```
$-------------------------------------------------------------------------$
$                                                                         $
$      ***  INPUT FORMAT INSTRUCTION FILE FOR PROGRAM MFIRE   ***         $
$                                                                         $
$    GENERAL RULES FOR DATA INPUT:                                        $
$                                                                         $
$   * NO NEED TO DISTINGUISH INTERGER AND REAL NUMBERS. SYMBOLS USED      $
$   IN NUMERICAL INPUT COMPRISE THE FOLLOWING LIST:                       $
$            1 2 3 4 5 6 7 8 9 0 . , - + BLANK                            $
$   * FREE FORMAT ALLOWED. COMMA AND BLANK SPACE CAN BOTH BE DELIMINA-    $
$   TORS. SEQUENTIALLY DISTRIBUTED BLANK SPACES ACT AS ONE DELIMINATOR.   $
$   BLANKS ADJACENT TO A COMMA HAS NO EFFECT IN SEPARATING INPUT TERMS.   $
$   * ZERO INPUT CAN BE OMITTED BUT ITS DELIMINATOR CAN'T EXCEPT BEING    $
$   THE LAST ONE IN A LINE.                                               $
$   * A LINE WHOSE FIRST NON-BLANK SYMBOL IS "$" IS AN INSTRUCTION        $
$   LINE WHICH WILL BE IGNORED IN A PROGRAM RUN.                          $
$   * A LINE WHOSE FIRST NON-BLANK SYMBOL IS NEITHER ONE USED IN THE      $
$   ABOVE LIST FOR NUMERICAL INPUT NOR "$", OR WHICH CONTAINS MORE        $
$   THAN 3 SYMBOLS OUTSIDE OF THE LIST, IS A COMMENT LINE WHICH WILL      $
$   BE SHOWN IN THE OUTPUT FILE.                                          $
$-------------------------------------------------------------------------$

$-------------------------------------------------------------------------$
$   (1) COMMENTS  (OPTIONAL)                                              $
$                                                                         $
$     YOU MAY PUT NOTES HERE TO REMIND YOU IN THE FUTURE. THEY WILL BE    $
$   SHOWN IN THE OUTPUT FILE. THE NUMBER OF TOTAL ACTIVE COMMENT LINES    $
$   IS 50. THE ACTIVE WIDTH OF A LINE IS 72 COLUMNS.                      $
$-----------------   INPUT YOUR COMMENTS HERE    ----------------------$

$-------------------------------------------------------------------------$
$  (2) CONTROL CARD I:                                                    $
$     NB,NFNUM,INFLOW,NVPN,NETW,TR,MADJ,ITN,NTEMP,TINC,SPAN,IOUT,TOUT     $
$     CONCT,DR                                                            $
$                                                                         $
$     NB: NUMBER OF AIRWAYS IN NETWORK, MAX. 500                          $
$     NFNUM: NUMBER OF FAN CHARACTERISTICS, MAX. 10.                      $
$     INFLOW: NUMBER OF CONTAMINATION SOURCES, MAX. 10.                   $
$     NVPN: MARKER FOR PRESENCE OF JUNCTION CARDS, 0: PRESENT.            $
$     NETW: MARKER, 1: ONLY THE NETWORK PART WILL BE PERFORMED.           $
$     TR: REFERENCE TEMPERATURE OF AIR, DEG. F. DEFAULT VALUE 75.         $
$     MADJ: MAX. NO. OF ITERATION IN TEMP. PART. DEFAULT 20.              $
$     ITN: MAX. NO. OF ITERATION IN DYNAMIC PART, DEFAULT 20.             $
$     NTEMP: MARKER. 1: SIMULATION GOES ONLY UP TO TEMPERATURE PART.      $
$     TINC: TIME INCREMENT IN DYNAMIC SIMULATION PART, SEC.               $
$     SPAN: TIME SPAN OF DYNAMIC SIMULATION, MIN.                         $
$     IOUT: OUTPUT, 0: BRIEF; 1: NORMAL; -1: DETAIL; -2; MORE DETAILED.   $
$     TOUT: TIME INTERVAL FOR OUTPUT, IN MIN.                             $
$     CONCT: MARKER. 1: SIMULATION GO TO TRANSIENT CONCENTRATION ONLY     $
$                    0: SIMULATION GO TO ALL TRANSIENT STATE              $
$     DR: REFERENCE DENSITY IN LBM/FT3, DEFAULT BASED ON TR AND 1 ATM.    $
$                                                                         $
$           ***  INPUT DATA FOR CONTROL CARD I HERE   ***                $
$NB,NFNUM,INFLOW,NVPN,NETW,TR,MADJ,ITN,NTEMP,TINC,SPAN,IOUT,TOUT,CONCT,DR
  10,1,0,0,0,70.0,5,40,0,15.,3.,-2,0.075
$  AIRWAY LINES HERE
$     NO,JS,JF,NWTYP,R,Q,KF,LA,A,O,HA,HK,CH4V,CH4PA,TROCK                 $
$                                                                         $
$   * IF NB IS 2 OR LARGER, THE NUMBER OF AIRWAY CARDS (LINES) MUST BE    $
$   NB. IF NB IS 1 OR LESS, THE AIRWAY CARDS MUST END WITH 9999.          $
$   * KF,LA,A,O,HA,HK HAVE THEIR AVERAGE OR DEFAULT VALUES WHICH ARE      $
$   ACTIVATED BY INPUTING ZERO FOR THE RESPECTIVE TERMS.                  $
$   * TROCK DOES NOT NEED TO INPUT EXCEPT WHEN YOU WANT TO OVERRIDE THE$
$   PROGRAM CALCULATED VALUE.                                             $
$   * COMMENT LINES ARE ACTIVE IN THIS DATA PARAGRAPH.                    $
$                                                                         $
$     NO:    AIRWAY ID NUMBER (1 TO 9980).                                $
$     JS:    JUNCTION ID NUMBER OF AIRWAY BEGINNING (1 TO 999).           $
$     JF:    JUNCTION ID NUMBER OF AIRWAY END (1 TO 999).                 $
$     NWTYP: AIRWAY TYPE, 1: FAN; 0: ORDINARY; -1: FIXED-Q.               $
$     R:     RESISTANCE OF AIRWAY 1.E-10 IN. W.G./(CFM)2.                 $
$     Q:     AIRFLOW RATE IN CFM.                                         $
$     KF:    FRICTION FACTOR IN 1.E-10 LBM*MIN2/FT4.                      $
$     LA:    AIRWAY LENGTH IN FT.                                         $
$     A:     AIRWAY CROSS SECTIONAL AREA IN FT**2.                        $
$     O:     AIRWAY PERIMETER IN FT.                                      $
$     HA:    THERMAL DIFFUSIVITY OF ROCK, FT2/HR.                         $
$     HK:    THERMAL CONDUCTIVITY OF ROCK, BTU/HR*FT*F.                   $
$     CH4V:  METHANE EMISION RATE IN AIRWAYS FT3/MIN.                     $
$     CH4PA: METHANE EMISION RATE PER UNIT SURFACE AREA, FT/MIN.          $
$     TROCK: AVERAGE ROCK TEMPERATURE IN AIRWAY, DEGREE F.                $
$                                                                         $
$           ***   INPUT DATA FOR AIRWAY CARDS HERE   ***                $
$-------- NO,JS,JF,NWTYP,R,Q,KF,LA,A,O,HA,HK,CH4V,CH4PA,TROCK ---------$
    1,1,4,0,3.85,100,50,1500,120.0,45.0,,,,,,,,
    2,1,2,0,2.55,100,50,1200,120.0,45.0,,,,,,,,,,
    3,2,3,0,1.45,100,50,300,80.0,35.0,,,,,,,,,,,,,,,
    4,3,4,0,1.15,50000,50,300,120,35.0,0,0,0,0,0,0,0
    5,4,5,0,0.5,65000,50,700,100.0,40.0,0,0,0,0,0,0,0
    6,5,6,0,1.45,100,50,500,120.0,45.0,0,0,0,0,0,0,0
    7,2,6,0,4.20,20000,50,2000,120.0,45.0,0,0,0,0,0,0,0
    8,3,5,0,2.27,30000,50,100,120.0,45.0,0,0,0,0,0,0,0
    9,6,7,0,1.20,140000,50,100,120.0,35.0,0,0,0,0,0,0,0
   10,7,1,1,4.0,140000,50,50,80.0,35.0,0,0,0,0,0,0,0
$-------------------------------------------------------------------------$
$   (4) JUNCTION CARDS:                                                   $
$     JNO,T,Z,CH4C                                                        $
$                                                                         $
$   * IF NVPN IS 0 OR LESS, EACH JUNCTION SPECIFIED IN JS AND JF  MUST    $
$   HAVE  A ONE-LINE INPUT HERE. OTHERWISE JUNCTION CARDS MUST BE         $
$   OMITTED.                                                              $
$                                                                         $
$     JNO:   JUNCTION ID NUMBER (1 TO 999)                                $
$     T:     TEMPERATURE OF AIR IN JUNCTIONS, DEGREE F.                   $
$     Z:     ELEVATION OF JUNCTIONS, FT.                                  $
$     CH4C:  METHANE CONCENTRATION IN JUNCTIONS, PERCENTAGE.              $
$                                                                         $
$              ***    INPUT JUNCTION CARDS HERE    ***                   $
$------------------------- JNO,T,Z,CH4C -------------------------------$
    1      45.0      1000 0.0
    2      62.0       350 0.0
    3      67.0       275 0.25
    4      67.0        50 0.30
    5      72.0       400 0.45
    6      76.0       550 0.52
    7      77.0      1000 0.55
$-------------------------------------------------------------------------$
$     (5) JUNCTION CARDS II (JUNCTIONS IN THE ATMOSPHERE)                 $
$    A STARTING JUNCTION IS THE JUNCTION WHERE ATMOSPHERE CONDITIONS      $
$  ARE DEFINED. ALL OTHER JUNCTIONS ON THE SURFACE ARE JUNCTIONS IN       $
$  THE ATMOSPHERE.                                                        $
$    IF THERE ARE MORE THAN ONE JUNCTION IN THE ATMOSPHERE, JUNCTION      $
$  CARD II IS EMPLOYED. OTHERWISE, ONLY NUMBER "1" IS READ IN.            $
$                                                                         $
$     JAN: THE NUMBER OF THE JUNCTIONS IN THE ATMOSPHERE                  $
$     JA:  JUNCTION ID NUMBER                                             $
$     JATP: JUNCTION TYPE:                                                $
$           0: STARTING JUNCTION                                          $
$           1: OTHER ATMOSPHERE JUNCTIONS EXCEPT STARTING JUNCTION        $
$                                                                         $
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$         ****    INPUT DATA FOR JUNCTION CARD II HERE    ****         $
                                                          $
$--------------------------- JAN ---------------------------------------$
$-------------------------- JA,JATP ------------------------------------$
1


$-------------------------------------------------------------------------$
$     FAN CARDS I AND II COMPRISE A DATA GROUP WHICH MUST REPEAT NFNUM $
$   TIMES FOR NFNUM FAN CURVES. IF NFNUM IS 0 OR LESS, FAN CARDS I AND $
$   II MUST BE OMITTED.                                                 $
$                                                                       $
$   (5) FAN CARD I:                                                     $
$     NOF,MPTS,NSWT                                                     $
$     NOF:   ID NUMBER OF FAN BRANCH.                                   $
$     MPTS:  NUMBER OF POINTS DEFINING FAN CHAR, MAXIMUM 10.            $
$     NSWT:  SELECTION OF FAN CURVE FITTING, 1: LEAST SQUARES           $
$            2: SPLINE  3. AUTO  4.AUTO+MANUAL                          $
$   (6) FAN CARD II:  (IF MPTS IS LARGER THAN 5, CONTINUE IN 2ND LINE.)$
$     QF,PF,QF,PF,QF,PF,QF,PF,QF,PF                                     $
$     QF:    AIRFLOW AT GIVEN POINT OF FAN CHAR, CFM.                   $
$     PF:    PRESSURE AT GIVEN POINT OF FAN CHAR, IN.W.G.               $
$   (7) FAN CARD III: NPLOT                                             $
$     NPLOT: TREATMENT OF THE BOUNDARY RANGE OF FAN CURVE               $
$            1: EXTEND FAN CURVE BY FOLLOWING GRADIENTS OF TWO ENDS.    $
$            2: EXTEND FAN CURVE AS ABOVE AT LEFT BOUNDARY REGION AND   $
$               SEND GRADIENT OF RIGHT BOUNDARY REGION TO ZERO.         $
$            3. SEND GRADIENT OF BOTH SIDES OF BOUNDARY REGION TO ZERO.$
$            ***    INPUT FAN CARDS I,II, AND III HERE    ***          $
$--------------------------- NOF,MPTS,NSWT ------------------------------$
$------------------ QF,PF,QF,PF,QF,PF,QF,PF,QF,PF ----------------------$
$-------------------------------NPLOT-------------------------------------$

   10   10  1
   20000  3.60   25000  4.30   30000  4.60   40000  4.78   55000  4.58
   70000  4.29   85000  3.96  100000  3.70  150000  3.00  200000  2.52
   1
$-------------------------------------------------------------------------$
$   (7) CONTAMINATION (HEAT SOURCE) CARDS:                               $
$     NCENT,CONT,CONC,HEAT,O2MIN,SMPO2,HTPO2,QCENT,TPR                  $
$                                                                       $
$   * EACH HEAT SOURCE MUST HAVE  A ONE-LINE INPUT HERE. THE NUMBER OF $
$   TOTAL FIRE SOURCES WAS SPECIFIED BY "INFLOW" IN CONTROL CARD I.     $
$                                                                       $
$     NCENT: ID NUMBER OF AIRWAYS WHERE HEAT SOURCES LOCATE.            $
$     CONT:  VOLUME FLOW RATE OF CONTAMINATED GAS INFLOW IN CFM.        $
$     CONC:  CONCENTRATION OF CONTAMINANT IN GAS INFLOW, %.             $
$     HEAT:  HEAT ENTERING OR LEAVING AIRWAY IN BTU/MIN.                $
$     O2MIN: OXYGEN CONCENTRATION OF AIR CURRECT LEAVING FIRE ZONE, %.  $
$     SMPO2: CONTAMINANT PRODUCTION PER FT**3 OF OXYGEN DELIVERY.       $
$     HTPO2: HEAT PRODUCTION (BTU) PER FT**3 OF OXYGEN DELIVERY.        $
$     QCENT: REF. Q DEFINING FIRE CHARACTERISTICS, CFM.                 $
$     TPR: LEADING TIME PERIOD IN MIN. FOR FIRE TO REACH FULL STRENGTH.$
$                                                                       $
$           ***    INPUT DATA FOR FIRE SOURCES HERE      ***           $
$---------- NCENT,CONT,CONC,HEAT,O2MIN,SMPO2,HTPO2,QCENT,TPR ----------$


$-------------------------------------------------------------------------$
$   (8) CONTROL CARD II                                                 $
$   NAV,JSTART,TSTART,TIME,CRITSM,CRITGS,CRITHT,WRNPR,WRNSM,WRNGS,WRNHT$
$                                                                       $
$   * A SET OF DEFAULT VALUES ARE AVAILABLE. THEY CAN BE ACTIVATED BY  $
$   INPUTING ZERO FOR THE RESPECTIVE TERMS.                             $
$                                                                       $
$     NAV: MARKER. 1 OR LARGER: AVERAGE-VALUE CARD IS PRESENT.          $
$     JSTART: STARTING JUNCTION (ATMOSPHERE).                           $
$     TSTART: TEMPERATURE AT THE START JUNCTION, DEGREE F.              $
$     TIME: TIME SPAN TO ASSUME QUASI-EQUILIBRIUM, HOUR. DEFAULT 10.    $
$     CRITSM: ACCURACY IN FUME CALCULATION, %. DEFAULT 0.005.           $
$     CRITGS: ACCURACY IN METHAME CALCULATION, %, DEFAULT .01.          $
$     CRITHT: ACCURACY IN TEMPERATURE CALCULATION, F. DEFAULT 0.1.      $
$     WRNPR: PRESSURE DROP WARNING CRITERIA, IN.W.G. DEFAULT 0.01.      $
$     WRNGS: METHANE CONCENTRATION WARNING CRITERIA, %. DEFAULT 1.0.    $
$     WRNSM: FUME CONCENTRATION WARNING CRITERIA, %. DEFAULT 0.05.      $
$     WRNHT: HIGH TEMPERATURE WARNING CRITERIA, F. DEFAULT 100.0.       $
$                                                                       $
$          ***    INPUT DATA FOR CONTROL CARD II HERE    ***           $
$- NAV,JSTART,TSTART,TIME,CRITSM,CRITGS,CRITHT,WRNPR,WRNSM,WRNGS,WRNHT-$
    0 1 45.0        10.0  .005  0.10   .20  .01 .05   1.0  95.

$-------------------------------------------------------------------------$
$   (9) AVERAGE-VALUE CARD:                                              $
$     HAAVR,HKAVR,KFAVR,LAAVR,AAVR,OAVR                                 $
$                                                                       $
$     IT MUST EXIST IF NAV IN CONTROL CARD II IS 1 OR LARGER. A DEFAULT$
$   VALUE CAN BE ACTIVATED BY INPUTING ZERO FOR THE RESPECTIVE TERM.    $
$   WHEN NAV IS ZERO OR LESS, THE WHOLE SET OF DEFAULT VALUES WILL BE   $
$   TAKEN.                                                              $
$                                                                       $
$     HAAVR: AVERAGE THERMAL DIFFUSIVITY OF ROCK, FT2/HR. DEFAULT 0.1.  $
$     HKAVR: AVERAGE THERMAL CONDUCTIVITY OF ROCK, BTU/HR*FT*F.         $
$            DEFAULT 3.0.                                               $
$     KFAVR: FRICTION FACTOR, 1.E-10 LBM*MIN2/FT4. DEFAULT 100.         $
$     LAAVR: AVERAGE LENGTH OF AIRWAY, FT. DEFAULT 500.                 $
$     AAVR: AVERAGE SECTIONAL AREA OF AIRWAY, FT2. DEFAULT 100.         $
$     OAVR: AVERAGE PERIMETER, FT. DEFAULT 40.                          $
$                                                                       $
$          ***   INPUT AVERAGE-VALUE CARD HERE IF NEEDED   ***         $
$----------------- HAAVR,HKAVR,KFAVR,LAAVR,AAVR,OAVR -------------------$

$-------------------------------------------------------------------------$
$    (10) TIME TABLE FOR CONDITION CHANGES:                             $
$                                                                       $
$      THIS TIME TABLE CAN CONTAIN THE FOLLOWING CONDITION CHANGES. IT $
$    MUST END WITH A ONE-LINE INPUT OF A VALUE LARGER THAN "SPAN" IN    $
$    CONTROL CARD I. THIS TIME TABLE MUST EXIST, BUT MAY CONTAIN ONLY   $
$    THE ENDING LINE. THE ORDER OF CHANGING CONDITIONS MUST BE ARRANGED$
$    ACCORDING TO THE RESPECTIVE OCCURING TIME.                         $
$                                                                       $
$    1) TS,1,NBR,R                                                      $
$       THIS INPUT CHANGES BRANCH "NBR" TO AN ORDINARY AIRWAY WITH      $
$     AIRFLOW RESISTANCE EQUAL TO "R" AT "TS" MIN. AFTER TIME ZERO.     $
$       TS: OCCURING TIME OF THE CHANGE CONDITION, MIN.                 $
$       NBR: AIRWAY ID NUMBER.                                          $
$       R: RESISTANCE OF AIRWAY 1.E-10 IN. W.G./(CFM)2.                 $
$    2) TS,2,NBR,INDEX,QF1,PF1,QF2,PF2,QF3,PF3,QF4,PF4,QF5,PF5          $
$       THIS INPUT CHANGES BRANCH "NBR" TO A FAN BRANCH WITH ITS        $
$     CHARACTERISTICS SPECIFIED BY "QF1" TO "PF5".                      $
$       INDEX: NUMBER OF DATA POINTS TO DEFINE FAN CHAR. MAX. 5.        $
$       QF: AIRFLOW RATE IN FT**3/MIN.                                  $
$       PF: CORRESPONDING FAN PRESSURE IN IN. W.G.                      $
$    3) TS,3,NBR,CONT,CONC,HEAT,O2MIN,SMPO2,HTPO2,QCENT,TPR             $
$       THIS INPUT CHANGES BRANCH "NBR" TO A FIRE SOURCE BRANCH WITH    $
$     FIRE CHAR. SPECIFIED BY "CONT" TO "TPR", WHICH RETAIN THE SAME    $
$     MEANING AS IN FIRE SOURCE CARD (7). REFER BACK TO (7) FOR DETAIL  $
$    4) TS,4,NBR                                                        $
$       THIS INPUT CHANGES FIRE BRANCH "NBR" TO AN ORDINARY AIRWAY AT   $
$     TIME "TS".                                                        $
$    5) TS,5,TINC                                                       $
$       THIS INPUT CHANGES TIME INCREMENT IN SYNAMIC SIMULATION TO A    $
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$     NEW VALUE "TINC" IN SEC.                                          $
$    6) TS,6,TOUT                                                       $
$       THIS INPUT CHANGES OUTPUT INTERVAL TO A NEW VALUE OF "TOUT"     $
$     MIN.                                                              $
$    7) TS,7,JDPP                                                       $
$       THIS INPUT FORCES DETAILED RECORDS TO BE SET UP FOR AIRWAYS     $
$     WHICH ARE ON THE IMMEDIATE DOWN-STREAM SIDE OF JUNCTION "JDPP"    $
$     AT "TS" MIN. AFTER TIME ZERO.                                     $
$                                                                       $
$         ***    INPUT CONDITION CHANGE TIME TABLE HERE    ***         $
$-- (IT MUST END WITH A ONE-LINE VALUE LARGER THAN "SPAN" IN CARD I) --$
1.5,3,  8,100.0,100.0,50000.0,0,0.0,0.0,0.
1100
```