# SHOP NOTES

**Pocket Guide and Reference Charts for CNC Machinists**

**– Made in the U.S.A. –**

WHAT'S INSIDE THIS BOOKLET?



ISO 9001:2008 CERTIFIED


Proudly printed and manufactured by:

**Haas Automation, Inc.**

800-331-6746
2800 Sturgis Rd., Oxnard, CA 93030
www.HaasCNC.com

39-1501104

# Table of Contents



**Haas operator's manuals** and other information may be downloaded for free from the Haas website (www.HaasCNC.com). From the Haas home page, click on **Resource Center,** and then select Manuals & Documentation. Haas manuals and information are listed for you to access and download. Information is updated as necessary.

# Decimal Equivalent Chart .0059 – .0980

| Decimal Equiv. | Drill Size | mm | Tap Sizes |
|---|---|---|---|
| .0059 | 97 | 0.150 | |
| .0063 | 96 | 0.160 | |
| .0067 | 95 | 0.170 | |
| .0071 | 94 | 0.180 | |
| .0075 | 93 | 0.191 | |
| .0079 | 92 | 0.201 | |
| .0083 | 91 | 0.211 | |
| .0087 | 90 | 0.221 | |
| .0091 | 89 | 0.231 | |
| .0095 | 88 | 0.241 | |
| .0100 | 87 | 0.254 | |
| .0105 | 86 | 0.267 | |
| .0110 | 85 | 0.279 | |
| .0115 | 84 | 0.292 | |
| .0120 | 83 | 0.305 | |
| .0125 | 82 | 0.318 | |
| .0130 | 81 | 0.330 | |
| .0135 | 80 | 0.343 | |
| .0145 | 79 | 0.368 | |
| .0156 | 1/64 | 0.397 | |
| .0160 | 78 | 0.406 | |
| .0180 | 77 | 0.457 | |
| .0200 | 76 | 0.508 | |
| .0210 | 75 | 0.533 | |
| .0225 | 74 | 0.572 | |
| .0240 | 73 | 0.610 | |
| .0250 | 72 | 0.635 | |
| .0260 | 71 | 0.660 | |
| .0280 | 70 | 0.711 | |
| .0292 | 69 | 0.742 | |
| .0310 | 68 | 0.787 | |
| .0313 | 1/32 | 0.794 | |
| .0320 | 67 | 0.813 | |
| .0330 | 66 | 0.838 | |
| .0350 | 65 | 0.889 | |
| .0360 | 64 | 0.914 | |
| .0370 | 63 | 0.940 | |
| .0380 | 62 | 0.965 | |
| .0390 | 61 | 0.991 | |
| .0400 | 60 | 1.016 | |
| .0410 | 59 | 1.041 | |
| .0420 | 58 | 1.067 | |
| .0430 | 57 | 1.092 | |
| .0465 | 56 | 1.181 | |
| .0469 | 3/64 | 1.191 | #0-80 |
| .0520 | 55 | 1.321 | |
| .0550 | 54 | 1.397 | |
| .0595 | 53 | 1.511 | #1-64 • #1-72 |
| .0625 | 1/16 | 1.588 | |
| .0635 | 52 | 1.613 | |
| .0670 | 51 | 1.702 | |
| .0700 | 50 | 1.778 | #2-56 • #2-64 |
| .0730 | 49 | 1.854 | |
| .0760 | 48 | 1.930 | |
| .0781 | 5/64 | 1.984 | |
| .0785 | 47 | 1.994 | #3-48 |
| .0810 | 46 | 2.057 | |
| .0820 | 45 | 2.083 | #3-56 |
| .0860 | 44 | 2.184 | |
| .0890 | 43 | 2.261 | #4-40 |
| .0935 | 42 | 2.375 | #4-48 |
| .0938 | 3/32 | 2.381 | |
| .0960 | 41 | 2.438 | |
| .0980 | 40 | 2.489 | |

**Tap drill sizes above based on approximately 75% full thread**
**Tap # Sizes #0 = .060 #1 = .073 #2 = .086 #3 = .099 #4 = .112**
**Tap # x .013 + .060 = Thread # OD**



# Decimal Equivalent Chart .0995 – .2969

| Decimal Equiv. | Drill Size | mm | Tap Sizes |
|---|---|---|---|
| .0995 | 39 | 2.527 | |
| .1015 | 38 | 2.578 | #5-40 |
| .1040 | 37 | 2.642 | #5-44 |
| .1065 | 36 | 2.705 | #6-32 |
| .1094 | 7/64 | 2.778 | |
| .1100 | 35 | 2.794 | |
| .1110 | 34 | 2.819 | |
| .1130 | 33 | 2.870 | #6-40 |
| .1160 | 32 | 2.946 | |
| .1200 | 31 | 3.048 | |
| .1250 | 1/8 | 3.175 | |
| .1285 | 30 | 3.264 | |
| .1360 | 29 | 3.454 | #8-32 • #8-36 |
| .1405 | 28 | 3.569 | |
| .1406 | 9/64 | 3.572 | |
| .1440 | 27 | 3.658 | |
| .1470 | 26 | 3.734 | |
| .1495 | 25 | 3.797 | #10-24 |
| .1520 | 24 | 3.861 | |
| .1540 | 23 | 3.912 | |
| .1563 | 5/32 | 3.969 | |
| .1570 | 22 | 3.988 | |
| .1590 | 21 | 4.039 | #10-32 |
| .1610 | 20 | 4.089 | |
| .1660 | 19 | 4.216 | |
| .1695 | 18 | 4.305 | |
| .1719 | 11/64 | 4.366 | |
| .1730 | 17 | 4.394 | |
| .1770 | 16 | 4.496 | #12-24 |
| .1800 | 15 | 4.572 | |
| .1820 | 14 | 4.623 | #12-28 |
| .1850 | 13 | 4.699 | |
| .1875 | 3/16 | 4.763 | #12-32 |
| .1890 | 12 | 4.801 | |
| .1910 | 11 | 4.851 | |
| .1935 | 10 | 4.915 | |
| .1960 | 9 | 4.978 | |
| .1990 | 8 | 5.055 | |
| .2010 | 7 | 5.105 | 1/4-20 |
| .2031 | 13/64 | 5.159 | |
| .2040 | 6 | 5.182 | |
| .2055 | 5 | 5.220 | |
| .2090 | 4 | 5.309 | |
| .2130 | 3 | 5.410 | 1/4-28 |
| .2188 | 7/32 | 5.556 | 1/4-32 |
| .2210 | 2 | 5.613 | |
| .2280 | 1 | 5.791 | |
| .2340 | A | 5.944 | |
| .2344 | 15/64 | 5.953 | |
| .2380 | B | 6.045 | |
| .2420 | C | 6.147 | |
| .2460 | D | 6.248 | |
| .2500 | 1/4&E | 6.350 | |
| .2570 | F | 6.528 | 5/16-18 |
| .2610 | G | 6.629 | |
| .2656 | 17/64 | 6.747 | |
| .2660 | H | 6.756 | |
| .2720 | I | 6.909 | 5/16-24 |
| .2770 | J | 7.036 | |
| .2810 | K | 7.137 | |
| .2813 | 9/32 | 7.144 | 5/16-32 |
| .2900 | L | 7.366 | |
| .2950 | M | 7.493 | |
| .2969 | 19/64 | 7.541 | |

**Tap drill sizes above based on approximately 75% full thread**
**Tap # Sizes #5 = .125 #6 = .138 #8 = .164 #10 = .190 #12 = .216**
**Tap # x .013 + .060 = Thread # OD**

# Decimal Equivalent Chart .3020 – 1.000

| Decimal Equiv. | Drill Size | mm | Tap Sizes |
|---|---|---|---|
| .3020 | N | 7.671 | |
| .3125 | 5/16 | 7.938 | 3/8-16 |
| .3160 | O | 8.026 | |
| .3230 | P | 8.204 | |
| .3281 | 21/64 | 8.334 | |
| .3320 | Q | 8.433 | 3/8-24 |
| .3390 | R | 8.611 | |
| .3438 | 11/32 | 8.731 | 3/8-32 |
| .3480 | S | 8.839 | |
| .3580 | T | 9.093 | |
| .3594 | 23/64 | 9.128 | |
| .3680 | U | 9.347 | 7/16-14 |
| .3750 | 3/8 | 9.525 | |
| .3770 | V | 9.576 | |
| .3860 | W | 9.804 | |
| .3906 | 25/64 | 9.922 | 7/16-20 |
| .3970 | X | 10.084 | |
| .4040 | Y | 10.262 | 7/16-28 |
| .4063 | 13/32 | 10.319 | |
| .4130 | Z | 10.490 | |
| .4219 | 27/64 | 10.716 | 1/2-13 |
| .4375 | 7/16 | 11.113 | |
| .4531 | 29/64 | 11.509 | 1/2-20 |
| .4688 | 15/32 | 11.906 | 1/2-28 |
| .4844 | 31/64 | 12.303 | 9/16-12 |
| .5000 | 1/2 | 12.700 | 9/16-18 |
| .5156 | 33/64 | 13.097 | 9/16-24 |
| .5313 | 17/32 | 13.494 | 5/8-11 |
| .5469 | 35/64 | 13.891 | |
| .5625 | 9/16 | 14.288 | 5/8-18 |
| .5781 | 37/64 | 14.684 | 5/8-24 |
| .5938 | 19/32 | 15.081 | |
| .6094 | 39/64 | 15.478 | 11/16-12 |
| .6250 | 5/8 | 15.875 | |
| .6406 | 41/64 | 16.272 | 11/16-20 • 11/16-24 |
| .6563 | 21/32 | 16.669 | 3/4-10 |
| .6719 | 43/64 | 17.066 | |
| .6875 | 11/16 | 17.462 | 3/4-16 |
| .7031 | 45/64 | 17.859 | 3/4-20 |
| .7188 | 23/32 | 18.256 | |
| .7344 | 47/64 | 18.653 | 13/16-12 |
| .7500 | 3/4 | 19.050 | 13/16-16 |
| .7656 | 49/64 | 19.447 | 13/16-20 • 7/8-9 |
| .7813 | 25/32 | 19.844 | |
| .7969 | 51/64 | 20.241 | 7/8-14 |
| .8125 | 13/16 | 20.637 | |
| .8281 | 53/64 | 21.034 | 7/8-20 |
| .8438 | 27/32 | 21.431 | |
| .8594 | 55/64 | 21.828 | 15/16-12 |
| .8750 | 7/8 | 22.225 | 15/16-16 • 1.0-8 |
| .8906 | 57/64 | 22.622 | 15/16-20 |
| .9063 | 29/32 | 23.019 | |
| .9219 | 59/64 | 23.416 | 1.0-12 |
| .9375 | 15/16 | 23.813 | |
| .9531 | 61/64 | 24.209 | 1.0-20 |
| .9688 | 31/32 | 24.606 | |
| .9844 | 63/64 | 25.003 | |
| 1.000 | 1 | 25.400 | |

# Pipe Thread Sizes

| Tap Thread Size | Approx. inside Dia. | Approx. outside Dia. | Tap Drill |
|---|---|---|---|
| 1/8 – 27 | 1/4 | 3/8 | 11/32 |
| 1/4 – 18 | 3/8 | 17/32 | 7/16 |
| 3/8 – 18 | 1/2 | 11/16 | 37/64 |
| 1/2 – 14 | 5/8 | 13/16 | 23/32 |
| 3/4 – 14 | 13/16 | 1 | 59/64 |
| 1 – 11 1/2 | 1 1/16 | 1 5/16 | 1 5/32 |
| 1 1/4 – 11 1/2 | 1 3/8 | 1 5/8 | 1 1/2 |
| 1 1/2 – 11 1/2 | 1 5/8 | 1 7/8 | 1 47/64 |
| 2 – 11 1/2 | 2 1/16 | 2 3/8 | 2 7/32 |
| 2 1/2 – 8 | 2 9/16 | 2 7/8 | 2 5/8 |

Pipe sizes are generally determined by the inside diameter of the pipe. The chart above gives nominal and approximate actual dimensions of commonly used sizes of standard threaded pipe.

**Tap drill sizes above based on approximately 75% full thread**
**A decimal equivalent chart** can be displayed on a Haas control by pressing the HELP/CALC button, and then selecting the Drill Table tab. Use the jog handle or cursor keys to scroll through the chart.

**Spindle Command:** You can stop or start the spindle with CW or CCW (FWD and REV on a lathe) any time you're at a Single Block stop or a Feed Hold. When you restart the program with CYCLE START, the spindle will be turned back on to the previously defined speed.

# Millimeter to Inch Chart 0.01 – 12.5

| mm | Inch | mm | Inch | mm | Inch | mm | Inch |
|---|---|---|---|---|---|---|---|
| 0.01 | .0004 | 2.6 | .1024 | 6.0 | .2362 | 9.4 | .3701 |
| 0.02 | .0008 | 2.7 | .1063 | 6.1 | .2402 | 9.5 | .3740 |
| 0.03 | .0012 | 2.8 | .1102 | 6.2 | .2441 | 9.6 | .3780 |
| 0.04 | .0016 | 2.9 | .1142 | 6.3 | .2480 | 9.7 | .3819 |
| 0.05 | .0020 | 3.0 | .1181 | 6.4 | .2520 | 9.8 | .3858 |
| 0.06 | .0024 | 3.1 | .1220 | 6.5 | .2559 | 9.9 | .3898 |
| 0.07 | .0028 | 3.2 | .1260 | 6.6 | .2598 | 10.0 | .3937 |
| 0.08 | .0032 | 3.3 | .1299 | 6.7 | .2638 | 10.1 | .3976 |
| 0.09 | .0035 | 3.4 | .1339 | 6.8 | .2677 | 10.2 | .4016 |
| 0.1 | .0039 | 3.5 | .1378 | 6.9 | .2717 | 10.3 | .4055 |
| 0.2 | .0079 | 3.6 | .1417 | 7.0 | .2756 | 10.4 | .4094 |
| 0.3 | .0118 | 3.7 | .1457 | 7.1 | .2795 | 10.5 | .4134 |
| 0.4 | .0157 | 3.8 | .1496 | 7.2 | .2835 | 10.6 | .4173 |
| 0.5 | .0197 | 3.9 | .1535 | 7.3 | .2874 | 10.7 | .4213 |
| 0.6 | .0236 | 4.0 | .1575 | 7.4 | .2913 | 10.8 | .4252 |
| 0.7 | .0276 | 4.1 | .1614 | 7.5 | .2953 | 10.9 | .4291 |
| 0.8 | .0315 | 4.2 | .1654 | 7.6 | .2992 | 11.0 | .4331 |
| 0.9 | .0354 | 4.3 | .1693 | 7.7 | .3031 | 11.1 | .4370 |
| 1.0 | .0394 | 4.4 | .1732 | 7.8 | .3071 | 11.2 | .4409 |
| 1.1 | .0433 | 4.5 | .1772 | 7.9 | .3110 | 11.3 | .4449 |
| 1.2 | .0472 | 4.6 | .1811 | 8.0 | .3150 | 11.4 | .4488 |
| 1.3 | .0512 | 4.7 | .1850 | 8.1 | .3189 | 11.5 | .4528 |
| 1.4 | .0551 | 4.8 | .1890 | 8.2 | .3228 | 11.6 | .4567 |
| 1.5 | .0591 | 4.9 | .1929 | 8.3 | .3268 | 11.7 | .4606 |
| 1.6 | .0630 | 5.0 | .1969 | 8.4 | .3307 | 11.8 | .4646 |
| 1.7 | .0669 | 5.1 | .2008 | 8.5 | .3346 | 11.9 | .4685 |
| 1.8 | .0709 | 5.2 | .2047 | 8.6 | .3386 | 12.0 | .4724 |
| 1.9 | .0748 | 5.3 | .2087 | 8.7 | .3425 | 12.1 | .4764 |
| 2.0 | .0787 | 5.4 | .2126 | 8.8 | .3465 | 12.2 | .4803 |
| 2.1 | .0827 | 5.5 | .2165 | 8.9 | .3504 | 12.3 | .4843 |
| 2.2 | .0866 | 5.6 | .2205 | 9.0 | .3543 | 12.4 | .4882 |
| 2.3 | .0906 | 5.7 | .2244 | 9.1 | .3583 | 12.5 | .4921 |
| 2.4 | .0945 | 5.8 | .2283 | 9.2 | .3622 | | |
| 2.5 | .0984 | 5.9 | .2323 | 9.3 | .3661 | | |

# Millimeter to Inch Chart 12.6 – 25.4

| mm | Inch | mm | Inch | mm | Inch | mm | Inch |
|---|---|---|---|---|---|---|---|
| 12.6 | .4961 | 15.9 | .6260 | 19.2 | .7559 | 22.5 | .8858 |
| 12.7 | .5000 | 16.0 | .6299 | 19.3 | .7598 | 22.6 | .8898 |
| 12.8 | .5039 | 16.1 | .6339 | 19.4 | .7638 | 22.7 | .8937 |
| 12.9 | .5079 | 16.2 | .6378 | 19.5 | .7677 | 22.8 | .8976 |
| 13.0 | .5118 | 16.3 | .6417 | 19.6 | .7717 | 22.9 | .9016 |
| 13.1 | .5157 | 16.4 | .6457 | 19.7 | .7756 | 23.0 | .9055 |
| 13.2 | .5197 | 16.5 | .6496 | 19.8 | .7795 | 23.1 | .9094 |
| 13.3 | .5236 | 16.6 | .6535 | 19.9 | .7835 | 23.2 | .9134 |
| 13.4 | .5276 | 16.7 | .6575 | 20.0 | .7874 | 23.3 | .9173 |
| 13.5 | .5315 | 16.8 | .6614 | 20.1 | .7913 | 23.4 | .9213 |
| 13.6 | .5354 | 16.9 | .6654 | 20.2 | .7953 | 23.5 | .9252 |
| 13.7 | .5394 | 17.0 | .6693 | 20.3 | .7992 | 23.6 | .9291 |
| 13.8 | .5433 | 17.1 | .6732 | 20.4 | .8031 | 23.7 | .9331 |
| 13.9 | .5472 | 17.2 | .6772 | 20.5 | .8071 | 23.8 | .9370 |
| 14.0 | .5512 | 17.3 | .6811 | 20.6 | .8110 | 23.9 | .9409 |
| 14.1 | .5551 | 17.4 | .6850 | 20.7 | .8150 | 24.0 | .9449 |
| 14.2 | .5591 | 17.5 | .6890 | 20.8 | .8189 | 24.1 | .9488 |
| 14.3 | .5630 | 17.6 | .6929 | 20.9 | .8228 | 24.2 | .9528 |
| 14.4 | .5669 | 17.7 | .6968 | 21.0 | .8268 | 24.3 | .9567 |
| 14.5 | .5709 | 17.8 | .7008 | 21.1 | .8307 | 24.4 | .9606 |
| 14.6 | .5748 | 17.9 | .7047 | 21.2 | .8346 | 24.5 | .9646 |
| 14.7 | .5787 | 18.0 | .7087 | 21.3 | .8386 | 24.6 | .9685 |
| 14.8 | .5827 | 18.1 | .7126 | 21.4 | .8425 | 24.7 | .9724 |
| 14.9 | .5866 | 18.2 | .7165 | 21.5 | .8465 | 24.8 | .9764 |
| 15.0 | .5906 | 18.3 | .7205 | 21.6 | .8504 | 24.9 | .9803 |
| 15.1 | .5945 | 18.4 | .7244 | 21.7 | .8543 | 25.0 | .9843 |
| 15.2 | .5984 | 18.5 | .7283 | 21.8 | .8583 | 25.1 | .9882 |
| 15.3 | .6024 | 18.6 | .7323 | 21.9 | .8622 | 25.2 | .9921 |
| 15.4 | .6063 | 18.7 | .7362 | 22.0 | .8661 | 25.3 | .9961 |
| 15.5 | .6102 | 18.8 | .7402 | 22.1 | .8701 | 25.4 | 1.0 |
| 15.6 | .6142 | 18.9 | .7441 | 22.2 | .8740 | | |
| 15.7 | .6181 | 19.0 | .7480 | 22.3 | .8780 | | |
| 15.8 | .6220 | 19.1 | .7520 | 22.4 | .8819 | | |

**Setting 9** on a Haas allows you to change between **inch** and **millimeter dimensioning**.

When in EDIT or MEM mode, you can select and **display another program** from Memory quickly by entering the program number (Onnnnn) and pressing the down arrow key.

# Metric Taps

| Tap Sizes | MM Tap Drill | Drill Dia. in Inches |
|---|---|---|
| M1 x 0.25 | 0.75 | .0295 |
| M1.1 x 0.25 | 0.85 | .0335 |
| M1.2 x 0.25 | 0.95 | .0374 |
| M1.4 x 0.3 | 1.10 | .0433 |
| M1.6 x 0.35 | 1.25 | .0492 |
| M1.8 x 0.35 | 1.45 | .0571 |
| M2 x 0.4 | 1.60 | .0630 |
| M2.2 x 0.45 | 1.75 | .0689 |
| M2.5 x 0.45 | 2.05 | .0807 |
| M3 x 0.5 | 2.50 | .0984 |
| M3.5 x 0.6 | 2.90 | .1142 |
| M4 x 0.7 | 3.30 | .1299 |
| M4.5 x 0.75 | 3.70 | .1457 |
| M5 x 0.8 | 4.20 | .1654 |
| M6 x 1 | 5.00 | .1969 |
| M7 x 1 | 6.00 | .2362 |
| M8 x 1.25 | 6.75 | .2657 |
| M8 x 1 | 7.00 | .2756 |
| M10 x 1.5 | 8.50 | .3346 |
| M10 x 1.25 | 8.75 | .3445 |
| M12 x 1.75 | 10.20 | .4016 |
| M12 x 1.25 | 10.80 | .4252 |

| Tap Sizes | MM Tap Drill | Drill Dia. in Inches |
|---|---|---|
| M14 x 2 | 12.00 | .4724 |
| M14 x 1.5 | 12.50 | .4921 |
| M16 x 2 | 14.00 | .5512 |
| M16 x 1.5 | 14.50 | .5709 |
| M18 x 2.5 | 15.50 | .6102 |
| M18 x 1.5 | 16.50 | .6496 |
| M20 x 2.5 | 17.50 | .6890 |
| M20 x 1.5 | 18.50 | .7283 |
| M22 x 2.5 | 19.50 | .7677 |
| M22 x 1.5 | 20.50 | .8071 |
| M24 x 3 | 21.00 | .8268 |
| M24 x 2 | 22.00 | .8661 |
| M27 x 3 | 24.00 | .9449 |
| M27 x 2 | 25.00 | .9843 |
| M30 x 3.5 | 26.50 | 1.0433 |
| M30 x 2 | 28.00 | 1.1024 |
| M33 x 3.5 | 29.50 | 1.1614 |
| M33 x 2 | 31.00 | 1.2205 |
| M36 x 4 | 32.00 | 1.2598 |
| M36 x 3 | 33.00 | 1.2992 |
| M39 x 4 | 35.00 | 1.3780 |
| M39 x 3 | 36.00 | 1.4173 |

**Tap drill sizes based on 77% full metric thread**

**Metric tap and drill sizes** can be displayed on a Haas control by pressing the HELP/CALC button twice, and then selecting the Drill Table tab.

# Metric Thread Pitch Conversion

| Metric Thd. Pitch | Thd. Pitch in Inches | Threads Per In. | Basic Height |
|---|---|---|---|
| . 25 | . 00984 | 101.6002 | . 00639 |
| . 30 | . 01181 | 84.6668 | . 00767 |
| . 35 | . 01378 | 72.5716 | . 00895 |
| . 40 | . 01575 | 63.5001 | . 01023 |
| . 45 | . 01772 | 56.4446 | . 01151 |
| . 50 | . 01969 | 50.8001 | . 01279 |
| . 60 | . 02362 | 42.3334 | . 01534 |
| . 70 | . 02756 | 36.2858 | . 01790 |
| . 75 | . 02953 | 33.8667 | .01918 |
| . 80 | . 03150 | 31.7501 | .02046 |
| . 90 | . 03543 | 28.2228 | . 02301 |
| 1.00 | . 03937 | 25.4000 | .02557 |
| 1.25 | . 04921 | 20.3200 | . 03196 |
| 1.50 | . 05906 | 16.9334 | . 03836 |
| 1.75 | . 06890 | 14.5143 | . 04475 |
| 2.00 | . 07874 | 12.7000 | . 05114 |
| 2.50 | . 09843 | 10.1600 | . 06393 |
| 3.00 | . 11811 | 8.4667 | . 07671 |
| 3.50 | . 13780 | 7.2572 | . 08950 |
| 4.00 | . 15748 | 6.3500 | . 10229 |
| 4.50 | . 17717 | 5.6445 | . 11508 |
| 5.00 | . 19685 | 5.0800 | . 12785 |
| 6.00 | . 23622 | 4.2333 | . 15344 |

**Clearing Current Commands Values:** On a Haas, the values in the CURNT COMDS display pages for Tool Life, Tool Load, and Timer registers can be cleared by cursor-selecting the one you wish to clear and pressing ORIGIN. To clear everything in a column, cursor to the top of that column (onto the title) and press ORIGIN.

| Code | Description | Group |
|---|---|---|
| **G00*** | Rapid Motion Positioning | 01 |
| **G01** | Linear Interpolation Motion | 01 |
| **G02** | Circular Interpolation Motion CW | 01 |
| **G03** | Circular Interpolation Motion CCW | 01 |
| **G04** | Dwell | 00 |
| **G09** | Exact Stop | 00 |
| **G10** | Set Offsets | 00 |
| **G12** | Circular Pocket Milling CW | 00 |
| **G13** | Circular Pocket Milling CCW | 00 |
| **G17*** | XY Plane Selection | 02 |
| **G18** | XZ Plane Selection | 02 |
| **G19** | YZ Plane Selection | 02 |
| **G20** | Select Inches | 06 |
| **G21** | Select Metric | 06 |
| **G28** | Return To Machine Zero Point | 00 |
| **G29** | Return From Reference Point | 00 |
| **G31** | Feed Until Skip | 00 |
| **G35** | Automatic Tool Diameter Measurement | 00 |
| **G36** | Automatic Work Offset Measurement | 00 |
| **G37** | Automatic Tool Offset Measurement | 00 |
| **G40*** | Cutter Compensation Cancel | 07 |
| **G41** | 2D Cutter Compensation Left | 07 |
| **G42** | 2D Cutter Compensation Right | 07 |
| **G43** | Tool Length Compensation + (Add) | 08 |
| **G44** | Tool Length Compensation - (Subtract) | 08 |
| **G47** | Text Engraving | 00 |
| **G49*** | G43/G44/G143 Cancel | 08 |
| **G50*** | Cancel Scaling | 11 |
| **G51** | Scaling | 11 |
| **G52** | Set Work Coordinate System | 00 or 12 |
| **G53** | Non-Modal Machine Coordinate Selection | 00 |

* default

**Complete descriptions of all Haas G- and M-codes** are available from the Haas website (www.HaasCNC.com). From the Haas home page, click on Resource Center, and then select Manuals & Documentation > G- and M-Codes.



HAAS MILL G-CODES

| Code | Description | Group |
|---|---|---|
| **G54*** | Select Work Coordinate System #1 | 12 |
| **G55** | Select Work Coordinate System #2 | 12 |
| **G56** | Select Work Coordinate System #3 | 12 |
| **G57** | Select Work Coordinate System #4 | 12 |
| **G58** | Select Work Coordinate System #5 | 12 |
| **G59** | Select Work Coordinate System #6 | 12 |
| **G60** | Uni-Directional Positioning | 00 |
| **G61** | Exact Stop Mode | 15 |
| **G64*** | G61 Cancel | 15 |
| **G65** | Macro Subroutine Call Option | 00 |
| **G68** | Rotation | 16 |
| **G69*** | Cancel G68 Rotation | 16 |
| **G70** | Bolt Hole Circle | 00 |
| **G71** | Bolt Hole Arc | 00 |
| **G72** | Bolt Holes Along an Angle | 00 |
| **G73** | High-Speed Peck Drilling Canned Cycle | 09 |
| **G74** | Reverse Tap Canned Cycle | 09 |
| **G76** | Fine Boring Canned Cycle | 09 |
| **G77** | Back Bore Canned Cycle | 09 |
| **G80*** | Canned Cycle Cancel | 09 |
| **G81** | Drill Canned Cycle | 09 |
| **G82** | Spot Drill Canned Cycle | 09 |
| **G83** | Normal Peck Drilling Canned Cycle | 09 |
| **G84** | Tapping Canned Cycle | 09 |
| **G85** | Boring Canned Cycle | 09 |
| **G86** | Bore and Stop Canned Cycle | 09 |
| **G87** | Bore In and Manual Retract Canned Cycle | 09 |
| **G88** | Bore In, Dwell, Manual Retract Canned Cycle | 09 |
| **G89** | Bore In, Dwell, Bore Out Canned Cycle | 09 |
| **G90*** | Absolute Position Command | 03 |
| **G91** | Incremental Position Command | 03 |

* default

In the Offset display on a Haas, you can **zero all offsets** at once by pressing ORIGIN, and following the simple on-screen commands. **You can't undo this.**

HAAS MILL G-CODES

| Code | Description | Group |
|---|---|---|
| **G92** | Set Work Coordinate Systems Shift Value | 00 |
| **G93** | Inverse Time Feed Mode | 05 |
| **G94*** | Feed Per Minute Mode | 05 |
| **G95** | Feed per Revolution | 05 |
| **G98*** | Canned Cycle Initial Point Return | 10 |
| **G99** | Canned Cycle R Plane Return | 10 |
| **G100** | Cancel Mirror Image | 00 |
| **G101** | Enable Mirror Image | 00 |
| **G102** | Programmable Output to RS-232 | 00 |
| **G103** | Limit Block Buffering | 00 |
| **G107** | Cylindrical Mapping | 00 |
| **G110-G129** | Coordinate System #7 - #26 | 12 |
| **G136** | Automatic Work Offset Center Measurement | 00 |
| **G141** | 3D+ Cutter Compensation | 07 |
| **G143** | 5-Axis Tool Length Compensation + | 08 |
| **G150** | General Purpose Pocket Milling | 00 |
| **G153** | 5-Axis High Speed Peck Drilling Canned Cycle | 09 |
| **G154** | Select Work Coordinates P1-P99 | 12 |
| **G155** | 5-Axis Reverse Tap Canned Cycle | 09 |
| **G161** | 5-Axis Drill Canned Cycle | 09 |
| **G162** | 5-Axis Spot Drill Canned Cycle | 09 |
| **G163** | 5-Axis Normal Peck Drilling Canned Cycle | 09 |
| **G164** | 5-Axis Tapping Canned Cycle | 09 |
| **G165** | 5-Axis Boring Canned Cycle | 09 |
| **G166** | 5-Axis Bore and Stop Canned Cycle | 09 |
| **G169** | 5-Axis Bore and Dwell Canned Cycle | 09 |
| **G174** | CCW Non-Vertical Rigid Tap | 00 |
| **G184** | CW Non-Vertical Rigid Tap | 00 |
| **G187** | Setting the Smoothness Level | 00 |
| **G188** | Get Program From PST | 00 |
| **G234** | Tool Center Point Control (TCPC) | 08 |
| **G254** | Dynamic Work Offset (DWO) | 23 |
| **G255** | Cancel Dynamic Work Offset (DWO) | 23 |

* default

You can edit programs on a Haas while a program is running, using **Background (BG) Edit**. When running a program in MEM mode from the Program display, hit the EDIT button until the Background Editor pane appears on the right side of the screen. Press SELECT PROG to see a list of Memory programs you can BG Edit. Changes will take effect the next time the program is opened. You can select entire blocks of code to edit/copy/delete by pressing F2 on the first and last lines you want to highlight, and then using the INSERT, ALTER, DELETE, and UNDO commands. If you need to press the Cycle Start button for an M00/M01 while you're editing, just hit the MEM botton to return to the active program. For older controls (mill software 15.xx and lathe software 8.xx and earlier), you can access BG Edit by entering the number of the program you want to edit (Onnnnn) and pressing F4.

**To Zero the POS-OPER Display:** This display is used for reference only. Each axis can be zeroed out independently, to then show its position relative to where you selected to zero that axis. To zero out a specific axis, press HAND JOG, and then press POSIT. When you Handle Jog the X, Y, or Z axis and then press ORIGIN, the axis that is selected will be zeroed. Or, you can press an X, Y, or Z letter key and then ORIGIN to zero that axis display. You can also press the X, Y, or Z key and enter a number (X2.125), then press ORIGIN to enter the number in that axis display.

HAAS MILL M-CODES

| | |
|---|---|
| **M00** | Stop Program |
| **M01** | Optional Program Stop |
| **M02** | Program End |
| **M03** | Spindle Commands |
| **M04** | Spindle Commands |
| **M05** | Spindle Commands |
| **M06** | Tool Change |
| **M07** | Shower Coolant On |
| **M08** | Coolant On |
| **M09** | Coolant Off |
| **M10** | Engage 4th Axis Brake |
| **M11** | Release 4th Axis Brake |
| **M12** | Engage 5th Axis Brake |
| **M13** | Release 5th Axis Brake |
| **M16** | Tool Change |
| **M17** | Unclamp APC Pallet and Open APC Door |
| **M18** | Clamp APC Pallet and Close Door |
| **M19** | Orient Spindle |
| **M21-M28** | Optional User M Function with M-Fin |
| **M30** | Program End and Reset |
| **M31** | Chip Conveyor Forward |
| **M33** | Chip Conveyor Stop |
| **M34** | Coolant Increment |
| **M35** | Coolant Decrement |
| **M36** | Pallet Part Ready |
| **M39** | Rotate Tool Turret |
| **M41** | Low Gear Override |
| **M42** | High Gear Override |
| **M46** | Jump if Pallet Loaded |
| **M48** | Check Validity of Current Program |
| **M49** | Set Status of Pallet |
| **M50** | Execute Pallet Change |
| **M51-M58** | Set Optional User M-codes |
| **M59** | Set Output Relay |
| **M61-M68** | Clear Optional User M-codes |
| **M69** | Clear Output Relay |
| **M75** | Set G35 or G136 Reference Point |
| **M76** | Control Display Inactive |
| **M77** | Control Display Active |
| **M78** | Alarm if Skip Signal Found |
| **M79** | Alarm if Skip Signal Not Found |
| **M80** | Auto Door Open |
| **M81** | Auto Door Close |
| **M82** | Tool Unclamp |
| **M83** | Auto Air Gun On |
| **M84** | Auto Air Gun Off |
| **M86** | Tool Clamp |
| **M88** | Through-Spindle Coolant On |
| **M89** | Through-Spindle Coolant Off |
| **M95** | Sleep Mode |
| **M96** | Jump If No Input |
| **M97** | Local Sub-Program Call |
| **M98** | Sub-Program Cal |
| **M99** | Sub-Program Return or Loop |
| **M109** | Interactive User Input |

When **Setting 32** on a Haas machine is set to **IGNORE**, then all commands for turning coolant on or off will be ignored. The coolant can still be turned on and off manually with the COOLNT button.

**Jog Keys:** You can select an axis for jogging on a Haas by entering the axis letter on the input line and then pressing the HANDLE JOG button.

HAAS LATHE G-CODES

| Code | Description | Group |
|---|---|---|
| **G00*** | Rapid Motion Positioning | 01 |
| **G01** | Linear Interpolation Motion | 01 |
| **G02** | CW Circular Interpolation Motion | 01 |
| **G03** | CCW Circular Interpolation Motion | 01 |
| **G04** | Dwell | 00 |
| **G09** | Exact Stop | 00 |
| **G10** | Set Offsets | 00 |
| **G14** | Secondary Spindle Swap | 17 |
| **G15** | Secondary Spindle Cancel | 17 |
| **G17** | XY Plane Selection | 00 |
| **G18*** | XZ Plane Selection | 02 |
| **G19** | YZ Plane Selection | 02 |
| **G20** | Select Inches | 06 |
| **G21** | Select Metric | 06 |
| **G28** | Return To Machine Zero Point | 00 |
| **G29** | Return From Reference Point | 00 |
| **G31** | Skip Function | 00 |
| **G32** | Thread Cutting | 01 |
| **G40*** | Tool Nose Compensation Cancel | 07 |
| **G41** | Tool Nose Compensation (TNC) Left | 07 |
| **G42** | Tool Nose Compensation (TNC) Right | 07 |
| **G50** | Set Global coordinate Offset FANUC, YASNAC | 00 |
| **G51** | Cancel Offset (YASNAC) | 00 |
| **G52** | Set Local Coordinate System FANUC | 00 |
| **G53** | Machine Coordinate Selection | 00 |
| **G54*** | Coordinate System #1 FANUC | 12 |
| **G55** | Coordinate System #2 FANUC | 12 |
| **G56** | Coordinate System #3 FANUC | 12 |
| **G57** | Coordinate System #4 FANUC | 12 |
| **G58** | Coordinate System #5 FANUC | 12 |

* default

| Code | Description | Group |
|---|---|---|
| **G59** | Coordinate System #6 FANUC | 12 |
| **G61** | Exact Stop Modal | 15 |
| **G64*** | Exact Stop Cancel G61 | 15 |
| **G65** | Macro Subroutine Call Option | 00 |
| **G70** | Finishing Cycle | 00 |
| **G71** | O.D./I.D. Stock Removal Cycle | 00 |
| **G72** | End Face Stock Removal Cycle | 00 |
| **G73** | Irregular Path Stock Removal Cycle | 00 |
| **G74** | End Face Grooving Cycle | 00 |
| **G75** | O.D./I.D. Grooving Cycle | 00 |
| **G76** | Threading Cycle, Multiple Pass | 00 |
| **G80*** | Canned Cycle Cancel | 09 |
| **G81** | Drill Canned Cycle | 09 |
| **G82** | Spot Drill Canned Cycle | 09 |
| **G83** | Normal Peck Drilling Canned Cycle | 09 |
| **G84** | Tapping Canned Cycle | 09 |
| **G85** | Boring Canned Cycle | 09 |
| **G86** | Bore and Stop Canned Cycle | 09 |
| **G87** | Bore and Manual Retract Canned Cycle | 09 |
| **G88** | Bore and Dwell and Manual Retract Canned Cycle | 09 |
| **G89** | Bore and Dwell Canned Cycle | 09 |
| **G90** | O.D./I.D. Turning Cycle | 01 |
| **G92** | Threading Cycle | 01 |
| **G94** | End Facing Cycle | 01 |
| **G95** | Live Tooling Rigid Tap (Face) | 09 |
| **G96** | Constant Surface Speed On | 13 |
| **G97*** | Constant Surface Speed Off | 13 |
| **G98** | Feed Per Minute | 10 |
| **G99*** | Feed Per Revolution | 10 |
| **G100** | Disable Mirror Image | 00 |

* default

**Complete descriptions of all Haas G- and M-codes** are available from the Haas website (www.HaasCNC.com). From the Haas home page, click on Resource Center, and then select Manuals & Documentation > G- and M-Codes.

Setting 22 on a Haas, **Can Cycle Delta Z**, defines the distance above the previous peck that a tool will rapid back to during a mill and lathe G83 peck drill or the amount it pulls back in a G74 and G75 lathe grooving cycle. It also defines the distance the tool retracts to break the chip in a mill G73 peck drill canned cycle.

| Code | Description | Group |
|---|---|---|
| **G101** | Enable Mirror Image | 00 |
| **G102** | Programmable Output to RS-232 | 00 |
| **G103** | Limit Block Lookahead | 00 |
| **G105** | Servo Bar Command | 09 |
| **G110** | Coordinate System #7 | 12 |
| **G111** | Coordinate System #8 | 12 |
| **G112** | XY to XC interpretation | 04 |
| **G113** | Cancel G112 | 04 |
| **G114-G129** | Coordinate System #9 - #24 | 12 |
| **G154** | Select Work Coordinates P1-99 | 12 |
| **G159** | Background Pickup / Part Return | |
| **G160** | APL Axis Command Mode Only | |
| **G161** | APL Axis Command Mode Off | |
| **G184** | Reverse Tapping Canned Cycle For Left Hand Threads | 09 |
| **G186** | Reverse Live Tool Rigid Tap (For Left Hand Threads) | 10 |
| **G187** | Accuracy Control | 00 |
| **G195** | Forward Live Tool Radial Tapping (Diameter) | 00 |
| **G196** | Reverse Live Tool Radial Tapping (Diameter) | 00 |
| **G198** | Disengage Synchronous Spindle Control | 00 |
| **G199** | Engage Synchronous Spindle Control | 00 |
| **G200** | Index on the Fly | 00 |
| **G211** | Manual Tool Setting | |
| **G212** | Auto Tool Setting | |
| **G241** | Radial Drill Canned Cycle | 09 |
| **G242** | Radial Spot Drill Canned Cycle | 09 |
| **G243** | Radial Normal Peck Drilling Canned Cycle | 09 |
| **G245** | Radial Boring Canned Cycle | 09 |
| **G246** | Radial Bore and Stop Canned Cycle | 09 |
| **G247** | Radial Bore and Manual Retract Canned Cycle | 09 |
| **G248** | Radial Bore and Dwell and Manual Retract Canned Cycle | 09 |
| **G249** | Radial Bore and Dwell Canned Cycle | 09 |

**Transferring Simple Calculations:** In the Haas Calculator display, the number in the simple calculator box (upper left corner) can be transferred to any cursor-selected data line on the page in either EDIT or MDI. Cursor to the register to which you wish to transfer the calculator number, and press F3.





| | |
|---|---|
| **M00** | Stop Program |
| **M01** | Stop Program |
| **M02** | Program End |
| **M03** | Spindle On Fwd |
| **M04** | Spindle On Rev |
| **M05** | Spindle Stop |
| **M08** | Coolant On |
| **M09** | Coolant Off |
| **M10** | Chuck Clamp |
| **M11** | Chuck Unclamp |
| **M12** | Auto Jet Air Blast On (Optional) |
| **M13** | Auto Jet Air Blast Off (Optional) |
| **M14** | Main Spindle Brake On (Optional C-Axis) |
| **M15** | Main Spindle Brake Off (Optional C-Axis) |
| **M17** | Turret Rotation Fwd |
| **M18** | Turret Rotation Rev |
| **M19** | Orient Spindle (Optional) |
| **M21** | Tailstock Advance (Optional) |
| **M22** | Tailstock Retract (Optional) |
| **M23** | Chamfer Out of Thread On |
| **M24** | Chamfer Out of Thread Off |
| **M30** | End of Program and Reset |
| **M31** | Chip Auger Forward (Optional) |
| **M33** | Chip Auger Stop (Optional) |
| **M36** | Parts Catcher On (Optional) |
| **M37** | Parts Catcher Off (Optional) |
| **M38** | Spindle Speed Variation On |
| **M39** | Spindle Speed Variation Off |
| **M41** | Low Gear (Optional) |
| **M42** | High Gear (Optional) |

On a Haas, you can use the **DIST-TO-GO screen to quickly zero** out the Position display for a reference move. When in Handle Jog mode and in the Position display, press any other operation mode key (EDIT, MEM, etc.), and then go back to Handle Jog. This will zero out all axes on the DIST-TO-GO display, and begin showing the distance moved.

HAAS LATHE M-CODES

| | |
|---|---|
| **M43** | Turret Unlock (Service Use Only) |
| **M44** | Turret Lock (Service Use Only) |
| **M51-M58** | User M Turn On (Optional) |
| **M59** | Set Output Relay |
| **M61-M68** | User M Turn Off (Optional) |
| **M69** | Clear Output Relay |
| **M76** | Display Disable |
| **M77** | Display Enable |
| **M78** | Alarm if Skip Signal Found |
| **M79** | Alarm if Skip Signal Not Found |
| **M85** | Automatic Door Open (Optional) |
| **M86** | Automatic Door Close (Optional) |
| **M88** | High-Pressure Coolant On (Optional) |
| **M89** | High-Pressure Coolant Off (Optional) |
| **M95** | Sleep Mode |
| **M96** | Jump If No Signal |
| **M97** | Local Subprogram Call |
| **M98** | Subprogram Call |
| **M99** | Subprogram Return Or Loop |

| | |
|---|---|
| **M104** | Probe Arm Extend (Optional) |
| **M105** | Probe Arm Retract (Optional) |
| **M109** | Interactive User Input |
| **M110** | Secondary Spindle Chuck Clamp (Optional) |
| **M111** | Secondary Spindle Chuck Unclamp (Optional) |
| **M112** | Secondary Spindle Air Blast On (Optional) |
| **M113** | Secondary Spindle Air Blast Off (Optional) |
| **M114** | Secondary Spindle Brake On (Optional) |
| **M115** | Secondary Spindle Brake Off (Optional) |
| **M119** | Secondary Spindle Orient (Optional) |
| **M121-M128** | User M-codes (Optional) |
| **M133** | Live Tool Fwd (Optional) |
| **M134** | Live Tool Rev (Optional) |
| **M135** | Live Tool Stop (Optional) |
| **M143** | Secondary Spindle Forward (Optional) |
| **M144** | Secondary Spindle Reverse (Optional) |
| **M145** | Secondary Spindle Stop (Optional) |
| **M154** | C-Axis Engage (Optional) |
| **M155** | C-Axis Disengage (Optional) |

On a Haas, it's easy to **transfer a program from MDI** and save it to your list of programs. In the MDI display, make sure that the cursor is at the beginning of the MDI program. Enter a program number (Onnnnn) that's not being used. Then press ALTER and this will transfer the MDI data into your **List of Programs** under that program number.

**To Rapid an Axis Home:** You can rapid *all* axes to machine zero by pressing the **HOME G28** key. You can also send just one axis (X, Y, Z, A, or B) to machine zero in rapid motion. Enter the letter X, Y, Z, A, or B, then press **HOME G28** and that axis alone will rapid home. *CAUTION!* There is no warning to alert you of any possible collision!

**ºC** = Degrees Celsius

**DIA** = Diameter

**d** = Depth of Cut

**F** = Feed in Inches or mm Per Minute (F)

**ºF** = Degrees Fahrenheit

**FPR** = Feed Per Revolution (F)

**FPT** = Feed Per Tooth

**IPM** = Inches Per Minute

**IPR** = Inches Per Revolution

**L** = Length of Cut

**MRR** = Metal Removal Rate (cubic in./min.)

**RPM** = Revolutions Per Minute

**SFM** = Surface Feed Per Minute

**SMPM** = Surface Meters Per Minute

**MMPR** = Millimeters Per Revolution

**T** = Number of Teeth in a Cutter

**TCm** = Time Cutting in Minutes

**TCs** = Time Cutting in Seconds

**TPI** = Threads Per Inch

**W =** Width of Cut



Cutting Speed (surface feet/min.)
**SFM** = 0.262 x DIA x RPM

Revolutions Per Minute
**RPM** = 3.82 x SFM ÷ DIA

Feed Rate (in/min.)
**IPM** = FPT x T x RPM

Feed Per Revolution
**FPR** = IPM ÷ RPM

Feed Per Tooth (in)
**FPT** = IPM ÷ (RPM x T)

Metal Removal Rate
**MRR** = W x d x F

Converting IPR to IPM
**IPM** = IPR x RPM

Converting IPM to IPR
**IPR** = IPM ÷ RPM

Converting SFM to SMPM
**SMPM** = SFM x .3048

Converting IPR to MMPR
**MMPR** = IPR x 25.40

Distance over Time (in minutes)
**L** = IPM x TCm

Time Cutting over Distance (Mill) (minutes)
**TCm** = L ÷ IPM

Time Cutting over Distance (Mill) (seconds)
**TCs** = L ÷ IPM x 60

Time Cutting over Distance (Lathe) (seconds)
**TCs** = L ÷ (IPR x RPM) x 60

**INCH METRIC CONVERSION**

| | |
|---|---|
| mm x 0.03937 = in. | in. x 25.4 = mm |
| m x 39.37 = in. | in. x 0.0254 = m |
| m x 3.2808 = ft | ft x 0.3048 = m |
| m x 1.0936 = yd | yd x 0.9144 = m |
| km x 0.621 = mi | mi x 1.6093 = km |
| Celsius to Fahrenheit<br>(ºC x 1.8) + 32 = ºF | Fahrenheit to Celsius<br>(ºF - 32) ÷ 1.8 = ºC |

**Chip Conveyor** - The chip conveyor on a Haas can be turned on or off when a program is running, either manually using the control keys or in the program using M-codes. The M-code equivalent to CHIP FWD is M31, and CHIP STOP is M33. You can set the Conveyor Cycle time (in minutes) with Setting 114, and the Conveyor On-Time (in minutes) with Setting 115.

**Setting 36 PROGRAM RESTART:** When it is ON, you are able to start a program from the middle of a tool sequence. You cursor to the line on which you want to start and press CYCLE START. It will scan the entire program to ensure the tools, offsets, G codes, and axes positions are set correctly before starting and continuing at the block where the cursor is positioned. Although you can leave this setting ON all the time, it may cause the machine to perform certain activities unnecessarily, so it's best to turn it OFF when you're done using it.

### INCH TAPS

**Tap Drill Size (inch)** = Thread Diameter $-\frac{0.01299 \times \%\text{ of Full Thread}}{\text{Number of TPI}}$

**% of Full Thread (inch)** = Number of TPI $\times \frac{\text{Major DIA of Thread} - \text{Drilled DIA}}{0.01299}$

**IPM (Mill Tapping Feed Rate)** = RPM ÷ TPI

**IPR (Lathe Threading)** = 1 ÷ TPI

**Form Tap Drill Size** = Basic Tap DIA $-\frac{0.0068 \times \%\text{ of Full Thread}}{\text{Number of TPI}}$

Recommended 65% form thread:

**Form Tap Drill Size** = Basic Tap DIA $-\frac{0.442}{\text{Number of TPI}}$

### METRIC TAPS

**Tap Drill Size (metric)** = Thread Diameter (mm) $-\frac{\%\text{ of Full Thread} \times \text{MM Pitch}}{147.06}$

**% of Full Thread (metric)** = $\frac{147.06}{\text{MM Pitch}}$ x [Thread DIA (mm) – Drilled Hole DIA (mm)]

**SMPM** = RPM x Metric Pitch

Recommended 65% form thread:

**Form Tap Drill Size (metric)** = Basic Tap DIA – (.75 x pitch (in metric) x .65)

**Memory Lock Keyswitch:** This is a Haas machine feature that prevents operators from editing or deleting programs, and from altering settings. Since the keyswitch locks the settings, it also allows you to lock areas within the settings. Setting 7 locks parameters; Parameters 57, 209, and 278 lock other features. Setting 8 locks all programs. Setting 23 locks 09xxx programs. Setting 119 locks offsets. Setting 120 locks macro variables. In order to edit or change these areas, the keyswitch must be unlocked and its setting turned off.





## FIND TAP DRILL SIZES ON ANY BASIC SIZE THREAD

**for an Approximate 75% Thread**

NC/NF INCH & ISO METRIC

**Major dia. less thread pitch = Tap drill size**

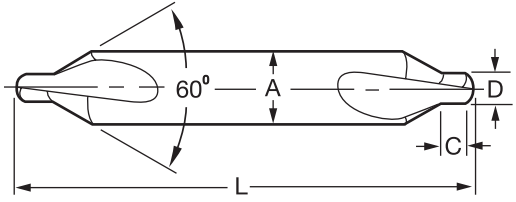
Note: thread pitch = 1.0 inch divided by threads per inch (TPI)

Inch Example:
(1 ÷ 16 = .0625)
3/8 – **16** = .375 – **.0625** = .3125 tap drill

Metric Example:
M10 – **1.5** = 10 – **1.5** = M8.5 tap drill

**Tool Life Management:** In the CURNT COMDS display on a Haas you can PAGE DOWN to the Tool Life Management page. On this page, the Tool Usage register indexes by one every time that tool is called up in the spindle. You enter the number of times you want that tool to be used in the Alarm column. When the Usage number for that tool reaches the number of uses in the Alarm column, it will stop the machine with an alarm. This will help you monitor tools to prevent them from breaking, and prevent parts being scrapped.

**STANDARD 60° CENTERDRILL**




| Size | Body Dia (A) | Drill Dia (D) | Drill Length (C) | OAL (L) |
|---|---|---|---|---|
| 00 | 1/8 | 0.025 | 0.030 | 1 1/8 |
| 0 | 1/8 | 1/32 | 0.038 | 1 1/8 |
| 1 | 1/8 | 3/64 | 3/64 | 1 1/4 |
| 2 | 3/16 | 5/64 | 5/64 | 1 7/8 |
| 3 | 1/4 | 7/64 | 7/64 | 2 |
| 4 | 5/16 | 1/8 | 1/8 | 2 1/8 |
| 5 | 7/16 | 3/16 | 3/16 | 2 3/4 |
| 6 | 1/2 | 7/32 | 7/32 | 3 |
| 7 | 5/8 | 1/4 | 1/4 | 3 1/4 |
| 8 | 3/4 | 5/16 | 5/16 | 3 1/2 |

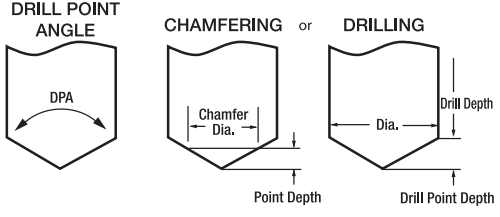


**To calculate drill tip depth for a chamfer diameter, or drill point depth for a required drilling depth:**

| Drill Point Angle (DPA) | Factor |
|---|---|
| 60° | 0.866 x Dia. = Point Depth |
| 82° | 0.575 x Dia. = Point Depth |
| 90° | 0.500 x Dia. = Point Depth |
| 118° | 0.300 x Dia. = Point Depth |
| 120° | 0.288 x Dia. = Point Depth |
| 135° | 0.207 x Dia. = Point Depth |

Example: To calculate for a 118-degree drill tip depth, multiply the dia. by 0.3

i.e., 0.250 drill diameter x .3 = 0.075 drill tip depth




**Setting 103: CYC START / FH SAME KEY.** This is good to use when you're carefully running through a program on a Haas. When this setting is on, the CYCLE START button functions as the Feed Hold key as well. When CYCLE START is pressed and held in, the machine will run through the program; when it's released, the machine will stop in a Feed Hold. This gives you much better control when testing a new program. When you're done using this feature, turn it off. This setting can be changed while running a program. It cannot be on when Setting 104 is on; when one of these settings is turned on, the other will automatically turn off.

**Setting 104:** JOG HANDL TO SNGL BLK. When Setting 104 is on and a program is running in MEM mode in the Program or Graphics display, pressing the SINGLE BLOCK key allows you to cycle through your program one line at a time, whether the machine is running or you're in Graphics. First press the CYCLE START button, and then each counterclockwise click of the jog handle will step you through the program line by line. Turning the handle clockwise will cause a Feed Hold. This setting can be changed while running a program. It cannot be on when Setting 103 is on; when one of these settings is turned on, the other will automatically turn off.

**CONVERT MINUTES OF A DEGREE TO A DECIMAL:**

**Divide minutes by 60**

| | |
|---|---|
| degree minutes to convert: | 30° 42' |
| divide minutes by 60: | 42 ÷ 60 = 0.7 |
| bring down degrees: | 30.7° |

**CONVERT MINUTES AND SECONDS TO DECIMAL:**

**Divide seconds, then minutes by 60**

| | |
|---|---|
| degree minutes and seconds to convert: | 30° 41' 15" |
| divide seconds by 60: | 15 ÷ 60 = 0.25 |
| divide decimal minutes by 60: | 41.25 ÷ 60 = 0.6875 |
| bring down degrees: | 30.6875° |

**CONVERT A DECIMAL DEGREE TO MINUTES:**

**Multiply decimal by 60**

| | |
|---|---|
| decimal degree to convert: | 30.7° |
| multiply decimal degree by 60: | 0.7 x 60 = 42' |
| bring down degrees: | 30° 42' |

**CONVERT DECIMAL TO MINUTES AND SECONDS:**

**Multiply decimal by 60**

| | |
|---|---|
| decimal degree to convert: | 30.6875° |
| multiply the degree decimal by 60: | 0.6875 x 60 = 41.25' |
| multiply decimal minutes by 60: | 0.25 x 60 = 15" |
| bring down degrees: | 30° 41' 15" |

**Advanced Editor Quick Cursor Arrow:** You can call up a cursor arrow with which to scroll through your program quickly, line by line, when you're in the Advanced Editor. For the quick cursor arrow, press F2 once; then you can use the jog handle to scroll line by line through the program. To get out of this quick-cursor mode and remain where you are in the program, just press the UNDO key.





| | |
|---|---|
| SELECT PROGRAM | When in the EDIT mode, pressing SELECT PROG will bring up the list of programs in the active (highlighted) window. |
| F2 | Press F2 to begin SELECTING A PROGRAM BLOCK to be copied, moved, or deleted. Scroll down to last line of program block. Press either F2 or the WRITE/ENTER key to select block. |
| EDIT | Press EDIT to SWITCH BACK AND FORTH between the left and right sides of the Edit display when editing programs on both sides of the Advanced Editor. |
| INSERT | Press INSERT to copy a selected (highlighted) program block to the line after the one the cursor is on. |
| ALTER | Press ALTER to move a selected (highlighted) program block to the line after the one the cursor is on. |
| DELETE | Press DELETE to delete a selected program block that is highlighted. |
| UNDO | Press UNDO to deselect a highlighted program block. UNDO will simply exit the block definition and return the cursor function back to normal. It will not undo any edits done in block edit. |
| F4 | F4 will swap the inactive program for the active program in the Advanced Editor. |
| HELP | Displays help information. |
| F1 | Press F1 to access the pop-up menu for easy access to editor functions: HELP, MODIFY, SEARCH, EDIT, and PROGRAM. |
| ERASE PROGRAM | The ERASE PROG key will bring up a program list (with the header "Delete Program From List") on the inactive side of the Edit display. You can then cursor to a program and delete it by pressing WRITE. |

**Duplicating a Program in LIST PROG:** In the LIST PROG mode, you can duplicate an existing program by cursor-selecting the program number you wish to duplicate, typing in a new program number (Onnnnn), and then pressing F2 (on older machines, press F1). You can also go to the Advanced Editor menu to duplicate a program, using the PROGRAM menu and the DUPLICATE ACTIVE PROGRAM item.

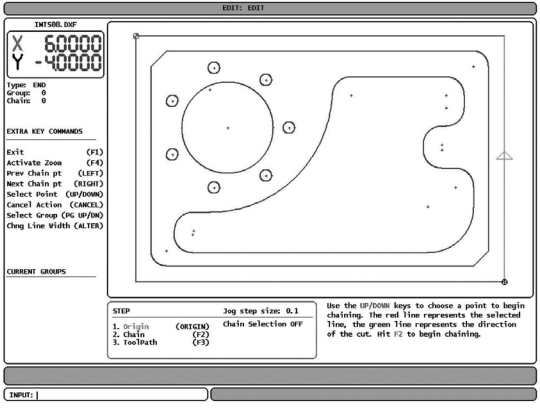
SAVING ENERGY MEANS SAVING MONEY

- Auto Power-Off by setting the number of minutes of idle time after which the control will turn itself off
- Power-Off at M30 sets the control to start a 30-second timer that will turn off all power unless interrupted
- Coolant pump shutoff setting
- Screen saver delay setting
- LCD display shutoff setting
- Conveyor shutoff setting
- Servo and hydraulics shutoff setting

greener. innovation.



- Import DXF data directly into the Haas mill or lathe control and create cutting toolpaths using the Haas Intuitive Programming System
- Simplifies programming of basic part features
- Program multi-tool processes in one simple step:
  - Spot drill, drill & tap
  - Drill for pocket entry and cut pocket
  - Rough and finish lathe contours
- Automatic and manual chaining capability
- Program output is fully editable G-code



The Haas Wireless Intuitive Probing System (WIPS) – with optical transmission for part setting, tool setting and inspection – consists of the following elements:

- Spindle Probe Module (work probe)
- Tool Setter Module (tool probe)
- Intuitive Probing System Software

The Haas Wireless Intuitive Probing System makes probing easy to understand and use through simple language, a graphical interface and clear instructions.

**Additional information** about the Haas Wireless Intuitive Probing System is available from the Haas website (www.HaasCNC.com). From the Haas home page, click on **Resource Center**, and then enter WIPS in the Search function.

**Tool Load Management:** Press the PAGE UP or PAGE DOWN key in CURNT COMDS to page to the Tool Load page. Spindle load condition can be defined for a particular tool, and the machine will stop if it reaches the spindle load limit defined for that tool. A tool overload condition can result in one of four actions by the control. The action is determined by Setting 84. ALARM will generate an alarm when overload occurs; FEED HOLD will stop with a Feed Hold when overload occurs; BEEP will sound an audible alarm when overload occurs; or AUTOFEED will automatically decrease the feedrate. This will also help you monitor tools.





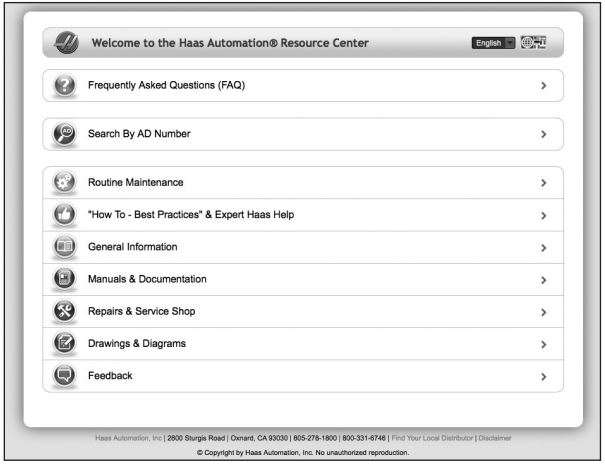
- Records feedrate and spindle-speed override adjustments while the machine is in cycle
- Records coolant on/off and P-COOL position
- Records notes while in cycle for later use

After the program is finished, one press of the F4 key will display the adjustments and show where they were made. When you choose to accept the changes, Program Optimizer will edit your program with the new speeds, feeds and notes, while displaying the original values in parentheses.

- Simplifies editing for easy program alterations
- Easy optimization of speeds and feeds

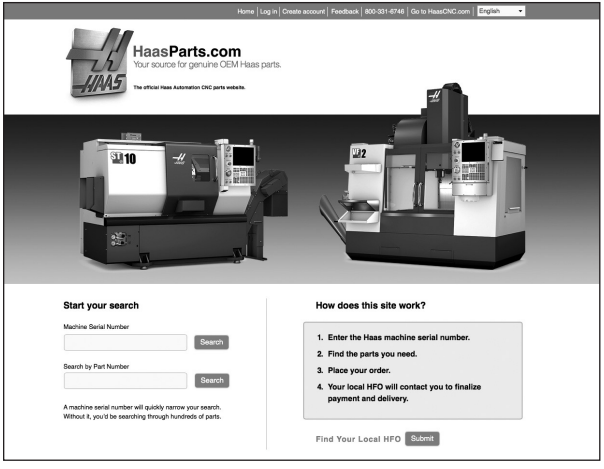
**Additional information** about the Program Optimizer is available from the Haas website (www.HaasCNC.com). From the Haas home page, click on **Resource Center**, and then enter Program Optimizer in the Search function.

**Leaving Messages:** You can enter a message in the MESGS display for the next operator, or for yourself. It will be the first display shown when you power up the machine, if there are no alarms other than the usual 102 SERVOS OFF alarm. If the machine was powered down using EMERGENCY STOP, the MESGS display will not show up when you turn the machine on again. Instead, the control will display the active alarm generated by the emergency stop. In this case, you would have to press the ALARM/MESGS key to view a message. It is not necessary to hit EMERGENCY STOP when you power down a Haas machine.




**At the Resource Center,** you'll find a library of valuable information – searchable by machine type and topic – like maintenance, how-to videos, manuals, simple repair procedures, and lots more. Go to HaasCNC.com and click on Resource Center.






**At HaasParts.com,** you can find typical service parts and maintenance items, like filters, bulbs, and lubricants – all with up-front pricing. Use your machine serial number to focus on only those parts that will fit. No need to look through hundreds of parts to find the ones that fit your machine – the HaasParts database takes care of it for you.

**Send and Receive Offsets, Settings, Parameters, Macro Variables, Programs, and more to/from Disk.** Offsets, settings, parameters, macro variables, ATM information, IPS information, alarm history, keystroke history, linear screw compensation, pallet information, and programs can be saved to a storage device. Press LIST PROG, then select the device to save to or load from. Press F4 and select the appropriate function, then press WRITE.

**Send and Receive Offsets, Settings, Parameters, and Macro Variables to/from Disk.** For controls using software versions M15.xx and L8.xx and older, offsets, settings, parameters, and macro variables can be saved to or loaded from a storage device. Press LIST PROG, select DESTINATION, and then select an OFSET, SETNG, PARAM, or Macro Variables (PAGE DOWN from CURNT COMDS) display page. Type in a file name, and then press F2 to write to, or F3 to read from disk.

### January

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

### February

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |

### March

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

### April

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

### May

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

### June

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

### July

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

### August

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

### September

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

### October

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

### November

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

### December

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |





### January

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

### February

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | | | | | |

### March

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

### April

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |

### May

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

### June

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

### July

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

### August

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

### September

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | |

### October

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

### November

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

### December

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

**January**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

**February**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | | | | |

**March**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

**April**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | | | | | | |

**May**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

**June**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | |

**July**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

**August**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

**September**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |

**October**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

**November**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | | |

**December**

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

**Haas Automation, Inc. USA**
2800 Sturgis Road, Oxnard, CA 93030
P. 800-331-6746 I www.HaasCNC.com

**Haas Automation, Europe**
Mercuriusstraat 28, B-1930
Zaventem, Belgium
P. ++32-2-522 99 05 I www.HaasCNC.com

**Haas Automation, Asia**
No. 96 Yi Wei Road, Building 67
Waigaoqiao F.T.Z., Shanghai, 200131, P.R.C
P. ++86-21-3861 6666 I www.HaasCNC.com



Eleventh printing 2015. This book is copyrighted material.
© 2015 by Haas Automation, Inc., USA. All rights reserved.
May not be reproduced without written permission from publisher.
Extra copies available by contacting your local HFO.

**Haas Automation, Inc. USA**
2800 Sturgis Road, Oxnard, CA 93030
P. 800-331-6746 I www.HaasCNC.com

**Haas Automation, Europe**
Mercuriusstraat 28, B-1930
Zaventem, Belgium
P. ++32-2-522 99 05 I www.HaasCNC.com

**Haas Automation, Asia**
No. 96 Yi Wei Road, Building 67
Waigaoqiao F.T.Z., Shanghai, 200131, P.R.C
P. ++86-21-3861 6666 I www.HaasCNC.com