Controller Reference Manual
MultiCam Systems
v1.05 March 5, 2014

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Controllers

The processor board can be identified by looking at the serial number of the controller. This serial number is the number shown in the ( ) of the connection.

Processor Board	Starting Serial Number	
RPC-520	1500	
RPC-353	15000	

Controller	Firmware	Inits	Notes
M2521 Rev 1&2	M1L		Processor on motherboard.
M2521 Rev 3&4	M3L (does not support KDM20g) M4L (KDM20g support)		Processor on motherboard.
M2521 Rev 5	M5L (rev 5)		Processor on motherboard.
M2621	M6L		RPC-520 processor. Compatible replacement for M2521.
RPD-21	M3521		RPC-353 processor The silk screen on the board will indicate an RPD-21. The controller is an M3521. Compatible replacement for M2521 & M2621.
M2545	R1W		RPC-520 processor
M3545	M3545		RPC-353 processor. Compatible replacement for M2545.
HP4	H0L		Processor on motherboard.
HP5	M3564L		RPC-353 processor. Compatible replacement for HP4.
SB5	M3564L		RPC-353 processor.
RPD-24	R1W (RPC-520 processor) M3521 (RPC-353 processor)		RPC-520 -or- RPC-353 processor The silk screen on the board will indicate an RPD-24. The controller is an M2524 -or- M3524. Compatible replacement for M24.
RPD-23			RPC353 processor. Compatible replacement for M23

DCN Mapping

DCN	Description	uCito Command	Type	Param	Notes
	Knife Only				
	Plasma Only				
	Laser Only				
	Waterjet Only				
	ExtraTech Only				
1	Tool Changer #1 Chuck Open?	chuck_open_sensor?	In	145	Param 145 value 1 = ignore this signal.
2	Tool Changer #1 Tool Loaded?	tool_loaded?	In	145	Param 145 value 2 = ignore this signal
3	Tool Changer #1 Chuck Closed?	chuck_closed?	In	145	Param 145 value 4 = ignore this signal This is also checked once a second in v8.25 of mh_atcb_module and v8.08 of mh_rio_linear_tc unless Param 145 value 8 is set to ignore the once a second check.
4	Air Pressure Low?	airlow?	In	124	Air Pressure is always checked for ATC machines. If STD machine and parameter 124 indicates a QuickChange chuck, then the air pressure will also be checked.
5	Tool Changer #1 Limit Input?		In		
6	Dust Collector Middle?		In		Used in Dustcollector_3pos.uc module
7	Dust Collector is Open?	dust_collector_open?	In	201	If 1, dust collector open signal ignored. Set to 2 to ignore signal on 2nd DustC.
8	Spindle Over Temperature Dust Collector Closed?		In	618	If param 618 = 1 then Spindle Overtemp is checked (v8.06.14 and later). Also used in Dustcollector_3pos.uc module to check to see if dust collector is closed.
9	Tool Changer #1 Extended?	tool_changer_extended?	In	127	Used if parameter 127 = 1 If parameter 176 bit 5 (value 16) is set, then this DCN will be deleted (see DCN 164)
10	Tool Changer #1 Retracted?	tool_changer_retracted?	In	127	Used if parameter 127 = 1 If parameter 176 bit 6 (value 32) is set, then this DCN will be deleted (see DCN 159)
11	Special Aggregate Tool Slider Extended?		In	990-999	Used if any Special Tools are on slider. Requires v8.17 mh_atcb_tc module to be mapped.

DCN	Description	uCito Command	Type	Param	Notes
12	Special Aggregate Tool Slider Retracted?		In	990-999	Used if any Special Tools are on slider. Requires v8.17 mh_atcb_tc module to be mapped.
13	Tool Changer #1 Open Chuck On/Off		Out		
14	Spindle #1 Purge Air	purge_air_on / purge_air_off	Out		
15	Spindle #1 Dust Collector		Out	650-699	Dust collector can be disabled by menu item.
16	Spindle #1 Spindle Cooling	cooling_on / cooling_off	Out	300	Starting in mh_atcb_tc.uc module v8.22 this DCN is not mapped to ATCB output 4 if spindle_type=2000 (MAX40). DCN 152 is mapped instead to ATCB output 4 if spindle type=2000
17	Spindle #1 Mister	mister_pon / mister_poff	Out	1110	Mister can be disabled by menu or CNC command G98 P136
18	Spindle #1 Air Blast	air_blast_on / air_blast_off	Out	108	108 is the time in msec to have air on.
19	Tool Changer #1 Extend/Retract Tool Changer	retract_tool_changer	Out	127, 990-999	Used if parameter 127 = 1. Also used for Aggregate slider extend/retract if parameter 990-999 are set.
20	Dust Collector Open (special 3 pos dustcollector)		Out		Used in Dustcollector_3pos.uc
21	Tool Changer #1 Close Chuck On/Off	close_chuck_on	Out		
22	Misc Output on ATCB#1		Out		
23	Misc Output on ATCB#1		Out		
24	Misc Output on ATCB#1		Out		
25	Heart Beat		HW value		
26	Heart Beat Devices (out port 10)		HW value		
27	Heart Beat Devices (out port 11)		HW value		
28	Spindle #1 Cooling Time		HW value	600	Set to the number of seconds after turning off output 4 that it actually turns off. Uses as a timer to leave output 4 on for a duration of time after job ends.
29	Spindle #1 Chuck Closed Monitor		Macro		
30	ATCB#1 Motor		Out		
31	Tool Changer Limit Input High Mask		HW value		
32	Tool Changer Limit Input Low Mask		HW value		
33	Knife #1 Limit?		In		See DCN #215 for Knife 2 Limit.
34	Tap Control Output		Out		The output to switch the inverter to Motor #2 parameter for tapping. Typically wired to Multi-Function S5 input on inverter.
35	Saw On/Off		Out		Used in atcb_saw.uc module with K5 inits.

DCN	Description	uCito Command	Type	Param	Notes
36	Saw Up/Down		Out		Used in atcb_saw.uc module with K5 inits. Used in Saw_90Deg.uc module
37	Saw Up?		In		Used in atcb_saw.uc module with K5 inits.
38	Water Flow?		In		Not Used. It was reserved for the water cooled spindles.
39	Water Pump		Out		Not Used. It was reserved for the water cooled spindles.
40	All Limits (debug)		In		
41	Tool Changer #2 Chuck Open?		In	145, 210	
42	Tool Changer #2 Tool Loaded?		In	145, 210	
43	Tool Changer #2 Chuck Closed?		In	145, 210	
44	Tool Changer #2 Air Pressure Low?		In		Not Used. The Air Pressure is only checked on TC #1.
45	Tool Changer #2 Limit Input?		In		
46	Misc Input on ATCB#2		In		
47	Spindle #2 Dust Collector is Open?		In		
48	Misc Input on ATCB#2		In		
49	Tool Changer #2 Extended?		In		
50	Tool Changer #2 Retracted?		In		
51	WJ Bevel Theta Homing Input		In		
52	WJ Bevel Phi Homing Input		In		
53	Tool Changer #2 Open Chuck On/Off		Out		
54	Spindle #2 Purge Air		Out		
55	Spindle #2 Dust Collector		Out		
56	Spindle #2 Cooling		Out		
57	Spindle #2 Mister		Out		
58	Spindle #2 Air Blast	air_blast_on2	Out		
59	Tool Changer #2 Extend/Retract Tool Changer		Out		
60	Misc Output on ATCB#2		Out		
61	Tool Changer Close Chuck On/Off		Out		
62			Out		
63			Out		
64			Out		
65	Heart Beat		HW value		
66	Heart Beat Devices (out port 10)		HW value		
67	Heart Beat Devices (out port 11)		HW value		
68	Spindle #2 Cooling Time		HW value		
69					

DCN	Description	uCito Command	Type	Param	Notes
70	ATCB#2 Motor		Out		
71	Tool Changer Limit Input High Mask		HW value		
72	Tool Changer Limit Input Low Mask		HW value		
73	Z Solenoid UP/DOWN		Out	55	If ZTrack_Drag module is loaded, then this will get mapped to SSR2 on M2545/M3545 if the controller is a M2545/M3545 controller. For WaterJet machines, this is only used if parameter 55 indicates a Z solenoid option.
74	Z Solenoid Up?		In	55, 221	If this is used with the ZTrack_Drag.uc module, then parameter 221 has to be set to 256 because the CE Safety input is used for the Z Solenoid up sensor. For WaterJet machines, this is only used if parameter 55 indicates a Z solenoid option.
75	Z Solenoid Down?		In	51, 55	If parameter 51 > 0, then this input is ignored.
76	Plasma Pierce Complete		Out		
77	Start of Job/End of Job		Out		Used with mh_autocheckhome.uc module. Turn output on at start of job. Turns off at end of job.
78	Waterjet Intensifier #2		Out	380	See DCN 217 for Waterjet #1
79	Waterjet Abrasive #2		Out	380	
80	Waterjet JetValve #2		Out		
99	Spindle 3 Stopped		In	176	
81-112	Reserved for Spindle and Tool Changer #3				
113	Drill # 1 (Fire)		Out	175	
114	Drill # 1 up?		In	175	
115	Drill # 1 (enable)		Out	175	
116	Drill # 2 (Fire)		Out	175	
117	Drill # 2 up?		In	175	
118	Drill # 2 (enable)		Out	175	
119	Tapper Foot #1 Down		Out		
120	Tapper Foot # 2 Down		Out		
139	Spindle 4 Stopped		In	176	
121-152	Reserved for Spindle and Tool Changer #4		In		
149	Open Chuck Foot Switch		In		Big Drill (uc40) machine
150	Spindle Drive Axis Parking		Out		Big Drill (uc40) machine When changing tools, turn on output to disable the checking of encoders so spindle drive does not fault if turned.

DCN	Description	uCito Command	Type	Param	Notes
152	Y Axis Brake		Out	300	Y Axis Brake. Used in Tapping_Spindle module (v3.34) to lock the Y axis during a tapping cycle. Used with the MAX 40 spindle (spindle type=2000). In mh_atcb_tc.uc module v8.22 this DCN is mapped to output 4 and DCN 16 is not mapped if spindle type =2000. Removed from Tapping_Spindle module v3.41. Added to router_module (v8.66) G98 P184 for manual control (500 msec hard-coded delay when turning off brake)
153	Grounding Clip Input	grounding_clip_on?	In	279	
154	Chuck Foot Switch		In		Big Drill (uc40) machine
155	3D Digitizer Up/Down		Out	165	Used in ZSurf_mod.uc module. For this DCN, there is usually a map device module (zsurf_mod_hp4_map, zsurf_mod_m2521_map, zsurf_mod_m24_map)
156	3D Digitizer UP?		In	165	Used in ZSurf_mod.uc module For this DCN, there is usually a map device module (zsurf_mod_hp4_map, zsurf_mod_m2521_map, zsurf_mod_m24_map)
157	3D surface sensor		In	165	Used in ZSurf_mod.uc module For this DCN, there is usually a map device module (zsurf_mod_hp4_map, zsurf_mod_m2521_map, zsurf_mod_m24_map)
158	Pause Indicator		Out		Turns on when paused/ off when not paused.
159	Cycle Start # 2		In	176	Used in mh_dualstart.uc module If parameter 176 has bit 6 set (or value 32), then this DCN is NOT automatically mapped to Input #11. In v8.18 of mh_atcb_tc.uc module it will be mapped to input L10 (pin 6) if param 176 bit 6 (value 32) is set.
160	Oiler (Lube)		Out	295	Can be disabled by menu item.
161	H/W Estop Active?	hw_estop?	In		
162	H/W Pause Active?	hw_pause?	In		
163	Surface Block	surface_block?	In		This is the Surface Block input and the Ohmic Sensor used an plasmas.
164	Cycle Start #1 input	hw_cycle?	In	176	If parameter 176 has bit 5 set (or value 16), then this DCN is NOT automatically mapped to Input #10. In v8.18 of mh_atcb_tc.uc module it will be mapped to input L9 (pin 5) if param 176 bit 5 (value 16) is set.
165	Servo Enable	servo_enable	Out		Not used on M2521/HP4 systems.
166	Servo Reset		Out		Not used on M2521/HP4 systems.
167	Spindle Enable	spindle_enable	Out -or- Macro	300, 302, 304, 306	Mapped to macro for M2521/M2621/RPD-21 systems.
168	Drill Enable		Out	175	

DCN	Description	uCito Command	Type	Param	Notes
169	Caution	caution_on/caution_off	Out		Turned on at start of job. Turned off at end of job, sheet change and pause/cancel. M2545_CautionMap module needed for M2545/M3545 controllers to map output.
170	Fault Indicator	fault_on/fault_off	Out		
171	Alignment Pins	alignment_pins_up/ alignment_pins_dn	Out	1625	See DCN# 190 for 2nd set of Alignment pins used for Multivision Flip'n Cut. If Conveyor.uc module loaded, this DCN is mapped to RIO #24 first 4 outputs. (Unless Barcode Option used). If barcode option is used, this DCN is un-mapped and DCN 324 is mapped to RIO #24 first 4 outputs.
172	Vacuum Zone Port Vacuum Zones use RIO #24. If additional zones are needed, RIO #25, #26, #27 can also be used. For Laser Systems RIO #19 is used.	vzones_on vzones_off	Out	237	Parameter 237 specifies how many vacuum zones. If > 0, then DCN 172 will be used to control the vacuum zones. Vacuum Zones were added to Router init v8.12.08
173	Scriber Raise/Lower		Out		
174	Laser Shutter		Out	70	
175	Laser Interlock		Out		
176	Lasing		Out		
177	Scriber On/Off		Out		
178	MultiVision Slider up? (ICut Up?)		In	179	Mapped using rio_multivision or atcb_multivision
179	MultiVision Slider Up/Down. (ICut Slider)		Out	179	Mapped using rio_multivision or atcb_multivision
180	Gang Drill #1 Enable (ON/OFF)	gang_drill_enable/ gang_drill_disable	Out	149	Mapped in mh_GDrillMap_xxxx.uc
181	Gang Drill #1 UP/DOWN	gang_drill_lower/ gang_drill_raise	Out	149	Mapped in mh_GDrillMap_xxxx.uc
182	Gang Drill #1 Fire (Bits)		Out -or- Macro	149	Mapped in mh_GDrillMap_xxxx.uc
183	Gang Drill #1 UP?	gang_drill_up?	In	149	It will not check if gang drill is up if parameter 149 bit 4 is set.
184					
185	Gang Drill #2 Enable (ON/OFF)		Out		Reserved, not currently used
186	Gang Drill #2 UP/DOWN		Out		Reserved, not currently used
187	Gang Drill #2 Fire (Bits)		Out		Reserved, not currently used
188	Gang Drill #2 UP?		In		Reserved, not currently used

DCN	Description	uCito Command	Type	Param	Notes
189	Knife Assembly Up?		In	373	Checks if Knife assembly is up. DCN 197 is used to lower knife assembly. Added to knife_cartridge module v8.124
190	Alignment Pins (2nd Set)		Out		Used in Multivision Flip'n Cut (added v2.43) See DCN# 171 for 1st set of Alignment pins.
191	Knife 1 Open Chuck		Out	372	Digital Express and Knife Cartridge (added to knife_cartridge module v8.123) Uses same physical output as oscillator.
192	Knife 2 Open Chuck		Out	372	Digital Express and Knife Cartridge (added to knife_cartridge module v8.123). Uses same physical output as oscillator.
193	Knife 3 Open Chuck		Out		Reserved, not currently used
194	Knife 3 Theta Limit Switch	knife3_limit?	In	379	
195	Knife 3 Slider Up/Down	knife3_slider_pdn/ knife3_slider_pup	Out	379	
196	Knife 3 Oscillator	knife3_osc_pon/ knife3_osc_poff	Out	379	
197	Knife Assembly Slider		Out	373	Lowers the knife assembly into place. (added to knife_cartridge module v8.124) knife_cartridge v8.127 maps this to ATCB address 20 output 8 if ATC machine and Number of Knives=1.
198	Knife 1 Oscillator (added v8.35 knife module)	knife1_osc_pon/ knife1_osc_poff	Out	372, 353, 379, 1680-1699	The oscillator will turn on only if configured to do so by menu item.
199	Knife 2 Oscillator (added v8.35 knife module)	knife2_osc_pon/ knife2_osc_poff	Out	372, 379, 1680-1699	The oscillator will turn on only if configured to do so by menu item.
200	Plasma Torch ON/OFF		Out		
201	Surface Block Enable		Out	148	On HP4 Systems, this output can move depending on the value of parameter 148.
202	Plasma Surface Switch?		In		
203	Plasma Unit ON/OFF	plasma_unit_pon	Out		
204	Enable Surface Block Pause		Param		
205	Enable Arc Out Pause		Param		
206	Plasma Arc Lit?	plasma_arc_lit?	In		
207	Plasma Fault Input		In		
208	Plasma Arc ready?		In		
209	Plasma Arc Ready Head2.		In		
210	Shutter Closed?	shutter_closed?	In	70	
211	Knife 1 Slider Up/Down	knife1_slider_pdn/ knife1_slider_pup	Out	353	Parameter 353 will switch I/O from M2521 to RIO
212	Knife 1 Up/Down	knife1_pdn/ knife1_pup	Out		

DCN	Description	uCito Command	Type	Param	Notes
213	Knife 2 Up/Down	knife2_pdn/ knife2_pup	Out	379	
214	Knife 3 Up/Down	knife3_pdn/ knife3_pup	Out	379	
215	Knife 2 Theta Limit Switch	knife2_limit?	In	379	
216	Knife 2 Slider Up/Down	knife2_slider_pdn/ knife2_slider_pup	Out	379	
217	Waterjet #1 Intensifier		Out	380	
218	Waterjet #1 Abrasive Feed		Out	380	
219	Waterjet #1 Jet Valve		Out	383	
220	2nd Plasma Arc ON/OFF		Out		
221	1st Plasma Break Away.		In		
222	2nd Plasma Surface Sw In		In		
223	2nd Plasma Unit on/off		Out		
224					
225					
226	2nd Plasma Arc Lit?		In		
227	2nd Plasma Unit Error		In		
228	2nd Plasma Surface Blk		In		
229	2nd Plasma Breakaway		In		
230-239	Reserved for 3rd Plasma				
240	Drill #1 Slider		Out		Used in Tapper_Device.uc, Rio_Drill_Tap.uc
241	Drill #1 Slider Up?		In		Used in Tapper_Device.uc, Rio_Drill_Tap.uc
242	Mister when using Drill/Tap.		Out		Used in Rio_Drill_Tap.uc
243	Drill #2 Slider		Out		Used in Rio_Drill_Tap.uc
244	Drill #2 Slider Up?		In		Used in Tapper_device.uc module (aka Big slider)
245	Mister 2 Enable (tapper)		Out		Used in Tapper_device.uc module
246	Drill #1 Down?		In		
247	Drill #2 Down?		In		
248	Spindle #1 Spindle Spinning Sensor		In	176	Used on Umbra spindles to detect if spindle is spinning. This is used in conjunction of the Inverter Input that indicates spindle is spinning. Also used on the Max40 spindle for homing the spindle.
249	Spindle #2 Spindle Spinning Sensor		In	176	See above comment.

DCN	Description	uCito Command	Type	Param	Notes
250-269	M-Code Mappable General Purpose Outputs		Out		Used to Map M-Codes to Outputs Require MCode_Map Module to be stored on controller. This was added to r8.02.29 Router Inits and p4.01.11 Plasma inits. MH Router (v8.02.29) MC Base Plasma (v4.01.11) WJ2521 (Not supported) Plasma2521 (Not supported) Laser2521 (Not supported) Knife2521 (Not supported) 2KL-iii (Not supported)
270	RIO High Preheat Fuel		Out		Mapped in rio_oxy.uc
271	RIO High Preheat Oxy		Out		Mapped in rio_oxy.uc
272	RIO Low Preheat Fuel		Out		Mapped in rio_oxy.uc
273	RIO Low Preheat Oxy		Out		Mapped in rio_oxy.uc
274	RIO Cut Oxy		Out		Mapped in rio_oxy.uc
275	RIO Dump Oxy		Out		Mapped in rio_oxy.uc
276	RIO Start Oxy?		In		Mapped in rio_oxy.uc
277	RIO Low Preheat Fuel?		In		Mapped in rio_oxy.uc
278	RIO Low Preheat Oxy?		In		Mapped in rio_oxy.uc
279	RIO Select plasma head		Out		Mapped in rio_oxy.uc
280	RIO Select Oxy head		Out		Mapped in rio_oxy.uc
281	RIO Select plasma head #2		Out		Mapped in rio_oxy.uc
282	RIO Select Oxy head #2		Out		Mapped in rio_oxy.uc
290-299	RIO Lite Bar/HAAS Calibrate				
300	Spindle#1 ON/ OFF		Out	300, 302, 304, 306	
301	Spindle#2 ON/OFF		Out		
302	Spindle#3 ON/OFF		Out		
304	Spindle#4 ON/OFF		Out		
305	Material Position Sensor		In		Mapped in MaterialHandling_v3.uc
306	Material Horizontal Positioner		Out		Mapped in MaterialHandling_v3.uc
307	Material Vertical Positioner		Out		Mapped in MaterialHandling_v3.uc
308	Conveyor Material Clamp	grab_material release_material	Out		Mapped in Conveyor.uc
309	Conveyor Clamp	grab_conveyor release_conveyor	Out		Mapped in Conveyor.uc

DCN	Description	uCito Command	Type	Param	Notes
310	Material Pusher Pin		Out		Mapped in MaterialHandling.uc
311	Material Pusher Up Sensor		In		Mapped in MaterialHandling.uc
312	Material Pusher Down Sensor		In		Mapped in MaterialHandling.uc
313	Material Roller #1		Out		Mapped in MaterialHandling.uc
314	Material Roller #2		Out		Mapped in MaterialHandling.uc
315	Material Roller #3		Out		Mapped in MaterialHandling.uc
316	Material Roller #4		Out		Mapped in MaterialHandling.uc
317	Material Lifter		Out		Mapped in MaterialHandling.uc
318	Material Positioner		Out		Mapped in MaterialHandling.uc
319	Material Sweep Blast Gates		Out		Mapped in MaterialHandling.uc
320	Dust Collector Blast Gates		Out		Mapped in MaterialHandling.uc
321	Dust Collector Lock		Out		Mapped in MaterialHandling.uc
322	Material Lifter Vacuum		Out		Mapped in MaterialHandling.uc
323	Material Air Knife		Out		Mapped in MaterialHandling.uc
324	Material Pod Vacuum Suction Cup		Out		Mapped in MaterialHandling.uc In conveyor.uc module, this DCN is mapped to RIO #24 output first 4 outputs. They (circle graphics) didn't want the vacuum to be turned off when just moving to cut the parts. This would be for the Barocde Jobs only. So, to fix this, map the normal alignment pins (DCN 171) to NULL and use the Material Handling Pod Vacuum for this. This way we can have more control over the operation of the vacuum.
325	Material Pod Vacuum Blower Conveyor Roll Brake		Out		Mapped in MaterialHandling.uc In conveyor.uc module, this DCN is mapped to RIO #24 Ouput #6. This is used to clamp the Roll Brake.
326	Material Popup Pins Up or Down Sensor?		In		Mapped in MaterialHandling.uc
327	Material Lifter Up Sensor		In		Mapped in MaterialHandling.uc
328	Material Lifter Down Sensor		In		Mapped in MaterialHandling.uc
329	Material Lifter Vacuum Sensor		In		Mapped in MaterialHandling.uc
330	Material Dust Collector Lock		In		Mapped in MaterialHandling.uc
331	ALL 4 Rollers Down		Out		Mapped in MaterialHandling.uc
332	ALL 4 Rollers Up Sensor		In		Mapped in MaterialHandling.uc
333	Roller #1 Up Sensor		In		Mapped in MaterialHandling.uc
334	Roller #2 Up Sensor		In		Mapped in MaterialHandling.uc
335	Roller #3 Up Sensor		In		Mapped in MaterialHandling.uc
336	Roller #4 Up Sensor		In		Mapped in MaterialHandling.uc
337	Material Handling WorkCell (Ready)		Out		Mapped in MaterialHandling.uc
338	Material Handling WorkCell (Running)		Out		Mapped in MaterialHandling.uc

DCN	Description	uCito Command	Type	Param	Notes
339	Material Handling WorkCell (Fail)		Out		Mapped in MaterialHandling.uc
340	Material Handling WorkCell (Loading)		Out		Mapped in MaterialHandling.uc
341	Material Handling WorkCell (Unloading)		Out		Mapped in MaterialHandling.uc
342	Material Handling WorkCell (Holding for Load)		Out		Mapped in MaterialHandling.uc
343	Material Handling WorkCell (Holding for Unload)		Out		Mapped in MaterialHandling.uc
344	Material Handling WorkCell (Holding for Start)		Out		Mapped in MaterialHandling.uc
345	Material Handling WorkCell (Load Request)		In		Mapped in MaterialHandling.uc
346	Material Handling WorkCell (Load Go)		In		Mapped in MaterialHandling.uc
347	Material Handling WorkCell (Unload Request)		In		Mapped in MaterialHandling.uc
348	Material Handling WorkCell (Unload Go)		In		Mapped in MaterialHandling.uc
349	Material Handling WorkCell (Job Go, Cycle Start)		In		Mapped in MaterialHandling.uc
351	Misc Tool #96 Slider.		Out	1346	Misc Tool is Tool #96.
352	Misc Tool #96 Up Sensor?		In	1346	
353	Knife 1 Theta Axis Brake Up Sensor		In		
354	Knife 2 Theta Axis Brake Up Sensor		In		
355	Knife 1 Theta Axis Brake		Out	368, 1639	
356	Knife 2 Theta Axis Brake		Out	368, 1639	
357	Knife 3 Theta Axis Brake		Out		
358	Misc Tool #97 Slider.		Out	1111	Misc Tool is Tool #97. Not mapped by default. Use atcb_misctool.uc or tcrio_mictool.uc, or misctool_hp4_map.uc module. Also mapped and used in Saw_90deg.uc Also mapped and used in Gang_Drill_Saw.uc module. In this case, the Saw is gang drill #13. You need at least v8.13 of mh_GDrillMap_5x3_2h_1s.uc gang drill map module.
359	Misc Tool #97 Up Sensor?		In	1111	Could be mapped using atcb_misctool.uc module. Mapped and used in Saw_90deg.uc

DCN	Description	uCito Command	Type	Param	Notes
360	InkJet Printer Slider	LowerIJHead/ RaiseIJHead	Out	601	Mapped and used in inkjet.uc module.
361	InkJet Printer Up Sensor?		In	601	Mapped and used in inkjet.uc module.
362	InkJet Start	ij_pon/ ij_poff	Out		Mapped and used in inkjet.uc module.
363	InkJet Printer Homing Switch		In		Mapped and used in inkjet.uc module.
364	InkJet Printer Purge Air	ij_purge_pon/ ij_purge_poff	Out		Mapped and used in inkjet.uc module.
365	Material Handling Positioner Extended sensor		In		Mapped in Material_Handling_V3 module.
366	Material Handling Positioner Retracted sensor		In		Mapped in Material_Handling_V3 module.
368	Saw at 0 degrees		In		Mapped and used in Saw_90deg.uc
369	Saw at 90 degrees		In		Mapped and used in Saw_90deg.uc
370	Laser Fault Indicator1				Mapped in Rio_Fault_ind.uc module for Laser Systems (uses RIO #28).
371	Laser Pointer		Out	274,275, 1205	Added to Router inits v8.11.16 Added to DE Inits v8.16.37 mapped to output #3. If rio_fault_ind.uc module is loaded for Laser Systems, this DCN gets mapped to Output #7. If version 1.09 of laser_ptr_io module is loaded, it will check for conflicts with DCNs 191,198 and 213. If any of the above DCNs are mapped to the same output, this DCN will get mapped to Output 6 on the M2521. In version 1.10 of laser_ptr_io module. It will check for conflicts with DCN 212 if used on a M2545/M3545 system. If there is a conflict the laser pointer will be moved to the mister output (Solenoid 1) and the mister (DCN #17) will be un-mapped. See DCN 374 for 2nd Laser Pointer.
372	Surface Contact	surface_sensor?	In	240	Only enabled if Z_Tracking is disabled
373	Safety Curtain	safety_curtain?	In		
374	2nd Laser Pointer		Out	386, 387, 1205	2nd Laser Pointer. Used on machines configured as Dual Y, Dual Z. See DCN 371 for 1st Laser Pointer. Added to Router inits v8.19.53
375	Abrasive Low?		In	381	Is the WaterJet Abrasive Low? This can be enabled or disabled using a menu item. The menu item specifies the amount of time the abrasive signal is low before stopping the machine.
376	Knife Tool Holder #1		In		Is there a tool in Knife holder #1?

DCN	Description	uCito Command	Type	Param	Notes
377	Knife Tool Holder #2		In		Is there a tool in Knife holder #2?
378	Knife Tool Holder #3		In		Is there a tool in Knife holder #3?
379	Knife Tool Holder #4		In		Is there a tool in Knife holder #4?
380	PS3000 24V Monitor		In		
381	PS3000 G Status		In		
382	PS3000 Servo Power		In		
383	PS3000 Servo Inrush		In		
384	PS3000 Stepper Power		In		
385	PS3000 Stepper Inrush		In		
386	PS3000 Version		In		
387	PS3000 Slave Heartbeat		In		
388	PS3000 All Outputs		In		
390	PS3000 Error Codes		In		Register 0x503 0x0000 = No Error 0x0001 = -24vAmp - 24v amperage error 0x0002 = LED was set by user. 0x0004 = -Short(short)- Short occurred on either the Servo or Stepper drives during charging. 0x0008 = -Short(long)- Short occurred on either the Servo or Stepper drives during charging. 0x0010 = -Inrush(Servo)- The voltage across the final relays is too high . The capacitors have not fully charged. 0x0020 = -RunTime- 0x0040 = -Inrush(Stepper)- 0x1000 = -BlinkShort- 0x2000 = -BlinkLong- 0xC000 = -BlinkCycle-
391	PS3000 / PS3100		In		Register 0x502 PS3000 - Retains last averaged 24V current reading if there is a shut-down PS3100 - Retains last averaged 24V current reading prior to over-current indication
394	PS3000 Dump Voltage				
395	PS3000 24v Current				
397	PS3000 Analog In 1				
398	PS3000 Analog In 2		In		
399	Water-Jet Pump	pump_pon pump_poff	Out	600	Turns on WJ Pump. Used for Direct Drive pumps on VSeries Waterjets with parameter 600 set to 30.

DCN	Description	uCito Command	Type	Param	Notes
Non-DCN Inputs					
	Lathe Along X Homing	M2521 Input 4 (109:8)	In		Y2 Over Travel Input
	Lathe Along Y Homing	M2521 Input 4 (109:8)	In		Y2 Over Travel Input In v8.15, this input is moved to input 8 if number of Z's >= 2

list_dcn Cross Reference

Port:Bit	M2521 & M2621 & RPD-21	M2545 & M3545	HP4 & HP5	SB5	RIO	ATCB	RPD-24	RPI	RPD-23
Port 0									
0:0									

Port 10 - Outputs

Port 10 (Outputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
10:1					HOUT2 Pin 1 (NPN output 1)	HSOL Pin 1 (Sol Output 1)			
10:2					HOUT2 Pin 3 (NPN output 2)	HSOL Pin 3 (Sol Output 2)			
10:4					HOUT2 Pin 5 (NPN output 3)	HSOL Pin 5 (Sol Output 3)			
10:8					HOUT2 Pin 7 (NPN output 4)	HSOL Pin 7 (Sol Output 4)			
10:15					All 4 outputs listed above at the same time.	All 4 outputs listed above at the same time.			
10:16					HOUT2 Pin 9 (NPN output 5)	HSOL Pin 9 (Sol Output 5)			
10:32					HOUT3 Pin 1 (NPN output 6)	HSOL Pin 11 (Sol Output 6)			
10:64					HOUT3 Pin 3 (NPN output 7)	HSOL Pin 13 (Sol Output 7)			

Port 10 (Outputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
10:128					HOUT3 Pin 5 (NPN output 8)	HSOL Pin 15 (Sol Output 8)			

Port 11 - Outputs

Port 11 (Outputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
11:1					HOUT3 Pin 7 (NPN output 9)	HSOL Pin 2 (Sol Output 1b)			
11:2					HOUT3 Pin 9 (NPN output 10)	HSOL Pin 10 (Sol Output 5b)			

Port 20 - Inputs

Port 20 (Inputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
20:1					H-Ang Pin 1 (Ain 1 Input 5)	HIG1 Pin 2 (L1 Input)			
20:2					H-Ang Pin 2 (Ain 2 Input 6)	HIG1 Pin 5 (L2 Input)			

Port 20 (Inputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
20:4					H-Ang Pin 3 (Ain 3 Input 7)	HIG1 Pin 8 (L3 Input)			
20:8					H-Ang Pin 4 (Ain 4 Input 8)	HIG1 Pin 11 (L4 Input)			
20:16					H1 Pin 2 (IN1 Input 1)	HIG2 Pin 1 (L5 Input)			
20:32					H1 Pin 4 (IN2 Input 2)	HIG2 Pin 2 (L6 Input)			
20:64					H1 Pin 6 (IN3 Input 3)	HIG2 Pin 3 (L7 Input)			
20:128					H1 Pin 8 (IN4 Input 4)	HIG2 Pin 4 (L8 Input)			

Port 21 - Inputs

Port 21 (Inputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
21:1					H-Ang Pin 1 (Ain 1 Input 5)	HIG2 Pin 5 (L9 Input)			
21:2					H-Ang Pin 2 (Ain 2 Input 6)	HIG2 Pin 6 (L10 Input)			
21:4					H-Ang Pin 3 (Ain 3 Input 7)	HIG2 Pin 7 (L11 Input)			
21:8					H-Ang Pin 4 (Ain 4 Input 8)	HIG2 Pin 8 (L12 Input)			

Port 21 (Inputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
21:16					H1 Pin 2 (IN1 Input 1)				
21:32					H1 Pin 4 (IN2 Input 2)				
21:64					H1 Pin 6 (IN3 Input 3)				
21:128					H1 Pin 8 (IN4 Input 4)				

Port 101 - Outputs

Port 101 (Outputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
101:1	HEXT Pin 21 (PNP output 1)	HF3 Pins 31,32,33 (Relay #1)	L1 Pins 31,32,33 (Relay #1)	L1 Pins 31,32,33 (Relay #1)			H2 Pins 1,2 (Spindle 1)		
101:2	HEXT Pin 22 (PNP output 2)	HF3 Pins 17, 18 (Relay #2)					H2 Pins 5,6 (Spindle 2)		
101:4	HEXT Pin 23 (PNP output 3)	HF1 Pins 7,14 (Relay #3)					H4 Pins 9,10 (Misc 2)		
101:8	HEXT Pin 24 (PNP output 4)	HF1 Pins 8,15 (Relay #4)					H4 Pins 5,6 (Dust Col.)		
101:16	HEXT Pin 25 (PNP output 5)	HF2 Pin 1 (drive enable)					HPRO Pin 26 (drive enable)		
101:32	HEXT Pin 26 (PNP output 6)	HF2 Pin 17 HM3 Pin 13 (drive enable)					H2 Pins 7,8 (Mister 2)		

Port 101 (Outputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
101:64	HINT Pin 12 (PNP output 7)						H4 Pins 1,2 (TC Chuck)		
101:128	HINT Pin 13 (PNP output 8)						H4 Pins 3,4 (TC Blast)		
101:256	HINT Pin 14 (NPN output 9)						H4 Pins 7,8 (Misc 1)		
101:512	HINT Pin 15 (NPN output10)						H3 Pins 5,6 (Caution)		
101:2048				LPI Pins 3, 4 (Arc on/off)					

Port 103 – Estop Contactor

Port 103 (Estop Contactor)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
103:1	HINT Pin 23 (Estop Contactor)	HF1 Pin 13 (Estop Contactor)							

Port 104 - Outputs

Port 104									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
104:1	TH1 Pin 4 (RunInvtr)						H2 Pin 9,10 (spindle enable)		
104:2	TH2 Pin 4 (RunInvtr)						H2 Pin 11,12 (drill enable)		
104:4	TH3 Pin 4 (RunInvtr)						H3 Pin 1, 2 (Drill 1)		
104:8	TH4 Pin 4 (RunInvtr)						H3 Pin 3, 4 (Drill 2)		

Port 106 - Outputs

Port 106 (Drive Enables)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
106:1			L2 Pin 16, 17 (SSR1)						
106:2			L2 Pin 18, 19 (SSR2)						
106:4			L1 Pin 17, 18 (SSR3)	L1 Pin 17, 18 (SSR3)					

Port 107 – Drive Enables

Port 107 (Drive Enables)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
107:1									
107:2									
107:4									

Port 109 – Inputs / Pause Mask

Port 109 (Inputs, Limit Mask, Pause Mask)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
109:1	HEXT Pin 1 (Xa Limit)	HF3 Pin 1 (Xa Limit)	L1 Pin 1 (Xa Limit)	L1 Pin 1 (Xa Limit)					
109:2	HEXT Pin 2 (Xb Limit)	HF3 Pin 2 (Xb Limit)	L1 Pin 2 (Xb Limit)	L1 Pin 2 (Xb Limit)					
109:4	HEXT Pin 3 (Y Limit)	HF3 Pin 3 (Y Limit)	L1 Pin 3 (Y Limit)	L1 Pin 3 (Y Limit)					
109:8	HEXT Pin 4 (Y2 Limit)	HF3 Pin 4 (PNP Input 4)	L1 Pin 4 (Z Limit)	L1 Pin 4 (Z Limit)					
109:16	HEXT Pin 5 (Z1 Limit)	HF3 Pin 6 (PNP Input 5)	L1 Pin 6 (PNP Input 5)	L1 Pin 6 (PNP Input 5)					
109:32	HEXT Pin 6 (PNP Input 6)	HF3 Pin 7 (PNP Input 6)	L1 Pin 7 (PNP Input 6)	L1 Pin 7 (PNP Input 6)					
109:64	HEXT Pin 7 (PNP Input 7)	HF3 Pin 8 (PNP Input 7)	L1 Pin 8 (PNP Input 7)	L1 Pin 8 (PNP Input 7)					
109:128	HEXT Pin 8 (PNP Input 8)	HF1 Pin 1 (PNP Input 8)	L2 Pin 1 (PNP Input 8)	L2 Pin 1 (PNP Input 8)					

Port 109 (Inputs, Limit Mask, Pause Mask)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
109:256	HEXT Pin 9 (PNP Input 9)	HF1 Pin 9 (PNP Input 9)	L2 Pin 2 (PNP Input 9)	L2 Pin 2 (PNP Input 9)					
109:512	HEXT Pin 10 (PNP Input 10)								
109:1024	HEXT Pin 11 (PNP Input 11)			L1 Pin 22 (PNP Input 11)					
109:2048	HEXT Pin 12 (PNP Input 12)			LPI Pin 12, 14 (Arc Transfer)					
109:4096	HEXT Pin 13 (PNP Input 13)			L1 Pin 21 (PNP Input 13)					
109:8192	HEXT Pin 14 (CE Safety)	HF3 Pin 9 (CE Safety)	L1 Pin 9 (CE Safety)	L1 Pin 9 (CE Safety)					
109:16384	HINT Pin 8 (PNP Input 15)								
109:32768	HINT Pin 9 (PNP Input 16)								

Port 110 - Inputs

Port 110 (Inputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
110:1	HEXT Pin 17 (NPN Input 1)	HF3 Pin 5 (NPN Input 1)	L1 Pin 5 (NPN Input 1)	L1 Pin 5 (NPN Input 1)					
110:2	HEXT Pin 18 (NPN Input 2)	HF3 Pin 10 (NPN Input 2)	L1 Pin 10 (NPN Input 2)	L1 Pin 10 (NPN Input 2)					

Port 110 (Inputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
110:256									
110:4096									
110:8192									

Port 111 - Inputs

Port 111 (Inputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
111:256									
111:512									
111:1024		HF1 Pin 6 (Estop - Internal)							

Port 114 - Inputs

Port 114									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
114:1							H8 Pin 5 (Misc 1)		
114:2							H8 Pin 6 (Misc 2)		

Port 114									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
114:4							H7 Pin 6 (Misc 3)		

Port 116

Port 116									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**

Port 117

Port 117									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
117:256	TH1 Pin 8 (Fault Invtr)								
117:512	TH2 Pin 8 (Fault Invtr)								
117:1024	TH3 Pin 8 (Fault Invtr)								
117:2048	TH4 Pin 8 (Fault Invtr)								

Port 117									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
117:4096	TH1 Pin 6 (0 Speed Invtr)								
117:8192	TH2 Pin 6 (0 Speed Invtr)								
117:16384	TH3 Pin 6 (0 Speed Invtr)								
117:32768	TH4 Pin 6 (0 Speed Invtr)								

Port 119 – Drive Faults

Port 119									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
119:1		HF2 Pin 10 (Drive Fault 1)							
119:2		HF2 Pin 11 (Drive Fault 2)							
119:4		HF2 Pin 12 (Drive Fault 3)							
119:8		HF2 Pin 13 (Drive Fault 4)							
119:16		HM3 Pin 14 (Drive Fault 5)							
119:32		HF2 Pin 15 (Drive Fault 6)							

Port 120 – 24v web

Port 120 (24V Web)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
120:1	HEXT Pin 15, 19, 27 (External +24v)								
120:2	HINT Pin 5 (+24v @ 6 Amps)								
120:4	TH1-TH4 Pin 3 (Inverter +24v)								
120:8									
120:16									
120:32									

Port 121 - Outputs

Port 121 (Outputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
121:254		HF3 Pin 23,24 (Solenoid 1)							

Port 122 - Outputs

Port 122 (Outputs)									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
122:254									

Port 124 - Outputs

Port 124									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
124:254			L1 Pin 23, 24 (Solenoid 1)	L1 Pin 23, 24 (Solenoid 1)					

Port 125 - Outputs

Port 125									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
125:254		HF3 Pin 26, 27 (Solenoid 2)	L1 Pin 26, 27 (Solenoid 2)	L1 Pin 26, 27 (Solenoid 2)					

Port 130 – RPI Outputs

Port 130									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
130:1									
130:2								HPR X Pin 15, 34 (Start)	
130:4								HPR X Pin 13, 32 (Pierce)	
130:8								HPR X Pin 14, 33 (Hold)	
130:16								HPR X Pin 12, 31 (Corner)	

Port 141 – RPI Inputs (plasma unit outputs)

Port 141									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
141:1								HPR X Pin 26 (Not Ready)	
141:2									
141:4								HPR X Pin 24 (Error)	
141:8									
141:16								HPR X Pin 23 (Arc Transfer)	
141:4096								HPR X Pin 27 (Arc Transfer 2)	

Port 142 – RPI Inputs (plasma unit outputs)

Port 142									
Port:Bit	**M2521 & M2621 & RPD-21**	**M2545 & M3545**	**HP4 & HP5**	**SB5**	**RIO**	**ATCB**	**RPD-24**	**RPI**	**RPD-23**
142:16								HPR X Pin 28 (Arc Transfer 3)	
142:4096								HPR X Pin 29 (Arc Transfer 4)	

Internal I/O Connector

M2521/M2621/RPD-21 Internal I/O (HINT)				
Pin	**Description**	**Port:Bit**	**LED**	**Common Uses**
2,4,6, 11, 16, 17, 20	Earth Ground			
1	Drv +5.5V @ 5 Amp			
3	+12V @ 1 Amp			
5	+24V @ 6 Amps	120:2		
7	Not connected on Rev1			
8	PNP Input #15	109:16384 (0x4000)	In #15 (on=24v)	24v Power Monitor
9	PNP Input #16	109:32768 (0x8000)	In #16 (on=24v)	Arc Transfer (DCN 206)
10	Internal Load 24V Output			
12	Internal Output #7 PNP (on=24vdc)	101:64 (0x40)	Out #7 (on=24v)	
13	Internal Output #8 PNP (on=24vdc)	101:128 (0x80)	Out #8 (on=24v)	
14	Internal Output #9 NPN (on=GND)	101:256 (0x100)	Out #9 (on=GND)	
15	Internal Output #10 NPN (on=GND)	101:512 (0x200)	Out #10 (on=GND)	Caution (DCN 169) Alignment Pins (DCN 171)
18	Internal ModBus (-) Line			
19	Internal ModBus (+) Line			
21	Internal Estop Switch (+)	111:512 (0x200)		
22	Internal Estop Switch (-)			
23	ESTOP RELAY (+)			
24	ESTOP RELAY RETURN			

External I/O Connector

M2521/M2621/RPD-21 External I/O (HEXT)				
Pin	**Description**	**Port:Bit**	**LED**	**Common Uses**
16, 20, 28, 31,36	GROUND			
15,19,27	External +24V	120:1		
1	PNP Input 1	109:1	In 1 (on=24v)	Xa Limit
2	PNP Input 2	109:2	In 2 (on=24v)	Xb Limit
3	PNP Input 3	109:4	In 3 (on=24v)	Y Limit
4	PNP Input 4	109:8	In 4 (on=24v)	Y2 Limit Y Overtravel Lathe (see input #8) Laser-Cover Closed Sensor
5	PNP Input 5	109:16 (0x10)	In 5 (on=24v)	Z1 Limit Z Solenoid Up Sensor (DCN 74)
6	PNP Input 6	109:32 (0x20)	In 6 (on=24v)	Z2 Limit Laser-Safety Input UC40-Zb Limit
7	PNP Input 7	109:64 (0x40)	In 7 (on=24v)	Z3 Limit Laser-Cover Gantry Input UC40-Zero Machine
8	PNP Input 8	109:128 (0x80)	In 8 (on=24v)	C-Axis Homing / Knife Homing (DCN 33) Lathe homing if number of Zs = 2 and mh_lathe_along_y
9	PNP Input 9	109:256 (0x100)	In 9 (on=24v)	Pause (see parameter 199)
10	PNP Input 10	109:512 (0x200)	In 10 (on=24v)	Cycle Start #1 (DCN 164) Spindle Spinning (DCN 248)
11	PNP Input 11	109:1024 (0x400)	In 11 (on=24v)	Cycle Start #2 (DCN 159) (see parameter 176) Laser-Maintenance Mode Pause, Cancel, GoHome (see parameter 199)

M2521/M2621/RPD-21 External I/O (HEXT)				
Pin	**Description**	**Port:Bit**	**LED**	**Common Uses**
12	PNP Input 12	109:2048 (0x800)	In 12 (on=24v)	Ram-Z (See parameter 166) MultiVision Slider Up (DCN 178) (see parameter 179) Plasma Switch (DCN 202) Shutter Closed (DCN 210)
13	PNP Input 13	109:4096 (0x1000)	In 13 (on=24v)	2D Scanner Surface Map (DCN 157)
14	PNP Input 14 (non-maskable)	109:8192 (0x2000)	In 14 (on=24v)	CE Safety
17	NPN Input 1	110:1	In NPN 17 (on=GND)	Surface Block (DCN 163) – Router Machines Ohmic Sensor (DCN 163) – Plasma Machines
18	NPN Input 2	110:2	In NPN 18 (on=GND)	Grounding Clip (DCN 153) Breakaway Head Laser-Door Open
21	External PNP Output 1	101:1	Out #1 (on=24v)	Z-Brake 2nd Plasma Unit On/Off (DCN 223)
22	External PNP Output 2	101:2	Out #2 (on=24v)	Oiler Lube (DCN 160) – Router Machines Surface Block Enable (DCN 201) – Plasma Machines
23	External PNP Output 3	101:4	Out #3 (on=24v)	Surface Map Slider (DCN 155) Scriber Raise/Lower (DCN 173) – Plasma Machines
24	External PNP Output 4	101:8	Out #4 (on=24v)	Scriber On/Off (DCN 177) – Plasma Machines
25	External PNP Output 5	101:16	Out #5 (on=24v)	Laser Pointer (DCN 371) if STD or Plasma Note: If this mapping conflicts with Knife, laser pointer will be moved to output #6. This is done in Laser_Ptr_IO module
26	External PNP Output 6	101:32	Out #6 (on=24v)	Laser Pointer (DCN 371) if ATC – Router Machines Z Solenoid Up/Dn (DCN 73) – Plasma Machines Caution (DCN 169) – Plasma machines

M2521/M2621/RPD-21 External I/O (HEXT)				
Pin	**Description**	**Port:Bit**	**LED**	**Common Uses**
29	External ESTOP (+)	111:128		
30	External ESTOP (-)			
32,33	No Connect			
34	External ModBus (-)			
35	External ModBus (+)			

User Interface Plug

M2521/M2621/RPD-21 User Interface			
Pin	**Description**	**Port:Bit**	**Notes**
1,5,11	Ground		
9, 10	24V Output, Web protected	120:16	
7, 12	5V OUTPUT		
2	Rx_Keypad (connect to KDM TX)		
3	Tx_Keypad (connect to KDM RX)		
4	DTR (output)		
6	DSR (input)		
8	KDM ESTOP (connect to 24V)	111:512 (0x200)	
13	Rx_Barcode (connect to BC TX)		See parameter 228
14	Tx_Barcode (connect to BC RX)		See Parameter 228
15	Reserved, do not connect		

Tool Headers I/O

M2521/M2621/RPD-21 TH1-4 (Tool Header I/O Connectors)			
Pin	**Description**	**Port:Bit**	**Common Uses**
5,7,9, 12	Earth Ground		
1	Analog Input	TH1) 130 TH2) 131 TH3) 132 TH4) 133	
2	Analog Output	set_ana_voltage (All 4 Tool Headers share this output)	
3	Invtr +24V	120:4 (Controls all 4 Tool Headers)	
4	RunInvtr	TH1) 104:1 TH2) 104:2 TH3) 104:4 TH4) 104:8	TH1) Spindle #1 Enable (DCN 167) – Router, DE TH1) Plasma Start (DCN 200) TH1) Abrasive #1 On/Off (DCN 218) – WJ3000 TH2) Abrasive #2 On/Off (DCN 79) – WJ3000 TH3) Drill Enable #1 (DCN 115) – WJ3000 TH4) Drill Enable #2 (DCN 118) – WJ3000
6	0 Speed Invtr	TH1) 117:4096 (0x1000) TH2) 117:9192 (0x2000) TH3) 117:16384 (0x4000) TH4) 117:32768 (0x8000)	TH1) Inverter Fault #1 – Router, DE
8	Fault Invtr	TH1) 117:256 (0x100) TH2) 117:512 (0x200) TH3) 117:1024 (0x400) TH4) 117:2048 (0x800)	
10	Tool ModBus (-)		
11	Tool ModBus (+)		

Motor Drive Connectors

M2521/M2621/RPD-21 Drives 1-8 (Motor Drive Connectors)		
Pin	**Description**	**Port:Bit**
1	Drive Vcc	
2	Teknic Tx	
3	Teknic Rx	
12,15	Ground	
9	Step (TTL)	
5	Step Differential (+) Encoder Ch A(+)	
13	Step Differential (-) Encoder Ch A (-)	
10	Direction (TTL)	
6	Direction Differential (+) Encoder Ch B(+)	
14	Direction Differential (-) Encoder Ch B(-)	
11	Enable	Drive 1) 107:1 (1 drive_enable) Drive 2) 107:2 (2 drive_enable) Drive 3) 107:4 (4 drive_enable) Drive 4) 107:8 Drive 5) 107:16 (16 drive_enable) Drive 6) 107:32 (32 drive_enable) Drive 7) 107:64 (64 drive_enable) Drive 8) 107:128
4	Ready (Internally biased to 5v)	
7	InRange	
8	Drive +24 V	120:8

HF1 Aux I/O (DB15 Female)

M2545 & M3545 HF1 Aux I/O (DB15 Female) (Can connect directly to LPI)			
Pin	**Description**	**Port:Bit**	**Common Uses**
3, 5	Ground		
2	24 VDC Group B		
1	Input 8 (PNP) LPI Tool_Fault	109:128	Inverter Fault (enabled by parameter 27) Waterjet Abrasive Low? (DCN 375)
11	Modbus (+) Line		
4	Modbus (-) Line		
6	Estop Input – Internal	111:1024	
7	Relay #3 (Common) LPI Relay_1_Common	101:4 Max 2A @30Vdc	Spindle Enable (DCN 167) Waterjet Abrasive On/Off (DCN 218)
14	Relay #3 (Normally Open) LPI Relay_1_N.O.		
8	Relay #4 (Common) LPI Relay_2_Common	101:8 Max 2A @30Vdc	Caution (DCN 169) Waterjet Intensifier (DCN 217) Laser Pointer (DCN 371) – Type 6
15	Relay #4 (Normally Open) LPI Relay_2_N.O.		
9	Input 9 (PNP) LPI Zero_Speed	109:256	Pause Input (added v1.19) Inverter Fault #2 (enabled by parameter 27)
10	reserved		

M2545 & M3545 HF1 Aux I/O (DB15 Female) (Can connect directly to LPI)			
Pin	**Description**	**Port:Bit**	**Common Uses**
12	Analog Input		
13	Estop Relay (+), Main Contactor	103:1	

HF2 – PP Drives (DB25 Female)

M2545 & M3545 HF2 – PP Drives (DB25 Female)			
Pin	**Description**	**Port:Bit**	**Common Uses**
18, 19, 20, 21, 22, 23, 24, 25	Earth GND		
1	n/c	101:16	
2	Drive #1 Step		X Axis Step
3	Drive #1 Direction		X Axis Direction
4	Drive #2 Step		Xb Axis Step
5	Drive #2 Direction		Xb Axis Direction
6	Drive #3 Step		Y Axis Step
7	Drive #3 Direction		Y Axis Direction
8	Drive #4 Step		Z Axis Step
9	Drive #4 Direction		Z Axis Direction
10	Drive #1 Fault	119:1	X Axis Fault
11	Drive #2 Fault	119:2	Xb Axis Fault
12	Drive #3 Fault	119:4	Y Axis Fault
13	Drive #4 Fault	119:8	Z Axis Fault
14	Drive #6 Step		

M2545 & M3545 HF2 – PP Drives (DB25 Female)			
Pin	**Description**	**Port:Bit**	**Common Uses**
15	Drive #6 Fault	119:32	
16	Drive #6 Direction		
17	Drive Enable	101:32 (same as Pin 13 on HM3)	

HF3 – Primary I/O (DB37 Female)

M2545 & M3545 HF3 – Primary I/O (DB37 Female)			
Pin	**Description**	**Port:Bit**	**Common Uses**
13, 14, 15, 20, 25, 28	Ground / 24V Return		
11, 12, 16, 19, 23, 26, 36	24VDC Group A		
1	PNP Input 1 (Note 1)	109:1	X Limit Lo
2	PNP Input 2 (Note 1)	109:2	Xb Limit Lo
3	PNP Input 3 (Note 1)	109:4	Y Limit Lo
4	PNP Input 4 (Note 1)	109:8	Z Limit Up Z Sol Up? (DCN 74)
5	NPN Input 1 (10) (Note 2)	110:1	Surface/Calibration Block (DCN 163)
6	PNP Input 5 (Note 1)	109:16 (0x10)	Z Sol Down? (DCN 75) 2D Scanner (DCN 157) Knife Limit (DCN 33)

M2545 & M3545 HF3 – Primary I/O (DB37 Female)			
Pin	**Description**	**Port:Bit**	**Common Uses**
7	PNP Input 6 (Note 1)	109:32 (0x20)	Knife Limit (DCN 33) Plasma Surface Switch (DCN 202)
8	PNP Input 7 (Note 1)	109:64 (0x40)	Plasma Arc Lit? (DCN 206) Knife 2 Limit (DCN 215)
9	PNP Input 14 (Note 1)	109:8192 (0x2000)	CE Safety
10	NPN Input 2 (11) (Note 2)	110:2	Grounding Clip (DCN 153) Plasma Breakaway (DCN 221)
17	Relay #2 (common)	101:2 Max 2A @30Vdc	Z Sol up/down (DCN 73) Knife 1 Oscillator (DCN 198) Knife 1 Slider (DCN 211) Plasma Scribe up/down (DCN 173) WaterJet Pump On/Off (DCN 399)
18	Relay #2 (normally open)		

M2545 & M3545 HF3 – Primary I/O (DB37 Female)			
Pin	**Description**	**Port:Bit**	**Common Uses**
24	NPN PWM #1, Solenoid 1 (Note 3)	121:255	Mister On/Off (DCN 15) Water Jet On/Off (DCN 219) Knife Creasing Wheel (DCN 213) Knife 1 Slider (DCN 211) Plasma Scribe Raise/Lower (DCN 173) Plasma Scribe On/Off (DCN 177) Plasma Surface Block Enable (DCN 201) Laser Pointer (DCN 371)
27	NPN PWM #2, Solenoid 2 (Note 3)	125:255	Plasma Scribe On/Off (DCN 177) Plasma Surf Blk Enable (DCN 201) Knife Up/Dn (DCN 212) WaterJet Intensifier (DCN 217)
31	Relay #1 Common	101:1 = 0 101:1 = 1 Max 2A @30Vdc	Spindle on/off (DCN 300) Knife 1 Oscillator On/Off (DCN 198) Plasma Arc On/Off (DCN 200)
32	Relay #1 NC Contact		
33	Relay #1 NO Contact		
34	Modbus A		
35	Modbus B		
21,22,29 30	N/C		

HM1 – RS232 (DB9 Male)

M2545 & M3545 HM1 – RS232 (DB9 Male)			
Pin	**Description**	**Port:Bit**	**Common Uses**
1	No Connection		
2	RXD (in)		
3	TXD (out)		
4	DTR (out, Fixed ON)		
5	Common		
6	DSR (in)		
7	CTS (out)		
8	No Connection		
9	+5 Vdc		

HM2 – Aux Com (DB15 Male)

M2545 & M3545 HM2 – Aux Com (DB15 Male)			
Pin	**Description**	**Port:Bit**	**Common Uses**
1	Ground		
2	M2545 RX Keypad (connect to KDM TX)		
3	M2545 TX Keypad (connect to KDM RX)		
4	+24vdc		
5	Ground		
6	Drive #8 Direction		
7	Drive #8 Step		
8	Drive #8 Step Diff		

M2545 & M3545 HM2 – Aux Com (DB15 Male)			
Pin	**Description**	**Port:Bit**	**Common Uses**
9	External Modbus A		
10	External Modbus B		
11	E-Stop Return		
12	+5vdc		
13	RX from Barcode		
14	TX to Barcode		
15	Drive #8 Direction Diff		

HM3 – SR Drives (DB25 Male)

M2545 & M3545 HM3 – SR Drives (DB25 Male)			
Pin	**Description**	**Port:Bit**	**Common Uses**
20, 21, 22, 23, 24, 25	Earth GND		
1	Drive #1 Direction		X Axis Direction
2	Drive #2 Direction		Xb Axis Direction
3	Drive #3 Direction		Y Axis Direction
4	Drive #4 Direction		Z Axis Direction
5	Drive #5 Direction		Knife Direction
6	Drive #1 Step		X Axis Step
7	Drive #2 Step		Xb Axis Step
8	Drive #3 Step		Y Axis Step
9	Drive #4 Step		Z Axis Step

M2545 & M3545 HM3 – SR Drives (DB25 Male)			
Pin	**Description**	**Port:Bit**	**Common Uses**
10	Drive #5 Step		Knife Step
11	Teknic Communication Rx 1		
12	Teknic Communication Tx 1		
13	Drive Enable	101:32 (same as pin 17 on HF2)	
14	Drive #5 Fault	119:16	
15	Drive Vcc		
16	Drive Vcc		
17	Drive Vcc		
18	Teknic Communication Tx 2		
19	Teknic Communication Rx 2		

M2545 & M3545 Notes

Notes		
1	PNP Inputs. Do not exceed +32VDC Do not exceed -100VDC Input transition point = +12VDC Zin = 4.5K Ohms	
2	NPN Inputs Biased to +12VDC Input transition point = +6VDC Do not exceed +100VDC	

	Do not exceed -8VDC	
3	NPN PWM #1 & #2 Output pin shorts to GROUND 0-100% @ 16.25kHz Load current must be 1 Amp or less CAUTION : Load supply must not exceed the controllers supply voltage. (Normally 24VDC) If an independent power supply is used for this load, the two system's Grounds must be linked. An on board recirculation diode is connected between this output pin and the controllers supply voltage. An external recirculation diode is recommended at an inductive load to minimize EMI.	

L2 24 Pin CPC (internal Connector)

HP4 & HP5 L2 24 Pin CPC (internal Connector)				
Pin	**Description**	**Port:Bit**	**Notes**	**Common Uses**
5, 6, 13, 20, 21	No Connection			
1	Input 8 (PNP)	109:128		Inverter Fault (parameter 30) Shutter (Laser)
2	Input 9 (PNP)	109:256		Inverter Fault #2 (parameter 30) Interlock (Laser)
3	Output 24V		3A max load	
4	Ground			
7	Dac Output (1 set_ana_voltage)	1 set_ana_voltage	0 – 10 V output The load resistance must be greater than 2k. Zout of the driver is approx. 100 Ohms 1000 pF load MAX (oscillations occur with higher cap.)	
8	Ground		Typically used for the DAC return path.	
9	Ground		Typically used as a shield connection point	
10	Modbus (+) Line			
11	Modbus (-) Line			
12	Analog In	1 get_ana_voltage	Voltage In MUST be less than 12V	
14	Estop Relay Coil (+)	103:1		

HP4 & HP5 L2 24 Pin CPC (internal Connector)				
Pin	**Description**	**Port:Bit**	**Notes**	**Common Uses**
15	Estop Input (other side -> pin3)	111:1024	PNP Input Require 24V to satisfy ESTOP	
16	SSR1 A side	106:1	Solid State Relay Output Voltage Max = 36V (AC or DC) Current Max = 1 amp	Spindle Enable (DCN 167) Waterjet Abrasive (DCN 218) Knife 1 Osc (DCN 198, param 600=6) Scribe Raise/Lower (DCN 173, param 600=10) Surf.Blk Enable (DCN 200)
17	SSR1 B side			
18	SSR2 A side	106:2	Solid State Relay Output Voltage Max = 36V (AC or DC) Current Max = 1 amp	Scribe On/Off (DCN 177, param 600=10)
19	SSR2 B side			
23	AC1			
22&24	AC2		Use pin 22 for 40V DC Bus (27VAC) Use pin 24 for 80V DC Bus (56VAC) **CONNECT TO ONLY 1 PIN**	

L1 37 Pin CPC (External Connector)

HP4 & HP5 L1 37 Pin CPC (External Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
11,12,16 19,36	Output 24V		Max output current for entire HP4 is 3Amps	
13,14,15 20,25,28,37	Earth GND			
1	PNP Input 1	109:1		Xa Limit

HP4 & HP5 L1 37 Pin CPC (External Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
2	PNP Input 2	109:2		Xb Limit
3	PNP Input 3	109:4		Y Limit
4	PNP Input 4	109:8		Z Limit Z Solenoid Up? (DCN 74)
5	NPN Input 1 (10)	110:1	Internally biased to 5V through a diode and 2.2k resistor	Surface Block (DCN 163) Ohmic Sensor (DCN 163)
6	PNP Input 5	109:16		Z Solenoid Down? (DCN 75)
7	PNP Input 6	109:32		Knife Limit (DCN 33, param 600=1, 2, 3, 4, 5, 6, 7 or 8) Plasma Surface Switch (DCN 202)
8	PNP Input 7	109:64		Plasma Arc Lit? (DCN 206) Knife 2 Limit (DCN 215, param 600=1, 2, 3, 7, 8)
9	PNP Input 14	109:8192 (0x2000)		
10	NPN Input 2 (11)	110:2	Internally biased to 5V through a diode and 2.2k resistor	Breakaway
17	SSR3 A	106:4	Solid State Relay Output Voltage Max = 36V (AC or DC) Current Max = 1 amp	Z Solenoid up/dn (DCN 73) Knife Slider (DCN 211, param 600=1,4) Scribe Raise/Lower (DCN 173, param 600=9)
18	SSR3 B			

HP4 & HP5 L1 37 Pin CPC (External Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
23	Solenoid 1 (+)		24V Source	
24	Solenoid 1 (-)	124:255	8-bit PWM register Recirculation diode present	Mister (DCN 17, STD machine and param 600= 1, 3, 4, 7, 8) Scribe raise/lower (DCN 173) Scribe on/off (DCN 177 param 600=9) Knife Slider (DCN 211, param 600=2, 6, 7, 8) Knife Creasing Wheel (DCN 213) Waterjet Jet on/off (DCN 219) Laser Pointer (DCN 371, param 600=10)
26	Solenoid 2 (+)		24V Source	
27	Solenoid 2 (-)	125:255	8-bit PWM register Recirculation diode present	Scribe on/off (DCN 177) Surf. Blk Enable (DCN 201, param 600=9, 10) Knife up/down (DCN 212, param 600=1, 2, 3, 4, 5, 6, 7, 8) Waterjet Intensifier (DCN 217)

HP4 & HP5 L1 37 Pin CPC (External Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
31	Relay Common		120 VAC, 10 amp	Plasma Arc On/Off (DCN 200) Spindle On/Off (DCN 300) Knife 2 up/down (DCN 213, param 600=1, 3) Knife 1 osc (DCN 198, param 600=4, 7, 8)
32	Relay NC Contact	101:1 = 0		
33	Relay NO Contact	101:1 = 1		
34	Modbus (+)			
35	Modbus (-)			
21,22,29 30	No Connection			

Drive 5-6 DB15 Connectors

HP4 & HP5 Drive 5-6 DB15 Connectors				
Pin	**Description**	**Direction**	**Port:Bit**	**Notes**
1	Drive Vcc *4.5VDC normally* *5.5VDC with optional supply.*	OUTPUT		Linked to the logic +5V supply through a PolyFuse and diode. Linked directly to the OPTIONAL +5.5V supply pin. Connect to the high side of the step & dir signals for drives like the PacSci 6410.
2	TX_Servo	OUTPUT		wired to Servo Rx
3	RX_Servo	INPUT		wired to Servo Tx

HP4 & HP5 Drive 5-6 DB15 Connectors				
Pin	**Description**	**Direction**	**Port:Bit**	**Notes**
4	Ready? Internally biased to +5V	NPN Input from Open-Collector output on the drive.		GND=Enabled H/Floating=Faulted Do not feed positive voltage to this pin.
5	Step Differential (+) Encoder Ch A(+)	OUTPUT INPUT		
6	Direction Differential (+) Encoder Ch B (+)	OUTPUT INPUT		
7	InRange	INPUT from Open Collector output on the drive		
8	Drive +24V	OUTPUT		Required by Yaskawa drives. Web Protected/Switched
9	Step (TTL)	OUTPUT		
10	Direction (TTL)	OUTPUT		
11	Enable	Open-Collector OUTPUT		30v Max
12, 15	Earth Ground			
13	Step Differential (-) Encoder Ch A(-)	OUTPUT INPUT		
14	Direction Differential (-) Encoder Ch B(-)	OUTPUT INPUT		

L1 37 Pin CPC (External I/O Connector)

Mating connector = AMP 206305-1
Mating pins = AMP 66099-4

SB5 L1 37 Pin CPC (External I/O Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
11,12,16 19,36	Output 24V		Max output current for entire HP4 is 3Amps	
13,14,15 20,25,28,37	Earth GND			
1	PNP Input 1	109:1	Input rated for (+)32VDC to (-) 50VDC	Xa Limit
2	PNP Input 2	109:2	Input rated for (+)32VDC to (-) 50VDC	Xb Limit
3	PNP Input 3	109:4	Input rated for (+)32VDC to (-) 50VDC	Y Limit
4	PNP Input 4	109:8	Input rated for (+)32VDC to (-) 50VDC	Z Limit Z Solenoid Up? (DCN 74)
5	NPN Input 1 (10)	110:1	NPN (external signal sinks) Signal must be shorted to Ground Biased at 12VDC via 4.7k & 4.7k voltage divider between 24V and Ground	Surface Block (DCN 163) Ohmic Sensor (DCN 163)
6	PNP Input 5	109:16	Input rated for (+)32VDC to (-) 50VDC	Z Solenoid Down? (DCN 75)
7	PNP Input 6	109:32	Input rated for (+)32VDC to (-) 50VDC -no laser interlock-	Knife Limit (DCN 33, param 600=1, 2, 3, 4, 5, 6, 7 or 8) Plasma Surface Switch (DCN 202)

SB5 L1 37 Pin CPC (External I/O Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
8	PNP Input 7	109:64	Input rated for (+)32VDC to (-) 50VDC -no laser interlock-	Plasma Arc Lit? (DCN 206) Knife 2 Limit (DCN 215, param 600=1, 2, 3, 7, 8)
9	PNP Input 14	109:8192 (0x2000)	Pause/CE Safety on A-Series. Matches input 14 on M2521/M2621.	
10	NPN Input 2 (11)	110:2	Signal must be shorted to Ground Biased at 12VDC via 4.7k & 4.7k voltage divider between 24V and Ground	Breakaway
17	SSR3 A	106:4	Solid State Relay Output Voltage Max = 36V (AC or DC) Current Max = 1 amp	Z Solenoid up/dn (DCN 73) Knife Slider (DCN 211, param 600=1,4) Scribe Raise/Lower (DCN 173, param 600=9)
18	SSR3 B	(106:4)		
21	PNP Input 13	109:4096	Rev 2 Only Input rated for (+)32VDC to (-) 50VDC	
22	PNP Input 11	109:1024	Rev 2 Only Input rated for (+)32VDC to (-) 50VDC	
23	Solenoid 1 (+)		24V Source	

SB5 L1 37 Pin CPC (External I/O Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
24	Solenoid 1 (-)	124:254	8-bit PWM register Recirculation diode present	Mister (DCN 17, STD machine and param 600= 1, 3, 4, 7, 8) Scribe raise/lower (DCN 173) Scribe on/off (DCN 177 param 600=9) Knife Slider (DCN 211, param 600=2, 6, 7, 8) Knife Creasing Wheel (DCN 213) Waterjet Jet on/off (DCN 219) Laser Pointer (DCN 371, param 600=10)
26	Solenoid 2 (+)		24V Source	
27	Solenoid 2 (-)	125:254	8-bit PWM register Recirculation diode present	Scribe on/off (DCN 177) Surf. Blk Enable (DCN 201, param 600=9, 10) Knife up/down (DCN 212, param 600=1, 2, 3, 4, 5, 6, 7, 8) Waterjet Intensifier (DCN 217)

SB5 L1 37 Pin CPC (External I/O Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
31	Relay Common	101:1	120 VAC, 10 amp	Plasma Arc On/Off (DCN 200) Spindle On/Off (DCN 300) Knife 2 up/down (DCN 213, param 600=1, 3) Knife 1 osc (DCN 198, param 600=4, 7, 8)
32	Relay NC Contact	101:1 = 0		
33	Relay NO Contact	101:1 = 1		
34	Modbus (+)			
35	Modbus (-)			
21,22,29 30	No Connection			

L2 24 Pin CPC (Internal I/O Connector)

Mating connector = AMP 206837-1
Mating pins = AMP 66101-4

Internal connector on RPD-68 Side-Board is connection H5 (SIP-14-WALLED)

SB5 L2 24 Pin CPC (Internal I/O Connector)					
CPC Pin	**H5 Pin**	**Description**	**Port:Bit**	**Notes**	**Common Uses**
5, 6, 13, 20, 21		No Connection			
1	1	Input 8 (PNP)	109:128	Input rated for (+)32VCD to (-)50VDC	Inverter Fault (parameter 30) Shutter (Laser)

SB5 L2 24 Pin CPC (Internal I/O Connector)					
CPC Pin	**H5 Pin**	**Description**	**Port:Bit**	**Notes**	**Common Uses**
2	2	Input 9 (PNP)	109:256	Input rated for (+)32VCD to (-)50VDC	Inverter Fault #2 (parameter 30) Interlock (Laser)
3	3	Output 24V		24V source for inputs and devices. 3A max load	
4, 5, 6	4, 8, 9	Ground		Ground return path for I/O	
7		Dac Output (1 set_ana_voltage)	1 set_ana_voltage	0 – 10 V output The load resistance must be greater than 2k. Zout of the driver is approx. 100 Ohms 1000 pF load MAX (oscillations occur with higher cap.)	
8		Ground		Typically used for the DAC return path.	
9		Ground		Typically used as a shield connection point	
10	7	Modbus (+) Line			
11	8	Modbus (-) Line			
12		Analog In	1 get_ana_voltage	Voltage In MUST be less than 12V	
14	9	Estop Relay Coil (+)	103:1	Wire to + side of ESTOP relay. *Wire negative side of ESTOP relay to Gnd.* *24V output is conditional on port 103:1 -and- KDM Estop.*	

SB5 L2 24 Pin CPC (Internal I/O Connector)					
CPC Pin	**H5 Pin**	**Description**	**Port:Bit**	**Notes**	**Common Uses**
15	10	Estop Input (other side -> pin3)	111:1024	PNP Input Require 24V to satisfy ESTOP Input rated for (+)32VCD to (-)50VDC	
16	11	SSR1 A side	106:1	Solid State Relay Output Voltage Max = 36V (AC or DC) Current Max = 1 amp	Spindle Enable (DCN 167) Waterjet Abrasive (DCN 218) Knife 1 Osc (DCN 198, param 600=6) Scribe Raise/Lower (DCN 173, param 600=10) Surf.Blk Enable (DCN 200)
17	12	SSR1 B side			
18	13	SSR2 A side	106:2	Solid State Relay Output Voltage Max = 36V (AC or DC) Current Max = 1 amp	Scribe On/Off (DCN 177, param 600=10)
19	14	SSR2 B side			
23		AC1			
22&24		AC2		Do not exceed 56VAC. **CONNECT TO ONLY 1 PIN**	

L4 4 Pin CPC (Cycle Start and ESTOP Connector)

Mating connector = AMP ??
Mating pins = AMP 66101-4

SB5 L4 4 Pin CPC (Cycle Start and ESTOP Connector)				
Pin	**Description**	**Port**	**Notes**	**Common Uses**
1	24 VDC Out		For ESTOP Signal	
2	24 VDC Out		For Cycle Start Signal	
3	ESTOP	111:256 (0x100)	Optional ESTOP In. Must be connected to be “good”. Input rated for (+)32VCD to (-)50VDC	
4	Input 10	109:512 (0x200)	Cycle Start or additional Pause Signal. Input rated for (+)32VCD to (-)50VDC	

LPI (Integrated Plasma Interface)

LPI (Integrated Plasma Interface)				
H3 Pin	**CPC 14 Pin**	**Description**	**Port**	**Notes**
1	6	Analog Input	131	This signal must be more positive than field ground. Max input is 6VDC
2	5	Field Ground		Not Connected. Do not connect to logic or earth ground.
3	12	HP5 Input	109:2048	Arc Transfer (Arc Lit?) Link to Field Ground to signal Transfer has occurred.
4	14	Field Ground		Not Connected. Do not connect to logic or earth ground.
5	3	HP5 Output Common	101:2048	Plasma Arc On/Off Dry Contact. Common side for CPC Pin 4.

C

LPI (Integrated Plasma Interface)					
H3 Pin	**CPC 14 Pin**	**Description**	**Port**	**Notes**	C
6	4	HP5 Output Normally Open Contact	(101:2048)	Dry Contract Normally Open side for CPC Pin 3.	

Drive 5-6 DB15 Connectors

SB5 Drive 5-6 DB15 Connectors				
Pin	**Description**	**Direction**	**Port:Bit**	**Notes**
1	Drive Vcc *4.5VDC normally* *5.5VDC with optional supply.*	OUTPUT		Linked to the logic +5V supply through a PolyFuse and diode. Linked directly to the OPTIONAL +5.5V supply pin. Connect to the high side of the step & dir signals for drives like the PacSci 6410.
2	TX_Servo	OUTPUT		wired to Servo Rx
3	RX_Servo	INPUT		wired to Servo Tx
4	Ready? Internally biased to +5V	NPN Input from Open-Collector output on the drive.		GND=Enabled H/Floating=Faulted Do not feed positive voltage to this pin.
5	Step Differential (+) Encoder Ch A(+)	OUTPUT INPUT		
6	Direction Differential (+) Encoder Ch B (+)	OUTPUT INPUT		
7	InRange	INPUT		Input from Open Collector output on the drive
8	Drive +24V	OUTPUT		Required by Yaskawa drives. Web Protected/Switched
9	Step (TTL)	OUTPUT		
10	Direction (TTL)	OUTPUT		

SB5 Drive 5-6 DB15 Connectors				
Pin	**Description**	**Direction**	**Port:Bit**	**Notes**
11	Enable	Open-Collector OUTPUT		30v Max
12, 15	Earth Ground			
13	Step Differential (-) Encoder Ch A(-)	OUTPUT INPUT		
14	Direction Differential (-) Encoder Ch B(-)	OUTPUT INPUT		

HMB1 (Modbus and Analog Input)

RPD-24 HMB1 (Modbus and Analog Input)			
Pin	**Description**	**Software (port:bit)**	**Notes**
1	Ground		
2	Modbus (A) Line		
3	Modbus (B) Line		
4	Ground		
5	Analog Input 1	0 get_ana_voltage	Input should not exceed 26VDC (recommended) Input must not exceed 34VDC (Absolute)
6	Analog Input 2	1 get_ana_voltage	

H1 (Spindle Analog Outputs)

RPD-24 H1 (Spindle Analog Outputs)			
Pin	**Description**	**Software (port:bit)**	**Notes**
1	Ground		
2	4.7 VDC		
3	Analog FRO Pot Center		
4	4.7 VDC		
5	Ground		
6	Spindle 1 Output	1 set_ana_voltage	All 3 are the same output. Max output is 10.0VDC.
7	Spindle 2 Output	1 set_ana_voltage	
8	Spindle 3 Output	1 set_ana_voltage	
9	N.C.		

H2 (Opto-22 Outputs)

RPD-24 H2 (Opto-22 Outputs)			
Pin	**Description**	**Software (port:bit)**	**Notes**
1,2	Spindle 1	101:1	
3,4	Mister 1	121:255	
5,6	Spindle 2	101:2	
7,8	Mister 2	101:32	
9,10	Spindle Enable	104:1	Spindle Enable (also used for Spindle 3 output)
11,12	Drill Enable	104:2	Drill Enable (also used for Mister 3 output)

H3 (Opto-22 Outputs)

RPD-24 H3 (Opto-22 Outputs)			
Pin	**Description**	**Software (port:bit)**	**Notes**
1,2	Drill 1	104:4	
3,4	Drill 2	104:8	
5,6	Caution	101:512	

H4 (Opto-22 Outputs)

RPD-24 H4 (Opto-22 Outputs)			
Pin	**Description**	**Software (port:bit)**	**Notes**
1,2	TC Chuck	101:64	
3,4	TC Blast	101:128	
5,6	Dust Collector	101:8	
7,8	Misc Out 1	101:256	Used for Servo Reset
9,10	Misc Out 2	101:4	User for Servo Enable (Note: on the HPRO Connector, the enable line is controlled automatically by drive_enable)
11,12	Misc Out 3	125:255	

H7 (Inputs)

RPD-24 H7 Inputs			
Pin	**Description**	**Software (port:bit)**	**Notes**
1	X Limit Lo	109:1	
2	Xb Limit Lo	109:2	
3	Y Limit Lo	109:4	
4	Z1 Limit	109:16	
5	Surface Block	110:1	
6	Misc 3	114:4	
7	Spindle 1 Ready?	110:4096 (0x1000)	
8	Inverter Fault	110:256 (0x100)	Requires 210 256 0 pset_bits to invert input.
9	Pause	109:256 (0x100)	
10	Emergency Stop	111:256 (0x100)	
11	+24 VDC Input		These (2) pins are the primary power feed for the board stack. The RPD-24 does not require 5VDC. Switching Power supply should be used. A linear power supply (transformer & cap) has been known to drop to much voltage on power up causing the system to not boot.
12	Ground		

H8 (Inputs)

RPD-24 H8 Inputs			
Pin	**Description**	**Software (port:bit)**	**Notes**
1	Cycle Start	109:512 (0x200)	
2	CE Safety Switch	109:8192 (0x2000)	
3	Spindle 2 Ready?	110:8192 (0x2000)	
4	2D Digitizer	109:4096 (0x1000)	Used for Spindle 3 Ready for 3 headed systems.
5	Misc 1	114:1	
6	Misc 2	114:2	

H9 (Inputs)

7RPD-24 H9 Inputs			
Pin	**Description**	**Software (port:bit)**	**Notes**
1	TC Home	109:128 (0x80)	
2	Air Pressure Low	109:16384 (0x4000)	
3	Chuck Open?	109:1024 (0x400)	
4	Chuck Closed?	109:2048 (0x800)	
5	Servo Fault	109:32768 (0x8000)	OR'd with input on HPRO connector.
6	Z2 Homing	109:32 (0x20)	
7	Misc 4	109:64 (0x40)	Dust Collector open sensor. Checked if parameter 201 is set.
8	Y Over Travel	109:8	
9	Drill 1	114:16	
10	Drill 2	114:32	

H10 (Step / Direction Interface)

RPD-24 H10 Step / Direction Interface			
Pin	**Description**	**Software (port:bit)**	**Notes**
1	Drive #1 Xa Step		
2	Drive #1 Xa Direction		
3	Drive #2 Ya Step		
4	Drive #2 Ya Direction		
5	Drive #3 Z1 Step		
6	Drive #3 Z1 Direction		
7	Drive #4 Q Step		Used for Knife Axis Step
8	Drive #4 Q Direction		Used for Knife Axis Direction
9	Drive #5 Xb Step		
10	Drive #5 Xb Direction		
11	4.7 VDC		Not Switched / not under software control
12	Ground		

H11 (Step / Direction Interface)

RPD-24 H11 Step / Direction Interface			
Pin	**Description**	**Software (port:bit)**	**Notes**
1	Drive #6 Yb Step		
2	Drive #6 Yb Direction		
3	Drive #7 Z2 Step		
4	Drive #7 Z2 Direction		
5	Drive #8 Z3 Step		
6	Drive #8 Z3 Direction		
7	Drive #9 Z4 Step		Used for Rotary ATC if not using ATCB
8	Drive #9 Z4 Direction		Used for Rotary ATC if not using ATCB
9	Ground		

HPRO (External Step / Direction Interface)

RPD-24 HPRO External Step / Direction			
Pin	**Description**	**Software (port:bit)**	**Notes**
9,11,13,15	Ground		
1,3,5,7	5 VDC		Tied to RPDs 24VDC to 5VDC switching power supply
2	Drive #1 Xa Step		
4	Drive #5 Xb Step		
6	Drive #1 Xa Direction		
8	Drive #2 Ya Step		
10	Drive #6 Yb Step		
12	Drive #2 Ya Direction		
8	Drive #3 Z1 Step		
16	Drive #7 Z2 Step		
18	Drive #8 Z3 Step		
20	Drive #9 Z4 Step		
22	Drive #3 Z1 Direction		
26	HPRO Drive Enable	101:16	This output is automatically controlled by drive_enable
17,19,21,23,24,25,27,28,29,30,31	N.C.		
32	Ground		
33	Servo Fault	109:32768 (0x8000)	This input is OR'd with Servo Fault on H9 Pin 5.
34	24VDC		Tied directly to H7 Pin 11.

ATCB

HIG1 Right angle connector

ATCB HIG1 (Right angle connector)					
Pin	**Description**	**Port:Bit**	**LEDs**	**Notes**	**Common Usage**
1,4,7,10	+24V Source				
3,6,9,12	Ground				
2	L1	20:1	On=GND	24V = Chuck Open, LED off (measure between Pins 2 and GND).	Chuck Open (DCN 1)
5	L2	20:2	On=GND	24V = Tool Loaded, LED off. (measure between Pin 5 and GND)	Tool Loaded (DCN 2)
8	L3	20:4	On=GND	24V = Chuck Closed, LED off. (measure between Pin 8 and GND) v8.25 Checked once a second when running job with spindle on	Chuck Closed (DCN 3)
11	L4	20:8	On=GND	DCN Calls chk_air macro 24V = Air Low, LED off. (measure between Pin 11 and GND)	Air Pressure (DCN 4)

HIG2 Vertical Connector

ATCB HIG2 (Vertical Connector)					
Pin	**Description**	**Port:Bit**	**LEDs**	**Notes**	**Common Usage**
9, 10, 11, 12	+24V Source				
1	L5	20:16	On=GND	24V = On Limit, LED off. (measure between Pin 1 and +24v)	TC Home (DCN 5)

ATCB HIG2 (Vertical Connector)					
Pin	**Description**	**Port:Bit**	**LEDs**	**Notes**	**Common Usage**
2	L6	20:32	On=GND	Mapped in module atcb_multivision.uc. Also used for Misc Tool using atcb_misctool.uc module.	
3	L7	20:64	On=GND	24v = Dust C. Open, LED off. (measure between Pins 3&+24v)	Dust Collector Open (DCN 7)
4	L8	20:128	On=GND	24v = Spindle Overtemp, LED off=GOOD (measure between Pin 4 and +24v)	Spindle Overtemp (atcb module v8.09, parameter 618)
5	L9	21:1	On=GND	Cycle Start #1 if parameter 176 bit 5 (value 16) is set. Mapped in mh_atcb_tc.uc module	Tool Changer Extended (DCN 9)
6	L10	21:2	On=GND	Cycle Start #2 if parameter 176 bit 6 (value 32) is set. Mapped in mh_atcb_tc.uc module ~~Spindle Spinning Sensor if parameter 176 bit 7 (value 64) is set. Mapped in mh_atcb_tc.uc v8.26 module.~~	Tool Changer Retracted (DCN 10)
7	L11	21:4	On=GND	Mapped in v8.17 mh_atcb_tc.uc	Aggregate Slider Extended (DCN 11)
8	L12	21:8	On=GND	Mapped in v8.17 mh_atcb_tc.uc Spindle Spinning Sensor (added in v21) if parameter 176 bit 7 (value 64) is set. Mapped in mh_atcb_tc.uc v8.26 module.	Aggregate Slider Retracted (DCN 12) Spindle Spinning Sensor

PWR Power/Modbus

ATCB PWR (Power/Modbus)					
Pin	**Description**	**Port:Bit**		**Notes**	**Common Usage**
1	Gnd				
2	Modbus (+)				
3	Modbus (-)				
4	Gnd				
5	24 V in				
6	80 V DC in				

HSOL Ribbon Connector

ATCB HSOL (Ribbon Connection)					
Pin	**Description**	**Port:Bit**		**Notes**	**Common Usage**
1	Sol Out 1	10:1			Open Chuck (DCN 13)
2	Sol Out 1b	11:1			Close Chuck (DCN 21)
3	Sol Out 2	10:2			Purge Air (DCN 14)
5	Sol Out 3	10:4			Dust Collector (DCN 15)
7	Sol Out 4	10:8		If MAX 40 Spindle, this gets mapped to Y-Brake, DCN 152 in mh_atcb_tc module.	Spindle Cooling (DCN 16)
9	Sol Out 5	10:16			Mister (DCN 17)
10	Sol Out 5b	11:2			
11	Sol Out 6	10:32			Air Blast (DCN 18)
13	Sol Out 7	10:64		Also used to Extend/Retract Aggregate slider.	Extend/Retract TC (DCN 19)

ATCB HSOL (Ribbon Connection)					
Pin	**Description**	**Port:Bit**		**Notes**	**Common Usage**
14	Sol Out 7b	11:4			
15	Sol Out 8	10:128		Mapped in module atcb_multivision.uc. Also used for Misc Tool using atcb_misctool.uc module. Mapped in knife_cartridge (v8.127) if number of knife=1 and knife assembly enabled (bit 16 of parameter 373) Mapped in module Map_device_scanner v1.01 to DCN 155.	
16	Sol Out 8b	11:8			
4, 6, 8, 12, 17, 18, 19, 20, 21, 22, 23, 24	No Connection				
25, 26	+24Vdc				

RIO

HOUT2 (Right Angle Connector)

RIO HOUT2 (Right angle connector)				
Pin	**Description**	**Port:Bit**	**LED**	Common Usage
2,4,6,8,10	+24V Source			
1	NPN Output 1	10:1	Out #1	Open Chuck (DCN 13)
3	NPN Output 2	10:2	Out #2	Purge Air (DCN 14)
5	NPN Output 3	10:4	Out #3	Dust Collector (DCN 15)
7	NPN Output 4	10:8	Out #4	Spindle Cooling (DCN 16)
9	NPN Output 5	10:16	Out #5	Mister (DCN 17)

HOUT3 (Vertical Connector)

RIO HOUT3 (Vertical Connector)				
Pin	**Description**	**Port:Bit**	**LED**	Common Usage
2,4,6,8,10	+24V Source			
1	NPN Output 6	10:32	Out #6	Air Blast (DCN 18)
3	NPN Output 7	10:64	Out #7	
5	NPN Output 8	10:128	Out #8	
7	NPN Output 9	11:1	Out #9	Chuck Close (DCN 21)
9	NPN Output 10	11:2	Out #10	

H1 (Inputs)

RIO H1 (Inputs)				
Pin	**Description**	**Port**	**LED**	Common Usage
1,3,5,7	+24V Source			
2	Input 1 (IN1)	20:16 or 21:16	In1 (on=24v)	Chuck Open? (DCN 1)
4	Input 2 (IN2)	20:32 or 21:32	In2 (on=24v)	Tool Loaded? (DCN 2)
6	Input 3 (IN3)	20:64 or 21:64	In3 (on=24v)	Chuck Closed? (DCN 3)
8	Input 4 (IN4)	20:128 or 21:128	In4 (on=24v)	Air Pressure? (DCN 4)

H-Ang (Inputs and DAC Outputs)

RIO H-Ang (inputs and DAC Outputs)				
Pin	**Description**	**Port**	**LED**	Common Usage
1	Input 5 (Ain1)	20:1 or 21:1		Spindle Spinning Sensor (added in v22) if parameter 176 bit 7 (value 64) is set.
2	Input 6 (Ain2)	20:2 or 21:2		
3	Input 7 (Ain3)	20:4 or 21:4		Dust Collector Open? (DCN 7)
4	Input 8 (Ain4)	20:8 or 21:8		Spindle Overtemp (DCN 8)
5,6	Logic Common			
7	Dac Out 1			

RIO H-Ang (inputs and DAC Outputs)				
Pin	**Description**	**Port**	**LED**	Common Usage
8	Dac Out 2			
9	Dac Out 3			
10	Dac Out 4			

QPI / DPI / SPI

TH1 (Connect to TH1 on M2521/M2621)		
Pin	**Description**	**Notes**
1, 2	No Connection	
3	24v Power Input	Powers the QPI / SPI (The QPI consumes about 120 mA)
4	RS422 Channel Change	Output from M2521 that advances the RS422 communications channel
5,7,9	Ground	Ground return path (all 3 points are connected together on both the SPI/QPI and M2521)
6	Analog Decode 0	Feed back to M2521, indicating which channel is active on the Analog communications (LSB)
8	Analog Decode 1	Feed back to M2521, indicating which channel is active on the Analog communications (MSB)
10	Analog Diff +	Carries the analog data to and from the QPI / SPI. This is the communication between the QPI/SPI and the RPI. It contains the arc voltage plus the I/O from the board. (pins 10 & 11 should be a twisted pair)
11	Analog Diff -	Carries the analog data to and from the QPI / SPI (pins 10 & 11 should be a twisted pair)
12	SHIELD	Use for shielding

TH2 (Connect to TH2 on M2521/M2621)		
Pin	**Description**	**Notes**
1, 2	No Connection	
3	24v Power Input	Powers the QPI / SPI (The QPI consumes about 120 mA)

4	RS422 Channel Change	Output from M2521 that controls the direction of the data flow.
5,7,9	Ground	Ground return path (all 3 points are connected together on both the SPI/QPI and M2521)
6	RS422 Decode (0)	Feed back to M2521, indicating which channel is active on the RS422 communications (LSB)
8	RS422 Decode (1)	Feed back to M2521, indicating which channel is active on the RS422 communications (MSB)
10	RS422 Diff +	Carries the RS422 data to and from the QPI / SPI (pins 10 & 11 should be a twisted pair)
11	RS422 Diff -	Carries the RS422 data to and from the QPI / SPI (pins 10 & 11 should be a twisted pair)
12	SHIELD	Use for shielding

RPI

Pin	Description	Pin	Description	LED	DCN	Port:Bit	Notes
1	RS422 (-)	20	RS422 (+)				Originating from Motion Controller
2	RS422 (-)	21	RS422 (+)				Originating from Plasma Unit
3		22					
4	Ground	23	Arc Transfer (1)	blue	206	141:16	RPI Input/ Plasma Unit NPN Output
5	Ground	24	Error	red	207	141: 4	RPI Input/ Plasma Unit NPN Output
6	Ground	25	Ramp Down Error	red			RPI Input/ Plasma Unit NPN Output (Not Used)
7	Ground	26	Not Ready	yellow	208	141:1	RPI Input/ Plasma Unit NPN Output
8	Ground	27	Arc Transfer (2)	blue	226	141:4096	RPI Input/ Plasma Unit NPN Output (Not Used)
9	Ground	28	Arc Transfer (3)	blue	236	142:16	RPI Input/ Plasma Unit NPN Output (Not Used)
10	Ground	29	Arc Transfer (4)	blue	216	142:4096	RPI Input/ Plasma Unit NPN Output (Not Used)
11							
12	Corner (-)	31	Corner (+)	blue	205	130:16	RPI Output / Plasma Unit Input (currently not used)
13	Pierce (-)	32	Pierce (+)	yellow	76	130:4	RPI Output / Plasma Unit Input
14	Hold (-)	33	Hold (+)	yellow	204	130:8	RPI Output / Plasma Unit Input
15	Start (-)	34	Start (+)	green	200	130:2	RPI Output / Plasma Unit Input

16		35					
17		36					
18		37					
19							

RPI H2			
Pin	**Description**	**Port:Bit**	**Common Uses**
1	CON-A	130:1	This is used to supply power to the HPR unit. By turning on this bit, a connection between CON-A and CON-B will be made. The D20 led (next to the H2 connector) will illuminate when on.
2	No connection		
3	CON-B		

LPI

LPI H1			
Pin	**Description**	**Port:Bit**	**Common Uses**
1	Estop Return		Extra / Internal Estop Switch
2	Estop Int Same as HM-1 Pin 6		

LPI H2			
Pin	**Description**	**Port:Bit**	**Common Uses**
1	+24 VDC		
2	Ground		
3	Estop Contactor Same as HM-1 Pin 13		
4	Ground		
5	Relay 2 N.O. Same as HM-1 Pin 8	101:8	Same as M2545 Relay #4 Normally Open
6	Relay 2 Common Same as HM-1 Pin 15		Same as M2545 Relay #4 Common
7	Relay 1 N.O. Same as HM-1 Pin 7	101:4	Same as M2545 Relay #3 Normally Open
8	Relay 1 Common Same as HM-1 Pin 14		Same as M2545 Relay #3 Common

LPI H3			
Pin	**Description**	**Port:Bit**	**Common Uses**
1	+24 VDC		
2	Ground		
3	Modbus (+)		
4	Modbus (-)		
5	Zero Speed Same as HM-1 Pin 9	109:256	Same as M2545 Input #9 Arc Transfer / Zero Speed (Yellow LED)
6	Tool Fault Same as HM-1 Pin 1	109:128	Same as M2545 Input #8 Start Pause / Tool Fault (Yellow LED)

LPI HM-1 Aux I/O (DB15 male) (Connects directly to M2545)			
Pin	**Description**	**Port:Bit**	**Common Uses**
1	Input 8 (PNP) Start Pause / Tool_Fault	109:128	Inverter Fault (enabled by parameter 27) Waterjet Abrasive Low? (DCN 375)
2	+24 VDC		
3, 5	Ground		
4	Modbus (-) Line		
6	Estop Input – Internal	111:1024	
7	Relay #3 (Common) LPI Relay_1_Common	101:4 Max 2A @30Vdc	Spindle Enable (DCN 167) Waterjet Abrasive On/Off (DCN 218)
8	Relay #4 (Common) Relay_2_Common	101:8 Max 2A @30Vdc	Caution (DCN 169) Waterjet Intensifier (DCN 217)

LPI HM-1 Aux I/O (DB15 male) (Connects directly to M2545)			
Pin	**Description**	**Port:Bit**	**Common Uses**
9	Input 9 (PNP) Zero_Speed	109:256	Pause Input (added v1.19) Inverter Fault #2 (enabled by parameter 27)
10	reserved		
11	Modbus (+) Line		
12	Analog Input		
13	Estop Contactor Same as H2 Pin 3	103:1	
14	Relay #3 (Normally Open) Relay_1_N.O.	101:4 Max 2A @30Vdc	
15	Relay #4 (Normally Open) Relay_2_N.O.		

Modules

AntiZ_DustCollector.uc (INI_ANTIZ_DUSTCOLLECTOR)

Description

Used for Dust Collectors that have motors instead of air cylinder. Only 1 Z axis is allowed, the 2nd Z is used for the dust collector.

Requirements

Firmware version 4.50n or later
Router inits v8.19.27 or later
The Dust collector is Connected to Drive Z2 and uses logical axis 5. Only 1 Z axis can be used. This means parameter 65 should be set to 1 only.
KDM20g is required. Will not work on KDM20 keypad.

Parameters

Parameter	Type	Description	Default Value
12	float	length of Dust Collector stroke	3.0
824	float	Dust Collectors calibrated tool length	0.0
1122	float	Material Thickness.	0.0
1123	int	Tool number that was used to calibrate the dust collector.	-1
1428	float	Dust Collector Resolution	10000.00

DCN

7	Mapped to macro 'dust_collector_open_dcn. This macro checks to see if the dust collector is open. It does this by looking at the position of the dust collector and if the position is < 0.5 inches, it assumes the dust collector is open.

15	Mapped to macro 'dust_collector_dcn. This macro is used to move the motor to open the dust collector.

Menus

Dust Collector	Added under the ATC Menus
Matl. Thickness	Used to specify the material thickness. This value should be set to 0.0 if setting surface on top of the material. If setting surface on the bottom of the material, this value should be the thickness of the material.
Calibrate DC	Used to calibrate the Dust Collector. The calibration means you set the dust collector to the depth you want on the tool. You don't have to move it down to surface or anything like that. Just jog the Dust Collector down relative to the tool and press Enter.
Home DC	Used to Home the Dust collector. The dust collector will automatically home when the machine is homed. This is used to home the DC by itself without homing the whole machine.
Jog DC	Used to Jog the DC.
Dust Collector DN/UP	Used to test the dust collector

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atcb_misctool.uc (INI_ATCB_MISCTOOL)

Description

Used to map the Misc Tool slider and up sensor to an ATCB. The Miscellaneous tool #97 is built into the init files. You can configure whether it is mounted on a slider and use an up sensor using parameter 1111 but the DCN's are not mapped to anything by default. Use this module to map the DCNs to an ATCB.
This mapping will conflict with the atcb_multivision.uc (INI_ATCB_MULTIVISION) mapping. In other words, both modules map to the same locations on the ATCB. If both the MultiVision Slider and the Misc Tool Slider are the same then both modules would be needed.

Requirements

The machine is a Router Rotary ATC machine.

Parameters

Parameter	Type	Description	Default Value
1111	int	Misc Tool Configuration (Tool #97) 100 = On Slider but no up sensor 101 = On Slider and has up sensor 102 = Not on Slider +256 = X only movement +512 = Y only movement	0

DCN

DCN	Description	Mapped
358	Misc Tool #97 Slider.	ATCB Address 20 Sol Out 8 - (HSOL Pin 15) Port:Bit 10:128
359	Misc Tool #97 Up Sensor?	ATCB Address 20 Input L6 - (HIG2 Pin 2) Port:Bit 20:32

Menus

none

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atcb_multivision.uc (INI_ATCB_MULTIVISION)

Description

Used to map the MultiVision slider and up sensor to an ATCB. You can configure whether it is mounted on a slider and uses an up sensor using parameter 179 but the DCN's are not mapped to anything by default. Use this module to map the DCNs to an ATCB. This mapping will conflict with the atcb_misctool .uc (INI_ATCB_MISCTOOL) mapping. In other words, both modules map to the

same location on the ATCB. If both the MultiVision Slider and the Misc Tool Slider are the same then both modules would be needed.

Requirements

The machine is a Router Rotary ATC machine.

Parameters

Parameter	Type	Description	Default Value
179	int	MultiVision Tool 99 Device Control 100 = On Z1, On Slider but NO up sensor 101 = On Z1, On Slider and up sensor 102 = On Z1, Not on Slider (r8.02.18) 103 = Not on Z axis (manual) 104 = No Camera, Use Laser Pointer 201 = On Z2, On Slider and up sensor. 202 = On Z2, not on Slider 302 = On Z3, not on Slider If not on slider, set to 102 and do not install rio_multivision or atcb_multivision module	0

DCN

DCN	Description	Mapped
179	MultiVision Slider up/down	ATCB Address 20 Sol Out 8 - (HSOL Pin 15) Port:Bit 10:128
178	MultiVision Slider up sensor.	ATCB Address 20 Input L6 - (HIG2 Pin 2) Port:Bit 20:32

Menus

none

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bevel_cut.uc (INI_BEVEL_CUT)

Description

Used for 5 axes Plasma systems that have the Bevel Head attachment.

Requirements

Firmware version 4.49p or later.
MC Base Plasma Inits v4.02.139 or later
5-Axis Feature Key
XMI Setting Machine Properties AXIS_TYPE=XYZBC

The Theta axis is connected to Drive 6
The Phi axis is connected to Drive 7

Parameters

Parameter	Type	Description	Default Value
540	float	Theta Axis Min Velocity	0.005
541	float	Theta Axis Max Velocity	1.000
542	float	Theta Axis Acceleration	5.000
543	float	Theta Axis Vertex Acceleration	5.000
545	float	Theta Axis Max Jog Velocity	0.200
546	float	Theta Axis Jog Acceleration	5.000

Parameter	Type	Description	Default Value
547	float	Theta Axis Min Jog Velocity	0.005
550	float	Phi Axis Min Velocity	0.005
551	float	Phi Axis Max Velocity	1.000
552	float	Phi Axis Acceleration	5.000
553	float	Phi Axis Vertex Acceleration	5.000
555	float	Phi Axis Max Jog Velocity	0.200
556	float	Phi Axis Jog Acceleration	5.000
557	float	Phi Axis Min Jog Velocity	0.005
1325	float	Theta Axis Resolution	80000.00
1326	float	Phi Axis Resolution	80000.00
1327	float	Theta Axis Limit Offset. This offset is the offset from the home position to where the bevel head is perpendicular to the table surface. Set using menu item ***"Set Bevel Offsets"*** under the ***"Bevel Head"*** main menu item. Both Theta and Phi offsets are set at the same time.	-0.1
1328	float	Phi Axis Limit Offset. This offset is the offset from the home position to where the bevel head is perpendicular to the table surface. Set using menu item ***"Set Bevel Offsets"*** under the ***"Bevel Head"*** main menu item. Both Theta and Phi offsets are set at the same time.	-0.1
1329	float	Bevel Head Tool Length. This the length of the tool in the bevel head. Measured from the center of rotation to the tip of the tool. Value is set using menu item "***Set Tool Length***" under the "***Bevel Head"*** main menu item.	8.9

Parameter	Type	Description	Default Value
1330	float	Theta axis min travel. This value is in Rotations. Amount the theta axis can move in the negative direction. Value is set using menu item ***"Set Bevel Min Travel"*** under the ***"Service"*** menu.	-0.125
1331	float	Theta axis max travel. This value is in Rotations. Amount the theta axis can move in the positive direction. Value is set using menu item ***"Set Bevel Max Travel"*** under the ***"Service"*** menu.	0.125
1332	float	Phi axis min travel. This value is in Rotations. Amount the phi axis can move in the negative direction. Value is set using menu item ***"Set Bevel Min Travel"*** under the ***"Service"*** menu.	-0.125
1333	float	Phi axis max travel. This value is in Rotations. Amount the phi axis can move in the positive direction. Value is set using menu item ***"Set Bevel Max Travel"*** under the ***"Service"*** menu.	0.125

DCN

none

Menus

Bevel Head	Main menu to access all the Bevel Head sub menu items
Jog Bevel Head	Used to jog the bevel head for both Theta and Phi motion.
Home Bevel Head	Homes the bevel head
Set Tool Length	Used to enter the tool length. The tool length is the from the center of rotation to the tip of the tool.
Set Bevel Offsets	Used to set the limit offsets

Straighten Bevel Used to move the bevel it's 0.0 location in both Theta and Phi
Turn Bevel Mode On/Off Used to enable or disable the bevel operation.
Set Bevel Min Travel Sets the min travel distance for both theta and phi. This menu is under the ***Service*** Menu.
Set Bevel Max Travel Sets the max travel distance for both theta and phi. This menu it under the ***Service*** Menu.

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*Bevel_Cut_WJ.uc (INI_BEVEL_CUT_WJ) *** WATER-JET 5-AXIS*

Description

Used for 5 axes Water-Jet systems that have the Bevel Head attachment.

Requirements

Firmware version 4.51c1 or later.
MC Base WJ3000 Inits v5.12.13 or later
5-Axis Feature Key
XMI Setting Machine Properties AXIS_TYPE=XYZBC

The Theta axis is connected to Drive 4
The Phi axis is connected to Drive 7

Theta Home is TH4:0Speed (pin 6) via DCN 51
Phi Home is TH4:Fault (pin 8) via DCN 52

Parameters

Parameter	Type	Description	Default Value
540	float	Theta Axis Min Velocity	0.005
541	float	Theta Axis Max Velocity	1.000
542	float	Theta Axis Acceleration	5.000
543	float	Theta Axis Vertex Acceleration	5.000
545	float	Theta Axis Max Jog Velocity	0.200
546	float	Theta Axis Jog Acceleration	5.000
547	float	Theta Axis Min Jog Velocity	0.005
550	float	Phi Axis Min Velocity	0.005
551	float	Phi Axis Max Velocity	1.000
552	float	Phi Axis Acceleration	5.000
553	float	Phi Axis Vertex Acceleration	5.000
555	float	Phi Axis Max Jog Velocity	0.200
556	float	Phi Axis Jog Acceleration	5.000
557	float	Phi Axis Min Jog Velocity	0.005
1325	float	Theta Axis Resolution	80000.00
1326	float	Phi Axis Resolution	80000.00

Parameter	Type	Description	Default Value
1327	float	Theta Axis Limit Offset. This offset is the offset from the home position to where the bevel head is perpendicular to the table surface. Set using menu item ***"Set Bevel Offsets"*** under the ***"Bevel Head"*** main menu item. Both Theta and Phi offsets are set at the same time.	-0.1
1328	float	Phi Axis Limit Offset. This offset is the offset from the home position to where the bevel head is perpendicular to the table surface. Set using menu item ***"Set Bevel Offsets"*** under the ***"Bevel Head"*** main menu item. Both Theta and Phi offsets are set at the same time.	-0.1
1329	float	Bevel Head Tool Length. The 45deg WJ head should not need any TL cqn.	0
1330	float	Theta axis min travel. This value is in Rotations. Amount the theta axis can move in the negative direction. Value is set using menu item ***"Set Bevel Min Travel"*** under the ***"Service"*** menu.	-1.1
1331	float	Theta axis max travel. This value is in Rotations. Amount the theta axis can move in the positive direction. Value is set using menu item ***"Set Bevel Max Travel"*** under the ***"Service"*** menu.	1.1
1332	float	Phi axis min travel. This value is in Rotations. Amount the phi axis can move in the negative direction. Value is set using menu item ***"Set Bevel Min Travel"*** under the ***"Service"*** menu.	-0.13

Parameter	Type	Description	Default Value
1333	float	Phi axis max travel. This value is in Rotations. Amount the phi axis can move in the positive direction. Value is set using menu item ***"Set Bevel Max Travel"*** under the ***"Service"*** menu.	0.13

DCN

51 Theta Homing

52 Phi Homing

Conveyor.uc (INI_CONVEYOR)

Description

Used for adding the conveyor option to Digital Express and Graph X machines.

Requirements

Suite 4 v4.6.106 or later.

Parameters

Parameter	Type	Description	Default Value
1363	float	Conveyor Barcode Scan Feedrate	Param 507 setting

Parameter	Type	Description	Default Value
1364	float	Conveyor Barcode Max X Distance	Param 9 setting
1365	float	Barcode X Offset Location. Set using menu item.	0.0
1366	float	Barcode Y Offset Location. Set using menu item.	0.0
1367	float	Barcode Z Offset Location.	0.0
1368	float	Barcode X Position (Currently NOT used)	20.0
1369	float	Barcode X Auto Scan Distance At the end of the job, the barcode for the next part is scanned. If it does not see the barcode move along the +X direction looking fo rhte barcode up to this distance. Set by menu item.	2.0
1370	float	Conveyor Split Contour overlap amount	0.0
1608	float	Conveyor Pickup Location	Param 9 setting
1610	float	Conveyor Release Location	20.0
1611	float	Conveyor velocity	2.0
1614	int	Conveyor Clamp Delay in milliseconds	1000
1616	float	Size of Panel	Param 9 setting
1618	float	Maximum pickup location user can specify	Param 9 setting
1622	int	Auto load/unload options	0
1625	int	Barcode Option	0
1626	int	Conveyor Accel Rate, slow, medium, fast	2 - fast

Parameter	Type	Description	Default Value
1627	float	Conveyor slow accel percent	0.25
1628	float	Conveyor medium accel percent	0.50
1629	float	Conveyor fast accel percent	0.90

DCN

DCN	Description	Mapped
171	Alignment Pins. Mapped for vacuum use. RIO Slave #24 first 4 outputs. This DCN mapping is removed if Barcode At Start of Job (parameter 1625) is set.	RIO Address 24 NPN output 1-4 - (HOUT2 Pins 1, 3 , 5, 7) Port:Bit 10:15
308	Material Clamps.	M2621 / M3521 PNP output 6 - (HEXT Pin 26) Port:Bit 101:32
309	Conveyor Clamps.	M2621 / M3521 PNP output 5 - (HEXT Pin 25) Port:Bit 101:16
323	Vacuum Relief	RIO Address 24 NPN output 1 - (HOUT2 Pin 9) Port:Bit 10:16
324	2nd set of Alignment Pins. For the conveyor, they don't want the vacuum to be turned off when just moving to cut the parts. This would be for the Barocde Jobs only. So, to fix this, map the normal alignment pins (DCN 171) to NULL and use the Material Handling Pod Vacuum for this. This way we can have more control over the operation of the vacuum. Mapped to RIO Slave #24 first 4 outputs.	RIO Address 24 NPN output 1-5 - (HOUT2 Pins 1, 3 , 5, 7, HOUT3 Pin 1) Port:Bit 10:31

DCN	Description	Mapped
325	Conveyor Roll Brake. Mapped to RIO Slave #24 Output #6. This output works in conjunction with the material clamps (DCN 308).	RIO Address 24 NPN output 6 - (HOUT3 Pin 1) Port:Bit 10:32

Menus

Job Repeat
Load/Unload Options
Overlap
X Pickup
X Dropoff
ClampDly
Index feed
Index Accel
Barcode Option
Test Cycle
Test I/O

M2621_Drill.uc (INI_M2621_DRILL)

Description

Used for a machine that does not have a spindle but has a Stud Welder mounted to the Z plate. First installed on machine S/N 9335

Requirements

No special requirements

Parameters

Parameter	Type	Description	Default Value
209	float	Drill Height	---

DCN

DCN	Description	Mapped
113	Fire Drill.	M2621 / M3521 PNP output 3 - (HEXT Pin 23) Port:Bit 101:4
114	Drill Up Sensor.	M2621 / M3521 PNP input 8 - (HEXT Pin 8) Port:Bit 109:128
115	Drill Enable.	M2621 / M3521 PNP output 7 - (HINT Pin 12) Port:Bit 101:64

Menus

DrillHght Utility menu to set the drill height. Jog Z to the desired drill height and press Enter. The drill height value is saved in location 209 and is referenced from Z=0.

mh_atcb_tc.uc (INI_MH_ATCB_TC)

Description

Adds ATCB Rotary Tool Changer support. Can configure and use up to 2 spindles.
Other tasks include:
- Turns off spindle cooling 10 minutes after the end of job.
- Monitors the spindle spinning sensor to determined if spindle has stopped.
- Read the air pressure sensor and spindle overtemp sensor ever ½ second

Requirements

V21 or above ATCB firmware to support Spindle Spin Sensors on input 12.
ATCB #1 (supports Spindle #1) Modbus address set to 20
ATCB #2 (supports Spindle #2) Modbus address set to 21

Useful Commands

rmd_stat	Displays the status of the ATCB.
find_rotor_home	Homes the Rotary Tool Changer
<loc> gsrw	Stands for Go Spin Roulette Wheel. This will move the rotary tool changer to the slot specified. Ex: 1 gsrw
moff_rmd	Disables the ATCB motor drive
mon_rmd	Enables the ATCB motor drive

Parameters

Parameter	Type	Description	Default Value
77	float	ATC Rotor Resolution	-32000.0
78	float	ATC Rotor Limit offset	0.0
79	float	2nd ATC Rotor Limit offset	0.0

Parameter	Type	Description	Default Value
140	float	ATC Rotor min velocity	No default
141	Float	ATC Rotor max velocity	No default
142	Float	ATC Rotor acceleration	No default
176	int	Spindle Ready input. Also used to configure spindle spin sensor.	0
210	Int	Dual ATC	0
222	int	Torque Monitoring. If torque monitoring is enabled, DCN 25 and 26 are mapped.	0
399	float	ATCB Motor Drive Current Motor Drive current for ATCB. Default to 7.0 amps. Range is 1.0 to 7.0	7.0
618	int	Spindle over temperature.	1

DCN

DCN	Description	Mapped
1	Spindle #1 Chuck Open sensor	ATCB Address 20 Input L1 - (HIG1 Pin 2) Port:Bit 20:1
2	Spindle #1 Tool Loaded sensor	ATCB Address 20 Input L4 - (HIG1 Pin 5) Port:Bit 20:2
3	Spindle #1 Chuck closed sensor	ATCB Address 20 Input L3 - (HIG1 Pin 8) Port:Bit 20:4
4	Spindle #1 Low Air Pressure sensor	Macro chk_air. The chk_air macro reads the following input: ATCB Address 20 Input L4 - (HIG1 Pin 11) Port:Bit 20:8
5	Spindle #1 Limit input sensor	ATCB Address 20 Input L5 - (HIG2 Pin 1) Port:Bit 20:16
7	Spindle #1 Dust Collector Open sensor	ATCB Address 20 Input L7 - (HIG2 Pin 3) Port:Bit 20:64
8	Spindle #1 Overtemp sensor	ATCB Address 20 Input L8 - (HIG2 Pin 4) Port:Bit 20:128
9	Spindle #1 Extended sensor	ATCB Address 20 Input L9 - (HIG2 Pin 5) Port:Bit 21:1 Unmapped if parameter 176 has bit 48 set.

DCN	Description	Mapped
10	Spindle #1 Retracted sensor	ATCB Address 20 Input L10 - (HIG2 Pin 6) Port:Bit 21:2 Unmapped if parameter 176 has bit 48 set.
11	Special aggregate tool slider extended sensor	ATCB Address 20 Input L11 - (HIG2 Pin 7) Port:Bit 21:4
12	Special aggregate tool slider retracted sensor	ATCB Address 20 Input L12 - (HIG2 Pin 8) Port:Bit 21:8
13	Spindle #1 open chuck	ATCB Address 20 Sol Out 1 - (HSOL Pin 1) Port:Bit 10:1
14	Spindle #1 purge air	ATCB Address 20 Sol Out 2 - (HSOL Pin 3) Port:Bit 10:2
15	Spindle #1 Dust Collector	ATCB Address 20 Sol Out 3 - (HSOL Pin 5) Port:Bit 10:4
16	Spindle #1 Cooling	ATCB Address 20 Sol Out 4 - (HSOL Pin 7) Port:Bit 10:8
17	Spindle #1 Mister	ATCB Address 20 Sol Out 5 - (HSOL Pin 9) Port:Bit 10:16
18	Spindle #1 Air Blast (cone blowoff)	ATCB Address 20 Sol Out 6 - (HSOL Pin 11) Port:Bit 10:32
19	Spindle #1 Extend/Retract TC	ATCB Address 20 Sol Out 7 - (HSOL Pin 13) Port:Bit 10:64
21	Spindle #1 Close Chuck	ATCB Address 20 Sol Out 1b - (HSOL Pin 12) Port:Bit 11:1
25	ATCB #1 Heart Beat	ATCB Address 20 atcb parameter 98 Set to the slave address to be used as a heartbeat
26	ATCB #1 Heart Beat Devices on Port 10	ATCB Address 20 atcb parameter 16 Bitmask of the devices on port 10 to turn off.
27	ATCB #1 Heart Beat Devices on Port 11	ATCB Address 20 atcb parameter 17 Bitmask of the devices on port 11 to turn off.
28	Spindle #1 Cooling Time	ATCB Address 20 atcb parameter 97 Set to the number of seconds after turning off output 4 that it actually turns off. Uses as a timer to leave output 4 on for a duration of time after job ends.
29	Spindle #1 Chuck Closed monitor	Macro chk_chuck_closed. The chk_chuck_closed macro reads the following input: ATCB Address 20 Input L3 - (HIG1 Pin 8) Port:Bit 20:4
30	ATCB #1 Motor on/off	ATCB Address 20 Port:Bit 70:3 Is used in the module to turn the ATCB motor drive on/off.

DCN	Description	Mapped
31	ATCB #1 Limit input High mask	ATCB Address 20 atcb parameter 4 Used to set the pause mask high for homing.
32	ATCB #1 Limit input Low mask	ATCB Address 20 atcb parameter 5 Used to set the pause mask low for homing.
40	ATCB #1 All Limits	ATCB Address 20 Port:Bit 20:255 Used to read atcb inputs 1-8 in one read.
ATCB #2 Address 21 (Following added if DUAL ATC is set using parameter 210)		
41	Spindle #2 Chuck Open sensor	ATCB Address 21 Input L1 - (HIG1 Pin 2) Port:Bit 20:1
42	Spindle #2 Tool Loaded sensor	ATCB Address 21 Input L4 - (HIG1 Pin 5) Port:Bit 20:2
43	Spindle #2 Chuck closed sensor	ATCB Address 21 Input L3 - (HIG1 Pin 8) Port:Bit 20:4
45	Spindle #2 Limit input sensor	ATCB Address 21 Input L5 - (HIG2 Pin 1) Port:Bit 20:16
47	Spindle #2 Dust Collector Open sensor	ATCB Address 21 Input L7 - (HIG2 Pin 3) Port:Bit 20:64
48	Spindle #2 Overtemp sensor	ATCB Address 21 Input L8 - (HIG2 Pin 4) Port:Bit 20:128
49	Spindle #2 Extended sensor	ATCB Address 21 Input L9 - (HIG2 Pin 5) Port:Bit 21:1
50	Spindle #2 Retracted sensor	ATCB Address 21 Input L10 - (HIG2 Pin 6) Port:Bit 21:2
53	Spindle #2 open chuck	ATCB Address 21 Sol Out 1 - (HSOL Pin 1) Port:Bit 10:1
54	Spindle #2 purge air	ATCB Address 21 Sol Out 2 - (HSOL Pin 3) Port:Bit 10:2
55	Spindle #2 Dust Collector	ATCB Address 21 Sol Out 3 - (HSOL Pin 5) Port:Bit 10:4
56	Spindle #2 Cooling	ATCB Address 21 Sol Out 4 - (HSOL Pin 7) Port:Bit 10:8
57	Spindle #2 Mister	ATCB Address 21 Sol Out 5 - (HSOL Pin 9) Port:Bit 10:16
58	Spindle #2 Air Blast (cone blowoff)	ATCB Address 21 Sol Out 6 - (HSOL Pin 11) Port:Bit 10:32
59	Spindle #2 Extend/Retract TC	ATCB Address 21 Sol Out 7 - (HSOL Pin 13) Port:Bit 10:64
61	Spindle #2 Close Chuck	ATCB Address 21 Sol Out 1b - (HSOL Pin 12) Port:Bit 11:1
65	ATCB #2 Heart Beat	ATCB Address 21 atcb parameter 98 Set to the slave address to be used as a heartbeat

DCN	Description	Mapped
66	ATCB #2 Heart Beat Devices on Port 10	ATCB Address 21 atcb parameter 16 Bitmask of the devices on port 10 to turn off.
67	ATCB #2 Heart Beat Devices on Port 11	ATCB Address 21 atcb parameter 17 Bitmask of the devices on port 11 to turn off.
68	Spindle #2 Cooling Time	ATCB Address 21 atcb parameter 97 Set to the number of seconds after turning off output 4 that it actually turns off. Uses as a timer to leave output 4 on for a duration of time after job ends.
70	ATCB #2 Motor on/off	ATCB Address 21 Port:Bit 70:3 Is used in the module to turn the ATCB motor drive on/off.
71	ATCB #2 Limit input High mask	ATCB Address 21 atcb parameter 4 Used to set the pause mask high for homing.
72	ATCB #2 Limit input Low mask	ATCB Address 21 atcb parameter 5 Used to set the pause mask low for homing.
159	Cycle Start #2	ATCB Address 20 Input L10 - (HIG2 Pin 6) Port:Bit 21:2 Mapped if parameter 176 bit 5 (value 16) or bit 6 (value 32) is set.
164	Cycle Start #1	ATCB Address 20 Input L9 - (HIG2 Pin 5) Port:Bit 21:1 Mapped if parameter 176 bit 5 (value 16) or bit 6 (value 32) is set.
248	Spindle #1 Spinning Sensor	ATCB Address 20 Input L12 - (HIG2 Pin 8) Port:Bit 101:1 Internally, the ATCB monitors input L12 for changes. Read 101:1 to determine if this input is changing for spindle spin sensor. See parameter 176.
249	Spindle #2 Spinning Sensor	ATCB Address 21 Input L12 - (HIG2 Pin 8) Port:Bit 101:1 Internally, the ATCB monitors input L12 for changes. Read 101:1 to determine if this input is changing for spindle spin sensor. See parameter 176.

Menus

none

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mh_rio_linear_tc.uc (INI_MH_RIO_LINEAR_TC)

Description

Adds Linear Tool Changer support. Can configure and use up to 4 spindles.
Other tasks include:

- Turns off spindle cooling 10 minutes after the end of job.
- Monitors the spindle spinning sensor to determined if spindle has stopped.
- Read the air pressure sensor and spindle overtemp sensor ever ½ second

Requirements

V22 or above RIO firmware to support Spindle Spin Sensors on input Ain1.
RIO #1 (supports Spindle #1) Modbus address set to 20
RIO #2 (supports Spindle #2) Modbus address set to 21
RIO #3 (supports Spindle #3) Modbus address set to 22
RIO #4 (supports Spindle #4) Modbus address set to 23

Parameters

Parameter	Type	Description	Default Value
176	int	Spindle Ready input. Also used to configure spindle spinning sensor.	0
210	Int	Dual ATC	0
222	int	Torque Monitoring. If torque monitoring is enabled, DCN 25 and 26 are mapped.	0

Parameter	Type	Description	Default Value
618	int	Spindle over temperature.	1

DCN

DCN	Description	Mapped
1	Spindle #1 Chuck Open sensor	RIO Address 20 Input IN1 - (H1 Pin 2) Port:Bit 21:16
2	Spindle #1 Tool Loaded sensor	RIO Address 20 Input IN1 - (H1 Pin 4) Port:Bit 21:32
3	Spindle #1 Chuck closed sensor	RIO Address 20 Input IN1 - (H1 Pin 6) Port:Bit 21:64
4	Spindle #1 Low Air Pressure sensor	Macro chk_air. The chk_air macro reads the following input: RIO Address 20 Input IN1 - (H1 Pin 8) Port:Bit 21:128
5	Spindle #1 Limit input sensor	RIO Address 20 Input Ain1 - (H-Ang Pin 1) Port:Bit 20:1
7	Spindle #1 Dust Collector Open sensor	RIO Address 20 Input Ain3 - (H-Ang Pin 3) Port:Bit 20:4
8	Spindle #1 Overtemp sensor	RIO Address 20 Input Ain4 - (H-Ang Pin 4) Port:Bit 20:8
13	Spindle #1 open chuck	RIO Address 20 NPN Out 1 - (HOUT2 Pin 1) Port:Bit 10:1
14	Spindle #1 purge air	RIO Address 20 NPN Out 2 - (HOUT2 Pin 3) Port:Bit 10:2
15	Spindle #1 Dust Collector	RIO Address 20 NPN Out 3 - (HOUT2 Pin 5) Port:Bit 10:4
16	Spindle #1 Cooling	RIO Address 20 NPN Out 4 - (HOUT2 Pin 7) Port:Bit 10:8
17	Spindle #1 Mister	RIO Address 20 NPN Out 5 - (HOUT2 Pin 9) Port:Bit 10:16
18	Spindle #1 Air Blast (cone blowoff)	RIO Address 20 NPN Out 6 - (HOUT3 Pin 1) Port:Bit 10:32
21	Spindle #1 Close Chuck	RIO Address 20 NPN Out 9 - (HOUT3 Pin 7) Port:Bit 11:1
25	RIO #1 Heart Beat	RIO Address 20 rio parameter 98 Set to the slave address to be used as a heartbeat
26	RIO #1 Heart Beat Devices on Port 10	RIO Address 20 rio parameter 16 Bitmask of the devices on port 10 to turn off.

DCN	Description	Mapped
27	RIO #1 Heart Beat Devices on Port 11	RIO Address 20 rio parameter 17 Bitmask of the devices on port 11 to turn off.
28	Spindle #1 Cooling Time	RIO Address 20 rio parameter 97 Set to the number of seconds after turning off output 4 that it actually turns off. Uses as a timer to leave output 4 on for a duration of time after job ends.
29	Spindle #1 Chuck Closed monitor	Macro chk_chuck_closed. The chk_chuck_closed macro reads the following input: RIO Address 20 Input IN1 - (H1 Pin 6) Port:Bit 21:64
30	RIO #1 Motor on/off	RIO Address 20 Port:Bit 70:3
40	RIO #1 All Limits	RIO Address 20 Port:Bit 20:255 Used to read rio inputs 1-8 in one read.
RIO #2 Address 21 (Following added if DUAL ATC is set using parameter 210)		
41	Spindle #2 Chuck Open sensor	RIO Address 21 Input IN1 - (H1 Pin 2) Port:Bit 21:16
42	Spindle #2 Tool Loaded sensor	RIO Address 21 Input IN1 - (H1 Pin 4) Port:Bit 21:32
43	Spindle #2 Chuck closed sensor	RIO Address 21 Input IN1 - (H1 Pin 6) Port:Bit 21:64
47	Spindle #2 Dust Collector Open sensor	RIO Address 21 Input Ain3 - (H-Ang Pin 3) Port:Bit 20:4
53	Spindle #2 open chuck	RIO Address 21 NPN Out 1 - (HOUT2 Pin 1) Port:Bit 10:1
54	Spindle #2 purge air	RIO Address 21 NPN Out 2 - (HOUT2 Pin 3) Port:Bit 10:2
55	Spindle #2 Dust Collector	RIO Address 21 NPN Out 3 - (HOUT2 Pin 5) Port:Bit 10:4
56	Spindle #2 Cooling	RIO Address 21 NPN Out 4 - (HOUT2 Pin 7) Port:Bit 10:8
57	Spindle #2 Mister	RIO Address 21 NPN Out 5 - (HOUT2 Pin 9) Port:Bit 10:16
58	Spindle #2 Air Blast (cone blowoff)	RIO Address 21 NPN Out 6 - (HOUT3 Pin 1) Port:Bit 10:32
61	Spindle #2 Close Chuck	RIO Address 21 NPN Out 9 - (HOUT3 Pin 7) Port:Bit 11:1
65	RIO #2 Heart Beat	RIO Address 21 rio parameter 98 Set to the slave address to be used as a heartbeat

DCN	Description	Mapped
66	RIO #2 Heart Beat Devices on Port 10	RIO Address 21 rio parameter 16 Bitmask of the devices on port 10 to turn off.
67	RIO #2 Heart Beat Devices on Port 11	RIO Address 21 rio parameter 17 Bitmask of the devices on port 11 to turn off.
68	Spindle #2 Cooling Time	RIO Address 21 rio parameter 97 Set to the number of seconds after turning off output 4 that it actually turns off. Uses as a timer to leave output 4 on for a duration of time after job ends.
RIO #3 Address 22 (Used only in special MHLDR_4LTC.uc inits which supports 4 headed tool changer)		
81	Spindle #3 Chuck Open sensor	RIO Address 22 Input IN1 - (H1 Pin 2) Port:Bit 21:16
82	Spindle #3 Tool Loaded sensor	RIO Address 22 Input IN1 - (H1 Pin 4) Port:Bit 21:32
83	Spindle #3 Chuck closed sensor	RIO Address 22 Input IN1 - (H1 Pin 6) Port:Bit 21:64
87	Spindle #3 Dust Collector Open sensor	RIO Address 22 Input Ain3 - (H-Ang Pin 3) Port:Bit 20:4
93	Spindle #3 open chuck	RIO Address 22 NPN Out 1 - (HOUT2 Pin 1) Port:Bit 10:1
94	Spindle #3 purge air	RIO Address 22 NPN Out 2 - (HOUT2 Pin 3) Port:Bit 10:2
95	Spindle #3 Dust Collector	RIO Address 22 NPN Out 3 - (HOUT2 Pin 5) Port:Bit 10:4
96	Spindle #3 Cooling	RIO Address 22 NPN Out 4 - (HOUT2 Pin 7) Port:Bit 10:8
97	Spindle #3 Mister	RIO Address 22 NPN Out 5 - (HOUT2 Pin 9) Port:Bit 10:16
98	Spindle #3 Air Blast (cone blowoff)	RIO Address 22 NPN Out 6 - (HOUT3 Pin 1) Port:Bit 10:32
99	Spindle #3 Spinning Sensor	RIO Address 22 Input Ain1 - (H-Ang Pin 3) Port:Bit 101:1 Internally, the RIO monitors input Ain1 for changes. Read 101:1 to determine if this input is changing for spindle spin sensor. See parameter 176.
101	Spindle #3 Close Chuck	RIO Address 22 NPN Out 9 - (HOUT3 Pin 7) Port:Bit 11:1
105	RIO #3 Heart Beat	RIO Address 22 rio parameter 98 Set to the slave address to be used as a heartbeat

DCN	Description	Mapped
106	RIO #3 Heart Beat Devices on Port 10	RIO Address 22 rio parameter 16 Bitmask of the devices on port 10 to turn off.
107	RIO #3 Heart Beat Devices on Port 11	RIO Address 22 rio parameter 17 Bitmask of the devices on port 11 to turn off.
108	Spindle #3 Cooling Time	RIO Address 22 rio parameter 97 Set to the number of seconds after turning off output 4 that it actually turns off. Uses as a timer to leave output 4 on for a duration of time after job ends.
RIO #4 Address 23 (Used only in special MHLDR_4LTC.uc inits which supports 4 headed tool changer)		
121	Spindle #4 Chuck Open sensor	RIO Address 23 Input IN1 - (H1 Pin 2) Port:Bit 21:16
122	Spindle #4 Tool Loaded sensor	RIO Address 23 Input IN1 - (H1 Pin 4) Port:Bit 21:32
123	Spindle #4 Chuck closed sensor	RIO Address 23 Input IN1 - (H1 Pin 6) Port:Bit 21:64
127	Spindle #4 Dust Collector Open sensor	RIO Address 23 Input Ain3 - (H-Ang Pin 3) Port:Bit 20:4
133	Spindle #4 open chuck	RIO Address 23 NPN Out 1 - (HOUT2 Pin 1) Port:Bit 10:1
134	Spindle #4 purge air	RIO Address 23 NPN Out 2 - (HOUT2 Pin 3) Port:Bit 10:2
135	Spindle #4 Dust Collector	RIO Address 23 NPN Out 3 - (HOUT2 Pin 5) Port:Bit 10:4
136	Spindle #4 Cooling	RIO Address 23 NPN Out 4 - (HOUT2 Pin 7) Port:Bit 10:8
137	Spindle #4 Mister	RIO Address 23 NPN Out 5 - (HOUT2 Pin 9) Port:Bit 10:16
138	Spindle #4 Air Blast (cone blowoff)	RIO Address 23 NPN Out 6 - (HOUT3 Pin 1) Port:Bit 10:32
139	Spindle #4 Spinning Sensor	RIO Address 23 Input Ain1 - (H-Ang Pin 3) Port:Bit 101:1 Internally, the RIO monitors input Ain1 for changes. Read 101:1 to determine if this input is changing for spindle spin sensor. See parameter 176.
141	Spindle #4 Close Chuck	RIO Address 23 NPN Out 9 - (HOUT3 Pin 7) Port:Bit 11:1
145	RIO #4 Heart Beat	RIO Address 23 rio parameter 98 Set to the slave address to be used as a heartbeat

DCN	Description	Mapped
146	RIO #4 Heart Beat Devices on Port 10	RIO Address 23 rio parameter 16 Bitmask of the devices on port 10 to turn off.
147	RIO #4 Heart Beat Devices on Port 11	RIO Address 23 rio parameter 17 Bitmask of the devices on port 11 to turn off.
148	Spindle #4 Cooling Time	RIO Address 23 rio parameter 97 Set to the number of seconds after turning off output 4 that it actually turns off. Uses as a timer to leave output 4 on for a duration of time after job ends.
248	Spindle #1 Spinning Sensor	RIO Address 20 Input Ain1 - (H-Ang Pin 3) Port:Bit 101:1 Internally, the RIO monitors input Ain1 for changes. Read 101:1 to determine if this input is changing for spindle spin sensor. See parameter 176.
249	Spindle #2 Spinning Sensor	RIO Address 21 Input Ain1 - (H-Ang Pin 3) Port:Bit 101:1 Internally, the RIO monitors input Ain1 for changes. Read 101:1 to determine if this input is changing for spindle spin sensor. See parameter 176.

Menus

none

TappingSpindle.uc (INI_TAPPINGSPINDLE)

Description

Provides tapping support for Routers and Plasma/Routers

Requirements

Firmware version 4.51e3 or later for dual tapping support.

Router inits v8.21.08 or later
The Spindle should be connected to Drive 7. For dual tapping, the 2nd spindle should be connected to Drive 8.

Useful Commands

tapit	Places inverter into tapping mode. Not applicable on MAX40 Spindles.
drillit	Places inverter into drill mode.
ton	Turn on tapping mode.
toff	Turns off tapping mode.
tt	Turns spindle at specified velocity. Example: start_motion 1.0 tt (turn spindle at 1 rev per second)
dd	Turn specified distance, dwell then turn back. Simulates tapping a hole. Example 10.0 1000 dd

Parameters

Parameter	Type	Description	Default Value
53	int	Pause Lift Disable. Pause lifting is disabled during the tap cycle. After tapping, parameter 53 resets the user defined pause lift.	0
123	int	Floating nose assembly. If set to 1, this will lower the nose assembly (DCN 15) before each tap cycle.	0
297	int	Tapper Foot up delay. Also used to delay when lowering the floating nose assembly.	No default, must be set
650-699	int	Dust collector settings. Used to disable using the floating nose assembly. This is used because the floating nose assembly used DCN 15.	0
300, 302	int	Spindle Type. If type is less than 1020 then spindle encoder value is 320. If type is 1020 or 1021 then spindle encoder value is 1024 if type is 1022 or 1023 then spindle encoder value is 2048 if type is 1024 through 1031 then spindle encoder value is 8192.	0
1428	float	Dust Collector Resolution	10000.00

DCN

15	Uses DCN 15 to raise/lower the floating nose assembly
17	Uses DCN 17 to turn on/off the mister.
34	Maps DCN 34 for Tap Control Output
152	Uses DCN 152 to lock the Y brake when tapping.

Menus

TapRecov After a fault with the tap in the material, this menu will allow you to open the chuck and jog up to release the spindle from the material.

Tap Encoder Test Service menu used to verify the functionality of the encoder.

Teknic.uc (INI_TEKNIC)

Description

Provide Teknic Motor Drive support. The Teknic module is used to communicate serially to the Teknic drives. It should not be used on RPD-24 systems because there is no serial connection to the drives.

It provides the following:

1) Program the drives when one is replaced in the field.
2) Read the blink code from the drives when a motor drive fault is detected.
3) Enable / Disable the 'ostrich' bit for plasma systems.
4) Run Torque tests and capture data to detect binding problems.

Requirements

Useful Commands

teknic_faults	Reads the fault history from all drives.
drive_checkout	Initializes communication with the Teknic drives.
lps_all	Read all the Teknic drive parameters and displays them.

Data Files

The Teknic module uses file location 12 to store and read the Teknic drive parameters.

Parameters

Parameter	Type	Description	Default Value
1397	int	If set, after the controller is first initialized, it will perform additional configuration. Bit Oriented 1 = Load Teknic Drives (teknic.uc loads the drive params then clears the bit)	0

DCN

none

Menus (under the Service menu)

Drive Status	Queries the Teknic drives an provides a status.
Torque Test	Run a motion test on a axis and logs the RMS value. Specify axis and distance to move. Allows you to capture the data that can be view using Job Editor. This option requires Job Name Server to be running and the Digitize folder to be specified.
Signal Check	Used to turn on/off the 'ostrich' bit on a Teknic Drive.
Load Drive Params	Sends the Teknic drive parameters stored in location 12 to the Teknic drives.
Save Drive Params	Reads the current parameters from the Teknic drives and creates a file in location 12 on the controller.

Tool Number Assignments

Tool #	Router (STD)	Router (ATC)	Plasma	Knife	Water-Jet	Laser	Notes
1	Tool #1 (head 1)	Tool #1	Plasma Head 1	Knife	WJ #1	Vector Tool #1	For Lasers (Tools 1-8 are Vector Tools, Tool 16 is Raster tool).
2	Tool #2 (head 2)	Tool #2	Oxy (or PH #2)	Creasing Wheel		Vector Tool #2	
3	Tool #3 (head 3)	Tool #3	Scriber	Pen/Aux		Vector Tool #3	
4			Pen 1				
5			Pen 2				
9+						> 8 will be converted to tool 16	

Tool #	Router (STD)	Router (ATC)	Plasma	Knife	Water-Jet	Laser	Notes
1-50		Regular Tools (50 max Rotary) (25 max Linear)					For Routers, the first set of tools through ATC_MAX_TOOLS is either rotary or linear tool changer. The tools greater than ATC_MAX_TOOLS are manual tool changes.
11,12	Drills	Drills	Drills				If NUM_DRILLS is defined (parameter 175) and MAX ATC TOOLS < 10, it will use as drills, otherwise it will be a normal tool.
16						Raster	Used for engraving bitmaps.
21	N/A	Aux Tool 21					Enabled by setting parameter 177. If NUM_AUX_HEADS is defined (parameter 177) it will use as Auxiliary head on Z2. Otherwise it will use a regular tool.
22	N/A	Aux Tool 22					Enabled by setting parameter 177.
31-40	Knife Tools Assembly #1	Knife Tools Assembly #1	Knife Tools Assembly #1				If Knife Cartridge Module installed, Tools 31-40 are Cartridges 31-40 in Holder #1 mh_knife_module does not use these tools, it uses tools 61, 62 & 63. If any tool is configured as OSC, then all tools are configured as OSC. (Exception, starting in v8.19.33, If 31 is configured as OSC, then 32 will be OSC/DRAG meaning the OSC will be used as a drag knife. For T=32, OSC-Stroke will not be used and the oscillator will not turn on.)

Tool #	Router (STD)	Router (ATC)	Plasma	Knife	Water-Jet	Laser	Notes
41-50	Knife Tools Assembly #2	Knife Tools Assembly #2	Knife Tools Assembly #2				If Knife Cartridge Module installed, Tools 41-50 are Cartridges 41-50 in Holder #2 (If 3 headed system, then Knife 2 uses Tools 41-45 and Knife 3 uses Tools 46-50) If any tool is configured as OSC, then all tools are configured as OSC. (Exception, starting in v8.19.33, If 41 is configured as OSC, then 42 will be OSC/DRAG meaning the OSC will be used as a drag knife. For T=42, OSC-Stroke will not be used and the oscillator will not turn on.)
46-50	Knife Tools Assembly #3	Knife Tools Assembly #3	Knife Tools Assembly #3				If Knife Cartridge Module installed and Number of Knives (parameter 379) is set to 3 then Tools 46-50 are Cartridges 46-50.
51-60	N/A	Special Tools					
61-64	Knife Tools	Knife Tools					Used for mh_knife_module tools. These are still used internally for knife tools in the Router Inits, do not re-use.
66	Drill #1	Drill #1	Drill #1		Drill #1		Enabled by setting parameter 175.
67	Drill #2	Drill #2	Drill #2		Drill #2		Enabled by setting parameter 175.
68	Drill #3	Drill #3	Drill #3		Drill #3		Enabled by setting parameter 175.
69	Drill #4	Drill #4	Drill #4		Drill #4		
71			Plasma Head #1				
72			Oxy Head				
73			Scriber				
74			Pen #1				
75			Pen #2				
76			Plasma Head #2				
77			Plasma Head #3				
78			Plasma Head #4				

Tool #	Router (STD)	Router (ATC)	Plasma	Knife	Water-Jet	Laser	Notes
71-80	Plasma Tools	Plasma Tools					
95	MultiVision	MultiVision	MultiVision	MultiVision	MultiVision	MultiVision	Rail Fiducial Tool. Normal fiducials are Tool 99, Rail Fiducials are Tool 95. The XMI setting RAIL_FIDUCIAL_TOOL = 95 also has to be set. Requires MultiVision4.uc module
96	N/A	Misc Tool #2					Misc tool is used to lower slider, offset in X and Y. Uses DCNs 351&352 (not mapped by default). See parameter 1346. Added to ATC Router inits v8.18.30. Not implemented for STD machines.
97	N/A	Misc Tool #1					Misc tool is used to lower slider, offset in X and Y. Uses DCNs 358&359 (not mapped by default). See parameter 1111
98	Ink Jet	Ink Jet	Ink Jet	Ink Jet	Ink Jet		Requires inkjet.uc module
99	MultiVision	MultiVision	MultiVision	MultiVision	MultiVision	MultiVision	Tool number for fiducials. The XMI setting FIDUCIAL_TOOL = 99 also has to be set. Requires MultiVision4.uc module

Standard File Locations

Location	Description	Notes
-3	Init File	
0	Table Comp	
1	Self- Test	
2	Additional Init	mhatc.uc, mhstd.uc, or router_module.uc
3	Device Map File	This is the last file loaded. Use to override DCN mappings.
4	Language File	Obsolete, use 30-34.
5	Spindle Inverter Params	
6 through 9	Optional	
10	Material Library	
11	Factory Library	
12	Teknic Motor Drive	Loaded and Saved using Teknic Service menu. See parameter 1397.
13	2nd Material Library	
14	2nd Factor Library	
15	Service Module	no longer used
16 through 19	Optional	
20	Hardware Driver	The hardware drive file is based on the controller. HP4_Driver.uc module is used for HP4 controllers M2545_Driver.uc module is used for M2545 controllers. RPD24_Driver.uc module is used for M2524 controllers.
21	User Customer File	Reserved for Use Customization.
22 through 25	Z Mapped surfaces	Created and used by ZSurf_mod.

Location	Description	Notes
26 through 29	Optional	
30 through 34	Language	The default language file location is set using parameter 298.
35	Customer File	Very last file loaded for customer specific applications. Currently only available on Plasma machines (mc_base).
36	KDM Resource File	Used to update the KDM20g resources (i.e. pictures). Implemented in v8.18.29 digital express, the version of the resource file will be compared to the version already stored on the KDM20g and will only update if necessary. Note: This file was in location 35 but it conflicted with the customer file so as of version 8.19.24, it was moved to location 36.
50 through 52	Table Comp temp files	Created by Move_it.uc and Move_it_jog.uc when creating the table compensation files.
55	Laser Calibration	
56	Abrasive Calibration	Waterjet Abrasive Feeder calibration data. Created when calibrating the abrasive feeder.
57	Tool Table	Digital Express settings per knife tool Knife Cartridge settings per knife tool See parameter 1124
58	Coil Line Configuration	Coil Line configuration file. Used by the CoilLine_MicroLogix.uc module.
60	Check Flash	Snapshot of parameters to determine which parameters changed. This is automatically created by the Genesis process.
61	Check Flash Ignore	What params to ignore when comparing.
100	Temporary file	Scratch file
201-220	Local DNC	

Messages

MSG #	Message	Description	Param	Module
0	English	Defines the type of language file.		
109	Hardware Pause Active...	Input #9, Pause. The Hardware Pause input is active when booting or trying to continue from Pause.	199	
111	Hardware Pause Active...	Input #11, Pause. Pause/Cancel go home.	199	
112	Low air for Ram-Z Z-Brake Active.	Input #12, Pause. Ram-Z Low air warning.	166	
114	Safety Hold Active.	Input #14, Pause. CE Safety	221	
115	24v Power Monitor Pause Active...	Input #15, Pause. pad out to characters.	199	
116	Hardware Pause Active...	Input #16, Pause. pad out to characters.	199	
589	Home DC			INI_ANTIZ_DUSTCOLLECTOR
590	Jog DC			INI_ANTIZ_DUSTCOLLECTOR
591	Matl. Thickness			INI_ANTIZ_DUSTCOLLECTOR
592	Dust Collector			INI_ANTIZ_DUSTCOLLECTOR
593	Up/Dn Test DC			INI_ANTIZ_DUSTCOLLECTOR
594				
595				
596				
597	Cal. Dust Collector	Menu Item for calibrating dust collector.		INI_ANTIZ_DUSTCOLLECTOR

MSG #	Message	Description	Param	Module
598	Jog DC to desired position using Spindle RPM keys.	Help message when calibrating dust collector		INI_ANTIZ_DUSTCOLLECTOR
599	Calibrate and Surface tool first.	AntiZ Dust Collector, Calibrate Dust Collector routine.		INI_ANTIZ_DUSTCOLLECTOR
600	Select Knife Tool	Knife Number		
601	Toe In Angle :	Knife Toe In Angle.		
602	Enter Toe In Angle	Knife Entering Toe In angle.		
603	Select Material...	Knife Select Material		
604	KnifeLib	KnifeLib menu item	1124	
605	[ADD MATERIAL]	Knife When Adding material.		
606	Toe Range-In :	Knife Toe Range In Angle		
607	Enter RangeIn Angle	Knife Entering Toe Range In Angle		
608	Toe Range-Out:	Knife Toe Range Out Angle		
609	Enter RangeOut Angle	Knife Entering Toe Range Out Angle		
610	Cut Depth :	Knife Cut Depth	375	
611	Toe Radius :	Knife Toe in Radius		
612	Enter Toe In Radius	Knife Toe in Radius		
613	KnifeEdgeComp:	Knife Toe in Blade Width		
614	Enter Knife Edge Compensation	Knife Blade Width		
616	Press 1 for Manual	Knife Cartridge, setting osc stroke.		
617	Press 2 for Auto	Knife Cartridge, setting osc stroke.		
618	ZDn Feedrate :	Knife feedrate for Z plunges.	363	
619	Set Knife Comp	Knife Comp menu		
620	1=Knife Osc on/off	Knife Osc Test menus.		
621	Rev. Knife Direction	Knife Reverse Knife Direction.		
622	ZUp Feedrate :	Knife feedrate for Z Lifts.		
623	Offset Knife by 180 degrees?	Knife after booting, offset by 180 degrees.	369	
624	Knife 1 Config:	Knife Configuration, OSC or Drag		
625	Knife 2 Config:	Knife Configuration, OSC or Drag		
626	Knife 3 Config:	Knife Configuration, OSC or Drag		
627	Set Knife Offsets	Knife Set Knife XY Offset		

MSG #	Message	Description	Param	Module
628	Jog Knife to offset,press ENTER	Knife Jog to Knife Offset, press Enter.		
629	Use Spin up/dn for K	Setting Knife offsets.		
630	Reverse	Knife Reverse blade 180		
631	KnifeMaxDepth:	Knife Max Depth: Obey/Ignore		
632	Obey	Selection for KnifeMaxDepth	370	
633	Ignore	Selection for KnifeMaxDepth	370	
634	Enter Knife Angle	Knife Configuration, Enter Knife Angle.	1780-1799	
650-699 Z Surface Map Module				
650	Start Z Surf Mapping	ZSurf_Mod Start Z Surface Mapping menu item		INI_ZSURF_MOD
651	Surf. Mode :	ZSurf_Mod Surface Mapping Mode menu item	165	INI_ZSURF_MOD
652	TouchRad :	ZSurf_Mod Touch Radius menu item	168	INI_ZSURF_MOD
653	Z Seek Speed:	ZSurf_Mod Z Seek Speed menu item		INI_ZSURF_MOD
654	Probe Lift :	ZSurf_Mod Probe Lift menu item		INI_ZSURF_MOD
655	Calibrate	ZSurf_Mod Calibrate Probe menu item		INI_ZSURF_MOD
656	Test Surface	ZSurf_Mod Test Surface menu item		INI_ZSURF_MOD
657	X Distance :	ZSurf_Mod X Distance to scan menu item		INI_ZSURF_MOD
658	Y Distance :	ZSurf_Mod Y Distance to scan menu item		INI_ZSURF_MOD
659	Step Size :	ZSurf_Mod Step Size menu item		INI_ZSURF_MOD
660	Z Seek Speed:	ZSurf_Mod Z Seek Speed menu item		INI_ZSURF_MOD
661	Z Safe Lift :	SSurf_Mod Z Safe Lift menu item		INI_ZSURF_MOD
662	Save Surface Map	ZSurf_Mod Save Surface menu item.		INI_ZSURF_MOD
663	Load Surface Map	ZSurf_Mod Load Surface Map menu item		INI_ZSURF_MOD
664	SurfMap	ZSurf_Mod Main Menu item		INI_ZSURF_MOD
665	Z Surface Mapping	ZSurf_Mod Menu Title		INI_ZSURF_MOD
700-799 Material Handling Messages.				
700	MatlHand	Material Handling menu		INI_MATERIAL_HANDLING_V3
701	Material Handling	Material Handling	1600	INI_MATERIAL_HANDLING_V3
702	Roller Setup...	Material Handling Roller Setup... menu		INI_MATERIAL_HANDLING_V3
703	Material Pusher...	Material Handling Material Pusher... menu		INI_MATERIAL_HANDLING_V3

MSG #	Message	Description	Param	Module
704	Material Lifter...	Material Handling Material Lifter... menu		INI_MATERIAL_HANDLING_V3
705	Air/Knife Sweeper	Material Handling Air/Knife Sweeper... menu		INI_MATERIAL_HANDLING_V3
706	Dust Coll. Setup...	Material Handling Dust Collector Setup... menu		INI_MATERIAL_HANDLING_V3
707	Dust Collector Setup	Material Handling Dust Collector Setup menu		INI_MATERIAL_HANDLING_V3
708	Drop Off location	Material Handling Dust Collector Drop off location		INI_MATERIAL_HANDLING_V3
709	Move to Drop Off	Material Handling Move to Dust Collector Drop off location.		INI_MATERIAL_HANDLING_V3
710	Drop Off Dust Coll	Material Handling Drop off Dust Collector		INI_MATERIAL_HANDLING_V3
711	Manually Pick Up	Material Handling Manually Pick up Dust Collector		INI_MATERIAL_HANDLING_V3
712	Y Range w/Dust Coll.	Material Handling Set Y max restriction.		INI_MATERIAL_HANDLING_V3
713	Test I/O	Material Handling Dust Collector Test I/O Also used for Conveyor system Test I/O		INI_MATERIAL_HANDLING_V3
714	Dust 1=blast,2=lock	Material Handling Dust Collector Test I/O Instructions		INI_MATERIAL_HANDLING_V3
715	Press Enter to Drop off Dust Collector	Material Handling Press Enter to Drop off Dust Collector		INI_MATERIAL_HANDLING_V3
716	Press Enter to move to Dust Collect DropOff location	Full Material Handling Press Enter to move to Dust Collector location.		INI_MATERIAL_HANDLING_V3
717	DustCol Blast:	Material Handling Dust Collector Test I/O information		INI_MATERIAL_HANDLING_V3
718	DustCol Lock :	Material Handling Dust Collector Test I/O Information		INI_MATERIAL_HANDLING_V3
719	Drop-Off/Pickup Loc.	Material Handling Dust Collection Drop off/Pickup location		INI_MATERIAL_HANDLING_V3
720	Air Knife Sweeper	Material Handling Air/Knife sweeper		INI_MATERIAL_HANDLING_V3
721	AirKnife Sweeper I/O1=Vac,2=Knife,3=Dust	Material Handling Air Knife Test I/O Instructions		INI_MATERIAL_HANDLING_V3
722	Vac :	Material Handling Air Knife Test I/O Information		INI_MATERIAL_HANDLING_V3
723	Knife:	Material Handling Air Knife Test I/O Information		INI_MATERIAL_HANDLING_V3
724	Material Lifter Menu	Material Handling Material Lifter menu		INI_MATERIAL_HANDLING_V3
725	X Pickup :	Material Handling Lifter X pickup location.		INI_MATERIAL_HANDLING_V3
726	X Drop-Off:	Material Handling Lifter X Drop-off location.		INI_MATERIAL_HANDLING_V3

MSG #	Message	Description	Param	Module
727	X PreStage:	Material Handling Lifter X Prestage location		INI_MATERIAL_HANDLING_V3
728	Load Speed:	Material Handling Lifter Load Speed		INI_MATERIAL_HANDLING_V3
729	XPos Speed:	Material Handling Lifter X Position Speed		INI_MATERIAL_HANDLING_V3
730	Test Cycle	Material Handling Test Cycle		INI_MATERIAL_HANDLING_V3
731	1=lift, 2=vac, 3=Pos	Material Handling Lifter Test I/O instructions		INI_MATERIAL_HANDLING_V3
732	Lift:	Material Handling Lifter Test I/O Information (Lift Out)		INI_MATERIAL_HANDLING_V3
733	Vac:	Material Handling Lifter Test I/O Information (vac)		INI_MATERIAL_HANDLING_V3
734	Up?:	Material Handling Lifter Test I/O Information (Lifter up sensor)		INI_MATERIAL_HANDLING_V3
735	Dn?:	Material Handling Lifter Test I/O Information (Lifter dn sensor)		INI_MATERIAL_HANDLING_V3
736	Press START to beginLifter Cycle	Full Material Handling Lifter Cycle		INI_MATERIAL_HANDLING_V3
737	Roller HoldDown Menu	Material Handling Roller Holddown menu		INI_MATERIAL_HANDLING_V3
738	Work Start:	Material Handling Roller Work start		INI_MATERIAL_HANDLING_V3
739	Sheet Size:	Material Handling Roller Sheet Size.		INI_MATERIAL_HANDLING_V3
740	Disable Rollers	Material Handling Roller Disable Rollers		INI_MATERIAL_HANDLING_V3
741	Enable Rollers	Material Handling Roller Enable Rollers		INI_MATERIAL_HANDLING_V3
742	Pre-lift :	Material Handling Roller Pre-Lift.		INI_MATERIAL_HANDLING_V3
743	Roller 1 Position	Material Handling Roller 1 Position		INI_MATERIAL_HANDLING_V3
744	Roller 2 Position	Material Handling Roller 2 Position		INI_MATERIAL_HANDLING_V3
745	Roller 3 Position	Material Handling Roller 3 Position		INI_MATERIAL_HANDLING_V3
746	Roller 4 Position	Material Handling Roller 4 Position		INI_MATERIAL_HANDLING_V3
747	X Pickup Location?	Material Handling Lifter X Pickup Location		INI_MATERIAL_HANDLING_V3
748	X Drop Off Location?	Material Handling Lifter X Dropoff Location		INI_MATERIAL_HANDLING_V3
749	X Pre-Stage Location	Material Handling Lifter X prestage Location		INI_MATERIAL_HANDLING_V3
750	X Loading Feedrate	Material Handling Lifter X Loading Feedrate Location		INI_MATERIAL_HANDLING_V3
751	X Position Feedrate	Material Handling Lifter X Position Feedrate		INI_MATERIAL_HANDLING_V3
752	Relative to Spindle	Material Handling Roller setup Relative to spindle		INI_MATERIAL_HANDLING_V3
753	Pre-Lift Distance?	Material Handling Roller Setup Pre-Lift distance.		INI_MATERIAL_HANDLING_V3
754	Size of Sheet?	Material Handling Roller Setup Size of Sheet.		INI_MATERIAL_HANDLING_V3

MSG #	Message	Description	Param	Module
755	Work Start X Pos	Material Handling Roller Setup Work Start X Position		INI_MATERIAL_HANDLING_V3
756	Jog, Press Enter	Material Handling Jog then press enter.		INI_MATERIAL_HANDLING_V3
757	Material Pusher Menu	Material Handling Material Pusher Menu		INI_MATERIAL_HANDLING_V3
758	Set Start Position	Material Handling Material Pusher Set Start Position		INI_MATERIAL_HANDLING_V3
759	Set Stop Position	Material Handling Material Pusher Set Stop Position		INI_MATERIAL_HANDLING_V3
760	Set Push Feedrate	Material Handling Material Pusher Feedrate		INI_MATERIAL_HANDLING_V3
761	Press START to beginPusher Cycle	Full Material Handling Pusher Cycle		INI_MATERIAL_HANDLING_V3
762	Pusher Output:	Material Handling Pusher Test I/O information		INI_MATERIAL_HANDLING_V3
763	Pusher Up Sensor:	Material Handling Pusher Test I/O information		INI_MATERIAL_HANDLING_V3
764	Pusher Dn Sensor:	Material Handling Pusher Test I/O information		INI_MATERIAL_HANDLING_V3
765	Pusher IO (Z=up/dn)	Material Handling Pusher Test I/O instructions		INI_MATERIAL_HANDLING_V3
766	Loading Material...	Material Handling Lifter Cycle		INI_MATERIAL_HANDLING_V3
767	Lifter did not lower.	Material Handling Lifter Cycle Lift did not lower		INI_MATERIAL_HANDLING_V3
768	Lifter did not retract.	Material Handling Lifter Cycle Lift did not Retract		INI_MATERIAL_HANDLING_V3
769	Pushing Material...	Material Handling Pusher Cycle		INI_MATERIAL_HANDLING_V3
770	Pusher did not retract.	Material Handling Pusher Cycle Lift did not Retract		INI_MATERIAL_HANDLING_V3
771	Pusher did not lower.	Material Handling Pusher Cycle Lift did not Lower		INI_MATERIAL_HANDLING_V3
772	Rollers not up!	Material Handling Roller check if up.		INI_MATERIAL_HANDLING_V3
773	Cycle Complete	Material Handling Cycle complete		INI_MATERIAL_HANDLING_V3
774	Y Max Range	Material Handling Setting Y Max Range.		INI_MATERIAL_HANDLING_V3
775	Y Min Range	Material Handling Setting Y Min Range.		INI_MATERIAL_HANDLING_V3
776	Saving...	Material Handling, Used when saving values.		INI_MATERIAL_HANDLING_V3
777	Lift Delay:	Material Lifter, Lift Delay		INI_MATERIAL_HANDLING_V3
778	Check Lift Vacuum	Material Lifter, Check Lift Vacuum.		INI_MATERIAL_HANDLING_V3
779	Num Sheets:	Material Lifter, How many sheets to load when using M-Code.		INI_MATERIAL_HANDLING_V3
780	Enter number of sheets to Load. 5max	Material Handling Sheet to load with lifter.		INI_MATERIAL_HANDLING_V3
781	Auto Load :	Material Lifter, Auto load sheet at start of job or sheet change.		INI_MATERIAL_HANDLING_V3
782	Load at Start:	Material Lifter, Auto load sheet at start of job		INI_MATERIAL_HANDLING_V3

MSG #	Message	Description	Param	Module
783	Load at Sheet:	Material Lifter, Auto load sheet at start of sheet (M25)		INI_MATERIAL_HANDLING_V3
784	LoadPrompt:	Material Lifter, Prompt when loading sheet at start of job.		INI_MATERIAL_HANDLING_V3
785	Prompt at Start:	Material Lifter, Prompt to load sheet at start of job		INI_MATERIAL_HANDLING_V3
786	Prompt at Sheet:	Material Lifter, Prompt to load sheet at start of sheet (M25)		INI_MATERIAL_HANDLING_V3
787	Auto UnLoad:	Material Pusher, Auto unload sheet at end of job or sheet change.		INI_MATERIAL_HANDLING_V3
788	Sweeper Dly:	Material Sweeper, Delay when lowering Sweeper.		INI_MATERIAL_HANDLING_V3
789	XPos Dist :	Material Handling Lifter X Position Distance.		INI_MATERIAL_HANDLING_V3
				INI_MATERIAL_HANDLING_V3
Conveyor.uc module for Digital Express				
791	Conveyor	Conveyor menu item.		
792	X Pickup :			
793	X Dropoff:			
794	Clamp Dly:	Conveyor clamp delay.		
795	Conveyor Feedrate			
796	Indexing Material			
797	Barcode Option		1625	
800-899 Miscellaneous messages used mainly by Router inits.				
Menu Titles (used by KDM20G)				
800	Main Menu			
801	Cut Utilities			
802	Utilities			
803	Service			
804	PAUSED...			
805	Local DNC			

MSG #	Message	Description	Param	Module
811	Remove Tool from Spindle	This message is similar to Msg#1645. The difference is the machine is configured as a manual tool changer. If parameter 75 = 4, then this message will be shown. If parameter 75 = 1 or 2, then Msg#1645 will be shown.	75	
812	Do Not Park ->			
813	<- Park Xpark Pos ->			
814	<- Park Xmin, Ymin->			
815	<- Park Job Extent->			
816	<- Park at Home |			
817	Select Park Option	Utility menu set park option.		
818	Parking Option	Utility menu Parking Option.		
818	Parking Option	Utility menu Parking Option.		
819	Unload	Tool Unload, Unload T**		
820	At Start of Contour.	Proximity Restart at start of Contour		
821	At End of Contour.	Proximity Restart at end of contour		
822	At First PD.	Proximity Restart at first PD		
823	At Last PD.	Proximity Restart at last PD		
824	At First PU.	Proximity Restart at first PU		
825	At Last PU.	Proximity Restart at last PU		
826	At First Tool.	Proximity Restart at first Tool		
827	At Last Tool.	Proximity Restart at last tool		
828	At Start of Job.	Proximity Restart at start of job		
829	At End of Job.	Proximity Restart at end of job.		
830	Clear	Button for Dialog to clear rotation.		
831	Accept	Button for Dialog to accept rotation.		
832	Job Rotation	Title to dialog box asking to acknowledge job is rotated.	249	
833	Pausing...	Call at start of pausing.		
834	Press 5 to open/close chuck	After tool not loaded		

MSG #	Message	Description	Param	Module
835	Spindle			
836	Knife			
837	Open			
838	Close			
839	Manual Chuck Control	Manual Chuck Control. Title when Key5 is pressed.		
840	OK	Button on some dialog boxes.		
841	Message	Title of some dialog boxes.		
842	Current :	Current value of something		
843	Flange Shape	Flange Shape		
844	Can't leave XB limit abort homing.	Homing Failure on Xb		
845	Can't leave X limit abort homing.	Homing Failure on X		
846	Dust Collector Up/Dn	Utility menu item to test dust collector.		
847	Tool Comp Settings	When setting Tool Comp values.		
848	Conventional	Direction of cut, Conventional.		
849	Climb	Direction of cut, Climb.		
850	Direction	Direction of cut.		
851	Tool Change requested, Safety Hold Active..	Used when tool change is requested during CE Safety.		
852	Tool Change not allowed in job:	Validating Knife tools.		
853	ToolCfg	Utility menu Tool Configuration.		
854	Range:	Used when showing the user a value range.		
855	Knf1 Open 1=Close	DUAL ATC Opening/Closing chuck.		
856	Knf1 Closed 7=Open	DUAL ATC Opening/Closing chuck.		
857	Clear Global Max Depth?	After successfully setting Global Max Depth.	988	
858	Global Max Depth Set	After successfully setting Global Max Depth.	989	
859	GlobMaxD	Utility menu Global Max Depth.	989	
860	Floating Point Exception			
861	Pos# = Lower Surf Neg# = Raise Surf	Additional info displayed when Adjusting Surface.		
862	(Laser Ptr)	Additional info display when setting home with Laser Pointer.	1205	

MSG #	Message	Description	Param	Module
863	(Use Laser Pointer)	Additional line displayed when setting home with Laser Pointer.	1205	
864	Turn off Laser Ptr?	After setting home with laser pointer.	1205	
865	Laser Ptr Offsets NOT set.	When cancelling out of setting laser pointer offsets.	274, 275	
866	Offsets set to	When setting Laser Pointer offsets.	274, 275	
867	Press Enter to Accept	When setting Laser Pointer offset	274, 275	
868	Jog Laser Ptr to offset, press ENTER	When setting Laser Pointer offset	274, 275	
869	Press Enter to Drillat the current home.	When setting Laser Pointer offset	274, 275	
870	LaserPtr	Utility menu LaserPtr	274, 275, 1205	
871	Set Laser Ptr Offset	Utility menu, set laser pointer offset.		
872	Enable Jogging?	Various Places.		
873	Enter=Set	Various Places.		
874	Lease Expired.	Lease Expired.		
875	Bad Password.	Bad Password was entered for the lease.		
876	Enter Password to End Lease	Enter password to End lease.		
877	Enter Password to Renew Lease	Enter password to Renew lease.		
878	Press 2 to END-LEASE	Press 2 to End Lease.		
879	Press 1 to RE-LEASE	Press 1 to re-Lease		
880	Days Left:	Days left on Lease.		
881	Lease	Lease menu name		
882	MisterTst	Mister Test menu name when in CE Safety.		
883	Disable Mister?	Utility menu Disable Mister?	1110	
884	MisterOpt	Utility menu Enable or Disable Mister when running jobs.	1110	
885	Calibrate and Surface Tool #1 First.	When calibrating knife.		

MSG #	Message	Description	Param	Module
886	Unload Tool?	ATC Ask to unload tool if too long for vision, knife, etc.		
887	Check Air Pressure Counter-Balance Installed.	A Counter balance is installed and the Air Pressure must be good before any Z motion can happen. If there is no Counter Balance, then change parameter 611.	611	
888	Spindle Overtemp	ATC Spindle overtemp.	618	
889	Spindle 2 Overtemp	ATC Spindle 2 overtemp.	618	
890	Tool # to Pickup:	ATC Menu Get Tools, asking for tool number to pickup.		
891	Get_Tool	ATC Menu item to pickup tool.		
892	Replay Job Skip Fiducials?	Before replaying Vision Job.		
893	Are you sure you want to Save Map File?	Before updating library.		
894	Updating Map File Please wait.	Updating library.		
895	No Spin Enabled.	When running spindle warmup or spindle test and NOSPIN is enabled.	109, 650-699	
896	Enable Optional Pause?	PauseCnf Enable Optional Pause.	1102	
897	5=Open/Close Chuck	ATC during Manual Tool Change.		
898	PauseCfg	Utility Menu to enable M01 to pause machine.	1102	
899	Park Ya and Yb?	Dual ATC, asking to park at start of job.		
900-999 WaterJet Only Messages				
900	Waterjet	Main Waterjet menu		
901	Abrasive Delay:	Waterjet menu Autoline Delay		
902	PiercePressure:	Waterjet menu Pierce Pressure		
903	High	Waterjet menu Pierce Pressure setting.		
904	Low	Waterjet menu Pierce Pressure setting.		
905	Enter Abrasive Delay	Waterjet menu Autoline Delay		
906	Change Nozzle...	Waterjet menu Change Nozzle		

MSG #	Message	Description	Param	Module
907	Press Enter to move to Change Nozzle location.			
908	Abrasive :	Params 2D Abrasive on/off		
909	Dynamic Pierce:	Params 2D Dynamic Pierce		
910	FocusTube :	Params 2D Focus Tube		
917	Aux On Delay :	Params 2D Aux On Delay :	35	
918	Aux Off Delay :	Params 2D Aux Off Delay :	36	
919	Abrasive Rate :	Params 2D Abrasive Flow Rate.	381	
920	Enter Abrasive Rate	Waterjet menu Abrasive Flow Rate		
921	Usage	Waterjet Utility menu Usage Tracker		
922	Tracker	Waterjet Utility Tracker (Second word, also used for Orifice tracker, etc)		
923	Orifice	Waterjet Usage Tracker Orifice		
924	Nozzle	Waterjet Usage Tracker Nozzle		
925	Bed	Waterjet Usage Tracker Bed		
926	Press 0 to reset	Waterjet Usage Tracker Press 0 to Reset.		
927	Abrasive Low Signal	Waterjet Utility Abrasive Low Signal		
928	Line Purge	Waterjet Utility Line Purge		
1000	Params_2D	Params 2D Main Menu		
1001	X,Y Feedrate :	Params 2D X,Y Feedrate submenu		
1002	Cut Depth :	Params 2D Cut Depth submenu		
1003	Tool Lift :	Params 2D Tool Lift submenu		
1004	Z Plunge Feed :	Params 2D Z Plunge Feedrate		
1005	Spindle RPM :	Params 2D Spindle RPM		
1006	Plasma Thres :	(PLASMA) Params 2D Speed Threshold		
1007	Pierce Delay :	(PLASMA) Params 2D Pierce Delay :		
1008	Voltage :	(PLASMA) Params 2D Voltage :		
1009	Plasma Tip :	(PLASMA) Params 2D Plasma Tip. :		
1002	Cut Height :	Params 2D Torch to Work Distance.		
1003	Lift Height :	Params 2D Tool Lift submenu		

MSG #	Message	Description	Param	Module
1010	Cut_Utils	Cut Utilities Main Menu		
1011	Tabl_Mill	Cut Utils Table Mill submenu		
1012	Matl_Cut	Cut Utils Material Cutoff submenu		
1013	Test_Cut	Cut Utils Test Cut submenu		
1014	Circle	Cut Utils Circle Shape submenu		
1015	Square	Cut Utils Square Shape submenu		
1016	Rectangle	Cut Utils Rectangle Shape submenu		
1017	Rect_Rnd	Cut Utils Rectangle with Round corners Shape submenu		
1018	Polygon	Cut Utils Polygon Shape submenu		
1019	RipCut	Cut Utils Cut using jog keys.		
1020	Rec_Home	Recorded Home		
1021	Pierce Height :	Params 2D Pierce Height:		
1022	Surface Feed :	Params 2D Surface Feed :		
1023	Surface SW? :	Params 2D Surface SW? :		
1024	Vacuum Zones :	Params 2D Vacuum Zones :	237, 238	
1025	PreHeat Hght :	Params 2D PreHeat Hght :		
1026	Update Material Lib.	Params 2D Update Material Lib.		
1027	Restore Factory Lib.	Params 2D Restore Factory Lib.		
1028	THC Delay :	Params 2D Torch Height Delay.		
1029	HS Radius :	Params 2D Height Sensing Radius		
1030	Utility	Utility Main Menu		
1031	Clr_Home	Utility Clear Home submenu		
1032	DrillTest	Utility Drill Test submenu		
1033	No_Spin	Utility No Spin submenu		
1034	Inv_Reset	Utility Inverter Reset submenu		
1035	Job_Time	Utility Job Time submenu		
1036	Reboot	Utility Reboot Machine submenu		

MSG #	Message	Description	Param	Module
1037	ParkPos	Utility X Park Position.		
1038	AdjSurf	Utility Adjust Surface.		
1039	GDrillTest	Utility Gang Drill Test submenu		
1040	Digitize	Digitize Main Menu		
1041	Knife	Knife Main Menu (used when Knife Module is installed)		
1042	HomeKnife	(KNIFE) Utility Home Knife		
1043	KnifeOff.	(KNIFE) Utility Set Knife Offset		
1044	Lube	Utility Auto Luber.	294, 295, 296	
1045	Lube Now	Lube Menu		
1046	Lube Frequency:	Lube Time	295	
1047	Lube Duration :	Lube Duration.	294	
1048	Show Last Lubed	Last Lube time.	296	
1049	DNC_Mode	utility toggle local/remote DNC	207	
1050	Tool_Comp	Tool Compensation Main Menu		
1051	Laser Freq. :	(LASER) Params 2D Frequency		
1052	Tactile Sensor:	(LASER) Params 2D Use Surface Block when Surfacing.		
1053	Bidir Coef :	(LASER) Params 2D Bidir Coef.		
1055	Pen Number :	(LASER) Params 2D Pen Number		
1056	Knife Dn Dly :	(KNIFE) Params 2D Knife Down Delay submenu	174	
1057	Knife Up Dly :	(KNIFE) Params 2D Knife Up Delay submenu	173	
1058	Closeness :	(KNIFE) Params 2D Knife Closeness	45	
1059	Rotate Degree:	(KNIFE) Params 2D Rotate Knife without lifting	46	
1060	Shutdown	Shutdown Main Menu		
1061	Tip_Usage	(PLASMA) Utility Plasma Tip Usage	900-999	

MSG #	Message	Description	Param	Module
1062	CalSensor	(PLASMA) Utility Plasma Calibrate Sensor	242, 1410, 1409	
1063	HD ComTst	(PLASMA) Utility Plasma HD Communication Test.		
1064	LoadMatl	(PLASMA) Utility Plasma Load Material		
1065	ChangeTip	(PLASMA) Utility Plasma Change Tip		
1066	Perf. Mode :	(PLASMA) Params 2d Perforated mode.		
1067	SPA Trigg	(Router) Utility Current limit until machine pauses.	222	
1068	SPA Level :	(Router) Utility Spindle current level	1100	
1069	SPA Time :	(Router) Utility Spindle time at amp level.	1101	
1070	Auto/All	Auto All Main Menu (ONLY for STD machine).		
1071	Cut Press. :	(LASER) Params 2D Laser Cut Pressure		
1072	Pierce Press. :	(LASER) Params 2D Pierce Pressure		
1073	FocusTest	(LASER) Utility Focus Program		
1074	Z Tracking :	(PLASMA) Params 2D Plasma Z Tracking.		
1075	Start On Edge :	(PLASMA) Params 2D Plasma Start on Edge.		
1076	Max Volt Gap :	(PLASMA) Params 2D Plasma Max Voltage Gap.		
1077	Speed Factor :	(PLASMA) Params 2D Plasma Speed Factor		
1078	Settings	Params 2D Plasma Settings.		
1079	PreHeat Time :	Params 2D Plasma Pre Heat Delay.		
1080	ATC	ATC Main Menu (ONLY for ATC machine).		
1081	Cal_Tool	ATC Calibrate Tool submenu		
1082	Adj_Tool	ATC Adjust Tool submenu		
1083	Tool_Unld	ATC Tool Unload submenu		
1084	LoadTools	ATC Tool Load submenu		
1085	CalGDrill	ATC Calibrate Gang Drill submenu (OPTIONAL)		
1086	LoadDrill	ATC Load Gang Drill submenu (OPTIONAL)		
1087	Auto/All	ATC Master/Slave (OPTIONAL)		
1088	Cal ATCs	ATC Calibrate ATCs (OPTIONAL)		
1089	Spindle DIR :	Params 2D Spindle DIR		

MSG #	Message	Description	Param	Module
Paused Menu				
1090	PAUSED...	Paused message		
1091	Continue	Paused Continue submenu		
1092	Jog	Paused Jog submenu		
1093	Cancel	Paused Cancel submenu		
1094	Params 2D	Paused Params 2D submenu NOT USED		
1095	Motion Resumed..	Full Motion resumed after paused.		
1096	Motion Cancelled..	Full Motion cancelled after paused.		
1097	Ready... (ENTER To Continue or CANCEL)	Full Continue after CE Safety.		
1098	Safety Hold...	CE Safety message		
1099	Safety Hold Active.	CE Safety		
1100	Waiting on Arc...	In pendown after firing arc.		
1101	Cancelled...	used various places.		
1102	YES	Various Places. (same length as NO)		
1103	NO	Various Places. (same length as YES)		
1104	ENTER=Yes, EXIT=No	Various Places		
1105	Searching	Prox Restart.		
1106	Breakaway Sensor Active...	The plasma breakaway sensor is active. Check DCN 221 for plasma head #1 Check DCN 229 for plasma head #2 Check DCN 239 for plasma head #3		
1107	Please Wait...	Please Wait boot message		
1108	Loading	Loading boot message		
1109	Finding Home...	Finding home		
1110	Run Spindle Warmup?	STD Spindle Warmup		
1111	Run Spindle Warmup using Tool #?	ATC Spindle Warmup		
1112	ENTER for Warmup	Spindle Warmup		

MSG #	Message	Description	Param	Module
1113	Spindle Warmup	Spindle Warmup title		
1114	mins	Spindle Warmup time.		
1115	secs	Spindle Warmup time.		
1116	Parking	Parking (the axis letter will follow so leave space at end)		
1117	Job:	Used when Paused to show job that was running.		
1118	Set home position here?	Used when setting home.		
1119	Go To Home	Go to home		
1120	Moving to Home	Moving to home		
1121	Home Set.	After setting home.		
1122	Home cleared.	From the CLR_HOME menu		
1123	Set Home	Setting Home.		
1124	Surface NOT Set	when running a job and surface has not been set. This is typically shown when using the Gang Drill. The surface must be set before using the Gang Drill. Set the Surface before using the Gang Drill.		
1125	Low Air Pressure	Low Air Pressure The low air pressure is checked on ATC machines and STD machines with the chuck type set to Quick Change (see parameter 124). Note: A Digital Express or G-Series machine is always considered an ATC machine. On G-Series machines, you can disable checking the air pressure if you set parameter 75 = 0.	75, 124	
1126	ON	various Places. (same length as OFF)		
1127	OFF	various places. (same length as ON)		
1128	0=AutoSet, ENTER=Set	used when setting surface, max depth, etc.		
1129	Drill Test	Used as head when running Drill Test		
1130	Length of Side	Used when asking for parameter in Cut Utils.		
1131	Length of X Side	Used when asking for parameters in Cut Utils.		
1132	Length of Y Side	Used when asking for parameters in Cut Utils.		

MSG #	Message	Description	Param	Module
1133	Spindle Test Running	Message when running spindle test.		
1134	Spindle Test	Title when running spindle test.		
1135	Are you sure you want to update Library?	Before updating library.		
1136	Updating Library Please wait.	Updating library.		
1137	MultiPass BiteSize	Used in Cut Utils.		
1138	DustCtrl	Utility menu Dust Collector Control.		
1139	Spindle 2 DIR :	Params 2D Spindle DIR		
local DNC messages				
1140	Loading Local DNC	Displayed when starting local DNC mode.		
1141	No Local Files	Local DNC option is selected but No files are stored on the machine.		
1142	Saving...	when saving Local DNC file.		
1143	Error Writing File, out of room.	Saving a Local DNC file to the controller. Not enough space.		
1144	End of Job not Found File not saved.	The end_plot was not found, not a complete job. This error will occur when trying to save a file to Local DNC. When storing the file, it is looking for the keyword “end_plot” which is produced by an M02 for G-Code or SP0; for hpgl or simply end_plot for ucj jobs.		
1145	Could not open Temp file. Try again.	Error opening temporary file. Try again When saving a Local DNC file, the controller could not open an temporary file location. This could be because it is out of room or a file is already open. Typically, you can try again and it will work.		
1146	Too Many Files, delete one first.	Tool many local dnc files, maximum number of files is 20.		
1147	Delete Job?	Do you want to delete a local DNC file.		

MSG #	Message	Description	Param	Module
1148	Select DNC Mode	Title for the DNC Mode dialog box.	207	
1149	Surface	Safety hold surface.		
1150	Connecting to host..	When connecting to Job Server		
1151	Attempting to take MM offline.			
1152	Loading...	When starting DNC.		
1153	Please Stand By...	After completing a job, wait for DNC to send host_terminate.		
1154	Restart Here?	Prox restarting		
1155	Error opening Host Port	Full When using barcode reader.	228	
1156	Material Cutoff	Material Cutoff		
1157	X CUTOFF DISTANCE	Material Cutoff		
1158	Y CUTOFF DISTANCE	Material Cutoff		
1159	Enter Lift Height?	(PLASMA) Enter Lift Height.		
1160	Enter Pierce Delay?	(PLASMA) Enter pierce delay		
1161	MODBUS Slave Timeout			
1162	Chuck Status:	Used when Opening/Closing Chuck		
1163	Open	Used when Opening/Closing Chuck.		
1164	Closed	Used when Opening/Closing Chuck.		
1165	Are you sure you want to open chuck?			
1166	Are you sure you want to close chuck?			
1167	Mount Grounding Clip	During Auto Surface	279	
1168	Remove Grounding Clip.	Full After Auto Surfacing.	279	
1169	Hold 0 to move down.	During Auto Surfacing.		
1170	Auto Setting...	During Auto Surfacing.		
1171	Initializing Spindle	When initializing spindle before homing.		
1172	Initializing Drill	When initializing Drill before homing.		
1173	Warning, NO Inverter Specified	No Inverter type specified in location 300.	300	
1174	Set Surface	STD Title when setting surface, asking for Head #.		

MSG #	Message	Description	Param	Module
1175	Setting Surface	STD When Setting Surface.		
1176	Surface Set	STD When Setting Surface.		
1177	Adjust Surface	STD When Adjusting Surface.		
1178	Surface Adjusted	STD When Adjusting Surface.		
1179	Surface Not Adjusted	STD When Adjusting Surface.		
1180	Set Max Depth	STD Title when setting surface, asking for Head #.		
1181	Setting Max Depth	When Setting max depth.		
1182	Max Depth Set.	When setting max depth.		
1183	Max Depth Not Set.	When Setting Max Depth.		
1184	Adjust Max Depth	When Adjusting Max depth.		
1185	Set Max Depth before Adjusting	When adjusting Max Depth.		
1186	CANCEL to Clear	When Adjusting Max Depth.		
1187	Max Depth Adjusted	When Adjusting Max Depth.		
1188	Clear Max Depth? ENTER=Yes, CANCEL=No	When Adjusting Max Depth.		
1189	Max Depth CLEARED	When Adjusting Max Depth.		
1190	Max Depth Not Adjusted	When Adjusting Max Depth.		
1191	START to Execute CANCEL to Abort PAUSE to Yield	Start menu		
1192	Executing...	When running a job (Pad out to characters)		
1193	Dry Running...	When running a job (Pad out to characters)		
1194	Barcode Ready Waiting for Input...	Full when running Barcode Scanner.		
1195	Jog= SLOW	Main Screen Jog = Slow		
1196	Jog= MED	Main Screen Jog = Med		
1197	Jog= FAST	Main Screen Jog = Fast		
1198	Move To	Move Menu.		
1199	Safety not ready	Safety hold checked before spindle test.		
1200	Spindle Off	Before Running spindle test. 4 digit number follows then MINS.		
1201	Press again for Spindle Test, ENTER for Warmup	For Spindle test key.		

MSG #	Message	Description	Param	Module
1202	Spindle not ready	Check before running spindle test. The Spindle Ready input is not satisfied. If the machine does not have a spindle ready input, then disable the check by setting parameter 176. The Spin 0 Speed input shows that the spindle is not ready. Check the system. If MODBUS is active, the first spindle will use the Spin 0 Speed input, and the second head will query MODBUS to make sure the spindle is ready.	176	
1203	Press Enter to begin	Before running spindle test.		
1204	Activating Spindle..	When running spindle test.		
1205	Mister Test	Mister Test		
1206	Extruder Test	Mister Test	52	
1207	Press CANCEL to stop	Mister Test		
1208	Enter AUX ON Delay	STD Enter Aux On delay		
1209	Enter AUX OFF Delay	STD Enter Aux OFf Delay		
1210	Head #?	STD When asking for head number.		
1211	Enter Tool Diameter:	Table Mill function.	105	
1212	Table Mill	Table Mill Function		
1213	Turning off Spindle	At end of spindle test and spindle warmup.		
1214	The Last Job Took:	Job Time menu		
1215	Reboot Machine?	Reboot machine menu		
1216	REBOOTING!! Please Wait...	Rebooting machine.		
1217	Enter X Max Park Position? 0.0 = use table size	ParkPos menu.	220	
1218	No Drills Defined!	Warning message during Drill Test. This message indicates parameter 175 has not be set.	175	
1219	Spindle Test Stopped	Spindle test Stopped, after running spindle test.		

MSG #	Message	Description	Param	Module
1220	Jogging disabled during Spindle Test.Enable?	Trying to jog during spindle test. Under normal situations, jogging is disabled when the spindle test is active. Press Enter to enable jogging while the spindle is running.		
1221	Enabled	STD Spindle Mode (nospin)		
1222	Disabled	STD Spindle Mode (nospin)		
1223	Spindle Mode Currently:	STD Spindle Mode (nospin)	109	
1224	ENTER to Enable	STD Spindle mode (nospin)		
1225	ENTER to Disable	STD Spindle mode (nospin)		
1226	Spindle Mode Now:	STD Spindle Mode (nospin)		
1227	Mode NOT Changed	STD Spindle Mode (nospin)		
1228	Set Cut Depth	Setting Cut Depth.		
1229	Enter Depth:	When setting cut depth.		
1230	Enter Cut Depth	When setting Cut depth.		
1231	Depth Not Set.	When setting cut depth.		
1232	Depth Set.	When setting cut depth.		
1233	Not Set	When setting cut depth and Max Depth as not been set yet.		
1234	Max Depth Active	When Max depth is activated when running job		
1235	Press START, CANCEL (or MENU)	During manual tool change.		
1236	Press START To Cont.	After tool change		
1237	Pause Code From Job	During pause code in job file (M00, M01)		
1238	Place Sheet	During Sheet change (M25)		
1239	User Paused...	When user pauses machine.		
1240	Going home...	Going home (home key).		
1241	ENTER to continue	Paused during finding home		
1242	Paused During	Paused during finding home.		
1243	Job Currently Rotated	Start of job if job was previously rotated.	249	
1244	ENTER = Accept, CANCEL = Clear	Start of job if job was previously rotated.		
1245	Drill NOT Supported	Drill test and no drills defined.	175	

MSG #	Message	Description	Param	Module
1246	Press START to Fire Drill and Continue.	When firing drill and it fails.		
1247	Enter Size of Sheet	Step and Repeat Job		
1248	Invalid value must be > 0.0	Step and Repeat Gap Distance check. The distance between the parts must be greater than 0.0.		
1249	Enter Space between parts	Step and Repeat Job		
1250	Use UP/DN to select	Step and Repeat Job		
1251	Cannot Step and Repeat a Re-Played Job.	Step and Repeat Job.		
1252	Step Along X or Y:	Step and Repeat Job		
1253	Along Y axis	Step and Repeat Job		
1254	Along X axis	Step and Repeat Job		
1255	Serpentine :	Step and Repeat Job		
1256	Tool Parameters ENTER to select	STARTing built in cut utils job.		
1257	Dry Run Mode ENTER to select	STARTing job.		
1258	Step And Repeat ENTER to select	STARTing job.		
1259	Location Not Found.	During Prox Restart and XY Point not found.	68	
1260	Prox Restart:	When Prox Restarting		
1261	Jog to Point, Use RPM up/dn for Sheet.	When Prox Restarting		
1262	Restart Sheet=	When Prox Restarting		
1263	ENTER=Search for XY	When Prox Restarting		
1264	Tool	When Prox Restaring		
1265	Sheet	When Prox Restarting		
1266	Shutdown Machine?	Shutting down machine.		
1267	OK to Power Down	After selecting to shutdown machine.		
1268	Use Negative number for inside cut	Tool Parameters for Cut Utils, Tool Diameter		
1269	Enter Lead In Radius	Tool Parameters for Cut Utils, Lead In Radius		
1270	Tool Diam :	Tool Parameters for Cut Utils.		

MSG #	Message	Description	Param	Module
1271	Lead In/Out:	Tool Parameters for Cut Utils.		
1272	Lead In Rad:	Tool Parameters for Cut Utils.		
1273	Enter Tool Lift?	Entering Tool Lift.		
1274	Press Down to set Rotation Point	When Setting home, ask to set rotation.		
1275	Rotation set to	After setting rotation point.		
1276	Spindle is ON!!	If spindle is on and user tries to set surface, max depth, etc.		
1277	Dust Coll. Settings	Dust Collector Control		
1278	Enter Tool # to Disable Dust Coll.	Dust Collector Control		
1279	Low air for Ram-Z Z-Brake Active.	Ram-Z Low air warning. Verify the air pressure is adequate for the Ram-Z.	166	
1280 - 1298 used for library				
Help Messages 1300-1499 (These are the messages display when you press ? then a key.				
1299	Press key for help			
1300	0 (Zero)			
1400	0 (Zero)	Shift + 0		
1301	1 (one) Activate Bar Code Scanner			
1401	1 (one)	Shift + 1		
1303	3 (three) Servo Enable			
1403	3 (three) Servo Disable	Shift + 3		
1305	5 (five)			
1405	5 (five) Open Chuck	Shift + 5		
1307	7 (seven) Move X,Y,Z			
1407	7 (seven)			

MSG #	Message	Description	Param	Module
1309	9 (nine) Spindle Test	Non-shifted		
1409	9 (nine) Mister Test	Shift + key		
1311	+/- Help			
1411	+/- Machine Information	Shift + key		
1312	Enter			
1412	Enter	Shift + key		
1313	Exit / Cancel Press again to Exit Help			
1413	Exit / Cancel Press again to Exit Help	Shift + key		
1315	4 (four) Jog Left			
1415	4 (four) Park Left	Shift + key		
1321	Menu Activate Menu			
1421	Menu Activate Menu	Shift + key		
1322	Jog Speed Adjust the Jog Speed			
1422	Jog Speed Adjust the Jog Speed	Shift + key		
1324	2 (two) Jog Down			
1424	2 (two) Park Down	Shift + key		
1325	8 (eight) Jog Up			
1425	8 (eight) Park Up	Shift + key		

MSG #	Message	Description	Param	Module
1326	6 (six) Jog Right			
1426	6 (six) Park Right	Shift + key		
1337	Go Home Move X,Y to 0,0, then move Z to TOOL-LIFT Height			
1437	Find Home Find Machine Limit Switches	Shift + key		
1338	Set Home Make this point 0,0			
1438	Set Home Move to Last Home	Shift + key		
1339	Surface Set Surface			
1439	Surface Fasmer Surface	Shift + key		
1340	Decimal point\015\nMove to Programmed Home (Press . then the home number)			
1440	Decimal point\015\nProgram Home (Press Shift . then the home number)	Shift + key		
1343	Start\015\nStart loaded Job or Replay Last Job			
1443	Start\015\nAccess Prox Restart	Shift + key		
1358	Pause motion			
1458	Pause motion	Shift + key		
1359	Max Depth\015\nSet Max Depth			
1459	Max Depth\015\nAdjust Max Depth	Shift + key		
1365	Z Up\015\nMove Z Axis Up			
1465	Z Up\015\nPark Z at Absolute ZZero	Shift + key		
1366	Z Down\015\nMove Z Axis Down			

MSG #	Message	Description	Param	Module
1466	Z Down\015\nMove Z Axis Down	Shift + key		
1370	Access DNC			
1470	Access DNC	Shift + key		
1371	Feedrate Override Up Increase Feedrate			
1471	Feedrate Override Up Increase Feedrate	Shift + key		
1372	Feedrate Override Down\015\nDecrease Feedrate			
1472	Feedrate Override Down\015\nDecrease Feedrate	Shift + key		
1373	Spindle RPM Up\015\nIncrease Spindle RPM			
1473	Set Spindle RPM\015\nSet Spindle RPM by entering value	Shift + key		
1374	Spindle RPM Down\015\nDecrease Spindle RPM			
1474	Spindle No Spin\015\nSelect NO SPIN Option	Shift + key		
1500	Ethernet Information	Title of Ethernet Information page		
1501	No Link Present	If Ethernet link is not present (cable not plugged in).		
1502	No DHCP Server	DHCP Enabled but no DHCP server found.		
1503	No Main Connection	No Ethernet connection established.		
1504	Ethernet Setting	Title to Ethernet setting page.		
1505	ENTER= Use DHCP EXIT = Specify IP	When Changing IP address.		
1506	Enter IP, Press ENTER for Each #	When Setting IP address.		
1507	Enter NetMask, Press ENTER for Each #	When Setting Net Mask.		
1508	IP already in use. Choose different IP	Duplicate IP detected when changing IP.		

MSG #	Message	Description	Param	Module
1509	Invalid IP. Choose different IP	Invalid IP Entered when changing IP.		
1510	Clear IP & Netmask?	Asking to Clear IP address. (usually used before shipping machine)		
1511	Feed=	Main screen Feedrate indicator in IPM.		
1512	Feed%=	Main Screen Feedrate indicator in %		
1513	Tool=	Main Screen Tool= Indicator		
1514	Home=	Main Screen Home= indicator		
1515	Speed Set.	When setting spindle speed.		
1516	Speed Not Set.	When setting spindle speed and user cancels.		
1517	Cut Speed?	Params 2D Changing XY Feedrate.		
1518	Currently	Params 2D Changing XY Feedrate (showing current Feedrate Override)		
1519	Enter X,Y Feedrate	Params 2D Changing XY Feedrate		
1520	?=Why	max Indicating to press ? to get reason why machine paused.		
1521	Axis =	In Out of bounds detect, what Axis.		
1522	Position =	In Out of bounds detect, Position=.		
1523	Gang Drill NOT up. (ENTER to continue)	Error when Gang Drill up sensor not detected.	149	
1524	Enter Spindle RPM?	Changing Spindle RPM		
1525	RPM=	Main Screen RPM= Indicator		
1526	Enter Z-Axis Speed?	Params 2D Entering Z Axis Plunge Speed.		
1527	Radius of Circle	Cut Utils Radius of Circle		
1528	Radius of Corners	Cut Utils Radius Rectangle, Radius of corners.		
1529	Number of Sides	Cut Utils Polygon, Number of sides.		
1530	Radius of Polygon	Cut Utils Polygon, Radius of Polygon.		
1531	Tool Comp Value For Tool #?	Tool Comp menu		
1532	Enter ToolComp Value	Tool Comp menu		
1533	Value NOT Changed...	Tool Comp menu, user pressed cancel.		
1534	Value Changed...	Tool Comp menu, user changed value.		
1535	Do you want to find home?	After manually enabling the drives.		
1536	Need to set MaxDepth	Setting Surface after Max Depth was set.		

MSG #	Message	Description	Param	Module
1537	Power Information	Power Information title.		
1538	Recorded Power Glitches:	Power Information screen		
1539	Machine Information	Machine Information title		
1540	Enter Drill # to Fire	30 Enter Drill number in Drill Test.		
1541	Press ENTER to Fire Drill #	30 Enter to fire drill in Drill Test.		
1542	Circle Shape	Cut Utils Circle Shape		
1543	Square Shape	Cut Utils Square Shape		
1544	Rectangle Shape	Cut Utils Rectangle Shape		
1545	Radiused Rectangle	Cut Utils Radius Rectangle Shape		
1546	Polygon Shape	Cut Utils Polygon Shape		
1547	Module Not Loaded!	Digitize Module not loaded.		
1548	Set Fasmer Surface	Start of Fasmer Surface (asking for head number).		
1549	Fasmer Surface...	Title when setting fasmer surface.		
1550	Enter Material Thickness:	Asking for material thickness in Fasmer and Shift Surface		
1551	Surface and Depth Set.	After setting surface using Fasmer Surface.		
1552	Surface and Depth NOT Set.	After cancelling out from setting Fasmer Surface.		
1553	Set Z Calibration	Start of Shift Surface (asking for head number)		
1554	Z Calibration...	Title when setting Shift Suface		
1555	Press START to beginCalibration	Shift Surface before starting calibration.		
1556	Moving to Calibration Block	Shift Surface Moving to calibration block.		
1557	Press Head # To Test...	Multi-headed machine asking for head number during spindle test.		
1558	Auto All All	Top of Auto/All selection for 3-headed STD machine.		
1559	1&2 1&2&3	2nd Line for Auto/All selection for 3-headed STD machine.		
1560	Auto All	Top of Auto/All selection for 2-headed STD machine.		
1561	Auto / All Setting	Title for Auto/All selection		
1562	Mode Changed	After changing Auto/All Setting.		
1563	Mode *NOT* Changed	After Cancelling out of changing Auto/All setting.		
1564	Number of Zs Changed Press ENTER to Home Z heads	After changing Auto/All Setting.		

MSG #	Message	Description	Param	Module
1565	Waiting for Spindle Ready	waiting for spindle ready sensor. The system is waiting for the spindle to stop moving. Allow the system time to end spindle movement and continue.		
1566	All	3 All indicator when in ALL mode on multi-headed machine.		
1567	Invalid value must be <	30 When entering number for Tool Comp that is out of range.		
1568	UP	Dry Run mode, tool is in up position.		
1569	DN	Dry Run mode, tool is in down position.		
1570	Error changing baud rate	Failure when trying to change baud rate of host port for barcode reader.		
1571	Rip Cut Mode:	Rip Cut banner.		
1572	Cut	Rip Cut Mode = Cut.		
1573	Jog	Rip Cut Mode = Jog.		
1574	Surface to Toggle	Rip Cut Mode (help message for toggling between Cut and Jog)		
1575	Range: 3 to	Cut Utils Polygon (Number of sides)		
1576	Check Spindle Cover.	Dust Collector Hood open detected by CE Safety. If the CE Safety input is used (turned on) when the spindle is on.	221	
1577	Too many Modbus Timeouts.	Error when Too many modbus timeouts occur. For modbus communication, if a slave is experiencing modbus communication errors, it will be disabled.		
1578	See Inverter for More Info. Reset Drives?	When Inverter Fault occurs.		
1579	Found, Configuring as Type	When Loading inverter with parameters.	300	

MSG #	Message	Description	Param	Module
1580	Communication Error with Inverter	The inverter could not be communicated with over modbus. Verify the inverter settings are correct. Inverter nnn is not detected. Check communication with the Inverter by sending a loopback command to detect the Inverter. The data returned is compared with the data sent. If the data are not equal, the error will continue.		
1581	Jogging	Title of Paused menu when H/W pause activated when jogging.		
1582	Paused... OverTemp	Title of Paused menu when Drives Overtemp causes machine to pause.		
1583	Communication Error Detected	The system detects a Framing or Host Overflow Error. The job will continue until the next motion buffer is completed before issuing an error message of "Communications Framing Error" or "Communications Host Overflow." This is only applicable to serial communications.		
1584	ATCB Failure.	Automatic Tool Change Board failure.		
1585	SP A=	Main Screen Spindle Amps =		
1586	*YIELD*	Message when user presses PAUSE during Cycle start.		
1587	Drill #	Drill Test, asking what drill to fire.		
1588	Invalid Drill #	Drill Test, invalid drill number entered. The drill number has to be 1 to Number of Drills setting.	175	
1589	Move to Z Drill Offset? Press ENTER to Move	Drill Test, if Param 209 is set, asking to move to offset.	209	
1590	Firing Drill	Drill Test, Firing Drill.		

MSG #	Message	Description	Param	Module
1591	Gang Drill Test	Gang Drill Test	149	
1592	.=Turn on/off Z=raise/lower bank	Gang Drill Test, key definitions. (pad out to be on 2 lines)		
1593	Tool # to Calibrate:	ATC CalTool Asking for tool number to calibrate.		
1594	Calibrating Tool:	ATC CalTool, Title when calibrating tool.		
1595	Tool Calibrated.	ATC CalTool After calibrating tool		
1596	Tool NOT Calibrated	ATC CalTool After user presses Cancel when calibrating tool.		
1597	Tool99 Device Not Up	ICUT Tool 99 device not retracted.		
1598	Cancel for NO Warmup	After finding home, asking for spindle warmup.		
1599	Unavailable during MOTION..	Full ATC Menu or key function not available during motion.		
1600	Unavailable during Tool Change.	ATC Commands unavailable during tool change.		
1601	Please Check Tool Changer	ATC MT Style Tool changer not in correct position. (followed by msg 1609)	127	
1602	Tool Changer NOT Extended!	ATC MT Style Tool Changer not extended.	127	
1603	Tool Changer NOT Retracted!	ATC MT Style Tool Changer not retracted.	127	
1604	Dust Collector NOT Open!	ATC Dust Collector not open. The dust collector sensor ATCB L7 is not active. Check the dust collector sensor. If there is no dust collector sensor, set the Flash location 201 to 0.	201	
1605	Please Check Tool	ATC Tool not properly seated in spindle. The Chuck Sensor recognizes that a tool is not in the correct place in the chuck. Double-check the location of the tools in the chuck and correct as needed.		

MSG #	Message	Description	Param	Module
1606	Paused Tool Change	ATC Paused during a tool change. (followed by msg 1609)		
1607	Remove Tool	ATC Manual Tool Change, Remove Tool		
1608	Insert Tool	ATC Manual Tool Change, Insert Tool (tool number will follow)		
1609	(ENTER to continue)	ATC Various Places. (usually displayed on last line.)		
1610	(cancel to ignore)	ATC Cancel to ignore status of chuck and exit.		
1611	Chuck Did Not Open.	ATC Chuck Did not open. (followed by msg 1609) The Chuck Open sensor is not active. If there is NO chuck open sensor, you can by pass this check by setting parameter 145.	145	

MSG #	Message	Description	Param	Module
1612	Tool NOT Loaded!	ATC Tool Not loaded (followed by msg 1609) The Tool Loaded sensor is either not active or is indicating that a tool is not loaded. Check parameter 125. Use parameter 145 to ignore. **Parameter 125 set to 0** DCN #2 = ON -and- DCN #13 = OFF **Parameter 125 set to 1 (New Spindles)** **Parameter 125 set to 6 (HSD ESnnn Spindles)** DCN #2 ON = Tool Loaded **Parameter 125 set to 2 (Euro Spindles)** **Parameter 125 set to 3 (Omlat Spindles)** **Parameter 125 set to 5 (DLS 90 Spindles)** DCN #2 ON -and- DCN #3 ON = Tool Loaded **Parameter 125 set to 4 (RPD-24 Setup)** DCN #3 ON = Tool Loaded **DCN #2 mappings** ATCB L2 Input (HIG1 Pin 5) RIO IN2 Input (H1 Pin 4) RPD-24 Drill 2 Input (H9 Pin 10) **DCN #3 mappings** ATCB L3 Input (HIG1 Pin 8) RIO IN3 Input (H1 Pin 6) RPD-24 Chuck Closed Input (H9 Pin 4)	125, 145	
1613	Chuck NOT Closed!	ATC Chuck Not Closed. (followed by msg 1609)		

MSG #	Message	Description	Param	Module
1614	Chuck Not Empty, Please Unload Tool	ATC Chuck not empty. The chuck sensor recognizes a tool is still in the chuck based on Flash location 126 and input Chuck Closed (H9:4). Make sure the tool is removed from the spindle and make sure the Chuck Closed input (H9:4) is on and glowing green. You can bypass the checking of the tool loaded sensor by setting parameter 145.	126, 145	
1615	Check Tool Spindle 2	DUAL ATC 2nd Head, Check Tool		
1616	Chuck 2 Did Not Open	DUAL ATC 2nd Head, Chuck not open.		
1617	Chuck 2 Not Closed!	DUAL ATC 2nd Head, Chuck not closed.		
1618	Chuck 2 Not Empty Please Unload Tool	DUAL ATC 2nd Head, Chuck not empty		
1619	Opening Chuck	Pad out, Using key to open chuck.		
1620	Closing Chuck	Pad out, Using key to close chuck.		
1621	Opening Chuck 2	Pad out, Opening Chuck 2nd head.		
1622	Closing Chuck 2	Pad out, Closing Chuck 2nd head.		
1623	8 = Open	Pad out, Key to press to open chuck.		
1624	2 = Close	Pad out, Key to press to close chuck. Line up with msg 1623.		
1625	CANCEL to Exit	Pad out, Cancel to exit open/close chuck operation.		
1626	Tool # to Adjust:	ATC asking for tool number to adjust calibration.		
1627	Adjusting Tool:	ATC When adjusting tool (tool number will follow)		
1628	Tool Adjusted	ATC After adjusting tool.		
1629	Tool NOT Adjusted	ATC After adjusting tool.		
1630	Please Check Tool 21	ATC Aux Tool not correctly in spindle (followed by msg 1609)		
1631	Surface Tool #?	ATC Asking for tool number to surface		

MSG #	Message	Description	Param	Module
1632	Surfacing Tool:	ATC When surfacing tool (tool number follows)		
1633	Use Tool #?	ATC Asking for tool number for table mill.		
1634	Please Unload Tool	ATC At end of spindle test, ask user to unload tool.		
1635	Please Unload Tool from Spindle 2	ATC At end of spindle test, ask user to unload tool.		
1636	Open Chuck Sensor Activated	ATC Start of spindle test and Open Chuck Sensor is on.		
1637	Insert Tool into Spindle 2	ATC Start of spindle test, ask user to insert tool.		
1638	Auto Unload Tools?	ATC Unload Tools title.	198	
1639	1) Unload Tool Now 2) Disable Unload 3) Re-Enable Unload Select Number		198	
1640	Unloading Tool	ATC Unloading tool banner.	198	
1641	Disabling Auto Unload at END-OF-JOB	ATC Disabling Auto unload at end of job.	198	
1642	Enabling Auto Unload at END-OF-JOB	ATC Enabling Auto unload at end of job.		
1643	Not a Rotary ATC Machine!	ATC Asking to Load Tools and but machine is a Linear ATC. Check parameter 75 to make sure it is set properly.	75	
1644	Location to load?	ATC Load Tools, asking for what tool location to load.		
1645	Return All Tools To Tool Holder	ATC Before homing, asking to put away tools.		
1646	Remove Tool from Spindle 2	ATC Before homing, asking to put away tools.		
1647	Enter Tool # for No Spin	ATC No Spin, Asking for tool	109	
1648	Set to 0 to disable	ATC No Spin and Lube Time, Press 0 to disable no spin.		
1649	Max:	When setting cut depth (space over to align with message #1229)		
1650	RPM:	To display RPM during Spindle Warmup.		
1651	Missing Gang Drill Calibration Module	Number of Gang Drills > 0 but Cal Module not loaded.	149	
1652	Checking Origin	Testing Origin		

MSG #	Message	Description	Param	Module
1653	Find Limits Failed!	Testing Find Limits failed.		
1654	Origin Error Axis	Testing Origin Error on axis.		
1655	Origin OK Axis	Testing Origin Axis within tolerance		
1656	Press EXIT To Return	Testing Origin, At end of test asking to press exit to return.		
1657	Are you sure you want to CANCEL?	ATC User presses cancel to abort check.		
1658	Current Mode:	DUAL ATC Master Slave Current mode.		
1659	Master and Slave	DUAL ATC Master and Slave		
1660	Master	DUAL ATC Master		
1661	Mode Changed to:	DUAL ATC Master slave mode.		
1662	Press ENTER for	DUAL ATC Master Slave mode, asking to press enter to change modes.		
1663	#1 Open 2=Close	DUAL ATC Opening/Closing chuck.		
1664	#1 Closed 8=Open	DUAL ATC Opening/Closing chuck.		
1665	#2 Open 3=Close	DUAL ATC Opening/Closing chuck.		
1666	#2 Closed 9=Open	DUAL ATC Opening/Closing chuck.		
1667	Deg.	Degrees rotation a part.		
1668	Home out of range	Going home and home is out of range.		
1669	Can't find second X limit, abort homing.	Homing failure on X. The controller has checked its maximum of 2.0" after finding the first limit without being able to find the second limit.		
1670	Can't leave second X limit, abort homing.	Homing Failure on X. The system has moved beyond its maximum of 2.0" to look for the second limit and has lost the coordinates of the first limit.		
1671	Can't leave Y limit abort homing.	Homing Failure on Y		
1672	Can't leave YB limit abort homing.	Homing Failure on Yb		
1673	Can't leave Z limit abort homing.	Homing Failure on Z		
1674	Checking...	Used when checking an input.		

MSG #	Message	Description	Param	Module
1675	Lube Every	Lube Time		
1676	Enter Lube Duration	Lube Duration		
1677	Last Lubed	Hours since last lubed.		
1678	Lubing...	Actual oiling.		
1679	Select Z Config:	STD Auto/All mode selection		
1680	Auto	STD Auto/All mode selection		
1681	All (1 & 2)	STD Auto/All mode selection		
1682	All (1 & 2 & 3)	STD Auto/All mode selection		
1683	All (1 & 2 & 3 & 4)	STD Auto/All mode selection		
1684	Auto/All (1&3, 2&4)	STD Auto/All mode selection		
1685	Select ATC Config:	DUAL ATC Select ATC Config.		
1686	Auto	DUAL ATC ATC Config selection		
1687	ATC #1 Only	DUAL ATC ATC Config selection		
1688	ATC #2 Only	DUAL ATC ATC Config selection		
1689	ALL (ATC #1 & #2)	DUAL ATC ATC Config selection		
1690	Z Sync	STD Auto/All Sync Z mode menu title		
1691	Z Sync Mode Currently:	STD Auto/All Sync Z mode.		
1692	?=System Status	Press ? to display system status.		
1693	Spindle Current Level Exceeded.	ROUTER when torque limit exceeds specified value. The current of the spindle has exceed the values specified for SPA Trig and SPA Time set on the controller.		
1694	Enter Max Current Level in amps:	ROUTER Max Current limit before we pause.		
1695	Enter Time at Max Current:	ROUTER Time at Max Current before pausing.		
1696	Enabling Motor Drives...	When enabling the motor drives.		
1697	Move to last Paused Position?	When paused because of Max Torque.		
1698	Select Head 2	STD Auto/All mode selection		
1699	MaxDepth	Safety menu Max Depth.		
1700 - 1750 Knife and Knife module, 600-649 also used for knife (mh_knife_module.uc and knife_cartridge.uc modules).				

MSG #	Message	Description	Param	Module
1700	Enter Knife Down Delay	KNIFE Entering Knife down delay.		
1701	Enter Knife Up Delay	KNIFE Entering Knife up delay.		
1702	Enter Closeness?	KNIFE Entering Closeness.		
1703	Enter Max Rotation without Lifting?	KNIFE Entering Max Rotation without lifting in degrees.		
1704	Finding Knife Home	KNIFE Finding knife home.		
1705	Knife Test	KNIFE Knife test menu item.		
1706	KnifeEnabled :	KNIFE Knife enabled menu item.		
1707	K Axis (deg)	KNIFE When jogging, shows degrees		
1708	Use Enter to Enter #	KNIFE When jogging, Use ENTER to Enter #		
1709	Use Z keys to Jog	KNIFE When jogging, Use Z keys to Jog.		
1710	Jog to Knife Offset Press ENTER	KNIFE Jog to knife offset Press ENTER		
1711	Changing Knife Offset	KNIFE Changing Knife offset		
1712	From	Knife When changing knife offset		
1713	to	Knife SHOULD BE SAME LENGTH AS Message number 1712		
1714	Set Knife Resolution?	Knife Set Knife Resolution?		
1715	Changing Knife Res	Knife Changing Knife Res.		
1716	Enter number of Revs	Knife Enter number of Revs.		
1717	KnifeRes	KnifeRes menu item		
1718	Enter Knife Lift?	Knife Enter Knife Lift?		
1719	Enter Knife Number?	Knife Enter Knife Number.		
1720	Knife Lift :	Knife Lift menu item.		
1721	Knife Cut Depth	Knife Cut Depth menu item.		
1722	Enter Cut Depth?	Knife Cut Depth		
1723	Knife Slider Test	Knife Slider Test		
1724	Calibrate and Surface Tool #1 First.	When calibrating knife.		
1725	Calibrate to Surface	Knife when calibrating knife tool		
1726	Turn on Oscillating Knife?	Knife when Calibrating or Surfacing knife.		
1727	Knife Cut Depth	Knife when setting Cut Depth.		
1728	Knife NOT Z Controlled	Knife when trying to set max depth.		
1729	Min. Radius :	Knife Minimum radius before lifting.		

MSG #	Message	Description	Param	Module
1730	Enter Minimum Radius	Knife when setting minimum radius		
1731	Knife 2 Depth:	Knife Cut depth knife 2.		
1732	Knife 3 Depth:	Knife Cut depth knife 3.		
1733	Knife Feedrate:			
1734	Knife 2 Slider Test	Knife 2 Slider Test.		
1735	Set Knife 2 Res.	KnifeRes menu item		
1736	Knife Osc Test	Knife Osc Test		
1737	Calibrate Cartriges	Knife Calibrate Cartridge menu		
1738	Surface Cartridges	Knife Surface Cartridges menu		
1739	Cartridge Offsets	Knife Cartridge Offsets menu		
1740	Cartridge Config.	Knife Cartridge Configuration menu		
1741	KnifeUtil	Knife Utility Menu.		
1742	Move to Knife Offset	Knife Utility menu Move to Knife Offsets.		
1743	Enter Cartridge #	Knife Enter Knife Cartridge#		
1744	Knife Z Ctrl :	Knife Z Control menu		
1745	Osc. Stroke :	Knife Oscillator Stroke Distance.		
1746	Enter Osc. Stoke	Knife Setting Oscillator Stroke distance.		
1747	Set Closeness	Knife Setting Closeness		
1748	Set Rotate Degree	Knife Setting Rotation Degree		
1749	Set Min. Radius	Knife Setting Minimum Radius.		
1750	Set Home w/Knife 1	Knife Menu item.		
1751 - 1799 Used for Vision Module (MultiVision.uc) 2300-2399 are additional Multivision Messages				
1751	Timeout	Vision Timeout error		
1752	Incorrect number of values	Vision Incorrect number of values.		
1753	Zero bytes read	Vision Zero bytes read.		
1754	Judgement value = 0	Vision Judgement value = 0		
1755	Zero Bytes sent	Vision Zero Bytes sent		
1756	Could not select fiducial.	Vision Could not select fiducial.		
1757	Could not save fiducial.	Vision Could not save fiducial.		
1758	User Cancelled save.	Vision User Cancelled save.		

MSG #	Message	Description	Param	Module
1759	Did not connect to Camera.	Vision Did not connect to Camera.		
1760	Mark not found, jog to mark	Vision Fiducial mark not found.		
1761	Finding Fiducial...	Vision Finding Fiducial....		
1762	Could not find mark	Vision Could not find mark.		
1763	Enter Fiducial Num:	Vision Enter Fiducial Number.		
1764	Set Camera Scale	Vision Menu Set Camera Scale		
1765	Press Enter to begin calibration.	Vision Press Enter to begin Calibration		
1766	Enter Move Size?	Vision Enter Move Size?		
1767	Select Fiducial	Vision Menu item Select Fiducial		
1768	Create New Fiducial	Vision Menu item Create New Fiducial		
1769	Distance to search	Distance to search before giving up and finding fiducial manually.		
1770	Vision	Main Vision Menu.		
1771	Set Camera Offsets	Vision menu to set camera offsets		
1772	Move to Cam Offsets	Vision menu to move to camera offsets.		
1773	Poor Correlation, jog to mark	Vision Judgement value out of range.		
1774	Use PC to select and save fiducial.	Vision .		
1775	Saving Fiducial...	Vision When saving fiducial.		
1776	Focus Camera	Vision Menu Focus Camera		
1777	Settling Time:	Vision Menu Settling delay how much to delay to keep camera from shaking.		
1778	Retake Dist :	Vision Menu Retake Distance.		
1779	Jog to Fiducial	Vision when asking user to find fiducial		
1780	Remember Fidcial Number?	Vision when selecting fiducial, ask to remember.		
1781	Auto Find Setting	Vision Menu to Auto Search for Fiducial.		
1782	Correlation :	Vision Menu for Correlation values.		
1783	Invalid Fiducial Number	Vision when selecting fiducial		
1784	Auto Focusing...	Vision when auto focusing.		
1785	Enter=Set	Vision Used when calibrating camera.		
1786	Camera Calibrated	Vision Camera Calibrated.		
1787	Camera Not Calibrated	Vision Camera not Calibrated.		
1788	Unload Tool?	Vision asking to unload tool if ATC.		

MSG #	Message	Description	Param	Module
1789	Calibrate and Surface Tool #1 First.	When calibrating vision tool.		
1790	Calibrate to Surface			
1791	Verify Camera offset Press Enter to Adj.	Vision when moving to camera offsets.		
1792	Manual Find Setting	Vision Menu to Manual Jog either Camera or Bit.		
1793	Find Fiducial Mode	Vision menu find fiducial mode (center or fiducial)		
1794	Connection Test	Vision menu connection test with camera.		
1795	Checking Connection	Vision Connection test		
1796	Calibration Aborted.	Vision calibration aborted.		
1797	Press Enter to Mark a fiducial at the current home.	Vision when setting		
1798	Fiducial Diam:	Vision menu asking for Diameter of Fiducial.		
1799	Skip this fiducial?	Vision, asking user if the with to skip this fiducials.		
1800 - 1850 Used for self_test				
1800	Initiating Self Test	SelfTest Start message (version will follow)		
1801	Rectangle Test	SelfTest Rectange Test (number preceeds message)		
1802	Surface Block Test	SelfTest Surface Block Test title.		
1803	Press a key to start Surface Block test	SelfTest Start of Surface Block Test.		
1804	Skipping Block Test	SelfTest Skipping Surface Block Test.		
1805	Block:	SelfTest Surface Block.		
1806	Switch:	SelfTest Surface Switch.		
1807	ACTIVE	SelfTest Surface Block Active		
1808	INACTIVE	SelfTest Surface Block InActive		
1809	MODBUS Inverter Test	SelfTest Modbus Test.		
1810	RPM :	SelfTest Modbus Test RPM		
1811	ERRORS:	SelfTest Modbus Test CRC Errors.		
1812	MODBUS Failed.	SelfTest Modbus Test Failed.		
1813	MODBUS Passed.	SelfTest Modbus Test Passed.		
1814	Press START Execute	SelfTest Start of Selftest.		
1815	Number of Origin Tests ?	SelfTest Asking for number of origin tests.		
1816	Number of Rectangle Repetitions?	SelfTest Asking for Number of rectangle tests.		

MSG #	Message	Description	Param	Module
1817	Communications Test	SelfTest Serial Communication test title		
1818	Skipping Comm Test	SelfTest Skipping Serial Communication test.		
1819	Testing	SelfTest Comm Test Testing		
1820	Bad character.	SelfTest Comm Test Character receive was not character sent.		
1821	No echo character received.	SelfTest Comm Test, no character received.		
1822	Motion Test...	SelfTest Motion Test.		
1823	Test ATC Tool Changing?	SelfTest ATC Tool Test.		
1824	START or CANCEL	SelfTest ATC Tool Test asking to start test.		
1825	ATC Tool Test...	SelfTest ATC Tool Test, Title when testing.		
1826	Testing Tool	SelfTest ATC Tool Test, Testing (tool number follows)		
1827	Skipping Motion Test	SelfTest Motion Test, skipping		
1828	Origin Test...	SelfTest Origin Test, (number preceeds message)		
1829	Skipping Origin Test	SelfTest Origing Test, Skipping		
1830	Error Occurred In Self Test	SelfTest At end if error occurs.		
1831	End Self Test	SelfTest The End.		
1832	Number of ATCB tests	SelfTest Asking number of ATCB tests.		
1833	Num Z Moves:	SelfTest Asking number of Z moves duing Z test.		
1834	Motion Z...	SelfTest Motion Z menu		
1835	Skip	No Error.		
1836	OK	Error occurred.		
1837	ERROR	Error occurred.		
1838	Serial Comm :	Results from Self Test (serial Comm)		
1839	Surface Block :	Results from Self Test (Surface Block)		
1840	Parameters :	Results from Self Test (Parameters)		
1841	Inverter Comm :	Results from Self Test (Inverter Comm)		
1842	Tool Change :	Results from Self Test (Tool Change)		
1843	Motion :	Results from Self Test (Motion)		
1844	Press Enter to begin	Self Test at start of test.		
1845	Remaining	During Key test, how many keys are remaining.		
1846	Parameter Check	Selftest Checking Parameters.		

MSG #	Message	Description	Param	Module
1847	Keypad Test...	SelfTest keypad test.		
1848	Modbus Test...	SelfTest Modbus Test.		
1849	ATCB Test...	SelfTest ATCB Test...		
1850	Remove SelfTest Menu	Removes Self Test menu.		
1851 - 1899 Used for Teknic module				
1851	Teknic Comm Error.	Error when communicating to Teknic Drives.		
1852	Blink Count			
1853	Over-Current/Voltage Shutdown. Incoming line voltage too high.	Blink count 3		
1854	Over-Temperature Shutdown. Drive Temp at rated limit. Chk drive fans.	Blink count 4		
1855	Tracking Shutdown Tracking limit exceeded. Confirm feed OK for bit. Chk for Low incoming voltage.	Blink count 5		
1856	RMS Shutdown Motor Torque reqmt too high. Confirm feed OK for bit. Chk for mech bind/drag.	Blink count 6		
1857	Encoder Signal Problem. Confirm motor conx seated properly. Chk for visible cable damage	Blink count 7		
1858	Step Failure Servo Drive problem 8. Call Customer Service.	Blink count 8		
1859	Commutation Signl Problem. Confirm motor conx seated properly. Chk for visible cable damage	Blink count 9		
1860	ADC Failure Servo Drive problem 10. Call Customer Service.	Blink count 10		

MSG #	Message	Description	Param	Module
1861	EE Needs Initializing. Call Customer Service.	Blink count 11		
1862	EE H/W Failure Servo Drive problem 12. Call Customer Service.	Blink count 12		
1863	Vector Setup Error. Confirm motor conx seated properly. Chk for visible cable damage	Blink count 13		
1864	Current Sensor fault Servo Drive problem 14. Call Customer Service.	Blink count 14		
1865	Logic Power Backed up.			
1866	Power up position window exceeded.			
1867	Excessive slip between Load and Mtr Position.			
1868	Over-Current Shutdown.			
1869	Over-Voltage Shutdown.			
Teknic messages for Eclipse drives.				
1870	Count 2: Drive is OK Safety stop basis: High motor temp or Comm. sensor short. Possible root causes Mechanical bind. Excessive cut speed. Short/noise			
1871	Count 3:			
1872	Count 4: Drive is OK Safety stop basis: High drive temp. Possible root causes Cabinet fans off. Cabinet filter clog. Excessive cut speed.			
1873	Count 5: Drive is OK Safety stop basis: Tracking error exceeded. Possible root causes Mechanical problem. Low bus voltage. Command too fast.			

MSG #	Message	Description	Param	Module
1874	Count 6: Drive is OK Safety stop basis: RMS torque too high. Possible root causes Mechanical problem. Motor cable short. Command too fast. Bus voltage problem. Dull or wrong tool			
1875	Count 7: Drive is OK Safety stop basis: Encoder signal error Possible root causes Damaged motor cable. Loose connection. Lost ground. Motor failure.			
1876	Count 8: Drive is OK Safety stop basis: Both limits asserted Possible root causes E-stop engaged. Controller cable bad			
1877	Count 9: Drive is OK Safety stop basis: Bad hall sensor state. Possible root causes Bad ground. Motor cable damage. Failed motor.			
1878	Count 10:Drive is bad. Replace drive.			
1879	Count 11:Drive is OK Safety stop basis: Firmware corrupted. Action needed: Reload firmware.			
1880	Count 12:Drive is bad. Replace drive.			
1881	Count 13:Drive is OK Safety stop basis: Corrupt motor file. Action needed: Reload motor file.			
1882	Count 14:Drive is bad. Replace drive.			
1883	Count 15:Drive is OK Not an error. Drive in 5v backup. DC bus is off or low			

MSG #	Message	Description	Param	Module
1884	Count 16:Drive is OK Safety stop basis: Beyond recovery window. Action needed: Re-home machine.			
1885	Count 17:Drive is OK Safety stop basis: Coupling error. Possible root causes Mechanics slipped. Mechanics failed. Load encoder bad.			
1886	Count 18:Drive is OK Safety stop basis: Max bus amp exceeded Possible root causes Motor cable short. DC bus problem. Bad power supply. Motor short-internal			
1887	Count 19:Drive is OK Safety stop basis: Bus voltage exceeded Possible root causes Bus DC high. Regen circuit bad. IPC wired wrong.			
1888	Count 20:Drive is OK Safety stop basis: Step input noise. Possible root causes Bad controller cable Bad ground. Bad filter setting.			
1889	Count 21:Drive is OK Safety stop basis: Load encoder violation. Possible root causes Bad load encoder cable. Noise - lost ground			
1892	Count 24:Drive is OK Safety stop basis: Run time error or F/W fuse tripped. Possible root causes Motor cable shorted. DC cable bad. DC voltage too high Current spikes			
1901	System Interrupt:			
1902	Power Fail.			
1903	Out Of Bounds			

MSG #	Message	Description	Param	Module
1904	Communications Framing Error	The controller detects a Framing Error, usually caused by noise resulting from a parity error, when receiving a job or file through DNC, MX, etc. This is only applicable when using Serial Communications.		
1905	Communications Host Overflow			
1906	Limit System Short Circuit Detect			
1907	ERROR: Firmware Checksum Failure!			
1908	ERROR: Invalid Firmware!	The Init files and Firmware do not match. Upgrade the Firmware to the version specified.		
1909	Emergency Stop Activated	The Emergency Stop button is pressed. Pull out the Emergency Stop button and reset Hard Home.		
1910	Parameter error:			
1911	Machine Not Homed!	The operator has not found Home. The machine loses its Home position upon first boot, after an Emergency Stop, or after a system interruption. The machine is required to be homed to perform many operations.		

MSG #	Message	Description	Param	Module
1912	Limit Still Active	The system shows the system is still active when it queries to make sure the limits are OK before starting such functions as DNC, Test Cut, etc. Check the configured limits and rehome. See "System Interrupt" for more information on Configured Limits	27	
1913	Check E-Stop!	The Emergency Stop button is pushed in. Make sure the button is pulled out. On the M24 check the E_Stop LED to make sure it is on and glowing green (input H7:10). On the M2521/M2621, you can check for the flashing blue led. You can also run "***stat***" from Motion Mechanic to get more information on which Emergency Stop circuit is active.		
1914	Pull Out E-Stop	The Emergency Stop button has been pushed. Pull the Emergency Stop button and re-home the system.		
1915	Missing or Loose Motor Cable	Cable connection is missing or loose. Only checked on express systems. • Check the wiring. • Complete a continuity test on the motor end and the cabinet end.		

MSG #	Message	Description	Param	Module
1916	Host Not Responding!	DNC or JobServer is **not** running on the host PC, or the controller cannot communicate with DNC or JobServer. • Make sure DNC or JobServer is active on the host PC and is in the Idle state. • Double-check the connection settings. • Try to communicate using MX32 or MotionMechanic. • Run the comt.uc test if the system is connected via serial port. • Check the Host Cable. • Check the FIFO settings on the Host PC. Receive = MAX, Transmit = MIN • Replace the MAX202 communication chip		
1917	Please wait, Resetting Spindle Drives.			
1918	MODE NOT PRESENT!	The system has both H4STD and H4ATC stored, and the operator has requested a number other than 1 or 2. Choose 1 or 2 to load.		
1919	NO MODES ENABLED!	STD or ATC module has not been stored in File location 2.		
1920	Motor Drives NOT Enabled.	The informational message indicates that the motor drives are **not** enabled. Wait for the message to default to the main screen and press Drive Enable		

MSG #	Message	Description	Param	Module
1921	Motor Drives Enabled...	The informational message indicates that the motor drives are enabled and ready for use. Wait for the message to default to the main screen before finding Home.		
1922	Motor Drives Disabled...	The Motor Drives have become disabled to prevent any erroneous motion from occurring due to the following actions: • Emergency Stop pressed • Drive Disable Hot Key pressed • Power failed • Shutdown selected through the menu system • System Interruption detected		
1923	ERROR: Inverter parameter file Not found.	The inv_params.uc file has **not** been loaded into file location 5 on the controller, and MODBUS has been enabled (Flash location 196 set to 1). Make sure inv_params.uc file is loaded when MODBUS is enabled.	196	
1924	Did not detect Surface Block	The system reached the Z max stroke before detecting the Surface Block during Auto Surfacing.	11	
1925	Drive System Short Circuit On XY			
1926	Drive System Short Circuit On ZQ			
1927	ACB not Detected!			

MSG #	Message	Description	Param	Module
1928	Hardware Pause Active...	The Hardware Pause input is active when booting or trying to continue from Pause.		
1929	Tool number < 0 --OR-- Invalid Tool Number	For every tool change, the tool number is validated. The tool number cannot be < 0. But, it also has to be a valid tool. The valid tools are: Tool 0 through 60, Tool 61, 62, 63 knife tools, Tools 66, 67, 68 drill tools, Tools 96, 97 misc tools, Tools 98 ink jet tool, Tool 99 vision tool.		
1930	Inverter Over Current (OC)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1931	Inverter Over Voltage (OV)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1932	Inverter Over Load (OL2)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1933	Inverter Over Heat (OH)	Inverter Fault Refer to the Inverter Technical Manual for more information.		

MSG #	Message	Description	Param	Module
1936	Inverter PID Feedback Loss (FbL)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1937	External Fault (EF3)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1938	Hardware Fault (Fxx)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1939	Motor Overload (OL1)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1940	Overtorque Detection(OL3)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1942	Power Loss (UV1)	Inverter Fault Refer to the Inverter Technical Manual for more information.		

MSG #	Message	Description	Param	Module
1943	Control Power Fault (UV2)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1944	Comm Timeover (CE)	Inverter Fault Refer to the Inverter Technical Manual for more information.		
1945	Chk Wiring and Drive Parameters			
1946	Chuck Not Closed!			
1947	Error Loading Material.			
1948	Error updating Library.			
1949	Defaulting Parameter	The controller will automatically default any settings that are not currently set in order to alert the operator that the parameters have not been set. Set or validate the parameters.		
Help Messages				
NOTE 1950-1999 is used for EDGESCAN_TWOTECH.UC or RAPIDSHAPE.UC				
1950	Help: Press Any Key			
1951	Adjust Step Size			
1952	Go Home			
1953		Blank Line this one will be used to clear the display after help.		
1954	Set Home			
1955	Start Auto Scan			
1956	Toggle Spline/Linear			
1957	Toggle 2D/3D state			

MSG #	Message	Description	Param	Module
1958	Start ARC			
1961	Exiting Help			
1962	Enter a Point			
1963	Finish Digitizing			
1964	Toggle PU/PD state			
1965	Flush Buffer			
1966	Backup one point			
1967	Adjust the Jog Speed			
1968	Pause Auto Scanning			
1970	Feature Not Enabled	RapidShape Feature not enabled.		
1971	Found Start Contour	RapidShape Found Start Contour		
1972	User Paused	RapidShape User Paused		
1973	Could not find edge	RapidShape Could not find edge.		
1974	Lost Edge	RapidShape Lost Edge		
1975	Too Many Points	RapidShape Too Many Points		
1976	Prev Point Too Close	RapidShape Prev Point too close.		
1977	2D Digitizing	RapidShape Menu 2D Digitizing.		
1978	3D Scanning	RapidShape Menu 3D Scanning		
2000-2099 Laser Only Messages				
2000	Tip Pause :	Params 2D Tip Pause :		
2100-2299 Plasma Only Messages				
	Plasma Surface option not enabled!		148	
	No Plasma Heads Installed!		1400	
	Selected Tool does not surface.		55	

MSG #	Message	Description	Param	Module
2300-2399 Additional Multivision Messages 1751-1799 Are the other Multivision messages.				
2300	Camera Offset set to	Vision when setting camera offsets		
2301	Fiducial Offsets	Vision when setting camera offsets		
2302	Error saving Fiducial Offsets	Vision when setting camera offsets.		
2303	Current Scale Values	Vision when setting camera scale.		
2304	Error saving Scale.	Vision, when error occurs setting scale value to PC		
2305	Fid Diameter Found:	Vision when setting scale, it verifies fiducial diameter setting.		
2306	Change Diameter?	Vision when setting scale, asking if user wants to change diameter.		
2307	Adj Cam Offset From	Vision Move to offsets validates offsets and asks if you want adj.		
2308	Camera offsets adjusted.	Vision Move to offsets, camera offsets adjusted.		
2309	Camera offsets NOT adjusted.	Vision Move to offsets, camera offsets not adjusted.		
2310	Flip to Cut :	Vision, menu item Flip to Cut.		
2311	Flip Material	Vision asking user to flip material.		
2312	Jog camera down to be in focus.	Vision Jog camera to be in focus.		
2313	Camera Focused.	Vision at end of setting focus.		
2314	Optimized based on Field Of View to	Vision when setting Auto Find Distance.		
2315	>>Jog Tool to Fid. Jog Camera to Fid.	Vision, 2 lines to select how to jog to find fiducial.		
2316	Jog Tool to Fid. >>Jog Camera to Fid.	Vision, This message should match message #2315.		
2317	Mark not found, Press ENTER to Try to Auto-Scale.	Vision, when setting scale and mark not found.		
2318	Auto Focus :	Vision Do we try to Auto Focus.		
2319	MatlThickness:	Vision, Material Thickness Offset.		
2320	Press 5 for Camera View	Vision, Focusing camera, show preview on KDM20g.		
2321	Rendering View	Vision, Focusing camera, rendering preview.		
2322	Camera View	Vision, Focusing camera, Camera view.		
2323	.=Zoom	Vision, Focusing Camera view, Zoom		

MSG #	Message	Description	Param	Module
2324	?=Digitized	Vision, Focusing Camera view, Digitized view.		
2400-2450 Bevel Head Module				
2400	Bevel Head	Bevel Head menu Title		INI_BEVEL_CUT
2401	Jog Bevel Head	Bevel head Jog bevel head menu		INI_BEVEL_CUT
2402	Home Bevel Head	Bevel head home bevel head menu		INI_BEVEL_CUT
2403	Set Tool Length	Bevel head set tool length menu		INI_BEVEL_CUT
2404	Set Bevel Offsets	Bevel head set bevel Homing offsets menu		INI_BEVEL_CUT
2405	Set Bevel Min Travel	Bevel head set min travel menu.		INI_BEVEL_CUT
2406	Set Bevel Max Travel	Bevel head set max travel menu.		INI_BEVEL_CUT

Error Messages

0 Z Track Sensor Reading	The Z Track input does not change when setting the surface on the laser. Contact ***MultiCam*** for assistance.
1 Token Error Occurred in Job!	An unrecognized command has been checked at the beginning and end of the job and has caused a token error that is usually in connection with Motion Mechanic. This error could indicate poor communication, drop characters, or similar occurrences but is typically a typo in Motion Mechanic. Contact ***MultiCam*** for assistance.

2 ISP Stack Error Occurred in Job!	Stack errors are typically errors in the Init file. Try to record the events that led up to the stack error and report them. Contact ***MultiCam*** for assistance.
4 FSP Stack Error Occurred in Job!	Stack errors are typically errors in the Init file. Try to record the events that led up to the stack error and report them. Contact ***MultiCam*** for assistance.
8 PF Glitch Error Occurred in Job!	Power supply problems Contact ***MultiCam*** for assistance.
10 Pwr Fail Error Occurred in Job!	Power supply problems Contact ***MultiCam*** for assistance.
20 Parameter Error Occurred in Job!	A parameter either does not exist or the parameter space has been corrupted. Contact ***MultiCam*** for assistance.
24V Over Current	The M2521/M2621 or HP4 has detected a short (or over current) on the 24v system.
40 Machine Error 9742 Occurred in Job!	Notify ***MultiCam***.
Capture Failed, JS not responding.	Could happen when trying to capture a QC file using the Service menu item “Capture Flash (QC)”. Check to make sure Job Server (PSS) or Job Name Server (Suite 4) is running and has a valid Digitize folder set.

Communications Host Overflow	The communications chip has accessed an overflow of characters that exceeds the 16 byte FIFO, usually occurring when the host PC continues to send more data than the controller can handle. This is only applicable when using Serial Communications. Make sure the FIFO setting for the Com Port transmit buffer is set to 1.
Could Not Open Material Library	The Material Library file has not been loaded. Load the Material Library file or contact ***MultiCam*** for assistance.
DCN Error Detected	MODBUS failed to communicate with a device when using a DCN number for I/O. Review the Slv: to identify which MODBUS Slave failed to communicate.
DCN Mapping Error	The DCN number is either out of range or the total number of DCNs exceeds the available space. Contact ***MultiCam*** for assistance.
Duplicate IP with xx.xx.xx.xx	The controller has located another system with the same IP address. Select another IP address or contact ***MultiCam*** for assistance.
Emergency Stop Detected	The Emergency Stop button is pressed. Pull out the Emergency Stop button and reset Hard Home.

Erroneous HALT Detected!	Something other than the normal HALT line (e.g., noise or static) is causing an Emergency Stop. Contact ***MultiCam*** for assistance.
Error 28: ISP Stack Error.	Stack underflow or overflow has occurred on the ISP Stack. Contact ***MultiCam*** for assistance.
Error 29: FSP Stack Error	Stack underflow or overflow has occurred on the FSP Stack. Contact ***MultiCam*** for assistance.
Error xxxxx Occurred!	All the Error xx Occurred messages are bit oriented so it is possible to get multiple messages. For example Error 900000 Occurred means error 100000 and 800000 both occurred.
Error 80 Occurred!	The wait bits have timed out in the matrix. Contact ***MultiCam*** for assistance.
Error 100 Occurred!	The input line length has been exceeded. Contact ***MultiCam*** for assistance.
Error 200 Occurred!	A compiler error has occurred (e.g., if, else, endif, loop, repeat, select out of range). Contact ***MultiCam*** for assistance.

Error 400 Occurred!	A system error has occurred in the memory, allocation, or directory. Contact ***MultiCam*** for assistance.
Error 4000 Occurred!	An error message has issued on a serial port. This is followed by a Subcode number. 1 = Unable to reset MPG buffers in FPGA 2 = Excessive data in ethernet packet. 3 = More data than can be handled in ethernet packet. 4 = Pointer to ethernet IC buffer out of sequence 5 = Insufficient memory available to create port 29 packet. 6 = Unknown software interrupt. 7 = Gen Trap occurred. 8 = Graphical preview image size was bad. 9 = Graphical preview pict2 data did not contain a magic number. 10 = Port 29 Receive error, not all data in one packet. 11 = Port 29 packet received before previous data read. (this may happen when running VisionTool because VisionTool uses port 29 for communication) Contact ***MultiCam*** for assistance.
Error 8000 Occurred!	The proper start of the Ethernet motion matrix has not been found. Contact ***MultiCam*** for assistance.
Error 10000 Occurred!	An error has occurred in the filing motion buffer or bank. Contact ***MultiCam*** for assistance.
Error 40000 Occurred!	The controller checks for the Ethernet chip each time it boots, and the Ethernet chip is not present. Contact ***MultiCam*** for assistance.

Error 80000 Occurred!	A hardware error has occurred, and FPGA is not present. Contact ***MultiCam*** for assistance.
Error 100000 Occurred!	The C-heap has overflowed. Contact ***MultiCam*** for assistance.
Error 200000 Occurred!	An error occurred in the M-Box communications to FPGA. M2521 – Bad Battery. Contact ***MultiCam*** for assistance.
Error 400000 Occurred!	An infinite loop of system faults has caused the system to auto-reboot. Rehome the system and try again.
Error 800000 occurred!	System Error: One of the following - Illegal Opcode - Return Stack Overflow - OBI Trap. - Divide by 0. - Floating point error Contact ***MultiCam*** for assistance.
Error 1000000 occurred!	Missing Feature Key. Contact ***MultiCam*** for assistance.
Error 2000000 occurred!	

Error 4000000 occurred!	Init file took longer than 60 seconds to boot up. Could be caused by an ESTOP or System Interrupt that was triggered when booting.
Error 8000000 occurred!	Galvo System error.
Error activating X table. Error activating Y table. Error activating Z table. Error activating Xb table. Error activating Y Offset.	When trying to read and use the Table comp file, an error occurs. Check to make sure the table comp file is valid. The Table Comp files are stored in location 0.
Error Changing Baud Rate	The host port baud rate could not be changed to 9600 baud when using it for the bar code reader. Contact ***MultiCam*** for assistance.
Error: Firmware Checksum Failure!	• The controller performs a checksum on the firmware stored in Flash every time it boots up. Update the Init files if the HLDR.uc Init file is **older** than v2.03 and loaded on an H971 Rev 4 board. • If the error continues, then the Flash either has been corrupted or is starting to fail. Document the error occurrence if the failure message continues and contact ***MultiCam*** for direction on sending the board back for repair.
Error in Calibration No Move detected. Scale Not Saved.	Multivision: When trying to set the camera scale, the user is asked for a move distance. After moving and capturing the data from VisionTool, the machine and or camera did not appear to move.

Error Opening Host Port	The host port could not be opened for the bar code reader to use. Contact ***MultiCam*** for assistance.
Error Updating Library	The Material Library could not be written to Flash when updating. Try updating the Material Library again.
Error Writing file. Check file space and try again. Press Ctrl-D to exit.	The controller has run out of file space. To view the amount of available space, use **dir.** Try storing the file again. The controller will automatically recover wasted space to increase the amount of available space
Error Writing File, out of room.	When trying to save a Local DNC file, the controller ran out of file space. Delete any unused local DNC files and try again.
Fatal Error: Seglen Nex x =	The Firmware VMAX is less than the VMIN for any particular axis. Contact ***MultiCam*** for assistance.
Feature Not Enabled	The controller sends a feature key to JobServer, but JobServer does not receive it. You also might get this error is you try to run Suite4 over serial. Suite 4 only operates over ethernet. Make sure DNC is enabled on the controller.

Find Limits Failed!	The controller cannot enable motion, and the motion buffer is not defined. Make sure the Emergency Stop is **not** active. Look at the boot up messages to make sure *Motion Buffer = 5000* appears without errors
Flash Init Error	This error is reported on the KDM20g keypads. The error indicated the flash on the keypad did not properly initialize. This is a hardware failure of the Keypad.
Floating Point Exception	A floating point error has occurred because of a divide by 0 or an incorrect Flash location. This also may be accompanied with an Error 800000 Occurred. Make adjustments to Flash locations as needed.
FSP Stack Overflow	More than 32 floating point numbers have been placed on the FSP stack. Wait until the controller automatically clears the stack after this error
FSP Stack Underflow	A floating point number (fvar) was expected to be on the FSP. Contact ***MultiCam*** for assistance.
Gang Drill Not Up	The Gang Drill Up sensor shows the gang drill is not up. Contact ***MultiCam*** for assistance.

Halt Detected! Port 0 = Port 111 = CPLD ID =	Something other than the normal HALT line (e.g., noise or static) is causing an Emergency Stop. • Document the displayed numbers for Port 0, Port 111, and CPLD ID. • Contact ***MultiCam*** for assistance and refer to the displayed numbers.
HALT Function Active	The internal HALT bit is set on the controller and cannot be cleared by rebooting the system. Contact ***MultiCam*** for assistance.
Hardware Pause Still Active!	The Hardware Pause input is made active before Continuing or Cancelling from Pause. Correct the Hardware Input to inactive before selecting *Continue* or *Cancel* from the Pause screen
Invalid Firmware	The Firmware did not successfully store. Check the communication cable and try again
Invalid Fixture Number	The operator has entered an unrecognizable fixture location for where the job file will be run. Enter a valid fixture number (0-9) that is directly related to the programmed Homes on the system
Invalid Number of Z Heads: n	More than 2 Z heads were requested. Lower the number of Z heads in Flash location 65 On the M2521 systems, 4Z heads are allowed.

Invalid Z_Select	An invalid Z head was selected, which caused an internal system error. Double-check the number of Z heads in Flash location 65 and the number of Aux heads in Flash location 177 to make sure they are set correctly
Inverter Fault	A problem occurred in the Inverter. Review the additional error message that follows and further describes the type of error. The Inverter Fault is an input from the inverter to the controller. On M2521/M2621 controllers, these come into the Tool Headers on Pin 8. The signal is enabled using parameter 30 for M2521/ M2621. If you change the location of the inverter, for example if you move it from TH1 to TH2, then you have to change parameter 30 as well.
Inverter File NOT Found	The inv_params.uc file was **not** loaded into file location 5 on the controller, and MODBUS was enabled by setting Flash location 196 to 1. Contact ***MultiCam*** for assistance.
Inverter n Type m Not Found!	• Inverter n is not detected. Check the communication with the inverter. • The type of Inverter specified in Flash location 300-303 is not found in the inv_params.uc file. Make sure the type of Inverter specified is correct and that the inv_params.uc file includes the correct Inverter.

ISP Stack Overflow	More than 64 integer numbers were placed on the ISP stack. Wait until the controller automatically clears the stack after this error.
ISP Stack Underflow	An integer (ivar) number was expected to be on the ISP. Contact ***MultiCam*** for assistance.
Job Currently Rotated xx Deg.	When you start a job, it checks to see if Rotation has been enabled and warns the user. To enable rotation, set home at edge of material. Jog along material edge then press the Down Arrow.
Job Terminated by Host!	JobServer terminated the job before the controller finished the job. Reboot the machine and run the job again.
Limit Still Active or Limit Active	The system shows the system is still active when it queries to make sure the limits are OK before starting such functions as DNC, Test Cut, etc. Check the configured limits and rehome. See "System Interrupt" for more information on Configured Limits
Limit System Short Circuit Detect	A short circuit is detected in the motor drives, and all the LEDs on the LED bar are off. Contact ***MultiCam*** for assistance.

Low Air for Ram-Z Z-brake Active	The system is not getting enough air to the Z-axis cylinder to function properly. Check Ram-Z air input (M2521 Input #12). This check is only enabled if parameter 166 = 1.
Low Air Pressure	The Air Pressure is checked at location H9:2 before changing a tool on ATC systems only and is low. This check cannot be disabled. Contact ***MultiCam*** for assistance.
M Code n Is Not Implemented!	The requested M Code is not implemented in the Init file and occurs only for CNC jobs sent directly to the controller without going through the translator. Review the currently implemented M Codes: • M00 - Program Pause (system waits for the Start Key or CYCLE_START) • M01 - Program Pause (system waits for the Start Key or CYCLE_START) • M11 - 2D Pen Down • M12 - 3D Pen Down • M21 - 2D Pen Up • M22 - 3D Pen Up • M38 - Gang Drill ON • M48 - Gang Drill OFF
Max Depth Active	The configuration for Maximum Depth has restricted a move. Review the Max Depth dimensions and make changes or correct the dimensions for the move. The keypad will not indicate this error during Dry Run.

Menu Option Not Used	A menu item has been selected that is not active on the machine with the given options. Revise the command to match the menu items currently active or speak with a Sales Associate about updating the system to allow the requested action
Minimum Features Not Supported	The controller does not have all the features enabled as required by plasma units. Contact ***MultiCam*** for assistance.
Missing ATCB Module	The ATCB module has not been loaded. Contact ***MultiCam*** for assistance.
Missing Commands	The Init file requires a command that is not in the firmware. Update the firmware.
Missing MD4 Driver Store in Location xx	The MD4 driver (A-series box) requires that a hardware driver module be stored in location xx. Contact ***MultiCam*** for assistance.
MODBUS: 0 Bytes Returned	A MODBUS command was sent with no response. Check the MODBUS cable.
MODBUS: CRC Error	A MODBUS command returned a CRC error. Contact ***MultiCam*** for assistance.

MODBUS: Device Busy	The MODBUS device is still communicating. Contact ***MultiCam*** for assistance.
MODBUS: Function Error	An invalid function number was sent to the Inverter. Contact ***MultiCam*** for assistance.
MODBUS Not Enabled	MODBUS has not been enabled on the controller. Check Flash location 196.
MODBUS: Not Initialized	A command was sent to a MODBUS device before that device was initialized. This error message appears at boot up before the operator finds Home. Contact ***MultiCam*** for assistance.
MODBUS Slv## Error	The Modbus device is not responding. This is a Status Bar message. Every time you press the CANCEL key, the Modbus Device that is having issues is checked again so the message is current. The way it works is when the controller boots up, it scans the list of DCNs looking for DCNs that are mapped to modbus devices. It only checks Modbus addresses 20 through 31 because the inverters are not powered up at the time. If a DCN is mapped to a modbus device, it “pings” the Modbus device. If the Modbus device doesn't respond, it gets flagged as an error. To get more information, use one of the following 1) Shift +? then 4 for Modbus Statistics. 2) Motion Mechanic command ***scan_for_mb*** to search for Modbus Devices. 3) Service Menu item “Modbus Devices” to search for Modbus Devices

MODBUS Slave Timeout	The MODBUS device has timed out. Contact ***MultiCam*** for assistance.
MODBUS Type out of Range	An Inverter type in parameters 300-309 has moved out of range. Contact ***MultiCam*** for assistance.
MODBUS: Timed Out	A command was sent to a MODBUS device with no response. Make sure the device is turned on and has the correct address configuration.
Module Not Loaded!	The module selected has not been configured for the system. Select the correctly loaded module or contact a Sales Associate to purchase the module for the system.
MODULE REQUIRES NEWER INIT FILES	When loading a module, a command is missing from the INIT files that the module requires. Update the INIT files and try again.
Motion Not Enabled!	Motion is checked at the start of a raster job. Contact ***MultiCam*** for assistance.
Motion Drives Over Temp.	Any of the 4 motor drives has exceeded 250 F. Allow the machine to cool down to 150 F before pressing *Continue*.

Motor Fault	A Motor Drive fault has automatically caused an Emergency Stop • Check Flash location 200 and document the drives shown in the configuration. • Contact ***MultiCam*** and provide that information.
No Drills Defined!	The number of drills is set to 0 in Flash location 175, and the operator has selected the Drill Test menu item. Correct the number of drills in Flash location 175 or select an appropriate menu item.
No Features Enabled	The Feature Key in the board is invalid or not set, the incorrect feature key is set, or the controller's Flash has become corrupted. Contact ***MultiCam*** for assistance.
No File in Replay Buffer	There is no file in the replay buffer or available through DNC. Contact ***MultiCam*** for assistance.
No Machine Parameters!	The Init file does not identify the machine parameters when booting, or the machine parameters are not loaded. Store machine parameters and reboot.
0 Bounds n: nnn Press Any Key	JobServer has determined that the job is out of bounds during validation before sending the job to the controller. Correct the boundaries for the job and send it again.

Out of Bounds	The operator selected a location that is beyond the X, Y, or Z boundaries. Correct the location coordinates in the system.
OXY RIO disabled	The error is caused by the RIO at slave address 19 not responding. Verify the RIO is operating correctly. The error is reported by the rio_oxy.uc (INI_RIO_OXY) module. It checks to see if the RIO that controls the OXY functions once a second. If disabled, it reports the error then trys to re-enable it. The error could mean the RIO not communicating or the controller is not communicating.
Parameter Error 1	The integer (ivar) requested is a different type than the integer stored at that location. Enter the correct integer type.
Parameter Error 2	The floating point number (fvar) requested is a different type than the floating point number stored at that location. Enter the correct floating point number.
Parameter Error 3	The PTR requested is a different type than the PTR stored at that location. Enter the correct PTR.
Parameter Error 50	The Parameter Directory is broken. Type in *format_params* to erase the parameters and then restore the parameters file.

Parameter Error 51	The system cannot write to any Flash location. Contact ***MultiCam*** for assistance.
Parameter Error 52	The parameter does not exist. Correct the parameter or contact ***MultiCam*** for assistance.
Parameter Error 53	The parameter space is full. Delete unnecessary data.
Parameter Error 54	The parameter space has not been formatted. Access *format_params* to format the parameter space.
Parameter Error 55	The parameter number is out of range. Correct the parameter number.
Please Check Special Tool Slider	Flash locations 990-999 indicate the aggregate is on a slider, but the slider is not in the correct position. Correct the slider position.
Please Check Tool Changer (Enter to Continue)	The system checks to see if the tool changer is in an extended location or at a park position before homing. • Correct the location of the tool changer. • Make sure the Flash locations 990-999 are set to 0 if a special tool slider is active on the system.

Point Not Found!	The desired point was not found during Proximity Restart. Try to increase the tolerance by adjusting parameter 68.
Power Fail	A power failure has been detected by the system, or the controller has detected more than 5 power glitches. The following actions take place: • All motion is halted. • All devices are turned off. • Motor drives are disabled. • The Inverter is turned off. Check the +5VDC power supply. The controller will reboot after a major power glitch. If power is detected at less than 4.90 or greater than 5.10, the controller will **not** boot and the PWR LED will flash.
Remove Grounding Clip	The grounding clip used for surfacing is still attached to the system as verified by Input #2. Remove the grounding clip.
Replace Battery	The M2521 has a battery that needs to be replace. This is not a field serviceable component. The battery is currently only used for the auto lube systems. To ignore the check, set parameter 1395.
Rollers not up	This is for Roller Holddown machines.
Safety Hold 13	Communication difficulty has occurred, probably due to user error. Walk to the office and resign as Master of the Universe.

Safety Hold Active	The CE Safety Input #14 has been triggered. Contact ***MultiCam*** for assistance.
Servo Fault	One of the Servo Drives has not responded. Look at the Servo Drives to determine which one did not respond. The Servo Fault is enabled as soon as the system finishes rebooting.
Setting parameter 404 to 10, Rebooting...	Parameter 404 is the Serial Buffer. Under most circumstances, it does not need to be set any larger than 10. Setting to 10 or below allows more memory for the controller.
Spindle Overtemp	The the spindle over temperature sensor is activated. If the machine does not have a spindle over temperature sensor, set parameter 618.
Surface Not Set for Z Track Use	A Pen Down command has been issued when the Z Track sensor has not been calibrated. Calibrate the Z Track sensor and try again.
System Interrupt: XA Home	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. Param 27:1 Enables detection -- M24 (H7:1) Param 27:1 Enables detection -- M2521 (Hext Pin 1) Param 27:1 Enables detection -- HP4 (CPC Ext Pin 1) Contact ***MultiCam*** for assistance.

System Interrupt: XB Home	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. Param 27:2 Enables detection -- M24 (H7:2) Param 27:2 Enables detection -- M2521 (Hext Pin 2) Param 27:2 Enables detection -- HP4 (CPC Ext Pin 2) Contact ***MultiCam*** for assistance.
System Interrupt: Y Home	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. Param 27:4 Enables detection -- M24 (H7:3) Param 27:4 Enables detection -- M2521 (Hext Pin 3) Param 27:4 Enables detection -- HP4 (CPC Ext Pin 3) Contact ***MultiCam*** for assistance.
System Interrupt: Z1 Home	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. Param 27:8 Enables detection -- M24 (H7:4) Param 27:16 Enables detection -- M2521 (Hext Pin 5) Param 27:8 Enables detection -- HP4 (CPC Ext Pin 4) Contact ***MultiCam*** for assistance.

System Interrupt: Z2 Home	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. Param 27:16 Enables detection -- M24 (H9:6) Param 27:32 Enables detection -- M2521 (Hext Pin 6) Contact ***MultiCam*** for assistance.
System Interrupt: Z3 Home	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. Param 27:32 Enables detection -- M24 (H9:7) Param 27:64 Enables detection -- M2521 (Hext Pin 7) Contact ***MultiCam*** for assistance.
System Interrupt: Y Over Travel	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. Param 27:64 Enables detection -- M24 (H9:8) Param 27:8 Enables detection -- M2521 (Hext Pin 4) Contact ***MultiCam*** for assistance.
System Interrupt: TC Home	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. M24 (H9:1) Contact ***MultiCam*** for assistance.

System Interrupt: Inverter Fault	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. The error occurred in Flash Bit 30:1 at H7:8. Contact ***MultiCam*** for assistance.
System Interrupt: Servo Fault	A limit detection occurs on inputs specified in Flash locations 27 and 30 that will stop motion, turn off any devices, and disable motor drives. The error occurred in Flash Bit 30:2 at H9:5. Contact ***MultiCam*** for assistance.
Too Many MODBUS Timeouts Slave Disabled	The system will pause if more than 3 MODBUS timeouts have occurred due to electrical noise on the MODBUS lines. Contact ***MultiCam*** for assistance.
Tool 99 Device Not Up	The slider for the MultiVision camera is not up. Check the camera position and try again. Double-check Flash location 179 if there is no up sensor.
Tool Changer NOT Extended! (Enter to Continue)	The ATC Tool Changer did not extend back to its park position. Check the Tool Changer to make sure it is functional.
Tool Changer NOT Retracted! (Enter to Continue)	The ATC Tool Changer did not retract enough to pick up a tool. Check the Tool Changer to make sure it is functional and positioned correctly.

Tool Not Loaded	The Tool Loaded sensor is either not active or is indicating that a tool is not loaded. Check Flash location 125. • If 125=0, the input Tool Clamped (L2) is ON and the output Open Chuck (1a) is OFF. • If 125=1, the input Tool Clamped (L2) is ON. --L2=2nd input on ATCB --1a=1st output on ATCB Contact ***MultiCam*** for assistance.
Virtual Port nnn is not defined!	Virtual Ports are ZO for HPGL files and G98 for CNC files and are used to extend the language. Format: M & G Code -- G98 P<Virtual Port> D<data> HPGL -- ZO<Virtual Port>, <data>; Examples: G98 P100 D4000 (Set spindle speed to 4000) ZO100,4000 (Set spindle speed to 4000) This warning will occur if a G98 or a ZO command is in a job file but the <Virtual Port> is not defined in the INIT file. Contact ***MultiCam*** for assistance.

VSYS FEED exceeded, axis n, VMAX reduced to XXXX	The Maximum Velocity for a particular axis is checked against the system to make sure that the system will allow the requested pulses to be issued correctly. VMAX = (Max Friction x VSYS) / Scale where • Max Friction = 0.30 as hardcoded in the Init file • VSYS = 557700.0 as hardcoded in the Init file • Scale = Resolution for the axis as set in Flash locations 1, 2, and 3 Contact ***MultiCam*** for assistance.
VSYS too high for DSP, VSYS reduced to XXXX	The specified VSYS in the Init file is more than the hardware can handle, so the system automatically reduces the VSYS to the maximum number allowed so that the performance will not be affected. Amend the VSYS in the Init file or contact ***MultiCam*** for assistance.
Warning 10: Word "XXXX" already defined	The macro or variable XXXX has been defined previously. Continue with job file or cutting sequence as this warning can be ignored.
Warning: Jogging Enabled! Boundaries Can Be Exceeded!	Since Jogging was enabled prior to homing, the operator can Jog into hardstops. Pay special attention to the position of the spindle or head assembly when Jogging.
Warning: No Inverters Specified	Flash locations 300-303 are set to 0. Enable MODBUS by setting Flash location 196 to 1.

Warning: PARAM xxx - Expected INTEGER found FLOAT	A float (fvar) was input instead of an integer (ivar) when using the gi command. Enter an integer when using the gi command.
Warning: PARAM xxx - Expected FLOAT found INTEGER	An integer (ivar) was input instead of a float (fvar) when using the gf command. Enter a float when using the gf command.
Warning: Possible FStack Error	Numbers are being accumulated between the job file and the Init file by the internal floating point stack (FSP) for every PU. Contact ***MultiCam*** for assistance.
Warning: Possible IStack Error	Numbers are being accumulated between the job file and the Init file by the internal integer point stack (ISP) for every PU. Contact ***MultiCam*** for assistance.
Warning: Spindle ON Command Blocked	A Spindle ON command has been received while the chuck is open, and the system has blocked the command. Close the chuck and try again.
Web Fault	A short circuit was detected on the 24v. Document the message that follows the error and contact ***MultiCam*** for assistance.
Z Not Down (Enter to Continue)	The pneumatic Z is not in the down position. This error will not appear if the system is not configured with a penumatic Z machine. Check the Z 2 limit input.

Z Not Up (Enter to Continue)	The pneumatic Z is not in the up position. This error will not appear if the system is not configured with a pneumatic Z machine. Check the Z 1 limit input.
Zero Z Track Sensor Reading	Z Tracking is enabled at Flash location 240 when surfacing the laser while the controller cannot read a valid value from the Z Track sensor. Resurface closer to the table or disable the Z Tracking.
Z Track Features Not Supported	The Z Tracking feature has not been enabled. Correct the configuration or contact ***MultiCam*** for assistance.