LOCKING DEVICES

- Safetying is the process of securing all aircraft, bolts, nuts, screws, pins, and other fasteners so that they do not work loose due to vibration.

- The most widely used methods are safety wire, cotter pins, lockwashers, snaprings, and special nuts, such as self-locking nuts, pal nuts, and jamnuts.

AIRCRAFT WASHERS

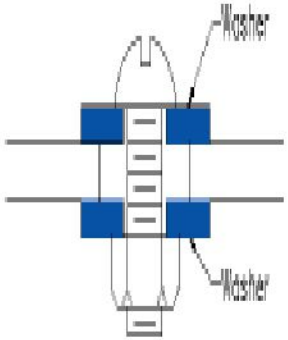
Aircraft washers used in airframe repair are either plain, lock, or special type washers.

Plain Washers

- Plain washers both the AN960 and AN970, are used under hex nuts.
- They provide a smooth bearing surface and act as a shim in obtaining correct grip length for a bolt and nut assembly.
- They are used to adjust the position of castellated nuts in respect to drilled cotter pin holes in bolts.
- Use plain washers under lockwashers to prevent damage to the surface material.
- Aluminum and aluminum alloy washers may be used under bolt heads or nuts on aluminum alloy or magnesium structures where corrosion is caused by dissimilar metals.
- A cadmium plated steel washer are under a as this

The AN970 steel washer provides a greater bearing area than the AN960 washer and is used on wooden structures under both the head and the nut of a bolt to prevent crushing the surface.

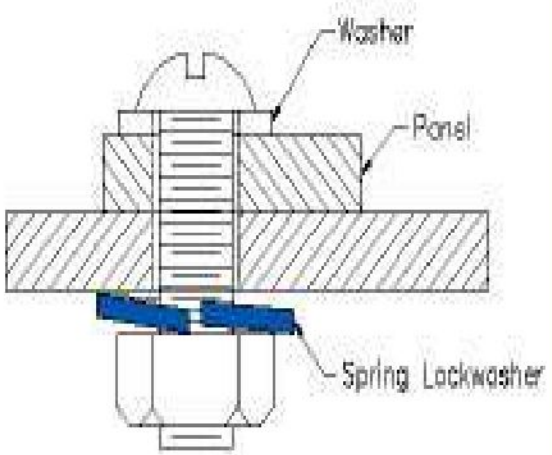
AN9
60

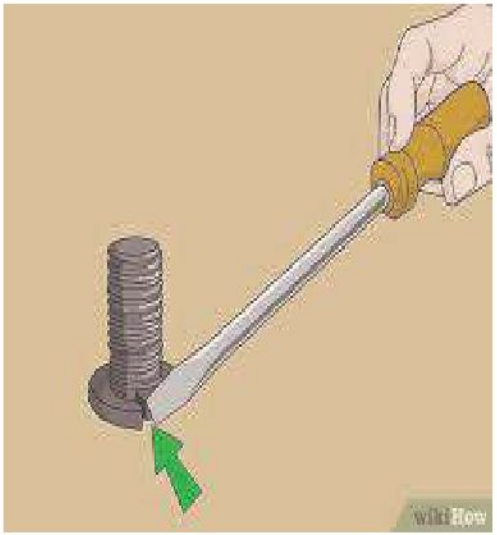


AN970

Lockwashers

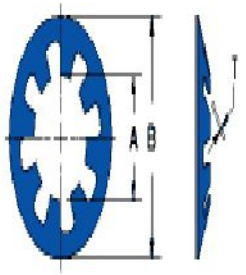
- Lockwashers, both the AN935 and AN936, are used with machine screws or bolts where the self-locking or castellated-type nut is not appropriate.
- The spring action of the washer (AN935) provides enough friction to prevent loosening of the nut from vibration.

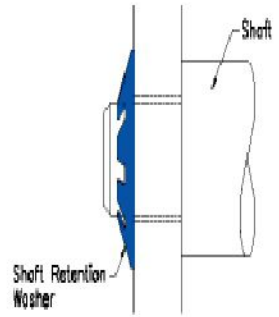




AN935

AN936



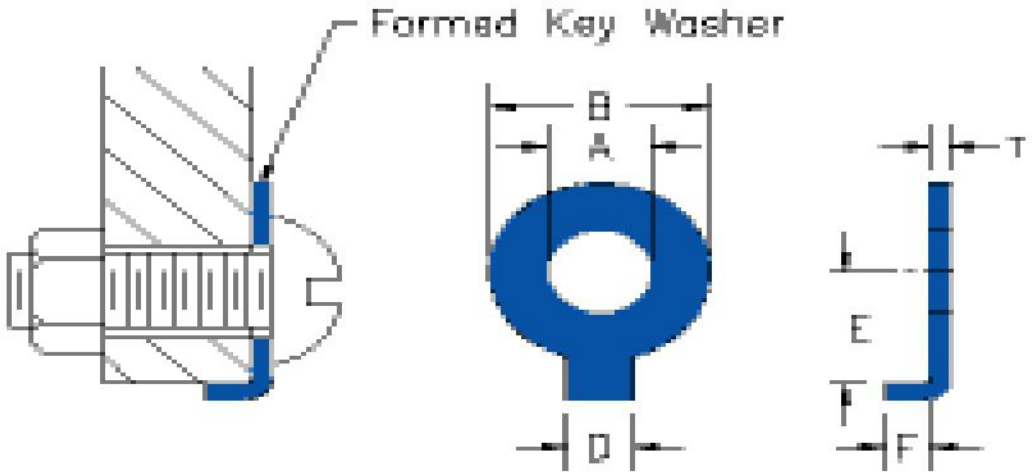


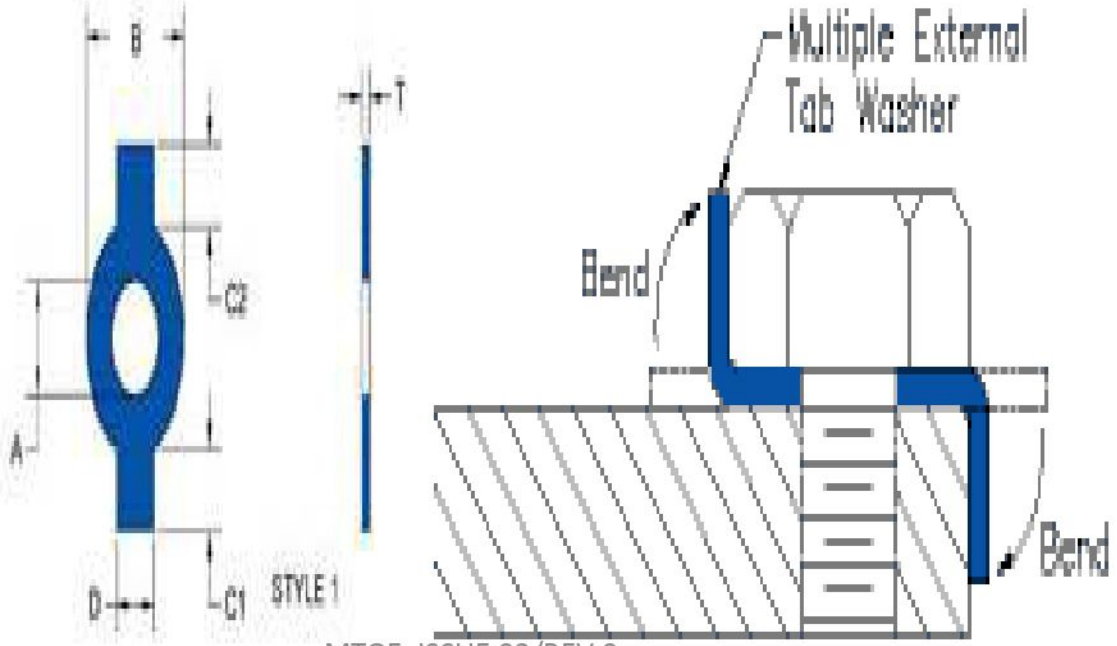
Shakeproof Lockwashers

- Shakeproof lockwashers are round washers designed with tabs or lips that are bent upward across the sides of a hex nut or bolt to lock the nut in place.

- There are various methods of securing the lockwasher to prevent it from turning, such as an external tab bent downward 90° into a small hole in the face of the unit, or an internal tab which fits a keyed bolt.

- Shakeproof lockwashers can withstand higher heat than other methods of safetying and can be used under high vibration conditions safely. They should be used only once because the tabs tend to break when bent a second time.


Formed Key Washer
B
A
T
E
F
D


B
T
C2
A
D
C1
STYLE 1
Multiple External
Tab Washer
Bend
Bend

Cotter Pins

- The AN380 cadmium plated, low carbon steel cotter pin is used for safetying bolts, screws, nuts, other pins, and in various applications where such safetying is necessary.

- The AN381 corrosion resistant steel cotter pin is used in locations where nonmagnetic material is required, or in locations whe on is desired.

AIRCRAFT RIVETS

- A rivet is a metal pin with a formed head on one end when the rivet is manufactured.

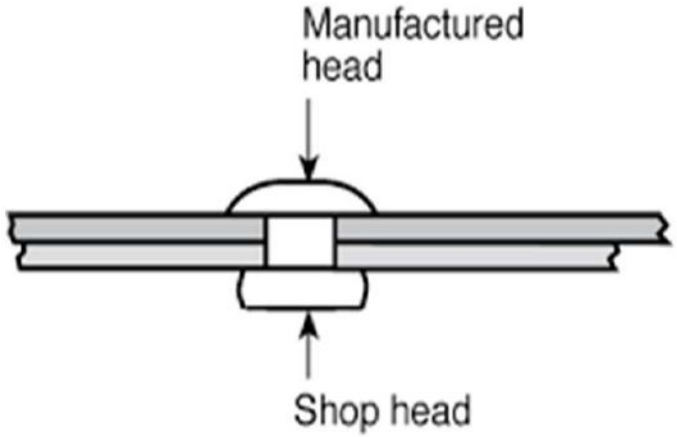
- The shank of the rivet is inserted into a drilled hole, and its shank is then upset (deformed) by a hand or pneumatic tool.

- The second head, formed either by hand or by pneumatic equipment, is called a "shop head."

- The shop head functions in the same manner as a nut on a bolt.

- The rivet creates a bond that is at least as strong as the

Rivets



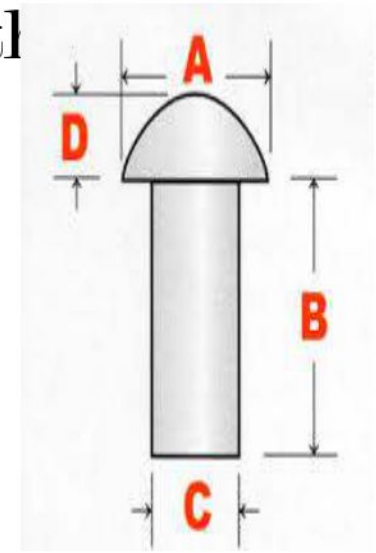
shop head

ROUNDHEAD RIVET

- Roundhead rivets are used in the interior of the aircraft, except where clearance is required for adjacent members.

- The roundhead rivet has a deep, rounded top surface.

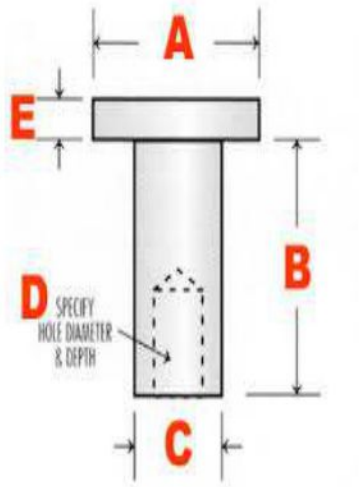
- The head is large enough to strengthen the sheet arou e and, at tl me, offer resist on.



FLATHEAD RIVET

- The flathead rivet is used on interior structures. It is used where maximum strength is needed and where there isn't sufficient clearance to use a roundhead rivet.

- It is used on external surfaces.



BRAZIER HEAD RIVET

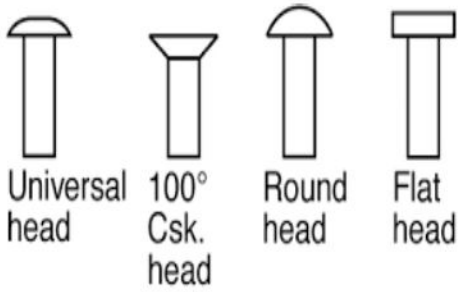
- The brazier head rivet has a head of large diameter, which makes it particularly adaptable for riveting thin sheet stock (skin).

- The brazier head rivet offers only slight resistance to the airflow, so it is frequently used for riveting skin on exterior surfaces.

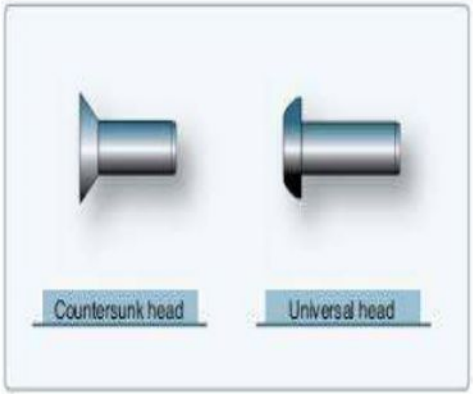
- A modified brazi  so manufactured; it is simply a brazie diameter.

UNIVERSAL HEAD RIVET

- The universal head rivet is a combination of the roundhead, flathead, and brazier head.
- It is used in aircraft construction and repair in both interior and exterior locations.
- When replacement is necessary for protruding head rivets— roundhead, flathead, or brazier head— they can be replaced by universal head rivets.



manufactured rivet heads

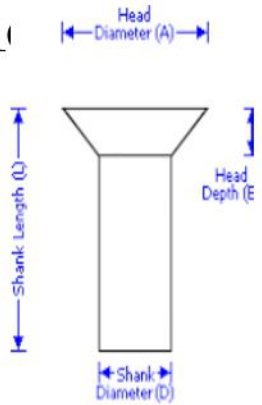


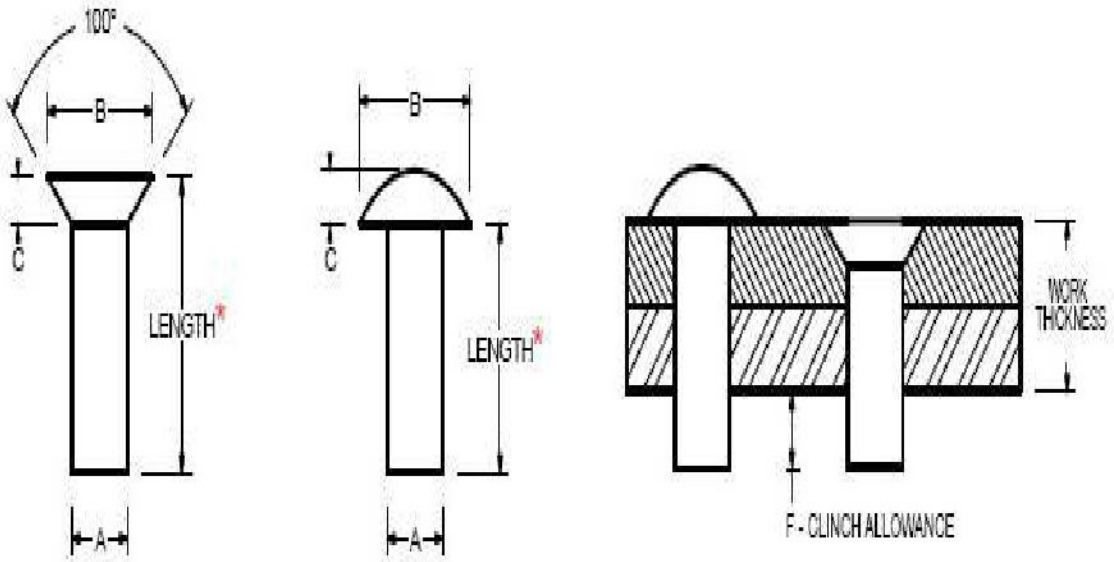
COUNTERSUNK HEAD RIVETS

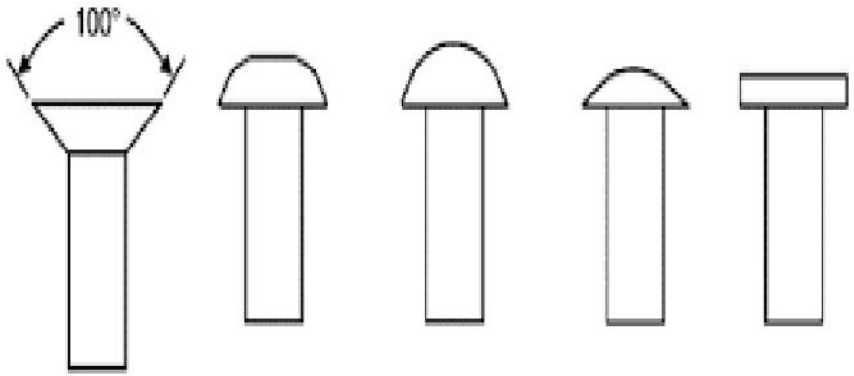
- The countersunk head rivet is flat topped and sloped toward the shank so that it fits into a countersunk or dimpled hole and is flush with the material's surface.

- he angle at which the head slopes may vary from 78° to 120°. The 100° rivet is the most commonly used type.

- They are also used on exterior surfaces of the aircraft because they offer only slight resistance to the airflow and help to mini rfl

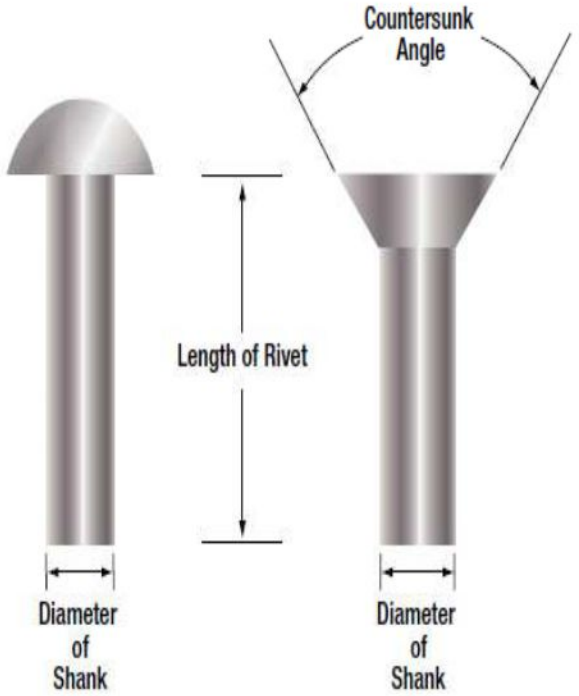



100°
B
C
LENGTH*
A
B
C
LENGTH*
A
WORK THICKNESS
F - CLINCH ALLOWANCE


100°
100° Countersunk
Universal head
Round head
Brazier head
Flat head

PART NUMBER AND TYPES OF HEAD

- AN426 or MS20426— countersunk head rivets (100°)
- AN430 or MS20430— roundhead rivets
- AN441— flathead rivets
- AN456— brazier head rivets
- AN470 or MS20470— universal hea



IDENTIFICATION

AN470AD3-5

AN— Air Force-Navy standard number

470— universal head rivet

AD— 2117-T aluminum alloy

3— 3⁄32 in diameter

5— 5⁄16 in length

A	aluminum alloy, 1100 or 3003 composition
AD	aluminum alloy, 2117-T composition
D	aluminum alloy, 2017-T composition
DD	aluminum alloy, 2024-T composition
B	aluminum alloy, 5056 composition
C	copper
M	monel
NO LETT	mild steel

HEAD MARKING AND ITS MATERIAL

Head marking indicates the material from which it is formed.