

Figure 3-1 : Safetywiring oil caps, drain cocks, and valves. These units are safety wired as shown in Figure 3-1. In the case of the oil cap, the wire is anchored to an adjacent fillister head screw. This system applies to any other unit which must be safety wired individually. Ordinarily, anchorage lips are conveniently located near these individual parts. When such provision is not made, the safety wire is fastened to some adjacent part of the assembly.

Under conditions of severe vibration the coupling nut of a connector may vibrate loose or may come apart. The proper protective measure to prevent this is safetywiring as shown in Figure 4-1. Make safetywire as short as practical and install so the pull on the wire is in the direction which tightens the nut on the plug.

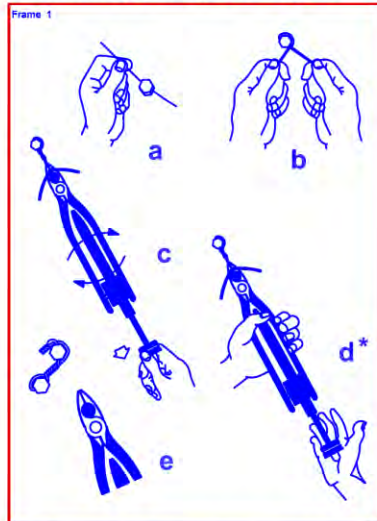
Figure 4-2 shows external snap ring with safety wire installed.

Figure 4-3 illustrates safetywiring on a venturi.

Figure 4-4 illustrates a closely spaced multiple group of fasteners that are single-twist safetywired.

### INSTRUCTION SHEET SAFETYTWIST® Safetywiring Pliers Preface

Your SAFETYTWIST® Pliers is a versatile tool and will help you do reliable safetywiring (lock wiring) rapidly and consistently. Safetywiring is a positive and proven method of securing critical fasteners that must not be allowed to back out: any tendency of the fastener to loosen is counteracted by tightening of the safety wire.



\*d Some models have automatic spring loaded slider return.

#### GENERAL OPERATING PROCEDURES 12 IMPORTANT RULES

Nothing outlined herein supercedes or replaces the safetywiring specifications that apply to equipment you assemble or service. However, experienced mechanics generally follow these practices for fasteners with right hand threads.

Form 99R320 Printed in USA

1. Before any screw, nut, plug, or other fastener is lockwired, torque it down snugly but do not overstress. Never overtorque or loosen a torqued fastener to align safety wire holes.
2. Use the size and type of safety wire called for in the application specifications. Do not reuse safety wire.
3. Open the jaws of the SAFETYTWIST® Pliers by squeezing the handles together to unlock the slider in the center of the pliers from the hook-lock.

Now, grip both safety wires in the jaws. Squeeze the handles together with one hand and pull the slider toward the rear of the pliers with your other hand to lock the pliers.

The safety wire may now be twisted by pulling the knob and twist rod out from the pliers, letting the tool spin free, as in Frame 1 c.

Return the knob and twist rod by holding the pliers steady with one hand and pushing the flat of your hand against the end of the knob as in Frame 1 d.\* The twisting cycle may now be repeated.

4. Whenever possible employ double-twist safetywiring (see below). After threading safety wire through the hole in the fastener, pull the wire straight through so as not to skin the outside of the wire. Twist to a tightness of 4-5 complete revolutions per inch. Also see frame 2 for additional examples of double-twist safetywiring.



5. Limit single-twist safetywiring (see below) to small screws located in closely spaced, closed geometrical patterns (triangle, square, rectangle, circle, etc.) or parts in electrical systems or parts that are difficult to reach. Also see Frame 4 for additional examples of single-twist safetywiring.



6. Do not pull the safety wire so hard that it stretches or is nicked by the edge of the hole in the fastener. Do not let kinks develop.

7. Orient safety wire so the pull exerted by the wire tends to tighten the nut.
8. Make twists tight, even, and as taut as possible without over-twisting to the point where the safety wire is weakened.
9. Twist the safety wire so the loop around the bolt is routed underneath the wire which passes through the fastener. Ensure sufficient tension to keep the loop from slipping up and over the bolt head, resulting in undesirable slack.
10. When castellated nuts are secured with safety wire, tighten the nut to the low side of the selected torque range, unless otherwise specified, and if necessary continue tightening (within specified torque limits) until a slot aligns with the hole.
11. Make a pigtail of 1/4" to 1/2" length (four twists minimum) at the end of the wiring and bend back or under to prevent it from becoming a snag, as in Frame 1e.
12. The number of nuts, bolts, or screws that may be safetywired together is dependent on the application, but as a guide when safetywiring widely-spaced bolts by the double-twist method, a group of three or a 24" length of safety wire is usually the maximum.

For further reading:

AC 65-9A Airframe & Powerplant  
Mechanics General Handbook (F A A)  
AC 43.13-1A Aircraft Inspection and Repair (F A A)  
Both available from the Superintendent of Documents, Washington D.C. 20402

Figure 2-1 illustrates several fasteners wired in series.

Figure 2-2 illustrates safety wiring of castellated nuts and studs. Note that there is no loop around the nut.

Figure 2-3 and 2-4 illustrates a single-threaded component safety wired to a housing or lug.

Figure 2-5 shows the method for wiring bolts in different planes. Wire is applied so tension is in the tightening direction.

Where lockwire lugs are not provided, wire should be applied as shown in Figure 2-6, with caution to insure that wire is wrapped tightly around the fitting.

Note: All safetywiring shown in this bulletin is based on right-hand threads. Safety wire is routed in the opposite direction for left-hand threads.