G Codes and M Codes with Software Ports

All lines of machine code must start with either a G Code or an M Code, and software ports can be used to define the operation. The timeline for additions and updates to the codes and software ports is included, and the following tables provide additional information on each type of code and on software ports. Multiple G or M Codes cannot be put on the same line.

Timeline for Additions and Updates

The following timeline shows what changes were made to the G and M Codes and to the software ports since 2003.

Date	Additions or Updates
01 Sep 2015	Updated software ports
01 Mar 2013	Add Router 5-axis Codes
19 Feb 2012	Add port 242
02 Nov 2010	Update port 159
03 Jun 2010	Add port 111
01 Jun 2010	Add M17 information
10 Jun 2009	Added port 183
11 Jan 2008	Added Material Handling
31 Jul 2007	Added font ports
23 Mar 2007	Added ports in 200 range
01 Mar 2007	Clarified Park commands, when they were added
18 Dec 2006	Added M50
27 Jul 2006	Updated Port 137 operation
09 Feb 2006	Added ports 126 and 127
11 Jan 2006	Add G84 commands (converted to atap_cycle)
29 Jul 2005	Added C-axis ports
28 Sep 2004	Added M18 and M19
01 Jul 2004	Allow G83 and G81to be modal
12 May 2004	Added in Plasma Library ports
21 Oct 2003	Fix G81 pecking more than once if retract height < 0
19 Aug 2003	Add G81 and allowed G83 to have X and Y
27 May 2003	Added M95, M96, M97, M98, and VP(133,142)
13 Jan 2003	Added Homing and Set Surface Virtual Ports

G Codes

Operators creating G-Code files from their post processor must end the file with a .cnc or .anc file extension so that the DNC program can recognize the file. The following table lists the supported G Codes for the ***MultiCam*** controller. Parameters within brackets are optional. The fields represented by "d.d" may be any decimal number, and fields represented by "d" may be any positive integer. Router 5-axis codes are shown in red.

Code	Description	Notes (if applicable)
G00	[Xd.d] [Yd.d] [Zd.d] [Fd.d] [Td] [Ctext string]	High speed move (slew); Rapid Axes Positioning
G01	[Xd.d] [Yd.d] [Zd.d] [Fd.d]	Linear move (machine)
G02	[Xd.d] [Yd.d] [Zd.d] [Id.d] [Jd.d] [Kd.d] [Fd.d]	CW 2D circular move
G03	[Xd.d] [Yd.d] [Zd.d] [Id.d] [Jd.d] [Kd.d] [Fd.d]	CCW 2D circular move
G04	Fd.d	Dwell (seconds)
G09	Deceleration at End of Block	
G16	Circular Interpolation and Cutter Diameter Compensation on a Defined Plane	
G17	Specify XY Plane for Helical	Circular Interpolation and Cutter Diameter Compensation on 1st – 2nd Axes Plane
G18	Specify ZX Plane for Helical	Circular Interpolation and Cutter Diameter Compensation on 3rd – 1st Axes Plane
G19	Specify YZ Plane for Helical	Circular Interpolation and Cutter Diameter Compensation on 2nd – 3rd Axes Plane
G20	Closes GTL Profile	
G21	Opens GTL Profile	
G27	Continuous Sequence Operation with Automatic Speed Reduction on Corners	
G28	Continuous Sequence Operation without Speed Reduction on Corners	
G29	Point-to-Point Operation	
G33	Constant or Variable Pitch Thread	
G37	Find Home	
G40	Cancel Tool Compensation	
G41	Left Tool Compensation	
G42	Right Tool Compensation	
G60	Closes the HSM Profile	
G61	Opens the HSM Profile	
G62	Clear Soft Home	Splits the HSM Profile in Two with Continuity
G63	Splits the HSM Profile in Two with Link	
G66	Splits the HSM Profile in Two with Edge	
G67	Splits the HSM Profile in Two with Reduced Speed on Edge	
G70	English Programming (inches)	
G71	Metric Programming (millimeters)	
G72	[Xd.d] [Yd.d] [Zd.d] [Id.d] [Jd.d] [Kd.d] [Fd.d]	CW 3D circular move; Point Probing with Probe Tip Radius Compensation
G73	[Xd.d] [Yd.d] [Zd.d] [Id.d] [Jd.d] [Kd.d] [Fd.d]	CCW 3D circular move; Hole Probing with Probe Tip Radius Compensation
G74	Incremental Mode for G02/03 Arcs	Probing for Theoretical Deviation from a Point

		without Probe Tip Radius Compensation
G75	G90/91 Mode for G02/03 Arcs	
G79	Programming Referred to Axis Home Switch	
G80	Disable Canned Cycles	
G81	[Xdd.d] [Ydd.d] [Rdd.d] [Zdd.d] [Fdd.d]	One-stroke drill cycle
G82	Spot-facing Cycle	
G83	[Xdd.d] [Ydd.d] [Rdd.d] [Zdd.d] [Ddd.d] [Fdd.d]	Peck drill cycle with router; Deep Hole Drilling Cycle
G84	[Xdd.d] [Ydd.d] [Zdd.d] [Rdd.d] [Fdd.d]	Tap cycle
G85	Reaming Cycle	
G86	Boring Cycle	
G89	Boring Cycle with Dwell	
G90	Absolute Coordinate Mode	
G91	Incremental Coordinate Mode	
G92	[Xd.d] [Yd.d] [Zd.d]	Set Soft Home; Axis Presetting without Mirror
G93	Inverse Time (V/D) Feedrate Programming Mode	
G94	Feedrate Programming in IPM or MMPM	
G95	Feedrate Programming in IPR or MMPR	
G96	Constant Surface Speed (feet per minute or meters per minute)	
G97	Sd	Set spindle speed (RPM)
G98	Plasma Systems Only 1. P133 D1 2. P133 D0 Other Systems 1. P145 Dd 2. P147 Dd 3. P300 Dd Router 5-axis	By default, plasma systems ignore feedrates sent in the job file. 1. Feedrates will be used from now on. 2. Feedrates will be ignored from now on. 1. Go to pre-recorded Home position (e.g., D1=Home 1, D2=Home 2) 2. Park X-axis (e.g., D0=X Min, D1=X Max) 3. Boring unit drill select Axis Presetting with Mirror
G99	Delete G92	

The following table lists the letters used to denote various arguments in Etc CNC version 1.0.

Argument	Description	Location of Use (if applicable)
C	Tool Change Operator message	G00
D	Peck Drill Data	G83, Data selection in G98
F	Feedrate in Units per Second	G00, G01, G02, G03, G72, G73, G83
G	Preparatory Function	
I	Circular Interpolation Value in X Dimension	G02, G03, G72, G73
J	Circular Interpolation Value in Y Dimension	G02, G03, G72, G73
K	Circular Interpolation Value in Z Dimension	G02, G03, G72, G73
M	Miscellaneous or Control Function	
N	Sequence Number	
R	Beginning Z Motion Dimension	G83
S	Spindle RPM	G97
T	Tool Change	G00
X	X Motion Dimension	
Y	Y Motion Dimension	
Z	Z Motion Dimension	

M Codes

The following table lists the available M Codes and how they should be configured for JobNameServer. Operators can use Device 199 Inactive to ignore M Code. Router 5-axis codes are shown in red.

Code	Description	Device #	State*	Graphics	Notes
M00	Program Pause Step Mode Forced	-97	I	n/a	0 prg_pause (needed for Suite4)
M01	Optional Program Pause Conditional Step Mode	-96	I	n/a	1 prg_pause (needed for Suite4)
M02	End of Job without Reset	-98	I	n/a	end_plot (needed for Suite4)
M03	Start Spindle Clockwise	113	A	n/a	Spindle ON clockwise
M04	Start Spindle Counter-clockwise	114	A	n/a	Spindle ON counter-clockwise
M05	Spindle OFF Stop	105	A	n/a	spindle_off
M06	Tool Pick-up				
M07	Turn Cooler on, Independently from Spindle Rotation				
M08	Turn Cooler on, Only with Spindle Rotation				
M09	Turn Cooler off				
M11	2D Device ON	-1 or 101	A	ON	-1= current tool number is passed 101= current tool number is selected by Init file
M12	3D Device ON	-1 or 102	A	ON	-1= current tool number is passed 101= current tool number is selected by Init file
M13	2D Device ON, no Z down Spindle Clockwise Rotation and Tool Cooler on	113	A	ON	-1= current tool number is passed 101= current tool number is selected by Init file **M13 does not lower the pneumatic Z and is used in Plasma only.**
M14	Spindle Counter-clockwise Rotation and Tool Cooler on				
M15	Spindle Stop and Tool Cooler off				
M17	Turn on Z Tracking	118	A	OFF	Turns on Z Tracking for the current contour in Plasma only
M18	Turn off Z Tracking	118	I	OFF	Turns off Z Tracking for the current contour in Plasma only
M19	Disable Arc Out Pause	119	I	OFF	Disables the Pause feature when the arc goes out and becomes enabled at the next contour (i.e., M11 or M12) in Plasma only

M21	2D Device OFF Check Tool Memory Congruence during Tool Change Macro	-1 or 101	I	OFF	-1= current tool number is passed 101= current tool number is selected by Init file
M22	3D Device OFF Spindle 1 Tool Clamp Unlock	-1 or 101	I	OFF	-1= current tool number is passed 101= current tool number is selected by Init file
M23	2D Device OFF, no Z up Spindle 1 Tool Clamp Lock	123	I	OFF	-1= current tool number is passed 101= current tool number is selected by Init file **M23 does not raise the pneumatic Z and is used in Plasma only.**
M25	Start of Sheet	-99	A	OFF	Starts sheet and is available as nsheet in H4LDR version 4.50 and later
M26	Dust Hood Down				
M27	Dust Hood Up				
M30	Fire Enabled Drill End of Program with Reset	130	A	OFF	Available in H4LDR version 4.55 and later; JobConsole v4.0.56.0 and above convert device #130 (Active) to 66 PD
M31	Drill 1 ON (Enable & Offset) Laser on	131	A	OFF	Available in H4LDR version 4.55 and later; JobConsole v4.0.56 and above convert device #131 to 66 PD tool_change
M32	Drill 2 ON (Enable & Offset)	132	A	OFF	Available in H4LDR version 4.55 and later; JobConsole v4.0.56.0 and above convert device #132 to 67 tool_change
M38	Gang Drill 1 ON	138	A	OFF	
M41	Drill 1 OFF (Disable) Laser off	131	I	OFF	Available in H4LDR version 4.55 and later; JobConsole v4.0.56.0 and above convert device #131 (Inactive) to 66 PU
M42	Drill 2 OFF (Disable)	132	I	OFF	Available in H4LDR version 4.55 and later; JobConsole v4.0.56.0 and above convert device #131 (Inactive) to 67 PU

M48	Gang Drill 1 OFF	138	I	OFF	Turns off and raises gang drill; resets surface back to surface for current tool. For JobConsole, change "Post" tab under CNC settings. Under XMI Settings, do the following: 1. Select CNC tab 2. Select Post tab 3. Add tool number -138 4. Add tool description as Gang Drill 5. Add Tool Change M38 6. Add Tool Unload M48 7. Leave Tool Activation blank 8. Leave Tool Deactivation blank
M50	Material Handler (Panel Pusher)	150	I	OFF	Requires RIO_pusher.uc module. Starts and ends a material unload process with the following: 1. Moves to X start. 2. Lowers pusher pins. 3. Moves to X stop. 4. Raises pusher pins.
M51	Work Piece 1 Unlock				
M52	Work Piece 2 Unlock				
M53	Work Piece 3 Unlock				
M54	Work Piece 4 Unlock				
M60	Put Away Tool	104	A	OFF	Available in H4LDR version 4.55 and later **M60 is only available on ATC machines.**
M61	Work Piece 1 Lock				
M62	Work Piece 2 Lock				
M63	Work Piece 3 Lock				
M64	Work Piece 4 Lock				
M90	Program Start	n/a	n/a	n/a	Opens start_plot or cycle_start **For Suite4 set device number to -90.**
M91	Program Replay	n/a	n/a	n/a	Not supported
M92	ALL Mode	192	A	OFF	Available in H4LDR version 4.58 and later **M92 is only available on standard machines.**

M93	Return to Auto Mode	192	I	OFF	Available in H4LDR version 4.58 and later **M93 is only available on standard machines.**
M94	Disable Spindle Offset	194	A	n/a	Available in H4LDR version 4.71 and later **M94 makes the spindle offset between heads 0,0 and is only available on standard machines.**
M95	Enable Marking Mode	195	A	OFF	Plasma only
M96	Disable Marking Mode	195	I	OFF	Plasma only
M97	Double Velocity	197	I	OFF	Sets for faster lead-outs in Plasma only
M98	Turn off Z Tracking, Disable Arc Out Pause, then Turn off Plasma Arc	198	I	OFF	Disables the arc before the end of the contour in Plasma only
M99	Exit CNC Interpreter Reset Tool Change in Dangerous Position Memory	n/a	n/a	n/a	
M100	Homing Paramacro				Machine zero reset
M101	Homing Cycle				
M105	Spindle Stop Request				
M106	Tool Offset Update				
M150	Material Handling Pusher Cycle	150	A	n/a	Runs a complete pusher cycle
M151	Material Handling Lifter Cycle	151	A	n/a	Runs a complete lifter cycle
M152	Material Handling Dust Collector Blast Gate ON	152	A	n/a	Turns ON the dust collector blast gate
M153	Material Handling Dust Collector Blast Gate OFF	153	A	n/a	Turns OFF the dust collector blast gate
M154	Material Handling Sweeper Blast Gate ON	154	A	n/a	Turns ON the sweeper blast gate
M155	Material Handling Sweeper Blast Gate OFF	155	A	n/a	Turns OFF the sweeper blast gate
M156	Material Handling Air Knife ON	156	A	n/a	Turns ON the air knife
M157	Material Handling Air Knife OFF	157	A	n/a	Turns OFF the air knife

* A = Active, I = Inactive

M Codes can directly control M24 devices when used to configure the M-Code table for JobNameServer. Devices 200-299 provide direct control while devices 300-399 provide exclusive device control that turns other devices off when a particular device has been turned on.

Device	Device Output	M24 Header / Location
200	Spindle 1 Output	H2: 1&2
201	Mister 1 Output	H2: 3&4
202	Spindle 2 Output	H2: 5&6
203	Mister 2 Output	H2: 7&8
204	Spindle 3 Output for M24 revision 2, 3, and 4 Spindle Enable for M24 Revision 5	H2: 9&10
205	Mister 3 Output for M24 revision 2, 3, and 4 Drill Enable for M24 revision 5	H2: 11&12
206	Drill 1 Output	H3: 1&2
207	Drill 2 Output	H3: 3&4
208	Caution Output	H3: 5&6
209	TC Chuck Output	H4: 1&2
210	TC Blast	H4: 3&4
211	Dust Collector	H4: 5&6
212	Misc 1 ** DO NOT USE **	H4: 7&8
213	Misc 2 ** DO NOT USE **	H4: 9&10
214	Misc 3 ** DO NOT USE **	H4: 11&12
250 – 269	General M-Code Mapping to Devices Mapped using MCode_Device_Map file.	

Software Ports

Software ports are used to expand either HPGL or CNC language. Operators can use a software port in the job file with either a G98 or Z0 command as shown below:

CNC Job G98 P147 D1 will park the machine at X Max.

HPGL Job Z0147, 1 will park the machine at X Max.

Virtual ports 1-49 are reserved for setting physical ports while virtual ports 50-99 are reserved for clearing physical ports. These ports apply to the HPGL command Z0, CNC command G98, and µCito command set_port. Each of these ports requires Init file commands to implement.

The following 2 strings are defined in relation to their associated port, location or data, and description while the third and fourth strings are more complex.

G98 P<n> X<x.x> Y<y.y> Z<z.z> S<string> G98 P<n> [X<x.x>] [Y<y.y>] [Z<z.z>] [S<string> --- Xlated to --- <n> info_string <string> The XYZ are only used for JobPreviewer.		
Port	XYZS	Description
1020	Any	Specifies the bounding box of sheet. XYZ are read and sent to JobPreviewer but not the controller; S is read and converted to <n> info_string.
1040	Tool Prompt	

G98 P<n> S<string> G98 P<n> S<string> --- Xlated to --- <n> info_string <string>		
Port	String	Description
140	Any	Displays the string but does not wait for the operator. Requires XLate v3.85 or later.
141	Any	Displays the string and waits for operator response. Requires Xlate v3.85 or later.

G98 P<p> D<d> [E<e.e>] G98 P<p> D<d> --- Xlated to --- <d> <p> set_port G98 P<p> D<d> E<e.e> --- Xlated to --- <e.e> <d> <p> set_port_ex		
Port	Data	Description
100	Spindle Speed in RPM	Sets spindle RPM.
101	Marker Identifier	1=character 2=word 3=line 4=part 5=start of part 6=end of part
102	Vacuum Control	0=off 1=on
103	Pump Control	0=off 1=on
104	Prox Control	0=off 1=on
109	Ring Mode	0=off 1=on
110	Max Z Increment for Multipass	Specifies in 1/1000th
111	Feedrate Override	n= percentage value (i.e., 1 – 100%) 0=disable This command is immediate and will change the feedrate override to the percent specified (i.e., 1% to 100%).
112	VisionMode	JC Vision mode number
120	Percentage of Laser Power	Sets laser power
121	Absolute Index	Move to abs. Position, int value *HPGL Resolution
122	Solenoid ON/OFF	0=off 1=on
123	Auto Spindle Enable (BOJ, EOJ)	0=disable auto spindle 1=enable auto spindle
125	Z Probe Disable/Enable	0=disable probing 1=enable probing on PD
126	Tapping Mode	
127	Linear Encoder Mode	
128	Z Probe Location	Specifies in 1/1000th; indicates the expected location of the top of the material when using the Z surface probe **Port 128 is reset to 0.0 at the start of each job.**
129	Touch Off Radius	Specifies in 1/1000th; uses the radius during Z Surface Probe use to determine if the probe should touch off again **Port 129 is reset back to the keypad settings at the start of each job.**

130	Spindle Control	0=off 1=on
131	Job Type	1=start of vector job 2=start of raster job
132	Data Ignored	Sets Home at the current position
133	Use Feedrate in Job	0=ignore feedrates in the job 1=use feedrates in the job
134	Use Z Values in Job	0=ignore Z values/use keypad values 1=use Z values
135	Spindle Reverse Direction	1=spindle 1 reverse (CCW) 2=spindle 2 reverse (CCW) **Port 135 orients the bit to reverse the spindle.**
136	Mister Configuration	0=disable 1=enable
137	Manual Dust Collector Control	0=raise 1=lower 2=disable
138	Low RPM Mode for Motor #2	
140	Drill Hole	D=<mode> E=<Hole Diameter> Hole is drilled at current XY location.
141	Prompt	
142	Host Jog	Starts host Jog and ignores data
143	Set Surface	0=auto 1=current position
144	Find Limits	Ignores data
145	Fixture Number	Sets Home at the fixture location
146	Park Z Location	0=Z Home 1=Z Max
147	Park X	0=X Home 1=X Max **Port 147 parks Z first and then parks X.**
148	Conveyor System Split Location	JC Internal
149	Dry Run Mode	0=turn off Dry Run at this point in the job file 1=turn on Dry Run at this point in the job file **Dry Run flag will turn off at EOJ & pause/cancel.**

Port numbers 150-199 are used to set dynamic values while running. These are pre-contour or in-contour settings. Values are "D=" by default unless "E=" is specified.		
150	Z Lift	Sets the Z lift in 1/1000th. See Port 271.
151	Contour Acceleration	D=<mask> E=<acceleration value> for those values. D value = axis bit value (1=X, 2=Y, 4=Z) E value = acceleration in user units e.g., G98 P151 D3 E15.0 sets acceleration of XY to 15.0 for the following contours
152	Pierce Type	D=<type> E=<exit angle> (value -999 means unknown) Operators should input the final angle relative to the start point to finish the pierce for dynamic pierce methods. This sets the desired direction for the next move.
153	Set Dual Head Control (dual heads, not dual gantry axes)	D=<enable mask> Ha=Head a (either Xa or Ya) Hb= Head b (either Xb or Yb) D=1 activate Ha, park Hb D=2 activate Hb, park Ha D=3 activate both heads with offset specified E=<Yb offset> Hb=Y offset + Ha
154	Set Dual-head Mirror	D=<enable> 0 to disable, 1 to enable E=<mirror Pt> Hb=Hmirror - Ha
155	Contour Deceleration	D=<mask> E=<deceleration value> for those axes
156	Torch Height Voltage	-1=Resample now -2=Use Book Value now
157	User Rate (1 – 10)	
158	Max Volt Gap	
159	Bevel Angle and Mode	D=0 Normal Bevel Angle D=2 Swurf-Left-TC D=3 Swurf-Right-TC E value= Bevel Angle in degrees
160	Material Handling Suction Cup Pod Vacuum	
161	Material Handling Suction Cup Pod Blower	
162	Material Handling Sheet Size	
163	Material Handling Start of Sheet	

170	Vertex Type	1=Concave 2=Convex or Collinear Bit-Flag 0x04= Last Entity Begin 8=Bevel Loop Diag Move Begin (tool is not touching the part edge; do unwrap, etc. here)
171	WJ Wrap Angle	0=Initial Wrap Angle
175	ToolComp	0=None 1=Left 2=Right
176	Poly Line Smoothing	G98 P176 E<tolerance>
180	Dual Y Configuration	
181	Dual Y Yb Offset	
183	Chip Break Value	<E=relative lift height> for chip breaking Port 183 is called before a G83 command to indicate it should only lift by the Chip Break value instead of retract height between pecks.
184	Y Brake Control	D=0 turns OFF Y brake D=1 turns ON Y brake
185	Material Thickness	
186	Bar Code Scan Location	
190	Job ID for Clamps	
191	Clamp Outputs	
192	Clamp Sensors To Look For	
193	New Bevel Angle	E Value=NEXT Bevel Angle in degrees; used to pre-adjust the Z height See VP 159 for more details.

Ports 200 – 251 are used to set job values.		
200	Cut Feedrate	
201	Slew Feedrate	
202	Z Up Feedrate	
203	Z Down Feedrate	
204-208	Same as 200-203	Unit conversion enabled
209	Speed	Laser power adjusted speed
210	Pen Down Delay	
211	Pen Up Delay	
220	Pen Down Height Cut Height	Equivalent to SPD in µCito and ZD in HPGL
221	Pen Up Height Lift Height	Equivalent to SPU in µCito and ZU in HPGL
222	Disable Z Depth unrolling in the translator	D=10 means Enable Unrolling
230	Set Job Type Bits	Set bits of the job-type flag in the job-info-table
231	Group ID	
240	Material Library Information	D=1 S=Material Name D=2 S=Process Name
241	Process Cut Parameters specified in the job file	D=<Param ID> E=<Param Value>
242	Cut Params from the Material Library, injected by JobConsole, for the Material/Process specified in the job	D=<Parameter ID> E=<Parameter value> ParamsID=9999 implies the end of data
242 (W)	<ParamsID> WaterJet * Advanced Param	//Process 400 Cut Finish 401 Pierce Type 402 Arc Washout 403 Back Wash 404 Abr Flow//If non-zero, this overrides 486 405 Max Feed 406 Max Accel 407 Max Arc Accel 408 Arc Feed Factor 420 *Recalc//If 0, do not recalculate the following 421 *Pierce Time 422 *Linear Feed 423 *Max Accel 424 *Critical Rad

		//Material
		491 Material Thickness
		492 Material Cut Index
		
		//Head
		481 Pressure High
		482 Pressure Low
		483 Nozzle Diameter
		484 Orifice Diameter
		485 Grit Cut Index
		486 Abrasive Flowrate

242 (P)	<ParamsID> Plasma * Advanced Param	102 Arc Current (amps) 103 *Reference Volts 104 Pierce Delay (msec) 105 Pierce Height 106 Cut Height 107 THC Delay (msec) 109 Max Feed (ipm) 110 Optimum Feed (ipm) 111 *Process ID 112 Speed Factor 113 *Max Voltage Gap 114 *Gas Select 1 115 *Gas Select 2 116 *Plasma Preflow 117 *Shield Preflow 118 *Plasma Cutflow 119 *Shield Cutflow 120 *Mix Gas 1 121 *Mix Gas 2 122 *Corner Percent 123 Oxy Preheat Time 124 *Sample ATHC 125 *Use Thin Coef 126 Cut Ramp Time 127 Preheat Height 128 Tip Size 129 Hole Kerf
243	Process ID	Set by external program
245	Cut Quality Override	E specifies the new cut quality value
246	Scribe Feedrate	E specifies the scribe feedrate
250	Set Raster Scan Line Start	Set the zero-based index (inclusive) of the first scan line in the following PICT
251	Set Raster Scan Line End	Set the zero-based index (inclusive) of the last scan line in the following PICT

Ports 252-299 are used to set values in a Material/Tool library. Each value uses the currently selected tool number to change the values in the tool table. Values are "D=" by default unless "E=" is specified.		
252	Select Tool	Used for port numbers 253 – 299
253		
254	Pause at Tool Change	Pause on next tool change
255	Laser Power for Tool	D=0:0% ~ 100:100%
256	Feedrate for Tool	Used to set other calibrations for Laser and Plasma
257	Focus Offset for Tool	
258	Pierce Time for Tool	D= value in milliseconds
259	Pierce Power for Tool	D=0:0% ~ 100:100%
260	Gas Pressure for Tool	E= PSI
261	Nozzle Type for Tool	
262	User Acceleration for Tool	
263	Rotary Diameter for Tool	E= diameter
264	Laser Power Control Mode	D=0 for fixed PWM D=1 for pulsed D=2 for analog output D=3 for variable PWM
265	VPPI or VPPmm	E= VPPunit
266	PWM Frequency	E= frequency in kHz
267	PWM Min Power (Pulsed Mode)	D= 0:0% ~ 100:100%
268	Analog Output Voltage, No Slew	E= volts, D=slew time
269	Analog Output Voltage, Slew Over Move	E= volts
270	Cut Height Deprecated – use 220	E= distance in user units
271	Lift Height Deprecated – use 221	E= distance in user units
272	Pierce Height	E= distance in user units
273	Reference Voltage	E= voltage (Z tracking)
274	Max Voltage Gap	E= voltage Port 274 tells Z tracking to inhibit because of the hole.
275	Abrasive	
276	Abrasive Delay	
277	Abrasive Flow Rate	
278	Pierce Pressure	
279	Cut Pressure	
280	Fiber Laser Clock Frequency	
281	Registration Mark Size	D= size index (1=1/6, 2=1/8, 3=3/16, 4=1/4, 5=5/16, etc) E= physical size (i.e., 0.250)

282	Fill Contour DPI	D= <not used> E= DPI of filled contours
283	Kerf	D0= no kerf D1= left side kerf, E= <kerf value> D2= right side kerf, E= <kerf value>
285	X and Y Array Boundary	D0= X min D1= Y min D2= X max D3= Y max Used to specify the boundary of an array part that follows in the job file.
286-294	Reserved for more tool settings	
295	Set Material Name	S<Material> as a string
296	Set Material Type	S<Material Type> as a string
297	Set Material Layer	S<Layer Name> as a string
298	Reserved + Material Settings	
299	Set Material Type and Current	D<current> in amps E<thickness> in mm S<material> as a string, of specified list
300	Gang Drill Number	D<bitmask>=gang drill to lower
301	Rotary Control <data=degree to move>	Moves the rotary or C-axis to a specified degree
302	Rotary RPM <data=RPM>	Turns the rotary like a lathe at a specified RPM
303	No Spin Tool	D<tool>=tool to enable no spin (v6.31)
304	Bitmask of OPTO EB Ports To Turn ON and Wait	
305	Set Auto-Rotary Modes	1= enable rotary mapping 2= disable rotary mapping 3= move to rotary offset 4= find rotary Home
306	Set Rotary Diameter	Adjust diameter for part D value specifies the diameter in 1/1000ths of user units E value specifies the diameter in user units
307	C-axis	0=disable C-axis 1=enable C-axis
310	OPTO EB Port to turn ON	
311	OPTO EB Port to turn OFF	
320	Knife Rotation Angle	
321	Home Knife	0= do not home 1= home knife 1 2= home knife 2 4= home knife 3 Home knife anywhere in job file and then reset the position back to the angle where it started.

G98 P<p> D<d> E<e.e> **G10 L<n> P<p> R<r.r>** G98 P<p> D<d> E<e.e> --- Xlated to --- <e.e> <d> <p> set_port_ex G10 L<n> P<p> R<r.r> --- Xlated to --- <r.r> <p> <n> set_port_ex		
Port G98 P<p> G10 L<n>	Parameter G98 D<d> G10 P<p>	Description
410	Tool #	Sets the tool length for the specified tool number
411	Tool #	Adjusts the tool length by the tool length wear
412	Tool #	Sets the tool comp value
413	Tool #	Adjusts the tool comp value
4000 – 4999	Reserved	Reserved for Job Info commands
The following ports are processed by JobConsole and are not passed to the controller.		
148	Resets HPGL Resolutions in the Translator	XY to 1021 and Z to 1 – does not send a command
1000	X Soft Home in 1/1000th	Sets X soft home position
1001	Y Soft Home in 1/1000th	Sets Y soft home position
1002	Z Soft Home in 1/1000th	Sets Z soft home position
1003		Reserved
1004		Reserved
1005	0 for M00 1 for M01	Performs program pause (prg_pause)
1006	Diameter in 1/1000th	Specify diameter of workpiece
1007		Reserved
1008	Angle in degrees	Sets rotational angle
1009	X Rotational Point of Origin in 1/1000th	Specifies X Rotation point of origin
1010	Y Rotational Point of Origin in 1/1000th	Specifies Y Rotation point of origin
1011	X Letter Base Coordinate in 1/1000th	Specifies X Letter base location
1012	Y Letter Base Coordinate in 1/1000th	Specifies Y Letter base location
1013	Z Letter Base Coordinate in 1/1000th	Specifies Z Letter base location
1015	Lead-in Length XY Length per Unit Z Depth	Not implements; reserved for future use
1020	Sheet Size	
1021	(see above)	
1030	Skip Processes	
1031	1= Negative Z Down	

1032	Pass Info to Controller, Change Representation Graphics	0x01= Digitized 0x02= RZ Theta 0x04= XYZUV (E=MatThk) 0x08= 3 Axis Rotary (E=Dia) 0x10= 4 Axis Rotary 0x20= Y Axis Rotary 0x40= Surface Cylinder Top (E=Dia) 0x80= RZ Theta (C)
1033	Hotwire Tool Type	0x00= Standard Wire 0x01= Rigid Wire 0x02= Router 0x04= Drill
1040	(see above)	Tool Prompt
1041	ToolChange Command in the ProxRestart Section	Tool Number
1050	Font Name	G98 P1050 S<name of font> Example: G98 P1050 SRomans Optional – Default font specified in XMI. S = Name of Font Specifies the name of the font to be used for all TEXT that follows or until another G98 P1050 is used. If the name of the font does not match a supported font, then the default font will be used. DEXYZ are not used.
1051	Text	G98 P1051 [D<subst>] E<size> S<string> Specifies the text string to be output at the current location. D<subst> = substitution number, 0= no substitution E<size>= height of text in user units S<string>= text to be displayed Example: G98 P1051 E0.25 S09863 The substitution number comes from the pre_job_table and allows the CNC job file to substitute text. The keyword TEXT_nnn will specify the substitution string. Example: pre_job_table would specify TEXT_001 09863 The job file would include G98 P1051 D1 E0.25 The results would be the same as G98 P1051 E0.25 S09863

1053	Character Identifier JC v4.0.68.0 or later	Identifies the character to be defined. EXYZ are not used. G98 P1053 D<asci #> S<character> Example: G98 P1053 D97 Sa D= ASCII value of the character (e.g., 97=a) S= text representation of the character
1054	Character Min Extents JC v4.0.68.0 or later	Used for defining the text box for the character. G98 P1054 X<Min Extent> Y<Min Extent> Example: G98 P1054 X0.0 Y-0.30 XY= minimum extents of character
1055	Character Max Extents JC v4.0.68.0 or later	Used for defining the text box for the character. G98 P1055 X<Max Extent> Y<Max Extent> Example: G98 P1055 X0.6 Y1.0 XY= maximum extents of character
2008		Rotation Angle
2009		X of the Center of Rotation
2010		Y of the Center of Rotation
2100-2199	Reserved	For Laser
2200-2399	Reserved	For JBS
4000-4999	Reserved	For Job Info Table