ACCU-Pro 633
AUTO - INDEX
SPIN / RELIEF
REEL MOWER GRINDER

Patent No. 6,010,394

6,290,581 & 6,685,544

ORIGINAL INSTRUCTIONS

SERVICE MANUAL

⚠ WARNING

YOU MUST THOROUGHLY READ AND UNDERSTAND ALL MANUALS BEFORE OPERATING THE EQUIPMENT, PAYING PARTICULAR ATTENTION TO THE WARNING & SAFETY INSTRUCTIONS.

6337951 (03-17)

IMPORTANT SAFETY MESSAGE

As manufacturers of sharpening equipment, we want to confirm to you, our customers, our concern for safety. We also want to remind you about the simple, basic, and common sense rules of safety when using this equipment. Failure to follow these rules can result in severe injury or death to operators or bystanders.

It is essential that everyone involved in the assembly, operation, transport, maintenance, and storage of this equipment be aware, concerned, prudent, and properly trained in safety. Always use proper shielding and personal protective equipment as specified by the manufacturer.

Our current production machines include, as standard equipment, guards or shields for the grinding wheel, safety signs, and operators and service manuals. Never bypass or operate the machine with any of the guards or safety devices removed or without the proper personal safety equipment.

Read and fully understand all the safety practices discussed in this manual and the Operators Manual . All safety rules must be understood and followed by anyone who works with reel grinders.

Before operating this grinder, an operator must read and understand all of the information in the operators manual and understand all of the safety signs attached to the product. A person who has not read or understood the operators manual and safety signs is not qualified to operate the unit. Accidents occur often on machines that are used by someone who has not read the operators manual and is not familiar with the equipment. If you do not have an operators manual or current production safety signs, contact the manufacturer or your dealer immediately.

The equipment is designed for one-man operation. Never operate the equipement with anyone near, or in contact with, any part of the grinder. Be sure no one else, including bystanders, are near you when you operate this product.

Following these simple, basic safety rules, as well as others:
Find and understand all safety signs in the operators manual and on the equipment. This will help minimize the possibility of accidents and increase your productivity in using this product. Be careful and make sure that everyone who operates the grinder knows and understands that it is a very powerful piece of machinery, and if used improperly, serious injury or death may result. The final responsibility for safety rests with the operator of this machine.

Throughout this manual, the following safety symbols will be used to indicate the degree of certain hazards.

This symbol is used throughout this manaul to call attention to the safety procedures.

DANGER

The word DANGER indicates an immediate hazardous situation, which if not avoided, will result in death or serious injury.

WARNING

The word WARNING indicates a potential hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION

The word CAUTION preceeded with a safety alert symbol indicates a potential hazardous situation which, if not avoided, may result in minor or moderate injury.

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Read the operators manual before operating this equipment. Keep this manual handy for ready reference. Require all operators to read this manual carefully and become acquainted with all adjustments and operating procedures before attempting to operate the equipment. Replacement manuals can be obtained from your selling dealer or the manufacturer.

The equipment you have purchased has been carefully engineered and manufactured to provide dependable and satisfactory use. Like all mechanical products, it will require cleaning and upkeep. Lubricate and clean the unit as specified in the Operators manual. Please observe all safety information in this manual, the operators manual, and the safety decals on the equipment.

This machine is designed for sharpening reel type mower blades ONLY. Any use other than this may cause personal injury and void the warranty.

To assure the quality and safety of your machine and to maintain the warranty, you MUST use original equipment manufacturer's replacement parts and have any repair work done by a qualified professional.

ALL operators of this equipment must be thoroughly trained BEFORE operating the equipment.

Do not use compressed air to clean grinding dust from the machine. This dust can cause personal injury as well as damage to the grinder.

INSTALLATION, DAILY MAINTENANCE, AND BASIC UPKEEP IS DISCUSSED IN THE OPERATORS MANUAL. THIS MANUAL SHOULD BE USED IN CONJUNCTION WITH THE OPERATOR'S MANUAL FOR PERFORMING SERVICE ON THIS EQUIPMENT.

SAFETY INSTRUCTIONS

⚠ WARNING **TO AVOID INJURY, READ AND UNDERSTAND THE SAFETY ITEMS LISTED BELOW. IF YOU DO NOT UNDERSTAND ANY PART OF THIS MANUAL AND NEED ASSISTANCE, CONTACT YOUR LOCAL DEALER.**

1. **KEEP GUARDS IN PLACE** and in working order.

2. **REMOVE WRENCHES AND OTHER TOOLS.**

3. **KEEP WORK AREA CLEAN.**

4. **DON'T USE IN DANGEROUS ENVIRONMENT.** Don't use grinder in damp or wet locations. Machine is for indoor use only. Keep work area well lit.

5. **KEEP ALL VISITORS AWAY.** All visitors should be kept a safe distance from work area.

6. **MAKE WORK AREA CHILD-PROOF** with padlocks or master switches.

7. **DON'T FORCE THE GRINDER.** It will do the job better and safer if used as specified in this manual.

8. **USE THE RIGHT TOOL.** Don't force the Grinder or an attachment to do a job for which it was not designed.

9. **WEAR PROPER APPAREL.** Wear no loose clothing, gloves, neckties, or jewelry which may get caught in moving parts. Nonslip footwear is recommended. Wear protective hair covering to contain long hair. Wear respirator or filter mask where appropriate. Wear protective gloves.

10. **ALWAYS USE SAFETY GLASSES.**

11. **SECURE YOUR WORK.** Make certain that the cutting unit is securely fastened with the clamps provided before operating.

12. **DON'T OVERREACH.** Keep proper footing and balance at all times.

13. **MAINTAIN GRINDER WITH CARE.** Follow instructions in Service Manual for lubrication and preventive maintenance.

14. **DISCONNECT POWER BEFORE SERVICING,** or when changing the grinding wheel.

15. **REDUCE THE RISK OF UNINTENTIONAL STARTING.** Make sure the switch is OFF before plugging in the Grinder.

16. **USE RECOMMENDED ACCESSORIES.** Consult the manual for recommended accessories. Using improper accessories may cause risk of personal injury.

17. **CHECK DAMAGED PARTS.** A guard or other part that is damaged or will not perform its intended function should be properly repaired or replaced.

18. **NEVER LEAVE GRINDER RUNNING UNATTENDED. TURN POWER OFF.** Do not leave grinder until it comes to a complete stop.

19. **KNOW YOUR EQUIPMENT.** Read this manual carefully. Learn its application and limitations as well as specific potential hazards.

20. **KEEP ALL SAFETY DECALS CLEAN AND LEGIBLE.** If safety decals become damaged or illegible for any reason, replace immediately. Refer to replacement parts illustrations in Service Manual for the proper location and part numbers of safety decals.

21. **DO NOT OPERATE GRINDER WHEN UNDER THE INFLUENCE OF DRUGS, ALCOHOL, OR MEDICATION.**

⚠ WARNING **IMPROPER USE OF GRINDING WHEEL MAY CAUSE BREAKAGE AND SERIOUS INJURY.**

GRINDING IS A SAFE OPERATION IF THE FEW BASIC RULES LISTED BELOW ARE FOLLOWED. THESE RULES ARE BASED ON MATERIAL CONTAINED IN THE ANSI B7.1 SAFETY CODE FOR "USE, CARE AND PROTECTION OF ABRASIVE WHEELS". FOR YOUR SAFETY, WE SUGGEST YOU BENEFIT FROM THE EXPERIENCE OF OTHERS AND CAREFULLY FOLLOW THESE RULES.

DO

1. **DO** always **HANDLE AND STORE** wheels in a **CAREFUL** manner.

2. **DO VISUALLY INSPECT** all wheels before mounting for possible damage.

3. **DO CHECK MACHINE SPEED** against the established maximum safe operating speed marked on wheel.

4. **DO CHECK MOUNTING FLANGES** for equal and correct diameter.

5. **DO USE MOUNTING BLOTTERS** when supplied with wheels.

6. **DO** be sure **WORK REST** is properly adjusted.

7. **DO** always **USE A SAFETY GUARD COVERING** at least one-half of the grinding wheel.

8. **DO** allow **NEWLY MOUNTED WHEELS** to run at operating speed, with guard in place, for at least one minute before grinding.

9. **DO** always **WEAR SAFETY GLASSES** or some type of eye protection when grinding.

DON'T

1. **DON'T** use a cracked wheel or one that **HAS BEEN DROPPED** or has become damaged.

2. **DON'T FORCE** a wheel onto the machine **OR ALTER** the size of the mounting hole - if wheel won't fit the machine, get one that will.

3. **DON'T** ever **EXCEED MAXIMUM OPERATING SPEED** established for the wheel.

4. **DON'T** use mounting flanges on which the bearing surfaces **ARE NOT CLEAN, FLAT AND FREE OF BURRS.**

5. **DON'T TIGHTEN** the mounting nut excessively.

6. **DON'T** grind on the **SIDE OF THE WHEEL** (see Safety Code B7.2 for exception).

7. **DON'T** start the machine until the **WHEEL GUARD IS IN PLACE.**

8. **DON'T JAM** work into the wheel.

9. **DON'T STAND DIRECTLY IN FRONT** of a grinding wheel whenever a grinder is started.

10. **DON'T FORCE GRINDING** so that motor slows noticeably or work gets hot.

⚠ WARNING

AVOID INHALATION OF DUST generated by grinding and cutting operations. Exposure to dust may cause respiratory ailments. Use approved NIOSH or MSHA respirators, safety glasses or face shields, and protective clothing. Provide adequate ventilation to eliminate dust, or to maintain dust level below the Threshold Limit Value for nuisance dust as classified by local safety codes.

⚠ WARNING

UNPLUG THE EQUIPMENT PRIOR TO DOING ANY SERVICE ON THIS EQUIPMENT. FAILURE TO REMOVE POWER TO THIS EQUIPMENT BEFORE SERVICING MAY RESULT IN INJURY OR DEATH.

IF POWER IS REQUIRED FOR TESTING OR TROUBLESHOOTING, THIS SHOULD BE PERFORMED BY A TRAINED PROFESSIONAL OR LICENSED ELECTRICIAN.

REVIEW THE SYMBOLS AND DESCRIPTIONS ON PAGES 10 AND 11 OF THE OPERATOR'S MANUAL. UNDERSTAND ALL SYMBOLS BEFORE OPERATING OR SERVICING THIS EQUIPMENT.

This is the electrical hazard symbol. It indicates that there are **DANGEROUS HIGH VOLTAGES PRESENT** inside the enclosure of this product. TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, do not attempt to open the enclosure or gain access to areas where you are not instructed to do so. **REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.**

IMPORTANT GROUNDING INSTRUCTIONS

If electrical testing is required, always verify the machine has a proper ground before performing any tests.

In case of a malfunction or breakdown, grounding reduces the risk of electrical shock by providing a path of least resistance for electrical current.

This Grinder has an electrical cord with an equipment grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded according to all local or other appropriate electrical codes and ordinances.

Before plugging in the Grinder, make sure it will be connected to a supply circuit protected by a properly sized circuit breaker or fuse. SEE SERIAL NUMBER PLATE FOR FULL LOAD AMP RATING OF YOUR MACHINE.

Never modify the plug provided with the machine--if it won't fit the outlet, have a proper outlet and circuit installed by a qualified electrician.

⚠ WARNING

ALWAYS PROVIDE A PROPER ELECTRICAL GROUND FOR YOUR MACHINE. AN IMPROPER CONNECTION CAN CAUSE A DANGEROUS ELECTRICAL SHOCK. IF YOU ARE UNSURE OF THE PROPER ELECTRICAL GROUNDING PROCEDURE, CONTACT A QUALIFIED ELECTRICIAN.

SKILL AND TRAINING REQUIRED FOR SERVICING

This Service Manual is designed for technicians who have the necessary mechanical and electrical knowledge and skills to reliably test and repair the this Spin/Relief Grinder. For those without the background, service can be arranged through your local distributor.

This section presumes that you are already familiar with the normal operation of the grinder. If not, you should read the operators manual, or do the servicing in conjunction with someone who is familiar with its operation.

⚠ WARNING

Persons without the necessary knowledge and skills should not remove any panels or shields, or attempt any internal troubleshooting, adjustments, or parts replacement.

If you have questions not answered in this manual, please contact your distributor.

TORQUE REQUIREMENTS

Throughout this manual we refer to torque requirements as "firmly tighten" or the like. For more specific torque values, refer to the information below.

Bolts Going Into a Nut, or Into a Thread Hole in Steel.
Refer to the table at the right.

Bolts Going Into a Thread Hole In Aluminum
Use the Grade 2 values in the table at the right.

Socket-Head Screws Going Into a Nut or Steel
Use the Grade 8 values in the table at the right.

Machine Screws
No. 6 screws: 11 in.- lbs (0.125kg - m)
No. 8 screws: 20 in. - lbs (0.23 kg - m)
No. 10 screws: 32 in. - lbs (0.37 kg - m)

	GRADE 2 SMOOTH HEAD	GRADE 5 3 MARKS on HEAD	GRADE 8 6 MARKS on HEAD
1/4 In. thread	6 ft-lbs (0.8 kg-m)	9 ft-lbs (1.25 kg-m)	13 ft-lbs (1.8 kg-m)
5/16 In. thread	11 ft-lbs (1.5 kg-m)	18 ft-lbs (2.5 kg-m)	28 ft-lbs (3.9 kg-m)
3/8 In. thread	19 ft-lbs (2.6 kg-m)	31 ft-lbs (4.3 kg-m)	46 ft-lbs (6.4 kg-m)
7/16 In. thread	30 ft-lbs (4.1 kg-m)	50 ft-lbs (6.9 kg-m)	75 ft-lbs (10.4 kg-m)
1/2 In. thread	45 ft-lbs (6.2 kg-m)	75 ft-lbs (10.4 kg-m)	115 ft-lbs (15.9 kg-m)

PERIODIC MAINTENANCE

DAILY MAINTENANCE IS SPECIFIED ON PAGE 5 OF THE OPERATOR'S MANUAL, AND IS TO BE PERFORMED BY THE OPERATOR.

LISTED BELOW ARE PERIODIC MAINTENANCE ITEMS TO BE PERFORMED BY YOUR COMPANY'S MAINTENANCE DEPARTMENT:

1. Clean the tank and filter of the vacuum system weekly or more often depending on the number of reels ground. (Vacuum system is optional equipment on the 633.)

2. Inspect the grinding wheel poly-V belt for cracking and adjust the belt tension per procedure called out in the adjustment section every six months.

3. Wipe and re-lube with never-seez, the vertical and horizontal alignment shafts and lead screws, every six months. See FIG. 10.

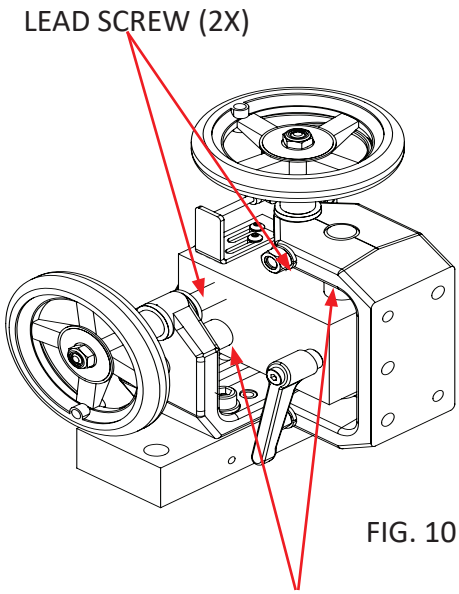


FIG. 10

4. Lift the bellows and wipe off the bearing rails monthly. To lubricate linear bearing, follow the lubrication procedure on the following pages. Generally, this will be every six months to a year.

5. Wipe and re-oil the index finger adjustment screw with spray lubricant every 3 months. Wipe off excess lubricant.

6. Check the traverse belt for cracking, uneven wear or other defects every 6 months to a year.

7. Clean the indicator rod on the Accu-positioning gauge. Wipe with a clean rag until the unit moves smothly. Generally, this will be every six months to a year.

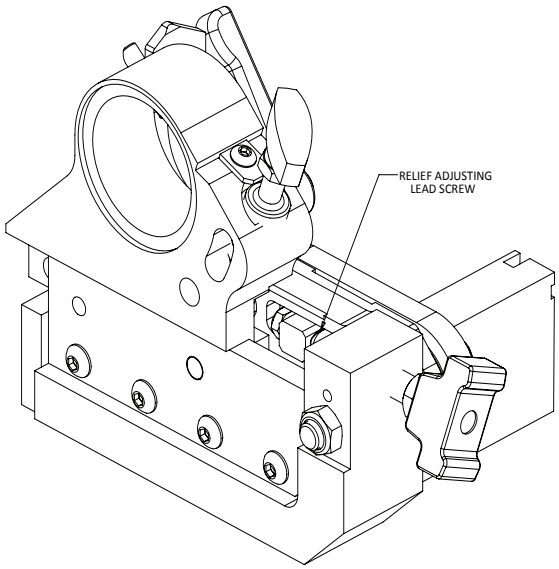


FIG. 9

STORAGE PROCEDURE

It is important to follow the procedures below when placing your grinding in storage for an extended period of time. Proper care will help maintain the working functions of the grinder and decrease maintenance and problems that occur when storing the grinder.

BEFORE STORING THE GRINDER:

-Clean the machine thoroughly. **(DO NOT USE COMPRESSED AIR OR A POWER WASHER TO CLEAN THIS MACHINE!)**

-Lubricate the following parts by flooding the area with a spray lubricant and leaving it in place:
(Do not use a Teflon based lubricant)

1. Traverse Shafts & Linear bearings (see Lubrication section of manual)
2. Remove grinding wheel and spray the movable parts of the finger system
3. Cross slide shafts and adjustment screws (Right side of Traverse Base)
4. Scratches in the paint or any other bare metal surfaces

-Work the lubricant in by moving parts through their full range of motion.

-Make sure all controls are in the off position and unplug the unit from the wall.
-Cover the unit if possible with a sheet or tarp.

BRINGING THE UNIT BACK INTO SERVICE:

-Remove the cover and reapply lubricant to the items stated above. Wipe off all excess lubricant. (See Lubrication section for more details.)

-Plug the unit into the wall and test all electrical functions.

-Check the belts for cracking and adjust the tension if necessary.

-Check for damaged or missing parts.

LUBRICATION OF LINEAR BEARINGS

STEP 1--Thoroughly clean the shafts.

STEP 2--Flood spray the two shafts with a spray lubricant **(do not use a Teflon based lubricant)** until the lubricant is dripping off the shafts. See FIG. 11 Then run the carriage back and forth through its full range of travel. This will carry the lubricant into the bearings.

STEP 3--With a clean rag, wipe off the excess amount of lubricant from the shafts. Run the carriage back and forth through its full range of travel and wipe the shafts after each traverse. Repeat until the shafts are dry to the feel. This completes the lubrication process.

If the unit will be shut down for an extended period of time, more than four weeks, then the shafts and other appropriate parts of the unit should be flooded with lubricant and that lubricant left in place until the unit is brought back into service. When the unit is brought back into service the full lubrication procedure as stated above should be repeated.

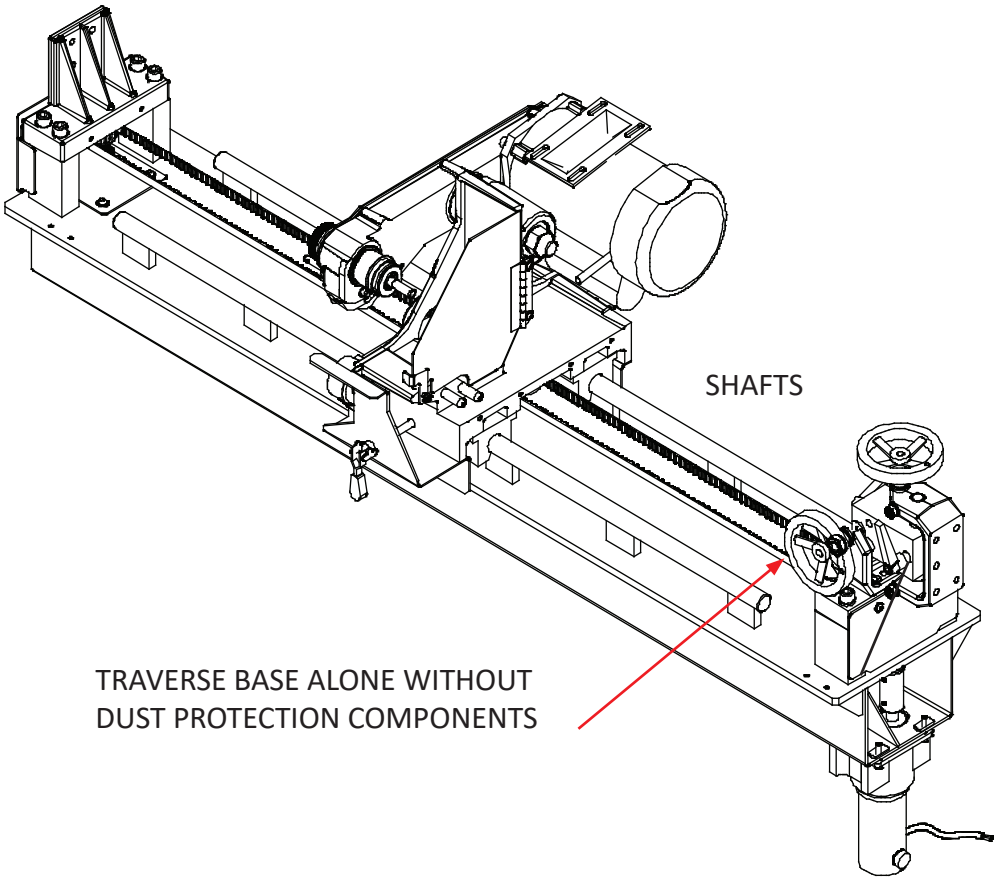


FIG. 11

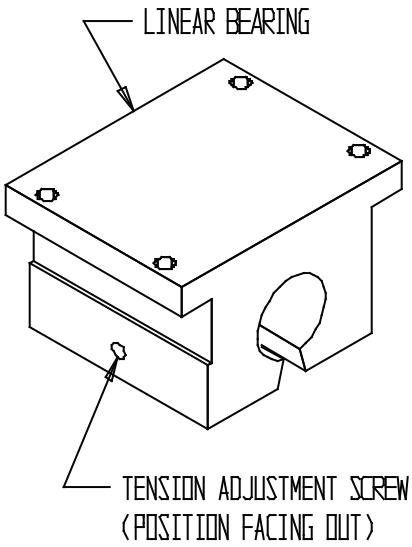


FIG. 14

CARRIAGE LINEAR BEARING REPLACEMENT

STEP 1--Detach the bellows mounting brackets from the carriage. Detach front and rear shields. See FIG. 15.
STEP 2--Remove the three screws of one linear bearing and slide the linear bearing off the end of the carriage shaft.
STEP 3--Insert a new linear bearing onto the end of the carriage shaft with the tension adjustment screw pointing outward. See FIG. 14. Adjust the tension screw of the linear bearing so when you radially rotate the linear bearing around the carriage shaft there should be no free play between the linear bearing and the carriage shaft.
NOTE: Tension is too tight if you feel a cogging action when you rotate the linear bearing around the shaft. This cogging is from the skidding of the bearing on the shaft and indicates tension screw is too tight.

Finally, sliding the bearing block back and forth should be a smooth uniform motion.

SETTING THE BEARING TENSION CORRECTLY IS CRITICAL TO PROPER GRINDING. BEARINGS WHICH ARE TOO TIGHT OR TOO LOOSE WILL CAUSE POOR GRIND QUALITY. ALSO, BEARINGS WHICH ARE TOO TIGHT WILL HAVE SUBSTANTIALLY SHORTER LIVES AND MAY DAMAGE THE SHAFT.

STEP 4--Slide linear bearing under carriage and attach with the three screws.
NOTE: Repeat Steps 2 thru 4 with the other three linear bearings.
STEP 5 -Position Dial Indicator assembly on the machine grinding head assembly next to the bearing to be tested. (Remove the bellows if the machine has them installed) The dial indicator should be within 1" of the side of the Grinding head carriage directly above the bearing being tested. It is best to measure to the traverse shaft with a wide flat tip.

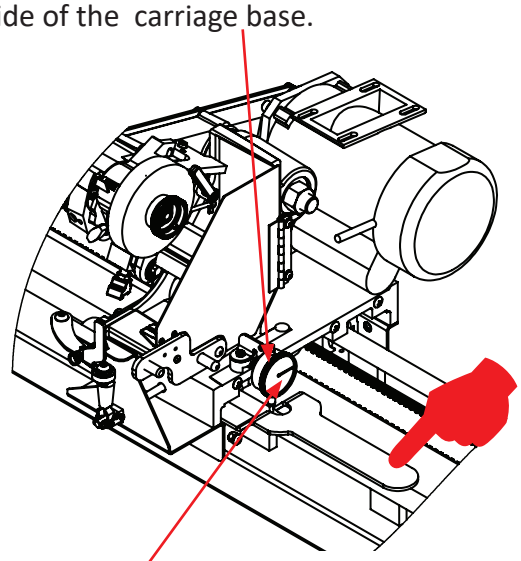
2. Insert Bearing Testing Fork 3706055 until the fork contacts the wiper bracket or the bearing.

3. With the tip of the Dial Indicator on the traverse shaft zero out the Dial Indicator.

4. Use your hand and press on the end of the Bearing Tester Fork until it contacts the traverse rail. See Fig 4. Read the movement on the dial indicator. If the movement exceeds .003" the bearing needs to be adjusted. Retest the bearing after adjusting the tension on the bearing. If the bearing does not improve to below the .003" reading then the bearing needs to be replaced.

Repeat steps 1-4 for the other two bearings.
STEP 6--Reattach the bellows carriage mounting brackets onto the carriage. Replace front and rear shields. See FIG. 15.

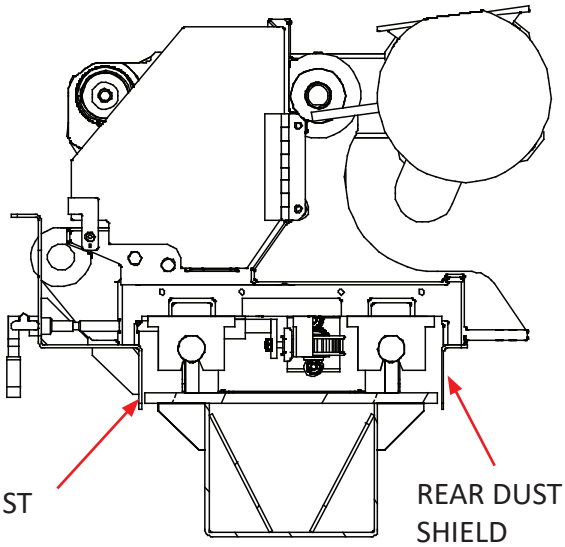
Dial Indicator must be positioned over the bearing being tested and located within 1" of the side of the carriage base.



Press down on Bearing Tester Fork and Read Dial.

If dial reads more than .003" of movement, adjust bearing tension using the tension screw. See FIG 2

FIG. 4



FRONT DUST SHIELD

REAR DUST SHIELD

FIG. 15

REEL FINGER DOVETAIL GIB AND ADJUSTING KNOB ADJUSTMENTS

The reel finger slide to the reel finger positioner has a dovetail with an adjustable gib for tensioning. Tighten the gib set screws on the side so there is no free play in the dovetail slide. Check for movement when pushing on the relief finger side to side with a 20 lbs. (44 kg) force. Make sure the knob assembly for adjusting the relief finger to the grinding wheel is rotatable by hand. See FIG. 16.

Check the knob assembly rotating tension by checking the tightness of the nylon plug to the knob assembly threads. The tightness has to be sufficient so the knob assembly does not rotate during the relief grinding cycle. See FIG. 17.

NOTE: To adjust the nylon plug you must lock the index finger assembly down and then adjust the reel finger positioner so the clearance holes line up with the nylon plug set screw.

Remove free play between the tee knob assembly, reel finger slide and .375" threaded split shaft collar. Loosen the shaft collar locking cap screw and rotate the shaft collar until there is no end play. Retighten locking cap screw on the threaded split shaft collar. See FIG. 16.

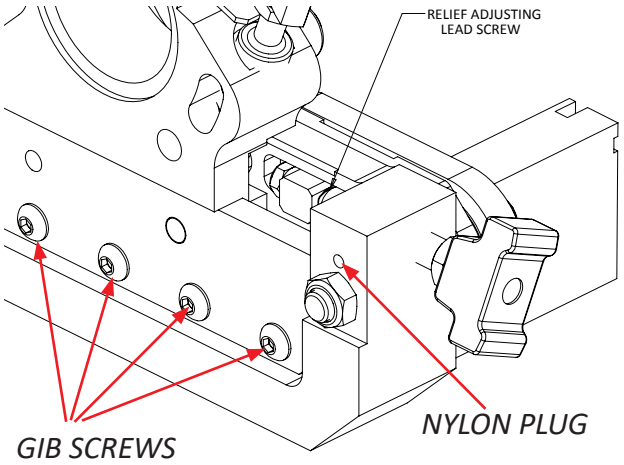


FIG. 16

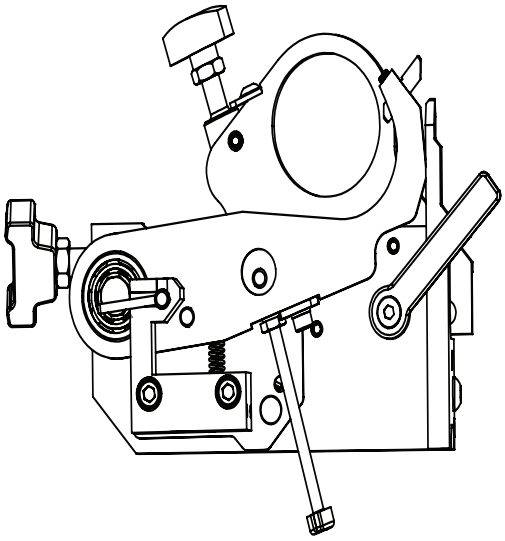
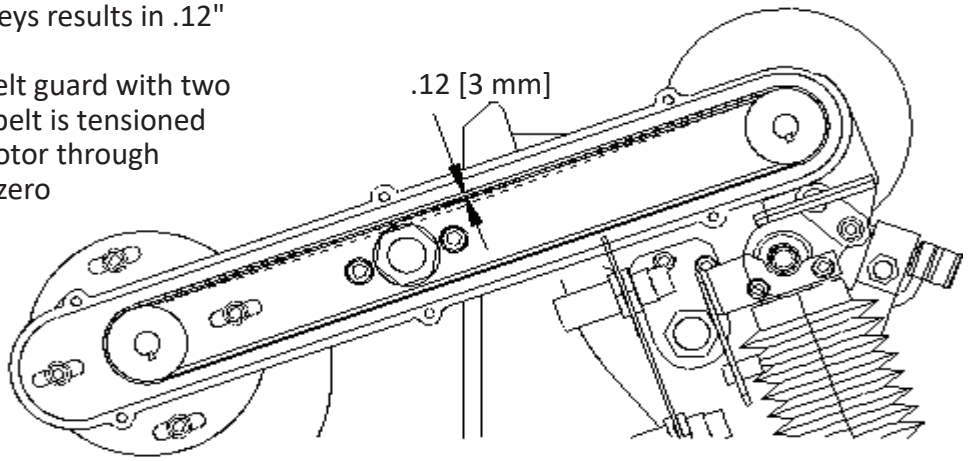


FIG. 17

GRINDING HEAD BELT TENSION ADJUSTMENT

The left side grip grinding wheel knob must be removed for belt tensioning adjustment. Remove the screws holding the vacuum hose bracket, the two double tube clamps and the belt cover. For grinding motor belt adjustment, loosen the four socket head cap screws that attach the motor mounting plate. Adjust the grinding motor for proper belt tension and tighten the four socket head cap screws. Proper belt tension is achieved when 5 lbs of force applied to the belt halfway between the two pulleys results in .12" (3mm) of deflection. See FIG 18
To verify belt tension mount the belt guard with two screws. Turn the motor on. If the belt is tensioned correctly, start-up torque of the motor through the pulley to the belt should have zero slippage. If there is belt slippage there will be a slight squeal before the belt comes up to speed. When you achieve correct tension, reassemble all of the remaining parts that have been removed.



INDEX FINGER PROXIMITY SETTING

Set all motor switches to the off position.

Press the machine System Start Switch, so the grinder is operational.

Push down on the index finger until the stop pin is within .06 inches (1.5 mm) of bottoming out. (You can use a 1/16" gage pin or rod stock between the stop pin and index finger). Set the proximity switch to activate the light at this setting. This assures the index finger to be close to its final stop position so the reel is completely indexed before the carriage starts to traverse. See FIG. 19.

The spring load force pushing up on the index finger brings it away from the proximity when released.

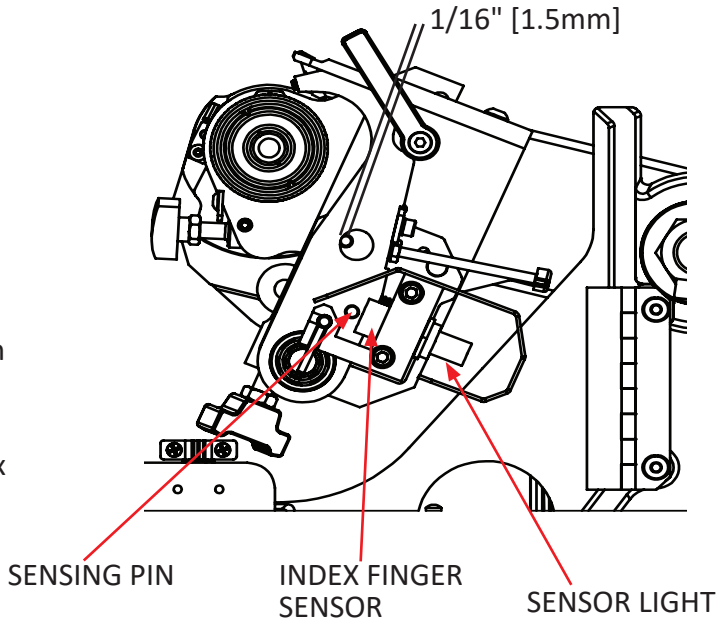


FIG. 19

STEPPPER INFEED TRAVEL LIMITS

The infeed stepper maximum extension is 6.0" (152 mm) and minimum compression is 3.5" (89 mm). If you experience a situation where the grind does not properly finish, check that you have not exceeded stepper travel by checking the values per FIG. 20

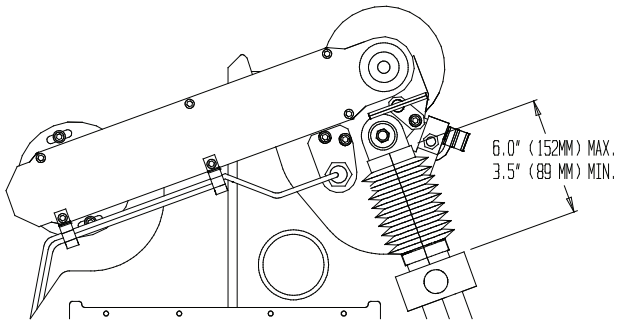


FIG. 20

TRAVEL LIMITS

For the TRAVEL LIMITS to perform properly and reverse the direction of the carriage at each end of the rails, a distance of 3/16" [4 mm] to 1/4" [6 mm] needs to be maintained between the carriage proximity flag bracket and the TRAVEL LIMIT. See FIG. 22.

NOTE: The light on the proximity switch activates when metal crosses in front of the switch.

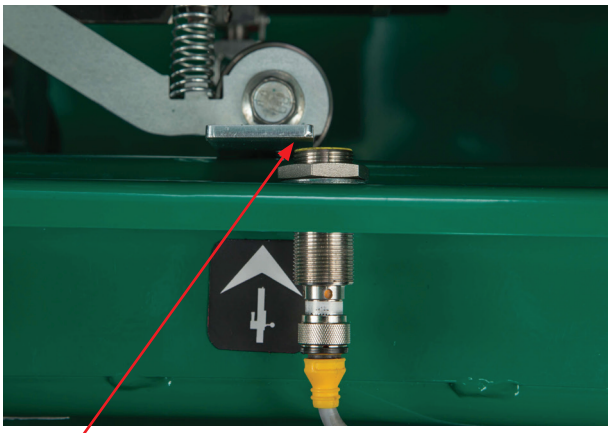


FIG. 22

ADJUSTABLE RELIEF TENSION

If the relief angle appears to vary during relief grinding adjust the tension on the nylon plug and set screw. See FIG. 23.

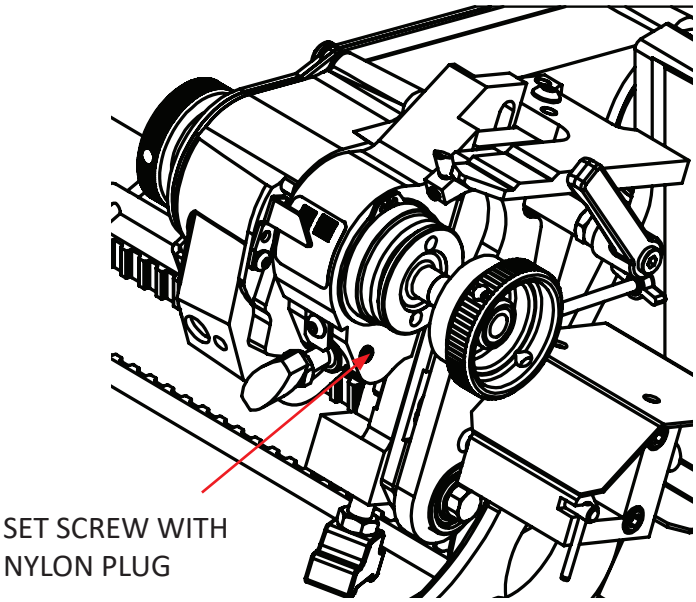


FIG. 23

SAFETY SWITCH ALIGNMENT

For the safety switches to work properly they must be adjusted so the sender and receiver are parallel to each other with a maximum gap of .19 inches (5mm). See FIG. 24. Adjust by moving the doors or mounting brackets. A special wrench is needed to adjust the safety screws used to hold the switch in place).

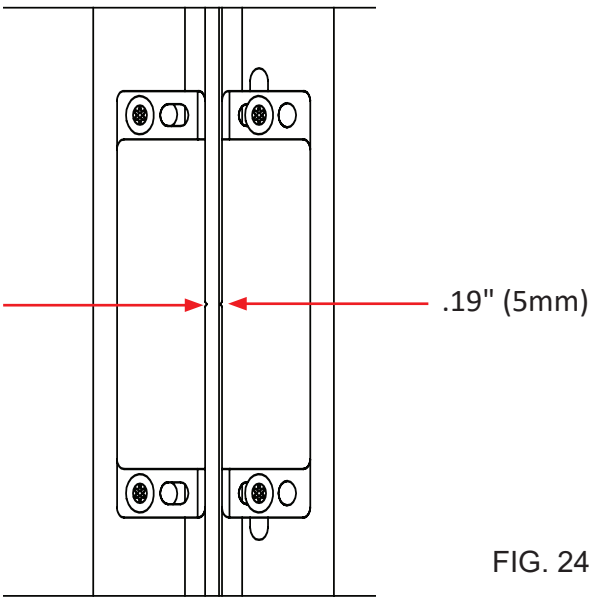


FIG. 24

SPIN MOTOR ADJUSTMENT

If the spin drive motor is moving during operation, or does not move freely into position, adjust the tension of the 2 T-Handles. See FIG. 25.

FIG. 25

TRAVERSE BELT TENSION

To adjust the tension on the traverse belt, tighten the screws and nuts located at the left side of the traverse belt. Tighten the nuts until the comprension springs measure 3/4" [19mm]. See FIG. 26. If the springs are not tensioned equally, uneven loading on the traverse system may cause parts to fail.

DO NOT OVERTIGHTEN. OVERTIGHTENING COULD DAMAGE THE BELT OR TRAVERSE DRIVE SYSTEM.

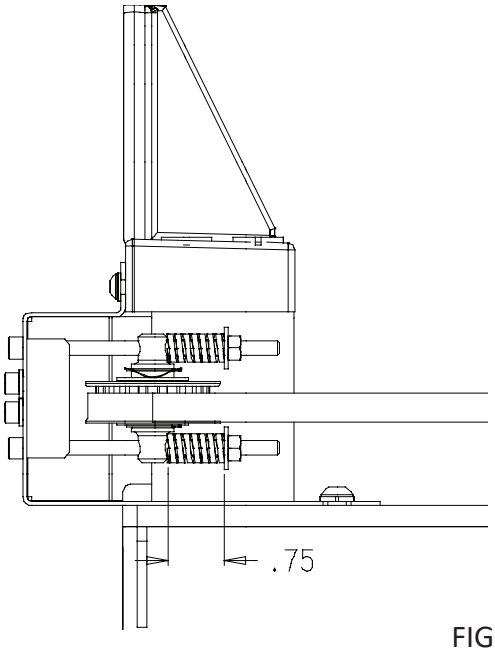


FIG. 26

TRAVERSE CLAMP FORCE

If the traverse clamp is slipping during regular operation it may be necessary to tighten the clamp. To tighten, loosen the jam nut on the clamp tip. Screw the tip out so there is .10" gap between the tip and the Clamp Support Block. See FIG 27. Lock in place by tightening the jam nut against the clamp being careful not to move the tip. Verify the distance between the clamp tip and block is still .10". The .10" setting allows slippage in a jam situation and damage can occur if this adjustment is set to narrow.

CAUTION SHOULD BE USED AS ADJUSTING THE TIP WILL AFFECT THE SLIP LOAD AND COULD DAMAGE THE CLAMP TIP, BELT OR TRAVERSE DRIVE SYSTEM.

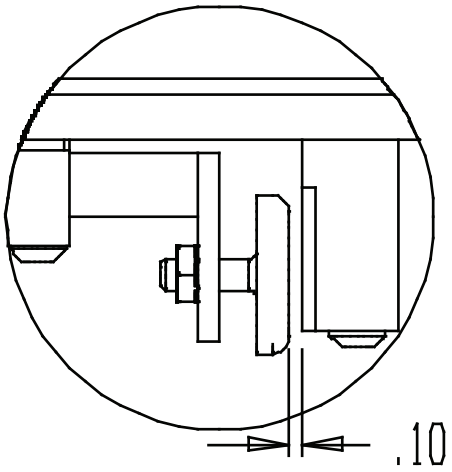


FIG. 27

ADJUSTING CROSS SLIDE ASSEMBLY

If the cross slide becomes very difficult to turn it may become necessary to adjust the assembly. To relieve the tension on the assembly follow the procedure listed below:

STEP 1—Turn the vertical handwheel on the cross-slide counter-clockwise to raise the carriage base up until you are able to slide a piece of wood or metal (such as 2-2 x 4s) under the carriage base. Be sure to insert this on the seam of the floor pan under where the right side leg is welded. Release the pressure on the cross slide by lowering the base until the base is supported by the wood/metal piece and the pressure on the cross slide is removed.
STEP 2—Knock out the pins on either side of the mounting frame adjuster and loosen the 4 bolts (B504801) that connect the carriage mounting bracket to the frame of the grinder.
STEP 3—Turn the Vertical handwheel clockwise to raise the cross slide assembly, this will put a preload on the cross slide assembly to the up position.
STEP 4—Tighten the 4 bolts on the Carriage Mounting Frame to 75 ft-lbs.
STEP 5-- Turn the Vertical handwheel counter-clockwise to raise the carriage base and remove the wood/metal support (example: the 2- 2 x 4s). Test the vertical and horizontal handwheels for ease of movement through their full range of motion.
STEP 6—If the cross slides tend to bind, repeat above steps 3-5 above until the handwheels move freely through there full range of travel.
STEP 7—when the cross slides move freely drill new holes and repin the assembly.

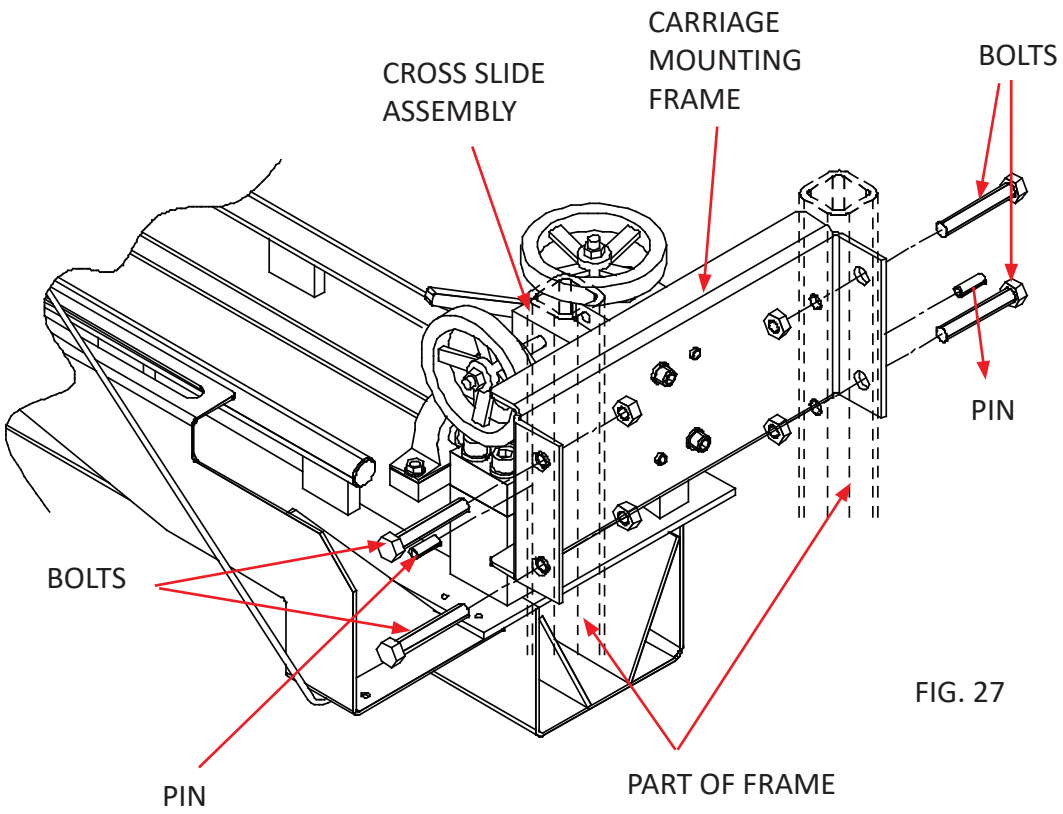
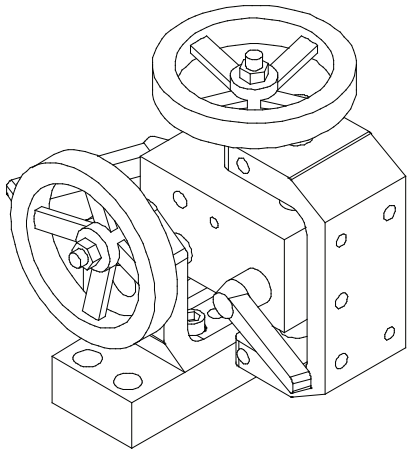


FIG. 27

CROSS SLIDE SHAFT REPLACEMENT

If the cross slide shafts become scarred or gnarled, replace them by the following procedure:



STEP 1--Turn the vertical handwheel on the cross-slide counter-clockwise to raise the carriage base up until you are able to slide a piece of wood or medal (such as 2-2 x 4s) under the carriage base. Be sure to insert this on the seam of the floor pan under where the right side leg is welded. Release the pressure on the cross slide by lowering the base until the base is supported by the wood/metal piece and the pressure on the cross slide is removed.
STEP 2--Loosen the two nuts on the support casting that hold the locking stud and tap the ends of the studs with plastic or rubber hammer to loosen.
STEP 3--Loosen the lock handles and tap the center of the handle with a plastic hammer to loosen.
STEP 4--Loosen locknut and setscrew on the handwheels and remove.
STEP 5--Remove the Slide Shafts.
STEP 6--Remove all burrs and resurface the shaft to a clean, smooth, polished surface. (OR REPLACE WITH A NEW SHAFT.)
STEP 7--Coat the shaft with Never-Seez and re-install the shaft through the Support, Cross Slide Block and the three locking studs. The shaft must move freely inside the Cross Slide Block before reassembling.
STEP 8--Retightening the nuts at the end of the locking studs to lock shaft in place.
STEP 9--Reinstall the Handwheel by snugging the setscrew to the flat located on the screw shaft, now tighten the nut until tight then back the nut off by 1/2 turn. Tighten the setscrew to 70 in-lbs.
STEP 10--Test the Cross Slide, the handwheel should turn freely.
STEP 11-- Turn the Vertical handwheel to raise the carriage base and remove the wood/metal supports (2-2 x 4s). Test the vertical and horizontal handwheels for ease of movement through their full range of motion. If binding occurs, follow the procedure under Cross Slide Assembly located on the previous page.

NOTE: it is also possible to remove the complete Cross Slide Assembly and do the repairs on a bench then reinstall.

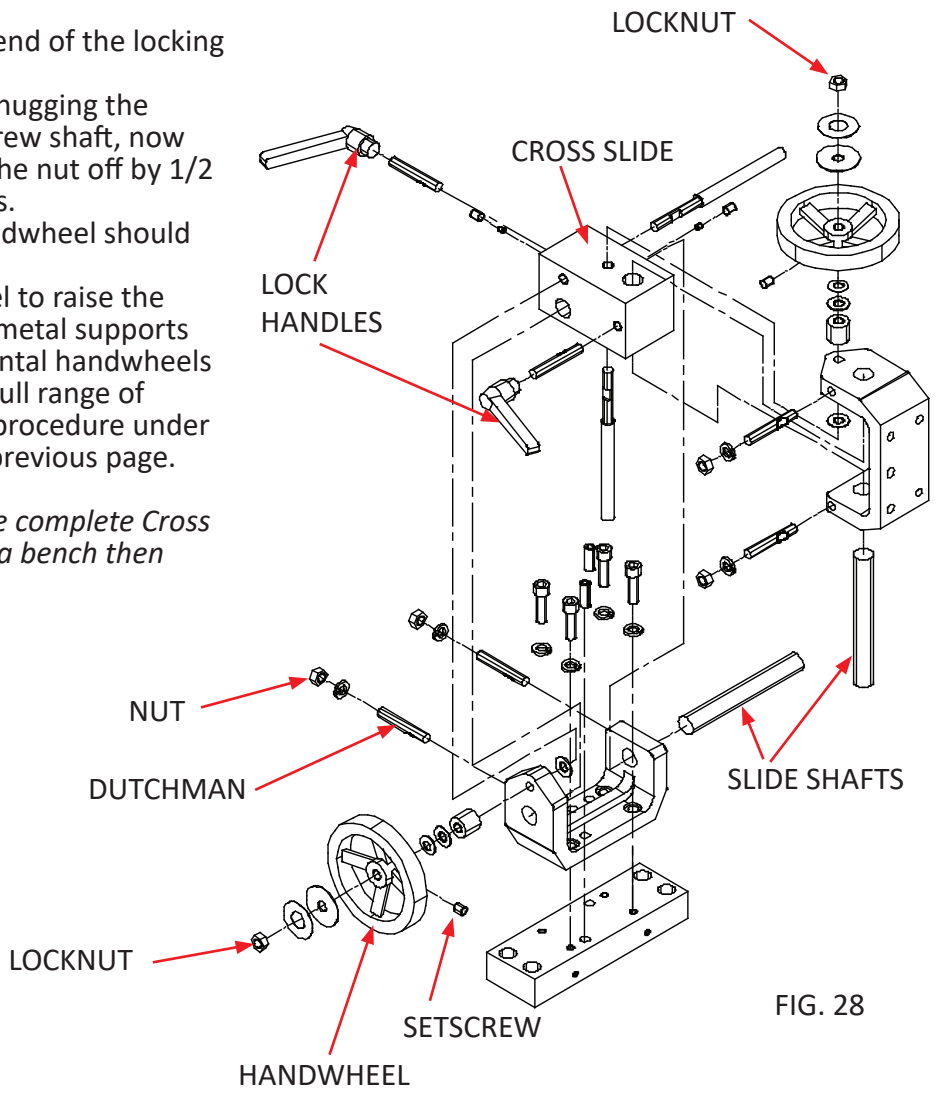


FIG. 28

REPLACEMENT OF GRINDING HEAD SHAFT & BEARINGS

Remove grinding wheel and grinding wheel knob. The Grinding Head Spindle Assembly consists of the grinding head spindle and a ball bearing press fit together. The left side ball bearing is slip fit on the opposite end. To replace the spindle assembly remove the left side grinding wheel grip knob, square key and belt cover. See FIG. 32. Loosen the 4 socket head cap screws on the motor plate to remove the poly V-belt. Loosen the 2 set screws on the spindle pulley and remove the pulley, square key and pulley spacer. Push on the right hand side of the spindle assembly to compress conical washers so there is no pressure on the shaft retaining ring. Using a retaining ring pliers remove the small external retaining ring from the spindle assembly. You can now remove the spindle assembly out the right side by lightly tapping on the left end with a rubber mallet. The second ball bearing can be removed from the belt side of the Grinding Head Housing.

To reassemble place the 4 conical washers (2 Pair nested and then place the 2 pairs back to back) against the ball bearing on the new spindle assembly. See FIG. 33. Thoroughly clean the housing bore and the outside diameter of both bearings. **APPLY BLUE LOCTITE #243 TO THE OUTSIDE DIAMETER OF THE TWO BEARINGS.** Slide the spindle assembly into the right side of the Grinding Head Housing. Install the bearing sleeve against the bearing on the spindle assembly. Slip fit the new left side ball bearing onto the spindle assembly and into grinding head housing. **APPLY BLUE LOCTITE #243 TO THE INSIDE THREAD OF THE 9/16-18 NUT** and install onto the spindle shaft with the grooved side toward the bearing, onto the spindle shaft and using a spanner wrench on the right side of the spindle and a 7/8 deepwell socket on the left side, torque the locknut to 15 Ft. Lbs.

APPLY BLUE LOCTITE #243 TO THE BORE OF THE PULLEY BEFORE INSTALLATION. Replace the square key and install the new pulley pushing the counter-bore side of the pulley against the spindle nut with no end play. **NEXT INSTALL BLUE LOCTITE #243 ON THE PULLEY SETSCREWS AND TIGHTEN THE TWO PULLEY SET SCREWS.** Then install the new external retaining ring on the spindle shaft. Mount the new poly V-belt. (See Grinding Head Belt Tension and Alignment Adjustments in the adjusting section of the manual). Install the new belt cover gasket on the belt cover and install the belt cover and square key. Mount the left side grinding wheel grip knob with a slight gap to the cover and tighten the two set screws.

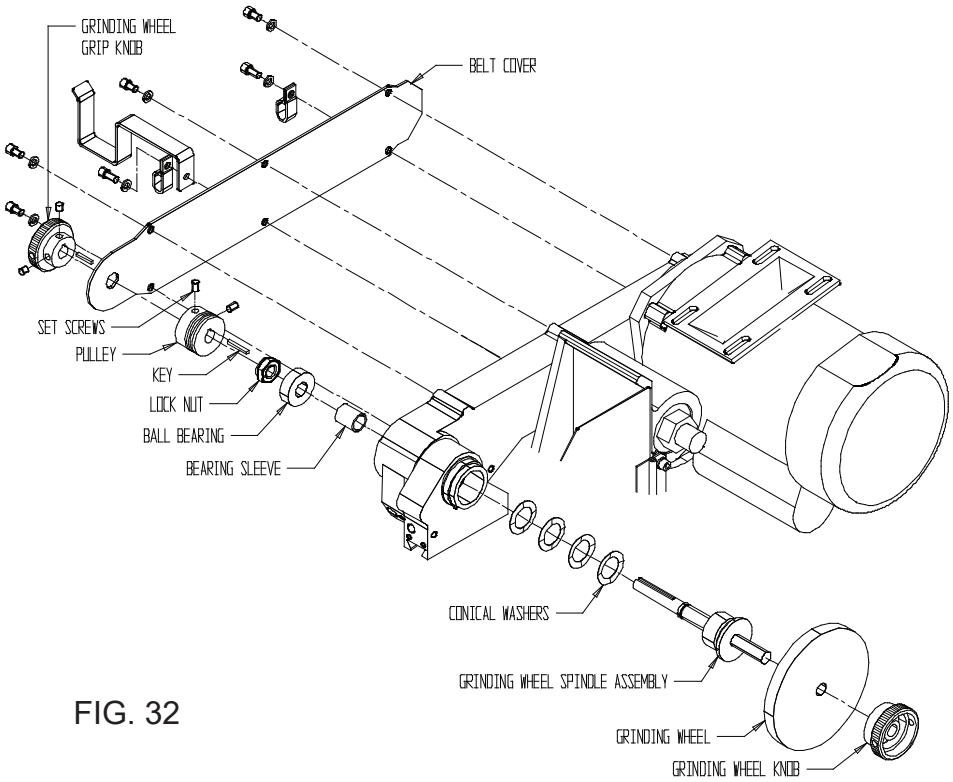


FIG. 32

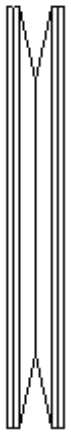


FIG. 33

POTENTIOMETER ADJUSTMENTS TRAVERSE DRIVE CONTROL (TDC)

Min. Speed--Factory set at full (CCW) 8:30. Do not change this setting.

(Right Traverse) Forward Torque--Factory set at full (CW) 4:30. DO NOT CHANGE THIS SETTING.
(Left Traverse) Reverse Torque--Factory set at full (CW) 4:30. DO NOT CHANGE THIS SETTING.

IR COMP--Factory set to 9:00. IR COMP is current (I) resistance (R) compensation (COMP).
IR COMP adjusts the output voltage of the drive which balances load to motor RPM. Regulation of a traverse motor may be improved by slight adjustment of the IR COMP trim pot clockwise from its factory-set position. Overcompensation causes the motor to oscillate or to increase speed when fully loaded. If you reach such a point, turn the IR COMP trim pot counterclockwise until the symptoms disappear.

Max. Speed--Set at 3:30 for maximum voltage of 90 Volts DC to the traverse motor. When voltage is above 90 volts DC, the traverse motor will start to pulsate and not run smoothly.

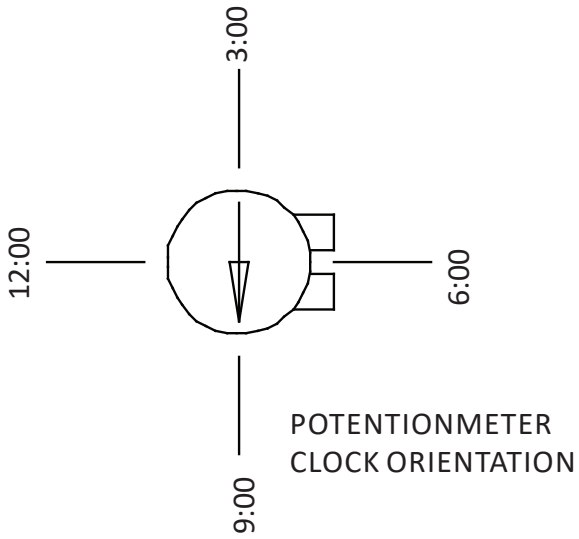
(Right Traverse) Forward Acceleration--Factory set at full (CCW) 8:30. DO NOT CHANGE THIS SETTING.
(Left Traverse) Reverse Acceleration--Factory set at full (CCW) 8:30. DO NOT CHANGE THIS SETTING.

(DB) Dead Band is the potentiometer setting for the 50 or 60 Hz cycle control. Factory set to 9:00, works for both 50 and 60 Hz. Do not change this setting.

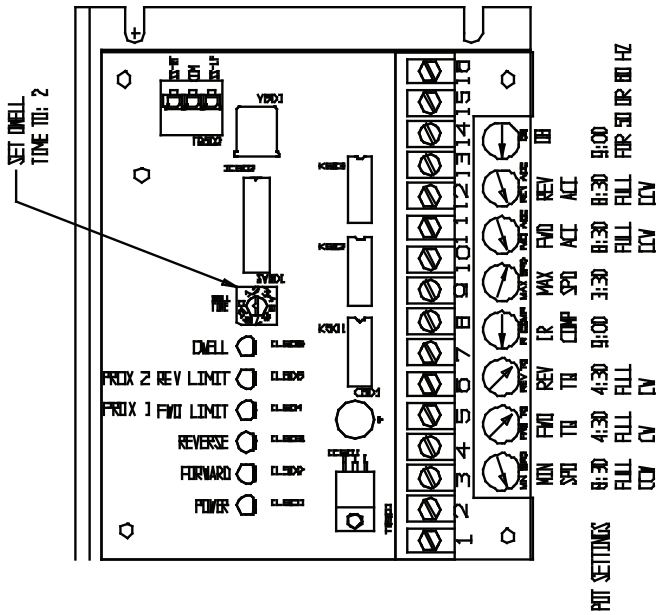
Calibrating the **DWELL TIME** rotary DIP switch adjusts the amount of time the process remains in the stop position after a limit switch is actuated. The **DWELL TIME** range is adjustable from 0 - 4 seconds. A DIP switch setting of 0 sets the **DWELL TIME** to 0 seconds, while a setting of 8 sets the **DWELL TIME** to 4 seconds. Dwell time is preset to #2 setting for a 1 second dwell time when reversing at each end of stroke.

Diagnostic LED's indicate the function that is currently being performed:

- **POWER indicates that ac power is being applied to the control.**
- **FORWARD indicates that the process is running in the forward direction (traversing left).**
- **REVERSE indicates that the process is running in the reverse direction (traversing right).**
- **PROX 1 FWD LIMIT lights when the forward limit switch is actuated (left prox).**
- **PROX 2 REV LIMIT lights when the reverse limit switch is actuated (right prox).**
- **DWELL lights when the process remains stopped after a proximity switch is actuated.**



POTENTIONMETER
CLOCK ORIENTATION



SPIN DRIVE CONTROL BOARD (SDC)

The Spin Drive Control Board has four potentiometers, two switches and one dial as shown on FIG. 26. These potentiometers, switches and dial have been set at the factory to the positions shown on FIG. 26.

In the Relief Grinding Mode--
The Torque Shut Off mode selector allows you to turn on or off the Torque Shut Off feature. When switch 1 is set to ON, the board will decrease the spin motor torque once the shut time is achieved after leaving the right proximity sensor. The amount of time it takes before the torque is decreased is set with the Torque Shut Off Delay dial. The spin motor toque will be increased to the higher value once the right proximity switch is activated again. If the Torque Shut Off selector is in the OFF position the torque will remain constant during relief grinding.

Torque Shut Off Delay dial is used to set the duration of time before the torque is decreased after leaving the right proximity sensor during relief grinding. If the dial is turned clockwise (higher number) the higher torque value will stay on for a longer period of time.

The Relief Speed (RSP) and the Relief Torque Pot (RTP) interact with each other. The (RSP) is located on the spin board as a remote speed preset at 12:00 (20 Volts DC). See FIG. 26. The (RTP) is located on the control panel and is for relief torque adjustment.

Relief Speed Pot (RSP) when rotated clockwise will increase spin drive speed (the speed at which the reel indexes to the next blade). This speed should never be above the 3:00 setting.

Relief Torque Pot (RTP) is used to vary the reel to finger holding torque for relief grinding. The recommended starting point is 30 in/lbs of torque setting. Never adjust the (RTP) potentiometer dial past the red line marking. Setting the reel to finger torque to high could cause the spin motor system to not operate smoothly.

Relief Idle Torque Pot (ITP) is used to vary the reel to finger holding torque once the shut time is achieved after leaving the right proximity sensor if the Torque Shut Off Selector is set to on.

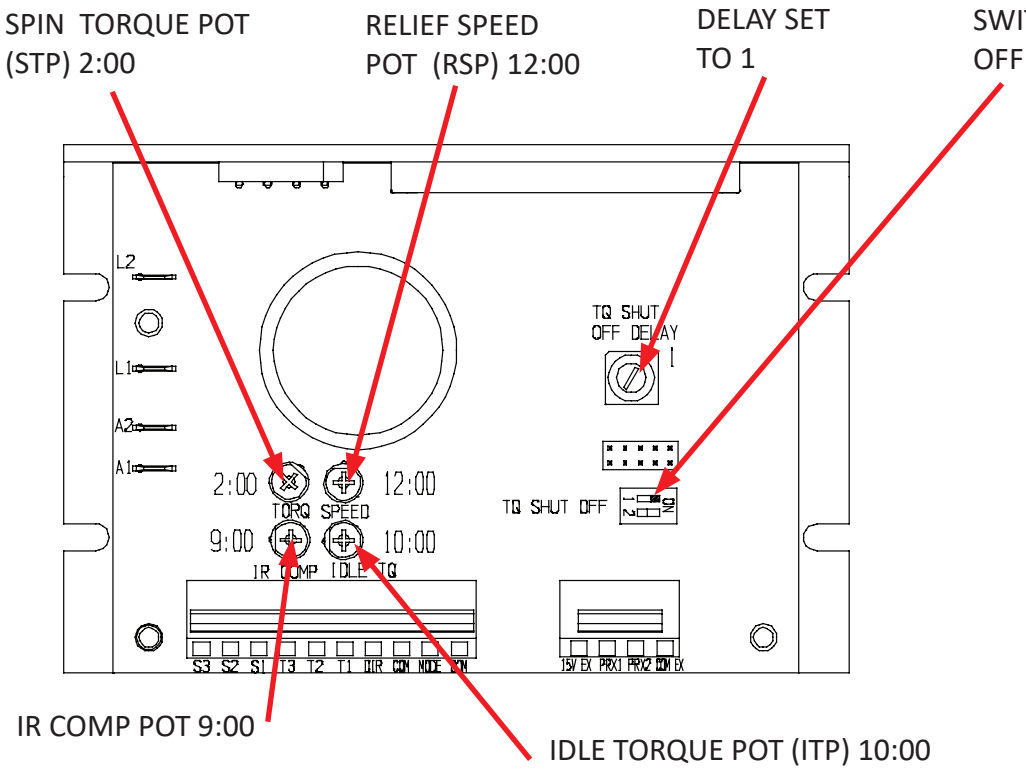
In the Spin Grinding Mode--
The Spin Torque Potentiometer (STP) and the Spin Speed Pot (SSP) interact with each other. The (STP) is located on the spin board as remote torque preset at 2:00 for torque setting. See FIG. 99. The (SSP) is located on the control panel and is for spin speed adjustment.

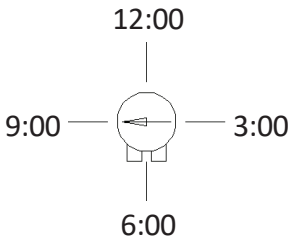
Spin Torque Pot (STP) controls maximum torque allowable in the spin grinding cycle only. This should never be adjusted past the 3:00 position. If the reel does not turn check that the reel is free turning by hand spinning with the power off and the spin drive disconnected.

The Spin speed Pot (SSP) controls reel spin speed, adjust as required. This controls the spin drive speed for spinning the reel.

IR COMP Pot--
The IR Compensation is factory set at 9:00.

Regulation of the spin or relief grind spin motor may be improved by a slight adjustment of the IR COMP pot clockwise from its factory-set position. Overcompensation causes the motor to oscillate or to increase speed when fully loaded. If you reach such a point, turn the IR COMP pot counterclockwise until symptoms just disappear.

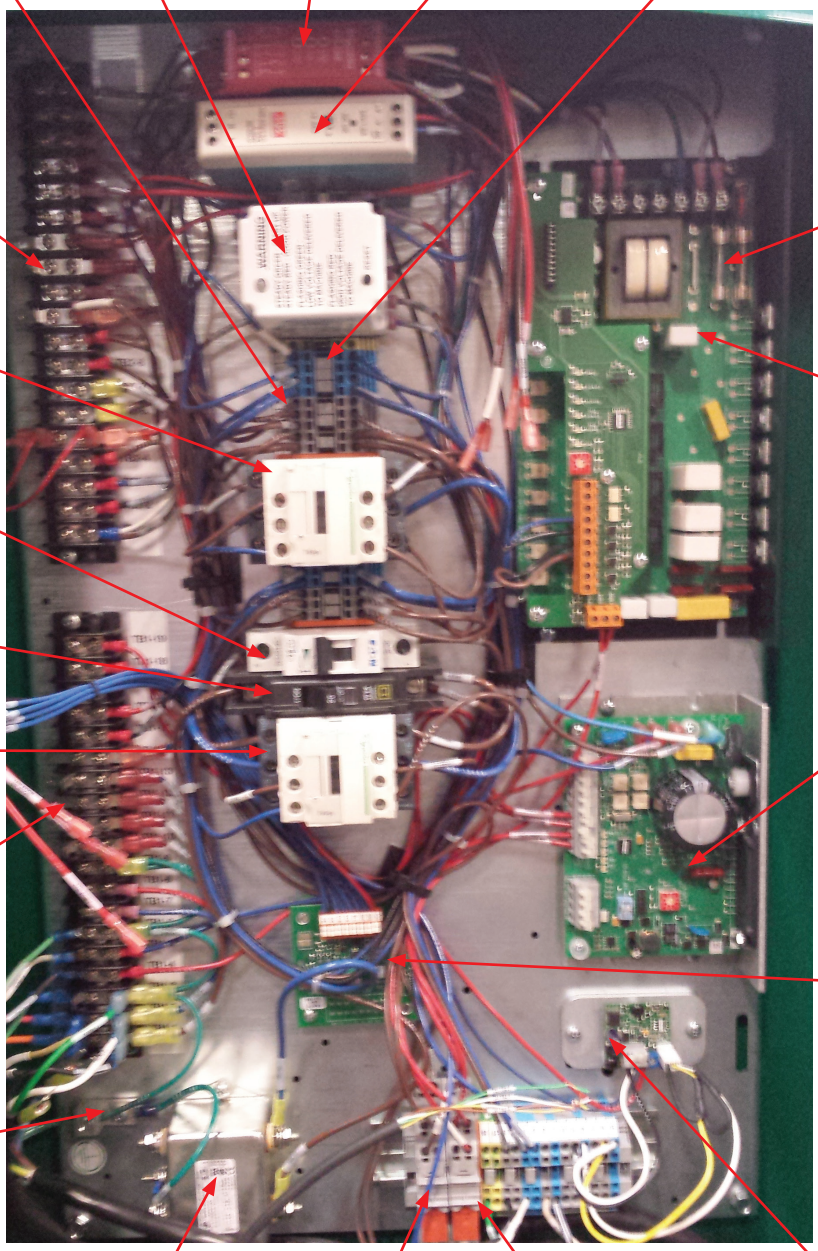




Potentiometer Clock Orientation

FIG. 30

CONTROL BOX


LOW VOLTAGE RELAY (LVR)
SAFETY SWITCH MONITOR (SSM)
GREY TERMINAL BLOCKS (TBG)
DC POWER SUPPLY (PWR)
BLUE TERMINAL BLOCKS (TBW) OR (TBB)
TERMINAL STRIP #2 (TB2)
TRAVERSE BOARD 3-AMP SLOW-BLO FUSE.
MAGNETIC CONTACTOR (MAG)
TRAVERSE DRIVE CONTROL BOARD (TDC)
SECONDARY CIRCUIT BREAKER (SCB)
MAIN CIRCUIT BREAKER (MCB)
GRINDING MOTOR RELAY (REL)
SPIN DRIVE CONTROL (SDC)
TERMIAL STRIP #1 (TB1)
POSITION GAUGE CONTROL (PGC)
MAIN GROUND LUG
AC FILTER (FTR)
BRIDGE DIODE 1 (BD1)
SPIN CONTROL RELAY (SCR)
SPIN TORQUE RELAY (STR)

SKILL AND TRAINING REQUIRED FOR ELECTRICAL SERVICING

This Electrical Troubleshooting section is designed for technicians who have the necessary electrical knowledge and skills to reliably test and repair the *ACCU*-Touch electrical system. For those without that background, service can be arranged through your local distributor.

This manual presumes that you are already familiar with the normal operation of the Grinder. If not, you should read the Operators Manual, or do the servicing in conjunction with someone who is familiar with its operation.

Persons without the necessary knowledge and skills should not remove the control box cover or attempt any internal troubleshooting, adjustments, or parts replacement.

If you have any question not answered in this manual, please call your distributor. They will contact the manufacturer if necessary.

WIRE LABELS

All wires on the ACCU-Master have a wire label at each end for assembly and troubleshooting. The wire label has a code designating wiring information. The first set of two or three numbers are the Foley WIRE NUMBER.

The next group of letters or numbers are the code for the COMPONENT to which the wire attaches. Example: RT1 for Relay Terminal 1.

The last set of numbers or letters is the name of the TERMINAL on the component to which the wire attaches.

PROBLEM--AC Main Power Controls: no electrical power to control panel.

Verify all wires shown on the wiring diagram on pages 78-79 are correct and pull on wire terminals with approximately 3 lbs force to verify there are no loose terminal connections and/or no loose crimps between wire and terminal. If problem persists, test as listed below.

Possible Cause	Checkout Procedure	
Emergency Stop Botton(ESS) is Depressed	**A.** Pull Up on ESS Button	Machine works Yes--end troubleshooting No--go to Step **B.** next
You must push the System Start Switch (SSS) to get power to control Panel	**B.** Listen for the Magnetic Starter (MAG) contacts to pull in with a clunking sound	Machine works Yes--end troubleshooting No--go to step **C.** next.
Main Power Cord is not plugged in	**C.** Plug in main power cord Then Press SSS.	Machine works Yes--end troubleshooting No--go to step **D.** next.
Guard doors must be closed and ALL Switches **MUST** be turned **OFF** for contactor to pull in.	**D.** Close guard doors and turn off all switches. Then press SSS.	Machine works Yes--end troubleshooting No--go to step **E.** next.
Main 20 amp outlet circuit breaker has tripped	**E.** Check circuit breaker in your building and reset if necessary. (Check wall outlet with a light to make sure it works) Follow steps A-D and test.	Machine works Yes--end troubleshooting No--but light works in outlet--go to Step **F.** next. No--but light does not work in outlet. You must solve your power delivery problem independent of machine.
No 120 Volts AC power to Filter (FTR)	**F.** Check for 120VAC at Cord into FTR (Power Cord #32)	FTR "Line" Terminals for 120 Volts AC Yes--Go to Step **G**. next. No--Replace Power Cord- 6059054
No 120 Volts AC power out of Filter	**G.** Check for 120V out of FTR Note: The neutral Blue wire connection "02FTRBU" will be used in other voltage checks	Check for 120 VAC at FTR "Load" Terminals (between wires labeled "02FTRBU" to "01FTRBR") Yes--Go to Step **H**. next. No--Replace Filter
No 120 Volts AC power to Main Circuit Breaker (MCB) 20 Amp.	**H.** Check for 120V in to MCB **I.** Check for 120V from MCB	Check for 120 VAC from MCB (01MCB--) to blue wire "02FTRBU" Yes--Go to Step **I**. next. No--Check wire #01 replace if needed.
No 120 Volts AC power from Main Circuit Breaker (MCB) 20 Amp.		Check for 120 VAC from MCB (03MCB--) to blue wire "02FTRBU" Yes--Go to Step **J**. next. No--Flip Switch on MCB to "ON" - Machine works-- end trouble shooting Machine does not work-- Recheck voltage and replace MCB if no voltage.

Possible Causes	***Checkout Procedure***	
No 120 Volts AC power to Secondary Circuit Breaker (SCB) 6 Amp.	**J.** Check for 120VAC in to SCB	Check for 120 VAC from SCB (03SCB--) to blue wire "02FTRBU" out of FTR Yes--Go to Step **K.** next. No--Check wire #03 from MCB to SCB replace if needed.
No 120 Volts AC power from Secondary Circuit Breaker (SCB) 6 Amp.	**K.** Check for 120VAC from SCB	Check for 120 VAC from SCB (67SCB--) to blue wire "02FTRBU" out of FTR Yes-- Go to Step **L.** next. No--Flip Switch on SCB to "ON"-Machine works--end of troubleshooting. Machine does not work--replace SCB
120 Volts AC power not delivered to Terminal Strip	**L.** Check for 120 VAC at terminal strip.	Check for 120 VAC from Terminal "11" on Terminal Strip 2 "07TB2-11" to blue wire "02FTRBU" out of FTR Yes--Go to Step **M**. next. No--Check wires #7 "07TBBG-2" and wire #67 "67TBG-3", Check Jumper on Grey Terminal Blocks 1-3.
Grinding Motor Switch (GMS) not working	**M.** Verify that GMS is off and Check for 120 Volts AC out of GMS at Terminals 1	Measure 120 volts AC from GMS Terminal 1 "90GMS-1" to blue wire "02FTRBU" out of FTR Yes--Go to Step **N**. next. No--Flip Switch and check again- Works--Switch is upside down. Does not work-- Check wire to GMS/ Replace GMS
Spin Motor Switch (SMS) not working	**N.** Verify that SMS is off and Check for 120 VAC out of SMS Terminals 1	Measure 120 volts AC from SMS Terminal 1 "91SMS-1" to blue wire "02FTRBU" out of FTR Yes--Go to Step **O**. next. No--Flip Switch and check again- Works--Switch is upside down. Does not work-- Check Wire #90/ replace Switch
Bad Emergency Stop Switch (ESS)	**O.** Check voltage after the (ESS) MAKE SURE SWITCH IS PULLED UP!	Measure 120 Volts AC from (ESS) term 2 "77ESS-2" to blue wire "02FTRBU" out of FTR Yes--Go to Step **P.** next No--Check wire #80 for continuity, then verify switch continuity. If bad replace ESS contactor (NC)
Bad System Start Switch (SSS)	**P.** Hold in SSS and Check voltage out of the (SSS)	Measure 120 Volts AC out of (SSS) at Terminal "13" on Terminal Strip 2 "76TB2-13" to blue wire "02FTRBU" out of FTR (hold in SSS when checking) Yes--Go to Step **Q.** next No--Verify switch continuity. If bad replace SSS contactor (NO), if not switch check wires #76, #140 & #77
Low Voltage Relay (REL) not operating	**Q.** Hold in SSS and Check voltage at LVR. LVR must be installed in 8-pin socket. Note: light on top of LVR should be on and steady RED. if not Press the Reset button.	Measure 120 Volts AC from LVR terminal 8 to blue wire "02FTRBU" out of FTR Yes--Go to Step **R.** next No--Check for 120 Volts AC from LVR term 6 to term 7. Yes-- Replace LVR if bad. No--Check wires to LVR
Bad Main Contactor (MAG)	**P.** Hold in SSS and Check voltage at MAG A1 & A2.	Measure 120 Volts AC from MAG Term A1 to Term A2 Yes--MAG Should pull in with clunck, if not replace MAG. No--Verify Continuity of Wires.

***PROBLEM*--Machine Shuts off when you turn on Grind motor switch or Spin Motor Switch.**

Possible Cause	***Checkout Procedure***	
Guard Doors are Open	**A.** Close the front doors and rear slide up door or workstation ramp depending on option installed.	Machine works Yes--end troubleshooting No--go to Step **B.** next
Door Safety Switches are not working properly	**B.** Check Alignment of Door Safety Switches on Front doors and rear slide up door.	See Alignment section of this Manual. Machine works Yes--end troubleshooting No--go to Step **C.** next
No 24 Volts DC to Safety Monitor (SSM)	**C.** Check SSM for 24 Volts DC. (Turn switches off and press start switch to pull in MAG before testing voltages)	Measure 24 volts DC from SSM Terminal A1+ to Terminal A2- Yes--Go to Step **E**. No--Go to Step **D**. next.
No Power into 24 Volt DC Power Supply (PWR)	**D.** Check PWR for 120 Volts AC. (Turn switches off and press start switch to pull in MAG before testing voltages)	Measure 120 volts AC from PWR Terminal L to Terminal N Yes--Verify 24 VDC out of PWR (V+ to V-). Replace if no Voltage out; or Check Wiring & Verify Continuity to SSM if there is 24 VDC. No--Verify Wiring and Continuity from PWR to terminal blocks.
No Power Out to Door Switches	**E.** Verify 24Volts DC out to Door Switches.	Measure approximately 24 volts DC from Terminal Strip 1 Terminal 17 to Terminal Strip 2 Terminal 3 Yes--Go to Step **F**. next. No--Verify Continuity of Wires to Terminal strip, Replace SSM if wires check OK.
Rear Safety Switch on the slide up door or workstation ramp depending on option installed is Bad.	**F.** With Rear slide up door closed Verify 24Volts DC back form rear Safety Switches.	Measure approximately 24 volts DC from Terminal Strip 2 Terminal 3 to Terminal Strip 1 Terminals 14 and 15. Yes--Go to Step **G**. next. No--Check Alingment of Rear switches. If no Voltage to Term14 or 15 then replace rear switch.
Front Door Switch is Bad	**G.** With Front doors Cloded Verify 24Volts DC back form Front Door Switch.	Measure approximately 24 volts DC from Terminal Strip 1 Terminal 17 to Terminal Strip 2 Terminals 2 and 4. Yes--Replace SSM No--Check Alingment of Front door switch. If no Voltage to Terminal 2 or 4 then replace front switch.

***PROBLEM*--(MAG) turns on only with System Start Switch held in.**

Possible Cause	***Checkout Procedure***	
(MAG) holding contact has failed	**A.** Check wiring to and from MAG holding contact in. Verify the magnetic starter holding contact is working.	Measure 120 Volts AC at MAG term L3 to Term Block 4(Blue) after SSS is pushed. Yes--Verify Wiring to LVR No--Check voltage at T3. If 120 Volts AC Replace MAG. If no 120 Volts AC verify wiring to T3.

PROBLEM-- Grinding motor not working.

Assuming (SSS) System Start Switch is on with 120 volts AC to control panel and all other functions are working.

Verify all wires shown on the wiring diagram on page 78-79 are correct and pull on wire terminals with approximately 3lbs force to verify there are no loose terminal connections and/or no loose crimps between wire and terminal. If loose terminals are found, retighten and retest system. If problem persists, test as listed below.

Possible Cause	Checkout Procedure	
Grinding Motor Switch (GMS) is not on	**A.** Turn switch on	Grinding Motor works Yes--end troubleshooting No--go to Step **B.** next
Guard doors are not closed	**B.** Close front and rear guard doors (and rear ramp - lift option)	Grinding Motor works Yes--end troubleshooting No--go to Step **C.** next
15 Amp Circuit Breaker (CB) is tripped	**C.** Check 15 amp CB on the side of the grinder above the control cover. Press in if tripped.	Grinding Motor works Yes--end troubleshooting No--go to Step **D.** next
GMS not working	**D.** Check for power to GMS	Terminal strip 2 terminal #15 to terminal block 4(Blue) for 120VAC Yes--go to Step **E.** next No-- check continuity of wires to GMS.
	E. Check for power from GMS	Terminal strip 2 terminal #14 to terminal block 4(Blue) for 120VAC Yes--Go to Step **F.** next No--replace GMS
Grinding Motor Relay not working	**F.** Check for power to relay Coil (Relay should click when GMS is turned on.)	Check for 120 Volts (AC) from A1 to A2 of Grinding motor Relay. Yes--Go to Step **G.** next No-- check wires to Grinding motor Relay A1 & A2.
No Power to Relay Contacts	**G.** Verify Power to Relay Contacts	(REL) Term L1 to Term L2 for 120 Volts (AC) Yes--Go to Step **H.** next No--Check wires to REL Term L1 & L2
Bad Contacts in Grinding motor Relay	**H.** Verify power out of Grinding Motor Relay.	(REL) Term T1 to Term T2 for 120 Volts (AC) Yes--Go to Step **I.** next No--Replace Gringing Motor Relay
Bad Circuit Breaker/ Bad Grinding Motor	**I.** Verify Power to Grinding motor Cord.	Verify wiring at terminals 1, 2 & 3 on Terminal Strip 1. Check TB1-1 to TB1-2 for 120 Volts (AC). Yes-- Check motor cord terminals. Replace motor. No-- Check continuity of circuit breaker. Replace.

PROBLEM--SPIN DRIVE NOT WORKING IN SPIN MODE.

Assuming (SSS) System Start Switch is on with 120 volts AC to control panel and all other functions are working.

Verify all wires shown on the wiring diagram on page 78-79 are correct and pull on wire terminals with approximately 3 lbs force to verify there are no loose terminal connections and/or not loose crimps between wire and terminal. If loose terminals are found, retighten and retest system. If problem persists, test as listed below.

Possible Cause	***Checkout Procedure***	
Spin Speed Pot (SSP) set to zero	**A.** Set (SSP) to 200 on the control panel.	Spin Motor works Yes--end troubleshooting No--go to Step **B** next
Spin Motor Switch (SMS) is not on	**B.** Turn (SMS) switch on	Spin Motor works Yes--end troubleshooting No--go to Step **C.** next
Circuit Breaker is Tripped (4 AMP)	**C.** Reset Circiut Breaker on front of Control Panel. Push in if tripped.	Spin Motor works Yes--end troubleshooting No--go to Step **D.** next
Spin Drive Control (SDS) is not working	**D.** Check (SDS) L1 to L2 for 120 Volts AC	(SDC)Remove wires to Terminals L1and L2 and test betwen wires for 120V AC. Yes--reconnect wires to board then go to Step **E.** next No--Verify Power to Circuit Breaker and SMS and continuity of wires. Replace CB or SMS if needed.
	E. With the Selector switch in spin and the spin pot set to 400RPM Check (SDC) A1 and A2 for 90-120 Volts DC	(SDC) Remove wires, test Terminals A1 to A2 on the board for approx 90-120 V DC Yes--reconnect wires and go to Step **F.** next No--go to Step **G.**
Spin Drive motor is bad	**F.** Check spin motor continuity  **DISCONNECT POWER FROM MACHINE !**	Remove wires at Terminal Strip 1, Term 4 & 5 check 0 ohms across the black and white wires Yes--end troubleshooting, spin drive should run, if not, replace motor. No--go to Step **J.**
Spin drive control in Torque mode	**G.** Check continuity of mode selector switch.	Light on SDC next to SP should be ON. If not Remove wires 41SDCMOD and 44SDC-COM from SDC control board. Check continuity of wires, should read 0 ohms. Yes--Check continuity of STS switch, replace if bad. (Machine was in Torque mode) No-- Light nest to SP is on but machine does not work. Go to Step **H**. next

Possible Cause	Checkout Procedure	
Spin Torque Pot (STP) is not set correctly	**H.** Check (STP) remote torque on the top (SDC) board	(STP) on (SDC) board, should be set as labled on pages 24 and 25. Adjust if incorrect and check Spin Drive Function. Yes--Go to Step **I**. next No--Replace (SDC)
(SSP) is not working	**I.** (SSP) (10K) Remove 3 Remote Speed wires. Red wire to term 2 White wire to term 1 Black wire to term 3  **DISCONNECT POWER FROM MACHINE !**	Check for 10,000 ohm Red wire to white wire Full CCW--0 ohms Full CW-10,000 ohms Red wire to black wire Full CCW--10,000 ohms Full CW--0 ohms Yes--replace (SDC) No--replace (SSP)
Worn Motor Brushes	**J.** Inspect Motor Brushes	Remove the brushes one at a time and maintain orientation for reinsertion. See if brush is worn short 3/8" (10 mm) minimum length. Yes--replace motor brushes No--replace Spin Drive Motor

PROBLEM--Spin Drive not working in relief mode.

Assuming (SSS) System Start Switch is on with 120 volts AC to control panel and all other functions are working.

Verify all wires shown on the wiring diagram on pages 78-79 are correct and pull on wire terminals with approximately 3 lbs force to verify there are no loose terminal connections and/or no loose crimps between wire and terminal. If loose terminals are found, retighten and retest system. If problem persists, test as listed below.

Possible Cause	Checkout Procedure	
Relief Torque Pot (RTP) set to zero.	**A.** Set (RTP) to 20 on the control panel.	Spin Motor works. Yes--end troubleshooting No--go to Step **B.** next
Spin Motor Switch (SMS) is not on.	**B.** Turn (SMS) switch on.	Spin Motor works. Yes--end troubleshooting No--go to Step **C.** next
Circuit Breaker is Tripped (4 AMP)	**C.** Reset Circiut Breaker on the right side of the machine. Push in if tripped.	Spin Motor works. Yes--end troubleshooting No--go to step **D.** next
Spin Drive Control (SDC) is not working	**D.** Check (SDC) L1 to L2 for 120 Volts AC	((SDC)Remove wires to Terminals L1and L2 and test betwen wires for 120V AC. Yes--reconnect wires, go to Step **F.** No--Go to Step **E**. next
CB or Spin Motor Switch (SMS) is bad	**E.** Check power into (SMS) terminal 6 for 120 Volts AC	Remove Wire to SMS Terminal 6 "89sms-6" and check between the wire and Terminal Block 4 (Blue) for 120 VAC Yes--Check switch continuity, replace No--Check CB continuity, replace.
	F. Check (SDC) A1 & A2 for approx. 20 Volts DC (Have Relief Torque set to maximum torque - full clockwise.	Check for approx. 20 VDC from Terminal Strip 1 Terminal 4 (48TB1-4) to Terminal 5 (49TB1-5) Yes--go to Step **G.** next No--Go to Step **J**.
Spin Drive motor is bad	**G.** Check spin motor continuity **DISCONNECT POWER FROM THE MACHINE**	Remove motor wires at Terminal Strip 1 (left side lower strip), Term 4 & 5 and check 0 ohms across the black and white motor wires Yes--end troubleshooting motor should work (if it does not, replace motor) No--go to Step **H.** next
Worn Motor Brushes	**H.** Inspect Motor Brushes **DISCONNECT POWER FROM MACHINE !**	Remove the brushes one at a time and maintain orientation for reinsertion. See if brush is worn short 3/8" (10 mm) minimum length Yes--replace motor brushes No--replace Spin Drive Motor

Possible Cause	Checkout Procedure	
Board is in spin mode.	**J.** Spin Torque Selector not working	Light next to TQ on board should be ON. If not remove wires 41SDCMOD and 44SDCCOM from SDC control board. Machine works. Yes--Machine was in spin mode. Check continuity of STS switch. Replace if bad. No-- Light next to TQ is ON but machine does not work, go to step **K**.
Relief Speed Pot (RSP) is not set correctly.	**K.** Check (RSP) remote speed (10k) on (SDC) board	Verify (SPEED) pot setting on the (SDC) board. Should be set as specified on pages 24 and 25. Adjust if incorrect and check Relief Torque function. Works Yes--end of troubleshooting No--go to Step **L**. next
(RTP) is not working	**L.** (RTP) (10K) Remove 3 Remote Torque Wires red wire to term 2 white wire to term 1. black wire to term 3.	Check for 10,000 ohms Red wire to white wire Full CCW--0 ohms Full CW--10,000 ohms Red wire to black wire Full CCW--10,0000 ohms Full CW--0 ohms Yes--go to Step **M**. nest No--replace (RTP)
Switches on SDC incorrect	**M.** Verify postion of all pots and switch on SDC	Verify postion of 4 pots on board. Should be set as specified on pages 20 and 21. Verify that the Torque reduction feature is in the OFF position. (pushed toward the pots on board). Motor works Yes--end of troubleshooting No--replace SDC.

PROBLEM : Spin drive speed goes at one speed only.

Possible Cause	Remedy	
Wiring hookup to potentiometer is improper. (If components have been replaced)	**A.** Check potentiometer wiring for proper hookup. See that speed pot is wired per electrical diagram	If wiring is wrong, correct and test. Yes--end of troubleshooting No--Go to Step B. next
Defective spin speed control (SSP) potentiometer.	B. (SSP) 10K Remove 3 remote speed wires. red wire to term 2 white wire to term 1 black wire to term 3	Check for 10,000 ohms Red wire to white wire Full CCW--0 ohms Full CW--10,000 ohms Red wire to black wire Full CCW--10,000 ohms Full CW--0 ohms Yes-- Go to Step C. next No--Replace (SSP)
Main circuit board dial pot settings not correct. (If board has been replaced	C. Check all pot settings on both boards as of the (SDC) shown on Pages 20 and 21. (See Adjustment Section Spin Drive Control [SDC] Board Setting).	Yes-- end of troubleshooting No--replace (SDC)

PROBLEM: Spin drive motor speed varies

IR Comp trim pot not adjusted properly.	A. See adjustment section for trim pot setting on Page 20.	Original adjustment was not set properly
Torque to rotate the reel too high.	B. Readjust bearing preload for the reel. Maximum torque load 25 in./lb to rotate reel.	Too much load on drive motor will cause motor to hunt and vary speed.
Check all terminal connections for tightness.	C. When .250 female spade terminals are not tight, remove and crimp slightly together. When reinstalling, push on pressure should have increased for good contact.	When connections are not tight the control board varies voltage to the DC motor which then varies speed.

PROBLEM--Traverse Drive not working.

Assuming (SSS) System Start Switch is on with 120 volts AC to control panel and all other functions are working.

Verify all wires shown on the wiring diagram on pages 88 are correct and pull on wire terminals with approximately 3lbs force to verify there are no loose terminal connections and/or no loose crimps between wire and terminal. If loose terminals are found, retighten and retest system. If problem persists, test as listed below.

Possible Cause	Checkout Procedure	
Traverse Motor Switch (TMS) is not on	**A.** Turn on (TMS)	Traverse works Yes--end troubleshooting No--got to Step **B.** next
Traverse Speed Pot (TSP) set to zero	**B.** Set (TSP) to 35 on the control panel	Traverse works Yes--end troubleshooting No--go to Step **C.** next
Traverse is waiting for signal from Index Finger Proximity Sensor (In Torque mode only)	**C.** If the Spin/Torque selector is in torque mode and the carriage is on the right proximity sensor, the traverse board waits for the indexing finger to be activated before traveling to the right.	Press on the indexing finger until the Indexing Proximity sensor lights. Traverse works Yes- end troubleshooting No- Verify Proximity sensor works, and go to Step **D.** next
Fuse on Traverse Drive Control (TDC) has failed	**D.** Check fuse and replace if failed. See Page 22. Too heavy a grind causes grinding head traverse motor to overload and blow the fuse, NOTE: Fuse can not be checked visually. Use Ohm test to check fuse. If needs replacing **MUST** use a **3 amp slo-blo fuse.** Part Number 3707546.	Traverse works Yes--end troubleshooting No--go to Step **E.** next
Traverse Drive Control (TDC) is bad	**E.** Check for 120 Volts (AC) incoming to (TDC)	On (TDC) Terminal L1 to L2 for 120 Volts AC Yes--Go to Step **F.** next No--Go to Step **G.** next
Bad Traverse Motor Switch (TMS)	**F.** Check for 120 Volts AC at (TMS). (Make certain (TMS) is on).	Measure 120 volts AC from TMS Terminal 5 to Term Block 4(Blue) Yes--Go to Step **K**. next. No--Flip Switch and check again- Works--Switch is upside down. Does not work-- Check wiring/Verify Continuity/ Replace Switch

Possible Cause	Checkout Procedure	
No DC Voltage from (TDC) Traverse Drive Control	**G.** Check for 90 Volts DC across (TDC) terminals #A1 to #A2 this voltage drives the DC traverse motor. NOTE: Traverse must be on and have (TSP) turned full CW to maximum voltage of 90 VDC	Check (TDC) terminals #A1 to #A2 for 90 Volts DC Yes--go to Step **H.** next No--go to Step **I.** next
Traverse Motor is bad	**H.** Check traverse motor continuity  **DISCONNECT POWER FROM MACHINE**	Remove motor wires from Terminal Strip 1 terminals #7 & #8 check for 0 ohms across the black and white wires Yes--end troubleshooting, motor should work (if it does not, replace motor) No--go to Step **K.** next
(TSP) is not working	**I.** Check (TSP) (10K) on control panel	(TDC) Pin #8 to #7 Pot Full CCW Pot Full CW 0 VDC 9.75 VDC Pin #8 to 9 Pot Full CCW Pot Full CW 9.75 VDC 0 VDC Yes--go to step **K**. No--go to Step **J.** next
(TSP) (10K) is bad	**J.** Check (TSP) for 10,000 ohms. Remove three wires from (TDC) red from term #8 white from term #7 black from term #9	Check for 10,000 ohms red to white wires Full CCW--0 ohms Full CW--10,000 ohms Red to black wires Full CCW--10,000 ohms Full CW--0 ohms Yes--replace the (TDC) No--Replace (TSP)
Worn motor brushes	**K.** Inspect Motor Brushes  **DISCONNECT POWER FROM MACHINE**	Remove the brushes one at a time and maintain orientation for reinsertion. See if brush is worn short, 3/8" (10 mm) minimum length. Yes--replace motor brushes No--replace Traverse Motor

PROBLEM--Traverse does not stop to reverse directions when flag goes under the proximity switch on the left side or right side of machine.

Possible Cause	Checkout Procedure		
Gap between flag and prox is incorrect.	A. Gap between flag and prox should be 3/16 to 1/4" (4-6 mm). Prox LED does not light when flag is under prox.	If incorrect, adjust per adjustment section of manual. Yes--end troubleshooting No--go to Step B. next	
Proximity Switch is bad.	B. Proximity switch is not working properly or wire connections are loose.	First check to see if proximity light comes on. When the light is on, it means that there is electricity coming to proximity switch. Actuate prox switches with steel tool to take measurements.	The light coming on shows the proximity is getting electrical contact.
		Left proximity (PROX 1) check Traverse drive Control (TDC) between terminals #13 (black wire) and #15 (brown wire).	Proximity light on- 0 Volts DC Proximity light off- 12 Volts DC
		Right proximity (PROX) check #14 (black wire) and #15 (brown wire).	Proximity light on- 0 Volts DC Proximity light off- 12 Volts DC
			Replace proximity switch if the voltages do not read as above.

PROBLEM--Traverse speed control goes at one speed only.

Possible Cause	Checkout Procedure	
Defective speed control potentiometer	**A.** Check potentiometer on control panel.	Traverse Drive Control Pin #8 to 7 Pot full CCW Pot Full CW 0 VDC 9.75 VDC Pin #8 to 9 Pot full CCW Pot Full CW 9.75 VDC 0 VDC Yes--Pot is OK No--Go to Step **B.** next
	B. Check potentiometer for 10,000 ohms. Remove three wires from Traverse Drive Control red from terminal #8 white from terminal #7 black from terminal #9	Check for 10,000 ohms Red to White wires Full CCW - 0 ohms Full CW - 10,000 ohms Red to Black wires Full CCW - 10,000 ohms Full CW - 0 ohms Yes--Go to Step **C.** next No--replace potentiometer. Wiper inside of potentiometer controls speed. Wiper may be bad and not making contact.
Wiring hookup to potentiometer is improper. (If components have been replaced.)	**C.** Check potentiometer wiring for proper hookup. See that speed pot is wired per electrical diagram	Wrong wire hookup effects traverse control. Reversing red and orange wires to potentiometer to the D C motor will run at zero speed but maximum will be too slow. Reversing red and white wires does not affect speed control. Check for Proper function. Yes--end troubleshooting No--Go to Step **D.** next
Main circuit board dial pot settings not correct. (If board has not been replaced.)	**D.** Check all pot settings on circuit board as shown in wiring diagram. (See adjustment section Traverse Motor Control Board Settings.)	Minimum and maximum pot settings effect traverse speed.

PROBLEM--If the carriage traverses to one end of stroke or the other and it stops and does not reverse direction.

Possible Cause	Remedy	Reason
Proximity switch is not working properly or wire connections are loose	First check to see of proximity light comes on. When the light is on, it means that there is electricity coming to proximity switch. Actuate prox switches with steel tool to take measurements.	The light coming on shows the proximity is getting electrical contract.
Machine is in Torque mode and the indexing finger is not being activated.	Check to see that the finger Proximity sensor is lit when the moveable indexing finger is in the back position. [To test swiitch the torque selector to spin, if the carriage travels back and forth then its the finger proximity sensor is the most likely the issue.] Left proximity (PROX1) check Traverse drive Control (TDC) between terminals #14 (black wire) and #15 (brown wire). Right proximity (PROX) check (TDC) between terminals #13 (black wire) and #15 (brown wire).	The moveable indexing proximity sensor is not adjusted correctly or is not working. Test the proximity sensor by pressing on the index finger and look for the light on the end of the proximity sensor. Adjust the position of the proximity sensor if not adjusted correctly. Proximity Light on- 0 Volts DC Proximity Light off- 12 Volts DC Proximity Light on- 0 Volts DC Proximity Light off- 12 Volts DC Replace proximity switch if the voltages do not read as above.

PROBLEM--Insufficient hesitation at carriage stops prior to reversing traverse.

The dwell time on the traverse drive control not set properly.	Reset dwell time as required. One increment increases Dwell time by 1/2 second.	

PROBLEM--Traverse changes directions erratically while running in traverse cycle.

Loose wire to proximity switch.	Check wire connections from the proximity switches and tighten down screws.	A loose wire connection will give intermittent electrical contact.

PROBLEM--Infeed motor not working.

Assuming (SSS) System Start Switch is on with 115 Volts AC to control panel and all other functions are working.

Possible Cause	Checkout Procedure	
Infeed Jog Switch (IJS) is not held to on position	**A.** (IJS) Hold switch on in either direction	Infeed motor works Yes--end troubleshooting No--go to Step **B.** next
Infeed Speed Switch (IJS) is not on high speed	**B.** Put (IJS) on high speed for ease of checkout.	High speed works Yes--end troubleshooting No--go to Step **C.** next
Infeed motor/reducer drive coupling is loose	**C.** Open infeed motor coupling inspection plate to check for loose coupling. Retighten coupling to drive actuator screw. See adjustment section of manual.	Infeed works-- Yes--end troubleshooting No--go to Step **D.** next
No DC voltage to Grinding Wheel Infeed Motor (GIM)	**D.** With the Infeed Speed Switch in rabbit position, check for 24 Volts DC across terminals labeled 2 and 5 of the (IJS) with (IJS) held on.	Check term 2 & 5 of (IJS) for 24 Volts DC. Yes--go to Step **E.** next No--go to Step **G.** next
Infeed Motor/Reducer will not function	**E.** With the Infeed Speed Switch in rabbit, check for 24 Volts DC at the terminals 137TBB-21 and 137TBG-22.	Check for 24 Volts DC at Term marked 137TBB-21 and 137TBG-22. Yes--Go to Step **F.** next No--Replace wires #127 and #128
	F. Disconnect (GIM) from the infeed actuator and check (GIM) function under no load.	Check (GIM) function when disengaged from Infeed Actuator. Yes--Replaced Infeed Actuator No--Replace (GIM)
Switch (IJS) is bad	**G.** Check for 24 Volts DC to (IJS).	Check for 24 Volts DC at Terminal 6 and 4 then check Terminals 3 and 1 of (IJS). Yes--Replace (IJS) No--go to Step **H.** next.
No DC Voltage to the Infeed Control Board (ICB).	**H.** Check for 24 volts DC Input to ICB.	Remove the Red and Blue wires going to the ICB and Check for 24 Volts DC between the wires. 150ICBB+ to 133ICBB- Yes--Replace (ICB) No--Replace 24 VDC power supply (PWR)

PROBLEM--Infeed motor has no low speed (turtle) function.

Assuming (SSS) System Start Switch is on with 115 volts AC to control panel and all other functions are working and infeed motor works in high speed (rabbit position).

Possible Cause	Checkout Procedure	
Incorrect DC Voltage from the Voltage Regulator in low speed turtle position.	**A.** Verify voltage to grind infeed motor (GIM). With the infeed speed switch in turtle, check the DC voltage at the terminal strip where the Grinding Wheel Infeed Motor (GIM) cord attaches.	Check 3-8Volts DC at terminal 137TBB-21 and 137TBG-22. Yes--Go to Step **B.** next. No--Go to Step **C.** next.
Infeed Actuator is bound and will not allow low speed (turtle) function.	**B.** Disconnect (GIM) from the infeed actuator and check (GIM) function under no load.	Check (GIM) function when disengaged from Infeed Actuator. Motor should step slowly. Yes--Replaced Infeed Actuator No--Replace Grind Infeed Motor.
Infeed Speed Selector not working (ISS)	**C.** Remove wires from ISS terminals 2 and 3. Check continuity between terminals on Switch (ISS).	Switch has continuity when on and not when switch if off. Yes-- Replace Resistors assembly on ICB. No-- Replace switch (ISS)

Possible Cause	Checkout Procedure
PROBLEM--Reels ground have high/low blades	
Traverse Speed set too fast.	Check roundness using a magnetic base dial indicator. Traverse speed should be set approximately 12 ft/min. (4 meters/ min.) if roundness is varying.
Lineal bearings for the grinding head carriage are out of adjustment (loose) or have grit buildup causing uneven traversing load.	Lubricate and adjust linear bearings per adjustment section. If problem persists, replace lineal bearings on the carriage base. Check for any holes in the bellows that would permit any grinding grit penetration. See adjustment section for lineal bearing replacement.
PROBLEM--Excessive grinding stock being removed when traversing to the right in the relief grinding mode.	
Gib adjustment for the relief finger assembly is loose so reel finger has movement. When traversing to the right minimum grinding stock removal should be seen as compared with heavy stock removal when traversing to the left.	Tighten the set screws for the gib adjustment. See procedure in the adjustment section in the manual.
PROBLEM-- Grinding stock removal from reel is irregular during spin grinding.	
Lineal bearings on the grinding head carriage are too loose .	The lineal bearing must be preloaded to the traverse shafts with no vertical movement. See manual adjustment section for carriage bearing adjustments.
PROBLEM--Carriage traversing varies speed while grinding.	
Lineal bearings in the carriage do not rotate freely.	Check for grinding grit getting into the lineal bearings and causing excessive driving torque of carriage. Abrasive noise is detectable when excessive grit is in the lineal bearings. Replace the four lineal bearings in the main carriage. Check bellows for holes and replace if necessary.
Belt is slipping	Belt Clamp may have moved. See manual adjustment section for Traverse Clamp Force.
Traverse Belt tension to loose	Check the spring length on left side of traverse belt. See manual adjustment section for Traverse Belt Tension.

Possible Cause	Checkout Procedure
PROBLEM--Too heavy a burr on cutting edge of reel blades.	
Traverse speed set too high causing a heavy burr on the reel blade when spin grinding.	Traverse speed should be set lower approximately 12 ft/min. (meters/min.) for a smaller burr on cutting edge.
PROBLEM--Cone shaped reel after grinding.	
Grinding head travel not parallel to the reel center shaft.	Grinding head travel was not setup parallel to the reel center shaft in vertical and horizontal planes. See Align the Reel Section in operator's Manual
PROBLEM--Relief grind on the reel blades do not go the full length of the reel.	
The right side corner of the grinding wheel is always to be in contact with the reel blade. This is high point of the relief finger.	The right hand side of the grinding wheel is not in full contact for relief grinding. See Operators Manual for NORMAL HELIX AND REVERSE HELIX.

PROBLEM-- Traverse speed is too slow.

Possible Cause	Remedy	Reason
Lineal bearing in the carriage are set too tight.	A. Readjust bearings for proper tension. (For more detail see lineal bearing replacement in the adjustment section of the manual.)	When bearing preload is too tight, it causes excessive loading to drive the carriage. When traverse belt is disengaged, the proper traverse load is 2 to 3 lbs. Use a tension scale to check. (A general guide only.)

PROBLEM--Spin Drive cranks up and down too hard.

The two top and two bottom pivot screws are compressing the conical washer too tight.	A. Tighten down the locknut until it bottoms out and back off 1/2 turn. Check to see if there is a cone shape to the washer. Four (4) pivot points.	Have enough play so the crank turns snugly but during operation it is free.
Check screw adjustment tension on nylon plug riding against the screw thread.	B. Loosen set screw and check. (See adjustment section.)	

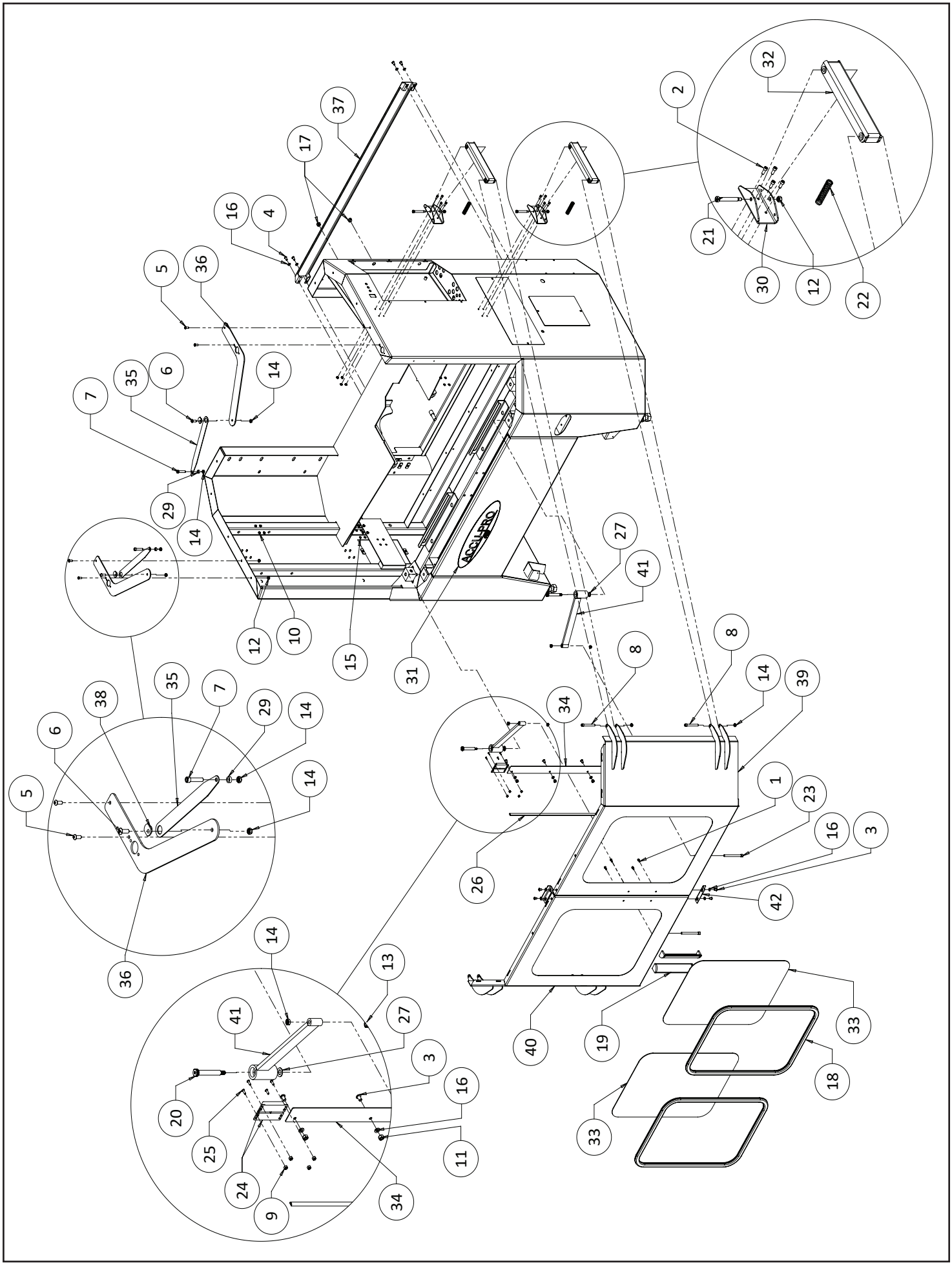

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DIAGRAM NO.	PART NO.	DESCRIPTION
1	B230611	M6 x 10 SOCKET HEAD CAP SCREW
2	B251011	1/4-20 x 5/8 SOCKET HEAD CAP SCREW
3	B310813	5/16-18 x 1/2 BUTTON HEAD SOCKET CAP SCREW
4	B311016	5/16-18 x 5/8 BUTTON HEAD SOCKET CAP SCREW
5	B311213	5/16-18 x .75 BUTTON HEAD SOCKET CAP SCREW
6	B371216	3/8-16 x 3/4 BUTTON HEAD SOCKET CAP SCREW
7	B372811	3/8-16 x 1-3/4 SOCKET HEAD CAP SCREW FULL THD
8	B374811	3/8-16 x 1-3/4 SOCKET HEAD CAP SCREW FULL THD
9	J167000	8-32 LOCKNUT JAM NYLON INSERT
10	J252000	1/4-20 HEX JAM NUT
11	J311000	5/16-18 HEX NUT FULL
12	J317100	5/16-18 LOCKNUT FULL NYLON INST
13	J372000	3/8-16 HEX JAM NUT
14	J377000	3/8-16 LOCKNUT JAM NYLON INSERT
15	K251501	1/4 LOCKWASHER SPLIT
16	K311501	5/16 LOCKWASHER SPLIT
17	3706039	HOLE PLUG .687 DIA. x .125 THK
18	3706186	WINDOW GASKET
19	3706215	LEDGE HANDLE
20	3706217	SHOULDER BOLT .5 x 2.5L
21	3706218	SHOULDER BOLT .38 x 2.5L
22	3706226	COMP. SPRING 3"L x .72 OD x .085 DIA WIRE
23	3706232	3/8 16 X 4.5" SOCKET HEAD CAP SCREW FULL THREAD
24	3707908	DOOR SWITCH W/DISCONNECT
25	3708820	8-32 x .50 BUTTON HD SAFETY SCREW
26	3708889	SEAL FOAM .50 HIGH
27	3709027	THRUST WASHER .507 x .917 x .062 T
28	3709304	THRUST WASHER .375 x .812 x .032 T
29	4609063	SPACER .385 x .625 x .25 L
30	6339039	DOOR PIVOT BRACKET
31	6339050	ACCUPro 633 DECAL
32	6339051	DOOR PIVOT ARM MACHINED ecp
33	6339056	WINDOW 18.5 x 26 (633)
34	6339057	DOOR CENTER PLATE
35	6539086	UPPER DOOR PIVOT ARM
36	6339189	DOOR UPPER ARM BRACKET
37	6339201	REAR BUMPER
38	6339202	UPPER DOOR PIVOT
39	6339521	633 DOOR WELDMENT RH
40	6339522	633 DOOR WELDMENT LH
41	6339524	DOOR PIVOT ARM WELDMENT
42	6539088	DOOR SHIPPING BRACKET

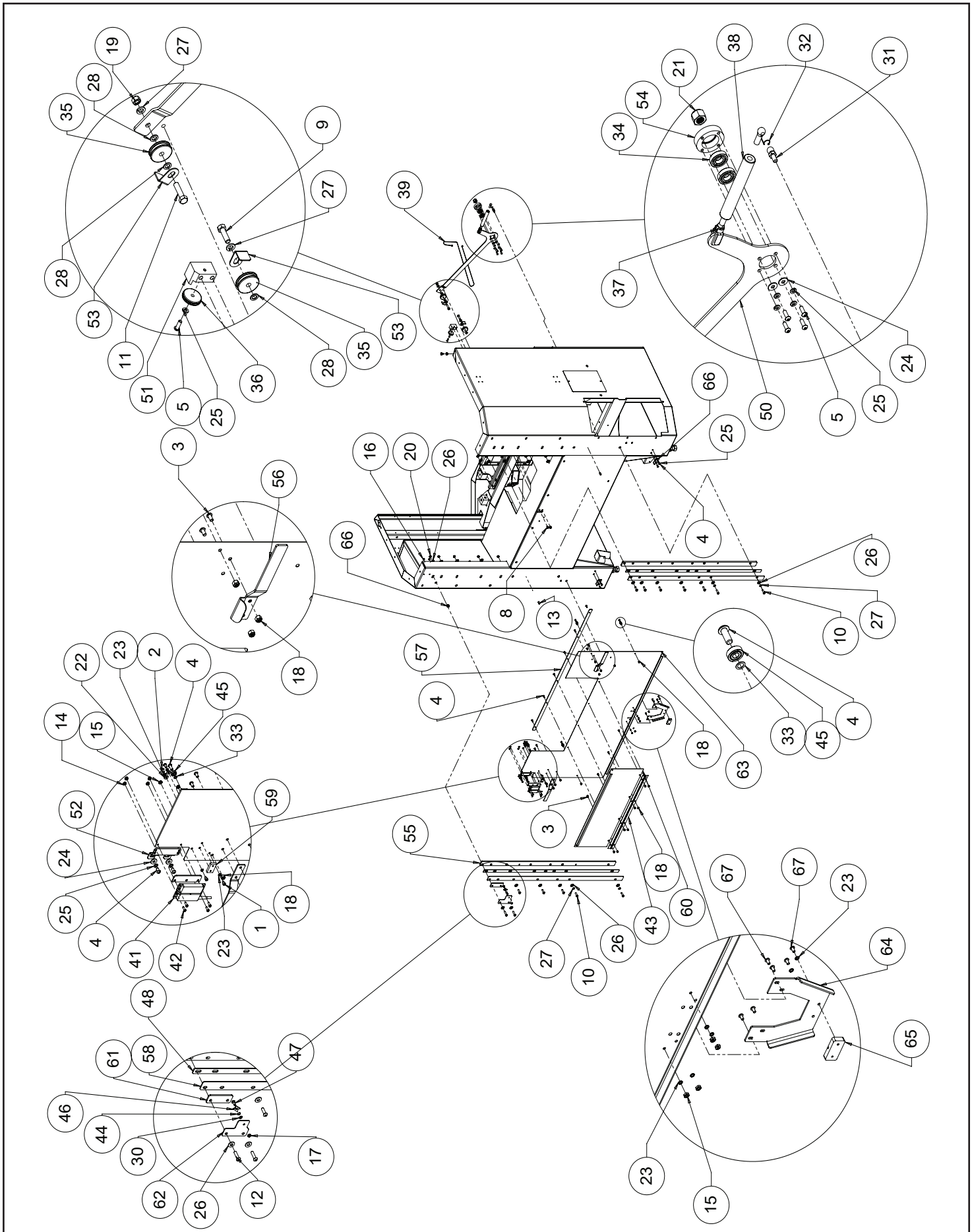
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DIAGRAM NO.	PART NO.	DESCRIPTION
1	B190411	10-24x1/4 SOCKET HEAD CAP SCREW
2	B190613	10-24x3/8 BUTTON HEAD SOCKET SCREW CAP
3	B250816	1/4-20x1/2 BUTTON HEAD SOCKET SCREW CAP
4	B251016	1/4-20x5/8 BUTTON HEAD SOCKET SCREW CAP
5	B251216	1/4-20x3/4 BUTTON HEAD SOCKET SCREW CAP
6	B310813	5/16-18x1/2 BUTTON HEAD SOCKET SCREW CAP
7	B370801	3/8-16x1/2 HEX HEAD CAP SCREW
8	B370816	3/8-16x1/2 BUTTON HEAD SOCKET SCREW CAP
9	B372001	3/8-16x1-1/4 HEX HEAD CAP SCREW
10	B372016	3/8-16x1.25 BUTTON HEAD SOCKET SCREW CAP
11	B372401	3/8-16x1-1/2 HEX HEAD CAP SCREW
12	B372416	3/8-16 X 1-1/2 BUTTON HEAD SOCKET SCREW CAP
13	H371202	ROLL PIN .375Dx.75
14	J167000	8-32 LOCKNUT JAM
15	J191000	10-24 HEX NUT
16	J252000	1/4-20 HEX JAM NUT
17	J257000	1/4-20 LOCKNUT JAM
18	J257100	1/4-20 LOCKNUT
19	J371000	3/8-16 HEX NUT
20	J377000	3/8-16 LOCKNUT JAM
21	J627100	5/8-11 LOCKNUT
22	K190001	FLAT WASHER #10 SAE
23	K191501	#10 LOCKWASHER SPLIT
24	K250001	FLAT WASHER 1/4 SAE
25	K251501	1/4 LOCKWASHER SPLIT
26	K370001	FLAT WASHER 3/8 SAE
27	K371501	3/8 LOCKWASHER SPLIT
28	09054	FLAT WASHER .387x..625X.065
29	55492	DOOR SAFETY SWITCH PLATE
30	80406	FLAT WASHER .27IDx.50 x .06
31	80418	STUD GAS SPRING
32	80421	RETAINING CLIP GAS
33	3249153	FLAT WASHER .252x.375x.018
34	3706032	BALL BRG R10 W/OIL
35	3706097	PULLEY 1.75OD X .37ID
36	3706098	PULLEY 1.5OD X .25ID
37	3706099	CLEVIS ROD END M8
38	3706100	GAS SPRING 202# 3.9 STROKE
39	3706212	CABLE ASSY REAR DOOOR
40	3707029	STRAIN RELF LIQUID TIGHT
41	3707908	DOOR SWITCH WITH DISCONNECT
42	3708820	8-32x.50 BUTTON HEAD SAFETY SCREW
43	3708869	SPRING HINGE
44	3708998	WAVE SPRING .35 ID
45	3709597	BALL BEARING
46	6329131	CATCH
47	6329133	CATCH PIN
48	6329136	REAR SLIDE SPACER
49	6329137	REAR SLIDING DOOR
50	6329163	REAR DOOR ARM
51	6329164	PULLEY BLOCK
52	6329165	DOOR SWITCH BRACKET
53	6329166	CABLE GUIDE
54	6329167	BEARING BLOCK
55	6329172	REAR DOOR INNER SLIDE
56	6329174	REAR DOOR LIFT HANDLE
57	6329175	REAR DOOR STIFFENER
58	6329179	REAR DOOR OUTER PLATE
59	6329180	DOOR STOP BLOCK
60	6329181	HINGED WALKER PANE
61	6329182	DOOR STOP SPACER PLATE
62	6329183	DOOR CATCH BRACKET
63	6339168	REAR DOOR SLIDE UP
64	6339169	REAR DOOR CABLE BRACKET
65	6339170	CABLE CLAMP BLOCK
66	6339171	DOOR STOP BLOCK
67	B190813	10-24X1/2 BUTTON HEAD SOCKET CAP SCREW

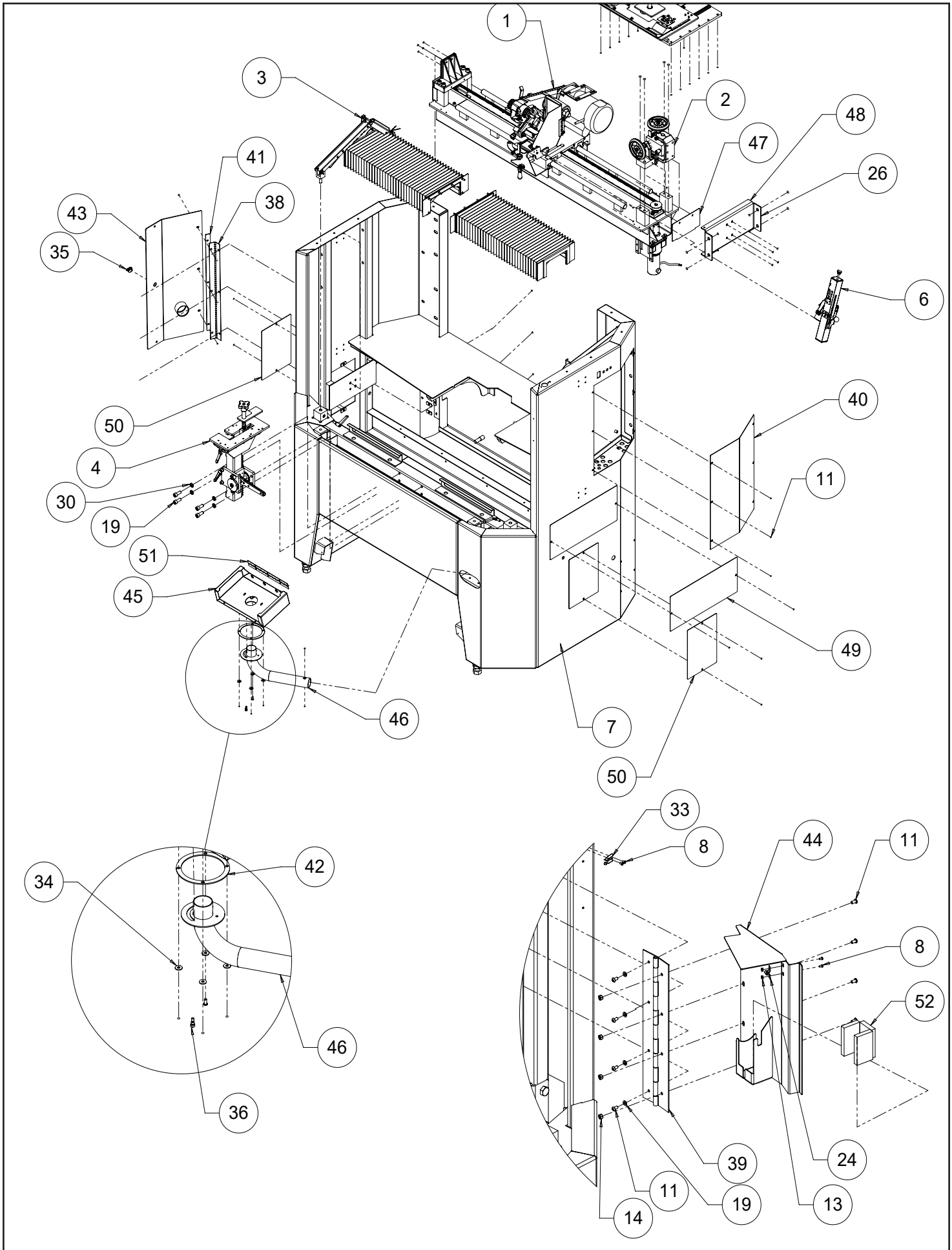
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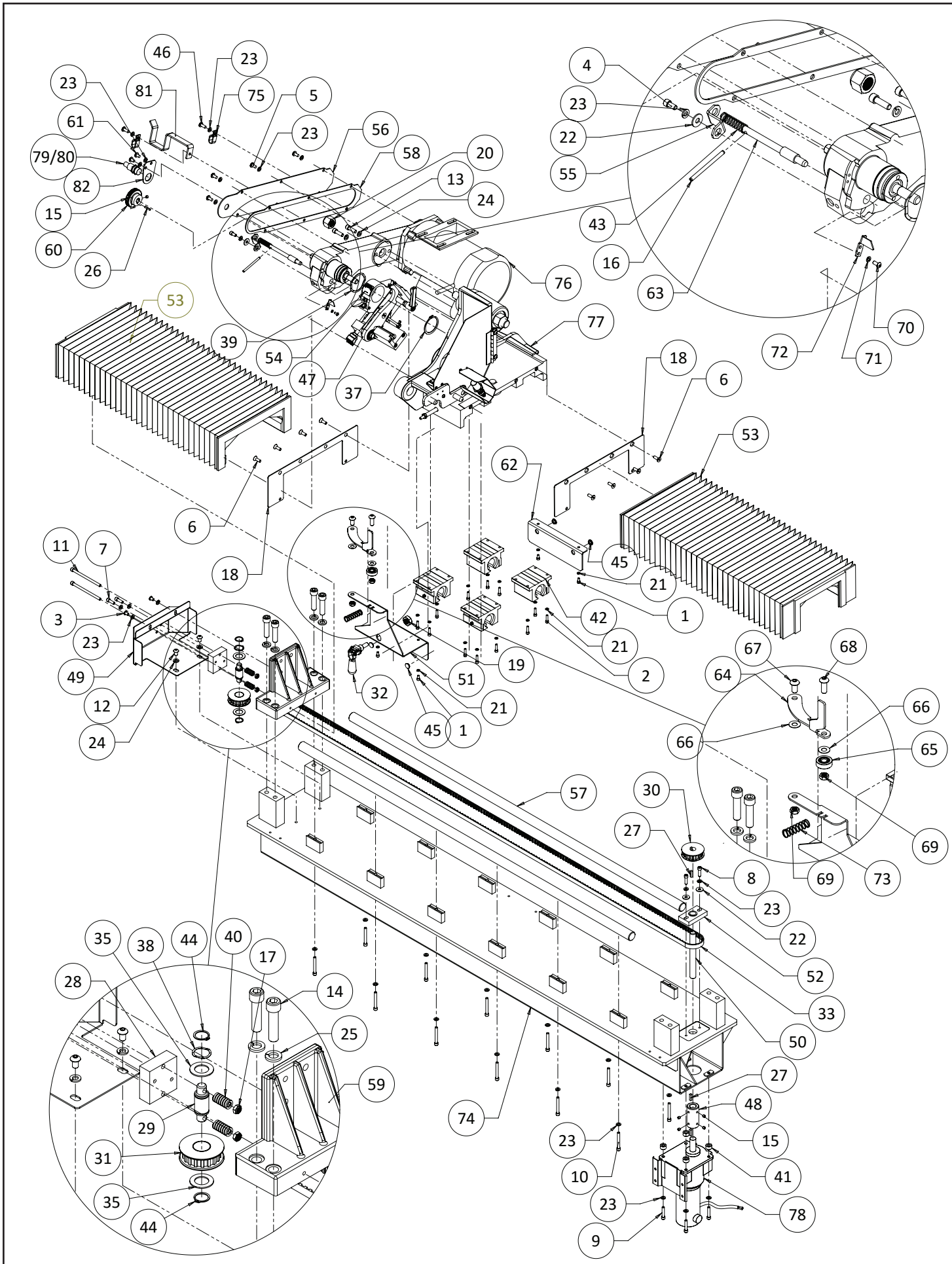
DIAGRAM NO.	PART NO.	DESCRIPTION
1	6339516	TRAVERSE BASE ASSEMBLY
2	6339537	CROSS SLIDE SUB ASSSEMBLY
3	6339505	SPIN DRIVE ASSEMBLY
4	6339530	FRONT TOOLING ASSEMBLY
5	6339534	REAR TOOLING ASSEMBLY
6	6339538	POSITION GAUGE ASSEMBLY
7	6339544	FRAME WELDMENT PAINT
8	B130412	6-32 x 1/4 PAN HEAD MACHINE SCREW
9	B190634	10-32 x 3/8 BUTTON HEAD SOCKET CAP SCREW
10	B250616	1/4-20 x 3/8 BUTTON HEAD SOCKET CAP SCREW
11	B250816	1/4-20 x 1/2 BUTTON HEAD SOCKET CAP SCREW
12	B250819	1/4-20 x 1/2 TRUSS HEAD MACHINE SCREW
13	B251016	1/4-20 x 5/8 BUTTON HEAD SOCKET CAP SCREW
14	B310813	5/16-18 x 1/2 BUTTON HEAD SOCKET CAP SCREW
15	B311013	5/16-18 x 5/8 BUTTON HEAD SOCKET CAP SCREW
16	B311613	5/16-18 x 1.0 BUTTON HEAD SOCKET CAP SCREW
17	B314811	5/16-18 x 3 SOCKET HEAD CAP SCREW FULL
18	B371211	3/8-16 x 3/4 SOCKET HEAD CAP SCREW
19	B502811	1/2-13 x 1-3/4 SOCKET HEAD CAP SCREW
20	B503211	1/2-13 x 2 SOCKET HEAD CAP SCREW
21	B504801	1/2-13 x 3 HEX HEAD CAP SCREW
22	H371602	ROLL PIN .375 D x 1.0
23	J137000	6-32 LOCKNUT JAM NUT
24	J257100	1/4-20 LOCKNUT FULL
25	J317100	5/16-18 LOCKNUT
26	J507100	1/2-13 LOCKNUT FULL
27	K191501	#10 LOCKWASHER SPLIT
28	K251501	1/4 LOCKWASHER SPLIT
29	K310001	FLAT WASHER 5/16 SPLIT
30	K311501	5/16 LOCKWASHER SPLIT
31	K371501	3/8 LOCKWASHER SPLIT
32	K501501	1/2 LOCKWASHER SPLIT
33	3706193	GRAB CATCH - METAL
34	3706219	.25"PLASTIC WASHER
35	3706220	WING HANDLE CAM LATCH
36	3708543	SHOULDER BOLT .313 DIA x .32 LG
37	3708908	ADJUSTABLE HANDLE 3/8-16 x.78 LG
38	6059030	HINGE - FRONT END
39	6329070	HINGE PAINTED
40	6339083	ELECTRICAL PANEL
41	6339187	VACUUM DOOR SPACER
42	6339191	CONTROL BOX RING
43	6339542	VACUUM DOOR WELDMENT
44	6339543	ALIGNMENT GAUGE HOUSING
45	6339556	CONTROL BOX WELDMENT
46	6339557	CONTROL ARM
47	6509020	TRAVERSE BASE END CAP
48	6509035	CROSS SLIDE MOUNT PLATE
49	6509039	ACCESS PANEL RIGHT SIDE
50	6509040	SMALL ACCESS PANEL
51	6509212	CONTROL PANEL HINGE
52	6339188	ADESIVE BACK FOAM
53	K250001	1/4" FLAT WASHER
54	3706118	PUSH IN CABLE TIE (NOT SHOWN)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DIA.	PART NO.	DESCRIPTION
1	B190611	10-24 x 3/8 SOCKET HEAD CAP SCREW
2	B191211	10-24 x 3/4 SOCKET HEAD CAP SCREW
3	B250616	1/4-20 x 3/8 BUTTON HEAD CAP SCREW
4	B250811	1/4-20 x 1/2 SOCKET HEAD CAP SCREW
5	B250818	1/4-20 x 1/2 PAN HEAD MACHINE SCREW
6	B251205	1/4-20 x 3/4 FLAT HEAD SOCKET CAP SCREW
7	B251211	1/4-20 x 3/4 SOCKET HEAD CAP SCREW
8	B251411	1/4-20 x 7/8 SOCKET HEAD CAP SCREW
9	B252011	1/4-20 x 1-1/4 SOCKET HEAD CAP SCREW
10	B253211	1/4-20 x 2 SOCKET HEAD CAP SCREW
11	B256411	1/4-20 x 4 SOCKET HEAD CAP SCREW
12	B310813	5/16-18 x 1/2 BUTTON HEAD CAP SCREW
13	B311611	5/16-18 x 1 SOCKET HEAD CAP SCREW
14	B503211	1/2-13 x 2 SOCKET HEAD CAP SCREW
15	C250420	1/4-20 x 1/4 SOCKET SET SCREW
16	H184002	ROLL PIN .188 D x 2
17	J257000	1/4-20 LOCKNUT JAM
18	6539094	BELLOWS CARRIAGE MNTG BRKT
19	J627200	5/8-18 LOCKNUT JAM
20	J757300	3/4-16 LOCKNUT FULL
21	K191501	#10 LOCKWASHER SPLIT
22	K250001	FLAT WASHER 1/4 SAE
23	K251501	1/4 LOCKWASHER SPLIT
24	K311501	5/16 LOCKWASHER SPLIT
25	K501501	1/2 LOCKWASHER SPLIT
26	R000376	SQ KEY 1/8 x .75
27	R000377	SQ KEY 3/16 x .75
28	28192	TRAVERSE PULLEY SUPPORT
29	50309	TRAVERSE PULLEY SHAFT
30	3706056	DRIVE COG PULLEY
31	55553	IDLER PULLEY ASSEMBLY
32	80335	CLAMP DESTACO 602
33	80354	COG BELT
34	80355	THRUST WASHER .75 ID
35	3707224	CABLE TIE MOUNT
36	3707225	CABLE TIE 6.5 L x.18
37	3708195	RETAINING RING EXTERNAL
38	3708419	WAVE SPRING .78 ID
39	3708436	WAVE SPRING
40	3708658	COMPRESSION SPRING
41	3708884	SPACER .28 ID x .62 OD
42	3709044	BALL BEARING
43	3709072	COMPRESSION SPRING .48 OD
44	3709331	RETAINING RING EXTERNAL
45	3709372	HOLE PLUG .50 DIA.
46	B251018	1/4-20x5/8 PAN HEAD MACHINE SCREW
47	6339510	RELIEF ANGLE POSITIONER ASSEMBLY
48	6329034	COUPLER .625 DIA.
49	6329036	PULLEY MOUNT BRACKET
50	6329141	MOTOR EXTENSION SHAFT
51	6339533	LIMIT SENSOR AND CLAMP
52	6329511	SHAFT SUPPORT BLOCK
53	6539095	BELLOWS WAY COVER (VELCRO)
54	6339214	RELIEF ANGLE DECAL
55	6509054	RETAINER PLUNGER
56	6509055	BELT COVER
57	6509063	CARRIER SHAFT
58	6509210	GASKET BELT COVER
59	6509221	FIXED TRAV BASE END BRACKET
60	6509238	GRIP KNOB GRINDING WHEEL
61	B250618	1/4-20 x 3/8 PAN HEAD MACHINE SCREW
62	6509253	CARRIAGE DUST COVER BRACKET
63	6339023	PLUNGER PIN
64	6339132	LIMIT SENSOR BRACKET
65	3709257	BALL BEARING
66	3709304	THRUST WASHER .375
67	B371216	3/8-16 x 3/4 BUTTON HEAD CAP SCREW
68	B371616	3/8-16 x 1 BUTTON HEAD CAP SCREW
69	J377000	3/8-16 LOCKNUT JAM
70	B160607	8-32 x 3/8 BUTTON HEAD CAP SCREW
71	K161501	#8 LOCKWASHER SPLIT
72	6339127	RELIEF ANGLE POINTER
73	3706194	COMPRESSION SPRING .6ODx
74	6329032	TRAVERSE BASE MACHINED
75	3708121	DOUBLE CORD CLAMP
76	6339515	GRINDING HEAD ASSEMBLY
77	6339531	CARRIAGE ASSEMBLY BELT TRAVERSE
78	80380	GEARMOTOR 1/20 HP
79	3707601	PROXIMITY SENSOR
80	6539082	HEAD POSITION SENSOR CORD
81	6509269	VACUUM HOSE BRACKET
82	6509216	HEAD SENSOR BRACKET

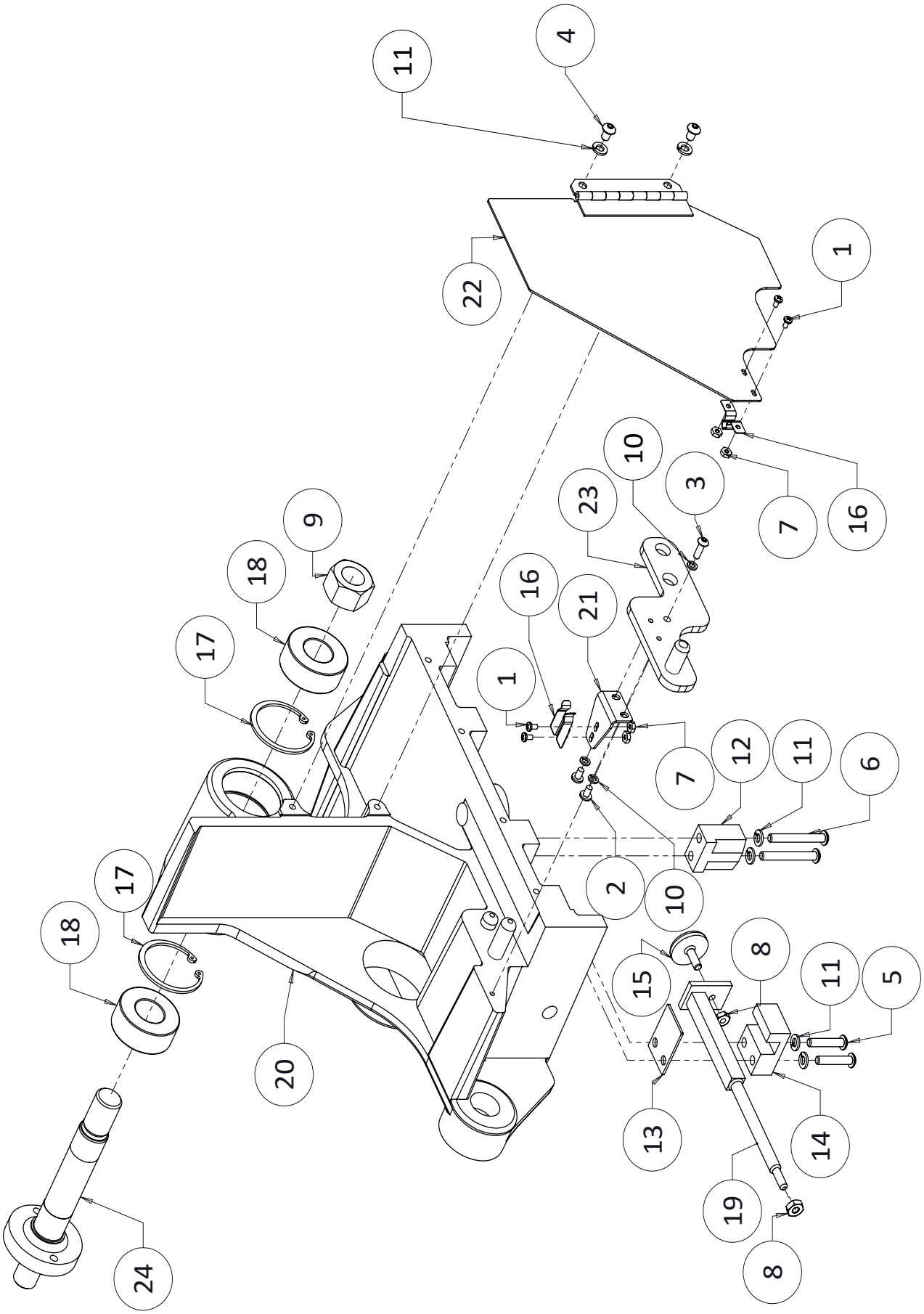
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DIAGRAM NO.	PART NUMBER	DESCRIPTION
1	B130412	6-32 x 1/4 PHILLIPS HEAD MACHINE SCREW +
2	B190509	10-24 x 5/16 PHILLIPS HEAD MACHINE SCREW +
3	B191013	10-24 x 5/8 BUTTON HEAD SOCKET CAP SCREW
4	B250616	1/4-20 x 3/8 BUTTON HEAD SOCKET CAP SCREW
5	B252016	1/4-20 x 1-1/4 BUTTON HEAD SOCKET CAP SCREW
6	B253216	1/4-20 x 2 BUTTON HEAD SOCKET CAP SCREW
7	J137000	6-32 LOCKNUT JAM N
8	J252000	1/4-20 HEX JAM NUT
9	J887300	7/8-14 LOCKNUT FUL
10	K191501	#10 LOCKWASHER SPL
11	K251501	1/4 LOCKWASHER SPL
12	28187	BLOCK TRAVERSE CLAMP
13	28188	SPACER TRAVERSE CLAMP
14	28189	BLOCK CLAMP SUPPOR
15	50310	TIP BELT CLAMP
16	3706193	GRAB CATCH - METAL
17	3708184	RETAINING RING INT
18	3708186	BALL BEARING DBL ROW 5
19	6329040	TRAVERSE CLAMP MAC
20	6329058	CARRIAGE BASE BELT
21	6339130	CATCH BRACKET
22	6339532	DUST DOOR WELDMENT
23	6339559	PIN PLATE WELDMENT
24	6509023	SHAFT GR HEAD PIVOT

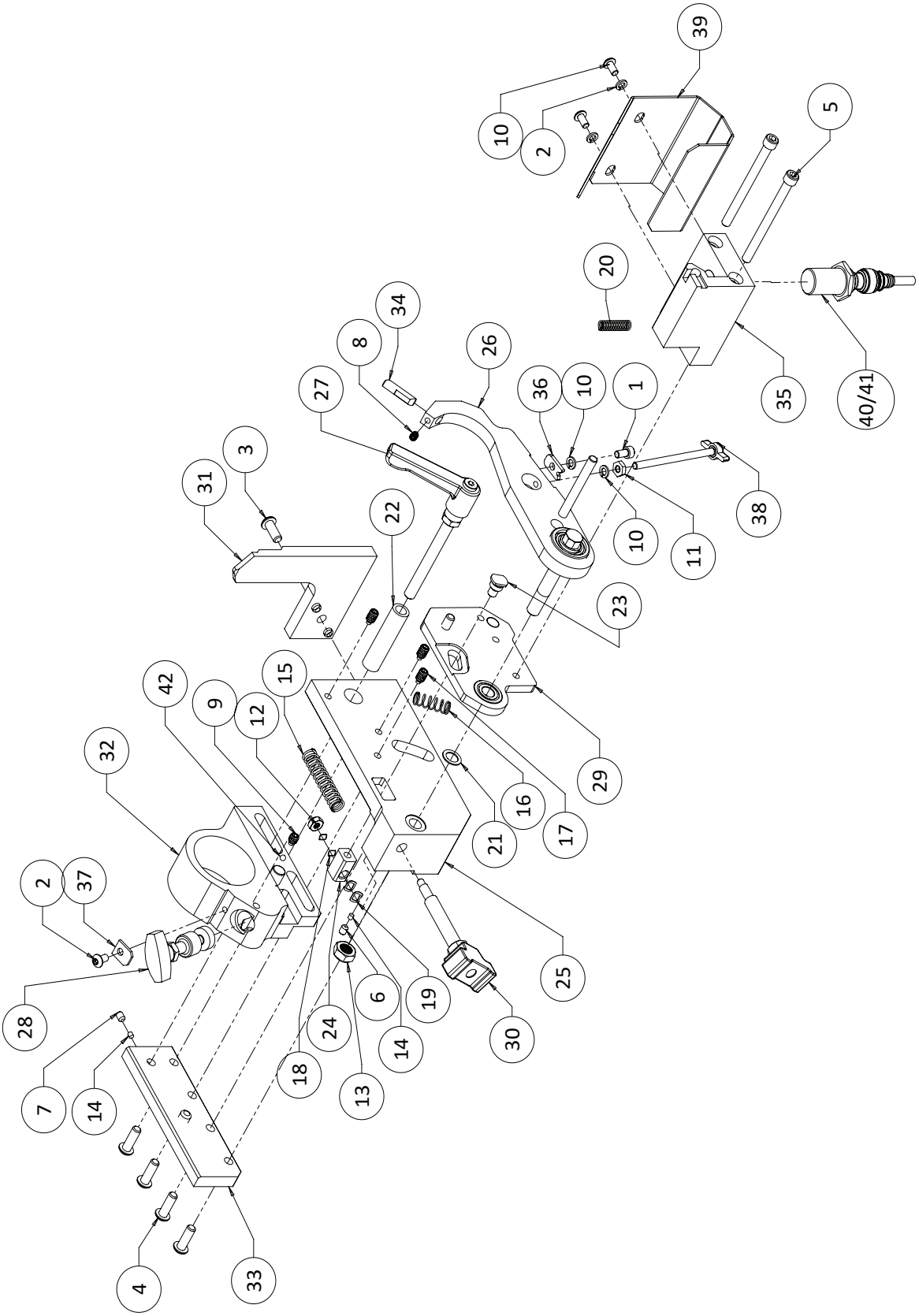
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DIAGRAM NO.	PART NUMBER	DESCRIPTION
1	B190631	10-32 x 3/8 SOCKET HEAD CAP SCREW
2	B190634	10-32 x 3/8 BUTTON HEAD SOCKET CAP SCREW
3	B251016	1/4-20 x 5/8 BUTTON HEAD SOCKET CAP SCREW
4	B251216	1/4-20 x 3/4 BUTTON HEAD SOCKET CAP SCREW
5	B254811	1/4-20 x 3 SOCKET HEAD CAP SCREW
6	C160420	8-32 x 1/4 SOCKET SET SCREW CAP POINT
7	C190460	SOCKET SET SCREW 10-32 x 1/4
8	C190467	10-32 x 1/4 SOCKET SET SCREW NYLON
9	C250427	1/4-20 x 1/4 NYLON
10	K191501	#10 LOCKWASHER SPLIT
11	J191100	10-32 HEX NUT
12	J197000	10-24 LOCKNUT JAM
13	J377200	3/8-24 LOCKNUT JAM
14	3579284	NYLON PLUG 1/8 DIA
15	3706170	COMPRESSION SPRING .42 OD x .31 ID
16	3706171	COMPRESSION SPRING .42 OD x .33 ID
17	3706172	1/4-20 x 3/8 SET SCREW
18	3706187	WAVE SPRING .2 ID
19	3706188	WAVE SPRING .24 ID
20	3708107	COMPRESSION SPRING .24 OD
21	3708999	WASHER FLAT .376 x .563 x .03
22	6339014	SPACER .5 OD x .33 ID
23	6339016	FINGER STOP POSITION
24	6339017	PIN BLOCK
25	6339020	FINGER SLIDE BASE
26	6339507	INDEX FINGER ASSEMBLY
27	6339508	RELIEF ADJUSTER LOCK HANDLE
28	6339569	RELIEF ANGLE POSITIONER KNOB ASSEMBLY
29	6339511	FINGER STOP PLATE ASSEMBLY
30	6339512	FINGER STOP ADJUSTMENT KNOB
31	6339548	FIXED FINGER ASSEMBLY
32	6339549	FINGER SUPPORT ROTATE ASSEMBLY
33	6339547	CLAMP PLATE FOR RELIEF ASSEMBLY
34	6509007	INDEX STOP PIN
35	6509008	INDEX SENSOR BLOCK
36	6509239	ANTI ROTATE PLATE
37	6509358	STOP PLATE
38	6509501	TEE KNOB ASSY 10-32X3.0
39	6509230	INDEX SENSOR GUARD
40	3707601	PROXIMITY SENSOR
41	6539083	FINGER POSITION SENSOR CORD
42	3709705	NYLON BALL 5/32 DIA.

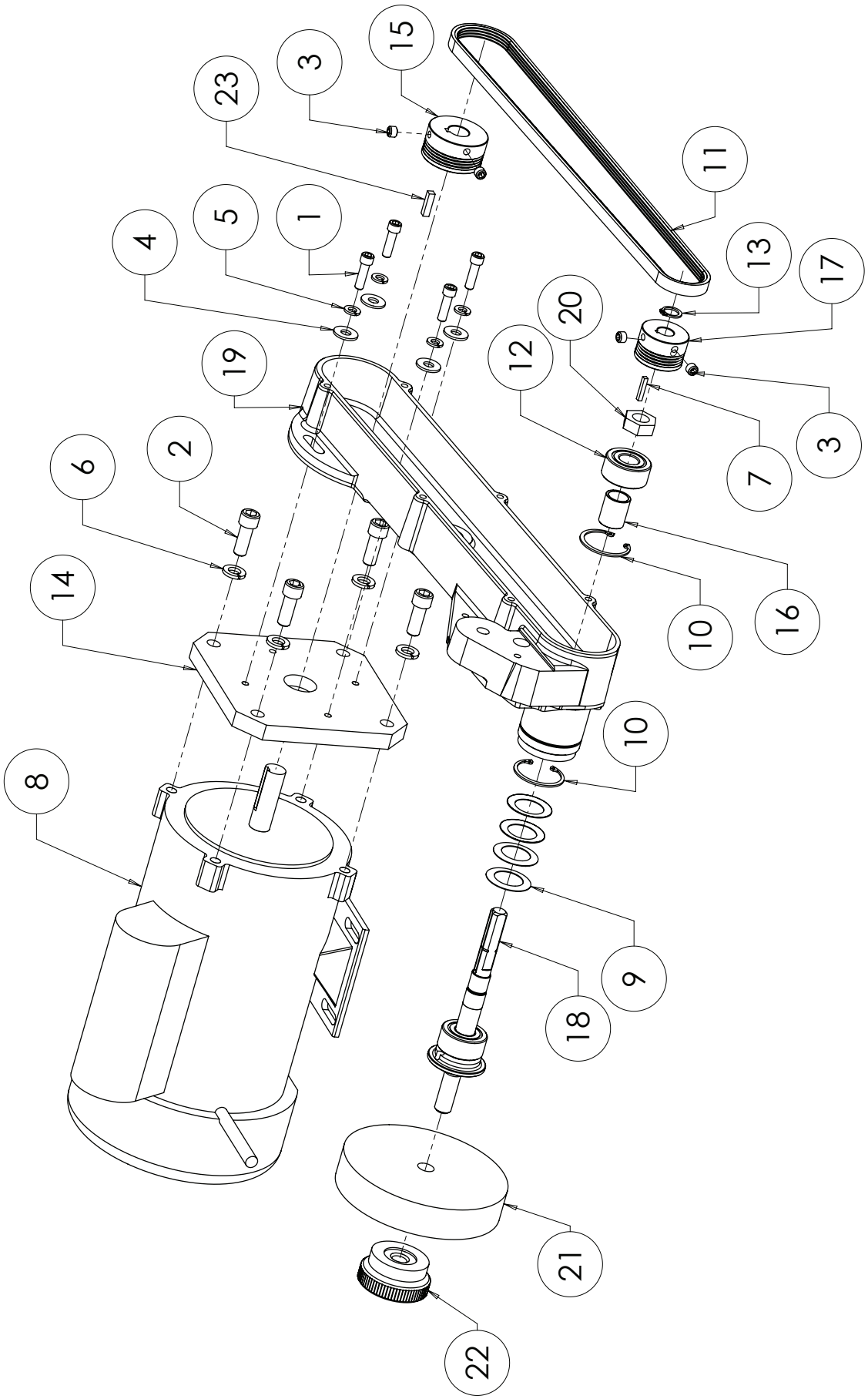
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DIAGRAM NO.	PART NO.	DESCRIPTION
1	B251411	1/4-20 x 7/8 SOCKET HEAD CAP SCREW
2	B371611	3/8-16 x 1 SOCKET HEAD CAP SCREW
3	C250627	1/4-20 x 3/8 SOCKET SET SCREW CAP POINT
4	K250001	FLAT WASHER 1/4 SAE
5	K251501	1/4 LOCKWASHER SPLIT
6	K371501	3/8 LOCKWASHER SPLIT
7	R000376	SQUARE KEY 1/8 x .75
8	3707690	MOTOR 1HP 120VAC TEFC
9	3708193	CONICAL WASHER .882 x 1.362 x .0197
10	3708194	RETAINING RING INTERNAL
11	3708202	BELT POLY V 320J4
12	3708204	BALL BRG DBL ROW 5202-2RS
13	3708870	RETAINING RING EXT .50 SHAFT HD
14	6329041	PLATE MOTOR MOUNT
15	6329042	PULLEY POLY V 1.80 DIA.
16	6329089	SLEEVE BEARING DBL ROW
17	6329100	PULLEY POLY-V 1.44 D STL
18	6329523	GR HEAD SPINDLE ASSY
19	6339026	GRINDING HEAD HOUSING
20	6509494	SPINDLE NUT
21		GRINDING WHEEL (SEE CARTON ASSEMBLY)
22	6509237	GRINDING WHEEL KNOB
23	R000377	SQUARE KEY 3/16 x .75

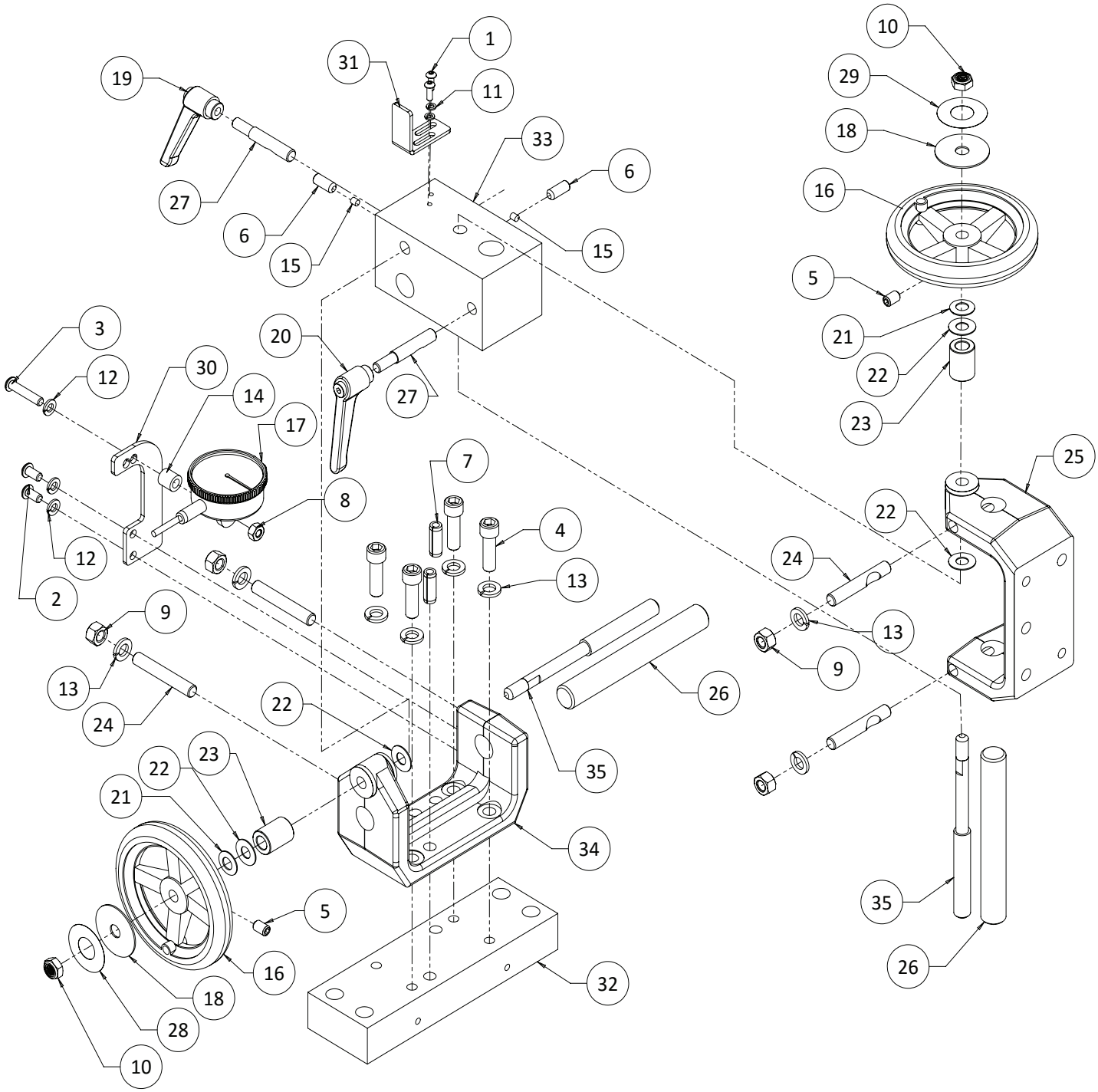
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DIAGRAM NO.	PART NUMBER	DESCRIPTION
1	B160807	8-32 x 1/2 BUTTON HEAD SOCKET CAP SCREW
2	B250816	1/4-20 x 1/2 BUTTON HEAD SOCKET CAP SCREW
3	B252016	1/4-20 x 1-1/4 BUTTON HEAD SOCKET CAP SCREW
4	B372011	3/8-16 x 1-1/4 SOCKET HEAD CAP SCREW
5	H371602	ROLL PIN .375 D x 1.0
6	C311220	5/16-18 x 3/4 SOCKET SET SCREW CAP POINT
7	J257000	1/4-20 LOCKNUT JAM
8	J371000	3/8-16 HEX NUT
9	J377000	3/8-16 LOCKNUT JAM
10	K161501	#8 LOCKWASHER SPLIT
11	K251501	1/4 LOCKWASHER SPLIT
12	K371501	3/8 LOCKWASHER SPLIT
13	3109027	SPACER .281 ID x .50 OD
14	3579109	NYLON PLUG 3/16 DI
15	3708148	HANDWHEEL 4.5 DIA .
16	3708581	DIAL INDICATOR - I
17	3708665	FLAT WASHER .41 x 1.
18	3708705	ADJ HANDLE 5/16-18
19	3708706	ADJ HANDLE 5/16-18
20	3709062	CONICAL WASHER .38
21	3709304	THRUST WASHER .375
22	3969065	SPACER .406 ID x .75O
23	6009035	SHAFT LOCKING STUD
24	6009082	SUPPORT CROSS SLIDE
25	6009095	SHAFT SLIDE
26	6309113	SHAFT LOCKING STUD
27	6309114	DECAL ORANGE
28	6309115	DECAL GREY
29	6339027	DIAL INDICATOR MOUNT
30	6339028	DIAL INDICATOR STO
31	6509011	CROSS SLIDE
32	6509015	SUPPORT CROSS SLIDE
33	6509010	BRKT ADJUSTER TRAV
34	6509390	SHAFT ADJUSTING AC

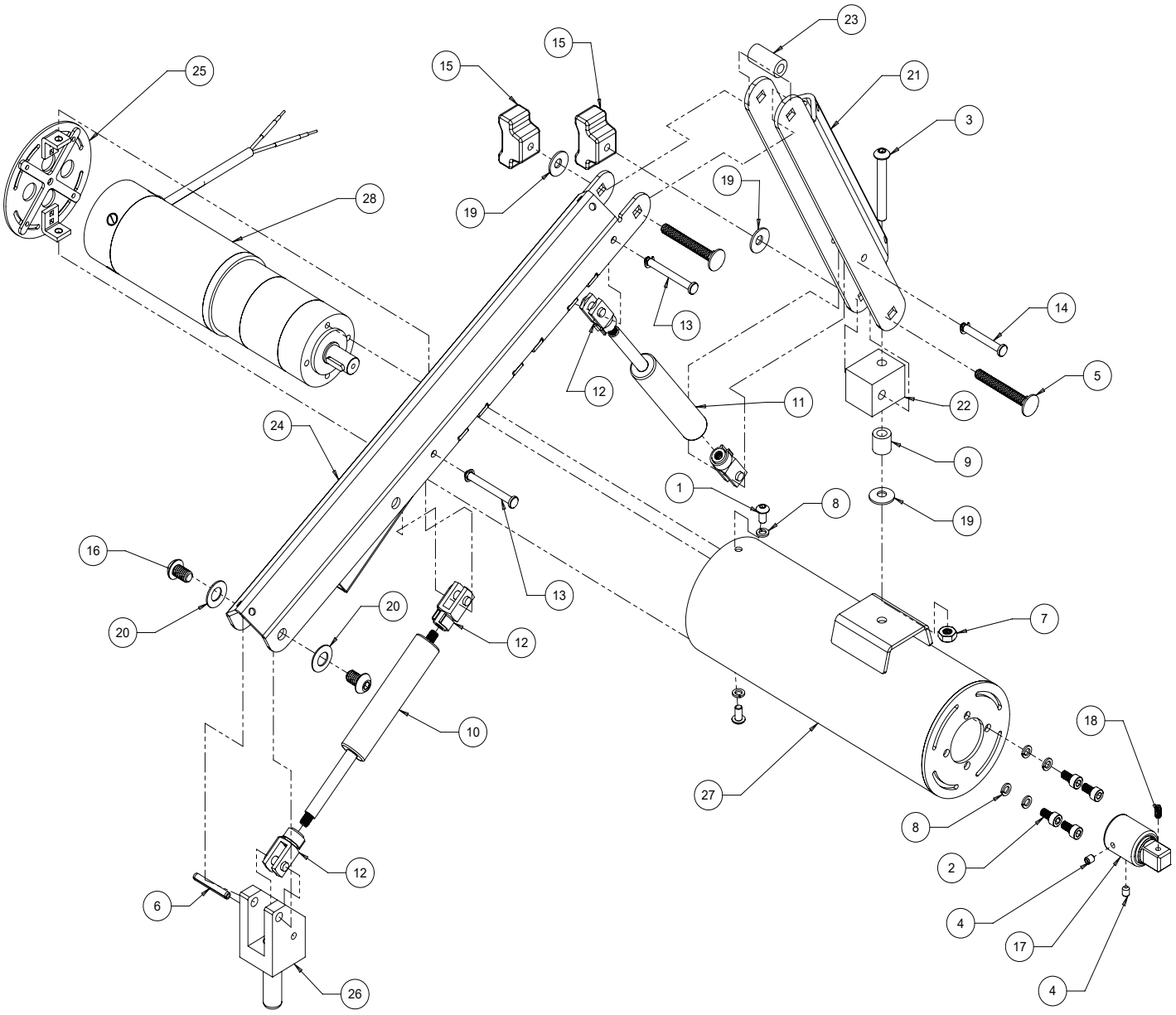
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DIAGRAM NO.	PART NO.	DESCRIPTION
1	B190613	10-24 x 3/8 BUTTON HEAD SOCKET CAP SCREW
2	B200611	M5-.8 x 10 SOCKET HEAD CAP SCREW METRIC
3	B253216	1/4-20 x 2 BUTTON HEAD SOCKET CAP SCREW
4	C190420	10-24 x 1/4 SOCKET SET SCREW CAP POINT
5	E253200	CARRIAGE BOLT 1/4-20 x 2.00
6	H182002	PIN - ROLL .188Dx1.25LG
7	J257000	1/4-20 LOCKNUT JAM NYLON INSERT
8	K191501	#10 LOCKWASHER SPLIT
9	3109027	SPACER .281 ID x .50 OD x .50 L STL
10	3706138	GAS SPRING 130# 1.97"STROKE
11	3706255	GAS SPRING 30# 1.97" STROKE
12	3706155	STEEL CLEVIS ROD END FOR M6 x 1
13	3706156	CLEVIS PIN 3/16 x 1-3/4L
14	3706157	CLEVIS PIN 3/16 x 1-1/2L
15	3706158	KNOB T 1.5 1/4-20F
16	3706159	5/16-18 x .5" BUTTON HEAD SOCKET CAP SCREW W/PATCH
17	3706165	MOTOR DRIVE ADAPTER 12MM-1/2 SQ
18	3706166	8-32 BALL NOSE SPRING PLUNGER
19	3708861	CONICAL WASHER .258 x .688 x .048
20	3709062	CONICAL WASHER .382 x .75 x .035 T
21	6339005	SPIN DRIVE UPPER ARM
22	6339006	SPIN MOTOR PIVOT BLOCK
23	6339012	SPACER .26 ID x .5 OD x 1.0 L
24	6339501	SPIN DRIVE LOWER ARM WELDMENT
25	6339503	MOTOR HOUSING END CAP
26	6339504	SPIN DRIVE BASE PIVOT BLK ASSY
27	6339564	MOTOR HOUSING WELDMENT W/ SLOT
28	6339565	SPIN MOTOR ASSY 1.9A

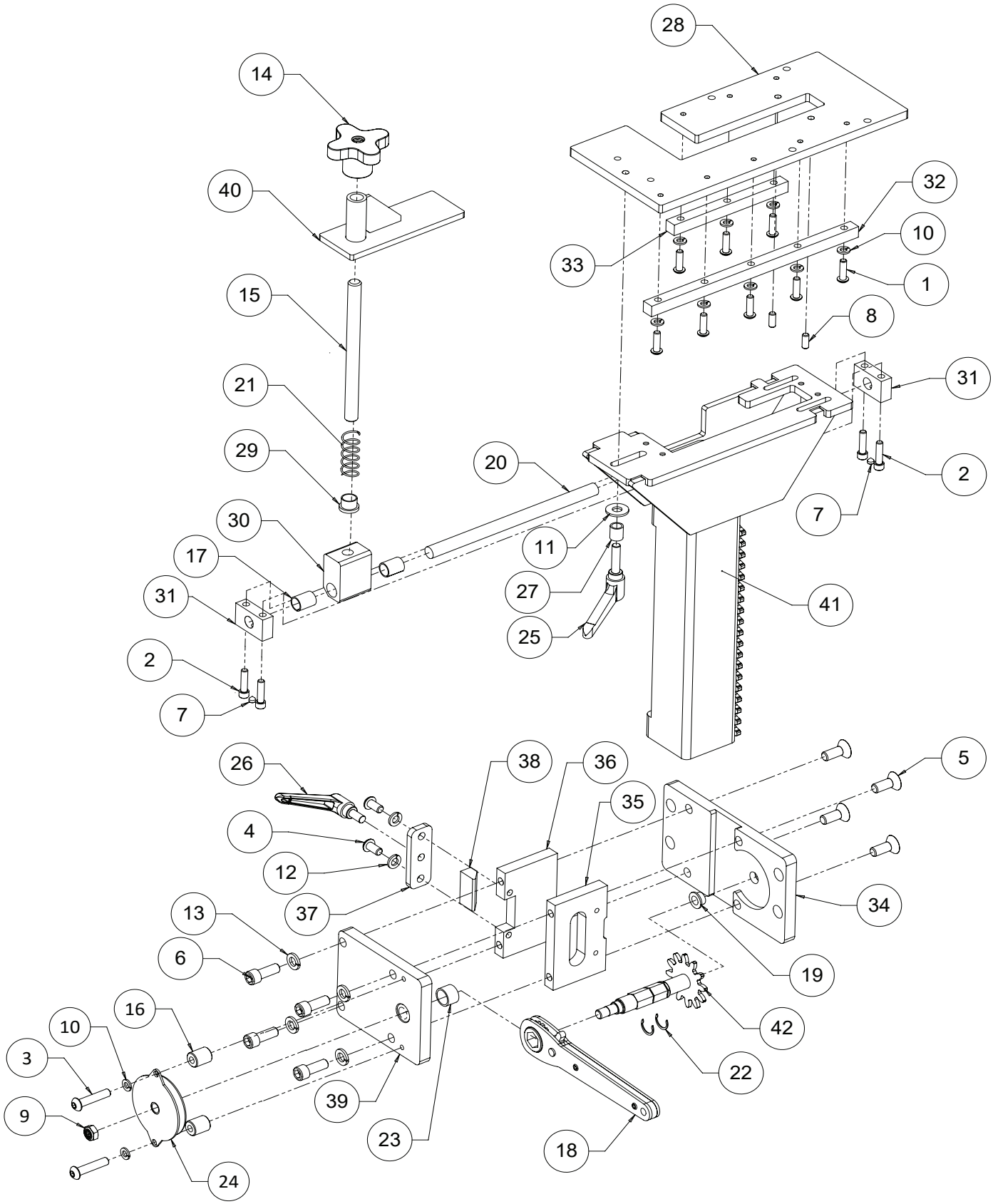
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DIAGRAM NO.	PART NO.	DESCRIPTION
1	B251416	1/4-20 x 7/8 BUTTON HEAD SOCKET CAP SCREW
2	B251611	1/4-20 x 1 SOCKET HEAD CAP SCREW
3	B252416	1/4-20 x 1-1/2 BUTTON HEAD SOCKET CAP SCREW
4	B311013	5/16-18 x 5/8 BUTTON HEAD SOCKET CAP SCREW
5	B371625	3/8-16 x 1 FLAT HEAD SOCKET CAP SCREW
6	B371611	3/8-16 x 1 SOCKET HEAD CAP SCREW
7	C250620	1/4-20 x 3/8 SOCKET SET SCREW CAP POINT
8	H251202	ROLL PIN .25D x .75 L
9	J377000	3/8-16 LOCKNUT JAM NYLON INSERT
10	K251501	1/4 LOCKWASHER SPLIT
11	K310001	FLAT WASHER 5/16 STEEL
12	K311501	5/16 LOCKWASHER SPLIT
13	K371501	3/8 LOCKWASHER SPLIT
14	09853	KNOB - 4 PRONG 1/2-13F
15	17119	STUD - THD 1/2-13 x 6.5 LG
16	3679096	SPACER .281 ID x .625 OD x .75 L
17	3706189	BRG - DU SLEEVE 1/2 ID x 3/4 LG
18	3706190	RATCHET WRENCH .625" HEX
19	3706191	BRG - OILITE FLANGE .375 x .5 x .25
20	3706192	1/2"OD x 8" LG SHAFT
21	3706203	SPRING COMPR .72 OD x 2 LG
22	3706204	RETAINING RING EXT 5103-62 LOW CLEARANCE FOR 5/8" SHAFT
23	3706234	BRG - OILITE SLEEVE .62 x .73 x .50
24	3706235	DAMPER - 10MM SHAFT
25	3708094	ADJ HANDLE 5/16-18 x 1.25 LG
26	3708908	ADJ HANDLE 3/8-16 x .78 LG
27	6009031	SPACER .386 ID x .50 OD x .56 L STL
28	6339095	FRONT TOOLING TOP PLATE
29	6339099	SPRING GUIDE
30	6339100	SLIDE CLAMP BLOCK
31	6339103	SHAFT SUPPORT BLOCK
32	6339104	TOOLING PLATE LONG BRACE
33	6339105	TOOLING PLATE SHORT BRACE
34	6339109	FRONT TOOLING MOUNT PLATE
35	6339111	FRONT TOOLING RIGHT SIDE PLATE
36	6339112	FRONT TOOLING LEFT SIDE PLATE
37	6339113	LOCK PLATE
38	6339114	TOOLING LOCK BLOCK
39	6339207	FRONT TOOLING OUTER PLATE
40	6339527	FRONT CLAMP WELDMENT
41	6339561	FRONT ROLLER MOUNT MACHINED
42	6339562	PINION SHAFT WELDMENT

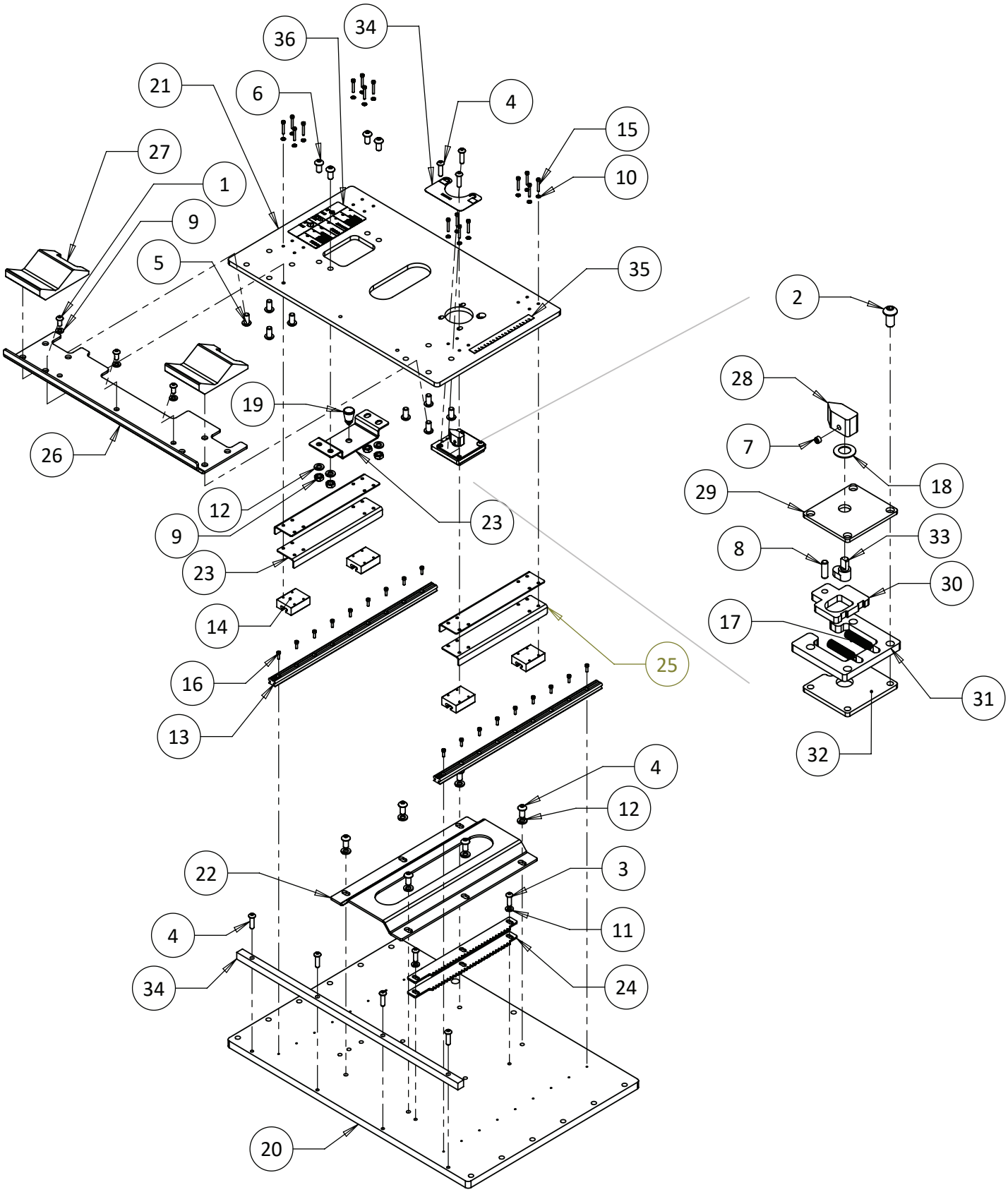
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DIAGRAM NO.	PART NUMBER	DESCRIPTION
1	B250616	1/4-20 x 3/8 FLAT HEAD SOCKET CAP SCREW
2	B250816	1/4-20 x 1/2 FLAT HEAD SOCKET CAP SCREW
3	B251216	1/4-20 x 3/4 FLAT HEAD SOCKET CAP SCREW
4	B251416	1/4-20 x 7/8 FLAT HEAD SOCKET CAP SCREW
5	B311013	5/16-18 x 5/8 FLAT HEAD SOCKET CAP SCREW
6	B311413	5/16-18 x 7/8 BUTTON HEAD SOCKET CAP SCREW
7	C190320	SKSS 10-24 x 3/16 CAP POINT
8	H180901	PIN - DOWEL .188 D x
9	J311000	5/16-18 HEX NUT FULL
10	K121501	#5 LOCKWASHER SPLIT
11	K251501	1/4 LOCKWASHER SPLIT
12	K311501	5/16 LOCKWASHER SPLIT
13	3706195	BEARING RAIL - 15M
14	3706196	LINEAR BEARING 15M
15	3706197	M3-.5 X 20MM SOCKET HEAD CAP SCREW
16	3706198	M3-.5 X 12MM SOCKET HEAD CAP SCREW
17	3706221	COMP SPRING .25 OD
18	3708214	CONICAL WASHER .38
19	3708914	PLUNGER - SPRING
20	6339119	BOTTOM PLATE REAR
21	6339120	TOP PLATE REAR TOOL
22	6339121	CLAMP PLATE REAR
23	6339122	POSITION PIN BRACK
24	6339123	PAWL RACK REAR TOOL
25	6339124	BEARING SIDE PLATE
26	6339125	SPARK PLATE
27	6339126	REAR TOOLING SUPPORT
28	6339134	POINTER KNOB
29	6339135	PAWL TOP PLATE
30	6339136	LOCATING PIN PLATE
31	6339137	PAWL SPACER PLATE
32	6339138	PAWL BOTTOM PLATE
33	6339139	PAWL PIVOT SHAFT
34	6339141	BOTTOM PLATE FRONT
35	6509304	DECAL - SCALE HORIZONTAL
36	6339025	DECAL SHEET

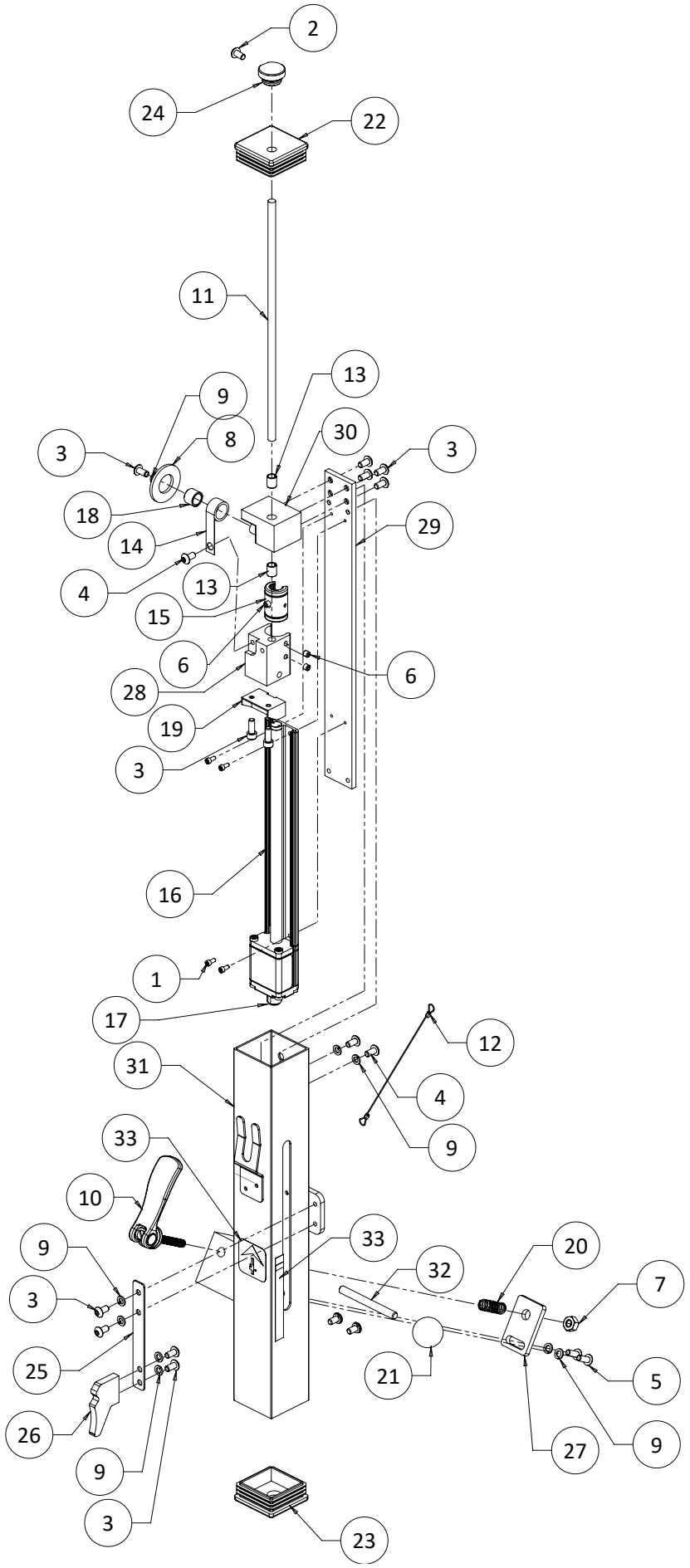
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DIAGRAM NO.	PART NUMBER	DESCRIPTION
1	B110406	4-40 x 1/4 SOCKET HEAD CAP SCREW
2	B190302	10-24 x 3/16 ROUND HEAD MACHINE SCREW
3	B190611	10-24 x 3/8 SOCKET HEAD SOCKET CAP SCREW
4	B190613	10-24 x 3/8 BUTTON HEAD SOCKET CAP SCREW
5	B190813	10-24 x 1/2 BUTTON HEAD SOCKET CAP SCREW
6	C190320	10-24 x 3/16 SOCKET HEAD SET SCREW CUP POINT
7	J257000	1/4-20 LOCKNUT JAM
8	K190101	FLAT WASHER .225 ID x .75 OD
9	K191501	#10 LOCKWASHER SPLIT
10	3706173	CAM LOCK HANDLE
11	3706174	.25 DIA x 9" LG SHAFT
12	3706175	LANYARD 8"
13	3706176	SLEAVE BEARING 1/4 ID
14	3706177	CONSTANT FORCE SPRING
15	3706180	LINEAR BEARING 10M
16	3706209	LINEAR SENSOR MACHINED
17	3706210	GAUGE CORD ASSEMBLY
18	3706225	OILITE BEARING .38 ID x .50 OD
19	3707998	LINEAR SENSOR MAGNET
20	3708175	COMPRESSION SPRING .36 OD
21	3709526	1" DIA BALL KNOB 1/4-20 THREAD
22	6339142	GAUGE TOP CAP
23	6339143	GAUGE BOTTOM CAP
24	6339148	HEIGHT STOP BLOCK
25	6339152	SPRING PLATE
26	6339154	GAUGE LATCH
27	6339155	PIN LOCK PLATE
28	6339156	BEARING BLOCK
29	6339199	GAUGE BASE PLATE
30	6339200	BEARING SUPPORT BLOCK
31	6339539	GAUGE HOUSING WELDMENT
32	3706238	STUD 1/4-20 x 3.00 LONG
33	6339025	DECAL SHEET

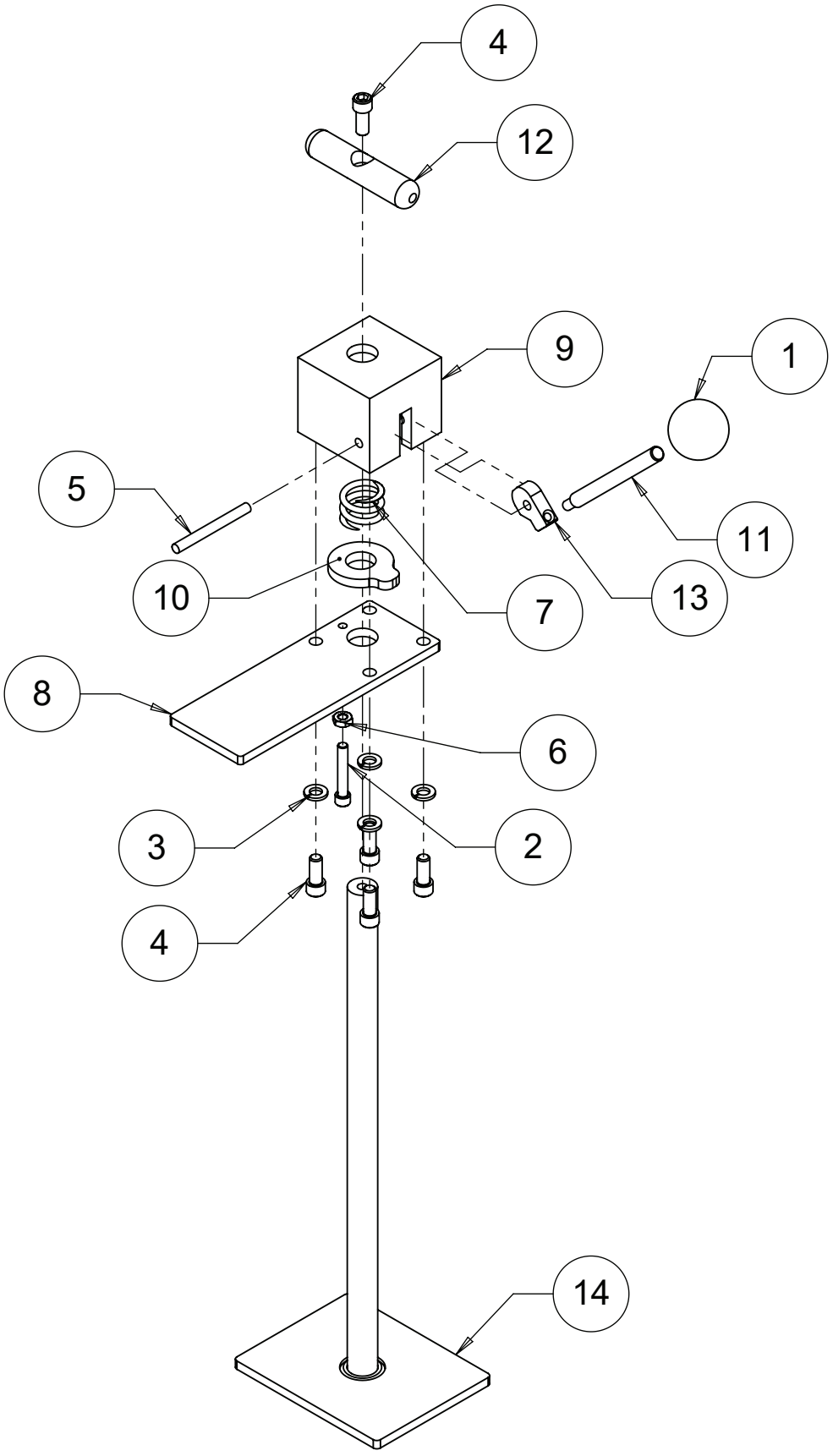
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DIAGRAM NO.	PART NUMBER	DESCRIPTION
1	09351	KNOB - BALL 1.18 OD x 3/8-16F (B27)
2	B252431	1/4-28 x 1.5 SOCKET HEAD CAP SCREW FULL THREAD
3	K311501	5/16 LOCKWASHER SPLIT
4	B311211	5/16-18 x 3/4 SOCKET HEAD CAP SCREW
5	H252807	PIN - DRIV LOC .25 D x 1.75 LG
6	J252100	JAM NUT 1/4-28
7	3706207	COMPR SPRING .84 ID X .88 LG
8	6339160	CLAMP BAR
9	6339161	CLAMP HOUSING
10	6339163	CLAMP RING
11	6339164	LEVER HANDLE
12	6339165	BASE HANDLE
13	6339212	CAM LOCK
14	6339540	REAR CLAMP WELDMENT

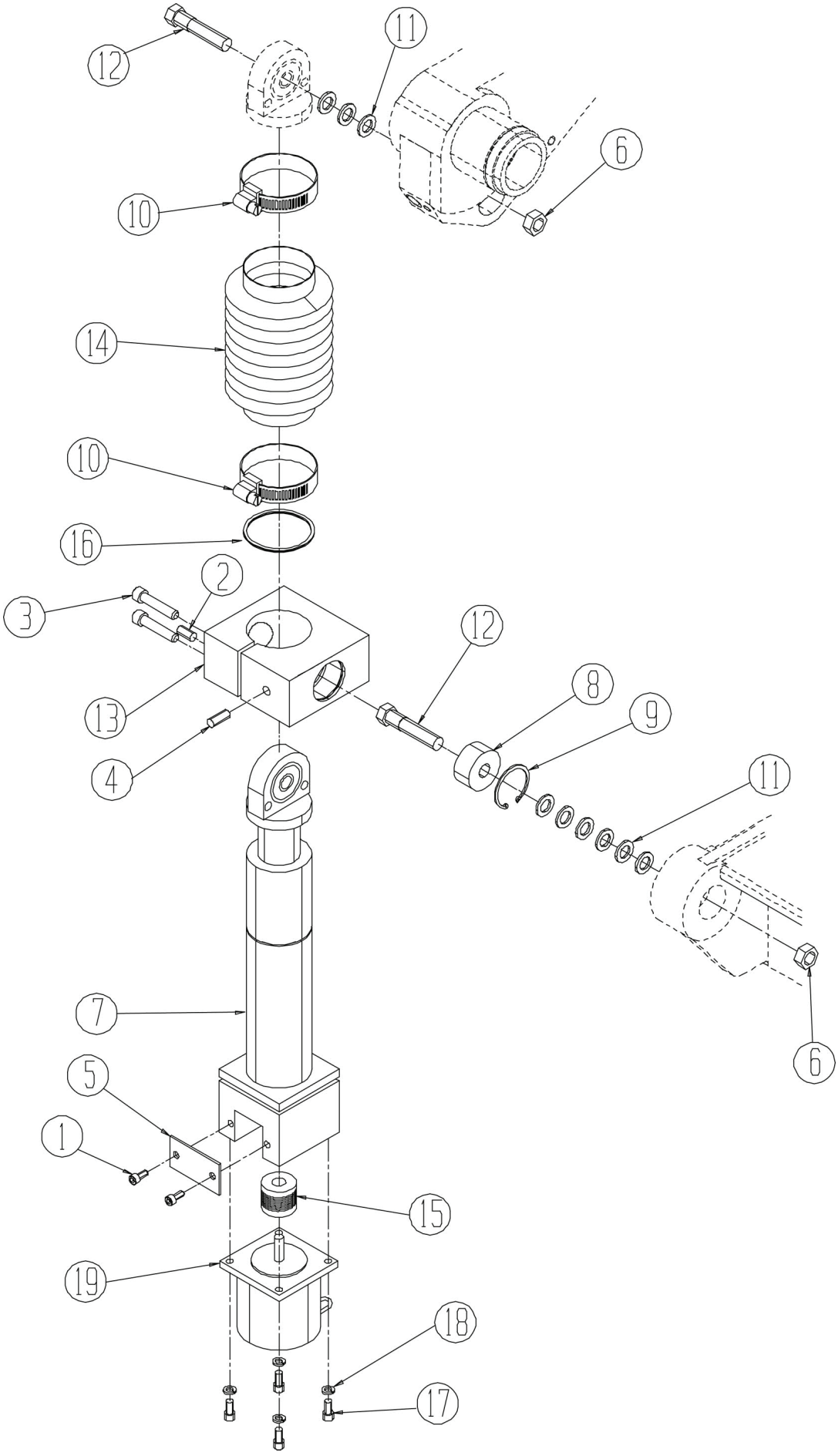
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DIAGRAM NO.	PART NO.	DESCRIPTION
1	B190613	10-24x3/8 BUTTON HEAD SOCKET CAP SCREW
2	C250825	1/4-20x1/2 SOCKET SET SCREW
3	B252011	1/4-20x1-1/4 SOCKET HEAD CAP SCREW
4	C251020	1/4-20x5/8 SOCKET SET SCREW CUP POINT
5	6509381	BASE COVER PLATE
6	J377200	3/8-24 LOCKNUT JAM NYLON INSERT
7	6509384	ACTUATOR ASSY
8	3708187	BALL BEARING DOUBLE ROW
9	3708189	INTERNAL RETAINING RING
10	3708192	HOSE CLAMP 2.25 DIAMETER
11	3709304	THRUST WASHER .375
12	6509048	HEX PIVOT PIN
13	6509051	BLOCK TRUNION
14	6509056	BELLOWS 1.88 ID
15	3708629	FLEX COUPLING 1x1x.25 BORE
16	3708424	RETAINING RING EXTERNAL SPIRAL 1.75
17	B190811	110-24x3/8 SOCKET HEAD CAP SCREW
18	K191501	#10 LOCKWASHER SPLIT
19	6529514	STEPPER MOTOR W/CORD ASSY

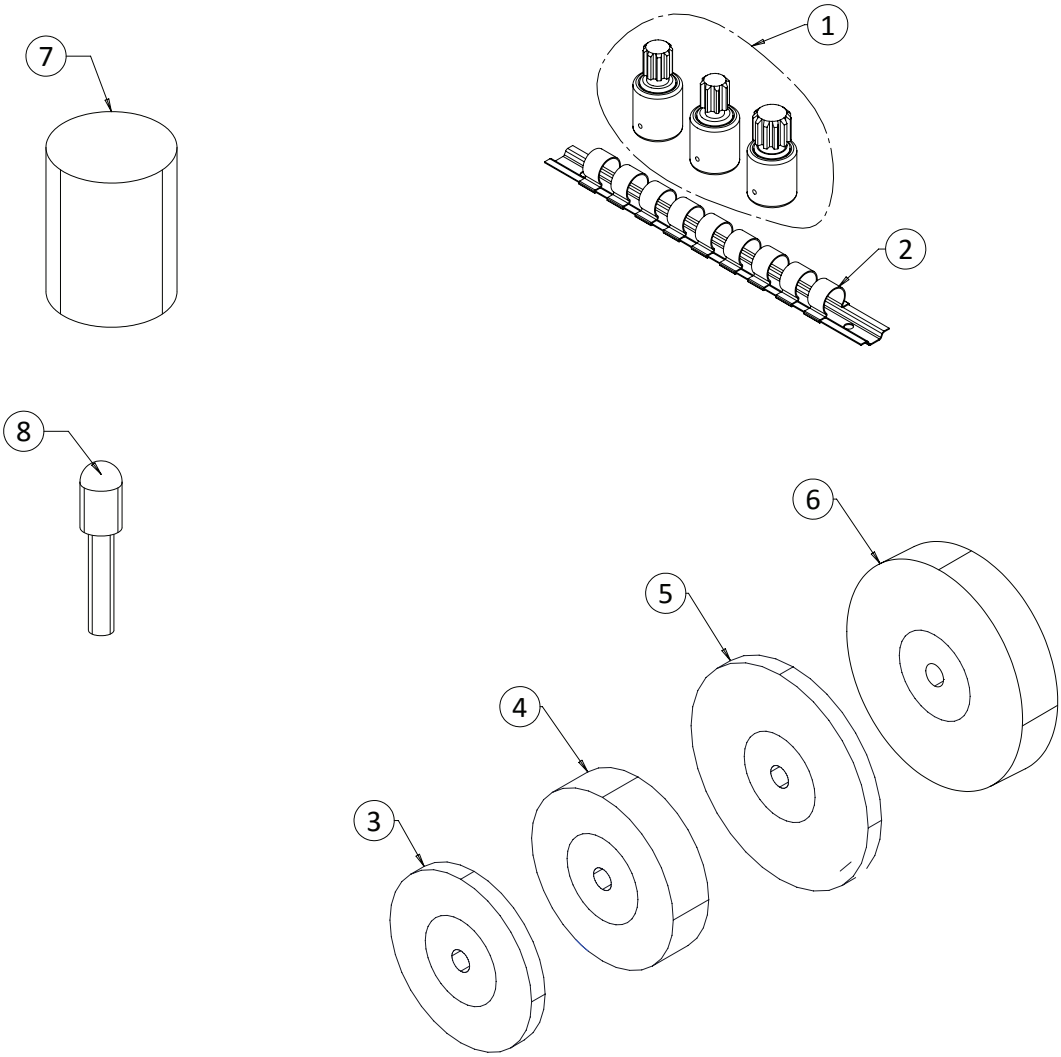
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DIAGRAM NO.	PART NO.	DESCRIPTION
1	3706130	DRIVE ADAPTERS
2	3708205	SOCKET HOLDER
3	3700088	GRINDING WHEEL 3.5 OD x .38 W x .502 B 24G
4	3700086	GRINDING WHEEL 3.5 OD x 1 W x .502 B 24G
5	3700087	GRINDING WHEEL 5 OD x .38W x.502 B 24G
6	3700089	GRINDING WHEEL 5 OD x 1 W x .502 B 24G
7	3707603	BLUE LENS
8	3707465	FLASHER BULB

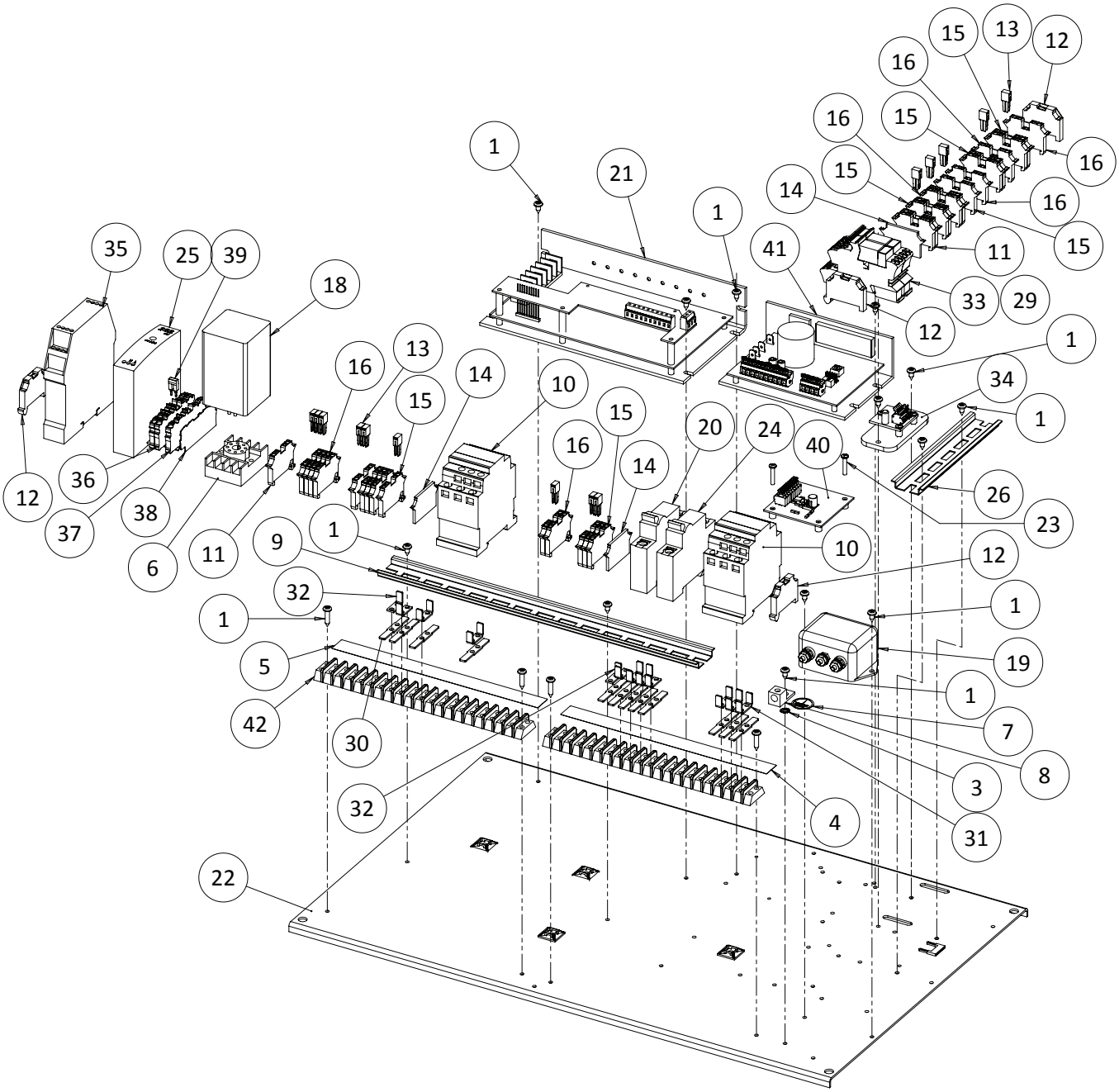
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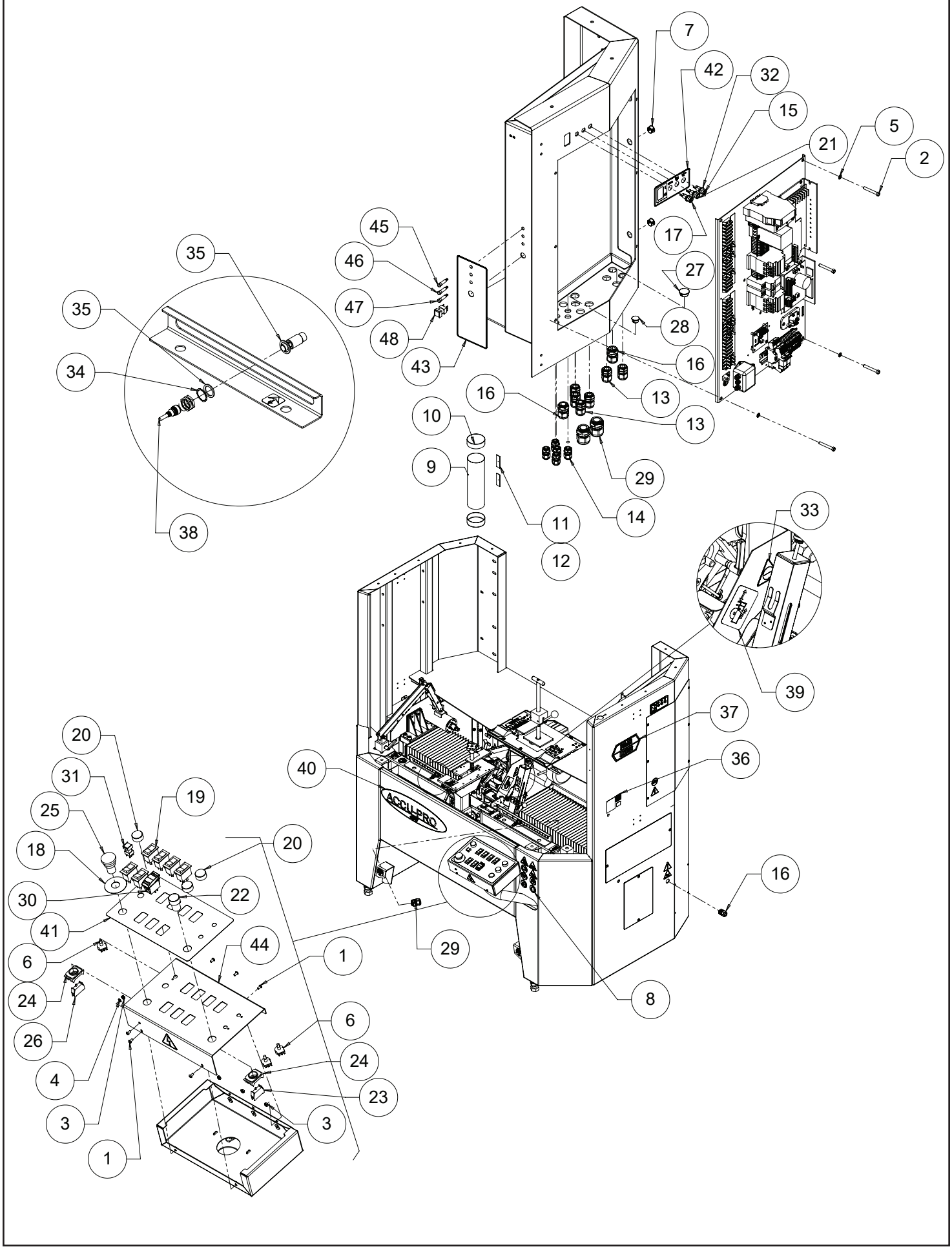
DIAGRAM NO.	PART NO.	DESCRIPTION
1	D160866	8 x 1/2 LONG PHILLIPS PAN HEAD
2	D161266	8 x 3/4" LONG PHILLIPS PAN HEAD
3	R000480	#8 EXTERINAL LOCK WASHER
4	3706078	19 POLE DECAL (TB1)
5	3706079	19 POLE DECAL (TB2)
6	3707073	8 PIN SOCKET
7	3707163	PRIMARY GROUND DECAL
8	3707164	PRIMARY GROUND LUG
9	3707378	DIN RAIL 14.0 LG
10	3707556	STARTER MAGNETIC
11	3707624	GROUND TERMINAL BL
12	3707625	END STOP SCREWLESS
13	3707626	JUMPER ADJACENT TERMINAL BLOCK
14	3707627	TERMINAL BLOCK END PLATE
15	3707628	TERMINAL BLOCK 2 CONDUCTOR GREY
16	3707629	TERMINAL BLOCK 2 CONDUCTOR BLUE
17	3707631	TERMINAL BLOCK TAG 1-10
18	3707688	LOW VOLTAGE RELAY
19	3707764	RGI LINE FILTER
20	3707779	6 AMP CIRCUIT BREAKER
21	3707850	TRAVERSE CONTROL BOARD
22	6009270	ELECTRICAL SUB PANEL
23	D131266	6X3/4" LONG PHILLIPS PAN HEAD
24	80259	CIRCUIT BREAKER 20 AMP
25	3707859	24VDC POWER SUPPLY
26	3707602	DIN RAIL 6.0 LONG
27	3707632	TERMINAL BLOCK TAG 11-20
28	3707634	TERMINAL BLOCK TAG 21-30
29	3707695	2 POLE JUMPER - WIDE
30	3707707	SPADE - DOUBLE FOR TERMINAL STRIP
31	3707708	SPADE - DOUBLE 90
32	3707709	SPADE - SINGLE 90
33	3707798	RELAY TERM BLOCK 8 AMP
34	3707857	24VDC INFEED CONTROL
35	3707907	DOOR SWITCH MONITOR
36	3707913	TERMINAL BLOCK 4-POLE GRAY
37	3707914	TERMINAL BLOCK 4-POLE BLUE
38	3707918	TERMINAL BLOCK END PLATE
39	3707919	2-POLE TERMINAL BLOCK JUMPER
40	3707941	CONTROL BOARD FOR POSITIONING LED
41	3707942	SPIN CONTROL BOARD
42	3707778	19 POLE TERMINAL STRIP 2 ROW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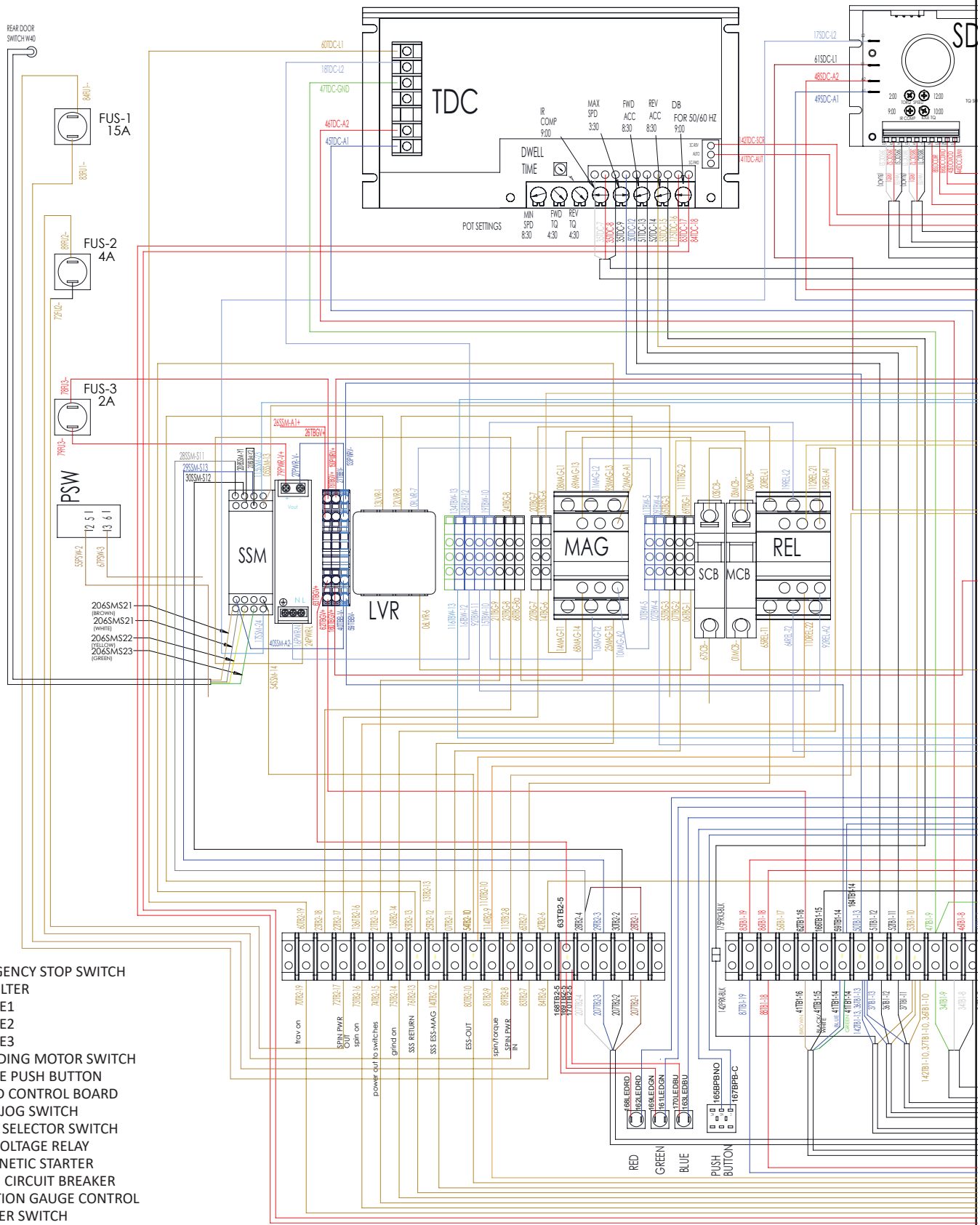
DIA. NO.	PART NO.	DESCRIPTION
1	B190634	#10-32 x 3/8 FLAT HEAD CAP SCREW
2	D250800	1/4 THREAD CUTTING SCREW
3	J197200	#10-32 HEX LOCKNUT
4	R000465	#10 EXTERNAL LOCK WASHER
5	R000536	1/4 INTERNAL LOCK WASHER
6	80419	POTENTIOMETER 10K
7	3706039	HOLE PLUG .687 DIA
8	3706105	DECAL SHEET (REEL GRINDER)
9	3706133	CLEAR TUBE 3.5 OD
10	3706134	END CAP - 3.5 ID B
11	3706135	VELCRO HOOK - 1"WIDE
12	3706136	VELCRO LOOP - 1"WIDE
13	3707009	LIQUID TIGHT STRAIN RELIEF .27-.47 D
14	3707029	LIQUID TIGHT STRAIN RELIEF .19-.30 D
15	3707090	FUSE - 4 AMP SLO-BLOW
16	3707093	LIQUID TIGHT STRAIN RELIEF .43-.55 D
17	3707219	FUSE - 2 AMP SLO-BLOW
18	3707342	RING YELLOW E-STOP
19	3707367	SWITCH ROCKER ON/OFF
20	3707446	POTENTIOMETER KNOB W/POINTER
21	3707525	FUSE - 15 AMP SLO-BLOW
22	3707564	PUSH BUTTON GREEN
23	3707565	BLOCK CONTACT NO
24	3707566	SWITCH MOUTNING LATCH
25	3707567	PUSH / PULL RED BUTTON
26	3707568	BLOCK CONTACT NC
27	3707595	HOLE PLUG .875 DIA
28	3707597	HOLE PLUG .625 DIA
29	3707658	LIQUID TIGHT STRAIN RELIEF .54-.71 D
30	3707713	ROCKER SWITCH MOMENTARY
31	3707826	SQUARE PUSH BUTTON GREEN
32	3707927	FUSE HOLDER - PANEL MOUNT
33	3708462	DECAL WARNING 4500 RPM
34	3707969	SQUARE PUSH BUTTON BLUE
35	3708419	WAVE SPRING .78 ID
36	3708421	FLAT WASHER .75 x 1.0 x .075 T
37	3708872	DECAL PATENT
38	3709990	DECAL FOLEY UNITED
39	3707713	SWITCH RCKR MOM ON
40	3707826	PUSH BUTTON SQ GRE
41	3707927	FUSE HOLDER PANEL
39	3707601	PROX HEAD 18MM DC SERVICE ONLY
40	6329065	LEFT TRAVERSE PROX CORD
41	6339211	RIGHT TRAVERSE PROX CORD
42	6329159	FINGER POSITION PROX CORD
41	6339025	DECAL SHEET 633/653
43	6339050	ACCUPro 633 DECAL
44	6339172	CONTROL PANEL DECAL
45	6339173	POWER SWITCH DECAL
46	6339174	LED DECAL FOR POSITION
47	6339197	CONTROL PANEL TOP
48	3707968	RED LED LIGHT
49	3707967	GREEN LED LIGHT
50	3707966	BLUE LED LIGHT
	3707233	TERMINAL .25 FEMALE 18-22 GA
	3707234	TERMINAL .25 MALE 18-22 GA
	3707351	TERMINAL .25 FEMALE 14-16 GA
	3707358	TERMINAL FORK #6 14-16 GA
	3707360	TERMINAL FORK #6 18-22 GA
	3708378	STRIP FOAM .25T
	3707224	MOUNT CABLE TIE
	3707255	CABLE TIE 4Lx.10Wx
	3707225	CABLE TIE 6.5Lx.18
	6329079	INFEED MOTOR CORD
	6329080	LIGHT RECEPTACLE CORD
	6329081	VACUUM RECEPTACLE CORD
	6339182	CONTROL PANEL CORD
	6339183	POTENTIOMETER CABLE ASSEMBLY
	6339185	REAR DOOR SWITCH CORD
	6339186	FRONT DOOR SWITCH CORD
	6339203	SPIN MOTOR CORD



ESS-EMERGENCY STOP SWITCH
FTR-LINE FILTER
FUS-1- FUSE1
FUS-2- FUSE2
FUS-3- FUSE3
GMS-GRINDING MOTOR SWITCH
GPB-GAUGE PUSH BUTTON
ICB- INFEED CONTROL BOARD
IJS-INFEED JOG SWITCH
ISS-INFEED SELECTOR SWITCH
LVR-LOW VOLTAGE RELAY
MAG-MAGNETIC STARTER
MCB-MAIN CIRCUIT BREAKER
PGC- POSITION GAUGE CONTROL
PSW- POWER SWITCH
PWR-24VDC POWER SUPPLY
PX1-LEFT PROXIMITY SWITCH
PX2-RIGHT PROXIMITY SWITCH
PX3-INDEX FINGER PROXIMITY SWITCH
REL-GRINDING MOTOR RELAY
RSS-REVERSE SELECTOR SWITCH
RTP-RELIEF TORQUE POTENTIOMETER
SCB-SECONDARY CIRCUIT BREAKER
SCR-SPIN CONTROL RELAY

SDC-SPIN DRIVE CONTROL
SMS-SPIN MOTOR SWITCH
SRS-SPIN ROTATION SWITCH
SSP-SPIN SPEED POTENTIOMETER
SSS-SYSTEM START SWITCH
SSM- SAFETY SWITCH MONITOR
SSP-SPIN SPEED POTENTIOMETER
STR- SPIN/TORQUE RELAY

STS-SPIN/TORQUE SELCTOR SWITCH
TB1-TERMINAL STRIP 1
TB2-TERMINAL STRIP 2
TBG-TERMINAL BLOCK GREY
TBW-TERMINAL BLOCK BLUE
TSP-TRAVERSE SPEED POT
TDC-TRAVERSE DRIVE CONTROL
TMS-TRAVERSE MOTOR SWITCH

WIRING DIAGRAM

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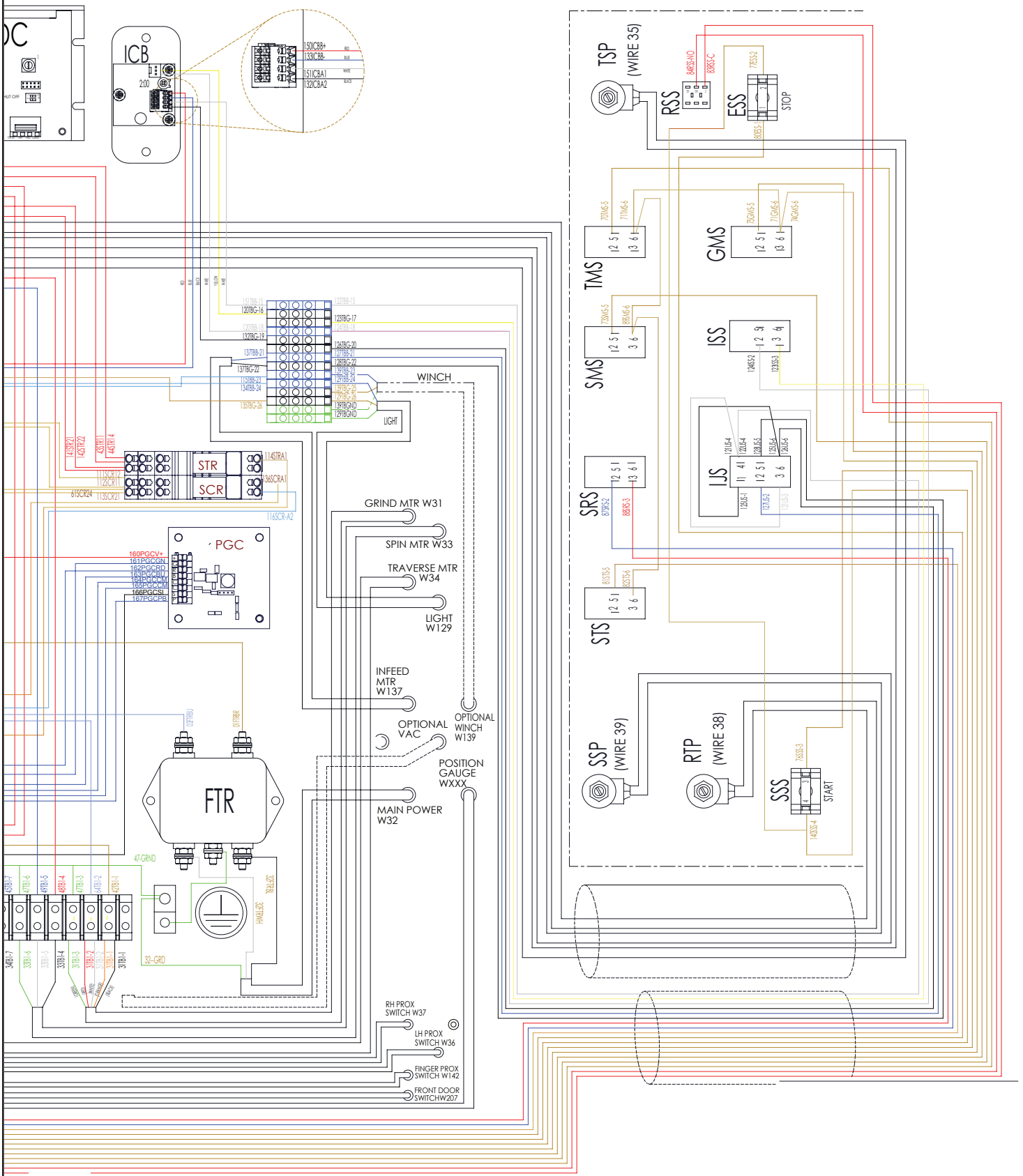

GROUND SCREW

WIRE CONNECTION

TERM. TO TERM CONNECTION

WIRING SCHEMATIC