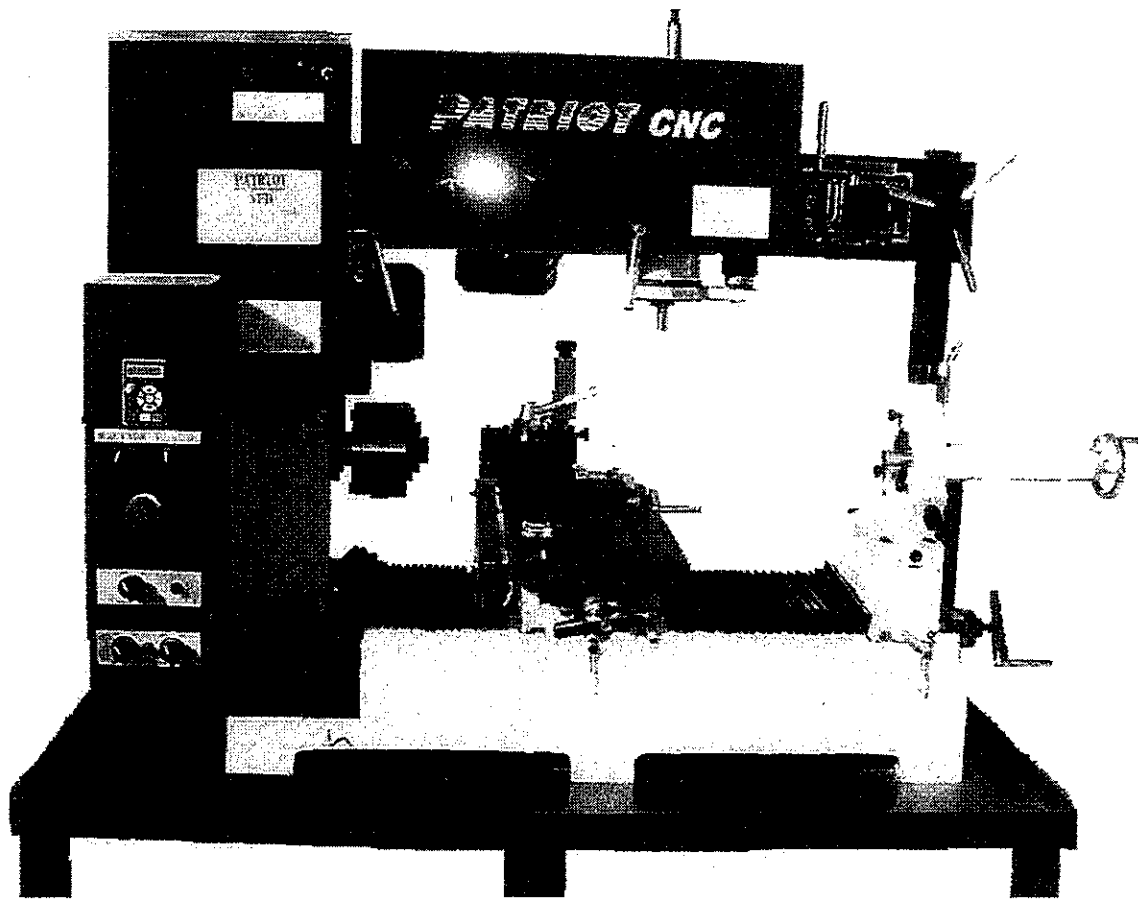


SHOPMASTER™ PATRIOT™ VFD™

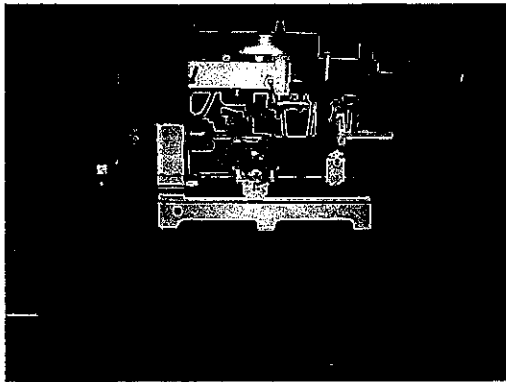
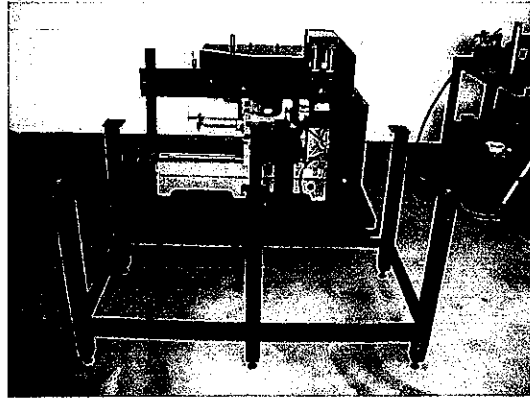
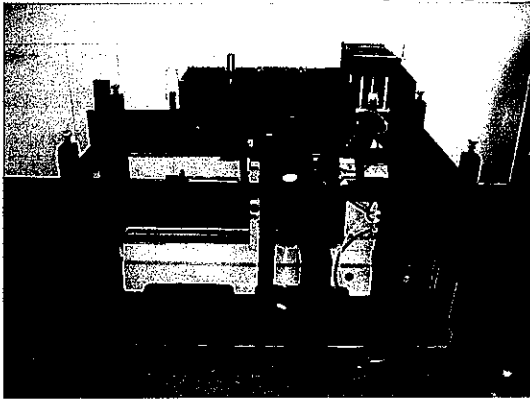
OWNERS MANUAL



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PREPARATION OF YOUR BENCH

1. After removing the wood crate, set it aside.
2. The bench legs are mounted upside down on the bench top. Remove the 12 bolts holding the bench legs in place and lift the leg assembly straight up and off the bench top. (requires 2 people)
3. Turn the leg assembly over so it is resting on the leveling pads.
4. Using your forklift or hoist, raise the machine up and move the leg assembly under it and lower the machine down onto the legs.
5. Align the holes and get all 12 bolts started by hand, then tighten. If you plan to use a coolant system, it would be a good time to seal around each bolt with some silicone sealant.
6. Once in place, screw the leg adjusters out until the machine is resting solidly on them and continue adjusting until your unit is level.



SAFETY RULES FOR THE PATRIOT VFD

WARNING -- DO NOT ATTEMPT TO OPERATE UNTIL YOU HAVE READ THOROUGHLY AND UNDERSTAND COMPLETELY ALL INSTRUCTIONS AND RULES CONTAINED IN THIS MANUAL. FAILURE TO COMPLY CAN RESULT IN ACCIDENTS INVOLVING FIRE, ELECTRIC SHOCK, OR SERIOUS PERSONAL INJURY. MAINTAIN YOUR OWNERS MANUAL AND REVIEW FREQUENTLY FOR CONTINUING SAFE OPERATION AND INSTRUCTING POSSIBLE THIRD-PARTY USER.

1. KNOW YOUR PATRIOT MACHINE

For your own safety, read the owner's manual carefully. Learn it's application and limitation as well as the specific potential hazards peculiar to this tool.

2. NEVER ATTEMPT ANY OPERATION OR ADJUSTMENT IF THE PROCEDURE IS NOT UNDERSTOOD.

3. KEEP GUARDS IN PLACE AND IN WORKING ORDER.

4. REMOVE ADJUSTING KEYS AND WRENCHES.

Form habits of checking to see that keys and adjusting wrenches are removed from the PATRIOT before turning on the machine.

5. DON'T USE IN DANGEROUS ENVIRONMENT.

Don't use the PATRIOT in damp or wet locations or expose it to rain. Keep work area well illuminated.

6. DO NOT REMOVE DRIVE COVERS WHILE IN OPERATION.

7. DON'T FORCE TOOLS.

It will do the job better and be safer at the rate for which it was designed .

8. WEAR PROPER APPAREL.

No loose clothing, gloves, neckties, rings, bracelets, or jewelry to get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair.

9. ALWAYS USE SAFETY GLASSES.

Every day eyeglasses only have impact-resistant lenses. They are NOT safety glasses.

10. SECURE WORK.

Always secure your work to the table with clamps or vise- NEVER attempt to hold a part by hand.

11. DON'T OVERREACH

Keep your balance and proper footing at all times.

12. MAINTAIN TOOLS IN TOP CONDITION.

Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.

13. DISCONNECT TOOL FROM POWER SOURCE.

Before servicing and when changing accessories such as bits or cutters .

14. AVOID ACCIDENTAL STARTING.

Make sure switch is in "OFF" position before plugging in cord.

15. USE RECOMMENDED ACCESSORIES.

Consult the owner's manual for recommended accessories. Use of Improper accessories may be hazardous.

16. CHECK DAMAGED PARTS.

Before further use of the PATRIOT, a guard or other part that is damaged should be carefully checked to ensure that it will operate properly and perform its intended function-check for alignment of moving parts, binding of moving parts, breakage of parts and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.

17. DIRECTION OF FEED.

Only feed work into a cutter against the direction or rotation of the cutter.

18. NEVER LEAVE YOUR PATRIOT RUNNING UNATTENDED.

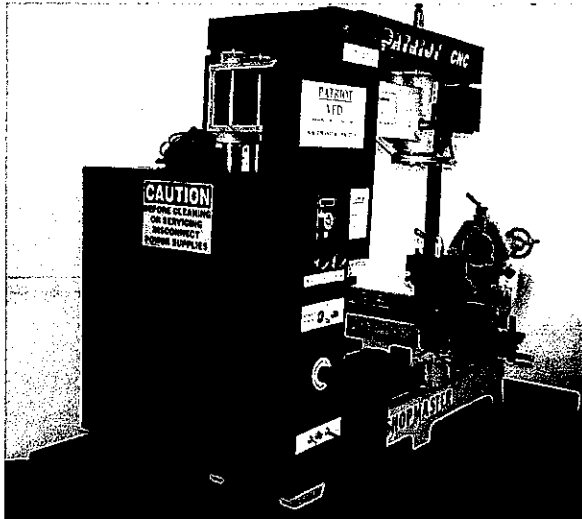
TURN POWER OFF.

Don't leave the machine until it comes to a complete stop.

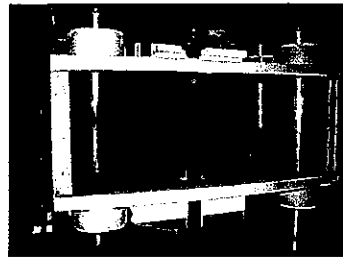
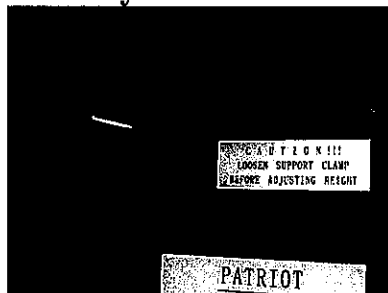
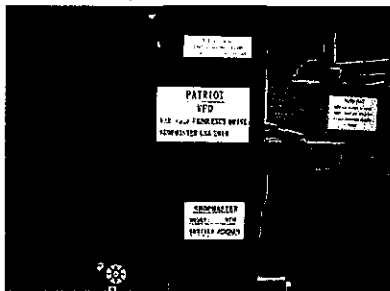
19. NEVER PERFORM AN ABNORMAL OR LITTLE USED OPERATION WITHOUT STUDY AND USE OF ADEQUATE BLOCKS, JIGS OR FIXTURES.

SHOPMASTER PATRIOT CONTROLS

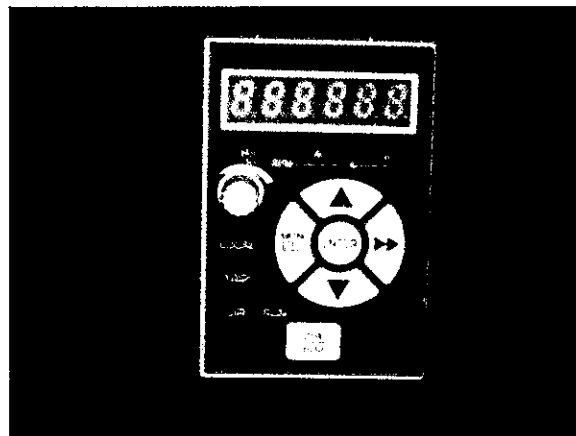
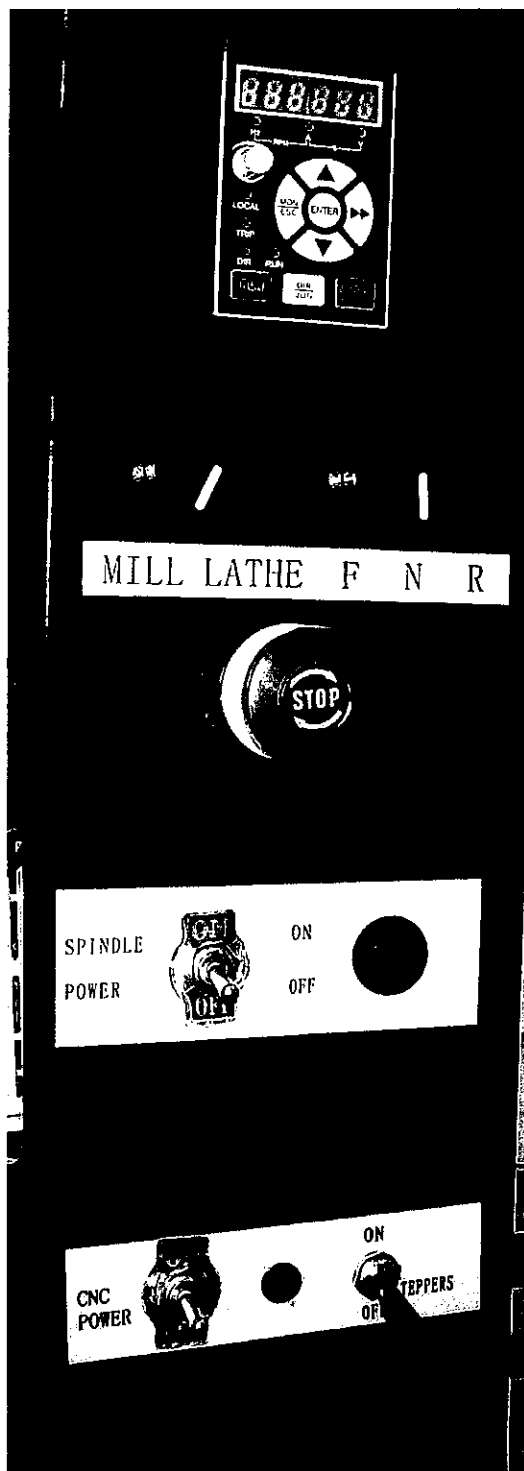
Take a few minutes to familiarize yourself with the location of the various controls on your machine. This will make using your PATRIOT much easier when you are ready to operate the machine.



This is the housing for the CNC electronic drivers. When you order your machine, we will install the CNC system.



This front cover contains your name tag and warning label for the mill lift mechanism. The square head shaft drives a set of helix gears to raise and lower your mill head assembly. The handle which attaches to the square head with a set screw is shipped in your box of parts.



The front panel of the machine contains the main electronic control switches and the VFD control panel. The VFD control panel is located at the top and has the keyboard for selecting the various parameters of the VFD Inverter. The inverter is pre-set at the factory, tested and ready to run when you receive the machine. When the power is applied, there will be a 2 second delay, and then the display will read all zeros. At this time you can select lathe or mill via the switches just below the panel as well as forward or reverse for the spindle direction. Simply by turning the small knob clockwise you can adjust the speed of your spindles. The display will read from 0-75 Hz. At 75 Hz, your spindle will be turning at about 1500 RPM. A simple rule of thumb for knowing your RPM is $5\text{Hz} = 20\text{ RPM}$. Please refer to the .PDF version of the VFD manual for explanations of the many functions of this device. We suggest that you not change any of the factory settings until you become 100% familiar with the machine and its functions. If for any reason the factory settings become lost, you may find the codes in this manual.



Below the VFD control panel you will find the selector switches for Lathe or Mill and another switch for spindle direction with choices of Forward-Neutral- Reverse. If you want to turn the spindles off without doing a full shut-down, simply put the direction switch in Neutral position. The Lathe-Mill selector switch engages a relay inside the metal housing, so you will hear an audible snap as the switch is engaged.

Below these switches is the Emergency Stop (E-Stop) switch. This switch turns off all power to the machine functions in an emergency situation. Simply push the button in and all power is cut off. To re-engage power, turn the switch knob clockwise.

Caution: Before re-engaging the E-Stop, put all other switches in the OFF position and turn the VFD speed control knob fully counterclockwise.

Below the E-Stop is the power switch for the VFD inverter. Beside the switch is a red indicator light to make you aware when the power is on.

Below the VFD power switch is the CNC power switch and a red indicator light. To the right of the indicator light is the engage-disengage switch for the stepper motors. When operating the machine manually, disengage the steppers to prevent them from sending current back into the Gecko drives.

NOTE: Early machines serial # 09116 thru 09917 and 10001 thru 10022 had a rocker style VFD power switch at the top of the housing above the VFD control panel and were not equipped with the E-Stop switch.



At the end of the machine you will find a large steel cover with a warning tag and a hole aligned to the lathe spindle. Behind this cover you will find the VFD inverter, the backs of the various switches, the lathe-mill selector relay, the CNC power supply and the electronic threading module.

CAUTION: These components are operated by high voltage. If you are not competent in electrical work, DO NOT open this cover panel.

The panel is deliberately designed with 6 attachment bolts, 4 of which are recessed to discourage unauthorized entry.

The VFD inverter takes your household single phase 220 volt current and converts it to 380 volt 3 phase out put. It also allows you to vary the frequency of the current and thereby vary the speed of your spindle motors. The remote VFD panel on the front of the machine is connected to the VFD Inverter by a ribbon cable. The inverter has an internal cooling fan.

The 3 phase current goes from the inverter to the magnetic contactor (relay) and is sent to either the lathe or mill motor from the selector switch on the front panel.

To the left of the relay is the CNC power supply. This unit converts your 220 volt household current to 48 volts DC to power the CNC system. The power supply also has an internal cooling fan.

To the left of the power supply is the G540 Gecko drive CNC module, which takes the 48 volt DC and out puts step and direction signals to your stepper motors. Below the Gecko drive is a third cooling fan designed to pull hot air out of the enclosure.

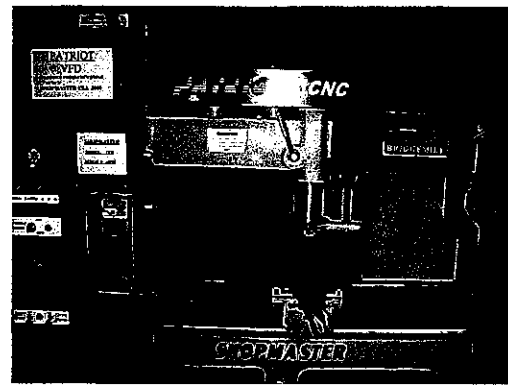
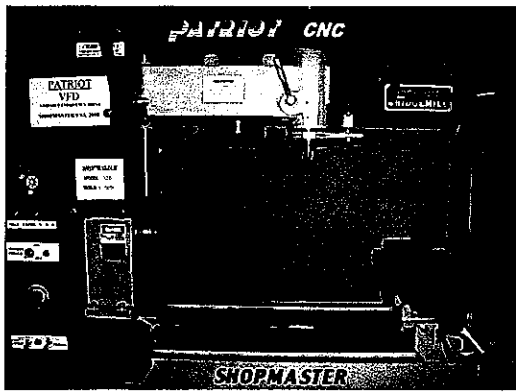
On the outside and at the rear of the sheet metal housing is the output side of the Gecko drive. Here you will find the 4 output ports for your stepper motors as well as the parallel port cable which connects to your computer. A small slide switch is marked " charge pump" leave this in the ON position. Its function is explained in the CNC Setup instruction portion of this manual. Notice that each output port also has a "trim" adjuster. DO NOT adjust these- they have been pre adjusted to match your stepper motors.

There are also 2 lites-

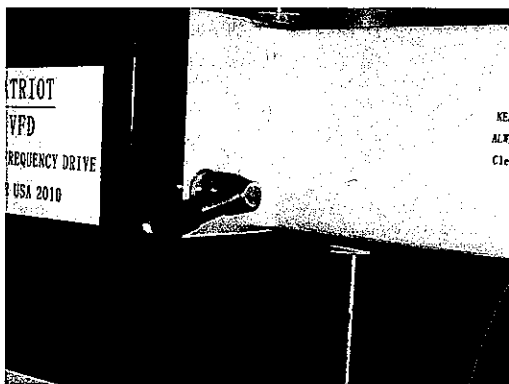
A green lite marked " power" and a red lite marked " fault"

Under normal running, the green lite will be on. However, should a cable come loose the red lite will come on. Also the red lite will be on if you disengage the stepper motors with the switch on the front panel.

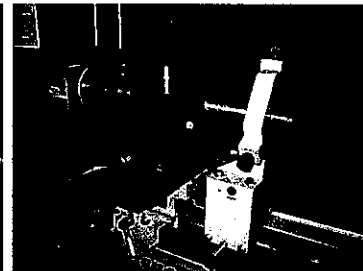
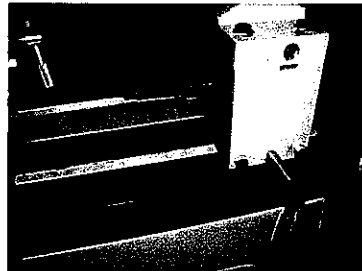
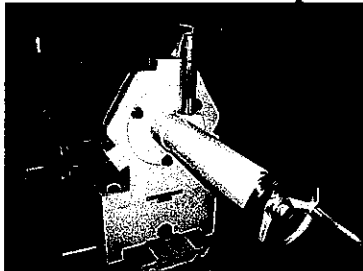
On the lathe drive pulley you will find a round magnet epoxyed in place. This magnet passes in front of a sensor as the pulley spins and sends a signal to the Gecko drive each time the spindle makes one rotation. In your MACH III software there is a threading wizard. This software calculates the spindle speed in relation to the stepper feed rate to allow you to cut various thread pitches. Even as the spindle slows under cutting loads, the software will adjust the stepper speeds to maintain the proper feed rate.



This is the main mill head casting The mill head assembly can be raised and lowered a total of 8". The mechanism consists of a 4 column support plate which holds the head moved by an acme screw activated by the CNC program or the handle on the motor. Beneath the mill belt cover you will find the drive belt for your mill spindle.

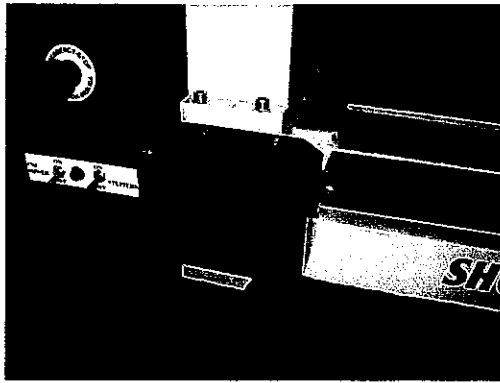
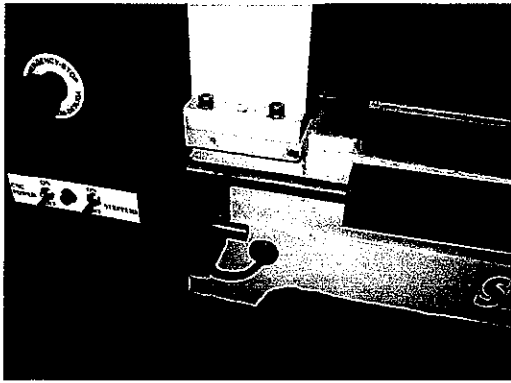


Locking these handles solidifies the mill head once you have set the desired height of the mill. CAUTION- read the warning label and ALWAYS loosen these locks before adjusting the height of the mill. The three handles are packed in the wood box of tools.

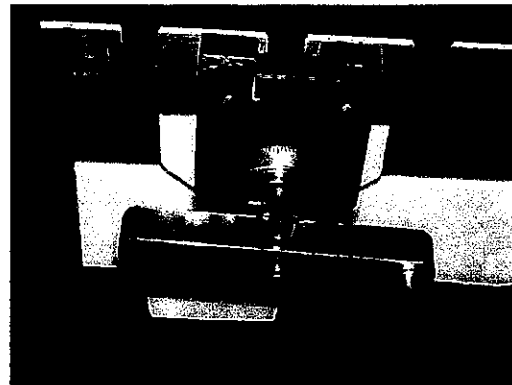
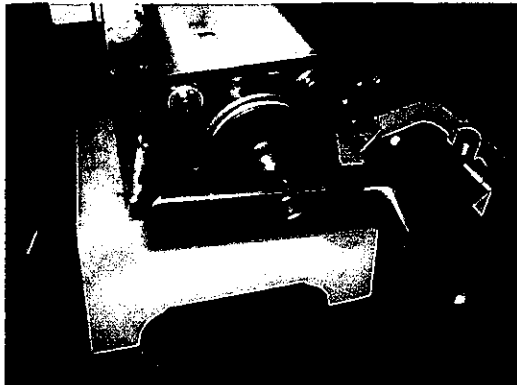


The PATRIOT tailstock assembly is unique in several ways. It combines the traditional tailstock functions with those of a steady rest. The entire long barrel assembly of the tailstock can be removed with 3 bolts to reveal the steady rest function. The tailstock itself has a full 6.25" barrel travel for those deep hole drilling operations. The handle has a dial for your depth measurements. The tailstock can be offset for cutting long tapers in the lathe.

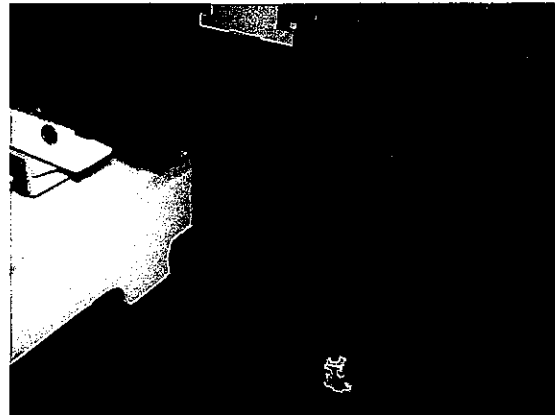
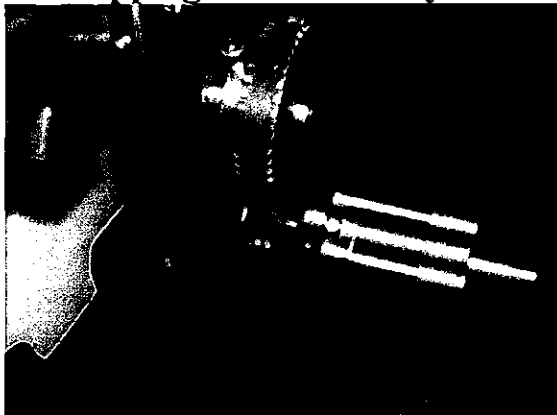
NOTE: From serial # 12001 on, the X leadscrew is in the center of the Main base casting and the mill head shield is larger.



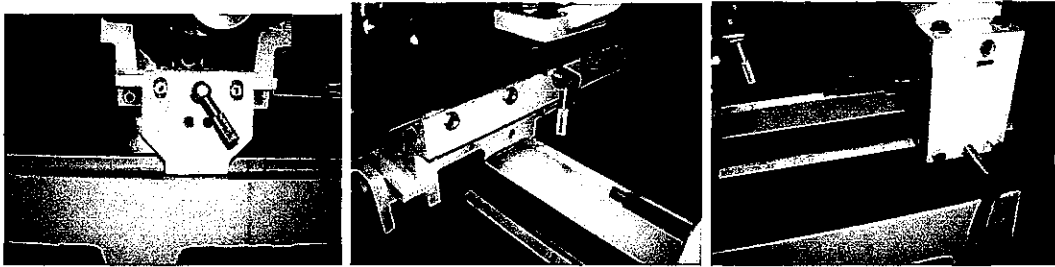
At the lathe end of the machine casting is the X axis CNC drive assembly. Covered by a metal shield, inside is the drive pulley and motor mounting bracket. The bracket has slotted holes for adjusting the X axis cnc drive belt tension.



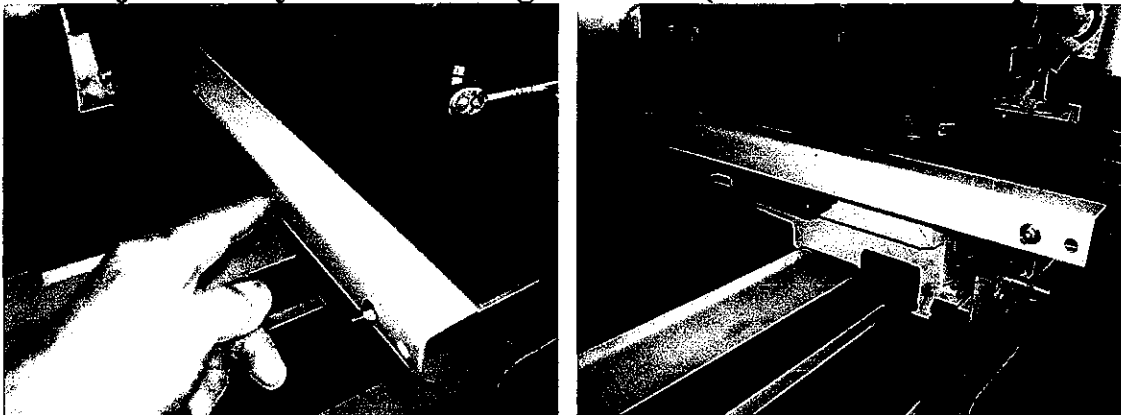
The left picture handle drives your X axis carriage toward and away from the lathe chuck. Use this handle for manual positioning or fine motions. The dial is divided into 0.001" increments and is full floating for easy zero setting. The lock nuts are used to set the preload on the ball screw thrust bearings which are located on each side of the steel mounting plate. One set is covered by the lead screw shield, while the other is recessed into the dial assembly. The right picture handle moves your cross slide table toward and away from you. It has the same dial calibration and thrust bearings. Both handles are removed for shipping and found in your box of tools.



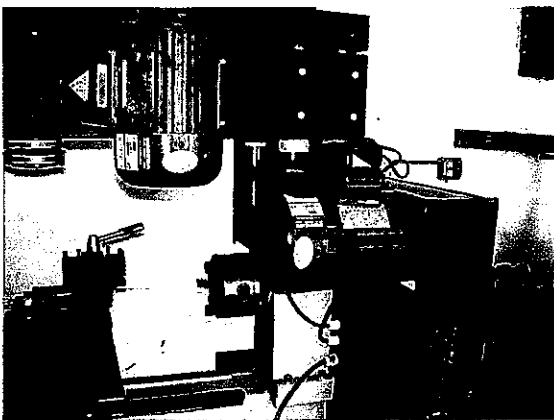
On the opposite end of the cross table is the CNC motor bracket. The motor mounts here and is covered by a sheet metal shield.



The handle in the left picture locks your main carriage travel. The center picture handle locks the cross slide travel and the right picture shows the tailstock lock handle. All the motions are adjustable by means of the gib screws (4 shown in center picture)

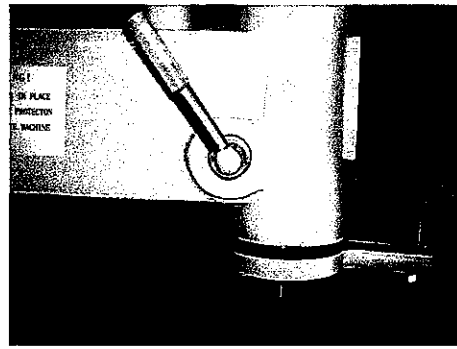
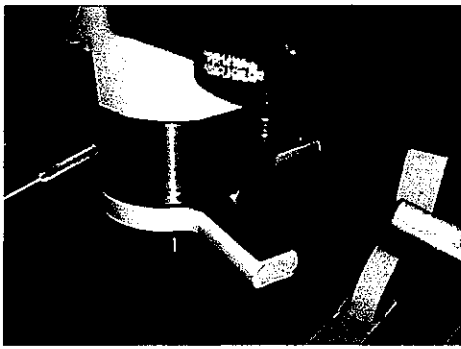


This heavy shield is designed for the installation of the DRO on the Y axis. All the holes are drilled and tapped at the factory for easy, professional installation. The shield is made of heavy gauge steel and painted to match the machine.

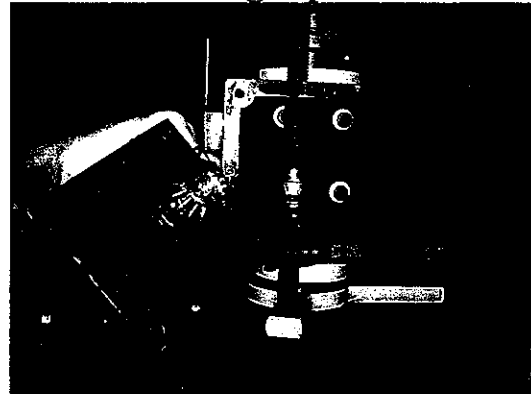
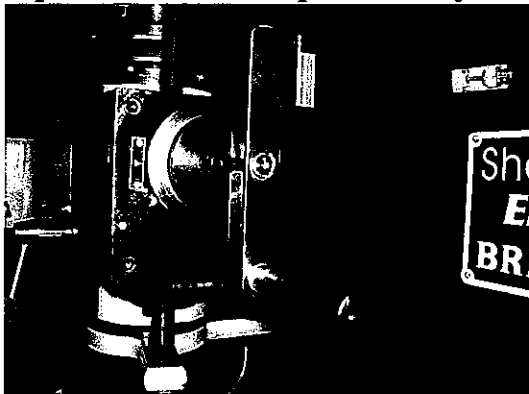


These are your spindle drive motors. The vertical mounted one is for the mill and the horizontal one is the lathe. Both motors are mounted high to prevent contamination from chips and fluids. Both motors are identical 1 hp 3 phase induction design. Each is mounted on a steel plate with slotted holes for adjusting the drive belt tension.

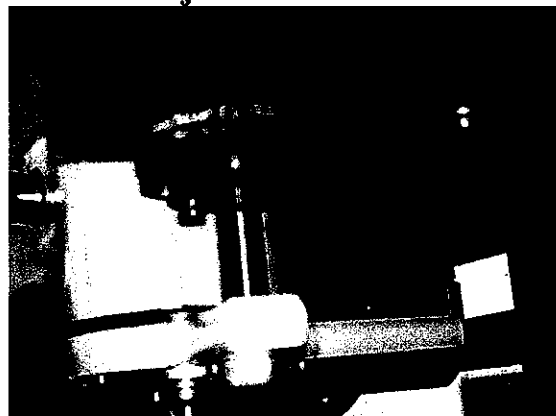
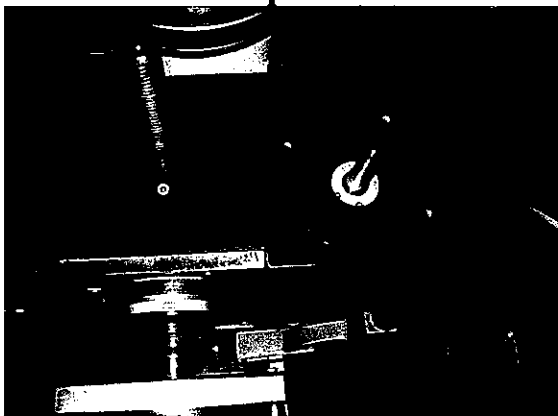
Early production machines serial # 09116-09917 have the lathe motor mounted on the end of the machine.



This is the Z axis drive plate. It consists of a 2 piece “sandwich” with a top plate around the quill and a lower plate. The 2 pieces are held together by bolts and when tight they clamp solidly around the quill. The plate has 2 “arms” one toward the rear for the DRO scale and one attached to the Z axis ball screw for moving the quill up and down. The quill is locked in position by the handle in the right picture.

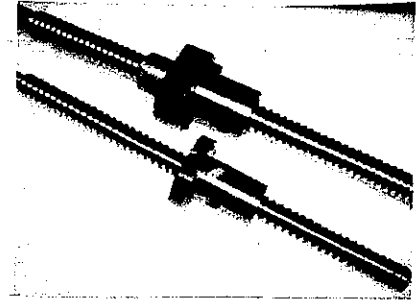
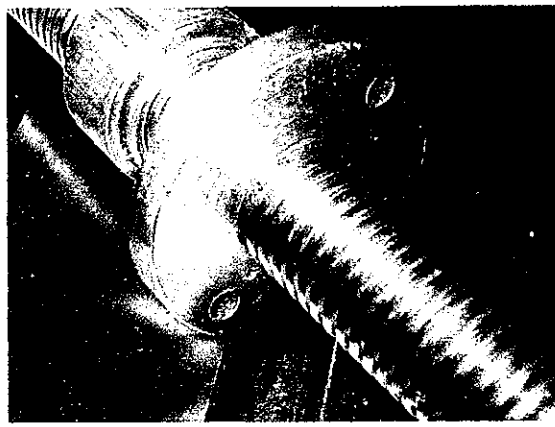


The quill motion is controlled by either the manual handle as shown in the left picture or the CNC drive motor. The manual handle has a dial calibrated in 0.001” increments and drives the quill down via a pair of bevel gears. The dial is fully floating for easy zero setting. The dial shaft has a pair of thrust bearings which are pre-loaded with the lock nuts just as on the X and Y.



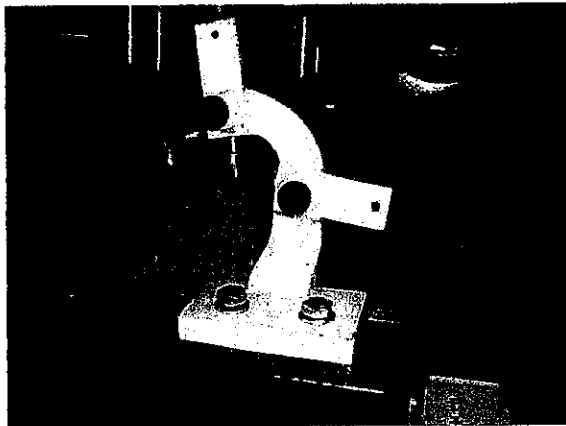
The CNC motor is mounted within the gearbox and drives the ball screw by a tooth belt.

Serial # 12001 on do not have the bevel gear drive. The handle is mounted on the stepper motor. The mill lift is controlled by the A axis CNC motor and the manual lift handle is attached to the stepper motor.



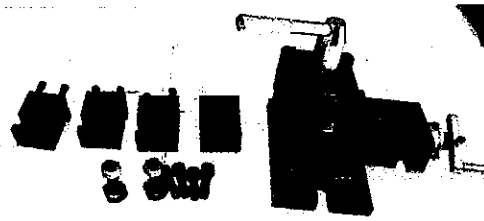
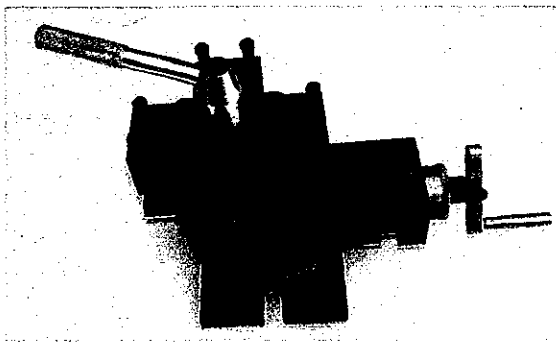
The PATRIOT uses special 2 piece adjustable nuts to reduce the inherent backlash in the acme system. On both the X and Y tables, each acme screw has 2 piece nuts with one half threaded for adjusting screws.. The nuts are held in a bracket with 2 clamp locks. When the clamp lock holding the flanged nut is loosened , you can adjust the tensioning set screws such that the nuts are forced apart putting contact on both leading and trailing threads of the lead screw. Because they are now contacting both the leading and trailing edges of the screw, the backlash is eliminated. As the machine is used and more wear begins to show, it is a simple operation to loosen the bracket and re-adjust them. *NOTE: Use care in this adjustment, as too much tension will make turning of the handles very difficult.*

ACME SCREWS WERE USED ON PATRIOT MACHINES FROM 2009 TO 2010 ALL PATRIOTS AFTER 2010 USED C-7 BALL SCREWS ON X, Y AND Z AXES AND ACME SCREW ON A AXIS.

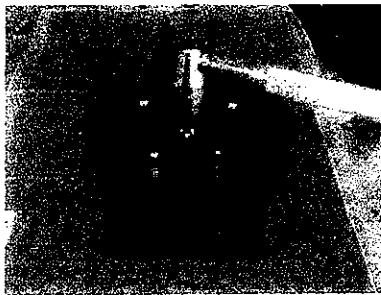


The PATRIOT comes equipped with a follow rest which attaches to the main carriage and travels along, following the cutting tool. It gives support to stock to prevent the force of the cutting tool from flexing the piece.

PATRIOT MACHINES FROM 2012 UNTIL 2014 USED A FOLLOW REST THAT WAS MOUNTED TO THE SIDE OF THE X AXIS CARRIAGE



The PATRIOT is equipped with a 4 way turret style toolpost with adjustable height tools. The turret is mounted on a compound slide base. The turret holds 4 separate tool holders. 2 holders are for lathe tools up to 1/2" size. The 3rd holder is for lathe tools and a boring bar (has a groove milled in it). The 4th holder is for a parting tool holder. It has a shallow groove to accept a 1/2" size blade and 4 bolts which clamp the blade in place. Each of the holders is secured by a large allen bolt in a slotted hole. On top of each holder is a 5mm allen bolt and jam nut to adjust the height of the holder. Once the height is adjusted, the holders can be taken on and off with no further adjustment necessary. The turret can hold all 4 holders and tools at one time, but it is more practical to use only 2 holders at 180 degrees to each other. The compound base can swivel a full 360 degrees and has a scale from 0-45 in each direction for quick reference in cutting bevels. The slide has 3 gib screws to set the tension. The compound should have some drag when moving it so that it does not deflect back under load. The dial is calibrated into 0.001" increments and 1 turn = 0.050".



MACHINE UPGRADES

Because the CNC cuts tapers, the compound toolpost is no longer a necessary feature. Beginning with serial # 14200, the compound has been replaced by the turret style as shown in the picture to the left. For those desiring a traditional compound, we offer an optional upgrade on our website, part # ST 27R.

SERVICING THE SPINDLES

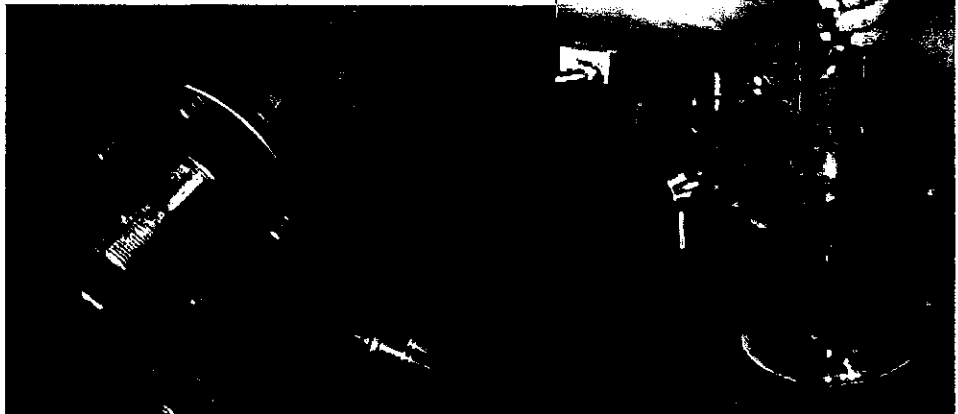
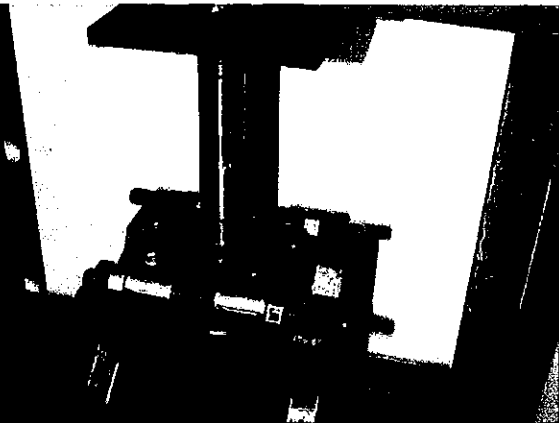
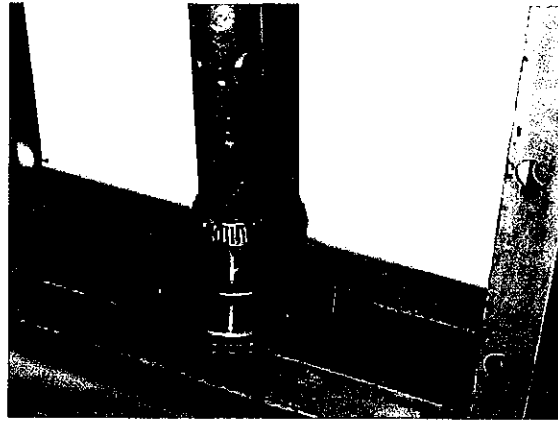
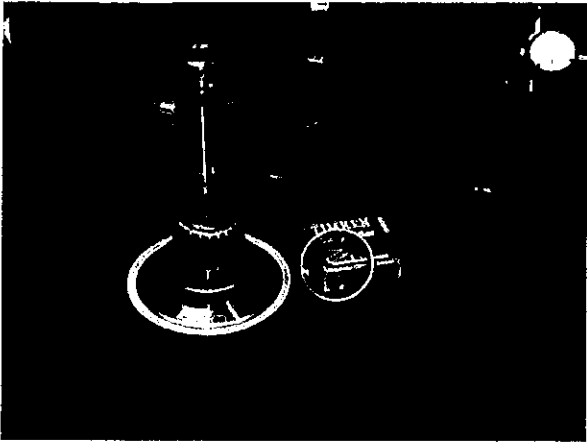
LATHE

- 1. Remove the 3 jaw chuck and remove the 3 allen bolts holding the front seal plate through the access hole in the spindle flange.**
- 2. Remove the spanner nuts which retain the drive pulley and remove the pulley.**
- 3. Pull the key from the spindle shaft and remove the 4 screws retaining the rear seal plate.**
- 4. Remove the seal plate and the seal collar from the spindle.**
- 5. Spin one spanner nut back on the spindle such that it is flush with the end to protect the threads.**
- 6. Use a wood block against the end of the spindle to protect the shaft and drive it out with a hammer.**
- 7. Clean the bearings and inspect them for any wear. If they are good, re-pack them and re-install. If they need replacing, use a press to remove and replace the chuck end bearing as shown in the photos and re-install the spindle.**

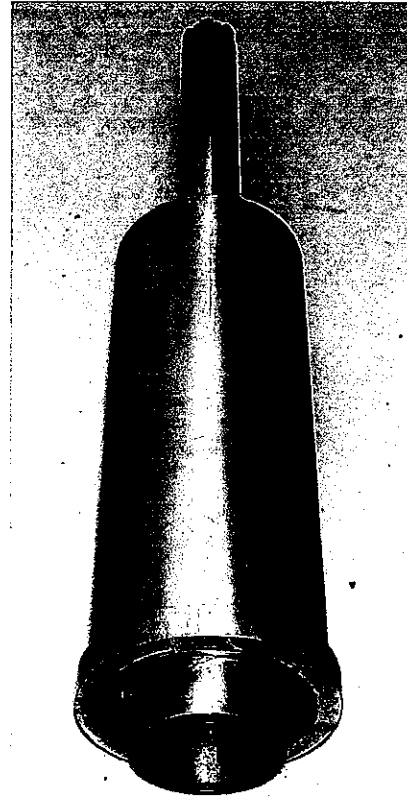
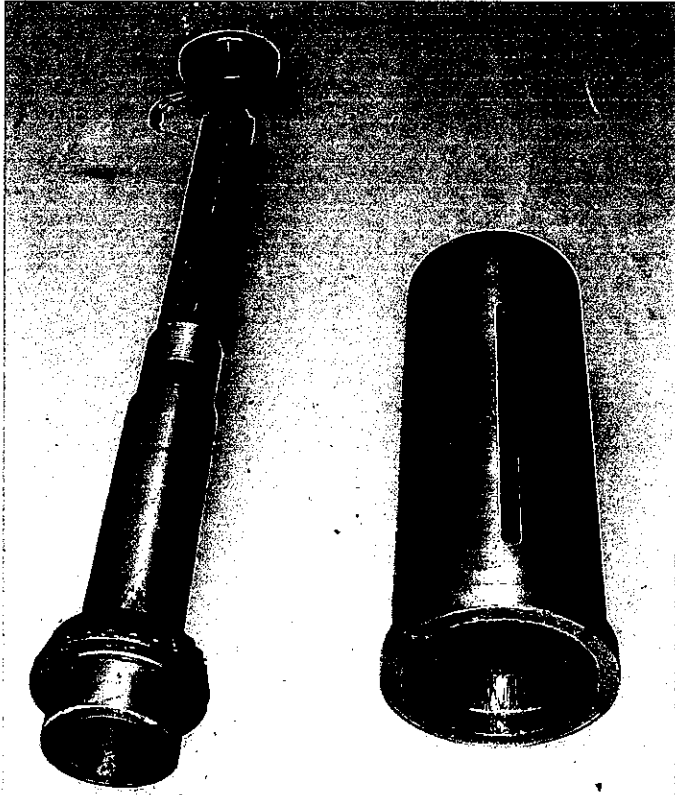
MILL

- 1. Remove the quill drive plate from the quill by loosening the 6 allen bolts, the lead screw nut and the DRO bracket if you have this option.**
- 2. Remove the allen set screw from the front of the mill head which rides in the groove.**
- 3. The quill assembly will drop out of the casting.**
- 4. Remove the 2 spanner nuts holding the spindle in the quill.**
- 5. Use a press if available or a hammer and wood block to drive the spindle out of the quill.**
- 6. Inspect the bearings for wear- if good, clean, re-pack and re-install. If they need replacing, use a press to remove the larger bearing from the spindle as shown in the lathe spindle photos.**
- 7. Use a press and/or heat to re-install the new bearings. Pack the bearings with moly grease and re-install the quill assembly.**

LATHE AND MILL SPINDLES AND BEARINGS



Your Shopmaster lathe spindle is supported by 2 machinery grade tapered roller bearings. They are lubricated by the oil in the mill head casting. There is a seal on each end of the spindle to retain the oil. The bearing nearest the chuck flange is pressed in place and must be removed in a press. Re-installing the bearing can also be done in the press, or by heating the bearing to 450 degrees. When heated, the bearing will fit over the spindle with only a light tapping using a hammer and a pipe to contact the inner race. The rear bearing is a light interference fit and can be tapped in place the same way without heating. When installing new bearings its best to pack them with grease to assure they have lubrication at startup.



The mill spindle assembly (QUILL) is similar to the lathe with 2 tapered roller bearings. However, the mill spindle is not oil lubricated. The bearings are packed with grease and designed to be serviced every 1000 hours of use. The quill assembly can be dropped out of the mill head as a unit. The upper bearing, like the lathe is a light interference fit and can be removed with light tapping. The lower bearing is press fit in place and requires a press and/or heat to remove and install it. Always use a high quality moly grease on the mill spindle bearings.

Both lathe and mill spindles use a pre-load of 35 ft/lbs torque and are secured by spanner nuts.

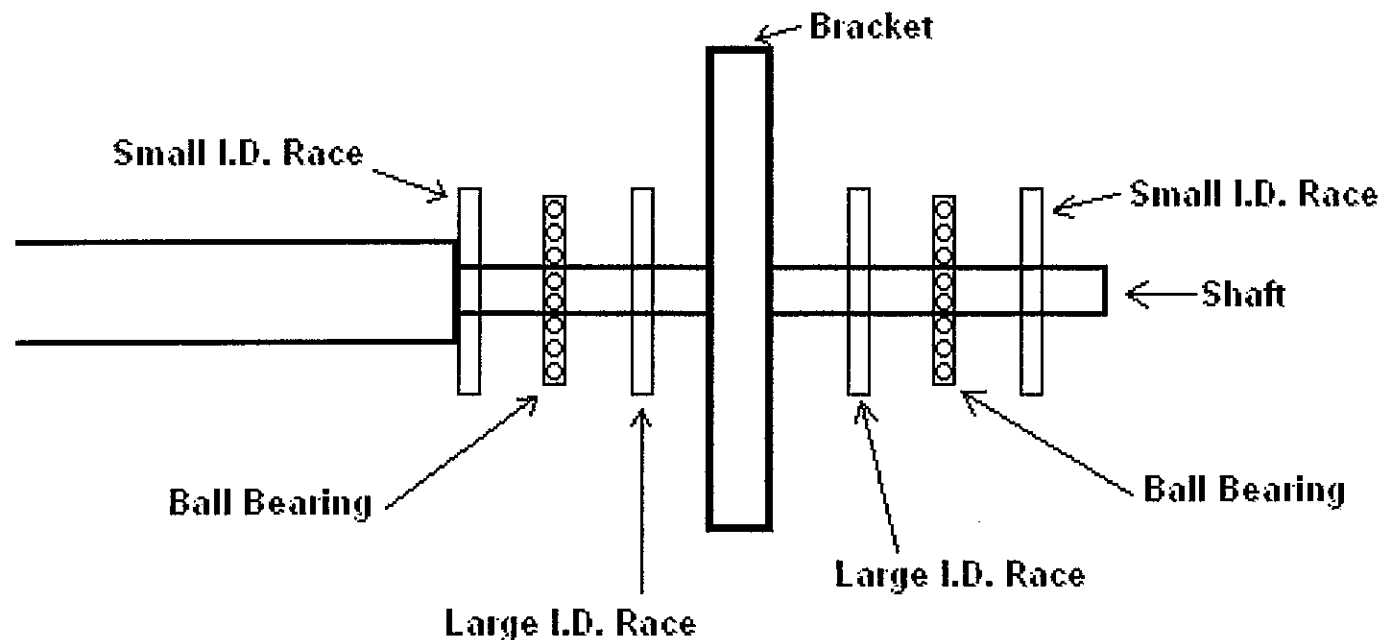
NOTES ON TAPERS AND DRAWBARS

Your lathe spindle has a hole through the spindle of 1.025' diameter to allow long shafts to be passed through. At the chuck end of the spindle there is a Morse # 4 taper . Morse tapers are industry standard for lathes and come in sizes ranging from Morse # 1 up. The geometry of all Morse tapers is the same, only the size changes. In your accessory box you will find a Morse # 4 dead center as well as a Morse #4 to #3 reducer sleeve. You can use these to adapt different tools to be used in the lathe.

The tailstock has a Morse # 3 taper and will accept the Morse #3 center, the extension socket and the Morse # 3 drill chuck arbor. Morse taper centers are used to support the ends of parts held in the 3 jaw chuck as well as when turning between centers. You can use the included drill chuck in the tailstock as well to drill into parts rotating in the lathe chuck.

The mill spindle has an R-8 taper, which is industry standard for most medium to large sized mills. The R-8 uses a drawbar to hold it in place. Your machine is shipped with the drawbar in the mill spindle retaining the R-8 drill chuck arbor. To remove tools from the spindle, loosen the jam nut a few turns and then tap the end of the drawbar with a hammer. This will loosen the taper and you can then unscrew the drawbar by hand and the tool will drop out. You tools also include an R-8 split collet. Split collets close up as the drawbar is tightened to grip around the cutting tools.

NOTES ON THRUST BEARING



The Shopmaster uses ball thrust bearings in a number of locations. If you remove them for servicing, be sure to re-install them properly. The bearing set consists of two races and a caged ball bearing. The two races have different inside diameters. This is not a manufacturing error. The race with the small diameter fits on the shaft, while the race with the large diameter always fits against the fixed bracket.

NOTES ON 3 JAW CHUCK

Your PATRIOT comes with a conventional 3-jaw chuck. A 4-jaw chuck is an option. See the notes on the 4-jaw chuck in the next section. The normal 3-jaw chuck has three inside jaws and three outside jaws. Be sure to take careful note that all bolts that hold the chuck to its face plate are tight and that the chuck fits properly in the face-plate recess made for it. The various parts of the chuck are an integral part of that particular chuck and should always be maintained as a unit. Each chuck is manufactured as a unit and is dialed in with the jaws that are provided with the chuck. The serial number of each individual chuck is stamped on the body and on each of the jaws (see following illustration). The order in which the jaws go into the chuck is also critical to maintain accuracy. Note that the jaws are numbered 1, 2 and 3 as well as stamped with the serial number.

THE NUMBER ON THE CHUCK JAW, BOTH INSIDE AND OUTSIDE, INDICATE THE POSITION THAT THEY SHOULD BE PLACED IN THE CHUCK BODY. Jaw NO. 1 must go in the slot stamped NO. 1 on the chuck body. The same NO. 1 slot will also typically have the chuck serial number stamped immediately after the slot number. Make certain you follow the instructions for installation exactly.

INSTALLATION OF THE CHUCK JAWS

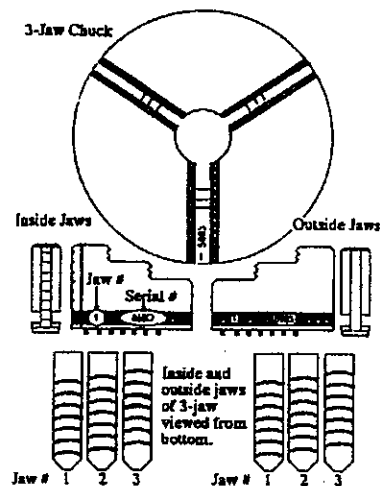
- 1. Using the chuck key provided, scroll to where the beginning of the scroll thread is visible in the NUMBER ONE slot, then back the thread off until the beginning of the thread is no longer visible in the slot (one-half turn counter clockwise will usually do it).**
- 2. Next, insert the jaw numbered NO. 1 in the slot and firmly push it toward the center of the chuck.**
- 3. Scroll the chuck until the thread becomes visible in the second slot; at this point pull out on the previously installed jaw to ensure that the scroll has engaged the teeth on the back of the jaw. If the jaw comes out, repeat steps 1 & 2. If the jaw holds proceed to step 4.**
- 4. With the beginning of the thread visible in the second slot, again back it off one-half turn and insert the jaw. Push it firmly toward the center of the chuck.**
- 5. Scroll the chuck until the thread becomes visible in the third slot; pull out on 2nd jaw to ensure the scroll has engaged the teeth.**

**WHEN ALL THE JAWS ARE INSTALLED AS INSTRUCTED ABOVE,
THEY WILL MEET AT THE CENTER OF THE CHUCK
SIMULTANEOUSLY.**

TO RECAP THE PROCEDURE...

- 1. Jaws are inserted in numerical order 1-3.**
- 2. Always begin with slot No. 1.**
- 3. Scroll until the beginning of the thread is visible.**
- 4. Install jaw, pushing it firmly toward center of chuck.**
- 5. Scroll until the beginning of the thread is visible in the next slot.**
- 6. Test the jaw just installed by pulling out.**
- 7. Repeat from STEP 4 until all the jaws are firmly installed.**
- 8. Scroll the chuck until all jaws meet in the center of the chuck.**

**IMPORTANT! IF ALL THE JAWS DO NOT MEET AT THE CENTER,
REPEAT THE STEPS ABOVE AFTER REMOVING THE INCORRECTLY
INSTALLED JAWS.**



NOTE!

**IF YOU LOSE THE JAWS YOU WILL HAVE TO BUY A COMPLETE NEW CHUCK-
PARTS ARE NOT INTERCHANGABLE.**

NOTES ON THE FOUR-JAW CHUCK

The 4 jaw chuck can be purchased as an option. Whether or not you need the extreme accuracy offered by a 4-jaw chuck is a decision that you need to make. Also, some units come with a machined installation plate while others come with plate which must be machined by you (this depends upon our suppliers). The diagram and instructions included at the back of this owner's manual will tell you how the plate must be machined to fit properly. It is not a very difficult procedure and might well qualify for your first serious project after you get set up and take a few practice cuts to familiarize you with your machine.

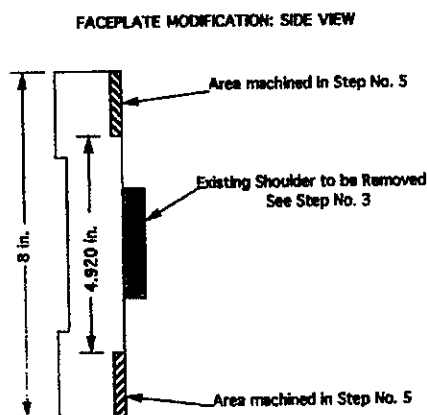
FACEPLATE MODIFICATION FOR THE FOUR JAW CHUCK.

Due to factory specification changes, please modify your faceplate according to the following instructions. Please refer to the following diagram for assistance.

1. Remove the three jaw chuck from the spindle.
2. Bolt the 8" face plate that came with your standard accessories to the spindle.
3. Make a cut across the surface of the face plate to true it to the spindle. Be sure to work slow to attain a ultra-smooth surface.
4. Measure the diameter and recess depth on the back of the chuck.
5. Cut the shoulder on the face plate to the same diameter and face it so the raised area fits snugly into the chuck recess.
6. Test the fit of the 4-Jaw chuck to the face plate.
7. When the fit is snug, remove the face plate from the spindle.
8. Clamp the chuck to the face plate and mark the position of the four mounting holes.
9. Drill and tap holes to accept the bolts supplied or any of your choice.

As always, do not be afraid to call the technical line for assistance.

FACEPLATE MODIFICATION: SIDE VIEW



When performing any lathe work, please be sure to remove the chuck key from chuck **BEFORE TURNING ON THE MACHINE!** Serious injury can result if you carelessly leave the chuck key in the machine. It becomes a flying object of great speed due to the centrifugal force generated by the fast turning chuck.

LUBRICATION OF THE UNIT

For accurate work, machinery must be properly lubricated. Take time to examine the CLEAR PLASTIC PORT located on the front of the lathe column. It is called the GEAR BOX SIGHT GLASS. It is important to add only enough oil to become visible in the sight glass when the lathe is running. If needed, add oil by unscrewing the plug that is located on the mill support plate which is mounted to the lathe casting. A drain plug is located on the opposite side of the column from the sight glass. DO NOT OVERFILL. Another important item is to make sure the lathe bed ways are lubricated each time you use the unit. Oil all "button" oilers daily. The lead screws for the lathe and the cross slide must not be ignored. Using an oil can, lubricate both lead screws while they are in motion. To easily oil the cross slide, move the table toward you as far as it reaches and squirt a generous amount onto the screw as you turn the hand wheel to move the table back away from you. Annually the machine should be disassembled to the point where the mill taper bearings can be re-packed in grease. We recommend a durable wheel bearing grease that is obtained at any auto parts store. Remember to adjust the pre-load carefully upon re-assembly.

An excellent all-round lubrication available in many places is MARVEL MYSTERY OIL.

ELECTRICAL, CNC, VFD

IN THIS SECTION:

MACHINE WIRING DIAGRAMS

CNC WIRING DIAGRAMS

VFD INVERTER WIRING DIAGRAMS

CNC SETUP PROCEDURES

VFD CODES AND TROUBLE SHOOTING

MACHINE ELECTRICAL TROUBLE SHOOTING

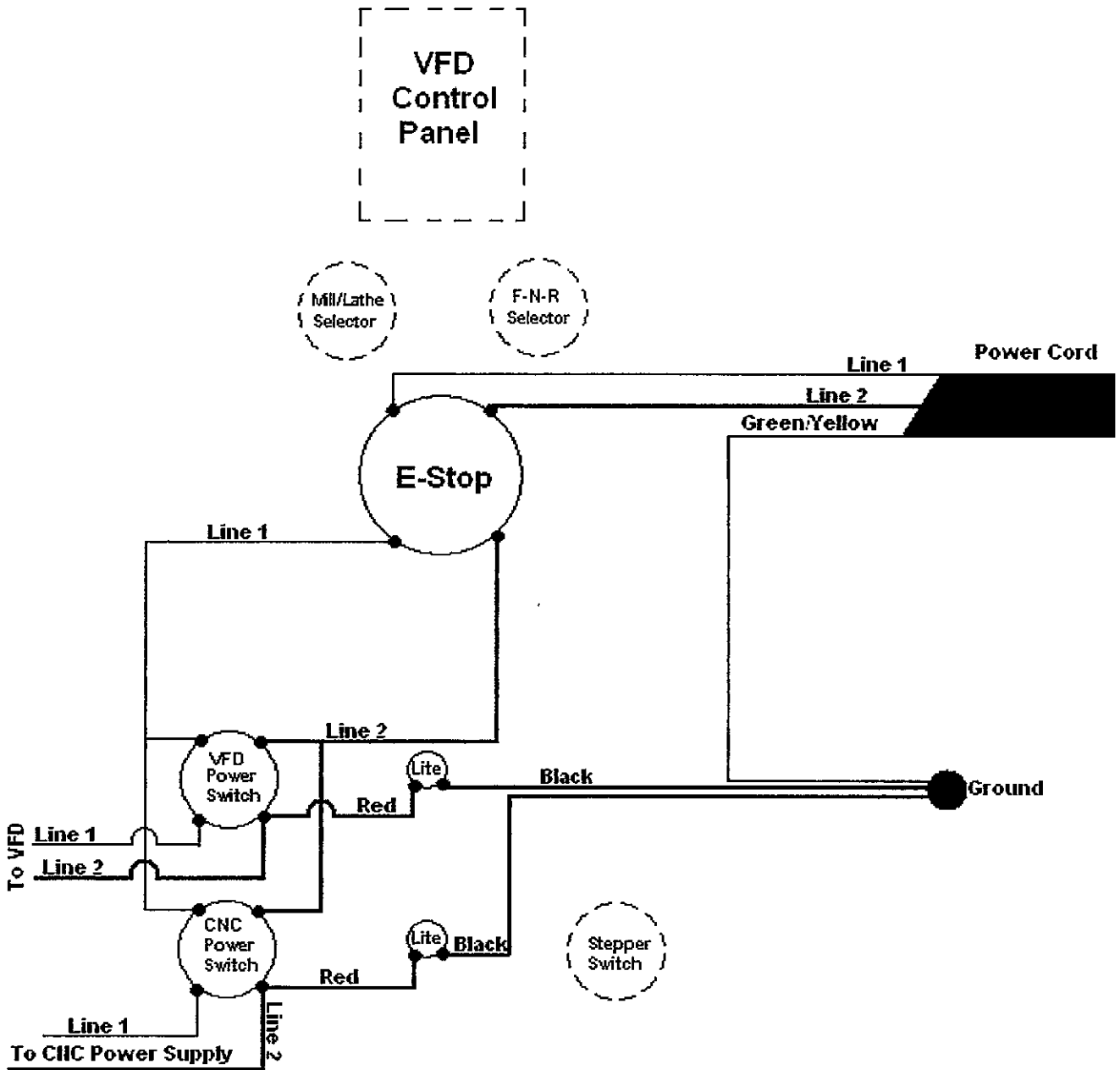
PLEASE NOTE:

The full CNC manual is included on your CNC software disc as a .PDF file.

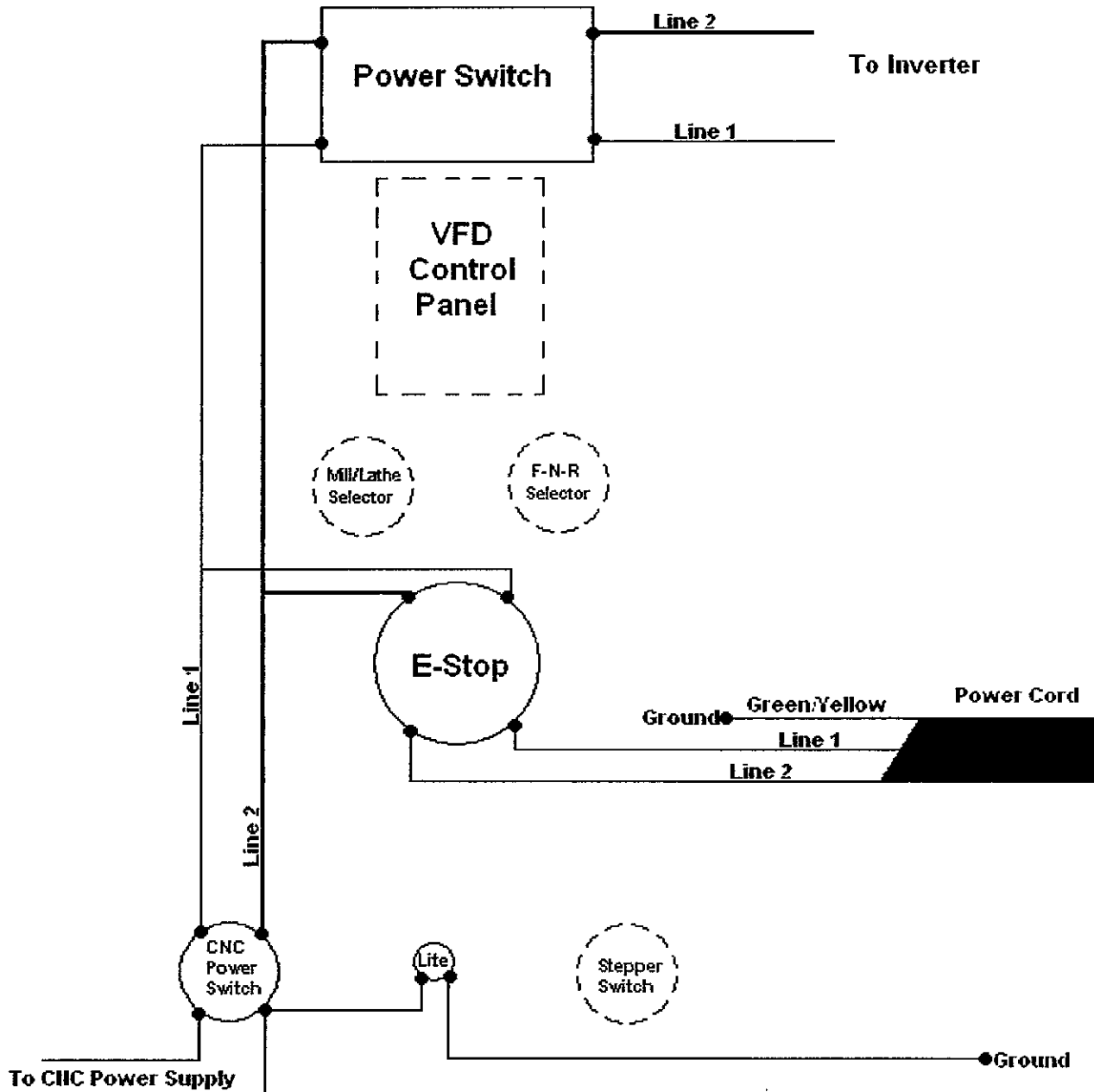
The full VFD manual will be sent to you as a .PDF file.

Because each of these full manuals consist of hundreds of pages, it is not practical to print them all. Also, in electronic formats we can update your manuals each time a change is made.

Overall Front Panel Wiring
This diagram for serial #'s 10023-

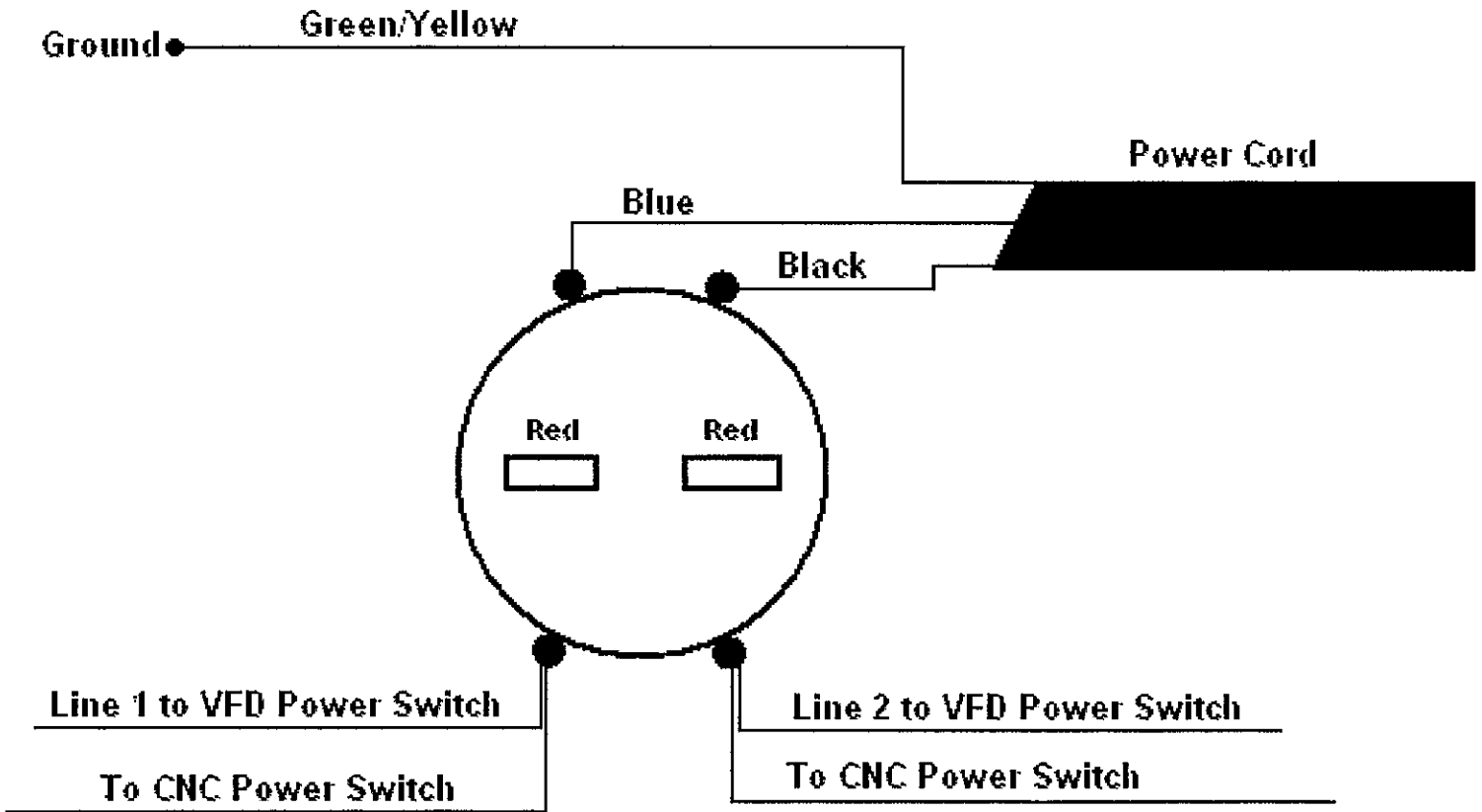


Overall Front Panel Wiring

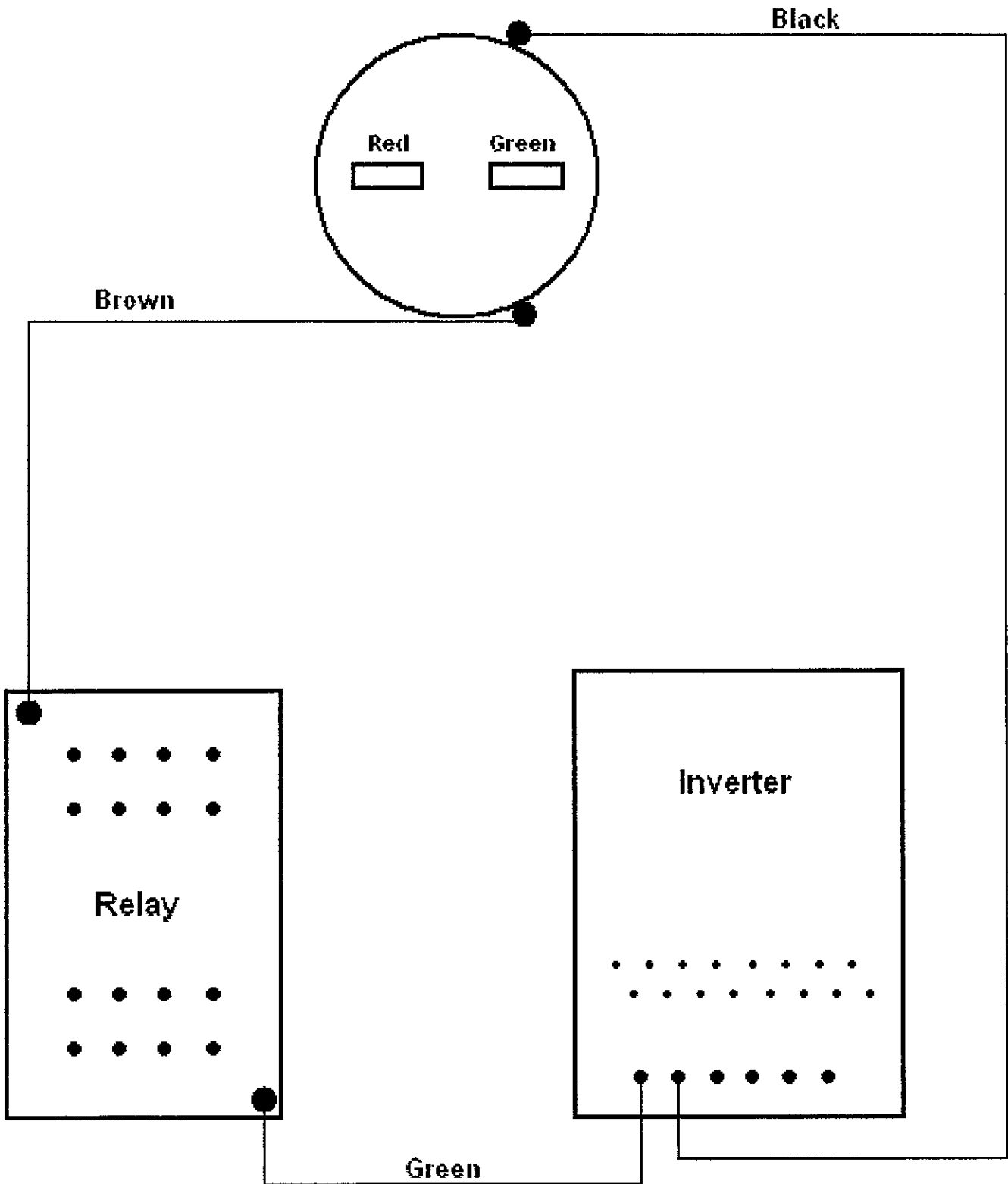


This diagram for serial #'s 09116-09917, 10001-10022.

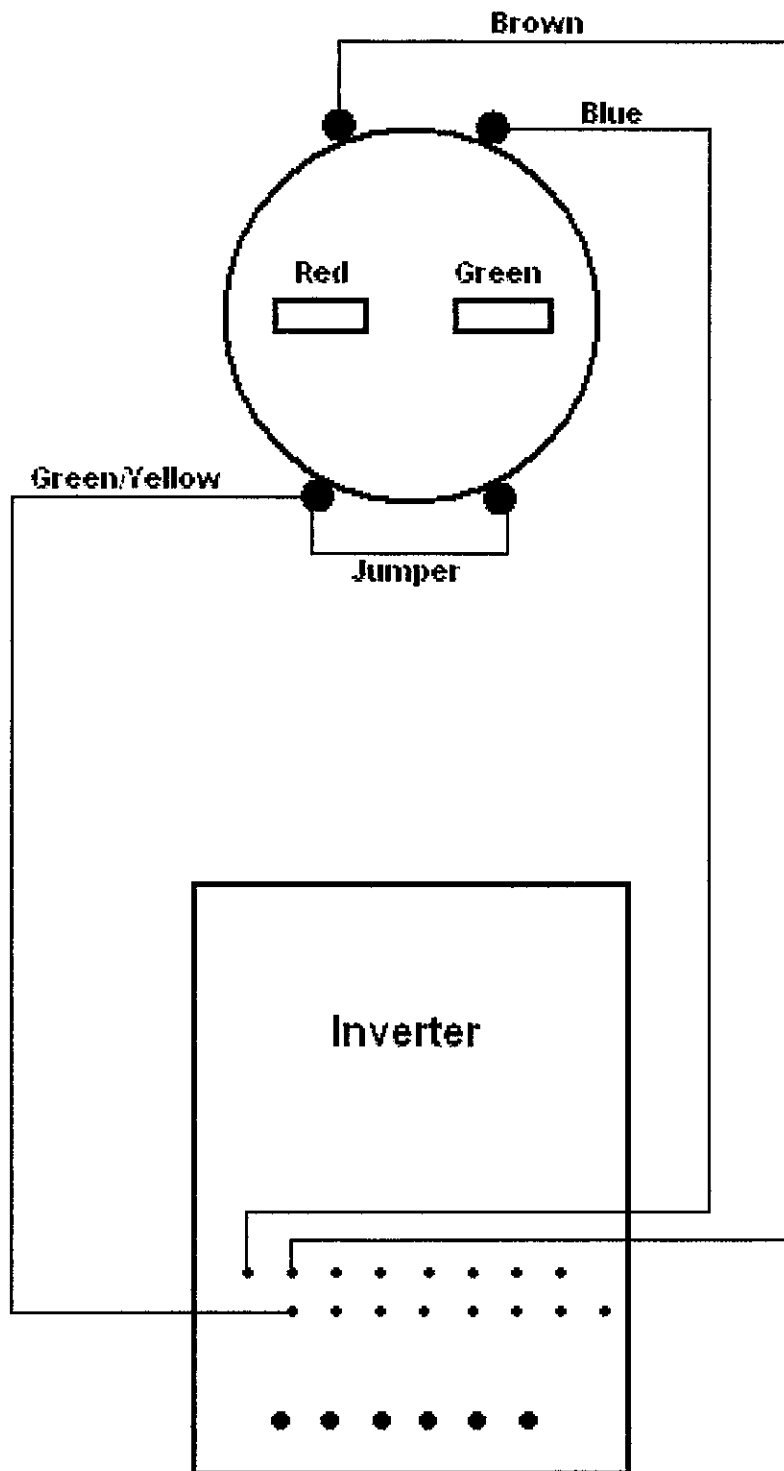
E-Stop Wiring Diagram



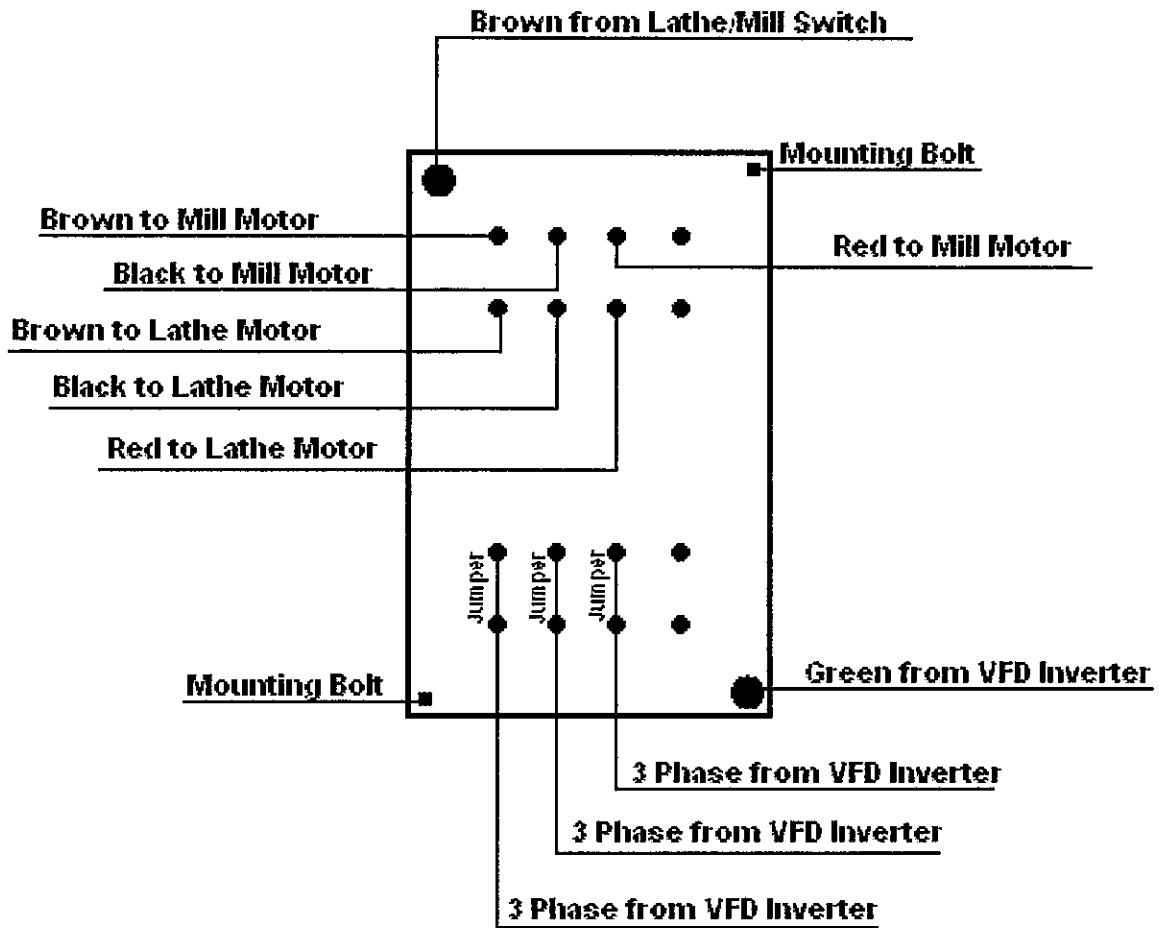
Lathe-Mill Selector Switch



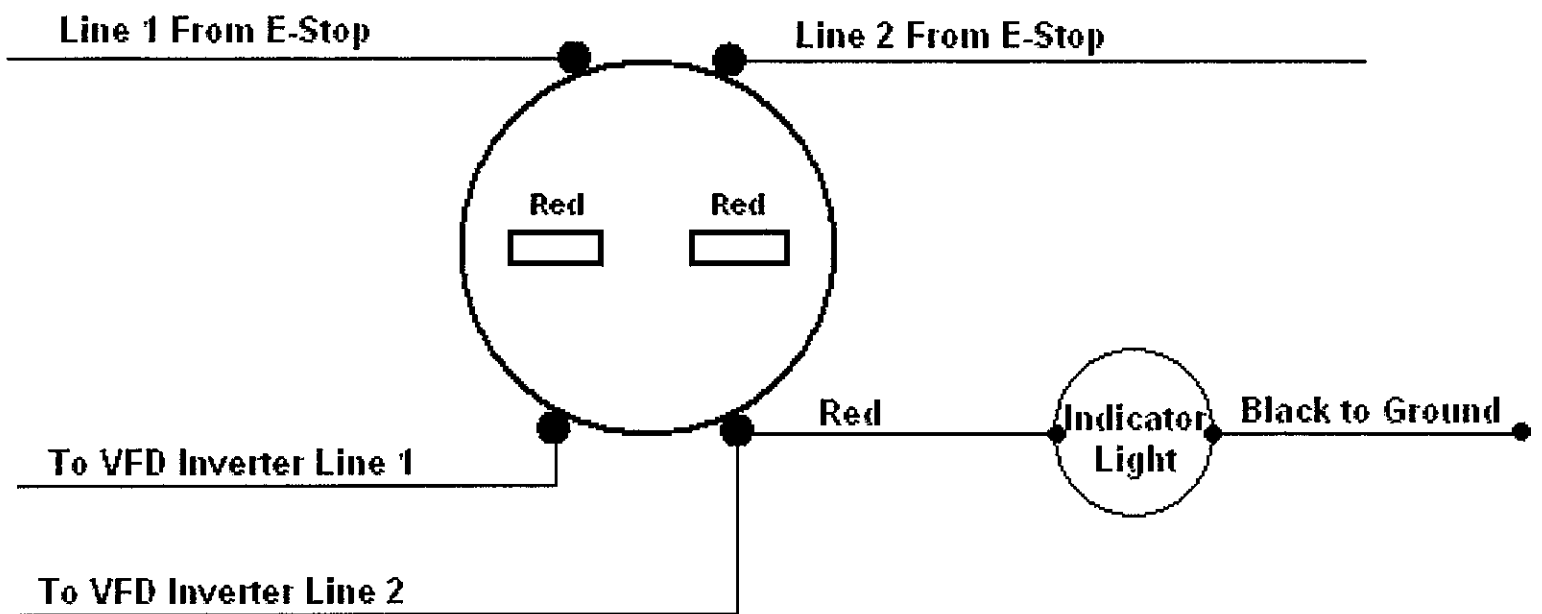
Forward-Neutral-Reverse Switch



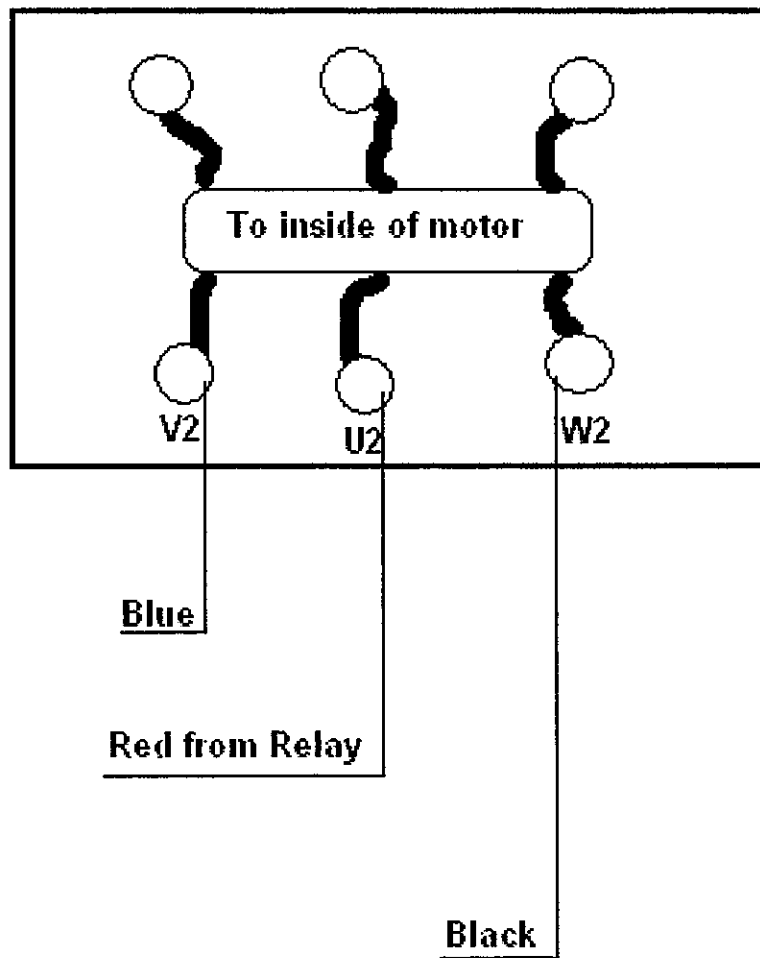
Relay



VFD Power Switch

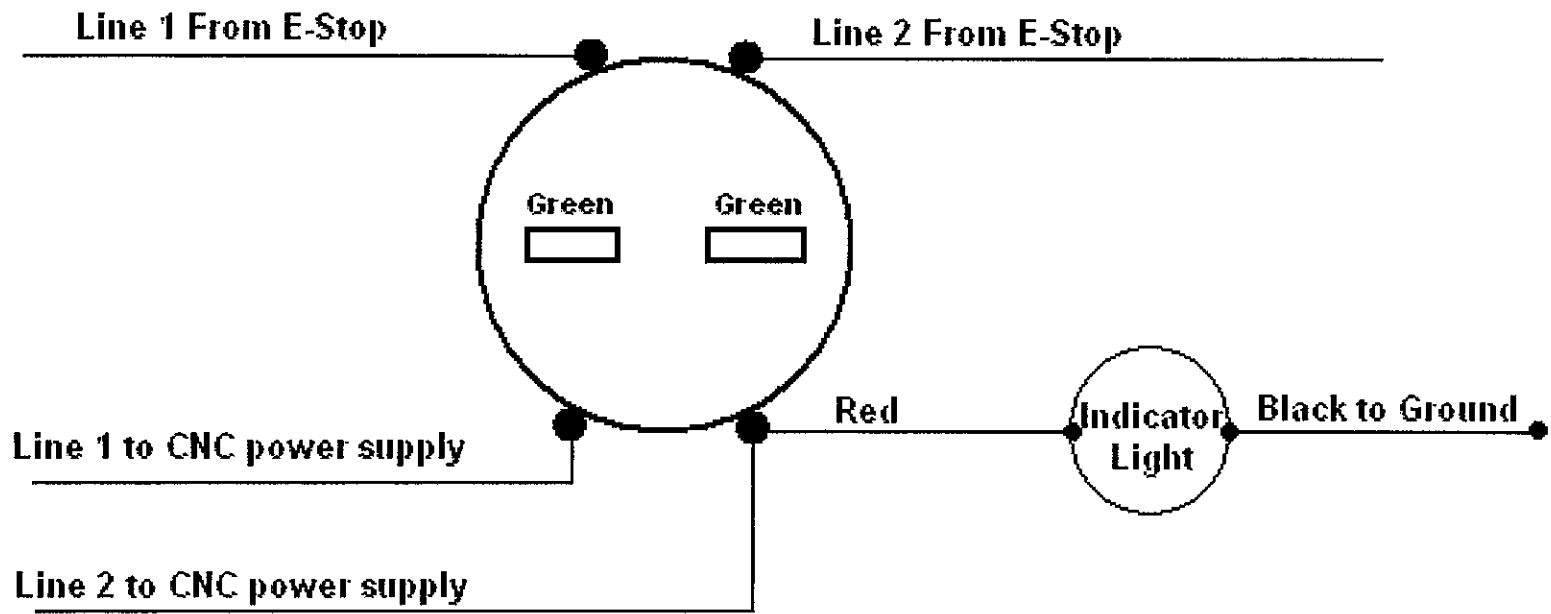


Motor Wiring

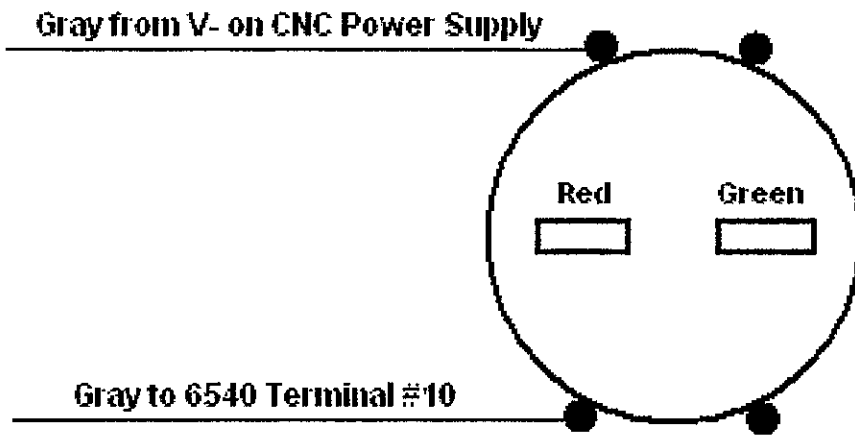


To reverse Motor Direction Swap Blue and Black

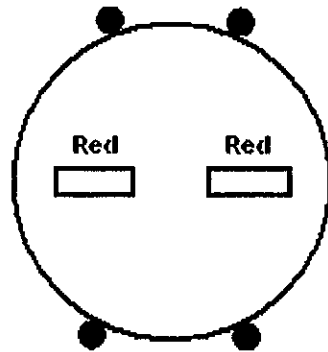
CNC Power Switch



Stepper Motor Switch

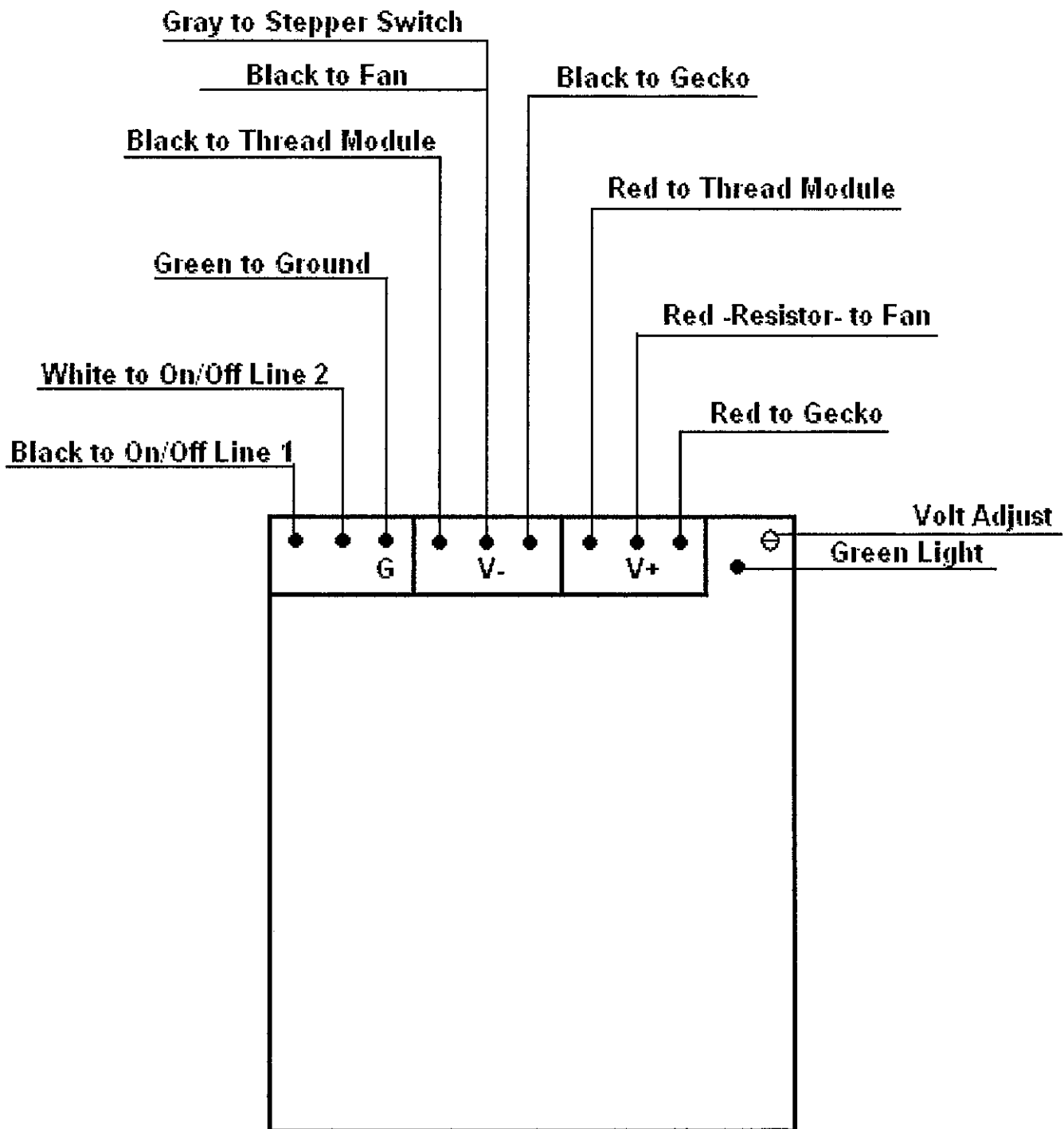


Switch Explanation

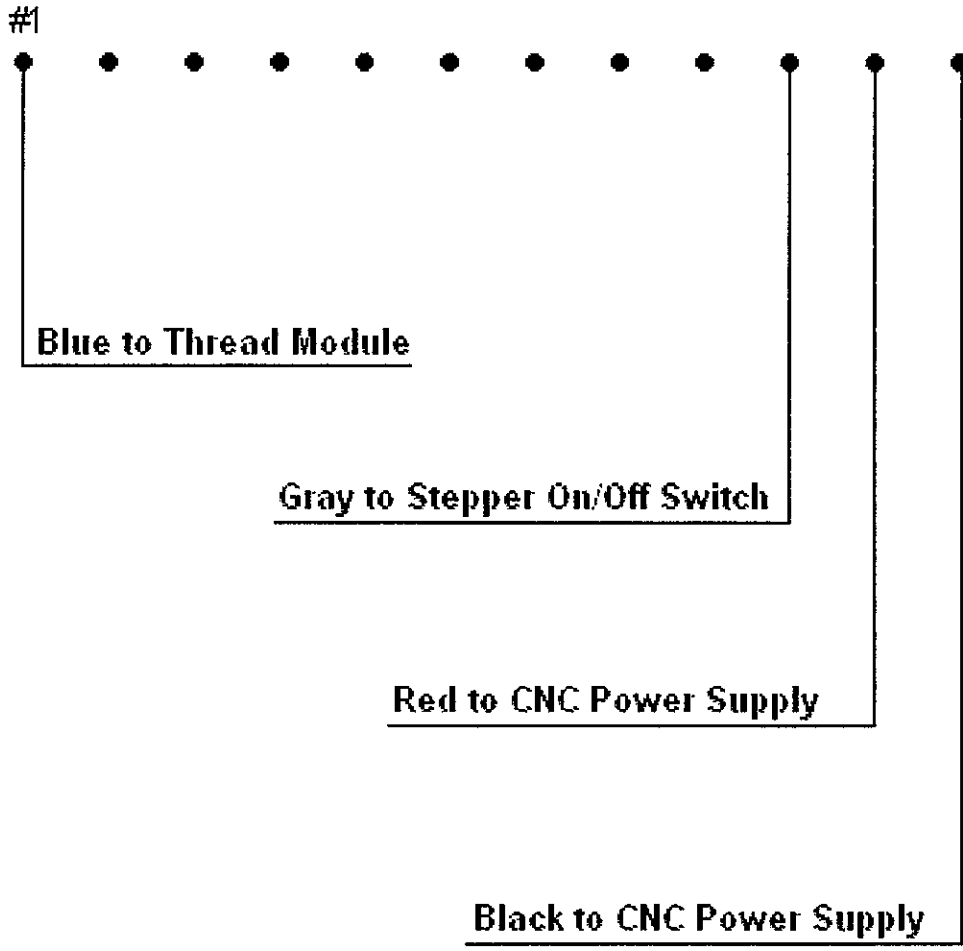


To remove the switch body from the button portion, push down the white tab. The switch portion will pull away from the the button. Looking inside the switch you will see two spring loaded contacts. These will be red, green, or red and green. Two red contacts means a normally open switch. Two green contacts are a normally closed switch. One red and one green means one side is normally open while the other is normally closed. The button portion can have a single notch for ON/OFF or a double notch for ON-NEUTRAL-OFF. The button portion is held in with a plastic nut, to get a firmer grip you can use a 12 point 25mm socket, but only tighten the socket by fingers not with a ratchet.

CNC Power Supply



G540 Gecko Drive

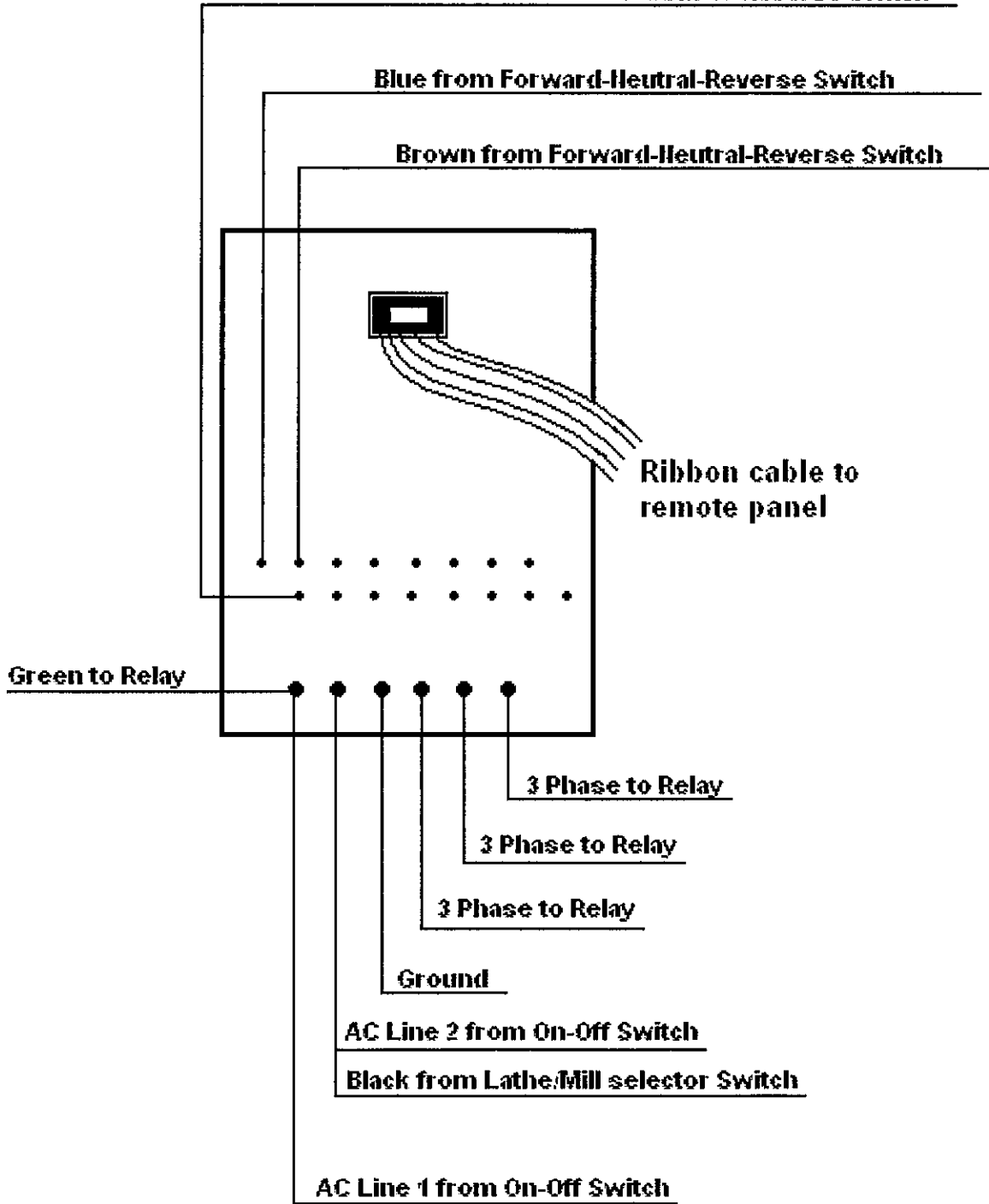


NowForever VFD Inverter

Green/Yellow from Forward-Neutral-Reverse Switch

Blue from Forward-Neutral-Reverse Switch

Brown from Forward-Neutral-Reverse Switch



MACH III Control of VFD

Your VFD inverter can be controlled through the Mach III software to perform a variety of functions, including spindle speed, spindle direction, CSS (constant surface speed) etc.

However, the machine comes from the factory setup for manual control of these functions.

We strongly recommend that you become familiar with the operation of the machine and cnc before changing to Mach III control.

The necessary wires are already attached to the CNC controller, but are not attached to the VFD inverter. The wire harness has the loose ends shrink wrapped and they are tucked away between the CNC drive and power supply. To attach the wires, disconnect the unit from the power source and open the end panel. Follow the diagram in your manual titled *SHOPTASK CNC WIRING DIAGRAM*

Forward and reverse operations will now be controlled via Mach III or the VFD control panel on the front of your machine, so keep the F-R manual switch in the neutral position.

Prior to modifying the VFD control settings, you must unlock the parameters.

The locking code is P1-000

To unlock the code –

Press Enter

P0-000 is displayed

Press the UP arrow until P1-000 is displayed

Press Enter

000001 will be displayed

Press the DOWN arrow until it reads 000000

Press Enter

Your codes are now unlocked, and you can follow the procedures outlined in the pages titled-

CHANGING CODES FOR SPINDLE CONTROL THROUGH MACH III

MODELS WITH DUAL SENSORS 2013- ON

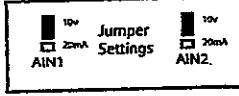
Shopmaster CNC Wiring Diagram

To enable Mach3 control of Mill Spindle Direction and Speed

NOWFOREVER E100S1R5B VFD Panel

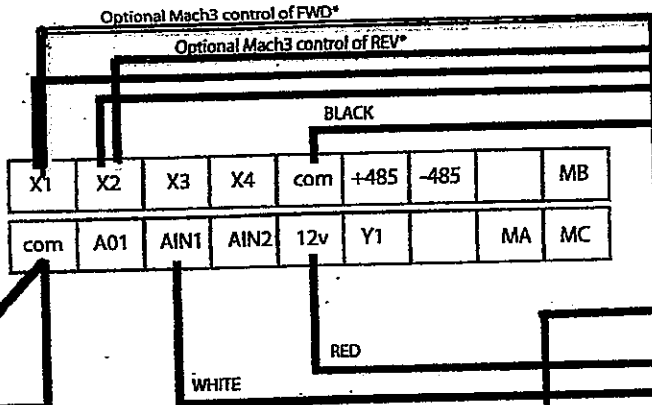
VFD Panel Connections

- X1 - FWD Run
- X2 - REV Run
- X3 - FWD Jog
- X4 - REV Jog
- Common
- +485 - Modbus RS485+
- 485 - Modbus RS485-
- MB - Relay Out - B node - Fault HD



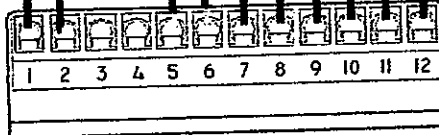
Common

- A01 - Analog Out 1 - Frequency Out
- AIN1 - Analog Frequency 1 - DC 0-10v (1/1000)
- AIN2 - Analog Frequency 2 - DC 0-10v or 0-20mA (1/1000)
- 12v - 12v power
- Y1 - Digital Out 1 - Inverter Running
- MA - Relay Out - A node - Fault NC
- MC - Relay Out - C node



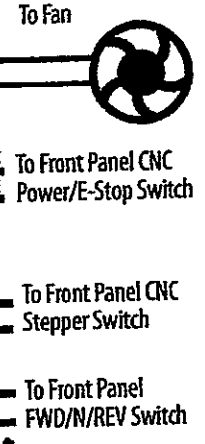
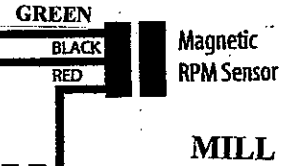
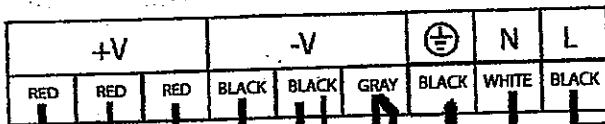
Gecko G540 Panel

- Pos 1 INPUT 1 (DB25 pin 10)
- Pos 2 INPUT 2 (DB25 pin 11)
- Pos 3 INPUT 3 (DB25 pin 12)
- Pos 4 INPUT 4 (DB25 pin 13)
- Pos 5 OUTPUT 1 (DB25 pin 17)
- Pos 6 OUTPUT 2 (DB25 pin 1)
- Pos 7 VFD GROUND
- Pos 8 VFD OUTPUT
- Pos 9 VFD +10VDC
- Pos 10 DISABLE input (E-STOP)
- Pos 11 SUPPLY +18 to +50VDC
- Pos 12 POWER SUPPLY GROUND



GROUND

CNC 48v Power Supply S-350-48 Panel



*Mach3 control of FWD/REV will make front panel switch Inoperative.