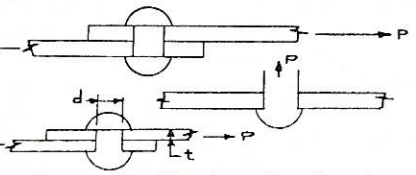
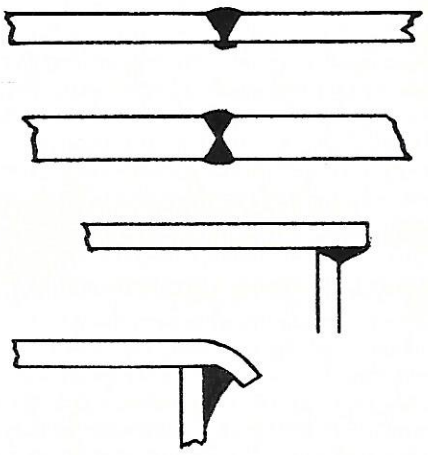
The basic rule for selecting rivets is: the diameter of any rivet used should never be smaller than the thickness of the thinnest plate, nor more than three times the thickness of the thinnest plate. It is better to have a rivet too long for driving than one too short, since there is little chance of damaging plates with long rivets. As in steel, rivet holes should be punched or drilled and reamed. It is usual to call for this in the specifications. A preferred method, of course, is sub-punching or sub-drilling and reaming. Punched plates will have a burr and will be liable to have small cracks radiating from the punch. Such cracks will reduce the strength of the joint. The minimum pitch to rivets should not be less than three times the diameter of the rivet and not greater than 24 times the thickness of the thinnest plate. Edge distance should be 1½ times the diameter of the hole. To calculate the sheer strength, tensile strength and bearing strength of rivets, the formulae are:

P/A = S (Shear)
P/A = T (Tension)
P/td = B (Bearing)



A = Area; P = Pull; S = Shear; T = Tension; B = Bearing; t = thickness of plate; d = diameter of the rivet.

Fatigue failures are most common in the plate, not in the rivet, and shear failures in the rivet itself are very rare. Punching makes for the lowest endurance limit; a well-drilled hole is next; and sub-punching or sub-drilling and reaming provides the best endurance. Fatigue strength tends to increase with the number of rows of rivets. Riveted joints in double shear have better fatigue strength than in single shear. Cold-driven steel rivets are better in fatigue than hot-driven steel rivets. However, in aluminum, the difference between cold and hot-driven rivets is negligible. Fatigue strength increases with size of the rivet. Butt-riveted joints have greater fatigue strength than lap joints, and the double-spliced plate has a better fatigue joint than a single-spliced plate.



Figs. C, D, E, F. Typical aluminum welding seams (right) and riveting methods (below) can be specified on a data sheet accompanying the designer's plans.

FIG. D FIG. E FIG. F

In drilling aluminum, pneumatic tools are always to be preferred to electric tools since it is possible to control the speed of the drill. It is, of course, desirable to have all riveting flush in small craft. There are several methods of flush riveting aluminum. One method is by dimpling (Figure D) wherein the die is recessed and the mall or driving hammer sinks both rivet and plate into a countersunk joint where the rivet does the countersinking and finishes flush. This can be used on very thin sheets. Another method of flush riveting (Figure E) is by countersinking the inner plate and driving rivets and the thinner plate into the countersink. The third method of flush riveting (Figure F) is one that is most adaptable to small craft in that only the outer plate is countersunk, the rivets being driven flush as in the case of steel. Round head is to be preferred over the many other types