Professor CNC Router

CWI Woodworking Technologies
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CWI MACHINERY

The Professor

CNC Router

Owner's Manual

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Dear Customer,

CWI Woodworking Technologies would like to thank you for your purchase of the Professor CNC Router. We hope you enjoy your machine and but please observe all safety precautions as you work. Please take some time to read this manual to familiarize yourself with the NK105 operating system before using the machine.

Stay safe and enjoy the exciting new world of CNC Router work.

The Entire Staff
CWI Woodworking Technologies

CWI: Innovation, Performance, Value

CWI Woodworking Technologies is a machinery importation company based on over 47 years' experience in the woodworking machinery industry. All of our machinery is sourced from handpicked, technically advanced manufacturers from Europe and Asia. Our manufacturers are the best in their field. Whether woodworking for Hobby, Educational or Commercial purposes our machinery will provide users excellent serviceability and exceptional endurance. CWI Woodworking Technologies is better performance, better features, better quality and better value!!

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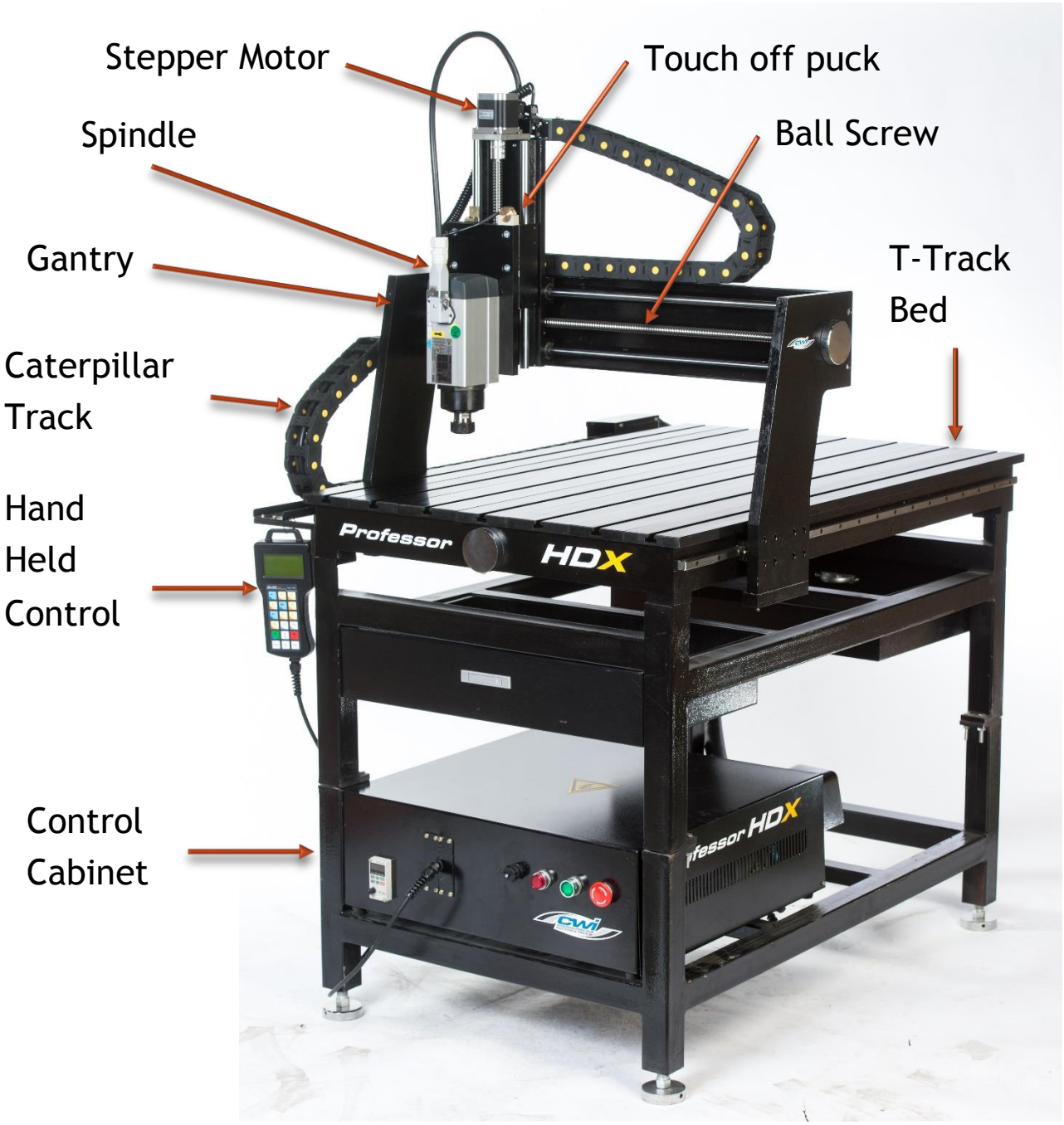
Introduction to the Professor CNC router

The Professor 2.2, 2.3 and HDX are 3 axis CNC routers capable of creating 2D, 2.5D and 3D work with the appropriate software and tooling. It is comprised of three main components; the CNC machine, the CPU and the hand held controller. An optional stand is available to provide a secure solid support for the CNC machine.



Warranty:

Five (5) Year Limited Warranty:

All tools sold by CWI Woodworking Technologies which are used for hobby, or educational applications are warranted for a period of 5 years (60 months) from the date of purchase. CWI Woodworking Technologies agrees to repair or replace any part or component which upon examination, proves to be defective in either workmanship or material to the original purchaser during this 5-year warranty period, subject to the "conditions and exceptions" as listed below. This warranty may not be transferred.

To file a claim:

To file a claim under our Standard 5-year Limited Warranty all defective parts, components or machinery must be returned freight or postage prepaid to CWI's main warehouse or your closest CWI dealer for inspection and approval for replacement.

A copy of the original proof of purchase must be sent with the return of the product being claimed for warranty. Information clearly stating the model and serial number of the tool and an explanation of the complaint or defect in material or workmanship.

Conditions and Exceptions:

This coverage is extended to the original purchaser only. This warranty does not apply to electrical components, CNC machinery, defects due directly or indirectly to misuse, abuse, negligence, accidents, damage in handling or transport, repairs, alterations, lack of maintenance or normal wear and tear. Under no circumstances will CWI be liable for incidental or consequential damages resulting from defective products. All other warranties, expressed or implied, whether of merchantability, fitness for purpose, or otherwise are expressly disclaimed by CWI. This warranty does not cover products used for commercial or industrial purposes. This limited warranty does not apply to accessory items such as blades, drill bits, sanding discs or belts and other related items. Repairs made without the written consent of CWI Woodworking Technologies will void all warranty.

CNC machinery, electrical components or tools used for commercial, institutional or industrial purposes are warranted for a period of one year from date of original purchase.

Safety Guidelines

Woodworking is not an inherently dangerous pursuit as long as you observe some basic safety rules and considerations. Unlike most tools, The Professor CNC Woodworking Router is composed of two parts; the machine onto which the work piece is loaded and on which it is machined and the software that controls the machine. Under no circumstances should you reach into the work area while the machine is running; if you need to access the work envelope during an operation pause or abort the process.

Follow these basic safety considerations while operating this machine

1. Keep your workspace clean and free of clutter around the Professor HDX. Allow enough free space for easy access in order to load and unload the cutting table. Route dust collection pipes and the power supply cable so they do not pose tripping hazards. An over-head dust extraction connection with a flexible hose will keep the area around the machine clear. When running a power cable to the machine over the floor, provide mechanical protection via a groove in a wooden board and use duct tape to fasten it to the floor. This not only prevents tripping over an exposed power cord but also will prevent the power from being disconnected by such an action.
2. Protect your hearing by wearing proper protective equipment. There are several basic types of hearing protection available; single use foam inserts, re-useable in ear sets, over the ear industrial ear muffs and over the ear muffs with active noise cancelling electronics. Hearing protection with active noise cancelling electronics will limit the volume of the loud noise while allowing you to hear more quiet sounds like conversation.
3. Eye Protection is strongly advised even when the included dust shroud/pick-up is used. Cutting sheet goods, plastic and wood will generate small particulate that can easily become airborne. Always use eye protection when using compressed air to clean the work-piece or machine.
4. Tight fitting clothing. Loose clothing will catch on sharp edges and can be at risk of being pulled into moving parts. Always wear close fitting clothing while working near machinery.
5. Use a personal respirator when the material being machined warrants it. When some tropical woods are machined they produce dust which is a respiratory irritant. Prolonged exposure to this dust can cause long term health effects. Respirators should be used when manufactured materials are machined.
6. Dust Collection is highly recommended. Using the included dust collection shroud in connection with a dust extraction system will greatly reduce the amount of dust and other material that the machining process will contribute to the shop environment. It will also

help reduce the amount of dust and debris that is deposited on the rails, screw mechanisms and other moving parts reducing the wear and extending their service life.

7. Disconnect power before servicing. Because this is a software controlled tool, to provide positive protection against accidental start-up and damage, always unplug the Professor HDX from the line power before making any repairs
8. Do not leave machine running unattended. Even if you have run a program many times in the past without any problem, it is best not to leave the machine running unattended. While the machine will execute the program the same way in regardless of how many times it is run, there are other variables that need to be factored in. You could experience a failure in the hold down system, find an internal flaw in the material you are using or a bit may dull and/or break. Having a presence in the shop will allow you to monitor the machine as the work progresses and intervene should it prove necessary.
9. Ensure the work table is clear when the machine is running. During the loading and securing of the material and installation of the tooling you will use various wrenches. It is a natural tendency to set these down on the table top as you work so be sure to get into the habit of clearing the working area of all foreign objects before you pick up the remote terminal to begin a job.

Receiving, Unpacking and Placement of the Professor HDX

Check for shipping damage before accepting delivery. Note any apparent minor damage to the shipping crates on the manifest before accepting the delivery. Inspect the contents of the crate for any damage before accepting delivery if damage to the shipping crate(s) is noted.

These crates are heavy! Do not attempt to move them without help. It will take at least to people to move the Professor 2.2 and possibly three people to move the 2.3 and HDX models onto a stand. Be sure to observe proper and safe lifting practices when moving the crates and their contents.

Use a cordless impact driver to remove the screws that hold the shipping crate together. Carefully remove the packing material and set aside.

Set-up and Connections

Placement of the Professor HDX.

Set up the machine in a dry, well lit location that has clear access from all sides. The Professor needs to be mounted on a table or stand. Because of its weight and the movement of the gantry, the stand must be sufficiently rigid and sturdy. It is best to consider the proximity of power and dust collection connections when choosing a location in your shop. Allow enough space around the machine to accommodate the largest material you will be working with.

The main portion of the Professor HDX arrives fully assembled; the end user only needs to connect the hand held terminal to the control cabinet and then to connect the cables coming from the machine to the control cabinet and plug it in.

Begin by placing the Professor on a sturdy table or the available optional stand. Ensure the table/stand is sitting securely on a solid floor. Use a couple of blocks of wood under the frame members to support the machine in order to insert the adjustable feet into each of the four corner posts. When the feet have been installed, level the machine.

In order to protect the metal surfaces from rust during the transportation, the factory has applied a protective oil based coating which must be removed before use. Use a rag with some Varsol to remove this coating before proceeding. Dispose of the contaminated rags properly to reduce the risk of fire.

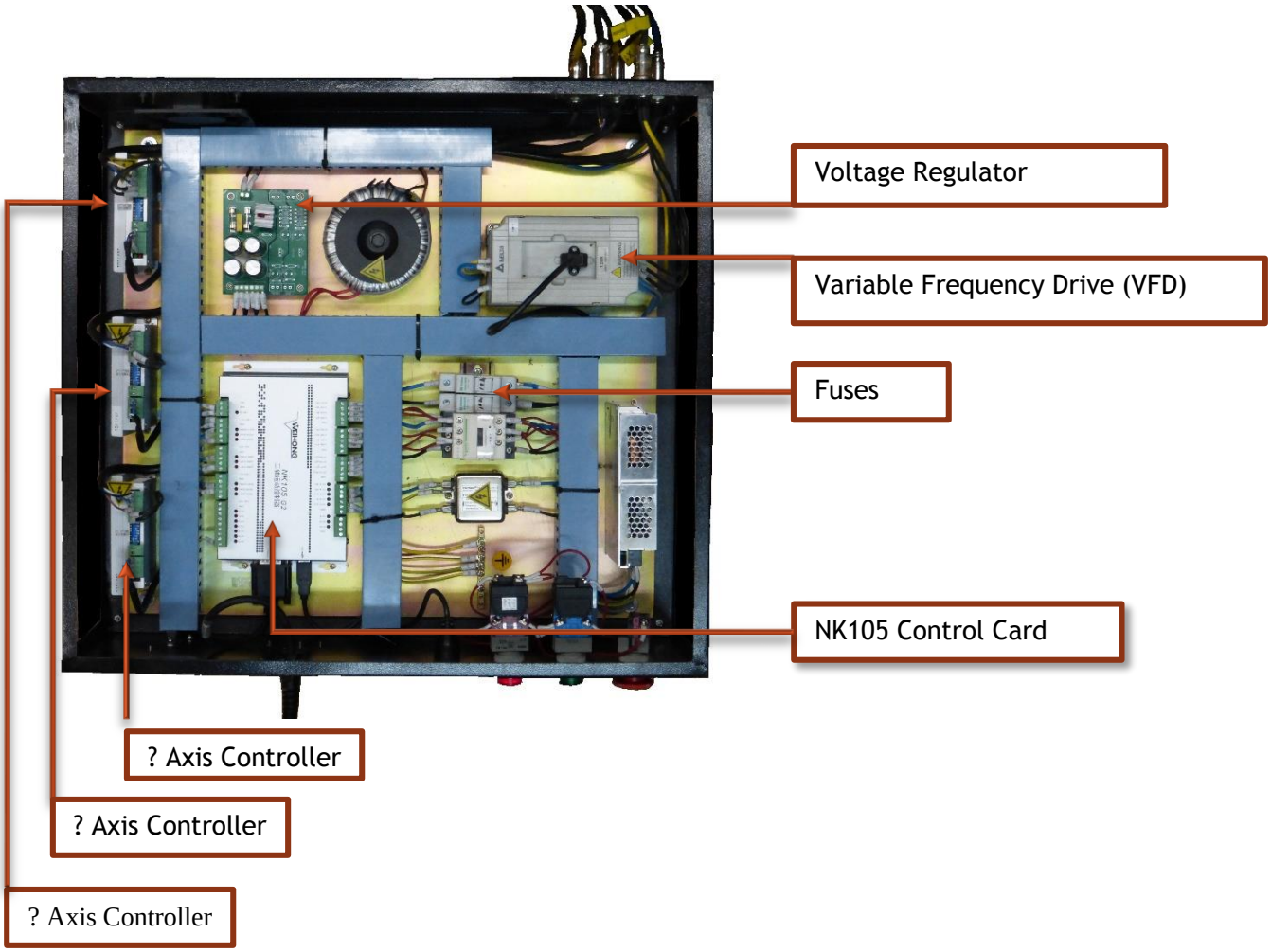
Placing the control cabinet.

The placement of the control cabinet is limited to the length of the connection cables. We recommend that you consider several factors when choosing where to place the cabinet. Consider ease of access to the USB port as well as the proximity to excessive dust and debris. This cabinet contains several electro mechanical components which will provide years of reliable service as long as they are protected from the accumulation of dust and other by-products of the machining process. There is a cooling fan in the control cabinet and if you locate the cabinet in an area where there is sawdust in the air it will get sucked into the cabinet. Once in the cabinet it will settle on the various components and build up. This results in increased temperatures for these components. If you must place the cabinet in an area that has high ambient particulate, provide a supply of filtered air by placing it in a larger cabinet with filters on the openings. Alternatively, cover the openings in the cabinet with filter material.

Mounting the Router (all models except HDX)

On the Professor 2.2 and 2.3, the user will need to mount the router in the cradle. Loosen the four screws that secure the two router brackets. Insert the router so that the bottom of the router housing is protruding a small amount below the bottom bracket. Tighten the four screws to secure the router.

Control Cabinet (not all parts required for all models)



Connecting the hand held controller to the cabinet.

The cable that connects the hand held controller must be fed through the front panel of the control cabinet. To do this,

- Remove the four screws that secure the cover and set them aside in a safe place.
- Lift off the cover from the control cabinet to expose the interior.
- Remove the four screws that fasten the reducer plates to the square opening on the front of the control cabinet and set the screws aside with the others.
- Pass the connector through the opening leaving about a foot or so to coil up in the cabinet.
- Coil the cable in a small loop and fasten it with a few cable ties. This will provide some strain relief if the cord is accidentally pulled.
- Plug the connector into the socket on the controller module and tighten the two set screws on either side of the connector.
- Fit the rubber strain relief connector to the cable where it passes through the front panel and with the lock-nut on the inside portion of the cable, re-install the two reduction plates in the front panel to close the opening.
- Insert the strain relief connector and tighten the plastic lock-nut.

Connect the 5 cables from the Professor CNC to the control cabinet.

There are five cables that need to be connected between the control cabinet and the machine. The connections are already made at the machine end and all that remains is for the connector to be fitted into the protective housing and the individual cables to be connected to the appropriate terminals.

- Feed the connectors and cables through large round knock-out the metal protective housing that is included in the parts kit.
- Fasten the connector to the metal cover with the included lock nut.
- Each cable has a tag attached that will match a corresponding label on the back of the control cabinet. Connect each of the cables to the appropriate terminal on the back of the cabinet. Insert the connector and push it in all the way and tighten the lock-nut
- When the connector has been fully inserted, tighten the retaining nut to ensure the connection remains secure.
- When all the cables have been connected, fasten the protective housing to the back of the control cabinet to provide mechanical protection to these critical connections.

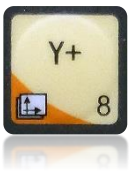
Connect the power.

The Professor HDX requires a 220 volt power source is ships with a NEMA 6-15 cord end rated for 15 amps. If you do not have this power available in your shop, consult a qualified electrician to install a circuit dedicated to this machine. If you already have this power available, simply insert the power cord into the cabinet and plug it in.

Hand Held Remote

All machine functions are accessed through the keypad on the handheld remote control. The following pages outline the function of each key. Some functions will require you to hold the shift key while selecting a function and these are outlined in the second table.

NK105 Control System Individual Panel Keys and Functions

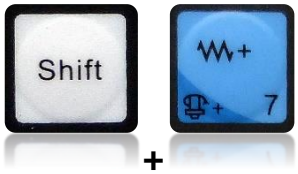
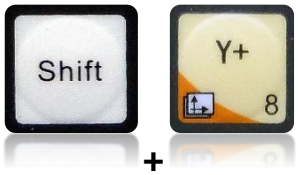
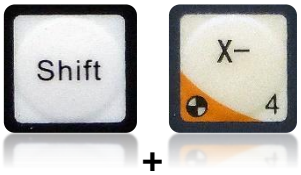
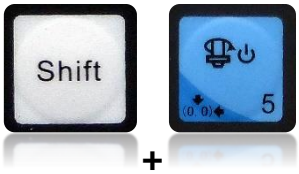
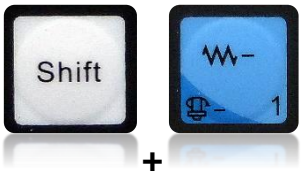
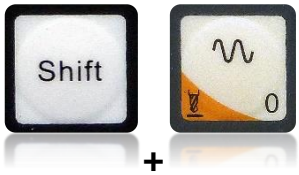
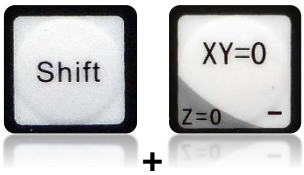
Control Key	Key Name	Function
	Override+	• Override to increase federate • Input of number 7 • Increase of spindle gear with the help of auxiliary key when spindle port has input
	Y+	• Positive shift of Y Axes • Input of number 8 • Switch between MCS and WCS with the help if the auxiliary key
	Z+	• Positive shift of the Z Axes • Input of number 9
	X-	• Negative shift of X Axes • Input of number 4 • Return to the mechanical origin with the help of the auxiliary key
	Spindle Start/Stop	• Start or stop the spindle under manual mode • Input of the number 5 • Return to work-piece origin with the help of the auxiliary key
	X+	• Positive shift of X Axes • Input of number 6
	Override -	• Override to decrease feed rate • Input of number 1 • Decrease of spindle gear with the help of auxiliary key when spindle port has input

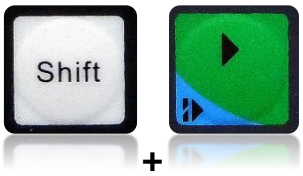
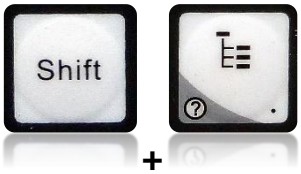
	Y-	• Negative shift of Y Axes • Input of number 2
	Z-	• Negative shift of Z Axes • Input of number 3
	Speed Switchover	• Switch between manual low/high speed • Input if number 0 • Tool pre-setting with the help of the auxiliary key
	Return to Origin	• Return to the origin of X and Y Axes • Input of minus • Return to the origin of the Z Axis with the help of the auxiliary key
	Menu	• Entering the menu page • Input of decimal point • Entering image update page at the time of system start up.
	Start	• Start key • Breakpoint resume with the help of the auxiliary key
	Up	• Suspend processing • Up direction key
	ESC	• Stop processing • Cancelation of various selections, inputs and operations
	Shift	• Auxiliary key

	Down	• Down direction key
	OK	• Entering manual high/low speed adjustment page under menu page • Confirmation of various selections, inputs and operations

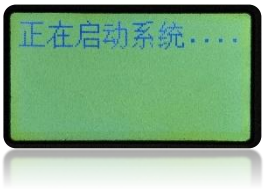
NK105 Control System Combination Panel Keys and Functions

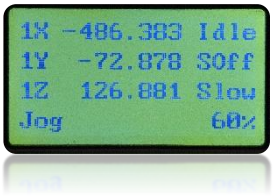
To access these functions, you will need to press the ‘Shift” key in addition to the function key.

Keys	Function
	Increase of spindle gear
	Switch between MCS and WCS
	Return to mechanical origin
	Return to work-piece origin
	Decrease of spindle gear
	Floating pre-setting
	Z Clear

	Break-point resume
	Enter help page

Quick Start Guide

Action	
Connect the machine to a properly rated electrical supply. Release the emergency stop button if required by giving it a twist to the right until it pops out.	
When connected to a live circuit, the lamp in the 'POWER OFF" button will be lit. This indicates that there is power to the system and it is ready to be turned on.	
To power up the system, press the green power 'POWER ON' button. The green 'POWER ON' button will illuminate and the red 'POWER OFF' lamp will go out.	
When power is applied to the system, the CPU will boot up and the home screen for the Weihong control system will be displayed as the controller boots up.	
A second Weihong home screen will be displayed during the boot process.	
The CPU will search if there is a USB thumb drive installed. It will move on to the next screen automatically.	
After checking for the USB drive, the machine will ask for the spindle to be returned to the reference point. Press 'OK' and the machine will move to the home position and engage the limit switches.	

When the spindle has finished the homing process, the controller will want to load a file. To load a file from the USB drive, press 'OK'	
The tool-path files available on the USB drive will be displayed on the screen. To see any additional files, use the 'UP' and 'DOWN' buttons to scroll through the list.	
Highlight the file you want by using the 'UP' and 'DOWN' buttons and then press enter to select it. To load the file into memory press '1'	
Depending on the size of the file, you may see a status screen displaying the load progress. When the file has loaded, the screen will show the current spindle position as well as some additional information on the right. At this point, the file is ready to run.	
Install and set the tooling as required by the loaded tool-path program (see Setting The Tool Length in the next section)	
Perform a test if you are unsure of the result. Set the Z=0 point to a location above the work-piece so the bit is in free air and run to program to observe the result.	

Setting the tool length

The Professor CNC allows you to automatically set the length of the tooling using the brass touch off puck.

- Install the cutter required into the collet and use the two wrenches to tighten the collet nut.
- Ensure that the controller is in slow jog mode and carefully move the bit down the Z axis so it is just above the top of the brass touch off puck.
- Place the touch off puck directly beneath the bit and press the shift and '0' key. The bit will begin to move down and when the tip makes contact with the puck it will complete an electrical circuit that will register the location of the bottom of the bit.
- After the bit makes contact with the puck it will complete and electrical circuit signaling the spindle to retract a pre-programmed distance above the puck and stop.
- The tool is now calibrated and is now ready to run.

The automatic tool setting function uses an electrical signal to set the tool length. When the bit contacts the touch off puck it will complete an electrical circuit which stops the bit and sets Z=0. To ensure the proper functioning of this feature, it is important that there be no electrical conductivity between the touch off puck and the machine frame. Touching the frame as well as the brass puck during the operation of the automatic tool-setting feature will cause unreliable operation that will damage the brass puck or the bit.

To avoid any potential damage to delicate spurs on some cutters, users may prefer to calibrate the tool manually. Follow this procedure to set the bit length (Z=0) manually. This method is less reliable when you must set the lengths of several different tools to complete one job.

- Using the jog function (Slow mode), move the spindle close to the surface of the material.
- Place a piece of paper on the surface of your material and switch the hand held remote to stepping mode.
- Use the 'Z=-'key to step the bit down until it contacts the piece of paper.
- Press the shift and 'Z=0' key to reset the Z=O value
- The system will confirm your request.
- Press the OK key to confirm.

Exiting the System and Power Down

The CNC machine is computer controlled and to prevent problems it is important to exit the control system in the proper manner. Failure to follow this procedure will generate error codes. If you simply press the power off button, one of the error codes you may see when you next start the machine is 'Previous shut down was illegal'. To avoid potential problems and the corruption of your data, follow this procedure.

Press the menu key to display options	
Scroll down to option '7', 'System Upkeep' and select	
Scroll down to option '7', 'Exit' and select	
Press 'OK' to exit the system and the screen will go blank and the system will be ready to power down.	
Press the red power button on the main control cabinet to shut the system down	
If you wish to re-enter the control system you will need to cycle the power to restart the controller	

Typical CNC Project Workflow

Concept Stage

This is the initial design stage of any CNC project. Your project may begin as a sketch, a request from a customer or a detailed drawing from a designer. At the concept stage you can receive your design criteria from any number of sources. This is the make or break stage of the project, the part of the process where the creative input is co-ordinated with the realities of the production process. Elements of the design may not be easily executable with your available machine and tooling so this is the time to revise the design to accommodate your available resources. You may not be able to cut tight radius corners with your available cutters for example. This is also the time to consider the material you will use, where the item is to be used (indoors or out) and any joinery that may need to be cut. You will need to prepare the thickness of your material accurately if the CNC machine is to cut joinery that will allow your parts to slot together.

Design Stage

When you have a fully realized concept you are ready to move on to the design stage and the CAD process. Open your CNC software and begin by specifying the size of the material you will be working with. At this time you will also specify the X,Y and Z origin points on your virtual part. When it comes time to machine the part on the CNC, you will set these co-ordinates in the real world on the bed of the machine. At this stage you will also define the measurement units you are going to be using. (mm vs. inch). You can use your software package to create your vectors or you can import them from another program. At this stage you can incorporate features that will aid in later production stages. For example, you can cut slight pockets for hardware to help properly locate it during assembly or you could mark the locations of hand drilled holes with a dimple. Consider all aspects of the project production during the design stage; small steps taken now can result in major time savings and increased accuracy later.

Tool Path Generation

After you have completed the design process and have a complete set of vectors to work with it is time to generate the tool-path. It is best to reconfirm your material dimensions before continuing.

- Begin by selecting the type of tool-path you wish to use. Most software packages offer a number of different tool-path options; pocket, drilling, v-carve and profiling to name a few. The function of each of these different tool-path options will be described in detail in the documentation that accompanies the software you are using.
- Select the type of cutter that is best suited to machine the chosen profile in the material you are using. Because of their nature, some tool-paths are limited to using certain types of cutters and this will become evident in the software you are using. Some options will

be visible in the menu but not available to use. The software will store a library of tool choices and you will need to make sure that the tool you are using matches the specifications for that cutter in the tool file. Adjust any discrepancies in the tool file or create a new tool file for that cutter.

- Select and define any other options for that specific tool-path. Items such as feed rate can be defined and depending on your model, speed control might be available as well. For example, when running a profile tool-path to cut out parts from a larger piece, you can set tabs that will hold everything together during the machining process. Once complete the parts can be removed from the grid and the tabs sanded flush.
- Calculate the tool-path and run a simulation. After you calculate the tool-path, use the preview function to view the result of the selected tool-path on the screen. This will allow you confirm that the piece has been cut according to your intentions and this is the time to correct any mistakes as they should be visible. If it does not look right during the preview, it will not be right during the cut.
- Save your tool-path(s) to your hard drive in a tool-paths folder. Each brand of CNC controller will require that the tool-path be configured so it will understand the information. The Weihong Controller used in the Professor Series needs to be saved with the ".nc easy" post processor.

Machining

For the machining part of the operation to faithfully reproduce what you worked to achieve in the simulation, you will need to properly re-create the all of the conditions of the simulation on the bed of the machine. This involves several steps which you must go through in order to achieve success.

- Begin by transferring the tool-path file to the machine. Open the tool-paths folder on your computer's hard drive, select the appropriate file(s) and then copy the file(S) to the USB drive.
- Insert the USB drive into the USB port on the front of the Professor CPU Cabinet. On the hand-held remote press the menu key and select the USB drive option. Scroll down to the file you want to select and press the enter key. This will place a check mark beside the file. With the file selected, you then press the "load' button and the file will load into the memory.
- Load the material onto the machine. You will need to use some form of hold down to secure the material while it is being machined. For more detailed information on the various options, see the chapter on fixturing. It is extremely important to ensure that the clamping mechanisms are clear of the tool-path you will run. If any part of the bit or spindle comes into contact with the clamping mechanism you will damage the bit, spindle, clamp and material. If in doubt, set your Z=0 point to a value above the surface of the material and run the program to check for any conflicts.
- Set the Material Co-ordinate system to reflect the same value as the simulation. Using the jog and step functions on the hand held controller, position the center of the spindle over the origin point in the X and Y axis. If you are using a bit that has a natural center point, this will be relatively simple to do visually. If you are using a large flat bottomed use another bit that comes to a point to properly locate this point. A 90 degree V groove bit is an excellent choice for this task.
- Insert the collet into the collet nut so that it is held captive. Begin to thread the collet nut onto the spindle arbor one turn. Insert the bit into the collet. Be sure the bit is not inserted to deeply or dust and debris will work its way up into the collet. When the bit has

been properly seated in the collet, tighten the nut with the two wrenches. For more detailed information, see the section on collets.

- Ensure that the bit you are using has the same characteristics as the bit that you used during the simulation. If any of the critical values are different then your result will not match the simulation.
- Set the length of the bit either automatically or manually. See the previous chapters for details.
- **STOP. LOOK AND THINK.** Before you proceed and turn on the machine to run the program, take a look at your set up with a critical eye. Has the material been loaded correctly and secured properly without any tool-path conflicts? Has the right tool been installed and calibrated. Has the work-piece origin been set correctly? Have all foreign objects been removed from the table?
- Start the spindle to confirm it spins freely and turn it off again.
- Ensure that an adequate time has been programmed into the tool-path to allow the spindle to come up to speed before the cutting starts. If the spindle is not at the proper speed when it begins cutting you will not get an optimum cut and could possibly damage the bit or material. If there is not enough time, change the value on the Weihong Controller. A quick short-cut is to back the gantry to the far end of the table to ensure that the spindle is spinning at the proper RPM by the time it gets to the start point of the cutting operation.

Finishing

Finishing is the final step in the process. The sharpness of the cutting tool, the machining characteristics of the material and the nature of the program will all play a part in the success of the final result.

If you are running a program that executes an intricate carved surface, running the program once may leave some fuzzy edges. This can often be remedied and your sanding time reduced by running the program twice.

Even under optimal condition there will be some sanding to do when the part has been finished. Regular sandpaper is not the most appropriate to sand carved surfaces; you cannot easily sand within the recesses without sanding off any raised detail and affecting the crisp look. The best way to reduce the amount of time it takes and maintain the crisp look of the carving is to use a sanding mop. These are composed of many layers of slotted sandpaper that is stacked on a mandrel. Mount the sanding mop in a drill press set at 2500 rpm and pass the carved work over the mop. It will sand any rough areas and prepare the part for finishing in very little time.

Another area that can be a problem with the carved areas crops up during the finishing process. When you apply a finish with a brush or a rag it is natural that as the applicator is dragged over the rough areas, the finish will be pulled off the applicator as it meets the edge of the carving. This excess finish will then run down the edge and pool at the bottom of the carving. It is best to use an HVLP system to carefully apply several thin coats of any film forming finish. If you are using a wipe on finish such as a Danish Oil, you can generously apply the finish with a cloth and then use compressed air to blow the excess finish out of the recesses. Observe all compressed air safety precautions and wear eye protection.

Collet and Tooling Installation

Select the proper size collet for the bit you will be using. Using the wrong size collet will not allow the collet to properly grip the bit; this will result in damage to the collet, bit and work piece. Do not insert the bit into the collet and then try to seat it in the nut; if the bit is inserted in the collet first, the collet will not be able to compress in order for the locking ring in the nut to engage.

To insert the collet into the nut, place the collet on a solid stable surface with the arbor end down. Place the collet nut on top of the collet so it sits level.

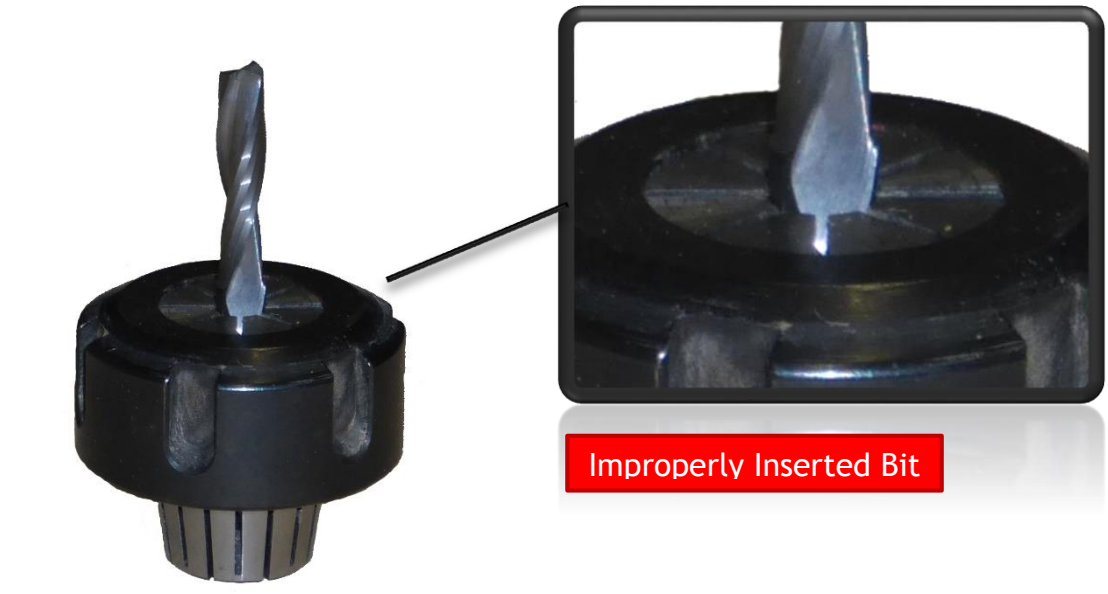
Using the palm of your hand, apply slight downward pressure to the nut until you hear and feel the ring in the collet engage with the raised ridge on the collet nut.

When the collet has been properly inserted it will be held captive by the nut and the face of the collet will be level with the face of the nut.

Loosely thread the nut/collet assembly onto the spindle. If you experience difficulty starting the thread, slowly spin the nut backwards until you feel it seat itself on the thread and then turn it in the forward direction just enough to hold it in place.

Bit inserted to the correct depth.

Insert the tooling into the collet ensuring that it is fully seated. Most of the shank should be engaged in the holder. If you insert the bit too deeply into the collet you could end up getting the flutes or chip clearance areas below the surface of the collet. This will allow dust and fine chips to penetrate up into the collet.



Improperly Inserted Bit

To remove the collet from the collet nut, first remove the bit and then place the assembly face down on a solid surface.

Use your thumb on the collet nut and the side of your index finger on the other side of the collet and squeeze. By applying pressure at an angle like this, the collet will pop it out of the retaining ring in the nut.

A clean collet is a happy collet.

Inspect your collets every time you change the bit. As the machine works, fine dust will work its way into the collet grooves. After removing the bit, thoroughly inspect and clean the collet. Any dust that remains in the collets groves will prevent it from compressing properly on the shaft of the bit. This dust can easily be removed with an old tooth-brush or a brass brush and some compressed air. Observe proper compressed air safety protocols. Pipe cleaners are an excellent way to clean the inside of the collet. If the inside of the collet is not cleaned, material can build up and cause run-out and this will affect the result.

Replace worn collets.

When collets are worn they will not compress properly and hold the bit securely. A collet should be replaced every 400-800 hours of use.

Fixturing

A CNC machine is a very accurate and efficient woodworking machine. For the CNC machine to do its work, the material it is working on must be held securely. Additionally, the hold down mechanism must be clear of, and not interfere with any portion of the spindle or dust collection hood during the program execution. Fixturing is the term used to refer to the hold down mechanisms employed on a project. This should be a consideration right from the projects earliest planning stages. Planning an efficient hold down strategy is especially critical in a production environment as this will reduce turn-over time between parts.

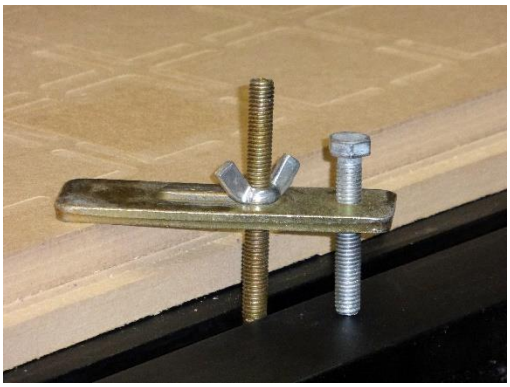
Two Sided Adhesive Tape

Two sided tape is available at almost every hardware and building supply outlet. There are several types available both with and without reinforcing fibres. When using two sided tape, be sure to apply the tape evenly around the perimeter. The tape has a certain thickness and you need to support the entire work-piece evenly. Failure to apply the tape properly may allow the material to move when the spindle tries to cut or press down on an unsupported portion of the material. If you are cutting the part out, be sure to keep the adhesive tape away from the tool-path. If the cutter cuts through the tape, it will get gummed up and the rest of the cut will be affected. For two sided tape to provide proper adhesion, both the work-piece and table must be free of dust. Apply the tape to the work-piece and then position it on the spoil-board. Us a sacrificial piece of MDF as a cushion and tap the material gently to set it in place. Do not leave a part attached to the spoil-board overnight. The adhesives on some brands will strengthen over time and if you leave attached overnight then you risk removing some of the surface of your spoil-board.

Screws (Nested parts)

When cutting a number of parts out of a larger sheet of material, have your CAD/CAM lay out the nested parts. Once you have determined which layout to use, plot a number of holes in the waste area of the material and calculate a tool-path to drill these. Load the material into the machine and then run the drilling tool-path. Once complete, fasten the material to the spoil-board using screws and then complete the rest of the tool-paths.

T-Tracks & Clamps



The Professor 2.2, 2.3 & HDX ship with an aluminum T-Track table top. These slots allow you to use a number of different clamping mechanisms that are designed to accommodate T-Track fixtures. If you use a spoil board then these slots can be used to hold down the spoil board. Use a spoil board anytime you will be cutting through the material or the bed will be damaged. If you are only working on the surface of the material then you can use the T-Track slots in combination with the supplied clamping fixtures to hold the part down. When using any hold down, be sure that it is clear of any tool-path travel required to machine the part. If the spindle and bit come into contact with the metal clamping mechanism damage will occur. If in doubt, set your Z=0 start point to a positive value above any obstructions and run the program and observe the result.

Job Specific Jigs

Certain jobs may require you to make specialized hold down fixtures. This can easily be done using your CAD/CAM software by utilizing vector elements of the item to be held down. For example, let's take a look at a situation where you want to be able to make multiple copies of the same part, a push stick for the table saw. In this case, the part is being made from a piece of ½" thick MDF. When cutting these form a larger sheet, you could set up the v-groove tooling for the caving, perform that operation and then swap tooling and to do the profile cut out. To carve the other side means you will have an irregular work-piece to secure repeatedly in the same location. When making multiple parts, swapping the bits during the machining of each part would involve a lot of extra time and work. In this case it is more efficient to produce all of the parts from your

stock in one operation and then carve the detail in a second operation and then flip the cut parts over and carve the second side. The obvious downside to this is that it leaves you a very irregular object that needs to be held down precisely in the right location for the next stage of the operation to succeed. Because of the design, using hold down clamps is not an option as they would, by their nature interfere with the cutter. Using clamps that apply pressure to the side of the part would be an option but this still leaves you with the need to precisely position this part relative to the virtual block of wood it was machined from. In this situation it is convenient to go back to your CAD/CAM software and use the vectors that defined the cut-out part to define a holder to secure the part for the next operation. In this case, a pocket was carved out in a 3/4" piece of MDF and the top edge chamfered to make it easier to insert the part. There are areas on the part that are too narrow for the radius of the cutter so these areas must be altered slightly. In addition, to provide some leverage to get the part out, add some finger channels that run across the item. Cut the hold down jig to the same size as the virtual piece your part was initially machined from and you will be able to utilize the same WCS and hold down method that you used for the original part.

Vacuum

Vacuum clamping is a quick and efficient way to hold down sheet goods when making repetitive cuts. Adding a vacuum table to your CNC machine is an option but the cost may prove to be prohibitive in a non-production environment.

Tabs (used in combination any of the above)

Tabs are added by the CAM section of your CAD/CAM software when you generate the tool-path. When cutting parts out of larger pieces of material you will end up with parts that have been separated from the larger material. Once these parts have been separated, there exists the possibility that they can move and if they do they will likely come into contact with the rotating cutter. If this happens, your part will be ruined and you will likely damage your cutting tool. In order to hold everything together until the cutting has been completed, use the software to add tabs to the profile cut-out tool-path. Tabs are short sections of material in the final cut-out pass that are left behind as the cutter raises up before plunging down again. After machining the parts can be cut from the larger material and the excess material sanded off. Be careful when separating these items, it can be tempting just to snap them apart at the tabs but this will invariably lead to the edges being chip out. If you insist on snapping them, take the time to score the surface with a knife to stop any fibre tear-out short of the finished edge.

Maintenance Schedule

The Professor HDX is composed of many moving parts that must operate within tight tolerances to produce a perfect result over a long life. Avoiding the daily and weekly maintenance will lead to premature wear and failure of the active components. The number one cause of a system problem can usually be traced back to poor maintenance which has led to the accumulation of foreign material in the CPU or on the machine.

Daily

- Blow the dust of off the working parts of the machine at the start of every day.
- Spray the non-painted working parts such as the rails and lead screws with a thin lithium or Teflon lubrication spray.
- Run the machine through the full range of motion in the X, Y and Z axis to confirm trouble free operation.
- Check the condition of your cutters prior to use. Clean, sharpen or replace as required.
- Lubricate the guide rails and lead screws every 10 hours of operation or at the end of the day, which-ever comes first.
- Clean all the dust off the rail and lead screws at the end of the day. Wood dust absorbs ambient moisture and this will lead to the formation of rust on these parts. Lubricate these parts after cleaning to provide additional protection

Weekly

- Inspect the machine for any loose parts and retighten as required.
- Inspect the rails and lead screws closely for any wear or damage.
- Clean and lubricate the rails and lead screws.
- Confirm that the dust extraction connection is functioning properly.
- In a dusty environment, open the CPU case and use compressed air to clear any dust that may have accumulated inside.

Monthly

- Open the CPU case and use compressed air to clear any dust that may have accumulated inside.
- Inspect the connections at the back of the CPU cabinet to ensure the retaining nut is tight.
- Inspect all connections at the gantry to ensure they are secure.

Definitions

2D	A tool-path to make a single depth cut of the selected design. The bit is moved along the tool-path in the 'x' and 'y' axis while the 'z' value remains constant.
2.5D	A tool-path that that follows the edge of a vector, the depth of cut being determined by the width of the vector and the geometry of the bit.
3D	Full three-dimensional modeling of objects.
Ball Nose Bit	A carving bit with a rounded tip that allows for smooth machining of complex forms.
CAD	Computer Aided Design. This is a software package that allows you to create a virtual design of your item on the computer. By designing the part on the computer it will be easy to modify the design at any point if required
CAM	Computer Aided Manufacturing. This is the other side of the CAD/CAM software package. It will take the computer-generated design and allow you to define tool-path and milling operations and convert it into a language that the CNC machine will understand.
CNC	Computer Numeric Control. A system that allows for the control of a machine using a stream of digital information generated via a computer.
DXF	Abbreviation for Design Exchange File, a two-dimensional graphics file format supported by all PC based CAD products. Autodesk created it for the AutoCAD system.
MCS	Material Co-ordinate system. This is the co-ordinate system that is defined when you set the X and Y axis to 0;0. It defines the origin point of the virtual part in the real world on the bed of the machine.
M Code	
Ref Point	The home position of the machine as defined by proximity switches.
Spoil Board	A sacrificial surface fastened to the CNC table to allow through cuts that would damage the bed of the machine.
Vector	A two dimensional line having length and width.

Troubleshooting Guide

Problem	Action
Machine does not turn on	• Ensure the Emergency Stop Switch has not been engaged. To release it, give it a spin to the right The red light should now come on. • Use a voltage tester to confirm that the correct electrical supply is available. • Consult a licensed electrician to provide the appropriate point of attachment. NEMA 6-15R • Confirm that the hand held remote connector has been properly and securely installed. • Unplug the power and remove the two line fuses from the F1 (see CPU cabinet breakdown) Check to see if these have continuity across them. If they are blown, inspect the control wiring and components for apparent damage. Replace the fuses and apply the power.
CPU line fuses keep blowing	• Inspect wiring in the CPU cabinet for damage, loose connections and short circuits. Heat damage will manifest as a discolouration in the wires insulation. This can indicate a loose connection that has been subjected to a sustained heavy load or rapid start stop cycle.
Excessive vibration	• Machine is has not been properly leveled. Adjust the levelling mechanisms between bed of the machine and the stand as well as between the stand and the floor. • If there are many small plunge cuts with movement in the X/Y axis, the machine will begin to shake if you attempt to execute the program too rapidly. Slow the speed down using the hand held remote until the vibration stops.
Spindle does not rotate	• Spindle gears not properly programmed on the Variable Frequency Drive. Compare parameters 17 through 23 with the VFD Initial Settings Chart. • Damaged VFD – if the Variable Frequency Drive has been damaged. It will display an error code that will allow further diagnostics beyond the scope of this manual.
Spindle Slows Down	• Speed value programmed incorrectly in the tool-path. • Density changes in the material along the tool-path. Reduce operating speed. • Cutting edges have become dull and need to be sharpened. • Feed rate and depth of cut too great for the cutter and material. Slow down the feed rate or reduce the depth of cut. • Variable Frequency Drive Fault. See error code on the drive.
Poor Quality of cut	• Cutting edges have gummed up and need to be cleaned. • Cutting tool is dull. Sharpen or replace the cutter. • Cut speed is too rapid for the material being cut. Adjust the speed to achieve optimum results for each type of material. Keep a record of your results for future reference.

VFD Initial Settings Chart

#	Parameter	MK HDX	
00	Source of Frequency Command	00	
01	Source of Operation Command	01	
02	Stop Method	00	
03	Maximum output frequency	300.0	
04	Maximum Voltage Frequency (base Frequency)	300.0	
5	Maximum Output Voltage (Vmax)	220.0	
6	Mid-Point Frequency	1.5	
7	Mid-Point Voltage	10	
8	Minimum Output Frequency	1.5	
9	Minimum Output Voltage	10	
10	Acceleration Time 1	10	
11	Deceleration Time 1	10	
12	Acceleration Time 2	10	
13	Deceleration Time 2	10	
14	Acceleration S-Curve	00	
15	Jog Acel/Decel Time	1.0	
16	Jog Frequency	6.00	
17	1st Step Speed Frequency	300.0	
18	2nd Step Speed Frequency	25.00	
19	3rd Step Speed Frequency	250.0	
20	4th Step Speed Frequency	150.0	
21	5th Step Speed Frequency	100.0	
22	6th Step Speed Frequency	50.00	
23	7th Step Speed Frequency	0.00	
24	Reverse Operation Inhibiton	01	
25	Over Voltage Stall Prevention	390.0	
26	Over-Current Stall Protection during Acceleration	150	
27	Over-Current Stall Prevention During Operation	150	
28	DC Braking Current Level	00	
29	DC Braking Time During Start-up	0.0	
30	DC Braking Time During Stopping	0.0	
31	Start Point for DC Braking	0.00	
32	Momentary Power Loss Operation Selection	00	

33	Maximum Allowable Power Loss Time	2.0	
34	Base-Block Time for Speed Search	0.5	
35	Maximum Current Level for Speed Search	150	
36	Upper Bound of Output Frequency	400	
37	Lower Bound of Output Frequency	0.00	
38	Multi-Function Input Terminal (M0, M1)	00	
39	Multi-Function Input Terminal (M2)	05	
40	Multi-Function Input Terminal (M3)	06	
41	Multi-Function Input Terminal (M4)	07	
42	Multi-Function Input Terminal (M5)	08	
43	Analog Output Signal	00	
44	Analog Output Gain	100	
45	Multi-function Output Terminal 1 (Photocoupler Output)	00	
46	Multifunction Output Terminal (Relay Output)	07	
47	Desired Frequency Attained	0.00	
48	Adjust Bias of External Input Frequency	0.0	
49	Potentiometer Bias Polarity	00	
50	Potentiometer Frequency Gain	100.0	
51	Potentiometer Reverse Motion Enable	00	
52	Motor Rated Current	7.0	
53	Motor No-Load Current	2.8	
54	Torque Compensation	00	
55	Slip Compensation	0.00	
56	Reserved	00	
57	Rated Current Display of the AC Drive	7.0	
58	Electronic Thermal Overload Relay Selection	02	
59	Electronic Thermal Motor Overload	60	
60	Over-Torque Detection Mode	00	
61	Over-Torque Detection Level	150	
62	Over-Torque Detection Time	0.1	
63	Loss of ACI (4-20mA)	00	
64	User Defined Function For Display	00	
65	Coefficient K	1.00	
66	Communications Frequency	0.00	
67	Skip Frequency 1	0.00	
68	Skip Frequency 2	0.00	
69	Skip Frequency 3	0.00	

70	Skip Frequency Band	0.00	
71	PWM Carrier Frequency	15	
72	Auto Restart Attempts After Fault	00	
73	Present Fault Record	00	
74	Second Most Recent Fault Record	00	
75	Third Most Recent Fault Record	00	
76	Parameter Lock and Configuration	00	
77	Time For Auto Reset the Restart Times after Fault	60.0	
78	PLC Operation Mode	00	
79	PLC Forward/Reverse Motion	00	
80	Identity Code of the AC Motor Drive	04	
81	Time Duration of 1st Step Speed (correspond to #17)	00	
82	Time Duration of 2nd Step Speed (correspond to #18)	00	
83	Time Duration of 3rd Step Speed (correspond to #19	00	
84	Time Duration of 4th Step Speed (correspond to #20)	00	
85	Time Duration of 5th Step Speed (correspond to #21)	00	
86	Time Duration of 6th Step Speed (correspond to #22)	00	
87	Time Duration of 7th Step Speed (corresponds to #23)	00	
88	Communications Address	01	
89	Transmission Speed (Baud Rate)	01	
90	Transmission Fault Treatment	03	
91	Time Out Detection	0.0	
92	Communication Protocol	00	
93	Accel 1 to Accel 2 Frequency Transition	0.00	
94	Decel 1 to Decel 2 Frequency Transition	0.00	
95	Auto Energy Saving	00	
96	Count Down Completion	00	
97	Preset Countdown Completion	00	
98	Total Time Count From Power On (Days)	Read Only	
99	Total Time Count From Power On	Read Only	
100	Software Version	Read Only	
101	Auto Acceleration/Deceleration	00	

102	Auto Voltage Regulation (AVR)	00	
103	Auto Tune Motor parameters	00	
104	R1 Value	00	
105	Control Mode	00	
106	Rated Slip	3.00	
107	Vector Voltage Filter	10	
108	Vector Slip Compensation Filter	50	
109	Selection For Zero Speed Control	00	
110	Voltage of Zero Speed Control	5.0	
111	Deceleration S-Curve	00	
112	External Terminal Scanning Time	01	
113	Restart Method After Fault	01	
114	Cooling Fan Control	02	
115	PID Set Point Selection	00	
116	PID Feedback Terminal Selection	00	
117	Proportional Gain (P)	1.0	
118	Integral Time (I)	1.00	
119	Differential Time (D)	0.00	
120	Integrations Upper Bound Frequency	100	
121	One Time Delay	0.0	
122	PID Frequency Output Command Limit	100	
123	Feedback Signal Detection Time	60.0	
124	Feedback Signal Fault Treatment	00	
125	Source of PID Set point	0.00	
126	PID Offset Level	10.0	
127	Detection Time of PID Offset	5.0	
128	Minimum Reference Value	0.0	
129	Maximum Reference Value	10.0	
130	Invert Reference Signal AVI (0-10V)	00	
131	Minimum Reference Value (0-20mA)	4.0	
132	Maximum Reference Value (0-20mA)	20.0	
133	Inverts Reference Signal (0-20mA)	00	
134	Analog Input Delay Filter for Set Point	50	
135	Analog Input Delay Filter for Feedback Signal	05	
136	Sleep Period	0.0	
137	Sleep Frequency	0.00	
138	Wake Up Frequency	0.00	
139	Treatment for Counter Attained	00	
140	External up/Down Selection	00	
141	Save Frequency Set Point	01	

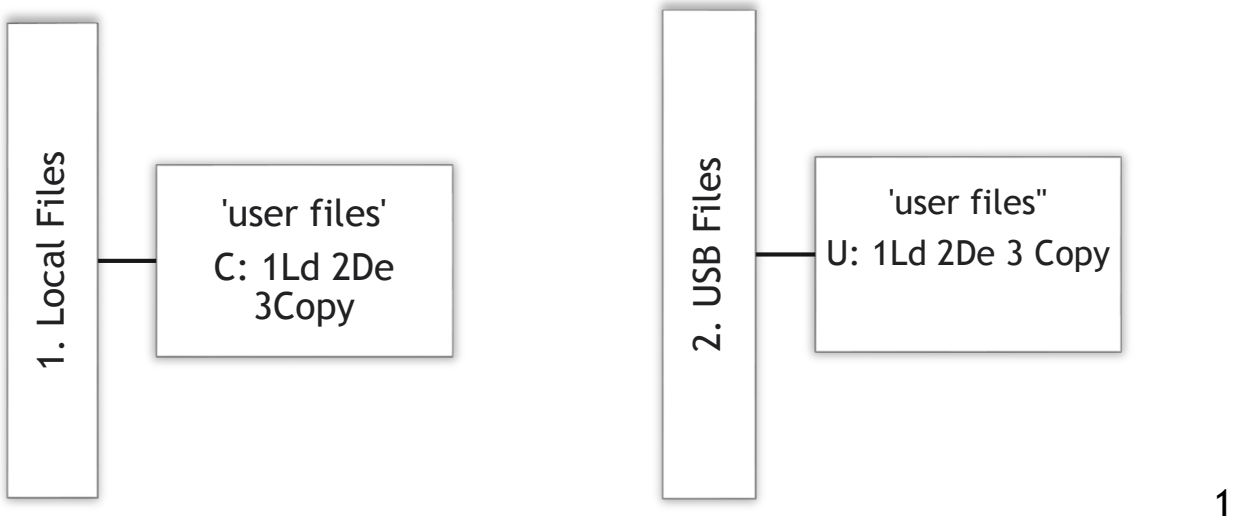
142	Second Source of Frequency Command	00	
143	Software Braking Level	380.0	
144	Accumulative Motor Operation Day	Read Only	
145	Accumulative Motor Operation Time (min)	Read Only	
146	Line Start Lockout	00	
147	Decimal Number of Accel/Decel Time	00	
148	Number of Motor Poles	04	
149	Gear Ratio for simple index function	200.0	
150	Index Angle for Simple Index Function	180.0	
151	Deceleration Time for Simple Index Function	0.00	
152	Skip Frequency Width	0.00	
153	Bias Frequency Width	0.00	
154	Reserved	00	
155	Compensation Coefficient for Motor Instability	0.0	
156	Communication Response Delay Time	00	
157	Communications Mode Selection	01	

Menu Parameters

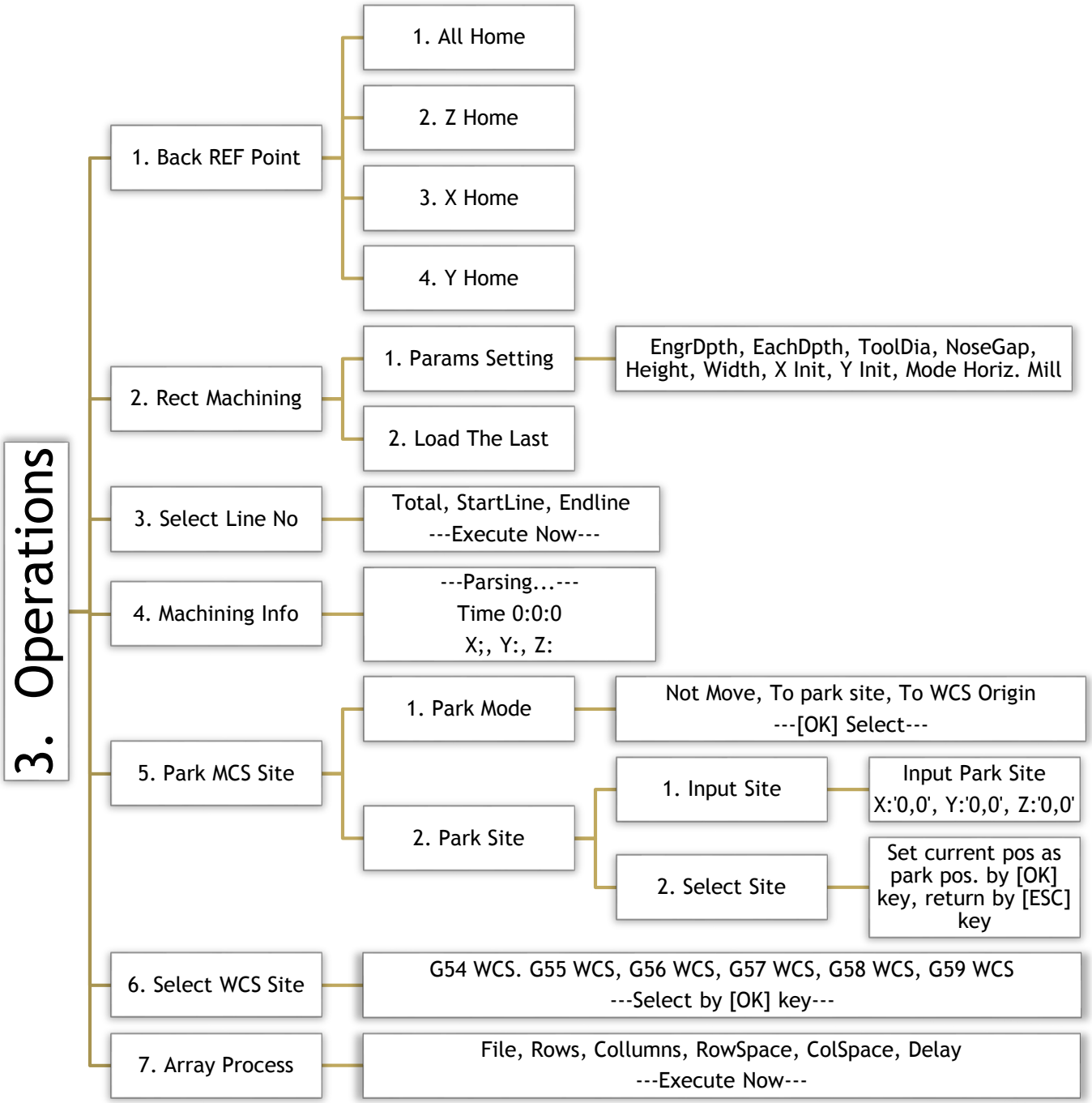
The various menu options available through the NK105 hand held remote are organized into the 8 menu groups shown on the table. We have outlined all of the various options available in each section so you can locate the parameter you are looking for easily.

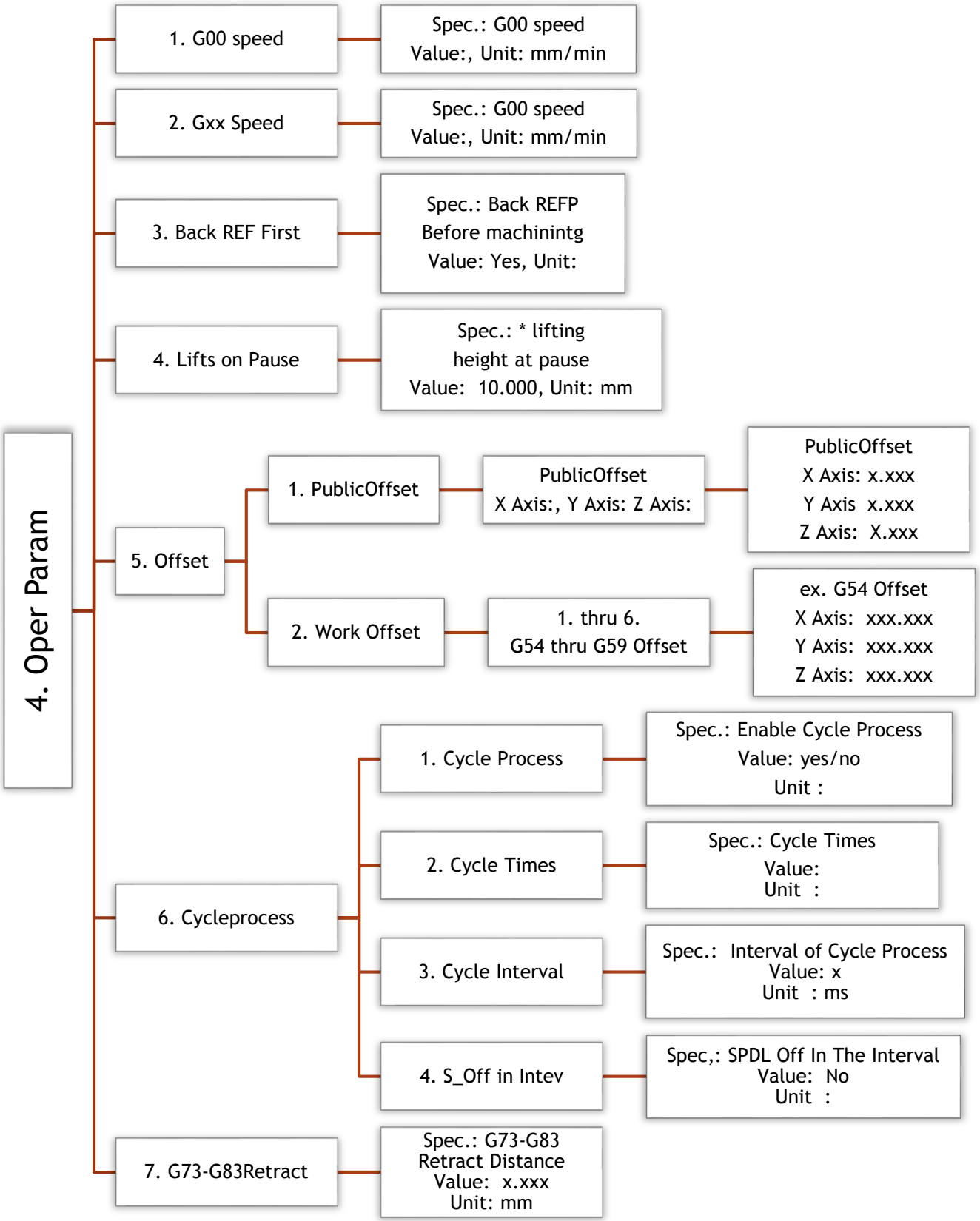
TOP MENU

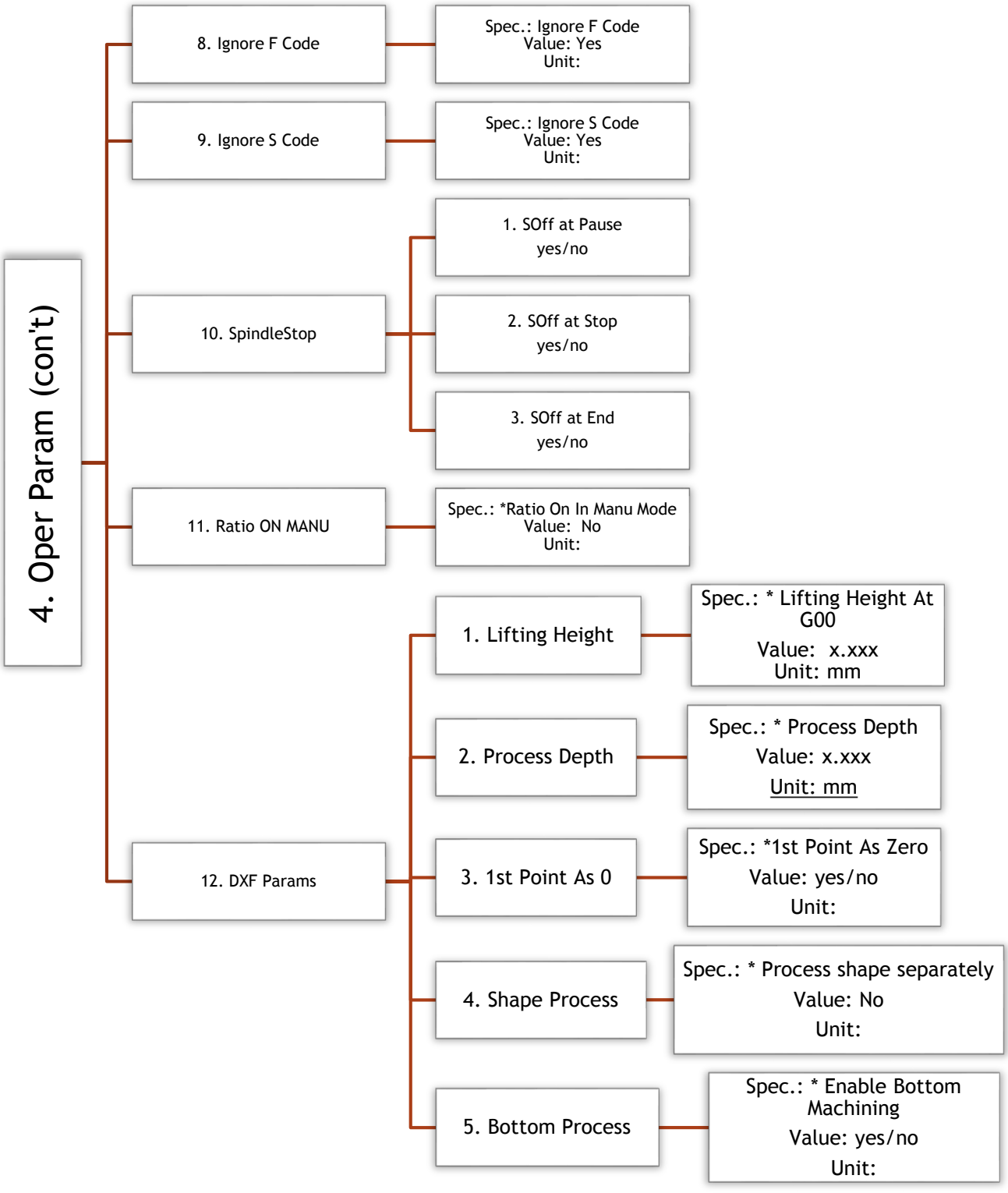
#	Section	Explanation
1	Local Files	This files are stored in the onboard memory by the factory.
2	USB Files	These are user files are stored on the USB drive.
3	Operations	This sets the various manual machine operating parameters.
4	Oper Param	This sets machine operating parameters.
5	Mfr Param	Parameters set by factory. Password required.
6	Param Upkeep	Import, back-up and restore parameters in this section.
7	System Upkeep	System maintenance and report files are dealt with in this section.
8	Diagnosis	System diagnostics files and options.

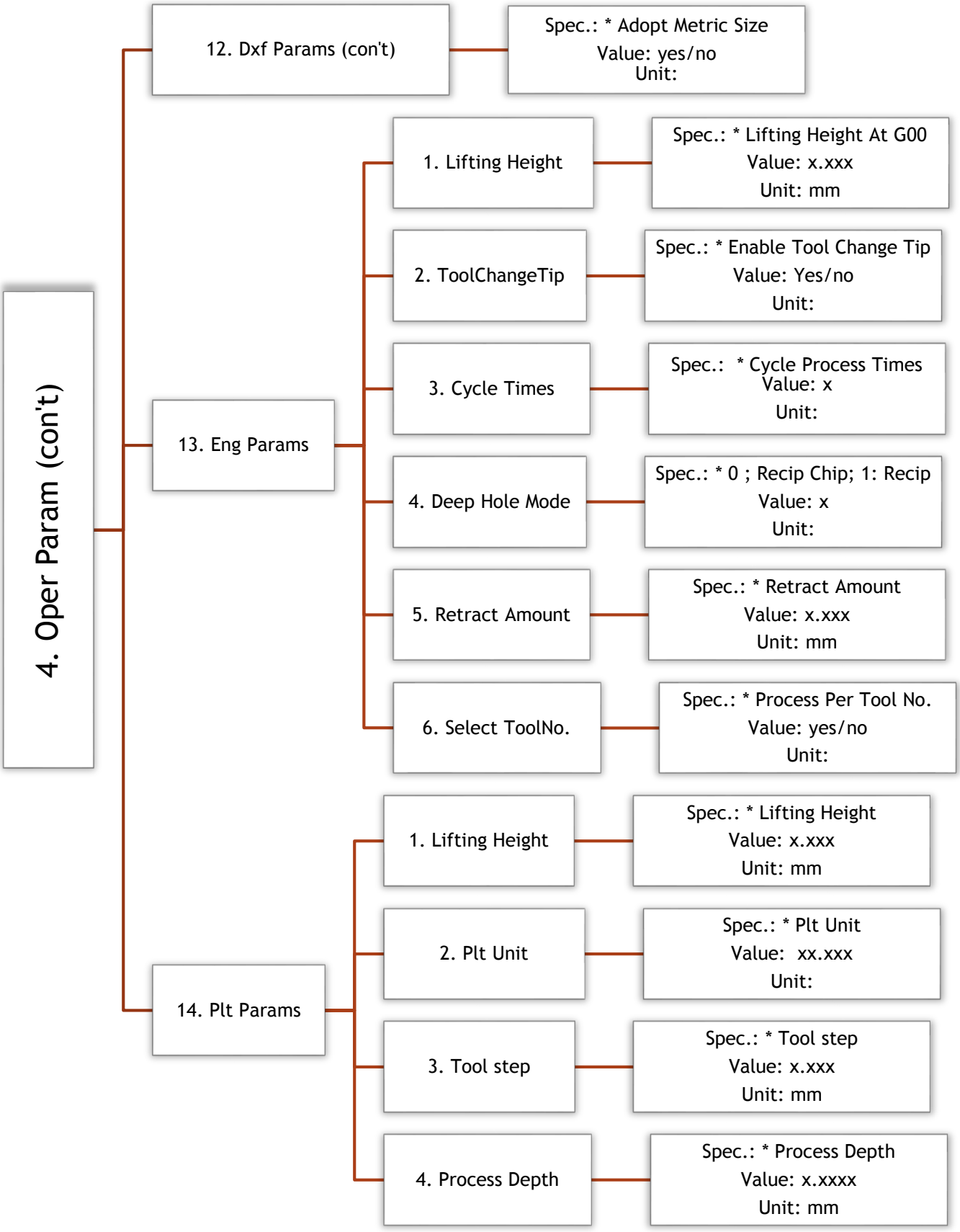


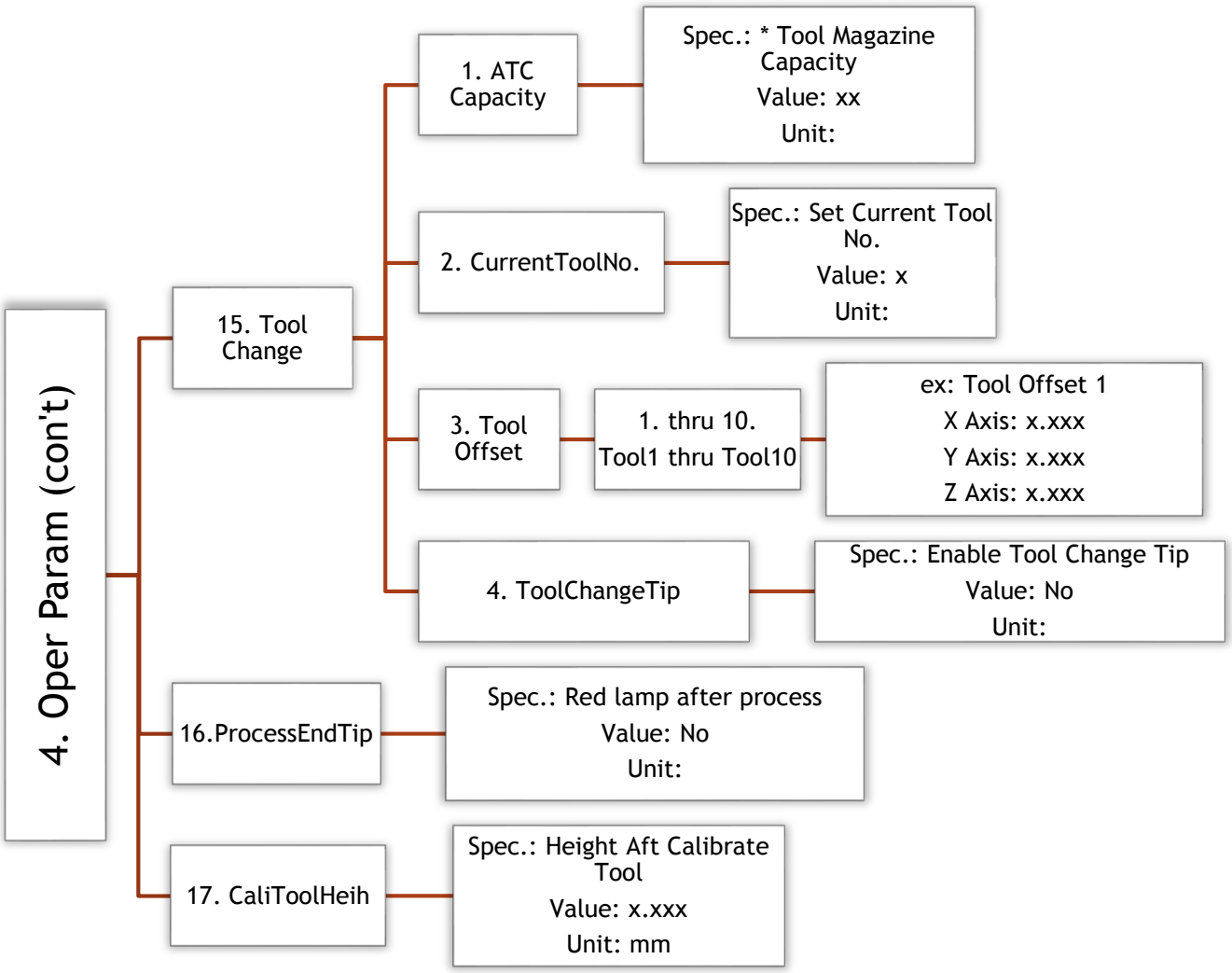
1

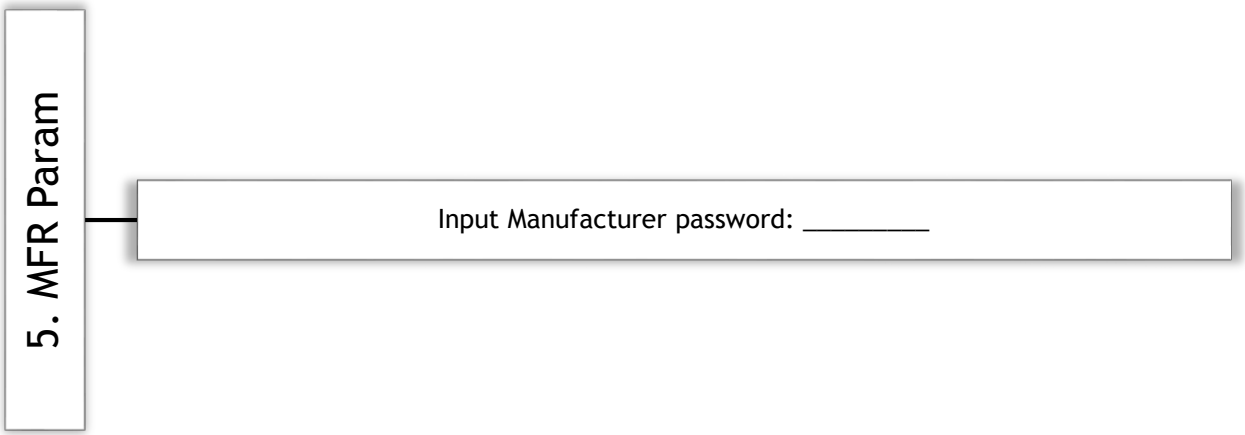

3. Operations
1. Back REF Point
1. All Home
2. Z Home
3. X Home
4. Y Home
2. Rect Machining
1. Params Setting
EngrDpth, EachDpth, ToolDia, NoseGap, Height, Width, X Init, Y Init, Mode Horiz. Mill
2. Load The Last
3. Select Line No
Total, StartLine, Endline
---Execute Now---
4. Machining Info
---Parsing...---
Time 0:0:0
X;, Y:, Z:
5. Park MCS Site
1. Park Mode
Not Move, To park site, To WCS Origin
---[OK] Select---
2. Park Site
1. Input Site
Input Park Site
X:'0,0', Y:'0,0', Z:'0,0'
2. Select Site
Set current pos as park pos. by [OK] key, return by [ESC] key
6. Select WCS Site
G54 WCS. G55 WCS, G56 WCS, G57 WCS, G58 WCS, G59 WCS
---Select by [OK] key---
7. Array Process
File, Rows, Collumns, RowSpace, ColSpace, Delay
---Execute Now---

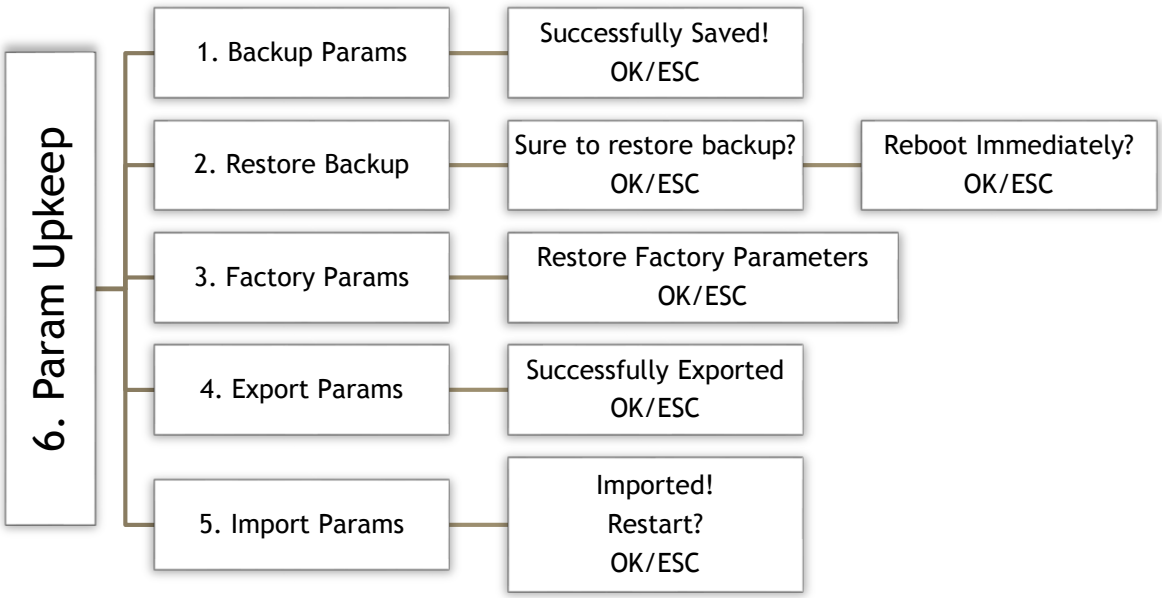

4. Oper Param
1. G00 speed
Spec.: G00 speed
Value:, Unit: mm/min
2. Gxx Speed
Spec.: G00 speed
Value:, Unit: mm/min
3. Back REF First
Spec.: Back REFP
Before machinintg
Value: Yes, Unit:
4. Lifts on Pause
Spec.: * lifting
height at pause
Value: 10.000, Unit: mm
5. Offset
1. PublicOffset
PublicOffset
X Axis:, Y Axis: Z Axis:
PublicOffset
X Axis: x.xxx
Y Axis x.xxx
Z Axis: X.xxx
2. Work Offset
1. thru 6.
G54 thru G59 Offset
ex. G54 Offset
X Axis: xxx.xxx
Y Axis: xxx.xxx
Z Axis: xxx.xxx
6. Cycleprocess
1. Cycle Process
Spec.: Enable Cycle Process
Value: yes/no
Unit :
2. Cycle Times
Spec.: Cycle Times
Value:
Unit :
3. Cycle Interval
Spec.: Interval of Cycle Process
Value: x
Unit : ms
4. S_Off in Intev
Spec,: SPDL Off In The Interval
Value: No
Unit :
7. G73-G83Retract
Spec.: G73-G83
Retract Distance
Value: x.xxx
Unit: mm

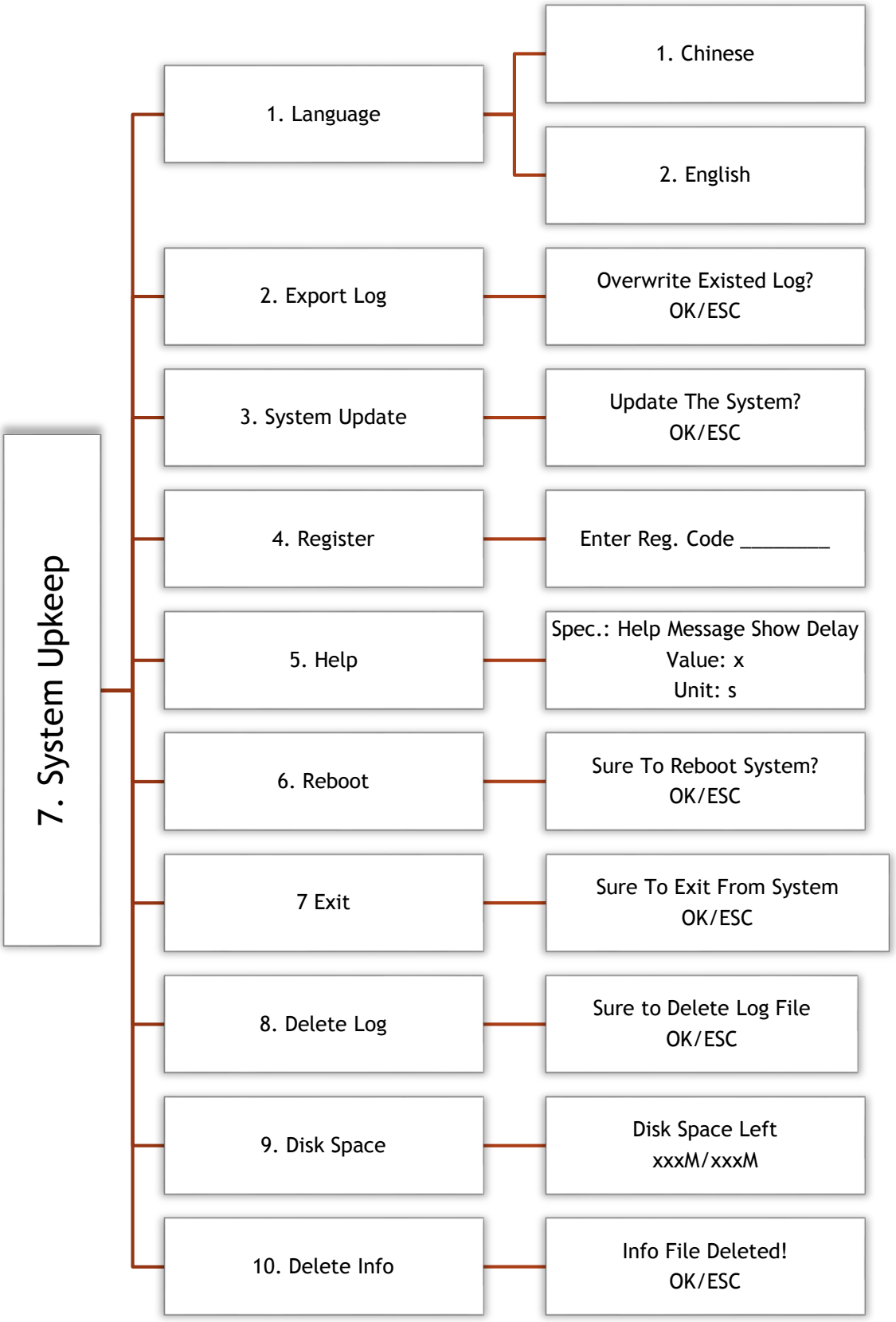

4. Oper Param (con't)
8. Ignore F Code
Spec.: Ignore F Code
Value: Yes
Unit:
9. Ignore S Code
Spec.: Ignore S Code
Value: Yes
Unit:
10. SpindleStop
1. SOff at Pause
yes/no
2. SOff at Stop
yes/no
3. SOff at End
yes/no
11. Ratio ON MANU
Spec.: *Ratio On In Manu Mode
Value: No
Unit:
12. DXF Params
1. Lifting Height
Spec.: * Lifting Height At G00
Value: x.xxx
Unit: mm
2. Process Depth
Spec.: * Process Depth
Value: x.xxx
Unit: mm
3. 1st Point As 0
Spec.: *1st Point As Zero
Value: yes/no
Unit:
4. Shape Process
Spec.: * Process shape separately
Value: No
Unit:
5. Bottom Process
Spec.: * Enable Bottom Machining
Value: yes/no
Unit:

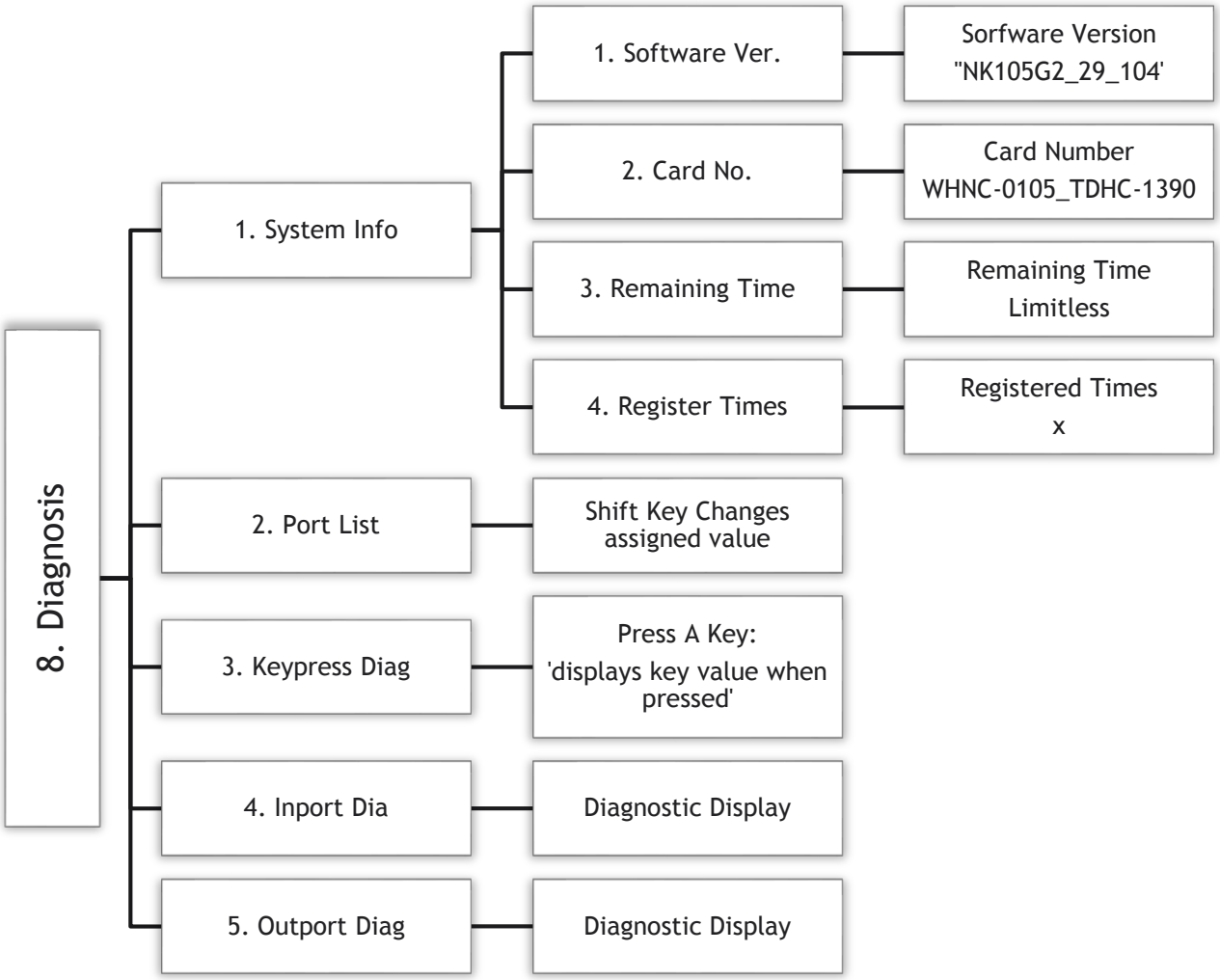

4. Oper Param (con't)
12. Dxf Params (con't)
Spec.: * Adopt Metric Size
Value: yes/no
Unit:
13. Eng Params
1. Lifting Height
Spec.: * Lifting Height At G00
Value: x.xxx
Unit: mm
2. ToolChangeTip
Spec.: * Enable Tool Change Tip
Value: Yes/no
Unit:
3. Cycle Times
Spec.: * Cycle Process Times
Value: x
Unit:
4. Deep Hole Mode
Spec.: * 0 ; Recip Chip; 1: Recip
Value: x
Unit:
5. Retract Amount
Spec.: * Retract Amount
Value: x.xxx
Unit: mm
6. Select ToolNo.
Spec.: * Process Per Tool No.
Value: yes/no
Unit:
14. Plt Params
1. Lifting Height
Spec.: * Lifting Height
Value: x.xxx
Unit: mm
2. Plt Unit
Spec.: * Plt Unit
Value: xx.xxx
Unit:
3. Tool step
Spec.: * Tool step
Value: x.xxx
Unit: mm
4. Process Depth
Spec.: * Process Depth
Value: x.xxxx
Unit: mm


4. Oper Param (con't)
15. Tool Change
1. ATC Capacity
Spec.: * Tool Magazine Capacity
Value: xx
Unit:
2. CurrentToolNo.
Spec.: Set Current Tool No.
Value: x
Unit:
3. Tool Offset
1. thru 10.
Tool1 thru Tool10
ex: Tool Offset 1
X Axis: x.xxx
Y Axis: x.xxx
Z Axis: x.xxx
4. ToolChangeTip
Spec.: Enable Tool Change Tip
Value: No
Unit:
16.ProcessEndTip
Spec.: Red lamp after process
Value: No
Unit:
17. CaliToolHeih
Spec.: Height Aft Calibrate Tool
Value: x.xxx
Unit: mm


5. MFR Param
Input Manufacturer password: _____


6. Param Upkeep
1. Backup Params
Successfully Saved!
OK/ESC
2. Restore Backup
Sure to restore backup?
OK/ESC
Reboot Immediately?
OK/ESC
3. Factory Params
Restore Factory Parameters
OK/ESC
4. Export Params
Successfully Exported
OK/ESC
5. Import Params
Imported!
Restart?
OK/ESC


7. System Upkeep
1. Language
1. Chinese
2. English
2. Export Log
Overwrite Existed Log?
OK/ESC
3. System Update
Update The System?
OK/ESC
4. Register
Enter Reg. Code _____
5. Help
Spec.: Help Message Show Delay
Value: x
Unit: s
6. Reboot
Sure To Reboot System?
OK/ESC
7 Exit
Sure To Exit From System
OK/ESC
8. Delete Log
Sure to Delete Log File
OK/ESC
9. Disk Space
Disk Space Left
xxxM/xxxM
10. Delete Info
Info File Deleted!
OK/ESC

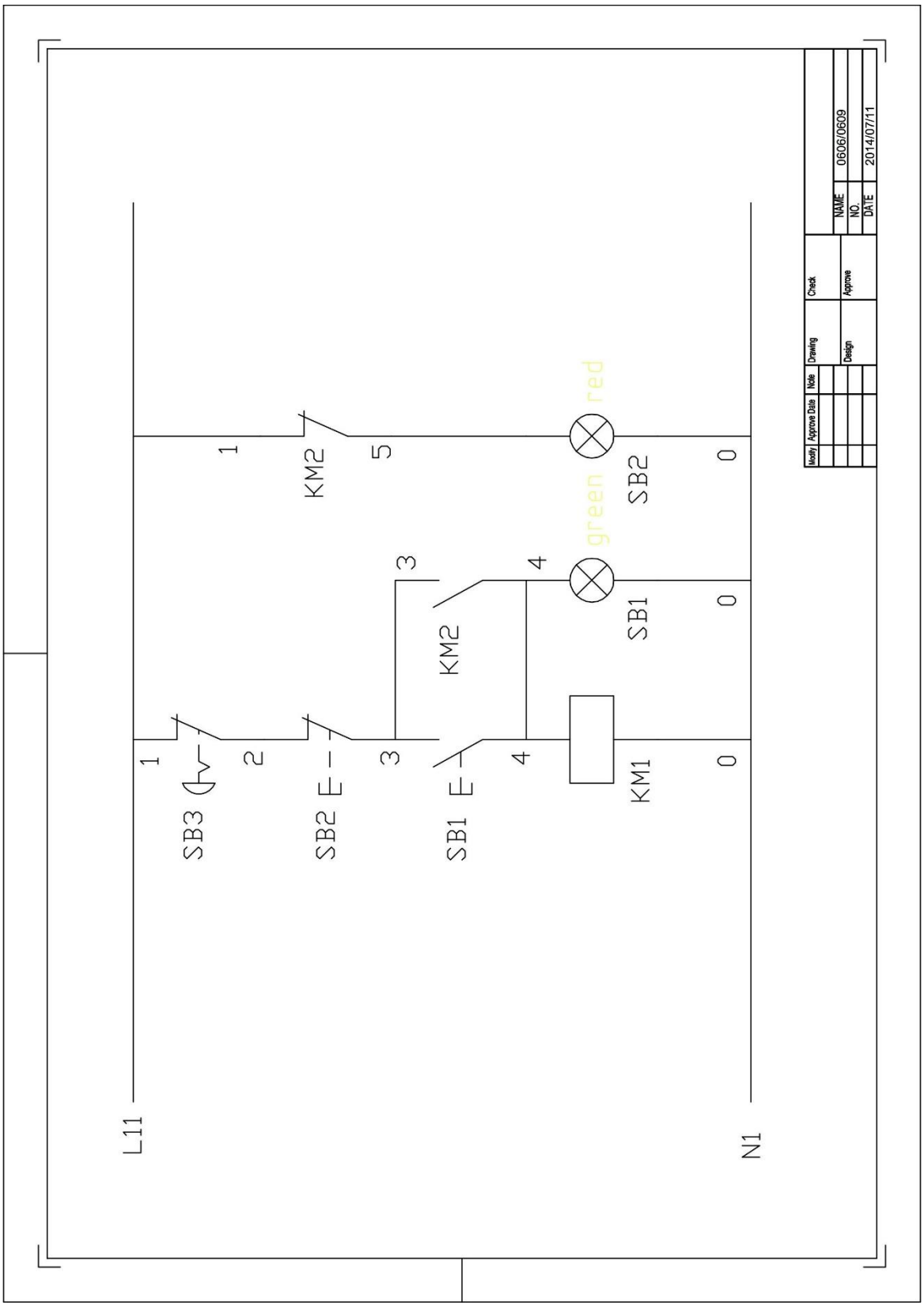

8. Diagnosis
1. System Info
1. Software Ver.
Sorfware Version
"NK105G2_29_104'
2. Card No.
Card Number
WHNC-0105_TDHC-1390
3. Remaining Time
Remaining Time
Limitless
4. Register Times
Registered Times
x
2. Port List
Shift Key Changes
assigned value
3. Keypress Diag
Press A Key:
'displays key value when
pressed'
4. Inport Dia
Diagnostic Display
5. Outport Diag
Diagnostic Display

CPU Cabinet Component Schedule

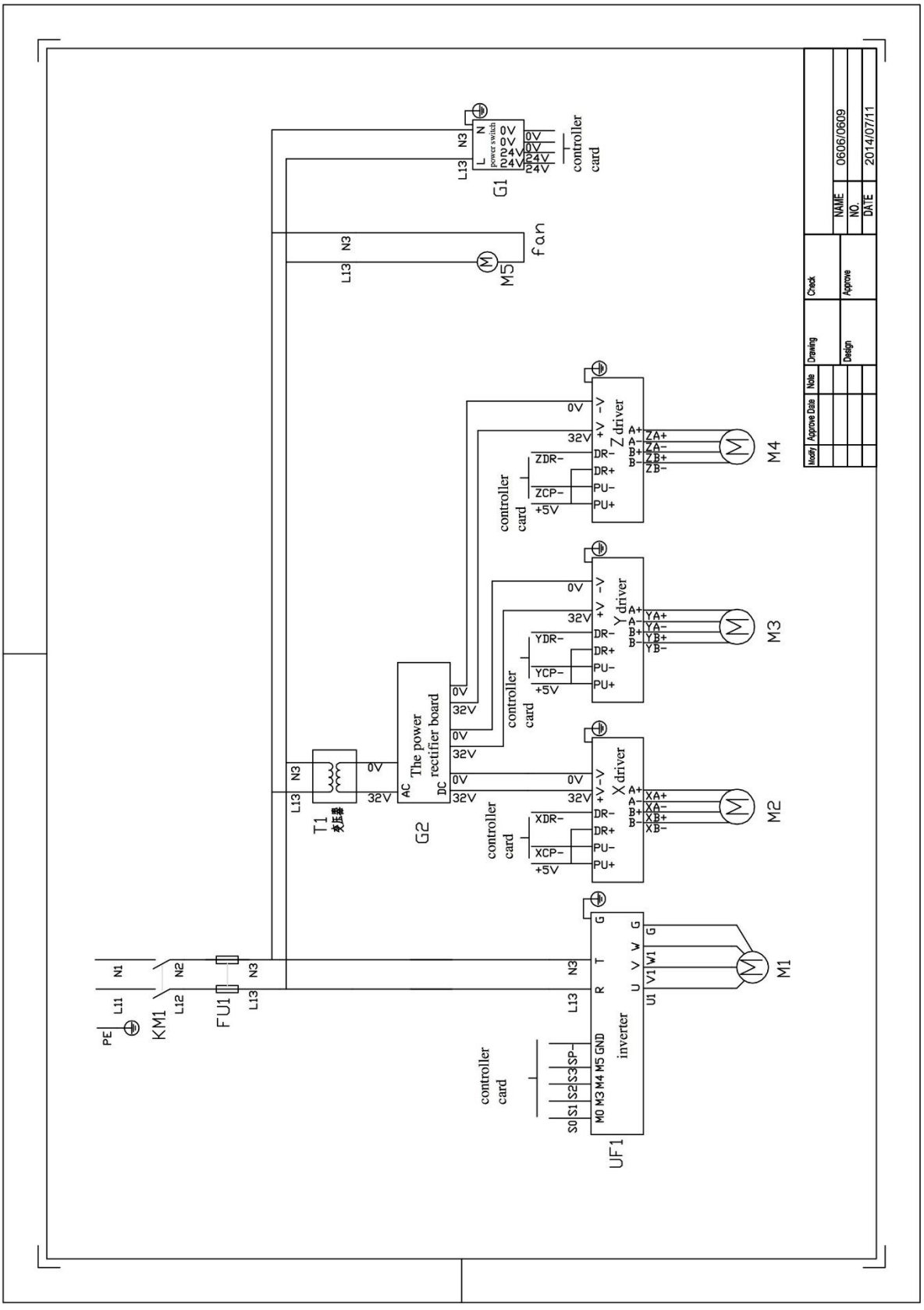
Use this table in conjunction with the three schematic diagrams that follow.

	KM1	AC Contactor
2	UF1	Inverter
3	M1	Spindle
4	M2. M3, M4	X/Y/Z axis motors
5	SB1 (green), SB2 (red)	Push Button
6	SB3	Emergency Stop Button
7	FU1	Fuse
8	SQ1, SQ2, SQ3	Limit Switches
9	G1	Power Switch
10	G2	Power Rectifier Board
11	T1	Transformer

Front Panel Control Wiring Schematic



Power Distribution Schematic



Weihong Controller Wiring Schematic