

Vipros 2510 King with Fanuc 18P Control User Pre-installation Guide



Amada America Inc.
7025 Firestone Blvd.
Buena Park CA. 90621
Phone: (714) 739 2111
Fax.: (714) 739 4099
Email info@amada.com

Warning

- ☐ Qualified personnel must complete all work.
- ☐ Do not apply power to the Vipros 2510 King until an A.E.S.I. (Amada Engineering and Service Incorporated) Engineer is present and has instructed you to do so.
- ☐ Considerable effort has been made to ensue that this manual is free of inaccuracies and omissions. However, as Amada America strives to continually improve our products, some data contained herein may not exactly reflect the latest revisions to the Vipros 2510 King. If in doubt concerning a specific item, please contact your local Amada America sales person for clarification.

Contents

Introduction	5
Motion Package Specifications	6
Punching System Specifications	7
31 Station - 3 Auto-Index Turret Configuration	8
B-Size Auto-Index	9
C Size Auto Index	10
CNC Controller	11
Hydraulic Systems Specifications	12
Power Hydraulic Numerical Control	12
Hydraulic Power Unit	12
Electrical Requirements	13
Optional Equipment	13
Installing the Electrical Power Supply	14
Pneumatic Requirements	15
Optional Equipment	15
Installing the Pneumatic Supply	15
Planning the Location of the Vipros 2510 King	16
Moving the Vipros 2510 King	16
Plan View – Vipros 2510 King	17
Plan View – Vipros 2510 King (shown with V255hs Conveyor)	18
Plan View – Vipros 2510 King (shown with V255hs Conveyor and MP1225 Loader)	19
End View – Vipros 2510 King	20
Elevation View – Vipros 2510 King	21
Chiller	22
Chiller Placement	23
Connections	24
Foundation Requirements	25
Machine to Foundation Anchoring Method	26
Foundation J-bolt Detail	26
Foundation Elevation View	27
Foundation Plan View	27
Machine to Floor Anchoring Method	28
Floor J-bolt Mounting Hole Detail (saw cut hole)	28
Floor J-bolt Mounting Hole Plan View (saw cut hole)	28

Alternative J-bolt Mounting Hole (Core Drill)	29
Alternative J-bolt Mounting Method Plan View (Core Drill)	29
Floor J-bolt Mounting Procedure.....	30
Alternative Anchoring Method (Drilled Hole with Anchor Rod and Adhesive)	32
Alternative Floor Bolt Mounting Method Plan View (Drilled Hole with Anchor Rod and Adhesive)	32
Drilled Hole with Anchor Rod and Adhesive Mounting Procedure	33
Removing the Protective Coating.....	35
Machine Leveling	36
Rocking Test.....	36
Floor Condition: Crowned	37
Floor Condition: Slope	38
Leveling Procedure	39

Introduction

This manual describes the tasks that the purchaser of a Vipros 2510 King must complete before calling the service organization to complete the installation and operator training.

An overview of the preparations is as follows:

- ☐ Plan the location of the Vipros 2510 King in the shop, taking into account all the maintenance areas indicated on the floor plan.
- ☐ Prepare the Vipros 2510 King foundation as required.
- ☐ Uncrate the Vipros 2510 King and SBC EX 3.0 chiller and place them on the floor, do not fill the anchor-bolt holes (if used) until after AESI completes the initial installation.
- ☐ Install the electrical supply.
- ☐ Install the pneumatic supply.
- ☐ Remove the protective coating from the surface of the Vipros 2510 King.
- ☐ If additional equipment such as the V255hs conveyor or MP1225 loader will be installed, repeat the previous steps for each piece of additional equipment.

Note: It is the purchaser's responsibility to install any safety devices to ensure the safety area.

Note: Considerable effort has been made to ensure that this manual is free of inaccuracies and omissions. However, as Amada America strives to continually improve our products, some data contained herein may not exactly reflect the latest revisions to the Vipros 2510 King. If in doubt concerning a specific item, please contact your local Amada America sales person for clarification.

Motion Package Specifications

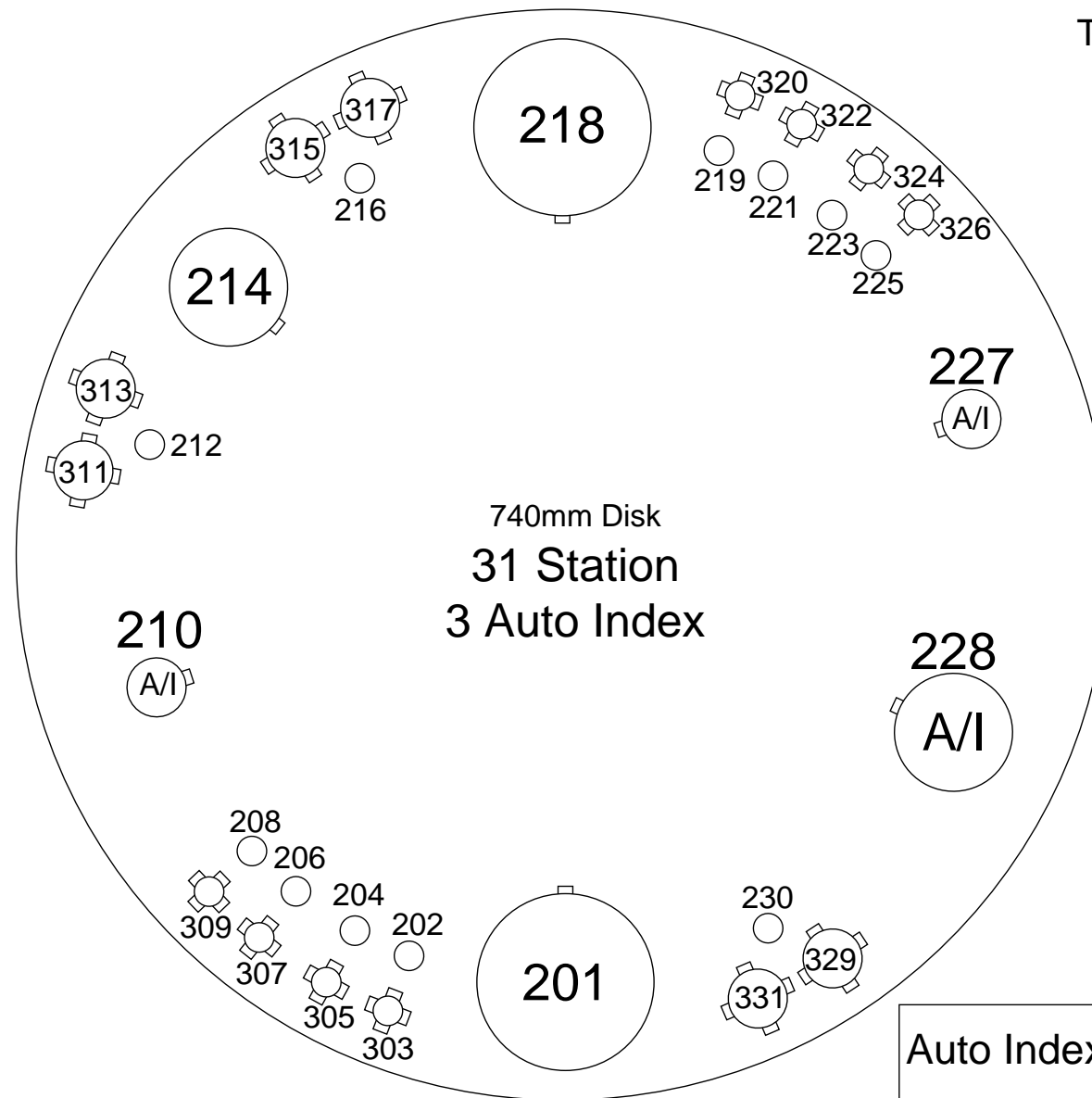
Travel Method	X and Y axes work piece movement
Control Method	X, Y, T & C
Drive Motors	Fanuc AC Servo (X, Y, T, C)
Maximum Sheet Size	50" (Y) by 196" (X) with 1 reposition
Maximum Sheet Thickness	10 gage (.135")
Maximum Material Weight	165 lb. (F4), 110 lb. (F1)
Maximum Axis Travel	98.425" (X) by 50.000." (Y)
Max. Linear Table Speed	5,039 ipm (combined) 3,937 ipm (X-axis) 3,149 ipm (Y-axis)
Punching Accuracy	±.004"
Positioning Accuracy	±.001"
Repeatability	±.001"

Punching System Specifications

Press Capacity	22 Tons		
Press Stroke	1.575"		
Stroke Rate (X/Y)	Pitch	Stroke	Stroke Rate
	0.079"	0.098"	1000 (X only)
	0.079"	0.118"	900/600
	1.000"	0.315"	350/280
Maximum Hole Diameter	3.5"		
Tool Type	Amada Thick Turret		
Turret Rotation Speed	35 RPM		
Turret Capacity	31 Stations (3 auto-index)		

31 Station - 3 Auto-Index Turret Configuration

Turret used in the following Models
Vipros 255, Vipros 2510 King



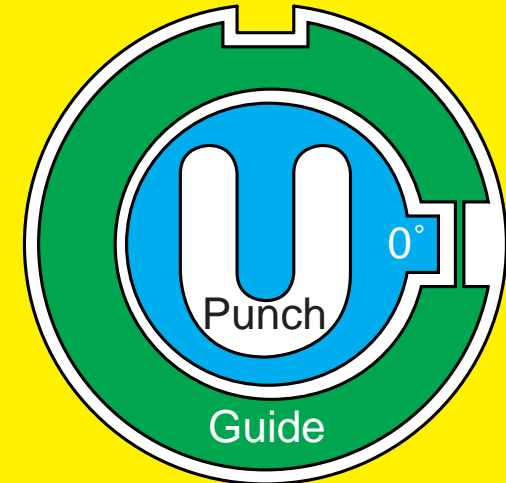
	Maximum Size Round	Number of Stations (keyed)
A	1½" (12.7mm)	19 (8)
B	1¼" (31.7mm)	6 (6)
C	2" (50.8mm)	1 (1)
D	3½" (88.9mm)	2 (2)
Auto Index	B 1¼" (31.7mm)	2 (2)
	C 2" (50.8mm)	1 (1)

B-Size Auto-Index

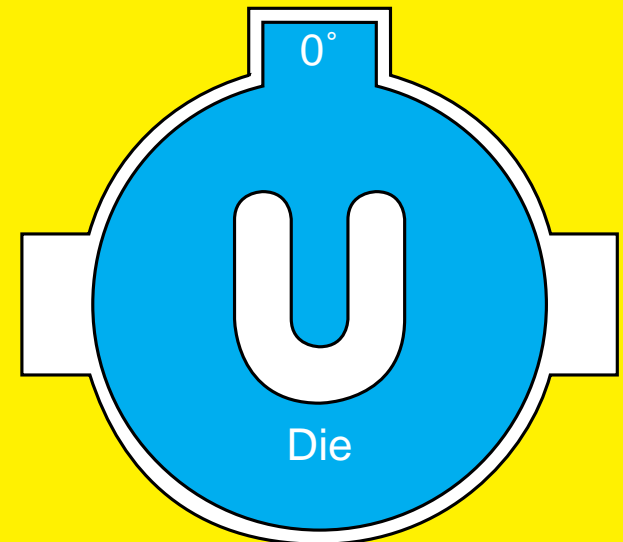
Care must be used when installing or ordering special shape punches and dies for use in the Vipros 2510 King B-Size Auto-Index station as the station is not keyed in the standard 0° position.

All existing punches and dies not keyed per this drawing must be loaded as the keying permits and compensated for in the G-code program.

New Punch Guides and Dies should be ordered keyed to orient the punch and die properly.



**B-Size Auto-Index
Upper Turret Punch Holder**



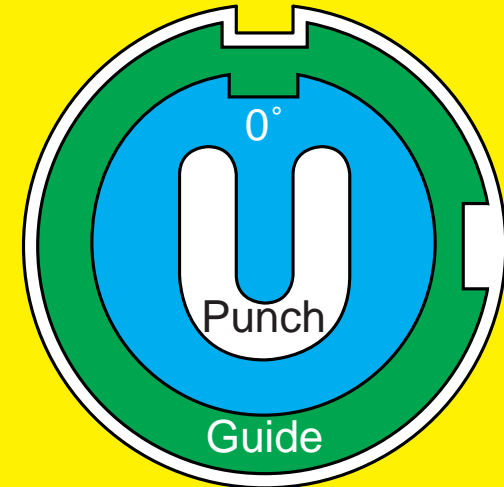
**B-Size Auto-Index
Die Holder Lower Turret**

C Size Auto Index

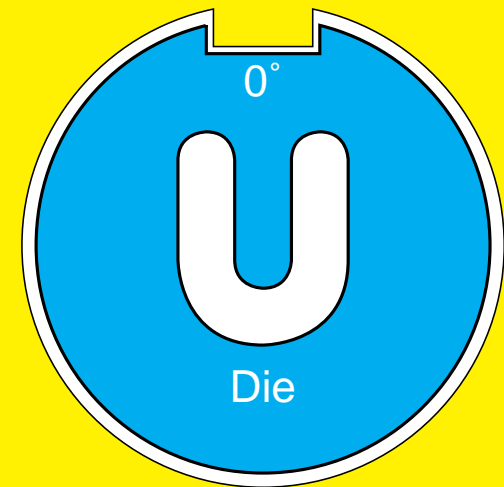
Care must be used when installing or ordering special shape punches and dies for use in the Vipros 2510 King C-Size Auto-Index station as the station is not keyed in the standard 0° position.

All existing punches and dies not keyed per this drawing must be loaded as the keying permits and compensated for in the G-code program.

New Punches, Guides and Dies should be ordered with keying to orient the punch and die properly.



Upper Turret
C-Size Auto-Index Punch Holder



Lower Turret
C-Size Auto-Index Die Holder

CNC Controller

Model	Fanuc 18 (with PHNC)
Control Function	X, Y, T & C
Input Method	MDI, Floppy Disk Drive, DNC
Minimum Command Unit	0.001" (X, Y) .01 ⁰ (C)
Minimum Travel Unit	0.001" (X, Y) .01 ⁰ (C)
Operating Modes	Automatic, MDI & Manual
Display Modes	Program Contents, Position Information, Program Check, Parameters, Tool Hit Counter, Self Diagnostics
Interlock Displays	Oil Temperature, Door Open

Hydraulic Systems Specifications

Power Hydraulic Numerical Control

Ram Cycle Patterns	377 total	
	Punching	2
	Nibbling	1
	Forming	250
	Marking	10
	Knockouts	10
	Slitting	4
Minimum Increment	0.01mm	

Hydraulic Power Unit

Model	Yuken
Dual Operating Pressure	100 kgf cm ² & 195 kgf cm ²
Oil Type	Mobil DTE [®] Excel 46 (formerly called Mobil Hydraulic Oil NZ 46)
Oil Capacity	40 Gallons

Electrical Requirements

Vipros 2510 King	230 / 460 / 3 / 60 $\pm 10\%$, 22 kVA 56 amps @ 230 / 3 / 60 VAC* 28 amps @ 460 / 3 / 60 VAC*
SBC EX 3.0 Chiller The Chiller voltage must be specified when machine is ordered	230 or 460 / 3 / 60 $\pm 10\%$, 15 kVA 38 amps @ 230 / 3 / 60 VAC* 19 amps @ 460 / 3 / 60 VAC*

Optional Equipment

V255hs Conveyor	208 / 230 / 460 3ph $\pm 10\%$, kVA 2.1 amps @ 208 / 3 / 60 VAC* 2.0 amps @ 230 / 3 / 60 VAC* 1.0 amps @ 460 / 3 / 60 VAC*
MP1225 Loader	200 / 3 / 60 $\pm 10\%$, 10 kVA 29 amps @ 200 / 3 / 60 VAC* To operate at 230 / 460 VAC a step up transformer with the following service is required 26 amps @ 230 / 3 / 60 VAC* 13 amps @ 460 / 3 / 60 VAC*

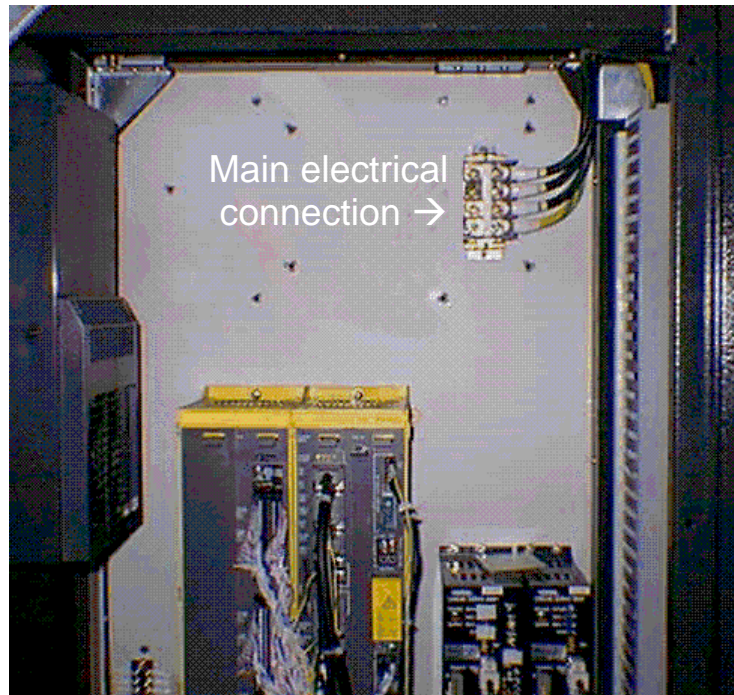
*This is actual maximum current draw of the machinery. The actual supplied electrical service must be sized to allow for starting current of approximately 150% of this value.

Installing the Electrical Power Supply

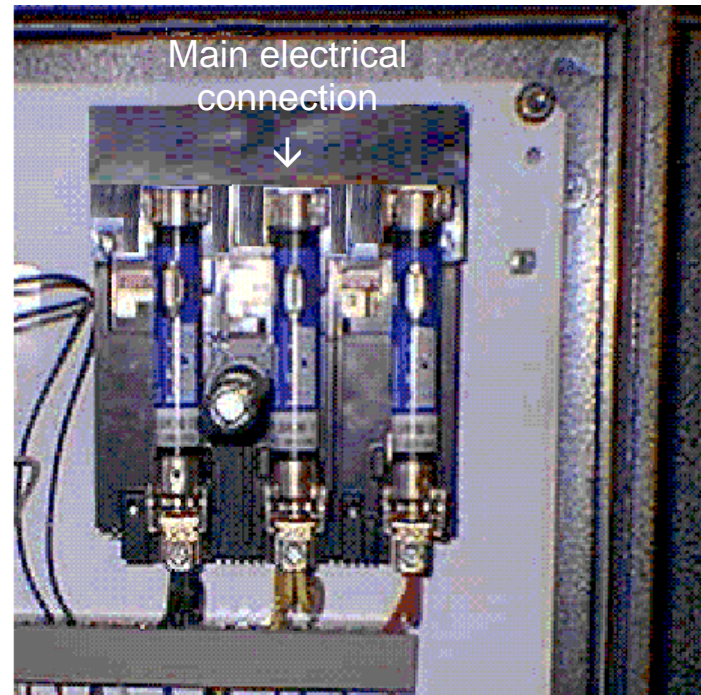
The Vipros 2510 King requires two separate power sources. The main power source must be supplied to the CNC Unit, the other supply source goes to the Chiller. The machine should be supplied from a power line separate from those for welding machines or other machines that produce electrical noise.

- ❑ The Vipros 2510 King electrical inlet is 72" above floor level.
- ❑ The SBC EX 3.0 Chiller electrical inlet is approximately 53" above floor level.
- ❑ For the location of required electrical supplies for optional equipment, please see the installation guides for the specific equipment.

Vipros electrical enclosure



Chiller electrical enclosure



Pneumatic Requirements

Vipros 2510 King	80 psi @ 8.8 ft ³ /min.
------------------	------------------------------------

Optional Equipment

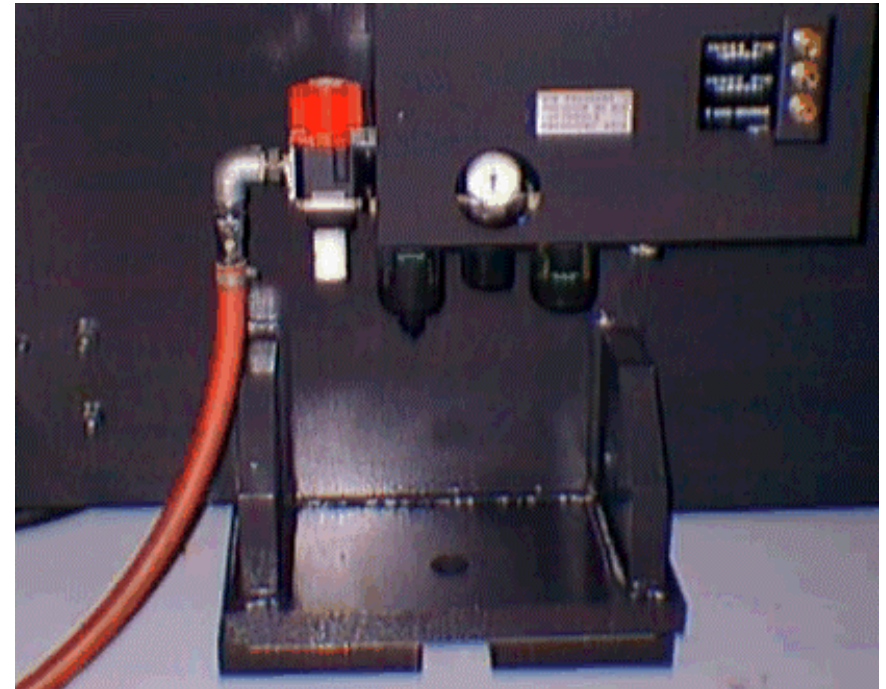
NJMP1225 Loader	75 psi @ 31.8 ft ³ /min.
-----------------	-------------------------------------

Installing the Pneumatic Supply

The Vipros 2510 King must be connected to a compressed air system by hose or pipe. The compressed air must be clean and dry.

Please note the following:

- ☐ The minimum inner pipe diameter is ½".
- ☐ The air pressure required is 80 psi.
- ☐ The air volume required is 8.8³ ft/min.
- ☐ The air inlet is approximately 18" above the floor level.
- ☐ For the location of required air supplies for optional equipment, please see the installation guides for the specific equipment.



Planning the Location of the Vipros 2510 King

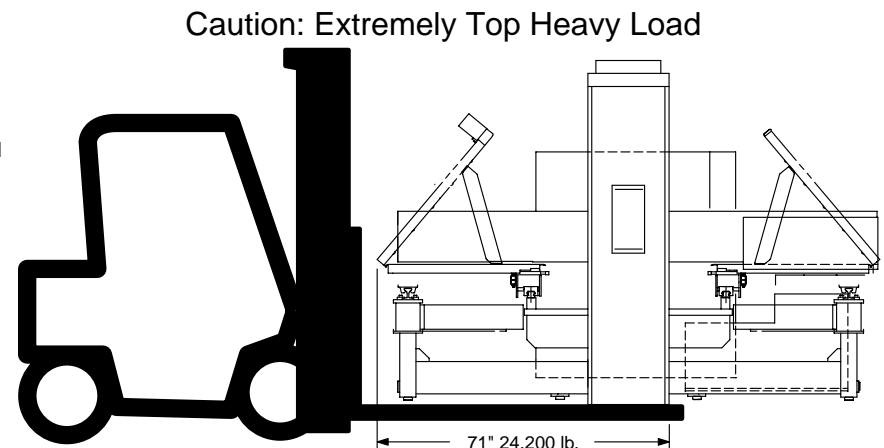
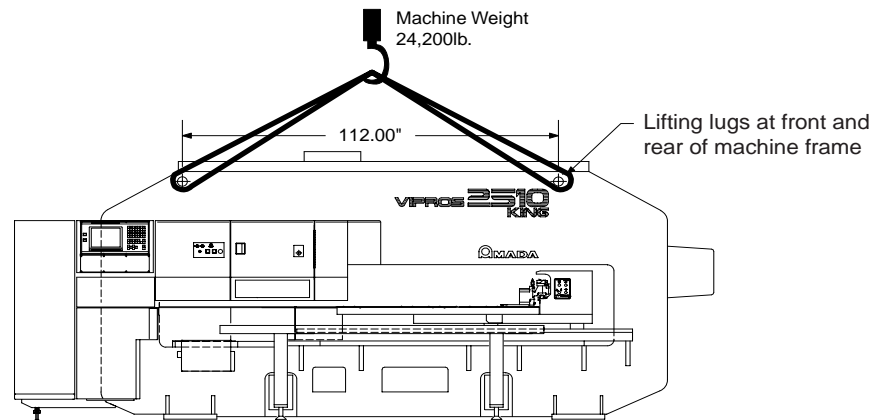
The following diagrams provide the details for positioning your new Vipros 2510 King.

- ☐ No obstacles are allowed in the worksheet travel area and the ceiling must be at least 40" above the top of the Vipros 2510 King.
- ☐ All of the recommended Safety / Maintenance areas should be used, but at a minimum, the doors of Fanuc 18P Control unit must be able to be opened. Any reduction of the listed Safety / Maintenance areas may decrease personnel safety and increase time and expense of installation and maintenance.
- ☐ The Vipros 2510 King and Fanuc 18P Control must be protected from direct sunlight or other heat sources. Exposure to direct heating sources such as infrared heaters have been shown to affect punch and die alignment.
- ☐ The positioning of the SBC EX 3.0 Chiller is very flexible. Please see *Chiller* page 22 of this document.


Moving the Vipros 2510 King

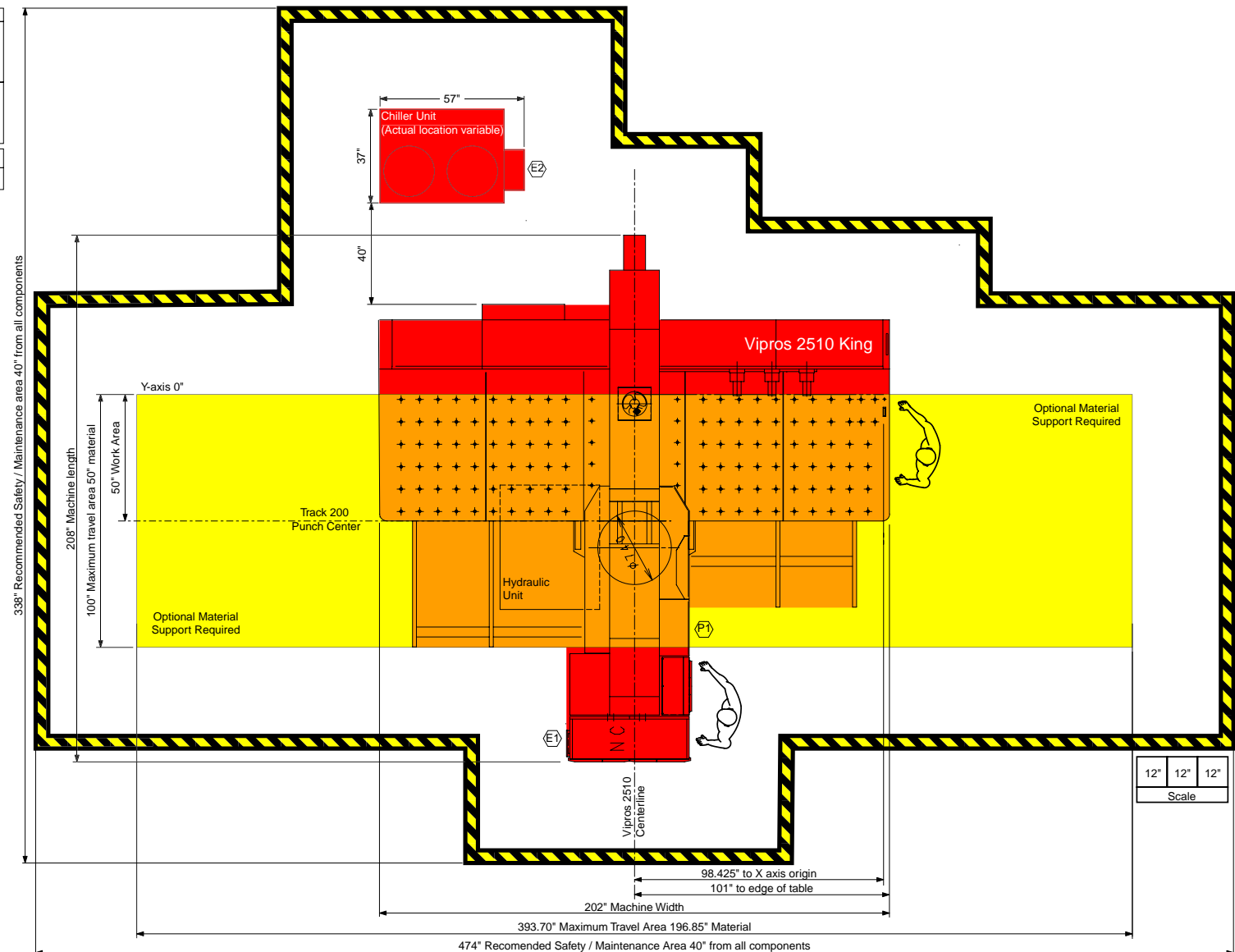
Lifting or moving of the Vipros 2510 King should be done only by professional rigging companies well versed in the moving of large and heavy industrial machinery. Acceptable moving methods include, lifting by overhead crane as shown, wheeled dollies beneath the machine feet, or adequately sized forklift forks beneath the machine frame.

The Vipros 2510 King has a relatively high center of gravity and narrow footprint care must be taken to prevent inadvertent tipping of the machine while in motion.



Plan View – Vipros 2510 King

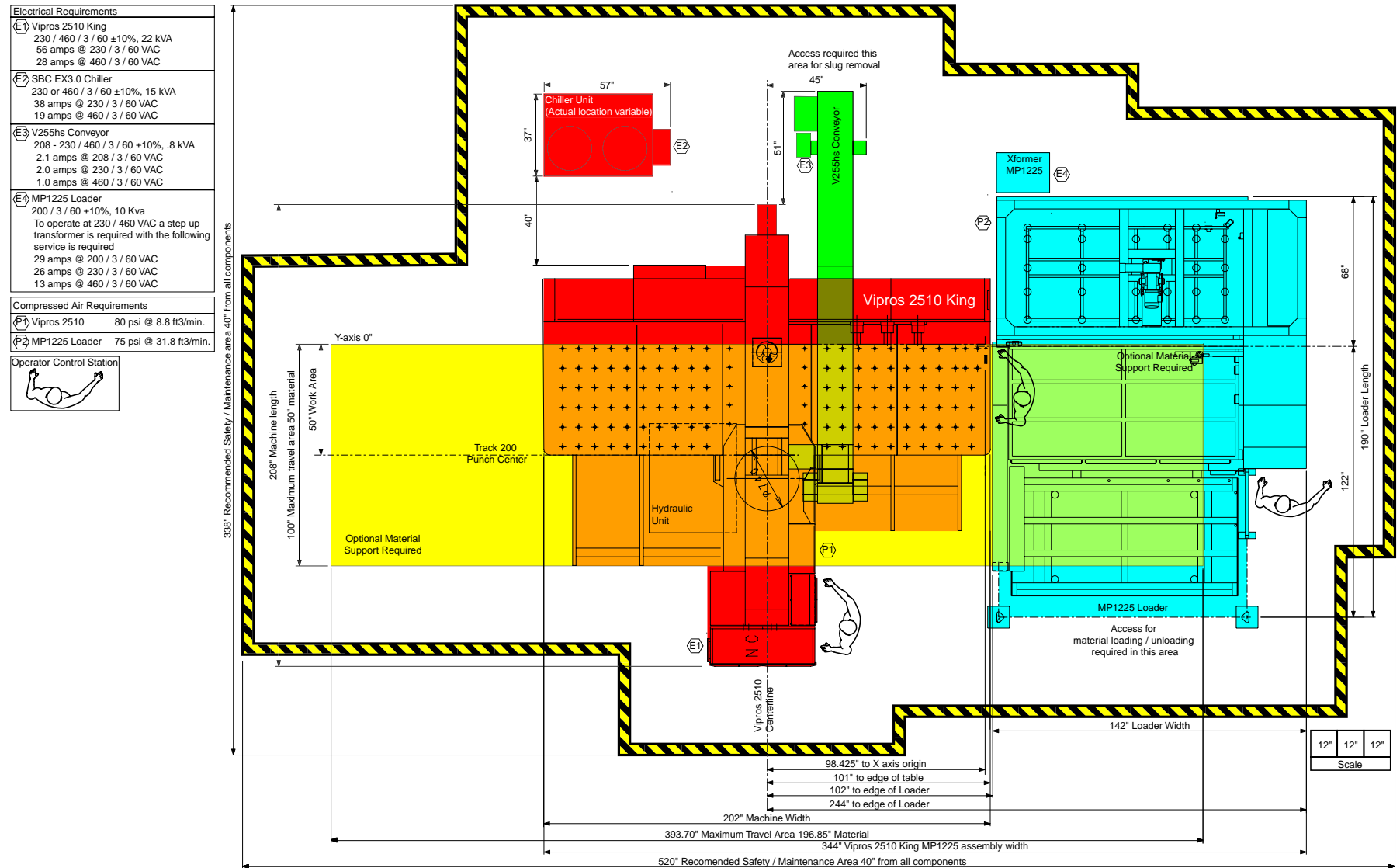
Electrical Requirements	
E1 Vipros 2510 King	230 / 460 / 3 / 60 ±10%, 22 kVA 56 amps @ 230 / 3 / 60 VAC 28 amps @ 460 / 3 / 60 VAC
E2 SBC EX3.0 Chiller	230 or 460 / 3 / 60 ±10%, 15 kVA 38 amps @ 230 / 3 / 60 VAC 19 amps @ 460 / 3 / 60 VAC
Compressed Air Requirements	
P1 Vipros 2510	80 psi @ 8.8 ft ³ /min.
Operator Control Station	
	



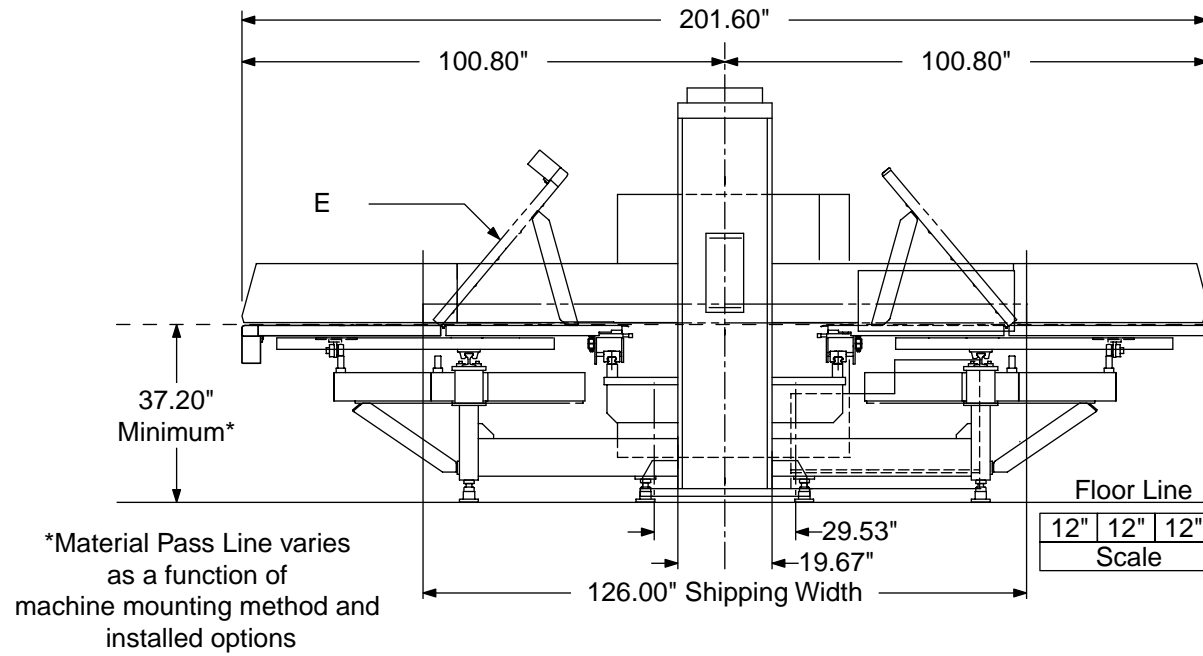
Plan View – Vipros 2510 King (shown with V255hs Conveyor)



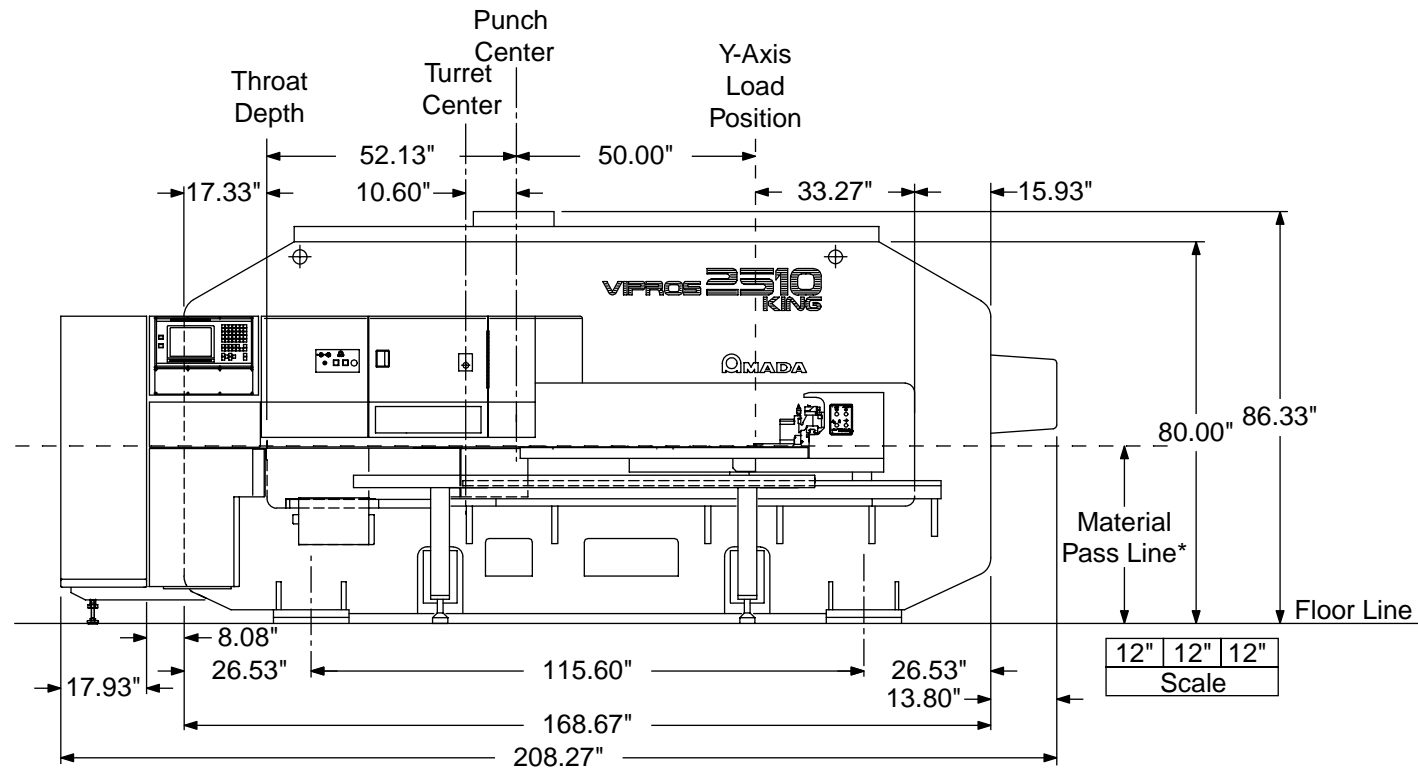
Plan View – Vipros 2510 King (shown with V255hs Conveyor and MP1225 Loader)



End View – Vipros 2510 King



Elevation View – Vipros 2510 King



*Material Pass Line varies between 37.20" and 40.95" as a function of machine mounting method and installed options

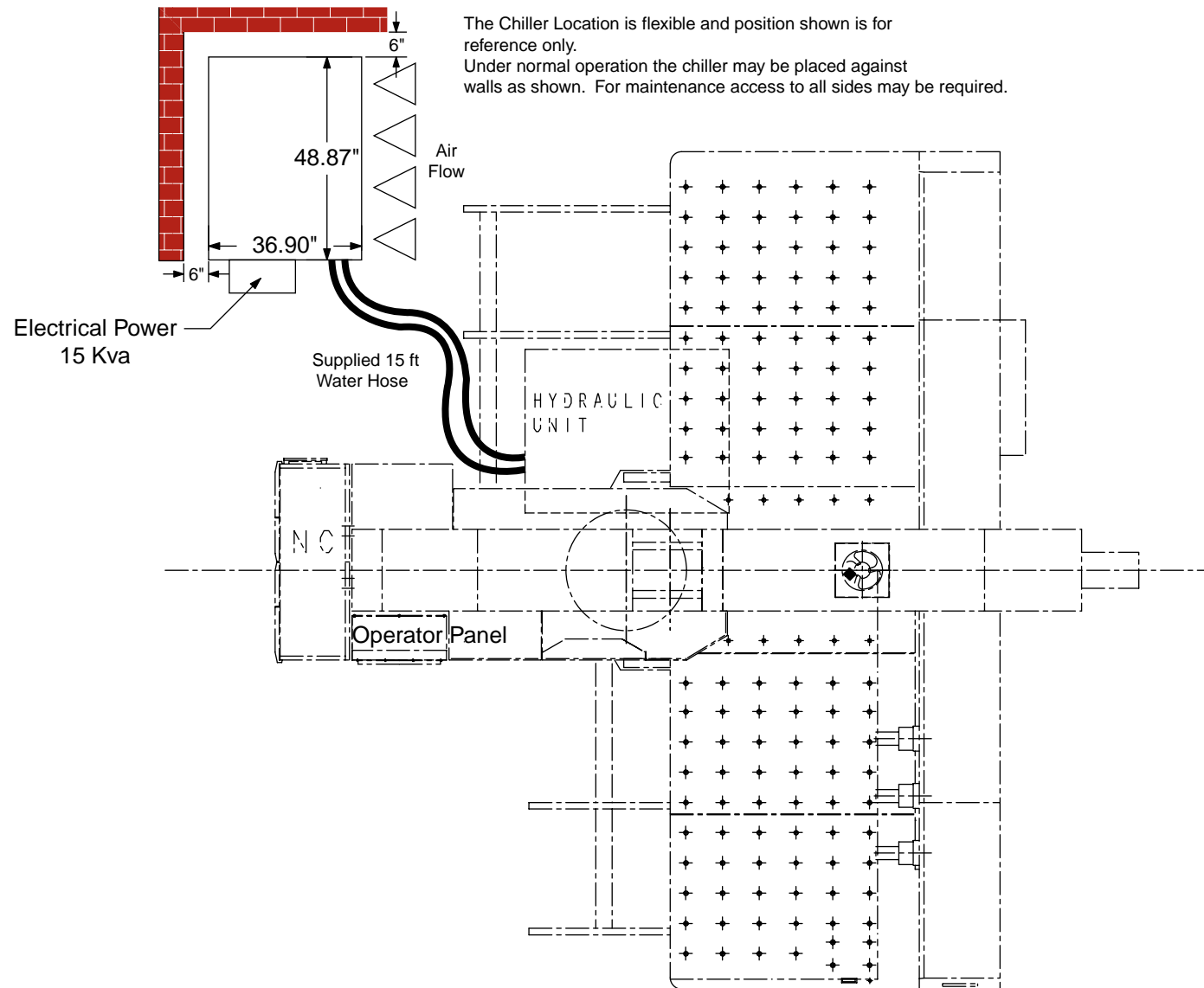
Chiller

Model	SBC EX 3.0
Cooling Capacity	36,000 BTU/hour @ 65° ambient air temperature
Water Volume	10-15 GPM @ 35 psi.
Reservoir Capacity	30 Gallons distilled water
Pump HP	1 hp single phase

The SBC EX 3.0 Chiller Unit is very important to the reliable operation of the Vipros 2510 King.

- ☐ The SBC EX 3.0 Chiller must be placed so that an adequate flow of air is maintained.
- ☐ The position of the SBC EX 3.0 Chiller is flexible. The Vipros 2510 King is supplied with two (2) fifteen-foot lengths of hose to connect the SBC EX 3.0 Chiller to the Hydraulic Unit. The customer may supply a longer length of hose if required.
- ☐ Under normal operating conditions the SBC EX 3.0 Chiller may be placed against walls as shown. However, for maintenance purposes access to all sides of the SBC EX 3.0 Chiller may be required.
- ☐ The SBC EX 3.0 Chiller must have a minimum 60" of clearance above the SBC EX 3.0 Chiller for proper airflow.

Chiller Placement

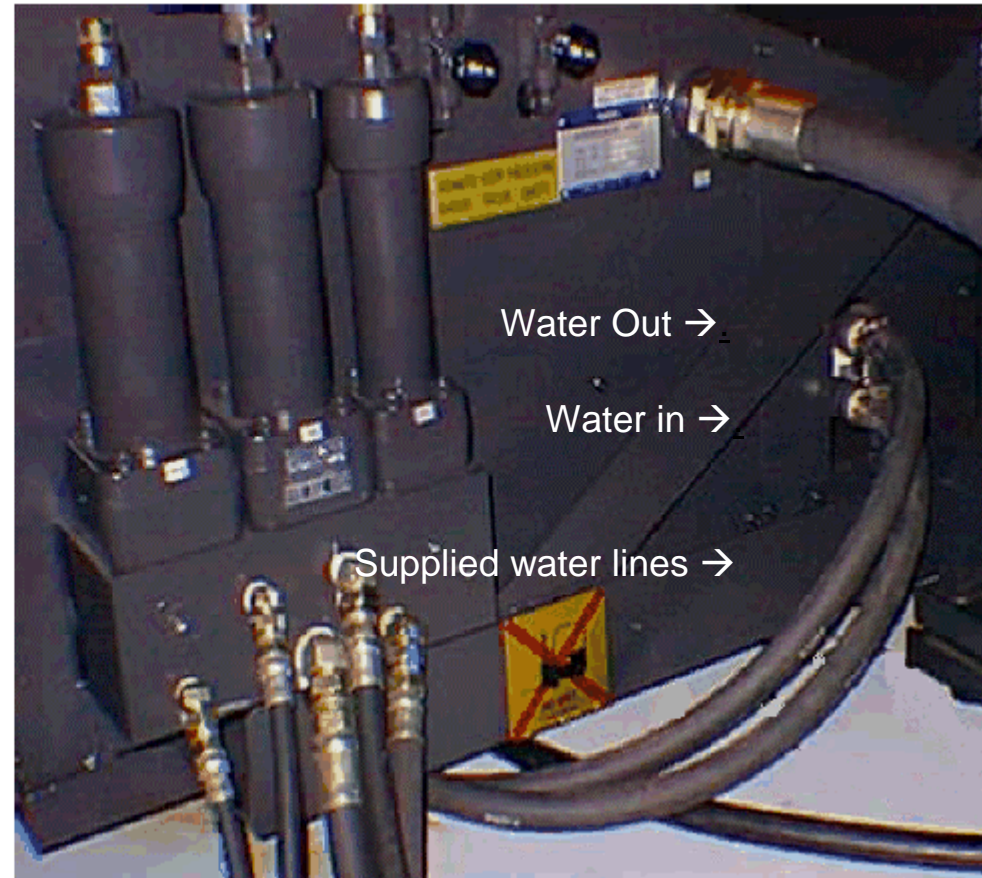


Connections

Chiller



Hydraulic Unit



Foundation Requirements

The Vipros 2510 King does not require a special foundation to perform as expected, however there are minimum requirements that an existing floor must meet in order to assure machine reliability and tool life. If the existing floor does not meet the following minimum requirements, plans for a recommended foundation are given in the section *Foundation Anchoring Procedure*

The minimum acceptable floor conditions to assure a successful installation are:

- ☐ The area of the floor where the Vipros 2510 King frame is to be located must be a single, homogeneous slab in good condition. There must be no cracks or other signs of deterioration of the floor.
- ☐ The floor must be 4" to 6" thick.
- ☐ The floor must be capable of supporting 3.5 tons/ft².
- ☐ The floor must be level to 0.032"/ft.

If the existing floor meets the minimum requirement list above, it must still be inspected carefully when the anchor-bolt holes are cut. Voids under the floor, or wetness (not associated with the hole cutting procedure) should be considered signs of an inadequate floor and a new machine location or new foundation must be considered.

It is the customer's responsibility to determine that the floor meets these minimum requirements. Placing the machine on an inadequate, cracked floor, or straddling seams in a floor may be grounds for voiding the machine warranty!

Amada America Inc. does not recommend the use of vibration isolating mounts under the machine feet, as these devices have been shown to increase the vibration within the machine frame, increasing the likelihood of vibration related problems. Solid leveling devices are acceptable provided they incorporate a means of anchoring the machine to the floor with the supplied J-bolts or alternative anchoring method.

Special Note: This document details several methods of anchoring the Vipros 2510 King to a new foundation or an existing floor. These methods are designed to install the Vipros 2510 King as a stand-alone machine using the supplied anchor bolts and base plates. Installation or use of additional options such as leveling pads or material handling systems may dictate other methods of anchoring or foundation design not shown in this document. Before committing to a specific method of anchoring the Vipros 2510 King, confirm that the chosen method is compatible with all purchased optional items and planned expansion.

Machine to Foundation Anchoring Method

An ideal foundation is given on the following pages. This foundation must be used if the existing floor cannot meet the minimum requirements to support the machine.

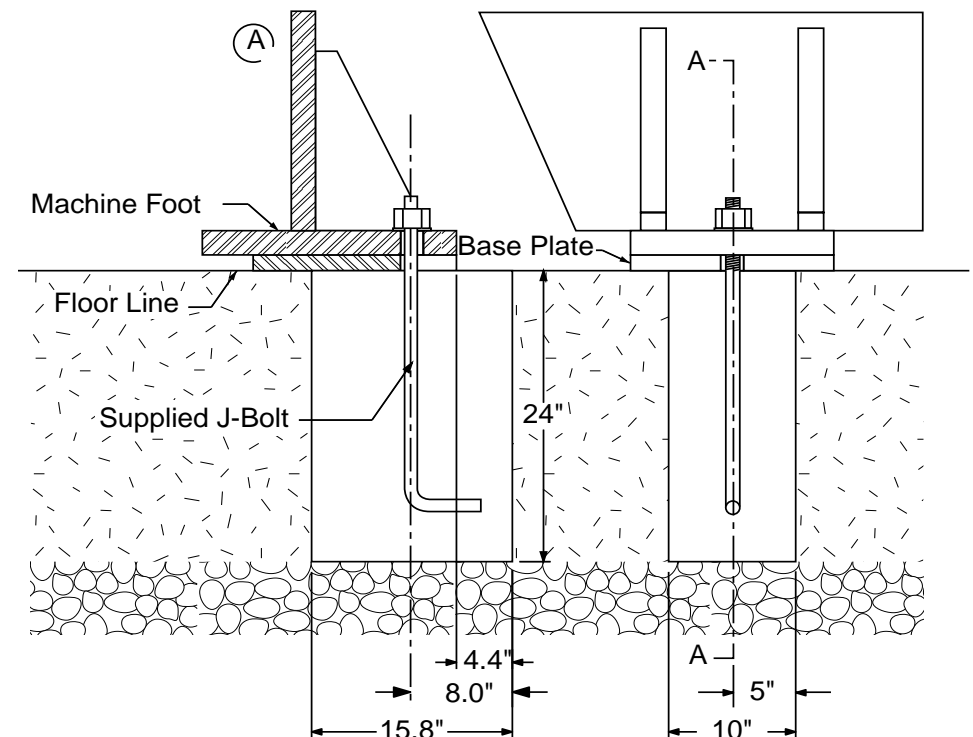
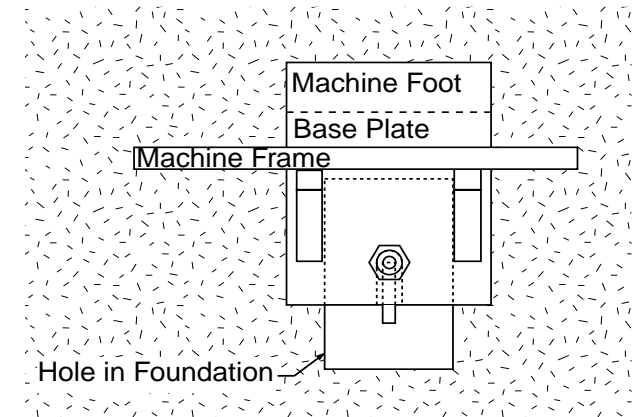
The foundation must consist of a single, homogeneous slab. The foundation must be level to within 0.032" / ft. Anchoring the Vipros 2510 King to the floor using the anchor-bolts supplied is essential to ensure reliable performance. Amada generally recommends that the foundation have a minimum load bearing capacity of 3.5 ton/ft². It is the purchaser's responsibility to determine that the foundation meets these requirements.

Please note the following:

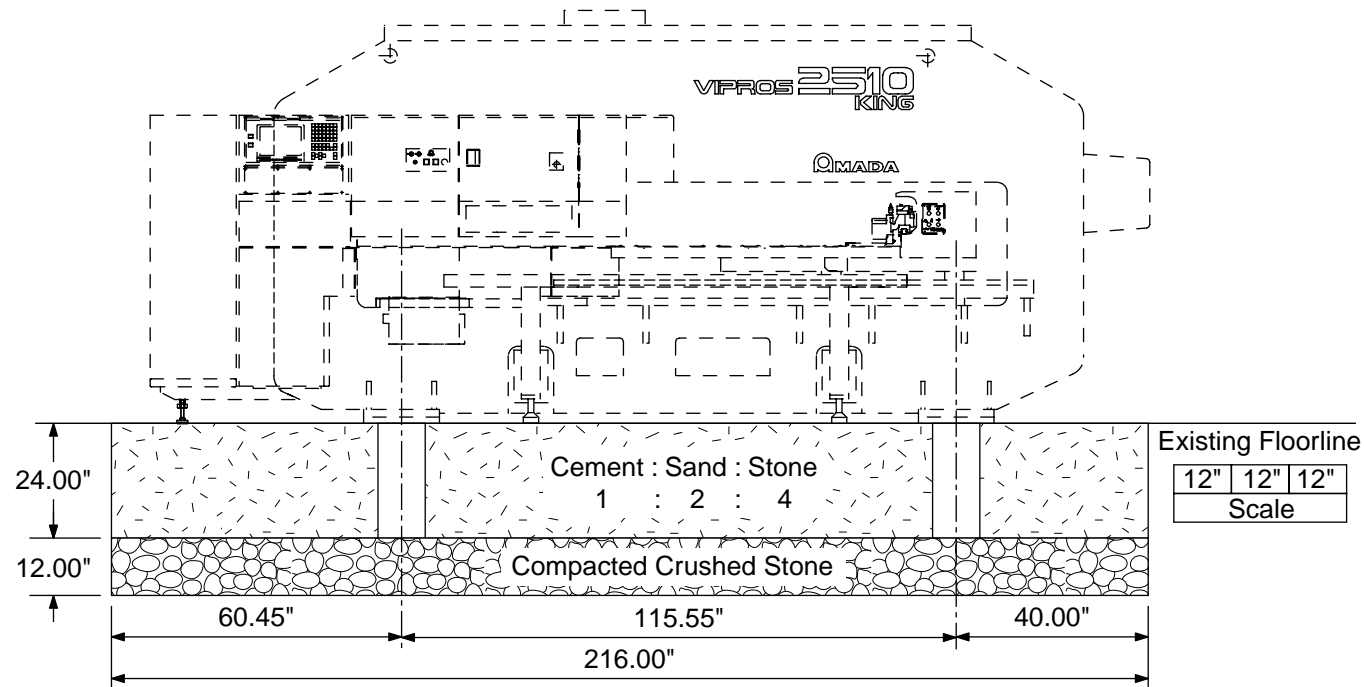
- ☐ The base plates, shims, anchor bolts, nuts, and washers are shipped with the Vipros 2510 King.
- ☐ The concrete J-bolt pads should be filled after the machine is placed on the foundation.
- ☐ See special note page 25

Foundation J-bolt Detail

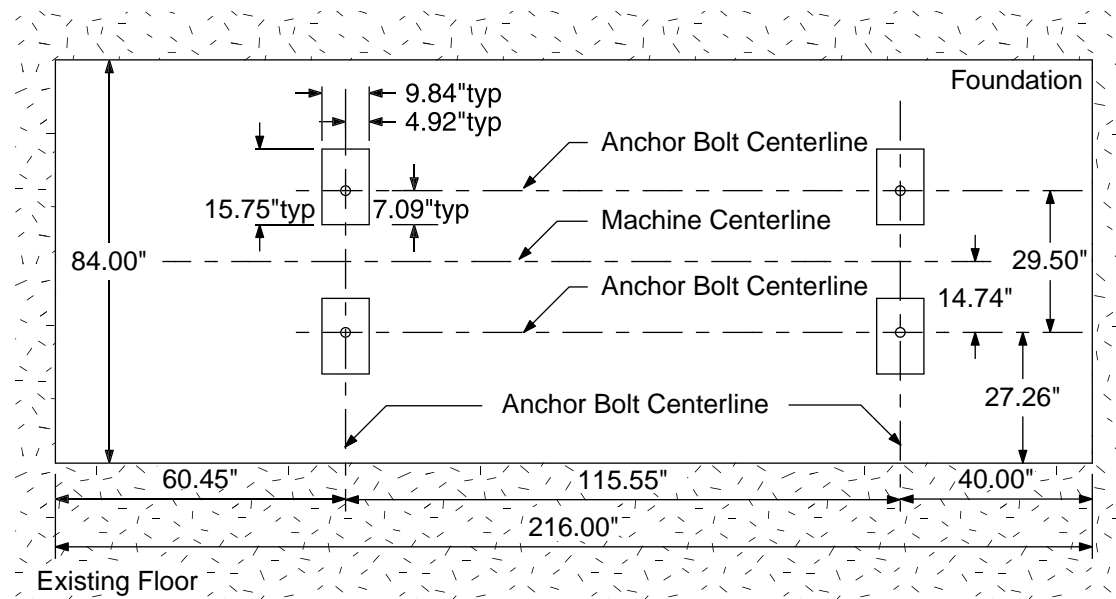
See *Floor J-bolt Mounting Procedure* for proper method of mounting machine on foundation.



Foundation Elevation View



Foundation Plan View



Machine to Floor Anchoring Method

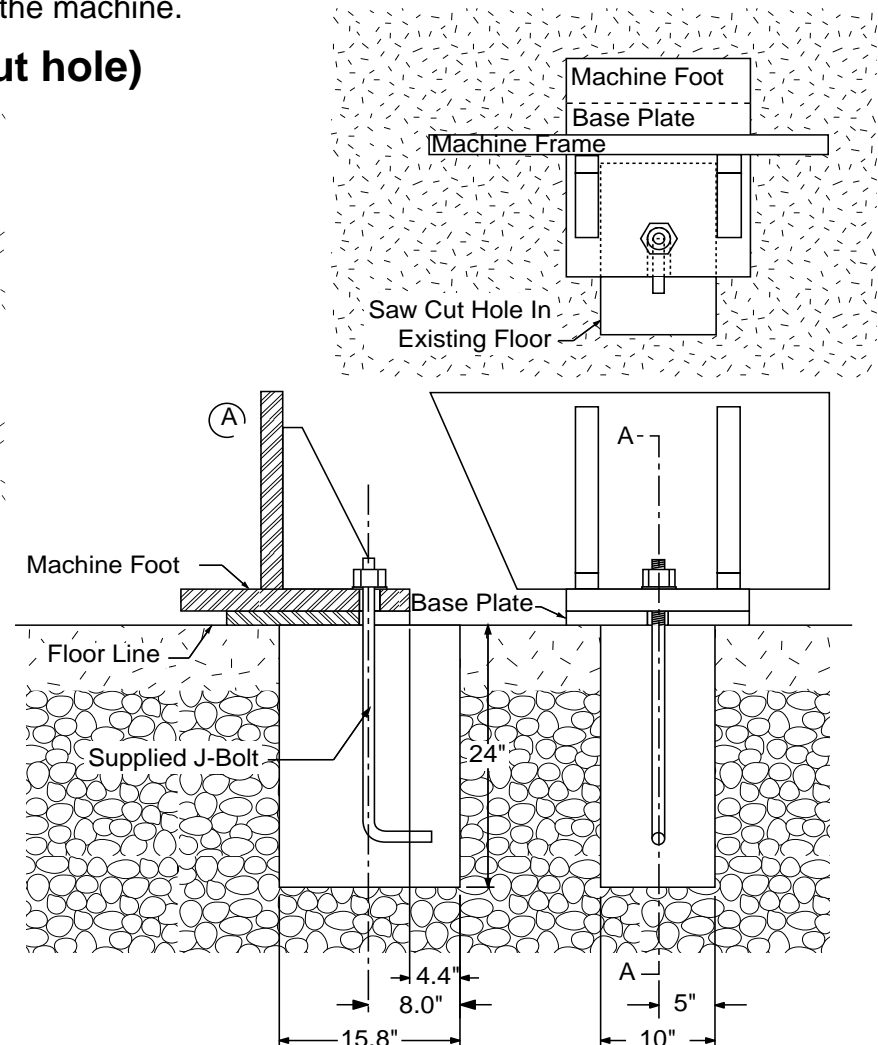
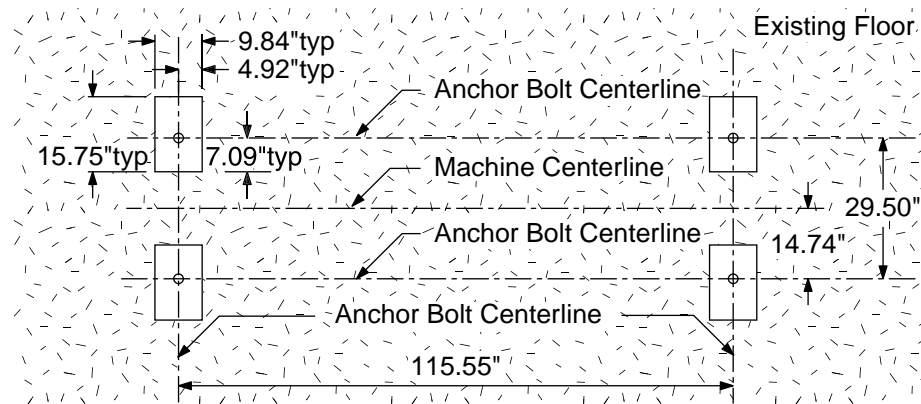
To maintain machine reliability, extend tool life, and remain level over an extended period the Vipros 2510 King must be anchored in place on an adequate floor or foundation.

At a minimum the floor must consist of a single, homogeneous slab, level to within 0.032"/ft², and capable of supporting 3.5 tons/ft². It is the purchaser's responsibility to determine that the floor meets these minimum requirements.

Floor J-bolt Mounting Hole Detail (saw cut hole)

This machine mounting method should be used only if the floor is of such quality that it will support the weight of the machine with the anchor J-bolts used only for maintaining the location of the machine.

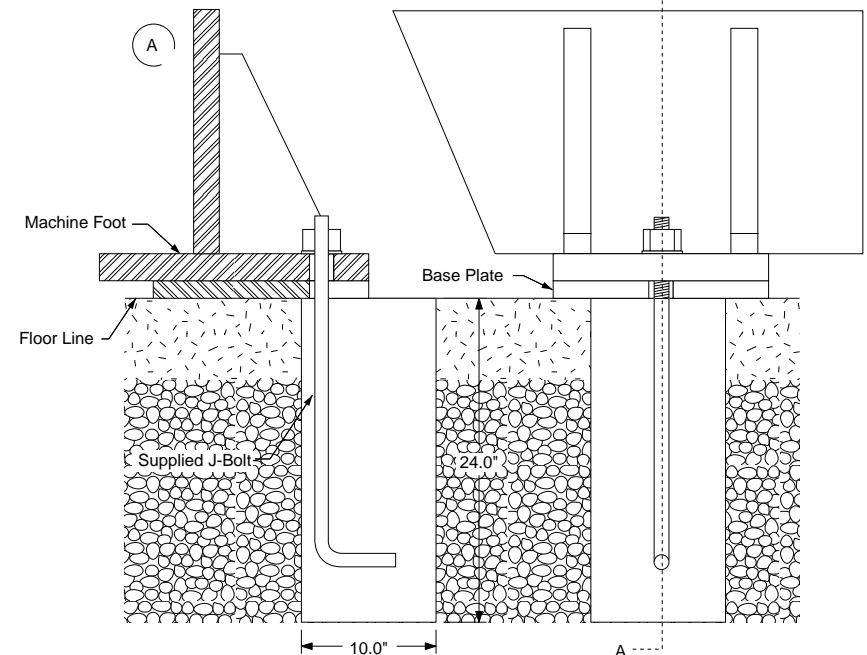
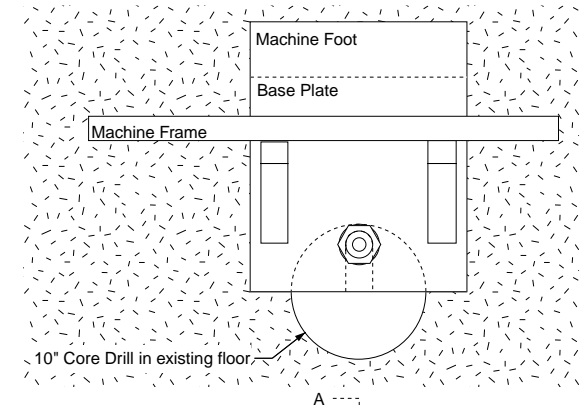
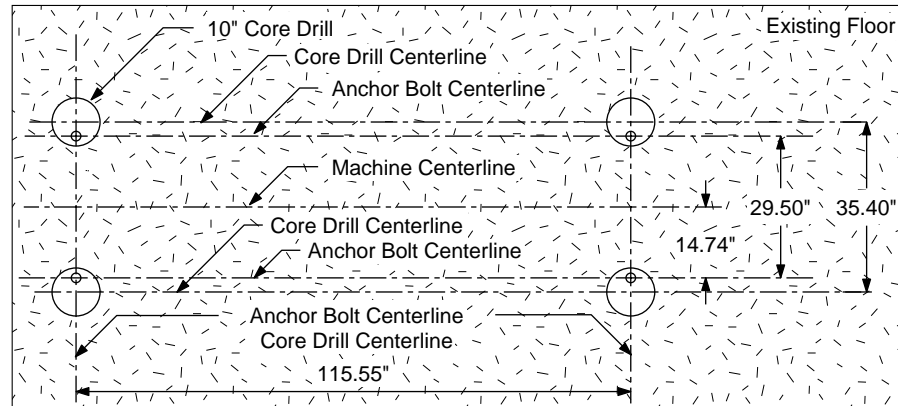
Floor J-bolt Mounting Hole Plan View (saw cut hole)



Alternative J-bolt Mounting Hole (Core Drill)

This machine mounting method should only be used if the floor is of such quality that it will support the weight of the machine with the anchor J-bolts used only for maintaining the location of the machine.

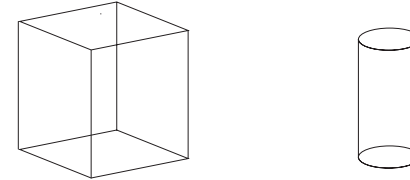
Alternative J-bolt Mounting Method Plan View (Core Drill)



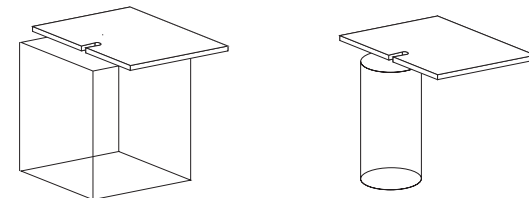
Floor J-bolt Mounting Procedure

- Step 1. Saw cut or Core drill a hole in the existing floor and remove the underlying dirt to the required 24" depth.

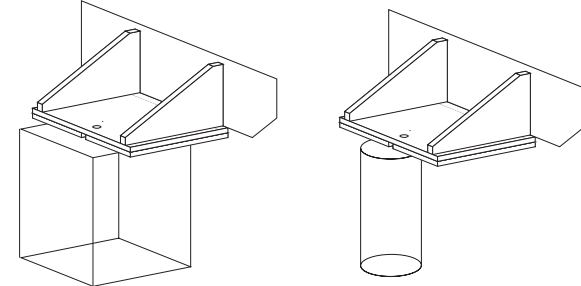
See *Floor J-bolt Mounting Hole Plan View (saw cut hole)* or *Alternative J-bolt Mounting Method Plan View (Core Drill)* for correct layout dimensions of the four anchor holes required.



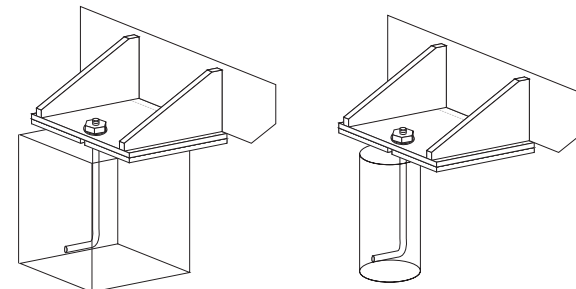
- Step 2. Set base plate over the hole.



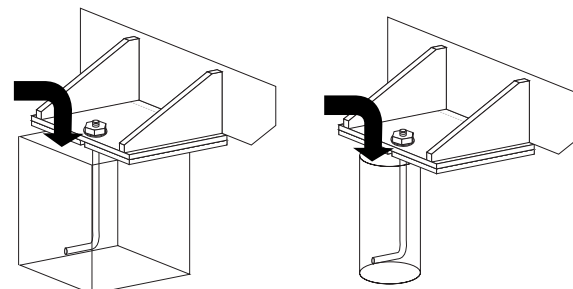
- Step 3. Set the machine on the base plate.



- Step 4. Set the J-bolt through the hole in machine foot, attach washer and nut to hold J-bolt in place.

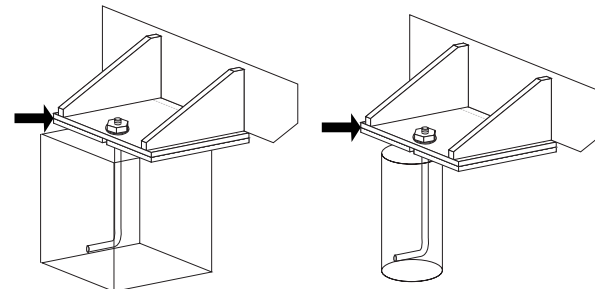


- Step 5 Pour the Concrete.
Ensure that the J-bolt remains correctly aligned to the machine frame during the pouring and hardening time of the concrete.
Ensure that the concrete level is equal to the floor level



- Step 6. To complete the mounting procedure, level the machine frame by inserting leveling shims between the machine foot and base plate.

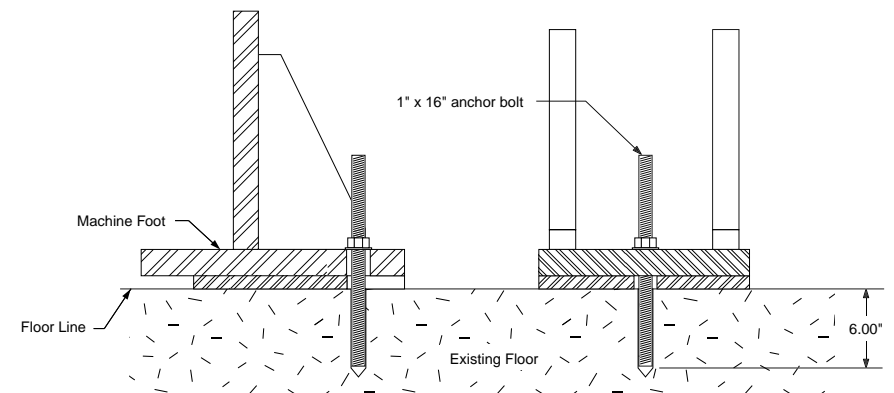
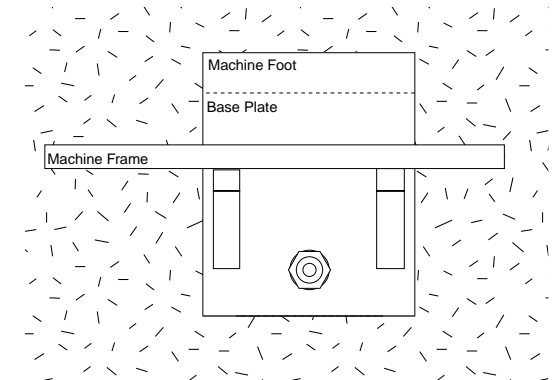
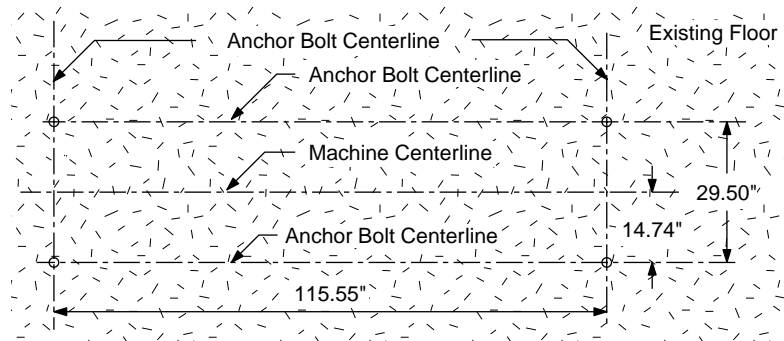
See *Leveling the Machine* section for correct procedure.



Alternative Anchoring Method (Drilled Hole with Anchor Rod and Adhesive)

This machine mounting method should only be used if the floor is of such quality that it will support the weight of the machine with the Anchor Rod used only for maintaining the location of the machine.

Alternative Anchoring Method Plan View (Drilled Hole with Anchor Rod and Adhesive)

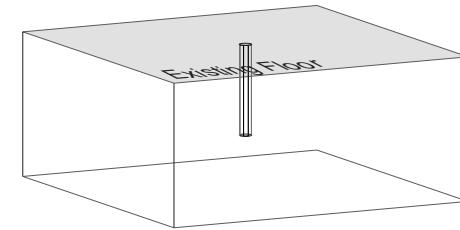


Drilled Hole with Anchor Rod and Adhesive Mounting Procedure

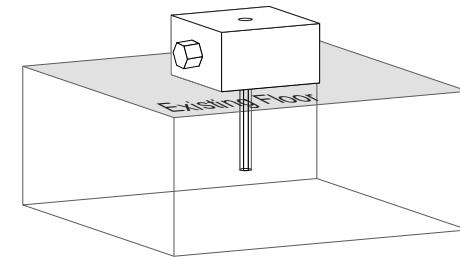
Step 1. Drill the four Anchor Rod holes in the existing floor.

The holes should be drilled approximately 6" deep.

See *Alternative Floor Bolt Mounting Method Plan View (Drilled Hole with Adhesive Anchor Rod)* for correct layout dimensions.



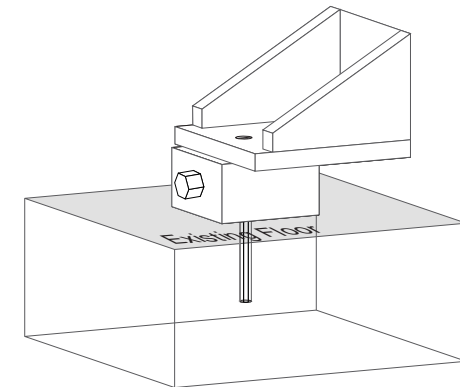
Step 2. Set the Amada Machine Leveling Plates over the drilled holes



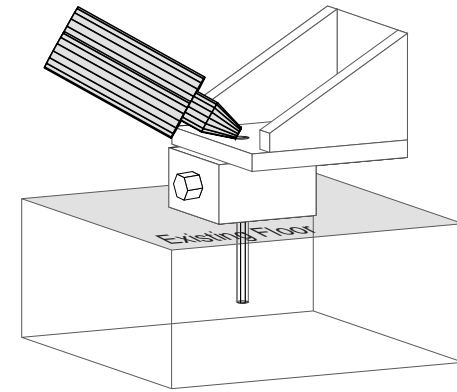
Step 3 Set the machine on the machine leveling plates.

Step 4. Level the machine frame by adjusting the Amada machine leveling plates.

See *Leveling the Machine* section for correct procedure.

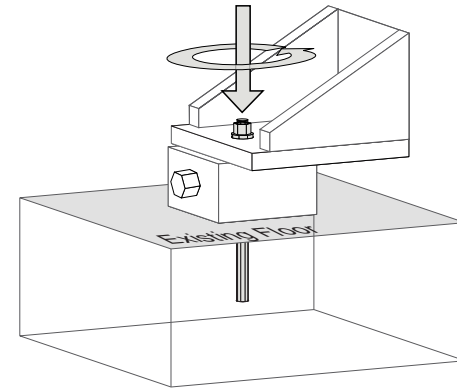


Step 5 Fill each the Anchor Rod holes to within 2 inches of the floor surface with the Adhesive compound. Do not overfill.



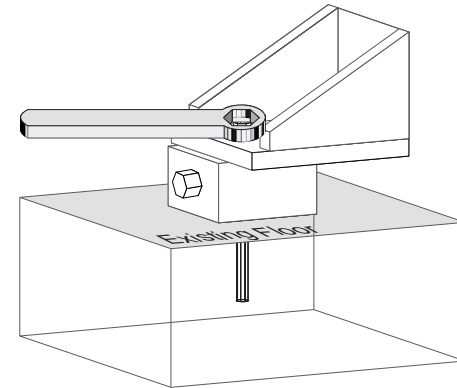
Step 6 Attach the hex nut and flat washer on the Anchor Rod and place the Anchor Rod into the drilled hole.

Using a twisting motion to move the Anchor Rod through the epoxy compound, seat the flat washer and hex nut against the top of the machine foot.



Step 7 Allow the Adhesive to harden for 24 hours.

Step 8. Tighten the 4 hex nuts.

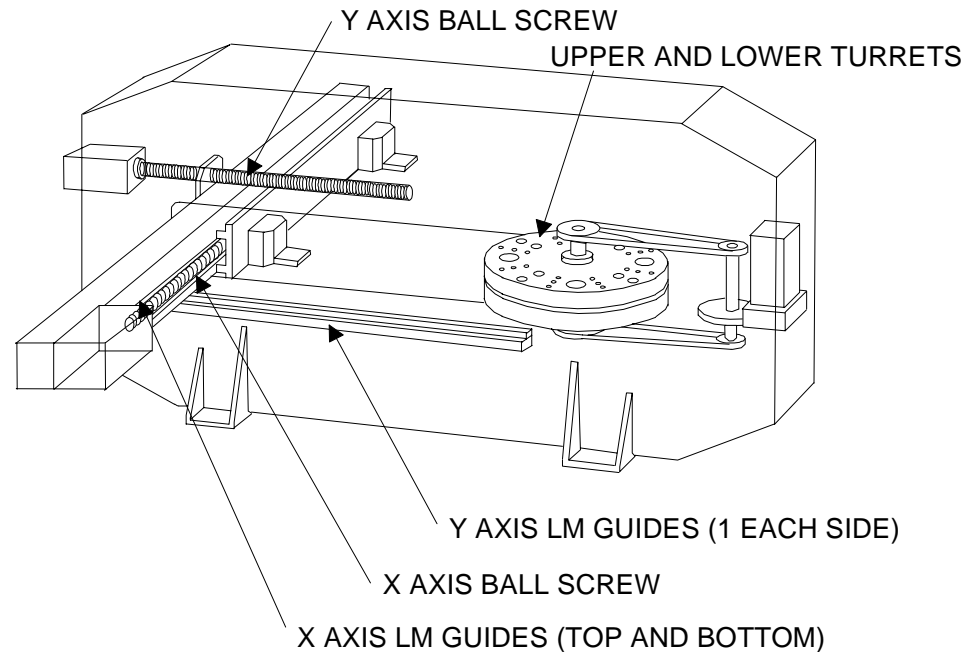


Removing the Protective Coating

The Vipros 2510 King must be thoroughly cleaned of protective coating. The sheet metal guards can be removed from around the turret to allow cleaning of the upper and lower turrets, tool bores and die holders.

Please note the following:

- ☐ Remove the wrapping paper from the X and Y-axes ball screws, then remove the protective coating.
- ☐ Remove the wrapping paper from the X and Y LM guides then remove the protective coating, make sure that you remove the paper from both sides of the carriage.
- ☐ Clean die holders one at a time. Remove a die holder, clean and replace it before removing the next die holder. If the die holders are mixed up, serious turret alignment problems may occur.
- ☐ A suitable solvent should be used to remove the protective coating.



Machine Leveling

Proper Machine leveling is critical to the Vipros 2510 King performing as designed.

Materials and tools required:

Supplied with the machine:

Assorted thickness machine leveling shim stock

Anchor bolts

Supplied by AESI service:

Spirit level capable of reading 0.0005"/ft

One-(1) 12 ton hydraulic bottle jack

Not supplied:

Additional shim stock of 0.005" thickness may be required to achieve a properly leveled machine.

Rocking Test

After the machine frame has been leveled the use of the following G-code is necessary to determine that the machine frame is properly leveled and balanced.

Should the machine frame vibrate or move excessively during the rocking test the machine frame must be re-leveled using the procedure in this manual.

Should the proper leveling technique not eliminate the excessive frame motion, consideration must be given to relocation of the machine or replacement of the existing floor with an adequate foundation.

Repeat the following test program with a X-axis motion values of -.25" -.5", -1." -4.".

G92X98.425Y50.000

G06A.050B0

M500

N1G91X-.25TTT (Use any valid tool number)

X.25

M97P1

G50

Floor Condition: Crowned

The flatness of the floor plays an important step in the leveling procedure of the machine. To properly level the machine the weight bearing points must be as far from the centerline of the machine frame as possible.

Should a condition known as crowned exist the weight bearing points of the machine may not be far enough from the machine centerline to ensure a stable machine.

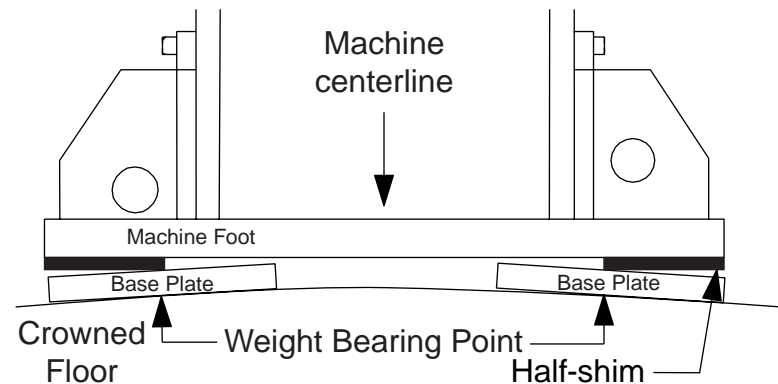
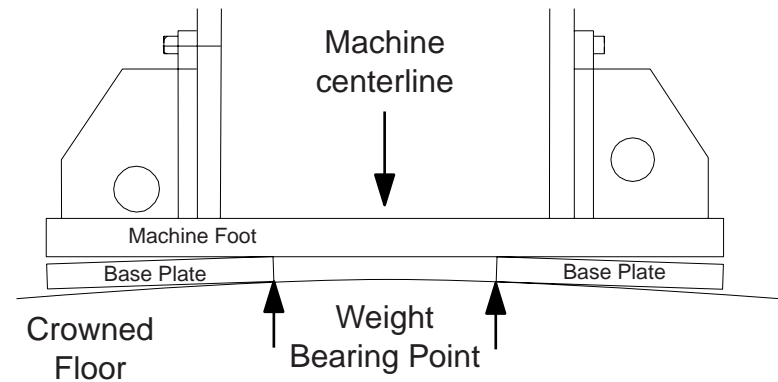
Under these conditions, a procedure known as *Half-Shimming* should be used.

To move the weight bearing points further from the machine centerline the use of half-shims of .125" thick on top of the base plate as shown is recommended.

After the half-shims are installed and the machine frame is leveled, use the rocking test to determine that the machine frame is stable enough to allow production without damaging the machine.

Under extreme conditions the use of half-shims may not move the machine weight bearing points far enough from the machine centerline to ensure the machine frame is stable.

Under these conditions, a more suitable location must be found for the machine, or a new foundation for the machine will be necessary.



Floor Condition: Slope

The slope of the floor plays an important step in the leveling procedure of the machine. To properly level the machine the weight bearing points must be as far from the centerline of the machine frame as possible.

Should the floor slope excessively the weight bearing points of the machine may not be far enough from the machine centerline to ensure a stable machine.

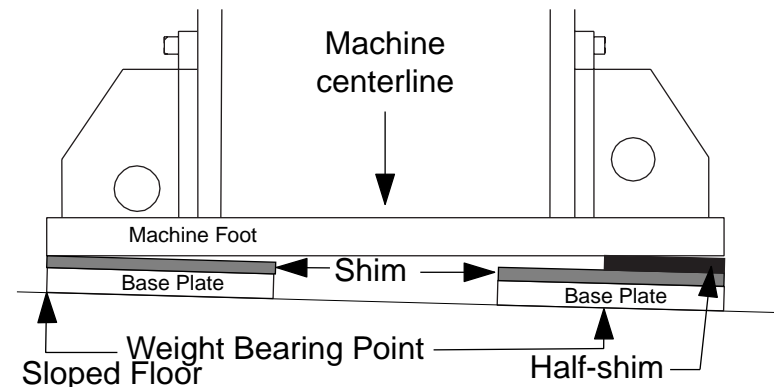
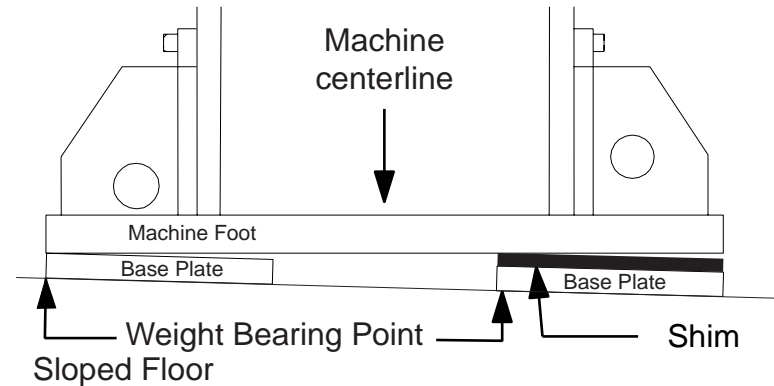
Under these conditions, a procedure known as *Half-Shimming* should be used.

To move the weight bearing points further from the machine centerline the use of half-shims of .125" thick on top of the base plate and leveling shims as shown is recommended.

After the half-shims are installed and the machine frame is leveled, use the rocking test to determine that the machine frame is stable enough to allow production without damaging the machine.

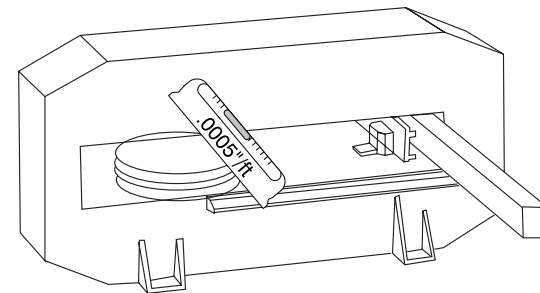
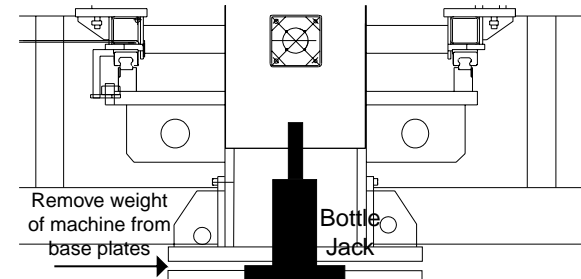
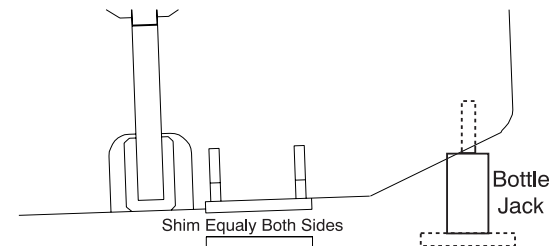
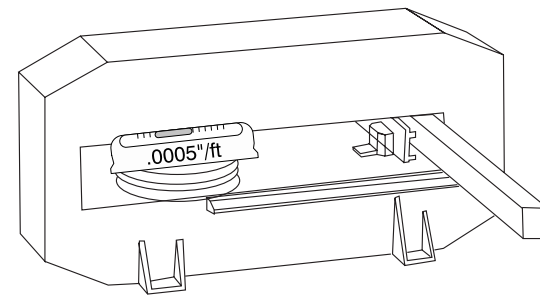
Under extreme conditions the use of half-shims may not move the machine weight bearing points far enough from the machine centerline to ensure the machine frame is stable.

Under these conditions, a more suitable location must be found for the machine, or a new foundation for the machine will be necessary.



Leveling Procedure

1. Determine the high end of machine frame by placing the spirit level on the turret to measure the level of the machine frame in the y-axis.
2. Use the bottle jack to lift the low end of the machine frame.
3. Shim between both machine feet and the base plates, until the machine frame measures near level on the y-axis. The turret end of the machine frame should be slightly higher than the carriage end.
4. Center the bottle jack under the carriage end of the machine frame.
5. Lift the machine frame until all weight is off of the machine feet at the carriage end of the machine frame. Lift the machine frame as little as possible to take the weight off of the base plates.
6. With the machine supported on the bottle jack at the carriage end of the machine frame and the machine feet at the turret end of the machine frame, place the spirit level on the turret.
7. Measure and record the level of the turret in the x-axis direction.
8. Lower the machine frame to place all machine feet in contact with the leveling shims and base plates.



9. Lift the turret end of the machine frame to allow shimming between the machine feet and base plates to level the machine frame in the x-axis direction.

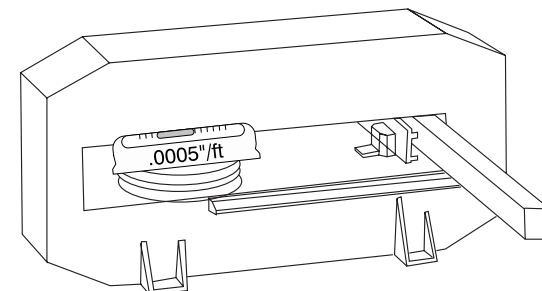
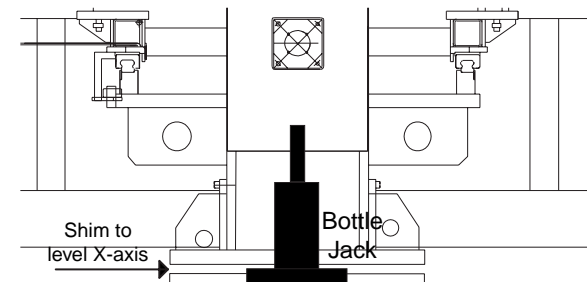
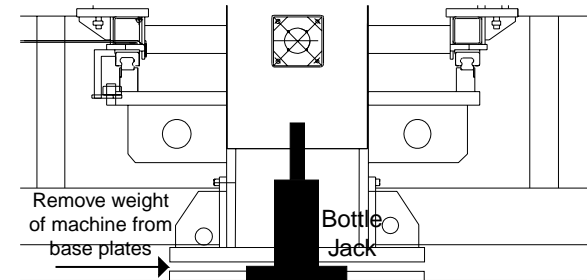
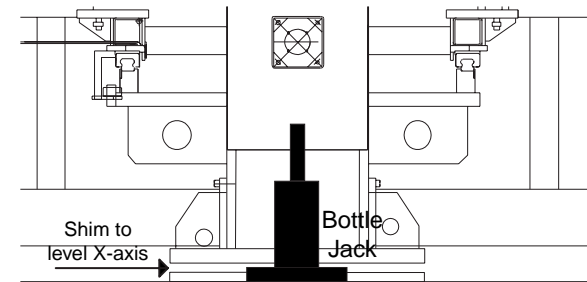
10. Repeat steps 4 to 9 until the machine frame measures level to 0.0005"/ft in step 7, then continue.

11. With the bottle jack supporting the weight of the carriage end of the machine. Monitor the level of the turret in the x-axis, as the bottle jack is slowly lowered to place the carriage end machine feet in contact with the base plates. Any change in the level indicates that the carriage end of the machine needs to be leveled.

12. Lift the carriage end of the machine frame to allow shimming between the machine feet and base plates to level the carriage end of the machine frame in the x-axis direction.

13. Repeat steps 11 and 12 until no difference in level is noted when the machine weight is on or off of the base plates and shims, then continue.

14. With all of the machine feet setting on the shims and base plates place the spirit level on the turret to measure and note the level of the machine frame in the y-axis.



15. Using the bottle jack lift the low end of the machine frame and shim equally under both machine feet to level the machine frame in the y-axis.
16. Repeat steps 14 to 15 until the machine frame measures level to 0.0005"/ft in the y-axis then continue.
17. Run the machine using the rocking test G-code to determine that the machine frame is leveled adequately. Should excessive movement of the machine frame be noticed check for the conditions discussed in *Floor Condition Crowning* and *Floor Condition Slope*.
18. Tighten the anchor bolt nuts to prevent the machine frame from moving when in use. Monitor the machine level while tightening the anchor bolts to assure the machine level is not changed.

