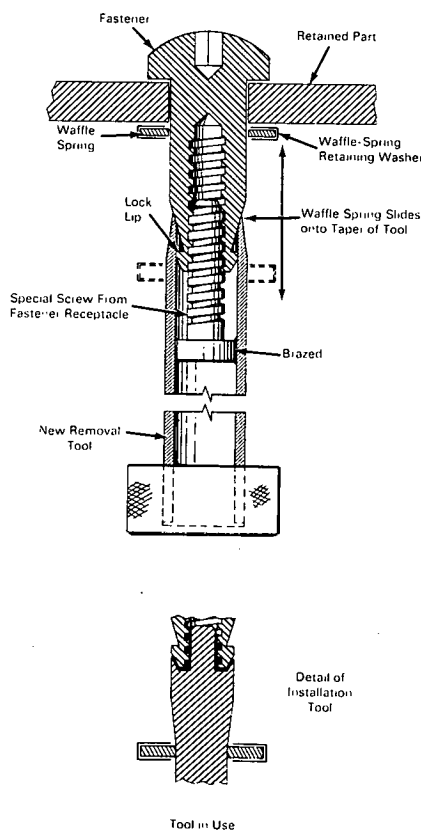


# NASA TECH BRIEF



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## Removal of Retaining Washers of the Waffle-Spring Type



### The problem:

Several makes of quick-locking fasteners incorporate retaining washers of the waffle-spring type; they are widely used in the aircraft and aerospace industries for such things as panels and covers that must be removable. The retainers are locked to the fasteners by internally expanding waffle springs; their removal is prevented by locking lips at the ends of

the fasteners, so that they must be cut (and destroyed) for removal.

### The solution:

Retainers can be removed easily with a special tool made quite similarly for various sizes and makes of fastener. Now to be described is the prototype of a tool for a 0.25-inch fastener.

(continued overleaf)

One end of a 1.5-inch length of 0.25-inch (outer diameter) stainless-steel tubing is reamed to 15/64 inch to a depth of 15/32 inch. The head of a screw from a nut plate is machined to a diameter of 0.233 inch before the screw is pressed head-first into the reamed end of the tubing and sweated in place, with the threaded end protruding at least 0.012 inch. The outside of 0.25 inch of this end of the tube is tapered and polished. Over the other end of the tube is pressed and sweated a knurled head as a finger grip.

**How it's done:**

The first step in withdrawal of the retainer is removal of the nut-plate assembly. The screw end of the tool is then screwed finger-tight into the internal thread of the fastener, before the tool is pushed against the fastener until the retainer is forced over

the taper. The tool is then withdrawn, carrying the retainer with it. The undamaged retainer is left on the tool until it is replaced.

**Notes:**

1. The tool may interest aircraft and aerospace manufacturers.

2. This Tech Brief is complete in itself. No additional information is available.

**Patent status:**

No patent action is contemplated by NASA.

Source: R. A. Marzullo of  
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