

Chapter 8. Data File Formats

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8.1 Introduction

This chapter shows the data file formats for PLOT3D. These formats are in the *on-line* help file, under READ file_formats. Most of the grid and solution generator programs supply the data already correctly formatted. One thing to check is that your solutions are calculated for the grid points, not at cell centers.

Because PLOT3D is written in FORTRAN, your XYZ and Q files must be in FORTRAN, which is no problem because they are normally written from a FORTRAN program. PLOT3D reads three types of FORTRAN files:

- 1) FORTRAN unformatted files — .dat extension.
- 2) FORTRAN formatted files — .fmt extension.
- 3) Binary files for the IRIS — .bin extension.

Standard FORTRAN supports .dat or .fmt files. The .dat (unformatted) are preferred because they are smaller than .fmt files. The .fmt files are used only when files that will work on any machine are desired. FORTRAN on the IRIS supports .dat, .fmt or .bin (binary); .bin is the default. On the IRIS 4D, FORTRAN unformatted is recommended (and READ with the /UNFORMATTED qualifier). Binary from FORTRAN doesn't work correctly on 4D's.

The formats below will work for .bin or .dat files. For .fmt files, substitute (IUNIT,*) for (IUNIT), and use the /FORMATTED qualifier with the READ command.

8.2 Grid XYZ Files

xyz_file single_grid

1D:

```
READ(IUNIT) IDIM  
READ(IUNIT) (X(I), I=1, IDIM)
```

2D:

```
READ(IUNIT) IDIM, JDIM
```

```

      READ(IUNIT) ((X(I,J),I=1,IDIM),J=1,JDIM),
C           ((Y(I,J),I=1,IDIM),J=1,JDIM)

3D (/WHOLE):
      READ(IUNIT) IDIM,JDIM,KDIM
      READ(IUNIT) (((X(I,J,K),I=1,IDIM),J=1,JDIM),K=1,KDIM),
C           (((Y(I,J,K),I=1,IDIM),J=1,JDIM),K=1,KDIM),
C           (((Z(I,J,K),I=1,IDIM),J=1,JDIM),K=1,KDIM)

3D (/PLANES):
      READ(IUNIT) IDIM,JDIM,KDIM
      DO 10 K= 1,KDIM
          READ(IUNIT) ((X(I,J,K),I=1,IDIM),J=1,JDIM),
C               ((Y(I,J,K),I=1,IDIM),J=1,JDIM),
C               ((Z(I,J,K),I=1,IDIM),J=1,JDIM)
10      CONTINUE

```

xyz_file with IBLANK

```

3D (/WHOLE):
      READ(IUNIT) IDIM,JDIM,KDIM
      READ(IUNIT) (((X(I,J,K),I=1,IDIM),J=1,JDIM),K=1,KDIM),
C           (((Y(I,J,K),I=1,IDIM),J=1,JDIM),K=1,KDIM),
C           (((Z(I,J,K),I=1,IDIM),J=1,JDIM),K=1,KDIM),
C           (((IBLANK(I,J,K),I=1,IDIM),J=1,JDIM),K=1,KDIM)

3D (/PLANES):
      READ(IUNIT) IDIM,JDIM,KDIM
      DO 10 K= 1,KDIM
          READ(IUNIT) ((X(I,J,K),I=1,IDIM),J=1,JDIM),
C               ((Y(I,J,K),I=1,IDIM),J=1,JDIM),
C               ((Z(I,J,K),I=1,IDIM),J=1,JDIM),
C               ((IBLANK(I,J,K),I=1,IDIM),J=1,JDIM)
10      CONTINUE

```

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xyz_file multiple_grid

```
3D (/WHOLE):
    READ(IUNIT) NGRID
    READ(IUNIT) (IDIM(IGRID),JDIM(IGRID),KDIM(IGRID),IGRID=1,NGRID)
    DO 10 IGRID= 1,NGRID
        READ(IUNIT)
        C (((X(I,J,K),
        C     I=1, IDIM(IGRID)),J=1, JDIM(IGRID)),K=1, KDIM(IGRID)),
        C (((Y(I,J,K),
        C     I=1, IDIM(IGRID)),J=1, JDIM(IGRID)),K=1, KDIM(IGRID)),
        C (((Z(I,J,K),
        C     I=1, IDIM(IGRID)),J=1, JDIM(IGRID)),K=1, KDIM(IGRID))
10      CONTINUE

3D (/PLANES):
    READ(IUNIT) NGRID
    READ(IUNIT) (IDIM(IGRID),JDIM(IGRID),KDIM(IGRID),IGRID=1,NGRID)
    DO 10 IGRID= 1,NGRID
        DO 10 K= 1,KDIM(IGRID)
            READ(IUNIT)
            C ((X(I,J,K),I=1, IDIM(IGRID)),J=1, JDIM(IGRID)),
            C ((Y(I,J,K),I=1, IDIM(IGRID)),J=1, JDIM(IGRID)),
            C ((Z(I,J,K),I=1, IDIM(IGRID)),J=1, JDIM(IGRID))
10      CONTINUE
```

8.3 Solution Q Files

Q_file

Listed are some samples... The Q header information (extra information at the beginning of each grid) includes the following:

Freestream Mach number	(FSMACH)
Angle-of-attack	(ALPHA)
Reynolds number	(RE)
Time (not used)	(TIME)

Q_file single_grid (without Jacobian)

1D:

```
READ(IUNIT) IDIM
READ(IUNIT) FSMACH,ALPHA,RE,TIME
READ(IUNIT) ((Q(I,NX),I=1, IDIM),NX=1,3)
```

2D:

```
READ(IUNIT) IDIM,JDIM
READ(IUNIT) FSMACH,ALPHA,RE,TIME
READ(IUNIT) (((Q(I,J,NX),I=1, IDIM),J=1, JDIM),NX=1,4)
```

3D (/WHOLE):

```
READ(IUNIT) IDIM,JDIM,KDIM
READ(IUNIT) FSMACH,ALPHA,RE,TIME
READ(IUNIT) (((((Q(I,J,K,NX),I=1, IDIM),J=1, JDIM),K=1, KDIM),
C           NX=1,5)
```

3D (/PLANES):

```
READ(IUNIT) IDIM,JDIM,KDIM
READ(IUNIT) FSMACH,ALPHA,RE,TIME
DO 10 K= 1,KDIM
    READ(IUNIT) (((Q(I,J,K,NX),I=1, IDIM),J=1, JDIM),NX=1,5)
10    CONTINUE
```

Q_file multiple_grid (without Jacobian)

3D (/WHOLE):

```
READ(IUNIT) NGRID
READ(IUNIT) (IDIM(IGRID),JDIM(IGRID),KDIM(IGRID),IGRID=1,NGR D
DO 10 IGRID= 1,NGRID
    READ(IUNIT) FSMACH,ALPHA,RE,TIME
    READ(IUNIT)
    C (((((Q(I,J,K,NX),
    C     I=1, IDIM(IGRID)),J=1, JDIM(IGRID)),K=1, KDIM(IGRID)),
    C     NX=1,5)
10    CONTINUE
```

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```
3D (/PLANES):
    READ(IUNIT) NGRID
    READ(IUNIT) (IDIM(IGRID),JDIM(IGRID),KDIM(IGRID),IGRID=1,NGRID)
    DO 10 IGRID= 1,NGRID
        READ(IUNIT) FSMACH,ALPHA,RE,TIME
        DO 10 K= 1,KDIM(IGRID)
            READ(IUNIT)
            C   (((Q(I,J,K,NX),I=1,IDIM(IGRID)),J=1,JDIM(IGRID)),NX=1,5)
10      CONTINUE
```

8.4 Function Files

Function_file single_grid

1D:

```
    READ(IUNIT) IDIM,NVAR
    FREAD(IUNIT) ((F(I,NX),I=1,IDIM),NX=1,NVAR)
```

2D:

```
    READ(IUNIT) IDIM,JDIM,NVAR
    READ(IUNIT) (((F(I,J,NX),I=1,IDIM),J=1,JDIM),NX=1,NVAR)
```

3D (/WHOLE):

```
    READ(IUNIT) IDIM,JDIM,KDIM,NVAR
    READ(IUNIT) (((((F(I,J,K,NX),I=1,IDIM),J=1,JDIM),K=1,KDIM),
C           NX=1,NVAR))
```

3D (/PLANES):

```
    READ(IUNIT) IDIM,JDIM,KDIM,NVAR
    DO 10 K= 1,KDIM
        READ(IUNIT) (((F(I,J,K,NX),I=1,IDIM),J=1,JDIM),NX=1,NVAR)
10      CONTINUE
```

Function_file multiple_grid

```
3D (/WHOLE) :
    READ(IUNIT) NGRID
    READ(IUNIT) (IDIM(IGRID),JDIM(IGRID),KDIM(IGRID),NVAR(IGRID),
C           IGRID=1,NGRID)
    DO 10 IGRID= 1,NGRID
        READ(IUNIT)
C (((F(I,J,K,NX),
C     I=1, IDIM(IGRID)),J=1,JDIM(IGRID)),K=1,KDIM(IGRID)),
C     NX= 1,NVAR(IGRID))
10      CONTINUE

3D (/PLANES) :
    READ(IUNIT) NGRID
    READ(IUNIT) (IDIM(IGRID),JDIM(IGRID),KDIM(IGRID),NVAR(IGRID),
C           IGRID=1,NGRID)
    DO 10 IGRID= 1,NGRID
    DO 10 K= 1,KDIM(IGRID)
        READ(IUNIT)
C (((F(I,J,K,NX),I=1, IDIM(IGRID)),J=1,JDIM(IGRID)),
C     NX=1,NVAR(IGRID))
10      CONTINUE
```