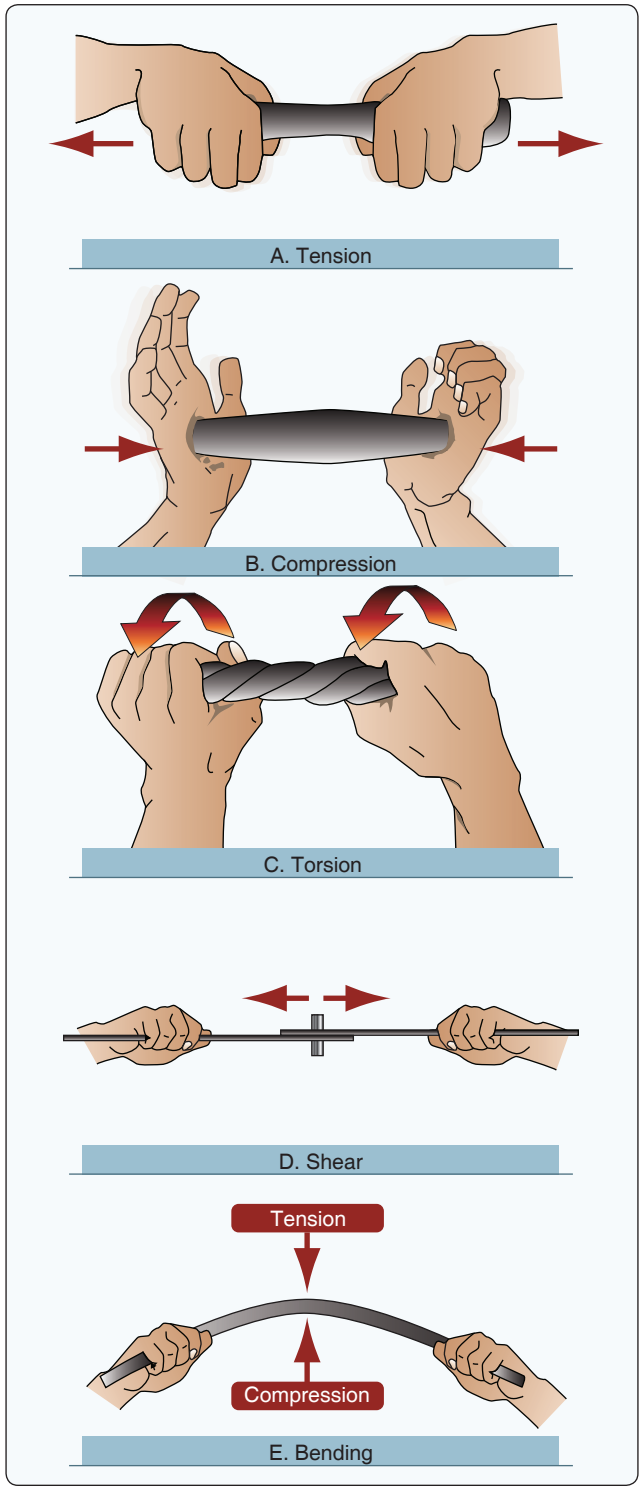

Figure 4-1. *Stresses in aircraft structures.*

involving tension must take into consideration the net area of the member. Net area is defined as the gross area minus that removed by drilling holes or by making other changes in the section. Placing rivets or bolts in holes makes no appreciable difference in added strength, as the rivets or bolts will not transfer tensional loads across holes in which they are inserted.

Compression

Compression, the stress that resists a crushing force, tends to shorten or squeeze aircraft parts. The compressive strength of a material is also measured in psi. Under a compressive load, an undrilled member is stronger than an identical member with holes drilled through it. However, if a plug of equivalent or stronger material is fitted tightly in a drilled member, it transfers compressive loads across the hole, and the member carries approximately as large a load as if the hole were not there. Thus, for compressive loads, the gross or total area may be used in determining the stress in a member if all holes are tightly plugged with equivalent or stronger material.

Shear

Shear is the stress that resists the force tending to cause one layer of a material to slide over an adjacent layer. Two riveted plates in tension subject the rivets to a shearing force. Usually, the shear strength of a material is either equal to or less than its tensile or compressive strength. Shear stress concerns the aviation technician chiefly from the standpoint of the rivet and bolt applications, particularly when attaching sheet metal, because if a rivet used in a shear application gives way, the riveted or bolted parts are pushed sideways.

Bearing

Bearing stress resists the force that the rivet or bolt places on the hole. As a rule, the strength of the fastener should be such that its total shear strength is approximately equal to the total bearing strength of the sheet material. *[Figure 4-2]*

Torsion

Torsion is the stress that produces twisting. While moving the aircraft forward, the engine also tends to twist it to one side, but other aircraft components hold it on course. Thus, torsion is created. The torsional strength of a material is its resistance to twisting or torque (twisting stress). The stresses arising from this action are shear stresses caused by the rotation of adjacent planes past each other around a common

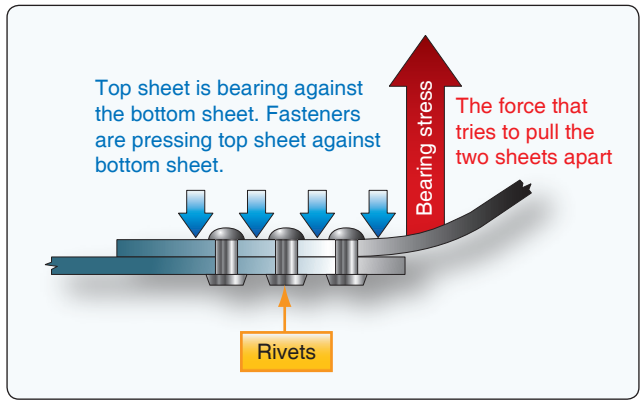

Figure 4-2. *Bearing stress.*