



SINCE 1991

5VC-5V Crimp

Roof Panel Machine OPERATION and MAINTENANCE MANUAL



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CHAPTER 1
5VC SPECIFICATIONS

SPECIFICATIONS

5VC Dimensions:	Length-10' 5"	(3.2m)
	Width-3' 10"	(1.2m)
	Height-4' 3"	(1.3m) w/Over Head Rack
	2' 4"	(.75m) w/o Over Head Rack
	Weight-2700 lbs.	(1230kg)
5VC on Trailer:	Length-17' 6"	(5.3m)
	Width-7'	(2.1m)
	Height-6' 3"	(1.9m) with reel
	Weight-4700 lbs.	(2140kg)
Speed:	60 ft/min. Approx.	(18m/min.) Approx.
Drive:	Hydraulic via chain, sprocket and gear using 8 polyurethane drive rollers.	
Shear:	Hydraulically Powered, Infinitely adjustable, hardened tool steel dies and blades with Panel Recognition Proximity Sensor	
Hydraulic Fluid:	15 Gallons - 32AW	
Coil Width	24", 27" or 27½" (610mm , 686mm, or 699mm)	
Finished Panel Width	21" and 24" (533mm and 610mm)	
Materials Formed	Painted Steel	30ga. to 24ga. (.3mm to .6mm) Painted, Galvanized, Aluminized
	Painted Aluminum	.019" to .040" (.5mm to 1.0mm)
	Copper	16 oz. to 20 oz. ¾ Hard (.5mm to .7mm)
Controls	Standard:	12VDC Manual Control Box w/Length Control Limit Switch
	Optional:	Computer Batch and Length Control

CHAPTER 2
PRECAUTIONS

PRECAUTIONS

1. **Make sure the operator of the machine has read and understands this manual in its entirety before attempting to operate this equipment.**
2. **ALWAYS** keep covers, guards and lids mounted to machine during operation
3. **OBSERVE** and **OBEY** all safety and warning signs affixed to the machine.
4. **ALWAYS** adhere to and follow all local and national safety codes concerning the loading and un-loading of reeled coils.
5. **USE ONLY** properly rated devices for lifting reeled coils into or out of the reel stand assembly.
6. **DO NOT** wear loose clothing, jewelry etc. that could become entangled in the moving parts of the machine when operating.
7. **STOP THE MACHINE** and disconnect the power before attempting to make any adjustments, perform any maintenance or changeover procedures.
8. **AVOID** storing the machine outdoors for long periods of time. Cover with a tarp but provide good ventilation to prevent condensation and rust.
9. **DO NOT USE SOLVENTS TO CLEAN DRIVE ROLLERS!**
10. **ALWAYS EMPTY MACHINE OF MATERIAL BEFORE TRANSPORT AND STORAGE.**

CHAPTER 3
MACHINE ORIENTATION

MACHINE ORIENTATION

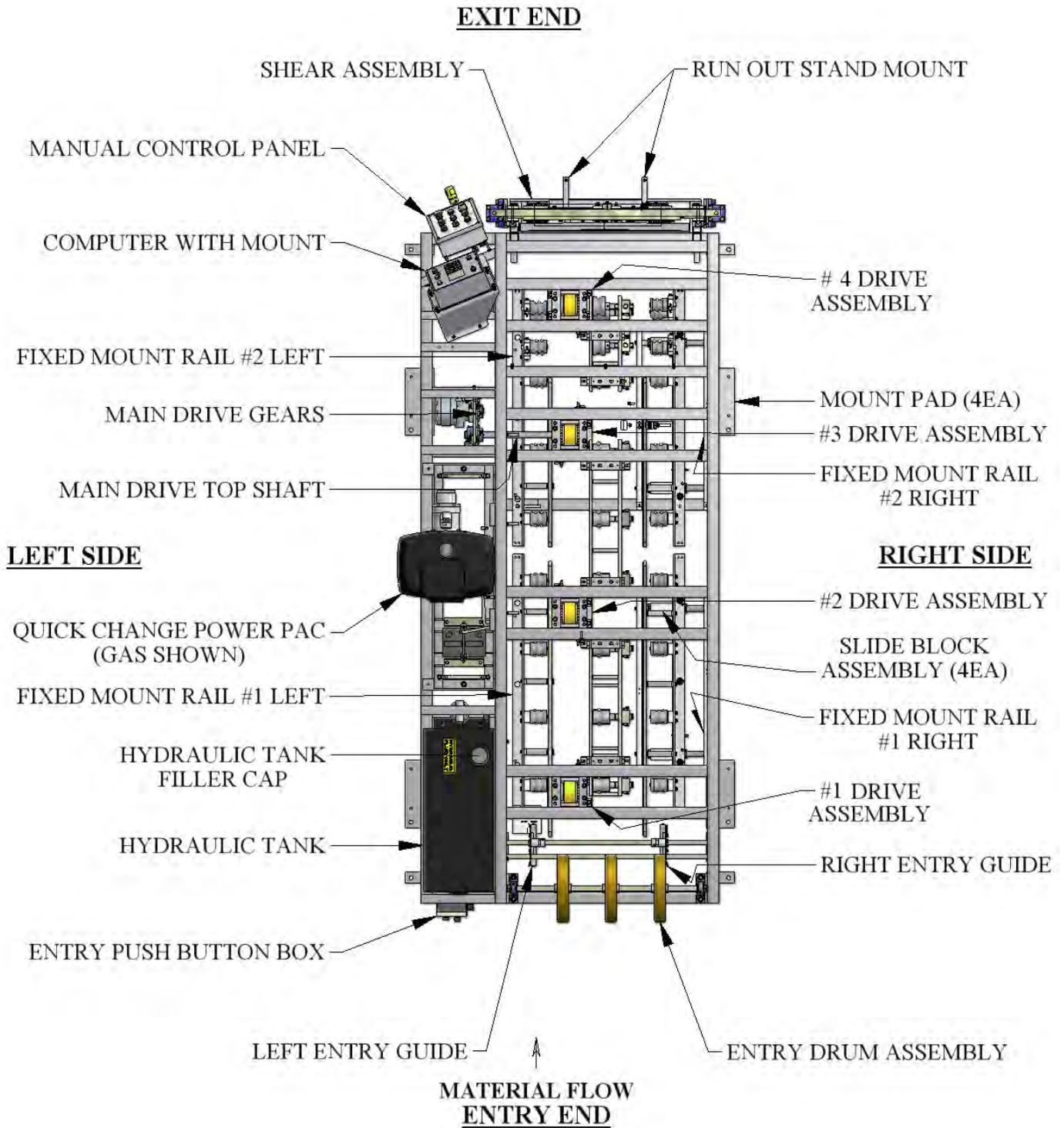


Figure 1: Machine Overview

CHAPTER 3
MACHINE ORIENTATION

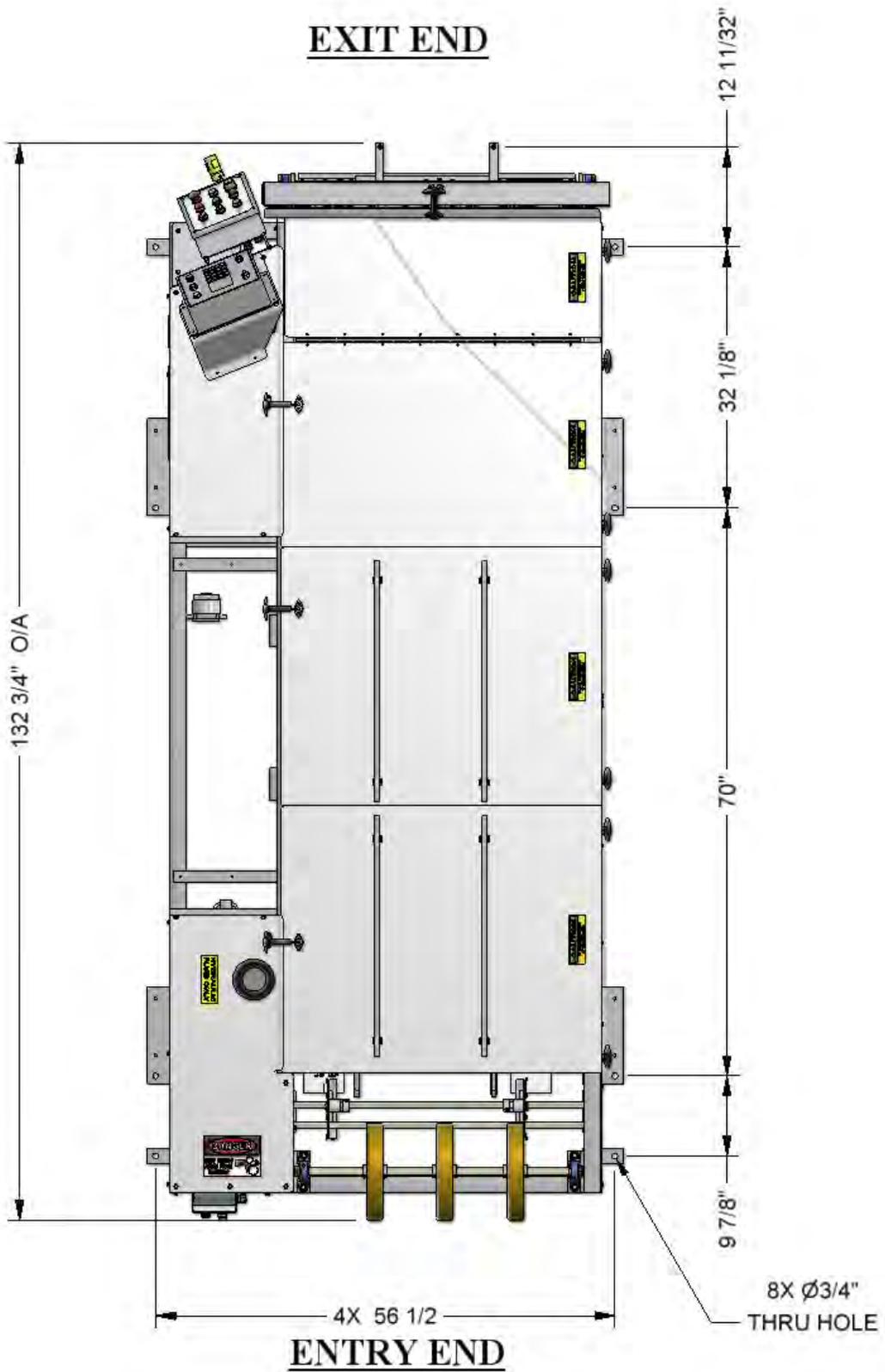


Figure 2: Mounting Dimensions

CHAPTER 4
GENERAL MAINTENANCE

GENERAL MAINTENANCE

1. Always keep covers on during operation and storage. The covers are for operator safety, but also protect the internal components of the machine from the environment.
2. Avoid storage of the machine outdoors for long periods of time. Cover the machine with a tarp to protect it but provide good ventilation to prevent condensation and rust.
3. Keep the machine clean. This will increase the life of the machine and make maintenance easier. A clean machine will provide a clean product.
4. Before operating the machine, visually inspect for foreign objects debris or anything unusual. If something doesn't seem correct, inspect and remedy prior to operation.
5. Keep chains properly tensioned. This will add to the life of the chains and sprockets. The chains should be just snug. An over-tightened chain is just as bad for the machine as a loose chain. Idler sprockets are provided on each chain for this purpose.
6. Lubricate the chains a minimum of every 40 hours of operation. It is preferable to use a dry motorcycle chain lube or equivalent.
7. Keep Entry Guide Carriage clean (Figure 3 on page 9).
8. Keep Arbor Cradles (Figure 10 on page 19) lubricated with Clear Grease.
9. Lubricate Arbor Nut (Figure 9 on page 18) using a grease gun with EP Grease when threads begin to look dry.
10. Clean Forming Rollers as needed with a Scotch Brite Pad and a small amount of solvent.
11. Clean Drive Rollers with soap and water or mild solvent free spray cleaner. **CAUTION: Do not use harsh chemicals or solvents or damage will occur.**
12. Lubricate both faces of the Shear Blades and Dies (Figure 20 on page 34) a minimum of once daily with Spray Lube. More should be added as needed before the cut edges begin to deteriorate.

CHAPTER 4
GENERAL MAINTENANCE

Recommended Lubricants and Fluids:

Spray Lube for:

Shear Blades, Dies, Bead Roller Carriage Shafts, Acme Shafts and Mitre Gears

Super Lube - Multi-Purpose Synthetic Aerosol Lubricant with Syncolon (PTFE)

Catalog No. 31110

11 oz. Aerosol Can

Available from:

MSC Supply at 1-800-645-7270

Clear Grease for:

Arbor Cradles

Synthetic Extreme Pressure, High Temperature Grease with Syncolon (PTFE)

Catalog No. 71160

400 gram container

Available from:

MSC Supply at 1-800-645-7270

EP Grease for:

Arbor Nuts and Pillow Blocks

Grease - Lubricants Type: Moly Ep Grease

Catalog No. 11335

14 Ounce Container

Available from:

MSC Supply at 1-800-645-7270

Spray Lube for:

Chains

Super Lube – Multipurpose Synthetic Dri Film Aerosol Lubricant with Syncolon (PTFE)

Catalog No. 11016

11oz Aerosol Can

Available from:

MSC Supply at 1-800-645-7270

Hydraulic Fluid (32AW) for:

Hydraulic Tank

Various Manufacturers

CHAPTER 4
GENERAL MAINTENANCE

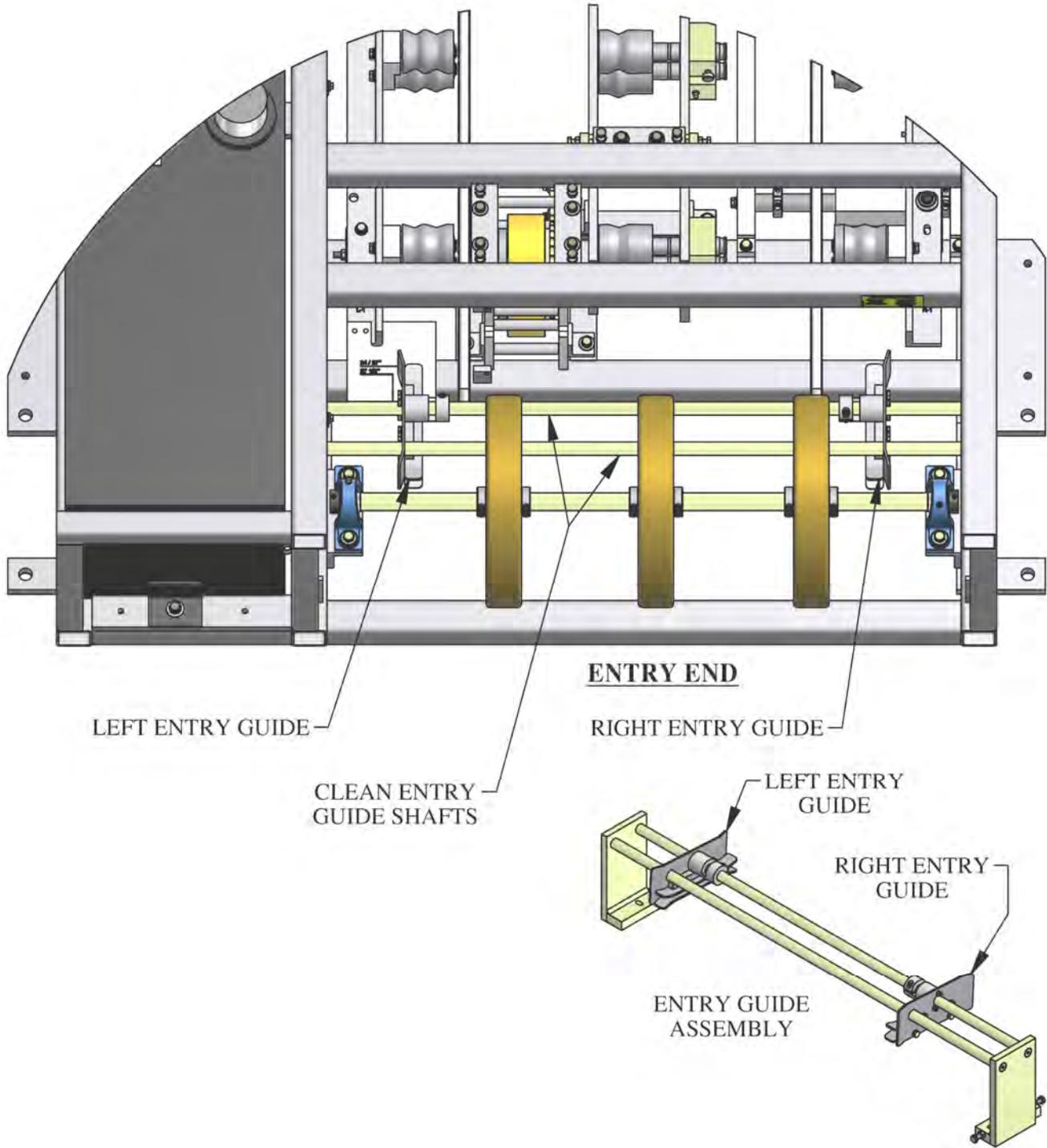


Figure 3: Clean Entry Guide

CHAPTER 5
ELECTRICAL CONTROLS AND OPERATION

ELECTRICAL CONTROLS AND OPERATION

POWER CORD REQUIREMENTS

For machines equipped with a QCPP-E it is very important to follow the power cord requirement prescribed by the motor and electrical control manufacturers to maintain their respective warranties. Make sure the cord being used is marked properly. Do not assume that because an extension cord looks heavy enough that it is the right gauge. **Use of the wrong gauge extension cord will void the warranty on motor and electrical controls.**

GENERATOR USE FOR ELECTRIC MOTOR MACHINES

If a generator will be used to power the machine it must be large enough to handle the amp draw requirements of the motor. Contact the local generator supplier for proper sizing and refer to the specification plate on the electric motor. **Use of an improperly sized generator will cause a low voltage situation of the electric motor and controls which will void the warranty.**

MANUAL CONTROL PANEL OPERATION:

(See Figure 4)

- A. FORWARD-REVERSE Switch
This selector switch controls the direction of movement of the material through the machine. Select forward to feed material and run panel through the machine.
NOTE: For operator safety, the machine will not run continuously in reverse.
- B. JOG-RUN Switch
This selector switch allows the machine to run continuously, or jog material through the machine. Select JOG to load coil into machine and to move material through the machine in small increments until it clears the shear dies. Select RUN after material has cleared the shear, and the machine will be ready to run panel.
NOTE: The Length Control Limit Switch must be plugged in to the Limit Switch Plug at the bottom of the Manual Control Box Assembly to run continuously.
- C. START FEED (Green button at Entry and Exit End)
This button is used to activate the drive system of the machine. (Jog only unless limit switch is plugged in)
- D. STOP FEED (Red button at Entry and Exit End)
This button acts as an emergency stop for the drive system when using the Length Control Limit Switch. **Pressing either the entry or exit button will stop the drive system of the machine in case of an emergency.**
- E. SHEAR DOWN (Green button)
Pressing this button once will cycle the shear to the bottom of its stroke and return it back to the top or home position. This is one shear cycle
- F. SHEAR UP (Red button)
Pressing this button during the down cycle of the shear will immediately send it back to the top or home position.
- G. EMERGENCY STOP (Raised Red Mushroom button)

CHAPTER 5
ELECTRICAL CONTROLS AND OPERATION

Function #1 (Power On)

Pull this button OUT prior to starting the machine.

Function #2 (Emergency Stop-Power Off)

Once the machine is running, pushing this button in will stop all functions and completely shut down the machine including the engine. If the shear is in the down cycle it will freeze it in position. The shear will default back to the top or home position once the engine or motor is re-started. This button is also used to shut the machine down when not in use. *Failure to push this button in prior to storage, even overnight, could result in a dead battery on gas engine models.*

H. MOTOR START (Green button)

The Emergency Stop button must be pulled out before the Start Button will function.

Press this button momentarily to start the Electric Motor machine.

Press and hold this button until the engine starts on a Gas Engine model.

MAIN CONTROL CABLE

(See Figure 5)

- A. The main control cable is the communication cable for the Manual Control Panel described above and the PLC Computer Batch and Length Control Computer covered in Appendix B. This cable must be connected to one or the other in order for the machine to operate.
- B. The Main Control Cable exits thru the panel below and under the left corner of the Manual Control Panel. There are three cables there and it is the larger diameter plug of the three. It has a key and slot configuration that must be aligned before the male/female connection can be made on the Manual Control Panel or Batch and Length Control Computer. This prevents misalignment and damage to the pins.

Manual Control Panel Connection

Connect the Female end of the Main Control Cable to the panel mounted male connection located at the bottom left corner of the Manual Control Panel. Make sure that the key and slot are aligned and carefully start the threads on the connection and turn clockwise until snug.

Batch and Length Control Computer Connection

Connect the Female end of the Main Control Cable to the panel mounted male connection located in the bottom of the computer on the right side. Make sure that the key and slot are aligned and carefully start the threads on the connection and turn clockwise until snug.

CHAPTER 5
ELECTRICAL CONTROLS AND OPERATION

REMOTE LIMIT SWITCH

(Figure 6)

NOTE: The machine will not run continuously in the forward direction unless the Remote Limit Switch is plugged into the machine. The Remote Limit Switch is used for panel length control. It is designed to attach to the right side of the optional Run Out Tables (see page 46) available for the machine. Plug the female end of a 3-wire 14-gage extension cord into the limit switch, and the male end into the female Limit Switch Plug located at the bottom of the Control Panel Assembly. The length of the panel to be run determines length of the extension cord needed. Run out a panel to the desired length and stop the machine. Slide the Remote Limit Switch onto the bottom let of the angle on the right side of the run out table so that the ARM of the switch is against the end of the panel. Pull the limit switch back toward the shear until a click is heard in the Limit Switch Head and secure the limit switch at this location. Cut and remove the set up panel from the table. Push the start button and run the next panel allowing the limit switch to stop the machine. Measure this second panel before cutting to determine if it stopped in the correct position and make the necessary adjustment to the limit switch to obtain the desired length. Repeat as necessary.

FUSES

(Figure 7)

All machines, gas or electric powered, have a 10-amp time delay fuse inside the Electrical Control Panel Assembly. This fuse protects the electrical components. If the fuse is blown, all functions of the machine except Motor Start will be inoperable. **To replace this fuse:** Loosen all 4 cover screws and open the front panel of the Control Box. Locate the automotive style in-line fuse near the bottom right hand corner. It is a spring loaded twist lock holder. Push together and turn to open. Check the fuse with a continuity tester. If it is bad, replace with a new fuse and re-connect spring loaded holder.

ELECTRIC MOTOR MACHINES

(Figure 8)

Electric motor machines have an additional 10-amp time delay fuse protecting the logic circuit of the Contactor Box. This fuse holder is mounted in the side or top cover of the contactor box located approximately mid machine on the right side. Access can be gained by removing the center left side cover. This is a panel mounted, spring loaded fuse holder. **To replace this fuse:** Push in on the cap and turn counterclockwise to release fuse. Check fuse with a continuity tester. If the fuse is bad replace with a new fuse. To re-install, insert fuse into cap. Install fuse and cap assembly into receptacle, push down and turn clockwise to lock in place.

CHAPTER 5
ELECTRICAL CONTROLS AND OPERATION

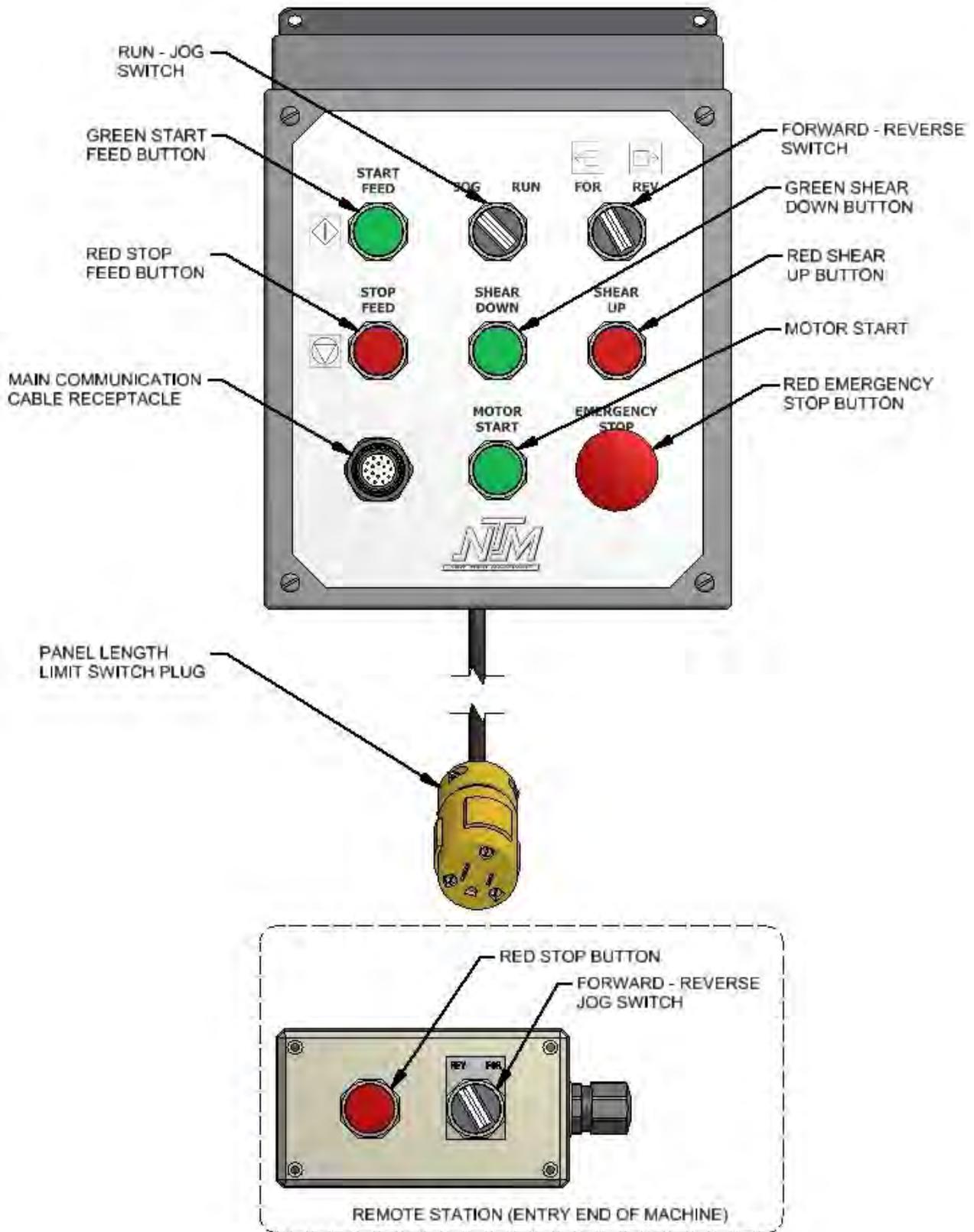


Figure 4: Controls

CHAPTER 5
ELECTRICAL CONTROLS AND OPERATION

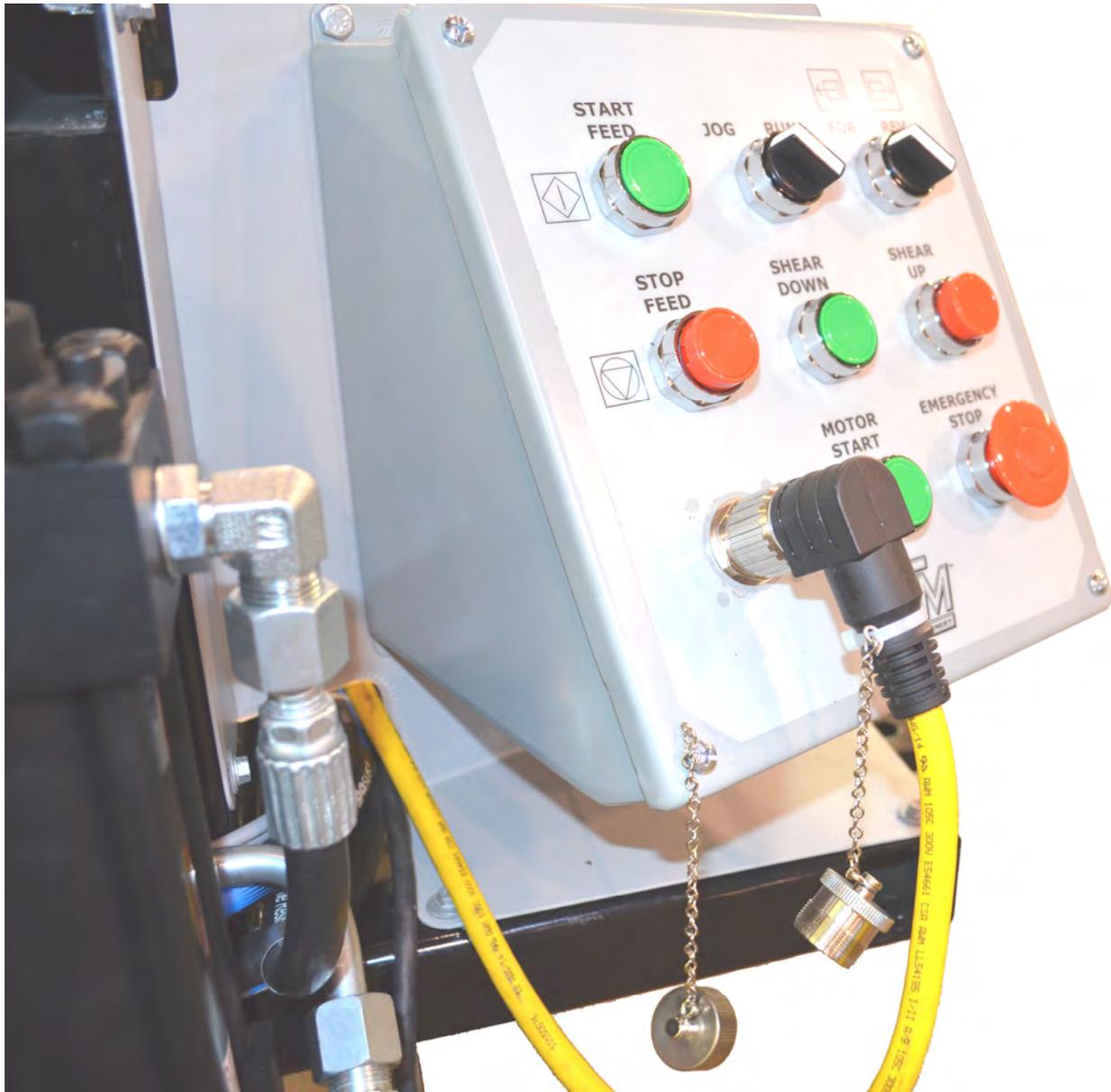


Figure 5: Main Control Cable

CHAPTER 5
ELECTRICAL CONTROLS AND OPERATION

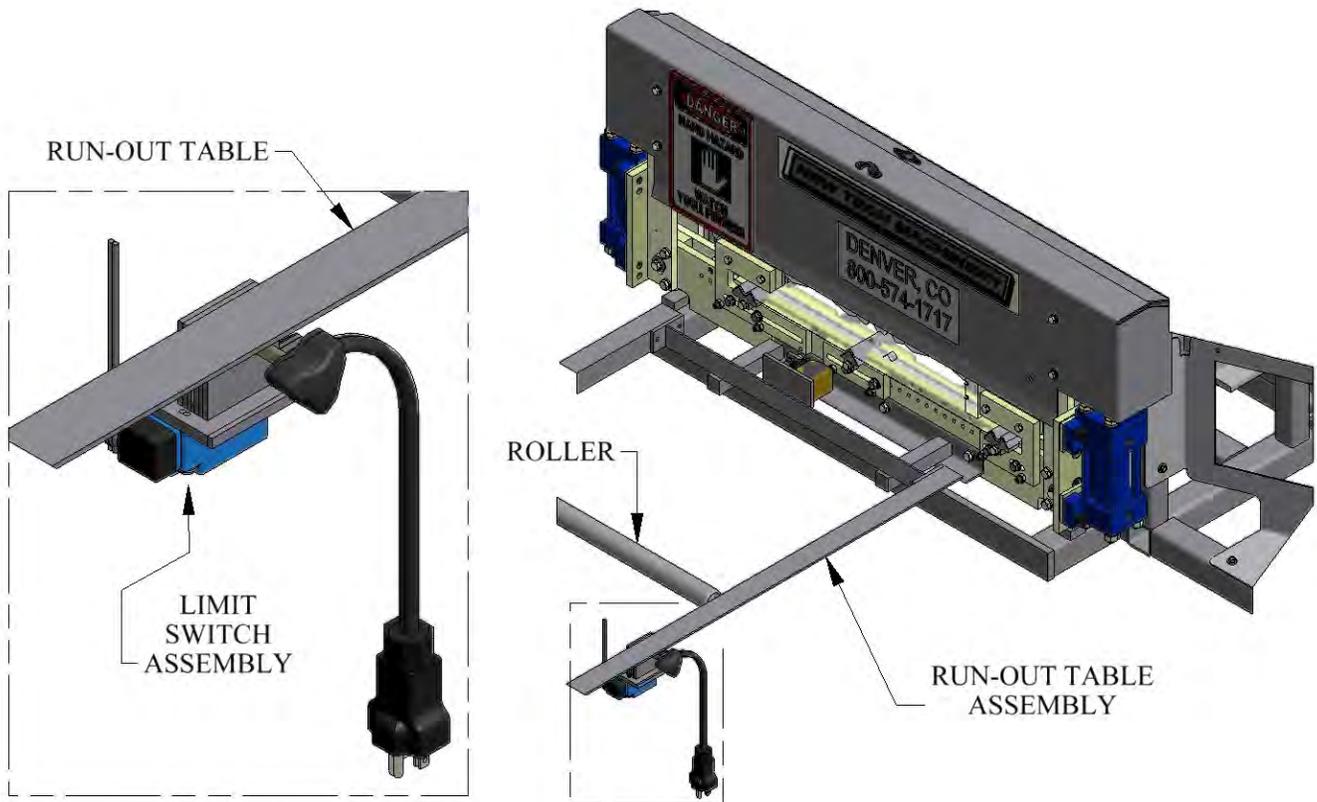


Figure 6: Run Out Table and Remote Limit Switch



Figure 7: Main Control Box Fuse

CHAPTER 5
ELECTRICAL CONTROLS AND OPERATION

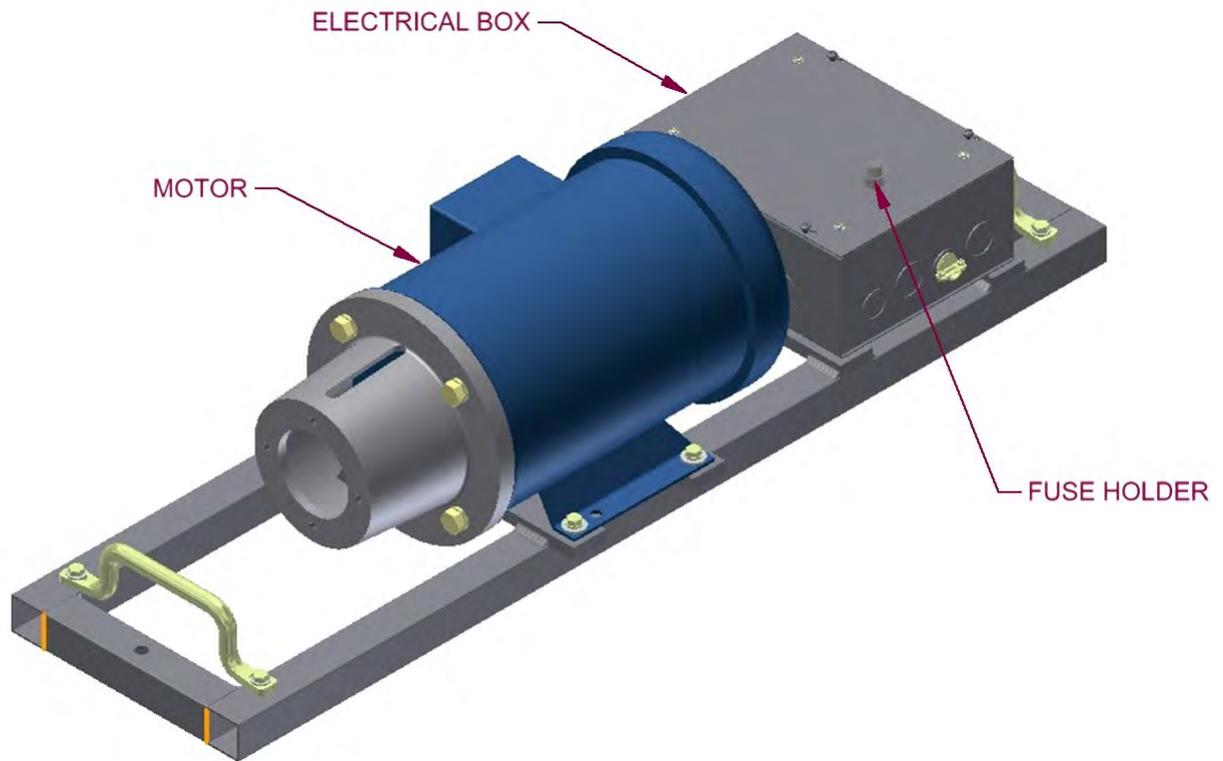


Figure 8: QCPP E 1-6 Fuse Location

CHAPTER 6
REEL STANDS, REELS AND EXPANDABLE ARBORS

REEL STANDS, REELS AND EXPANDABLE ARBORS

EXPANDABLE ARBOR

(Figure 9)

The Expandable Arbor adjusts to accommodate coils with 16” to 20” inside diameters by expanding into the ID of the coil.

CAUTION: Always use properly rated lifting devices to load and unload coils.

Maximum Capacity / Reel: **3,000 lbs.**

Total Capacity for Reel Stand: **6,000 lbs.**

THREADED NUT

The threaded nut should always be on the right side of the machine and the tail of the coil should always be routed under the bottom and pointing toward the exit or shear end of the machine.

This threaded nut is used to increase or decrease the outside diameter of the arbor. Turning the nut clockwise will increase the outside diameter of the arbor, and counter-clockwise rotation will decrease the arbor size. There is a grease zerk in the collar of the threaded nut that should be lubricated at least twice a year, or whenever grease is not visible on the threads of the shaft.

END COLLAR

The End Collar has two positions.

Position “A” is used for coils with inside diameters of 16”.

Position “B” is used for coils with inside diameters of 20”.

To adjust from one position to the other, remove (2) Bolts “C” until end collar is free to slide. Slide it to the inside position for 20” ID or outside position for 16” ID coil. Align it to the respective threaded holes in the reel shaft. Re-insert and tighten Bolts "C" to lock the end collar to the shaft.

LOADING EXPANDABLE ARBORS WITH COIL

1. Using the Threaded Nut, collapse the arbor small enough to fit into the inside diameter of the coil.
2. Slide the Expandable Arbor into the center of the coil making sure the threaded nut is on the right and the tail of the coil is over the top and pointed toward the exit end of the machine. See Figure 11
3. Turn the Threaded Nut clockwise until the Support Bars on the arbor are just snug against the inside of the coil.
4. Using the Reel Set Up Chart, (Figure 9), find the “D” dimension that corresponds to the profile being used.
5. Slide the material on the arbor left or right to get the correct “D” dimension measuring from the edge of the coil to the end of the Support Bar on the Threaded Nut side.
6. Finish by rotating the Threaded Nut clockwise until the Support Bars are very tight against the inside of the coil. Verify that dimension “D” is correct, and re-adjust if necessary. The Coil and Arbor are now ready for loading. (see LOADING REELED COIL on page 20)

REEL STANDS, REELS AND EXPANDABLE ARBORS

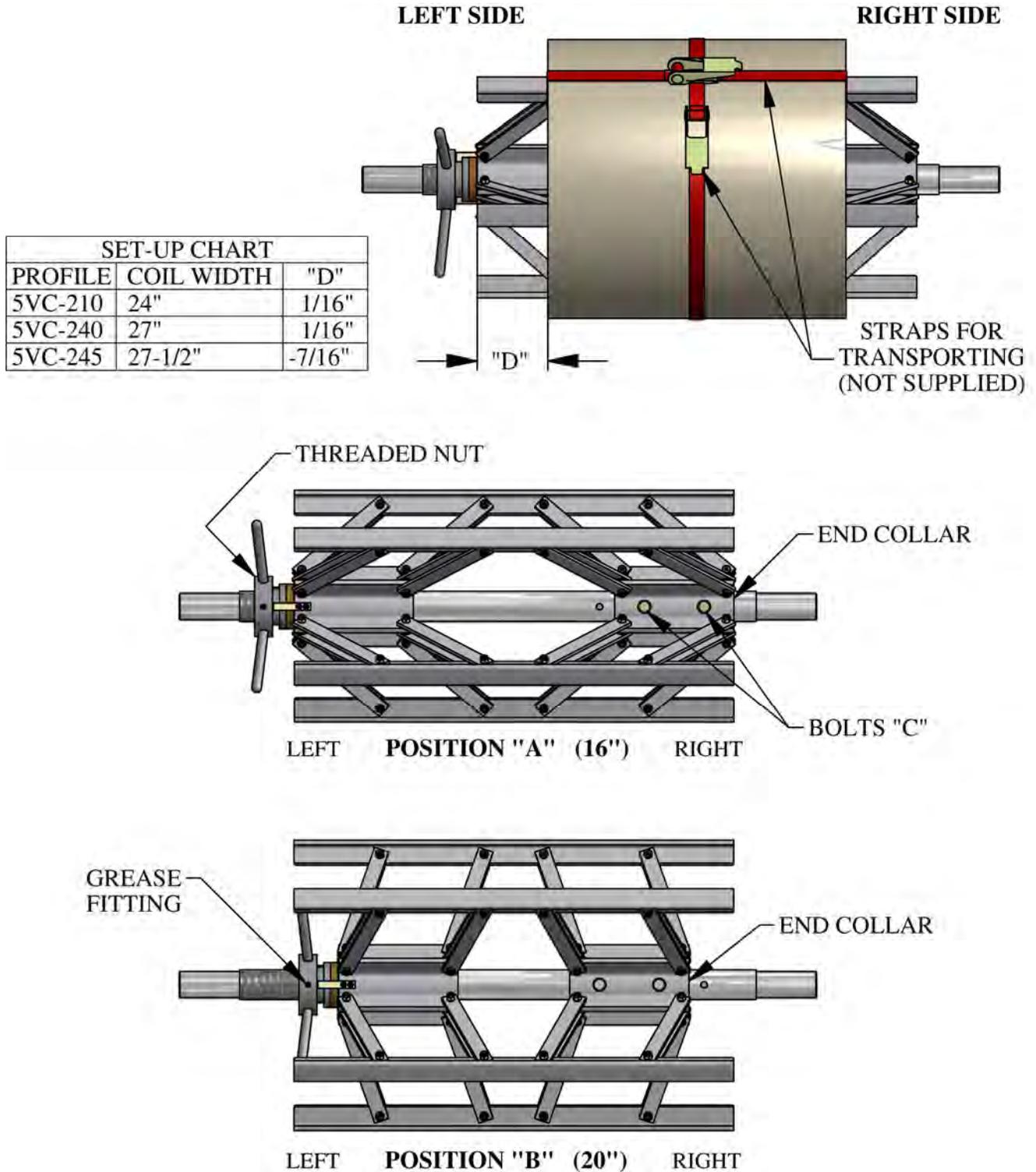


Figure 9: Expandable Arbor Set-Up

CHAPTER 6
REEL STANDS, REELS AND EXPANDABLE ARBORS

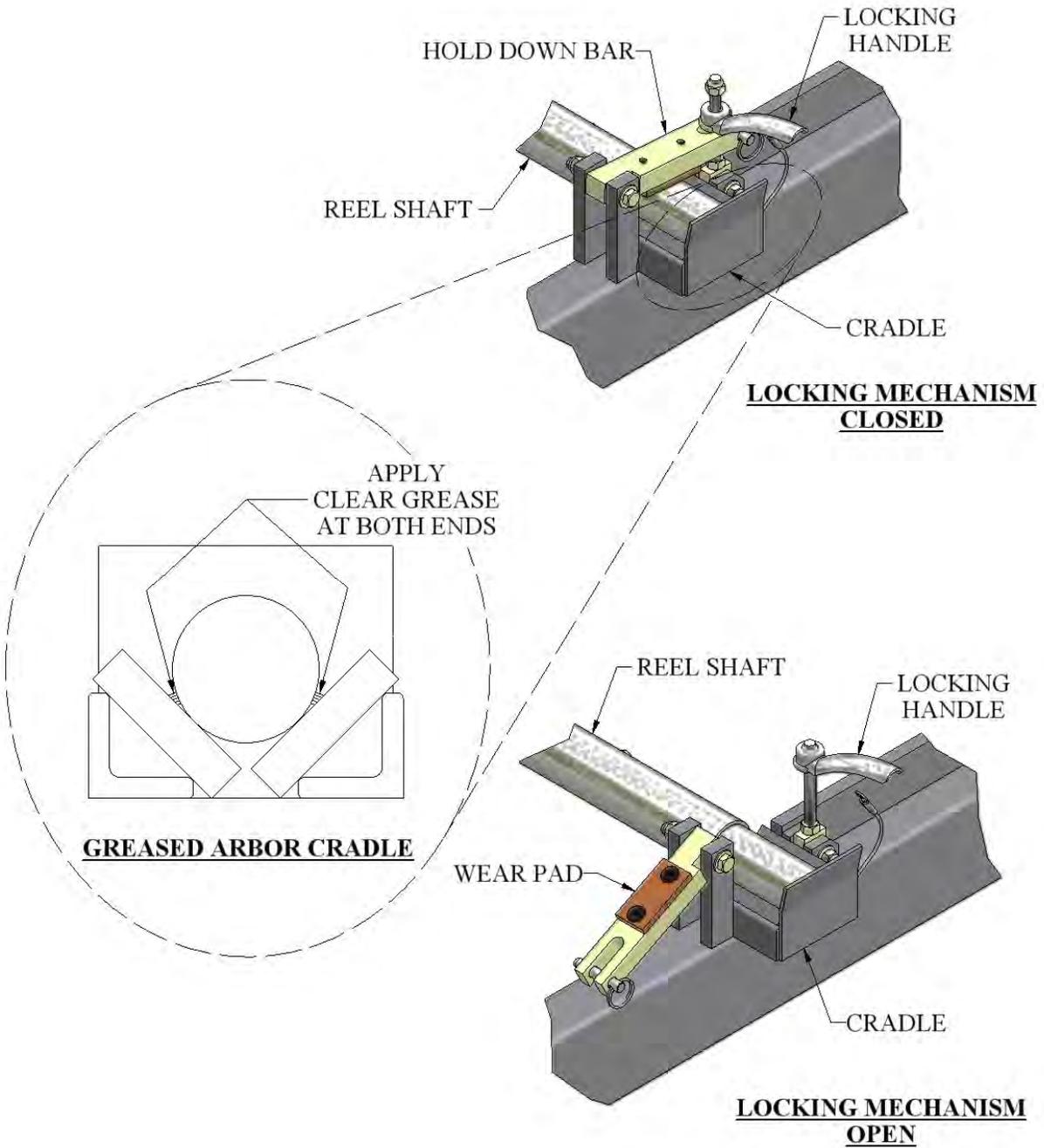


Figure 10: Expandable Reel Assembly

REEL STANDS, REELS AND EXPANDABLE ARBORS

LOADING REELED COIL

Caution:

Always use a forklift or other approved lifting device to load or unload Fixed Reels or Expandable Arbors loaded with coil.

The Lifting Holes in the Fixed Reel sides are provided to make loading safer and easier.

DO NOT use lifting straps through the lifting holes as the sharp edges may cut the straps.

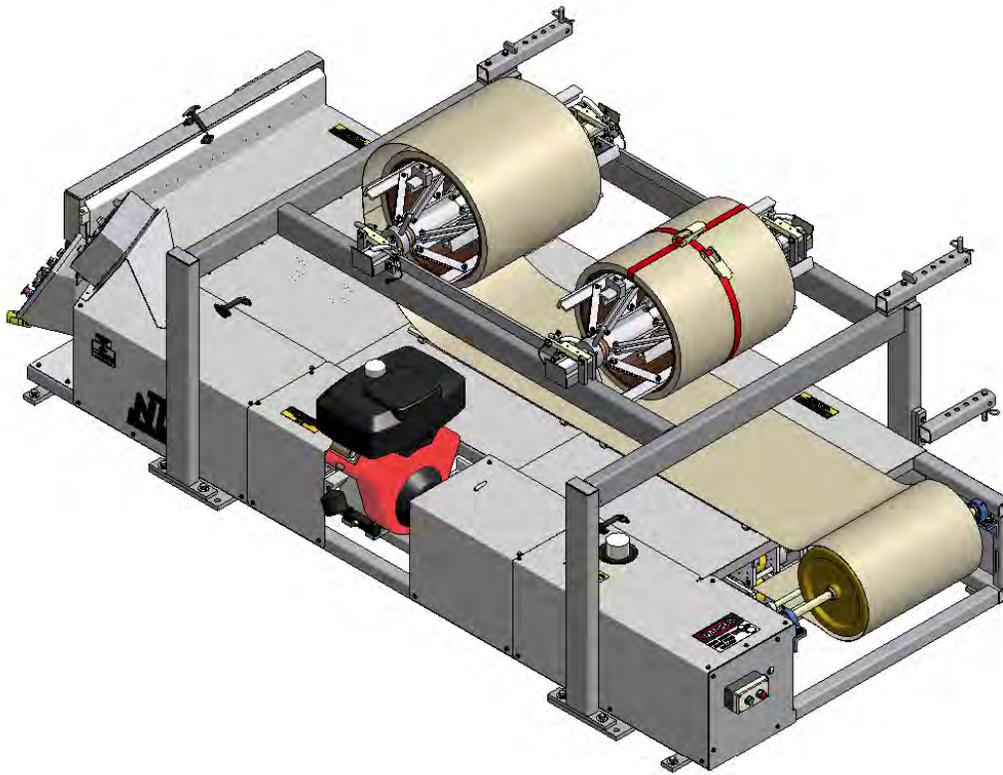
1. Prepare the reel stand by making sure the Hold Down Bars are in the unlocked and open Position (Figure 10).
2. Using an approved lifting device, lift the reeled coil into the cradles on the reel stand making sure that the tail of the coil is in the correct position (Figure 11) then remove the lifting device.
3. Rotate the Hold Down Bars (Figure 10) to the closed position and thread the handle onto the hold down bolt. If material is going to be used from this coil right away, tighten the left and right handle just snug. Final adjustment of tension should be made while running a panel to keep reel from unwinding material too fast. As the coil becomes smaller, re-adjustment will need to be made. **Caution: Do Not over tighten Hold Down Bars. Drive and/or electrical system failure may occur.**
4. If the machine will be transported after loading coil, tighten the Hold Down Bars securely to keep coil from unwinding during transport and secure the loose end of the material to the coil.
5. Before transporting the loaded Expandable Arbor, the coil should be secured around the outside edges through the inside diameter using a strap, rope, etc. to prevent the coil from telescoping (Figure 9).

NOTE: Make sure Hold Down Bars are tightened securely and coil is properly tied off before transporting machine.

OPERATION AND MAINTENANCE

1. The reel shafts must rest in the cradles on the reel rack. Keep the cradles lubricated with synthetic lube to minimize wear. (Figure 10)
2. Use the Hold Down Bars on each cradle to secure the coil and reel to the reel stand during both operation and transit of the machine. The Hold Down Bracket should be used to keep the coil from uncoiling too fast during the fabrication of panels. Apply just enough drag to keep coil tensioned. (Figure 10)
Caution: Do not over tighten Hold Down Bars during machine operation. This will cause excessive load on the drive and electrical systems and premature failure will result.
Tighten Hold Down Bars tightly prior to transport of the machine.
3. If a Remote Decoiler is used it should be placed 8 to 10 feet behind the machine. Align it as close as possible to the Right Side Entry Guide line of fire, making the side of the coil and reel parallel to the machine. **NOTE:** The closer the Decoiler and reel are set to the machine, the more critical this alignment becomes.

CHAPTER 6
REEL STANDS, REELS AND EXPANDABLE ARBORS



REMOVE STRAPS FROM COIL PRIOR
TO LOADING MATERIAL IN MACHINE
(STRAPS NOT INCLUDED WITH MACHINE)

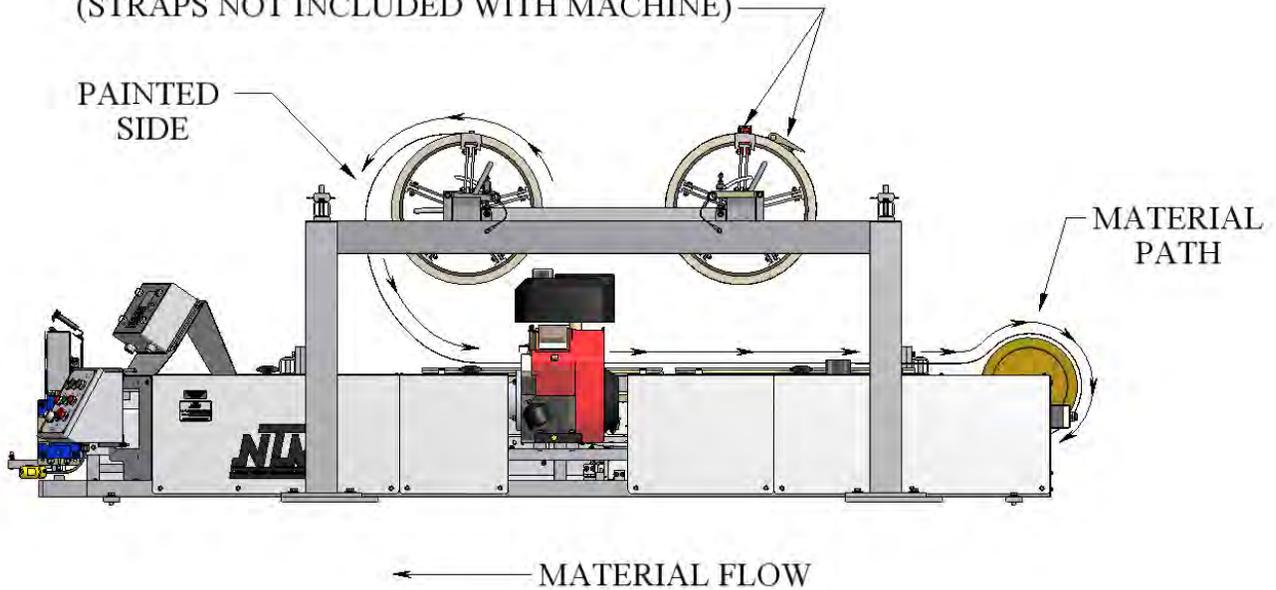


Figure 11: Material Routing

CHAPTER 7
HYDRAULIC SYSTEMS

HYDRAULIC SYSTEM

MAINTANANCE

(Figure 12)

The hydraulic system in the machine is very durable and reliable. It must be properly maintained to ensure trouble free operation and longevity. The factory has installed a 32 weight AW hydraulic fluid. Because this equipment is used primarily outdoors and exposed to the elements, it is recommended that the oil be changed annually. Hydraulic oil will degrade if it remains stagnate in the system for long periods of time. Check the fluid level weekly. It should be approximately 5” below the top of the filler neck. When checking the fluid level, also note the color and condition of the fluid. It should be clear in color.

HYDRAULIC FLUID TROUBLESHOOTING

CONDITION	SOLUTION
1 White milky color indicates water contamination.	Change the fluid.
2 Dark fluid usually indicates a dirty oil filter.	Replace the oil filter.
3 Foamy fluid will cause a noisy pump and slow erratic operation of the system. The cause is usually low oil level or air in the system.	Check fluid level and bleed off air by pushing the shear down button and holding for 10 seconds.
4 Machine runs slow after continuous operation. Check hydraulic fluid temperature, it should be no more than 140°F (60°C).	Allow to cool down. Move to a shaded area if possible.

CHANGING HYDRAULIC FLUID AND FILTER

The hydraulic fluid should be changed at least once a year. More frequently if the machine is constantly in operation in a dusty environment or if the fluid becomes contaminated. To change the fluid:

1. Remove the Left Side Covers and set aside.
2. Remove Filler Cap “E”.
3. Using an external electric or manual pump, pump the hydraulic fluid from the tank. Properly discard used oil.
4. Loosen, remove and discard the used Hydraulic Filter.
5. Re-install the new Hydraulic Filter and fill the tank with fresh 32 weight fluid until it is 5” below the top of the Filler Neck “F”.

CHAPTER 7
HYDRAULIC SYSTEMS

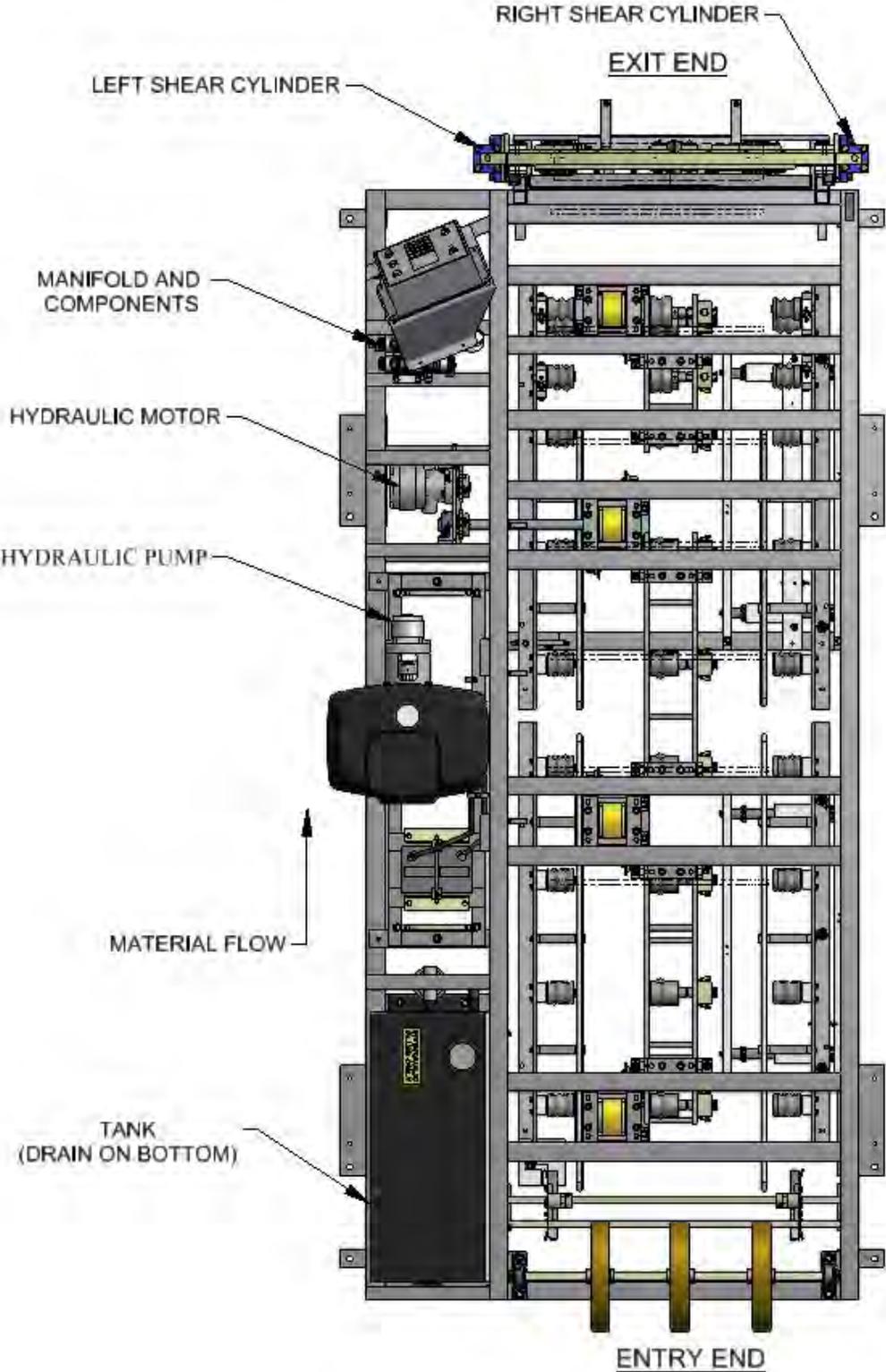


Figure 12: Hydraulic System Overview

CHAPTER 8
DRIVE SYSTEM

DRIVE SYSTEM

(Figure 13 - Figure 15)

The drive system in the machine has four Drive Stations. Each has a top and bottom polyurethane drive roller assembly. They are connected together via #40 roller chain and sprocket and each chain has two tensioner assemblies. The drive system is powered by a Hydraulic Motor which transfers power to the drive assemblies using chain sprockets and a #50 roller chain coupled to a top and bottom drive shaft.

1. Clearance between the top and bottom drive rollers is factory set at $\frac{3}{4}$ of a turn of pressure past the point of contact. This will drive material up to 24ga. though the machine without the need for adjustment. If adjustment becomes necessary due to slippage, pressure can be added. **Do not add more than $\frac{1}{4}$ turn beyond the factory setting.**

To add pressure: Loosen two Lock-Down Bolts “B” $\frac{1}{8}$ of a turn. Loosen lock nuts on two corresponding Jack Bolts “A”. Tighten Bolts “A” $\frac{1}{8}$ of a turn. Re-tighten 2 lock nuts on Jack Bolts “A” to lock in adjustment. Repeat this procedure on the other end of the Drive Assembly and repeat for the other 3 drive assemblies. Test for result and repeat one more time if necessary.

To remove pressure: Loosen two lock nuts on Jack Bolts “A”. Loosen two Jack Bolts “A” $\frac{1}{8}$ of a turn. Tighten two corresponding Lock-Down Bolts “B” $\frac{1}{8}$ of a turn. Tighten two lock nuts on Jack Bolts “A” to lock in adjustment. Repeat this procedure on the other end of the Drive assembly.

2. There are chain tensioner assemblies on each drive roller side plate both top and bottom. To tension chain, slightly loosen the “C” bolt on both tensioners. Loosen the lock nut “D” on both “E” bolts and Tighten “E” bolts evenly until the chain is just snug. Tighten both lock nuts “D” and both “C” bolts.
3. The polyurethane drive rollers will eventually need cleaning. This will become evident when they start leaving a stripe the width of the drive roller on the formed panels that doesn't come off easily or if a material is ran with an oily film on it. Avoid cleaning the drive rollers with harsh chemicals or solvent. These products will attack the polyurethane and cause irreversible damage. **Use of these products will void the warranty on the drive rollers.**

Clean the rollers with mild soap and water and a rag. **Caution must be taken around the moving parts of the machine during the cleaning process.**

4. Covers should be kept on the machine during operation and storage. **Ultraviolet light will attack the polyurethane drive rollers and cause deterioration.** Again, this type of damage is not covered under the warranty.

CHAPTER 8
DRIVE SYSTEM

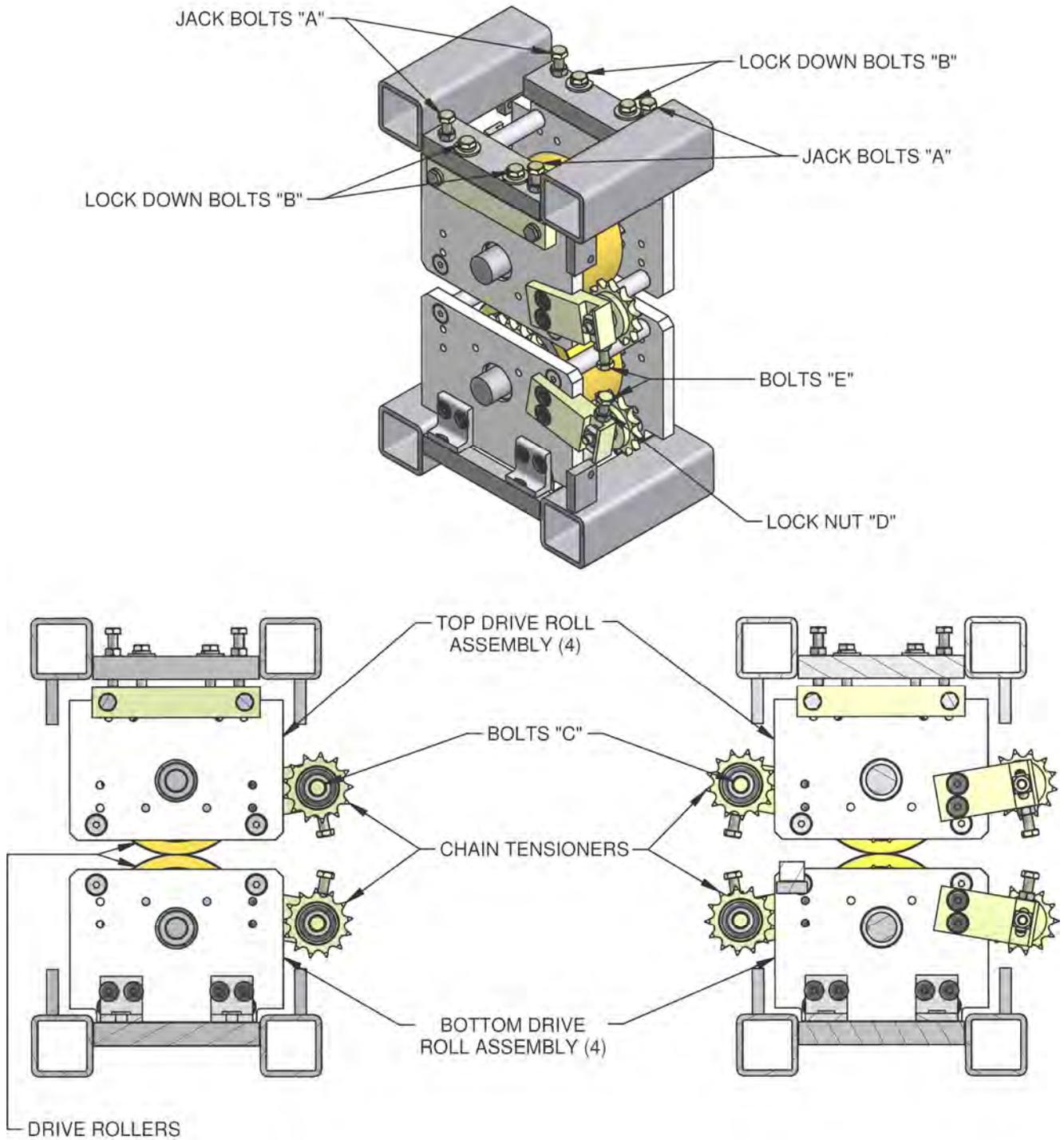


Figure 13: Drive Roll Assembly Views

CHAPTER 8
DRIVE SYSTEM

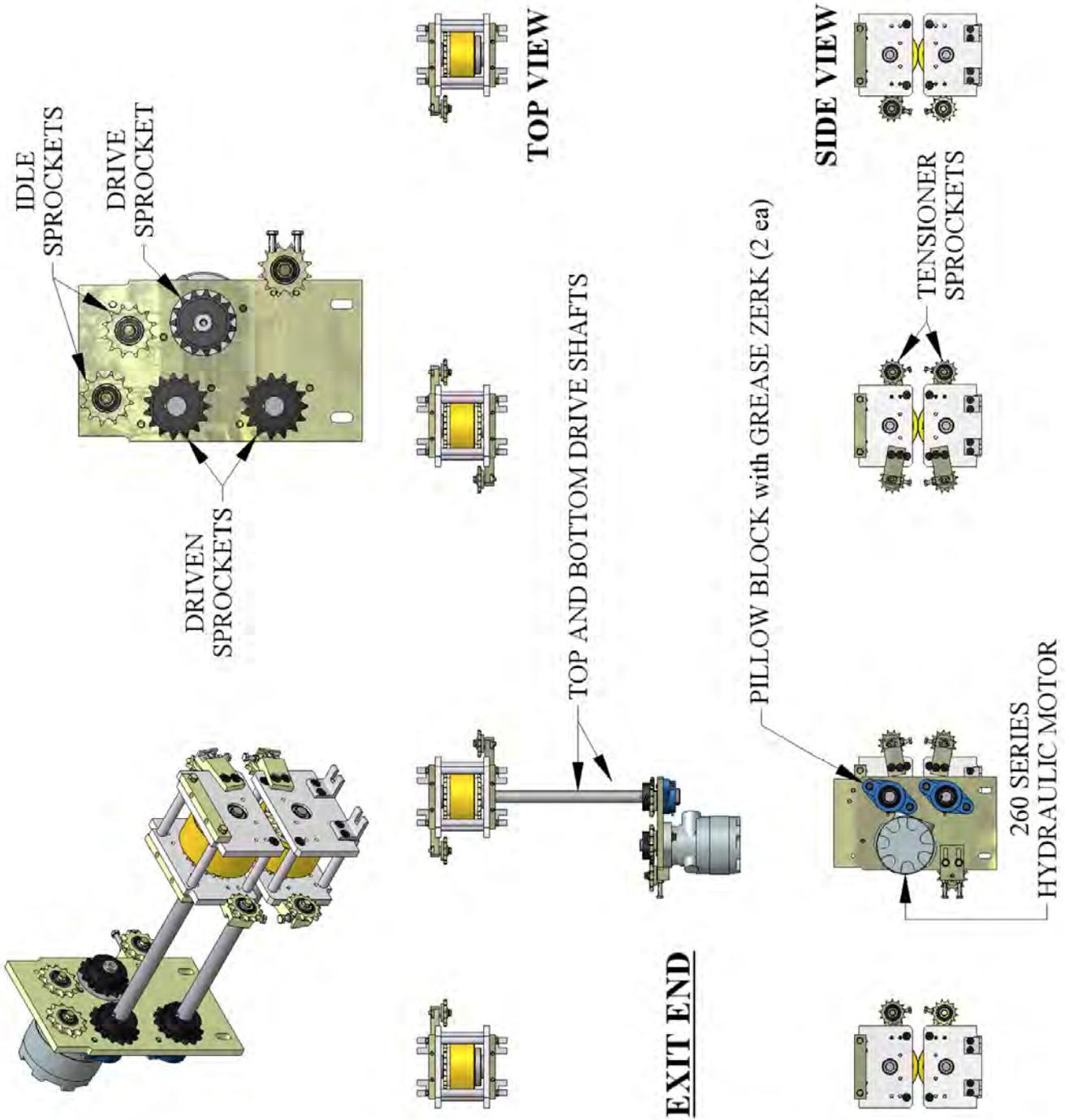


Figure 14: Gears and Shafts

CHAPTER 8 DRIVE SYSTEM

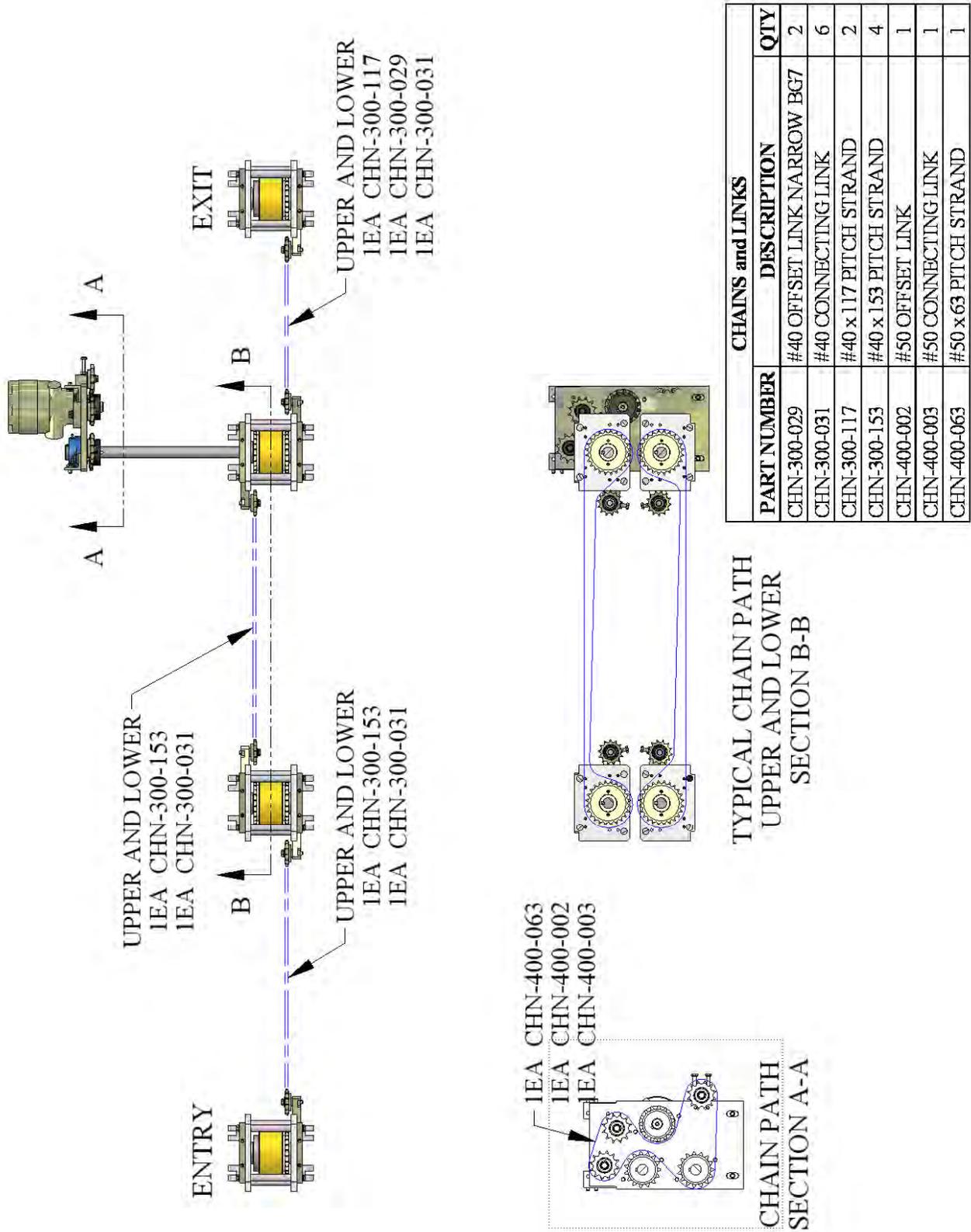


Figure 15: Chains, Upper and Lower

CHAPTER 9
WIDTH CHANGE PROCEDURE

WIDTH CHANGE PROCEDURE

CAUTION: *Always make sure the machine is shut down prior to making any adjustments.*

DO NOT reach through the opening of the shear while the machine is running. EVER! To do so could result in serious injury.

The 5VC machine can run 24", 27" or 27 1/2" material. Machine adjustments will need to be made when changing the width of the material. The width change consists of

1. Adjusting the position of the forming rollers (right and center).
2. Adjusting the position of the entry guides.
3. Adjusting the position of the entry drums.
4. Positioning the material on the expandable arbor.
5. Adjusting the position of the shear dies.

Forming Roller Adjustment

The Left Side tooling is the fixed tooling and does not move when changing the material width. Only the Center and Right Side Tooling change location. The Center Tooling has two positions, to the Left for 24" material and to the Right for 27" or 27-1/2" material. The Right Side Tooling has two positions, to the Left for 24" material and to the Right for 27" or 27-1/2" material.

1. Position the Center Tooling (Figure 16)
 - A. Pull and rotate the Retractable Plunger on each Upper and Lower Center Tooling Shaft.
 - B. Slide each pair of Upper and Lower a small distance to the Left for 24" material and to the Right for 27" or 27-1/2" material.
 - C. Rotate each Retractable Plunger and allow them to retract back onto the Roller Shaft.
 - D. Continue sliding the Roller pairs until the Retractable Plungers snap back into the shaft groove.
2. Position the Right Side Tooling (Figure 16):
 - A. Insert a 3/16" T-Handle Allen Wrench through the Access Holes and into the Screws "B" on the Entry and Exit Carriage Blocks of the first carriage. Rotate the Allen Wrench counter-clockwise to loosen the Screws "B".
 - B. Slide the first carriage inboard (to the left) for 24" material and outboard (to the right) for 27" or 27-1/2" material until it contacts the two Inside or Outside Stop Collars.
 - C. Retighten Screws "B".
 - D. Repeat steps one through four for the second carriage.

CHAPTER 9
WIDTH CHANGE PROCEDURE

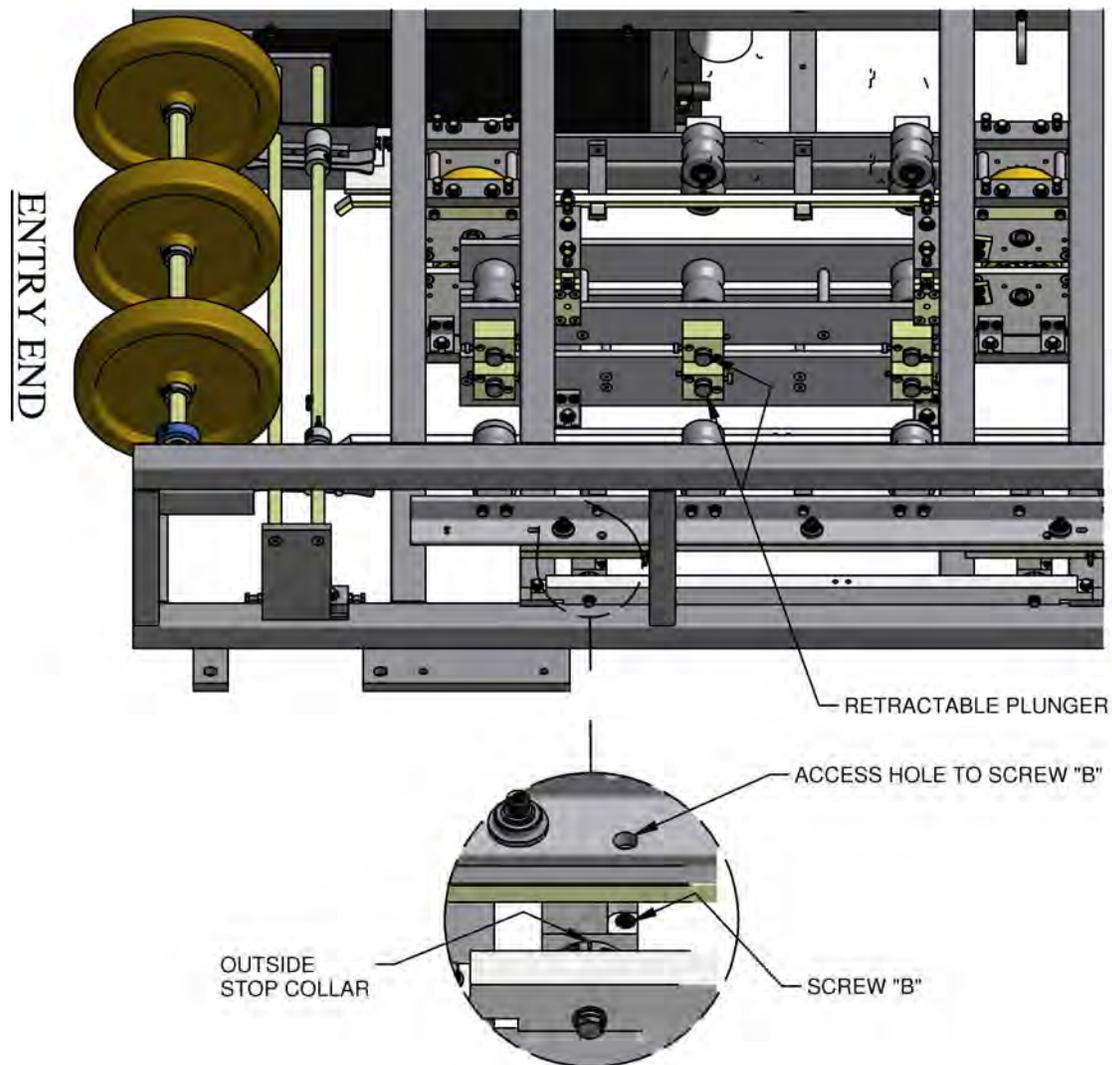


Figure 16: Width Change Fasteners

Entry Guide Adjustment

(Figure 18 & Figure 17)

The entry guides are used to set the material to the correct position in relation to the forming rollers of the machine. They also hold the material and feed it straight into the machine. If the entry guides are not set correctly the material will not feed into the machine properly.

1. The Left Entry Guide is set to the Tooling Rail Marker Plate mounted to the L1 Tooling Rail.
2. To align, loosen the “A” Screw on the Left Entry Guide. Slide the entry guide to the left or right until the outside edge of the entry guide is directly over one of the notches on the Tooling Rail Marker Plate. Make sure to choose the notch that corresponds to the desired width as noted on the top of the marker plate.
3. Tighten the “A” Screw on the Left Entry Guide.
4. Cut a 12” long piece of material from the coil to be used.

CHAPTER 9
WIDTH CHANGE PROCEDURE

5. Loosen "A" screw on the Right Entry Guide.
6. Slide material between the Left and Right Entry Guides.
7. Slide the Right Entry Guide to the left or right to accept the new coil width. Make sure that the coil is captured snugly between the entry guides and re-tighten the "A" screw on the Right Entry Guide.

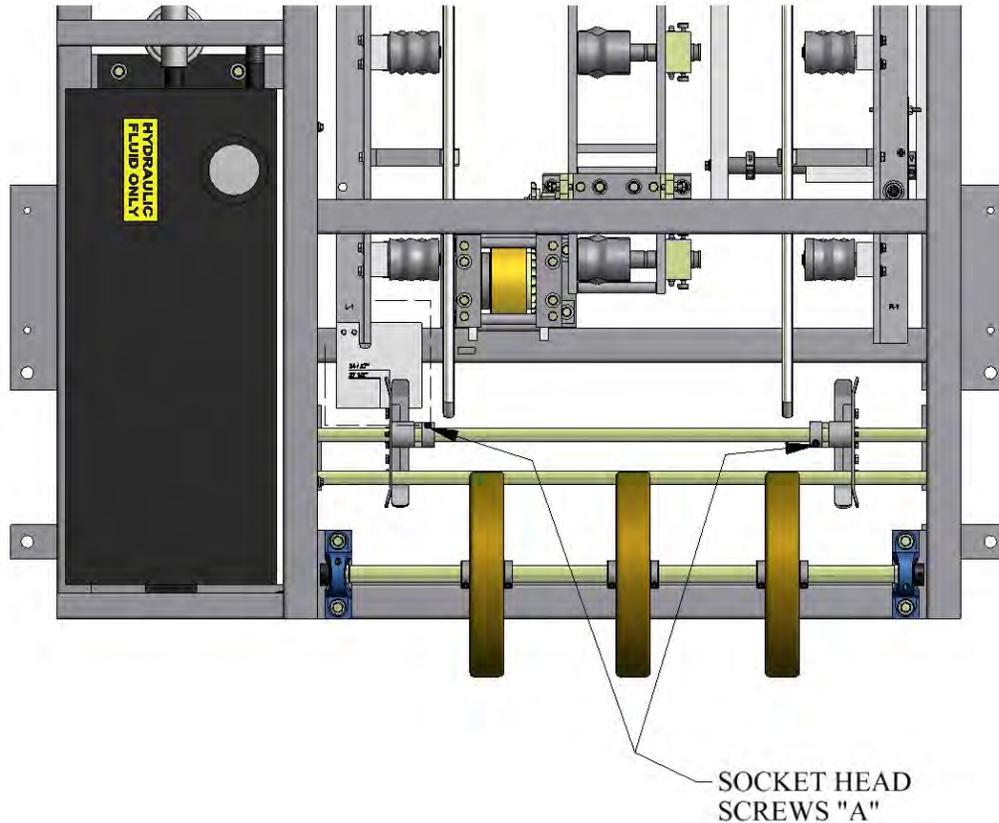


Figure 17: Entry Guide Adjustment

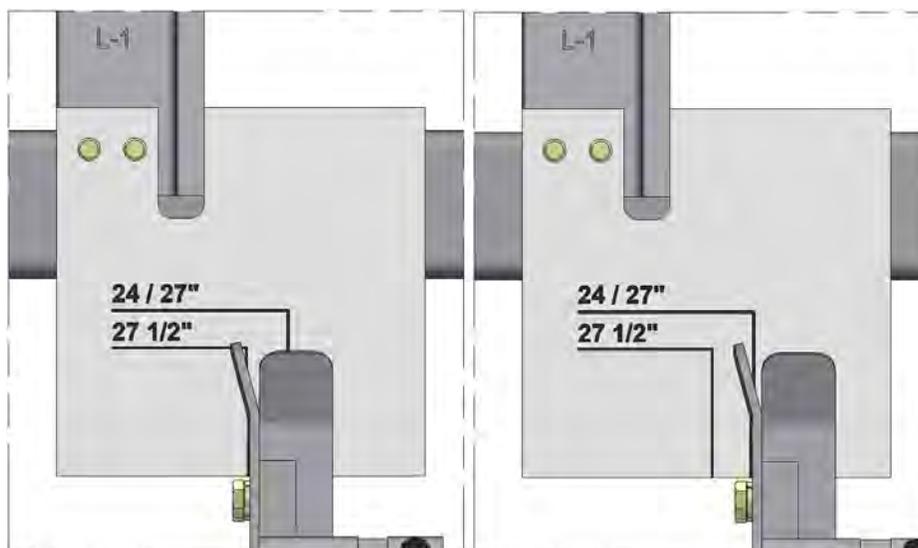


Figure 18: Entry Guide Positions

CHAPTER 9
WIDTH CHANGE PROCEDURE

Entry Drum Adjustment

(Figure 19)

The Entry Drum Assembly is necessary when feeding coil off of the optional DR1/ Dual Overhead Reel Stand. The Entry Drums need to be adjusted when a width change is made after the entry guide has been adjusted in order to line up correctly with the entry guides.

To adjust the entry drums:

1. Using a 3/16" allen wrench, loosen the six Shaft Collars "E", on either side of the drums.
2. Slide the Right and Left Entry Drums over until they are lined up with edge of entry guides. Align the Center Entry Drum so that it is centered between the Left and Right Entry Drums.
3. Slide the six Shaft Collars "E" against the sides of the drums and lock them into place.

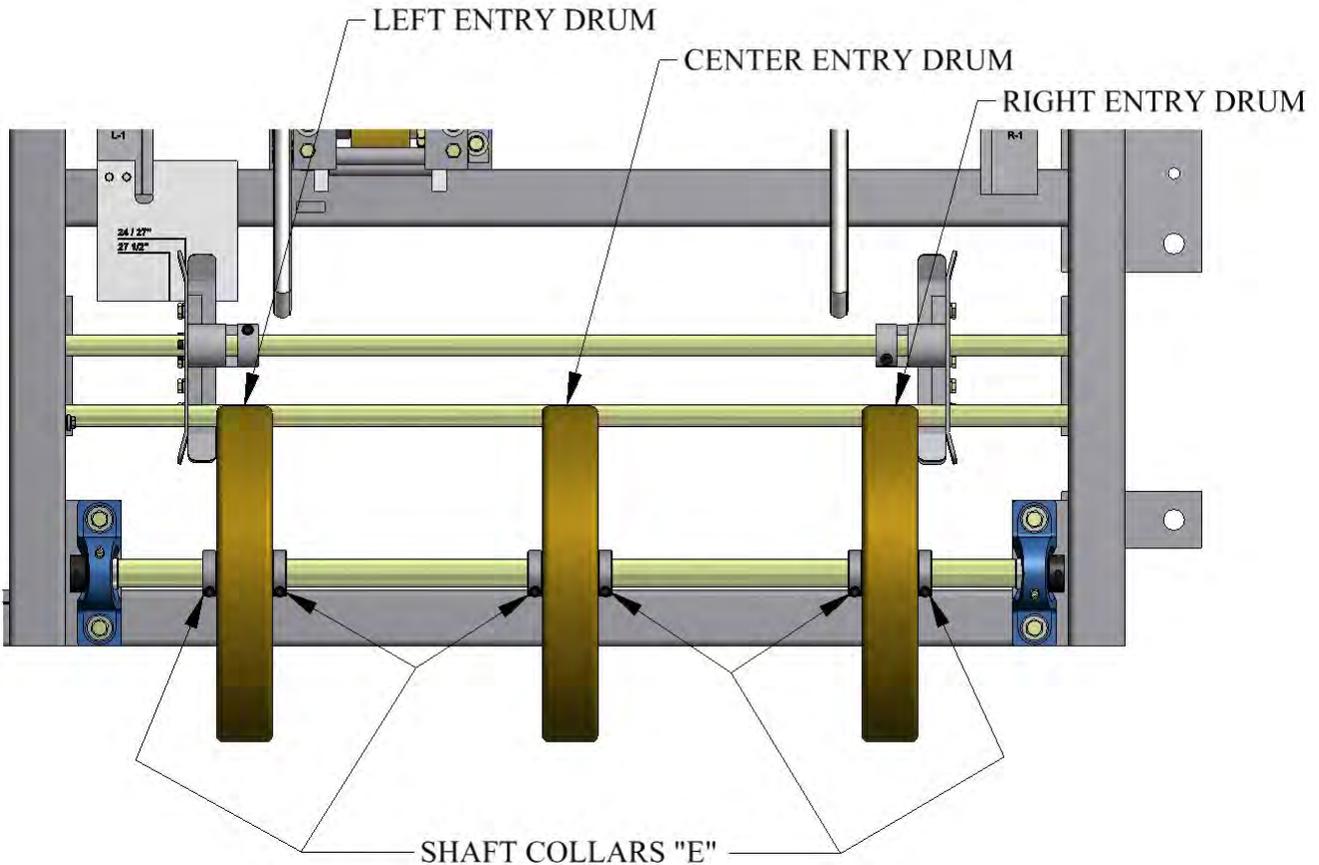


Figure 19: Entry Drum

Shear Adjustment

(Figure 20 & Figure 21)

OPERATION

Push the Shear Down button to activate the shear cycle and cut material. **IN CASE OF AN EMERGENCY: Push the SHEAR UP button during the down cycle to immediately send the shear up to the home position.**

CHAPTER 9
WIDTH CHANGE PROCEDURE

Caution: Pressing the Emergency Stop button will stop the shear WITHOUT sending the shear up.

The shear is electrically activated and hydraulically driven.

The two Top Limit Switches and single Bottom Pressure Switch control the cycle of the shear. The Top Limit Switches electronically lock out the drive system when the shear is in motion. The Bottom Pressure Switch sends the shear back up once the set pressure is reached.

CHAPTER 9
WIDTH CHANGE PROCEDURE

SHEAR ADJUSTMENTS

Bottom Shear Dies (Figure 21 - Detail A)

1. Bottom dies should be adjusted 1/32” below the bottom edge of the panel. Loosen the (2) “A” bolts on the left and right Front Vertical Plates. Loosen the (2) lock nuts on the (2) Height Adjustment bolts “B”.
2. Tightening bolts “B” will lower the shear, and loosening them will raise it. Adjust each side as needed to properly set the bottom dies to the correct spacing from the bottom corners of the panel.
3. After adjustments have been made, tighten (2) “A” bolts and (2) Lock Nuts on Height Adjustment Bolts “B”.

ADJUSTING THE ENTRY AND EXIT SHEAR DIES

1. The Entry and Exit Shear Dies must be adjusted to the proper location over the panel. This is done by centering the dies under the panel. The Exit Dies should be slightly down from the Entry Dies so that after a cut is made, the panel does not hang up on the Exit Dies. This is designed into the parts and no up and down adjustment should be needed.
2. Each Shear Die Holder is held in position by (2) “C” bolts passing through slotted holes at the bottom edge of the holder, and threaded into the Entry and Exit Shear Plates.
3. Visually sight thru the male and female entry dies. Rough align them to the forming tool “line of fire” by moving them side-to-side. If necessary, remove bolts “C” and slide the Die Holders left or right until two mounting holes are seen that will work for proper alignment, then re-install bolts “C”. **Tighten them just enough to hold the dies in position.**
4. Jog the material through the machine and stop about 2 inches from the Entry Shear Dies. Now re-sight the alignment of the Male and Female Dies to the actual legs of the panel and move them accordingly to assure the panel will pass through without hanging up. Carefully jog material through the shear dies and verify alignment by pressing down on the panel over each shear die.
5. Once alignment of the dies is achieved, Jog the material in reverse and tighten all “C” bolts. Jog the material out approximately 2”. Engage the shear to cut to 2” piece off. Inspect the cut made on this piece and the piece still in the machine by jogging it out another 2” so it can be viewed. If the cut is not satisfactory, re-adjust as necessary.

CHAPTER 9
WIDTH CHANGE PROCEDURE

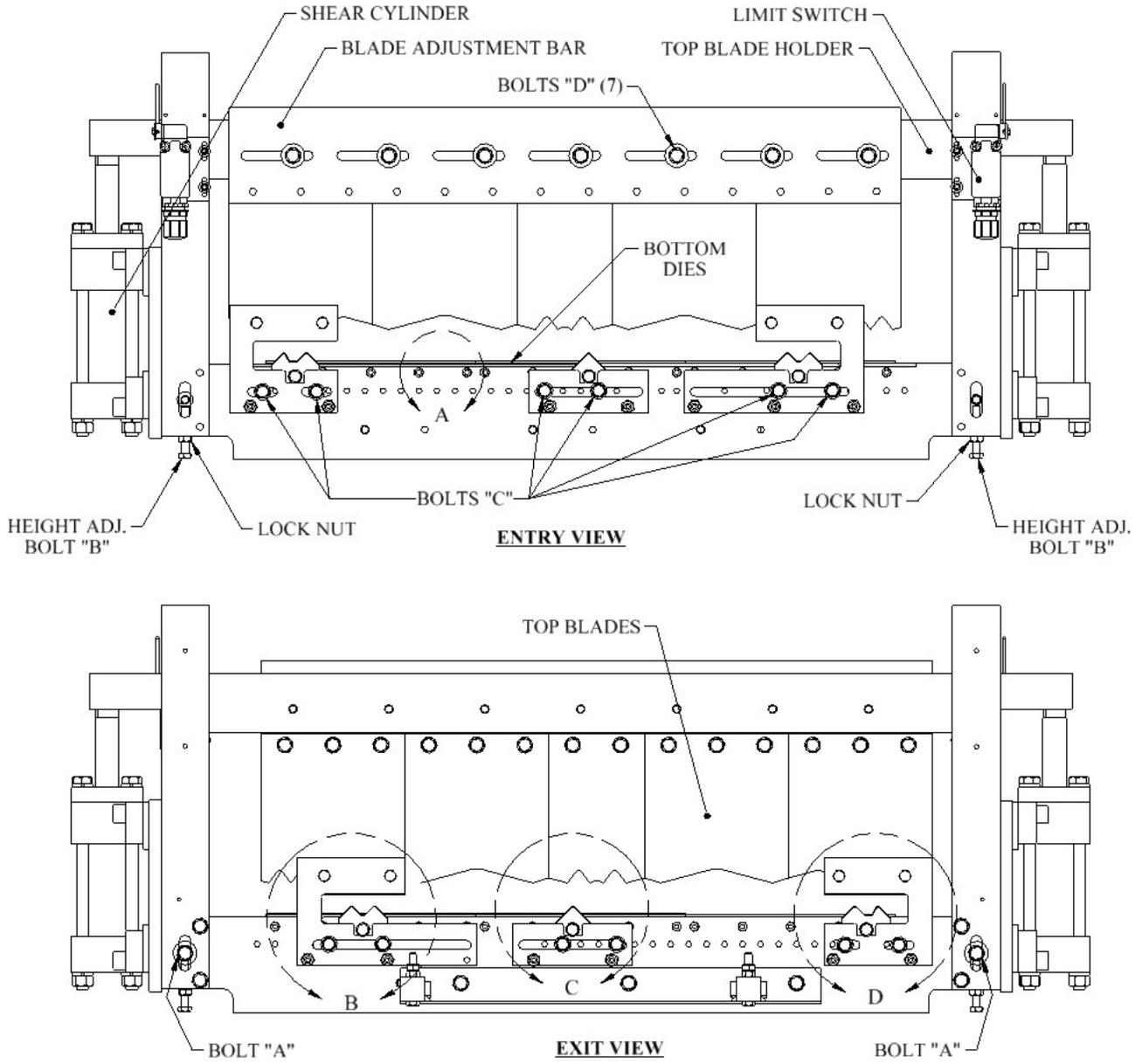


Figure 20: Shear Assembly

CHAPTER 9
WIDTH CHANGE PROCEDURE

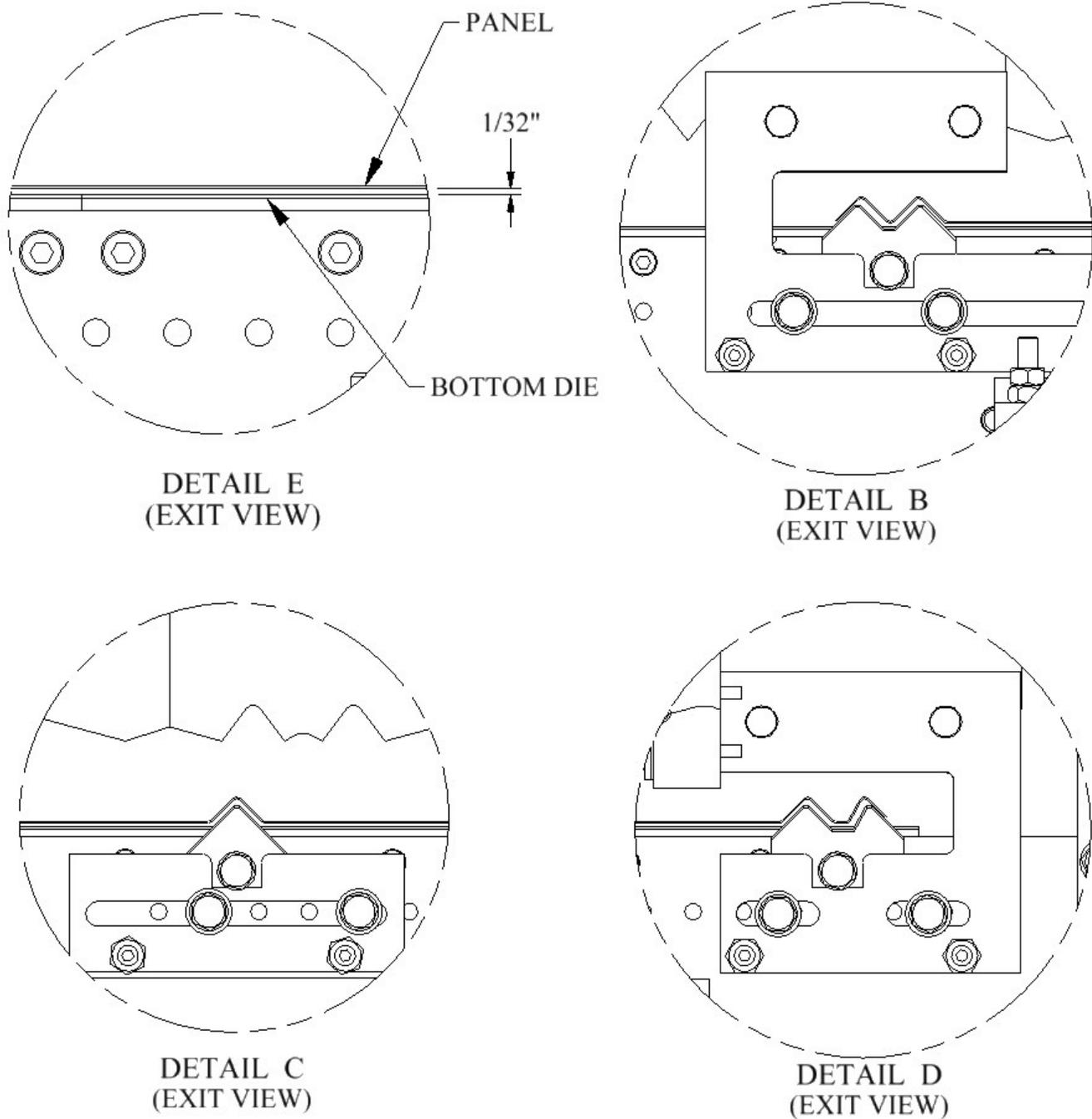


Figure 21: Shear Assembly Details

Arbor Adjustment

(Figure 9)

The coil must be positioned properly on the arbor for the material to enter the machine easily. The position of the coil on the arbor is different for 24", 27" and 27 1/2" material.

CHAPTER 9
WIDTH CHANGE PROCEDURE

Using the Reel Set Up Chart, (Figure 9), find the “D” dimension that corresponds to the profile being used. Slide the material on the arbor left or right to get the correct “D” dimension measuring from the edge of the coil to the end of the Support Bar on the Threaded Nut side.

Loading Machine with Material

1. Cut a 1” triangle off of the 2 leading corners of the coil and feed it into the entry guides as shown below.

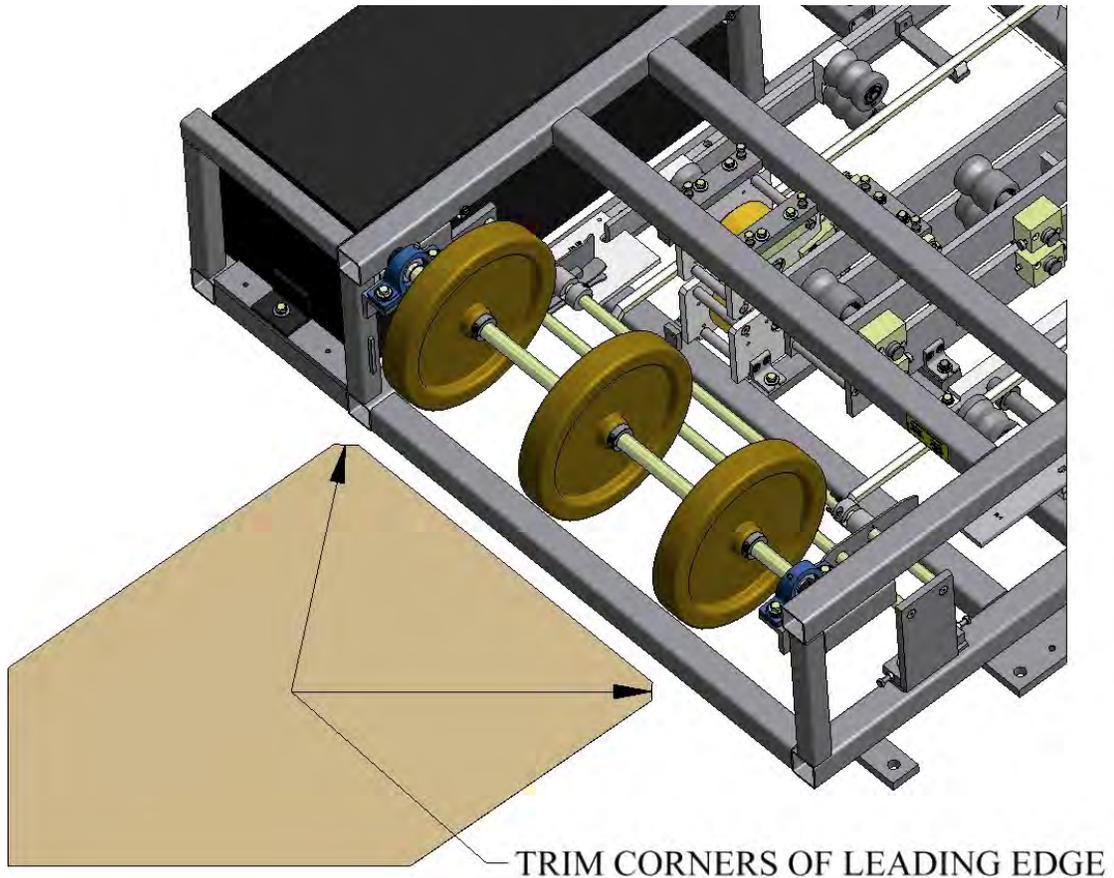


Figure 22: Feeding Material into Entry Guides

2. Start the machine and use the Jog button on the Manual Control Box or Computer, to jog the material through the machine 6 to 8 inches at a time until it exits the last forming stations, and the leading edge is about 1” from the Shear Assembly

SHUT THE MACHINE DOWN BEFORE PROCEEDING.

Visually sight through the shear assembly to ensure that the material is in line with the shear dies. If the shear dies need to be adjusted left or right, see

CHAPTER 9

WIDTH CHANGE PROCEDURE

3. SHEAR ADJUSTMENTS section on page 33.
4. After the shear is adjusted in line with the material, start the machine and carefully jog the material through the shear assembly. Press the Shear Down button to cut off the leading edge of material and the machine is now ready to run panels.

CHAPTER 10
MACHINE ADJUSTMENT

MACHINE ADJUSTMENT

The L8, R8 and corresponding center roller assembly are set from the factory with a clearance of .035” and shouldn’t need to be adjusted. The last stations in the machine, L9, R9 and corresponding center roller assembly can be adjusted to change uphill and downhill.

Unlike most panel machines, the 5VC machine should be adjusted so that the panel runs slightly downhill. When the panel is laid flat on a surface it will flatten out and any oil canning should disappear. If the panel is run out from the machine with no downhill and laid on a flat surface, the edges of the panel will lift up away from the surface.

ADJUSTMENT PROCEDURE

(Figure 23)

The following adjustments are sensitive. Only make adjustments in small increments then run a test panel and readjust as necessary.

To adjust the upper rollers on the L9 and R9 stations:

1. Loosen the 5/16 Set Screw “A”.
2. Insert a punch or allen wrench into the hole on the Eccentric Roller Shaft and rotate the shaft.
 To increase downhill, rotate the shaft towards the shear.
 To decrease downhill, rotate the shaft away from the shear.
3. While holding the Eccentric Roller Shaft in the desired position, tighten Set Screw “A”.

To adjust the last station on the Center Roller Assembly:

1. Loosen the 5/16 Set Screw “B”.
2. Insert a punch or allen wrench into the hole on the Eccentric Roller Shaft and rotate the shaft.
 To increase downhill, rotate the shaft towards the shear.
 To decrease downhill, rotate the shaft away from the shear.
3. While holding the Eccentric Roller Shaft in the desired position, tighten Set Screw “B”.

CHAPTER 10
MACHINE ADJUSTMENT

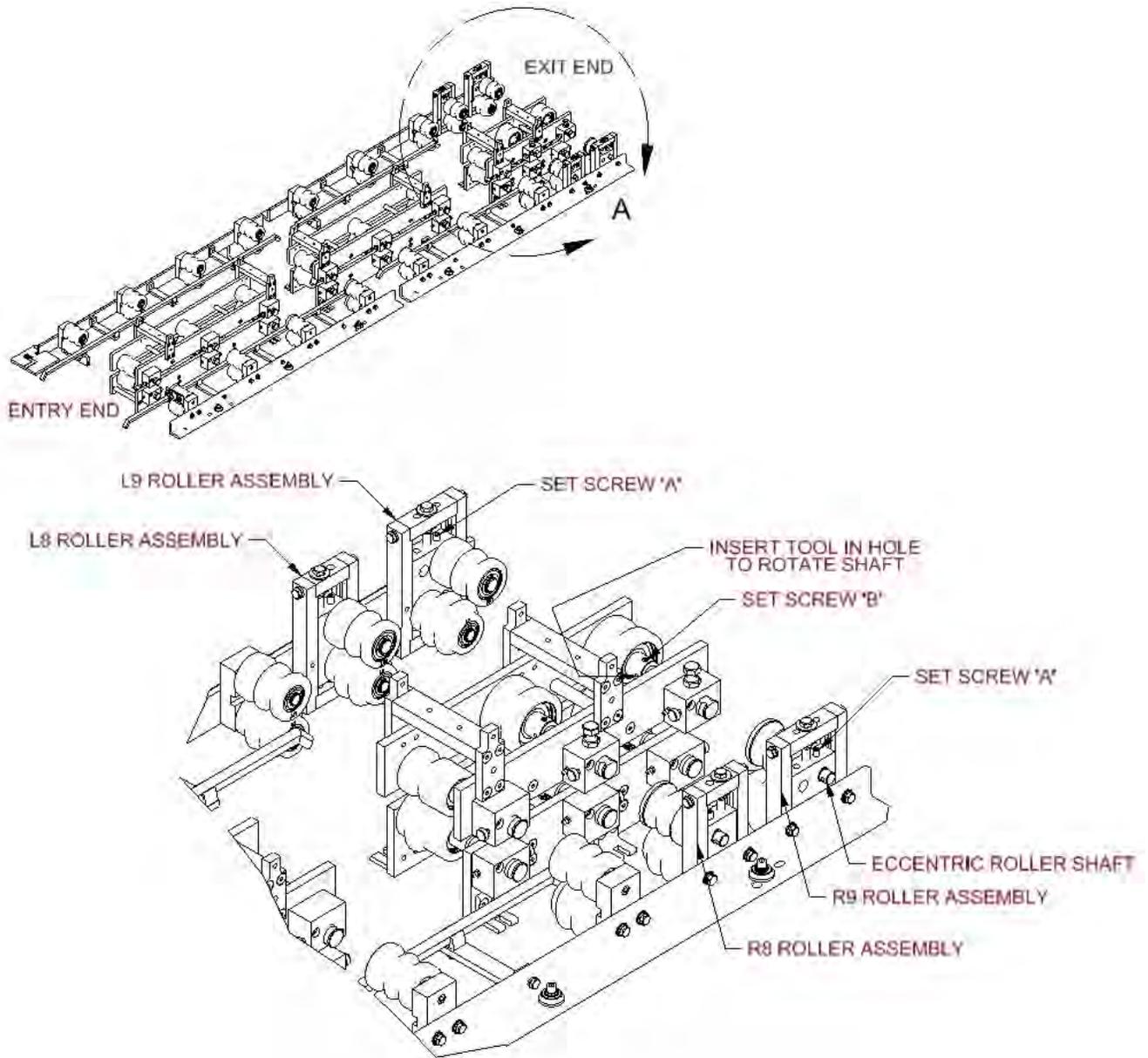


Figure 23: Downhill Adjustment

CHAPTER 10
MACHINE ADJUSTMENT

CUSTOMER NAME: _____	SERIAL NO: _____
SALES ORDER #: _____	COMPUTER S/N: _____
CIRCLE ONE: QCPP-E-1 QCPP-E-3 QCPP-E-4 QCPP-E-5 QCPP-E-6	
24"	27 1/2"
ENTRY GUIDE R _____ L _____	R _____ L _____
LEFT RAIL _____	_____
RIGHT RAIL _____	_____
1 & 2 _____	_____
SHEAR R _____	L _____
L-8 ECCENTRIC →  _____	L-8 ECCENTRIC →  _____
_____  ← L-9 ECCENTRIC	_____  ← L-9 ECCENTRIC
R-8 ECCENTRIC →  _____	R-8 ECCENTRIC →  _____
_____  ← R-9 ECCENTRIC	_____  ← R-9 ECCENTRIC
C-8 ECCENTRIC →  _____	C-8 ECCENTRIC →  _____
_____  ← C-9 ECCENTRIC	_____  ← C-9 ECCENTRIC
TOP CENTER TO BOTTOM ROLLER GAPS _____	
NOTES: _____	

Figure 24: 5VC Setup Sheet

CHAPTER 10
MACHINE ADJUSTMENT

ROLLER SYSTEM AND PANEL PROFILE DRAWINGS

ROLLER SYSTEM AND PANEL PROFILE DRAWINGS

L-LEFT T-TOP
R-RIGHT B-BOTTOM

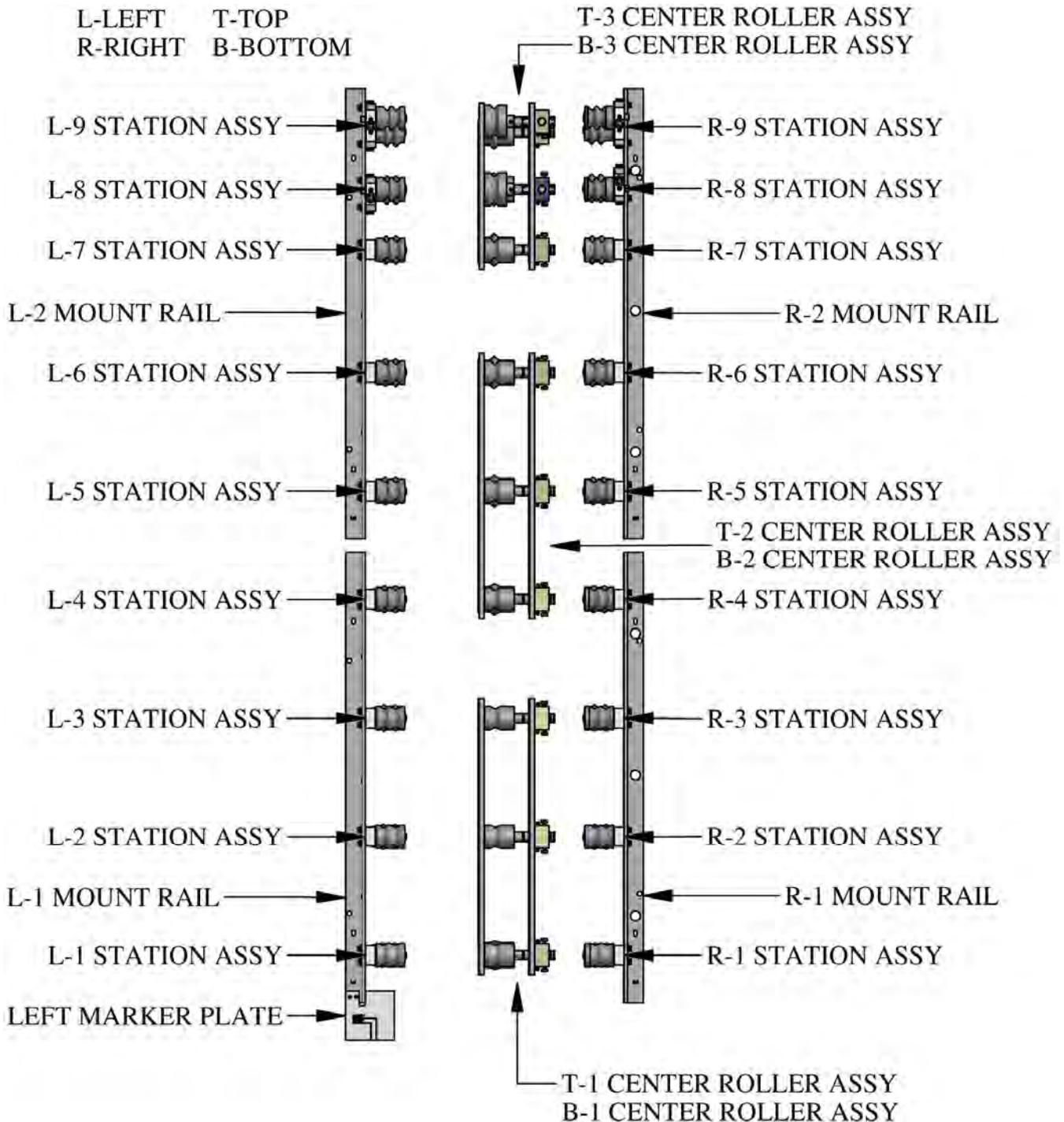


Figure 25: 5VC Roller System

ROLLER SYSTEM AND PANEL PROFILE DRAWINGS

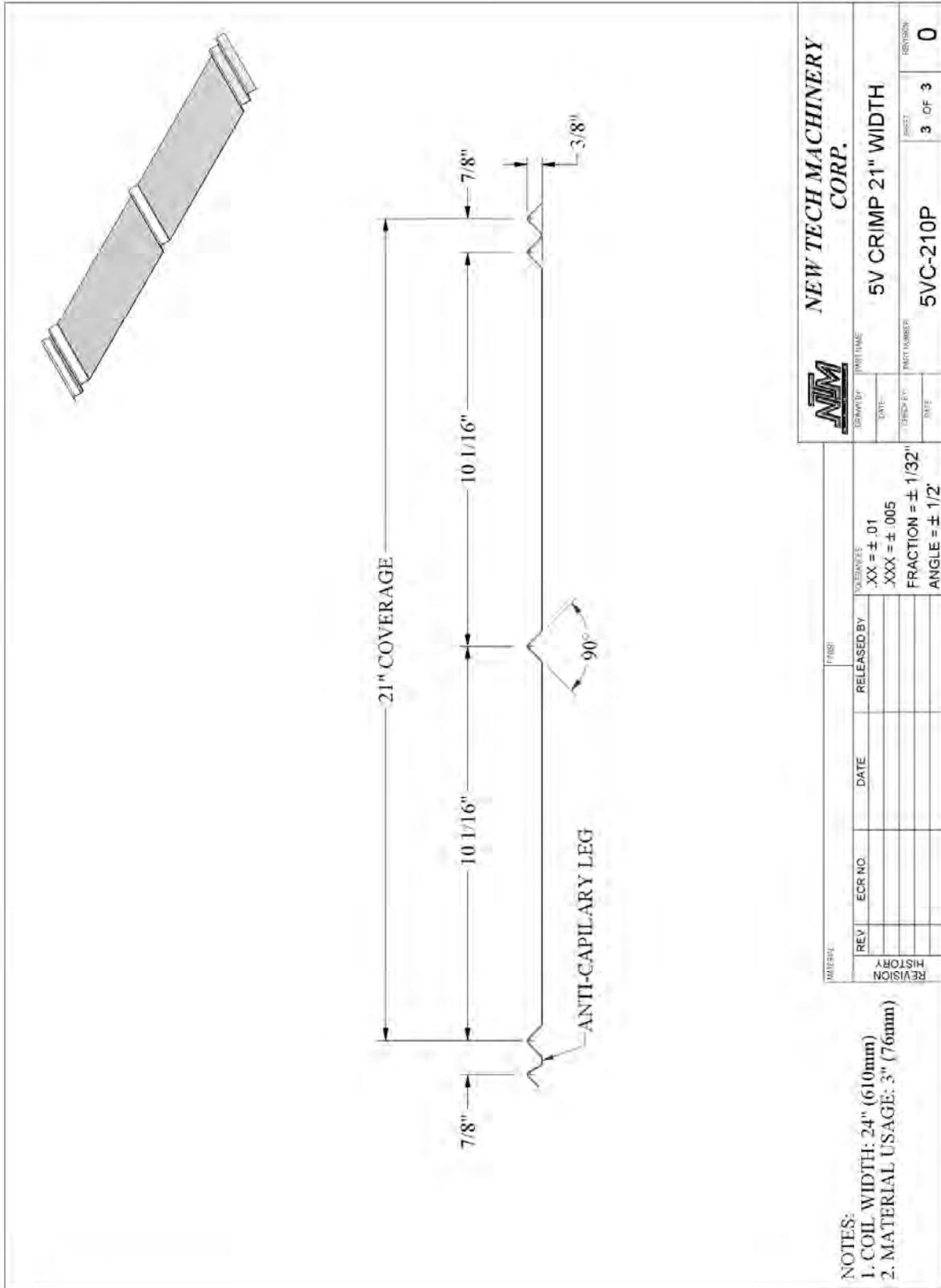


Figure 26: 5VC 21" Width

ROLLER SYSTEM AND PANEL PROFILE DRAWINGS

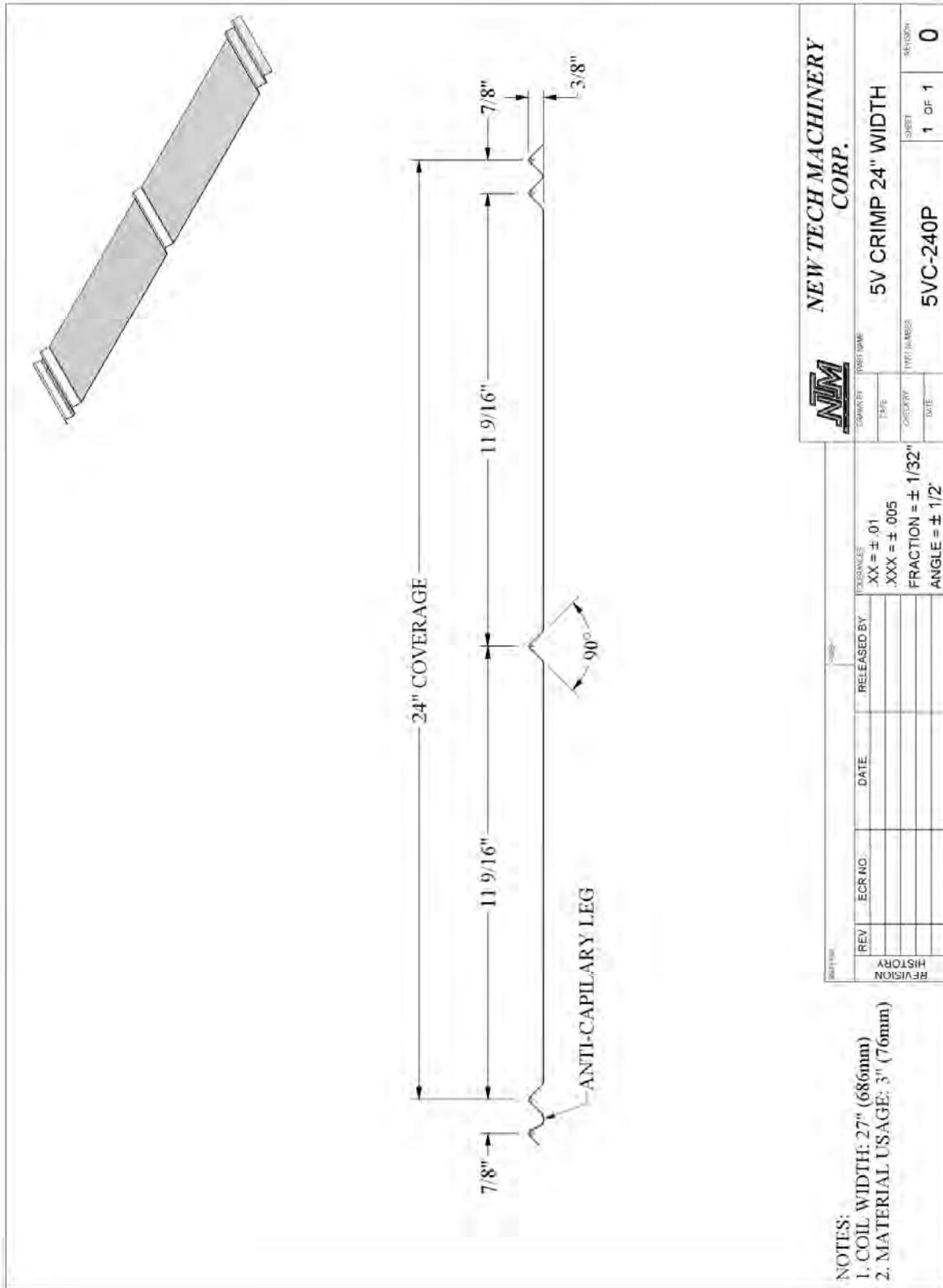


Figure 27: 5VC 24" Width

ROLLER SYSTEM AND PANEL PROFILE DRAWINGS

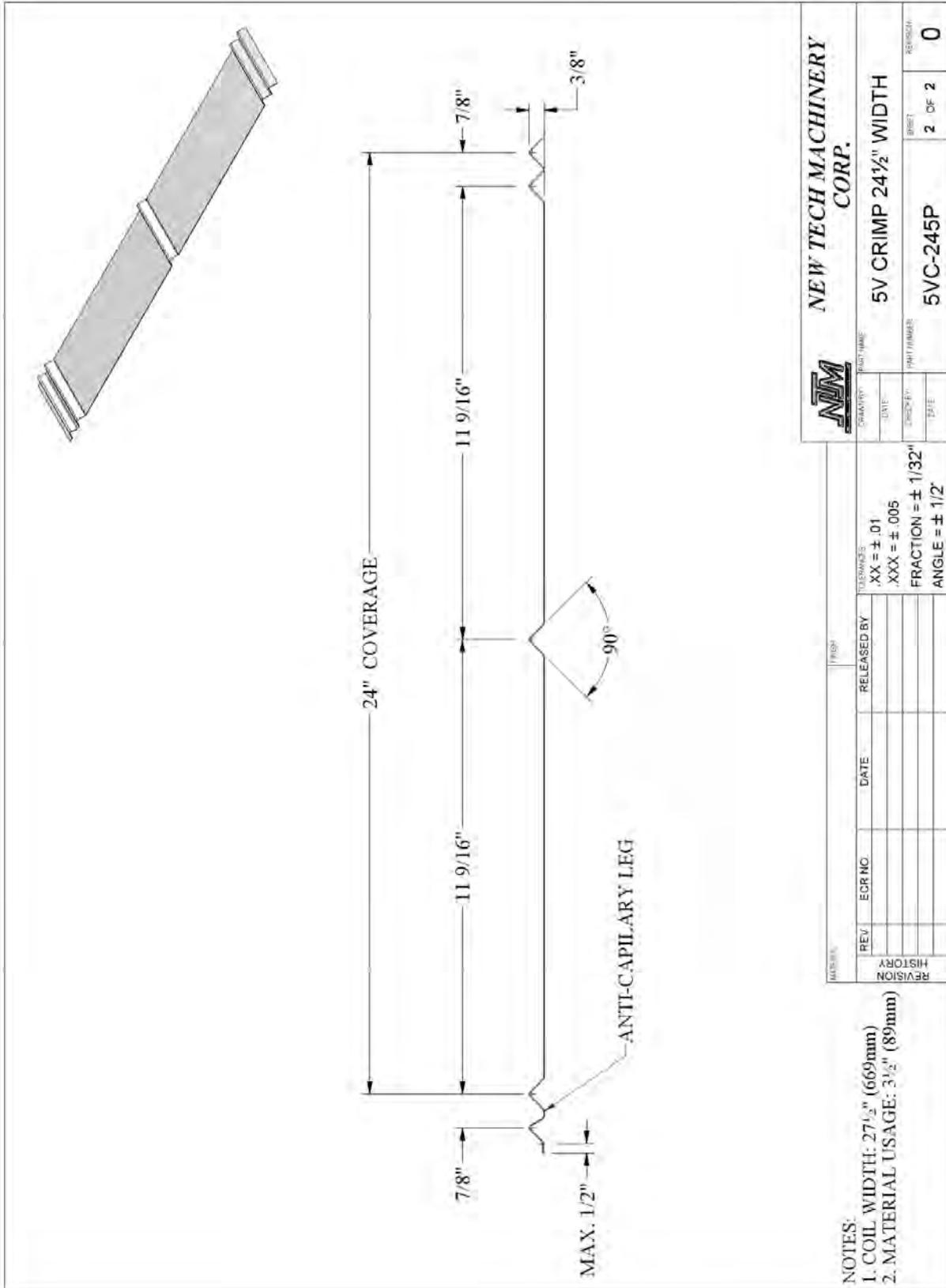


Figure 28: 5VC 24 1/2" Width

CHAPTER 11
RUN OUT TABLE AND REMOTE LIMIT SWITCH

RUN OUT TABLES AND REMOTE LIMIT SWITCH

The Run-Out Table attaches to the Exit End of the Shear assembly and are used to support the panel as it exits the machine. The Run-Out Tables are available in 10 ft. long sections that fasten together and have adjustable legs so they can be set to the correct height. The Remote Limit Switch (Figure 6) is designed to be used with the run out tables for controlling panel length.

RUN-OUT TABLE SETUP

(Figure 29 & Figure 30)

1. Place the first Run-Out Table on its side and in front of the machine with the leg assembly away from the shear.
2. Open the leg assembly and set it upright on the ground.
3. Lift the attachment end of the table and drop the Mounting Holes “B” over the (2) Mounting Lugs “A” on the Shear Run-Out Table Bracket.
4. Loosen the 2 knob-handles on the leg assembly and allow the legs to fall free. Sight the height of the table on the left and right side adjusting it level to the machine using the knob-handles to lock the legs in place.
5. Repeat the above procedures for each succeeding table and attach it to the bracket on the end of the previous table.

CHAPTER 11
RUN OUT TABLE AND REMOTE LIMIT SWITCH

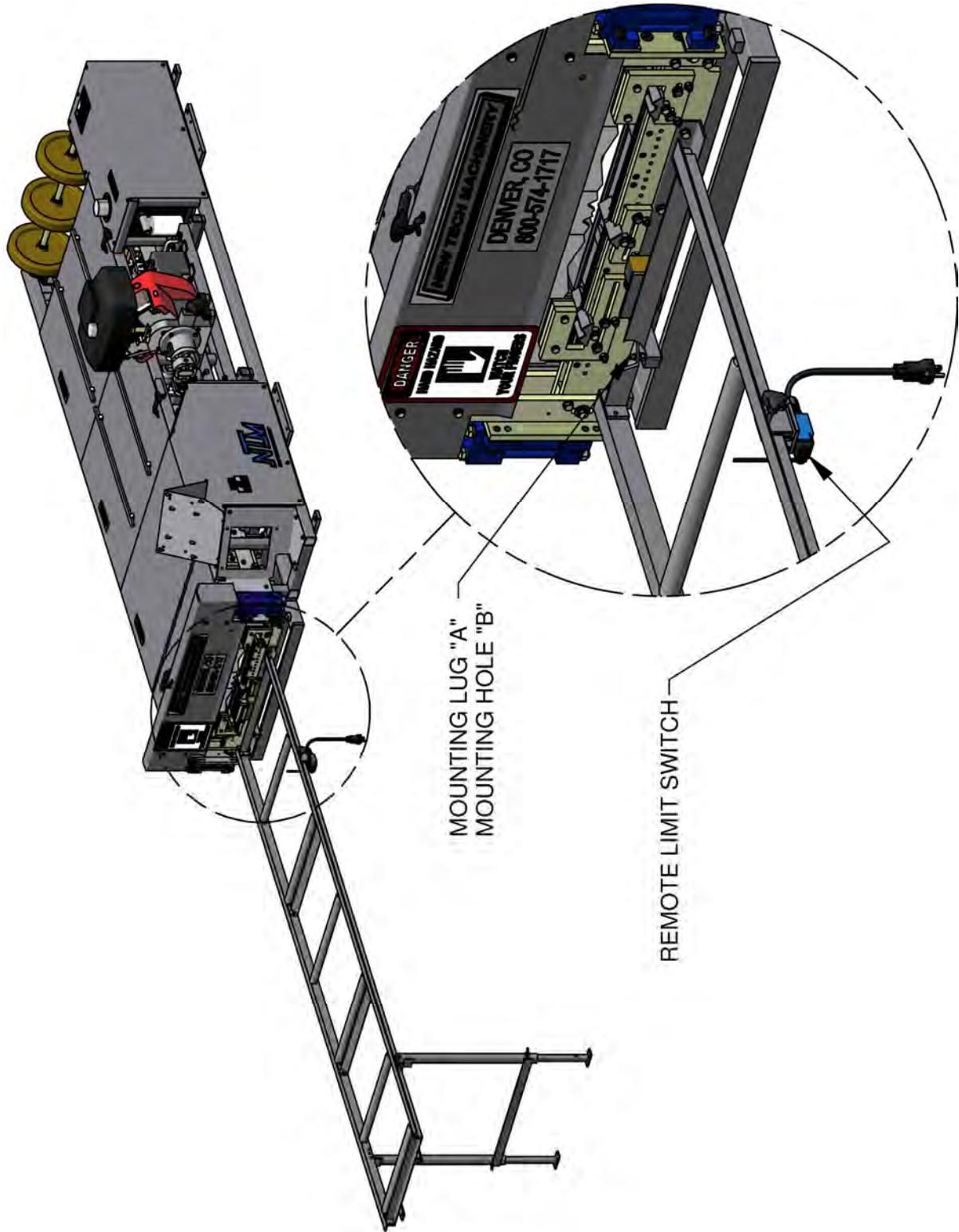


Figure 29: Run Out Table

CHAPTER 11
RUN OUT TABLE AND REMOTE LIMIT SWITCH

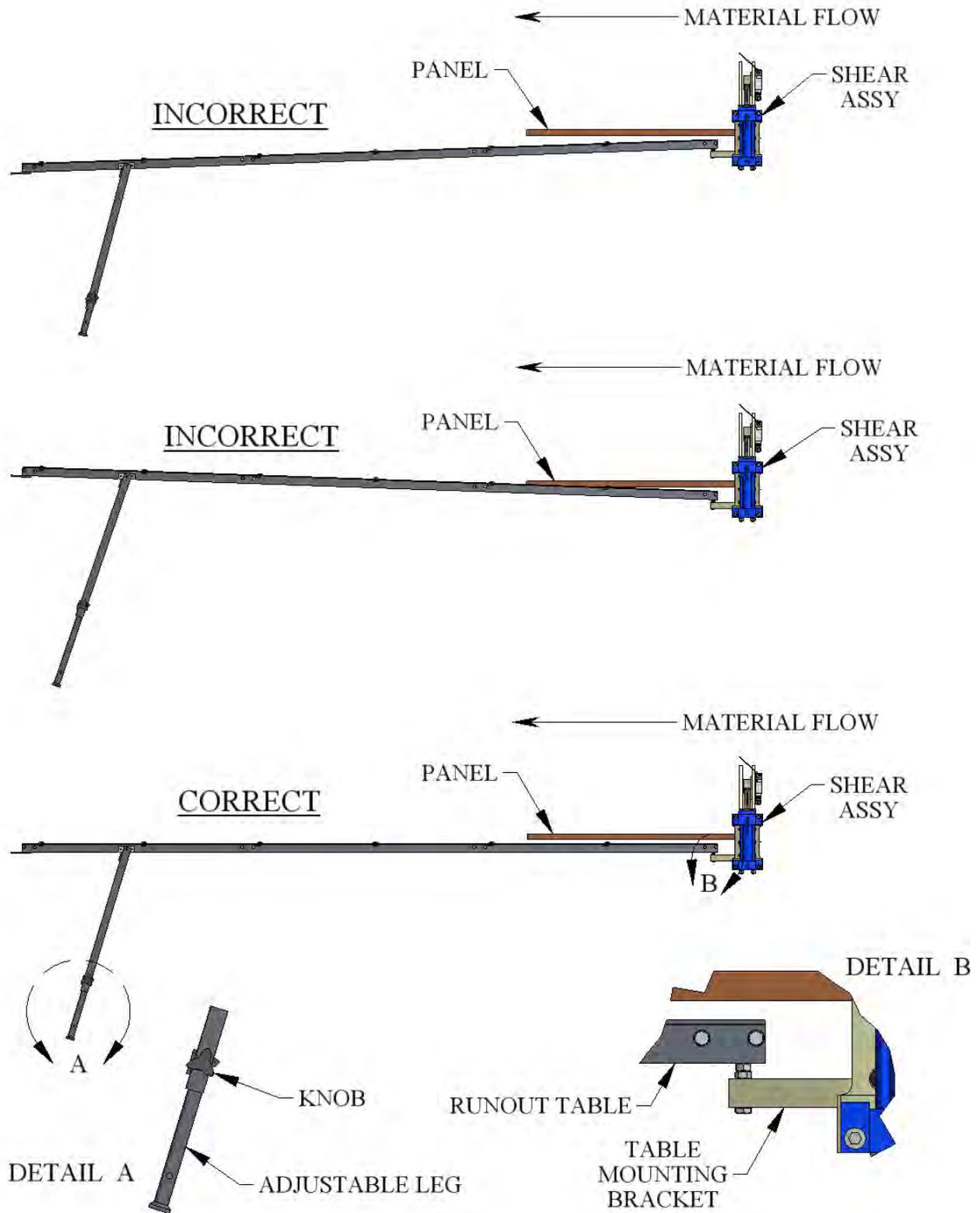


Figure 30: Run Out Table Setup

CHAPTER 12
QUICK CHANGE POWER PAC

QUICK CHANGE POWER PAC

The Quick Change Power Pac for the machine allows a change from one power source to another very quickly. For example, it is useful to run their machine at the jobsite with a gas engine and use it in a factory or indoor setting as well. **It requires two people to lift the Power Pac out of and into the machine.**

POWER PAC REMOVAL

(Figure 31)

1. Remove the screws holding the Left Cover on the machine. Set cover aside.
2. Separate the Male /Female Connectors of the Main Communication Cable by unscrewing them from each other.
3. Remove Bolts "B" and uncouple the hydraulic pump from the motor-pump adapter. Remove the coupling insert found inside the motor-pump adapter and set aside.
4. Using a 9/16" wrench, remove the two "A" bolts.
5. Using the two handles, lift the Quick Change Power Pac out of the machine.

Install new Power Pac in reverse order.

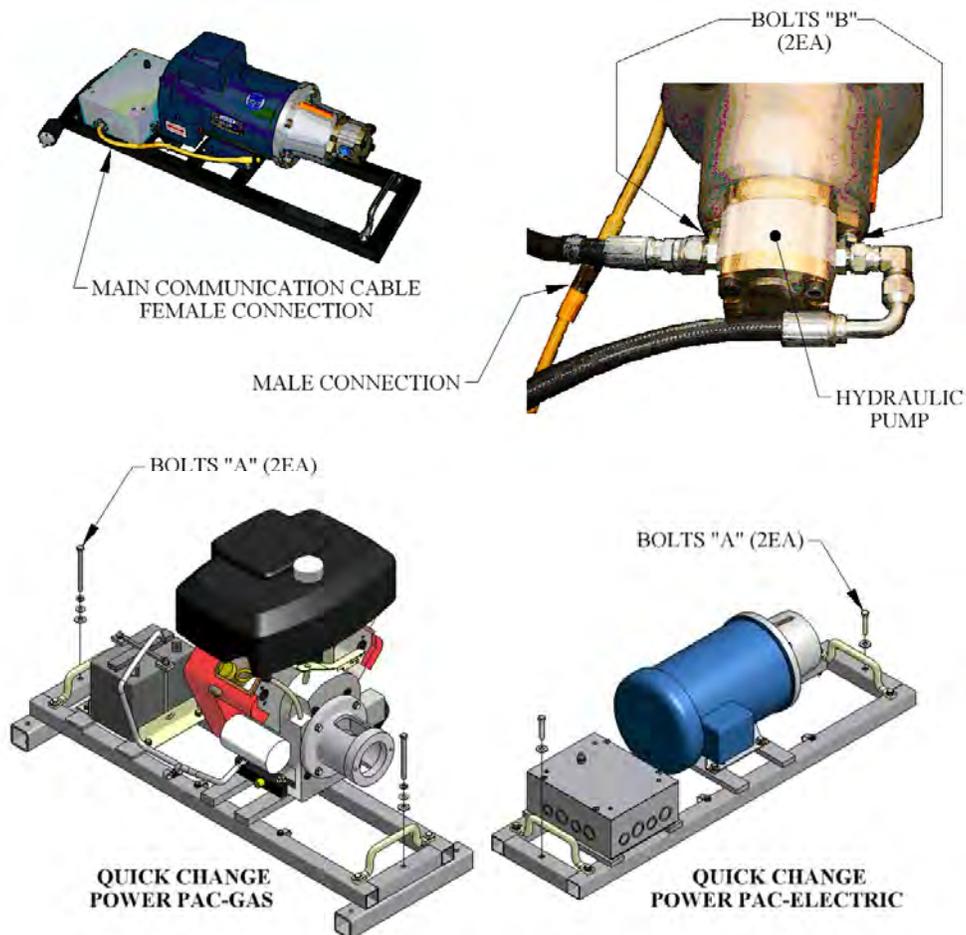


Figure 31: Quick Change Power Pac

CHAPTER 13
TROUBLESHOOTING

TROUBLESHOOTING

The hydraulic system operates the Shear and Drive assemblies. They are interfaced together and electronically activated. The hydraulic system pressure is factory set at 2000 psi and should not be changed. Some of the common problems that occur and their solutions follow below.

1. Shear travels to the bottom of the stroke and does not return to the top of the stroke. The hydraulic system continues laboring and pushing the Red Shear Up Button does not return it to the top of stroke.

SOLUTION: Adjust the pressure switch (Figure 32) by turning the silver knurled sleeve "A" **counterclockwise** until the shear goes up. **NOTE:** If the sleeve is turned too far CCW, problem #2, below, will be seen on the next cut made.

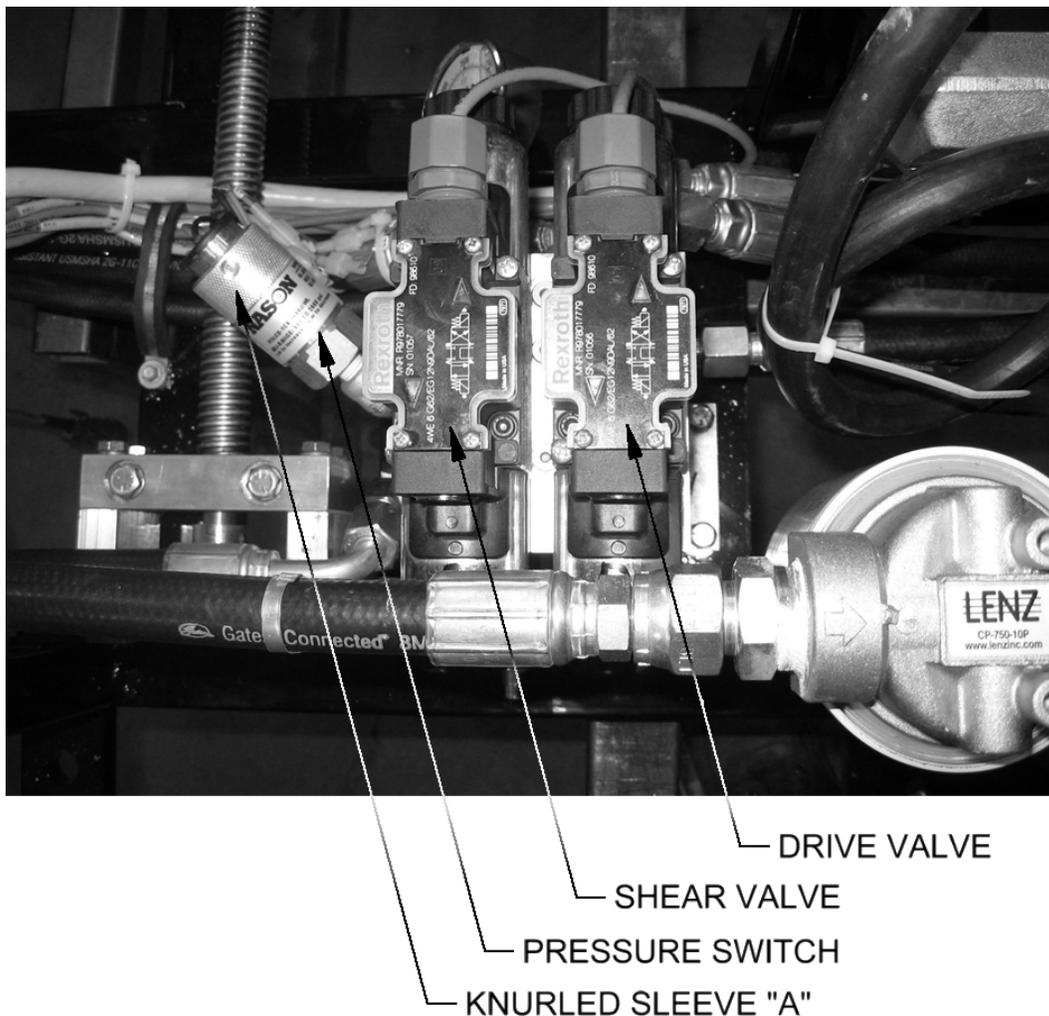


Figure 32: Pressure Switch Adjustment

CHAPTER 13
TROUBLESHOOTING

2. **Shear travels to the bottom of the stroke and returns to the top of the stroke without cutting the panel completely through.**

SOLUTION: Press and hold the Green Shear Down Button until the panel is cut off. Remove the cut panel and jog material out 2 or 3 inches past the shear. Adjust the pressure switch (Figure 32) by turning the silver knurled sleeve "A" clockwise 1/8 of a turn. Press the Shear Down Button again. Check to see if the panel is cut off completely. If not, repeat this procedure until the cut is made with one stroke of the shear. **NOTE:** If the sleeve is turned too far CW, problem #1, above, will be seen on the next cut made.

3. **Shear is at the top of the stroke, the hydraulic system continues laboring and the next panel cannot be run.**

SOLUTION: Remove the Shear Cover. Lift the arms "A" on the limit switches (Figure 34) one at a time. If one of them stops the hydraulic system laboring then that Limit Switch arm needs to be adjusted. If neither of them stops it, lift both arms at the same time to see if it stops. If it does then both arms need adjusting. **ADJUSTMENT:** Tape one or both Limit Switch Arms "A" to the Top Shear Bar "B". Loosen Hex Nut "C" until spring tension is released. Using a small flat tipped screwdriver, turn Slotted Stud "D" toward the entry end of the machine until a click is heard and stop. Repeat this process a few times so that the adjustment can be stopped right when the click occurs. While holding this position, tighten Hex Nut "C" to lock in adjustment. Adjust one or both sides as required from test above. Start the engine. If the adjustment/adjustments were done correctly, the hydraulic system should no longer be laboring and the next panel can be produced.

CHAPTER 13
TROUBLESHOOTING

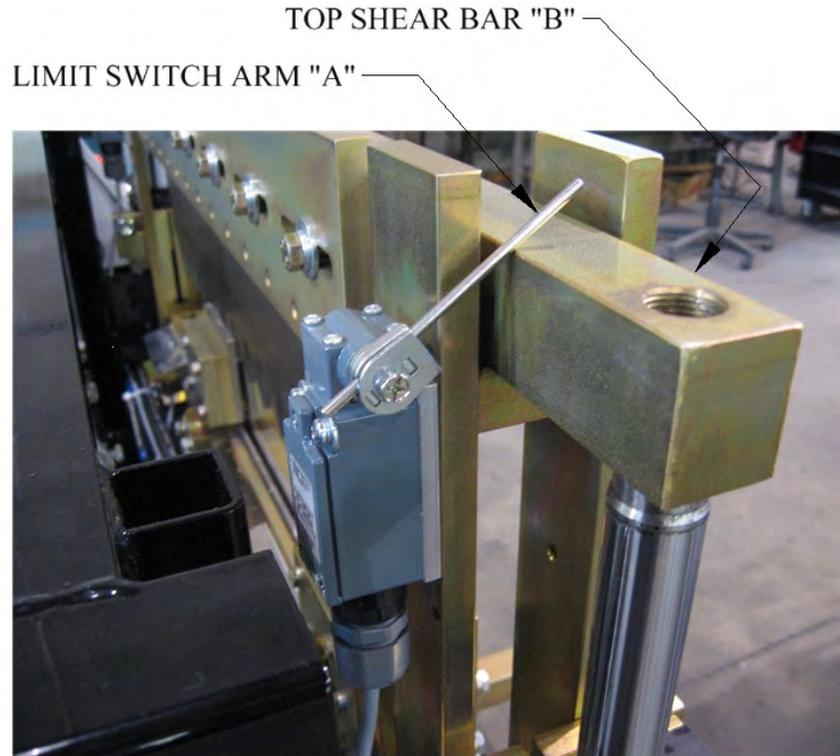


Figure 33: Top of Stroke Limit Switch

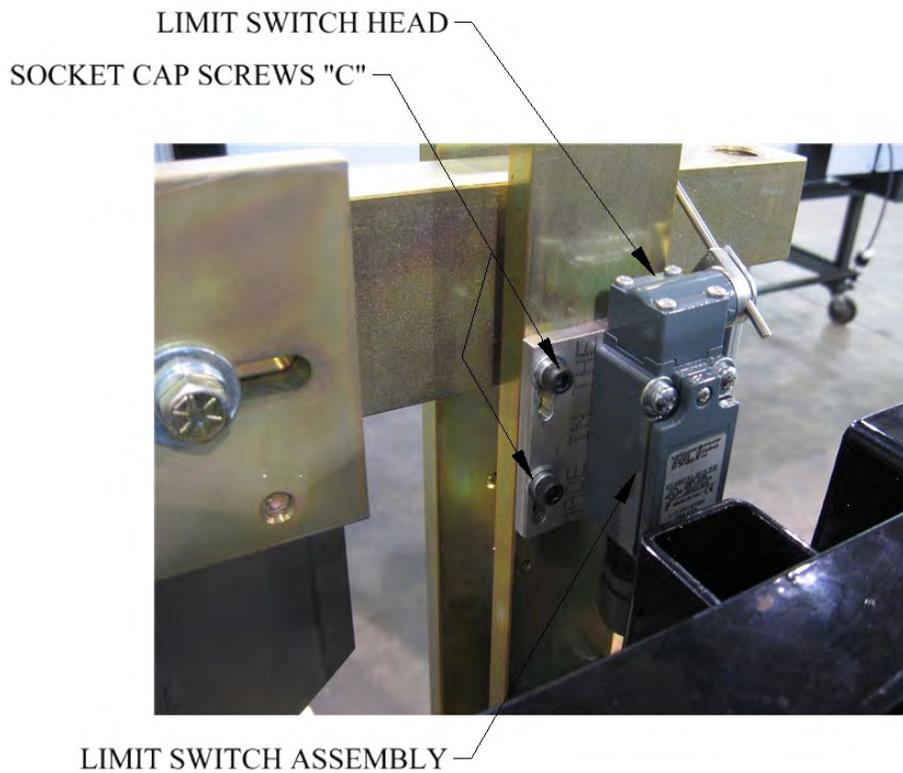


Figure 34: Limit Switch Adjustment

CHAPTER 13
TROUBLESHOOTING

4. Manual Control Panel buttons do not work.

SOLUTION #1: Check fuse inside of Manual Control Box. Replace if blown with a 10-amp time delay fuse (Figure 7 on page 15).

SOLUTION #2: If the machine is equipped with a gasoline engine, check the condition of the battery. The control system requires 12 volts to operate properly. Replace or charge battery as required.

APPENDIX A
PLC CONTROLLER

PLC CONTROLLER



Figure 35: PLC Assembly



Figure 36: Serial Number Plate

APPENDIX A

PLC CONTROLLER

Home

When the controller is turned on, it will automatically go to the home screen.

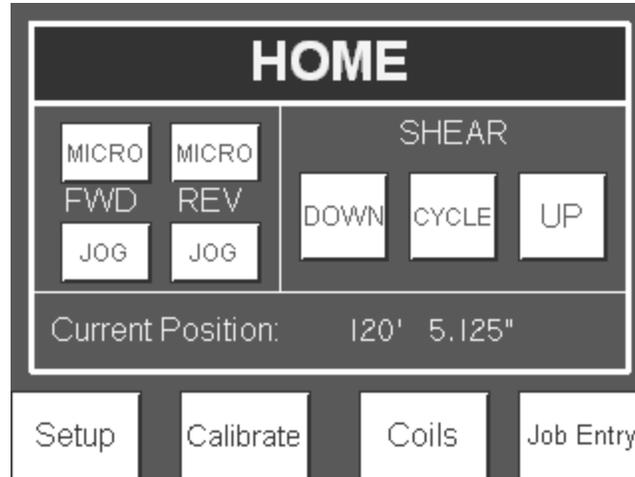


Figure 37: Home Screen

Manual Operation

The machine can be manually operated from the home screen by pressing the Jog and Shear buttons.

JOG:

FWD and REV JOG buttons will jog the machine forward and reverse as long as the button is depressed. When the JOG buttons are released, the action will stop. The FWD and REV MICRO buttons will jog the material approximately ¼" each time the button is pressed.

SHEAR:

The shear UP and DOWN buttons are momentary and will act in a similar manner as the jog buttons. The SHEAR CYCLE button only needs to be pressed once and the shear will go to the bottom of the stroke and back up to the top. At any time during the shearing cycle, the UP button on the display or red stop button next to the screen can be pressed to return the shear to the top. CAUTION: The shear will stop **without** returning to the top if the E-Stop pushbutton on the manual control box below the PLC is pressed. This button shuts off all power to the machine and machine controls. Upon start-up, the shear will return to the top.

Automatic Operation

The pre-run sequence must be completed in the correct order before automatic operation can be utilized.

Pre-Run Sequence:

APPENDIX A
PLC CONTROLLER

1. Jog the material forward using the manual FWD JOG or MICRO buttons on the Home screen or the JOG switch at the entry end of the machine. The material must exit the shear and be detected by the panel detection sensor.
2. Shear the material using the Shear Cycle button. At that point, the machine will be fully loaded with material, the length counter will be reset and the controller will be ready to run in automatic mode.

If the machine goes forward or reverse and the encoder does not detect movement, the pre-run sequence will be reset and the controller will not run in automatic mode. This would happen if the material was cut at the entry end of the machine at the end of a job or at the end of a coil. This could also happen if the encoder did not have proper tension on the material.

Job Entry

Jobs can be programmed to run automatically. From the Home screen, press the Job Entry button to enter the Job Entry Screen.

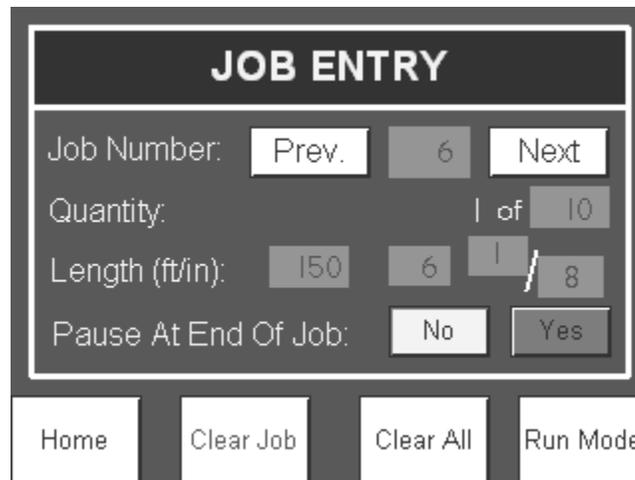


Figure 38: Job Entry Screen

Programming Jobs

The controller can store up to ninety nine jobs or lengths, called: Job Numbers. Press the Previous and the Next buttons to change the Job Number. The Job Number display is also an input in order to skip many jobs at a time. Press the Job Number display and enter the desired job number to program or run.

Enter in the quantity of parts to run and the length of the part.

Specify if the machine will pause at the end of job. If Yes is selected, the machine will stop after the job is done running. The user can then press Start to run the next job or return to the Job Entry. If No is selected, the machine will run the current job and automatically start running the next job. If yes is selected and there is no job programmed after the current job, the controller will stop and return to the Job Entry screen.

APPENDIX A
PLC CONTROLLER

Clear Jobs

To clear the current job on the screen press Clear Job. To clear all the jobs in the controller, press Clear All. The next screen will confirm the Clear All command; press Yes to clear all jobs.

Auto Run

Press the Run Mode button to run the jobs that are programmed. Type in the job number to run first (if different than the job that was just programmed).

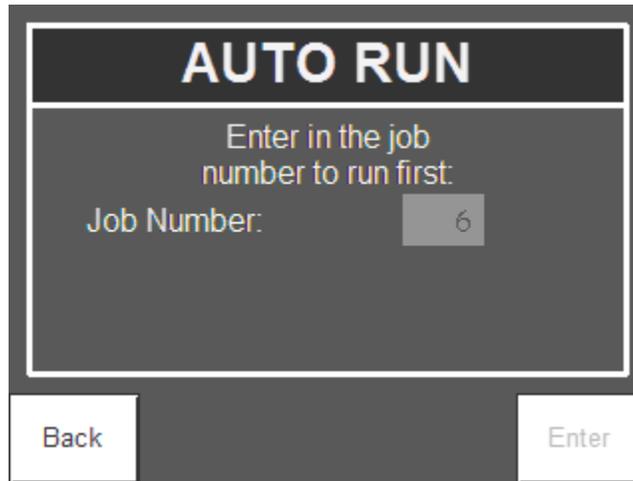


Figure 39: Specify Job to Run First

Then hit Enter to continue to the Auto-Run mode.

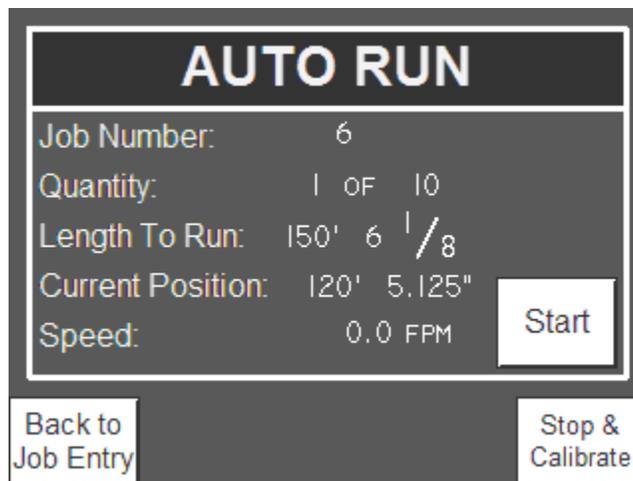


Figure 40: Auto-Run Screen

Automatic Operation

In the Auto Run screen, the current job and progress are displayed. Press the Start button to begin running the job. When the current job is complete the next job will start if the No button for pause was pressed for the current job. If the Yes button was pressed for pause

APPENDIX A
PLC CONTROLLER

or if there is no next job programmed, the controller will return to the Job Entry screen after the current job is completed.

On the Fly Calibration

The controller can be calibrated at any time while the machine is running to improve accuracy of the parts being run. If the machine is consistently making parts too short or too long, press Stop & Calibrate to bring up the Calibration screen.

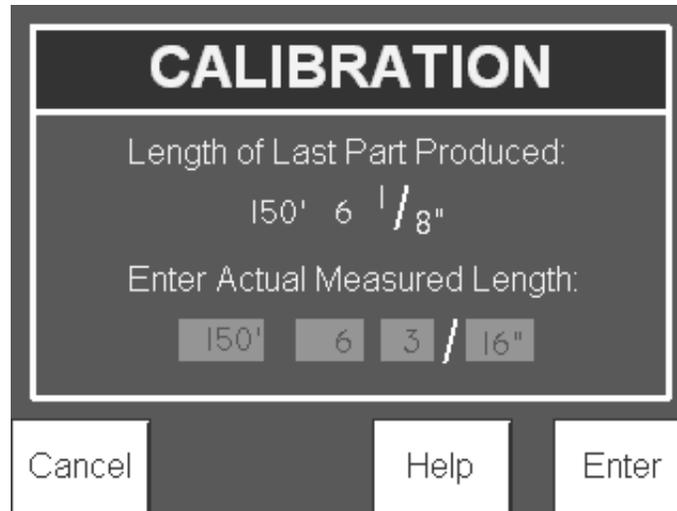


Figure 41: Calibration Screen

The length of the last part will automatically populate to the length that the controller ‘thought’ was run. Measure the length of the part, enter in the actual measured length and press Enter to re-calibrate the controller. Or press cancel to return to the Auto-Run screen. Press Start on the Auto-Run screen to continue operation.

Calibration

The controller can also be calibrated from the Home screen by pressing the Calibrate button. On the calibration screen, enter in the desired part length to use to calibrate the controller. A length of over 12” is required and a length of 36” or more is recommended. Press the Start button to run the specified part.

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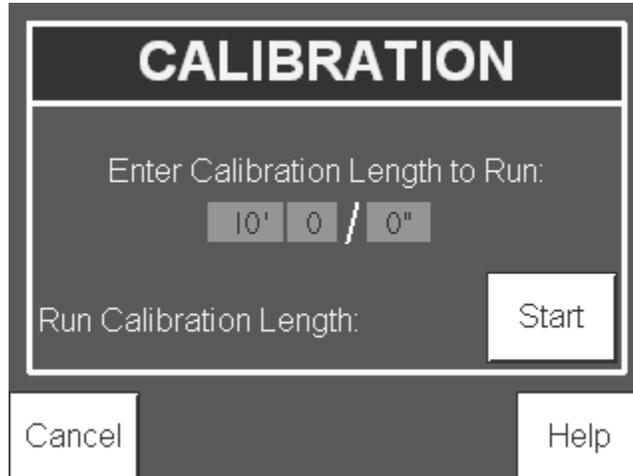


Figure 42: Calibration Screen

The controller will display the theoretical length of the part after it is produced. The theoretical length may be slightly different than the intended calibration length due. Measure the length of the part and input the length in the Actual Measured Length fields. Press Enter to re-calibrate the controller or Cancel to return to the Home screen without making any changes to the controller.

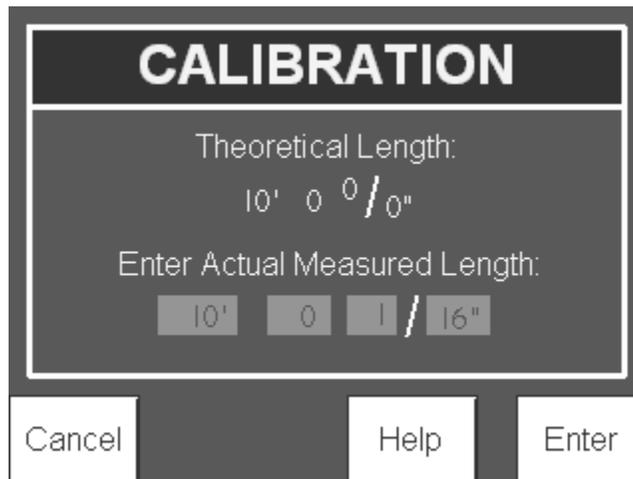


Figure 43: Calibration Screen

Setup:

From the Home screen, press the Setup button to make setting changes to the controller.

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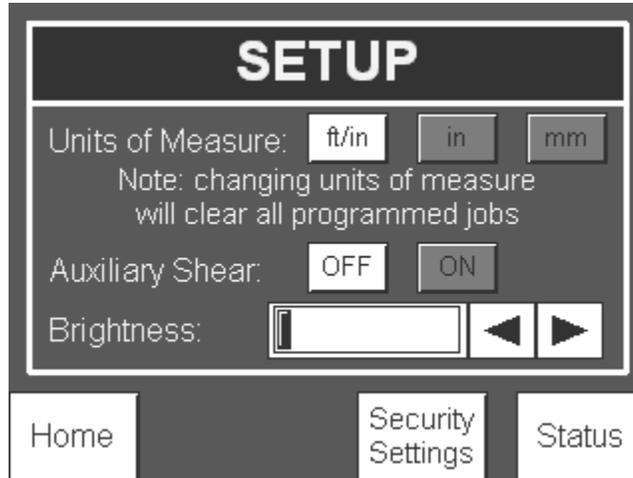


Figure 44: Setup Screen

In the Setup screen, the Units of Measure can be changed to Imperial units in either feet and inches (ft/in) or only inches (in) or Metric units (mm).

Example:

ft/in: 10' 4 1/16"
in: 124 1/16"
mm: 3,151mm

The shear operation can be turned on and off if an auxiliary shear such as the Swenson Snap Table will be utilized.

The brightness of the display can also be adjusted up or down by pressing the right and left arrow buttons.

Status/Diagnostics:

In order to help troubleshoot the machine, press the Status button found on the setup screen to bring up the status of the machine as seen from the controller.

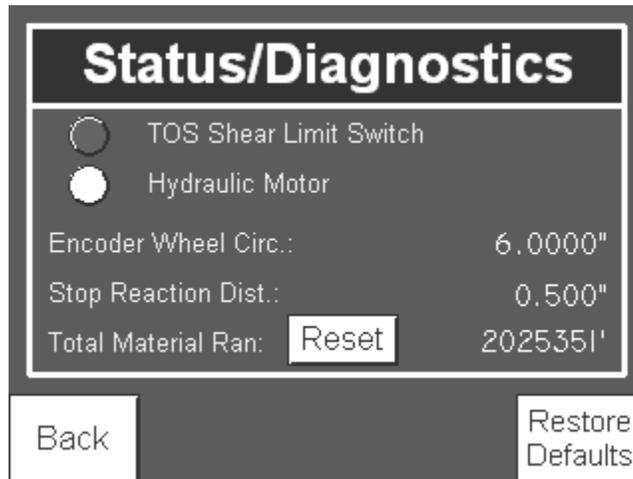


Figure 45: Status Screen

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The Status 1 screen shows the condition of the Hydraulic Pressure Switch and the Top of Stroke Limit Switch. If one or both of the TOS Shear Limit Switches are not activated the TOS Shear Limit Switch light will be on. Refer to the Shear section in the machine manual for limit switch adjustment.

If the motor is not on or if the pressure switch is not activated then the Hydraulic Motor light will be on.

The Status screen lists the Encoder Wheel Circumference. This value is changed automatically when the controller is calibrated. The Stop Reaction Distance is also automatically changed by the controller as the machine runs. In order to reset these values, press the Restore Defaults button. NOTE: Calibration should be initiated following the defaults restore. The Total Material Ran through the machine with the controller on is shown on this screen. The Total Material Ran can be reset by pressing the Reset button. If the security is turned on, the password will be required to reset the Total Material Ran.

Press Back to return to the Setup Screen.

Security:

From the Setup screen press the Security Settings button to enter the security screen. The default password is: 1234.



Figure 46: Security Screen

If the security is turned on, the password will be required to change the stored coil lengths and colors or to reset the Total Material Ran value (totalizer). If security is turned off, no password is needed to make changes to these values. With security turned off the Security screen displays the current password which can be changed by entering a new password and pressing the enter button. Once this is done, the new password will be needed to make any changes to the coil lengths and colors or to reset the Total Material Ran.

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Coil Tracking:

From the Home screen, press the Coils button to change the coil of material to track. If the security is turned on, a password must be entered if changes to the stored coils are necessary. If security is turned off, the controller will display the current coil screen and changes can be made without the password.

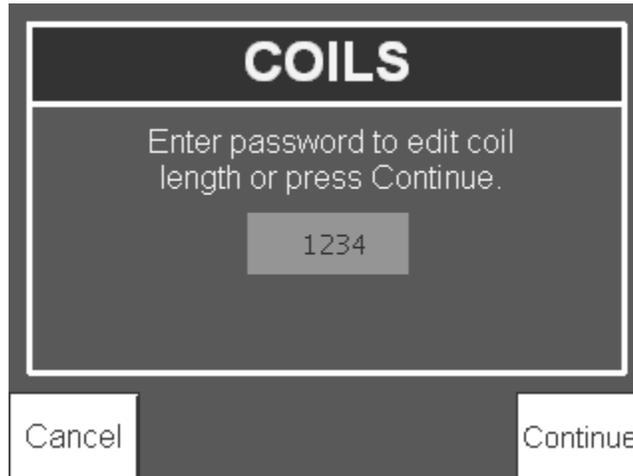


Figure 47: Coils Password Access Screen

Without the password, press Continue to view the Coils screen.

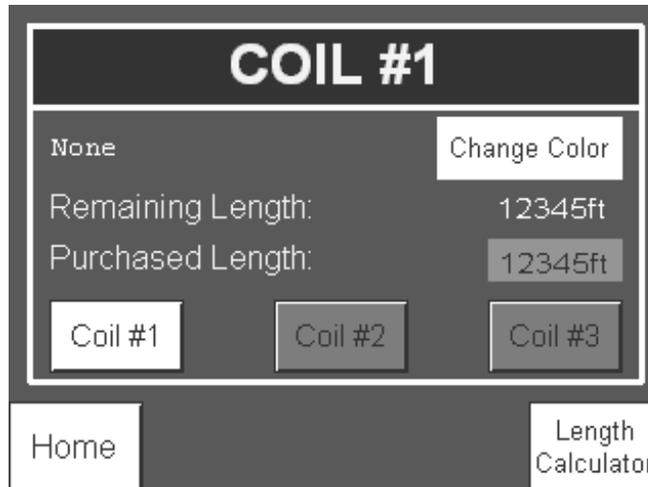


Figure 48: Coils Screen

The controller has the ability to track the length of three different coils of material. Press Coil #1, 2 or 3 to change the coil to be run through the machine. When a new coil is purchased, press the Purchased Length numerical display to input the length of the coil into the controller. The Remaining Length will reset to the new purchased length. As material is run through the machine, the controller will subtract material from the remaining length. The coil (#1, 2 or 3) that is displayed when the Home button is pressed will be the coil that the controller subtracts material from as the machine is run.

Example:

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The controller is set to run a black coil designated as Coil #2 and the user changes to a white coil designated by Coil #1. From the Home screen, press the Coils button which will bring up the Coil #2 information. Press the Coil #1 button and then the Home button.

If the remaining length reads negative then the machine has tracked more material than the purchased length.

Example:

If a purchased length of 100' is input into the controller then 115' of material is ran through the machine before the coil is gone, the controller will read a remaining length of -15'.

There is an indicator on the top right of the Home screen that indicates which coil is being tracked.

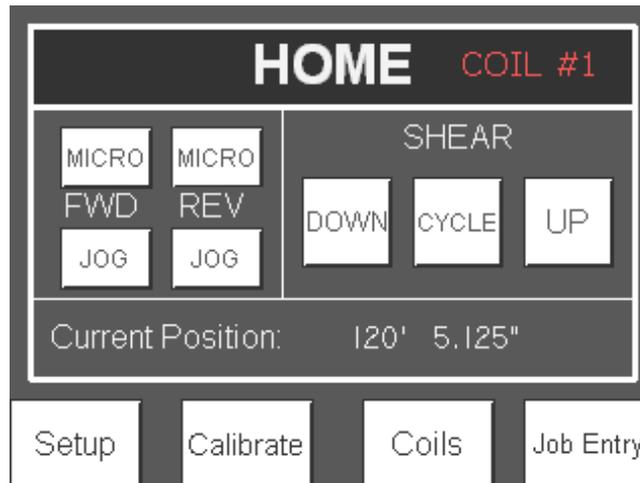


Figure 49: Coil Indicator

Colors

Press the Change Color button to select the color of the coil. Press the Cancel button to avoid changing the color of the coil.

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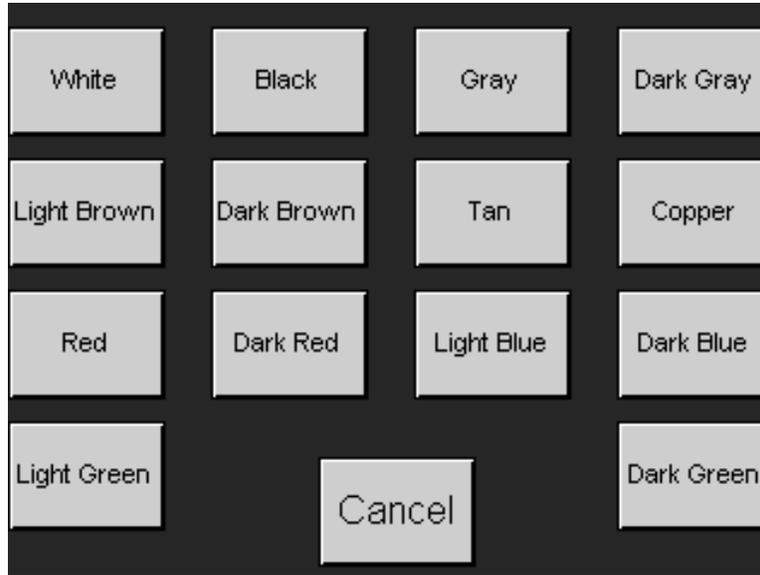


Figure 50: Coils Color Screen

Coil Length Calculator

The controller has a built in calculator to estimate the length of a coil based on the dimensions of the coil. From the Coils screen, press Length Calculator button.

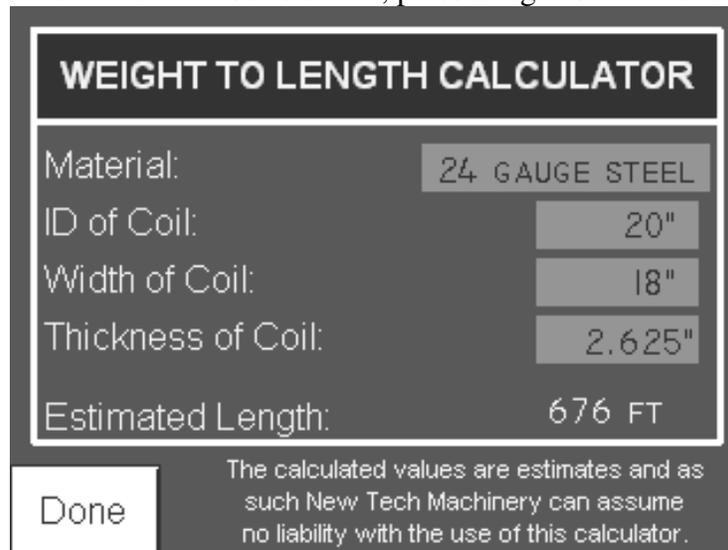


Figure 51: Length Calculator Screen

Press the Select Material button to select the thickness and type of material.

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MATERIAL THICKNESS		
Aluminum:	Steel:	Copper:
0.027"	22 Gauge	16 Gauge
0.032"	24 Gauge	20 Gauge
0.040"	26 Gauge	
0.050"	28 Gauge	
	30 Gauge	

Figure 52: Material and Thickness Screen

Then enter in the Inside Diameter of the Coil, Width of the coil and thickness of the coil. The thickness of the coil is the difference between the Inside Diameter (ID) and the Outside Diameter (OD). When all the fields are populated, the calculator estimates the length of the coil. Press the Done button to return to the Coils screen.

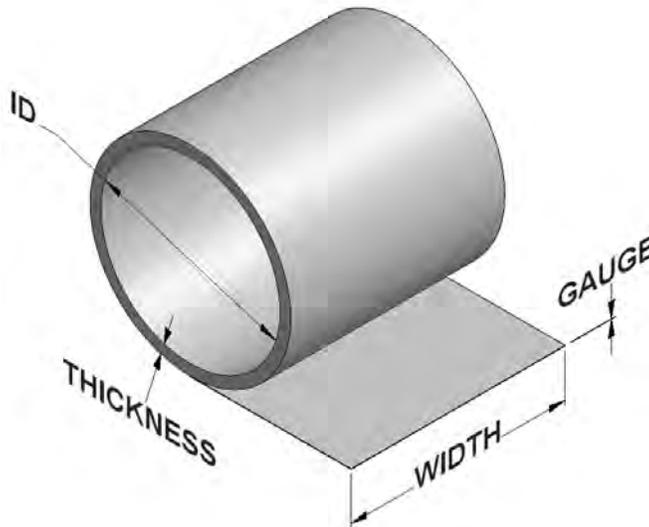


Figure 53: Coil Dimensions

APPENDIX B
ELECTRICAL SCHEMATICS

ELECTRICAL SCHEMATICS

<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Description</u>
PLC-380-000	1	Electrical Assembly – Parts List
PLC-380-000	2	Electrical Assembly – Wiring Details
PLC-381-000	1	Control Box Assembly – Parts List
PLC-381-000	2	Control Box Assembly – Outside & Inside Views
PLC-381-000	3	Control Box Assembly – Wiring Schematic
PLC-381-000	4	Control Box Assembly – Ladder Logic 1
PLC-381-000	5	Control Box Assembly – Ladder Logic 2