

Model 3096 Accu-Spin Reel Mower Grinder

**Maintenance
Troubleshooting
Adjustments
And Parts Lists**



WARNING

You must thoroughly read and understand this manual before operating the equipment, paying particular attention to the Warning & Safety instructions.

SAFETY INSTRUCTIONS



Safety Awareness Symbols are inserted in this manual to alert you to possible **Safety Hazards**. Whenever you see these symbols, follow their Instructions



The **Warning Symbol** identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

The **Caution Symbol** identifies special instructions or procedures which, if not strictly observed, could result in damage to, or destruction of equipment.

1. **KEEP GUARDS IN PLACE** and in working order.
2. **REMOVE ADJUSTING KEYS AND WRENCHES.**
3. **KEEP WORK AREA CLEAN.**
4. **DON'T USE IN DANGEROUS ENVIRONMENT.**
Don't use power tools in damp or wet locations, or expose them to rain. Keep work area well lighted.
5. **KEEP ALL VISITORS AWAY.** All visitors should be kept a safe distance from work area.
6. **MAKE WORKSHOP 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 foot wear is recommended. Wear protective hair covering to contain long hair.
10. **ALWAYS USE SAFETY GLASSES.**
11. **SECURE WORK.** Mount the cutting unit in place before grinding as prescribed in the operators manual.
12. **DO NOT 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 SEVICING.**
15. **REDUCE RISK OF UNINTENTIONAL STARTING.** Make sure switch is in OFF position 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 back lapper until it comes to a complete stop.
19. **KNOW YOUR EQUIPMENT.** Read this manual carefully. Learn its application and limitations as well as specified potential hazards.
20. **KEEP ALL SAFETY DECALS CLEAN & 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 THE GRINDER WHEN UNDER** the influence of drugs, alcohol, or medication.

SAFETY INSTRUCTIONS



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 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 BURS.**
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.



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.

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MAINTENANCE & LUBRICATION

MAINTENANCE

1. Clean excess dirt and grit from machine daily.
2. Wipe off the auto traverse drive shaft daily./
3. Carriage front rail boots should be lifted and wiped off daily.
4. Replace the two (externaly) foam rail wipers every 20 hours of operation.
5. Check all fastening bolts monthly to be sure they are tight.
6. Check gib plate adjustment in the grinder carriage base monthly.
7. Check the brushes on the auto traverse drive motor once a year. Replace as necessary.

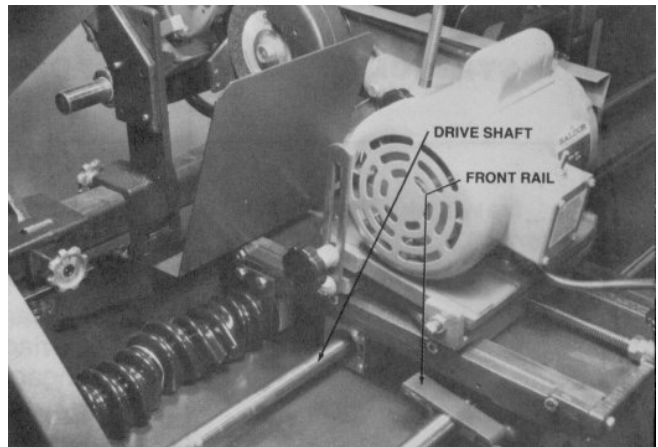


Fig. 1

LUBRICATION OF ACTUATOR AND LINEAR BEARINGS

STEP 1– Thoroughly clean all three shafts and seals. If you have compressed air available, blow off the shafts, carriage, seals, grinder base, etc.

NOTE: Always point the compressed air nozzle away from the seals bearings to insure you do not drive foreign material into the bearings. Then wipe off the shafts and seals and blow off a second time. If you do not have compressed air, then thoroughly wipe off the shafts and seals. As part of this cleaning the carriage should be traversed several times to insure all areas are clean.

STEP 2- Flood spray all three shafts with either WD40 or Tri-Flow Lubricant or our lubricant part No. 3708201, until the lubricant is dripping off the shafts. Then run the carriage back and forth through its range of travel. This will carry the lubricant into the actuator and bearings.

NOTE: Because of the flood of lubricant you may find that the actuator slips and traversing is erratic or stalls. This is not a problem as it will be corrected in the subsequent steps.

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

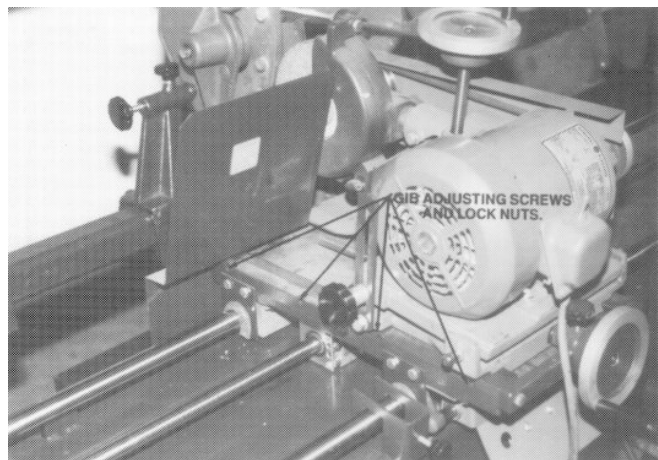


Fig. 2

LUBRICATION FREQUENCY

The lubrication frequency should be every four hours of grinder operation or more often if a squeaking noise is coming from the linear actuator. If the unit will be shut down for an extended period of time, more than two 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.

ADJUSTMENT: LINEAR ACTUATOR ADJUSTMENT & BEARING REPLACEMENT

LINEAR ACTUATOR BEARING REPLACEMENT

STEP 1- Unscrew the pin driver (item 2) that passes through the self aligning bearing, (item 38) in the carriage (item 11) and unscrew where it is threaded in to the actuator block (fig. 3). Slide the carriage off to one side to expose the actuator.

STEP 2- Turn the actuator screw (item 25) as much as required clockwise to disengage the bearings from the drive shaft so it moves freely.

STEP 3- Remove the two outboard seal mounts (item 31).

STEP 4- Remove shoulder bolts (fig. 4) fastening the bearings (item 41) to the actuator block (item 29). Remove the old bearings and discard, saving the inside washer (fig. 4). Inspect the hole that the bearing and shoulder bolt were removed from and the actuator bore for foreign material. If any is observed, thoroughly clean.

Insert the shoulder bolt through the new bearings and through the saved inside washer. Then install this assembly into the actuator and tighten the shoulder bolts.

STEP 5- Turn actuator screw (item 25) counterclockwise until all 6 bearings are in contact with the drive shaft (item 24). The actuator screw washer (item 27) should be 1/32" clear of the outboard screw heads. (see fig 4)

STEP 6- Remount the outboard seal mounts (item 31) making sure the seal is concentric to the carriage drive shaft (item 24). Also square up the seal mount blocks (item 31) to the actuator block (item 29) within 1/32".

STEP 7- Slide the carriage (item 11) over the actuator block (item 29) to line up the hole in the carriage with the tapped hole in actuator. Insert the pin driver (item 2) through self aligning bearings (item 38) and tighten.

STEP 8- Using a spring scale, set the scale up to pull on the carriage parallel to actuator drive shaft (item 24). Then while holding the drive shaft from rotating, pull on carriage; the pull force should be from 15 lbs. To 45 lbs., target 30 lbs. Force. (See step 9 for readjustment if necessary).

! The pull force is to be checked when shaft is wiped clean and dry. If checked when oily, too much tension will be set and affect bearing life.

STEP 9- If readjustment is required to achieve pull force within specification, with actuator bearings engaged to drive shaft, readjust the two outboard screws with springs (fig. 4) that hold the actuator together. To reach these screws, the actuator screw, washer and spring must be removed. Turn each screw an equal amount when resetting for more or less tension, clockwise is more tension. Repeat Step 8 and verify pull force. Continue to adjust until within specification. The factory preadjusted tension is 9/32" from under the washer holding the spring to the actuator block. This should give the 15 to 45 lbs. Carriage pull force specified. When adjustment is correct reinstall the actuator screw (fig. 3 item 25) with its spring (fig. 3 item 28) and flatwasher (fig. 3 item 27) and tighten to within 1/32" of the outboard screw heads.

! If the actuator screw is tightened too much, it will contact the outboard screw heads and override their adjustment which could cause traverse malfunction. Always maintain the 1/32" gap except when purposefully overriding per Step 2 above.

! Overtightening of actuator above the 45 lbs. Maximum will not improve drive performance. It will only shorten the bearing life.

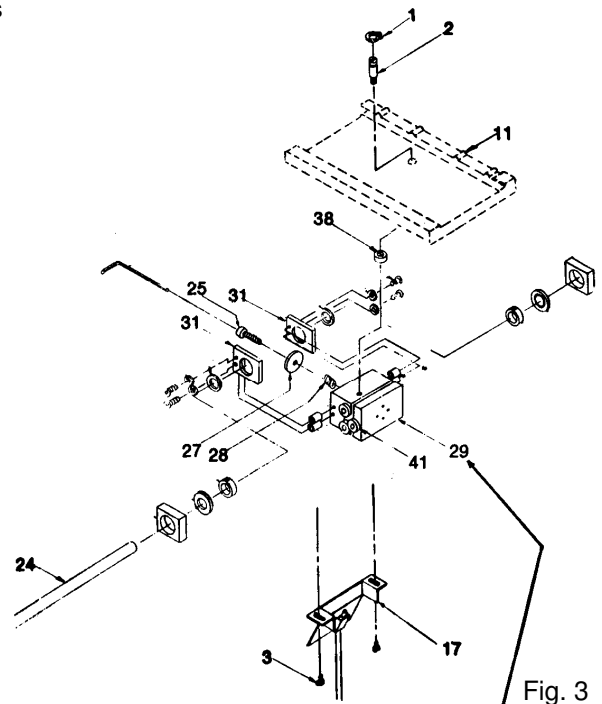


Fig. 3

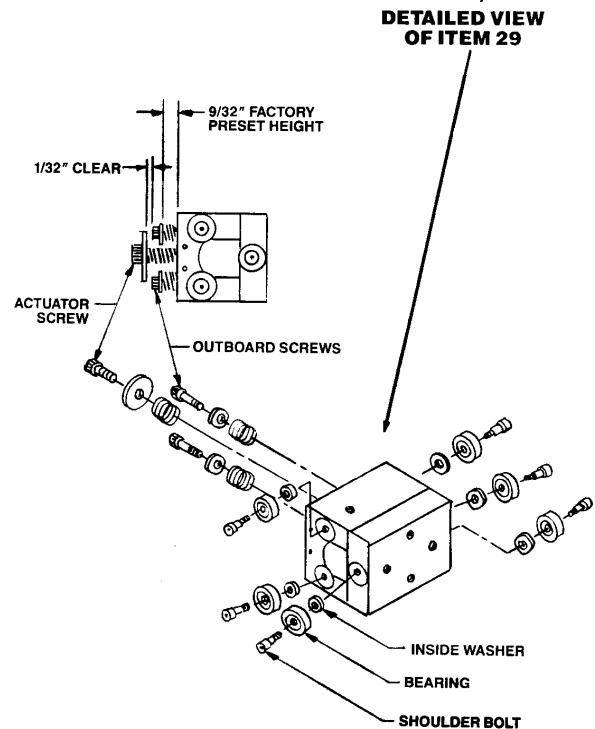


Fig. 4

ADJUSTMENT: CARRIAGE LINEAR BEARING ADJUSTMENT & REPLACEMENT

CARRIAGE LINEAR BEARING REPLACEMENT

STEP 1- Loosen & remove the limit switch bracket (item 17, fig. 3) and place it as the electrical lead will allow. Unplug the electrical lead from the motor and place it to one side.

On the 3096 model only, release *all* spring tension by removing the horizontal adjusting screw assembly. On the 3096 model only, remove the rubber boots from both sides of the carriage on the front shaft. (see fig. 5)

Remove pin driver (item 2, fig. 3) from linear actuator (item 29, fig. 3). Then remove the screws (item 33, fig. 6) from the front and rear carriage shafts. Then slide the carriage assembly to the right end of the carriage shafts (fig. 6) Lift the carriage assembly and carriage shafts (fig. 6), slide the carriage assembly to the right off first the rear carriage shaft and then off the front shaft. The shafts must be gripped by hand and pulled left while the carriage assembly is moved right. After removing the carriage assembly, lay it on its side on the floor.

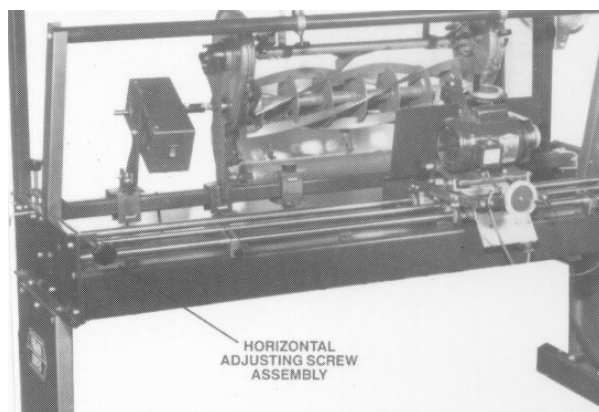


Fig. 5



The carriage assembly weighs approximately 40 lbs. Be prepared to handle the weight or get assistance in handling.

STEP 2- Remove the 3 linear bearing pillow blocks (item 12, fig. 6) and discard.

STEP 3- Insert the three new linear bearing pillow blocks (item 12, fig. 6). Adjust the tension screw on the side of each bearing block so when you radially rotate the pillow block around the carriage shaft there should be no free play between bearing (item 12, fig. 6) and carriage shaft (item 42, fig. 6). Repeat this adjustment to all three pillow blocks and then remove the pillow blocks from the carriage shaft.

NOTE: Tension is too tight if you feel a cogging action when you rotate pillow block around the shaft. This cogging is from the skidding of the bearing on the shaft and indicates tension screw is too tight. As a final check, sliding the bearing back and forth on the shaft should be a smooth uniform motion.

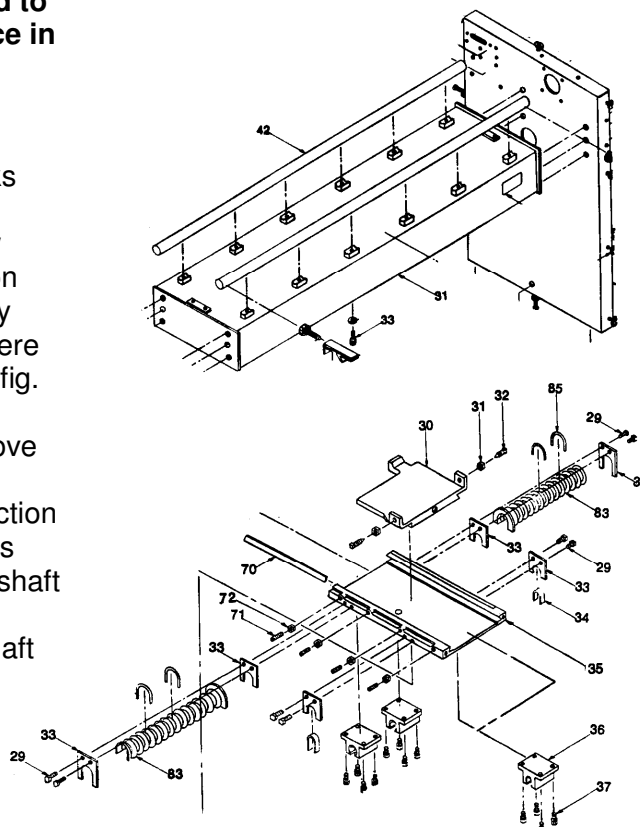


Fig. 6

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 a substantially shortened life and will damage the shaft

ADJUSTMENT: CARRIAGE LINEAR BEARING ADJUSTMENT & REPLACEMENT

STEP 4- Assemble the three linear bearing pillow blocks (item 12, fig. 6) loosely to carriage (item 11, fig. 6) with the tension adjustment screws pointing outward. Insert the previously cleaned carriage shaft (item 42, fig. 6) thru the front two linear bearing pillow blocks and align them to each other with a straight edge underneath the carriage and tighten down the socket head screws (item 13, fig. 6). Lift the carriage assembly back onto the main grinder base and solidly bolt down the front carriage shaft (item 42, fig. 6) with screws (item 33, fig. 6).

On the 3096 model only, attach a center screw into the carriage shaft loosely, then attach the horizontal adjusting springs to the carriage shaft and install and tighten the screws.

STEP 5- To set the distance between the front pillow blocks, already tight, and the rear pillow block, slide the rear carriage shafts thru the pillow block and position it into its "V" groove bosses. Tighten the 2 socket head screws (item 13, fig. 6) visible from the rear on pillow block (item 12, fig. 6). Raise rear carriage shaft and carriage, position the carriage between V-groove bosses on the main base (item 31, fig. 6) and tighten the other 2 socket head screws. Lower and bolt down the rear carriage shaft (item 42, fig. 6) solidly in the "V" groove bosses with screws (item 33, fig. 6). The bearing tension is correct when you try to lift the carriage and can feel no carriage movement, free play up and down. Also, when pulling the carriage in the traversing direction, there should be only approximately a 3 lb. force using a scale system similar to Step 8 of Linear Actuator Bearing Replacement. To double check the assembly, slide the carriage assembly from "end of travel" to "end of travel," it should have very uniform resistance through the full range of travel. When bearing tension is correct, reinstall linear actuator pin driver (item 2 fig. 5).

STEP 6- Reinstall the limit switch bracket and reconnect the electrical lead to the motor. On the 3096 model only, reinstall the rubber boots on the front shaft and reinstall the horizontal adjusting screw assembly (see fig. 5).

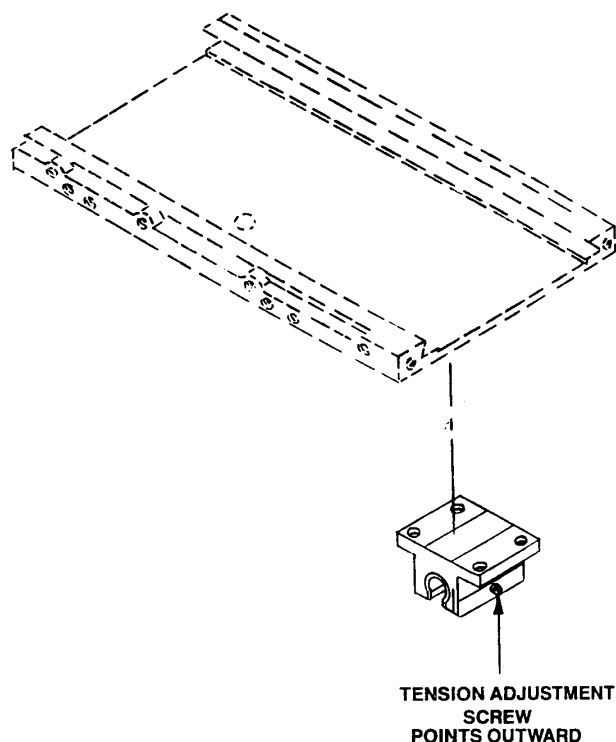


Fig. 7

ADJUSTMENTS

ALIGN FRONT RAIL & DRIVE SHAFT

The front rail and drive shaft need to be perfectly aligned ($\pm .010$). The adjustment is made by loosening the drive shaft support blocks and aligning the shaft to the front rail to within $\pm .010$. When alignment has been completed, tighten the drive shaft support blocks.

Also refer to the Troubleshooting section, Items J & K-

Problem- Reel ground in a concave, convex shape or irregular shape.

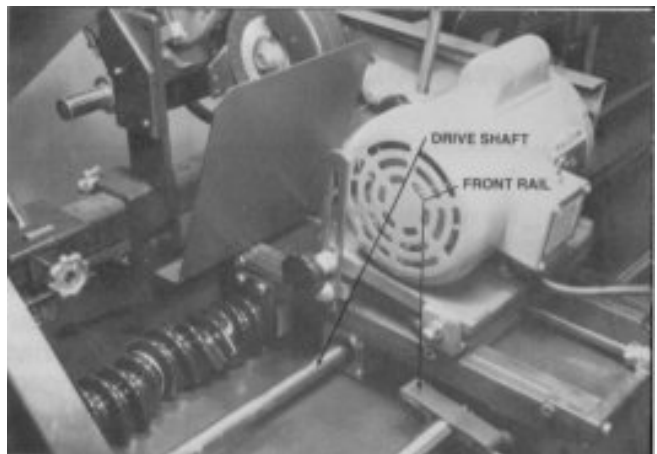
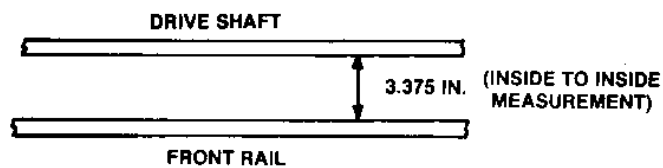


Fig. 8



GIB ADJUSTMENT

It is very important to have the gib adjustment tight, so as not to have any play while grinding.

Refer to the Troubleshooting section Item H-

Problem- Reel ground in a concave, convex shape or irregular shape.

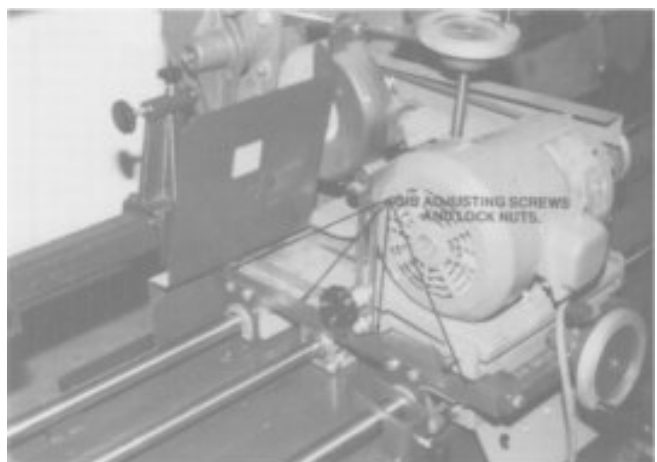


Fig. 9

ADJUSTMENTS

CONTROL BOARD SETTINGS- The control board adjusting knobs inside the control box should be set as follows:

Min. Speed (Minimum Speed)- Allows adjustment of the motor speed when the main speed knob is set at minimum. This permits the user to eliminate the “Dead Band” on the main speed control permitting zero calibration. Clockwise rotation of “MIN,” trim pot increases speed. This trim pot allows for adjustment of 30% of maximum speed.

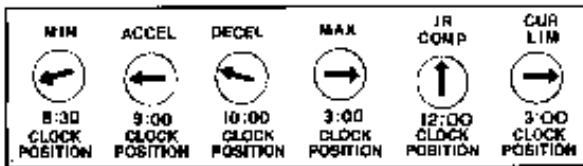
ACC. (Acceleration)- Allows adjustment of the motor acceleration form a minimum of .2 seconds to 10 seconds maximum.

DECEL. (Deceleration)- Permits adjustments of the motor deceleration from a minimum of 1 second to 10 seconds maximum.

MAX. SPEED (Maximum Speed)- Provides for adjustment of the motor speed when the main speed knob is set a maximum. This permits the user to eliminate the “Dead Band” on the main speed control to have full speed at maximum rotation. Rotation of “MAX,” trim pot in the clockwise direction increases maximum motor speed. The “MAX” trim pot allows for adjustment of 70% of base speed.

I.R. COMP (Speed Regulation)- This allows for adjustment of the circuitry that controls the speed regulation of the motor. The circuitry controls armature voltage by changing the armature voltage to compensate for increased or decreased motor loading. Clockwise rotation of “I.R. COMP” trim pot will increase compensation. 1) Set SPEED control pot at 50%. 2) Turn IR COMP pot CW until motor begins to hunt. 3) Turn IR COMP pot CCW until hunting stops. 4) Set IR Comp pot 1/3 of the span between where motor hunting stopped & fully CCW position.

CUR. LIM. (Current Limit)- Provides protection form excessive armature current by limiting the maximum torque the motor can deliver. Torque adjustment (CUR. LIM.) is preset at 125% of rated motor torque (Current) based on horsepower. Clockwise rotation of “CUR. LIM.” pot increases the torque (Current) the control will provide. This control is adjustable to 200% of rated motor torque.



THESE SETTINGS ARE PRESET AT FACTORY. MOVE ONLY AFTER CONSULTING WITH FACTORY.

NOTE: The only two settings that ever need to be adjusted are the acceleration dial and the IR comp dial. Consult factory before adjusting any of these dials.



The manufacturer recommends that the maximum speed be set no higher than shown for safety considerations.



Alteration of Current Limit could damage the motor.

LIMIT SWITCH ADJUSTMENT

When the switch (#20) is riding on the high side of the shaft (#17), it should be actuated by only .005 to .010". It is actuated when you hear a click inside.

With the actuator slide rod (.50 diameter) over the limit switch plunger, adjust the limit switch until you hear a click, then go .005/.010 farther for additional travel.

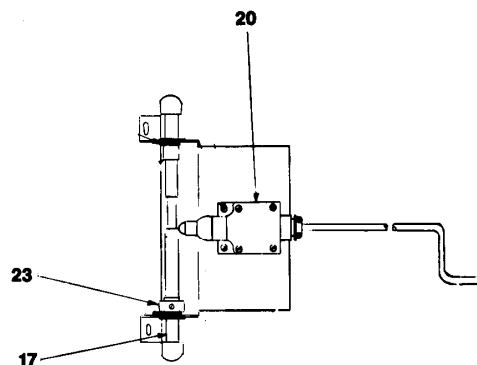
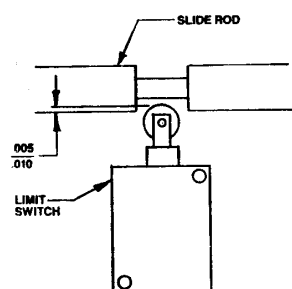
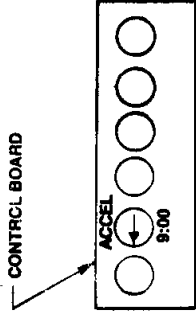
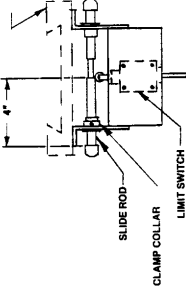
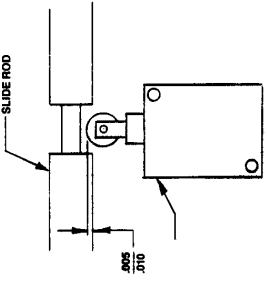
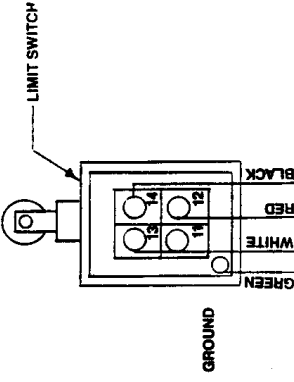
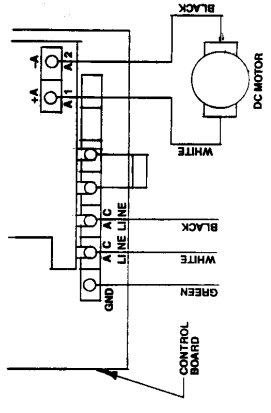


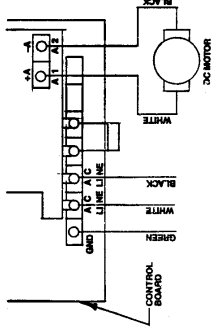
Fig. 11

<p>PROBLEM- Insufficient hesitation at carriage stops prior to reversing</p>	<p>POSSIBLE CAUSE- Acceleration pot inside control panel on the main control board set to low.</p>	<p>REMEDY- Remove the sheet metal front cover on the control panel. On the printed circuit board turn the dial marked "accel" clockwise to increase delay time. Adjust for a 1-second delay prior to reversing. (For more detail see the control board settings in the adjustment section of the manual.)</p>  <p>The diagram shows a rectangular control board with four circular components. The second component from the left is labeled 'ACCEL' and has a dial with a pointer pointing to '9:00'. An arrow points to this dial from the label 'CONTROL BOARD'.</p>	<p>REASON- Accel pot controls acceleration time and hesitation time before reversing.</p>
<p>PROBLEM- Carriage traverse will not reverse direction.</p>	<p>POSSIBLE CAUSE- A-Limit switch actuator slide is inserted wrong. (Only if the actuator slide rod was removed.)</p>	<p>REMEDY- The slide is not symmetrical and can be installed incorrectly. The actuator rod is to have the side with the 4" long x .50" diameter (from one end to center groove) side located on the right hand side when looking from operator position at the limit switch bracket for 3096. On the 3084 and 3055, the 4" long x .50 " diameter is to be mounted on the left hand side</p>  <p>The diagram shows a cross-section of a limit switch assembly. Labels include 'SLIDE ROD', 'CLAMP COLLAR', and 'LIMIT SWITCH'. A dimension of '4"' is shown for the length of the slide rod from one end to a center groove.</p>	<p>REASON- Installation positioning required for proper mechanical actuation of limit switch and wiring hookup. (DC motor to circuit board controls direction of reversing.) When slide rod is inserted wrong the traverse will only travel in one direction and will not reverse.</p>
<p>POSSIBLE CAUSE- B- Limit switch stays unactivated.</p>	<p>REMEDY- With the actuator slide rod (.50 diameter) over the limit switch plunger. Adjust the limit switch until you hear a click then go .005/.010 farther for additional travel. (For more detail see limit switch in the adjustment section of the manual.)</p>  <p>The diagram shows a side view of the limit switch adjustment. A 'SLIDE ROD' is shown passing over a plunger. An arrow points to the gap between the plunger and the slide rod, labeled with the dimension '.005/.010'.</p>	<p>REASON- The limit switch slide rod is improperly adjusted and does not actuate the limit switch to reverse the traverse direction. The .005/.010 plunger over travel permits actuation.</p>	

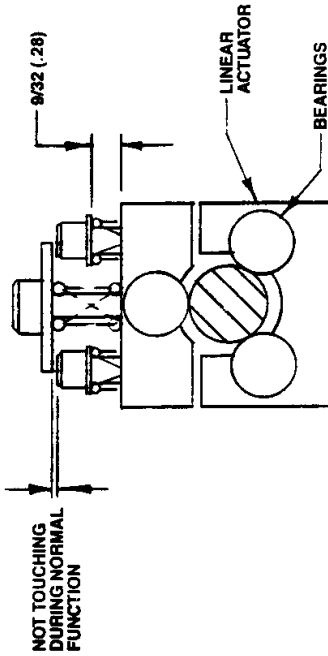
TROUBLESHOOTING: Electrical controls, wiring, linear actuator, carriage system and DC drive system.

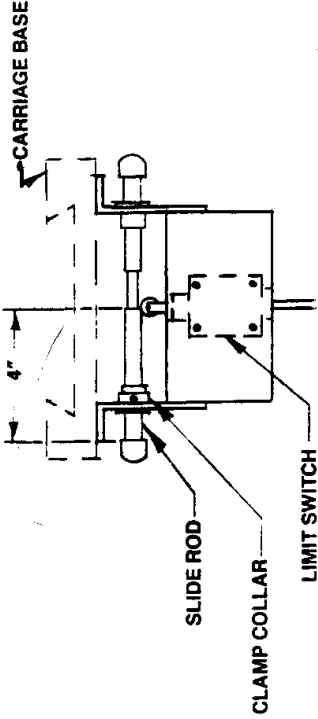
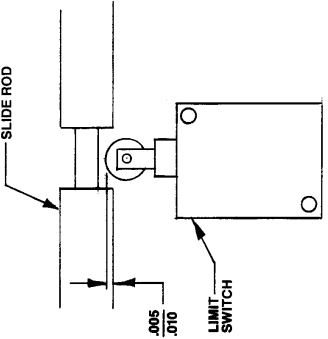
<p>PROBLEM- Carriage traverse will not reverse direction.</p>	<p>POSSIBLE CAUSE- C- Limit switch plunger is jammed.</p>	<p>REMEDY- Loosen the limit switch and free up the plunger manually, then with the actuator slide rod large .50" diameter over the limit switch plunger, adjust eh limit switch until you hear a click, then go 005/.010 farther for additional travel. (For more information see limit switch in the adjustment section of the manual.)</p>	<p>REASON- The limit switch has moved, causing the actuator plunger to be jammed in retracted position only. This causes only one way actuation so the traverse will not reverse direction.</p>
<p>PROBLEM- Carriage traverse will not reverse direction.</p>	<p>POSSIBLE CAUSE- D- Limit switch is bad.</p>	<p>REMEDY- Check continuity of the limit switch by unplugging limit switch from the main box outlet. Next, remove limit switch wires from the main circuit board. Use ohm meter for this step. First, measure continuity between the red and white (common) wire and check to see if make (switch closed) has continuity and break (switch open) has no continuity when actuation the limit switch. Second, measure continuity between the black wire to white (common) wire and check to see if make (switch closed) has continuity and break (switch open) has no continuity when actuating the limit switch. If not, replace switch. using ohm meter an open circuit (switch open) reads "0" ohms-closed circuit (switch closed) ohms reads full scale.</p>	<p>REASON- When one set of contacts are bad, the carriage will not reverse, allowing it to go in the opposite direction.</p> 
<p>PROBLEM- Carriage traverse will not reverse direction.</p>	<p>POSSIBLE CAUSE- E- The reversing control board is bad.</p>	<p>REMEDY- First, check limit switch operation (shown in Step D) before this step. With limit switch activated on large .50" slide diameter, first check 90 volts to DC motor at circuit board from +A or (A1) terminal to -A or (A2) terminal with a voltmeter. NOTE: The voltage meter connection leads to terminal +A & -A will have to be switched when going from the high side (large diameter) of slide rod (switch activated) to groove side (small diameter of slide rod) (switch inactivated) to get a voltage reading to the DC motor because DC voltage changes polarity to reverse motor directions. Second, with limit switch in the groove location (switch Inactivated) check for 90 volts to DC motor at circuit board from +A or (A1) terminal to -A or (A2) terminal with a voltmeter. If not, replace board. The voltage varies with speed</p>	<p>REASON- To check the circuit board is working to drive motor in both directions.</p> 

TROUBLESHOOTING: Electrical controls, wiring, linear actuator, carriage system and DC drive system.

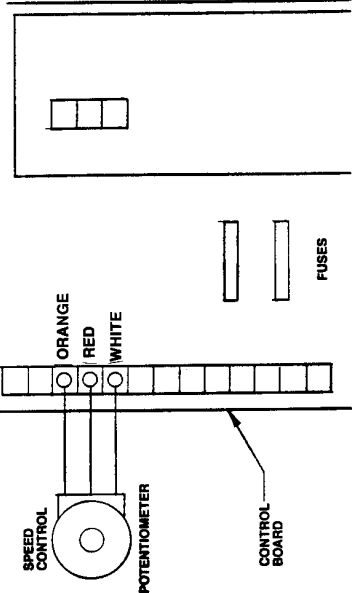
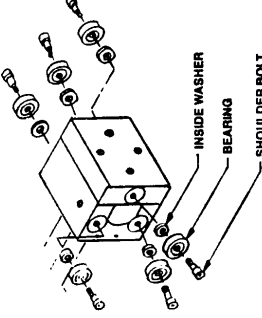
<p>PROBLEM- DC traverse motor does not work. .</p>	<p>POSSIBLE CAUSE- A- No voltage going to motor.</p>	<p>REMEDY- Check for 90 volt DC at the circuit board leads going to the motor. Across terminal +A or (A1) and -A or (A2), check reading with a voltage meter. When there is voltage from the circuit board but DC motor does not run, check wiring and plug connection. When there is voltage form circuit board, remove the brush holder caps and crushes from the motor. The voltage varies with speed pot setting.</p>	<p>REASON- This checks to see that voltage is getting from circuit board only. Check the voltage across the two brush holders. This is to assure voltage is all the way to DC motor. (Note: Brushes are long life and very seldom need replacement.)</p> 
<p>POSSIBLE CAUSE- B- Brushes in motor may be worn out.</p>	<p>REMEDY- Remove the brushes one at a time and maintain orientation for reinsertion. See if brush is worn short 3/8 (.375) minimum length, and look at wear pattern on commutator for arcing. Replace brush if necessary.</p>	<p>REASON- A short brush does not make an adequate electrical connection to run the electrical motor.</p>	<p>REASON- Extremely heavy grinding cuts cause excessive loading of the motor.</p>
<p>POSSIBLE CAUSE- C- Blown fuse.</p>	<p>REMEDY- Replace the fuse and decrease stock removal rate.</p>	<p>REASON- Worn and binding actuators causes heavy loading to motor.</p>	<p>REASON- Grinding grit over a period of time does get into the linear bearings and causes excessive drive torque of carriage.</p>
<p>REMEDY- Replace actuator bearings if they are worn and do not rotate freely. (For more detail see actuator maintenance in the adjustment section of the manual.)</p> <p>Replace the linear bearings in the main carriage. Carriage should traverse freely with a 3 lb. Maximum loading. Also check for excessive bearing preload. (For more detail see carriage bearing replacement in the adjustment section of the manual.)</p>			

TROUBLESHOOTING: Electrical controls, wiring, linear actuator, carriage system and DC drive system.

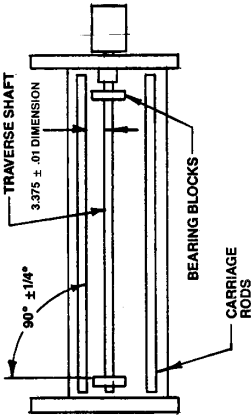
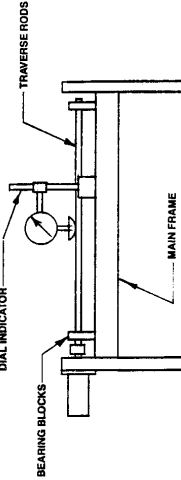
<p>PROBLEM- Carriage traversing (varies speed) while grinding.</p>	<p>POSSIBLE CAUSE- A- Oil on carriage drive shaft..</p>	<p>REMEDY- Wipe oil completely from shaft.</p>	<p>REASON- Driving torque is lost because the oil decreasing friction for driving linear actuator.</p>
<p>PROBLEM- Carriage traverse will not reverse direction.</p>	<p>POSSIBLE CAUSE- B- Linear actuator does not have sufficient tension to shaft.</p>	<p>REMEDY-</p> <ol style="list-style-type: none"> 1. Release linear actuator override screw to permit full driving torque. 2. Increase spring pressure on linear actuator if below factory minimum of 15 lbs. Target tension is 30 lbs. (For more detail see linear actuator bearing replacement in the adjustment section of the manual). 	<p>REASON- Sufficient spring tension on linear actuator bearings is required for driving of the carriage.</p>
<p>POSSIBLE CAUSE- C- Linear actuator bearings have developed flat spots.</p>	<p>REMEDY- When the linear actuator spring pressure is set too high, you can flat spot the actuator bearings. Back off the spring tension to manual specifications. Factory preset range is 15-45 lbs. Pull. Target tension is 30 lbs. Replace all bearings. (For more detail see bearing replacement in adjustment section of the manual.)</p>	<p>REASON- Too high a spring pressure in linear actuator causes excessive bearing loading. This causes bearings to be overloaded and not rotate freely under a grinding load. Bearings then skid and create flat spots.</p>	<p>REASON- Too high a spring pressure in linear actuator causes excessive bearing loading. This causes bearings to be overloaded and not rotate freely under a grinding load. Bearings then skid and create flat spots.</p>
<p>POSSIBLE CAUSE- D- Linear bearings in carriage do not rotate freely.</p>	<p>REMEDY- Replace the linear bearings in the main carriage. (For more detail, see linear bearing replacement in the adjustment section of the manual.)</p>	<p>REASON- Grinding grit over a period of time does get into the linear bearings and causes excessive drive torque of carriage. Abrasive noise is detectable when excessive grit is in the linear bearings.</p>	<p>REASON- Grinding grit over a period of time does get into the linear bearings and causes excessive drive torque of carriage. Abrasive noise is detectable when excessive grit is in the linear bearings.</p>

<p>PROBLEM- Carriage has erratic reversing of direction during grinding operation.</p>		<p>REMEDY- Adjust set screw located in locking collar to squeeze to bronze bearing tighter against the limit switch slide rod.</p> 	<p>REASON- The clamp collar over the bronze bearing controls tension in limit switch slide rod to maintain position during grinding. NOTE: At slow traverse speeds shaft tension is more critical.</p>
<p>POSSIBLE CAUSE- A. Limit switch slide rod moves too freely.</p>		<p>REMEDY- Remove oil or grease.</p>	<p>REASON- Excess oil or grease reduces tension drag on slide rod and rod moves freely causing limit switch to change position reversing direction.</p>
<p>POSSIBLE CAUSE- B- Oiled or greased limit switch.</p>		<p>REMEDY- With the actuator slide rod large .50 diameter over the limit switch plunger. Adjust limit switch until you hear a click, then go .005/.010 farther for additional travel. (For more detail, see limit switch in the adjustment section of the manual.) Turn speed pot to traverse at at faster speed setting.</p> 	<p>REASON- When the limit switch plunger roller has too much travel before actuating, the plunger roller does not fully leave the groove. When traversing is at low speed the plunger roller does get fully out of the groove and onto the .50 diameter when actuated. When roller is not completely out of the groove, the spring pressure of roller plunger can cause the slide rod to move and disengage limit switch causing carriage to travel in the opposite direction.</p>
<p>POSSIBLE CAUSE- C- Limit switch does not stay engaged on the .50 diameter of the slide rod.</p>			

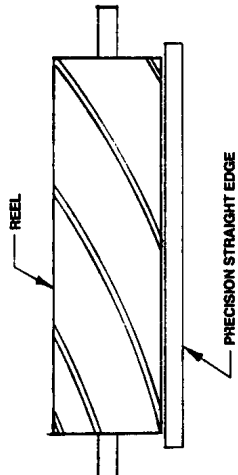
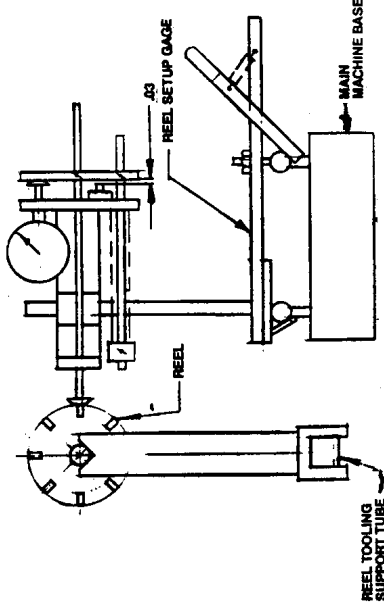
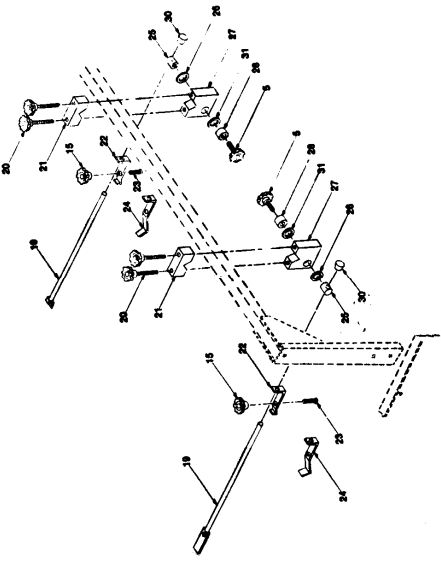
TROUBLESHOOTING: Electrical controls, wiring, linear actuator, carriage system and DC drive system.

<p>PROBLEM- Traverse speed control goes at one speed only.</p>	<p>POSSIBLE CAUSE- A- Wiring hookup to potentiometer is improper. (If components have been replaced.)</p>	<p>REMEDY- Check potentiometer wiring for proper hookup. See that speed pot is wired per electrical diagram. (See manual or exploded view section.)</p> 	<p>REASON- Wrong wire hookup effects traverse control. Reversing red and orange wires to potentiometer the DC motor will run at zero speed but maximum will be too slow. Reversing red and white wires does not affect speed control.</p>
<p>PROBLEM- Traverse speed too slow</p>	<p>POSSIBLE CAUSE- A- Linear bearings in the carriage are set too tight.</p>	<p>REMEDY- Readjust bearings for proper tension. (For more detail see linear bearing replacement in the adjustment section of the manual.)</p> 	<p>REASON- When bearing preload is too tight, it causes excessive loading to drive the carriage. When linear actuator is disengaged, the proper traverse load 2 to 3 lb. Use a tension scale to check.</p>
<p>POSSIBLE CAUSE- B- Defective speed control potentiometer.</p>	<p>REMEDY- Replace potentiometer (first test), set dial to maximum speed, and using ohm meter set at 100 scale. Red to white wires needs 100 ohms. Red to orange wires needs 70 ohms. Set dial at minimum speed setting. Orange to red wires needs 100 ohms. Red to white wires needs 70 ohms.</p>	<p>REASON- Wiper inside of potentiometer controls speed. Wiper may be bad and not making contact.</p>	<p>REASON- Minimum and maximum pot settings effect traverse speed.</p>
<p>POSSIBLE CAUSE- C- Main circuit board dial pot settings not correct. (If board has been re-placed.)</p>	<p>REMEDY- Check all pot settings on circuit board as shown in wiring diagram. (See manual or diagram #3967315.)</p>	<p>REASON- When bearing preload is too tight, it causes excessive loading to drive the carriage. When linear actuator is disengaged, the proper traverse load 2 to 3 lb. Use a tension scale to check.</p>	<p>REASON- Minimum and maximum pot settings effect traverse speed.</p>

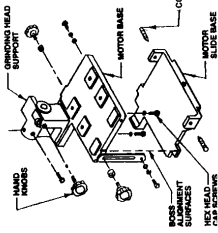
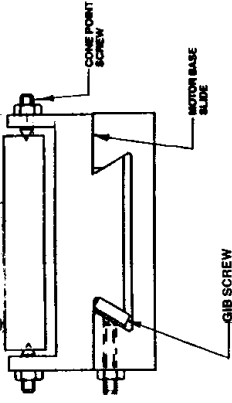
TROUBLESHOOTING: Electrical controls, wiring, linear actuator, carriage system and DC drive system.

<p>PROBLEM- Traverse speed is too slow.</p>	<p>POSSIBLE CAUSE- B- Actuator springs set too tight.</p>	<p>REMEDY- Check to see if actuator bearings have been overloaded causing the bearings to not rotate freely. (For more detail, see actuator setting in the adjustment section of the manual.)</p>	<p>REASON- When actuator spring tension is excessive bearings will not rotate freely causing carriage to not run freely.</p>
<p>PROBLEM- Actuator drive shaft whipping excessively at high traverse speed.</p>	<p>POSSIBLE CAUSE- A-Bearing shaft support blocks are not perpendicular to carriage shaft.</p>	<p>REMEDY- Loosen the screws that retain the shaft support blocks on each end of the actuator shaft. Use a square to align them 90° as shown and holding the 3.375 dimension. (For more detail, see alignment from rail and drive shaft in the adjustments section in the manual.)</p> 	<p>REASON- Misalignment of shaft support blocks to carriage traverse rod causes a bow in the rod. This bow will cause an out of balance which in turn will cause it to whip at high traverse speeds.</p>
	<p>POSSIBLE CAUSE- B- Drive shaft is bent</p>	<p>REMEDY- Turn the actuator screw clockwise 1/4-1/2 turn to release actuator from the drive shaft. Slide the carriage to one end of the machine. Mount indicator in the middle of the two bearing support blocks. Check for a maximum .015 indicator reading when you rotate the shaft. Replace shaft if required. NOTE: Item A above must be done prior to this step.</p> 	<p>REASON- Excessive bend in the shaft will cause the shaft to whip at high traverse speeds.</p>
<p>PROBLEM- Buzzing or clicking sound inside of electrical enclosure— When machine is turned on or when carriage reverses direction.</p>	<p>POSSIBLE CAUSE- A-Worn electrical solenoid contacts. B- Low voltage to the control board.</p>	<p>REMEDY- Solenoid contacts are bad and do not maintain contact. Replace circuit board. REMEDY- Too long of a wire lead running into the machine. Use 12 gage wire for less voltage drop. Check voltage for minimum 105 volts of input between the two incoming lines.</p>	<p>REASON- When solenoids do not maintain contact, the DC motor will not run smoothly. REASON- With supply voltage below 105 volts the solenoids may not maintain contact. NOTE: This is a very infrequent electrical problem.</p>

TROUBLESHOOTING: STRAIGHTNESS OF GROUND REEL

<p>PROBLEM- Reel ground in a concave, convex shape or irregular shape. There are two methods of checking reel outside diameter straightness. One method is by using a precision straight edge and the second method is using the reel setup gauge.</p> <ol style="list-style-type: none"> 1. Inspect the reel by using a precision straight edge to check straightness (use a .002 maximum shim). Use a .002 shim stock and check full length between straight edge and reel. 2. Inspect the reel by using the setup gauge while mower unit is in the spin grinder (see reel setup gauge instructions in operating instruction section.) 	<p>POSSIBLE CAUSE- A. Too heavy a grind on the final grinding pass.</p>	<p>REMEDY- Infeed the grinding head for only approximately .002 stock removal in final two passes and let the grinding wheel spark out. For sparking out in grinding process always traverse grinding head 20 passes with no grinding head infeed. Set traverse at slow speed on dial setting approximately 4 to 8 feet per minute range for final grinding sparkout. NOTE: This process refers to sparkout, but what we are looking for is a near spark out, approximately a 99% reduction in grinding spark from normal grind. Do not run sparkout until you have no sparks because this could be an extremely extended period.</p>	<p>REASON- For close tolerance in roundness the sparking out process is critical on final grinding of a reel.</p>
<p>POSSIBLE CAUSE- B- Overhead clamps and fixture clamps not holding mower unit tight.</p>			<p>REASON- To eliminate reel movement during grinding.</p>
<p>REMEDY- With the Tighten down eight locking hand knobs. Four hand knobs for the square tube top and bottom clamps, and two knobs for the mower holding swivel. Check alignment of overhead clamp so there is no binding before locking down of hand knobs. Use allen wrench for increased tightness of hand knobs.</p>	<p>POSSIBLE CAUSE- B- Overhead clamps and fixture clamps not holding mower unit tight.</p>		<p>REMEDY- With the Tighten down eight locking hand knobs. Four hand knobs for the square tube top and bottom clamps, and two knobs for the mower holding swivel. Check alignment of overhead clamp so there is no binding before locking down of hand knobs. Use allen wrench for increased tightness of hand knobs.</p>

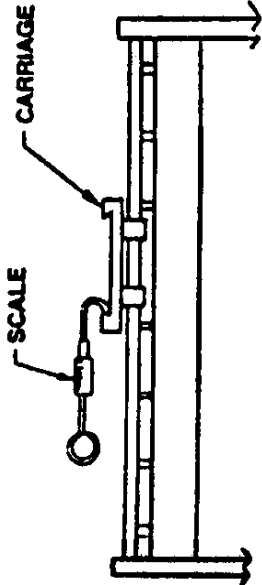
TROUBLESHOOTING: STRAIGHTNESS OF GROUND REEL

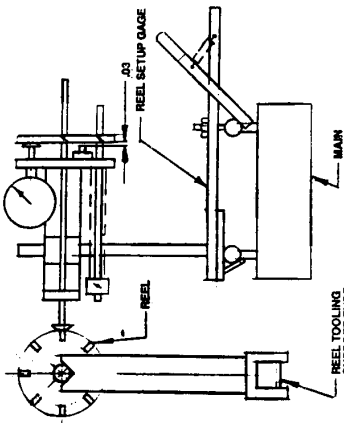
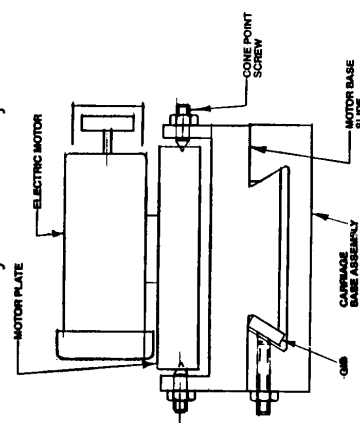
<p>POSSIBLE CAUSE- C. Square tubing tooling bar for fixture holding is not rigid.</p>	<p>REMEDY- Check the two angle brackets at (pivoting) stationary end of the tooling bar. Tighten the long bolt to eliminate bracket to tubing clearance. On adjustable end, tighten slide end locking handles one for vertical and one for horizontal locking.</p>	<p>REASON- To eliminate reel movement during grinding.</p>
<p>PROBLEM- Reel ground in a concave, convex shape or irregular shape.</p> <p>POSSIBLE CAUSE- D- Grinding wheel head moving.</p>	<p>REMEDY- Tighten up head mounting bolts and two locking screws that holds the head in a vertical locked position, torque screw to 19 ft. lbs. Align the motor plate to motor base slide by adjusting the cone screws to shift plate to either side. Bosses are to be in line for adjusting arm locks. Cones must be tight and jam nuts fully locked. There are three hand knobs to tighten. Two on the base for the adjusting arm locks and one for grinding wheel vertical height adjustment locking screw.</p>	<p>REASON- To prevent grinding head from moving or pivoting during grinding. When motor base and slide base, mounting surface are not aligned to each other, the two adjusting arm locks will not hold the motor base rigid.</p> 
<p>POSSIBLE CAUSE- E- Gibs loose on carriage.</p>	<p>REMEDY- Tighten gib screws to prevent movement. Crank the motor slide base forward and adjust the gib screws. Then crank the motor slide base all the way back to adjust the final gib screws.</p>	<p>REASON- To prevent grinding head from moving during grinding.</p> 
<p>POSSIBLE CAUSE- F- Carriage linear bearings loose to carriage rod shafts or pillow blocks loose.</p>	<p>REMEDY- Tighten pillow block socket head cap screws first. Adjust pillow block bearings to carriage rod shafts. (For more detail, see setting of pillow block bearings in the adjustment section of the manual.)</p>	<p>REASON- To prevent grinding head from moving during grinding.</p>

TROUBLESHOOTING: STRAIGHTNESS OF GROUND REEL

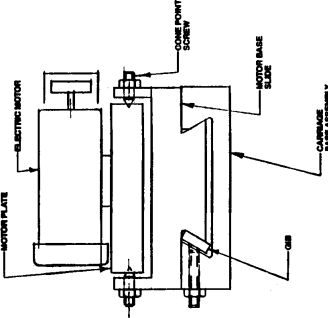
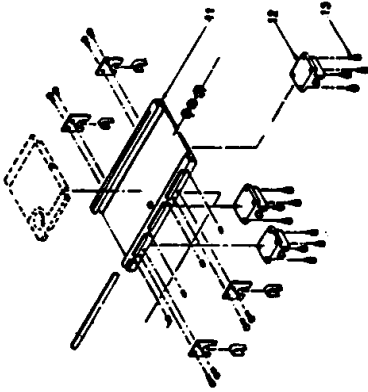
	<p>POSSIBLE CAUSE- G- Tooling bar support brackets are loose.</p>	<p>REMEDY- All reels have "V" supports of center brackets. Be sure they are tight to the square tooling support tube in horizontal and vertical plane. Tighten the horizontal locking screws first firmly pull over to the side of the tooling support tube. Then tighten the vertical locking handle to pull down the supports to the top of the tooling support tube. Last, retighten the vertical locking hand knob.</p> <p>When using center supports, check to see if the fixed center is screwed in tight. The adjustable center is screwed in tight. The adjustable center is to locked tight.</p> <p>Any clamps used ar to have tension on the locking surface.</p>	<p>REASON- When the supports are not held tight to the square tube, the reel can move during grinding.</p> <p>Loose centers effect grinding accuracy.</p> <p>Clamps must be tight to prevent movement during grinding.</p>
<p>PROBLEM- Reel ground in a concave, convex shape or irregular shape.</p>	<p>POSSIBLE CAUSE- H-Pivot screws from motor base to motor slide base are loose.</p>	<p>REMEDY- Tighten the cone shaped screw to prevent movement . Lock nuts are retightened to maintain screw position. Recheck motor plates to motor base slide alignment as shown in step D.</p>	<p>REASON- To prevent grinding head from moving during grinding.</p>

TROUBLESHOOTING: STRAIGHTNESS OF GROUND REEL

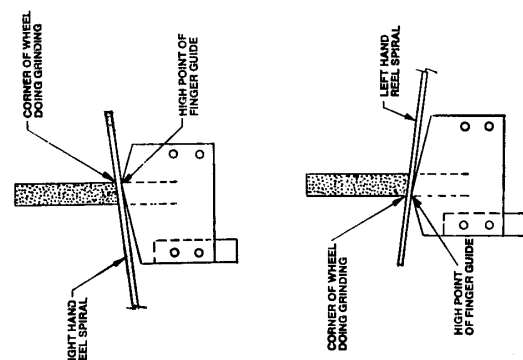
<p>POSSIBLE CAUSE- I- Carriage has varying load in either direction from grinding grit buildup inside of linear bearings.</p>	<p>REMEDY- With linear actuator released from the carriage, check for a 2 to 3 lb. Traversing load in both directions.</p> <p>When there is a varying load or excessive noisy bearings have linear bearings replaced. (For more detail see replace carriage linear bearing in the adjustment section.)</p>  <p>The diagram shows a side view of a carriage assembly. A circular scale is attached to the left side of the carriage. The carriage itself is a rectangular frame with a central shaft. Labels 'SCALE' and 'CARRIAGE' point to their respective parts. Arrows at the bottom indicate the direction of movement.</p>	<p>REASON- With grit buildup uneven loading to linear bearings can effect the straightness of grinding.</p> <p>Linear bearings need replacement caused from excessive grinding grit buildup. Grinding grit buildup in the linear bearings can cause uneven carriage movement. With enough grit buildup over a period of time, bearings may be noisy.</p>
<p>POSSIBLE CAUSE- J-Rails not straight. Check rail towards the reel side for straightness in the horizontal plane.</p>	<p>REMEDY- Use a three foot long precision straight edge, and using a feeler gage, check for a maximum of .002 in straightness at the front edge of the front rail. (Consult factory.)</p>	<p>REASON- Rail straightness directly effects grind straightness of outside diameter of the reel in the horizontal plane.</p>
<p>POSSIBLE CAUSE- K- Rails not straight vertical plane straightness of rails.</p>	<p>REMEDY- Use three foot long precision straight edge, and using a feeler gage, check for a maximum of .003 in straightness at the top edge of the front rail. (Consult factory.)</p>	<p>REASON- This plane is not critical for reel grinding accuracy, but still must be held to tolerance listed to hold grind straightness of outside diameter of the reel.</p>

<p>PROBLEM- Roundness of reel varies: Reel blades are high or low. (Use setup gage to check roundness; see setup gage instructions in manual.) The high and low indicator readings on the reel outside diameter should not vary over .001.</p>	<p>POSSIBLE CAUSE- Did not spark out properly on final grinding pass.</p>	<p>REMEDY- Infeed only approximately .002 (approximately 7° rotation of infeed handle) in final pass and let the grinding wheel spark-out. For sparking out in grinding process, always traverse grinding head 20 passes with no grinding head infeed. Set traverse at slow speed on dial setting approximately 4 to 8 feet per minute range for final grind range for final grinding sparkout. NOTE: This process refer to sparkout, but what we are looking for is a near sparkout, approximately a 99% reduction in grinding spark from normal grind. Do not run sparkout until you have no sparks because this could be an extremely extended period.</p> 	<p>REASON- For close tolerance in roundness the sparking out process is critical on final grinding of a reel. NOTE: For other troubleshooting see B thru K in section: Problem—Reel ground in a concave, convex or irregular shape.</p>
<p>PROBLEM- Grinding stock removal from reel irregular when reversing directions to grind.</p>	<p>POSSIBLE CAUSE- A-Gibs loose on carriage.</p>	<p>REMEDY- Tighten gib screws to prevent movement. Crank the motor slide base forward and adjust the gib screws. Then crank the motor slide base all the way back to adjust the final gib screws.</p> 	<p>REASON- To prevent grinding head from moving during grinding.</p>

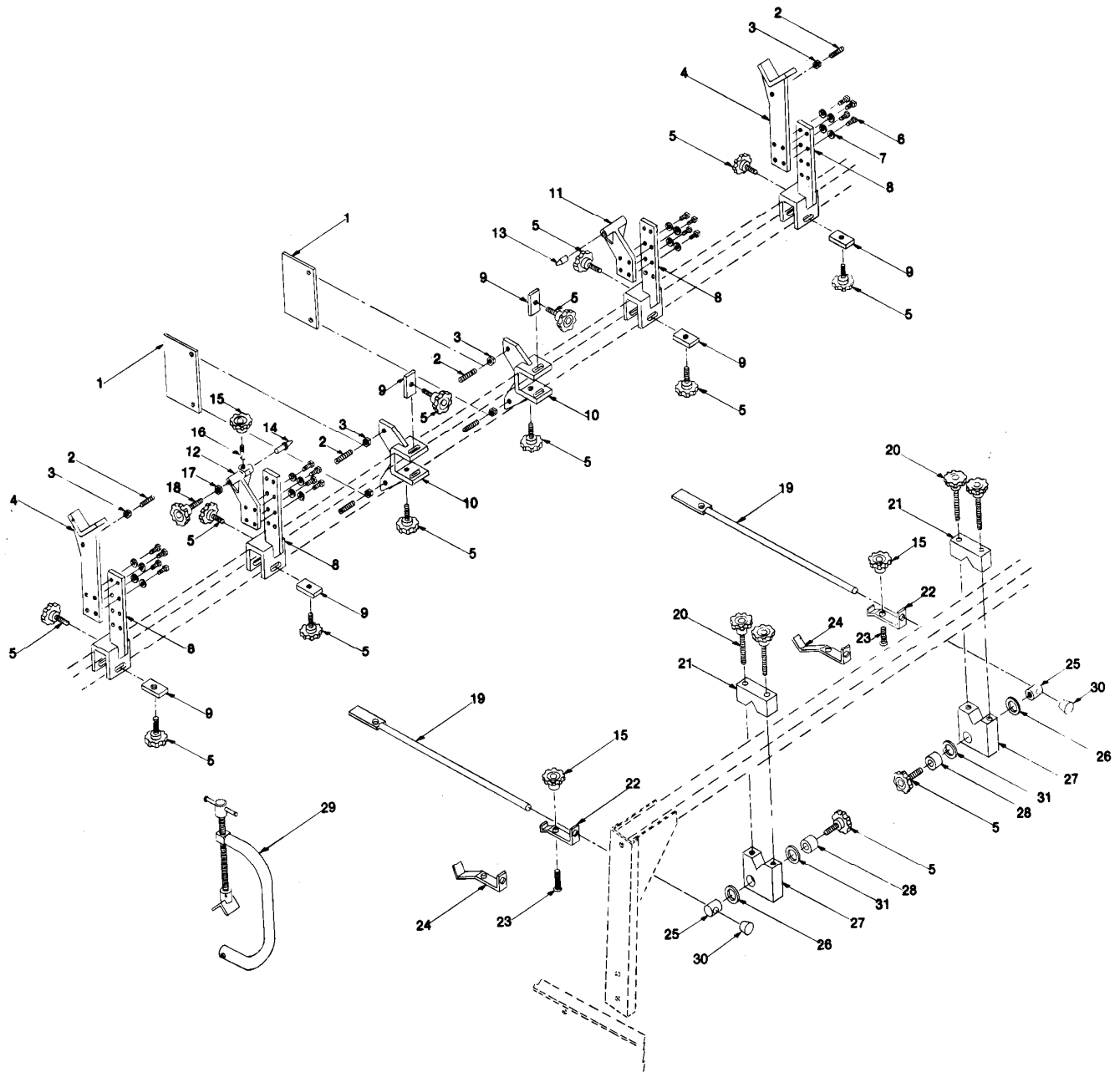
TROUBLESHOOTING: STRAIGHTNESS OF GROUND REEL

	<p>POSSIBLE CAUSE- B- Grinding wheel head moving.</p>	<p>REMEDY- Tighten up head mounting bolts and two locking screws that holds the head in a vertical locked position, torque screw to 19 ft. lbs.</p> <p>Align the motor plate to motor base slide by adjusting the cone screws to shift plate to either side. Bosses are to be in line for adjusting arm locks. Cones must be tight and jam nuts locked. There are three hand knobs to tighten. Tow on the base for the adjusting arm locks an one for grinding wheel vertical height adjustment locking screw.</p> 	<p>REASON- To prevent grinding head from moving or pivoting during grinding.</p> <p>When motor base and slide base mounting surface are not aligned to each other, the two adjusting arm locks will not hold the motor base rigid.</p>
<p>PROBLEM- Grinding stock removal from reel irregular when reversing directions of grind.</p>	<p>POSSIBLE CAUSE- C-Carriage has varying load in either direction from grinding grit buildup inside of linear bearings.</p>	<p>REMEDY- With linear actuator released from the carriage, check for a 2 to 3 lb. Traversing load in both directions. When there is a varying load or excessive noisy bearings, have linear bearings replaced. (For more detail see replace carriage linear bearings itne the adjustment section.)</p> 	<p>REASON- With grit buildup uneven loading to linear bearings can effect the straightness of grinding.</p> <p>Linear bearings need replacement caused from excessive grinding grit buildup in the linear bearings can cause uneven carriage movement. With enough grit buildup over a period of time, bearings may be noisy.</p>

TROUBLESHOOTING: STRAIGHTNESS OF GROUND REEL

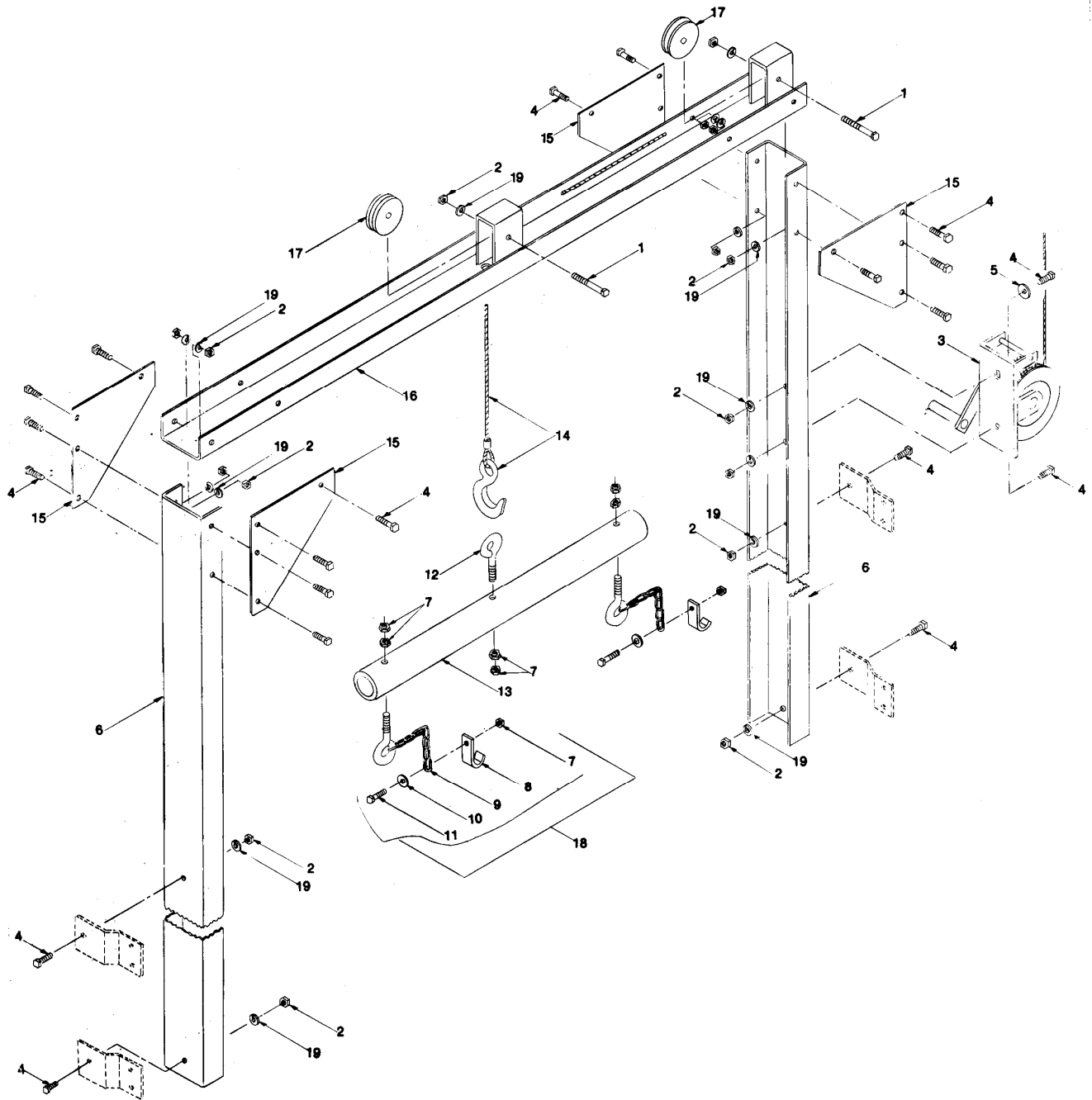
<p>PROBLEM- Too heavy a burr on cutting edge of reel blades.</p>	<p>POSSIBLE CAUSE- Too heavy a grind on final grinding pass.</p>	<p>REMEDY- Make two infeeds of .002 (approximately 7° turn of grinding head handwheel) each for grinding, then let the grinder spark out. For sparking out in grinding always traverse grinding head with no infeed for final 20 passes. Use a hardwood board or a deburring tool if desired for complete burr removal. NOTE: This process refers to sparkout, but what we are looking for is a near sparkout, approximately a 99% reduction in grinding spark from normal grind. Do not run sparkout until you have no sparks because this could be an extremely extended period.</p>	<p>REASON- Light grinds in final passes create less of a burr and would remove some of previous burrs from heavy grind passes.</p>
<p>PROBLEM- Cone shape of reel.</p>	<p>POSSIBLE CAUSE- Reel position not parallel to carriage travel.</p>	<p>REMEDY- Use reel setup gage procedure touching off on reel hub to zero out the reel position from each end. (For more information, see reel setup gage procedure in manual.)</p>	<p>REASON- Reel hub has to be parallel to carriage traverse rails so reel is not cone shaped.</p>
<p>PROBLEM- Relief grind on the reel blades do not go full length.</p>	<p>POSSIBLE CAUSE- Large finger guide is mounted on backwards.</p>	<p>REMEDY- Mount the large finger guide so that the corner of wheel ding the grinding and the high point of finger guides are in the same location. (See relief grinding section in operating instructions in the manual for more information.)</p> <div style="text-align: center;">  </div>	<p>REASON- The relief will be ground full length on the reel at the one end but on the opposite end it will drop off too soon and leave a band 3/4" (.75) long. Note: 3/4" is the same width as the grinding wheel.</p>

EXPLODED VIEW: MODEL 3096 EXPLODED VIEW NO. 4



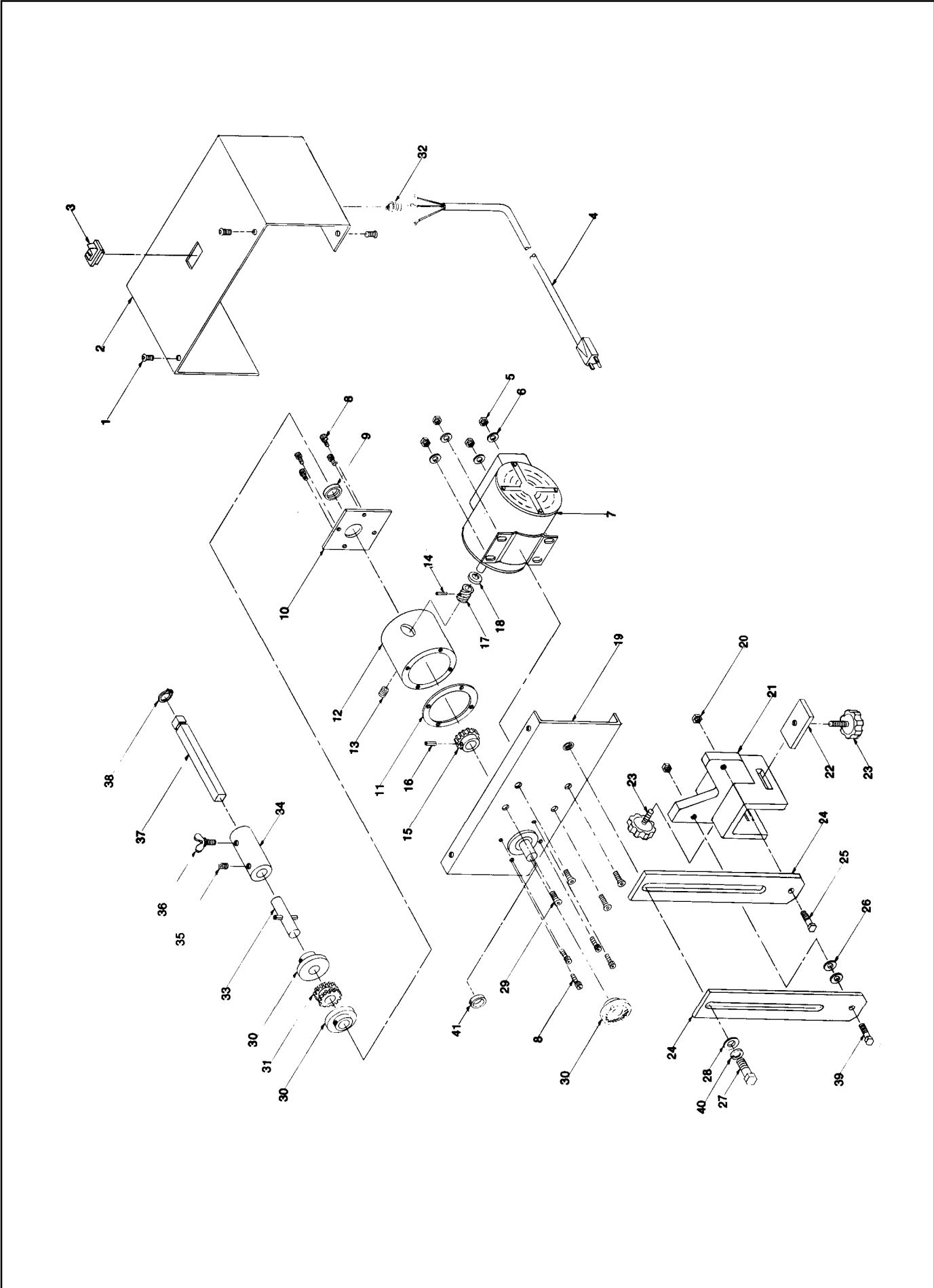
Dia No	Part No.	Description	Dia No	Part No.	Description
1	3969163	Roller Spacer Plate	17	J372000	Hex Jam Nut 3/8-16 NC
2	C374820	Socket Set Screw 3/8-16 NC x 3" Long	18	3969552	Knob Assembly
3	J377000	Hex Locknut Nylok 3/8-16 NC	19	3969547	Mower Clamp
4	3969011	Reel Hub Support Top	20	3969552	Knob Assembly
5	3969555	Knob Assembly	21	3969094	Top Clamp
6	B311601	Hex Cap Screw 5/16-18 NC x 1" Long	22	3649078	Clamp Lip
7	R000470	Lockwasher 5/16 Split	23	A313202	Rd Hd Machine Screw 5/16-18 NC x 2"
8	3969009	Reel Hub Support Bottom	24	3969162	Camp Lip
9	3889066	Center Stand Lock	25	3969096	Clamp Bar
10	3969017	Mower Support	26	3709808	Washer 1-1/2 OD x 1" ID
11	3889130	Center Stand	27	3969095	Bottom Clamp
12	3969161	Adjustable Center Stand	28	3109026	Spacer
13	3649040	Center	29	3969501	C-Clamp Assembly (2) Required
14	3889086	Adjustable Center	30	4509029	End Bumper
15	3149038	Handwheel	31	3589106	Washer
16	3969160	Shaft Locking Stud			

EXPLODED VIEW: MODEL 3096 ELEVATOR ASSEMBLY PART NO. 3960551



Dia No.	Part No.	Description
1	B372801	Hex Cap Screw 3/8-16 NC x 1-3/4" Long
2	J371000	Hex Nut 3/8-16 NC
3	3709796	Winch
4	B371201	Hex Cap Screw 3/8-16 NC x 3/4" Long
5	R000527	Plain Washer 3/8 SAE
6	3969049	End Frame
7	R000381	Hex Locknut 5/16-18 NC
8	3649165	Grab Hook
9	3969598	Chain Eye Bolt Assembly
10	R000526	Plain Washer 5/16 SAE
11	B311201	Hex Cap Screw 5/16-18 NC x 3/4" Long
13	3889075	Spreader
14	3709794	Hook and Cable Assembly
15	3889071	Gusset
16	3969519	Overhead Channel
17	3709795	Pulley
18	3889580	Grab Hook Assembly
19	R000471	Lockwasher 3/8 Split

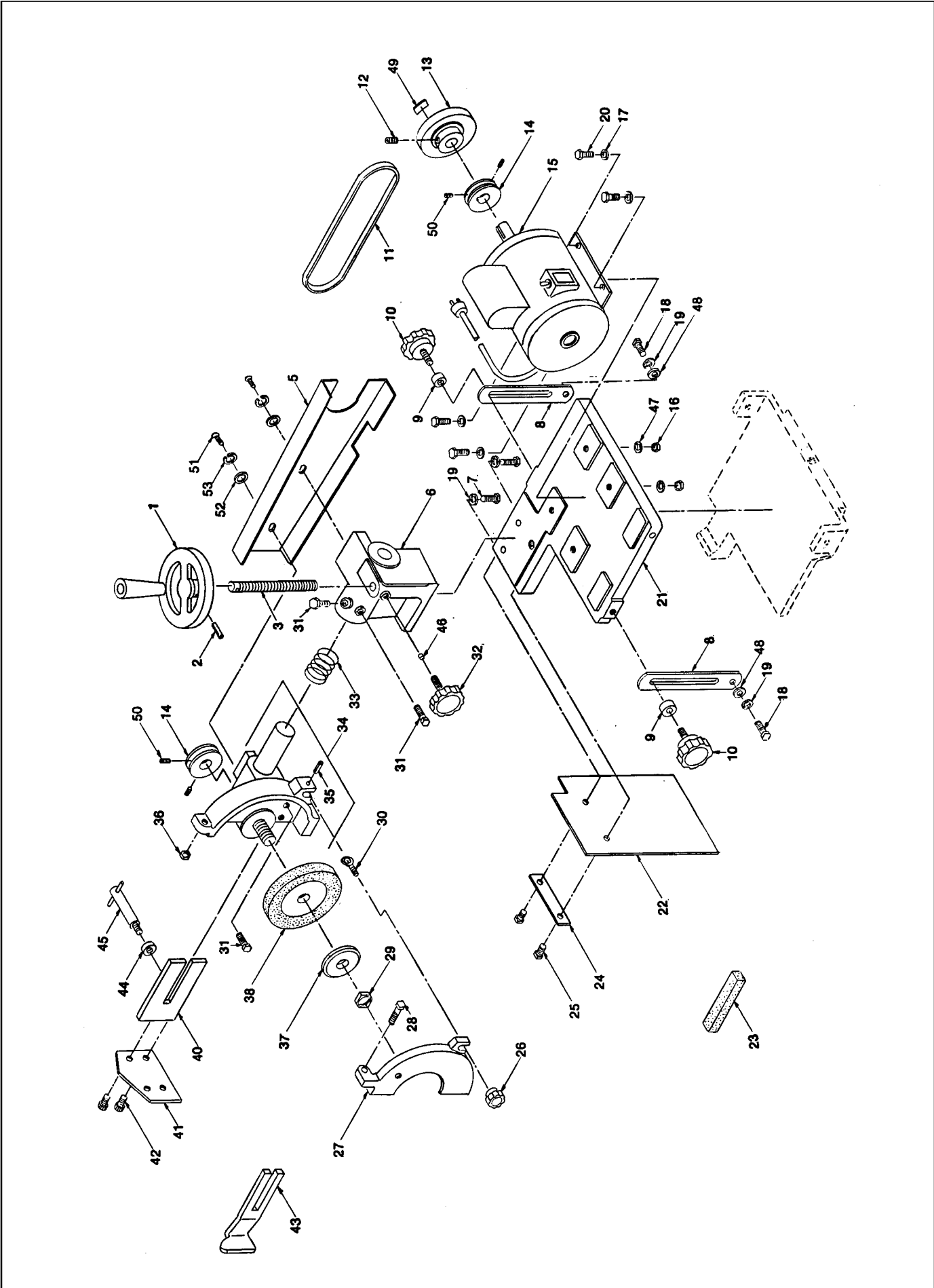
EXPLODED VIEW: MODEL 3960561 SPIN DRIVE ASSEMBLY



PARTS LIST: MODEL 3960561 SPIN DRIVE ASSEMBLY

Dia No.	Part No.	Description
1	..... B250617	..... Round Head Screw 1/4-20 NC x 3/8"
2	..... 3969569	..... Gear Box Cover
3	..... 3707950	..... Rocker Switch
4	..... 3969075	..... Motor Cord
5	..... R000550	..... Kep Nut #10-32 NF
6	..... R000522	..... Plain Washer #10 SAE
7	..... 3969580	..... Motor Assembly
8	..... B250811	..... Socket Cap Assy 1/4-20 NC x 1/2" Long
9	..... 3709297	..... Oil Seal 5/8
10	..... 3969073	..... Gear Box Cover
11	..... 3969072	..... Gear Box Gasket
12	..... 3969074	..... Gear Box Housing
13	..... 3709550	..... Pipe Plug
14	..... R840050	..... Rollpin 3/32 Dia. X 1/2" Long
15	..... 3969077	..... Worm
16	..... R841100	..... Rollpin 1/8 Dia. X 1" Long
17	..... 3109038	..... Worm Gear
18	..... 3709296	..... Oil Seal 1/2
19	..... 3969513	..... Spin Grind Brg. Assembly
20	..... J371000	..... Hex Nut 3/8-16 NC
21	..... 3969017	..... Mower Support
22	..... 3889066	..... Center Stand Lock
23	..... 3969555	..... Knob Assembly
24	..... 3969016	..... Bar Support Drive
25	..... B372001	..... Hex Cap Screw 3/8-16 NC 1-1/4" Long
26	..... 3599028	..... Spacer
27	..... B502401	..... Hex Cap Screw 1/2-13 NC x 1-1/2" Long
28	..... R000529	..... Plain Washer 1/2 SAE
29	..... B191025	..... Socket Flat Head Screw 10/32 NF x 5/8"
30	..... 3709587	..... Flange Coupler 5/8
31	..... 3709585	..... Sleeve Coupler
32	..... 3707275	..... Bushing
33	..... 3969526	..... Drive Coupler Adapter Assembly
34	..... 3969076	..... Adapter
35	..... C250420	..... Socket Set Screw 1/4-20 NC x 1/4" Long
36	..... 3709191	..... Wing Screw
37	..... 3969071	..... Support Shaft
38	..... 3709073	..... Retaining Ring
39	..... B372801	..... Hex Cap Screw 3/8-16 NC x 1-3/4" Long
40	..... R000473	..... Lockwasher 1/2 Split
41	..... 3709875	..... Set Collar 1/2

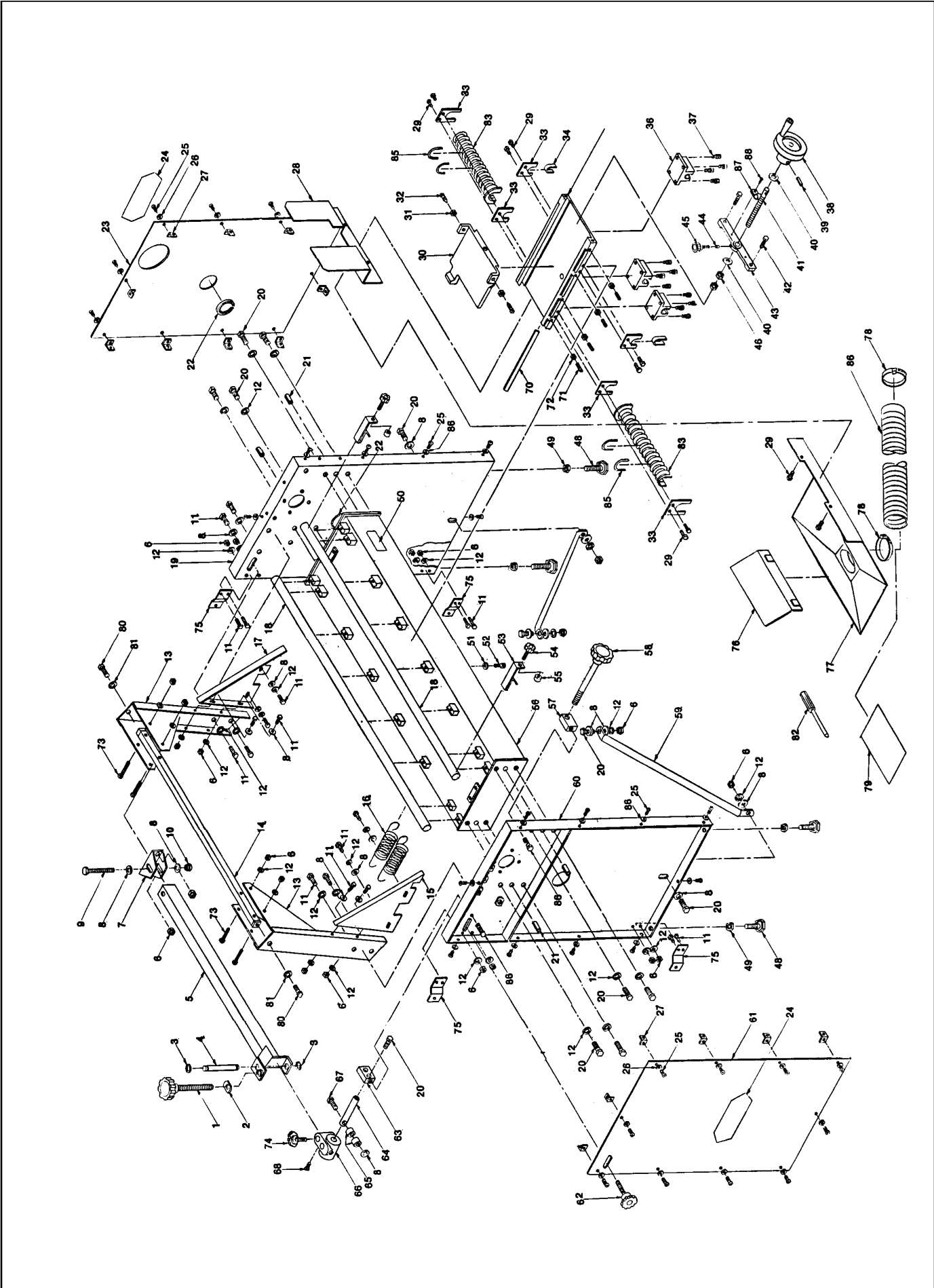
EXPLODED VIEW: MODEL 3096 GRINDING HEAD ASSEMBLY



PARTS LIST: MODEL 3096 GRINDING HEAD ASSEMBLY

Dia No.	Part No.	Description
1	3889579	Handwheel Assembly
2	H121202	Rollpin 1/8 Diameter x 3/4" Long
3	3809033	Feed Screw
4	3709191	Wing Screw
5	3969056	Belt Guard
6	3889008	Head Support
7	B371601	Hex Cap Screw 3/8-16 NC x 1" Long
8	3969027	Adjusting Arm Lock
9	3969065	Spacer
10	3709399	Knob
11	3709764	V-Belt
12	C250627	Socket Set Screw Nylok 1/4-20 NC x 3/8"
13	3969059	Handwheel
14	3889088	Pulley
15	3707700	Motor 1/2 HP 115V Phase 60 Hz
16	J311000	Hex Nut 5/16-18 NC
17	R000526	Plain Washer 5/16 SAE
18	B371401	Hex Cap Screw 3/8-16 NC x 7/8" Long
19	R000471	Lockwasher 3/8 Split
20	B311401	Hex Cap Screw 5/16-18 NC x 7/8" Long
21	3969006	Motor Plate
22	3969061	Rubber Splash Guard
23	3702508	Dressing Stick
24	3969062	Guard Support Pad
25	B251001	Hex Cap Screw 1/4-20 x 5/8" Long
26	3709660	Knob
27	3969007	Wheel Guard Cover
28	B312401	Hex Cap Screw 5/16-18 NC x 1-1/2" Long
29	J502100	Hex Jam Nut 1/2-20 NF
30	3709277	Eye Bolt
31	B311001	Hex Cap Screw 5/16-18 NC x 5/8" Long
32	3709387	Knob
33	3889059	Compression Spring
34	3969508	Grinding Head Assembly
35	H251602	Rollpin 1/4 Diameter , 1" Long
36	R000381	Hex Locknut Nylok 5/16-18 NC
37	3649018	Outer Flange
38	3700090	Grinding Wheel 3/4" x 6" Diameter
39	3700091	Grinding Wheel 3/8" x 6" (optional)
40	3969058	Guide Finger Support
41	3969057	Reel Guide Finger
42	B190831	Socket Cap Screw 10-32 NF x 1/2" Long
43	3969090	Reel Guide Finger
44	3709787	Set Collar
45	3649506	T-Handle
46	3579109	Nylon Plug
47	R000470	Lockwasher 5/16 Split
48	R000527	Plain Washer 3/8 SAE
49	4509385	Rotation Decal
50	C251020	Socket Set Screw 1/4-20 NC x 5/8" Long

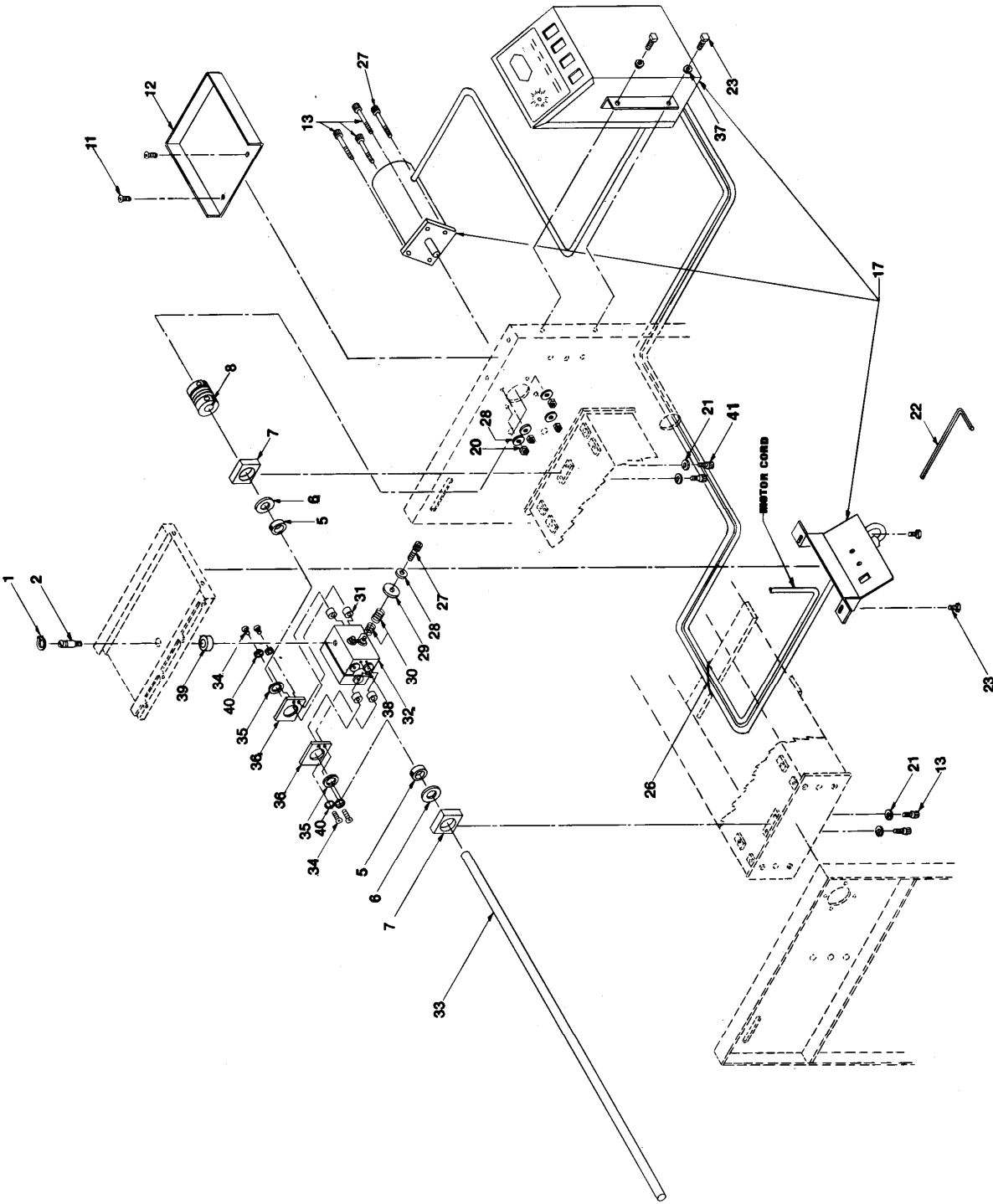
EXPLODED VIEW: MODEL 3096 AUTO REEL GRINDER



PARTS LIST: MODEL 3096 AUTO REEL GRINDER

Dia No	Part No.	Description	Dia No	Part No.	Description
1	3889510	Vertical Adjusting Screw Assembly	44	3579109	Nylon Plug
2	3889035	Lock	45	3709777	Knob
3	3709331	Retaining Ring	46	3809069	Hex Jam Nut 1/2-10 ACME L.H.
4	3889039	Clevis Pivot Pin	48	3709563	Adjusting Leveling Bolt
5	3969520	Tube Weldment	49	J501000	Hex Nut 1/2-13 NC
6	J371000	Hex Nut 3/8-16 NC	50	3969164	Nameplate
7	3889053	"L" Bracket	51	R000469	Lockwasher 1/4 Split
8	R000527	Plain Washer 3/8 SAE	52	B252406	Socket Cap Screw 1/4-20 NC x 1-1/2" Long
9	B374801	Hex Cap Screw 3/8-16 NC x 3" Long	53	3969599	Carriage Stop
10	J377000	Hex Nut Nylok 3/8-16 NC	54	3119508	Stud & Knob Assembly
11	B371201	Hex Cap Screw 3/8-16 NC x 3/4" Long	55	3969066	End Bumper
12	R000471	Lockwasher 3/8 Split	56	3969001	Grinder Main Base
13	3969524	Overhead Arm	57	3889047	Guide Block
14	3969592	Overhead Bar	58	3889511	Horizontal Adjusting Screw Assembly
15	3969545	Arm Brace L.H.	59	3969047	Tie Rod
16	3889055	Support Bar Return Spring	60	3849555	Side Frame R.H.
17	3969546	Arm Brace R.H.	61	3969149	Side Frame Panel
18	3969018	Carrier Shaft	62	3969551	Knob Assembly
19	3849556	Side Frame L.H.	63	3889048	Support Block
20	B371601	Hex Cap Screw 3/8-16 NC x 1" Long	64	3889046	Cross Slide Shaft
21	H371602	Rollpin 3/8 Diameter x 1" Long	65	3589133	Spacer
22	4509457	Grommet	66	3969012	Cross Slide
23	3849262	Side Frame Panel	67	B372801	Hex Cap Screw 3/8-16 NC x 1-3/4" Long
24	3709990	Large Foley-United Decal	68	R601018	Drive Screw #2 x 3/16 Long
25	B190614	Phillips Pan Head Screw 10-24 NC x 3/8"	69	3889065	Gib Plate
26	R000483	Lockwasher #10 Int. Tooth	70	C252020	Socket Set Screw 1/4-20 x 1-1/4" Long
27	3709416	90° Weld Nut	72	J252000	Hex Jam Nut 1/4-20 NC
28	3969060	Splash Guard	73	B374401	Hex Cap Screw 3/8-16 NC x 2-3/4" Long
29	B250601	Hex Cap Screw 1/4-20 NC x 3/8" Long	74	3969552	Knob assembly
30	3969005	Motor Base Slide	75	3969148	Anchor Strap
31	J372000	Hex Jam Nut 3/8-16 NC	76	3969558	Bust Deflector
32	C372000	Sq Head Set Screw 10-24 NC x 5/8" Long	77	3969554	Dust Collector
33	3969063	Sponge Wiper Holder	78	3709804	Hose Clamp
34	3969064	Sponge Holder	79	3708146	Bag
35	3969504	Carriage Base Assembly	80	B501201	Hex Cap Screw 1/2-13 NC x 3/4" Long
36	3709044	Ball Bushing Bearing	81	R000473	Lockwasher 1/2 Split
37	B191011	Socket Cap Screw 10-24 NC x 5/8" Long	82	3702450	Diamond Dresser (optional)
38	3889579	Handwheel Assembly	83	3969152	Rubber Boot-Open
39	H21202	Rollpin 1/8 Dia. X 3/4" Long	84	3589055	Compression Spring
40	3709027	Thrust Washer	85	3969168	Boot Clip (4) Required
41	3679088	Feed Screw	86	3889100	Hose 5-Feet (optional)
42	B251601	Hex Cap Screw 1/4-20 NC x 1" Long			
43	3889012	End Cap			

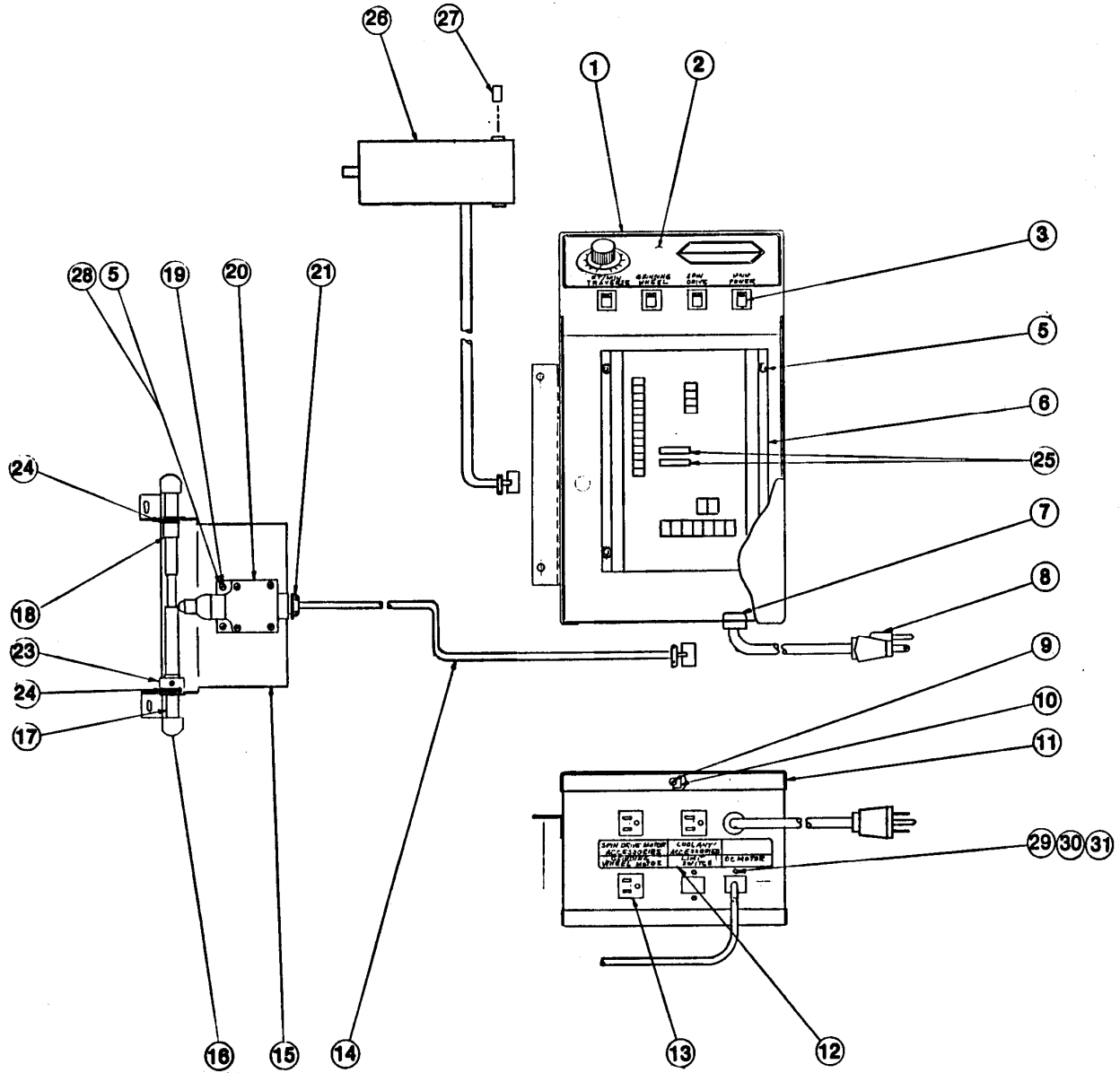
EXPLODED VIEW: MODEL 3096 VARIABLE SPEED TRAVERSE



PARTS LIST: MODEL 3096 VARIABLE SPEED TRAVERSE

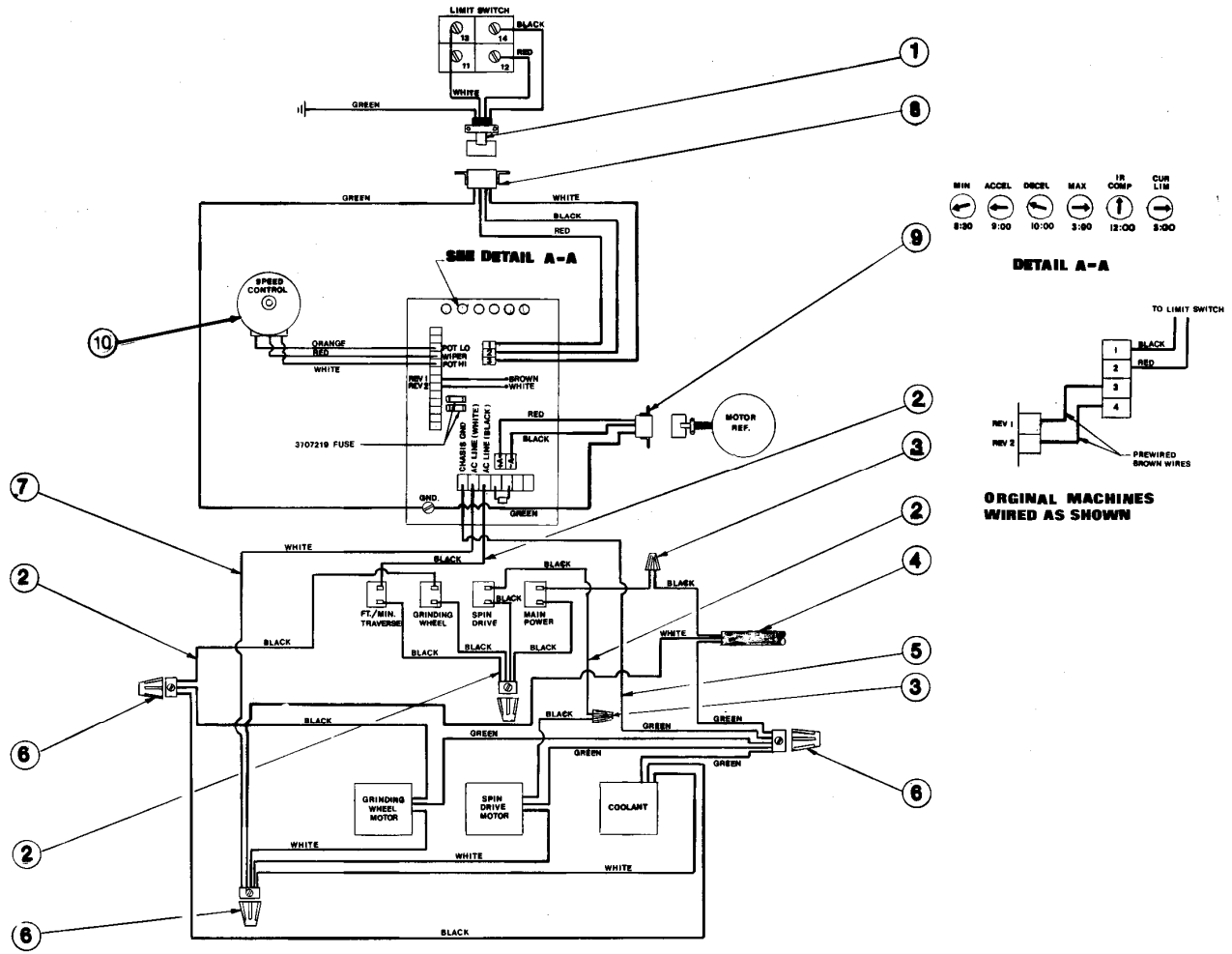
Dia No.	Part No.	Description
1	..... 3709145	..... Retaining Ring
2	..... 3969033	..... Pin Driver
3	..... 3707933	..... Cord Clip
4	..... B190509	..... Phillips Head Screw 10-24 NC x 5/16" Long
5	..... 3709867	..... Set Collar
6	..... 3709037	..... Ball Bearing
7	..... 3969030	..... Shaft Support Block
8	..... 3709588	..... Flange Coupler
9	..... 3709585	..... Sleeve Coupler
10	..... 3709586	..... Flange Coupler
11	..... B251017	..... Phillips Rnd. Hd. Screws 1/4-20 NC x 5/8"
12	..... 3969068	..... Tool Tray
13	..... B251611	..... Socket Cap Screw 1/4-20 NC x 1" Long
14	..... 3707312	..... D.C. Motor
15	..... 3707254	..... D.C. Motor Brush (optional)
18	..... B251601	..... Hex Cap screw 1/4-20 NC
20	..... R000552	..... Kep Nut 1/4-20 NC
21	..... K251501	..... Lockwasher 1/4 Split
22	..... 3969067	..... 10 Inch Allen Key 3/16
23	..... B250801	..... Hex Cap Screw 1/4-20 NC x 1/2" Long
25	..... 3707224	..... Tie Down Mount
26	..... 3707225	..... Cord Tie
27	..... 3708140	..... Socket Cap Screw Nylok 1/4-20 NC x 1" Long
28	.....	.....
29	..... 3589106	..... Washer
30	..... 3708141	..... Spring-Compression
31	..... 3589081	..... Spacer
32	..... 3969036	..... Actuator
33	..... 3969046	..... Carriage Drive Shaft
34	..... B191233	..... Pan Head Screw 10-32 NF x 3/4" Long
35	..... 3709183	..... Wiper Seal
36	..... 3969032	..... Seal Mount
37	..... R000536	..... Lockwasher 1/4 Int. Teeth
38	..... 3709597	..... Replacement Bearing
39	..... 3709040	..... Spherical Bearing
40	..... R000468	..... Lockwasher # 10 Split
41	..... B251611	..... Socket Cap Screw 1/4-20 NC x 1" Long
42	..... 3709597	..... Replacement Bearing (6) Required

PARTS LIST: CONTROL PANEL ASSEMBLY



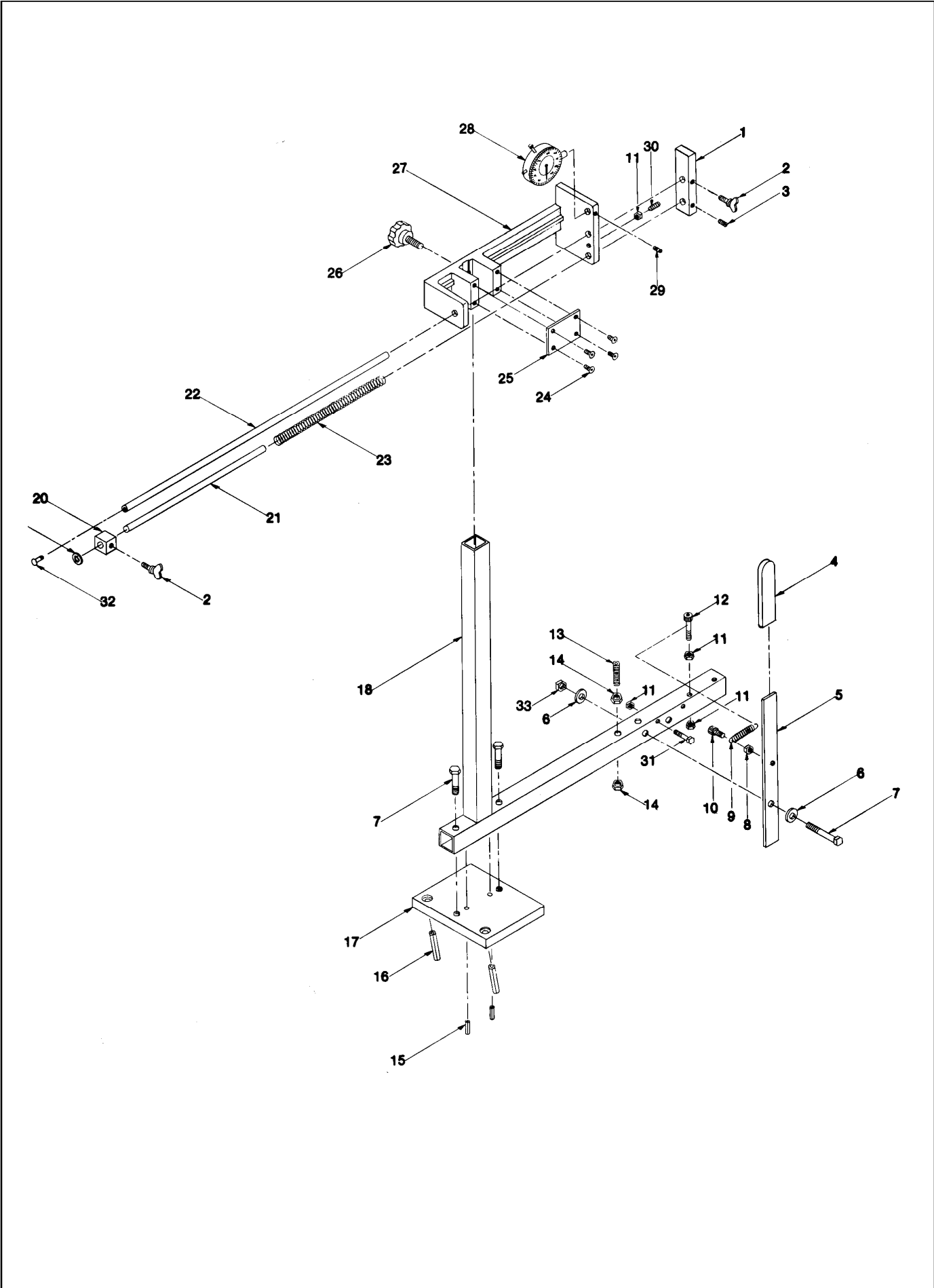
Dia No	Part No.	Description	Dia No	Part No.	Description
1	3849578	Control Box	17	3969045	Shaft
2	3709952	Electric Box Decal	18	3709047	Bushing
3	3707950	Switch	19	B190801	Hex Head Cap Screw 10-24 NC x 1/2"
4	3707266	Potentiometer	20	3707313	Limit Switch
5	R000553	Keq Nut 10-24 NC	21	3707180	Connector
6	3707315	Control Board (Includes 3707266)	22	3707273	Strain Relief
7	3707275	Strain Relief	23	3969083	Set Collar
8	3707173	Power Cord	24	3709345	Push On Ring
9	D191067	Sheet Metal Screw #10 x 5/8"	25	3707219	2 AMP Fuse
10	3709864	Tinnerman Nut	26	3969544	DC Motor Connector Assembly
11	3969042	Cover	27	3707254	DC Motor Brush (2 Required)
12	3969182	Receptacle Panel Decal	28	R000531	Washer #8 Flat
13	3707165	Snap-In Outlet	29	B130812	Phill Pan Head Screw 6-32 NC x 1/2" Long
14	3969581	Cord Socket Ass'y	30	J131000	Hex Nut 6-32 NC
15	3969048	Switch Mount	31	R000479	Lockwasher #6 Split
16	4509029	Rubber Tip			

PARTS LIST: WIRING DIAGRAM



Dia No.	Part No.	Description
1	3969581	Cord Socket Assembly
2	3969576	Wire Assembly (Black)
3	3707953	Wire Nut (Yellow)
4	3707173	Cord Set
5	3969034	Wire (Green)
6	3707155	Set Screw Connector
7	3969028	Wire (White)
8	3969548	Limit Switch Receptacle Assembly
9	3969549	D.C. Motor Receptacle Assembly
10	3707266	Potentiometer

EXPLODED VIEW: REEL SETUP GAGE ASSEMBLY



PARTS LIST: REEL SETUP GAGE ASSEMBLY

Dia No.	Part No.	Description
1	3969113	Indicator Stop Bar
2	3709191	Wing Screw 1/4-20 NC
3	C250420	Socket Set Screw 1/4-20 NC x 1/4" Long
4	3709624	Plastic Handle
5	3969112	Gage Handle
6	R000526	Plain Washer 5/16 SAE
7	B312401	Hex Cap Screw 5/16-18 NC x 1-1/2" Long
8	J251001	Hex Nut 1/4-28 NF
9	3709821	Extension Spring
10	B250831	Socket Head Cap Screw 1/4-28 NF x 1/2" Long
11	J252000	Hex Jam Nut 1/4-20 NC
12	B252811	Socket Cap Screw 1/4-20 NC x 1-3/4" Long
13	C313220	Socket Set Screw 5/16-18 NC x 2" Long
14	J312000	Hex Jam Nut 5/16-18 NC
15	R000601	Rollpin 1/4 Diameter x 1/2" Long
16	H372802	Rollpin 3/8 Diameter x 1-3/4" Long
17	3969114	Gage Base Locator
18	3969511	Gage Slide
19	3709336	Push on Ring
20	3109022	Saddle Stop
21	3969109	Spring Guide Rod
22	3969108	Gage Alignment Rod
23	3709278	Compression Spring
24	B190614	Phillips Pan Screw #10-24 NC x 3/8" Long
25	3969107	Gage Slide Keeper
26	3709382	Knob
27	3969115	Indicator Gage Slide
28	3579123	Dial Indicator
29	C190420	Socket Set Screw #10-24 NC x 1/4" Long
30	C251220	Socket Set Screw 1/4-20 NC x 1-1/4" Long
31	B252001	Hex Cap Screw 1/4-20 NC x 1-1/4" Long
32	F000614	Domed Anvil 3/8
33	R000381	Hex Locknut 5/16-18 NC