

## 7.1 Introduction

Three airplane orthogonal axis systems are commonly in use for different applications. For drawings, the body axis system is used (Fig. 7.1.1) with the following characteristics:

- Origin forward of the nose and below the aircraft (so that x- and z-values are always positive on production aircraft)
- X-axis facing aft along some reference line (sometimes the static ground line, sometimes the passenger cabin line)
- Y-axis facing to starboard and horizontal
- Z-axis facing up.

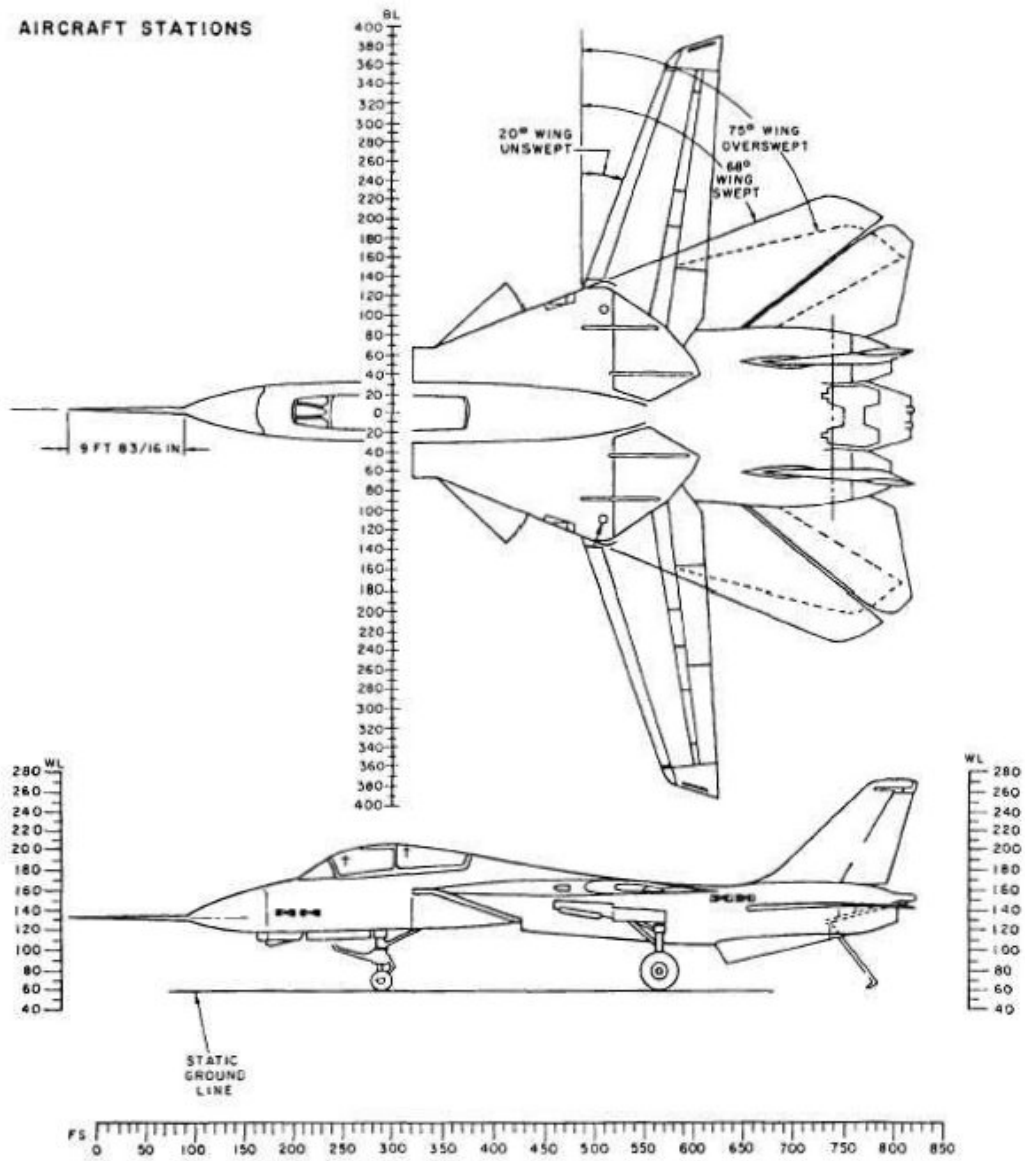


Fig. 7.1.1 Example of Drawing Axis System

Note that this particular configuration is a flight-test aircraft, and the forward end of the nose-probe has negative x-values.

Chapter 7 uses only the drawing axis system. The other two axis systems (performance and stability) are described in Chapter 16. Airplane drafting uses some terms that are adapted from naval architecture. In the drawing axis system the airplane may commonly be sectioned in three planes:

1. Y-Z plane: Sections are usually called fuselage stations (abbreviated as FS, see Fig. 7.1.1), and the term is also applied to the cutting plane itself, as it is for the other two cutting planes.
2. X-Z plane: Sections of the outer mold line (OML) are called buttock (or butt) lines (abbreviated as BL).
3. Y-X plane: Sections of the OML are called waterlines (abbreviated as WL).

For supersonic-cruise airplanes, other cutting planes may be used, such as those lying on the Mach lines at the cruise condition.

The wing may also have its own set of reference axes. The issue is compounded by the fact that the wing is flexible, and the shape of the wing is determined by the g-loading, aerodynamic loading and amount of fuel in the wing.