

TAP and DRILL INFORMATION

WARNING: Cutting tools may shatter when broken. An approved form of eye protection is strongly recommended.

DRILLING Drilling the hole is the first step of most tapping jobs. First, determine what tap you need, (this is decided by the size of the screw to be used) then refer to Table 1 under the Tap Drill Column and select the proper size drill for that tap. Do not substitute drill sizes since a slight difference in diameter may cause trouble and produce unsatisfactory results. Next, locate the position for the hole and mark it with a center punch. If possible, secure the part in a vice to hold it while drilling. Most often you will be drilling by hand with a pin vice, however using a drill press is basically the same. In any case, care must be taken not to break these tiny drills or taps. Apply a drop of lubricant, (metal only - not plastic. See Table 2) to the point where hole is to be made and start drilling with gentle pressure. As you start, watch the point of the drill to make sure it does not jump off center. Also, make sure you are holding the drill at a right angle to the part. An inaccurately held drill or part will cause the drill to cut at an angle. If using a drill press, release the pressure on the drill frequently to avoid overheating and apply more oil as needed. When the hole is complete, clean away the burrs.

TAPPING Place the tap in your pin vice (do not use drill press), leaving about one-half its length projecting. Dip the tip of the tap in oil (for metal only) and tap the hole by turning clockwise. Hold the tap in a straight line with the hole at all times. Reverse the tap a half turn at frequent intervals to break the chips loose (metal). Remove the tap after five or six complete turns, wipe off any chips and apply more oil.

HELPFUL HINTS If you countersink the hole slightly before tapping, it makes it easier to start the threads. Avoid forcing the tap. If it won't turn, back it out and see why. When two parts are to be held together with screws, drill the part that goes next to the head of the screw with a clearance drill and tap the other piece. This allows the screw to pass through the first part without engaging any threads, and lets you tighten one part against the other. Do not over tighten any screw, especially in plastic.

DEFINITIONS CLEARANCE DRILL: Drill used to provide hole large enough for screw to pass easily through material.

PIN VICE: A handle or holder used to grip small drills and taps for hand drilling and tapping procedures.

TAP: Tool for cutting an internal thread in a tap drill hole.

TAP DRILL: Drill used to provide sufficient thread material when tapped.

TABLE 1 TAP DRILL SIZES AND INFORMATION

SIZE	OUTSIDE DIAMETER	THREAD DEPTH	TAP DRILL	CLEARANCE DRILL
0000 - 160	.0210	.0041	#78	#73
000 - 120	.0340	.0054	#71	#63
00 - 112	.0470	.0058	#61	#56
00 - 96	.0470	.0068	#62	#56
00 - 90	.0470	.0072	#62	#56
0 - 80	.0600	.0081	#55	#52
1 - 64	.0730	.0101	#53	#48
1 - 72	.0730	.0090	#53	#48
2 - 56	.0860	.0116	#50	#43
2 - 64	.0860	.0101	#49	#43

TABLE 2 TAPABLE MATERIALS, TAPS, THREAD PERCENTAGES, and LUBRICANTS

MATERIAL	TAP	THREAD % TO 1-1/2 D.	LUBRICANT
Aluminum	CS 2 Flute (Gun)	65	Kerosene
Brass	CS 3 Flute	65	Soluble or Light Base Oil
Bronze	CS 3 Flute	65	Soluble or Light Base Oil
Copper	CS 3 Flute	65	Soluble or Light Base Oil
Die Cast	CS 2 Flute (Gun)	70	Light Base Oil
Nickel Silver	CS or HSS 2 or 3 Flute	60	Sulfur Base Oil
Steel, Free Mach.	CS or HSS 2 or 3 Flute	65	Sulfur Base Oil
Stainless Steel and Alloys	HSS 2 and 3 Flute or 2 Flute (Gun)	50-55	Sulfur Base Oil

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Decimal	Inch	Wire	mm	Decimal	Inch	Wire	mm	Decimal	Inch	Wire	mm	Decimal	Inch	Wire	mm	Decimal	Inch	Wire	mm
0.135	1/8	80	2.0	0.138	1/8	79	2.0	0.145	1/8	78	2.0	0.158	1/8	77	2.0	0.165	1/8	76	2.0
0.158	1/8	75	1.9	0.165	1/8	74	1.9	0.175	1/8	73	1.9	0.185	1/8	72	1.9	0.195	1/8	71	1.9
0.205	1/8	70	1.8	0.215	1/8	69	1.8	0.225	1/8	68	1.8	0.235	1/8	67	1.8	0.245	1/8	66	1.8
0.255	1/8	65	1.7	0.265	1/8	64	1.7	0.275	1/8	63	1.7	0.285	1/8	62	1.7	0.295	1/8	61	1.7
0.305	1/8	60	1.6	0.315	1/8	59	1.6	0.325	1/8	58	1.6	0.335	1/8	57	1.6	0.345	1/8	56	1.6
0.355	1/8	55	1.5	0.365	1/8	54	1.5	0.375	1/8	53	1.5	0.385	1/8	52	1.5	0.395	1/8	51	1.5
0.405	1/8	50	1.4	0.415	1/8	49	1.4	0.425	1/8	48	1.4	0.435	1/8	47	1.4	0.445	1/8	46	1.4
0.455	1/8	45	1.3	0.465	1/8	44	1.3	0.475	1/8	43	1.3	0.485	1/8	42	1.3	0.495	1/8	41	1.3
0.505	1/8	40	1.2	0.515	1/8	39	1.2	0.525	1/8	38	1.2	0.535	1/8	37	1.2	0.545	1/8	36	1.2
0.555	1/8	35	1.1	0.565	1/8	34	1.1	0.575	1/8	33	1.1	0.585	1/8	32	1.1	0.595	1/8	31	1.1
0.605	1/8	30	1.0	0.615	1/8	29	1.0	0.625	1/8	28	1.0	0.635	1/8	27	1.0	0.645	1/8	26	1.0
0.655	1/8	25	0.9	0.665	1/8	24	0.9	0.675	1/8	23	0.9	0.685	1/8	22	0.9	0.695	1/8	21	0.9
0.705	1/8	20	0.8	0.715	1/8	19	0.8	0.725	1/8	18	0.8	0.735	1/8	17	0.8	0.745	1/8	16	0.8
0.755	1/8	15	0.7	0.765	1/8	14	0.7	0.775	1/8	13	0.7	0.785	1/8	12	0.7	0.795	1/8	11	0.7
0.805	1/8	10	0.6	0.815	1/8	9	0.6	0.825	1/8	8	0.6	0.835	1/8	7	0.6	0.845	1/8	6	0.6
0.855	1/8	5	0.5	0.865	1/8	4	0.5	0.875	1/8	3	0.5	0.885	1/8	2	0.5	0.895	1/8	1	0.5
0.905	1/8	0	0.4	0.915	1/8	0	0.4	0.925	1/8	0	0.4	0.935	1/8	0	0.4	0.945	1/8	0	0.4
0.955	1/8	0	0.3	0.965	1/8	0	0.3	0.975	1/8	0	0.3	0.985	1/8	0	0.3	0.995	1/8	0	0.3
1.005	1/8	0	0.2	1.015	1/8	0	0.2	1.025	1/8	0	0.2	1.035	1/8	0	0.2	1.045	1/8	0	0.2
1.055	1/8	0	0.1	1.065	1/8	0	0.1	1.075	1/8	0	0.1	1.085	1/8	0	0.1	1.095	1/8	0	0.1
1.105	1/8	0	0.0	1.115	1/8	0	0.0	1.125	1/8	0	0.0	1.135	1/8	0	0.0	1.145	1/8	0	0.0
1.155	1/8	0	0.0	1.165	1/8	0	0.0	1.175	1/8	0	0.0	1.185	1/8	0	0.0	1.195	1/8	0	0.0
1.205	1/8	0	0.0	1.215	1/8	0	0.0	1.225	1/8	0	0.0	1.235	1/8	0	0.0	1.245	1/8	0	0.0
1.255	1/8	0	0.0	1.265	1/8	0	0.0	1.275	1/8	0	0.0	1.285	1/8	0	0.0	1.295	1/8	0	0.0
1.305	1/8	0	0.0	1.315	1/8	0	0.0	1.325	1/8	0	0.0	1.335	1/8	0	0.0	1.345	1/8	0	0.0
1.355	1/8	0	0.0	1.365	1/8	0	0.0	1.375	1/8	0	0.0	1.385	1/8	0	0.0	1.395	1/8	0	0.0
1.405	1/8	0	0.0	1.415	1/8	0	0.0	1.425	1/8	0	0.0	1.435	1/8	0	0.0	1.445	1/8	0	0.0
1.455	1/8	0	0.0	1.465	1/8	0	0.0	1.475	1/8	0	0.0	1.485	1/8	0	0.0	1.495	1/8	0	0.0
1.505	1/8	0	0.0	1.515	1/8	0	0.0	1.525	1/8	0	0.0	1.535	1/8	0	0.0	1.545	1/8	0	0.0
1.555	1/8	0	0.0	1.565	1/8	0	0.0	1.575	1/8	0	0.0	1.585	1/8	0	0.0	1.595	1/8	0	0.0
1.605	1/8	0	0.0	1.615	1/8	0	0.0	1.625	1/8	0	0.0	1.635	1/8	0	0.0	1.645	1/8	0	0.0
1.655	1/8	0	0.0	1.665	1/8	0	0.0	1.675	1/8	0	0.0	1.685	1/8	0	0.0	1.695	1/8	0	0.0
1.705	1/8	0	0.0	1.715	1/8	0	0.0	1.725	1/8	0	0.0	1.735	1/8	0	0.0	1.745	1/8	0	0.0
1.755	1/8	0	0.0	1.765	1/8	0	0.0	1.775	1/8	0	0.0	1.785	1/8	0	0.0	1.795	1/8	0	0.0
1.805	1/8	0	0.0	1.815	1/8	0	0.0	1.825	1/8	0	0.0	1.835	1/8	0	0.0	1.845	1/8	0	0.0
1.855	1/8	0	0.0	1.865	1/8	0	0.0	1.875	1/8	0	0.0	1.885	1/8	0	0.0	1.895	1/8	0	0.0
1.905	1/8	0	0.0	1.915	1/8	0	0.0	1.925	1/8	0	0.0	1.935	1/8	0	0.0	1.945	1/8	0	0.0
1.955	1/8	0	0.0	1.965	1/8	0	0.0	1.975	1/8	0	0.0	1.985	1/8	0	0.0	1.995	1/8	0	0.0
2.005	1/8	0	0.0	2.015	1/8	0	0.0	2.025	1/8	0	0.0	2.035	1/8	0	0.0	2.045	1/8	0	0.0
2.055	1/8	0	0.0	2.065	1/8	0	0.0	2.075	1/8	0	0.0	2.085	1/8	0	0.0	2.095	1/8	0	0.0
2.105	1/8	0	0.0	2.115	1/8	0	0.0	2.125	1/8	0	0.0	2.135	1/8	0	0.0	2.145	1/8	0	0.0
2.155	1/8	0	0.0	2.165	1/8	0	0.0	2.175	1/8	0	0.0	2.185	1/8	0	0.0	2.195	1/8	0	0.0
2.205	1/8	0	0.0	2.215	1/8	0	0.0	2.225	1/8	0	0.0	2.235	1/8	0	0.0	2.245	1/8	0	0.0
2.255	1/8	0	0.0	2.265	1/8	0	0.0	2.275	1/8	0	0.0	2.285	1/8	0	0.0	2.295	1/8	0	0.0
2.305	1/8	0	0.0	2.315	1/8	0	0.0	2.325	1/8	0	0.0	2.335	1/8	0	0.0	2.345	1/8	0	0.0
2.355	1/8	0	0.0	2.365	1/8	0	0.0	2.375	1/8	0	0.0	2.385	1/8	0	0.0	2.395	1/8	0	0.0
2.405	1/8	0	0.0	2.415	1/8	0	0.0	2.425	1/8	0	0.0	2.435	1/8	0	0.0	2.445	1/8	0	0.0
2.455	1/8	0	0.0	2.465	1/8	0	0.0	2.475	1/8	0	0.0	2.485	1/8	0	0.0	2.495	1/8	0	0.0
2.505	1/8	0	0.0	2.515	1/8	0	0.0	2.525	1/8	0	0.0	2.535	1/8	0	0.0	2.545	1/8	0	0.0
2.555	1/8	0	0.0	2.565	1/8	0	0.0	2.575	1/8	0	0.0	2.585	1/8	0	0.0	2.595	1/8	0	0.0
2.605	1/8	0	0.0	2.615	1/8	0	0.0	2.625	1/8	0	0.0	2.635	1/8	0	0.0	2.645	1/8	0	0.0
2.655	1/8	0	0.0	2.665	1/8	0	0.0	2.675	1/8	0	0.0	2.685	1/8	0	0.0	2.695	1/8	0	0.0
2.705	1/8	0	0.0	2.715	1/8	0	0.0	2.725	1/8	0	0.0	2.735	1/8	0	0.0	2.745	1/8	0	0.0
2.755	1/8	0	0.0	2.765	1/8	0	0.0	2.775	1/8	0	0.0	2.785	1/8	0	0.0	2.795	1/8	0	0.0
2.805	1/8	0	0.0	2.815	1/8	0	0.0	2.825	1/8	0	0.0	2.835	1/8	0	0.0	2.845	1/8	0	0.0
2.855	1/8	0	0.0	2.865	1/8	0	0.0	2.875	1/8	0	0.0	2.885	1/8	0	0.0	2.895	1/8	0	0.0
2.905	1/8	0	0.0	2.915	1/8	0	0.0	2.925	1/8	0	0.0	2.935	1/8	0	0.0	2.945	1/8	0	0.0
2.955	1/8	0	0.0	2.965	1/8	0	0.0	2.975	1/8	0	0.0	2.985	1/8	0	0.0	2.995	1/8	0	0.0
3.005	1/8	0	0.0	3.015	1/8	0	0.0	3.025	1/8	0	0.0	3.035	1/8	0	0.0	3.045	1/8	0	0.0
3.055	1/8	0	0.0	3.065	1/8	0	0.0	3.075	1/8	0	0.0	3.085	1/8	0	0.0	3.095	1/8	0	0.0
3.105	1/8	0	0.0	3.115	1/8	0	0.0	3.125	1/8	0	0.0	3.135	1/8	0	0.0	3.145	1/8	0	0.0
3.155	1/8	0	0.0	3.165	1/8	0	0.0	3.175	1/8	0	0.0	3.185	1/8	0	0.0	3.195	1/8	0	0.0
3.205	1/8	0	0.0	3.215	1/8	0	0.0	3.225	1/8	0	0.0	3.235	1/8	0	0.0	3.245	1/8	0	0.0
3.255	1/8	0	0.0	3.265	1/8	0	0.0	3.275	1/8	0	0.0	3.285	1/8	0	0.0	3.295	1/8	0	0.0
3.305	1/8	0	0.0	3.315	1/8	0	0.0	3.325	1/8	0	0.0	3.335	1/8	0	0.0	3.345	1/8	0	0.0
3.355	1/8	0	0.0	3.365	1/8	0	0.0	3.375	1/8	0	0.0	3.385	1/8	0	0.0	3.395	1/8	0	0.0
3.405	1/8	0	0.0	3.415	1/8	0	0.0	3.425	1/8	0	0.0	3.435	1/8	0	0.0	3.445	1/8	0	0.0
3.455	1/8	0	0.0	3.465	1/8	0	0.0	3.475	1/8	0	0.0	3.485	1/8	0	0.0	3.495	1/8	0	0.0
3.505	1/8	0	0.0	3.515	1/8	0	0.0	3.525	1/8	0	0.0	3.535	1/8	0	0.0	3.545	1/8	0	0.0
3.555	1/8	0	0.0	3.565	1/8	0	0.0	3.575	1/8	0	0.0	3.585	1/8	0	0.0	3.595	1/8	0	0.0
3.605	1/8	0	0.0	3.615	1/8	0	0.0	3.625	1/8	0	0.0	3.635	1/8	0	0.0	3.645	1/8	0	0.0
3.655	1/8	0	0.0	3.665	1/8	0	0.0	3.675	1/8	0	0.0	3.685	1/8	0	0.0	3.695	1/8	0	0.0
3.705	1/8	0	0.0	3.715	1/8	0	0.0	3.725	1/8	0	0.0	3.735	1/8	0	0.0	3.745	1/8	0	0.0
3.755	1/8	0	0.0	3.765	1/8	0	0.0	3.775	1/8	0	0.0	3.785	1/8	0	0.0	3.795	1/8	0	0.0
3.805	1/8	0	0.0	3.815	1/8														