Date: June 1, 2006

```
OUTPUT JACOBIAN/DERIVATIVE FILES (in the AJ directory):

    RDderivDNW_xx_lll        Layer downwelling Jacobian/derivative files
    RDderivUPW_xx_lll        Layer upwelling Jacobian/derivative files
                              (includes downwelling and surface components)
    LEV_RDderivDNW_xx_lll    Level downwelling Jacobian/derivative files
    LEV_RDderivUPW_xx_lll    Level upwelling Jacobian/derivative files
                              (includes downwelling and surface components)

    Files related to surface derivatives

    LEV_RDderivE-R_-1_000    TOA radiance Jacobian wrt surface emittance/reflectance (with  E + R = 1)
    LEV_RDderivEMI_-1_000    TOA radiance Jacobian wrt surface emittance
    LEV_RDderivRFL_-1_000    TOA radiance Jacobian wrt surface reflectance
    LEV_RDderivTSF_-1_000    TOA radiance Jacobian wrt surface temperature

    Note: -> xx   signifies the parameter for which the radiance analytic Jacobian ie calculated
          -> lll  is the layer number starting from the lowest altitude
          -> Layer output Jacobian/derivative files:
                  - are in the same TAPE12 two-panel binary format
                  - first panel containing the Jacobian, and the second the total transmission
```

RECORD 1.1

    CXID: 80 characters of user identification (80A1)

        CXID(1) is the flag which determines program initialization and termination. The actual input data
                stream for LBLRTM commences with the record containing a '$' in CXID(1). Any record that are
                read prior to a record containing a '$' in CXID(1) are ignored. Since LBLRTM automatically
                recycles and reads Record 1.1 at the end of each run (this allows the stacking of multiple
                runs), each subsequent run of LBLRTM must also have a '$' in CXID(1) on Record 1.1. In order
                to effect a normal termination of LBLRTM, CXID(1) must be set to '%', on the final record of

IMRG = 0 KFILE rewound after each layer

        IMRG (Continued)

                        IMRG OPTIONS FOR MERGED OUTPUT
                        ==============================

           Monochromatic Input, on precalculated KFILE. Output is determined by IEMIT.
        _____
                                              IMRG =

           MERGE PATH: space to ground   ground to space   tangent   Final
        RADIANCE CALCULATION: downwelling   upwelling   Results
           915   IMRG =

                          IMRG OPTIONS FOR SEQUENTIAL OUTPUT
                          =================================

                     Monochromatic Input, calculated in current run.
                     _____
                                          IMRG =

                  MERGE PATH: space to ground   ground to space   tangent   Results
        RADIAN9   MERGE   nd   ground to space   tangent   Results

RECORD 1.2 (Continued)

The actual results produced on MFILE or NFILE are determined by both IEMIT on Record 1.2 and JEMIT on either Record 6 (scanned results) or Record 7.1 (filtered results). The following table describes the options:

RECORD 1. or (required if ICNTNM = 6)

        XSELF, XFRGN, XCO2C, XO3CN, XO2CN, XN2CN, XRAYL

        free format

        XSELF H2O self broadened continuum absorption multiplicative factor

        XFRGN H2O foreign broadened continuum absorption multiplicative factor

        XO3CN O3 continuum absorption multiplicative factor

        XO2CN O2 continuum absorption multiplicative factor

        XN2CN N2 continuum absorption multiplicative factor

        XRAYL Rayleigh extinction multiplicative factor

RECORD 1.2b   (required for Analytic Jacobian calculation: IEMIT=3 and IMRG=40,41,42 or 43)

            NSPCRT

              1-5

               I5

         NSPCRT (-1,0,1,...N)   species number for radiance analytic Jacobian/derivative

                   -1 = surface emissivity and surface skin temperature
                    0 = atmospheric temperature profile
            1 -> Nmol = reference number in TABLE 1 for molecular species

```
RECORD 1.2.1     (required if IEMIT = 2; otherwise omit)

                          NOTE:   IEMIT = 2 requires binary solar radiance file SOLAR.RAD, containing
                                  extraterrestrial source spectra in units W/(m2 cm-1).

         INFLAG,  IOTFLG,  JULDAT

           1-5,     6-10,   13-15

           I5,       I5, 2X, I3


           INFLAG       (0,1,2,3) input flag for solar radiance calculation

                        = 0  input previously calculated radiance and transmittance from TAPE12 (default)
                        = 1  input previously calculated optical depth from TAPE12
                        = 2  input previously calculated upwelling radiance and transmittance from TAPE12,
```

RECORD 1.3   (required if IHIRAC > 0; IAERSL > 0; IEMIT = 1; IATM = 1; or ILAS > 0; otherwise omit)

      V1,   V2,   SAMPLE,   DVSET,   ALFAL0,   AVMASS,   DPTMIN,   DPTFAC,   ILNFLG,   DVOUT,   NMOL_SCAL

     1-10,   11-20,   21-30,   31-40,   41-50,   51-60,   61-70,   71-80,   85,   90-100,   105

    E10.3,   E10.3,   E10.3,   E10.3,   E10.3,   E10.3,   E10.3,   E10.3,   4X(n0 0 8X,E10.3,   3x,I2)Tj ET

RECORD 1.4   (required if IEMIT = 1, or both IEMIT=2 and IOTFLG=2; otherwise omit)

         TBOUND, SREMIS(1), SREMIS(2), SREMIS(3), SRREFL(1), SRREFL(2), SRREFL(3), surf_refl

           1-10,   11-20,   21-30,   31-40,   41-50,   51-60,   61-70,   75

          E10.3,   E10.3,   E10.3,   E10.3,   E10.3,   E10.3,   E10.3   4X,1A

     temperature and emissivity parameters for boundary at H2 (end of path)
              (applies to downlooking, uplooking and tangent paths)

     for down looking case, the effect of reflected atmospheric radiance above lower boundary included for SRREFL(I) > 0.
              (reflected atmosphere from H1 to H2 included)

         TBOUND   temperature of boundary (K)

         SREMIS(I)   frequency dependent boundary emissivity coefficients (I = 1,2,3)

                         EMISSIVITY   = SREMIS(1) + SREMIS(2)*V + SREMIS(3)*(V**2)

             *** NOTE: Entering a value for SREMIS(1) < 0 allows for direct input of boundary emissivities
                       from file 'EMISSIVITY'

         SRREFL(I)   frequency dependent boundary reflectivity coefficients (I = 1,2,3)

                         REFLECTIVITY = SRREFL(1) + SRREFL(2)*V + SRREFL(3)*(V**2)

             *** NOTE: Entering a value for SRREFL(1) < 0 allows for direct input of boundary reflectivities
                       from file 'REFLECTIVITY'

         surf_refl   specifies the surface type used in computing the reflected downward radiance

RECORD 1.6b, 1.6c, and 1.6d   (required if IMRG = 40,41 and IEMIT=3; otherwise omit)

      Note: requires separate optical depth files for each layer (use IMRG = 10 prior to this run)

          PTHODL

            1–55

             A55

         PTHODTupw

            1–55

             A55

         PTHODTdnw

            1–55

             A55

  PTHODL = layer optical depth file (e.g., "ODint_")
  PTHODTupw = upwelling total optical depth file (e.g., "ODtoupw_")

```
 *****************************************************************************
 ******  these records applicable only if LBLATM not selected (IATM=0)  ******

                   LAYER INPUT  (MOLECULES ONLY)

RECORD 2.1


         IFORM, NLAYRS, NMOL, SECNTO,          ZH1,        ZH2,      ZANGLE

          2     3-5,   6-10,  11-20,        41-48,      53-60,      66-73

         1X,I1    I3,    I5,   F10.2,   20X, F8.2,   4X, F8.2,   5X, F8.3


             IFORM      (0,1) column amount format flag

                        = 0  read PAVE(L), WKL(M,L), WBROADL(L) in F10.4, E10.3, E10.3 formats (default)
                        = 1  read PAVE(L), WKL(M,L), WBROADL(L) in E15.7 format

            NLAYRS      number of layers (maximum of 200)

              NMOL      value of highest molecule number used (default = 7; maximum of 35)
                              See Table I for molecule numbers.

            SECNTO      user entered scale factor for the column amount for the layers defined by NLAYRS
                              if positive, looking up
                              if negative, looking down
                        normal value = 1.0

               ZH1      observer altitude

               ZH2      end point altitude

            ZANGLE      mean zenith angle for path calculation (degrees)

                        NOTE: With the surf_refl = 'l' option on Record 1.4
                              ZANGLE must be set.  (ZANGLE .gt.90 and .le.180 )

RECORD 2.1.1


         PAVE(L), TAVE(L), SECNTK(L), ITYL(L),  IPATH, ALTZ(L-1), PZ(L-1), TZ(L-1), ATLZ(L), PZ(L), TZ(L)

          1-10,   11-20,     21-30,    31-33,   34-35,    37-43,   44-51,   52-58,   59-65, 66-73, 74-80
```

ITYL(L)   overrides the LBLRTM internal calulation of ITYPE for the layer L.
ITYPE controls the DV ratio of the previous layer to the current layer.
A blank defaults to the internal calulation.
= 0 specifies 1/1

```
*******************************************************************************************************
          ****  Note: all the quantites on thid Record, are for information only, LBLRTM will use the corresponding
****
```

```
RECORD 2.2.4


          (XAMNT(I,L), I=1, 7), WBROADX(L)

                    (8E10.3)


          XAMNT(I,L)    column densities (molecules/cm**2) or mixing ratios (ppv) for 7 cross-section molecules

          WBROADX(L)    column density for broadening gases (molecules/cm**2),                    ** information only
**
                        should be the same as WBROADL, on Record 2.1.2

                        **NOTE** If IFRMX=1, then XAMNT(I,L) and WBROADX(L) are in 8E15.7 format


RECORD 2.2.5      only if (IXMOL  .GT . 7)          # records depends on IXMOL


          (XAMNT(I,L), I=8, IXMOL)

                (8E10.3)

                **NOTE: If IFRMX=1 then XAMNT(I,L) in 8E15.7 format**


REPEAT RECORDS 2.2.3 through 2.2.5 for the remaining layers (up to NLAYXS)
```

```
RE          radius of earth (km)
            defaults for RE=0:

            a)  MODEL 0,2,3,6   RE = 6371.23 km
            b)        1         RE = 6378.39 km
            c)        4,5       RE = 6356.91 km

HSPACE      altitude definition for space (default = 100 km)
            internal models defined to 120 km


VBAR        frequency for refractive geometry calculation

               (default:  VBAR = (V1+V2) / 2 )      (V1,V2 from Record 1.3)


REF_LAT     latitude of location of calculation (degrees)
            defaults for REF_LAT = 0:
            a) MODEL 0,2,3,6   REF_LAT = 45.0 degrees
            b) MODEL 1         REF_LAT = 15.0
            c) MODEL 4,5       REF_LAT = 60.0
```

```
          RECORD 3.3  options


RECORD 3.3A         For IBMAX  = 0 (from RECORD 3.1)


             AVTRAT, TDIFF1, TDIFF2, ALTD1, ALTD2

              1-10,  11-20,  21-30, 31-40, 41-50

             F10.3,  F10.3,  F10.3, F10.3, F10.3


         AVTRAT  maximum Voigt Qidth ratio across a layer
                 (if zero, default = 1.5)

         TDIFF1  maximum layer temperature difference at
                 ALTD1 (if zero, default =  5 K)

         TDIFF2  maximum layer temperature difference at
                 ALTD2 (if zero, default = 8 K)

         ALTD1   altitude of TDIFF1 (if zero, default = 0 Km)

         ALTD2   altitude of TDIFF2 (if zero, default = 100 Km)



RECORD 3.3B         For IBMAX > 0  (from RECORD 3.1)
```

TABLE I. Units and input options for the K'th molecule

                                  TABLE I

          USER OPTIONS FOR PRESSURE, TEMPERATURE, AND MOLECULAR DENSITY

                     JCHARP

        PRESSURE   1-6   default to value for specified model atmosphere
        (JCHARP)   " ",A   pressure in (mb)
                       B   "   "   (atm)
                       C   "   "   (torr)

                     JCHART

     TEMPERATURE   1-6   default to value for specified model atmosphere
        (JCHART)   " ",A   ambient temperature in deg (K)
                       B   "   "   "   "   " " (C)

                     JCHAR(M)

(M): AVAILABLE   (1) H2O (2) CO2 (3)   O3 (4) N2O (5)   CO (6) CH4 (7)   O2
MOLECULAR SPECIES   (8)   NO (9) SO2 (10)   NO2 (11) NH3 (12) HNO3 (13)   OH (14)   HF
                      (15) HCL (16) HBR (17)   HI (18) CLO (19)   OCS (20) H2CO (21) HOCL
                      (22)   N2 (23) HCN (24) CH3CL (25) H2O2 (26) C2H2 (27) C2H6 (28)   PH3
                      (29) COF2 (30) SF6 (31)   H2S (32) HCOOH (33) EMPTY (34) EMPTY (35) EMPTY

                 potential choice of units for above species:

        JCHAR = 1-6   - default to value for specified model atmosphere
              = " ",A   - volume mixing ratio (ppmv)
              = B   - number density (cm-3)
              = C   - mass mixing ratio (gm/kg)
              = D   - mass density (gm m-3)
              = E   - partial pressure (mb)
              = F   - dew point temp (K) *H2O only*
              = G   - dew point temp (C) *H2O only*
              = H   - relative humidity (percent) *H2O only*
              = I   - available for user definition

     JCHAR must be less than "J"

TABLE II. Structure of file FSCDXS. (Continued)

          V1X   Beginning wavenumber for the cross-section data (cm-1)

          V2X   Ending wavenumber for the cross-section data (cm-1)

          DVX   Wavenumber spacing for the cross-section data (cm-1)   ** for information only **

        NTEMP   number of temperature dependent cross-section files to be read in. '1' indicates no temperature
                     dependence. Maximum of '6' files (i.e. 6 temperatures) is allowed.   ***** no default *****

         IFRM   is the format specifier
                     = 86 - HITRAN 86 format
                     = 90 - HITRAN 90 format   ** default **

                     Note: the headers are different between HITRAN 86 and HITRAN 90

         CFRM   is the blocking specifier

```
--------------------------------------------------------------------------------
                    User Defined Atmospheric Profile

------------------------------ (IPRFL = 0) ------------------------------


RECORD 3.8


            LAYX,   IZORP,  XTITLE

              5,      10,   11-60

            I5,     I5      A50


        LAYX         number of atmospheric profile boundaries

        IZORP (0,1)  flag which determines value of ZORP on Record 3.8.1

                     = 0   ZORP is an altitude in KM
                     = 1   ZORP is a pressure in millibars

        XTITLE       50 character descmiption of profile

RECORD 3.8.1


    ZORP,   (JCHAR(K),K =1,28)

    1-10,    16  through  50

   F10.3, 5X,          35A1


       ZORP       boundary altitude (km) or pressure (millibars) as determined by IZORP on Record 3.8

     JCHAR(K)     flag for units and input options for
```

```
******************************************************************************

                           AEROSOLS (IAERSL = 1,7)

--------------------------------------------------------------------------------
Subroutine LOWTRN

Stripped down version of LOWTRAN 7 run as a subroutine to supply
LBLRTM with the attenuation due to aerosols, clouds, fogs, and rain.

Further details of most of the aerosol parameters are contained in
the LOWTRAN7 User Guide (AFGL-TR-88-0177), the LOWTRAN6 Report (AFGL-TR-83-0187)
the LOWTRAN5 Report (AFGL-TR-80-0167) and the Millimeter Aerosol Report (AFGL-TR-79-0253)
******************************************************************************

Activated by IAERSL = 1 or 7 (on record 1.2)

** Note:(i) IAERSK7and)CALT should beRECORDon speciMleTITLE0)
**         model levels (ZBND or PBND from Record 3.3B)  **
**       2) MODEL is read in LBLATM                       **
**       3) M1, M2, and M3 are set depending on MODEL     **

RECORD sequence as follows

4.1    IHAZE,ISEASN,IVULCN,ICSTL,ICLD,IVSA,VIS,WSS,WHH,RAINRT,GNDALT

                         Format (6I5,5F10.3)

     ***Optional RECORDS***

   (if ICLD = 18,19, or 20)    RECORD 4.2        CTHIK,CALT,CEXT,ISEED
                                                 Format (3F10.3,I10)

   (if IVSA = 1)               RECORD 4.3        ZCVSA,ZTVSA,ZINVSA
                    ows
```

```
RECORD 4.1          IHAZE,ISEASN,IVULCN,ICSTL,ICLD,IVSA,VIS,WSS,WHH,RAINRT,GNDALT
```

RECORD 4.1 (Continued)

ICSTL is the air mass character (1 to 10); only used with
      Navy maritime model (IHAZE=3)   (default value = 3)

      ICSTL   = 1 open ocean
                        .
                        .
                        .
                      10 strong continental influence

ICLD determines the inclusion of cirrus cloud attenuation or gives
      a choice of five cloud models and 5 rain models

ICLD for cloud and or rain

      ICLD   = 0   no clouds or rain

                    = 1   Cumulus cloud; base .66 km; top 3.0 km

RECORD 4.1 (Continued)

Optional input records after Record 4.1
Selected by parameters ICLD, IVSA, and IHAZE on Record 4.1

****

RECORD 4.2   CTHIK,CALT,CEXT,ISEED   (if ICLD = 18, 19, or 20)

                 FORMAT (3F10.3,I1

             Input record for cirrus altitude profile

```
*****************************************************************************
RECORD 4.4    ML,TITLE                          (if IAERSL = 7)

                 FORMAT (I5,18A4)

         Additional aerosol profile
```

        SAMPL   number of sample points per half width

              = 0 gives default value for each function

              < 0 this variable specifies the output spectral spacing (DELVO cm-1)
                    The value of SAMPL is calculated internally as SAMPL = HWHM/DELVO

        NNFILE   unit number for scanned sequential output

                   defaults to NFILE (= 13) or previous value of NNFILE if doing multiple LBLRTM runs

FLTMRG   (for sequential results with filter; IMRG between 23 and 28)

RECORD 7.1

       V1F,   DVF,   NPTS,   JEMIT,   NNFILE,   HEDDR

      1-10,   11-20,   21-25,   26-30,   31-35,   46-80

     F10.3,   F10.4,   I5,   I5,   I5, 10X,   8A4,A3

          V1F   wavenumber of initial filter value

          DVF   wavenumber increment between filter values

         NPTS   number of filter values

                   (if NPTS.LT.0, previous values of XF utilized XF 7tilized XF 7tilized XF7318 774 cm BT 33 0 0 -33 0

```
                              SCANFN

                           (ISCAN = 1)

RECORD 8.1


   HWHM,      V1,      V2, JEMIT,    JFN,   JVAR,   SAMPL,  IUNIT,  IFILST, NIFILS, JUNIT,  NPTS

   1-10,   11-20,  21-30,  34-35,  39-40,  44-45,  46-55,  59-60,  64-65,   69-70, 74-75, 76-80

   F10.3,  F10.3,  F10.3,  3X,I2,  3X,I2,  3X,I2,  F10.4,  3X,I2,  3X,I2,   3X,I2, 3X,I2,    I5



        HWHM    (Half Width Half Maximum)

                negative value terminates SCANFN option

                Notes: 1. HWHM is first zero crossing of periodic functions for  JV < 0.
                          HWHM is redefined as  HWHM=(FIRST ZERO)/(PI/SCALE)
                       2. HWHM is instrument field of view half angle (in degrees) for  JV=5,6
                          (e.g., for FOV of 10.0 degrees, HWHM=5.0)


        V1      beginning wavenumber value for performing SCAN

        V2      ending wavenumber value for performing SCAN

      JEMIT     = -1  SCANFN convolved with absorption (1.0 - transmission)

                =  0  SCANFN convolved with transmission

                =  1  SCANFN convolved with radiance

        JV      selects choice of scanning function

                    JV    Function      Half-width Bound     Default Sample
                    ---   --------      ----------------     --------------
                =  0    rectangular          1.0                  0.5

                =  1    triangular           2.0                  2.0

                =  2    gaussian             4.0                  4.0

                =  3    sinc squared        54.1826               4.0

                =  4    sinc               119.332818             4.0

                =  5    FOV correction       1.0                  0.5


                =  6    FOV correction       1.0                  0.5
```

INTRPL

(ISCAN = 2)

RECORD 9.1

```
 DVO,     V1,     V2, JEMIT,   I4PT,   IUNIT, IFILST, NIFILS, JUNIT,  NPTS

 1-10,  11-20, 21-30, 31-35,  36-40,   56-60, 61-65,  66-70, 71-75, 76-80

 F10.3, F10.3, F10.3,    I5      I5, 15X,I5,    I5,     I5,    I5,    I5
```

       DVO   wavenumber spacing for interpolated result

               negative value terminates INTRPL option

       V1   beginning wavenumber value for performing INTRPL

       V2   ending wavenumber value for performing INTRPL

     JEMIT

           = -1 interpolation of absorption (1 - transmission)

           = 0 interpolation of transmission

           = 1 interpolation of radiance

      I4PT

           = 0 linear interpolation of data points

           = 1 four-point interpolation of data points

    IUNIT   unit designation of file to be interpolated (default is MFILE)

   IFILST   initial file from IUNIT to be interpolated

  NIFILS   number of files to be interpolated starting at IFILST

   JUNIT   file containing interpolated results (default is JUNIT, file 11)

    NPTS   number of values to be printed for the beginning and ending of each panel
             for current interpolated file

REPEAT RECORD 9.1

       A '-1.' within columns 1-10 will terminate interpolation.

```
                                FFTSCN

                           (ISCAN = 3)

RECORD 10.1


  HWHM,    V1,     V2,   JEMIT,  JFNin = 38R.nNuVOUT,  IUNIT, IFILST, NIFILS,  JUNIT,    IVX,  NOFIX


 F10.3, F10.3, F10.3,    I5,     I5,     I5,  F10.3,    I5,    I5,    I5,     I5,    I3,    I2


          M,        (Half Width Half Maximum)

                    negative value terminates FFTSCN option

                Note: M,   is the maximum optical path difference of an
                      equivalent interferometer for JFNin < 0.

         V1     beginning wavenumber value for performing FFTSCN

         V2     ending wavenumber value for performing FFTSCN

      JEMIT     =  0  convolve with transmittance

                =  1  convolve with radiance
```

JFNin   selects choice of scanning function

JFNin	Scanning Function	Apodization Function	a/HWHM	a/FZ	CR
= 0	boxcar				
= 1	1-v/a, |v|<a 0, |v|>a (triangle)	(sin(pi*x*a)/pi*x*a)**2 (sinc squared)	2.0	1.0	40
= 2	exp(-0.5*(v/a)**2) (gauss)	exp(-2*pi*(a*x)**2) (gauss)	0.849322	(NA)	10
= 3	(sin(pi*x*a)/pi*x*a))**2 (sinc squared)	1-x*a, |x|=<1/a 0, |x|>1/a (triangle)	2.257609	1.0	40
= 4	sin(u)/u (sinc)	1, |x|=<1/a 0, |x|>1/a (rectangle)	3.314800	2.0	160
= 5	J(5/2,u)/(u**(5/2)) (Beer)	(1-(x*a)**2)**2	2.100669	0.91728	20
= 6	sinc(u)+c1*(sinc(u+pi)+ sinc(u-pi)) (Hamming)	(1+2*c1*cos(pi*x*a))/ (1+2*c1)	2.195676	1.0	20
= 7	sinc(u)+0.5*(sinc(u+pi)+ sinc(u-pi)) (Hanning)	(1+cos(pi*x*a))/2	2.0	1.0	20

NORTON-BEER FUNCTIONS:
_____

$$\text{sum}\{C_i*(1-(x*a)**2)**i\}$$
  from i=0 to 4, for
  0 =< x =< 1/a
          and
  0 for x > 1/a

= 8	weak	Ci = 0.384093,-0.087577, 0.703484, 0., 0.	2.57027		40

        JFNin   Scanning Function   Apodization Function   a/HWHM   a/FZ   CR
        -----   -----------------   --------------------   ------   ----   --

        OTHER FUNCTIONS:-----a7m24*TR

MRATin   ratio of HWHM of the scanning function to the halfwidth of the boxcar; for prescanning with a

PLTLBL

RECORD 12.1

        CPRGID,   CEX

        1-60,   79-80

        A60, 18X, A2

```
************************************************************************************************
************************************************************************************************
****************         Use Records 12.2A and 12.3A for PLOT (IOPT = 0,1)         ******************
****************    Use Record1 *****    = 0,1)          ***************** 3 0 0 -33 0 437 Tm /F1.0 1 Tf( ***************
```

RECORD 12.3A   (IOPT = 0,1)

        YMIN,   YMAX,   YSIZE,   DELY,NUMSBY,NOENDY, IDEC, JEMIT, JPLOT,LOGPLT, JHDR,   JOUT,JPLTFL

        1-10, 11-20, 21-30, 31-40,   45,   50,   55,   60,   65,   70,   72,   77,   80

       G10.4, G10.4, F10.3, F10.3,   I5,   I5,   I5,   I5,   I5,   I5, I2,3X, I2,   I3

     YMIN is Y value at bottom of Y-axis.

              * IOPT = 1 will cause YMIN to determine the vertical offset (in Y)
              * for the overlayed plot. YMIN is in the units of the previous plot
              * axes and any offset is applied with respect to the previously
              * defined axes. (i.e. YMIN = 10. will offset the new plot 10. units up)

     YMAX is Y value at top of Y-axis.

          (if log plot selected, YMIN and YMAX are the exponent values at the bottom and top of the plot).

     YSIZE is the number of inches for the y-axis.

     DELY is the number of y units per major division (= 1. when log plot is selected).

     NUMSBY is the number of subdivisions per major division of y-axis.

     NOENDY controls the plotting of the values at either end of y-axis (= 1 supresses plotting).

     IDEC is number of figures after decimal point on linear y-axis.

     JEMIT   = 0 for transmission,
             = 1 for radiance.

     JPLOT   = 0 plots transmission for JEMIT = 0
             = 1 plots optical depth for JEMIT = 0
             = 2 plots attenuation in decibels for JEMIT = 0

             = 0 plots radiance in watts/(cm^2 sr cm^-1) for JEMIT = 1
                  (if YMIN and YMAX.GT.1, these values are interpreted as
                  brightness temperatures from which minimum and maximum
                  values of radiance are assigned).

             = 1 plots radiance in equivalent brightness temperature for JEMIT = 1

    LOGPLT   = 0 for linear y-axis,
             = 1 for log y-axis.

     JHDR   = 0 for plot of header data
             = 1 for suppression of header data plot

RECORD 12.3A (Continued)

        JOUT   = ut8 70 43 eJt to system3 eJtfile/screenTj ET Q q 0.24 0 0 -0.24 18 774 cm BT 33 0 0 -33 0 324 cm /F

RECORD 12.3A (Continued)

PLTLBL (Continued)

```
*****************************************************************************************
**************************** USE RECORD 0t.2B FOR IOPT > 1 *******************************
*****************************************************************************************
```

(IOPT = 2,3; CEX = 'EX')

RECORD 12.2.1B

          CFILEN(1)

            1-25

             A25

          CFILEN(1) is the external name for the data file associated with JFILE.

RECORD 12.2.2B

          CFILEN(2)

            1-25

             A25

          CFILEN(2) is the external name for the data file associated with LFILE.

RECORD 12.2.3B

          CFILEN(3)

            1-25

             A25

          CFILEN(3) is the external name for the data file associated with the difference/ratio file, MFILE.

REPEAT RECORD 12.2A or RECORD 12.2B

            A '-1.' within columns 1-10 will terminate plotting.

TABLE III. Structure of file JPLTFL (standard LBLRTM structure).

                              TABLE III

   record 1   /PLTHDR/   XID(10),SEC,P0,T0,HMOL(64),W(64),WBROAD,DVT,V1V,
                               V2V,TBOUND,EMISIV,FSCDID(17),NMOL,NLAYER, YID1,YID(10)

   ----

   record 2   /JPLTFL/   V1P,V2P,DVP,NLIM

   record 3   NLIM values of Y from V1P to V2P   V2V,TBOUND,EMIM

If the NLTE (IHIRAC = 4) option is selected a separate file (TAPE4) must be created.
The following instructions describe the contents of a TAPE4 file.

```
          1              2143.272        1
          2              4260.063        1

   NO
   --     0                 0.           1
          1              1878.077        1
          2              3724.067        1


TAPE4(RECORD 1.1)

      TIT

      1-80
```