

CHAPTER 3

DZUS FASTENERS

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General

1. DZUS fasteners (see fig. 1) are used on aircraft for the purpose of securely holding detachable sheet-metal components in their respective positions, at the same time providing a means for repeated rapid attachment and detachment of the components without causing wear or localised fatigue of the sheet metal. The fastener consists of a bayonet-fitting type catch provided with a slotted head, and a wire spring. The catch is retained in the outer sheet-metal member and the spring is secured to the inner member; a helix slot is machined in the catch sleeve which engages with the centre portion of the spring, drawing it up when

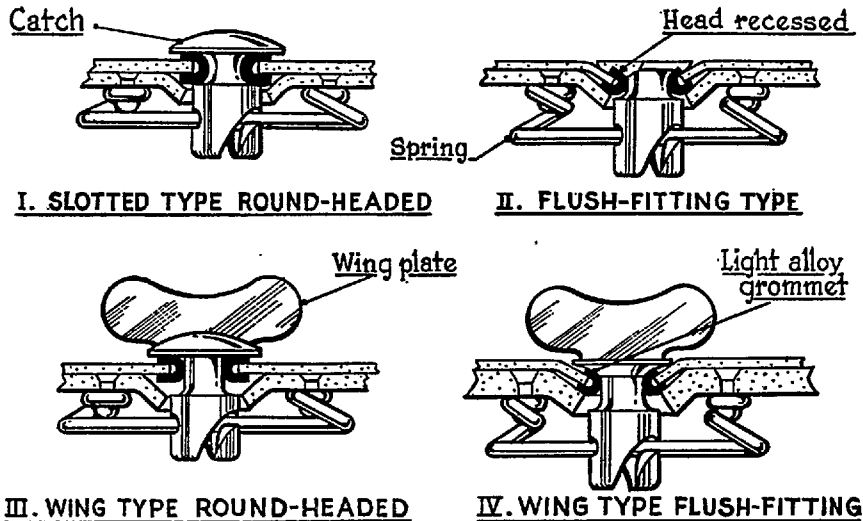


Fig. 1.—Types of DZUS fastener

the catch is given a quarter turn in a clockwise direction. The catch is retained in position in the outer member by means of a light alloy ferrule or grommet and the spring is riveted at each looped end to the underside of the inner member, the fastener catch engaging with the

spring through a hole drilled in the inner member. Various types of catch and spring are used for different applications and a description of the types generally used is given in this chapter, together with information on the methods adopted for fitting the components of the various types of fastener.

Description

2. All types of DZUS fasteners consist of a catch and a spring, typical examples of the parts being described in the following sub-paras. and illustrated in fig. 1:—

- (i) *Catch*—The catch (see fig. 1) is made in the shape of a sleeve-type nut with a screw head; a helix slot being machined at the end remote from the head, to form a bayonet-type fitting. The catch may be round-headed (see sketch I), or in instances where the fastener is required to be flush-fitting, the underside of the head is recessed (see sketch II), or bevelled (see sketch IV). The sleeve portion under the head is made in different lengths (see sketches I and III) according to the application of the fastener and to the thickness of the plate in which the catch is fitted. The hole in the outer member is fitted with a light-alloy grommet which prevents the catch from falling out when the fastener is unlocked (see fig. 1). The head of the catch is usually slotted to provide for the engagement of a locking key. In addition to the slotted types of catch, similar types are available fitted with a fixed wing plate to facilitate the locking and unlocking operations in positions where drag does not prohibit their use (see sketch III).
- (ii) *Spring*—The fastener spring (see fig. 2) is a short length of spring-steel wire, the ends of which are coiled in opposite directions to form spirals, through the eyes of which the spring is riveted to the inner member. The centre portion of the spring engages with the helix slot in the end of the catch. The pitch of the rivet-centres of the springs and the height of the spring vary with different types, according to the position of the fasteners on the aircraft; fig. 2 shows a typical arrangement of small-type springs at a joint in an engine cowl. When the fastener is in its locked position the spring is deflected by the helix slot, and

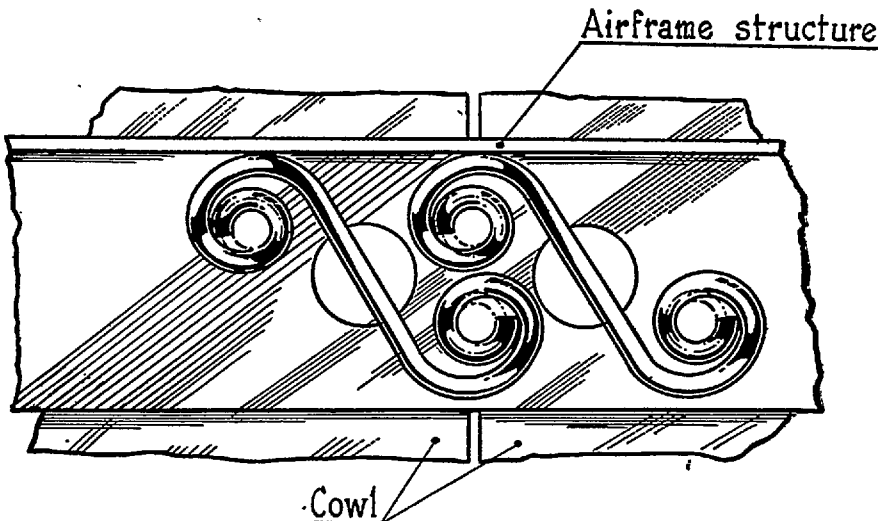


Fig. 2.—Typical installation of small type springs

the outer member is thereby firmly held in position under compression. The recommended deflection for all springs where the pitch of the rivet-centres is over 1 in. is 0.062 in. \pm 0.010 in., whilst the deflection for most other types is 0.047 in. \pm 0.010 in., exception being made in the case of the small-type spring already referred to; the latter can be identified by the diameter of the wire, which is 0.09 in. and the rivet-centre pitch which is 1 in. The deflection of the small-type spring is 0.062 in. \pm 0.010 in.

INSTALLATION

General

3. Care must be taken during the installation of DZUS-type fasteners to ensure that the correct type of spring is used in conjunction with the required types of catch, and that the information given in this paragraph for the determination of the correct length of fastener is followed closely. In instances where a defective fastener is to be replaced by a new one, the defective parts should be used as a guide to the size and shape of the replacement parts required. The length of the catch is measured from the lower edge of the locking slot to the upper surface of the head, for all flush-type fasteners, but to the underside of the head for round-headed fasteners (see fig. 3). The length of the catch for any particular application may be determined, in the majority of cases, by subtracting the deflection of the spring (para. 2, sub-para. (ii)) from the combined thicknesses of the plates and packing (where fitted) through which the catch passes, plus the thickness of the grommet, plus the height of the spring (see fig. 3); in the types of head which are bevelled or recessed on the underside, however, the thickness of the grommet should be omitted. If the calculated length of catch differs from the lengths of the nearest size available, the next larger size should be used, and shim-washers to the required thickness should then be inserted under the spring seats to bring the spring deflection to the recommended figure. The procedure adopted for fitting the various types of fasteners is described in paragraphs 4 to 7.

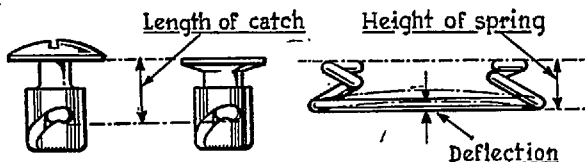


Fig. 3.—Primary dimensions of catch and spring

Equipment

4. For the purpose of installing DZUS-type fasteners special equipment is required for each particular type and the drifts and blocks used are illustrated in figs. 4 to 7. The drifts and blocks are of case-hardened steel and they should be struck when in use, with a wooden mallet or a lead hammer; under no circumstances should a steel hammer be used for this purpose or the drifts and blocks will be damaged. Round-headed aluminium rivets, $\frac{1}{8}$ in. diameter, together with drills of the sizes indicated in the following paragraphs, will also be required.

Fitting round-headed fasteners and spring:

5. Two sizes of drifts and blocks are provided for use when fitting round-headed type fasteners of different diameters, four drifts and one block being used for each. Each block is machined on five of its sides to suit the various purposes for which it is used (see figs. 4 and 5). To fit round-headed fasteners and springs proceed as follows:—

- (i) Drill a hole of the same outside diameter as the grommet, in the outer member, and then insert the grommet from the underside (see fig. 4, sketch I).

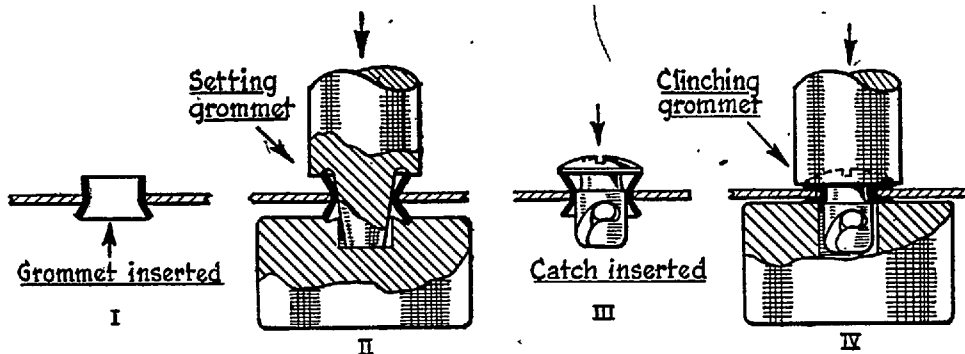


Fig. 4.—Operations for fitting round-headed catch

- (ii) The grommet should then be partially set by means of a drift and block, as illustrated in sketch II, the set of the grommet being controlled by the depth of the hole in the block.
- (iii) The catch should then be inserted in the grommet (see sketch III) and clinched by completing the set of the grommet by means of the drift and block illustrated in sketch IV.
- (iv) The inner member, to which the spring is riveted, should then be drilled, due precautions being taken to ensure that the hole will register correctly with the catch; the diameter of the drill used should be of the same diameter as the sleeve of the catch.
- (v) The inner member should then be countersunk by means of the drift and block, as illustrated in fig. 5.

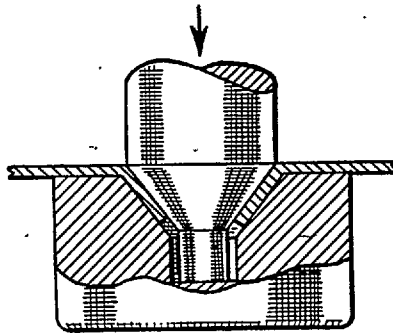


Fig. 5.—Forming countersink in inner member

- (vi) The rivet holes for the spring should then be marked out and drilled $\frac{1}{8}$ in. diameter, ensuring during the operation that they are symmetrically placed with regard to the hole in the inner member which accommodates the fastener. Each rivet hole should then be countersunk on the upper side of the inner member by means of a $\frac{1}{4}$ in. diameter countersink.
- (vii) The spring should then be riveted in position using two round-headed aluminium rivets, $\frac{1}{8}$ in. diameter, of sufficient lengths to enable the countersink to be completely filled when the rivet end is riveted over. The rivet ends remote from the head should then be filed flush with the surface.

Fitting flush-type fasteners and springs

6. The information given in this paragraph applies to both types of flush-fitting fastener. Three drifts and blocks are used, the essential difference between the separate drifts or blocks being in the included angle of the countersunk end. The particular type of drift and block required for the various operations are illustrated in figs. 6 and 7. It is intended that flush-type

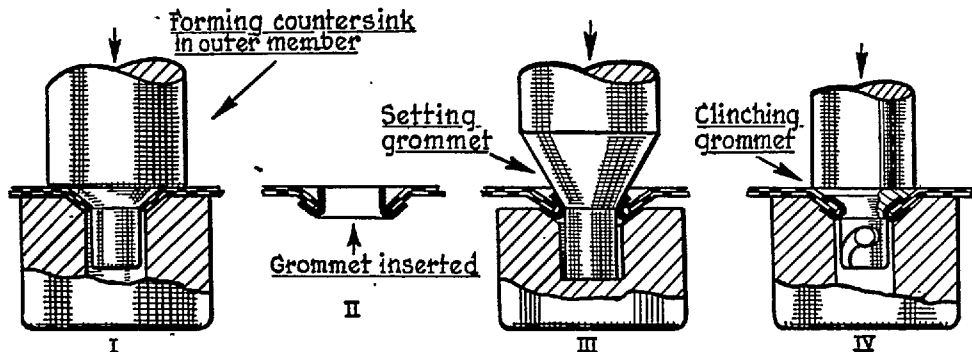


Fig. 6.—Operations for fitting flush-type catch

fasteners should be installed with the slot cut in the head of the fastener parallel with the direction of the slip-stream, and the slot is cut at various angles for this purpose. In order to fit flush-type fasteners and springs the following procedure should be adopted:—

- (i) Drill a hole, $\frac{7}{16}$ in. diameter, in the outer member, which should then be countersunk by means of the type of drift and block illustrated in fig. 6, sketch I.
- (ii) The grommet, which is of the type illustrated in sketch II, should then be inserted from the underside of the outer member and partly set, as indicated in sketch III. The set of the grommet is limited to the correct amount by the depth of the hole in the block, which is machined to give the required amount of set to the grommet.
- (iii) The catch should then be inserted and clinched by the application of a few light blows with a mallet on a flat-nosed punch of the same diameter as the head of the catch, the outer member and grommet being supported in a block, as illustrated in sketch IV.
- (iv) The procedure adopted for fitting the spring of flush-type fasteners is similar to that described for round-headed fasteners in para. 5, sub-para. (iv) to (vii), except that the hole in the inner member should be drilled $\frac{7}{16}$ in. diameter and that the drift and block illustrated in fig. 7 should be used.

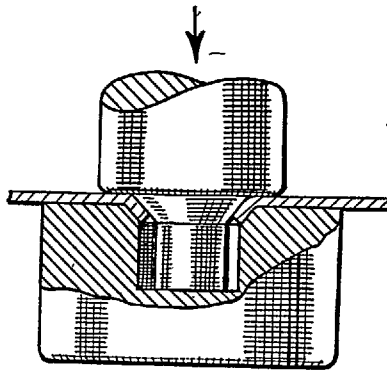


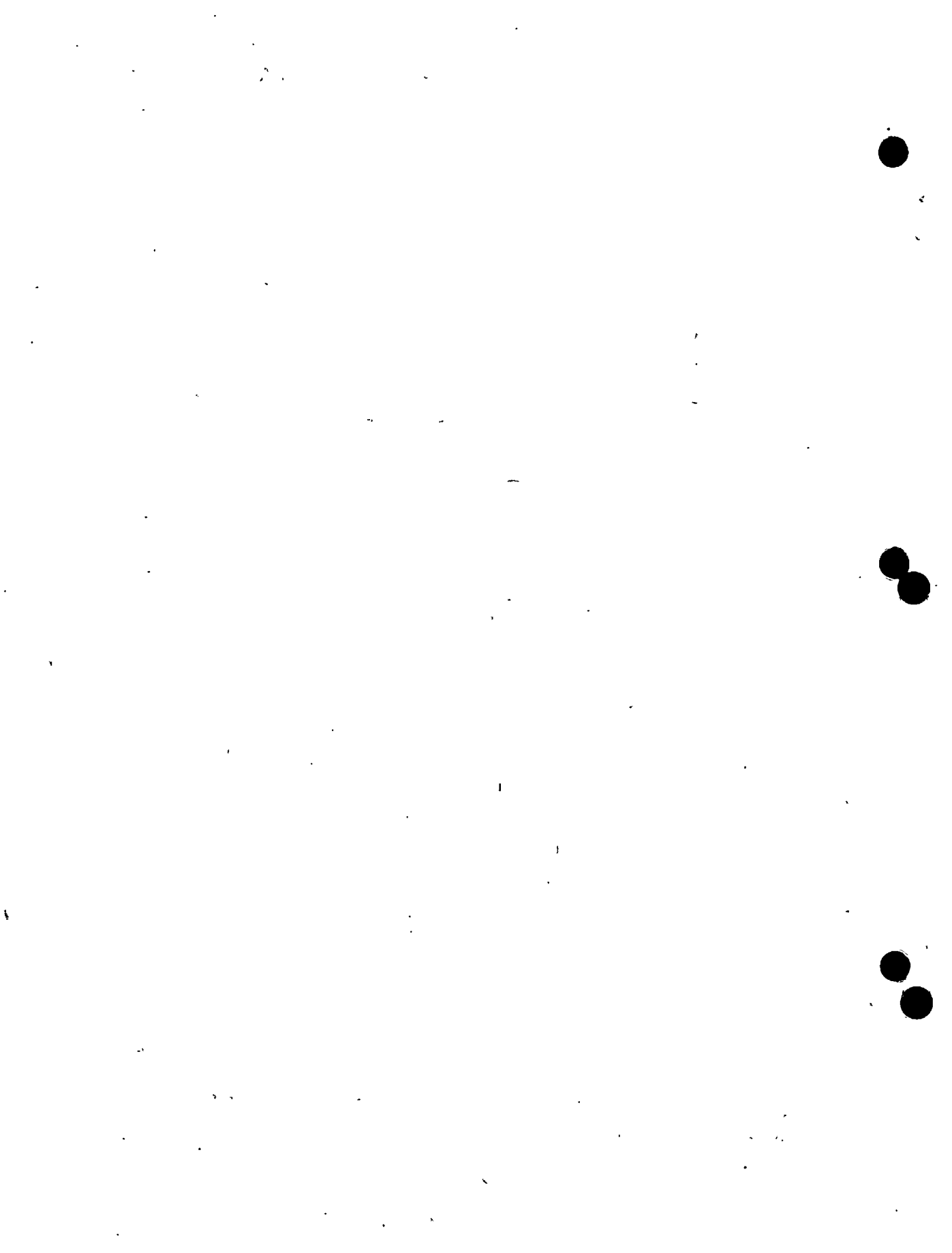
Fig. 7.—Forming countersink in inner member

Fitting wing-type fasteners and springs

7. The procedure adopted for fitting fasteners provided with wing-plates is the same as that described in paragraphs 5 and 6 for the same type of fastener without the wing-plate except that a block provided with a groove around its periphery is used during the clinching operations instead of the drift or punch illustrated in figs. 4 and 6 respectively. The sides of the block are hollowed out to suit the various types of fastener-head and the groove is provided to accommodate the wing-plate.

Removal of fasteners

8. If the catch is defective it should be replaced by a new one. To remove a defective catch the aluminium grommet should be cut away by means of a trepanning tool, which is kept centred during the cutting operations by means of the sleeve end of the catch. When the grommet has been completely cut through, the catch may easily be removed from the outer members; a new fastener should then be fitted in accordance with the information given in paras. 5 to 7. If a spring is distorted or broken it should be replaced by a new one of the same type. To remove a broken spring the rivets should be drilled out by means of an $\frac{1}{8}$ in. diameter drill and then the new spring should be riveted in position, as described in paras. 5 to 7. If a catch or spring shows signs of wear or is badly corroded it should be replaced by a new part of the same type, whilst loose spring rivets should be drilled out and new ones fitted. If a grommet is loose or free to rotate in the outer member, it should be reset, using the appropriate drift and block for the type of fastener held in the grommet or if there is any signs of wear, it should be replaced with a new one.



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