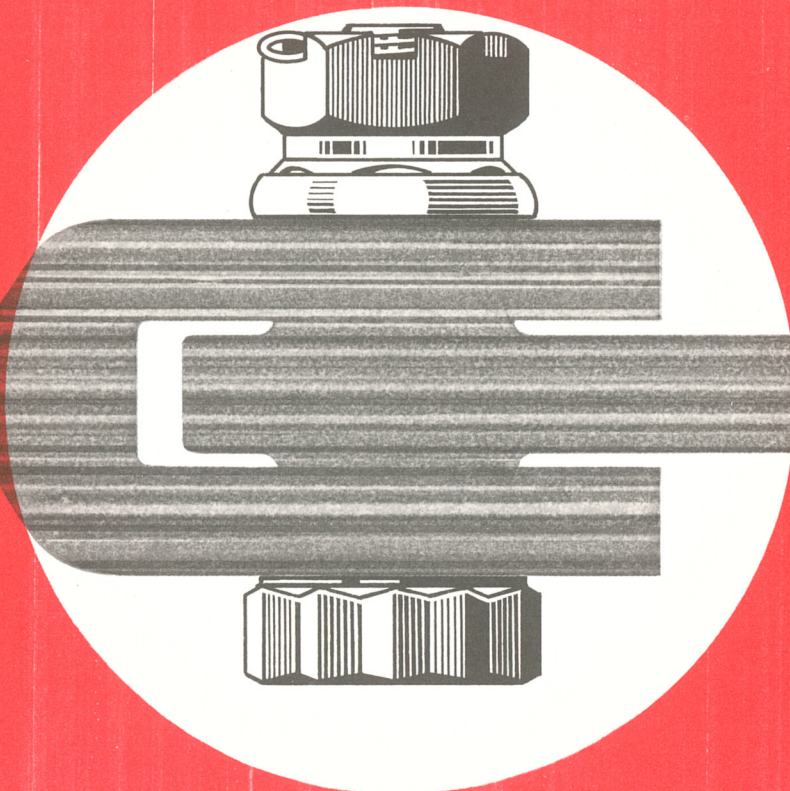
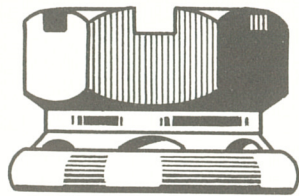


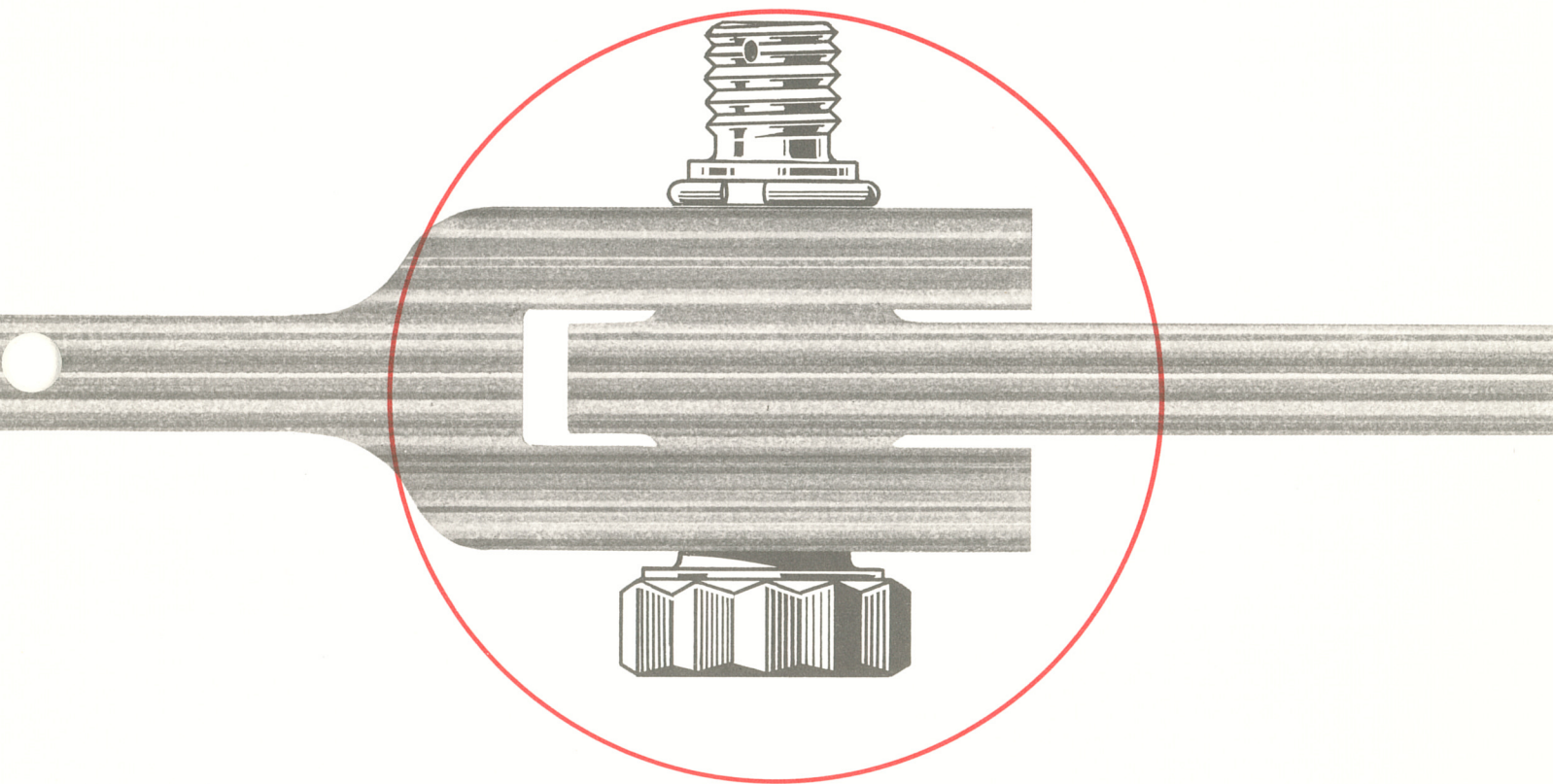
SPS

POSITIVE RETAINING BOLT SYSTEM





your
best
protection
against
BOLT LOSS
in
critical
shear joints



PRB Positive Retaining Bolt System*

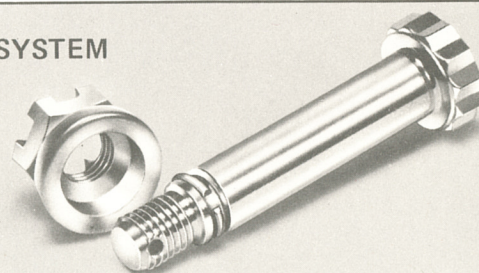
A simple reliable back-up device for critical shear joints.

In critical dynamic joint assemblies, it is imperative that the fastener securing the joint stay in place. Lockwires, locknuts, and castellated nuts with cotter pins have been used to insure the retention of fasteners in such critical applications. However, cotter pins and lock wires can be and have been, omitted or installed incorrectly with disastrous results. Consequently many aircraft specifications demand a more positive method of bolt retention.

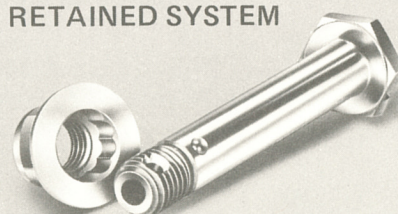
Today self-retaining bolts are required for many shear fastener applications in critical assemblies, such as flight control linkages, engine control mechanisms, fuel controls, bell crank systems, and other shear joints. But, many currently available self-retaining fasteners are complex and expensive, often requiring from four to seven internal parts to provide their self-retaining capability. In addition, bolt strength is often compromised by the self-retaining feature, with the result that larger and heavier bolts are required for the assembly.

TYPE OF SYSTEM

PRB SYSTEM



BALL RETAINED SYSTEM



THE PRB SYSTEM

The PRB Positive Retaining Bolt System from SPS consists of a positive locking, self-retaining bolt, companion castellated nut, and a simple bolt removal tool. It provides the most reliable method of bolt retention, and has greater shear strength and corrosion resistance than other types of self-retaining bolts. Figure 1 compares the PRB System with the MS 18115 ball-retained system.

PRB System bolts are easy to install, yet cannot be pushed out accidentally. The unique design of the retaining feature does not impair the mechanical properties of the bolt, and provides maximum re-usability. (Tests show up to 100 reuses with no dimensional wear or loss in holding power.) The PRB System far exceeds the physical requirements of specification MIL-B-23964. In fact, the tensile strength of the retaining device is twice the value required by the MIL Spec.

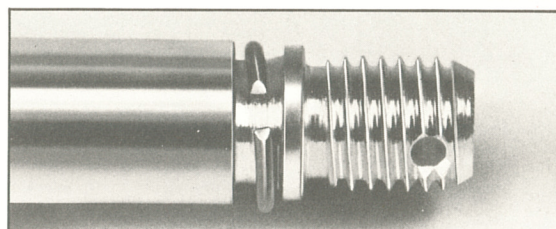


Figure 2

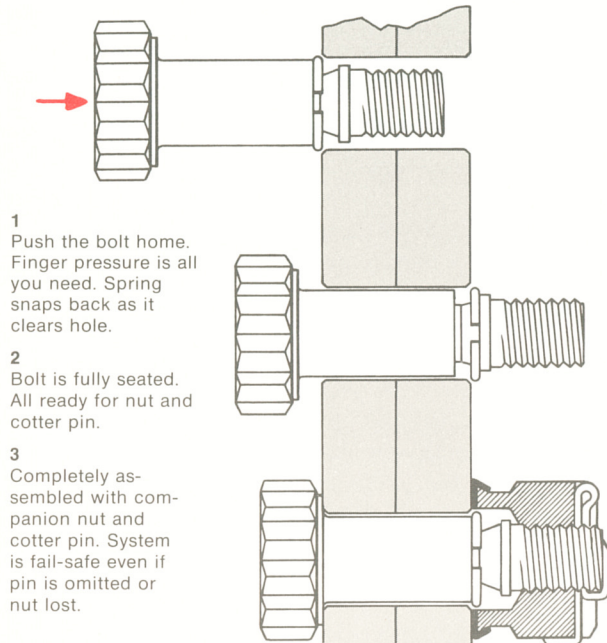
DESIGN FEATURES

The PRB System bolt is a solid bolt with only one moving part, a circular spring which rides on a tapered shank adjacent to the bolt threads. No plungers or internal springs compromise the bolt's inherent strength. The smaller taper toward the bolt head permits the spring to compress when the bolt is being installed. After the bolt is installed, if force is applied to remove it, the spring rides up on the larger end of the tapered shank where it cannot be compressed, thus effectively preventing removal.

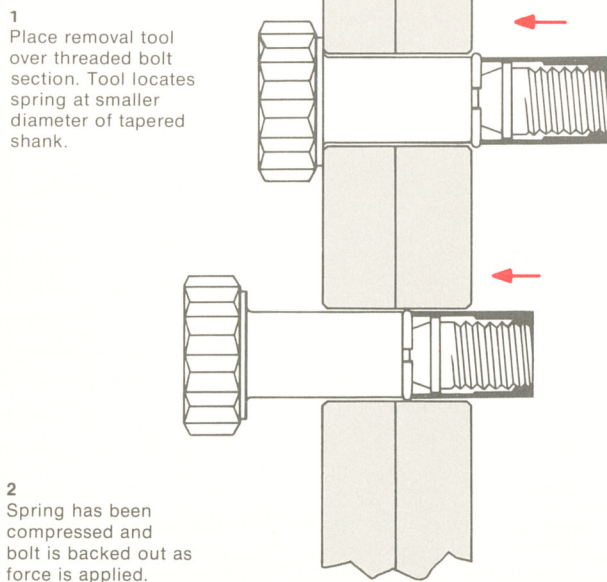
Figure 1—AREAS OF COMPARISON

Ease of assembly	Applicable bolt Specifications	Minimum tensile strength, lbs. (retaining device)		Minimum double shear, lbs. (bolt)	Vibration resistance per MIL-B-23964B	Assembly reliability
Bolt need only be pushed through assembly	MIL-B-23964	#10	220	6,100	Meets requirements	Once snap is heard bolt is seated
		1/4	460	10,600		
		5/16	1020	16,600		
		3/8	1150	23,900		
		7/16	1420	32,500		
		1/2	2320	42,400		
		9/16	2840	53,700		
Pin must be held in while bolt is inserted and nut applied	MIL-B-23964	#10	110	4,250	Meets requirements	Pin may be released prematurely and balls expand before bolt is seated.
		1/4	230	7,360		
		5/16	510	11,500		
		3/8	575	16,560		
		7/16	710	22,500		
		1/2	1160	29,400		
		9/16	1420	37,400		

INSTALLATION Figure 3



REMOVAL Figure 4



For example, a 3/8" diameter PRB System bolt requires only 25 pounds of force to insert, yet a removal force of 1150 pounds could not push it out of the assembly. These bolts cannot be pushed out accidentally, or shaken out by vibration. THEY STAY IN PLACE UNTIL YOU REMOVE THEM.

INSTALLATION AND REMOVAL

Installation is quick and easy. (See Figure 3) Just push the bolt into the assembly. When a click is heard, the bolt is seated. Install the nut, tighten, and insert cotter pin. That's all there is to it. The PRB System is fail-safe even if the pin is omitted, or the nut lost.

To remove the bolt, a simple cylindrical tool is used. The tool fits over the bolt threads and locates the spring against the flange at the smaller diameter of the tapered shank. Removal pressure on the tool enables the spring to be compressed as the bolt is pushed out of the assembly. (Figure 4) The need for the tool also provides a safeguard against bolt removal by unauthorized personnel.

SIZES AND MATERIALS

PRB System bolts are available in bolt body diameters from .190" through .562", in cadmium plated alloy steel, or stainless steel. Companion castellated nuts are available in either cadmium plated steel, or A-286 alloy steel, silver plated. Head configurations can be furnished to customers' specifications.

HOW TO ORDER

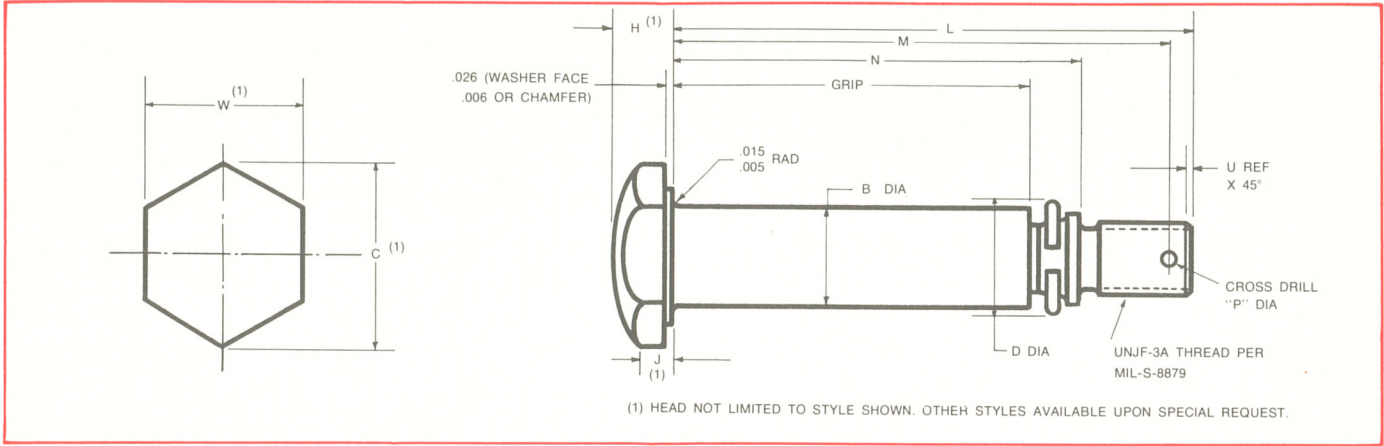
BOLTS: Specify Bolt Part Number, Bolt Diameter (Dash Number, Grip Length, and Material. 72688-4-C-20—PRB System Bolt, 1/4" diameter, stainless steel, 1 1/4" grip length. (Omission of letter designates alloy steel, cadmium plated.)

NUTS: Specify Basic Part Number, Dash Number corresponding to Bolt Dash Number, and Material. 72689-4-C—Castellated nut with captive washer, 1/4" bolt diameter, A-286, silver plated. (Omission of letter designates steel nut with cadmium plate.)

REMOVAL TOOL: Specify Basic Part Number and Bolt Dash Number.

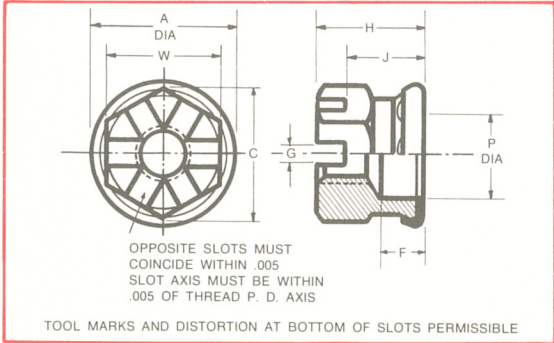
72691-4—Removal tool for PRB System Bolt, 1/4" diameter.

PRB SYSTEM BOLT—Part Number 72688



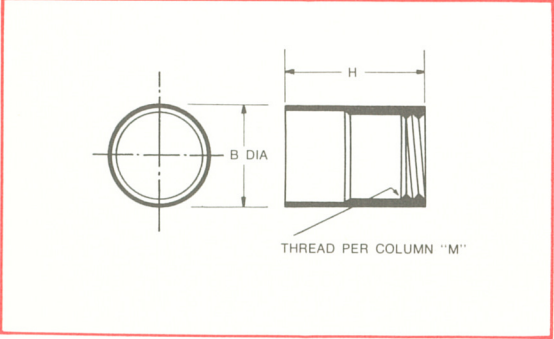
FIRST DASH NO.	NOM. BOLT DIA.	THREAD SIZE	MIN. GRIP LENGTH	N	M	L	B DIA.	C MIN.	D DIA. MAX.	H MAX.	J MIN.	P DIA.	U REF.	W		AXIAL TENSILE LBS. MIN.	RECOMMENDED HOLE SIZE	
				NOMINAL DIMENSION MINIMUM GRIP LENGTH										MAX.	MIN.		MAX.	MIN.
—3	.190	.164-36	.188	.308	.498	.570	.1894 .1885	.413	.205	.110	.063	.057	.040	.376	.367	1,110	.1940	.1900
—4	.250	.190-32	.188	.326	.534	.616	.2492 .2483	.488	.267	.141	.084	.057	.040	.439	.430	2,040	.2540	.2500
—5	.312	.250-28	.250	.403	.645	.738	.3117 .3108	.557	.331	.172	.105	.081	.040	.502	.492	3,250	.3165	.3125
—6	.375	.312-24	.250	.416	.696	.799	.3742 .3733	.628	.395	.204	.126	.081	.050	.564	.553	5,050	.3790	.3750
—7	.437	.375-24	.375	.561	.850	.968	.4367 .4358	.698	.459	.235	.146	.111	.050	.627	.617	6,800	.4425	.4375
—8	.500	.437-20	.375	.581	.903	1.031	.4991 .4982	.840	.523	.266	.168	.111	.060	.752	.741	9,250	.5050	.5000
—9	.562	.500-20	.437	.658	1.106	1.234	.5616 .5607	.918	.586	.297	.188	.111	.060	.877	.865	11,800	.5675	.5625

CASTELLATED NUT with integral washer



DASH NUMBER	NOM BOLT SIZE	A DIA MAX	C MIN	F ±.010	G ±.015	H MAX	J ±.010	P DIA MAX	W	
									MAX	MIN
72688 —3	.190	.490	.413	.145	.079	.372	.249	.240	.376	.367
72688 —4	.250	.560	.488	.160	.079	.408	.285	.309	.439	.430
72688 —5	.312	.640	.557	.166	.098	.456	.321	.395	.502	.492
72688 —6	.375	.710	.628	.178	.098	.507	.372	.460	.564	.553
72688 —7	.437	.735	.698	.195	.140	.536	.386	.529	.627	.616
72688 —8	.500	.925	.840	.207	.140	.589	.439	.614	.752	.741
72688 —9	.562	1.080	.988	.218	.140	.729	.579	.686	.877	.865

REMOVAL TOOL



BOLT BASIC PART NUMBER	PART NUMBER	B DIA REF	H REF	M THREAD
72688—3	72691—3	.190	.390	.164—36
72688—4	72691—4	.250	.430	.190—32
72688—5	72691—5	.312	.490	.250—28
72688—6	72691—6	.375	.550	.312—24
72688—7	72691—7	.437	.600	.375—24
72688—8	72691—8	.500	.660	.437—20
72688—9	72691—9	.562	.800	.500—20



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