ARTICLE OF THE MONTH

#54F .05

Methods of Safetying

Vibration is a real concern in aircraft maintenance, and there must be some provision for safetying or locking all fasteners to prevent their vibrating loose in flight.

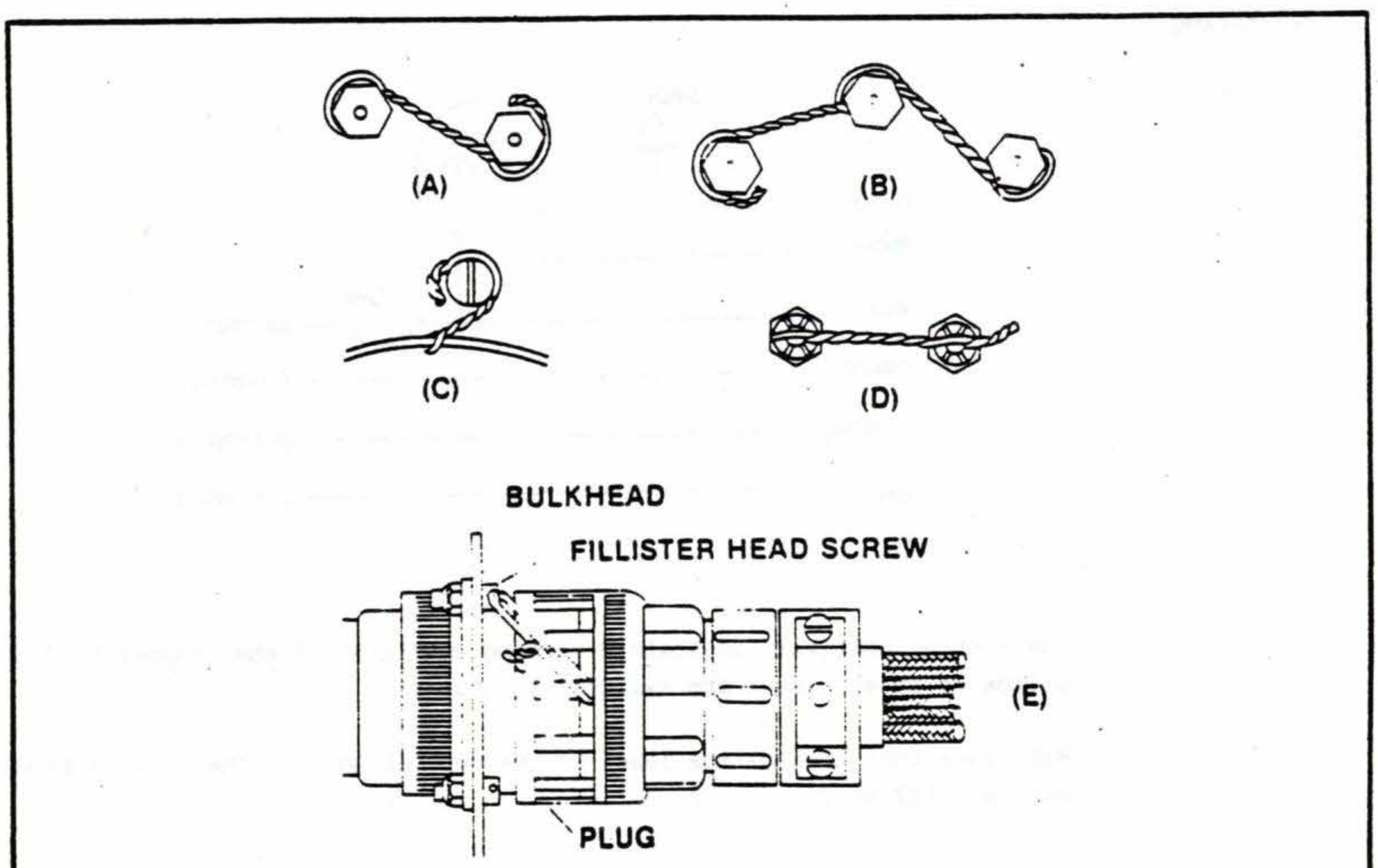
Self-locking nuts are used for the vast majority of applications in modern aircraft construction, but there are still places where safety wire or cotter pins are needed. In Fig. 1 we see some of the typical uses of safety wire. In Fig. 1A we see two drilled-head engine bolts safetied together. The wire should pull the bolt head in the direction of tightening and should be twisted with an even twist to the next bolt. After the end of the wire is passed through the head of the second bolt it is again twisted, this time for about three or four turns, and the wire is cut off. Always bend the ends of the wire back where they cannot cut you when you pass your hand over the bolts.

If there are a number of bolts, such as used to mount a propeller, you may safety them in groups of three. It is usually not a good idea to tie more than three together with one piece of wire, Fig. 1B.

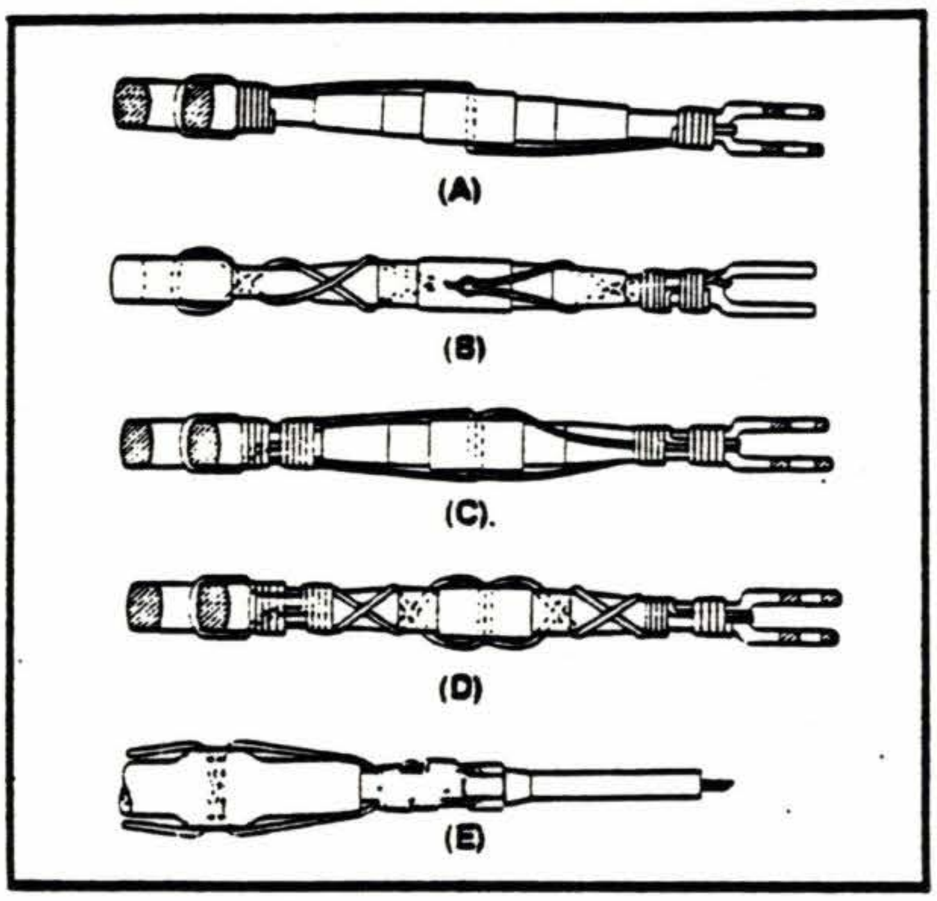
Fillister-head screws are safetied to holes in a housing in much the same manner as the drilled head bolts, Fig. 1C. Remember, anytime safety wire is cut off, the ends should be bent back so they cannot cut your hand.

Studs should not have self-locking nuts used on them nor should drilled studs be safetied with cotter pins, because neither of these safetying methods will prevent the stud backing out of the casting. Fig. 1D shows two drilled studs with castellated nuts safetied together with safety wire. This prevents the nut becoming loose, as well as preventing the stud backing out of the casting.

Electrical connectors can be safetied to drilled-head fillister-head screws. Be sure that the wire pulls the plug in the direction of tightening, Fig. 1E.



Turnbuckles may be safetied in a number of ways. Those used in control systems where the cable is 1/16- or 3/32-inch diameter may be safetied by the single-wrap method, Fig. 2A, using either brass or copper safety wire, 0.040 diameter. Turnbuckles used with 1/8-inch cable may be safetied with a single wrap if 0.040 stainless steel or monel safety wire or 0.057 copper or brass wire is used. Forty-thousandths-inch copper or brass wire may be used if the turnbuckle is double-wrap safetied.

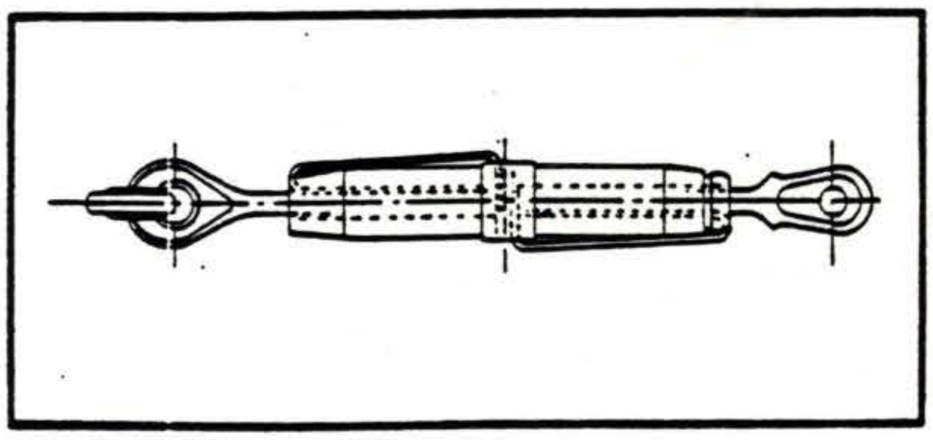


CABLE SIZE	TYPE OF WRAP	WIRE DIAMETER	MATERIAL
1/16	Single	0.040	Brass
1/8	Single	0.040	Stainless Steel
1/8	Double	0.040	Brass
5/32	Single	0.057 (min)	Stainless Steel
5/32	Double	0.051	Brass

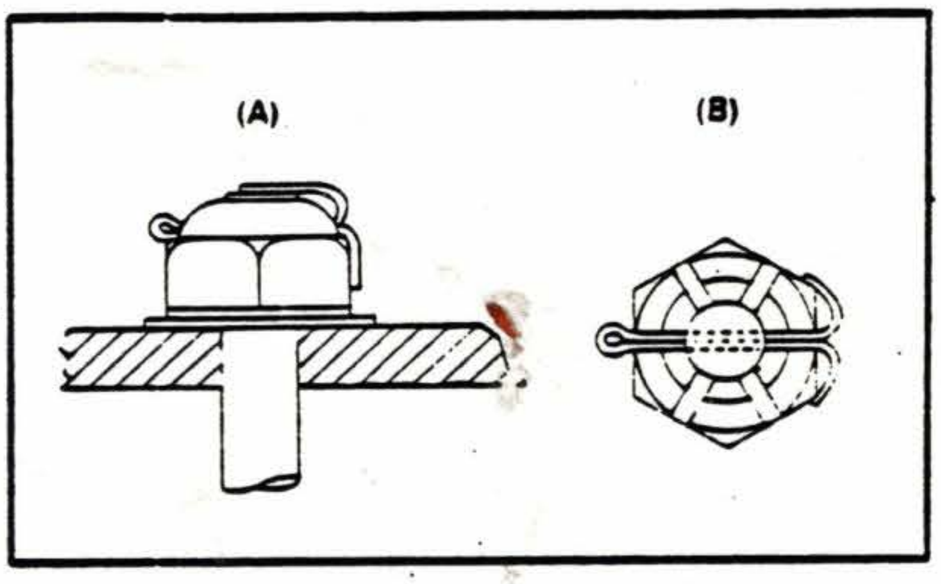
Turnbuckles in 5/32-inch control cable can be double-wrap safetied with 0.040 stainless steel or 0.051 copper or brass, or they may be single wrapped with 0.057 stainless steel wire.

Before safetying a turnbuckle, it must be adjusted to the correct cable tension, and there must not be more than three threads showing on either side of the barrel. Wrap the wire around the turnbuckle in the manner shown in Fig. 2 and finish the safety wiring with at least four turns around the shank of the turnbuckle before it is cut off.

Clip-type locks such as those seen in Fig. 3 may be used in place of safety wire if the turnbuckle barrel is drilled to accommodate this type of clip.



Cotter pins may be used to lock a castellated nut onto a drilled-head bolt by either of the two methods shown in Fig. 4. The method in which



one end of the pin is bent over the top of the bolt is the preferred method. In either method, when the ends of the cotter pin are cut off, be sure that they are bent back so they cannot cut you if you rub your hand over the end of the bolt.

The excerpt for this month's Technical Library was taken from ITP-G, Book 5, Section 1, Aircraft Hardware, published by Aviation Maintenance Publishers. For a free book catalog write: Aviation Maintenance Publishers, P.O. Box 890, Basin, WY 82410.