01
597   0.867931E 01 0.875668E 01 0.883288E 01 0.866923E 01 0.838320E 01 0.815680E 01 0.761727E 01 0.713807E 01 0.671780E 01
598   0.638182E 01 0.633505E 01 0.613988E 01 0.593489E 01 0.582008E 01 0.566988E 01 0.561677E 01 0.545532E 01 0.537990E 01
599   0.533272E 01 0.510594E 01 0.806809E 01 0.843598E 01 0.863302E 01 0.873327E 01 0.879331E 01 0.862784E 01 0.828400E 01
600   0.806809E 01 0.749387E 01 0.704665E 01 0.668211E 01 0.639693E 01 0.630992E 01 0.609357E 01 0.591080E 01 0.580212E 01
601   0.566988E 01 0.560580E 01 0.542495E 01 0.535186E 01 0.531321E 01 0.506259E 01 0.801102E 01 0.839661E 01 0.859007E 01
602   0.869935E 01 0.873327E 01 0.859563E 01 0.825349E 01 0.804012E 01 0.745008E 01 0.700216E 01 0.665544E 01 0.638182E 01
603   0.628227E 01 0.606611E 01 0.588889E 01 0.576519E 01 0.563835E 01 0.557215E 01 0.542935E 01 0.533272E 01 0.528320E 01
604   0.503695E 01
  1   ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
  2       5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100  105  110  115  120
  3   ....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|....:....|.
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APPENDIX 8

INPUT DATA

TEST RUN FOR GE6014LOW , LOW BEAM, 2 LAMPS, PAUL GREEN, 5/80

CENTERLINE DISTANCE 12.0 FEET, VEHICLE VELOCITIES MAIN = 30.0 MPH, OPPOSING = 30.0 MPH
EYE IS 72.0 IN. BEHIND LAMPS, 42.0 IN. ABOVE ROAD AND 20.0 IN. LEFT OF CENTERLINE
TARGET IS 24.0 IN. ABOVE ROAD AND 72.0 IN. FROM CENTERLINE

OBSERVER RELATION FOR TARGET INTENSITY = EXP(A+B*D) , WHERE D IS VISIBILITY DISTANCE
COEFFICIENTS FOR A = C+D(4TH ROOT OF GI), B = E+F(SQRT OF GI)

C	D	E	F
0.3400E+01	0.3600E+00	0.1600E-01	0.8000E-04

TARGET REFLECTIVITY IS 10.0 PER CENT

BASIC TARGET REFLECTIVITY FOR OBSERVER RELATION IS 10.0 PER CENT, NOMINAL EYE RECOVERY RATE PARAMETER IS 0.002858 PER SECOND

ILLUMINATED AREA OF PAVEMENT EXTENDS 200.0 FEET AHEAD OF LAMPS AND -8.0 AND 8.0 FEET FROM CENTERLINE
ROAD REFLECTIVITY IS 10.0 PER CENT.

SEPARATION DISTANCES: INITIAL 4000.0 FEET, FINAL -1000.0 FEET

DISTANCE BETWEEN HEADLIGHT NO. 1 AND (IN.)	X	Y	Z	HEADLIGHT INDEX	MISAIM ANGLE (DEGREES) VERT.	HOR.	ROT.	BEAM PATTERN INDEX	NAME
ORIGIN	0.0	24.0	30.0	1	0.0	0.0	0.0	0	G.E. 6014 LOW BEAM (NO.2 PH.)
NO. 2	0.0	0.0	60.0	2	0.0	0.0	0.0	0	G.E. 6014 LOW BEAM (NO.2 PH.)

DISTANCE BETWEEN HEADLIGHT NO. 6 AND (IN.)	X	Y	Z	HEADLIGHT INDEX	MISAIM ANGLE (DEGREES) VERT.	HOR.	ROT.	BEAM PATTERN INDEX	NAME
ORIGIN	0.0	24.0	30.0	6	0.0	0.0	0.0	0	G.E. 6014 LOW BEAM (NO.2 PH.)
NO. 7	0.0	0.0	60.0	7	0.0	0.0	0.0	0	G.E. 6014 LOW BEAM (NO.2 PH.)

COEFFICIENTS FOR GOL = GA+(AX-C)*EXP(-X/B)

0.2739E+01 0.0 -0.2489E+01 0.1829E+03

HEADLIGHT VISIBILITY PERFORMANCE EVALUATION   MAY 21, 1980

OUTPUT DATA

TEST RUN FOR GE6014LCW , LOW BEAM, 2 LAMPS, PAUL GREEN, 5/80

SEPARATION DISTANCE (FEET)	VISIBILITY DISTANCE (FEET)	VEILING GLARE (FT.LAMB.)	GLARE INTENSITY (CANDELAS)	DISCOMFORT GLARE INDEX	SEPARATION DISTANCE (FEET)	VISIBILITY DISTANCE (FEET)	VEILING GLARE (FT.LAMB.)	GLARE INTENSITY (CANDELAS)	DISCOMFORT GLARE INDEX
4000.	260.4	0.01094	7721.1	7.5	350.	228.5	0.02496	3111.7	4.5
3800.	260.2	0.01102	7653.1	7.4	300.	226.9	0.02596	2773.3	4.4
3600.	259.9	0.01110	7585.1	7.3	250.	225.4	0.02687	2397.7	4.2
3400.	259.6	0.01119	7517.1	7.2	200.	224.3	0.02762	2001.5	4.0
3200.	259.2	0.01131	7449.2	7.2	150.	223.4	0.02821	1597.1	3.8
3000.	258.8	0.01144	7381.2	7.1	100.	223.3	0.02823	1181.3	3.5
2800.	258.3	0.01159	7277.7	7.0	50.	226.8	0.02603	0.0	3.2
2600.	257.8	0.01177	7174.3	6.8	0.	230.3	0.02392	0.0	-2.1
2400.	257.1	0.01199	7049.2	6.7	-50.	233.6	0.02210	0.0	-2.1
2200.	256.3	0.01225	6902.4	6.6	-100.	236.6	0.02051	0.0	-2.1
2000.	255.4	0.01258	6755.6	6.5	-150.	239.4	0.01914	0.0	-2.1
1800.	254.3	0.01296	6531.3	6.3	-200.	242.0	0.01794	0.0	-2.1
1600.	252.9	0.01347	6307.1	6.2	-250.	244.3	0.01691	0.0	-2.1
1400.	251.1	0.01411	6038.2	6.0	-300.	246.4	0.01601	0.0	-2.1
1200.	248.9	0.01497	5724.5	5.8	-350.	248.3	0.01523	0.0	-2.1
1000.	245.9	0.01621	5410.9	5.6	-400.	250.0	0.01456	0.0	-2.1
950.	245.1	0.01656	5294.7	5.5	-450.	251.5	0.01397	0.0	-2.1
900.	244.2	0.01696	5178.6	5.4	-500.	252.9	0.01346	0.0	-2.1
850.	243.2	0.01740	5064.5	5.4	-550.	254.1	0.01302	0.0	-2.1
800.	242.0	0.01790	4950.4	5.3	-600.	255.2	0.01264	0.0	-2.1
750.	240.9	0.01844	4814.0	5.2	-650.	256.2	0.01231	0.0	-2.1
700.	239.6	0.01905	4677.6	5.2	-700.	257.0	0.01202	0.0	-2.1
650.	238.3	0.01968	4512.1	5.1	-750.	257.8	0.01177	0.0	-2.1
600.	236.8	0.02042	4346.5	5.0	-800.	258.5	0.01155	0.0	-2.1
550.	235.3	0.02117	4137.3	4.9	-850.	259.0	0.01137	0.0	-2.1
500.	233.7	0.02204	3928.0	4.8	-900.	259.6	0.01120	0.0	-2.1
450.	232.0	0.02295	3686.1	4.7	-950.	260.0	0.01106	0.0	-2.1
400.	230.3	0.02394	3416.8	4.6	-1000.	260.4	0.01094	0.0	-2.1

MINIMUM VISIBILITY DISTANCE IS 223.3 FEET AT A SEPARATION OF 100. FEET
VISIBILITY DISTANCE FOR NO GLARE CAR IS 263.0 FEET. MAXIMUM VEILING GLARE IS 0.02823 FT.C AT A SEPARATION OF 100. FEET.
COMPONENTS OF MAXIMUM VEILING GLARE ARE 0.01762 FROM OPPOSING CARE AND 0.01058 FROM FOREGROUND
GLARE INTENSITY AND INDEX ARE NOT CALCULATED DURING RECOVERY. VEILING GLARE IS ACTUAL VALUE DIVIDED BY THE FACTOR K.

APPENDIX 9

HSRI

FORTRAN Coding Form

HSRI Form 31

PROGRAM: LAMPER INPUT CARD FORMAT

PROGRAMMER:

DATE 4-29-80

PAGE 1 OF 3

T | T in column 1, rest of card is blank

Output title up to 80 columns (must follow T card) (40A2)

REMAINING CARDS ALL HAVE FORMAT A1,E9.0,7E10.0

IN MANY CASES NOT ALL FIELDS CONTAIN DATA (default entries are shown)

Field 1	FIELD 2	FIELD 3	FIELD 4	FIELD 5	FIELD 6	FIELD 7	FIELD 8	FIELD 9
A	4000.	-1000.	200.	1500.	50		±1	±1
	Initial separation distance	Final separation distance	1st separation interval	Last interval at which 1st interval used	2nd separation interval	Radius of curvature	hill valley/or hill/valley indicator	Inside outside/or curve indicator
B	10	10	.251504	3.4	.36	.016	.00008	
	Road reflectivity	Basic target reflectivity	Nominal eye threshold recovery rate		Observer relation coefficient parameters			
S	100							
	x-comp 1st eye line of-sight and glare calculation	x-komp fixed eye line-of-sight	Y-comp of fixed eye line-of-sight	Z-comp of fixed eye line-of-sight				
C	Lateral dis CL	Main vehicle speed	Glare vehicle speed	Fwd dis from 1 2 lamp #1, + 4 behind lamp	Ver dist from 1 2 rd, + 4 1 abv road	Lateral dist from 1 to veh CL, for eye to left	Vert dist from targ 2 rd, + 4 target abv rd	Lateral dist targ 2 veh CL, + 4 targ 2 right

HSRI

FORTRAN Coding Form

HSRI Form 31

PROGRAM

PROGRAMMER | DATE

PAGE 2 OF 3

FORTRAN STATEMENT

Cols 1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
G							
4gnd glare coeff default calc'ed by program	4gnd glare coeff default calc'd by program	4grd glare coeff 'default calc'd by program	4gnd glare coeff default calc'd by program				
M				1			
Mirror index: 1 = interior, 2 = exterior	Dist from lamp plane 2 mirr; + 4 mirror beh lamps	Dist from rd 2 mirr, + 4 mirror abv road	Dist from veh CL 2 mirr; + for mirr to right	Mirror reflect	Shape 0 = circular; 1 = rectangular	Transmissivity of assoc window	
O	0	0			30		
Mirror index: 1 = interior, 2 = exterior	Lateral dimension of mirror	Vertical dimension of mirror	Dist from rd 2 mirr cen aim pt, + 4 point abv road	Dist from veh CL 2 mirr cent aim point + 4 point 2 right	Dist from I 2 mirr cent aim point, + beh eye		
P					30	.01	
Mirror index: 1 = interior, 2 = exterior	Dist from rd 2 lwr edg fld of view + edg above road	Dist from rd 2 upper edg fld of view, + edg abv rd	Dist from veh CL 2 rt sd of fld of view, + side 2 rt	Dist from veh CL 2 lt side of fld of view, + side 2 rt	Dist from eye 2 field of view, + 4 field beh eye	Fractional error allowed in aim	
V 154	37	32	-32				
Dist from lp plane 2 veh obst plane; + 4 plane beh lamps	Dist from rd 2 top of obst plane, + up	Dist from veh CL 2 rt side of obst plane, + 2 right	Dist from veh CL 2 left of obst plane, + to right				
X	200	-8	8	10	2		
Not used	Lgt dist from I 2 farthest edg of pvmt 4 4grd glcal	Lat dist from I 2 ltmost edg of pvmt area, + 2 right	Lat dist from I 2 ltmost edg of pvmt area, + to right	Longitudinal increment	Lateral increment		
Y							
Lamp index if 1-10 0 means windshield analyzer	Transmissivity parallel to filter axis	Transmissivity perpendicular 2 filter axis	Transmissivity perpendicular to filter axis	If 1-10, angle of polz axis rel 2 anlyz axis			
Z	200	8	10				
Not used	Initial est of visibility dist interval	Initial visibility dist interval	Target reflectivity	Not used	Not used	EK reset switch; 0 yes, otherwise no	

HSRI

FORTRAN Coding Form

HSRI Form 31

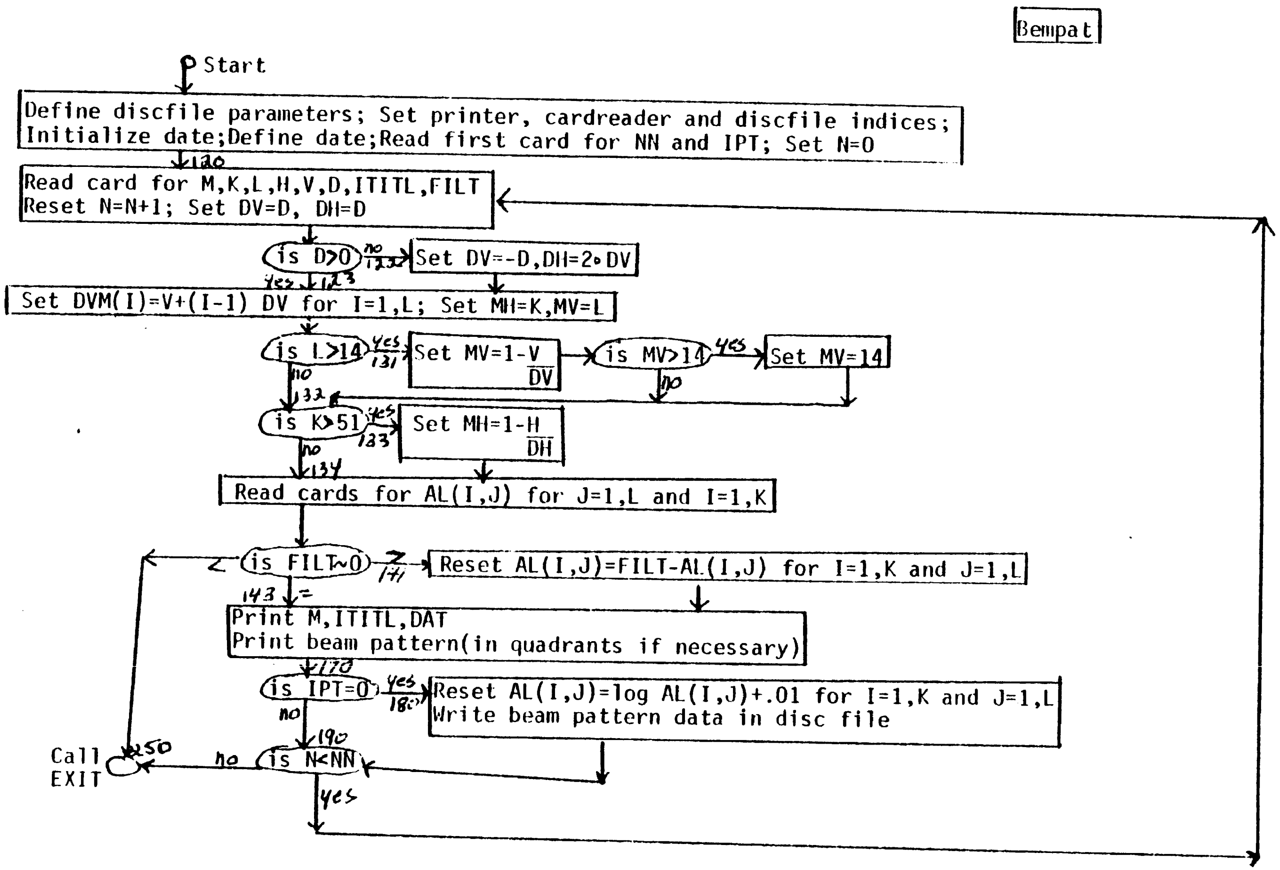
PROGRAM

PROGRAMMER DATE

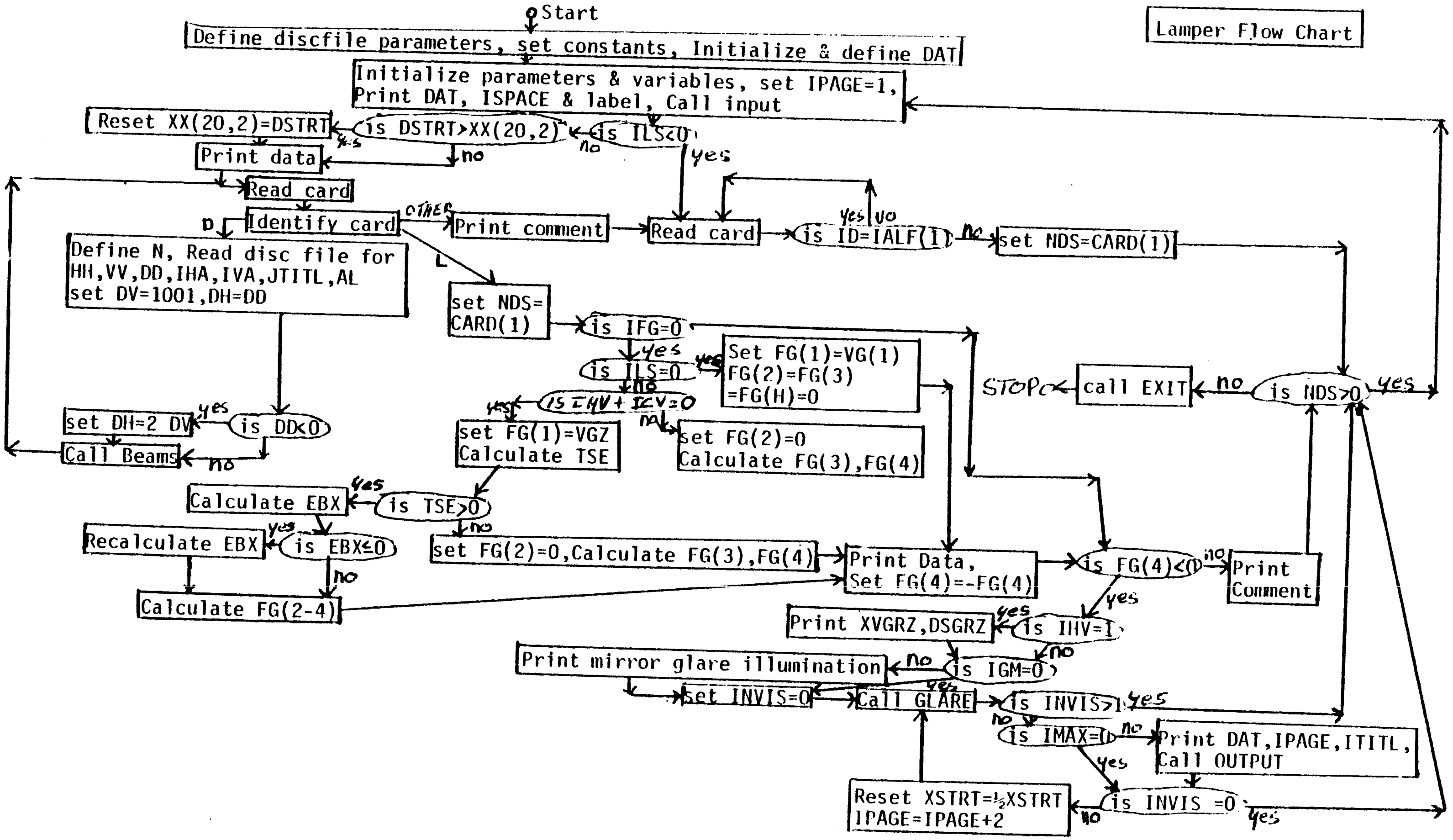
PAGE 3 OF 3

Columns 1–10	Columns 11–20	Columns 21–30	Columns 31–40	Columns 41–50	Columns 51–60	Columns 61–70	Columns 71–80
D Lamp index; 1-6 main, 7-10 glr, 11-15 foll vehicle	M=1, 6 not used M=11; dist from I to lamp, + 4 lamp foll I			Vertical misaim angle, + up	Horizontal misaim angle, + to right	Rotational mis-aim angle, + counterclkwise	Beam pattern index in disk file
L Multiple data set ind. 0 or blank no otherwise yes							
	M=2-5,7-10, 12-15; forward dist from ref lamp (#1,6,11) to lamp #M, + if lamp in front of local ref lamp	M=1,6,11 dist from road to lamp M=2-5,7-10,12-15; vert dist from ref lamp 2 lamp #M, + 4 lamp above reference	M=1,6,11; dist from veh cl 2 lamp M=2=5,7-10,12-15; lat dist from ref lamp 2 lamp #M, + 4 lamp to own rt of ref				

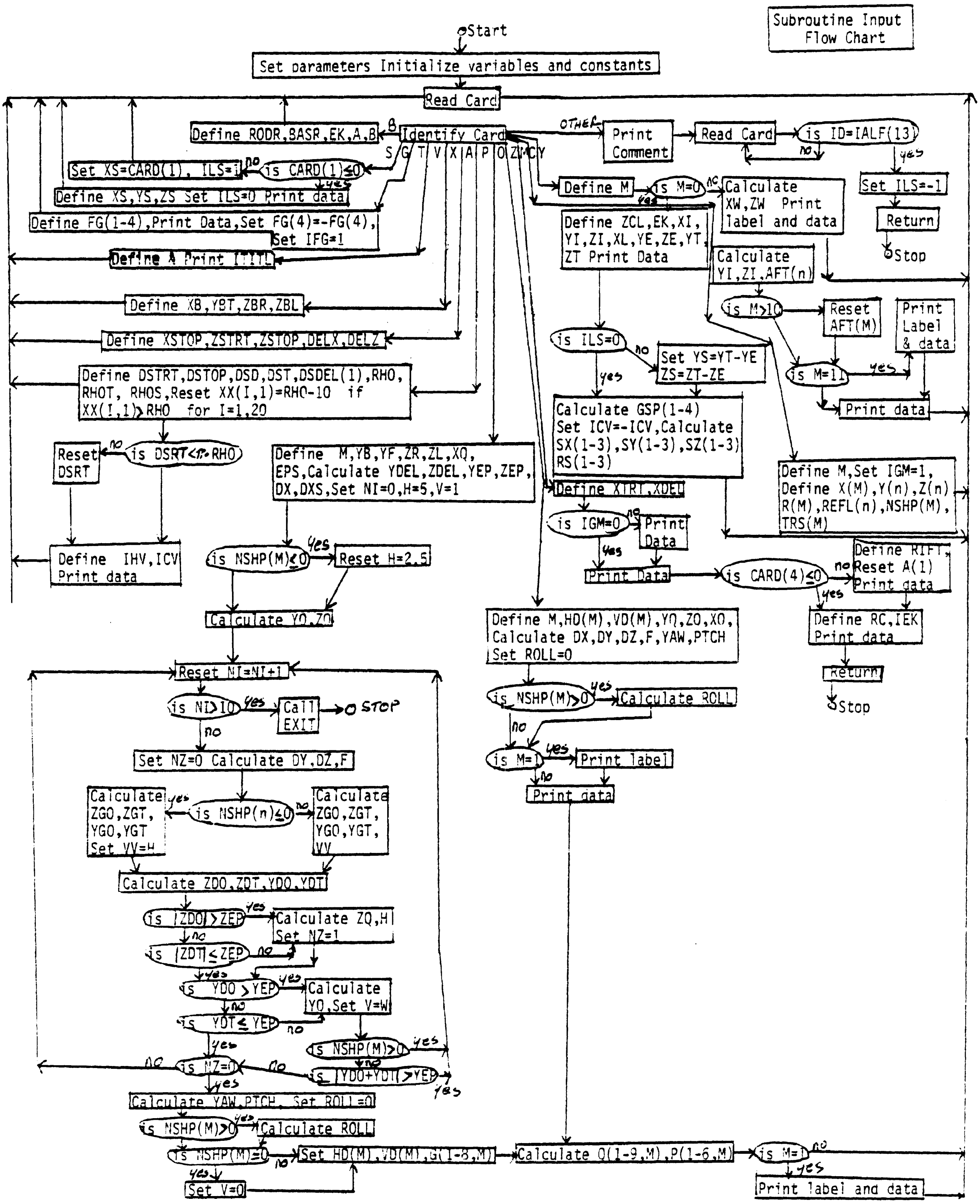
APPENDIX 10



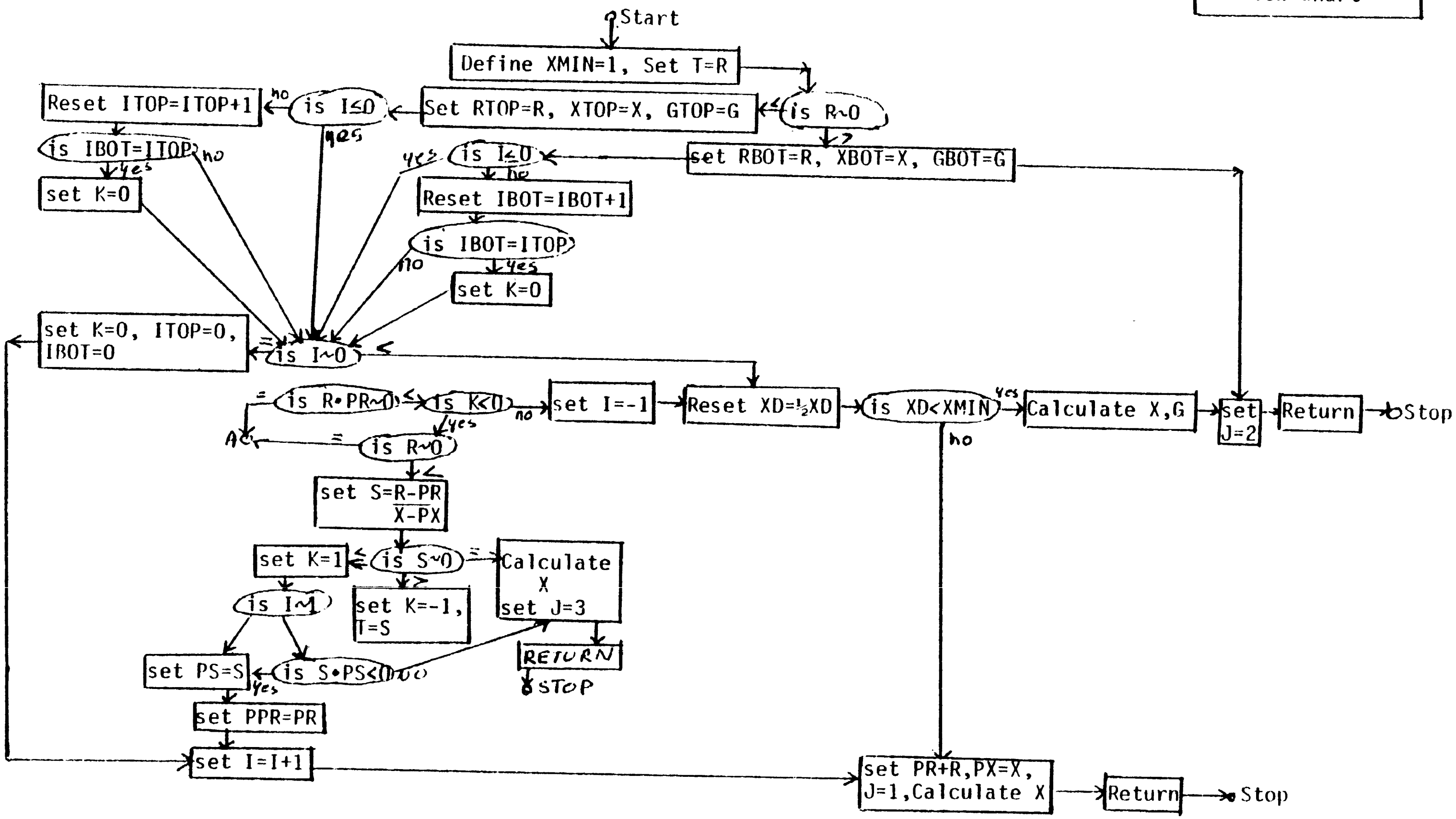
Bempat
Start
Define discfile parameters; Set printer, cardreader and discfile indices; Initialize date;Define date;Read first card for NN and IPT; Set N=0
120
Read card for M,K,L,H,V,D,ITITL,FILT
Reset N=N+1; Set DV=D, DH=D
is D>0
no
122
Set DV=-D,DH=2•DV
yes
123
Set DVM(I)=V+(I-1) DV for I=1,L; Set MH=K,MV=L
is L>14
yes
131
Set MV=1-V/DV
is MV>14
yes
Set MV=14
no
no
132
is K>51
yes
133
Set MH=1-H/DH
no
134
Read cards for AL(I,J) for J=1,L and I=1,K
is FILT~0
<
>
141
Reset AL(I,J)=FILT-AL(I,J) for I=1,K and J=1,L
143
=
Print M,ITITL,DAT
Print beam pattern(in quadrants if necessary)
170
is IPT=0
yes
180
Reset AL(I,J)=log AL(I,J)+.01 for I=1,K and J=1,L
Write beam pattern data in disc file
no
190
is N<NN
no
yes
250
Call EXIT

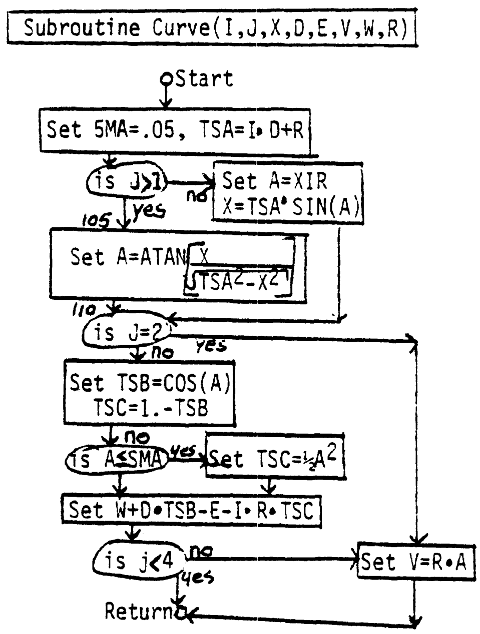

Lamper Flow Chart
Start
Define discfile parameters, set constants, Initialize & define DAT
Initialize parameters & variables, set IPAGE=1, Print DAT, ISPACE & label, Call input
is ILS<0
yes
no
is DSTRT>XX(20,2)
yes
no
Reset XX(20,2)=DSTRT
Print data
Read card
Identify card
D
OTHER
L
Print comment
Read card
is ID=IALF(1)
yes
no
set NDS=CARD(1)
Define N, Read disc file for HH,VV,DD,IHA,IVA,JTITL,AL set DV=1001,DH=DD
set NDS= CARD(1)
is IFG=0
is ILS=0
is IHV + ICV=0
Set FG(1)=VG(1) FG(2)=FG(3) =FG(H)=0
set FG(1)=VGZ Calculate TSE
set FG(2)=0 Calculate FG(3),FG(4)
is DD<0
set DH=2 DV
Call Beams
is TSE>0
Calculate EBX
is EBX≤0
Recalculate EBX
Calculate FG(2-4)
set FG(2)=0,Calculate FG(3),FG(4)
Print Data, Set FG(4)=-FG(4)
is FG(4)<0
Print Comment
is NDS>0
call EXIT
STOP
is IHV=1
Print XVGRZ,DSGRZ
is IGM=0
Print mirror glare illumination
set INVIS=0
Call GLARE
is INVIS>1
is IMAX=0
Print DAT,IPAGE,ITITL, Call OUTPUT
is INVIS =0
Reset XSTRT=½XSTRT IPAGE=IPAGE+2

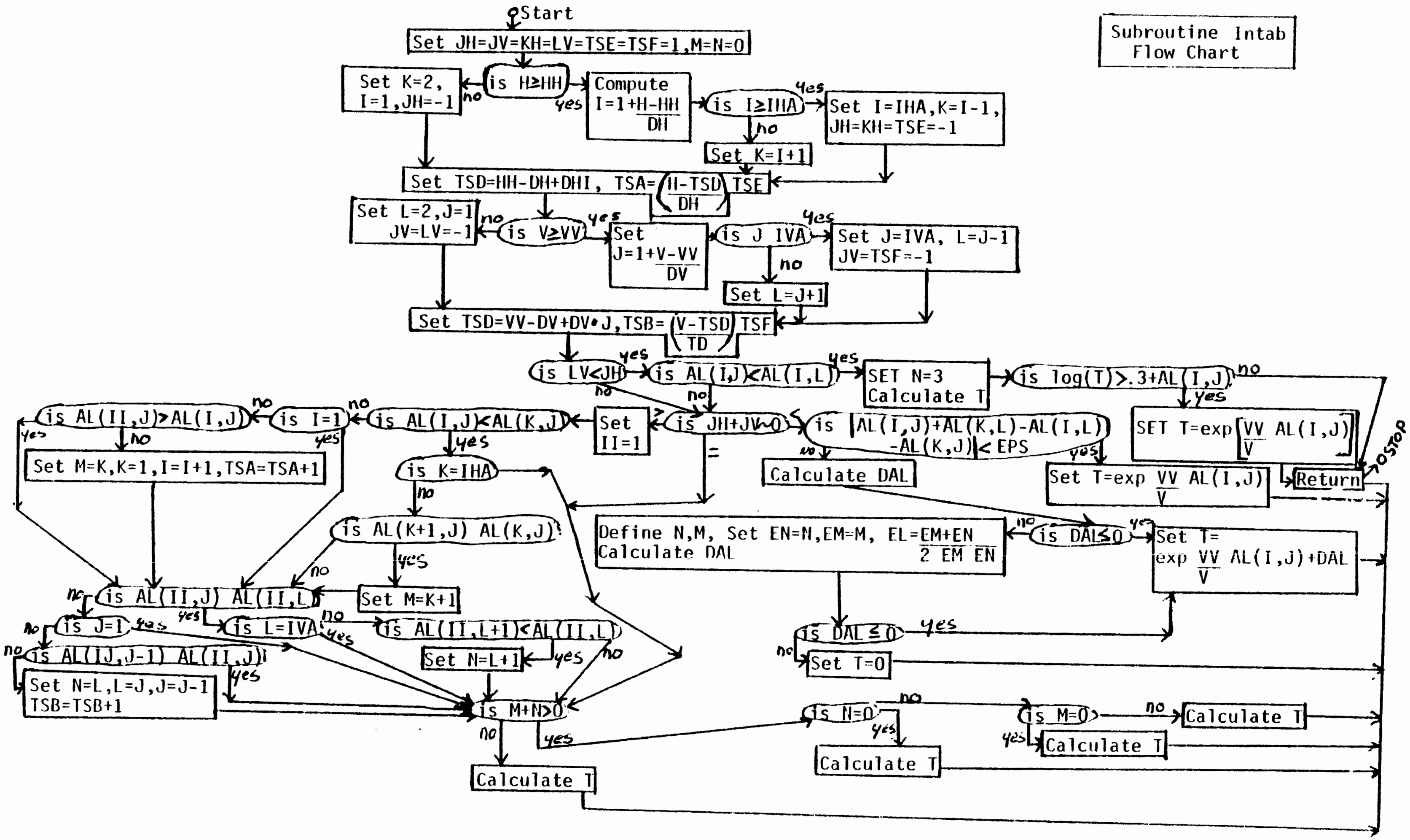
Subroutine Input
Flow Chart



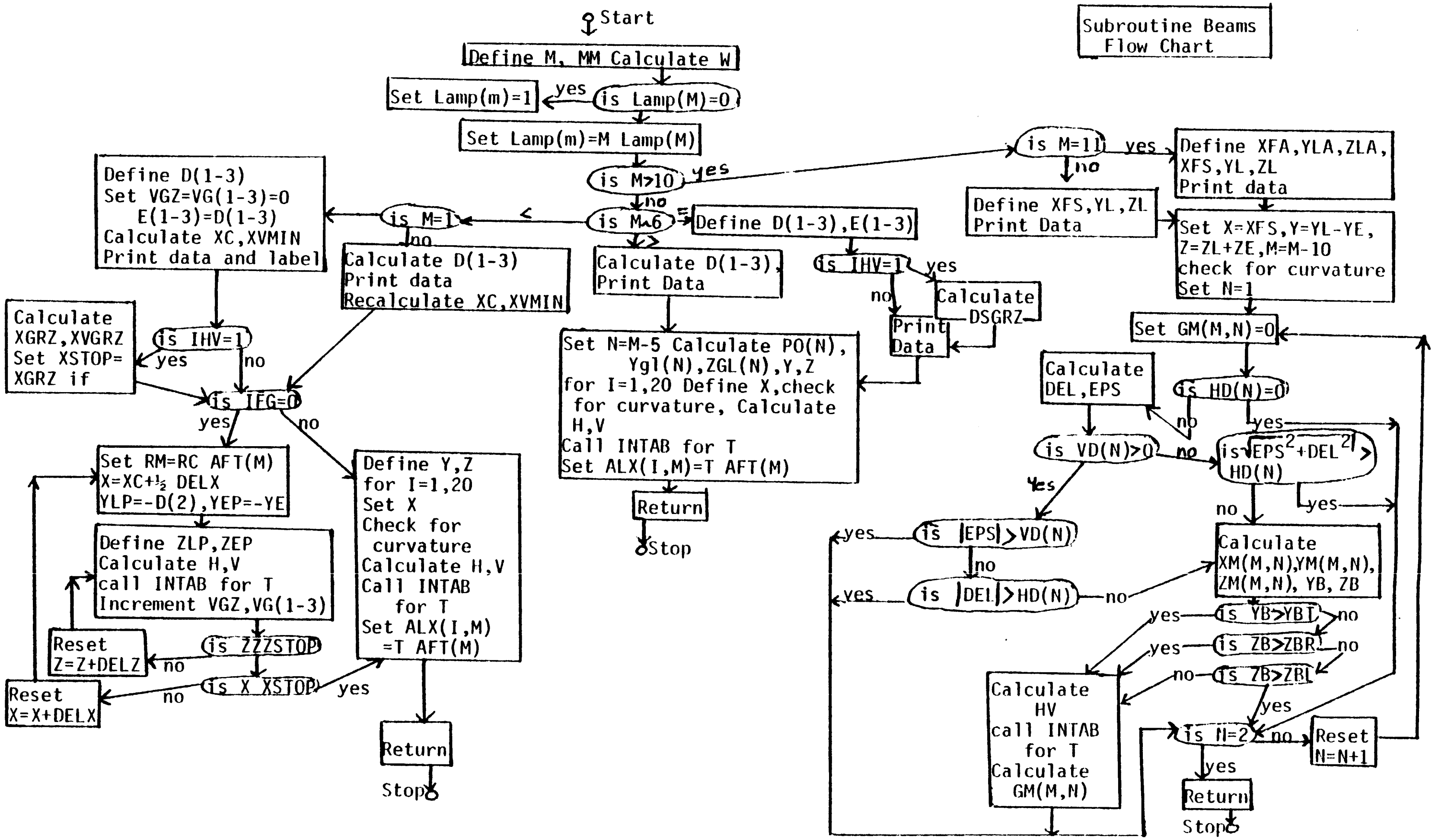
Subroutine Conver
Flow Chart




Subroutine Curve(I,J,X,D,E,V,W,R)
Start
Set 5MA=.05, TSA=I•D+R
is J>1
no
Set A=XIR
X=TSA•SIN(A)
105
yes
Set A=ATAN[X / √(TSA²-X²)]
110
is J=2
yes
no
Set TSB=COS(A)
TSC=1.-TSB
no
is A≤SMA
yes
Set TSC=½A²
Set W+D•TSB-E-I•R•TSC
is j<4
no
Set V=R•A
yes
Return



Subroutine Intab Flow Chart


Subroutine Beams
Flow Chart
Start
Define M, MM Calculate W
is Lamp(M)=0
yes
Set Lamp(m)=1
Set Lamp(m)=M Lamp(M)
is M>10
yes
no
is M=11
yes
no
Define XFA,YLA,ZLA,
XFS,YL,ZL
Print data
Define XFS,YL,ZL
Print Data
Set X=XFS,Y=YL-YE,
Z=ZL+ZE,M=M-10
check for curvature
Set N=1
Set GM(M,N)=0
is HD(N)=0
yes
no
Calculate
DEL,EPS
is VD(N)>0
no
yes
is EPS^2+DEL^2 >
HD(N)
yes
no
is |EPS|>VD(N)
yes
no
is |DEL|>HD(N)
yes
no
Calculate
XM(M,N),YM(M,N),
ZM(M,N), YB, ZB
is YB>YBT
is ZB>ZBR
is ZB>ZBL
yes
no
Calculate
HV
call INTAB
for T
Calculate
GM(M,N)
is N=2
yes
no
Reset
N=N+1
Return
Stop
is M~6
=
Define D(1-3),E(1-3)
is IHV=1
yes
no
Calculate
DSGRZ
Print
Data
>
Calculate D(1-3),
Print Data
Set N=M-5 Calculate PO(N),
Ygl(N),ZGL(N),Y,Z
for I=1,20 Define X,check
for curvature, Calculate
H,V
Call INTAB for T
Set ALX(I,M)=T AFT(M)
Return
Stop
<
is M=1
no
Define D(1-3)
Set VGZ=VG(1-3)=0
E(1-3)=D(1-3)
Calculate XC,XVMIN
Print data and label
Calculate D(1-3)
Print data
Recalculate XC,XVMIN
is IHV=1
yes
no
Calculate
XGRZ,XVGRZ
Set XSTOP=
XGRZ if
is IFG=0
yes
no
Set RM=RC AFT(M)
X=XC+½ DELX
YLP=-D(2),YEP=-YE
Define ZLP,ZEP
Calculate H,V
call INTAB for T
Increment VGZ,VG(1-3)
is ZZZSTOP
no
Reset
Z=Z+DELZ
is X XSTOP
no
yes
Reset
X=X+DELX
Define Y,Z
for I=1,20
Set X
Check for
curvature
Calculate H,V
Call INTAB
for T
Set ALX(I,M)
=T AFT(M)
Return
Stop

Subroutine Output

Start

Set GV(I) for I=1,IMAX

GVG=DTRS•GVG,GVF=DTRS•GVG

GMI=DTRS•GMI,GMG=DTRS•GME

IHLF=$\frac{IMAX+1}{2}$, IDEL=IHLF-$\frac{IMAX}{2}$

Print label and data

Return

Stop