



618  
AUTO - INDEX  
SPIN / RELIEF  
REEL MOWER GRINDER

Patent No. 9,776,297  
6,290,581 & 6,685,544

SERVICE  
MANUAL

 **WARNING**

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



## 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 equipment 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 manual 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** preceded 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 MAINTENACE, LUBRICATION AND BASIC UPKEEP IS DISCUSSED IN THE OPERATORS MANUAL. THIS MANUAL SHOULD BE USED IN CONJUNCTION WITH THE OPERATORS MANUAL FOR PREFORMING SERVICE ON THIS EQUIPMENT.**



## **WARNING**

**TO VOID 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.



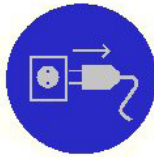
## WARNING

**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 OSHA.


**WARNING**

**Carefully Read all the instructions below before attempting to operate or service your winch! Failure to comply with instructions could result in personal injury, death and/or property damage!**

1. Maximum lifting capacity is 400 pounds (180 kg.) in a single line operation. **DO NOT ATTEMPT TO MOVE LOADS GREATER THAN THE RATING.**
2. **NEVER CARRY** personnel on the hook or the load.
3. **NEVER MOVE A LOAD** with this winch until all personnel are clear.
4. **NEVER HOOK THE WIRE ROPE BACK ON ITSELF. USE THE SPREADER BAR ASSEMBLY.** Hooking the wire rope back on itself creates an unacceptable strain on the wire rope.
5. **DO NOT ALLOW** unqualified personnel to operate this unit.
6. **KEEP CLEAR OF WINCH WIRE ROPE AND HOOK WHEN OPERATING WINCH. DO NOT ATTEMPT** to guide wire rope by hand as it rewinds.
7. **DO NOT** use the wire rope as a ground for welding.
8. **NEVER TOUCH** a welding electrode to the wire rope.
9. **WHEN SPREADER BAR ASSEMBLY IS USED** be sure it is properly seated in the saddle of the hook.
10. **AVOID** excessive inching and quick reversals of load.
11. **BE SURE** that the power supply is disconnected before performing maintenance and repair procedure.
12. **DO NOT OPERATE** this unit if it is not functioning properly.
13. **MAINTAIN A MINIMUM OF 4 TURNS OF WIRE ROPE** around the winch drum to prevent the wire rope from pulling off under load.
14. **KEEP WINCHING AREA CLEAR.** Do not allow people to remain in the winching area. Do not stand between the winch and the load.
15. **INSPECT WIRE ROPE FREQUENTLY.** A frayed wire rope with broken strands should be replaced immediately. Never replace the wire rope with rope of any kind or with wire rope other than the type and size specified in the repair parts section of this manual.
16. **USE HEAVY LEATHER GLOVES** when handling the wire rope to eliminate the possibility of cuts or scratches from burrs and slivers from broken strands.
17. **ALLOW WINCH TO COOL DOWN FREQUENTLY (Electric Winch),** as the motor is designed for intermittent duty only. When the metal motor housing is hot to touch, it is time to let the winch cool down
18. **DO NOT OPERATE WINCH WHEN UNDER THE INFLUENCE OF DRUGS, ALCOHOL, OR MEDICATION.**
19. **DO NOT USE WINCH TO HOLD LOADS IN PLACE.** Use other means of securing loads, such as tie down straps.
20. **USE ONLY FACTORY APPROVED, PARTS, SWITCHES, REMOTE CONTROLS AND ACCESSORIES.** Use of non-factory approved components may cause injury or property damage and could void your warranty.
21. **DO NOT MACHINE OR WELD ANY PART OF THE WINCH.** Such alterations may weaken the structural integrity of the winch and could result in personnel injury and void your warranty.
22. **DO NOT OPERATE THIS WINCH OUT DOORS OR IN A CORROSIVE OR EXPLOSIVE ENVIRONMENT.**

 **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 8 AND 9 OF THE OPERATORS 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 Spin/Relief Grinder. For those without the 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 section of this 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 questions not answered in this manual, please call your distributor. They will contact the manufacturer if necessary.

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



## CARRIAGE LINEAR BEARING REPLACEMENT

**STEP 1**--Remove the four screws of one linear bearing and slide the linear bearing off the end of the carriage shaft.

**STEP 2**--Insert a new linear bearing onto the end of the carriage shaft with the tension adjustment screw pointing outward. See FIG. 1.

**STEP 3**--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 the tension screw is too tight. Sliding the bearing block back and forth should be a smooth uniform motion.

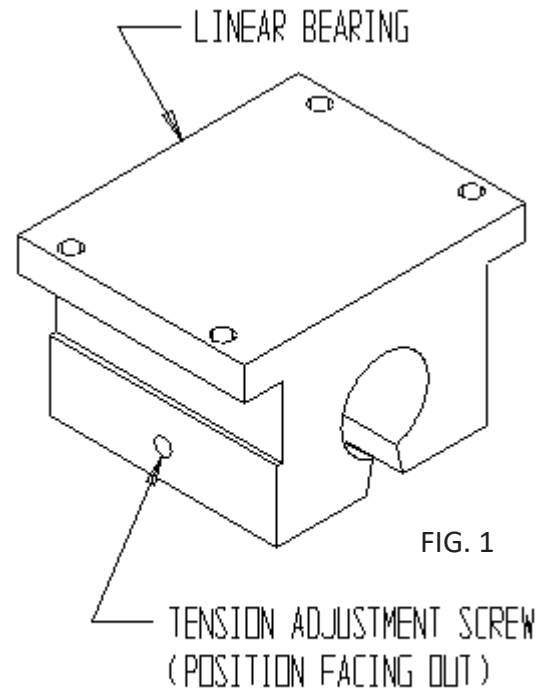


FIG. 1



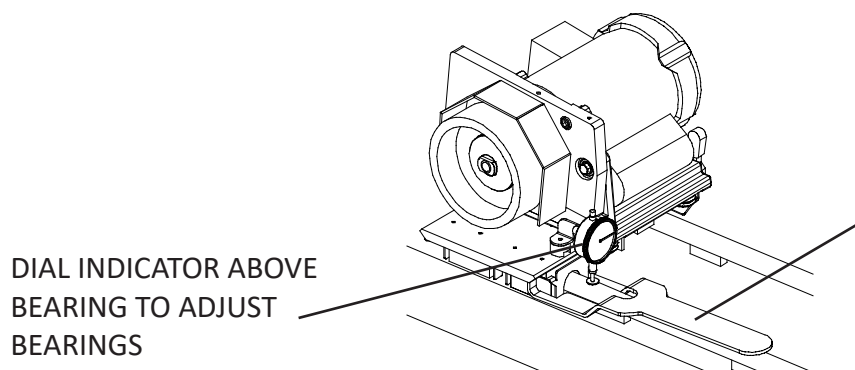
**SETTING THE BEARING TENSION CORRECTLY IS CRITICAL TO PROPER GRINDING. BEARINGS WHICH ARE TOO TIGHT OR TOO LOOSE WILL CAUSE POOR GRIND QUALITY. ALSO, BEARINGS WHICH ARE TOO TIGHT WILL HAVE SUBSTANTIALLY SHORTER LIVES AND may DAMAGE THE SHAFT.**

**STEP 4**--Slide linear bearing under carriage and attach with the four screws.

**Repeat Steps 1 through 3 with the other two linear bearings.**

**STEP 5**--After all three linear bearings are secured to the carriage, check for correct bearing tension. The bearing tension is correct when you try to lift the carriage and can feel no carriage movement. If there is movement this means there is up and down free play. The most dependable method of checking free play is to use a magnetic base dial indicator attached to the traverse frame weldment and a bearing testing fork 3706055. Read the vertical movement above each bearing. This movement should be within .003" [.07 mm]. See FIG 2.

In addition, there should only be approximately 3lbs [13 Newtons] of force required to pull the carriage from side to side with the belt clamp disengaged. The grinding head assembly should have very uniform resistance through its full range of travel.



BEARING TESTING FORK 3706055 CAN BE USED TO APPLY THE CORRECT UPWARD FORCE FOR CHECKING THE BEARINGS.

FIG. 2

## SPIN GRINDING ATTACHMENT ADJUSTMENT

The tension on the height adjustment screw can be adjusted by turning the adjustment setscrew. See FIG 3. If the screw moves during grinding, increase the tension on the screw with the adjustment setscrew.

If there is too much play in the spin drive pivot points, torque down the hex nut until the conical washer is compressed, then back off 1/2 turn. See FIG. 3.

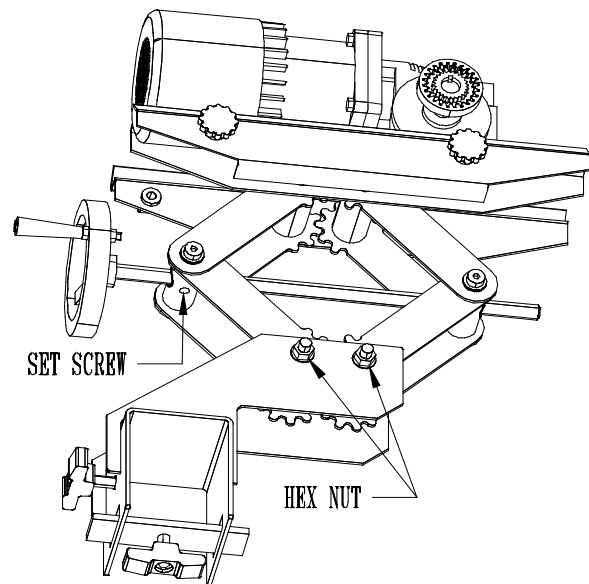


FIG. 3

## TO ADJUST THE CARRIAGE GIB PLATE

The gib plate must be readjusted occasionally to eliminate free play. If the gib plate is not adjusted properly the grinding head can move from side to side. This movement may cause the reel to be ground unevenly.

The gib must allow the carriage to be moved freely forward and back without any side play. See FIG. 4.

To adjust:

1. Move the carriage all the way forward (toward the operator position).
2. Loosen the jam nut on the front gib screw then tighten the screw until the carriage has no side play but the horizontal handwheel can still be rotated easily. When set correctly lock the screw in place with the jam nut.
3. Use the handwheel to gradually move the carriage away from the operator position. Adjust the remaining gib screws as you move the carriage. **THE CARRIAGE MUST BE OVER THE GIB SCREW WHEN IT IS ADJUSTED OR IT MAY BE OVERTIGHTENED.**

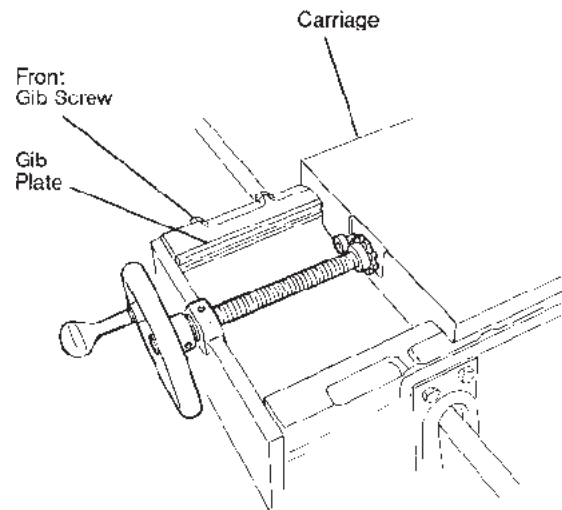


FIG. 4

## ADJUSTABLE FINGER STOP TENSION

To increase or decrease the tension on the finger stop knob, adjust the setscrew on the side of the relief finger assembly. There is a nylon ball that presses against the threads of the knob. If the knob is moving when grinding, increase the tension by rotating the setscrew clockwise. See FIG 5

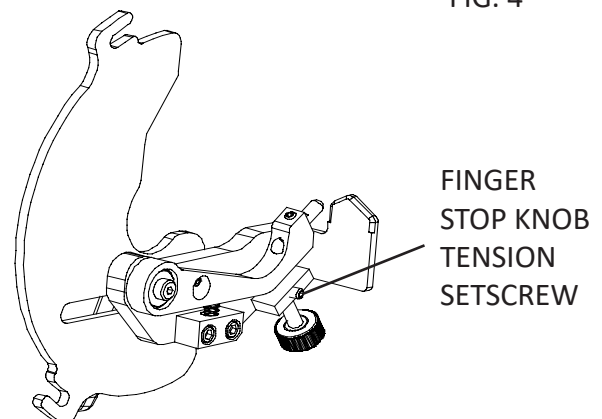


FIG. 5

**CROSS SLIDE SHAFT REPLACEMENT**

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

**STEP 1**--Loosen the two nuts on the support casting that hold the locking studs and tap with plastic hammer to loosen.

**STEP 2**--Loosen the locking handles and tap the center stud with a plastic hammer.

**STEP 3**--Loosen locknut and setscrew and remove the handwheel.

**STEP 4**--Remove the Slide Shaft.

**STEP 5**--Remove all burrs and resurface the shaft to a clean, smooth, polished surface.

**(OR REPLACE WITH A NEW SHAFT.)**

**STEP 6**--Coat 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 7**--Retighten the nuts at the end of the locking stud to lock shaft in place.

**STEP 8**--Reinstall the Handwheel by snugging the setscrew to the flat located on the screw shaft, then torque nut until tight and back off 1/2 turn. Torque the setscrew to 70 in-lbs.

**STEP 9**--Test the Cross Slide, the handwheel should turn freely.

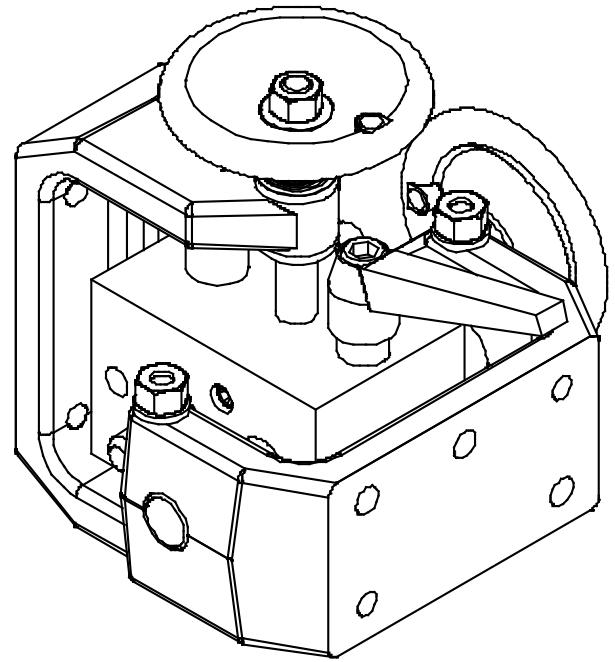


FIG. 6

NOTE: It is also possible to remove the complete Cross Slide Assembly and do the repairs on a bench then reinstall. See FIG. 6 and 7.

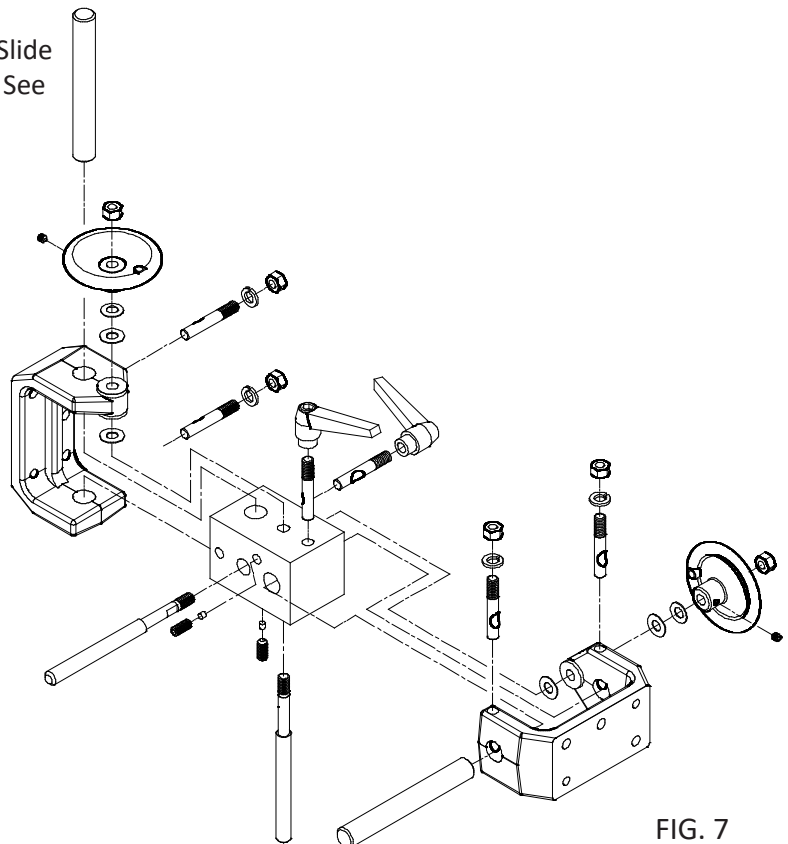


FIG. 7

## 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 nuts until the compression springs measure 3/4" [19 mm]. See FIG. 8. If the springs are not tensioned equally, uneven loading on the traverse system may cause parts to fail.

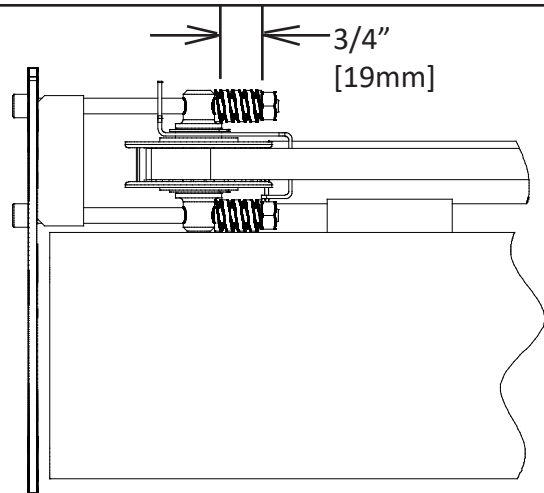


FIG. 8



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

## 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 and screw the tip out. Move the traverse belt out of the way and verify the clamped distance from the tip to the clamping block (shoe). See FIG. 9. Lock in place by tightening the jam nut against the clamp, being careful not to move the tip.

Do not set the adjustment at less than .10" [2.5 mm]. The .10" [2.5 mm] setting allows slippage in a jam situation and damage can occur if this adjustment is set too narrow.

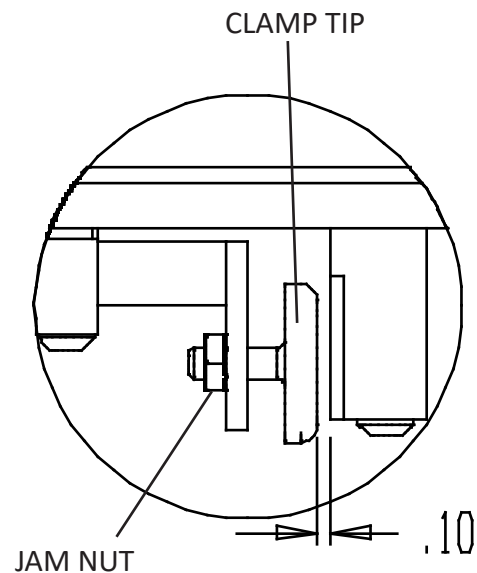


FIG. 9

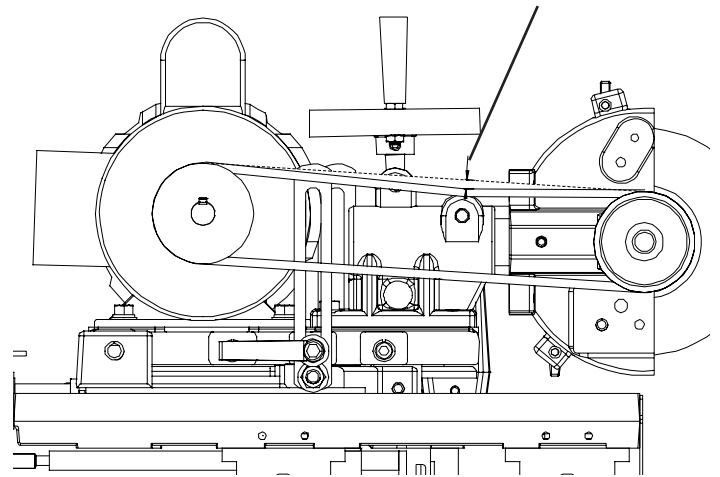


**CAUTION SHOULD BE USED AS ADJUSTING THE TIP WILL AFFECT THE SLIP LOAD AND COULD DAMAGE THE CLAMP TIP, BELT OR TRAVERSE DRIVE SYSTEM.**

## BELT TENSION

The belt must be tensioned so when the lock handle is locked the maximum belt deflection is .12 [3 mm] at a 10lb [4.5 Kg] load.

BELT DEFLECTION .12"  
[3mm] WITH 10 LBS  
[4.5 Kg] LOAD



NOTE: SHOWN WITH BELT GUARD  
REMOVED. NEVER OPERATE  
GRINDER WITH ANY GUARD  
REMOVED.

FIG. 10

## PROXIMITY SWITCH

For the proximity switch to perform properly and reverse the direction of the carriage at each end of the rails, a distance of 4 mm [.156"] to 6 mm [.234"] needs to be maintained between the proximity sensing bracket and the proximity switch. See FIG. 11.

NOTE: The light on proximity switch activates when metal crosses over sensing part of the switch.

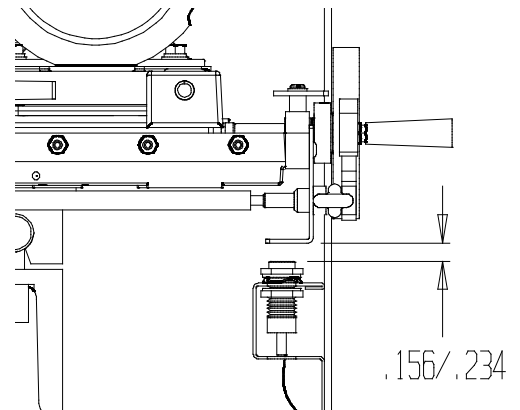


FIG. 11

### ALIGNMENT FIXTURE ADJUSTMENT

The body of the dial indicator should be flush with the casting it is mounted in. The anvil should be able to be depressed fully without touching the casting. To adjust properly, loosen the set screw in the indicator mounting casting and adjust accordingly. See FIG. 12.

Tighten dial indicator set screw enough to lightly hold the indicator in place. Never overtighten so plunger does not have free travel.

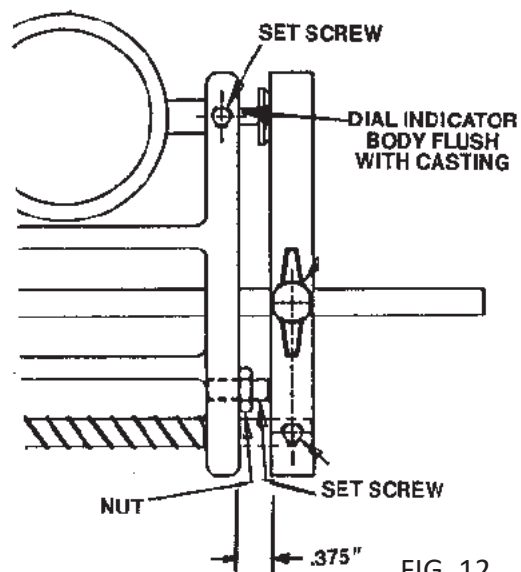


FIG. 12

### SET UP GAUGE ADJUSTMENT

There should be no backlash in the fine adjustment screw on the set up gauge slide. See FIG. 13. If necessary, adjust hex nut until the conical washer is completely compressed then back off 1/2 turn.

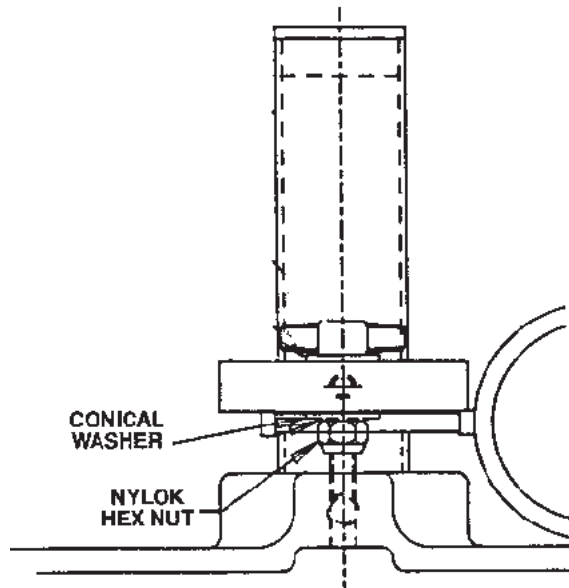


FIG. 13

## TO ELIMINATE CARRIAGE INFEEED BACKLASH

If there is backlash in the carriage infeed handwheel (See FIG. 14), there are two adjusting points to check:

### 1. Conical washers behind the shaft adjusting nut:

- A. Unscrew the shoulder bolt.
- B. Hold the horizontal handwheel, and turn the shaft adjusting nut counterclockwise until the conical washers are touching each other. Continue turning the nut counterclockwise until the next notch is centered over the shoulder-bolt hole.
- C. Reinstall the shoulder bolt to lock the nut in position.

### 2. Washers behind the handwheel

- A. Remove the calibration ring setscrew and rotate the calibration ring to access the handwheel setscrew. Loosen the handwheel setscrew (about half a turn).
- B. Hold the handwheel and torque the hex lock nut which secures the handwheel to 100 in. lbs. [1.15 kg-m], then back off 1/2 turn.
- C. Verify that the gap between the wave washer and flat washer is .015 in. [.04mm]. See FIG 15. Adjust the hex lock nut if necessary.
- D. Tighten the setscrew holding the handwheel of the shaft. Install and tighten the calibration ring setscrew.

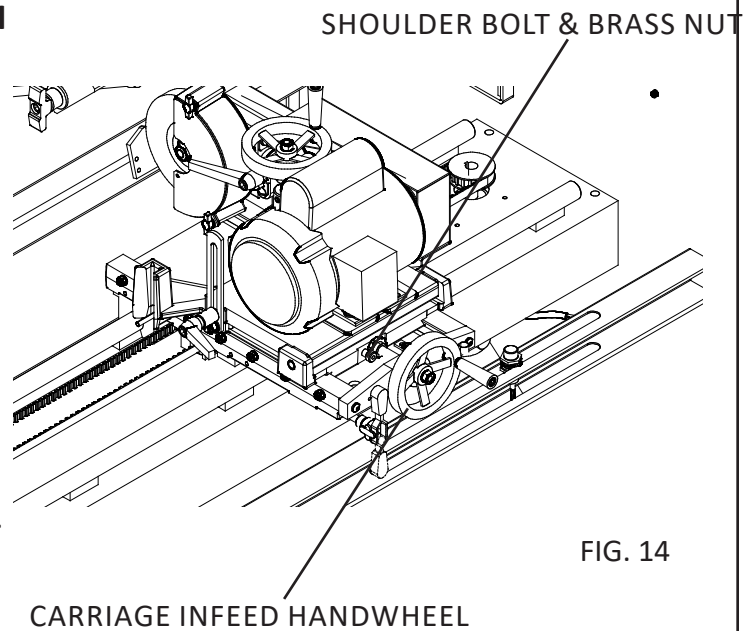


FIG. 14

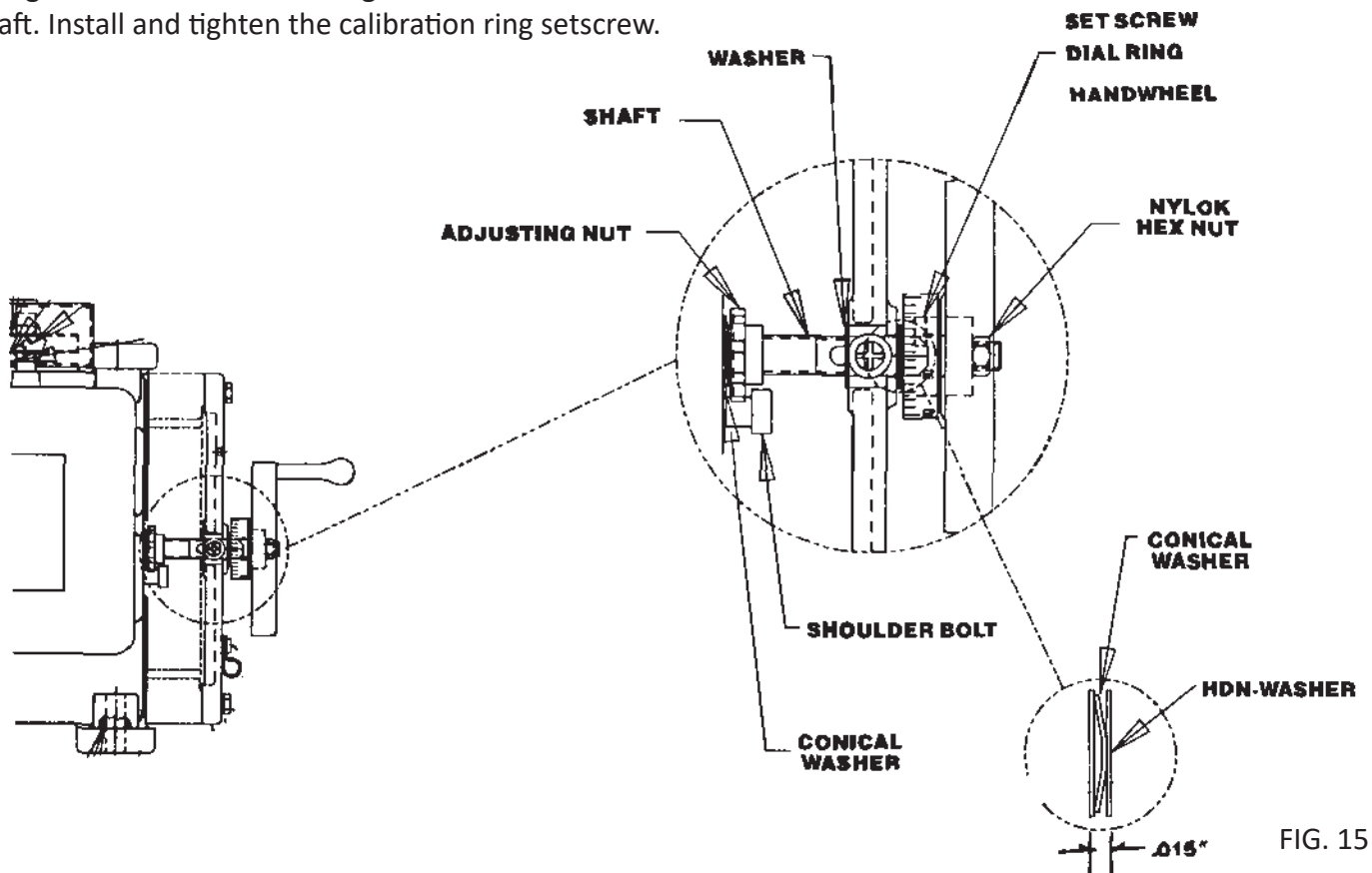


FIG. 15

## 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 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 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 9 sets the **DWELL TIME** to 4.5 seconds. Dwell time is preset to #4 setting for a 2 second dwell time when reversing at each end of stroke. A setting of 6, sets the dwell time at 3 seconds, etc.

### 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.

**Potentiometer Clock Orientation**

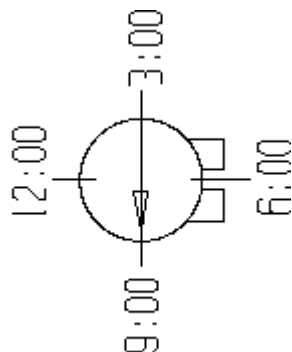
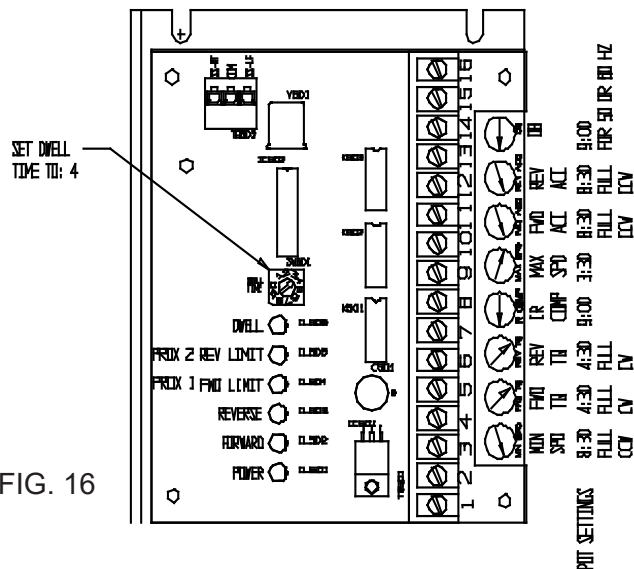


FIG. 16





## SPIN DRIVE CONTROL BOARD (SDC)

The Spin Drive Control Board has four potentiometers, two switches and one dial. These potentiometers, switches and dial have been set at the factory to the positions shown on Figure 17.

### 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 torque 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. This should be set to OFF.

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). The (RTP) is located on the control panel and is for relief torque adjustment.

Relief Speed Pot (SPEED) 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 (TORQ) 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. 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.

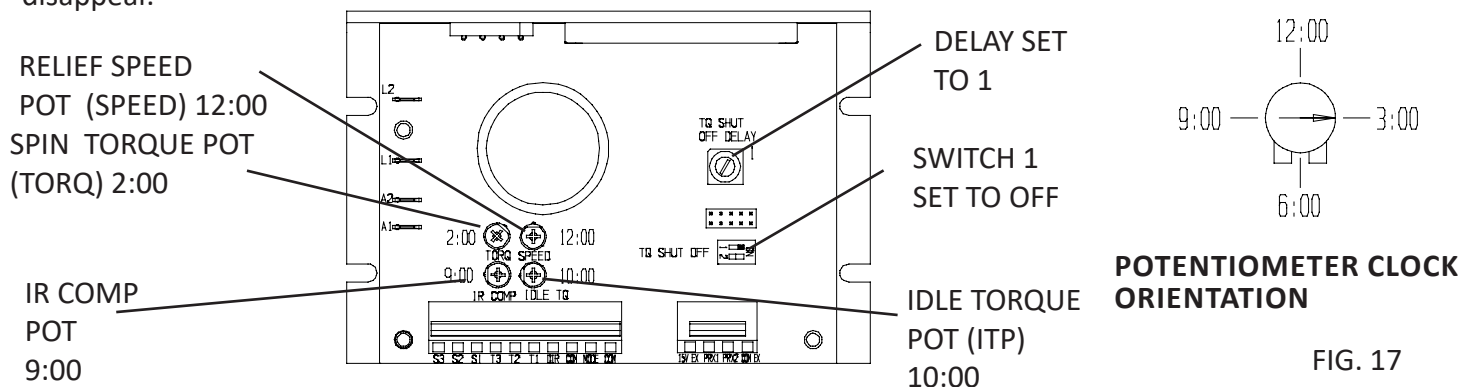
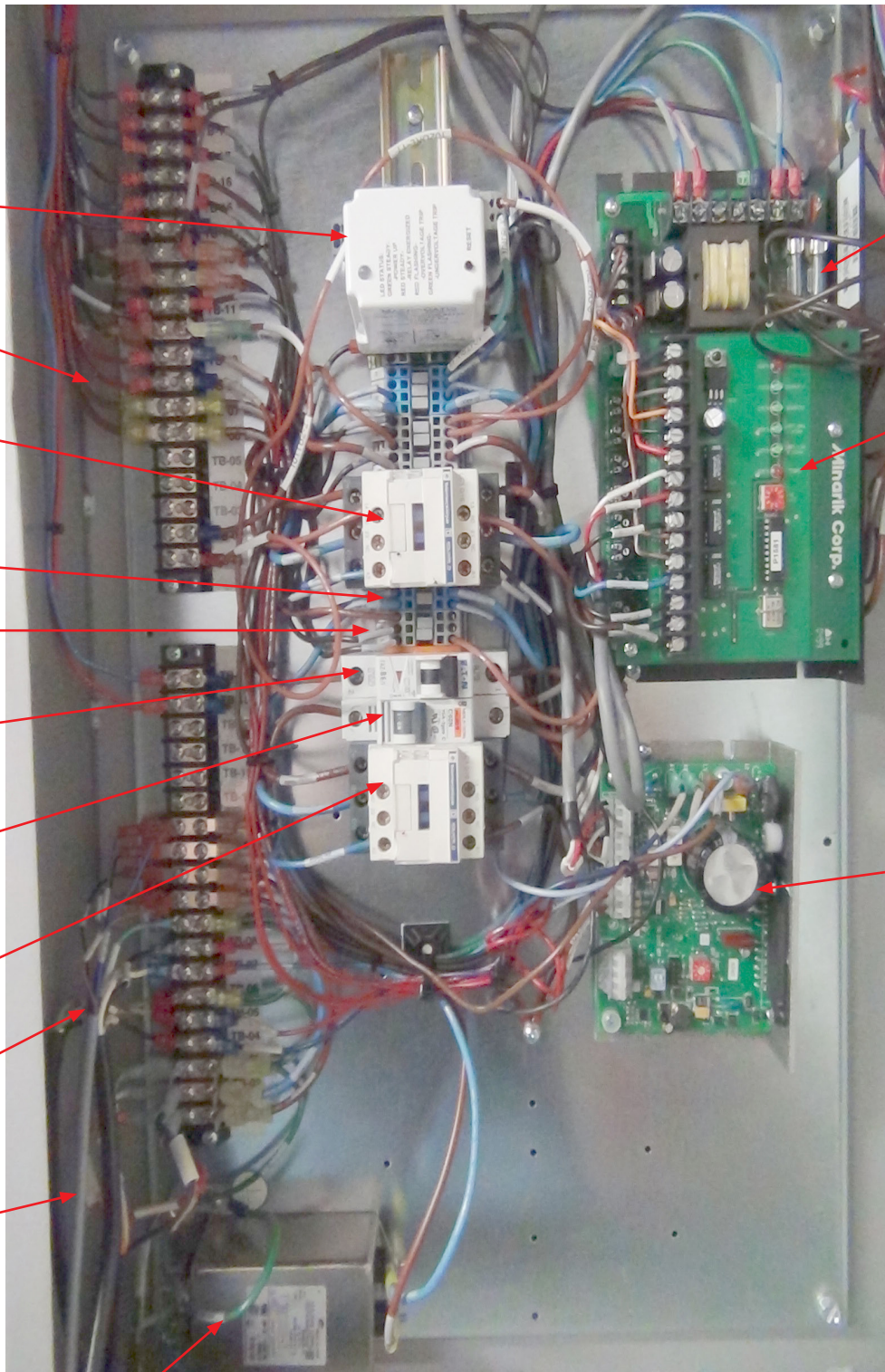


FIG. 17

**CONTROL PANEL**  
located on the right side of the machine.



Low Voltage Relay (LVR)

Terminal Strip #2 (TB2)

Magnetic Contactor (MAG)

Blue Terminal Blocks (TBB)

Grey Terminal Blocks (TBG)

Secondary Circuit Breaker (SCB)

Main Circuit Breaker (MCB)

Grinding Motor Relay (REL)

Terminal Strip #1 (TB1)

Main Ground Lug

AC Filter (FTR)

Traverse Drive Control Board FUSES 3A Slow Blow

Traverse Drive Control Board (TDC)

Spin Drive Control Board (SDC)

FIG. 18

### **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 6181 electrical system. For those without that 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.

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

If you have any question not answered in this manual, please call your local dealer.

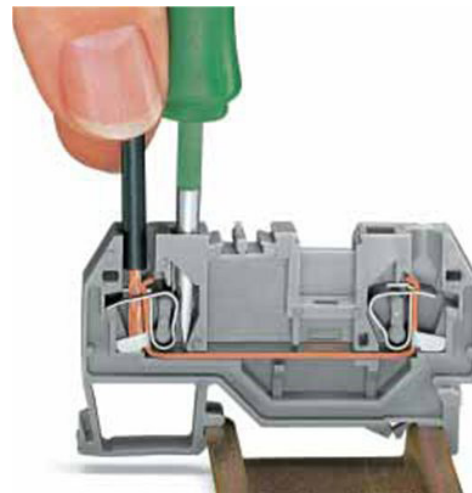
### **WIRE LABELS**

All wires have a wire label at each end for troubleshooting. The wire label has a code which tells you wiring information. The wire label has a position code. The first two or three digits are the wire number: 01-199. The next three numbers or letters are the code for the component to which the wire attaches. Example: TDC for Traverse Drive Control. The last two or three numbers or letters indicate which the terminal on the component the wire attaches.

#### **TERMINAL BLOCKS:**

To insert or remove a wire from the terminal block insert a small screw driver into the square hole. Then insert or remove wire from the round hole. Remove screwdriver to lock the wire in place.

Note the square hole can also be used when checking for voltages. The probe tip of the multimeter can be inserted into the square hole to take readings.



### **TROUBLESHOOTING INDEX**

AC Main Power Controls.....	Page 20-22
Spin Drive Controls.....	Page 22-26
Grinding Motor Controls .....	Page 27
Traverse Drive Controls .....	Page 28-32
Door Switch .....	Page 33
Mechanical Troublshooting .....	Page 34-35

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

Verify all wires shown on the wiring diagram 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 the wire and the terminal. If problem persists, test as listed below.

Possible Cause	Checkout Procedure	
Emergency Stop Botton(ESS) is Depressed.	<b>A.</b> Pull Up on all 3 ESS Button <b>(1 on front of control and 2 located at rear of machine)</b>	Machine works Yes--end troubleshooting No--go to Step <b>B.</b> next
You must push the System Start Switch (SSS) to get power to control Panel.	<b>B.</b> Push the SSS. Listen for the Magnetic Starter (MAG) contacts to pull in with a clunk	Machine works Yes--end troubleshooting No--go to step <b>C.</b> next.
Main Power Cord is not plugged in.	<b>C.</b> Plug in main power cord	Machine works Yes--end troubleshooting No--go to step <b>D.</b> next.
<b>ALL</b> switches <b>MUST</b> be turned <b>OFF</b> for contactor to pull in.	<b>D.</b> Turn all switces off.	Machine works Yes--end troubleshooting No--go to step <b>E.</b> next.
Main 15 amp outlet circuit breaker has tripped.	<b>E.</b> Check circuit breaker in your building and reset if necessary. (Check wall outlet with a light to make sure it works)	Machine works Yes--end troubleshooting No--go to step <b>F.</b> next.
No 120 Volts AC power to Filter (FTR).	<b>F.</b> Check for 120VAC at Cord into FTR (Power Cord Wire No. 32)	You have 120VAC at Filter input. Yes--go to Step <b>G.</b> next. No----but light works in outlet-- Replace Power Cord
No 120 Volts AC power out of Filter.	<b>G.</b> Check for 120VAC out of FTR	You have 120VAC at Filter output. Yes-- go to step <b>H.</b> next. No--Replace the Filter.
No 120 Volts AC power to Main Circuit Breaker (MCB).	<b>H.</b> Check for 120VAC to MCB	You have 120VAC at MCB input. MCB left side Terminal to Terminal Block 4 (Blue) for 120 Volts AC Yes--Go to Step <b>I.</b> next. No--Verify continuity of wires from Filter to MCB and replace if bad.
No 120 Volts AC power from Main Circuit Breaker (MCB).	<b>I.</b> Verify that MCB is "ON" or flip switch to "ON" position. Then check for 120VAC out of MCB.	You have 120VAC at MCB output. MCB right side Terminal to Terminal Block 4 (Blue) for 120 Volts AC Yes--If machine works, end of troubleshooting, if not, go to Step <b>J.</b> next. No--Replace MCB.

Possible Causes	Checkout Procedure	
No 120 Volts AC power to Secondary Circuit Breaker (SCB) 6 Amp.	<b>J.</b> Check for 120V to SCB	SCB (03SCB--) to neutral (blue) terminal out of FTR for 120VAC Yes--Go to Step <b>K.</b> next. No--Check wires & replace if needed.
No 120 Volts AC power from Secondary Circuit Breaker (SCB) 6 Amp.	<b>K.</b> Check for 120V from SCB	SCB (67SCB--) to neutral (blue) terminal out of FTR for 120 VAC Yes-- Go to Step <b>L.</b> 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	<b>L.</b> Check for 120 Volts AC at terminal strip.	Terminal "11" on Terminal Strip 2 "07TB2-11" to Terminal Block 4 (Blue) for 120 Volts AC Yes--Go to Step <b>M.</b> next. No--Check wires #7 & #3, Check Jumper on Terminal Blocks 1-3.
Grinding Motor Switch (GMS) not working	<b>M.</b> Check for 120 Volts AC at GMS Terminals 1	Measure 120 volts AC from GMS Terminal 1 to Term Block 4(Blue) Yes--Go to Step <b>N.</b> next. No--Flip Switch and check again-Works--Switch is upside down. Does not work-- Check wiring/Verify Continuity/ Replace Switch
Spin Motor Switch (SMS) not working	<b>N.</b> Check for 120 Volts AC at SMS Terminals 1	Measure 120 volts AC from SMS Terminal 1 to Term Block 4(Blue) Yes--Go to Step <b>O.</b> next. No--Flip Switch and check again-Works--Switch is upside down. Does not work-- Check Wiring/ Verify Continuity/ Replace Switch
Bad Emergency Stop Switch (ESS)	<b>O.</b> Check voltage after the (ESS) MAKE SURE SWITCH IS PULLED UP!	Measure 120 Volts AC from (ESS) term 2 to Term Block 4(Blue) Yes--Go to Step <b>P.</b> next No--Check wire for continuity, then verify switch continuity. If bad replace ESS contactor (NC)
Bad System Start Switch (SSS)	<b>P.</b> Hold in SSS and Check voltage after the (SSS)	Measure 120 Volts AC from (SSS) term 3 to Term Block 4(Blue) Yes--Go to Step <b>Q.</b> next No--Check wire for continuity, then verify switch continuity. If bad replace SSS contactor (NO)
Low Voltage Relay (REL) not operating	<b>Q.</b> Hold in SSS and Check voltage at LVR. LVR must be installed in 8-pin socket.	Measure 120 Volts AC from LVR term 8 to Term Block 4(Blue) Yes--Go to Step <b>R.</b> next No--Check for 120 Volts AC from LVR term 6 to term 7. Yes--Verify Continuity of term 1 to term 8 on LVR. Replace LVR if bad. No--Verify Continuity of Wires.
Bad Main Contactor (MAG)	<b>R.</b> 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 clunk, if not replace MAG. No--Verify Continuity of Wires.

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

**Possible Cause**

**Checkout Procedure**

No Power to MAG holding Contact

**A.** Check voltage to MAG holding contact in.

Measure 120 Volts AC at MAG term T3 to Term Block 4(Blue) with E-Stop Pulled out. (Do NOT press start button while checking.)

Yes--Go to Step **B.** next.

No--Verify continuity of wiring to MAG T3.

MAG holding contact has failed

**B.** Verify the magnetic starter (MAG) holding contact is working.

Disconnect Wire to MAG L3 and Measure 120 Volts AC from MAG term L3 to Term Block 4(Blue). Press and hold Green Start button to hold in MAG contacts while checking.

Yes--Verify continuity of wiring from MAG L3

No--Replace MAG.

**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 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 the wire and the terminal. If problem persists, test as listed below.

**Checkout Procedure**

**A.** Set (SSP) to 200 on the control panel.

Spin Motor works

Yes--end troubleshooting

No--go to Step **B** next

**B.** Turn (SMS) switch on

Spin Motor works

Yes--end troubleshooting

No--go to Step **C.** next

**C.** Reset Circuit Breaker on front of Control Panel. Push in if tripped.

Spin Motor works

Yes--end troubleshooting

No--go to Step **D.** next

**D.** Check (SDS) L1 to L2 for 120 Volts AC

(SDC)Remove wires to Terminals L1and L2 and test between 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.**

Possible Cause	Checkout Procedure	
Spin Drive motor is bad	<b>F.</b> Check spin motor continuity	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.
<div style="background-color: #ff4500; color: black; padding: 5px; display: inline-block;"><b>⚠ WARNING</b></div>		
Spin drive control in Torque mode	<b>G.</b> Check continuity of mode selector switch.	Light on SDC next to SP should be ON. If not, remove wires 41SDCMOD and 44SDCCOM from SDC control board. Check continuity of wires, should read 0 ohms. Continuity checks out? No--Check continuity of STS switch, replace if bad. (Machine was in Torque mode) Yes-- Light next to SP is on but machine does not work. Reinstall wired, Go to Step H. next
Spin Torque Pot (STP) is not set correctly	<b>H.</b> Check (STP) remote torque on the top (SDC) board	(STP) on (SDC) board, should be set as labled on pages 17. Adjust if incorrect and check Spin Drive Function. Yes--Go to Step I. next No--Replace (SDC)
(SSP) is not working	<b>I.</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 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)
<div style="background-color: #ff4500; color: black; padding: 5px; display: inline-block;"><b>⚠ WARNING</b></div>		
Worn Motor Brushes	<b>J.</b> 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 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 the wire and the terminal. 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 Circuit 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 between 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	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	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



**WARNING**

**DISCONNECT POWER FROM THE MACHINE**



**WARNING**

**DISCONNECT POWER FROM MACHINE !**



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

## 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 Page 17. (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.

See adjustment section for trim pot setting on Page 17.

Original adjustment was not set properly.

Torque to rotate the reel too high.

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.

When .250 female spade terminals are not tight, remove and crimp slightly together. When re-installing, 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-- Machine will go to E-stop when the Grinding motor or Spin motor is turned on.**

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 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 the wire and the terminal. If problem persists, test as listed below.

Possible Cause	Remedy	
Bad contact on Door Switch Relay. (DRL)	A. Check for 120 VAC coming to the Door Switch Relay.	Measure 120 VAC from DRL Terminal 11 (102DRL-11) to Terminal block 4 (Blue) (02TBW-4). Yes--go to Step B. next No--Replace wire#102
	B. Check for 120 VAC leaving the Door Switch Relay,	Measure 120 VAC from DRL Terminal 14 (100DRL-14) to Terminal block 4 (Blue) (02TBW-4). Yes--go to Step D. No--go to Step C. next
Bad Door Switch Relay.	C. Check for 120 VAC at DRL coil (A1 to A2). Power must be on (traverse works).	Measure 120 VAC from DRL Terminal A1 (103DRL-A1) to Terminal A2 (104DRL-A2). Yes--Replace Relay in DRL (3707798) No--Check/Replace wires #103 and #104
Bad Door Safetly Switch (DSS)	D. Check for 120 VAC Back from Door Switch. Door must be closed and power on (Traverse works)	Measure 120 VAC from Terminal Strip 2 Terminal 2 (41TB2-2) to Terminal block 4 (Blue) (02TBW-4). Yes--Check/Replace wire #101 No--Verify Cord to DSS is good, Check Door Switch Alignment (Switch should be at 90 degrees when door is down), if alignment is good then Replace DSS.

**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 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 the wire and the terminal. If problem persists, test as listed below.**

<u>Possible Cause</u>	<u>Remedy</u>	
Grinding Motor Switch (GMS) is not on.	<b>A.</b> Turn switch on	Grinding Motor works Yes--end troubleshooting No--go to Step <b>B.</b> next
12 Amp Circuit Breaker (CB) is tripped.	<b>B.</b> Check 12 amp CB on front of Control panel. Press in if tripped.	Grinding Motor works Yes--end troubleshooting No--go to Step <b>C.</b> next
GMS not working.	<b>C.</b> Check for power to GMS.	GMS term 5 to Terminal Block 4 (Blue) for 120 V AC Yes--go to Step <b>D.</b> next No--With power off, check continuity of wires to GMS.
Relay (REL) coil not working.	<b>D.</b> Check for power from GMS.	GMS Term 6 to Terminal Block 4 (Blue) for 120 V AC Yes--Go to Step <b>E.</b> next No--replace GMS
	<b>E.</b> Check for power to the (REL) coil.	(REL) Term's A1 to A2 for 120 VAC Yes--Go to Steep F. next. (REL) should pull in, if not replace (REL). No--Check wires to Term's A1 and A2, if bad replace.
Relay contacts not working	<b>F.</b> Check for power to (REL) relay contacts.	(REL) Term L1 to Term L2 for 120 Volts AC Yes--Go to Step <b>G.</b> next No--Check wires to REL Term L1 and L2.
	<b>G.</b> Check for power from the (REL) relay.	(REL) Term T2 to Term T2 for 120 V AC Yes--Go to Step <b>H.</b> next No-- Replace the relay (REL).
Circuit breaker (CB-1) not working.	<b>H.</b> Check the power to and from the 12 amp circuit breaker.	(CB-1) input term to Terminal Block 4 (Blue) for 120 VAC. Then (CB-1) output term to Terminal Block 4 (Blue) for 120 VAC. Yes--Go to Step <b>I.</b> next. No-- Check appropriate wire and (CB-1), if bad replace.
Grinding Motor Not Working	<b>I.</b> Check for power to the Grinding Motor cord	Measure 120 Volts AC at Grinding Motor Cord Grind end Terminal 42TB1-1 and 64TB1-2. Yes--. If Grinding Motor does not work replace motor. No--Verify Continuity of wires 42, 64 and 84. Replace wire if bad.

**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 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 the wire and the terminal. If problem persists, test as listed below.**

<b>Possible Cause</b>	<b>Checkout Procedure</b>	
Traverse Motor Switch (TMS) is not on.	<b>A.</b> Turn on (TMS)	Traverse works Yes--end troubleshooting No--got to Step <b>B.</b> next
Traverse Speed Pot (TSP) set to zero.	<b>B.</b> Set (TSP) to 35 on the control panel	Traverse works Yes--end troubleshooting No--go to Step <b>C.</b> next
Fuse on Traverse Drive Control (TDC) has failed.	<b>C.</b> Check fuse and replace if failed. See Page 23. Too heavy a grind causes grinding head traverse motor to overload and blow the fuse, NOTE: Fuse can not be checked visually. Fuses must be continuity checked.	Traverse works Yes--end troubleshooting No--go to Step <b>D.</b> next
Traverse Drive Control (TDC) is bad	<b>D.</b> Check for 120 Volts AC incoming to (TDC)	On (TDC) Terminal L1 to L2 for 120 VAC Yes--Go to Step <b>F.</b> next No--Go to Step <b>E.</b> next
Bad Traverse Motor Switch (TMS)	<b>E.</b> 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--Check wires to the (TDC) and replace if bad. No--Flip Switch and check again- Works--Switch is upside down. Does not work-- Check wiring/Verify Continuity/ Replace Switch or wires.

## Possible Cause

## Checkout Procedure

No DC Voltage from (TDC) Traverse Drive Control

**F.** 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 **G.** next

No--go to Step **H.** next

Traverse Motor is bad

**G.** Check grinding motor continuity

Remove motor wires from Terminal Strip 1 terminals #7 & #8 check for 0 ohms across the black and white wires

Yes--end troubleshooting, traverse should work, if not, replace motor.

No--go to Step **J.** next



**WARNING**

**DISCONNECT POWER FROM MACHINE**

(TSP) is not working

**H.** 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--replace the (TDC)

No--go to Step **I.** next

(TSP) (10K) is bad

**I.** 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

**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 Traverse Motor



**WARNING**

**DISCONNECT POWER FROM MACHINE**

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

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 #14 (black wire) and #15 (brown wire).

Proximity light on-  
0 Volts DC  
Proximity light off-  
12 Volts DC

Right proximity (PROX) check between terminals #13 (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 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--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. Check for Proper function.  
 Yes--end troubleshooting  
 No--Go to Step **D.** next  
  
 Minimum and maximum pot settings effect traverse speed.

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.)

Incorrect potentiometer settings effects traverse control. Check for proper function.  
 Yes--end of troubleshooting  
 No-- replace (TDC)



**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 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 (PROX1) check Traverse drive Control (TDC) between terminals #14 (black wire) and #15 (brown wire).	Proximity light on- 0 Volts DC Proximity light off- 12 Volts DC
	Right proximity (PROX) check (TDC) between terminals #13 (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.
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. NOTE: Factory dwell setting is 4.	
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-- Power goes off when Grinding Motor or Spin Motor is turned on - Door Switch .**

Verify all wires shown on the wiring diagram 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 the wire and the terminal. If problem persists, test as listed below.

Possible Cause	Checkout Procedure	
Door is open	<b>A.</b> Close Front door	Machine works Yes--end troubleshooting No--go to Step <b>B.</b> next
No Power to Door Relay	<b>B.</b> With power on to machine (Traverse works) check for power to Door Relay (DRL)	Check for 120 VAC at A1 (103DRL-A1) to A2 (104DRL-A2) Yes--go to step <b>C.</b> next. No--Check wires to #103 and #104
Door Relay	<b>C.</b> Check for 120 VAC out of Door Relay Conact.	Check for 120 VAC at Terminal Strip 2 Terminal 1 (100TB2-1) to Neutral (light blue wire) on filter (02FTRBU). Yes--go to step <b>D.</b> next. No--Replace Door Relay.
Door Switch	<b>D.</b> Check for Power coming back from door switch.	Check for 120 VAC at Terminal Strip 2 Terminal 2 (101TB2-2) to Neutral (light blue wire) on filter (02FTRBU). Yes--Check wire 101. No--Check door switch alignment, make adjustments if necessary and retest. If machine still does not run replace door switch.

**PROBLEM--Reel ground concave, convex or with irregular shape.**

**Possible Cause**

Too heavy a grind on the final grinding passes.

Overhead clamps and tooling bar clamps not tight.

Cross slide lock handles not tight.

Grinding head lock handles not tight.

Loose gibs on the carriage.

Linear bearings on the grinding head carriage are bound with grit, loose or damaged .

**Checkout Procedure**

Grind out reel using correct sparkout procedure as specified in the Operators Manual.

Tighten all locking hand knobs, Four knobs on the tooling bar, four knobs on the overhead bar clamp and two on the overhead clamp swivels.

When using center brackets, insure the fixed center is tight as well as the moveable center lock knob.

Tighten the horizontal and vertical cross slide lock handles.

Tighten the two lock handles on the adjusting arm slots and one on the vertical height adjustment.

Adjust the gibs per the procedure in the adjustment section in this manual.

The lineal bearing must be preloaded to the traverse shafts with no vertical movement. See manual adjustment section for carriage linear bearing adjustments.

Lubricate the linear bearings per the procedure as specified in this manual. Replace bearings if they cannot be properly adjusted.

**PROBLEM--Roundness of reel varies, High low reel blades are observed.**

**Possible Cause**

Too heavy a grind on the final grinding passes.

**Checkout Procedure**

Grind out reel using correct sparkout procedure as specified in the Operators Manual.

**PROBLEM--Stock removal much different traversing left compared to traversing right.**

**The possible causes and checkout procedures are the same as listed above for concave, convex or with irregular shape.**

**PROBLEM--Relief grind on the reel blades does not go full length.**

**Possible Cause**

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.

**Checkout Procedure**

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 for information on using the grinding wheel.

**PROBLEM--Too heavy a burr on cutting edge of reel blades.**

**Possible Cause**

Traverse speed set too high causing a heavy burr on the reel blade when spin grinding.  
  
Too heavy a grind on the final grinding passes.

**Checkout Procedure**

Traverse speed should be set lower approximately 12 ft/min. (meters/min.) for a smaller burr on cutting edge.  
  
Grind out reel using correct sparkout procedure as specified in the Operators Manual.

**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-- Traverse speed is too slow.**

**Possible Cause**

Lineal bearing in the carriage are set too tight.

**Remedy**

Readjust linear bearings for proper tension per the adjustment section of this manual.

Traverse drive belt tension springs set too tight

Check to see if traverse drive belt tension springs have been overloaded, causing the bearings to not rotate freely. Verify proper adjustment per the adjustment section of this manual.



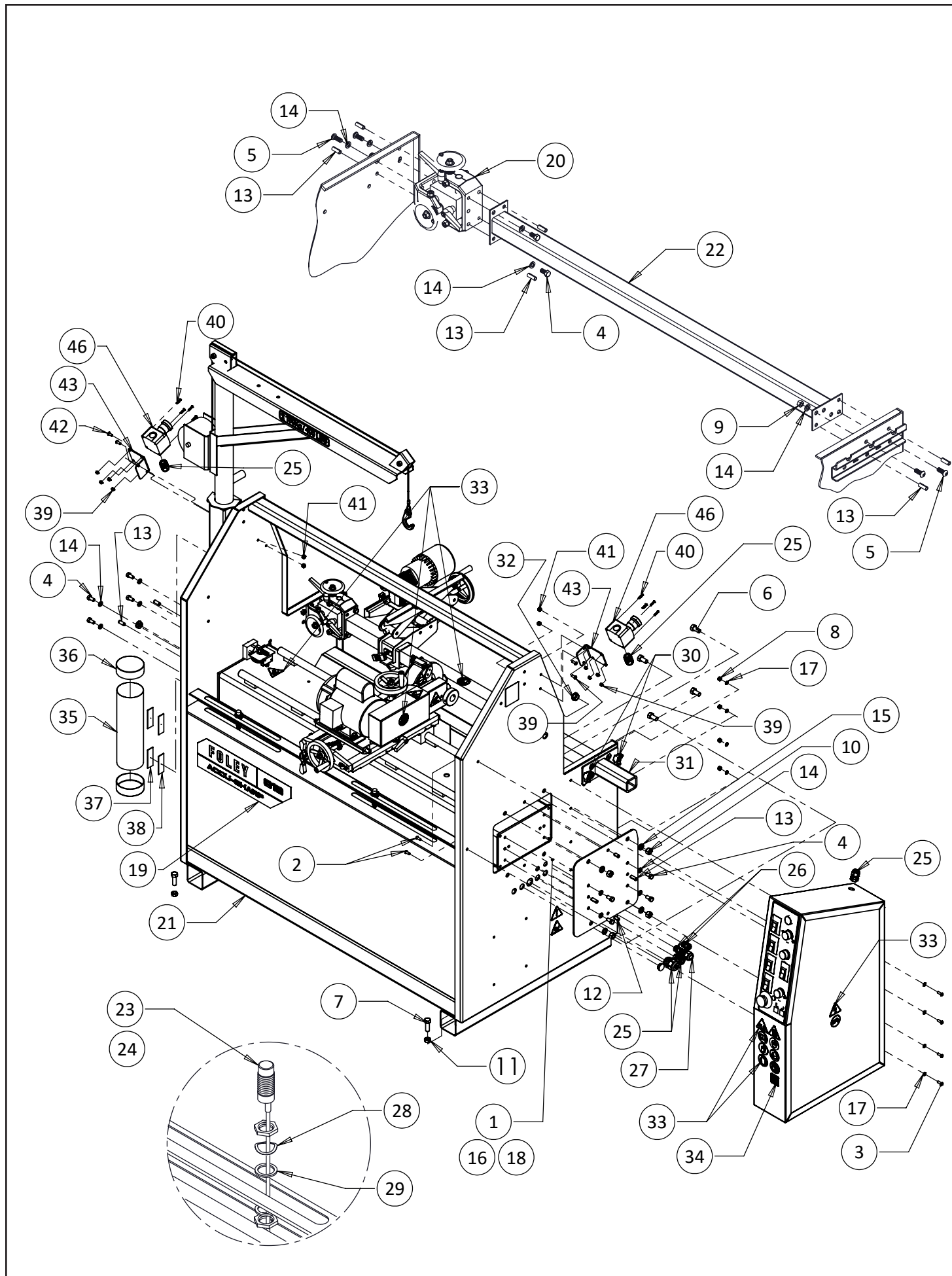
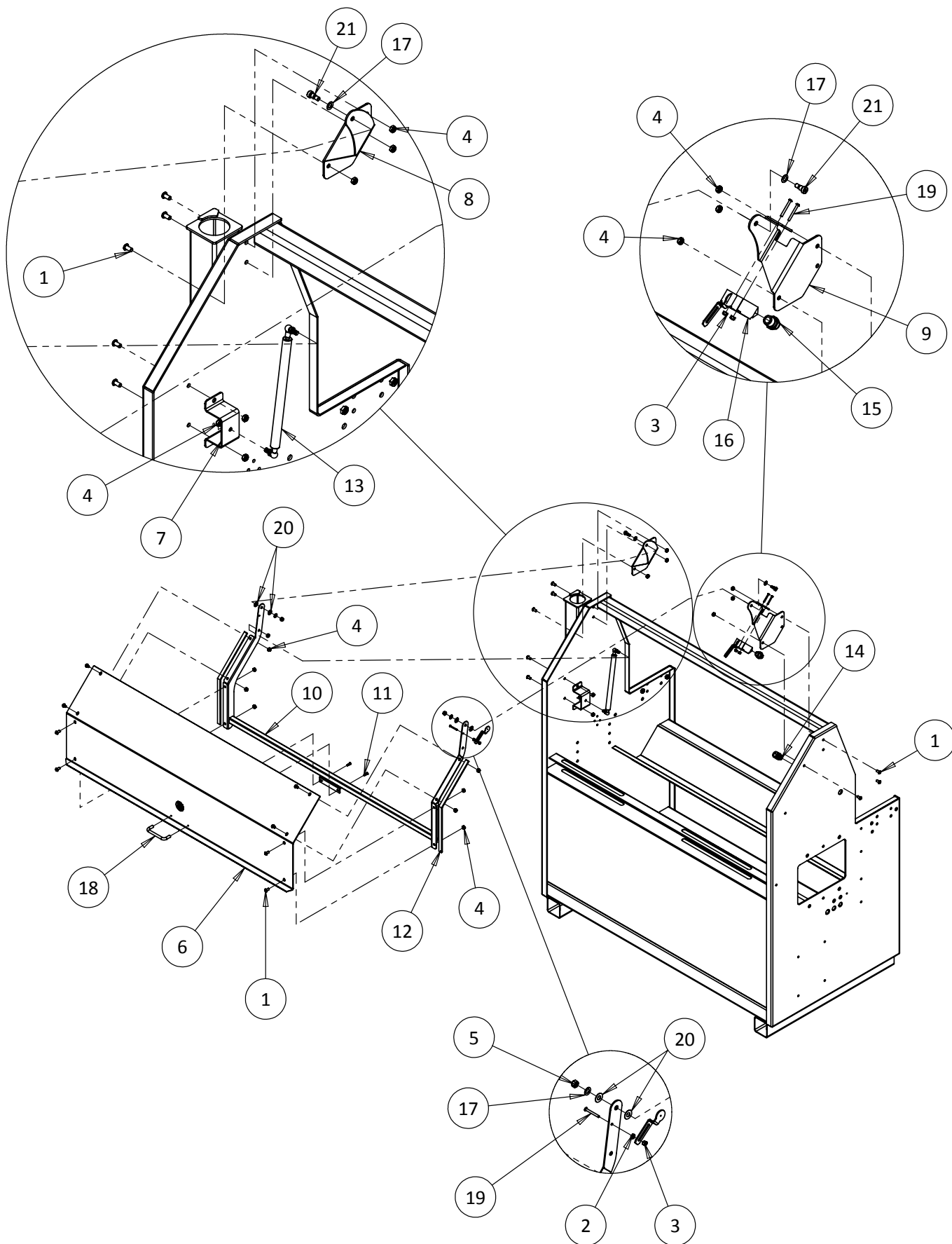


DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	B190809.....	10-24 x 1/2 Round Head Machine Screw
2.....	B251016.....	Button Head Socket Cap Screw 1/4-20 x 5/8 Long
3.....	B251216.....	Button Head Socket Cap Screw 1/4-20 x 3/4 Long
4.....	B371201.....	Hex Head Cap Screw 3/8-16 x 3/4 Long
5.....	B371616.....	Button Head Socket Cap Screw 3/8-16 X 1 Long
6.....	B501601.....	Hex Head Cap Screw 1/2-13 x 1 Long
7.....	B502401.....	Hex Head Cap Screw 1/2-13 x 1-1/2 Long
8.....	J257100 .....	1/4-20 Hex Locknut
9.....	J371000 .....	3/8-16 Hex Nut
10.....	J501000 .....	1/2-13 Hex Nut
11.....	J502000 .....	1/2-13 Hex Jam Nut
12.....	H371202 .....	Roll Pin 3/8 Diameter x 3/4 Long
13.....	H371602 .....	Roll Pin 3/8 Diameter x 1 Long
14.....	K371501.....	3/8 Lockwasher
15.....	K501501.....	1/2 Lockwasher
16.....	R000483.....	Internal Tooth Lock Washer #10
17.....	R000536.....	Internal Tooth Lock Washer 1/4
18.....	R000553.....	Kep Nut 10-24
19.....	6189003.....	618 Foley Decal
20.....	18518.....	Cross Slide Assembly
21.....	6189505.....	Cabinet Weldment
22.....	18573.....	Tooling Bar Weldment
23.....	3707601.....	Proximity Sensor only - 18MM DC
.....	27168.....	Proximity Cord Assembly - Traverse Left Hand
24.....	3707601.....	Proximity Sensor only - 18MM DC
.....	27169.....	Proximity Cord Assembly - Traverse Right Hand
25.....	3707009.....	Strain Relief - .27/.47 Cord Diameter
26.....	3707029.....	Strain Relief - .19/.30 Cord Diameter
27.....	3707093.....	Strain Relief - .43/.55 Cord Diameter
28.....	3708419.....	Wave Spring - .78 ID
29.....	3708421.....	Flatwasher - .75 ID x 1.0 OD x .075 Thick
30.....	6109570.....	T - Knob Assembly - 3/8-16 x .75 Long
31.....	18517.....	Tooling Bar Extension Weldment
32.....	3707595.....	Hole Plug
33.....	3706105.....	Decal Sheet - (Contains Multiple Decals)
34.....	3706263.....	Patent Decal
.....	3708461.....	Warning 3600 RPM min rating for Grinding Wheels.
35.....	3706133.....	Manual Tube
36.....	3706134.....	End Cap
37.....	3706135.....	Velcro Strip Hook
38.....	3706136.....	Velcro Strip Hoop
39.....	3711305 .....	6-32 SS Serrated Head Nut
40 .....	3711306 .....	6-32 x 3/4" SS Phillips Head Screw
41 .....	J257100 .....	1/4-20 LOCKNUT FULL NYLON INSRT
42 .....	B251016.....	1/4-20x5/8 BHSCS
43.....	6189004 .....	ESTOP MOUNT BRACKET
44 .....	6189005.....	ESTOP CORD 1 LH
45 .....	6189006.....	ESTOP CORD 2 RH
46.....	3711304.....	E-Stop Enclosure





<b>DIAGRAM NUMBER</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
1.....	B311013 .....	5/16-18 x 5/8 Button Head Socket Cap Screw
2.....	J161000 .....	#8-32 Hex Nut
3.....	J167000 .....	#8-32 Locknut Thin
4.....	J317000 .....	5/16-18 Locknut Thin
5.....	J317100 .....	5/16-18 Locknut Full
6.....	18110.....	Door
7.....	18111.....	Gas Spring Mounting Bracket
8.....	18114.....	Left Door Mount Bracket
9.....	18115.....	Right Door Mount Bracket
10.....	18542.....	Door Support Weldment
11.....	3706042.....	#8 x 3/4 Thread forming Screw
12.....	3706052.....	Adhesive Backed Foam Seal
13.....	3706088.....	Gas Spring
14.....	3707009.....	Strain Relief (side frame)
15.....	3707563.....	Strain Relief (door switch)
16.....	3707828.....	Door Switch (rotate)
17.....	3708214.....	Conical Washer
18.....	3708857.....	Black Pull Handle
19.....	3708865.....	#8-32 x 1.5 Button Head Safety Screw
20.....	3709304.....	Thrust Washer
21.....	3709809.....	Shoulder bolt 3/8 x 3/8

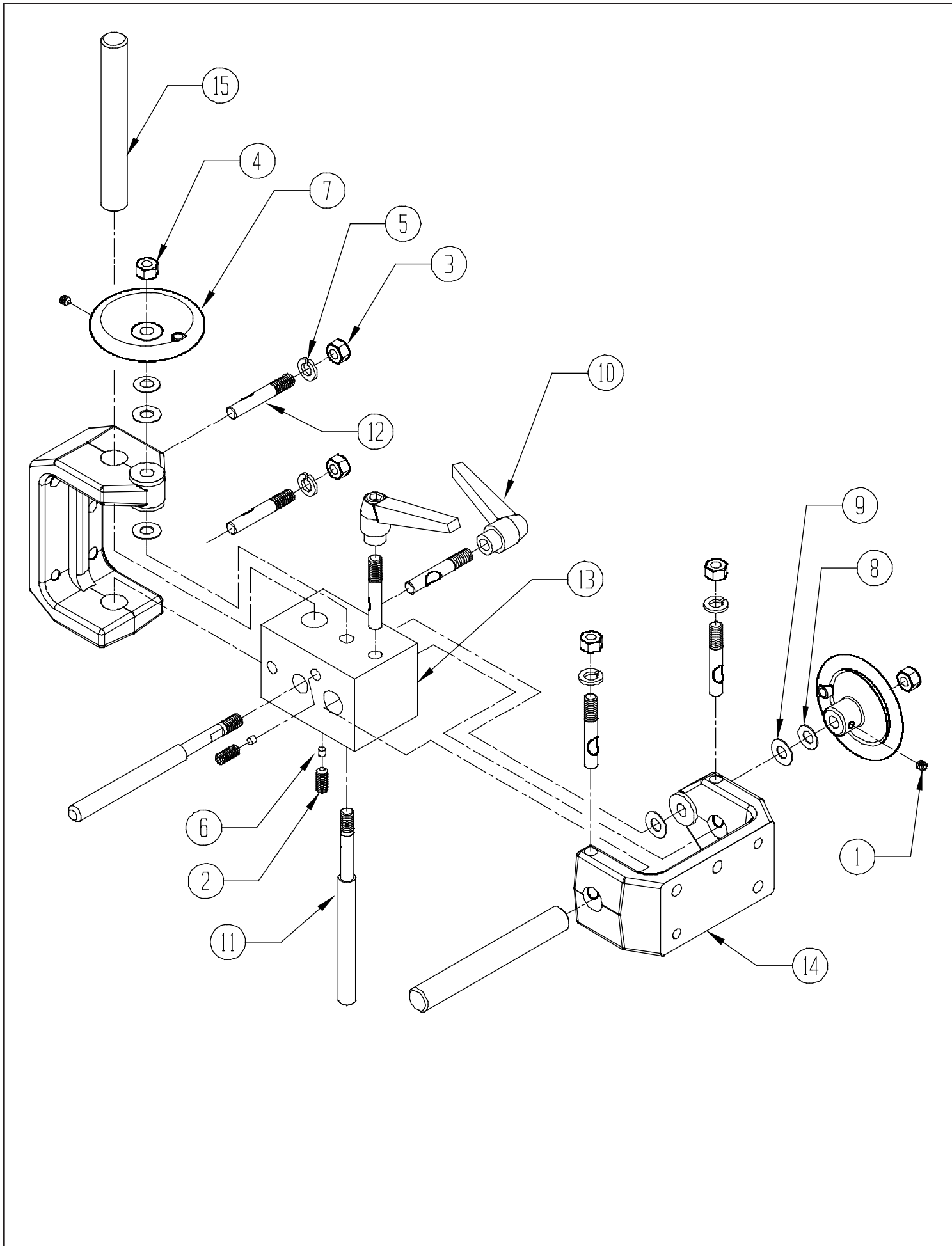


DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	C250420.....	1/4-20 x 1/4" Long Socket Set Screw
2.....	C311220.....	5/16-18 x 3/4" Long Socket Set Screw
3.....	J371000 .....	3/8-16 Hex Nut
4.....	J377000 .....	3/8-16 Jam Locknut
5.....	K371501.....	3/8 Split Lockwasher
6.....	3579109.....	3/16 Dia. Nylon Plug
7.....	3708393.....	Handwheel
8.....	3709062.....	Conical Washer
9.....	3709304.....	Thrust Washer
10.....	3708437.....	3/8-16 Adjustable Handle
11.....	6009027.....	Acme Adjusting Shaft
12.....	6009035.....	3/8-16 Locking Stud Shaft
13.....	6009081.....	Cross Slide
14.....	6009082.....	Cross Slide Support
15.....	6009095.....	Slide Shaft

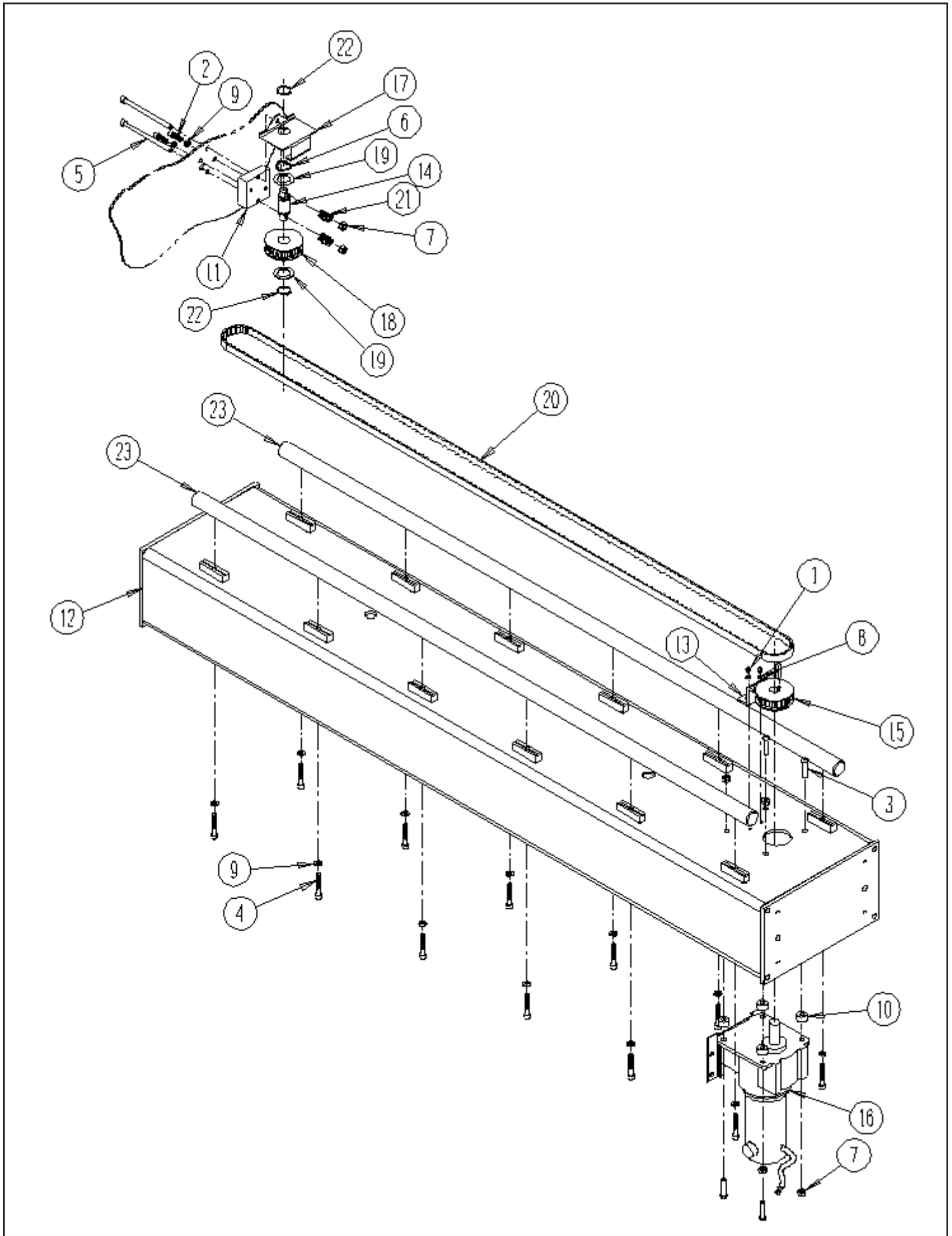


DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	B160607 .....	8-32 x 3/8 Button Head Socket Cap Screw
2.....	B251211 .....	1/4-20 x 3/4 Socket Head Cap Screw
3.....	B252016 .....	1/4-20 x 1-1/4 Button Head Socket Cap Screw
4.....	B252011 .....	1/4-20 x 1-1/4 Socket Head Cap Screw
5.....	B256411 .....	1/4-20 x 4 Socket Head Cap Screw
6.....	3708419.....	Wave Spring .78 ID x 1.00 OD
7.....	J257000 .....	1/4-20 Locknut Thin
8.....	K161501.....	#8 Lockwasher Split
9.....	K251501.....	1/4 Lockwasher Split
10.....	3708884.....	Spacer .281 ID x .62 OD x .38 Long
11.....	28192.....	Support - Travel Pulley
12.....	27156.....	Traverse Base Machined
13.....	28197.....	Guard - Travel RH
14.....	50309.....	Shaft- Travel Pulley
15.....	3706056.....	Pulley - Cog Drive
16.....	6059062.....	Motor Assembly - Travel W34
17.....	50363.....	Guard - Traverse Pulley
18.....	55553.....	Idler Pulley Assembly
19.....	80355.....	Washer - Thrust .75ID x 1.25OD
20.....	80375.....	Belt -Cog
21.....	3708658.....	Spring - Compression
22.....	3709331.....	Ring - Retaining Ext
23.....	6509063.....	Shaft - Carrier

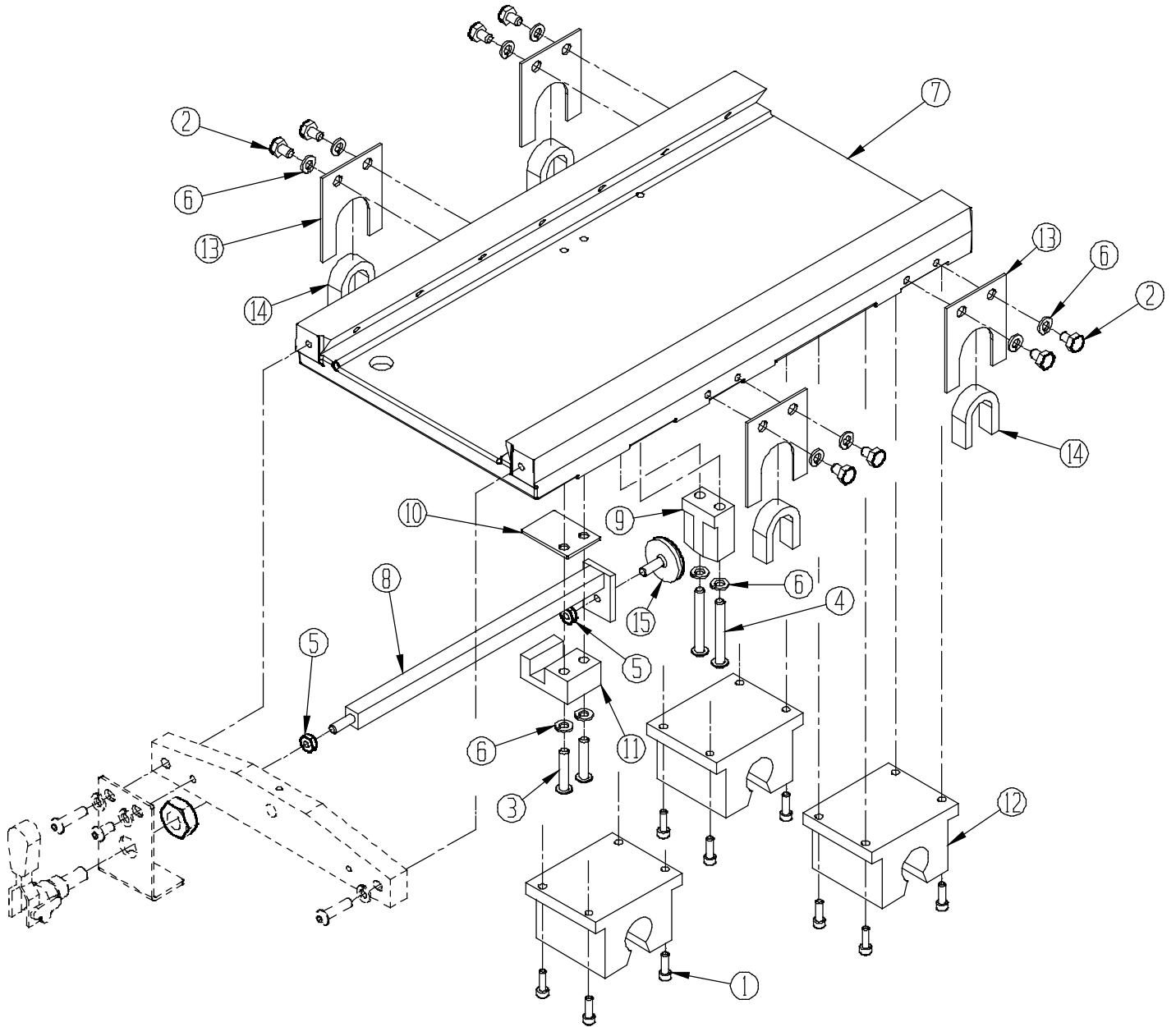
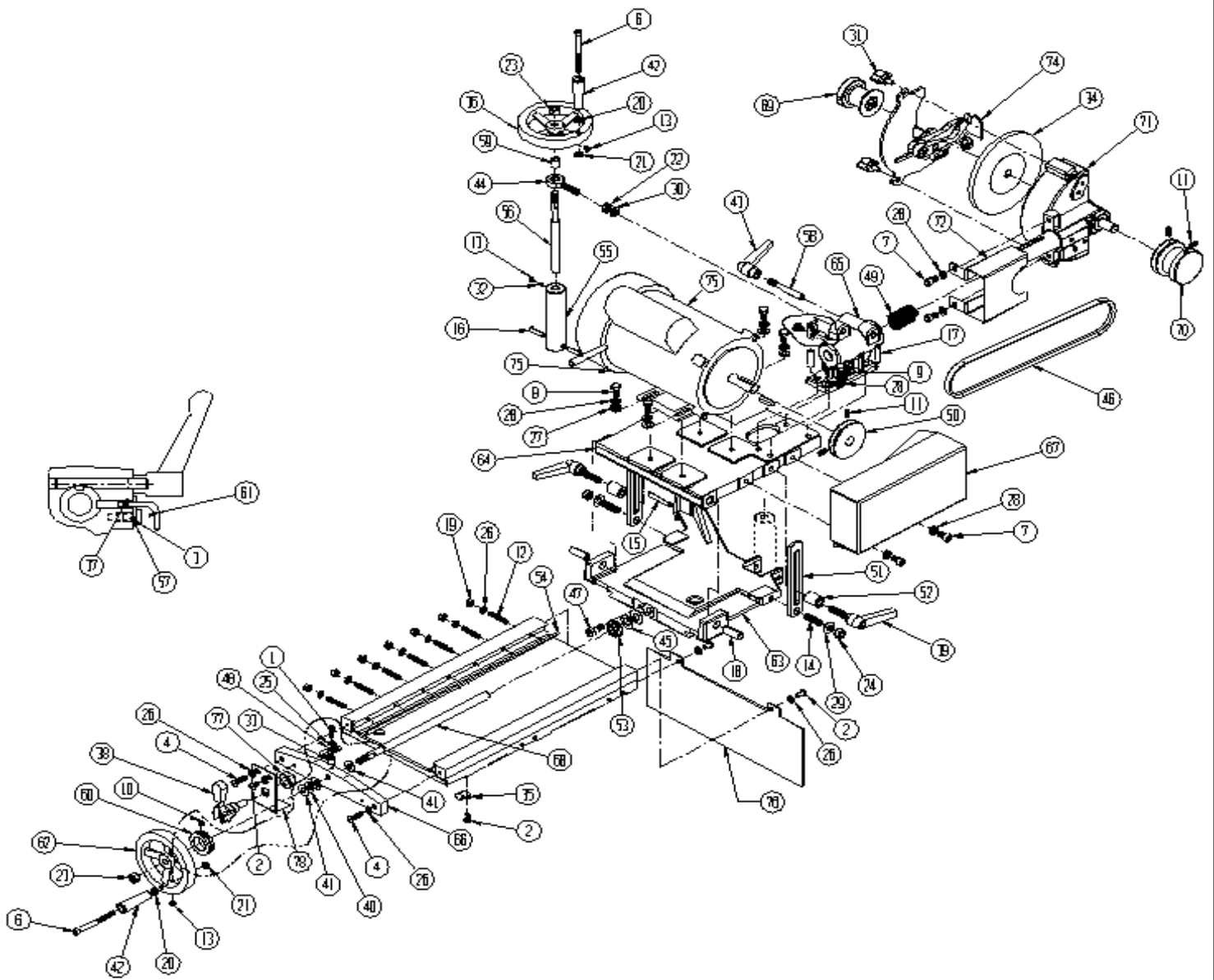


DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	B191011.....	#10-24x5/8 Socket Head Cap Screw
2.....	B250601.....	1/4-20x3/8 Hex Head Cap Screw
3.....	B252016.....	1/4-20x1-1/4 Button Head Socket Cap Screw
4.....	B253216.....	1/4-20x2 Button Head Socket Cap Screw
5.....	J252000 .....	1/4-20 Hex Jam Nut
6.....	K251501.....	1/4 Split Lockwasher
7.....	18065.....	Carriage Base
8.....	18571.....	Traverse Clamp Assembly
9.....	28187.....	Traverse Clamp Block
10.....	28188.....	Traverse Clamp Spacer
11.....	28189.....	Clamp Support Block
12.....	3709044.....	Ball Bushing Bearing
13.....	3969063.....	Sponge Wiper Holder
14.....	3969064.....	Foam Wiper
15.....	50310.....	Belt Clamp Tip





# PARTS LIST 18520 GRINDING HEAD

- ORIGINAL INSTRUCTIONS -

DIA. NO.	PART NO.	PART NAME	DIA. NO.	PART NO.	PART NAME
1	B191233	10-32 x 3/4 Pan Head Machine Screw	43	3709437	3/8-16 Adj Handle
2	B250816	1/4-20 x 1/2 Button Head Cap Screw	44	3709463	Rod End Bearing
3	B250819	1/4-20 x 1/2 Truss Head Machine Screw	45	3709620	Conical Washer
4	B251616	1/4-20 x 1 Button Head Cap Screw	46	3709764	V-Belt
6	B255011	1/4-20 x 3-1/8 Socket Head Cap Screw	47	3709809	.375 Dia x .38 Lg Shoulder Bolt
7	B310811	5/16-18 x 1/2 Socket Head Cap Screw	48	3809047	Clear Indicator
8	B311001	5/16-18 x 5/8 Hex Head Cap Screw	49	3889059	1.13 OD 2.0 Lg Compr. Spring
9	B311401	5/16-18 x 7/8 Hex Head Cap Screw			
10	C250420	1/4-20 x 1/4 Socket Setscrew Cup Pt.	50	3889088	.62 Bore Pulley
11	C251020	1/4-20 x 5/8 Socket Setscrew Cup Pt.	51	3969027	Adjusting Arm
12	C252420	1/4-20 x 1-1/2 Socket Setscrew Cup Pt.	52	3969065	.406ID x 1Lg Steel Spacer
13	C310420	5/16-18 x 1/4 Socket Setscrew Cup Pt.	53	6009024	1/2-10 ACME Backlash Nut
14	C372020	3/8-16 x 1-1/4 Socket Setscrew Cup Pt.	54	6009025	Gib Plate
15	H252802	.25 Dia x 1.75Lg Roll Pin	55	6009026	Tapped Pivot Sleeve
16	H311602	.31 Dia x 1 Lg Roll Pin	56	6009027	ACME Adjusting Shaft
17	H372002	.38 Dia x 1.25 Lg Roll Pin	57	6009029	Keeper Plate
18	H502001	.50 Dia x 1.25 Lg Dowel Pin	58	6009030	Shaft Locking Stud
19	J251000	1/4-20 Hex Nut	59	6009031	.386 ID x .56Lg Steel Spacer
20	J252000	1/4-20 Hex Jam Nut	60	6059082	Calibrated Ring
21	J257000	1/4-20 Thin Locknut	61	6009041	Angle Locking Pin
22	J371100	3/8-24 Hex Nut	62	6009044	4.50 Dia Modified Handwheel
23	J377000	3/8-16 Locknut Jam Nylon	63	6009083	Grinding Head Slide Base
24	J377100	3/8-16 Locknut Hex Nylok Full	64	6009084	Grinding Head Pivot Base
25	K190001	#10 Flat Washer	65	6009088	Grinding Head Swivel Base
26	K251501	1/4 Split Lock Washer	66	6009136	Feed Screw Guide
27	K310001	5/16 Flat Washer	67	6009216	Rear Belt Guard
28	K311501	5/16 Split Lock Washer	68	6009218	ACME Adjusting Shaft
29	K370001	3/8 Flat Washer	69	6009272	Grinding Wheel Knob
30	K371501	3/8 Split Lock Washer	70	6009277	V-Belt Pulley Knob
31	09394	2-Prong Knob	71	6009587	Grinding Head Arbor Assembly
32	3579109	Nylon Plug 3/16 Dia.	72	6059023	Front Belt Guard
33	6009224	Spacer .50 OD x .191 ID ID x .43 Long	73	6059028	Spinning Knob
34	3700091	Grinding Wheel 6" Dia x .375" Wide	74	6059550	Index Finger Assembly
	3700095	Spin Grinding Wheel 6" Dia x 1" Wide	75	3707690	1 HP Motor
35	3707935	Cord Clip	76	18077	Front Bearing Dust Plate
36	3708148	Handwheel 4.5 Dia	77	J627200	5/8-18 Thin Locknut
37	3708213	.24 OD x .62 Lg Comp. Spring	78	18067	Traverse Belt Clamp Bracket
38	80335	Destaco Clamp			
39	3708561	3/8-16 x 1.56 Lg Adj. Handle			
40	3709062	Conical Washer			
41	3709304	Thrust Washer			
42	3709370	Handle			

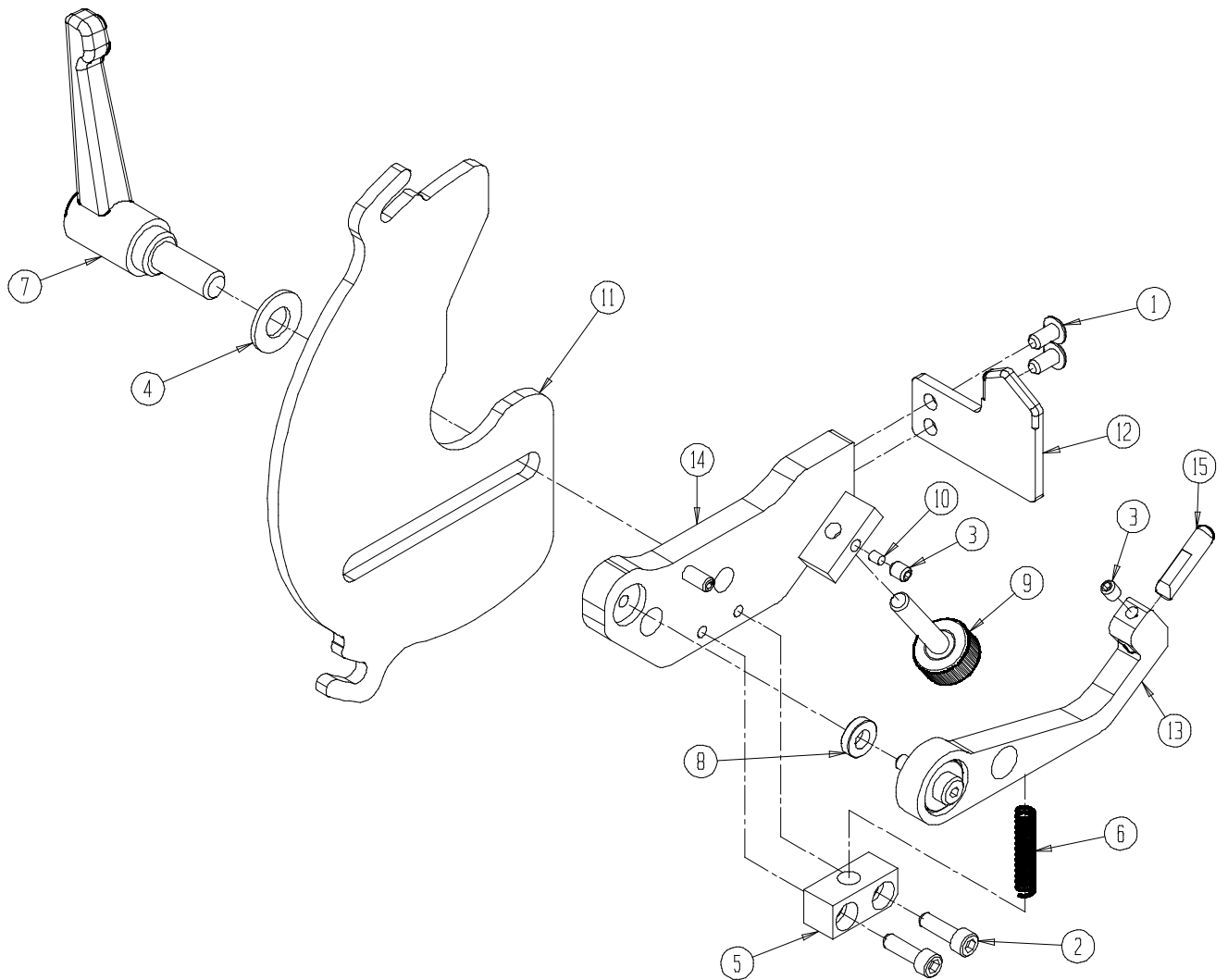
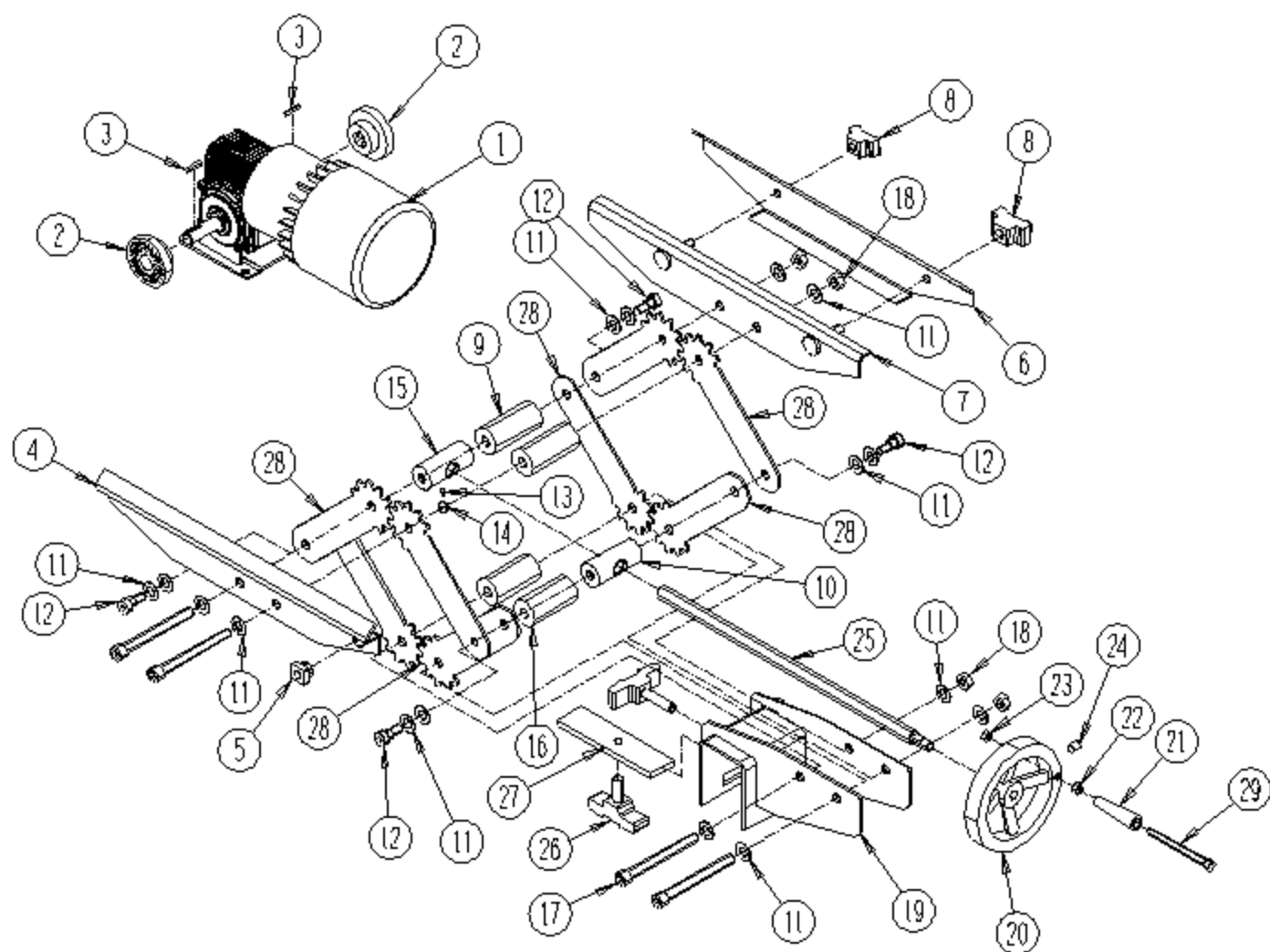


DIAGRAM NO.	PART NO.	DESCRIPTION
1	B190634 .....	10-32 x 3/8 Long Button Head Socket Cap Screw
2	B191031 .....	10-32 x 5/8 Long Socket Head Cap Screw
3	C190467 .....	10-32 x 1/4 Long Socket Setscrew Nylock Cup Point
4	K310001.....	5/16 Flat Washer
5	55116.....	Index Finger Spring Block
6	3708919.....	Compression Spring
7	3708786.....	5/16-18 x 5/8" Long Adjustable Handle
8	3708833.....	Spacer
9	3708854.....	Knob Assembly
10	3709852.....	1/8" Diameter Nylon Ball
11	6009271.....	Grinding Wheel Guard & Finger Support
12	6009276.....	Fixed Finger
13	6059584.....	Index Finger Assembly
14	6059585.....	Finger Support Assembly
15	6509007.....	Index Stop Pin
16	C190667 .....	10-32 x 3/8 Long Socket Setscrew Cup Point w/Patch



# PARTS LIST (continued) 6009523 SPIN DRIVE ASSEMBLY ORIGINAL INSTRUCTIONS -

DIAGRAM NO.	PART NO.	DESCRIPTION
1	6329160.....	Motor Assembly , Electric 90 VDC .25 HP
2	3709586.....	Flange Coupler .50
3	R000376 .....	Square Key 1/8 x 1/8 x 3/4
4	6009078.....	Bracket, Gearbox Slide
5	3707279.....	Strain Relief
6	6009079.....	Bracket, Gearbox Clamp
7	6009580.....	Bracket, Gearbox Slide Weldment
8	3708262.....	T-Knob
9	6009048.....	Spacer, Linkage 2.50 Lg.
10	6009047.....	Spacer, Linkage L.H. Thd.
11	3709062.....	Bellevill Washer 3/8"
12	3709809.....	Shoulder Screw
13	3709705.....	Nylon Plug
14	C310420 .....	SSS 5/16-18 x 1/4" CP-PT
15	6009046.....	Spacer, Linkage R.H. Thd.
16	6009045.....	Spacer, Linkage 2.29 Lg.
17	B375611 .....	SKHCS 3/8-16 x 3.50"
18	J377100 .....	Locknut--Nylon 3/8-16 Full
19	6009575.....	Linkage--Support Bracket Weldment
20	3708148.....	Handwheel, 4.50 Diameter
21	3709370.....	Handle, Spinning
22	J252000 .....	1/4-20 Hex Jam Nut
23	J257000 .....	1/4-20 Nylok Nut
24	C310620 .....	SKSS, SP-PT, 5/16-18 x 3/8"
25	6009076.....	Rod, Double Thread
26	6009555.....	Knob Assembly
27	3889066.....	Center Stand Lock
28	6009067.....	Linkage, Geared
29	B255011 .....	SHCS 1/4-20 x 3-1/8"

**PARTS LIST 6009527 REEL SET UP GAUGE ASSEMBLY** - ORIGINAL INSTRUCTIONS -

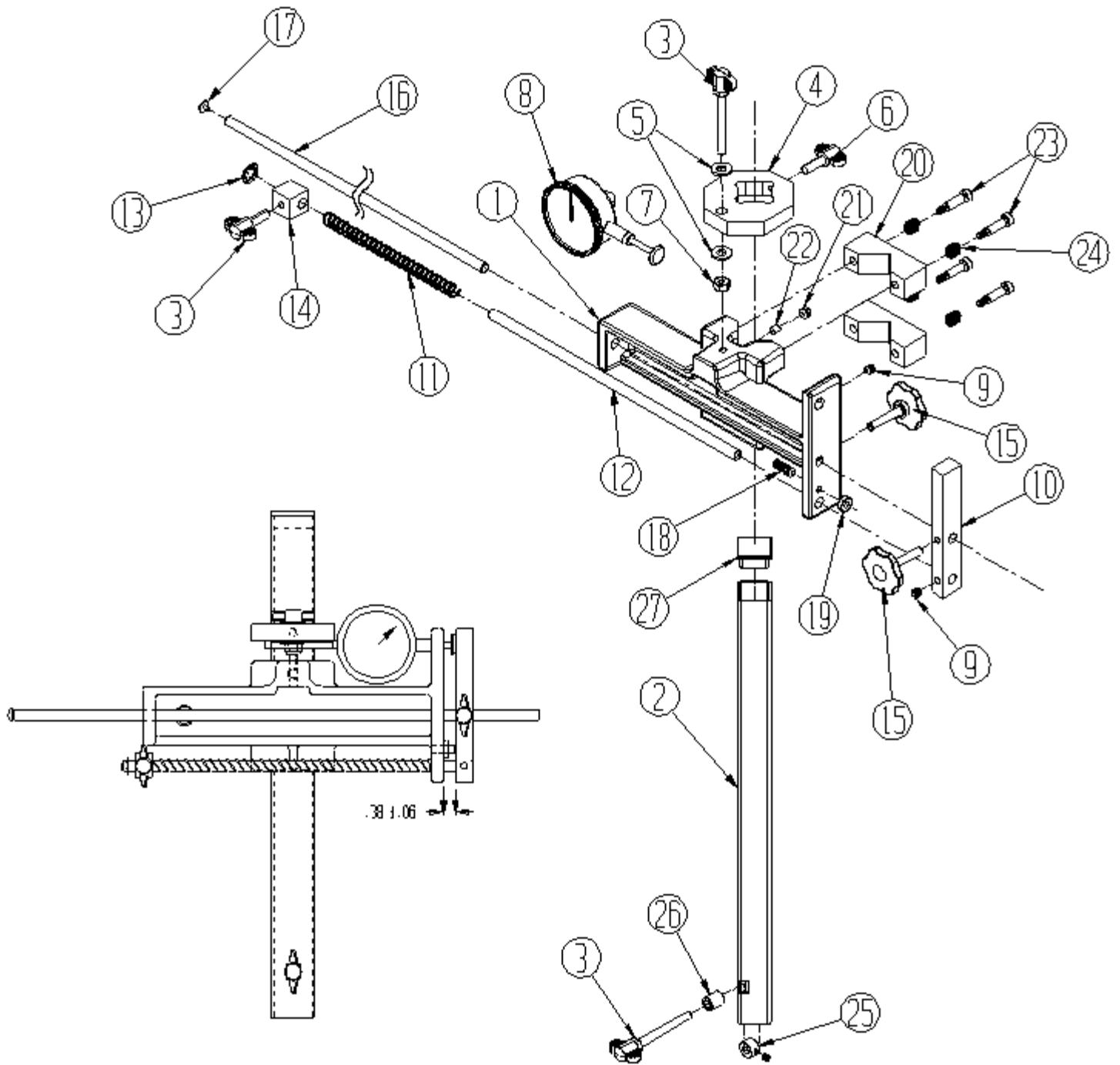


DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	6009089.....	Slide, Setup Gage
2.....	18003.....	Tube, Gage Slide
3.....	6009597.....	Tee Knob Assembly 2.25 lg.
4.....	6009049.....	Adjust Slide Block
5.....	K250001.....	1/4 Flat SAE Washer
6.....	3706033.....	T-Knob Assembly 1/4-20 x .79 Long
7.....	J257100.....	Locknut--Nylon 1/4-20 Full
8.....	3579123.....	Dial Indicator
9.....	C250420.....	SKSS, CP-PT, 1/4-20 x 1/4"
10.....	6009054.....	Bar, Indicator Stop
11.....	3709278.....	Spring--Compression
12.....	3969109.....	Spring Guide Rod
13.....	3709336.....	Push on Ring
14.....	3109022.....	Saddle Stop
15.....	6009596.....	Tee Knob Assembly, Nylon
16.....	6009055.....	Rod, Gage Alignment
17.....	3708540.....	Domed Anvil 3/8
18.....	C251220.....	SKSS, CP-PT, 1/4-20 x 3/4"
19.....	J252000.....	1/4-20 Jam Nut
20.....	6009050.....	Clamp, Spring Loaded
21.....	C310420.....	SSS 5/16-18 x 1/4" CP-PT
22.....	3579109.....	Nylon Plug
23.....	3708453.....	Shoulder Bolt 1/4" D x 3/4"
24.....	3708175.....	Spring
25.....	3708674.....	Set Collar 1/4 with SSS
26.....	6009286.....	Spacer .438 OD
27.....	3708154.....	Plug--Spacer

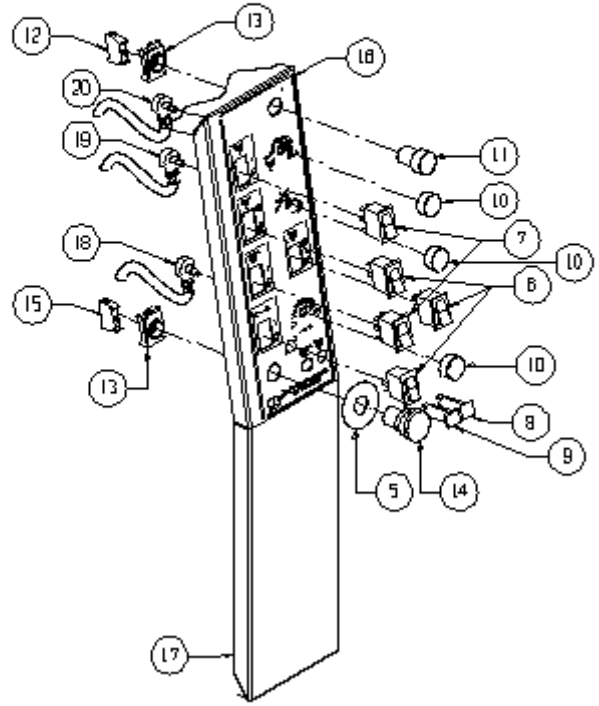
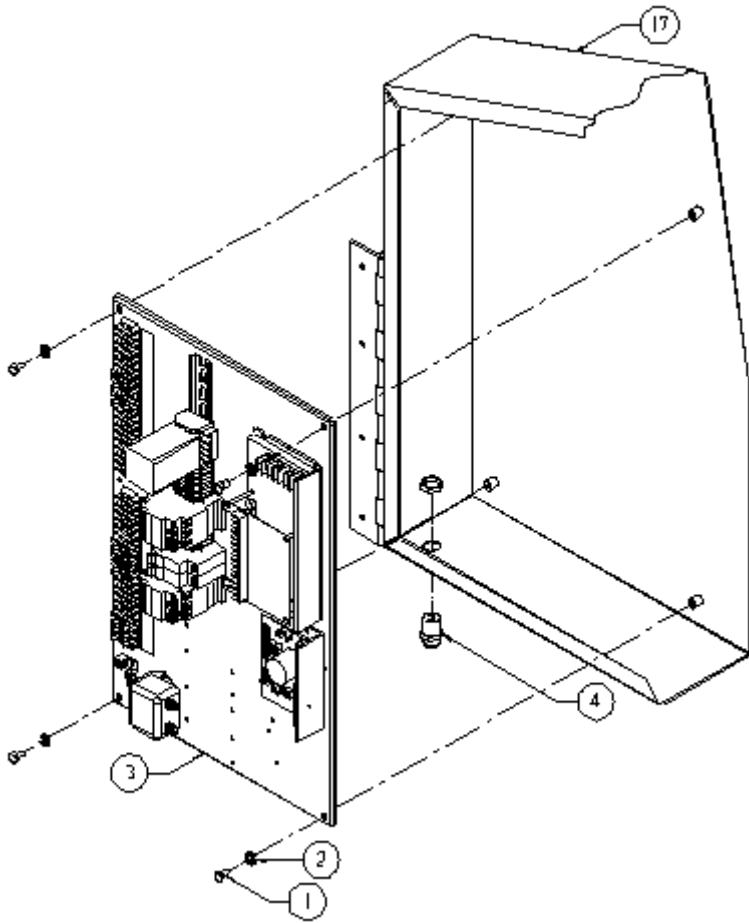
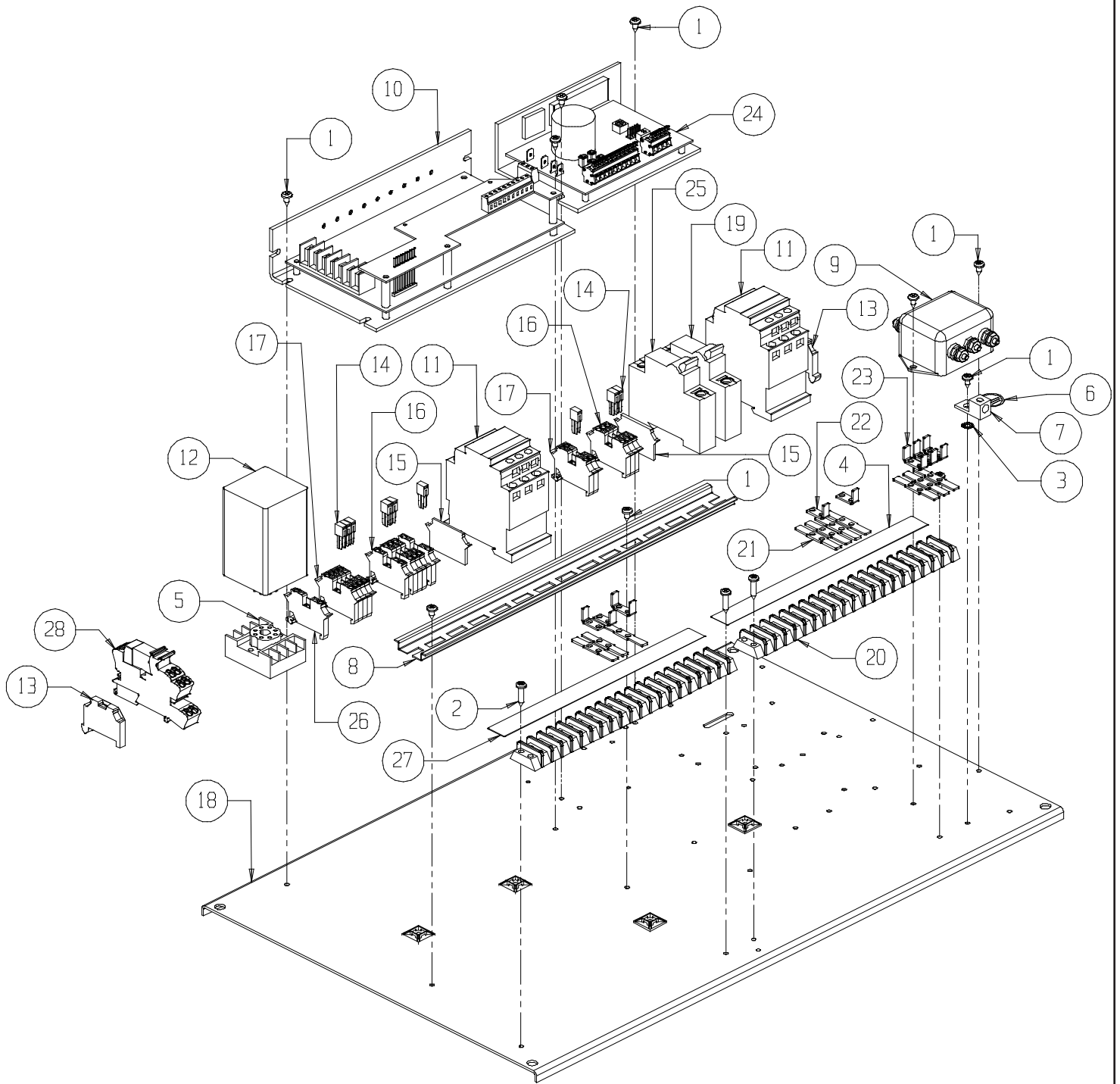




DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	D250800 .....	1/4-20 x 1/2" Long Thread Cutting Screw
2.....	R000536.....	1/4 Internal Teeth Lock Washer
3.....	see next page.....	Control Panel Sub-Assembly
4.....	3707093.....	Strain Relief - .43-.55 Cord Diameter
5.....	3707342.....	Yellow E-Stop Ring
6.....	3707367.....	Rocker Switch - On/Off DPST
7.....	3707429.....	Rocker Switch - On/Off DPDT
8.....	3707443.....	4-Amp Circuit Breaker
9.....	3707543.....	12-Amp Circuit Breaker
10.....	3707446.....	Potentiometer Knob
11.....	3707564.....	Green Start Pushbutton
12.....	3707565.....	Normal Open Contact Block
13.....	3707566.....	Mounting Switch Latch
14.....	3707567.....	Push-Pull Red E-Stop
15.....	3707568.....	Normal Closed Contact Block
16.....	3706043.....	Control Panel Decal
17.....	18526.....	Control Panel Weldment
18.....	6059050.....	Traverse Potentiometer
19.....	6529052.....	Relief Torque Potentiometer
20.....	6529053.....	Spin Speed Potentiometer
.....	3707255.....	Cable Tie 4" Long x .10 Wide (Not Shown)
.....	3708378.....	Foam Strip .25 Tall (Not Shown)

# PARTS LIST 18534 ELECTRICAL PANEL SUB-ASSEMBLY - ORIGINAL INSTRUCTIONS -

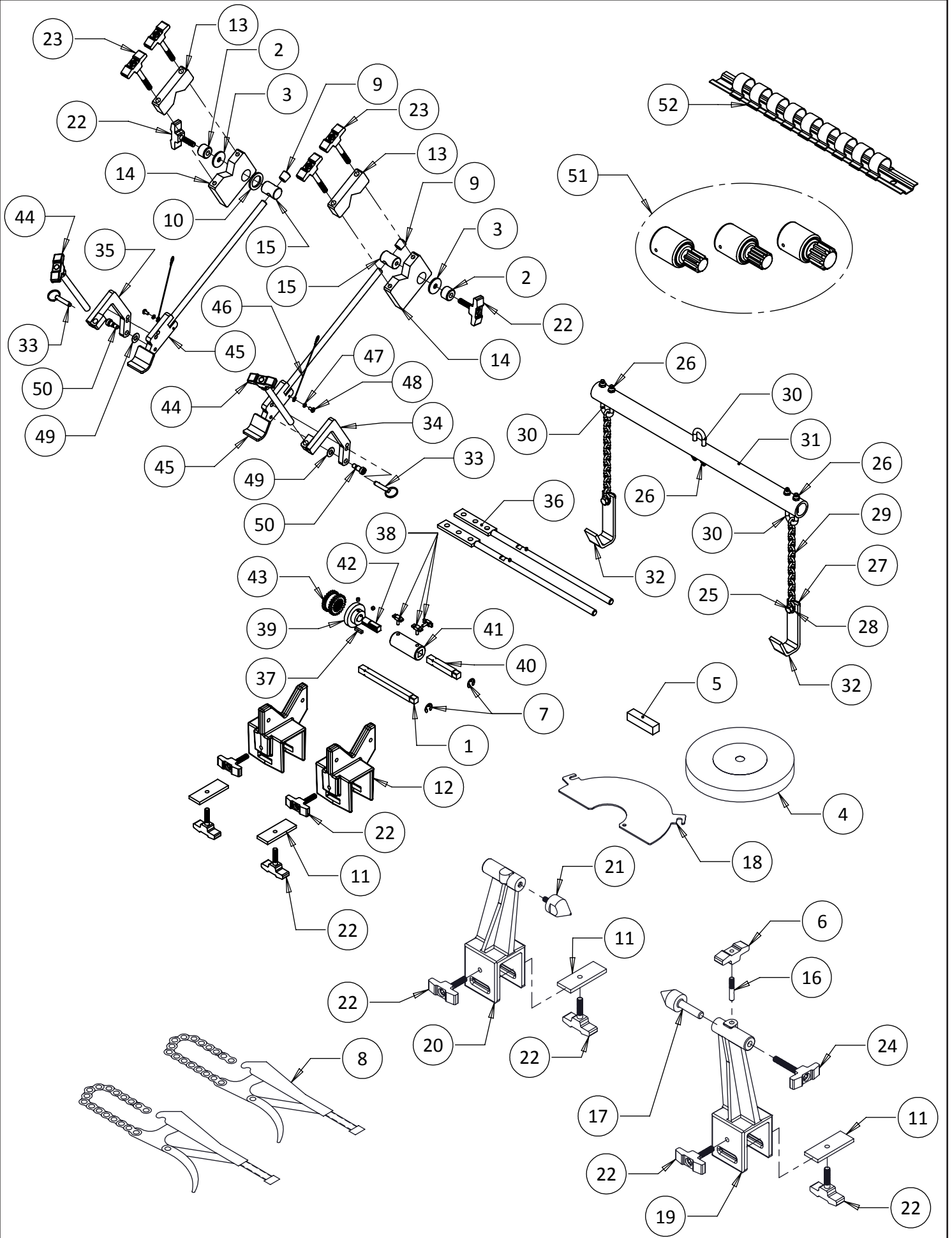


**PARTS LIST 18534 ELECTRICAL PANEL SUB-ASSEMBLY - ORIGINAL INSTRUCTIONS -**

DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	D160666 .....	#8 x 3/8" Long Pan Head Tapping Screw
2.....	D161266 .....	#8 x 3/4" Long Pan Head Tapping Screw
3.....	R000480.....	#8 Lock Washer - External Teeth
4.....	55223.....	Terminal Strip Decal
5.....	3707073.....	8-Pin Socket
6.....	3707163.....	Primary Ground Decal
7.....	3707164.....	Primary Ground Lug
8.....	3707378.....	Din Rail - 14"
9.....	3707764.....	Power Line Filter
10.....	3707550.....	Traverse Motor Control Board
11.....	3707556.....	Magnetic Starter 1 HP
12.....	3707688.....	Low Voltage Relay
13.....	3707625.....	End Stop - Terminal Block
14.....	3707626.....	Jumper - Terminal Block
15.....	3707627.....	End Plate - Terminal Block
16.....	3707628.....	Terminal Block - Grey
17.....	3707629.....	Terminal Block - Blue
18.....	6009270.....	Electrical Sub - Panel
19.....	3707589.....	15-Amp Circuit Breaker
20.....	3707778.....	Terminal Strip - 19 Pole
21.....	3707707.....	Straight Double Spade Terminal
22.....	3707709.....	Single 90° Spade Terminal
23.....	3707708.....	Double 90° Spade Terminal
24.....	3707830.....	Spin Drive Motor Control Board
25.....	3707779.....	6-Amp Circuit Breaker
26.....	3707624.....	Ground Terminal Block
28.....	3707798.....	Relay Terminal Block 8amp 115V
-- .....	3707224.....	Cable Tie Mount (Not Shown)
-- .....	3707225 .....	Cable Tie 6.5 Long x .18 Wide (Not Shown)
-- .....	3707255.....	Cable Tie 4.0 Long x .10 Wide (Not Shown)
-- .....	3707631.....	Terminal Block Tag 1-10 (Not Shown)
-- .....	3707632.....	Terminal Block Tag 11-20 (Not Shown)

# PARTS LIST 18536 CARTON ASSEMBLY

- ORIGINAL INSTRUCTIONS -



# PARTS LIST 18536 CARTON ASSEMBLY

- ORIGINAL INSTRUCTIONS -

DIAGRAM NO.	PART NO.	DESCRIPTION	
1.....	18053.....	Drive Adapter - 10.5" Long	
2.....	3109026.....	Spacer 1.0 Diameter x .75 Long	
3.....	3589106.....	Flat Washer 1.4 OD x .13 Thick	
4.....	3700095.....	Spin Grinding Wheel 6" OD x 1" Wide x .5" Bore	
	3700091.....	Relief Grinding Wheel 6" OD x 3/8" Wide x .5" Bore	
5.....	3702508.....	Dressing Stick .75 x .75 x 3.0 Long	
6.....	3708262.....	T-Knob Assembly 5/16-18 Female	
7.....	3709073.....	Retaining Ring - External	
8.....	3709298.....	Chain Clamp	
9.....	3709258.....	Rubber Bumper	
10.....	3709808.....	Flat Washer 1.5 OD x .11 Thick	
11.....	3889066.....	Center Stand Lock	
12.....	3969017.....	V - Bracket - Mower Mount	
13.....	3969094.....	Top Clamp	
14.....	3969095.....	Bottom Clamp	
15.....	3969096.....	Clamp Bar	
16.....	3969160.....	Shaft Locking Stud	
17.....	6009020.....	Adjustable Center	
18.....	6009037.....	Wheel Guard	
19.....	6009221.....	Adjustable Center Stand	
20.....	6009222.....	Fixed Center Stand	
21.....	6009517.....	Fixed Center Assembly	
22.....	6009555.....	T - Knob Assembly 3/8-16 x 1.5 Long	
23.....	6009566.....	T - Knob Assembly 3/8-16 x 3.25 Long	
24.....	6009577.....	T - Knob Assembly 3/8-16 x 2.25 Long	
25.....	B372011.....	3/8-16 x 1.25 Long Socket Head Cap Screw	
26.....	J317100.....	5/16-18 Hex Locknut	
27.....	J377100.....	3/8-16 Hex Locknut	
28.....	3599028.....	Flat Washer 1.00 OD x .375 ID x .188 T	
29.....	3649005.....	Chain	
30.....	3709316.....	5/16-18 U Bolt	
31.....	6009011.....	Spreader Bar	
	3708456.....	Warning Decal - Boom Capacity	
	3708856.....	Decal - Spreader Bar	
32.....	6009102.....	Grab Hook	
33.....	3708364.....		
34.....	6509576.....	Small Clamp Lip	
35.....	6509564.....	Small Clamp Lip	
36.....	18120.....	Short Holder Clamp Assembly	
	18121.....	Long Holder Clamp Assembly (Not Included)	
37.....	R000377.....	Square Key 3/16 x .75 Long	44..... 6509559
38.....	09394.....	Knob - 2 Prong 1/4-20 x .50 Long	45..... 18537
39.....	3709584.....	Flange Coupler .625 Bore	46..... 3708366
			47..... K191501
40.....	6009051.....	Drive Adapter - 3.5 Long	48..... B190614
41.....	6009052.....	Adapter	49..... 3709304
42.....	6009217.....	Drive Coupling Adapter	50..... 3709158
43.....	3709585.....	Sleeve Coupler	51..... 3706130
	3730117.....	CD - Foley United Training 6181	52..... 3708025

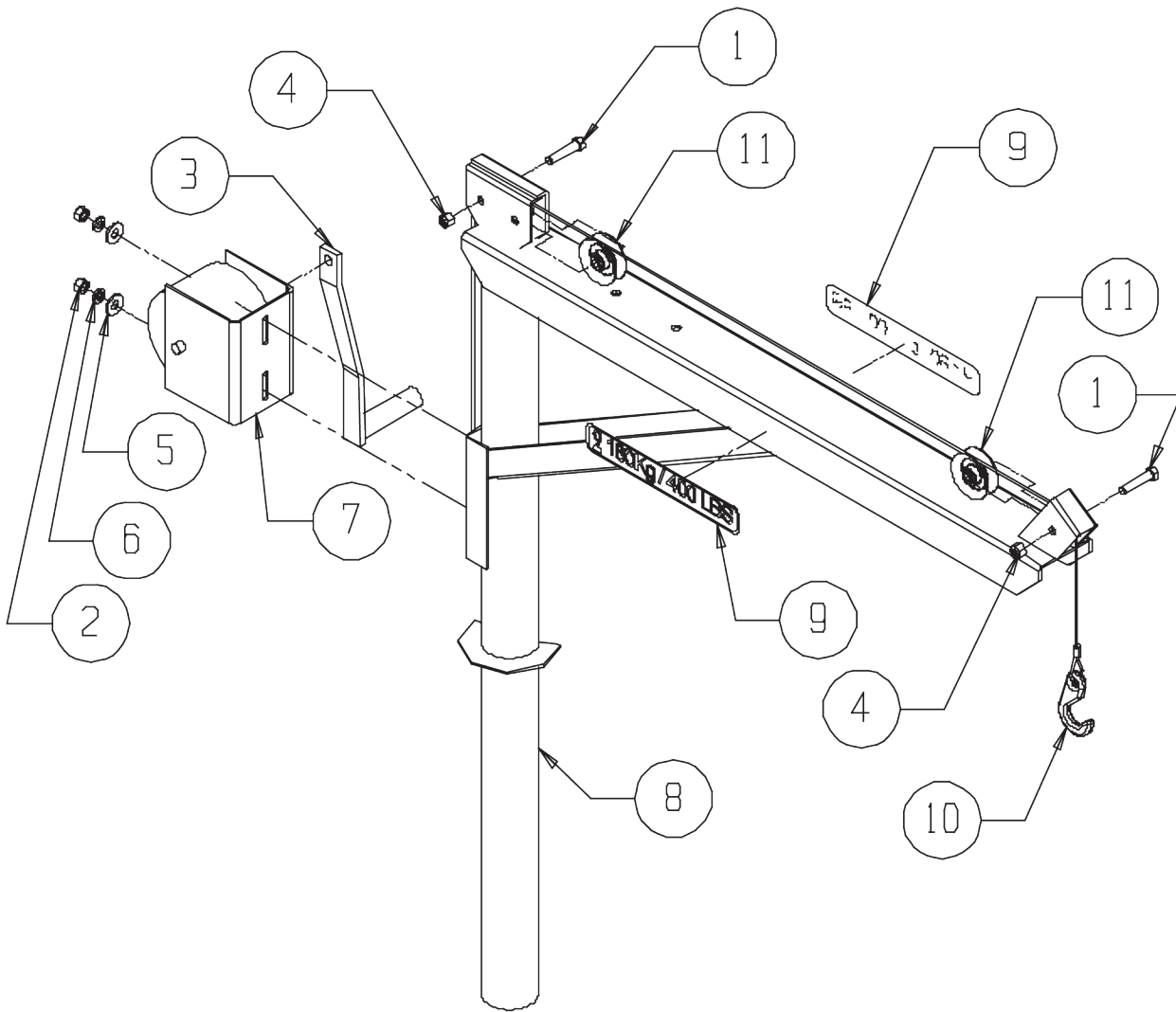
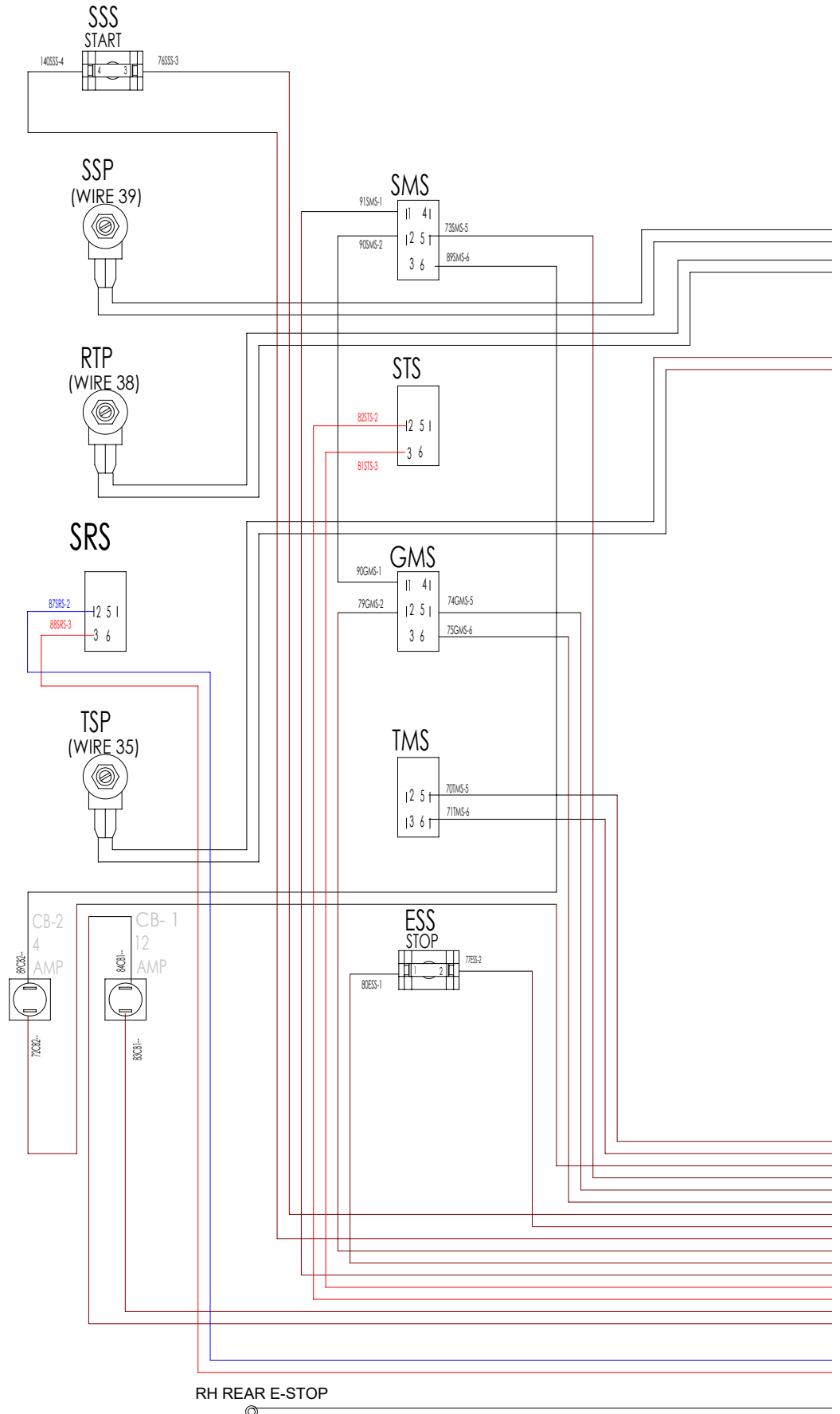


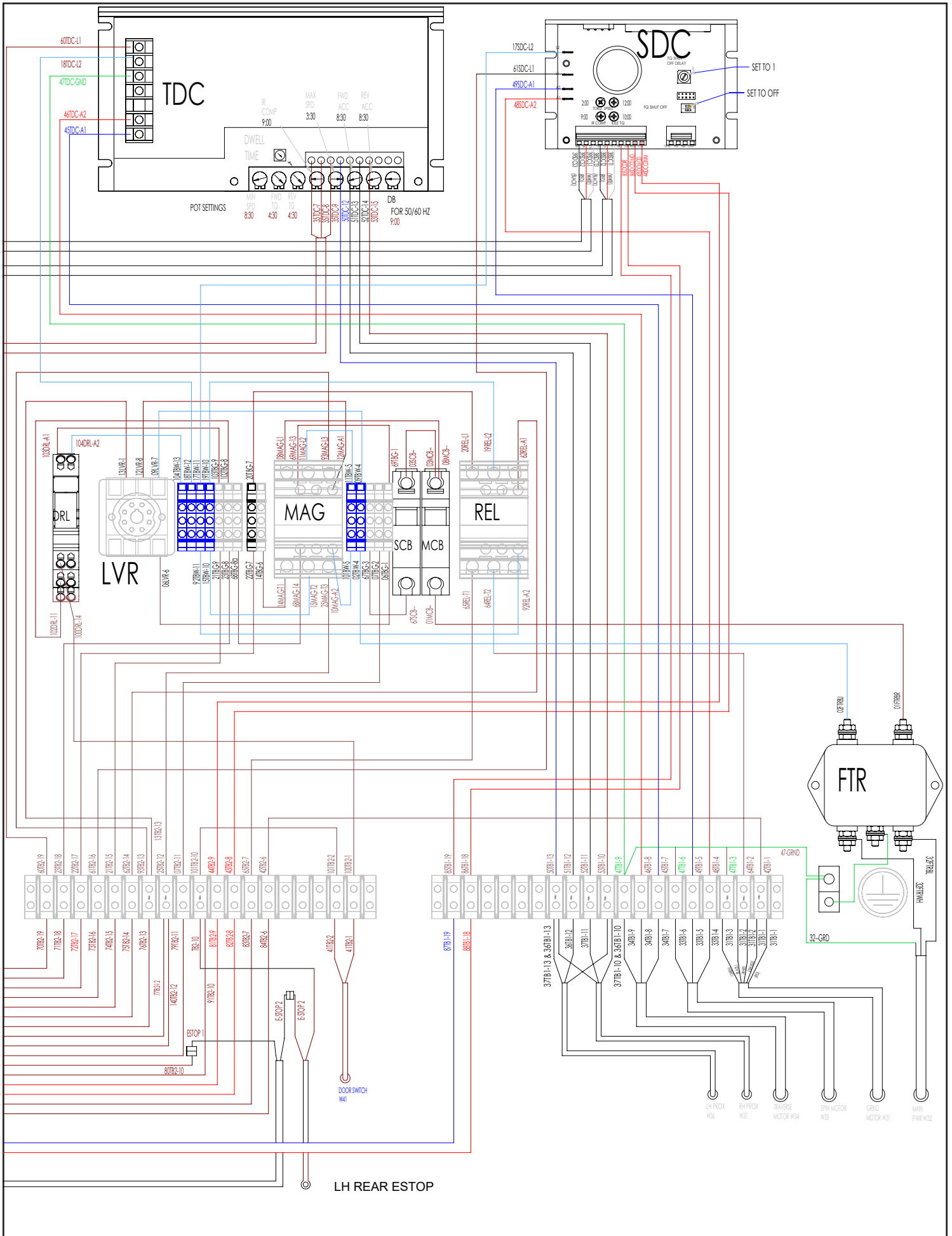
DIAGRAM NO.	PART NO.	DESCRIPTION
1.....	B372801.....	3/8-16X1-3/4 Hex Head Cap Screw
2.....	J371000 .....	3/8-16 Hex Nut
3.....	3708647.....	7" Winch Handle
4.....	J377100 .....	3/8-16 Locknut Nylon Full
5.....	K370001.....	3/8 Flat Washer
6.....	K371501.....	3/8 Split Lockwasher
7.....	3708578.....	Winch
8.....	6059527.....	Boom Weldment
9.....	3706111.....	Boom Capacity Warning Decal
10.....	3709407.....	Hook & Cable Assembly
11.....	3709795.....	Pulley



RH REAR E-STOP







# WIRING SCHEMATIC

- ORIGINAL INSTRUCTIONS -

