

EO 05-1-3/8

# ROYAL CANADIAN AIR FORCE



# SAFETYING MEDIA

(This EO replaces Part 8 of EO 05-1-3)

ISSUED ON AUTHORITY OF THE CHIEF OF THE AIR STAFF

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# LIST OF RCAF REVISIONS

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# SAFETYING MEDIA

## SAFETY WIRING METHODS

- 1 For general instructions regarding the use and application of safety wire, refer to EO 05-1-2AQ

### CABLE QUICK-DISCONNECT INSTALLATION

- 2 Instructions for installation of control cable quick-disconnects are shown in Figure 1.

### INSTALLATION INSPECTION

- 3 Carry out the following inspections during installation:
- (a) The lips at the open end of the locking handle (A) must be parallel. If they are not parallel, the handle has been warped by improper installation of the unit and the unit must be replaced.
  - (b) On units having the peened hinge pin (B) inspect the peened head for fullness. If the head is not fully flattened outside the surface of the sheet-metal locking handle, replace the unit.
  - (c) Check the T-ends on the male part of the unit carefully during the mating of the cable. Both ends must extend beyond the surface of the locking handle through the slotted holes (C). If the cross is not seated properly in the slotted holes before the locking handle is closed, closing the handle may jam the cross against the body casting, which warps the locking handle by spreading the sides and may damage the hinge pin. Check for correct positioning of the T-ends before and after the locking handle is closed as shown in Figure 1.
  - (d) Exercise caution to prevent warping the locking handle by extending the unlocking action beyond approximately 200 degrees. Further extension of the unlocking movement may force the parallel lips on the handle (A) over the body casting, thus warping the open end of the handle.

### COTTER-PINS

- 4 Cotter-pins (Item 1) for use on aircraft or engines must be round, mild steel, cadmium plated or galvanized. See Figure 2 for approved methods of use. For cotter-pin table, see Figure 3. For correct installation, the cotter-pin nominal diameter must be the same as hole size.

### TAB WASHERS

- 5 Tab washers (Item 2) may conform to Specification NAS460, see Figure 4. When necessary, special designs are used for particular installations and special precautions are necessary in their manufacture and use. Ensure that tab ends are of the proper length and do not override the slot or flat provided.

- 6 If the tab is not at a direct right angle to the surface over which it is to be bent, take extreme care to make the bend in the direction tending to tighten the assembly. Backing off any threaded member to suit the tab is not permitted.

### LOCK WASHERS

- 7 Lock washers (Items 3&4) are used with machine screws or bolts, whenever the

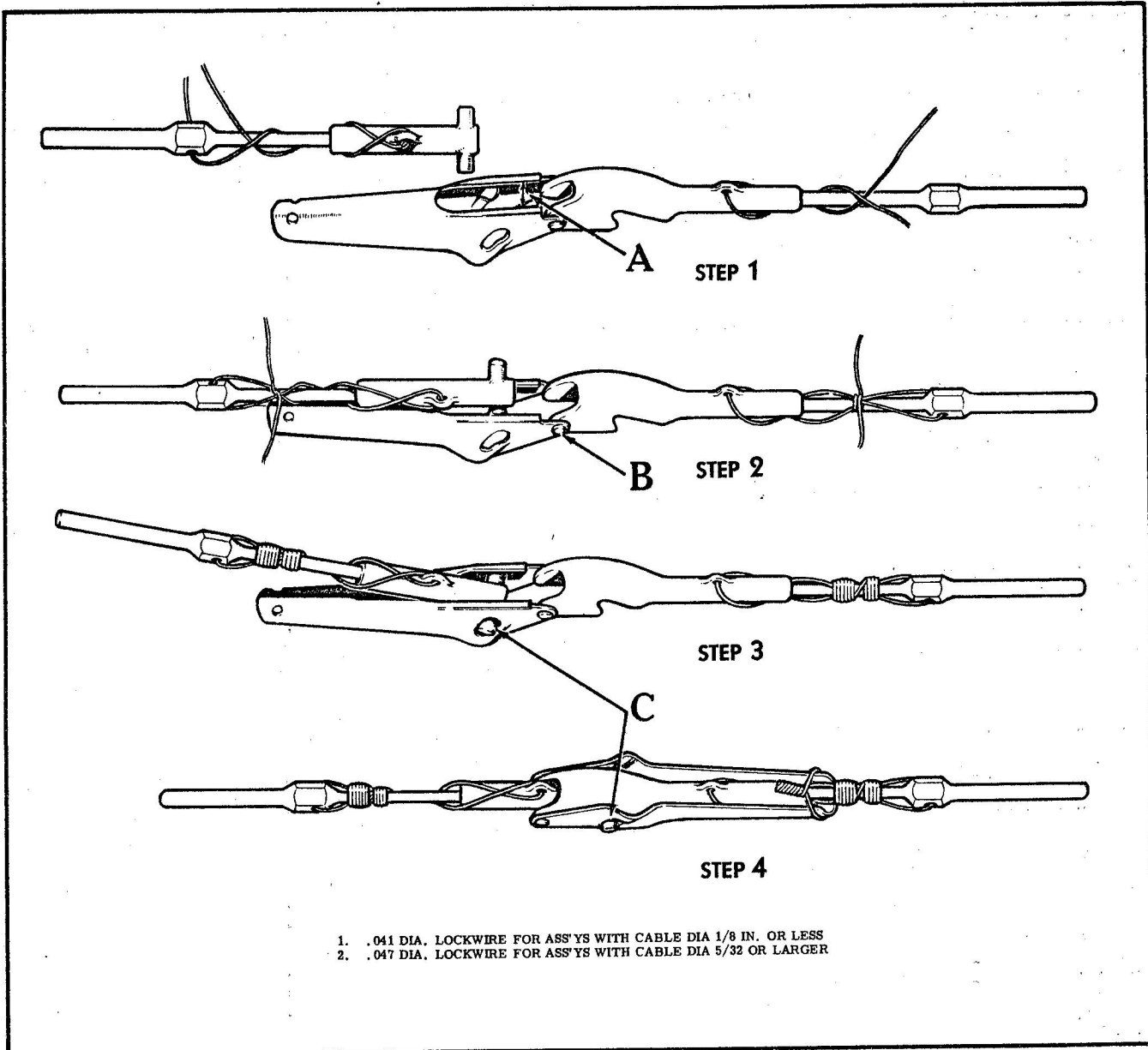


Figure 1 Quick-disconnect Assembly Details

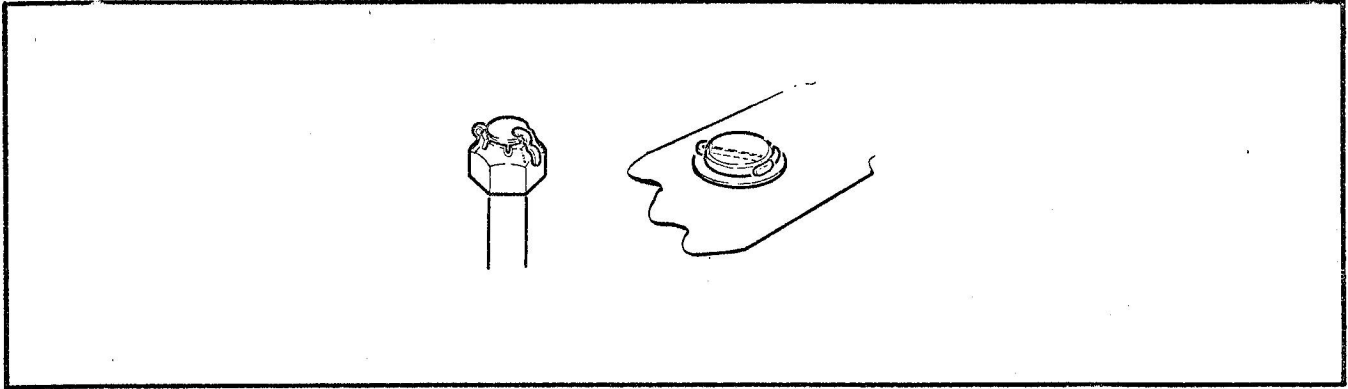


Figure 2 Cotter-pin Installation

Nom Dia	A Dia	B Min	Hardness	Recom- mended Drill Hole
			Rockwell 15-N	Dia $+ .005$ $- .002$
1/32	.030 $+ .000$ $- .003$	.032	65 TO 75	.035
1/16	.061 $+ .000$ $- .003$	.063		.067
3/32	.090 $+ .000$ $- .004$	.094	60 TO 70	.096
1/8	.122 $+ .000$ $- .004$	.125	55 TO 67	.129
5/32	.150 $+ .000$ $- .004$	.156		.161
3/16	.176 $+ .000$ $- .004$	.188		.188
7/32	.207 $+ .000$ $- .005$	.219		.219
1/4	.225 $+ .000$ $- .005$	.250		.238
5/16	.280 $+ .000$ $- .005$	.313		.295

Prong of pin shall withstand bending flat on itself without cracking. Flat of prong shall form outside of bend.

Material: corrosion resisting steel.

Finish: passivate.

Example of Part No: AN381-2-10 - 1/6 (2/32) Nom. Dia Cotter Pin .625 inches long.

Note: Cotter Pins shall be free from burrs.

Figure 3 (Sheet 1 of 4) Cotter-pins - AN381

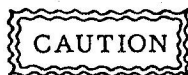
self-locking or castellated type of nut is not applicable. Sufficient friction is provided by the spring action of the washer to prevent loosening of the nut from vibration. For lockwasher tables, see Figures 5 and 6. Lockwashers may be used to prevent loosening of threaded fasteners in airframe construction under the following conditions:

- (a) When a self-locking nut or a castle nut and cotter-pin cannot be used.
- (b) When lockwire cannot be used.
- (c) When the fastening is not used in primary structure, or when loosening of the locked parts would not endanger the aircraft or personnel.
- (d) When corrosion, encouraged by gouging of aluminum or magnesium alloys by teeth of lockwashers, would not cause malfunction of parts. Corrosion may be reduced by installing washers with wet primer. Refer to EO 05-1-3/23

Length L	Dash Numbers								
	1/32	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16
.313		2-5							
.375	1-6	2-6							
.438		2-7							
.500	1-8	2-8	3-8	4-8	5-8				
.625		2-10	3-10						
.750	1-12	2-12	3-12	4-12	5-12				
.875		2-14	3-14	4-14					
1.000	1-16	2-16	3-16	4-16	5-16				
1.125			3-18	4-18	5-18				
1.250		2-20	3-20	4-20	5-20				
1.375			3-22	4-22	5-22				
1.500		2-24	3-24	4-24	5-24	6-24			
1.625			3-26	4-26	5-26	6-26			
1.750		2-28	3-28	4-28	5-28	6-28			
2.000		2-32	3-32	4-32	5-32	6-32	7-32	8-32	10-32
2.250				4-36	5-36	6-36	7-36	8-36	10-36
2.500					5-40	6-40	7-40	8-40	10-40
3.000						6-48		8-48	
3.500								8-56	
4.000								8-64	

Figure 3 (Sheet 2 of 4) Cotter-pins - AN381





Lockwashers must not be used where the screw is subject to frequent removal, where the washers are on exposed surfaces, or where failure would permit the opening of a joint to airflow.

Dia.	AN381 Current			AN380 Obsolete			AGS784 Obsolete		AGS166 Obsolete	
	Length	Dash No.	RCAF Ref	Length	Dash No.	RCAF Ref	Dash No.	Dash No.		
1/32	.375	-1-6	6025	3/8	-1-1	19560		-1C		
1/32	.500	-1-8	6026	1/2	-1-2	18590		-2C		
1/32	.750	-1-12	6027	3/4	-1-3	19561		-3C		
1/32	1.000	-1-16		1	-1-4	19562				
1/16	.313	-2-5								
1/16	.375	-2-6	6028	3/8	-2-1	18123				
1/16	.438	-2-7								
1/16	.500	-2-8	5945	1/2	-2-2	11183	-2	-2		
1/16	.625	-2-10								
1/16	.750	-2-12	5946	3/4	-2-3	11254	-3	-3		
1/16	.875	-2-14								
1/16	1.000	-2-16	5947	1	-2-4	11255	-4	-4		
1/16	1.250	-2-20	5948	1-1/4	-2-5	13310	-5	-5		
1/16	1.500	-2-24	5949	1-1/2	-2-6	14926				
1/16	1.750	-2-28	5950	1-3/4	-2-7	14928	-6	-6		
1/16	2.000	-2-32	5951	2	-2-8	11322				
3/32	.500	-3-8	5952	1/2	-3-2	11256	-10	-10		
3/32	.625	-3-10								
3/32	.750	-3-12	5953	3/4	-3-3	11257	-11	-11		
3/32	.875	-3-14								
3/32	1.000	-3-16	5954	1	-3-4	11258	-12	-12		
3/32	1.125	-3-18								
3/32	1.250	-3-20	5955	1-1/4	-3-5	11259	-13	-13		
3/32	1.375	-3-22								
3/32	1.500	-3-24	5956	1-1/2	-3-6	11253				
3/32	1.625	-3-26								
3/32	1.750	-3-28	5957	1-3/4	-3-7	14299	-14	-14		
3/32	2.000	-3-32		2	-3-8	14938				
1/8	.500	-4-8	5959	1/2	-4-2	14300	-18	-18		
1/8	.750	-4-12	5960	3/4	-4-3	13311	-19	-19		
1/8	.875	-4-14								
1/8	1.000	-4-16	5961	1	-4-4	11260	-20	-20		
1/8	1.125	-4-18								
1/8	1.250	-4-20	5962	1-1/4	-4-5	12714	-21	-21		

AGS Lengths are Overall Lengths whereas AN Pins are measured below head.

NO RCAF REFERENCE

All Lengths on this Chart are based on Length as specified for AN Pins.

NO RCAF REFERENCE

Figure 3 (Sheet 3 of 4) Cotter-pins - Interchangeability Table

Dia.	AN381 Current			AN380 Obsolescent			AGS784 Obsolescent		AGS166 Obsolescent	
	Length	Dash No.	RCAF Ref	Length	Dash No.	RCAF Ref	Dash No.		Dash No.	
1/8	1.375	-4-22		1-1/4						
1/8	1.500	-4-24	5963	1-1/2	-4-6	11184				
1/8	1.625	-4-26								
1/8	1.750	-4-28	5964	1-3/4	-4-7	14301	-22		-22	
1/8	2.000	-4-32	5965	2	-4-8	11708	-23		-23	
1/8	2.250	-4-36	6049	2-1/2	-4-10	11708	-24		-24	
5/32	.500	-5-8	5967	1/2	-5-2	14302	-26		-26	
5/32	.750	-5-12	5968	3/4	-5-3	16759	-27		-27	
5/32	1.000	-5-16	5969	1	-5-4	13314	-28		-28	
5/32	1.125	-5-18								
5/32	1.250	-5-20	5070	1-1/4	-5-5	14433	-29			
5/32	1.375	-5-22								
5/32	1.500	-5-24	5971	1-1/2	-5-6	14519				
5/32	1.625	-5-26								
5/32	1.750	-5-28	5972	1-3/4	-5-7	14303	-30		-30	
5/32	2.000	-5-32	5973	2	-5-8	12987	-31		-31	
5/32	2.250	-5-36	6055	2-1/2	-5-10	16106				
3/16	1.500	-6-24	5975	1-1/2	-6-6	18125			-37	
3/16	1.625	-6-26								
3/16	1.750	-6-28	6059				-38		-38	
3/16	2.000	-6-32	5976	2	-6-8	18126	-39		-39	
3/16	2.250	-6-36	6060							
3/16	2.500	-6-40	5977	2-1/2	-6-10	18127	-40		-40	
3/16	3.000	-6-48	5978	3	-6-12	18128				
7/32	2.000	-7-32								
7/32	2.250	-7-36								
7/32	2.500	-7-40								
1/4	2.000	-8-32	5979	2	-8-8	18129	-47		-47	
1/4	2.250	-8-36	6066							
1/4	2.500	-8-40	5980	2-1/2	-8-10	18130	-48		-48	
1/4	3.000	-8-48	5981	3	-8-12	18131				
1/4	3.500	-8-56	5982	3-1/2	-8-14	14304				
1/4	4.000	-8-64	5983	4	-8-16	14305				
5/16	2.250	-10-36								
5/16	2.500	-10-40								

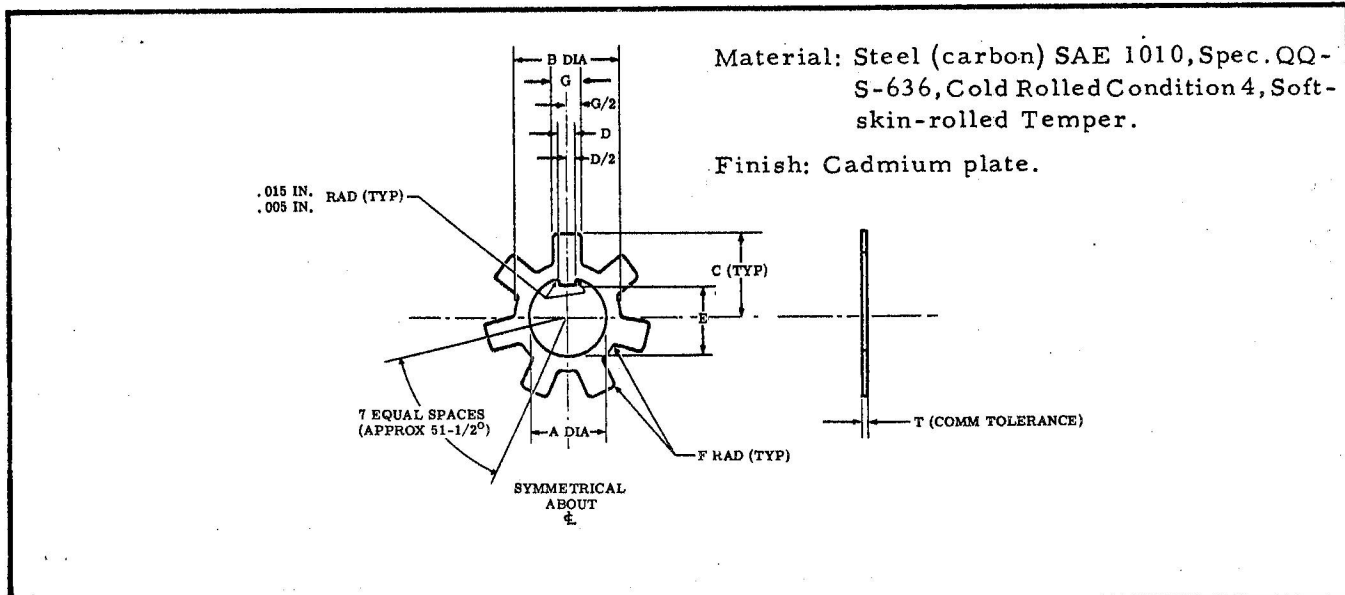
AGS Lengths are Overall Lengths whereas AN Pins are measured below head.

NO RCAF REFERENCE

All Lengths on this Chart are based on Length as specified for AN Pins.

NO RCAF REFERENCE

Figure 3 (Sheet 4 of 4) Cotter-pins - Interchangeability Table

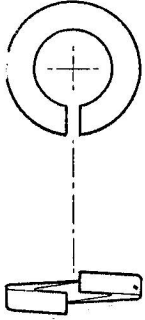


Part Number	A ± .005	B	C	D ± .005	E ± .005	F	G	T
NAS460-416	.256	.374	.317	.055	.223	.032	.094	.030
NAS460-516	.319	.436	.364	.055	.286	.032	.116	.030
NAS460-616	.381	.499	.411	.086	.333	.032	.140	.030
NAS460-716	.444	.560	.458	.086	.396	.032	.164	.030
NAS460-816	.506	.684	.546	.117	.442	.032	.188	.030
NAS460-916	.569	.773	.626	.117	.505	.050	.210	.048
NAS460-1016	.631	.896	.705	.148	.551	.050	.234	.048
NAS460-1216	.756	1.019	.798	.180	.661	.050	.280	.048
NAS460-1416	.881	1.206	.934	.180	.786	.050	.329	.048
NAS460-1616	1.006	1.367	1.057	.242	.880	.062	.374	.060
NAS460-1816	1.131	1.517	1.211	.242	1.005	.062	.422	.060
NAS460-2016	1.256	1.698	1.361	.305	1.097	.062	.468	.060
NAS460-2216	1.381	1.880	1.487	.305	1.222	.062	.516	.060
NAS460-2416	1.506	2.029	1.623	.367	1.316	.078	.562	.075
NAS460-2816	1.756	2.392	1.875	.430	1.534	.078	.656	.075
NAS460-3216	2.006	2.754	2.127	.492	1.753	.078	.750	.075

Figure 4 (Sheet 1 of 2) Table of NAS460 Tab Washers

(Reference Only)				
Eyebolt Thread	Eyebolt Keyway Width	Eyebolt Keyway Depth	Air-craft Check Nut AN316	Regular Jam Nut SAE
1/4-28	.0625 .0615	.0342 .0327	-4	
5/16-24	.0625 .0615	.0342 .0327	-5	
3/8-24	.0937 .0927	.0499 .0484	-6	
7/16-20	.0937 .0927	.0499 .0484	-7	
1/2-20	.1250 .1240	.0655 .0640	-8	
9/16-18	.1250 .1240	.0655 .0640	-9	
5/8-18	.1562 .1552	.0811 .0796	-10	
3/4-16	.1875 .1865	.0968 .0953	-12	
7/8-14	.1875 .1865	.0968 .0953	-14	
1-14	.2500 .2490	.1280 .1265	-16	
1-1/8-12	.2500 .2490	.1280 .1265		1-1/8
1-1/4-12	.3125 .3115	.1615 .1590		1-1/4
1-3/8-12	.3125 .3115	.1615 .1590		1-3/8
1-1/2-12	.3750 .3740	.1930 .1905		1-1/2
1-3/4-12	.4375 .4365	.2242 .2217		1-3/4
2-12	.5000 .4990	.2555 .2530		2

Figure 4 (Sheet 2 of 2) Table of NAS460  
Tab Washers

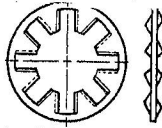
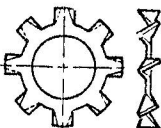
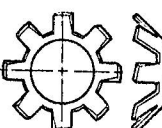
		
Dash Numbers		Bolt Size
Regular	Light	
2	2L	No. 2(.086)
4	4L	No. 4(.112)
6	6L	No. 6(.138)
8	8L	No. 8(.164)
10	10L	No. 10(.190)
416	416L	1/4
516	516L	5/16
616	616L	3/8
716	716L	7/16
816	816L	1/2
916	916L	9/16
1016	1016L	5/8
1216	1216L	3/4

Examples of Part Numbers:  
AN935-10 - Washer for No. 10 bolt,  
regular.

AN935-10L - Washer for No. 10 bolt,  
light.

Material: Steel.

Figure 5 Table of AN935 Lock Washers

Size						
	Internal Teeth		External Teeth		Countersunk Teeth	
	Dash Number:		Dash Number		Dash Number	
	Steel	Bronze	Steel	Bronze	Steel	Bronze
#2	A2					
#3	A3					
#4	A4	A4B	B4	B4B		
#6	A6	A6B	B6	B6B	C6	C6B
#8	A8	A8B	B8	B8B	C8	C8B
#10	A10	A10B	B10	B10B	C10	C10B
1/4	A416	A416B	B416	B416B	C416	C416B
	A416H					
5/16	A516	A516B	B516	B516B	C516	C516B
3/8	A616	A616B	B616	B616B	C616	C616B
7/16	A716	A716B	B716	B716B	C716	C716B

Example of Part Number: AN936B416B - Washer, external teeth, for 1/4-inch bolt, bronze.  
Material: Steel, bronze.

Figure 6 Table of AN936 Lock Washers

Dash No.	A	B	C	D
20	1-1/4	.063	5/16	1/16
22	1-3/8	.063	5/16	1/16
24	1-1/2	.063	5/16	3/32
26	1-5/8	.080	5/16	3/32
28	1-3/4	.080	5/16	3/32
30	1-7/8	.080	5/16	3/32
32	2	.080	5/16	3/32
34	2-1/8	.080	1/2	3/32
36	2-1/4	.080	1/2	3/32
38	2-3/8	.080	1/2	3/32
40	2-1/2	.080	1/2	3/32
44	2-3/4	.090	1/2	3/32
48	3	.090	1/2	3/32
52	3-1/4	.090	1/2	3/32
56	3-1/2	.090	1/2	3/32
60	3-3/4	.090	1/2	3/32
64	4	.090	1/2	3/32
68	4-1/4	.090	1/2	3/32

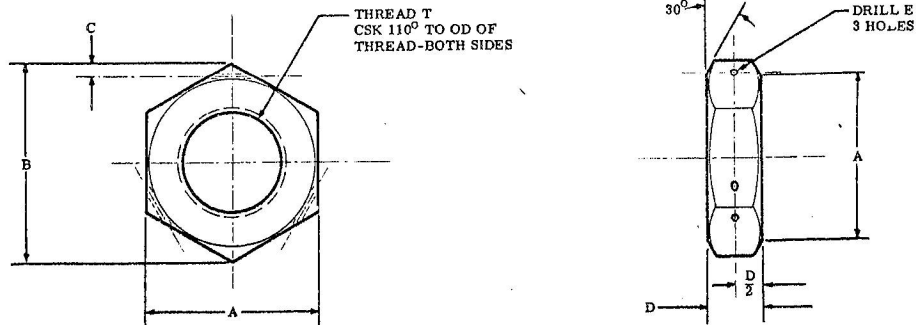
  

Dash Nos.	A	B	C	D
8	1/2	.063	5/16	1/16
10	5/8	.063	5/16	1/16
12	3/4	.063	5/16	1/16
14	7/8	.063	5/16	1/16
16	1	.063	5/16	1/16
18	1-1/8	.063	5/16	1/16

Example of Part Number:  
AN996-8 - Lock Ring; with 1/2 inch I.D.  
Material: Steel, Spring temper.  
Specification AN-QQ-W-441.  
Finish: Cadmium Plate, or Zinc Plate.

Figure 7 Table of AN996 Lock Rings



Dash No.	Thread T	A	B Approx	C	D	Drill E No.
4	1/4-28UNF-3B	.438 +.002 -.010	.50	.093	.188	56(.046)
5	5/16-24UNF-3B	.500 +.002 -.010	.58	.093	.219	56(.046)
6	3/8-24UNF-3B	.563 +.002 -.010	.66	.093	.250	56(.046)
7	7/16-20UNF-3B	.625 +.002 -.010	.72	.093	.281	56(.046)
8	1/2-20UNF-3B	.750 +.002 -.010	.88	.093	.313	56(.046)
9	9/16-18UNF-3B	.875 +.002 -.012	1.02	.093	.375	56(.046)
10	5/8-18UNF-3B	1.000 +.002 -.014	1.16	.093	.406	56(.046)
12	3/4-16UNF-3B	1.125 +.002 -.016	1.30	.125	.469	50(.070)
14	7/8-14UNF-3B	1.313 +.002 -.017	1.52	.125	.500	50(.070)
16	1-14NF-3B	1.500 +.002 -.019	1.73	.125	.500	50(.070)
18	1-1/8-12UNF-3B	1.625 +.002 -.020	1.88	.125	.531	50(.070)
20	1-1/4-12UNF-3B	1.750 +.002 -.022	2.02	.125	.563	50(.070)
22	1-3/8-12UNF-3B	1.875 +.002 -.024	2.16	.125	.594	50(.070)
24	1-1/2-12UNF-3B	2.000 +.002 -.025	2.31	.125	.625	50(.070)
26	1-5/8-12N-3B	2.125 +.002 -.027	2.45	.125	.656	50(.070)
28	1-3/4-12UN-3B	2.250 +.002 -.028	2.60	.125	.688	50(.070)
30	1-7/8-12N-3B	2.375 +.002 -.030	2.74	.125	.719	50(.070)
32	2-12UN-3B	2.625 +.002 -.030	3.04	.125	.750	50(.070)
34	2-1/8-12N-3B	2.750 +.002 -.031	3.18	.125	.781	50(.070)
36	2-1/4-12UN-3B	2.875 +.002 -.032	3.32	.125	.812	50(.070)

Code: Dash number designates thread size as noted in the above table.

Example: NAS509-4 = Jam nut with 1/4-28UNF-3B right hand thread.

Material: Steel, SAE 4130

Heat-treat: Rockwell C33-38

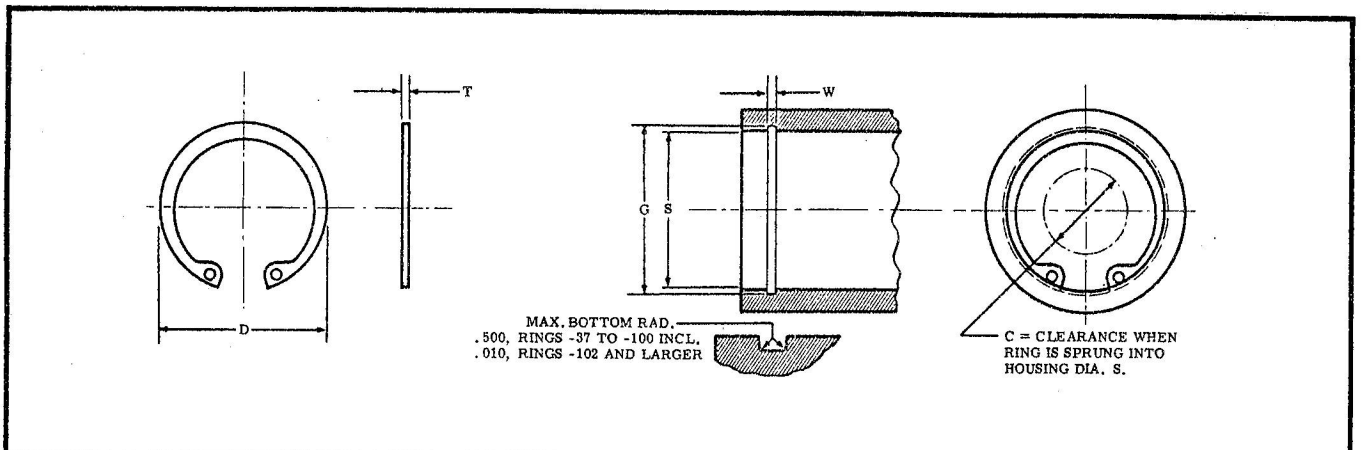
(150,000 psi min TS)

Tolerances: Unless otherwise specified, decimals,  $\pm .010$ ; angles,  $\pm 1^\circ$ .

Finish: Cadmium plate, see EO 05-1-3/2.

- Notes:
1. This nut is intended for use with the NAS513 keyed washer for positive locking of rod end terminals to hydraulic piston rods.
  2. All machined surfaces 250.
  3. Parts shall be magnafluxed.
  4. Remove all burrs and sharp edges.
  5. Surface to be square with thread within .003 inches per inch diameter.

Figure 8 Table of NAS509 Drilled Jam Nuts



Dash No.	Housing		Ring Dimensions					Engineering Information			
	Diameter		Free Diam.		Thickness		C	Groove Diam.		Groove Width	
	S In.	S Mm.	D In.	Tol. In.	T In.	Tol. In.	Max. In.	G In.	Tol. In.	W In.	Tol. In.
37	.375	9.5	.403	+ .005	.025	± .0016	.19	.397		.028	
43	.438	11	.468	- .002	.025		.22	.461	± .002	.028	
50	.500	13	.533		.035		.23	.524		.039	
56	.562	14.5	.607		.035		.27	.592		.039	
62	.625	16	.675		.035		.33	.659		.039	
68	.688	17.5	.742		.035		.37	.724		.039	+ .003
75	.750	19	.808	+ .010	.035		.43	.790	± .003	.039	- .000
77	.777	20	.836	- .005	.042		.45	.819	.002	.046	
81	.812	21	.877		.042		.47	.857	T. I. R.	.046	
87	.875	22	.944		.042		.51	.922		.046	
90	.901	23	.970		.042		.52	.950		.046	
93	.938	24	1.015		.042		.54	.989		.046	
100	1.000	25.5	1.081		.042	± .002	.59	1.055		.046	
102	1.023	26	1.106		.042		.60	1.079		.046	
106	1.062	27	1.150		.050		.65	1.120		.056	
112	1.125	28.5	1.217		.050		.71	1.185		.056	
118	1.188	30	1.283		.050		.77	1.250		.056	
125	1.250	32	1.351	+ .015	.050		.82	1.320	± .004	.056	
131	1.312	33	1.418	- .010	.050		.87	1.385	.003	.056	+ .004
137	1.375	35	1.486		.050		.92	1.450	T. I. R.	.056	- .000
143	1.438	36.5	1.552		.050		.98	1.515		.056	
145	1.456	37	1.572		.050		1.00	1.535		.056	
150	1.500	38	1.622		.050		1.04	1.580		.056	
156	1.562	40	1.688		.062		1.09	1.647		.068	
162	1.625	41	1.756		.062		1.14	1.715		.068	
165	1.653	42	1.786		.062		1.16	1.745	± .005	.068	
168	1.688	43	1.823	+ .020	.062	± .003	1.20	1.780	.003	.068	
175	1.750	44.5	1.891	- .013	.062		1.26	1.845	T. I. R.	.068	
181	1.812	46	1.958		.062		1.31	1.910		.068	
185	1.850	47	1.998		.062		1.34	1.949		.068	

Figure 9 (Sheet 1 of 2) Table of NAS50 Internal Retainer Rings

Dash No.	Housing		Ring Dimensions				Engineering Information				
	Diameter		Free Diam.		Thickness		C	Groove Diam.		Groove Width	
	S In.	S Mm.	D In.	Tol. In.	T In.	Tol. In.	Max. In.	G In.	Tol. In.	W In.	Tol. In.
187	1.875	47.5	2.025	+.020 -.013	.062		1.36	1.975	±.005	.068	+.004 -.000
193	1.938	49	2.095		.062		1.41	2.040	.003	.068	
200	2.000	51	2.160		.062		1.47	2.110	T. I. R.	.068	
206	2.062	52.5	2.225	+.025 -.015	.078		1.54	2.175		.086	
212	2.125	54	2.295		.078		1.58	2.240		.086	
218	2.188	55.5	2.365		.078		1.63	2.305		.086	
225	2.250	57	2.435		.078		1.69	2.370		.086	
231	2.312	59	2.500		.078		1.75	2.440		.086	
237	2.375	60.5	2.567		.078		1.81	2.505		.086	
244	2.440	62	2.634		.078		1.86	2.570		.086	
250	2.500	63.5	2.700		.078		1.91	2.635		.086	
253	2.531	64.5	2.733		.078		1.93	2.668		.086	
256	2.562	65	2.760		.093		1.96	2.700		.103	
262	2.625	66.5	2.840		.093		2.02	2.765		.103	
268	2.688	68	2.907		.093		2.09	2.834		.103	
275	2.750	70	2.975		.093		2.16	2.900		±.006	
281	2.813	71.5	3.040	+.030	.093	±.003	2.20	2.965	.004	.103	+.005 -.000
283	2.834	72	3.063	-.020	.093		2.22	2.987	T. I. R.	.103	
287	2.875	73	3.105	.093	2.24		3.030	.103			
300	3.000	76	3.245	.093	2.35		3.165	.103			
306	3.062	78	3.310	.109	2.41		3.230	.120			
312	3.125	79.5	3.377	.109	2.46		3.295	.120			
315	3.156	80	3.408	.109	2.53		3.328	.120			
325	3.250	82.5	3.509	.109	2.59		3.426	.120			
334	3.346	85	3.611	.109	2.67		3.525	.120			
347	3.469	88	3.746	.109	2.75		3.657	.120			
350	3.500	89	3.780	.109	2.79		3.690	.120			
354	3.543	90	3.826	.109	2.82		3.735	.120			
356	3.562	90.5	3.850	.109	2.84		3.756	.120			
375	3.750	95	4.060	.109	3.00	3.955	.120				
387	3.875	98.5	4.205	.109	3.11	4.087	.120				
393	3.938	100	4.283	.109	3.18	4.150	.120				
400	4.000	102	4.350	.109	3.23	4.220	.120				

Part Number Example: NAS 50-306N: Ring for 3.062 nom. dia. bore, oiled or greased only, no plating. Dash number indicates bore nom. dia. in hundredths.  
 Material: Steel, S.A.E. 1065-1090, H. T. 238,000 - 280,000 psi, tensile.  
 Installation: Use long-nose or installation pliers.

#### Corrosion Protection:

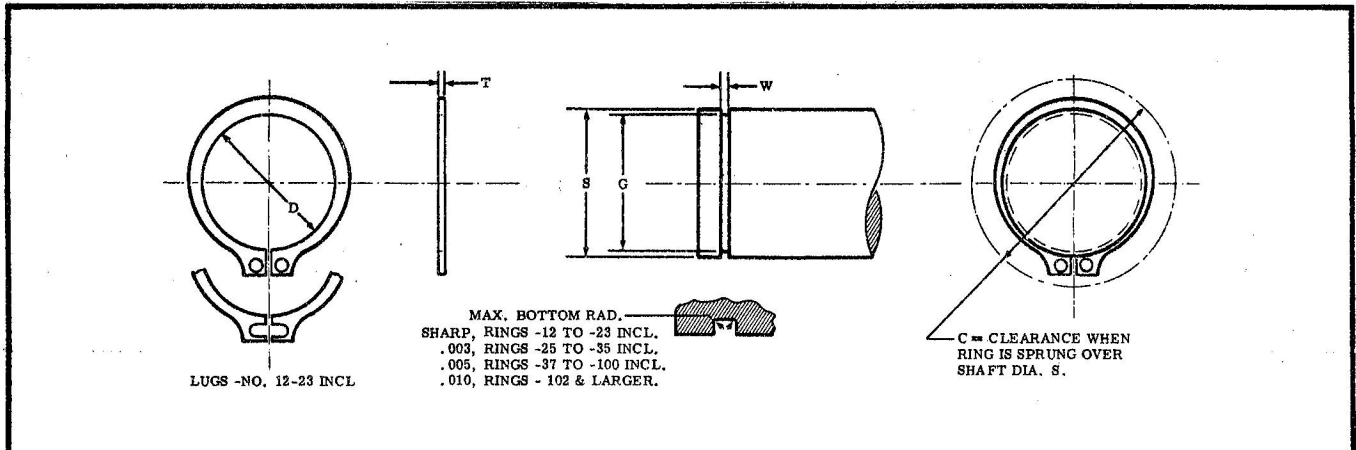
Unplated: Coat with corrosion prevention compound, specification AN-C-52, suffix N to dash number.

Parkerize: Suffix P to dash number.

Cadmium Plate: No suffix to dash number.

Figure 9 (Sheet 2 of 2) Table of NAS50 Internal Retainer Rings





Dash No.	Shaft		Ring Dimensions					Engineering Information			
	Diameter		Free Diam.		Thickness		C	Groove Diam.		Groove Width	
	S In.	S mm	D In.	Tol. In.	T In.	Tol. In.	Min. In.	G In.	Tol. In.	W In.	Tol. In.
12	.125	3.2	.112	+.002 -.004	.010	±.0005	.40	.117	±.0015 .0015 T.I.R.	.012	+.002 -.000
15	.156	4	.140		.010	±.001	.44	.146		.012	
18	.188	4.7	.168		.015		.47	.175		.017	
19	.197	5	.179		.015		.48	.185		.017	
21	.219	5.5	.196		.015		.50	.205		.017	
23	.236	6	.215		.015		.52	.222		.017	
25	.250	6.5	.225		.025		±.0015	.54		.230	
27	.275	7	.250	.025	.56	.255		.028			
31	.312	8	.281	.025	.61	.290		.028			
35	.354	9	.320	.025	.66	.330		.028			
37	.375	9.5	.338	.025	.68	.352		.028			
39	.393	10	.354	.025	.70	.369		.028			
40	.406	10.5	.366	.025	.71	.382		.028			
43	.438	11	.395	.025	.75	.412		.028			
46	.469	12	.428	.025	.77	.443		.028			
50	.500	13	.461	.035	±.002	.80		.474	.039	±.003 .002 T.I.R.	+.003 -.000
55	.551	14	.509	.035		.87	.524	.039			
56	.562	14.5	.521	.035		.89	.535	.039			
59	.594	15	.550	.035		.93	.565	.039			
62	.625	16	.579	.035		.97	.596	.039			
66	.669	17	.618	.035		1.00	.638	.039			
68	.688	17.5	.635	.042		1.03	.655	.046			
75	.750	19	.693	.042		1.10	.715	.046			
78	.781	20	.722	.042		1.14	.745	.046			
81	.812	21	.751	.042		1.16	.776	.046			
87	.875	22	.810	.042	1.24	.835	.046				
93	.938	24	.867	.042	1.31	.894	.046				

Figure 10 (Sheet 1 of 2) Table of NAS51 External Retainer Rings

Dash No.	Shaft		Ring Dimensions				Engineering Information							
	Diameter		Free Diam.		Thickness		C	Groove Diam.		Groove Width				
	S In.	S mm.	D In.	Tol. In.	T In.	Tol. In.	Min. In.	G In.	Tol. In.	W In.	Tol. In.			
98	.984	25	.910	+ .005	.042	± .002	1.36	.940	± .003	.046	+ .003			
100	1.000	25.5	.925	- .010	.042		1.38	.955	.002 T.I.R.	.046	- .000			
102	1.023	26	.946	+ .010 - .015	.042		1.41	.977	± .004 .003 T.I.R.	.046	+ .004 - .000			
106	1.062	27	.982		.050		1.45	1.015		.056				
112	1.125	28.5	1.041		.050		1.52	1.075		.056				
118	1.188	30	1.098		.050		1.63	1.135		.056				
125	1.250	32	1.156		.050		1.73	1.195		.056				
131	1.312	33	1.214		.050		1.80	1.250		.056				
137	1.375	35	1.272		.050		1.87	1.310		.056				
143	1.438	36.5	1.333		.050		1.94	1.370		.056				
150	1.500	38	1.387		.050		2.00	1.430		.056				
156	1.562	40	1.446		+ .013 - .020		.062	2.08		1.490		± .005 .003 T.I.R.	.068	+ .004 - .000
162	1.625	41	1.503				.062	2.14		1.550			.068	
175	1.750	44.5	1.618				.062	2.28		1.670			.068	
177	1.771	45	1.637				.062	2.33		1.689			.068	
181	1.812	46	1.675			.062	2.34	1.730		.068				
187	1.875	47.5	1.735			.062	2.41	1.790		.068				
196	1.969	50	1.819	.062		2.50	1.879	.068						
200	2.000	51	1.850	.062		2.54	1.910	.068						
206	2.062	52.5	1.906	+ .015 - .025		.078	2.62	1.970	± .006 .004 T.I.R.	.086	+ .005 - .000			
212	2.125	54	1.964			.078	2.68	2.027		.086				
215	2.156	55	1.993		.078	2.72	2.057	.086						
225	2.250	57	2.081		.078	2.82	2.145	.086						
231	2.312	59	2.139		.078	2.88	2.205	.086						
237	2.375	60.5	2.197		.078	2.95	2.265	.086						
250	2.500	63.5	2.313		.078	3.08	2.385	.086						
255	2.559	65	2.377		+ .020 - .030	.078	3.16	2.451		± .006 .004 T.I.R.		.086	+ .005 - .000	
262	2.625	66.5	2.428			.078	3.21	2.505				.086		
275	2.750	70	2.543			.093	3.35	2.625				.103		
287	2.875	73	2.659	.093		3.48	2.742	.103						
293	2.938	74.5	2.717	.093		3.55	2.801	.103						
300	3.000	76	2.775	.093		3.62	2.860	.103						

Part Number Example: NAS 51-231N: Ring for 2.312 nom. dia. shaft, oiled or greased only, no plating. Dash No. indicates shaft nom. dia. in hundredths.

Installation: Use long-nose or installation pliers.

Material: Sizes dash 12 to dash 23 incl. only, beryllium copper, H. T. 180,000 - 200,000 psi tensile. Note: these sizes were formerly steel and are inter-

changeable. Sizes dash 25 and larger, steel, S. A. E. 1065 - 1090, H. T. 238,000 - 280,000 psi tensile.

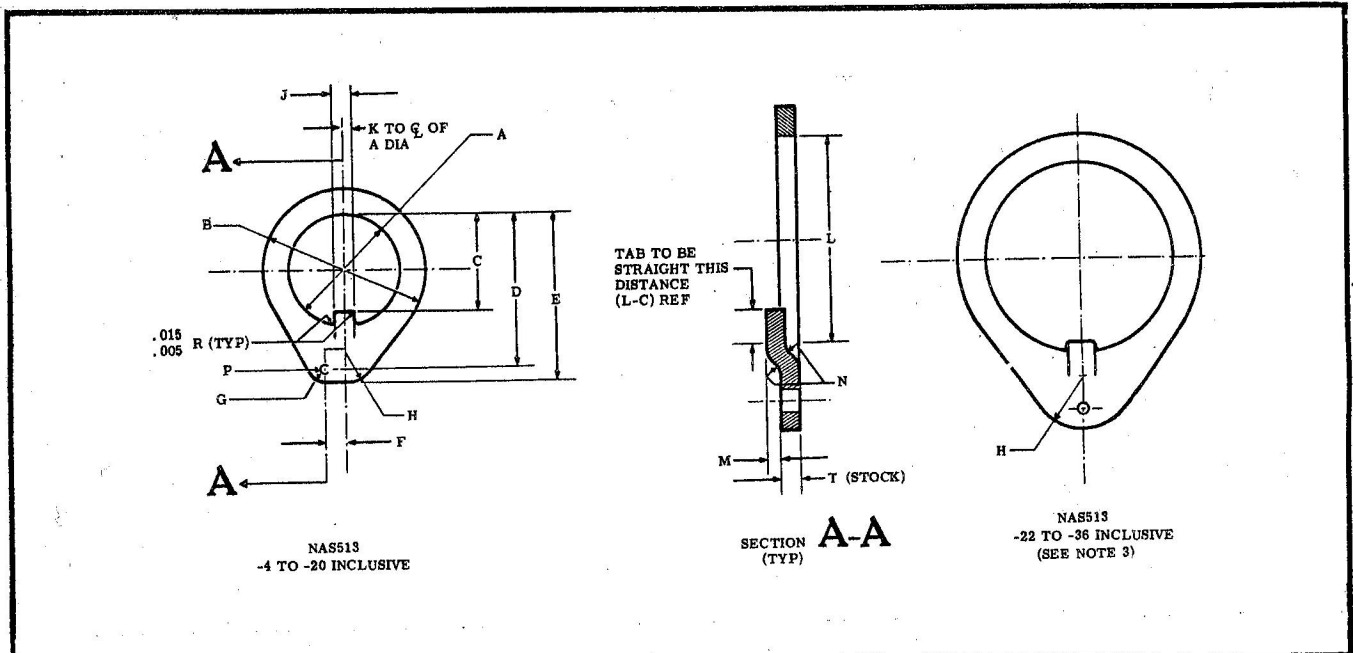
#### Corrosion Protection:

Unplated: Coat with corrosion prevention compound, specification AN-C-52. Suffix N to dash number.

Parkerize: Suffix P to dash No.

Cadmium Plate: No suffix to dash No.

Figure 10 (Sheet 2 of 2) Table of NAS51 External Retainer Rings



Dash No.	Terminal Thread Size (Ref)	A Dia.	B Dia. +.02 -.00	C	D ±.016	E ±.016
4	1/4 -28UNF-3A	.272±.005	.44	.214±.005	.406	.500
5	5/16-24UNF-3A	.334±.005	.50	.273±.005	.484	.578
6	3/8 -24UNF-3A	.396±.008	.56	.327±.008	.562	.636
7	7/16-20UNF-3A	.459±.008	.63	.386±.008	.625	.719
8	1/2 -20UNF-3A	.520±.008	.75	.450±.008	.719	.813
9	9/16-18UNF-3A	.583±.008	.88	.496±.010	.812	.906
10	5/8 -18UNF-3A	.647±.010	1.00	.559±.010	.937	1.031
12	3/4 -16UNF-3A	.772±.010	1.12	.681±.010	1.062	1.158
14	7/8 -14UNF-3A	.897±.010	1.31	.795±.010	1.250	1.344
16	1 -14NF-3A	1.022±.010	1.50	.918±.010	1.422	1.516
18	1-1/8 -12UNF-3A	1.147±.010	1.62	1.028±.010	1.547	1.656
20	1-1/4 -12UNF-3A	1.272±.010	1.75	1.154±.010	1.687	1.796
22	1-3/8 -12UNF-3A	1.397±.010	1.88	1.254±.010	1.859	1.969
24	1-1/2 -12UNF-3A	1.518±.010	2.00	1.379±.010	1.969	2.078
26	1-5/8 -12N-3A	1.643±.010	2.12	1.495±.010	2.109	2.249
28	1-3/4 -12UN-3A	1.766±.010	2.29	1.607±.010	2.266	2.375
30	1-7/8 -12N-3A	1.891±.010	2.38	1.732±.010	2.375	2.484
32	2 -12UN-3A	2.016±.010	2.63	1.857±.010	2.594	2.703
34	2-1/8 -12N-3A	2.141±.010	2.75	1.973±.010	2.750	2.860
36	2-1/4 -12UN-3A	2.266±.010	2.88	2.098±.010	2.875	2.984

Figure 11 (Sheet 1 of 2) Table of NAS513 Rod End Locking Washers

Dash No.	F ±.031	G Rad	H Rad	J ±.005	K	L ±.031	M ±.005	N Rad	T	P Dia.
4	.125	.094	.094	.052	.026 ± .005	.293	.036	.031	.050	.062
5	.125	.094	.094	.052	.026 ± .005	.355	.036	.031	.050	.062
6	.125	.094	.094	.082	.041 ± .005	.418	.036	.031	.050	.062
7	.125	.094	.094	.082	.041 ± .005	.463	.049	.031	.063	.062
8	.156	.094	.156	.082	.041 ± .005	.542	.049	.031	.063	.062
9	.188	.094	.156	.114	.057 ± .005	.597	.057	.062	.071	.071
10	.188	.094	.188	.114	.057 ± .005	.675	.057	.062	.071	.071
12	.188	.094	.188	.114	.057 ± .005	.800	.057	.062	.071	.071
14	.188	.094	.250	.142	.071 ± .007	.944	.066	.062	.080	.080
16	.188	.094	.250	.142	.071 ± .007	1.088	.074	.062	.090	.090
18	.219	.109	.313	.174	.087 ± .007	1.213	.074	.062	.090	.090
20	.219	.109	.313	.174	.087 ± .007	1.280	.096	.094	.112	.112
22			.375	.236	.118 ± .007	1.405	.096	.094	.112	.112
24			.375	.236	.118 ± .007	1.530	.096	.094	.112	.112
26			.375	.236	.118 ± .007	1.638	.109	.094	.125	.125
28			.500	.298	.149 ± .007	1.763	.109	.094	.125	.125
30			.500	.298	.149 ± .007	1.888	.109	.094	.125	.125
32			.500	.298	.149 ± .007	2.076	.109	.094	.125	.125
34			.500	.298	.149 ± .007	2.201	.109	.094	.125	.125
36			.500	.298	.149 ± .007	2.326	.109	.094	.125	.125

Code: Dash number designates washer size as noted in the above table.

Example: NAS513-4 Lockwasher for use with a 1/4-28UNF-3A rod end terminal and an NAS509-4 jam nut.

Material: Spring steel, SAE1095, Spec. AN QQ-S-666, condition cold rolled and annealed.

Finish: Cadmium plate.

Heat-treat: Rockwell C40-45, Spec. MIL-H-6875.

Tolerance: Unless otherwise specified, decimals ±.010, angles ±1°.

- Notes: 1. This washer is intended for use with the NAS509 jam nut for positive locking of rod end terminals to hydraulic piston rods.  
 2. Washer face surfaces must be flat within .010 inch.  
 3. Unless otherwise specified, dimensions of NAS513-4 to -20 are identical to NAS513-22 to -36.

Figure 11 (Sheet 2 of 2) Table of NAS513 Rod End Locking Washers

**MISCELLANEOUS DEVICES**

8 For tables of other safetying media, see Figures 7 to 11 inclusive.

**MATERIAL SPECIFICATIONS**

9 For table showing item numbers, materials, specifications and manufacturers, see Figure 12.

Item No.	Material	RCAF Ref.	Spec.
1	Cotter-pin AN381	28/	FF-P-386
2	Washer, Tab SAE1010 NAS460	28/	
3	Washer, Lock AN935	28/	FF-M-84
4	Washer, Lock AN936	28/	MIL-W-6986

Figure 12 Table of Material Specifications

