

Program Code Quick Reference

G0	Rapid Travel	G53	Use Machine Coordinate System
G1	Linear Interpolation	G54-59	Fixture Offsets 1-6
G2	Circular Interpolation (Clockwise)	G66	Modal Subroutine Call
G3	Circular Interpolation (Counter Clockwise)	G67	Modal Subroutine Cancel
G4	Dwell P= Time in Milliseconds Also: Non Modal In-position Check	G68	Rotation (R0= Angle, XY= Center of Rotation)
G5	Non Modal Rapid Travel	G69	Rotation Cancel
G8	Accelerate (No Feed Ramps)	G70	Check for Inch Parameter
G9	Decelerate (Feed Ramps) Also: In Position Check	G71	Check for Metric Parameter
G10	Programmable Data Input L02= Fixture X, Y, Z, A, B, P= 0, 1-48 L10= Length, P= 1-99, R0= Amount L12= Diameter, P= 1-99, R0= Amount L13= Read Fixture, P= 1-24, R0= Z, R1= X, R2= Y L14= Read Length, P= 1-99, R0= Amount L15= Read Diameter, P= 1-99, R0= Amount L100 to L109= R Values, P= Amount	G73	Peck Drill Q= Peck Size P= Feed Distance before next Peck (optional) I= Initial Peck J= Reducing Value for Subsequent Pecks K= Minimum Peck Size
G15	YZ Circular Interpolation with the A Axis	G74	Left Hand Tap Format 1 Q= Thread Lead (1/pitch), F= RPM Format 2 S= RPM, F= Feed (Lead * RPM)
G17	XY Plane Selection Also: Y Axis Cam Wrapping Q= A Axis Ratio/ [5p (cam dia. in inches)] O= A Axis Ratio/ [[5/25.4p (cam dia. in mm)] P0= A Axis, P1= B Axis	G74.1	Left Hand Rigid Tap Format 1 Q= Thread Lead (1/pitch), F= RPM Format 2 S= RPM, F= Feed (Lead * RPM)
G17.1	A/B Word Swap On	G74.2	Prepare for G74.1
G17.2	A/B Word Swap Off	G75	Tapping Head Cycle Format 1 Q= Thread Lead (1/pitch), F= RPM Format 2 S= RPM, F= Feed (Lead * RPM)
G18	ZX Plane	G76	Fine Boring Q= Amount of Y+ Shift or I= Amount & Direction of X Shift J= Amount & Direction of Y Shift
G19	YZ Plane	G80	Fixed Cycle Cancel
G20	Check for Inch Parameter Setting	G81	Drill, Spot Drill
G21	Check for Metric Parameter Setting	G82	Center Drill, Counterbore P= Dwell Time in Milliseconds 180,000/RPM= Dwell time for 3 revolutions
G28	Return to Zero	G83	Deep Hole Cycle Q= Peck Size P= Feed Distance before next Peck (optional) I= Initial Peck J= Reducing Value for Subsequent Pecks K= Minimum peck Size
G28.1	Return from Jog Away	G84	Right Hand Tap Format 1 Q= Thread Lead (1/pitch), F= RPM Format 2 S= RPM, F= Feed (Lead * RPM)
G29	Return from Zero	G84.1	Right Hand Rigid Tap Format 1 Q= Thread Lead (1/pitch), F= RPM Format 2 S= RPM, F= Feed (Lead * RPM)
G31	Probe Touch Function	G84.2	Prepare for G84.1
G31.1	Probe No Touch Function	G85	Bore In / Out
G40	Cutter Radius Compensation Cancel	G86	Bore In / Spindle Off / Rapid Out
G41	Cutter Radius Compensation Left (climb)	G87	Bore In / Out
G42	Cutter Radius Compensation Right (conve.)	G88	Bore In / Dwell / Out, P= Milliseconds
G43	Tool Length Compensation Positive	G89	Bore In / Dwell / Out, P= Milliseconds
G44	Tool Length Compensation Negative	G90	Absolute Positioning
G45	Tool Length Offset Single Expansion	G91	Incremental Positioning
G46	Tool Length Offset Single Reduction	G91.1	High Speed Execution (-2 System Only)
G47	Tool Length Offset Double Expansion	G91.2	High Speed Execution Cancel Also: Binary Compress / Analyzer End Point
G48	Tool Length Offset Double Reduction	G91.3	Binary Compress / Analyzer Start Point
G49	Tool Length Offset Cancel	G92	Absolute Preset
G50	Ramp Slope Control Cancel	G93	1/T Feed Rate Specification (Inverse Time)
G50.1	Mirror Image Cancel	G94	Feed Rate Specification DPM, IPM
G51	Ramp Slope Control R0= Ramp Speed Value of .5 - 2. R0+= Z Axis, R0-= XY Axis	G98	Return to Initial Plane
G51.1	Mirror Image	G99	Return to R0 Clearance Plane
G51.2	Tool Load Compensation State Feed Rate Before the G51.2 Line R1= Target Spindle Load R2= Min. Percentage Feed Rate Reduction R3= Max. Percentage Feed Rate Increase R4= Time at Min. Feed Rate to Initiate Slide Hold		
G51.3	Axis Scaling R1= Program (All three axes) R2= X R3= Y R4= Z		
G52	Coordinate System Shift		

Fixed Subroutines

L9101	Probe Functions R1 + 1-10, See User's Manual for details
L9201	Engraving: R1 + 0 = Standard font R1 + 1 = Stencil font R1 + 2 = Serialized standard R1 + 3 = Serialized stencil R2 + = Height of letters R3 + = Angle of word R4 + = Serial increment R0 = Clearance plane Z = Final depth F = Feed rate
L93NN	Bolt Circle R0 = 1 (incremental X distance and direction from 1st position to center) R1 = J (incremental Y distance and direction from 1st position to center) R2 = Angular step between holes (+ angles for CCW, - angles for CW) NN = Amount of holes
L94NN	Mill Boring cycle CCW: R0 + = Feed, R1 + = Diameter of hole, NN = Repetitions
L95NN	Mill Boring cycle CW: R0 + = Feed, R1 + = Diameter of hole, NN = Repetitions
L9601	Rectangular pocket CCW: R0 + = Feed, R1 + = Corner radius on tool, R2 + = X, R3 + = Y
L9701	Rectangular pocket CW: R0 + = Feed, R1 + = Corner radius on tool, R2 + = X, R3 + = Y
L9801	Circular pocket CCW: R0 + = Feed, R1 + = Corner radius on tool, R2 + = Diameter of hole
L9901	Circular pocket CW: R0 + = Feed, R1 + = Corner radius on tool, R2 + = Diameter of hole
Note:	Input the tool diameter in the tool table before using fixed subroutines, and use the D word in Format 2.

M Codes

M0	Program Stop	M48.2	Dual Rotary Pot Active Pallet A
M1	Optional Stop	M48.3	Dual Rotary Pot Active Pallet B
M2	End of Program	M49	Feed Rate and RPM Pot Inactive
M3	Spindle On Clockwise	M49.1	Servo Coolant Pot Inactive
M3.1	Sub-Spindle On Ignore Magnet CW	M49.2	Dual Rotary Pot Inactive Pallet A
M3.2	Acknowledge Spindle Magnet	M49.3	Dual Rotary Pot Inactive Pallet B
M4	Spindle On Counter Clockwise	M60-69	User Attached Devices M60 A Axis Brake On M61 A Axis Brake Off M62 B Axis Brake On M63 B Axis Brake Off M64 MP Probe Active M65 TS-20 Probe Active M66 MP-12 Probe Active M67 Laser Probe Active M68 Delta Motor M69 Wye Motor
M4.1	Sub-Spindle On Ignore Magnet CCW	M80	Automatic Doors Open
M4.2	Acknowledge Spindle Magnet	M81	Automatic Doors Close
M5	Spindle Off	M90	Default Gain (from SV Command)
M6	Tool Change	M90.1	Advanced Feed Forward Gain Enable P=Gain (50-250)
M7.1	Servo Coolant On	M91	Normal Gain
M8	Coolant On	M92	Intermediate Gain
M8.1	Servo Coolant On	M94	Feed Forward P = Angle Tolerance Q = Line Length (Moves less than this not checked) Example: M94 P91 Q.002
M9	Coolant Off	M94.1	Feed Forward by Feed Rate Modification State Feed Rate Before M94.1 Line P = Angle Q = Percentage change each modification R0 + = Min. Feed Rate Modification R1 + = Length to ignore M94.1 R2 + = Modify feed every, this angle, from P Example: M94.1 P170 Q10. R0+50. R1+1. R2+15.
M10	Cancel Reciprocation	M94.2	Advanced Feed Forward On, P = Ramp, Q = Detail Window
M11	X Axis Reciprocation	M95	Feed Forward Cancel
M12	Y Axis Reciprocation	M95.1	Feed Forward Modify Cancel
M13	Z Axis Reciprocation	M95.2	Advanced Feed Forward Cancel
M14	B Axis Reciprocation	M96	Roll CRC
M15	A Axis Reciprocation	M97	Intersectional CRC
M16	C Axis Reciprocation	M98	Execute Sub Program P = Program # L = # of Repetitions
M17	End of Subroutine	M99	End of Sub Program Also: Line Jump, P = Line #, Example: M99 P#
M18	Cycle Cushman Indexer		
M19	Spindle Stop/Orient		
M20	Cycle General Purpose Indexer Also: Automatic Doors Close Also: Toggle On/Off Hydrosweep		
M30	End of all Subroutines Also: End of Program (Format 2)		
M31	Exchange Pallets		
M32	Store/Load Pallet A		
M32.1	Load and Verify Pallet A		
M33	Store/Load Pallet B		
M33.1	Load and Verify Pallet B		
M41	Low Range RPM		
M42	High Range RPM		
M45	Execute Fixed Cycle		
M46	Positive Approach On		
M47	Cancel Positive Approach		
M48	Feed Rate and RPM Pot Active		
M48.1	Servo Coolant Pot Active		