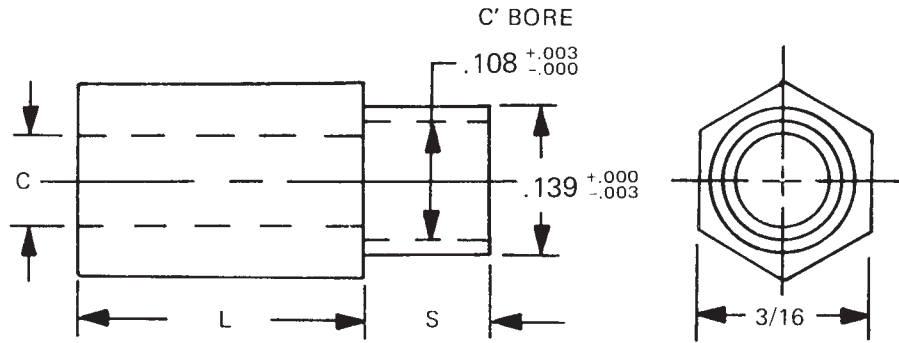


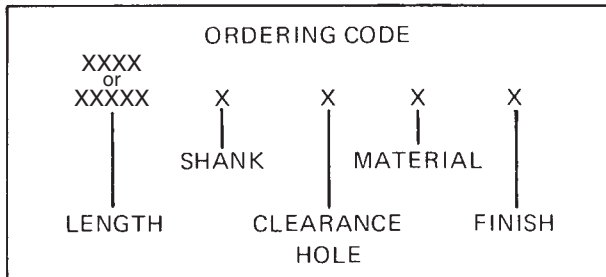
# 3/16 HEX SWAGE SPACERS



See page iv for installation information

L = SPACER LENGTH  
 S = SHANK LENGTH  
 P = BOARD THICKNESS  
 C = THREAD CLEARANCE HOLE

See page 9 for finish codes  
 For non-standard parts contact Sales Office



SWAGE TOOLING		
PUNCH	ANVIL	LENGTH
P-3	AH-48	3/32-3/16
	AH-49	7/32-7/16
	AH-50	15/32-11/16
	AH-51	23/32-1"

SWAGE/PANEL CODE		
±.003	S	P
.075	A	1/32
.105	B	1/16
.135	C	3/32
.165	D	1/8
.230	E	3/16
.290	F	1/4

LENGTH	PART NO.
3/32	1546A
1/8	1546
5/32	1546T
3/16	1547
7/32	1547T
1/4	1548
9/32	1548T
5/16	1549
11/32	1549T
3/8	1550
13/32	1550T
7/16	1551
15/32	1551T
1/2	1552
17/32	1552T

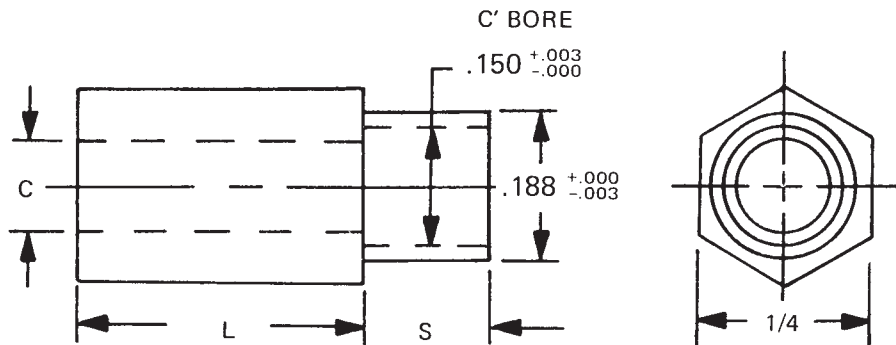
LENGTH	PART NO.
9/16	1553
19/32	1553T
5/8	1554
21/32	1554T
11/16	1555
23/32	1555T
3/4	1556
25/32	1556T
13/16	1557
27/32	1557T
7/8	1558
29/32	1558T
15/16	1559
31/32	1559T
1"	1560

HOLE CLEARANCE CODE	
+ .010 - .000	CODE
.090	2
.101	3

MATERIAL	CODE	RoHS
Aluminum	AL	YES
Brass	B	YES
Stainless Steel	SS	YES
Steel	S	YES



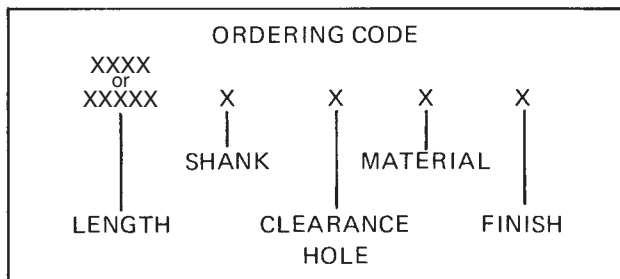
# 1/4 HEX SWAGE SPACERS



L = SPACER LENGTH  
 S = SHANK LENGTH  
 P = BOARD THICKNESS  
 C = THREAD CLEARANCE HOLE

See page iv for installation information

See page 9 for finish codes  
 For non-standard parts contact Sales Office



SWAGE TOOLING		
PUNCH	ANVIL	LENGTH
P-4	AH-52	3/32-3/16
	AH-53	7/32-7/16
	AH-54	15/32-11/16
	AH-55	23/32-1"

SWAGE/PANEL CODE		
±.003	S	P
.075	A	1/32
.105	B	1/16
.135	C	3/32
.165	D	1/8
.230	E	3/16
.290	F	1/4

LENGTH	PART NO.
3/32	1561A
1/8	1561
5/32	1561T
3/16	1562
7/32	1562T
1/4	1563
9/32	1563T
5/16	1564
11/32	1564T
3/8	1565
13/32	1565T
7/16	1566
15/32	1566T
1/2	1567
17/32	1567T

LENGTH	PART NO.
9/16	1568
19/32	1568T
5/8	1569
21/32	1569T
11/16	1570
23/32	1570T
3/4	1571
25/32	1571T
13/16	1572
27/32	1572T
7/8	1573
29/32	1573T
15/16	1574
31/32	1574T
1"	1575

HOLE CLEARANCE CODE	
+ .010 - .000	CODE
.090	2
.101	3
.115	4
.140	6

MATERIAL	CODE	RoHS
Aluminum	AL	YES
Brass	B	YES
Stainless Steel	SS	YES
Steel	S	YES



# MATERIALS

MATERIAL ROD & BAR	ORDERING CODE	MATERIAL SPECIFICATIONS	RoHS COMPLIANT
Aluminum	AL	QQ-A-225/3D, QQ-A-225/6A, QQ-A-225/8B, QQ-A-200/9D	YES
Brass	B	ASTM-B-16	YES
Nylon	N	LP-410A, D 4066	YES
Phenolic – Paper	PH	MIL-P-79 Type PBE, MIL-I-24768/10	YES
Phenolic – Linen	PHL	MIL-P-79 Type FBE, MIL-I-24768/13	YES
Steel	S	ASTM-A108-07	YES
Stainless Steel	SS	ASTM-A-581, A-582	YES
Teflon	TE	ASTM-1710	YES
Delrin	D	ASTM-D-4181	YES

\* Non RoHS Compliant Finish

## FINISH CODES

* 1	Cadmium (Commercial) (Special Order Only)	25	Black Oxide, Brass MIL-F-495E
* 2	Cadmium QQ-P-416F-Class 2 Type-1 (Clear Chromate) (Special Order Only)	26	Black Oxide, Stainless Steel, Steel Mil-DTL-13924D, Class 1 and 4
* 3	Cadmium QQ-P-416F-Class 2 Type-2 (Yellow Chromate) (Special Order Only)	27	Electro Tin Solder (60/40) per M222-MIL-F-14072D
4	Chrome Over Nickel	28	Zinc Plate .0002 ASTM-B-633 (Yellow Chromate)
5	Nickel QQ-N-290 Class 1 Grade G	29	Brushed Finish – Handles Only
* 6	Iridite #14 (Gold) MIL-DTL-5541F	30	Brushed Finish – Clear Lacquer – Handles Only
7	Iridite (Clear) MIL-DTL-5541F	31	Brushed Satin – Handles Only
* 9	Alodine 1200	32	Brushed Satin – Clear Anodize – Handles Only
10	Chrome QQ-C-320B Class 1 Type I (Bright Finish)	33	Brushed Satin – Black Anodize – Handles Only
11	Chrome QQ-C-320B Class 1 Type II (Satin Finish)	34	Satin Finish – Clear Anodize
12	Zinc .0002 ASTM-B-633 (Clear Chromate)	35	Satin Finish – Black Anodize
13	Bright Dip – Brass	36	Anodize MIL-A-8625F Black High Luster
14	Bright Tin ASTM B545 over Copper Flash Mil-C-14550	37	Ductile Nickel
15	Hot Tin Dip MIL-T-10727C Type II	38	Polished Nickel – Handles Only
16	Electro Tin ASTM B545 Class A, B or C	39	Caustic Etch and Lacquer
19	Caustic Etch	40	Semi-Frost Anodize (Clear)
20	Passivate MIL-F-14072E	41	Semi-Frost Anodize (Black)
21	Anodize MIL-A-8625F – Type II Class 2 (Sulfuric) Chemical Seal (Dark Grey)	42	Black Zinc
22	Anodize MIL-A-8625F – Type II Class 1 (Sulfuric) Hot Water Seal (Clear)	43	Blue Zinc
23	Anodize MIL-A-8625F – Type II Class 2 (Sulfuric) Chemical Seal (Yellow Green)	44	Electro Tin with Nickel Undercoat Per Mil-T-10727C
24	Anodize MIL-A-8625F – Type II Class 2 (Sulfuric) Chemical Seal (Black)	45	Passivate QQ-P-35C Type VI
		46	Passivate ASTM A 967 Nitric 1
		47	Passivate ASTM A 380-96
		48	Passivate AMS 2700 Type 2

## NOTES

Responsibility ends with customer inspection or 10 days after customer receives parts. No returns will be accepted without prior approval from factory in writing.

All parts are stocked in plain finish. Parts will be plated to customer specification.

The items in this catalog are designed and manufactured to be functional. Engineering evaluation and quality assurance evaluations should be accomplished with functionality as a prime criteria.

RAF reserves the right to change any specifications, tolerances and plating types, for any products listed in this REFERENCE MANUAL without prior notice, provided the function of the item is not changed.

All custom (non-catalog) items are subject to an over shipment or under shipment of up to 10% of the order quantity. The price quotation from RAF will clearly identify these items.

## ILLUSTRATION OF THE SWAGING PROCESS

Follow these instructions for a superior installation of both plain swage standoffs and knurled swage standoffs. Knurled swage standoffs offer more holding power than plain standoffs, and eliminate electrical connection breaks due to loosening and spinning of the standoff because of high torque stresses.

### HOLE SPECIFICATIONS

#### Plain Swage Standoff

A plain swage standoff (no knurl) requires a *STRAIGHT HOLE*. The hole diameter in the board or panel is the same as the shank (or shoulder) diameter of the standoff with a **tolerance of  $+.003"/-0.000"$  ( $+.076\text{ mm}/-.000\text{ mm}$ )**.

#### Partial Knurl or Full Knurl Swage Standoff

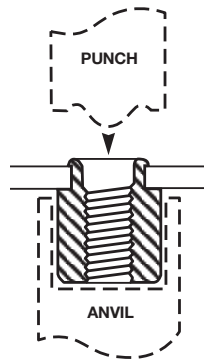
A partial knurl or full knurl swage standoff requires a *STRAIGHT HOLE* in a printed circuit board. The hole diameter in the board is  **$.010"$  to  $.012"$**  smaller than the shank (or shoulder) diameter of the standoff with a **tolerance of  $+.005"/-0.000"$  ( $+.13\text{ mm}/-.000\text{ mm}$ )**.

### METHODS OF INSTALLATION

#### Swage

While some dimensions of the punch and anvil change with the size of the swage standoffs, the following dimensions remain constant:

- The punch is 2.5" in overall length and .5" OD
- The anvil is 1" in overall length and .5" OD with a 1/2-24 external thread
- Punch and anvil part numbers for swaging are listed on the individual pages of plain and partial knurl swage standoffs



#### Flare

- Flare tool is not supplied
- Flare angle should be same as countersink angle
- For flush flaring into countersunk hole use shank length .020" shorter than board thickness

