

Basic Mill

Operator

Training course

www.hfoallendale.com

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Types of haas mills





VF SERIES

(VF 1 – 12, SS, YT, SSYT)



VM Series

(VM-2, VM-3, VM-6)



Toolroom Mill

(TM1 – TM3 & TM1P – TM3P)



DRILL TAP & DRILL MILL MACHINES

(DM1-DM2 AND DT1-DT2)



MINI MILLS

(MINI MILL 1 & 2, SUPER MINI MILL 1 & 2, MINI MILL EDU)



COMPACT MILL



Desktop MILL



VC Series

(VC-400, VC-400SS)



HORIZONTAL MILLS

(EC-400, EC-500, EC-1600, EC-1600ZT, EC-1600ZT-5AX)



UNIVERSAL MACHINING CENTER

(UMC 500, 750, 1000, 1250, 1500 DUO, SS, P, UMC-1600-H, ZT-5AX)



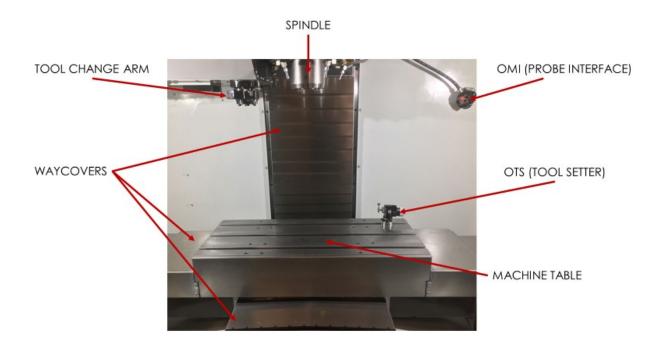
VR Series

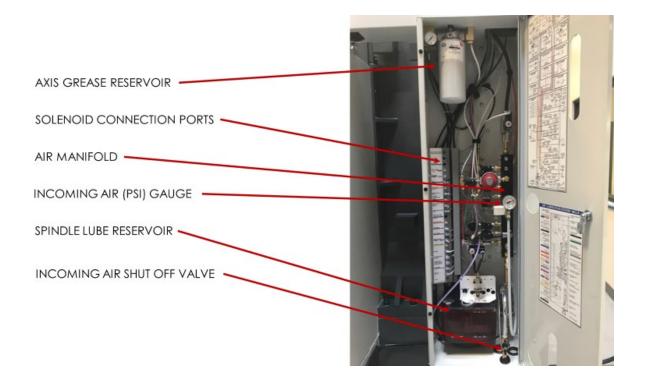
(VR-8, VR-9, VR-11, VR-14)

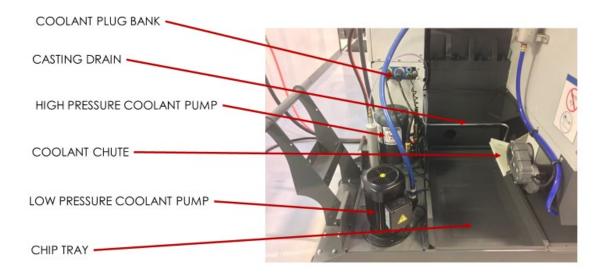


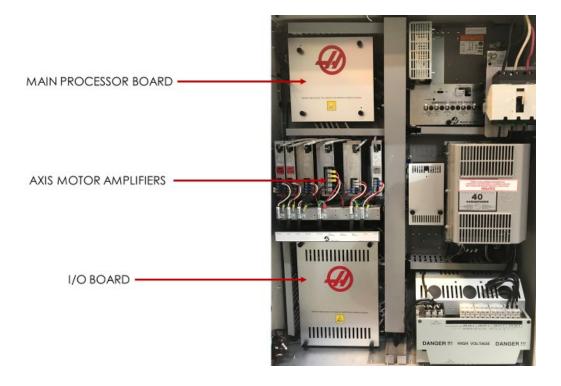
Machine layout

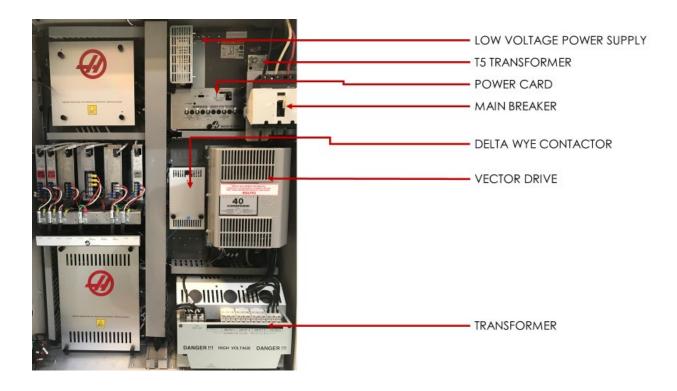












THINGS TO CHECK PERIODICALLY



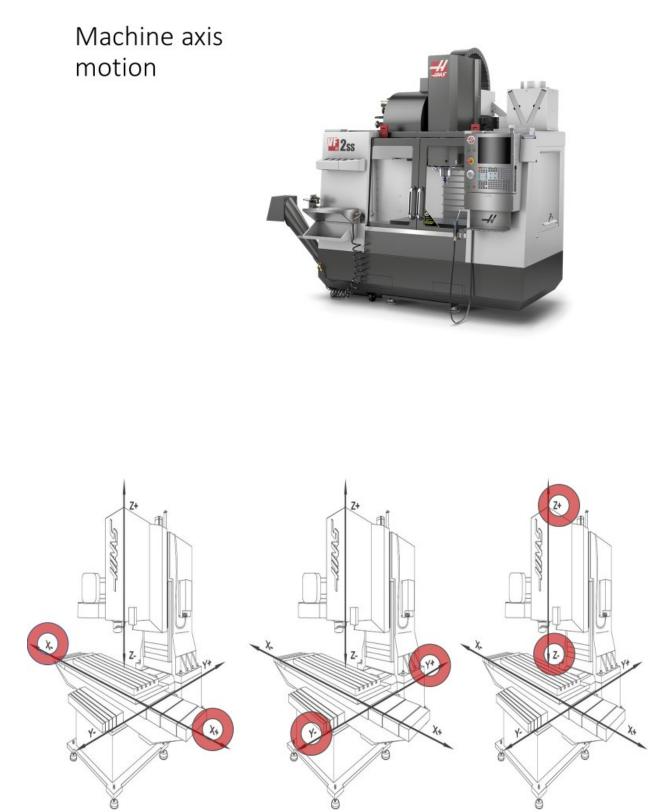
CHIP TRAP MANIFOLD







SPINDLE LUBRICATION



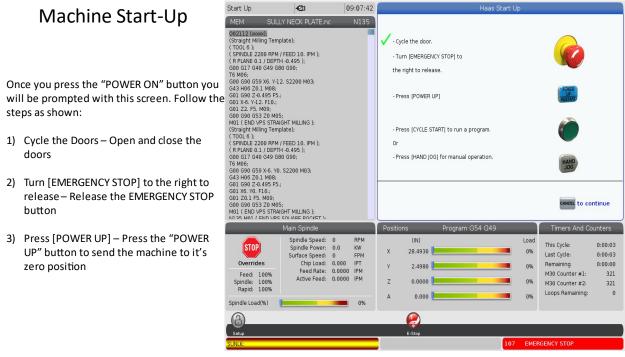


SPINDLE MOTION

Spindle will not run with doors open

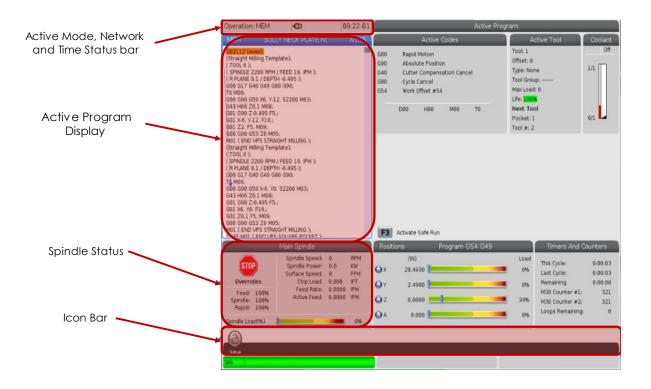
Machine Start-Up

- 3) Press [POWER UP] Press the "POWER UP" button to send the machine to it's zero position

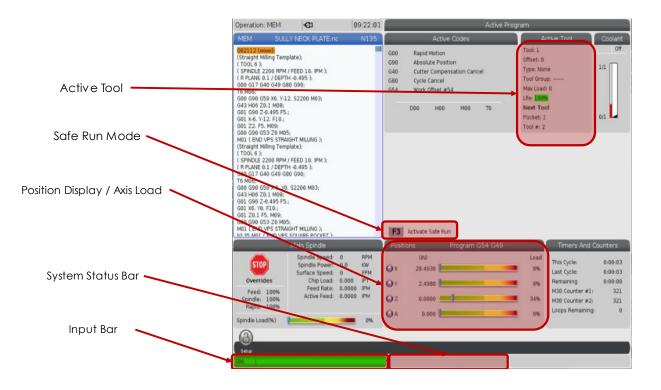


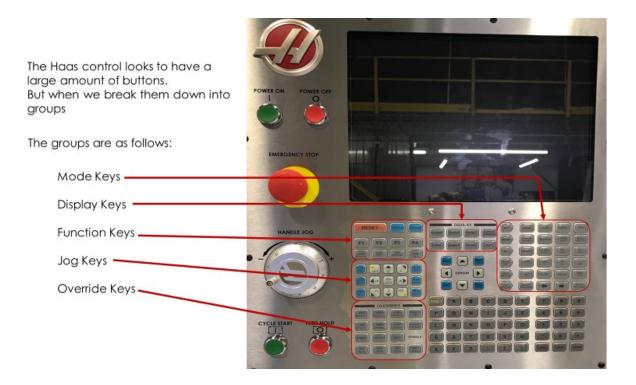


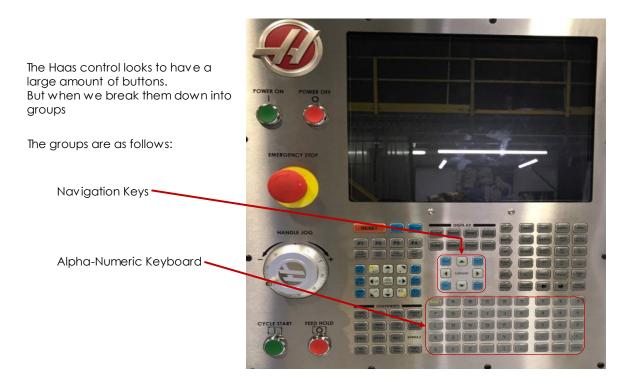
Pendant OVERVIEW



Main Display	Operation: MEM	a	09-22-08		Act	tive Program		
. ,	MEM SUL	LY NECK PLATE.nc	N135			A	ctive Tool	Coolant
(Size varies) Program/Offsets/Current Commands/Settings/Graphics/Editor/ VPS/Help	002112 000002 (Straight Milling Tem (TOOL 6); (SPINDLE 2200 RPM (R PLANE 0.1 / DEPT G00 G17 G40 G49 Gi T6 M06; G00 G90 G59 X6 X1	, / FEED 10. IPM); H -0.495); 80 G90;		G00 G90 G40 G80 G54	Rapid Motion Absolute Position Cutter Compensation Cancel Cycle Cancel Work Offset #54	Tool: 1 Offset: 0 Type: No Tool Gro Max Load Lfe: 100	up: 1: 0	0ff
Active Codes	G42.400 20.1 M08; G01 G90 2-0.495 F5 G01 X-6. Y-12. F10.; G01 G90 G53 20 M0 M01 (END VPS STRA (Straight Milling Tem (TOOL 6); G9INDLE 2200 RPM	5; /GHT MILLING); plate);			DOO HOO MOO TO	Next To Pocket: (Tool #: 2		o/1 L
Coolant Level	G00 G17 G40 G49 G T6 M06: G00 G90 G59 X-6, Y0 G43 H06 Z0.1 M08: G01 G90 Z-0.495 F5 G01 X8. Y0. F10.; G01 Z0.1 F5. M09: G00 G90 G53 Z0 M0 M01 (END VPS STRA M135.M01 (END VPS STRA	5: 0 405); 80 G90; 9. 52200 M03; 4: 5: 16HT MILUNG);		F3	Activate Safe Run			
Timers, Counters and		Main Spindle		Positi	ons Program G54 (349	Timers And C	ounters
Advanced Tool Management	Overrides Feed: 100% Spindle: 100% Rapid: 100%	Spindle Speed: Spindle Fower Surface Speed: Chip Load: Feed Rate: Active Feed:	0.0 KW 0 FPM 0.000 IPT 0.0000 IPM	QY QY QZ QA	(N) 28.4930 2.4980 0.0000	Load 0% 03 34%	This Cycle: Last Cycle: Remaining M30 Counter #1: M30 Counter #2: Loops Remaining:	0:00:03 0:00:03 0:00:00 321 321 0
Active Alarms	Spindle Load(%)			U.A.	0.000			
								÷.







The Navigation/Cursor Keys

The UP, DOWN, LEFT and RIGHT arrows will toggle around the screen

HOME: Brings the cursor to the top of the page

END: Brings the cursor to the bottom of the page

PAGE UP: Brings the cursor up a page/screen

PAGE DOWN: Brings the cursor down a page/screen

Hint: If you press the mode or display you are currently in, it will bring you straight to the tabs to navigate between the pages of the mode/display



Edit Mode: Let's you edit programs in the Haas advanced editor. You can also access the Visual Programming System (VPS) from the tabbed menu

Insert : Enters text from input line or the clipboard into the program at the cursor position

Alter: Replaces the highlighted text with the text from the input line or clipboard

Delete: Deletes the item the is on, or deletes the selected program block

Undo: Undoes up to the last 40 edit changes and deselects a highlighted block



The FILE menu has these options:

NEW: Creates a new program. In the pop-up menu fields, type an O number (required), a filename (optional), and a file title (optional)

0 Number	(number i	required)	
File Name			
File comm	ent		

File Edit Search	
New	002112
Set To Run	plate):
Save	place);
Save As	/ FEED 10. IPM);
Load File	H -0.495);
Discard Changes	B0 G90;
16 MU6; G00 G90 G59 X6, Y-	12 52200 M02
G43 H06 Z0.1 M08:	
G01 G90 Z-0.495 F5	
G01 X-6. Y-12. F10.;	
G01 Z2. F5. M09;	
G00 G90 G53 Z0 M0 M01 (END VPS STR	
(Straight Milling Ten	
(TOOL 6);	in a contract of the contract
(SPINDLE 2200 RPM	
(R PLANE 0.1 / DEP	
G00 G17 G40 G49 G T6 M06;	380 (380)
G00 G90 G59 X-6. Y	0. S2200 M03:
G43 H06 Z0.1 M08;	
G01 G90 Z-0.495 F5	ō.;
G01 X6. Y0. F10.;	
G01 Z0.1 F5. M09; G00 G90 G53 Z0 M0	DE.
M01 (END VPS STR	
	S SQUARE POCKET);
Clipboard	
Cheboard	

The FILE menu has these options:

NEW: Creates a new program. In the pop-up menu fields, type an O number (required), a filename (optional), and a file title (optional)

0 Number (nui	mber required)
ile Name	
ile comment	
5	

	Program Generation
Editor VPS	
File Edit Search	Modify
New	002112
Set To Run	
Save	plate);
Save As	/ FEED 10. IPM);
Load File	H -0.495);
	B0 G90;
16 MU6; G00 G90 G59 X6. Y-	2 52200 M02
G43 H06 Z0.1 M08:	2. 32200 103,
G01 G90 Z-0.495 F5	4
G01 X-6. Y-12. F10.;	
G01 Z2. F5. M09; G00 G90 G53 Z0 M0	ς.
M01 (END VPS STRA	
(Straight Milling Tem	plate);
(TOOL 6);	
(SPINDLE 2200 RPM (R PLANE 0.1 / DEP	
G00 G17 G40 G49 G	
T6 M06;	
G00 G90 G59 X-6. Y0 G43 H06 Z0.1 M08:). S2200 M03;
G01 G90 Z-0.495 F5	
G01 X6. Y0. F10.;	1
G01 Z0.1 F5. M09;	
G00 G90 G53 Z0 M0 M01 (END VPS STRA	
N135 M01 (END VP)	
Clipboard	
chipboard	
New Save A	nd Load F1 Menu F2 To Select Text F4 Paste From Clipboard
Jave A	The solution of the solution o

The EDIT menu has these options:

UNDO: Reverses the last edit operation, up to the last (40) edited operations. You can also press UNDO key to use this function

REDO: Reverses the last undo operation, up to the last (40) undone operations

CUTSELECTION TO CLIPBOARD: Removes the selected lines of code from the program and puts them in the clipboard

COPY SELECTION TO CLIPBOARD: Puts the selected lines of code in the clipboard. This operation does not remove the original selection from the program

PASTE FROM CLIPBOARD: Puts a copy of the clipboard contents below the current line. This does not remove the clipboard contents



The EDIT menu has these options:

INSERT FILE PATH: Prompts a program selection and will insert a comment of file location

INSERT MEDIA FILE (M130): Inserts a media file into a program. NOTE: A "M00" is required after the "M130" for the machine to stop when the media is loaded

INSERT MEDIA FILE (\$FILE): Inserts a comment of where a media file is located

INSERT SEQUENCE FILE (M300): Inserts a call for a robot or APL to use a custom sequence

SPECIAL SYMBOLS: Brings up a list of symbols that aren't already on the keyboard



The SEARCH menu has the following option:

FIND AND REPLACE TEXT: This function lets you quickly find code in the program and optionally replace it

ind:		
eplace:		
)irection:	Forward	O Backward
	Find [F]	IJ
	Replace ([F2]
	Find/Replac	e (F3)
Repl	lace All (Can't	Undo!) [F4]



The MODIFY menu has these options:

REMOVE ALL LINE NUMBERS: Automatically removes all N-code line numbers from the program or the selected program blocks

RENUMBER ALL LINES: Automatically adds N-code line numbers to the program or the selected program blocks. Enter the line number you want to start with and the increment to use between line numbers, then press ENTER to continue or press UNDO to cancel and to return to the editor

REVERSE X AND Y: Changes the X address codes in the program to Y address codes, and changes Y address codes to X address codes

			Program Generation
Edit	or	VPS	
File	Edit	Search	Modify
			Remove All Line Numbers
012	346 ()	0000X);	Renumber All Lines
(Circ	le Co	ntour Milli	Reverse + & - Signs
(TO	OL 1 /	DIA 0.5);	Reverse X & Y
		7500 RPM / DEPTH	
		40 G49 G8	
TI M		10 040 01	50 0501
			JR MILLING);
		G54 X1.75	y Y0.;
	00 M0 H1 Z		
M08		1	
G01	Z-,2 I	10.0;	
		(1.5 Y0.5	D1 F20.;
		Y0. J-0.5;	
	1-1.0;	(1.5 Y-0.5	10.5
		(1.75 Y0.;	
		20. M09;	
		53 Z0 M0	5;
G90			CONTOUR):
		ntour Milli	
		DIA 0.5);	
			M / FEED 20.);
		/ DEPTH	
TI N		40 G49 G	30 090;
	ooard		
ciipt	, oaru		
	6		
	NEX	Save A	Ind Load F1 Menu F2 To Select Text F4 Paste From Clipboard

The MODIFY menu has these options:

•

REVERSE + AND - SIGNS: Changes positive values for selected address codes to negative, or negative values to positive. Press the letter key for the address codes that you want to reverse to toggle selections in the pop-up menu. Press ENTER to execute the command or CANCEL to return to the editor

Swap Plus A	nd Minus Signs
Press Addr	ess Code To Toggle
X	V
Y	W
_ Z	E
A	R
B	
🗌 C	
U	К
Warning:	
This operat	ion cannot be undone.
This will for	ce the file to be saved.
	Proceed [ENTER]
Can	cel Operation [CANCEL]

Memory You run programs in this Mode: mode, and the other keys in the MEMORY row control the ways in which the program is run.

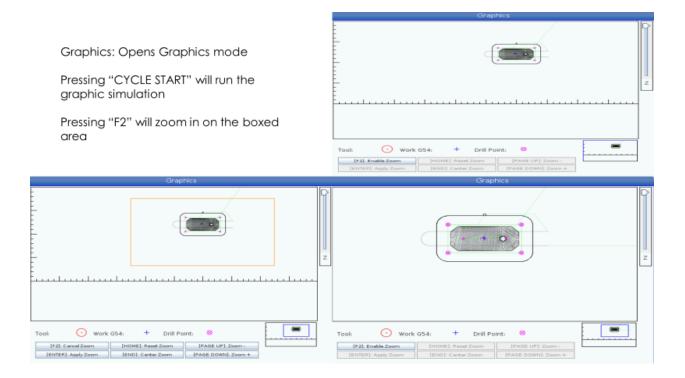
> Single Block : Toggles single block on or off. When single block is on, the control runs only one program block each time you press CYCLE START

Graphics: Opens Graphics mode

Optional Stop: Toggles optional stop on or off. When optional stop is on, the machine stops when it reaches M01 commands

Block Delete: Toggles block delete on or off. The program ignores (does not execute) items with a slash ("/") when this option is on





MDI Mode: In MDI mode, you run unsaved programs or blocks of code entered from the control

Coolant: Turns the coolant on and off

Hand Scroll: Toggles Handle Scroll mode. This lets you use the jog handle to move the cursor in menus while the control is in jog mode

ATC FWD: Rotates the tool carousel to the next tool

ATC REV: Rotates the tool carousel to the previous tool



Handle Jog Mode: Enters machine into manual jog mode to move individual axis around at a specified rate

Each button selects the increment for each click of the jog handle

When the mill is in MM mode the first number is multiplied by ten when jogging the axis (e.g., .0001 becomes 0.001 mm)

The bottom number sets speed after you press JOG LOCK key and an axis jog key or you press and hold an axis jog key





When selecting an axis to move while in handle jog mode, you can do this one of two ways

You can press the axis keys on the pendant you wish to move. It does not matter which direction you press

You can also select the axis by typing the letter designation of the axis you want to move and pressing the handle jog mode key.



Zero Return In Zero Return mode, you have the mode : ability to send the machine to its home position

All : Returns all axes to machine zero. This is similar to POWER UP, except a tool change does not occur

Origin: Sets selected values to zero in different displays

Single: Returns one axis to machine zero. Press the desired axis letter on the Alpha keyboard and then press SINGLE

Home G28: Returns all axes to zero in rapid motion. HOME G28 key will also home a single axis in the same manner as SINGLE key



Make sure the axis motion paths are clear when you press this key. There is no warning or prompt before axis motion begins.



List Programs Accesses a tabbed menu to mode : load and save programs

Select Program : Makes the highlighted program the active program

Back arrow : Navigates to the screen you were on before the current one. This key operates like the BACK button on a web browser

Forward arrow: Navigates to the screen you went to after the current screen, if you have used the back arrow. This key operates like the FORWARD button on a web browser

Erase Program: Deletes the selected program in List Program mode. Deletes the entire program in MDI mode



				List	Prog			
Mem	ory	User Data	USB					
Curre	ent Di	rectory: Memory/		(TEXT)	[F1], or [F1] to cl	ear.		
	0#	Comment	File Name	Size	Last Modified		New	INCOM
			09000	<dir></dir>	03-20-2017 09:49	>	Ivew	[INSERT
			В	<dir></dir>	02-24-2017 10:59	>	Load	10000
			G17	<dir></dir>	06-29-2017 15:18	>	Load	[PROG
			T10.	<dir></dir>	08-07-2017 12:17	>		
			radio1.NC	66 KB	12-01-2016 14:54		Edit	[ALTER
			radioactive	68 KB	12-01-2016 14:33		because of the local division of the local d	CLASSING STATE
0	00000	(Setup 1)	Setup_1.nc	17 KB	07-18-2017 14:22		Mark	[ENTER
0	00001	(Using high fee	1.nc	142 KB	07-26-2017 15:24		_	
-		(DEMO SIDE 1)		235 KB	11-16-2016 12:22		Сору	[F2
Second Second		(NPT Thread Mill)	and the second se	79 B	12-08-2016 12:07			
_		(TEST)	000005.nc		06-22-2017 09:24		File	(F3
		(3/16 jobber D			08-07-2017 12:17	*		
hand .	00011		000011.nc		11-16-2016 12:47	_	System	
Second 1 1		(USB0/Machine		6 KB	02-21-2017 17:42		and the second second	0.68
band .	0050		50.nc	11 KB	02-24-2017 11:01			
0	0100	(BEGIN PREDAT	crt3153.nc	4 KB	11-30-2016 11:12			
File I	Name	: Setup 1.nc						
		ent: (Setup 1)						
			Di La		07 ND 5 /2011		Colored 1	
Folde	er Ha	s: 34 Items	DISK S	pace: /	37 MB Free (72%)	1	Selected I	tems: 1

The device manager display becomes active when you press List Programs. It shows the available memory devices in a tabbed menu. These devices can include machine memory, the User Data directory, USB memory devices connected to the control, and files available on the connected network

To select a program to be the active program in Memory

		110.	COINS	00-01-2011 12.11	1	E 49	(ALTER)
		radio1.NC	66 KB	12-01-2016 14:54		Edit	[ALTER]
		radioactive	68 KB	12-01-2016 14:33			
00000	(Setup 1)	Setup_1.nc	17 KB	07-18-2017 14:22		Mark	[ENTER]
00001	(Using high fee	1.nc	142 KB	07-26-2017 15:24			
00002	(DEMO SIDE 1)	demo side	235 KB	11-16-2016 12:22		Copy	[F2]

Cursor to the program you would like to run in memory mode and press "SELECT PROGRAM"

Curre	nt Directory: USB0/					
	File Nam	e	Size	Last Modified	New	[INSER
	2817.ATM		12 KB	07-28-2017 07:45		
	2817.HIS			07-28-2017 07:45	Load	
	2817.IPS		6 KB	07-28-2017 07:45		
	2817.KEY			07-28-2017 07:45	Edit	
	2817.LSC			07-28-2017 07:45	2.00	(1.12.1.2)
	2817.OFS 2817.PAR			07-28-2017 07:45 07-28-2017 07:45	Mark	(ENTER
	2817.PGM			07-28-2017 07:45	Mark	(conc)
	2817.SET		22 KB	07-28-2017 07:45	Conv	(F)
	2817.VAR		2 KB	07-28-2017 07:45	Сору	ĮF.
	rror 080817012240.zi			08-08-2017 13:23	File	15
	01031.nc	*		07-28-2017 07:43	File	[F:
	00009.txt		228 B	08-07-2017 12:17		
					System	[F·

To copy a file from USB follow the following:

1. Cursor up to the Memory tab

2. Cursor over to USB tab

3. Cursor down to file you would like to load into the control memory and press the F2 button

4. This will put a check in the box next to the programs you would like to copy

1emory		>
JSB0		>
Jser Data		>
lata		>

Make sure the cursor on the Copy menu is on Memory tab and press Enter

Now that you are in the Memory directory, press enter to copy it to the main memory directory

If you wish to copy it to folders in the main directory, you just need to cursor to the one you want and press the right arrow key. This will bring you to that folder to copy the file there

Сору То

Insert Directory: Memory/	
09000	>
В	>
G17	>
T10.	>
Copy [ENTER] Exit [CANCEL]	

List Prog Memory User Data USB The tabs on the right of the list programs display have a few Search (TEXT) [F1], or [F1] to clear. other functions If you were to press Insert on Current Directory: Memory/ the Edit mode line of keys, this File Name 0# Comment Size Last Modified will allow you to create a new New [INSERT] <DIR> 03-20-2017 09:49 > 09000 program file <DIR> 02-24-2017 10:59 > В Load [PROG] G17 <DIR: 06-29-2017 15:18 > Create New Program 08-07-2017 12:17 > T10. <DIR: Edit radio1.NC 66 KB 12-01-2016 14:54 68 KB 12-01-2016 14:33 radioactive ... 0 Number (number required) Mark [ENTER] 00000 (Setup 1) Setup_1.nc 17 KB 07-18-2017 14:22 00001 (Using high fee... 1.nc 142 KB 07-26-2017 15:24 00002 (DEMO SIDE 1) demo side ... 235 KB 11-16-2016 12:22 [F2] 00003 (NPT Thread Mill) npt.NC 79 B 12-08-2016 12:07 File Name 00005 (TEST) 000005.nc... 1 KB 06-22-2017 09:24 [F3] 🖌 00009 (3/16 jobber D... 000009.txt 224 B 08-07-2017 12:17 * 00011 000011.nc 458 B 11-16-2016 12:47 00011 00030 (USB0/Machine. 6 KB 02-21-2017 17:42 pocket.NC File comment 00050 (0) 00100 (BEGIN PREDAT... crt3153.nc 00050 (0) 11 KB 02-24-2017 11:01 4 KB 11-30-2016 11:12 File Name: Setup_1.nc File comment: (Setup 1) Enter [ENTER] Exit [UNDO] Folder Has: 34 Items Disk Space: 737 MB Free (72%) Selected Items: 1

If you were to press Alter on the Edit mode line of keys, this will activate the program Edit window with that program in it

	List Prog	16. 16.
If you were to press F3, this will	Memory User Data USB	
bring down a menu that will allow you to:	Search (TEXT) [F1], or [F1] to clear.	
Make a directory: Creates a folder to organize programs	Current Directory: Memory/	
6 1 6	File Commands	New [INSERT]
Rename a file: Change file name but not	Make Directory Clear Selections Get File Path	Load [PROG]
the program number	Rename Sort By 0 Number Special Symbols	
Delete: Deletes a program	Delete Show File Details	Edit [ALTER]
	Duplicate Program Setting 252	Mark (ENTER)
Duplicate Program: Copies all the	Select All Setting 262 DPRNT	Hark [Enteril
information from the highlighted program into a new program	Exit [CANCEL]	Copy [F2]
	00005 (TEST) 000005.nc 1 KB 06-22-2017 09:24	File [F3]
Select All: Selects all files to be copied or deleted	<i>v</i> 00009 (3/16 jobber D 00009.txt 224 B 08-07-2017 12:17 * 00011 000011.nc 458 B 11-16-2016 12:47 00030 (USB0/Machine packet.NC 6 KB 02-21-2017 17:42	System [F4]
Clear Selection: Deselects all selected files	00050 (0) 50.nc 11 KB 02-24-2017 11:01 00100 (BEGIN PREDAT crt3153.nc 4 KB 11-30-2016 11:12	
Sort By O Numbers: Organizes files from O00000 to O99999	File Name: Setup_1.nc File comment: (Setup 1) Folder Has: 34 Items Disk Space: 737 MB Free (72%)	Selected Items: 1

Select all files or clear all file selections:

Show/Hide File Details: Will toggle the file "SIZE" and "LAST MODIFIED" column

Setting 252: Adjust where the machine looks for sub programs (M98)

Setting 262 DPRNT: Changes the out put folder for DPRINT

Get File Path: Outputs a comment of where the highlighted program is located

Special Symbols: Symbols that aren't already on the keyboard

lemory	User Data	USB					
		Search	(TEXT)	[F1], or [F1] to cle	ear.		
urrent Di	rectory: Memory,	File Com	nands	1 1 1 1 10 1		New	[INSERT]
Make	Directory	Clear Selecti	ons	Get File Path		Load	[PROG]
Renar	ne	Sort By O Nu	mber	Special Symbo	ls	Loud	[1100]
Delete	2	Show File De	tails			Edit	[ALTER]
Duplic	ate Program	Setting 252					
Select	: All	Setting 262	DPRNT			Mark	[ENTER]
		Exit [CAN	CEL]			Сору	[F2]
00005	(TEST)	000005.nc	1 KB	06-22-2017 09:24		File	[F3
00009	(3/16 jobber D	o00009.txt	224 B	08-07-2017 12:17	*	1 110	[, ⁰ ,
00011		000011.nc	458 B	11-16-2016 12:47		System	
1 100000000	(USB0/Machine		6 KB	02-21-2017 17:42		ojacom	Le vi
00050	1	50.nc	11 KB	02-24-2017 11:01			
00100	(BEGIN PREDAT	crt3153.nc	4 KB	11-30-2016 11:12			
	: Setup_1.nc ent: (Setup 1)						
older He	s: 34 Items	Disk S	pace: 7	37 MB Free (72%))	Selected	tems: 1

System Commands

Estimated size to zip: 25 MB

	Backup	Save	Load
When a USB is in the machine:	Back Up Machine	Save Settings	Load Settings
	Restore Machine	Save Offsets	Load Offsets
		Save Macro Vars	Load Macro Vars
		Save ATM	Load ATM
		Save Alarm History	Load Lsc
Back Up Machine: Creates a back up of the machine so that		Save Key History	Load Network Config
it can be restored at a later point	at a later point	Save Lsc	Load Robot Frames
		Save Network Config	Load Data Collection
Other information on the machine can be saved and		Save Robot Frames	
loaded into the same machine or other machines		Exit [CANCEL]	
Pressing "SHIFT" then "F3" will create an "ERROR REPORT" as	Backup Machine		401
a zip folder on the USB. It will be listed with the machine serial number	System Data (1 MB)		Select [ENTER]
	User Data (23 MB)		Select All [F2]
	User Data (23 MB)		Clear all [F3]
	Programs (1013 KB)		Backup [F4]

Exit [CANCEL]



	MEM	ry/X-Y-Z	POS	TEST).nc	N100
	099999 (X	-Y-Z POS TEST)	:	-	
	: G80 G00 M G53 G90 G M01 ;	109 ; 600 Z0 M05 ;			
	T40 M06 ;				
the	G43 H40 ; G65 P9832 G65 P9810	90 G00 X0 Y0 ; 2 ;) Z1. F100. ;) Z-0.2 F40. ;			
ne	(WORK OF	DRE - JOG PROBE		SIDE BORE TO	START);
	(OFFSET S	E .5); HIFT IN X 0.); HIFT IN Y 0.); W154.1000 A]	0.000	D1. E0.0000 H	40.0000;
	#14221=	#10188;			
	; G01 Z0.4 F G65 P9832 G65 P9810				
	G65 P9832	2 ;			

The "PROGRAM" button shows you the active program in the control and shows you where in the program the machine is running at that time



The "POSITION" button shows where is the machine's position at that time in up to 4 different position types

Your "Work" position is where the machine is in relation to the active work offset

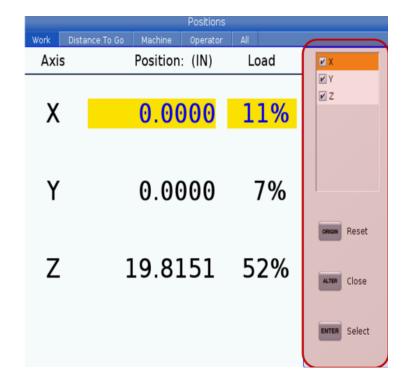
Pressing the "ALTER" Key allows you to change what axis are being viewed

The "ENTER" Key is used to select/deselect different axis

The "ALTER" Key, when pressed again is used to close the highlighted window

The "ORIGIN" Key is used to reset the selected axis to the default

This can be done in all 4 displays



	Work Distance To Go Machi	Positions ne Operator All	
	Axis	Position: (IN)	Load
	Х	0.0000	11%
"Distance To Go" shows the amount of distance the machine has to move to get to its next position	Y	0.0000	7%
	Z	0.0000	52%
	ALTER To view options.		

		Positions	
	Work Distance To Go	Machine Operator All	
	Axis	Position: (IN)	Load
	Х	-25.5013	12%
zero	Y	-10.1089	7%
	Z	-2.5560	52%
	ALTER To view option	15.	

"Machine" Shows the position of the machine in reference to the machine's zero

	Work Distance To Go	Positions Machine Operator All	
	Axis	Position: (IN)	Load
	Х	-25.5013	12%
I	Y	-10.1089	7%
	Z	-2.5560	52%
	Alter To view option	ons.	

"Operator" is a "Digital Read Out" that can be zeroed out to get a measurement from a specific location

	Positions	
Work Distance To Go	Machine <u>Operator</u> All Position: (IN)	Load
Х	0.0000	12%
Y	0.0000	7%
Z	0.0000	51%
[Axis Letter] + 🛛 🕬	N Reset Selected Axis Position	
[Axis Letter] +	R Set Axis Operator Position	To view options.

In "Handle Jog" mode, the "Operator" can set axis to zero and change position

			Position	าร	
Work	Distance To Go	Machine	Operato		
		Posit	ion: (IN)	
Axis		Work G5	4	Axis	Dist To Go
Х		0.000	00	Х	0.0000
Y		0.000	00	Y	0.0000
Z		19.815	1	Ζ	0.0000
Axis		Machir	ie	Axis	Operator
Х		-25.501	.3	Х	-25.5013
Y		-10.108	9	Y	-10.1089
Z		-2.556	0	Ζ	-2.5560
	ALTER To view optio	ns.			

"ALL" shows all 4 of the previous windows along with the work offset



The "OFFSET" displays tool offsets and works offsets

The "OFFSET" button will show all the offsets. Here in the "Tool" tab, you can adjust:

Length of Tool in "Length Geometry"

Compensate for the wear of the length in "H(Length) Wear"

The Diameter of the Tool in "Diameter Geometry"

Compensate for the wear of the Diameter in "Diameter Wear"

The amount of cutting edges a tool has is "Flutes" and is used to calculate chip load

ool Offset	Length Geometry(H)	Length Wear(H)	Diameter Geometry(D)	Diameter Wear(D)	Flutes
1 Spindle	0.	0.	0.	0.	0
2	0.	0.	0.	0.	0
3	0.	0.	0.	0.	0
4	0.	0.	0.	0.	0
5	0.	0.	0.	0.	0
6	-9.3140	0.	0.3120	0.	0
7	-5.6200	0.	0.2500	0.	0
8	0.	0.	Θ.	0.	0
9	0.	0.	Θ.	0.	0
10	0.	0.	Θ.	0.	0
11	0.	0.	Θ.	0.	0
12	0.	0.	Θ.	0.	0
13	0.	0.	0.	0.	0
14	0.	0.	Θ.	0.	0
15	0.	0.	0.	0.	0
16	0.	0.	0.	0.	0
17	0.	0.	0.	0.	0



Using the arrow keys to move to the right. You can find more adjustments for tool offsets including:

"Tool ID" is a user input to identify a tool, generally a vendor ID number

"Description" is where any identifying factors of the tool would be put

"Actual Diameter" is used to calculate chip load and other values while running a program

The type of tool is set in "Tool Type"

The material of the tool is set in "Tool Material"

The "Tool Pocket" can be observed to identify where a toolis located in the machine

The "Category" can be used to adjust the how fast the tool can be changed

			Offsets	5		
	Tool Wo	rk Tool Info				
						CONTRACTOR OF
	Active Tool:	L _{ene}				t Position: 0
	Tool Offset	Description				Toc
		Description	Diameter	Туре	Material	Pock
	1 Spindle		0.	None	User	Spin
	2		0.	None	User	1
	3		0.	None	User	2
	4		0.	None	User	3
	5		0.	None	User	4
	6		0.	None	User	5
	7		0.	None	User	6
	8		0.	None	User	7
When inputting a tool type the	9		0.	None	User	8
	10		0.	None	User	9
bottom window will show up to	11		0.	None	User	10
	12		0.	None	User	11
choose what kind of tool is being	13		Ο.	None	User	12
	14		0.	None	User	13
used	15		0.	None	User	14
	16		0.	None	User	15
	17		0.	None	User	16
_	ENTER Add To	o Value 🛛 📕	F4 Work Offset			
_	_		Tool Types		_	_
	Drill Ta	p Shell Mill	End Mill	Spot Drill	Ball Nose	Probe
	M		ii.	i.	Ű.	Ŵ
					Ç	
			1/AA	w la		4
				_	-	_
	1 2	2 3	4	5	6	7
				5		'

Offsets Tool Work Active Tool: 1 Coolant Position: 0 Tool Offset Too Pock Tool Material 1 Spin User User User User User User User User 0. 0. 0. 0. Spin 23 5 6 7 8 9 10 11 12 13 14 15 16 о. о. When inputting a "Tool Material" the User User User User User User User User 9 10 0. 0. bottom window will show up to 0. choose what kind of material the tool 0.0 is made of 0.0.0 TOOL OFFSET MEAS Tool Offset Measure ALTER Tool Presetter F1 Set Value ENTER Add To Value F4 Work Offset Tool Material 0 1 2

			Of	fsets			
Tool	Work						
Active 1	fool: 40						

The buttons available in Tool Offsets display are:

"TOOL OFFSET MEASURE": This sets the length of the tool to it's current machine position

"F1" replaces the value with value you entered

"Enter" adds the entered value to the value already in the highlighted offset

"F4" brings you to the work offset page

Tool Offset	Length	H(Length)	Diameter	Diameter
Tooronsec	Geometry	Wear	Geometry	Wear
	-2.5560	0.	2.9917	0.
	4.9105	0.	0.4995	θ.
	4.6374	0.	0.3747	0.
	θ.	0.	0.	0.
	4.9126	0.	0.4995	0.
	4.6375	0.	0.3746	0.
	θ.	0.	0.	0.
	6.0000	0.	0.	θ.
	0.	0.	0.	0.
9	5.0061	0.	0.	0.
1	4.9102	0.	0.	0.
2	4.9338	0.	0.	θ.
3	4.9793	0.	0.4995	0.
4	4.8891	0.	0.	0.
5	4.9545	0.	0.	0.
5	θ.	0.	0.	0.
7	4.1706	0.	0.1268	0.
3	3.7041	0.	0.	θ.
nter A Value				
_	_			_
OFFSET Tool Offse	et Measure F1	Set Value ENTER	R Add To Value	F4 Work Of



Using the arrow keys to move to the right You can find more adjustments for tool offsets including:

"Approximate Length" is where you input an estimate of what length the tool is from the spindle face to the tip of the tool

"Approximate Diameter' is where you input an estimate of what the tool diameter is

"Edge Measure Height" is set to how far the tool goes down past the stylus when checking the tool diameter

"Tool Tolerance" is the tolerance you have on the tool when running a tool breakage cycle

"Probe Type" is how you want to measure the tool

			ffsets		
Tool Worl					
Active Tool: 1					
Tool Offset	Approximate Length	Approximate Diameter	Edge Measure Height	Tool Tolerance	Probe Type
1 Spindle	Θ.	0.	0.	0.	2-L Non Rot
2	0.	0.	0.	0.	None
3	0.	0.	0.	0.	None
3	0.	0.	0.	0.	None
5	0.	0.	0.	0.	None
6	0.	0.	0.	0.	None
7	0.	0.	0.	0.	None
8	0.	0.	0.	0.	None
9	Θ.	0.	0.	0.	None
10	0.	0.	0.	0.	None
11	0.	0.	0.	0.	2-L Non Rot
12	Θ.	0.	0.	0.	None
13	0.	0.	0.	0.	None
14	0.	0.	0.	0.	None
15	0.	0.	0.	0.	None
16	Θ.	0.	0.	0.	None
17	0.	0.	0.	0.	None
18	0.	0.	0.	0.	None
Enter A Value	atic Probe Options	F1 Set Val		o ∨alue 🛛 📕	4 Work Offset
		Tool P	robe Help		
0 - No tool pr 1 - Length pr 2 - Length pr	Type Of Probing obing to be perfi obing (Rotating). obing (Non- Rota d Diameter prob	ormed. ting).	d:		

When probing you have different options:

"0 - No tool probing to be preformed" clears out any type of probing previously there

"1 - Length probing (Rotating)" is used to find the length of a tool and to find the lowest point on a tool that has multiple edges

"2 - Length probing (Non-Rotating)" is used to find the length of the tool when one edge is being measured

"3 - Length and Diameter probing (Rotating)" is used to find the length and diameter of the tool ("Approximate Length", "Approximate Diameter" and "Edge Measure Height" is needed for this)

		The second second	Offsets			
Tool	Nork -	Tool Info				
Active Too	: 1				Coolant Position	
Tool Offset	iximate ngth	Approximate Diameter	Edae Measure Height	Tool Tolerance	Probe Type	
1 Spindle).	0.	0.	0.	None	
2).	0.	0.	0.	None	
3		Select P	robe Type		None	
4					None	
5	0: No P	robina			None	
6					None	
7	1: Leng	th Probing (Rota		None		
8	2. Leng	th Probing (Non			None	
9	2. Long	in robing (Non	Hotating 1001/		None	
16 11 12	3: Leng	th and Diameter	Probing (Rotat	ing Tool)	None	
11					None	
12		Exit [C	ANCEL]		None	
13					None	
14).	0.	0.	0.	None	
15).	0.	0.	0.	None	
16).	0.	0.	0.	None	
17		0.	0.	0.	None	ł
17	omatic Pro	0.	0.	0.	None To view options.	

Once you choose a probing type and hit "TOOL OFFSET MEASURE" you have to choose from the following probing options:

"1: *Probe selected tool." this will allow you to begin probing the current selected tool

"2: *Probe selected tool manually." this will allow you to manually bring the tool to the probe too be measured

"3: *Probe selected tool for breakage/wear." this allows you to re-evaluate a tool that has already been probed

"4: *Probe all tools." this will probe all tools that have been set up with probing option (Besides shell mills)

Automatic Probe Options

- 1: * Probe selected tool.
- 2: * Probe selected tool manually.
- 3: * Probe selected tool for breakage/wear.
- 4: * Probe all tools.

Exit [CANCEL]

Automatic Probe Options

* Probe selected tool.

Run in MDI [CYCLE START] Open Template in VPS [ENTER] Exit [CANCEL]

Once the way of probing has been selected you will be given the option to:

"Run in MDI" which will allow you to probe the tool in a temporary program

"Open Template in VPS" will allow you to generate a G-code which can be saved to the clipboard or put into MDI

G Code	Y Axis	Z Axis	A Axis	C Axis	Work Material
G52	0.	0.	0.	0.	No Material Selected
G54	-5.4037	-13.6200	0.	0.	No Material Selected
G55	-10.0001	-10.0000	0.	0.	No Material Selected
G56	0.	0.	0.	0.	No Material Selected
G57	0.	0.	0.	0.	No Material Selected
G58	0.	0.	0.	0.	No Material Selected
G59	0.	0.	0.	0.	No Material Selected
G154 P1	0.	0.	0.	0.	No Material Selected
G154 P2	0.	0.	0.	0.	No Material Selected
G154 P3	0.	0.	0.	0.	No Material Selected
G154 P4	0.	0.	0.	0.	No Material Selected
G154 P5	0.	0.	0.	0.	No Material Selected
G154 P6	0.	0.	0.	0.	No Material Selected
G154 P7	0.	0.	0.	0.	No Material Selected
G154 P8	0.	0.	0.	0.	No Material Selected
G154 P9	0.	0.	0.	0.	No Material Selected
G154 P10	0.	0.	0.	0.	No Material Selected
G154 P11	0.	0.	0.	0.	No Material Selected

The work offset section of Offsets allows you to input and adjust the zero coordinates of a part in a certain offset

There are 106 offsets available, G54-G59 and G154 P1 - G154 P99

G52 is a global offset that will add any values in this row to all of the other rows. It will be cleared out once a "M30" is reached or a power cycle

G92 will so the same thing as G52 but will ONLY be cleared out if it is done manually

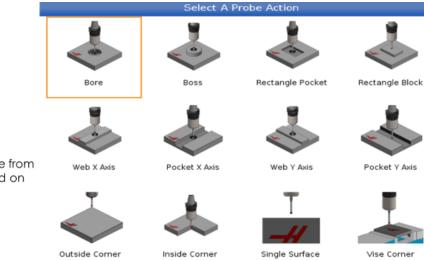
Tool W	ork					
			Axes Info			
G Code	Y Axis	Z Axis	A Axis	C Axis		Work Material
G52	0.	0.	0.	0.	No	Material Selected
G54	-5.4037	-13.6200	0.	0.	No	Material Selected
G55	-10.0001	-10.0000	0.	0.	No	Material Selected
G56	0.	0.	0.	0.	No	Material Selected
G57	0.	0.	0.	0.	No	Material Selected
G58	0.	0.	0.	0.	No	Material Selected
G59	0.	0.	0.	0.	No	Material Selected
G154 P1	0.	0.	0.	0.	No	Material Selected
G154 P2	0.	0.	0.	0.	No	Material Selected
G154 P3	0.	0.	0.	0.	No	Material Selected
G154 P4	0.	0.	0.	0.	No	Material Selected
G154 P5	0.	0.	0.	0.	No	Material Selected
G154 P6	0.	0.	0.	0.	No	Material Selected
G154 P7	0.	0.	0.	0.	No	Material Selected
G154 P8	0.	0.	0.	0.	No	Material Selected
G154 P9	0.	0.	0.	0.	No	Material Selected
G154 P10	0.	0.	0.	0.	No	Material Selected
G154 P11	0.	0.	0.	0.	No	Material Selected
F1 Set V	/alue	F 3	Probing Action	s (F4	Tool Offsets

"F3" will bring you to the probing options:

Probing is a fast, autonomous, way of finding a part in your machine

Here you can choose from a variety of probing actions based on what needs to be probed

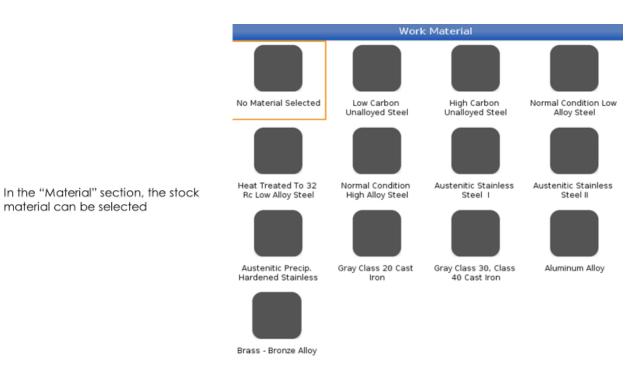
Material can be selected

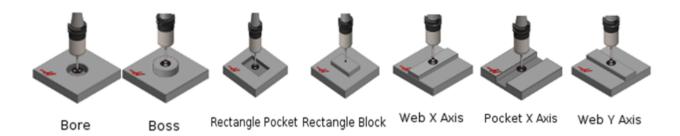


In "Probe Action" you can choose from a variety of probing actions based on what needs to be probed



Outside Corner with Angle





When probing there are many different options:

"Bore" is used the probe to find the center of an inner diameter

"Boss" is used to find the center of an outside diameter

"Rectangle Pocket" is used to find the center of a rectangular pocket

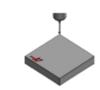
"Rectangle Block" is used to find the center of an extruded rectangle

"Web X Axis" is used to find the center of a block in the X direction

"Pocket X Axis" is used to find the center of pocket in the X direction

"Web Y Axis" is used to find the center of a block in the Y direction













Pocket Y Axis

Outside Corner

Inside Corner

Single Surface

orner Outs

Outside Corner with Angle

"Pocket Y Axis" is used to find the center of a pocket in the Y direction

"Outside Corner" is used to find the corner of a Block using the outside walls

"Inside Corner" is used to find the inside corner of a block using the adjacent walls "Single Surface" is used to a surface of a single axis at a time

"Vise Corner" is used to find the top right corner of a block in the X,Y and Z axis

"Outside Corner with Angle" will allow you to measure an angle

Once a "Probe Action" is selected you can hit "Part Zero Set". After the probe should be brought to the approximate center

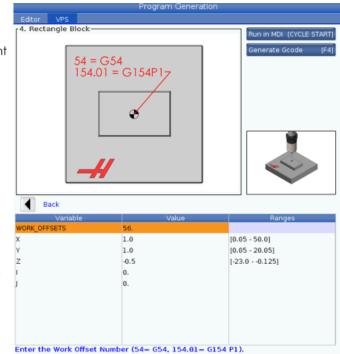
"WORK_OFFSETS" is where you can check to make sure you are in the correct work offset

"X" is looking to get the approximate length of the part in the X axis

"Y" is looking for the approximate length in the Y axis

"Z" is the distance you want the probe to go down below the part including the distance it is above the top

"I" and "J" are offsets that can be used to adjust where the zero will be set. These should be from the center of the part



Editor VPS	Progra	am Generation	1
1. Bore			Run in MDI (CYCLE START
Variable		Value	Ranges
WORK_OFFSETS	56. 1.0		[0.3 - 20.05]
x	0.		[0.5 - 20.05]
Ŷ	0.		

"D" is looking for the diameter of the part



The "Current Commands" display gives you access to multiple control function tools

	Current Commands								
	Devices	Timers	Macro Vars	Active Codes	Tools	Plane	Calculator	4	
	Mechanis	ms Wor	kholding						
		2010	Device			State	- 2		
			ain Spindle Orien	t 👘		-0.000			
When you hit the "Current			Mist Condenser Tool Release			Off			
Commands" gives you access to			Tool Release			Clamped			
multiple control function tools									
"Devices" tab can be used to show:									
"Main Spindle Orient" will allow you									
to orient the spindle	[Main Sp	indle Orier	nt						
"Main Spindle Brake" will engage									
and disengage the spindle break		_							
"Tool Release" will release the tool	F2	To Orient	Spindle.						
from the spindle									
		on the inpu			icaro io par				
	Press	[F2] to orie	nt the spindle						

ulator 🛛 Media 🛃 🕨
0
40
40
HOLE DIAMETER
14221
LABEL 2
ENTER Set Value

Timers	Macro Vars	Active Codes	ATM	Tool Table	e Calculat	tor Media		
		M	Macro Variables			10400 - 10999 (Global) 🕨		
(Local) 1 - 33	(Glob	oal) 10000	- 10199	(Global) 10200 - 10399			
Var	Value	Var	Va	lue	Var	Value		
1		10000	(0.000000	10200	0.000000		
2		10001	(0.000000	10201	0.000000		
3		10002	(0.000000	10202	0.000000		
4		10003	(0.000000	10203	0.000000		
5		10004	(0.000000	10204	0.000000		
6		10005	(0.000000	10205	0.000000		
7		10006	(0.000000	10206	0.000000		
8		10007	(0.000000	10207	0.000000		
9		10008	(0.000000	10208	0.000000		
10		10009	(0.000000	10209	0.000000		
11		10010	(0.000000	10210	0.000000		
12		10011	(0.000000	10211	0.00000		
13		10012	(0.000000	10212	0.00000		
14		10013	(0.000000	10213	0.000000		

This displays the local and global macro variables available on the control

*Legacy 3 digit macros begin at 10000 Range. i.e. Macro 100 will be displayed as 10100.

Current Commands	
Timers Macro Vars <u>Active Codes</u> ATM Tool Table Ca	lculator 🛛 Media 💽 🕨
G-Codes Address Codes DHMT Codes Speeds &	Feeds
G00 N 0 D 00 Programmed Feed Rate G17 X 0. H 00 Actual Feed Rate G90 Y 0. M 00 Programmed Feed Rate G90 Y 0. M 00 Programmed Spindle Speed G94 Z 0. T 00 Commanded Spindle Speed G40 J 0. - - - G49 K 0. - - - G80 P 0 - - - - G50 R 0. - - - - G54 O O00000 - - - - G69 B 0. - - - - - V 0. - - - - - - G555 C 0. - - - - - <td< td=""><td></td></td<>	

The "Active Codes" display the codes that are currently being used by the machine The "TOOLS" tab has extra information regarding the machine tooling

The "Tool Table" tab in the allows you to input information about your tools:

In the "Category" section, the weight of the tool controls how fast a tool can be changed. Also, the tool can be set to large to make sure clear the pockets on either side of the tool

In the "Tool" section, the tool number can be changed based on what pocket it is in

Devices	Timers	Ma <u>cr</u>	o Vars	Active	Codes	Tools	Plane	Calculator	
Tool Table	Tool U	sage	ATM			And the second second			
Active Tool	1				Next Po	cket			
Pocket	Cat	egory		Tool		1	Set pocke	t as large	[L]
Spindle*				1					
1				2					
2				3			Set pocke	t as heavy	[H]
3				4					10000
4				5					
5				6					
6				7					
7				8		1	the province of the second		
8				9			Clear cate	egory (si	PACE]
9				10					
10				11		1	Set tool	[###] + [E	NTEDI
11				12			Sectoor	[###] + [E	NIENJ
12				13					
13				14			Clear tool	[0] + [E	NTER]
14				15					
15				16					
16				17			Reset tab	le [0	RIGIN]
17				18					
18				19					
19				20					

* Indicates Current Tool Changer Pocket

Green indicates a large pocket. Yellow indicates an extra large pocket.

Devices Tool Table	Timers			i cric o	lomman	ds			
	-	Macro \	/ars	Active (Codes	Tools	Plane	Calculator	4 🕨
Tool#	Tool U	sage	ATM						
Ti	/ Start me	Total Tim			Load(%)	Feed / T	otal time	Relative Use	9
> Tool 1	(1)	0:00:0	03 0:	00:00				6	
Duoroll timo.	0.00.02								
Overall time:	0:00:03/	0:00:00	■ Tot	al Time	Feed	time			
_	_								
_	_	F3 Colla					ıd last use	d	

"Tool Usage" will give information on the tools being used in a program. This information will be cleared out when the machine reaches a M99, M199 or M299

Devices	Timers M:	acro Vars	Active Code	s Tools	Plane	Calculator	
Tool Table	Tool Usage	ATM					
F4 To Sw	itch Boxes		Allowe	d Limits		Active	Tool: 1
Group	Expired Count	Tool Order	Holes Limit	Usage Limit	Life Warn %	Expired Action	Feed
All	-	-	-	-	-	-	-
Expired	0	-	-	2	-	-	-
No Group	2	-	-	2	-	2	-
Add Group	2	2	2	2	2	2	2

The "ATM" (Advanced Tool Manager)allows operator to set up redundant tools that will expire based on tool usage parameters setup by the operator

When tool life expires for one tool in the group the control will automatically grab the next available tool in the group

Tool	Pocket	Life	Holes Count	Usage Count	Usage Limit	H-Code	
1	0	100%	0	1	0	0	0
2	1	100%	0	0	0	0	0
3	2	100%	0	0	0	0	0
4	3	100%	0	0	0	0	0

INSERT Add Group

				Anthing Co.	-		Tool Toble	Calar	later.	Mardia
	ers	Macro		Active Co	des	ATM	Tool Table	Calcu	lator	Media
Sta	ndard	Milli	ng	Tapping	_					
								F2	Switch	Entry To Input
	_							INSERT	To app line.	end to INPUT
	7	8	9	+ [D]	+/- [E]		MS [S]	ALTER	To rep	lace INPUT line
	4	5	6	- []]	sqrt [K]		MR [R]	ORIGIN	Reset	Calculators
	1	2	3	* [P]	% [Q]		мс [С]			
	(0)	/ [٧]						
	Cle	ear [ORIG	GIN]			Enter				

The "Calculator" tab can be used to do many different calculations including:

Calculations on a basic scientific calculator

			Curre	nt Com	mands		
	Timers	Macro Vars	Active Codes	ATM	Tool Table	Calculato	r Media
	Standard	Milling	Tapping				
	Cutter D Surface	iameter e Speed		*****,***		FZ U	witch Entry To Input ine o append to INPUT
		RPM		*****,***	**	INSERT	ne.
The "Calculator" tab can be used to do many		Flutes		*****,***	**	ALTER	o replace INPUT line.
different calculations		Feed		*****,***	** in/min	DELETE	lear current input
including:	Ch	nip Load		****,***	** in/tth	ORIGIN R	eset Calculators
Milling speeds and feeds	Work I	Material	No Material Sel	ected			
	Tool	Material	Please Select W	Vork Mate			
		ut Width		*****,***	tt in		opy Value From tandard Calculator
		t Depth		100,00	•• in	F4 T	aste Current Value o Standard alculator
			Next to Field Name D)enotes (alculated Value	1	

			Curre	ent Comr	mands		
	Timers	Macro Vars	Active Codes	ATM	Tool Table	Calculato	n Media
	Standard	Milling	Tapping				
The "Calculator" tab can be used to do many different calculations including: Calculations required for properly tapping	м	TPI etric Lead RPM Feed		*****,*** *****,*** *****,***	*** mm/rev	HEATER C	witch Entry To Input ine o append to INPUT ne. o replace INPUT line. lear current input eset Calculators
		* Next	to Field Name Der	iotes Calc	ulated Value	F3 s	opy Value From tandard Calculator aste Current Value o Standard alculator

The "F2" button can be used to switch between a line being enter and calculated

"INSERT" can be used to add to highlighted value

The "ALTER" button can be used to replace the number that has been put in

The "Delete" button will clear the current line

The "ORIGIN" button will clear all current inputs

"F3" can be used to copy The value from the "Standard Calculator" and paste it into the selected line

"F4" will copy and paste the selected line into the "Standard Calculator"

*****	***** in ***** ft/min	FZ Line	Media ch Entry To Input ppend to INPUT
***** ***** *****	***** *****	FZ Line	
*****	***** *****	FZ Line	
*****	***** *****	FZ Line	
*****	*****	FZ Line	
	·		ppend to INPUT
	·		
*****		ALTER TO D	eplace INPUT line.
	****	ALTER TO R	eplace INPUT line.
*****	.**** in/min	DELETE Clea	r current input
*****	.**** in/tth	ORIGIN Rese	et Calculators
No Material Selected			
Please Select Work M			
****	.***** in		Value From dard Calculator
11111	.***** in	and the second se	e Current Value tandard
	With Material Selected	***** in/tth No Material Selected Please Select Work Material	No Material Selected Please Select Work Material

* Next to Field Name Denotes Calculated Value



The "Media" tab is used to display the Media Player



The "ALARMS" button can used to find any alarms and messages that the machines has

ive Alarms	Messages	Alarm History	Alarm Viewer	Key History
EMERGE	NCV STOP	Alarm [1	Total]	
MERGE	NCY STOP			

107 EMERGENCY STOP

In the "Active Alarms" tab can be used to see any alarms that your machine currently has, along with a brief description of the alarm

An Emergency Stop button was pressed. The spindle and all axes have been decelerated to a stop and power has been removed from the motors. To restore power to the motors and spindle release all Emergency Stop buttons and press reset.





Active Alarn	ns Messages	Alarm History	Alarm Viewer	Key History			
	5	Search (TEXT) [F1],	or [F1] to clear.				
Alarm		Description		Date And Time			
903	Security EMP#:DI	10953 LVL:2		2017/04/24 18:23:54			
107	EMERGENCY STOP	2		2017/04/25 21:08:26			
903	CNC MACHINE PO	WERED UP		2017/04/28 14:16:35			
107	EMERGENCY STOP	þ		2017/04/28 14:16:35			
903	CNC MACHINE PO	WERED UP		2017/05/01 15:56:25			
903	CNC MACHINE PO	CNC MACHINE POWERED UP					
903	CNC MACHINE PO	CNC MACHINE POWERED UP					
107	EMERGENCY STOP	2017/05/31 15:50:57					
903	CNC MACHINE PO	CNC MACHINE POWERED UP					
107	EMERGENCY STOP	þ		2017/06/13 12:57:16			
903	CNC MACHINE PO	WERED UP		2017/06/13 13:59:32			
349	PROGRAM STOP V	VITHOUT CANCELIN	G CUTTER COMP	2017/06/13 14:16:40			
107	EMERGENCY STOP	0		2017/06/13 17:12:43			
107	EMERGENCY STOP	b		2017/06/13 17:13:26			
903	CNC MACHINE PO	WERED UP		2017/06/14 20:10:39			
503	ILLEGAL MACRO V	ARIABLE REFERENC	E	2017/06/14 20:18:39			
503	ILLEGAL MACRO V	ARIABLE REFERENC	E	2017/06/14 20:19:27			
903	CNC MACHINE PO	WERED UP		2017/06/19 14:31:37			
107	EMERGENCY STOP	Þ		2017/06/19 15:08:34			
107	EMERGENCY STOP	>		2017/06/19 11:26:33			

Alarms And Messages Active Alarms Messages Alarm History Alarm Viewer Key History Search (TEXT) [F1], or [F1] to clear. Alarm 102 SERVOS TURNED OFF 103 AXIS SERVO ERROR TOO LARGE 107 EMERGENCY STOP 108 AXIS SERVO OVERLOAD 113 SHUTTLE IN FAULT SHUTTLE OUT FAULT 114 115 CAROUSEL POSITION FAULT 116 SPINDLE ORIENTATION FAULT 119 INPUT AC LINE OVERVOLTAGE 120 LOW AIR PRESSURE OR FLOW 122 REGEN OVERHEAT 123 SPINDLE DRIVE FAULT 125 SHUTTLE FAULT HELP To read full description

"Alarm History" tells you all of the previous alarms

"Alarm Viewer" is used to see all of

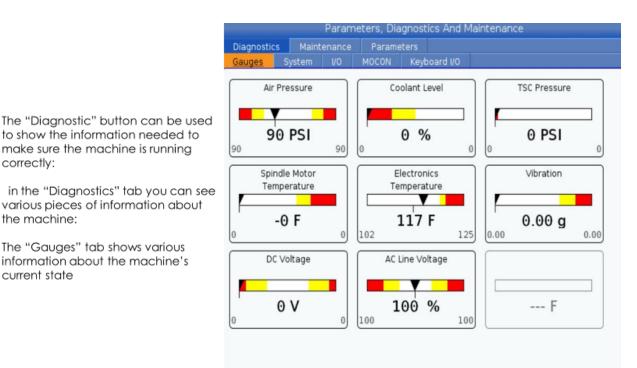
the alarms that can appear

Active Alarms	Messages	Alarm Histo	ory	Alarm Viewer	Key History
PACE		2017/06/19	13:13	:50	
		2017/06/19	13:13	: 50	
		2017/06/19	13:13	:51	
		2017/06/19	13:13	: 52	
		2017/06/19	13:13	:53	
		2017/06/19	13:13	: 54	
1		2017/06/19	13:13	: 55	
		2017/06/19	13:13	:56	
		2017/06/19	13:13	: 57	
		2017/06/19	13:13	:57	
K_SHIFT		2017/06/19	13:13	:59	
		2017/06/19	13:14	:01	
K_SHIFT RELEAS	ED	2017/06/19	13:14	:01	
K_RIGHT		2017/06/19	13:15	: 45	
K_UP		2017/06/19	13:15	: 46	
K_UP		2017/06/19	13:15	: 47	
K_RIGHT		2017/06/19	13:15	: 48	
K_RIGHT		2017/06/19	13:16	: 43	
K_RIGHT		2017/06/19	13:17	: 38	

"Key History" logs all user key strokes



The "Diagnostic" button can be used to show the information needed to make sure the machine is running correctly



Diagnostics	Maintena	nce	Param	eters	
	stem V	0	MOCON	Keyboard I/O	
Versions				Machine Data	
Serial Number		12	234567	Run Time 2:	57:38
Model		CS	SMD-G2	Bill Time 00:	00:00
Release	100.	16.00	0.1041	Tool Changes	62
Platform		RevD_	R18_X6	Power Cycles	181
Link	01/2	5/2017	7 10:09	Power On Time 3791:	54:52
MOCON					
FPGA				Safety Levels	- 31
Control	10:09:51	Jan 2	6 2017	Operator Door Safety Level	1
SKBIF Version			4.9	Load Station Door Safety Level	1
RJH-C			???	Tool Changer Cage Door Safety Level	1
SI0 Version				Alarm Level	2
I/0 TC Version					
I/O Version			N/A		
			5		

The "System" tab gives you information about the machine's configuration

correctly:

the machine:

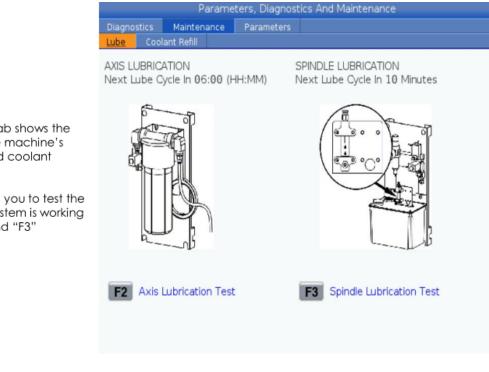
current state

The "Gauges" tab shows various

information about the machine's

Diagnostics Gauges Syst	Maintenance Parameters tem 1/0 MOCON Keyboard I	vo	
	Search (TEXT) [F1], or [F]		
	Search (TEXT) [F1], or [F1	I to clear.	
Туре	Name	Value	Filter
Axis Inputs	CH1 [X] Axis Z Channel	0	
Axis Inputs	CH 1 [X] Axis Brake Air Pressure	0	
Axis Inputs	CH 1 [X] Axis Cable Input	0	
Axis Inputs	CH 1 [X] Axis Home Switch	0	
Axis Inputs	CH 1 [X] Axis Drive Fault	0	
Axis Inputs	CH 1 [X] Axis Trans Fault	0	
Axis Inputs	CH 1 [X] FAULT REGISTER 1	0x0	
Axis Inputs	CH 1 [X] FAULT REGISTER 2	0x0	
Axis Inputs	CH 1 [X] FAULT REGISTER 1 Latch	0×0	
Axis Inputs	CH 1 [X] FAULT REGISTER 2 Latch	0x0	
Axis Inputs	CH 1 [X] Raw Encoder Data	0×0	
Axis Inputs	CH 1 [X] Raw Encoder Count	0	
Axis Inputs	CH 2 [Y] Axis Z Channel	0	
Axis Inputs	CH 2 [Y] Axis Brake Air Pressure	0	
Axis Inputs	CH 2 [Y] Axis Cable Input	0	
Axis Inputs	CH 2 [Y] Axis Home Switch	0	
ENTER Select fil	ter criteria	Filter by selected crit	

"I/O", "MOCON" and "Keyboard I/O" are used to display to see if components are working properly on the control

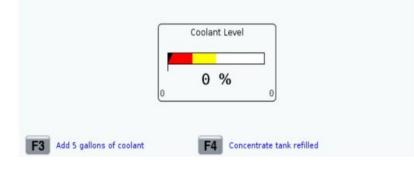


The "Maintenance" tab shows the information about the machine's lubrication system and coolant information

The "Lube" tab allows you to test the that the lubrication system is working properly using "F2" and "F3"

Diagnostics	Maintenance	Parameters		
ube <u>Coo</u>	lant Refill			
	Coolant F	Refill Settings	Value	Units
Coolant Refill			Off	
Estimated Co	olant Use Per Hou	r	1.0	Gal
Coolant Cond	entrate		5	%
Time Between	n Refills		5.0	Hrs
Maximum Coo	plant From Remain	ing Concentrate	500	Gal
Supply Water	Rate		2.0	Gal/Min
Concentrate	Adjustment	0	%	

The "Coolant Refill" tab is used to input information regarding coolant refill settings



Diagnostics	Maintenance	Parameters					
eatures	Compensation	Activation					
	s	earch (TEXT) IE	1], or [F1] to clear				
		curent (really fr.					
	Feature		Status	Date:			
Machine			Purchased	Acquired 05-11-16			
Macros			Purchased	Acquired 06-19-17			
Rotation	And Scaling		Purchased	Acquired 06-19-17			
 Rigid Tap 	ping		Purchased	Acquired 06-19-17			
TCPC and	DWO		Purchased	Acquired 06-19-17			
M19 Spin	dle Orient		Purchased				
High Spe	ed Machining		Purchased	Acquired 06-19-17			
VPS Editi	ng		Purchased	Acquired 06-19-17			
Media Di	splay		Purchased	Acquired 06-19-17			
Fourth A	kis		Purchased	Acquired 06-19-17			
Fifth Axis			Purchased	Acquired 06-19-17			
Custom F	Rotaries	1.1.1	Purchased	Acquired 06-19-17			
Max Mem	emory: 1GB Purchase		Purchased	Acquired 06-19-17			
	eless Networking Purchased		Purchased	Acquired 06-19-17			
	sation Tables		Purchased	Acquired 06-19-17			
	Spindle Coolant		Purchased	Acquired 06-19-17			
	dle Speed: 15000 l	RPM	Purchased	Acquired 06-19-17			

features on the machine, allows you to adjust the different axis, and displays the machine information for activation

The "Parameters" tab additional

The "Features" tab allows you to turn on and off different features of the machine and allows you to unlock purchased features

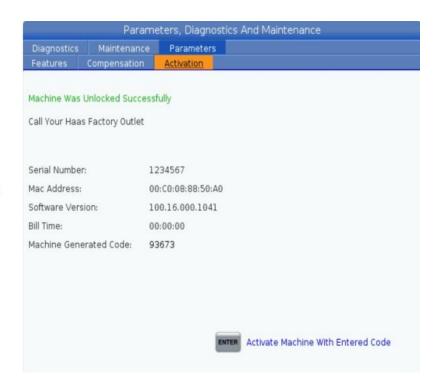
*Tryout time is only updated while Feature is enabled.

ENTER Turn On/Off Feature

F4 Purchase Feature With Entered Activation Code.

gno	stics Mai	Maintenance Parameters		
eature	s <u>Compe</u>	ensation	Activation	
Y				
Axis	Lead Screw	Comper	sation	
10.	Position	and the second se	ection(MM)	
1	-0.000	-	.0000	F1 10.0 MM / 0.5 Inch Increments
2	-2.000		impty	10.0 MM / 0.5 men increments
3	-4.000		mpty	
4	-6.000		Empty	F2 25.0 MM / 1.0 Inch Increments
5	-8.000		Impty	
6	-10.000		Empty	F3 50.0 MM / 2.0 Inch Increments
7	-12.000		mpty	50.0 MM / 2.0 inch increments
8	-14.000		Empty	
9	-16.000			F4 100.0 MM / 4.0 Inch Increments
10	-18.000		Empty	
11	-20.000		mpty	Changes Discourses (MM4001)
12	-22.000	E	Empty	Change Dimensions (MM/IN)
13	-24.000	E	Empty	
14	-26.000	E	Empty	Clear Table Values
15	-28.000	E	Empty	
10	-30.000		Empty	

"Compensation" allows you to adjust the X,Y and Z compensation based on position



"Activation" gives you information about the machine's software and remaining time until an activation code will be needed



The "Setting" button is used to adjust different settings, connecting your machine to the internet, set-up rotaries and user positions

		Settings			
	Alias Codes	User Positions	Rotary	Network	Settings
	F1] to clear.	rch (TEXT) [F1], or [F	Sear		
		Group			
>					General
>				eous	Miscellan
>					Program
>				anel	Control Pa
>				Statute:	Editing
>					Graphics
>				2	Overrides
>				anger	Pallet Cha
>				ation	Compensi
>				nce	Maintena
>				ttings	Power Set
>					Probe
>				Setup	Machine S

Restore default settings menu.

The "Setting" button allows you to adjust the various settings in the machine

The "Settings tab" allows you to adjust and override different functions of the machine

The "Network" tab gives you information about the machine's connection to a network

To connect your machine to the internet:

Go to "Wired Connection for connecting your machine using an Ethernet cable by turning on "Wired Network Enabled" and "Obtain Address Automatically" then pressing "F4"

Go to "Wireless Connection" for connecting your machine with an antenna. Press "F2" in order to search for your WiFi network then input your network's password

• Passwords are case sensitive and may require you to use the shift key for lower case n letters

	0.59		Se	ettings				
Settings	Netwo	r <u>k</u> Rotary	User Po	sitions	Alia	s Code		
Wired Conr	nection	Wireless Con	nection	Net Sh	are	Haas	s Drop	Haas Con 📢 🕽
Wired Netv	vork Infor	mation				84 		
Host Nam	e	HaasCNC1234	567	DHCP	Serve	er	192.16	58.10.210
Domain	Domain		IP Ad	dress		192.16	58.10.51	
DNS Serve				Subn	et Mas	sk	255.25	55.255.0
Mac Addre	ess	00:C0:08:94:A8	3:53	Gate	wav		192.16	58.10.1
DHCP Ena	bled	Enabled		Status			UP	
		Name						Value
Wired Netw						>		On
Obtain Add	ress Auto	omatically				>		On
P Address	-1-				-		3	
Subnet Ma					2			
Default Gat DNS Server								
DIAD DELAEI					24		103 103	
Narning: Ch	hanges w	Il not be saved	if page is I	left withou	ut app	lying cl	nanges	
F3 Dis	card Char	nges		F 4	Apply	/ Chang	ges	

			Settin	ngs		
Settings	Network	Rotary	User Positio	ons A	las Codes	
Current Ro	tary Selectio	ns				
Axis	s Configu	ration Na	ime	Model	Direction	Save With Offsets [F2]
✓ 4th A		A PROPERTY OF A	ase H	HRT110	Normal	
5th A					Normal	Set TC Offset [INSERT]
ENTER TO	ggle axis enabled	I. Disabled remai	n configured but	will not mov ys To Nav		Set Grid Offset [ALTER]
Select New	Dotorios	Coord	(mm) (m) 1			
	notaries	Search	(TEXT) [F1]			Clear Rotaries [ORIGIN]
4th Axis		Na		Mod	el	Clear Rotaries [ORIGIN]
4th Axis			me	Mod EC160		Clear Rotaries [ORIGIN] Undo Changes [UNDO]
	5th Axis	Na	me	and the second	0-P8	
	5th Axis	Na	ne	EC160	0-P8)-P8R	
	5th Axis 	Na	ne	EC160 EC1600 EC1600 EC1600	0-P8)-P8R 0-P9)-P9R	Undo Changes [UNDO]
	5th Axis 	Na	ne	EC1600 EC1600 EC1600 EC1600 HA2CT	0-P8 0-P8R 0-P9 0-P9R 15-B	Undo Changes [UNDO]
	5th Axis 	Na	ne	EC160 EC160 EC160 EC160 HA2CT HA2TS	0-P8 0-P8R 0-P9 0-P9R 15-B 5-P3	Undo Changes [UND0] Enable TCPC/DWO [F4]
	5th Axis 	Na	ne	EC160 EC1600 EC1600 EC1600 HA2CT HA2TS HA5C	0-P8 0-P8R 0-P9 0-P9R 15-B 5-P3 -P1	Undo Changes [UND0] Enable TCPC/DWO [F4]
	5th Axis 	Na	me	EC160 EC1600 EC1600 EC1600 HA2CT HA2CT HA5C HA5C	0-P8 0-P8R 0-P9 0-P9R 7S-8 5-P3 -P1 -P3	Undo Changes [UND0] Enable TCPC/DWO [F4]
	5th Avis	Na	ne	EC160 EC1600 EC1600 HA2CT HA2TS HA5C HA5C HA5C	0-P8 1-P8R 0-P9 1-P9R 75-B 5-P3 -P1 -P3 2-B	Undo Changes [UND0] Enable TCPC/DWO [F4]
	5th Avis	Na	me .	EC160 EC1600 EC1600 HA2CT HA2TS HA5C HA5C HA5C HA5C	0-P8 1-P8R 0-P9 1-P9R 5-B 5-P3 -P1 -P3 2-B 2-P3	Undo Changes [UND0] Enable TCPC/DWO [F4]
	5th Avis	Na	me .	EC160 EC1600 EC1600 HA2CT HA2TS HA5C HA5C HA5C	0-P8 0-P9R 0-P9 1-P9R 5-B 5-P3 -P1 -P3 2-B 2-P3 -HDH	Undo Changes [UND0] Enable TCPC/DWO [F4]

The "Rotary" tab is used to activate and configure rotary files and set up

			Settings		
Settings	Network	Rotary	User Positions	Alias Codes	
				Search F1	
			Group		
User Trav	vel Limit				>
Safe Too	l Change Loca	ation			>
Casadi	Home Position	1			>
Second		ion			>

"User Position" allows you to define positions in the machine

User Travel Limit: Allows users to set soft limits for how far the machine can travel. This will affect where the machine when move manually or in a program

Second Home Position: Sets the location for the "Second Home Position" button option

Tool Change Mid Position: Sets a location for the machine to go to anytime a tool change is done

			Settings		
Settings	Network	Rotary	User Positions	Alias Codes	
	M·	Codes & G-	Codes Program Alia	ises	Value
	M MACRO CALL		Č.		(
	M MACRO CALI	09001			(
	M MACRO CALI	09002			(
	M MACRO CALL	09003			(
	M MACRO CALL	09004			
	M MACRO CALL	09005			(
	M MACRO CALI	09006			(
	M MACRO CALI	09007			(
9	M MACRO CALI	09008			(
	M MACRO CALI	09009			(
	G MACRO CALL	09010			
	G MACRO CALL	. 09011			(
	G MACRO CALL				(
	G MACRO CALL	. 09013			
	G MACRO CALL				(
	G MACRO CALL	. 09015			
	G MACRO CALL	and shares a second			(
	G MACRO CALL				(
	G MACRO CALL				(
	G MACRO CALL	09019			(

"Alias Codes" are user defined codes that can be used to reference a program from a sub program

In the "Network" tab there is a "Wired Connection" tab that:

"Wired Network Enabled" activates and deactivates the wired networking

"Obtain Address Automatically" retrieves IP address and other networking information if the network server is capable

"IP Address" is the machine's TCP/IP on the network

"Subnet Mask" is your network administrator assigns the subnet mask value for machines with a static TCP/IP address

"Default Gateway" is the address for your machine to access the network

"DNS Server" is the Domain Name Server

D-N		Se	ettings				
Networ	k Rotary	User Po	sitions	Alia	s Codes		
nection	Wireless Cor	nection	Net Sh	are	Haas D	rop	Haas Con 🔍 🕨
ork Inform	nation		(i)				
	lation						
e	HaasCNC1234	567	DHCP	Serve	er 1	92.16	58.10.210
Domain		IP Ad	dress	1	92.16	58,10,51	
r	192.168.10.21	0	Subn	et Mas	sk 2	255.25	55.255.0
		Gate	Nav	1	92.16	58.10.1	
		0.00		-			5011011
bica	Enablea		Juiu	5]
	Name			Î			Value
ork Enabl					>		On
ress Auto	matically				>		On
sk							
eway							
		if page is	left withou F4			-	
	ection ork Inform e ork Enabl ress Auto sk eway anges wil	ection Wireless Cor ork Information e HaasCNC1234 ar 192.168.10.21 ess 00:C0:08:94:A bled Enabled Name ork Enabled ress Automatically sk eway	Network Rotary User Pc nection Wireless Connection ork Information e HaasCNC1234567 e H32.168.10.210 ess 00:C0:08:94:A8:53 bled Enabled ork Enabled Name ork Enabled sk eway eway	ection Wireless Connection Net Sh ork Information e HaasCNC1234567 DHCP IP Adu r 192.168.10.210 Subn ess 00:C0:08:94:A8:53 Gatev bled Enabled Statu Name ork Enabled ress Automatically sk eway anges will not be saved if page is left without	Network Rotary User Positions Alian ection Nection Wireless Connection Net Share ork Information Information Information e HaasCNC1234567 DHCP Server IP Address IP Address orr 192.168.10.210 Subnet Mats orss 00:C0:08:94:A8:53 Gateway bled Enabled Status ork Enabled Informatically Informatically sk Informatically Informatically sk Informatically Informatically	Network Rotary User Positions Alias Codes nection Wireless Connection Net Share Haas D ork Information Information Information Information e HaasCNC1234567 DHCP Server Information e HaasCNC1234567 DHCP Server Information er 192.168.10.210 Subnet Mask 2 ess 00:C0:08:94:A8:53 Gateway Information ork Enabled Status Units Information ork Enabled > > > ork Enabled > > > sk > > eway > ranges will not be saved if page is left without applying chart >	Network Rotary User Positions Alias Codes nection Wireless Connection Net Share Haas Drop ork Information Internation Internation Internation e HaasCNC1234567 DHCP Server 192.16 int 192.168.10.210 Subnet Mask 255.25 ors 00:C0:08:94:A8:53 Gateway 192.16 bled Enabled Status UP Name Internation Internation Internation ork Enabled > Status Internation sk Internation Internation Internation anges will not be saved if page is left without applying changes Internation Internation

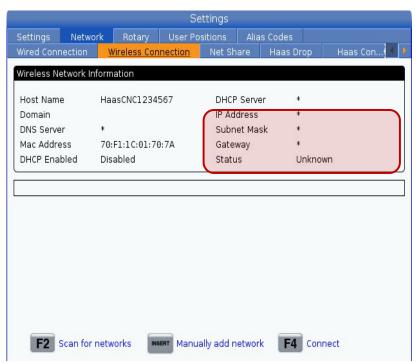
In the "Network" tab there is a "Wireless Connection" tab that:

To connect it is required to know the (if you do not have a Dynamic Host Configuration Protocol [DHCP]): IP address Subnet Mask address Default Gateway address DNS server address

Also, you will need your SSID and password to connect

"F2" can be used to search for available networks

"INSERT" can be used to enter a network in manually



In the "Net Share" tab allows you to connect to computers to send and receive files

"Cnc Network Name" is the name of the machine which is defaulted to "HAASMachine" but can be changed

"Domain/Workgroup Name" is the name of the owner/company

"Remote Net Share Enabled" when "On" the machine shows its content in the shared folder. This feature allows the machine to connect to a server

"Local Net Share Enabled" when "On" allows machine to access the User Data directory to computers on the network

			Se	ettings				
Settings	Network	Rotary	User Po		Alia	is Codes		
Wired Conr	nection \	Vireless Con	nection	Net Sh	are	Haas D	Drop	Haas Con 🖣
Network Sh	are Informat	tion						
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		Name			0			Value
Cnc Networ								HaasCNC1234567
	rkgroup Nam t Share Enab					>		Off
	hare Enable					>		Off
	anges will no		if page is l	eft withou				
F3 Disc	ard Change	S		F 4	Appl	y Change	S	



"HAAS Drop" allows users to wirelessly drop files on to the machine using the HAASDrop app

				Settings				
	Network	Rotary		Positions		s Codes		
/ired Connectio	n Wire	less Conne	ction	Net Share	H	aas Drop	Haas Cor	nect 🧃
HaasConne	ct Informat	ion						
Registered	. o	ff		Conne	ected:	Of	÷	
Last Conta								
HaasCloud S		Name				-1-	Value ud.haascnc.	
Haascloud	erver					CIO	ud.naaschc.	com:2800
N N	/isit my.Ha	asCNC.com	to man	age settings	!	F1	Begin Regi	stration
						_		

"HAAS Connect" is a web-based application that allows you to access your machine's status from a mobile phone or computer

To use this service, you must set up an account at myhaascnc.com, add users and machines, and designate the alerts you want to receive

			Settings			
Settings	Network	Rotary	User Positions	Alias Codes		
Wireless Co	nnection	Net Share	Haas Drop	Haas Connect	Remote Display	1 F

"Remote Display" allows to the machine control screen to be viewed from devices connected to the same internet network. You will have to:

- 1) Download the VNC Viewer app
- 2) Turn the setting on
- 3) Create a password for the connection
- 4) In VNC Viewer you will have to search for the machine IP address (Displayed in the Wireless/Wired Connection tab)

	Value
>	Or
	*otototototototo
	>





The "HELP" button can be used when further assistance is needed with machine functions, commands or programming in the printed manual

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OVERRIDE KEYS

While running a program you can:

Adjust the feed rate of the machine by increments of 10%

The feed rate can be reset straight to 100%

The feed rate can be controlled by the "Handle Jog" wheel a percent at a time

The same can be done with the Spindle Speed

The direction of the spindle can also be changed

The rapid movement can be decreased to different increments



JOG KEYS

The "CHIP FWD", "CHIP STOP" and "CHIP REV" control the Chip Auger/Conveyor

The "CLNT UP" and "CLNT DOWN" control the Programable Coolant nozzle position

The "AUX CLNT" enable/disables the Through-Spindle Coolant system



Function Keys

The "RESET" Button is used to clear alarms, clear input text, stop the machine if its running a program and bring a program to the top of the page

The "POWER UP" button brings all of the machine's axis to zero

The "RECOVER" puts the tool changer into recovery mode

The F1 to F4 button are used to show different functions. They are different depending on the page you are on

"TOOL OFFSET MEASURE" records the length of the tool during the part set up

"NEXT TOOL" selects the next tool from the tool changer only after "TOOL OFFSET MEASURE" has been pressed

"TOOL RELEASE" release the tool from the spindle



"PART ZERO SET" records the machine's coordinate offsets during part setup



15 Easy Steps for Preventive Maintenance on Your HAAS VMC

- 1. Clean chips from tool changer (50 hours of running)
- 2. Clean chips from way covers and bottom pan (50 hours of running)
- 3. Grease pull studs (50 hours of running)
- 4. Clean and lubricate the spindle taper (50 hours of running)
- 5. Inspect the tool changer cambox oil level (200 hours of running)
- 6. Inspect the axes grease reservoir lubrication tank level (200 hours of running)
- 7. Inspect way covers and lubricate (200 hours of running)
- 8. Clean vector drive air vents and filters (200 hours powered on)
- 9. Inspect the oil levels of the gearbox (200 hours powered on)
- 10. Clean coolant filter, replace coolant and clean coolant tank (1200 hours powered on)
- 11.Inspect hoses for cracking (1200 hours powered on)
- 12. Check probe batteries and calibration (1200 hours powered on)
- 13.Grease tool changer cams (2400 hours of running)
- 14.Replace and clean oil, oil filter and oil tanks (2400 hours of running)
- 15.Replace gearbox oil (2400 hours powered on)



All maintenance intervals are recommended but can vary based on use.

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