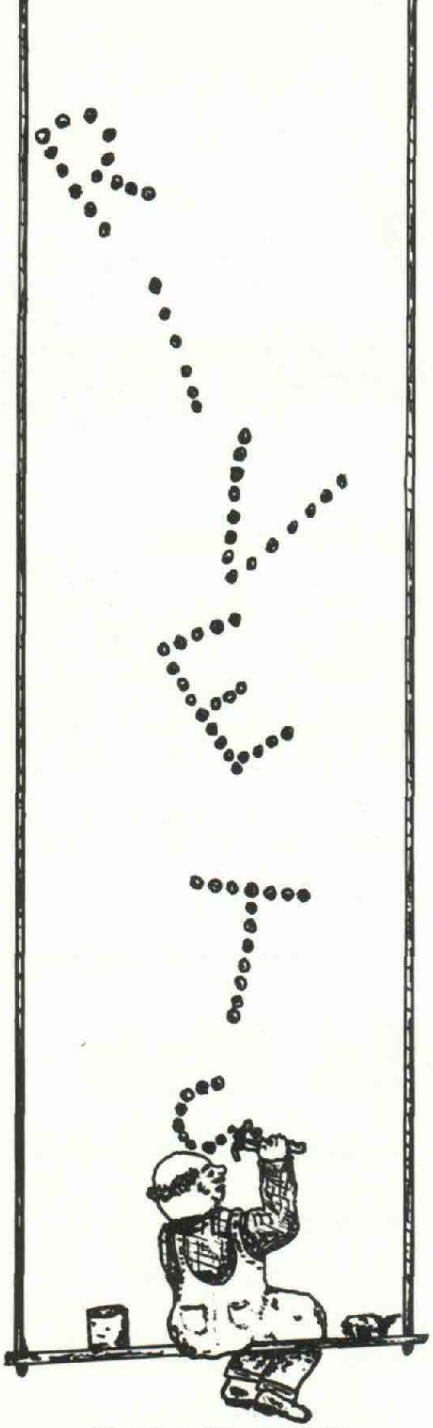

(Courtesy Chapter 135)

RIVETS CONSIST OF A solid shank capped with a head of various shapes. During the process of riveting, a head is formed on the end of the shank opposite the manufactured head. The process is known as bucking or upsetting the rivet.

BASIC RIVETS

The **BRAZIER-HEAD** rivet is used extensively for riveting thin sheet (skin) exposed to the slipstream. Such a rivet has a low round head which does not protrude much above the metal, thus offering little resistance to the air. The large diameter of the head makes it particularly adaptable for use in thin sections since it covers areas sufficient to strengthen the sheet around the hole.

FLAT-HEAD rivets are used inside the aircraft where increased clearance is necessary. They are used in the construction of fuel tanks and oil tanks.

ROUND-HEAD rivets are used in relatively thick sheets and for inside riveting where strength is required. The size of the head is such that it covers a sufficient area around the hole and, at the same time, offers considerable resistance to tension. Round-head rivets are used in the tail sections because the head will hold a better set than other shaped heads.

UNIVERSAL-HEAD rivets are used to replace all raised head rivets.

COUNTERSUNK-HEAD rivets are used because they offer the least resistance to airflow. They are therefore used for external riveting of thin sheet metal which is exposed to the slipstream. Countersunk rivets are also used to rivet sheets over which other plates must fit, because they do not protrude. In order to use this rivet head on thin sheet it is necessary to dimple the sheet. Otherwise, the countersunk plate will not be strong enough to support the head of the rivet (sometimes called press countersinking).

IDENTIFICATION OF RIVETS

When selecting a rivet for a specific job, they can be distinguished at a glance by the shape. However, aircraft rivets are made principally from five kinds of aluminum or aluminum alloys. Aluminum manufacturers have "dog-tagged" the heads for easy identification.

1. The 1100 and 3003 rivets, type A, have a plain head without markings. To distinguish between the two, they are sometimes stamped "2" or "3" on the end of the shank, denoting 1100 or 3003.
2. The 2017-T rivet, type D, has a bump or teat on the center of the head for identification.
3. The 2117-T rivet, type AD, has a dimple in the center of the head.
4. The 2024-T rivet, type DD, is identified by two raised bars, or dashes, on opposite sides of the head.
5. The 5056-T rivet, type B, is identified by a raised cross on the head.

There are three things to be remembered in selecting the correct rivet for the job: 1. The composition of the rivet; 2. The diameter; 3. The length.

Selecting the rivet of the correct aluminum alloy is important because rivets carry shear stress. The full shear strength of a riveted joint depends upon the proper combination of material and rivet. If a hard rivet such as a 2017-T is driven into a soft plate such as 1100-0 or 3003-0, the result would be distortion of the sheet and a complete loss of shear strength of the 2017-T rivet. The rivet should possess the same properties as the metal it is to be driven into. Never drive a hard rivet into soft metal. However, a soft rivet can be used in hard material if the joint is not subjected to high stress.

The full strength of a riveted joint depends upon picking a rivet of the correct length and diameter. If a large diameter rivet were inserted in a thin sheet, the pressure required to drive the rivet would result in bulging the thin metal around the rivet head. The accepted rule is to use a rivet with a diameter three times the thickness of the thickest section through which the rivet is driven to the next larger 1/32nd of an inch.

Correct length is important, a rivet too long has a tendency to bend when headed. Too short a rivet will prove hard to head and impossible to shape properly. The correct length of the rivet should equal the sum of the thickness of the metal plus 1½ times the diameter of the rivet shank. For a rivet to be effective it must be squashed within certain limits. Rules must be followed. The height of the "bucktail" should be 1½ times the rivet diameter.

SPACING OF RIVETS

Rivets should be spaced not less than a distance equal to three times the rivet diameter, and not more than 12 times the rivet diameter. Rivets should be spaced in from the edge of the sheet an absolute minimum of twice the rivet diameter. For countersunk rivets this distance must be 2½ times the diameter of the rivet.

DRILL SIZES FOR RIVETS

Rivet Shank Diameter	Drill No.	Drill Size
1/16	52	.0635
3/32	41	.0960
1/8	30	.1285
5/32	21	.1590
3/16	11	.1910
1/4	F	.2570

SELECTION OF RIVETS

Rivet Type	Use
A	Parts fabricated from 1100 and 3003 alloys
AD	Parts fabricated from 2017 and 2024 alloys
D	Parts fabricated from 2017 and 2024 alloys
DD	Parts fabricated from 2024 alloys and as a substitute for types AD and D rivets.