



MODEL 111 & 181 REEL GRINDER

OWNER'S MANUAL



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 into 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.

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 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.**
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 this 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 THE GRINDER WHEN UNDER THE INFLUENCE OF DRUGS, ALCOHOL, OR MEDICATION.**



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 BURNS.**
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.

GETTING TO KNOW YOUR GRINDER

This machine is intended for reel mower reel blade grinding 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 manufacturers 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. Machine is for indoor use only. Do not use a power washer to clean the machine.



SPECIFICATIONS

POWER REQUIREMENT:

115 Volts, 50/60 Hz, 15 Amps

DIMENSIONS:

68" long (+14" for spin drive when mounted on left) x 33" wide x 79" high (to the top of the elevator, 55" to top of frame)

SHIPPING DIMENSIONS:

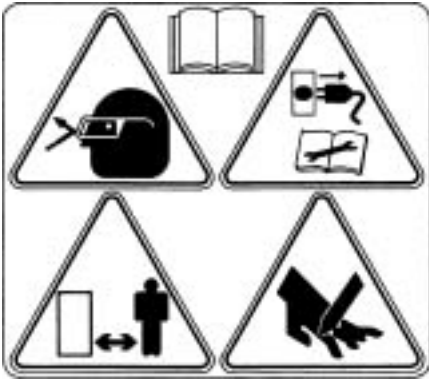
70" long x 41" wide x 72" high, 800#, 120 cubic feet



The Model 111/181 Reel Sharpening System is offered in several versions:

Feature	111	181
Single Blade Relief Grinding	Yes	Yes
Spin and Relief Grinding		Yes
Back Lapper included for Spin Drive		Yes
Elevator for ease in loading	Yes	Yes
Infeed, Manual Control	Yes	Yes
Travel, Manual	Yes	
Travel, Automatic		Yes
Transformer for 220 Volts, 50/60 Hz		Optional
Bedknife Kit - 6000555	Optional	Optional
Pull-Gang Vert. Mount Kit - 18574	Optional	Optional

GETTING TO KNOW YOUR GRINDER (Continued)



Symbols for Read operators manual, wear safety glasses and disconnect power before servicing.

Symbols for sharp object which will cause serious injury and symbol for keep visitors a safe distance away from machine.



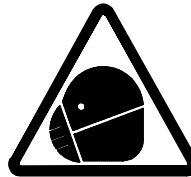
Symbols for caution relating to RPM of motor and minimum safe rated RPM of the grinding wheel.



Symbol identifying a panel, cover, or area as having live electrical components within.



Symbol for hearing protection required when operating this machine.



Symbol that operators and people in the close proximity must wear respirators or have adequate ventilation systems.

Low Voltage Relay

The grinder is equipped with a low voltage relay which is factory preset at 100 VAC. If the power supply line does not deliver 100 VAC power under load, the relay will open and trip out the starter. If this occurs, your power supply line is inadequate and must be correct before proceeding further with the grinder.



ASSEMBLY

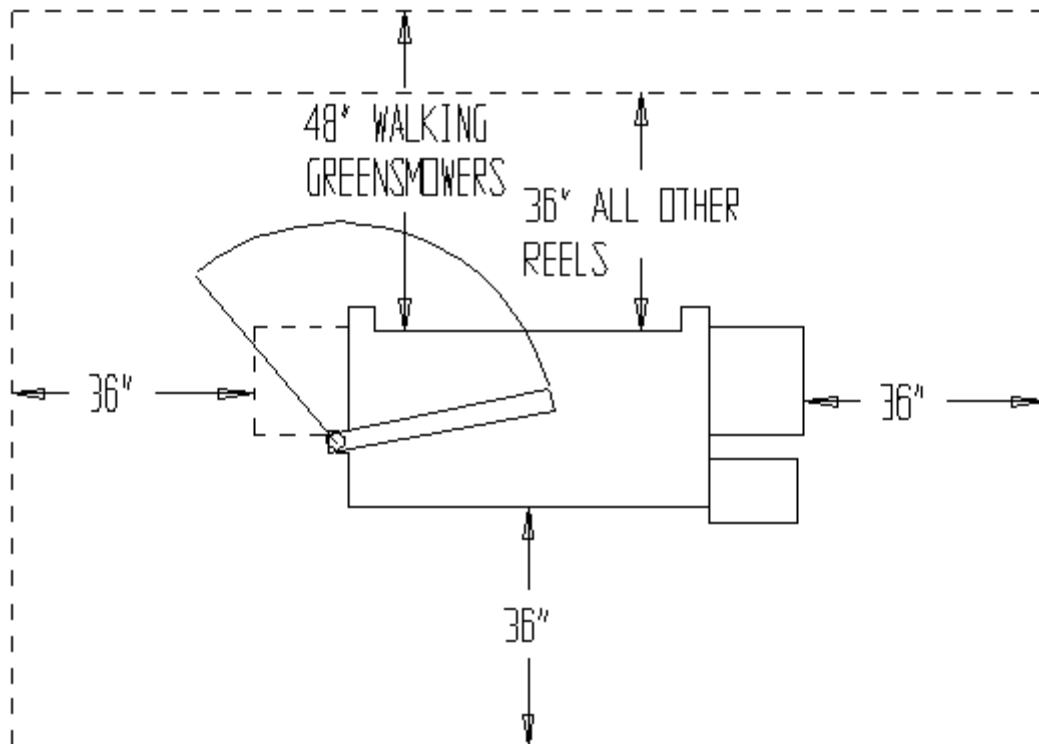
PACKING LIST: Upon arrival make sure that all parts are included in shipment.

<u>Feature</u>	<u>111</u>	<u>181</u>
18100 Operator's Manual	Yes	Yes
Elevator	Yes	Yes
Model 18556 Back Lapper		Yes
Lapper Shelf		Yes
Electrical Control Box		Yes
3702508 Dressing Brick	Yes	Yes
18561 Dial Indicator Style Set Up Gauge		Yes
3880941 Rod Style Set Up Gauge	Yes	

If any item is **MISSING** from the shipment, notify your dealer so that they can contact a Service Representative.

SITE REQUIREMENTS:

- Indoors
- Dry
- Reasonably level Concrete floor
- Good Lighting
- 115 Volts, 50/60 Hz, 15 Amp outlet, dedicated circuit
- We suggest a space about 13' x 10' based on the following drawing



ASSEMBLY

Tools Required For Assembly:

- Hammer
- Level
- Utility Knife
- Screw Driver

The **Model 111/181** is shipped on a pallet, fully assembled, except for the electrical control box, elevator, gauge, backlapper and lapper shelf. These items are in boxes under the machine or in the tray of the frame.

1. Remove the crate from the machine using a hammer.
2. Carefully use the utility knife to remove the protective wrapping.
3. Remove the straps that secure the grinding head for shipment.
4. Move the machine to the desired location. Screws located in the legs of the machine may be used to eliminate rocking of the machine.
5. Assemble the Elevator to the frame.
6. Model 181, attach the set up gauge to the carriage.
7. Model 181, remove the electrical control box from the carton and hang it on the right side of the machine using the dove tail brackets.
8. Model 181, Hang the back lapper shelf on the right side of the frame.
9. Model 181, Unpack the Back Lapper and attach to the shelf as shown on the following pages.
10. Model 181, Install the spin drive adapter to the shaft of the back lapper.
11. Model 181, Check to assure that the main power switch is "OFF" by pushing it "IN".
12. Model 111, check to assure that the toggle switch on the motor is turned off.
13. Then plug the Model 111/181 into the wall outlet. **THIS MUST BE GROUNDED 115 VOLT, 50/60 HERTZ OUTLET RATED FOR 15 AMPS.**

INSPECT THE GRINDING WHEEL

The grinder has been supplied with a medium grit wheel Part #3700090. With proper use and care, this wheel will provide maximum grinding capability, accuracy, and safety. Prior to starting the machine, visually inspect the wheel for possible damage in shipment.

IF THE GRINDING WHEEL APPEARS TO BE DAMAGED, DO NOT START THE GRINDER. ALWAYS WEAR PROPER SAFETY EYEWEAR, HEARING AND RESPIRATOR EQUIPMENT WHEN OPERATING THE MODEL 111/181.



The Model 111/181 is now fully assembled and ready for the re- view of the operating instructions.



BEFORE OPERATING THIS GRINDER, READ THE OPERATING INSTRUCTIONS.

ASSEMBLY INSTRUCTIONS (Continued)

APPLY POWER



BEFORE YOU APPLY POWER TO THE GRINDER, REFER TO THE "IMPORTANT GROUNDING INSTRUCTIONS".



FIG. 2

115 Volt Model Only. Plug the control box power cord into a standard 115V AC 15-amp grounded receptacle. See FIG. 2.

220 Volt Model Only. For Model 181, 220 Volt Applications order Part No. 1800951, which includes a 220 to 115 Volt Step Down Transformer. For Model 111, 220 Volt Applications, rewire the motor as described on page 9. Cut off plug and replace for 220 Volt 60/50 Hz. Application.

IT IS RECOMMENDED THAT THIS GRINDER HAS ITS OWN PERMANENT POWER CONNECTION FROM THE POWER DISTRIBUTION PANEL, WITH NO OTHER MAJOR POWER DRAW EQUIPMENT ON THE SAME LINE.

! IT IS REQUIRED THAT THE POWER DELIVERED TO THIS GRINDER IS 115 VAC - 15 AMPS. THE TOLERANCE ON THIS POWER REQUIREMENT IS +/- 5%. THEREFORE THE MINIMUM VOLTAGE REQUIREMENT IS 109VAC WITH 15 AMPS. VOLTAGE MUST BE CHECKED WITH ALL EQUIPMENT UNDER LOAD (OPERATING) ON THE CIRCUIT.

DO NOT OPERATE THIS GRINDER WITH AN EXTENSION CORD.

! PROPER GROUNDING OF THE RECEPTACLE GROUND IN YOUR BUILDING MUST BE VERIFIED. IMPROPER GROUNDING IN YOUR BUILDING MAY CAUSE THE GRINDER TO MALFUNCTION.

The grinder is equipped with a low voltage relay which is factory preset at 100 VAC. If the power supply line does not deliver 100 VAC power under load, the relay will open and trip out the starter. If this occurs, your power supply line is inadequate and must be correct before proceeding further with the grinder.



FOR 15 AMP RATED LARGE MACHINES

For 0 to 30	Feet from panel to receptacle	= Use 14 Ga. Wire.
For 30 to 50	Feet from panel to receptacle	= Use 12 Ga. Wire.
For 50 to 80	Feet from panel to receptacle	= Use 10 Ga. Wire.
For 80 to 140	Feet from panel to receptacle	= Use 8 Ga. Wire.

For 0 to 9	Meters from panel to receptacle	= Use 2.5mm Wire.
For 9 to 15	Meters from panel to receptacle	= Use 4.0mm Wire.
For 15 to 24	Meters from panel to receptacle	= Use 6.0mm Wire.
For 24 to 42	Meters from panel to receptacle	= Use 10.0mm Wire.

ASSEMBLY INSTRUCTIONS (Continued)

**FOR MODEL 181 220 V 50 or 60Hz applications
Product No. 1810951 should be ordered.**

**1810951 includes a 2 KVA 220 Volt Step Down to
115 volt 50/60 Hz transformer which is prewired.**

The wiring diagram is shown in FIG. 3.

**The power cord has no connector. A connector
which is appropriate for your locality and 220 volt,
8 amp application should be installed.**



**Use only a qualified electrician to
complete the installation.**

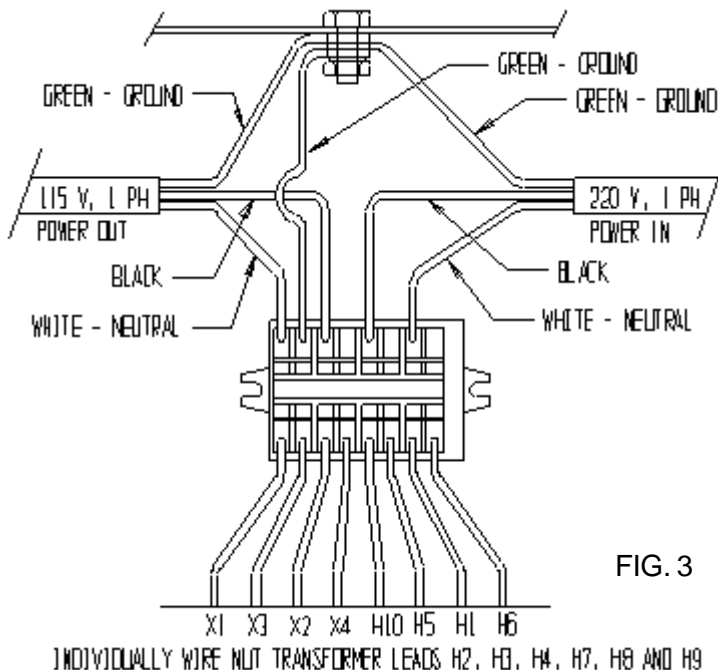
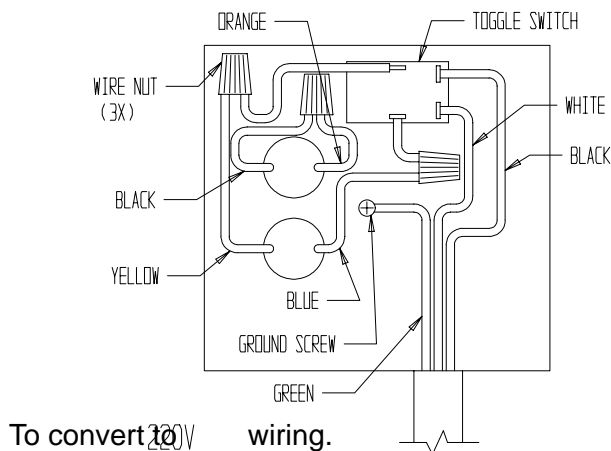


FIG. 3

**FOR 111 MODEL: To convert this grinder to
operate on 220 V 50/60Hz 1 phase current, cut
the plug off from the cord and replace it with the
appropriate plug for your locality. For plug and
circuit breaker sizing, see motor nameplate
ratings. Use only a qualified electrician.**

**To convert the grinder from 115 Volt to 220 Volt,
disconnect the four wires coming from the motor
internally and reconnect them as shown to the
right. One additional wire nut will be required.
NOTE: This motor will operate correctly on 60Hz
or 50Hz power.**



IMPORTANT GROUNDING INSTRUCTIONS

In case of a malfunction of 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.

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.



**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.**

GETTING TO KNOW YOUR GRINDER

GETTING TO KNOW YOUR MACHINE

The following is an explanation of the machine components you will be using when setting up reels to grind on your new Spin Grinder. You should familiarize yourself with each part as this grinder has been engineered to spin and relief grind almost every type and make of reel mowers available today. An adjustment of the various fixtures will be necessary for different types of reels.



FIG. 4

OVERHEAD MOWER CLAMP ASSEMBLY

Each overhead mower clamp assembly consists of two rectangular bar clamps (top and bottom), which also contain adjustable holding fixtures into which is placed the mower clamps. These clamps will be positioned on the overhead square bar as shown in FIG. 4 and FIG 5. They are designed to lock into place and not move during the grinding procedure. Included are two sizes of clamp lips, normally the smaller will be used.

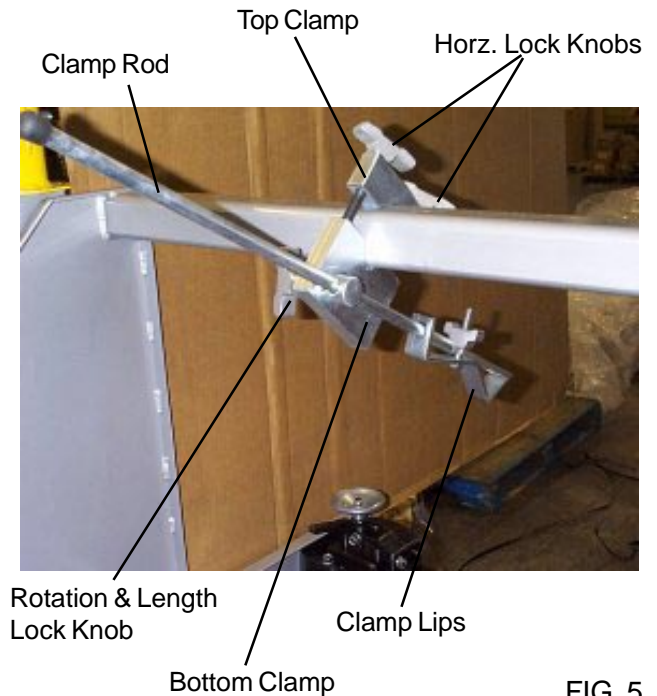


FIG. 5

REEL SUPPORT

CENTER MOUNTING BRACKETS

The centers mounting brackets consist of a lower portion that fits on the square mounting bar, a stationary center fixture and an adjustable centering fixture. The stationary fixture will normally be used on the left hand side of the mounting bar when facing the reel loading position. There are three vertical positions for the center fixture but they will normally be used in the lower position as shown in the picture. These brackets should be mounted to the square bar so that the centering pins are facing the back of the machine and directly over the square mounting bar. These centering fixtures are used on greens mowers or any reel that does not have a hub that can fit into the "V" bracket.



FIG. 6



THE HARD KNOBS ON THE SQUARE BAR MUST BE VERY TIGHT OR THE REEL CAN LOOSEN CAUSING POOR GRIND QUALITY. KNOBS CAN BE ADDITIONALLY TIGHTENED WITH AN ALLEN WRENCH TO ENSURE MAXIMUM LOCKING POWER.

ROLLER SUPPORTS

There are two roller supports that are mounted to the square mounting bar. They may be mounted so that the "V" faces the back of the machine as pictured, (see FIG. 8) or with the "V" facing up (see FIG. 7).

Use the vice grip chain clamp to secure the reel to the roller supports.

REEL GUIDE FINGERS

There are two reel guide fingers included with your grinder. They are used to relief grind reels after the reel has been spun ground. The wider factory mounted finger will normally be used, See FIG. 9 & 10, but on reels where there is not enough room between blades or reel to end frame clearance, the stamped narrow finger will have to be used. See FIG. 11.

At the factory, the finger is installed with the high point of the finger positioned at the left hand corner of the grinding wheel for a normal helix reel, viewed from the relief finger side. It might be necessary on reels that have a reverse helix to reposition the support finger. When using the stamped thin finger it is necessary to dress the grinding wheel so that the high point of the finger is positioned where the grinding wheel makes contact with the reel.



FIG. 7



FIG. 8

Vice Grip Chain Clamps

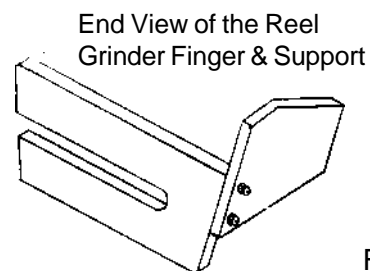


FIG. 9



FIG. 10



FIG. 11

OPERATING INSTRUCTIONS

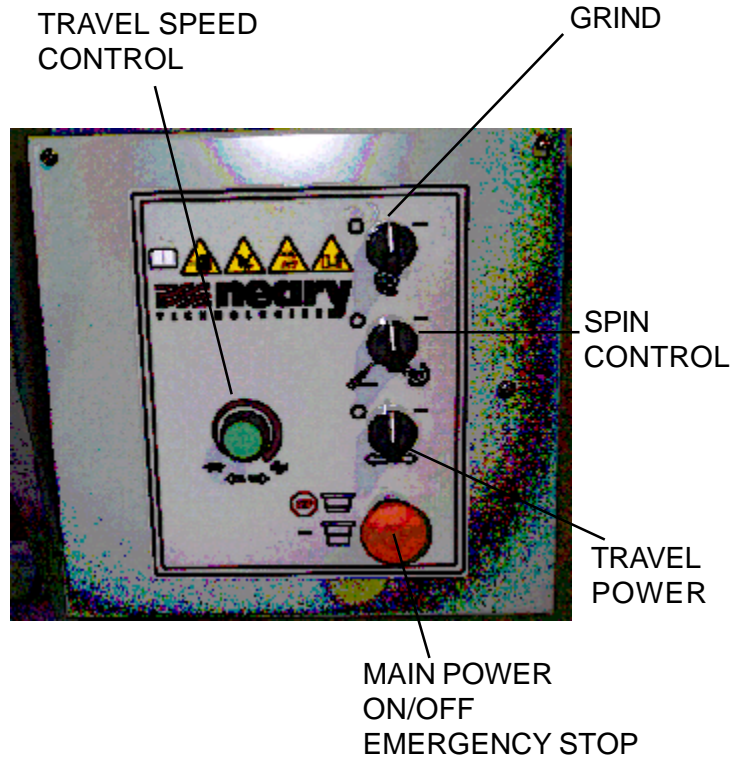
OPERATION

The Controls for the Model 111:

The Model 111 grinder is a manual reel single blade relief grinder. The only switch control is the grinding motor on/off switch.

The Controls for the Model 181:

Learn the function of each switch and knob on the control box. As you read and learn about each knob you are encouraged to turn that knob on and view that particular operation. See FIG. 12.

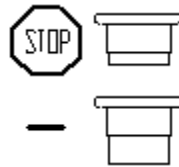


ALWAYS WEAR PROPER SAFETY EYEWEAR WHEN OPERATING YOUR GRINDER. NEVER TURN ON YOUR GRINDER WITHOUT FIRST PUTTING ON SAFETY EYEWEAR.

FIG. 12

ON/OFF CONTROL

This is the red knob, the main power switch. Pulling out will turn the main power on and pushing in will turn power off. The large button type design allows a quick stop of all power in an emergency situation.



GRIND CONTROL

The grind control knob turns the Grinding Wheel on and off.



SPIN CONTROL

The spin control knob turns the spin motor on and off. There is a direction switch and speed control dial located on the Spin Drive/Backlapper. (Refer to Backlapper manual for more details.)



THE SPIN DRIVE/BACK LAPPER MUST BE PLUGGED INTO THE OUTLET ON THE BACK OF THE BOX IN ORDER TO BE CONTROLLED BY THIS SWITCH. BECAUSE THE SPIN DRIVE CAN BE MOUNTED ON EITHER SIDE OF THE MACHINE, IT IS NECESSARY TO CHANGE THE DIRECTION OF ROTATION OF THE SPIN DRIVE. THE SWITCH ON THE BACK OF THE LAPPER MUST BE TURNED ON, AND SWITCHED TO THE PROPER DIRECTION FOR YOUR SET UP. WHEN SET UP PROPERLY, THE REEL TURNS BACKWARDS FROM THE CUTTING DIRECTION.

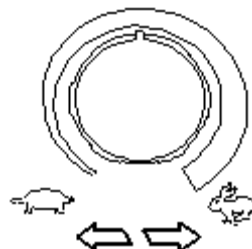
TRAVEL ON/OFF CONTROL

The travel control knob turns the travel motor on and off controlling the side to side movement of the carriage and grinding head.



TRAVEL SPEED CONTROL

This control knob determines the speed of travel for the grinding carriage. When turned on to minimum, the carriage should stop. When turned to the maximum, the carriage moves back and forth at full speed. When learning to use this machine, it is a great idea to set this speed at minimum, start the other functions, then slowly increase the speed to observe that your operation and set up are correct.



TRAVEL MECHANISM RELEASE

To move the grinding head from side to side manually, there is a release located on the front, bottom of the carriage. To disengage the carriage drive system, rotate the red handled engagement lever to the down position. To engage the carriage drive system, rotate the red handled engagement lever to the up position. See FIG 13.

PROXIMITY SWITCHES

Two movable switches determine the left and right limits of carriage traverse. An LED on the switch lights when the switch actuator on the bottom of the carriage gets close to the head of the switch. Note, there should be a 3/16 gap between the proximity switch head and the traverse actuator bracket. See FIG. 46 on Page 42.

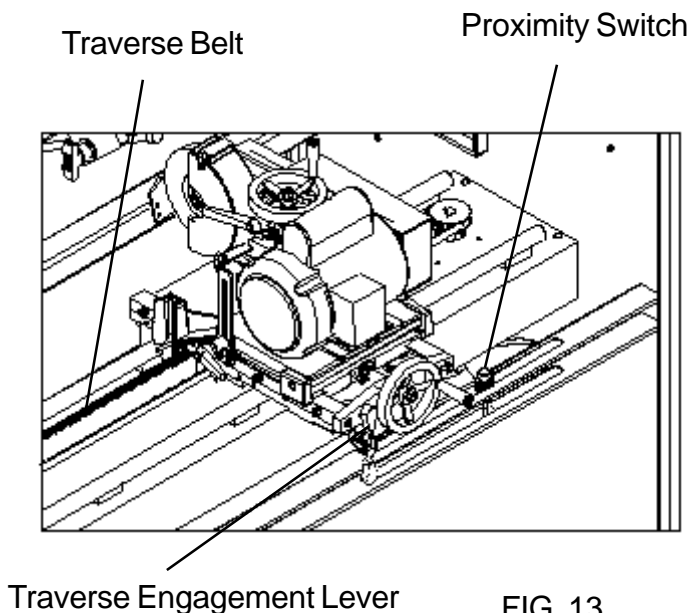


FIG. 13

SINGLE BLADE RELIEF VS. SPIN/ RELIEF GRINDING

MODEL 111 SINGLE BLADE RELIEF GRINDING

The reels are ground one blade at a time, removing material at an angle as shown in figure 14.

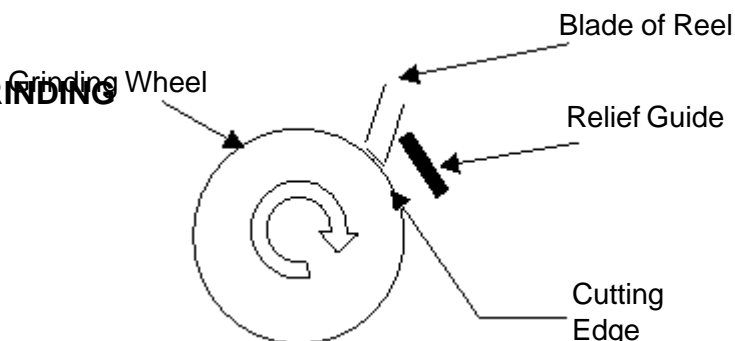


FIG. 14

OPERATING INSTRUCTIONS (CONTINUED)

SINGLE BLADE RELIEF VS. SPIN & RELIEF GRINDING (CONTINUED)

MODEL 181 SPIN GRINDING

The reel is rotated while grinding renewing all cutting edges at the same time.

A correctly ground and maintained reel is cylindrical in shape, meaning that all reel blades are the same distance from the center reel shaft. The reel will wear to a cone shape if it is improperly maintained or ground. Spin grinding removes the conical shape and restores the reel back to a sharp cylindrical shape with all blade cutting edges ground to the same distance from the reel shaft.

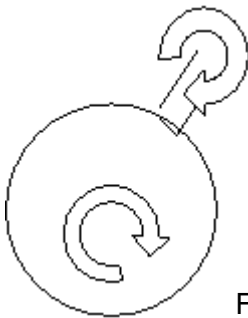


FIG. 5

MODEL 181 RELIEF GRINDING

The relief grinding is performed as a secondary operation, removing back edge of the blade. This is done one blade at a time.

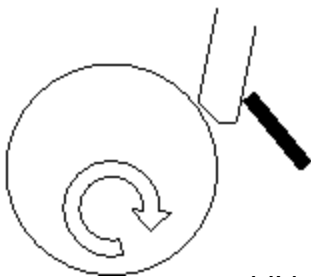


FIG. 6

RELIEF GRINDING/SINGLE BLADE GRINDING

Relief Grinding removes the excess steel behind the cutting edge (particularly on reels with thick blades) to allow the reel to operate with less wear and friction on its cutting surface and to mow with less power consumption by the mower. On the Model 111 which only relief grinds, the reel cylindrical shape can be restored through relief grinding followed by backlapping.

WHY REELS LOSE THEIR CYLINDRICAL SHAPE

When manufactured, mower reels are ground to be perfect cylinders. The diameter at all points is equal. The bed knife is mounted so it is perfectly parallel to the blade surface across the full width of the mower. The best quality of cut is a result of grinding the reel to a true cylinder, grinding the bed knife to a straight true edge, and properly aligning and adjusting the reel and bed knife in the cutting unit.

Usually two things happen to cause a reel to wear to a cone shape.

- 1) Some cutting units are adjusted in the field to compensate for wear at the cutting edge. If adjusted more on one side than the other, the reel will wear more on that side and the reel will become cone shaped.
- 2) Reels also lose their cylindrical shape because of the very nature of the reels themselves. The helix (or twist) in the reel blades causes the "lead in" end of the reel to wear faster. The diameter at the end becomes smaller. Each time you adjust the mower, the accelerated wear continues and the "lead in" diameter becomes even smaller. If you use the simple "touch method" of alignment for sharpening, where you contact each end of the reel with the grinding wheel, the reel's conical or tapered condition is not corrected and the reel is not restored to a true cylinder. The difference between the two ends continues to increase, and eventually the taper exceeds the mower's range of adjustment.

A severely cone shaped reel will result in poor quality of cut, difficulty in adjusting the reel to the bed knife, premature replacement of the reel and bed knife, and in extreme cases, reel bearing failure due to misalignment.

BACK LAPPING

Back lapping is an important step in maintaining reel mowers. Lapping must be performed after single blade grinding, to establish a land area and insure a perfect match between the bed knife and reel cutting edge. Lapping is not intended to be a reconditioning process to correct severely nicked or rounded blades. If the edge is not restored after five minutes of lapping, it is time to grind.

GRIND OR BACK LAP

If the edges of the reel blade, and of the bed knife, are only slightly rounded, and have only minor nicks, they may be restored to a suitable cutting condition with lapping compound and a back lapper.

When more extremes of wear or damage exist, it is necessary to perform both a grinding and lapping operation.

GRINDING IS NECESSARY IF THE FOLLOWING CONDITIONS EXIST:

- Major nicks on the bedknife or reel blades
- Uneven wear on either the bedknife or the reel blades
- Bent reel blades
- Significant roundness to the reel blades or the bedknife
- A cone shaped reel.

DRESSING THE GRINDING WHEEL

Dressing is the process of cleaning the surface of the grinding wheel. If the wheel becomes loaded with steel from the grinding process, the steel on the wheel starts to create heat as it contacts the steel of the reel. Poor quality of grind, slow removal of material from the reel, and excessive heat or a burned surface indicate that it is time to clean the surface of the grinding wheel. Use the dressing brick #3702508 provided with the machine to clean the surface of the wheel.



ALWAYS WEAR SAFETY GLASSES OR GOGGLES WHEN DRESSING THE WHEEL.



THE DRESSING PROCESS REQUIRES THAT YOU HOLD THE DRESSING BRICK AGAINST THE WHEEL WHILE IT IS ROTATING AT HIGH SPEED. APPLY ONLY LIGHT PRESSURE BETWEEN THE BRICK AND WHEEL. KEEP FINGERS AWAY FROM THE GRINDING WHEEL. KEEP ALL BODY PARTS, CLOTHING, JEWELRY, AND HAIR AWAY FROM THE ROTATING PARTS.

THE SET UP PROCESS

As with most processes, the beginning and the end are similar. To set up a specific cutting unit for the first time, it takes time to determine the specific steps, dimensions, hardware and short cuts that apply to that cutting unit. If this information is recorded accurately so that it may be used to set up the cutting unit the next time, set up time is reduced to a minimum. To make your job easier, record your set ups on the form provided and label, box and retain special hardware, spacers, etc. that were used to create the set up. Pictures of the completed set up may also help minimize the time needed to set up the cutting unit. An accurate set up guide enables you, or the person that has to set up the cutting unit the next time, a convenient place to start, and to refine the process. A full size copy of the form below appears later in this section. Make copies. Fill them out. Use them. They will make your job easier.



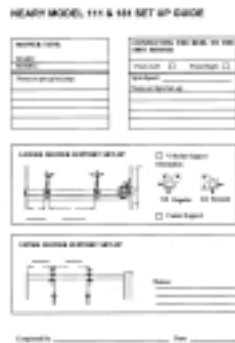
THE BASIC STEPS ARE....

1. Find the set up guide for that particular reel, refer to the information in the following steps.
2. Clean the cutting unit.
3. Remove the Bed Knife.
4. Check for worn reel shaft bearings. If there is play in the bearings, replace the bearings.
5. Determine which side to set up the spin drive.
6. Move the Grinding Carriage to one side to prevent damage during loading.
7. Move the grinding wheel toward the operator to assure that you can move the grinding wheel toward the reel during set up.
8. Adjust the V blocks (Or centers).
9. Use the elevator to lift the cutting unit into the V blocks.
10. Clamp the roller into the V blocks with the rear chain clamp.
11. Check the grinding wheel location according to the following drawings.
12. Attach the upper support clamps to support the front of the cutting unit.
13. Use the gauge to fine adjust the vertical and horizontal location of the reel center shaft.
(111 Model)
14. Use the gauge to fine adjust the vertical and horizontal location of the reel center shaft.
(181 Model)
15. Check tightness of all clamps and adjustments, the key to a good grind is....Rigidity!! Rigidity!! Rigidity!!!
16. Use the gauge to recheck horizontal and vertical adjustment. If necessary, loosen clamps slightly and readjust the location of the reel. Then retighten and check again.
17. Number the blades with a marker or paint stick.
18. Attach the spin drive to the reel.
19. Adjust the grinding wheel to the reel blade.
20. For the Model 111, single blade relief grind the blades until the relief comes to the front on every blade, end to end.
21. For the Model 181, spin grind until the desired cutting edge is achieved on every blade, end to end.
22. For the Model 181, proceed to the relief grind process.
23. Record your set up on the form. If you worked from a form recorded previously, make corrections or improvements.
24. Move the grinding wheel back to one end, remove the spin drive connection.
25. Remove the cutting unit from the grinder.
26. Make sure when you set the cutting unit on the floor that you do not damage the cutting edges of the reel.

THE SET UP PROCESS (con't)

1. CHECK THE SET UP GUIDE.

Check to see if there is set up information of file.



2. CLEAN THE MOWER OR CUTTING UNIT.

Thoroughly clean the mower and remove all dried material from the reel blades and the bedknife.

3 REMOVE THE BEDKNIFE.

It is possible to spin and relief grind many reels without removing the bedknife, however it is recommended that bed knife is removed and ground. Removing the bedknife provides more space for setting the grinding wheel to the reel blades.

4. INSPECT THE REEL OR CUTTING UNIT.

Inspect the back of each reel blade. If there are any irregularities such as weld flashes, thick paint runs, etc., remove them so that the relief guide has smooth surfaces on which to travel. Check for bent reel blades and straighten, if necessary. Inspect welds at spiders. Check the reel and ground roller bearings. (In accordance with the instructions of the mower manufacturer.) Determine that the roller is mounted such that it is parallel too the reel center shaft.

5. DETERMINE WHICH SIDE TO SET UP THE SPIN DRIVE.

Some cutting units can only be driven from one side. Determine which side, and that will determine the location of the V Blocks in the following steps.

6. POSITION THE GRINDING CARRIAGE TO THE FAR RIGHT SIDE OF THE MACHINE.

Moving the grinding carriage to the end opposite the elevator will put it out of harms way during the loading process.

7. MOVE THE GRINDING WHEEL BACK TOWARD THE OPERATOR.

It is frustrating to get all set up, then find out that the wheel was adjusted all the way forward, and you need to relocate the reel so that you can reach it with the grinding wheel.

8. ADJUST THE V BLOCKS TO RECEIVE THE REAR ROLLER OF THE CUTTING UNIT.



IT CAN BE DANGEROUS TO ADJUST THE V BLOCKS AFTER THE MOWER IS IN PLACE, OR WHILE IT IS HANGING FROM THE ELEVATOR.

9. USE THE ELEVATOR TO LIFT THE CUTTING UNIT INTO THE V BLOCKS.

Place the cutting unit on the floor behind the grinder with the front of the cutting unit facing towards the front of the grinder. Securely attach the cutting unit to the hooks of the elevator.

10. CLAMP THE ROLLER TO THE V BLOCKS.



TO PREVENT THE CUTTING UNIT FROM FALLING OUT OF THE GRINDER, ALWAYS USE THE VISE GRIP STYLE REAR ROLLER CLAMP TO HOLD THE ROLLER IN THE V BLOCKS.

OPERATING INSTRUCTIONS (CONTINUED)



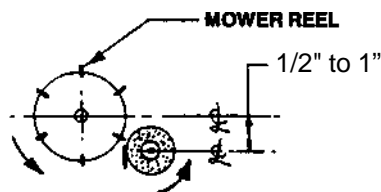
KEEP ALL BODY PARTS OUT FROM UNDER THE CUTTING UNIT WHEN LIFTING IT WITH THE ELEVATOR. THE WEIGHT AND BLADES CAN CAUSE SERIOUS DAMAGE. IF THE CUTTING UNIT SHIFTS OR STARTS TO FALL, DO NOT TRY TO CATCH IT. MOVE AWAY FROM THE UNIT TO PREVENT INJURY. USING THE WINCH AND THE CAPABILITY OF ROTATING THE ELEVATOR, POSITION THE REEL, SO THE REAR ROLLER IS RESTING IN THE "V" BLOCKS. AS AN ADDED SAFETY MEASURE, IT IS CONSIDERED DESIRABLE TO LEAVE THE ELEVATOR ATTACHED TO THE MOWER. SOME MOWERS (MOST NOTABLY GREENS MOWERS) MAY REQUIRE THAT THE UNIT BE MOUNTED ON CENTERS THAT ARE POSITIONED IN THE BEDKNIFE MOUNTING HOLES LOCATED IN THE MOWER SIDE FRAMES.



FIG. 17

11. CHECK THE GRINDING WHEEL LOCATION.

- A. Position the height of the grinding wheel center so that it is 1/2" to 1" below the reel center. If the reel guide finger interferes, remove it.
- B. Infeed the grinding wheel until it just makes contact with a reel blade and rotate the reel by hand to make sure the blades clear the stop finger. Now tighten the two locking knobs on the locking arms and the locking knob for the height adjustment screw.



THE REEL AND GRINDING WHEEL ARE TO ROTATE IN THE SAME DIRECTION.

FIG. 18



IT IS CRITICAL THAT THE REEL BE HAND ROTATED TO VERIFY STOP FINGER CLEARANCE. FAILURE TO DO SO COULD CAUSE SIGNIFICANT DAMAGE TO THE REEL AND GRINDER AND POTENTIAL INJURY TO THE OPERATOR.

12. ATTACH THE UPPER SUPPORT CLAMPS.

Now that grinding wheel is located properly, 1/2" to 1" below the reel, the next step is to adjust the upper mower support arms to hold the reel in the correct position for spin and relief grinding. There are many reel designs, all with unique requirements for mounting the front of the cutting unit to the grinder. By loosening the upper mower support arms they can slid side to side for correct alignment to a specific reel. The knob located on the side will allow for in and out as well as rotational adjustments.



Side Lock Knob

FIG. 19

OPERATING INSTRUCTIONS (CONTINUED)

13. USE THE GAUGE TO ADJUST THE VERTICAL POSITION OF THE REEL CENTER SHAFT. (111 Model)

Loosen the side lock knob holding the left upper clamp. This will reduce the possibility of pre-loading or binding. (See FIG 19.)

Move the carriage to the right hand side of the reel shaft and position the alignment tool so that the rod (plunger) gently rests on the top or bottom of the reel shaft. Avoid weld areas. (See FIG 20.)

Without disturbing the positioning of the alignment tool, pull the rod to the rear to clear the reel and move the carriage to the opposite (left) end of the shaft.

Push the rod towards the reel shaft. Loosen the lock handles and, using the vertical adjustment handwheel, raise or lower the reel until the rod is positioned on the reel shaft as it had been on the right hand side of the reel.

Recheck the measurement on the right hand side.

Repeat as necessary until both sides are at the same height. Secure the adjustment with the lock lever.

USE THE GAUGE TO ADJUST THE HORIZONTAL POSITION OF THE REEL CENTER SHAFT (Model 111).

Again, loosen the side lock knob holding the left upper clamp. This will reduce the possibility of pre-loading or binding.

Move the carriage to the right hand side of the grinder and position the alignment tool so that the rod (plunger) gently touches the front of the reel shaft. Avoid weld areas. Tighten the stop block.

Without disturbing the positioning of the alignment tool, pull the rod to the rear to clear the reel and move the carriage to the opposite (left) end of the grinder.

Push the rod towards the reel shaft. Loosen the lock lever and, using the horizontal adjustment handwheel, move the reel back and forth until the rod is touching the front of the reel shaft in the same way it touched on the right hand side of the reel.

Recheck the measurement on the right hand side.

Repeat as necessary until both sides are at the same horizontal location. Then secure the adjustment with the lock lever.

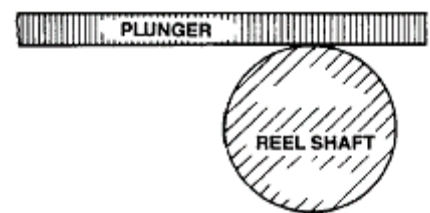
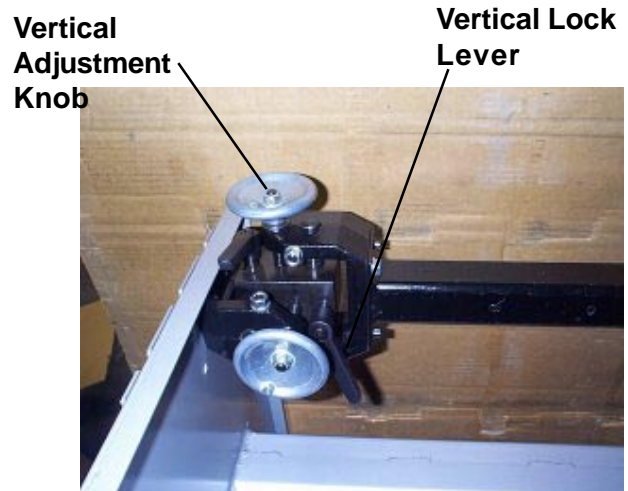


FIG. 20

Horizontal Lock Lever



Horizontal Adjustment Knob

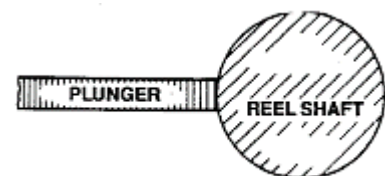


FIG. 21

OPERATING INSTRUCTIONS (Continued)

14. DIAL INDICATOR ALIGNMENT GAGE (181 MODEL)

The dial indicator set up gage is designed to be quickly mounted into position and/or quickly removed.

The gage is mounted to the front left corner of the grinding head assembly.

REEL ALIGNMENT USING THE DIAL INDICATOR SET UP GAGE

- A. Mount the guage into position on the left front side of the grinding head assembly.
- B. Tighten the clamp located on the fixed end of the tooling bar (right side) and loosen the left side clamp when aligning the reel. Use the chain vice clamp when using V-bracket mounts. When using the centers do not use the chain vice clamp.
- C. Loosen the two locking knobs on the pivot assembly on the left side of the square tooling bar so that it can be adjusted in both the vertical and horizontal plane.

ALIGNING REELS IN THE VERTICAL PARALLELISM PLANE

- A. Move the grinding head assembly until the alignment rod is approximately 1" from the right side of the reel. Lock the Knob A within approximately 1/4" of center shaft of the reel.
- B. Raise the indicator slide casting on the vertical support so that the indicator rod can be extended over or under the center shaft of the reel.
- C. Lower the indicator slide by turning the vertical fine adjustment Knob B until the alignment rod lightly touches the top of the reel center shaft.
- D. Pull rod back and lock Knob C. Traverse to the other side of reel, same distance from end. Loosen Knob C and extend alignment rod.
- E. Raise or lower the mounting bar and the reel until the center shaft of the reel lightly touches the extended indicator rod.

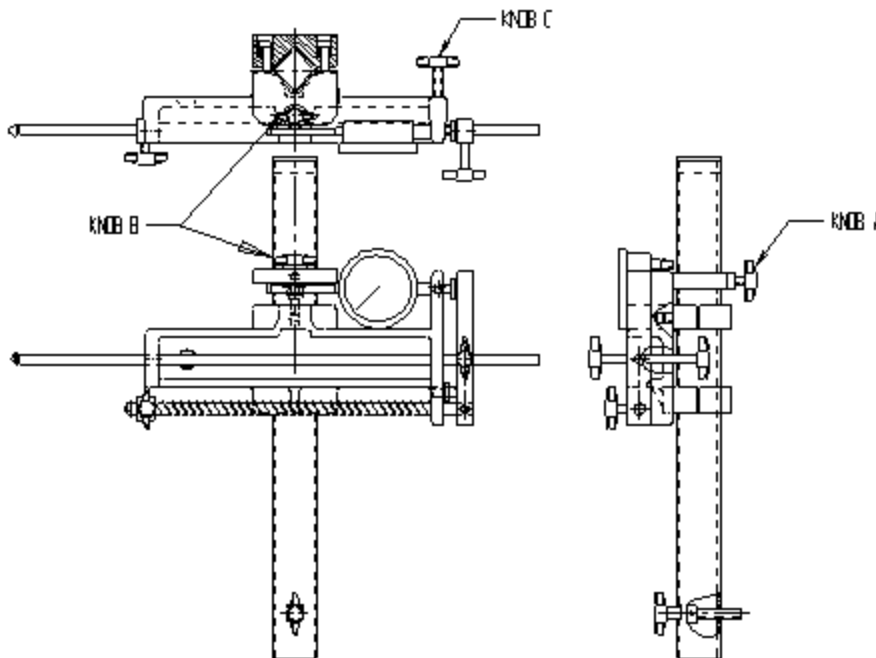


Fig. 22

OPERATING INSTRUCTIONS (Continued)

VERTICAL ALIGNMENT (CONTINUED)

- F. Take note of the knob so you know where you are starting from. Now turn the vertical adjusting screw 1 more revolution. This 1 revolution is to compensate for the fact that as you adjust the left side, the right side is also moving at a ratioed amount. This should almost align your reel in the vertical parallelism plane.
- G. Move the alignment fixture back to the right hand side of the reel and readjust the alignment rod so that it lightly touches the top or bottom of reel center shaft.
- H. Move it back to the left side to make sure the reel is in correct vertical position. If not, move vertical adjustment handle up or down so that it just touches alignment rod on both sides.
- I. Now lock the vertical adjusting screw locking knob.

NOTE: This alignment is not as critical as the horizontal plane, but care should be taken on all reel set ups. The accuracy need only be approximately .010".



CAREFULLY REVIEW THE CORRECT IDENTIFICATION OF THE LOCKING KNOBS IN FIG 22. MAKE CERTAIN YOU ARE LOCKING AND UNLOCKING THE CORRECT KNOBS.

ALIGNING REELS IN THE HORIZONTAL PARALLELISM



THIS A CRITICAL SET UP AND CARE SHOULD BE TAKEN WHEN MAKING THESE ADJUSTMENTS. IF REEL IS OUT OF POSITION IN THE HORIZONTAL PLANE, IT WILL BE GROUND CONE SHAPED.

- A. Move set up gauge on the right hand side of reel approximately 1" from the end.
- B. Lower the indicator slide casting on the vertical support so the indicator rod can make contact with the center of the reel shaft within approximately 1/8" and lock Knob A. Center shaft should be clean and free of rust where rod makes contact. Now fine adjust using Knob B until at the center of the center shaft of the reel.

- C. Now loosen Knob D on the indicator stop bar. Holding the indicator rod firmly against the reel shaft, move the indicator stop bar back, until no contact is made with the indicator rod plunger. Now move indicator stop bar forward until contact is made and then an additional 1/2". This will set the plunger at about its midpoint and allowing it to move in both directions.
- D. Now set the outer dial indicator to the "0" position. Read and note the position of the smaller (.100) dial. You must know this reading when setting up the other side. Pull back and lock with Knob C.
- E. Move alignment gauge to the left side of the reel carefully retracting the indicator rod so as not to damage or change setting. Set indicator rod on the same position on the reel as on the other side, that is 1" from the end and centered on the shaft. Now read the dial indicator to determine the distance the reel is out of position.

NOTE: Because the set up gauge is mounted to the carriage, you can unlock the drive system and traverse manually from end to end or you can use the auto traversing drive by setting the pot to a slower speed and powering from end to end.

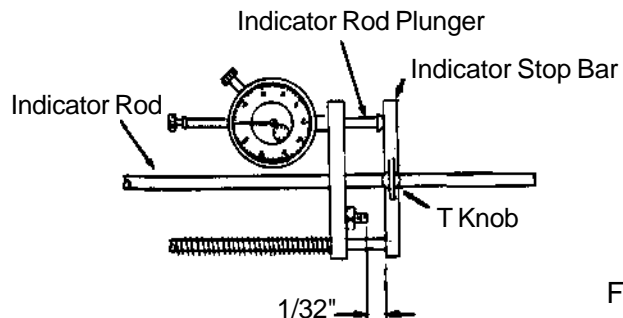


FIG. 23

OPERATING INSTRUCTIONS (Continued)

ALIGNING REELS IN THE HORIZONTAL PARALLELISM (CONTINUED)

- F. To adjust reel position first determine the direction the reel has to move for alignment. The direction that the reel will have to be moved can be determined by pulling back on the dial indicator stop bar and if the dial moves back to the "0" position you will have to move the reel towards you. If that cannot be done the reel will have to be moved away from you.

There are two adjusting steps for final positioning of the reel as follows:

1. With the reel set gauge still in the left hand side of the reel, turn the horizontal adjusting screw in the direction required to match the initial indicator reading on the right hand reel position.
2. Now travel farther by half the amount already traveled.

The reason for this is that the square mounting bar pivots on one end and is adjusted on the opposite end. Anytime the adjusting end is moved to change the left side dimension, the right side dimension is also changing at a ratio to the left side. By over compensating at the adjusting end you will compensate for this movement and get the reel aligned much faster.

- G. Now move the set up stand back to the right side of the reel. Set indicator rod on the same spot you used the first time and reset large dial on "0". Make sure you read the setting on the small scale and note. Repeat the steps discussed above.

IT IS ESSENTIAL THAT CARE IS TAKEN WHEN SETTING THE REEL UP IN THE HORIZONTAL POSITIONS IN ORDER TO GRIND IT INTO A CYLINDER SHAPE. ANY MISALIGNMENT WILL CAUSE YOU TO GRIND INTO A CONE.

- I. When the horizontal parallelism has been adjusted to within .003" end to end, tighten the horizontal adjustment locking knob and both overhead clamp adjusting knobs. When tightening the knob it is very important that you have the dial indicator at that side of the reel and watch it as you tighten. It must not move in the tightening process. After both knobs are tight, recheck alignment.

OPERATING INSTRUCTIONS (Continued)

CHECKING REEL FOR CONE SHAPE, REEL ROUNDNESS, AND STRAITNESS OR REEL OUTSIDE DIAMETER.

BEFORE GRINDING--

- A. Before storing the set up gauge, it is very effective to use it to check the ungrounded reel to determine the amount the reel is conical in shape and which end has the larger diameter. Start with the set up gauge at the right end of the reel. Loosen the wing nut on the indicator stop bar, holding the indicator rod firmly against one blade. Pull the indicator stop bar back until it clears the plunger then advance it forward until it contacts the plunger and advances it 1/2 inch further. Lock in place. This sets the plunger at its midpoint and allows adequate movement in both directions. Set outer dial at zero and note position of pointer on small dial.
- B. Now move it to the left side of reel and indicate the same blade. From the reading determine the amount the reel is cone shaped. This also determines high point for grinding. Grinding of a reel must always start at the high point.

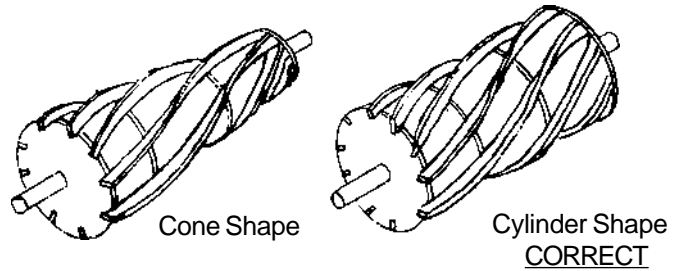


Fig. 24

AFTER GRINDING--

- A. After grinding a reel, check the roundness on each end of the reel and center before removing ground reel. Loosen the wing nut on the indicator rod firmly against one blade. Pull the indicator stop bar back until there is a 1/32" gap between it and the set screw. This is to permit rotation of the reel blades to ride on the domed anvil only. At each location (left, right and center) turn the reel by hand and observe the indicator variations. All readings should be within .002".
- B. Straitness of reel outside diameter--Take indicator readings at both ends of reel. Compare readings between each end of reel for straitness. All reading should be within .002".
- C. Carefully remove guage and store in a safe place.

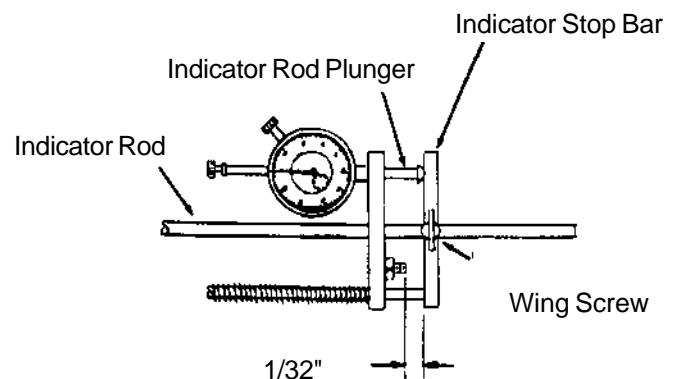


Fig. 25

OPERATING INSTRUCTIONS (CONTINUED)

15. NOW TIGHTEN ALL CLAMPS AND ADJUSTMENTS.

The key to a good grind is **Rigidity! Rigidity!! Rigidity!!!**

16. USE THE GAUGE TO RECHECK THE HORIZONTAL AND VERTICAL ADJUSTMENT.

Sometimes the reel moves during the tightening process. If necessary, loosen the set up slightly, and readjust.

17. NUMBER THE BLADES WITH A MARKER OR A PAINT STICK.

This step is helpful in keeping track of which blades have been ground and which ones require another pass.

18. ATTACH THE SPIN DRIVE TO THE REEL. (MODEL 181)

If not in place already, move the shelf and the back lapper to the side of the machine appropriate to drive the reel. Adjust the lapper front to back on the shelf, and turn the knob on the lapper to adjust the shaft vertically until the shaft is in line with the reel. Using sockets, extensions and in some cases, special adapters, attach the spin drive to the reel.

Check to assure that the switch on the lapper is set to turn the reel in the correct direction. With the grinding wheel backed away from the reel and all body parts and tools away from the reel, start the spin drive. The correct direction is when the reel is turning backwards, the reverse of the cutting action.

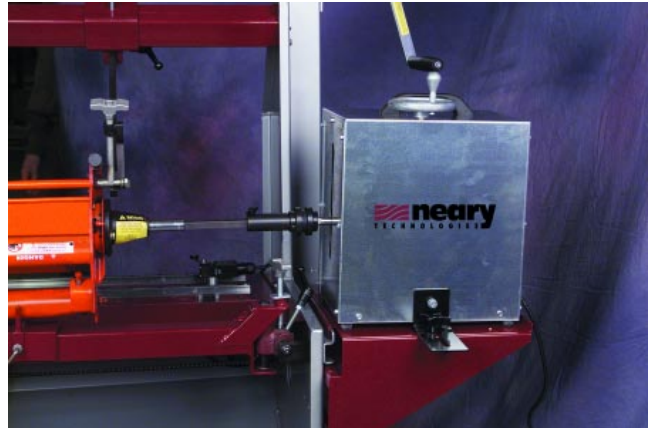


FIG. 26



KEEP HANDS, FINGERS, LONG HAIR, AND ALL OTHER BODY PARTS AWAY FROM THE REEL. DO NOT WEAR JEWELRY OR LOOSE CLOTHING.

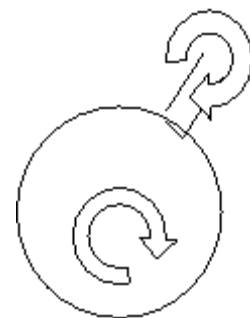


FIG. 27

19. ADJUST THE GRINDING WHEEL TO THE REEL BLADES.

If the horizontal and vertical adjustments are accurate, and the reel is already a perfect cylinder, the adjustment of the wheel to the reel blades should be uniform end to end. In most cases some additional adjustments may be made at this time. However, if the adjustments are accurate, grinding the reel to match the path of the grinding wheel will return the reel to the same diameter on both ends.

OPERATING INSTRUCTIONS CONT.

20. SINGLE BLADE RELIEF GRINDING WITH THE MODEL 111.

A. Check to see if your mowing unit is a normal or reverse helix. NOTE: As you look into the guide finger in FIG. 28 it shows the normal reel helix. The high point of the finger guide is on the right hand side of the grinding wheel. See FIG. 29 for reverse helix. Most mowing units are normal helix.

! The high point of the guide finger must always be at the corner of the grinding wheel that is making contact with the reel. (See FIG. 28 and 29)

NORMAL HELIX

For a NORMAL HELIX reel, the grinding wheel should be dressed to match the angle of the reel blade. It is recommended that a slightly larger angle is dressed on the wheel so the right side of the wheel is contacting the blade prior to the left side as shown. The grinding wheel will then wear to a match.

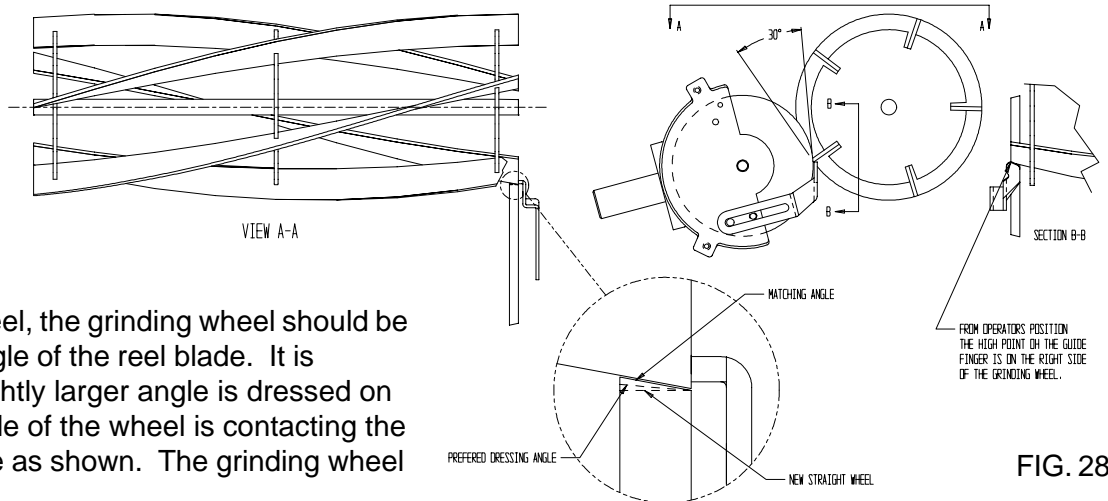


FIG. 28

! If you do not dress the grinding wheel so the right side contacts first you may not relief grind part of the last 3/8" [10 mm] of the reel blade.

NOTE: The square faced wheel from the factory can be used for normal helix reels with no dressing.

REVERSE HELIX

For a REVERSE HELIX reel, the grinding wheel should be dressed to match the angle of the reel blade. It is recommended that a slightly larger angle is dressed on the wheel so the right side of the wheel is contacting the blade prior to the left side as shown. The grinding wheel will then wear to a match.

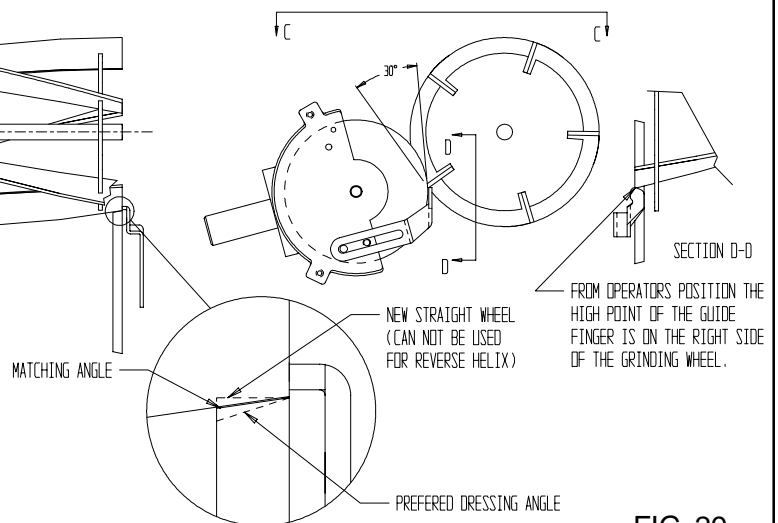


FIG. 29

! If you do not dress the grinding wheel so the right side contacts first you may not relief grind part of the last 3/8" [10 mm] of the blade.

OPERATING INSTRUCTIONS CONT.

B. It is recommended that you practice indexing the blades for relief grinding prior to actually grinding them. Do this by backing the grinding wheel away from blade so that virtually no contact is made with the blade that is resting on the guide finger. Now, with the grinding wheel NOT turning, manually traverse at a uniform speed from right to left on blade 1. On the return stroke, always come back on the same blade. After traversing down and returning on a blade, relief grinding requires the operator to manually index to the next blade. This is a critical operation and should be well practiced prior to grinding. When on the practice run you have to hold the reel down to the finger on the return stroke.

SEE GRINDING WHEEL WARNINGS ON PAGE 3 BEFORE GRINDING.



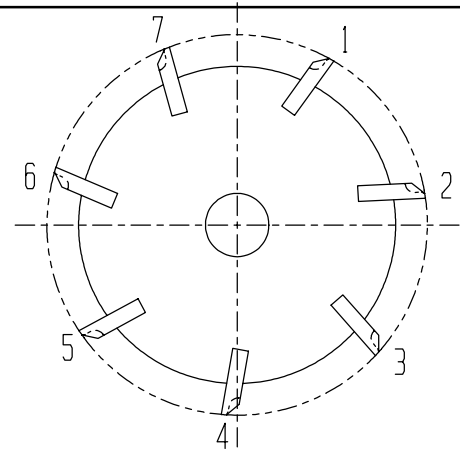
THE FLANGE AND NUT ON A GRINDING WHEEL SHOULD BE TIGHTENED TO 5 FT.LBS. [.7 KGM]. OVERTIGHTENING CAN CAUSE WHEEL BREAKAGE. REPLACE ALL CRACKED WHEELS IMMEDIATELY. ALWAYS USE GUARDS AND EYE SHIELDS.

USE ONLY FLANGES FURNISHED WITH THE GRINDER. THE WHEEL GUARD IS ALWAYS TO BE MOUNTED TO COMPLY WITH OSHA REGULATIONS AND FOR SAFE OPERATIONS.

C. Turn on the motor and grind across blade #1. The grinding should be done with light to moderate cuts as heavy grinding pressure will result in excessive heating of the blades. Also, the carriage should be traversed manually in **smooth** and **uniform speed** passes across the blade and without stopping. Hold the reel to the guide finger with your left hand and pull the grinding head assembly with your right hand. As soon as the grinding wheel contacts the reel, remove your left hand. The guide finger will keep the blade in place as the grinding head assembly is traversed across the reel. When it reaches the left side of the reel, the reel blade comes fully off the grinding wheel and partially off the guide finger. The reel blade will automatically pick up the same blade on the return stroke. The blade will be held to the finger in both directions by the rotation of the grinding wheel driving the blade downward against the finger. When you reach the right end of the blade let the carriage come off the blade.

OPERATING INSTRUCTIONS CONT.

D. Next manually rotate to blade #2 and grind blade #2 and continue to grind all of the blades without changing the grinding wheel setting. If you have brought all of the blades to a sharp edge, advance the grinding wheel slightly and regrind the blades, in reverse order-- starting with the highest blade number and going down. Example: #5 then 4,3,2,1. The reason for this is to get a better finish and to compensate for grinding wheel wear on the original grind. If the blade is not ground to a sharp edge, adjust the horizontal infeed wheel and grind another cycle. Grind the blades 2-3-4-5-1 as an example on the second cycle. Listed on FIG. 30 are two optional methods to stagger reel blades during grinding. The reel must be ground until you achieve a sharp edge. See FIG. 31. Again, always reverse order with a slight infeed after achieving a sharp edge.



GRINDING SEQUENCE

1	3	5	7	2	4	6
2	4	6	1	3	5	7
3	5	7	2	4	6	1
			OR			
1	2	3	4	5	6	7
2	3	4	5	6	7	1
3	4	5	6	7	1	2

FIG. 30



IT IS VERY IMPORTANT TO A QUALITY GRIND THAT A STAGGERED GRINDING METHOD IS USED.

INFEEED AMOUNT:

The ring located on the inside of the infeed handle is calibrated in .002" [.05mm] increments. The maximum desired infeed is about .015". Most chose a more conservative infeed.



IT IS NECESSARY TO MANUALLY POSITION THE REEL BLADE ON THE GUIDE FINGER. IF YOU OVER-INDEX AND MISS THE FINGER THE GRINDING WHEEL COULD BE JAMMED BETWEEN TWO BLADES. IF YOU UNDER-INDEX, THE GRINDING WHEEL WILL BE JAMMED AGAINST THE END OF THE BLADE YOU ARE TRYING TO GRIND.

BECAUSE YOU ARE MANUALLY TRAVERSING, BACKING UP AND RESTARTING WITH THE REEL BLADE ON THE GUIDE FINGER IS VERY EASY.

EXTREME CARE MUST BE TAKEN IN LEARNING THIS PROCEDURE AS SERIOUS PERSONAL INJURY COULD OCCUR IF THE OPERATOR CONTACTS THE GRINDING WHEEL OR IS CAUGHT IN A GRINDING WHEEL TO REEL JAM. PRACTICE WITHOUT THE GRINDER MOTOR ON UNTIL YOU ARE SATISFIED WITH YOUR CAPABILITY

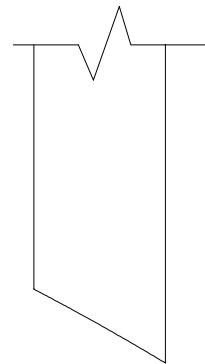


FIG. 31

OPERATING INSTRUCTIONS (Continued)

SETUP PROCEDURE FOR SPIN DRIVE RPM VERSUS TRANSVERSE SPEED

SPIN DRIVE RPM

SPIN DRIVE RPM IS VERY IMPORTANT IN ACHIEVING A QUALITY GRIND. USE CARE IN ESTABLISHING THE SPIN DRIVE RPM, PER THE INSTRUCTIONS BELOW.

Generally, the Spin Drive RPM will be between 180 RPM (45%) and 360 RPM (100%). The speed required to spin a specific reel is dependant on reel diameter, the number of reel blades, and reel hardness. For all reels, there is an optimum Spin Speed where there is an **AGGRESSIVE**, yet smooth grind as you spin grind the reel. Your objective is to spin grind the reel as aggressively and as fast as possible while maintaining top quality.

It is recommended to start grinding each reel at a Spin Speed of 200 RPM (50%) and evaluate the RPM by adjusting higher and lower to optimize the Spin Speed for that reel. If the Spin Speed is incorrectly set, you can experience two problems, grinding wheel dressing or grinding wheel resonance. Each of these problems is explained below.

On some reels, especially small diameter high blade count reels if the Spin Speed RPM is set to high, the reel can act as a dresser to the grinding wheel. There can develop what appears to be a very aggressive grind (as if the infeed has self infed) and then a sudden stop of grinding with no grinding wheel to reel contact. If this occurs, your Spin Speed was set to high and you effectively dressed your grinding wheel.

Some reels have a resonant RPM where the reel goes into harmonics with the grinding wheel and the resonance vibrates the grinder and results in a very bad grind. By changing the Spin Speed to a higher or lower RPM you will move out of the resonant range.

After determining the best Spin Speed RPM for a reel, note the RPM on the "Set-up Chart" in the "NOTES" section. See page 34. By noting the correct RPM, you will avoid evaluating the Spin Speed the next time you grind the reel.

TRAVERSE DRIVE RPM

The Traverse Speed potentiometer is adjustable from approximately 5 feet per minute [1.5 meters per minute] (20%) to 20 feet per minute [6 meters per minute] (100%). It is recommended to grind at approximately 15 feet per minute [4.5 meters per minute] (75%).

Grinding at a slower traverse speed, 10 feet per minute [3 meters per minute] (50%) as an example, will give a better finish but will extend the grind cycle time. Grind finish versus grind cycle time is controlled by the choice of the operator

OPERATING INSTRUCTIONS (CONTINUED)

GRINDING REEL INTO A TRUE CYLINDER BY SPIN GRINDING

Spin Grinding removes the conical shape & restores the reel back to a cylindrical shape with all reel blade edges ground to the same distance from the reel shaft.

Remove the Relief Guide from the Grinding Wheel Guard.

Using the grinding wheel vertical and horizontal adjustments position the wheel lightly against one of the blades. Move end to end and check for alignment and high blades.

When you are satisfied with the adjustment, position the grinding wheel at one end, set the travel speed to zero, and engage the traverse belt.

Locate the travel proximity switches so the grinding wheel can grind off the end of the reel on both sides. With hands away from the reel, turn on the power by pulling out the red power button.

Turn on the spin drive, the grinding wheel, and last the traverse drive and slowly turn up the travel speed until the grinding wheel starts moving across the reel.

Adjust travel speed and infeed as desired.

INFEEED AMOUNT:

The ring located on the inside of the infeed handle is calibrated in .002" [.05mm] increments. The maximum desired infeed is about .008". Most chose a more conservative infeed.

Spin Grind until the grind pattern is uniform from blade to blade and from end to end.



IT IS VERY IMPORTANT IN SPIN GRINDING THAT YOU THOROUGHLY SPARKOUT AT THE END OF THE GRIND CYCLE. THE DIFFERENCE OF ACHIEVING .005 OR .003 TOTAL READING IS ACCOMPLISHED WHEN NOT INFEEEDING THE GRINDING WHEEL.

VERTICAL
ADJUSTMENT

HORIZONTAL
ADJUSTMENT



FIG. 33



ALWAYS WEAR PROPER SAFETY EYEWEAR, HEARING AND RESPIRATORY EQUIPMENT BEFORE TURNING ON AND OPERATING YOUR GRINDER.

It is required to have a sparkout to complete grinding the outside diameter to a true diameter. For sparking out, the process is to infeed the grinding head for approximately .002 stock removal and let the grinding wheel sparkout. For sparking out in grinding process, always traverse grinding head at least 20 passes with no grinding head infeed. Set traverse at slow speed on dial setting approximately 30 percent for final grinding sparkout. After sparkout, shut the grinder completely off.

NOTE: This process refers to sparkout, but what we are looking for is a near sparkout, approximately a 99% reduction in grinding sparks from normal grind. Do not run sparkout until you have no sparks because this could be an extremely extended period.

NOTE: Greatest accuracy and best finish is obtained when reel is sparked out. Use your set up gauge, prior to relief grinding to check the reels for roundness. This is very important when first learning the operation of your machine.

OPERATING INSTRUCTIONS (CONTINUED)

22. FOR THE MODEL 181, PROCEED TO THE RELIEF GRIND PROCESS

REEL SPIRAL

When standing behind the mowing unit when the mowing unit is sitting in normal position on the ground. If the spiral is such that the right side of the blade cuts before the left, it is a right hand lead in or a right hand spiral reel. If the spiral is such that the left side of the blade cuts before the right it is a left hand lead in or left hand spiral reel. Most reels made today are right hand spiral.

RELIEF GRINDING TO COMPLETE THE REEL GRINDING PROCESS

- A. Disconnect the spin drive coupling components from the reel.
- B. Check to see if your mowing unit is a left hand or right hand spiral. See reel spiral definition above. NOTE: As you look into the guide finger in FIG. 35 it shows a reel with reverse helix reel spiral. The high point of finger guide is on the right hand side of the grinding wheel viewed from the finger mounted side. See FIG. 36 for standard helix. Most mowing units are standard helix so traverse your carriage to the right hand side of reel for starting position. Traverse carriage until there is at least .125 (1/8") clearance to the guide finger for indexing. See FIG. 37. Set the right hand traverse stop for this carriage reversing position. Traverse to the other end of the reel blade until the guide finger is beyond the point of grind by approximately .125 (1/8") to .75 (3/4"). Set the left hand traverse stop for this carriage reversing position.
- C. There are two (2) hand knobs to loosen. They are located on the base of the adjusting arms. Raise the grinding wheel up (approximately 7 turns) so the reel blade can rest on the reel guide finger. It will be necessary to infeed the grinding wheel to accomplish this. See FIG. 34.
- D. Now you can adjust the back angle you wish to put on the reel blade. (The average recommended manufacturer's angle is 15 degrees. When in doubt, check with each reel manufacturer as to the exact angle required.) By looking down the reel from the operator's position you can see the reel and its relative position to the grinding wheel. By raising the grinding wheel you will decrease the back angle and conversely by lowering the grinding wheel you will increase the back relief angle. Traverse the grinding wheel assembly to the right side of the reel. Retighten the two hand knobs.

SIDE VIEW OF GRINDING WHEEL

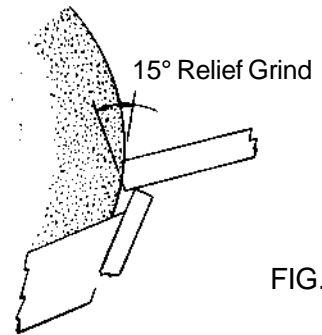


FIG. 34

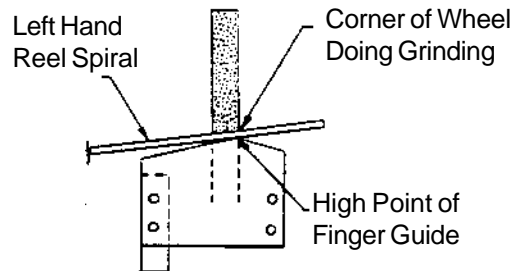


FIG. 35

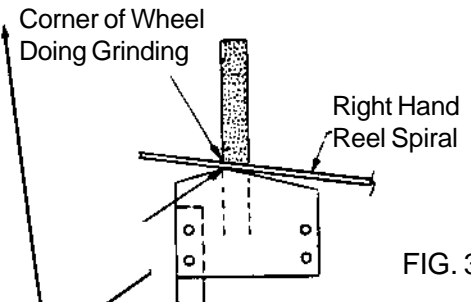


FIG. 36

LOOKING FROM THE REEL LOADING POSITION

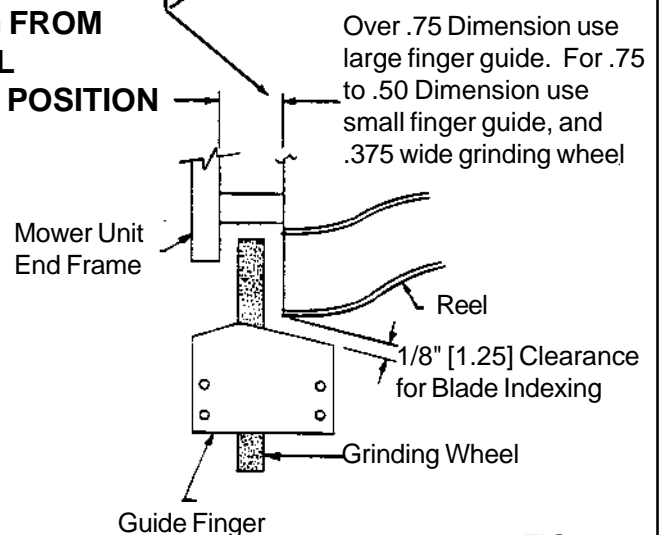


FIG. 37

OPERATING INSTRUCTIONS (Continued)

REEL SPIRAL (CONTINUED)



THE HIGH POINT OF THE GUIDE FINGER MUST ALWAYS BE AT THE CORNER OF THE GRINDING WHEEL THAT IS MAKING CONTACT WITH THE REEL. SEE FIG. 35 & 36.

ROTATE FINGER GUIDE END FOR END WHEN REEL SPIRAL IS IN THE OPPOSITE DIRECTION AS SHOWN IN FIG. 35 & 36.

E. It is recommended that you practice indexing the blades for relief grinding prior to actually grinding them. Do this by backing the grinding wheel away from the blade so that virtually no contact is made with the blade that is resting fully on the guide finger. Now with the grinding wheel NOT turning, turn on traverse motor and set speed at 9 or 10 o'clock position and let grinding assembly traverse down. On the return stroke, always come back on the same blade. After traversing down and returning on a blade, relief grinding requires the operator to manually index to the next blade. This is a critical operation and should be well practice prior to grinding. When on the practice run you have to hold the reel down to the finger on the return stroke.

IT IS NECESSARY TO MANUALLY POSITION THE REEL BLADE ON THE GUIDE FINGER. IF YOU OVER-INDEX AND MISS THE FINGER THE GRINDING WHEEL WILL BE JAMMED BETWEEN TWO BLADES. IF YOU UNDER-INDEX THE GRINDING WHEEL WILL BE JAMMED AGAINST THE BLADE YOU ARE TRYING TO GRIND.



EXTREME CARE MUST BE TAKEN IN LEARNING THIS PROCEDURE AS SERIOUS PERSONAL INJURY COULD OCCUR IF THE OPERATOR CONTACTS THE GRINDING WHEEL OR IS CAUGHT IN A GRINDING WHEEL TO REEL JAM. PRACTICE UNTIL YOU ARE SATISFIED WITH YOUR CAPABILITY.

When you are comfortable with this procedure, continue with the next step in actually grinding.

NOTE: At each end of the stroke when reversing, there must be a 1-second or longer pause. This can be increased. The 1-second hesitation at the end of the stroke permits time to manually index the reel.

- F. It is recommended that when the relief grinding is completed that 60% of the reel blade be removed. This will generally take up to three passes across each blade. At this time infeed the grinding wheel to take 1/3 to 1/2 relief grind. This amount will vary depending on the condition of the reel.
- G. Mark the first blade with an "X" using a felt marker and with this reel blade resting on the finger guide but not making reel contact with the grinding wheel, set the traverse dial to "0", turn on the grinding wheel motor and traversing motor.
- H. Hold the reel to the guide finger with your left hand and turn the traverse speed at 9 or 10 o'clock. As soon as the grinding wheel contacts the reel, remove you hand. The guide finger will keep the blade in place as the grinding assembly traverses across the reel. When it reaches the left side of the reel the reel blade leaves the guide finger and then traverse switches reverse carriage to the opposite direction. The guide finger will automatically pick up the same reel blade and will be held down to the guide finger with the rotation of the grinding wheel driving force downward.
- I. Now continue grinding each blade by indexing them as practiced in procedure "E" until you have ground each blade down and back. When each blade has been ground inspect to see if proper relief has been attained. If not, reset wheel and regrind as before. Continue until you achieve the 60% relief.

OPERATING INSTRUCTIONS (Continued)

REEL BLADE GRINDING WITH CLOSELY SPACED BLADES

- A. If the reel blades are too close together or the clearance between mower unit is too narrow and will not permit you to use the large reel finger guide, it will be necessary to use the alternate stamped finger guide and a 3/8" wide grinding wheel (Part No. 3700363). NOTE: This wheel is not included with the grinder. In order to use this guide you will be required to dress the grinding wheel as follows: Place the guide finger on the grinding motor assembly and position about 1/16" away from the grinding wheel. On the normal helix reels, no dressing is required. See FIG. 38. On the reverse helix reels. See FIG. 39. With the grinding wheel assembly in a position where you can reach it with the dressing stick, turn on the grinding wheel and dress the portion of the wheel at approximately 10 degrees. See FIG. 39.
- B. The grinding procedures for using this finger will be the same as when using the larger guide finger, but because of its relative small size it is recommended that you index from blade to blade in the following manner: When grinding wheel assembly makes contact with the right traversing stop and pauses before reversing direction. Turn the traversing speed dial to "0" this will stop the grinding head carriage. Now index the next blade and slowly dial to move the grinding wheel into the reel while you position the blade onto the guide finger. Once finger is in place and grinding has started turn the speed dial up and continue to grind as before. This procedure will be necessary for every blade.

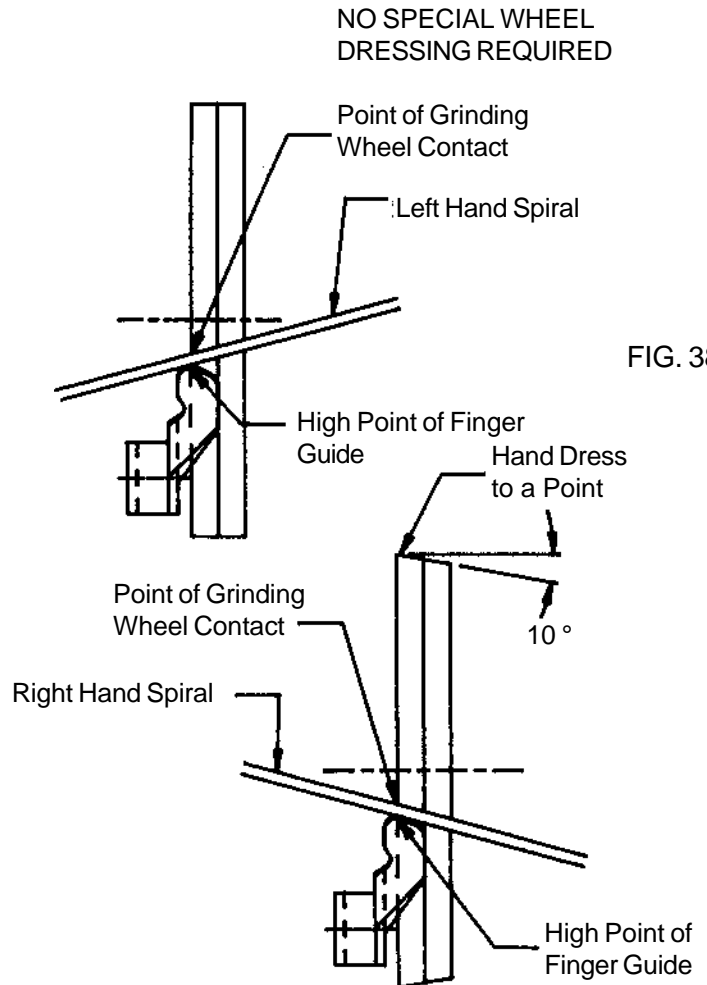


FIG. 38

FIG. 39



IT IS NECESSARY TO MANUALLY POSITION THE REEL BLADE ON THE GUIDE FINGER. IF YOU OVER-INDEX AND MISS THE FINGER THE GRINDING WHEEL WILL BE JAMMED BETWEEN TWO BLADES. IF YOU UNDER-INDEX THE GRINDING WHEEL WILL BE JAMMED AGAINST THE BLADE YOU ARE TRYING TO GRIND. EXTREME CARE MUST BE TAKEN IN LEARNING THIS PROCEDURE AS SERIOUS PERSONAL INJURY COULD OCCUR IF THE OPERATOR CONTACTS THE GRINDING WHEEL OR IS CAUGHT IN A GRINDING WHEEL TO REEL JAM. PRACTICE UNTIL YOU ARE SATISFIED WITH YOUR CAPABILITY.

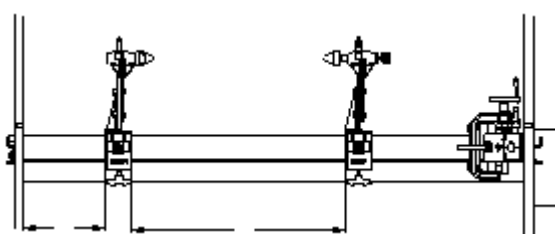
OPERATING INSTRUCTIONS (CONTINUED)

NEARY MODEL 111 & 181 SET UP GUIDE

MOWER TYPE:
MAKE:
MODEL:
Notes on pre-grind prep:

CONNECTING THE REEL TO THE SPIN MOTOR
From Left <input type="checkbox"/> From Right <input type="checkbox"/>
Spin Speed: _____
Notes on Spin Set-up:

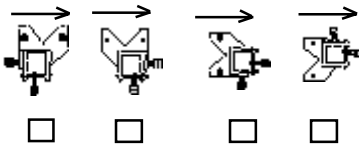
LOWER MOWER SUPPORT SET-UP



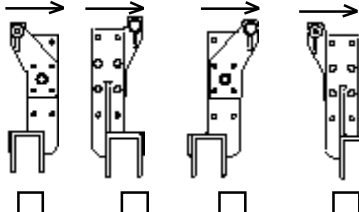
Low Holes Middle holes High Holes

V-ROLLER SUPPORT

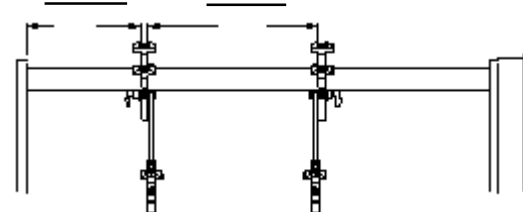
Orientation: (→)front of machine)



CENTER SUPPORT



UPPER MOWER SUPPORT SET-UP



Small Clamp
 Large Clamp
 No Clamp, 90° & bolt

Notes:

Completed By _____ Date _____

OPERATING INSTRUCTIONS (CONTINUED)

23. RECORD YOUR SET UP ON THE FORM, THE SET UP GUIDE.

We recommend recording the setups. This will make your job easier, and will make it much easier to show someone else how to use the machine in the future. Make copies of page 34 and record the set ups for each type of cutting unit.

24. MOVE THE GRINDING WHEEL BACK TO ONE END.

25. CAREFULLY REMOVE THE CUTTING UNIT FROM THE GRINDER.

Keep hands and feet and other body parts out from under the cutting unit.

26. DO NOT DAMAGE THE CUTTING EDGES OF THE BLADES MOVING THE CUTTING UNIT AWAY FROM THE GRINDER.

The reel or cutting unit is now sharp and ready for reassembly and adjustment.

BACK LAPPING

Many turf professionals feel that it is necessary to back lap reels and bed knives after grinding . This assures a proper match between the bed knife and the reel cutting edges. It also establishes a "land" area on the reel blades. The Model 18556 Lapping Machine used for the spin drive on the Model 181 may be removed from the shelf and used as a back lapper on the floor.

SERVICE DATA

SKILL AND TRAINING REQUIRED FOR SERVICING

This Service Section of this manual is designed for technicians who have the necessary mechanical and electrical knowledge and skills to reliably test and repair the 111/181 Reel Grinder. For those without the background, service can be arranged through your local distributor.

This section presumes that you are already familiar with the normal operation of the Grinder. If not, you should read the front 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	GRADE 5	GRADE 8
	 SMOOTH HEAD	 3 MARKS on HEAD	 6 MARKS on HEAD
1/4 In. thread	6 ft-lbs (0.8 kg-m)	9 ft-lbs (1.25 kg-m)	13 ft-lbs (1.8 kg-m)
5/16 In. thread	11 ft-lbs (1.5 kg-m)	18 ft-lbs (2.5 kg-m)	28 ft-lbs (3.9 kg-m)
3/8 In. thread	19 ft-lbs (2.6 kg-m)	31 ft-lbs (4.3 kg-m)	46 ft-lbs (6.4 kg-m)
7/16 In. thread	30 ft-lbs (4.1 kg-m)	50 ft-lbs (6.9 kg-m)	75 ft-lbs (10.4 kg-m)
1/2 In. thread	45 ft-lbs (6.2 kg-m)	75 ft-lbs (10.4 kg-m)	115 ft-lbs (15.9 kg-m)

MAINTENANCE

CHANGING THE GRINDING WHEEL #3700090:

When installing a new grinding wheel, it is important to follow the instructions provided by the grinding wheel manufacturer. These instructions are detailed on page 3 of the manual.



BEFORE PERFORMING ANY MAINTENANCE PROCEDURE UNPLUG THE UNIT FROM ITS POWER SOURCE.

DAILY MAINTENANCE IS TO BE PERFORMED BY THE OPERATOR. PERIODIC MAINTENANCE ITEMS ARE TO BE PERFORMED BY YOUR COMPANY'S MAINTENANCE DEPARTMENT:

DAILY MAINTENANCE

On a daily basis, clean the grinder by wiping all areas down.

On a daily basis, inspect the grinder for loose fasteners or components and tighten.

Contact your company's Maintenance Department if damaged or defective parts are found.



DO NOT USE COMPRESSED AIR TO CLEAN GRINDING DUST FROM THE GRINDER.



FIG. 40

Wiper

PERIODIC MAINTENANCE

1. Check gib plate adjustment in the grinder carriage base monthly. See Troubleshooting Section for Adjustment.
2. Check the free play in the grinding wheel shaft bearings once a year. Replace if excessive play exists.
3. Replace the four foam rail wipers (FIG. 40) every 6 months of operation.
4. Check the brushes on the auto traverse drive motor once every 24 months. Replace as necessary.
5. Lubricate the shafts and bearings at least every three to six months. Follow the lubrication procedure located on page 38.
6. On a monthly basis spray a lubricant onto the vertical and horizontal screws and also the motorhead infeed and height adjustment screws.

MAINTENANCE (Continued)

LUBRICATION

Linear Bearings

Do the following at least every six months:

1. Thoroughly clean the carriage rails and shaft seals. Wipe the shafts and seals thoroughly with a clean rag.

While cleaning, traverse the carriage several times to clean the full length of the rails.

2. Flood-spray shafts with WD-40 or an equivalent lubricant (**do not use a Teflon-based lubricant**) until lubricant drips off the shafts. Then run the carriage back and forth through its range of travel.
3. With a clean rag, wipe the excess 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 shafts feel dry.

IMPORTANT: If the machine will be shut down for more than one month, flood the shafts and other appropriate parts with lubricant as outlined above, and leave the lubricant in place until the unit will be used again. Then repeat the above lubrication procedure before operating.

ADJUSTMENTS

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. 41. 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 linear bearing around the shaft. This cogging is from the skidding of the bearing on the shaft and indicates tension screw is too tight.

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



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

LINEAR BEARING

STEP 3--Slide linear bearing under carriage and attach with the four screws.

NOTE: Repeat Steps 1 thru 3 with the other two linear bearings.

STEP 4--After all three linear bearings are reattached 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, which is free play up and down. The most dependable method of checking free play is to use a magnetic base dial indicator attached to the traverse frame weldment and reading the vertical movement above each bearing. This movement should be within .001" [.03 mm] Also, when pulling the carriage in the traversing direction, there should be only approximately a 3 lb force, with the belt clamp disengaged. 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.

TENSION ADJUSTMENT SCREW
(POSITION FACING OUT)

FIG. 41

ADJUSTMENT (Continued)

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 until the springs are fully compressed then back off 1-turn. If the springs are not tensioned equally, uneven loading on the traverse system may cause parts to fail.



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

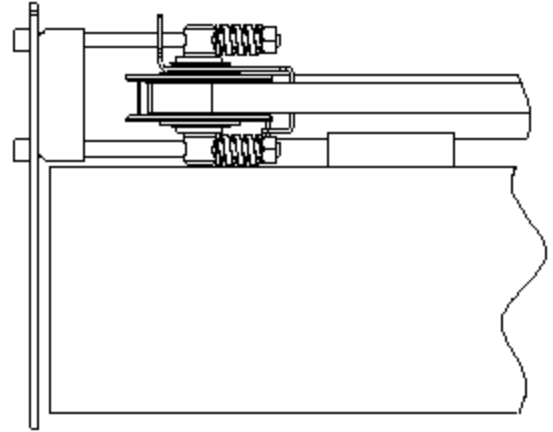


FIG. 42

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). Lock in place by tightening the jam nut against the clamp being careful not to move the tip.



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

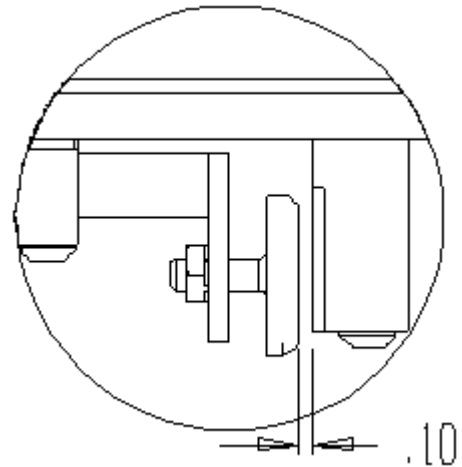


FIG. 43

GRIND MOTOR BELT TENSION

The belt must be tensioned so when the lock handle is locked the maximum belt deflection is .12 at a 10lb./load.

ADJUSTMENTS (Continued)

TO ADJUST THE CARRIAGE GIB PLATE

The gib plate must be readjusted occasionally to eliminate free play. Otherwise, the grinding head can move from side to side, and the reel may be ground unevenly.

The gib must allow the carriage to be cranked freely forward and back without any side play. See FIG. 44.

To adjust:

1. Crank the carriage all the way forward (toward the operator position).
2. Tighten the front gib screw until the carriage has no side play but the horizontal handwheel can still be cranked.
3. Crank the carriage gradually back (away from the operator position), and adjust the remaining gib screws as you go.

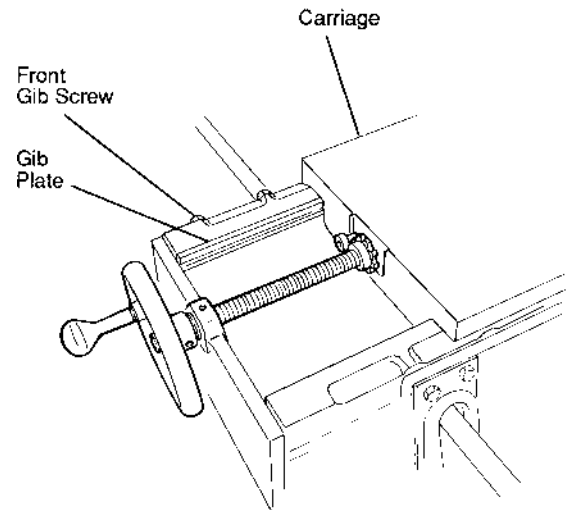


FIG. 44

FREQUENT OVERLOADING AND CIRCUIT TRIPPING

The magnetic starter is factory set at a 12 AMP rating. If your motor is frequently shutting down, consult the factory. The main control power source is for a 15 AMP supply circuit. See machine set up for explanation.

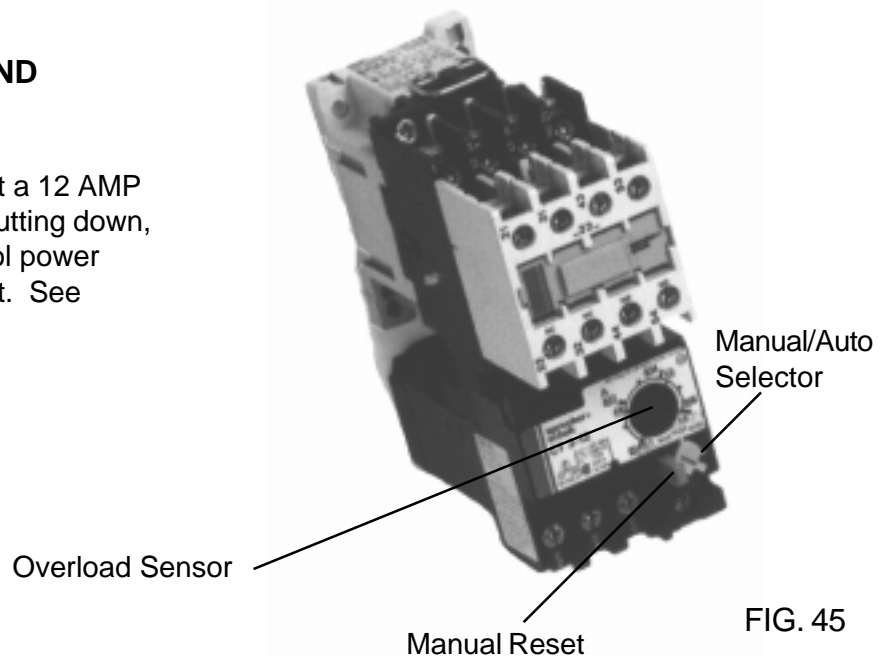


FIG. 45

ADJUSTMENTS (Continued)

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 6mm [.234"] needs to be maintained between the proximity sensing bracket and the proximity switch.

NOTE: Light on proximity activates when metal crosses over the switch.

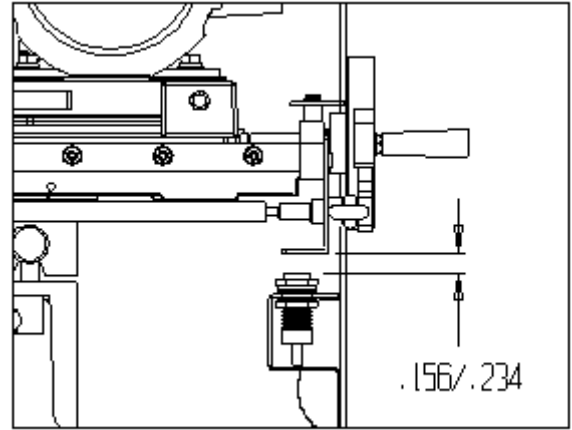


FIG. 46

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. 47.

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

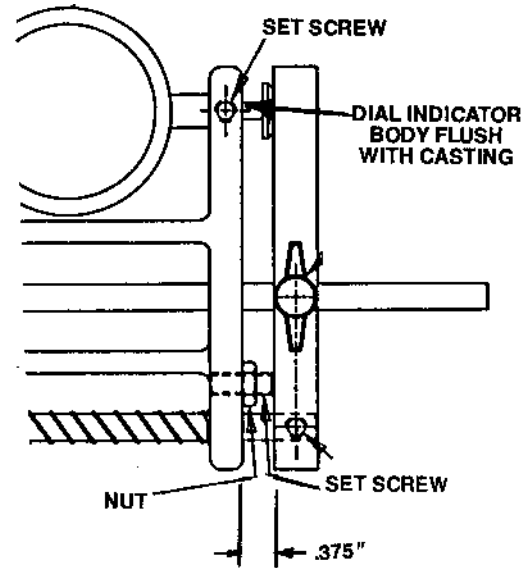


FIG. 47

SET UP GAUGE ADJUSTMENT

There should be no backlash in the fine adjustment screw on the set up gauge slide. See FIG. 48. Adjust hex nut tight so conical washer is completely compressed then back off 1/2 turn.

Make sure the set screw is compressing the nylon plug tightly on the vertical adjusting screw.

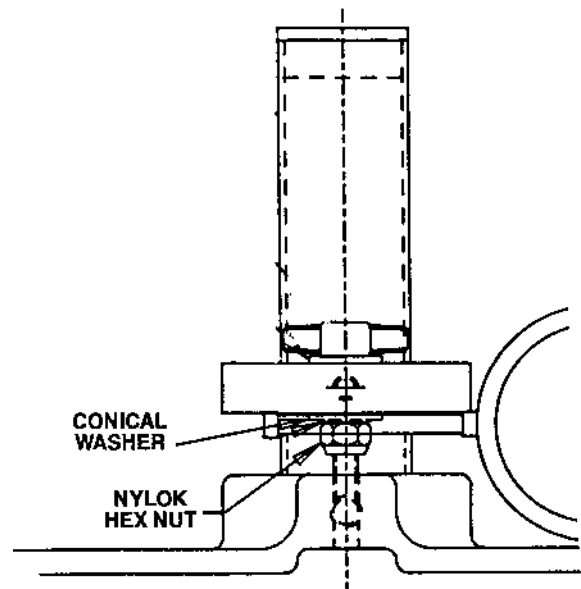


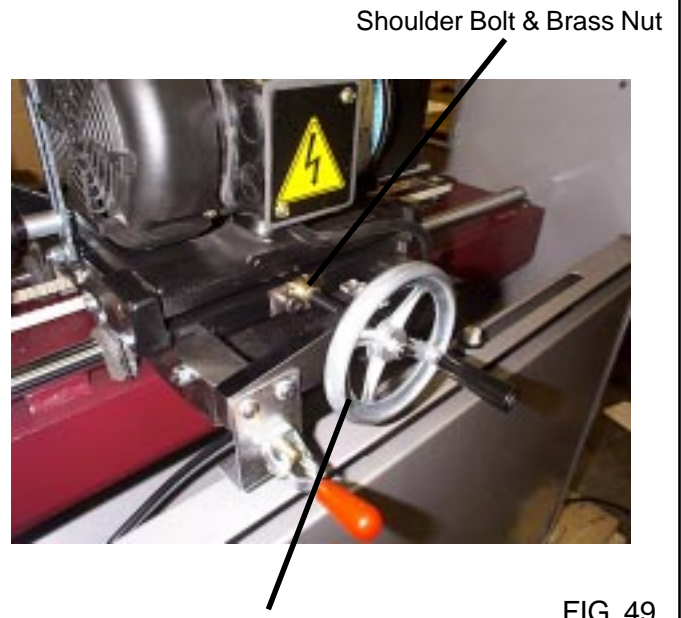
FIG. 48

ADJUSTMENTS (Continued)

TO ELIMINATE CARRIAGE INFEED BACKLASH

If there is backlash in the carriage infeed handwheel (See FIG. 49), 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. Then turn the nut one notch (40 degrees) further.
 - C. Reinstall the shoulder bolt to lock the nut in position.
2. Washers behind the handwheel:
 - A. Loosen (about one-half turn) the set screw holding the handwheel to the shaft.
 - B. Tighten the hex nut which secures the handwheel to 100 in.-lbs [1.15 kg-m), then back it off 1/2 turn.
 - C. Check for .015 in [.4 mm] gap between the wave washer and flat washer. See insert to FIG. 50. Readjust the hex nut if necessary.
 - D. Tighten the set screw holding the handwheel to the shaft.



Carriage Infeed Handwheel

FIG. 49

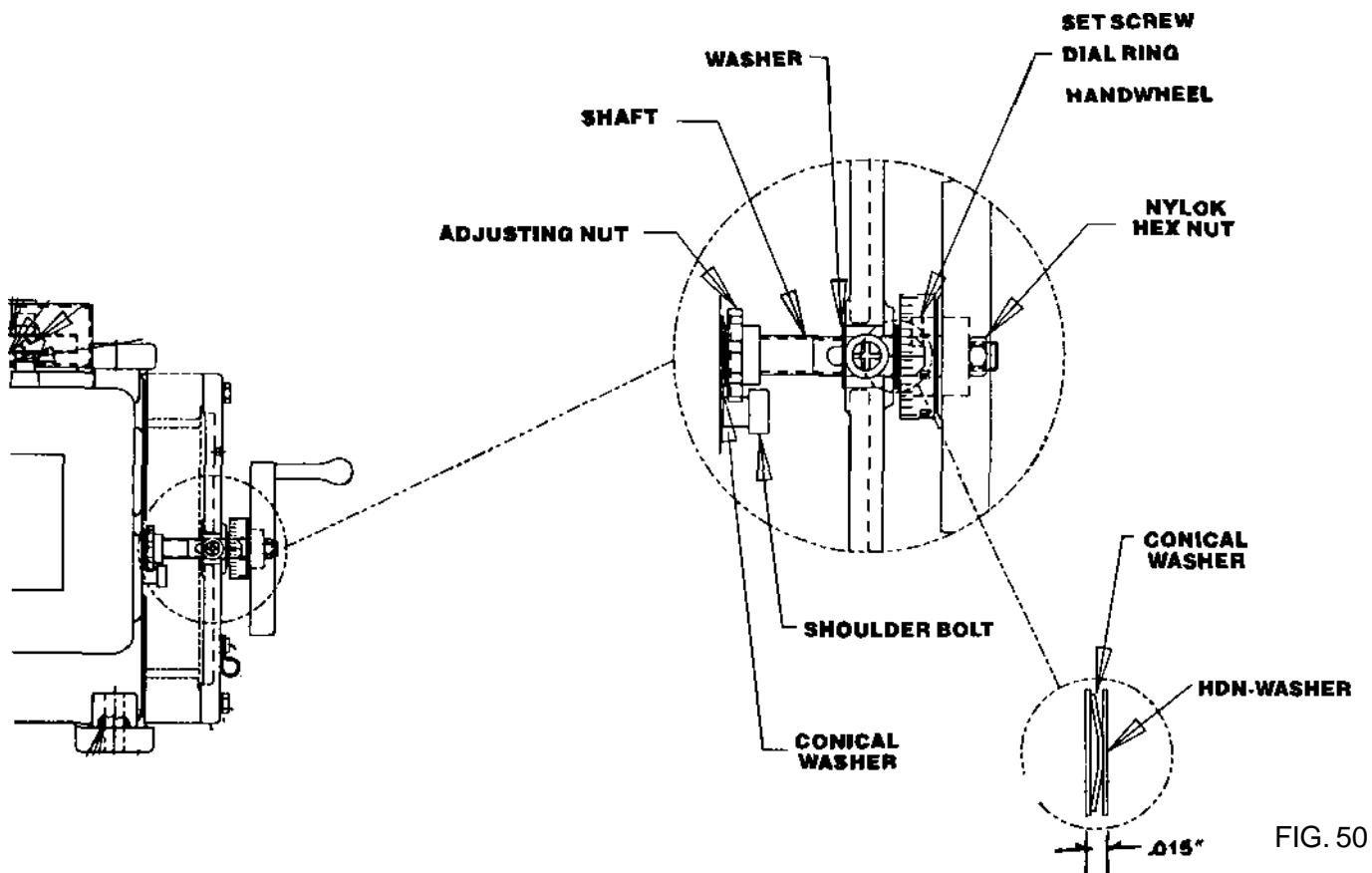


FIG. 50

TROUBLE SHOOTING

Troubleshooting:

1. Ask Questions???
2. Double check the easy things first.
3. Establish a sequence.
4. Use common sense.
5. Use the manual.
6. Safety First!!!

Ask Questions???

What does it do right?	What does it do wrong?
What won't it do?	Did it fail gradually?
Did it fail suddenly?	Did it ever work right?
What does the failure look like?	
Did it smoke?	Was there a smell?
Were there any different sounds?	

Electrical Control Boxes:

Double check the following to assure that something as simple as a loose connection is not the source of the problem. When a grind motor starts, it draws up to 55 amps for a very brief period of time. A loose connection cannot carry enough current to start the motors.

1. Double check the easy things first!!!
2. Tighten all screws (wire connections).
3. With the power off, push all buttons (on contactors, motor starters and relays) .
4. With the power off, push on all relays (to assure they are seated in their sockets).
5. Reset all circuit breakers.

Then try again...

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
<p>Grinding motor does not function (no apparent power to machine)</p>	<p>A--System start Switch (SSS) is not on</p>	<p>Pull Emergency stop switch out to turn on the grinder.</p>	<p>115 volt single phase AC power source required</p>
	<p>B--Main power source breaker is tripped, power source switch is off, or grinder is not plugged in.</p>	<p>Reset breaker, turn switch on, or plug machine in.</p>	
	<p>C--Machine circuit breakers are not switched to the on position.</p>	<p>Set circuit breakers to the on position.</p>	
	<p>D--Power not getting through the motor contactor</p>	<p>With a voltmeter set to AC voltage, check terminals 1 and 2 for 115 Volt AC. If no voltage replace contactor</p>	
<p>Turn on grinding motor and it immediately shuts off.</p>	<p>E--Burned out motor</p> <p>A-- Low voltage coming into machine and tripping the low voltage relay (LVR)</p>	<p>Replace Motor. Part #3707991</p> <p>Check power source to see if adequate. Don't use an extension cord.</p>	<p>This machine is equipped with a LVR. If voltage is too low at the outlet, or an extension cord is used, the machine will turn itself off.</p>
<p>Spin drive/ Backlapper will not run.</p>	<p>A-- Direction switch on back of Spin drive in not selected, or speed pot is at zero.</p>	<p>Check the direction switch on the back of the spin drive. It must be up or down for the spin drive to operate. Turn the pot located on the spin drive clockwise.</p>	
	<p>B-- Spin drive is defective or plug on electrical panel has malfunctioned.</p>	<p>Plug spin drive into a 120 V 15amp outlet to verify it is working. With voltmeter check receptacle in the back of the electrical box.</p>	
<p>Grinding carriage does not traverse</p>	<p>A-- Speed pot is turned down low, carriage not engaged to belt</p>	<p>Engage the traverse clamp and turn speed pot clockwise until you can see movement</p>	<p>A DC motor control board controls the traverse system. Part number 3707550.</p>
	<p>B-- DC motor drive board has malfunctioning.</p>	<p>Check the traverse board fuse. Check all traverse board pot are set too the proper settings. Check wiring for looseness.</p>	
<p>Carriage does not change direction</p>	<p>A-- Travel limit proximity switch not set at proper height.</p>	<p>Make sure there is about 3/16 clearance between the top of the proximity switch and the travel flag.</p>	<p>There is a designated left hand a right hand proximity switch</p>
	<p>B-- The two travel limit proximity switch positions are reversed.</p>	<p>Reverse the placement of the two switches and recheck travel position.</p>	

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
Carriage movement not smooth or is erratic	<p>C--Damage proximity switch or loose wire</p>	<p>Check for looseness in the wire. Check for any damage to switch or wire. Check function of proximity switch by passing a metal object over the sensor and verify sensor lights turn on.</p>	<p>The lights coming on shows the proximity switch is getting electrical contact.</p>
	<p>A--Carriage is binding on rails. There is an obstruction. Travel pulleys are misaligning.</p>	<p>Clear any obstruction in the path of the carriage travel. Check and align carriage on linear guides. Check the traverse pulley alignment.</p>	
	<p>B--Settings of the pots on the DC traverse drive board are not correct.</p>	<p>Check setting by referring to Potentiometer adjustment section.</p>	
	<p>C--Travel speed set too low.</p>	<p>Turn up the travel speed.</p>	

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
<p>Traverse motor does not work.</p>	<p>A--Blown fuse.</p>	<p>Replace the 3 amp slo-blo fuse on the control board and decrease stock removal rate.</p>	<p>Extremely heavy grinding cuts cause excessive loading of the motor.</p>
		<p>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>Worn and binding actuators causes heavy loading to motor.</p>
		<p>Replace the lineal 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>	<p>Grinding grit over a period of time does get into the lineal bearings and causes excessive drive torque of carriage.</p>
	<p>B--No voltage going to motor.</p>	<p>Check for 90 volt DC at the circuit board leads going to the motor. Across terminals A1 and A2, check reading with a voltage meter. When there is voltage from the circuit board but DC motor does not run, check wiring and connections. The voltage reading varies with speed pot setting. NOTE: Make sure speed pot setting is towards the maximum dial reading for 90 volts. Check for incoming voltage at L1 to L2 for at least 105 Volts AC Red power light is on.</p>	<p>This checks to see that voltage is getting to the control board.</p>
	<p>C--Bad traverse motor.</p>	<p>Remove the brushes one at a time and maintain orientation for reinsertion. See if brush is worn short 3/8" [9.5 mm] minimum length, and look at wear pattern on commutator for arcing. Replace brushes if necessary. Replace motor if brushes are good. Remove wires from A1 to A2 from the spin motor. Check with the ohm meter for "0" ohms across the white and black wires.</p>	<p>A short brush does not make an adequate electrical connection to run the electrical motor. NOTE: Brushes are long lived and seldom need replacing.</p>

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
<p>Traverse speed control goes at one speed only.</p>	<p>A--Wiring hookup to potentiometer is improper. (If components have been replaced.)</p>	<p>Check potentiometer wiring for proper hookup. See that speed pot is wired per electrical diagram.</p>	<p>Wrong wire hookup effects traverse control. Reversing red and black 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>B--Defective speed control potentiometer.</p>	<p>Check Potentiometer on control panel.</p>	<p>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 If Yes, pot is O.K. If No, go to step below</p>
	<p>C--Main circuit board dial pot settings not correct. (If board has been replaced.)</p>	<p>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</p>	<p>Check for 10,000 ohms red to white wires Full CCW--10,000 ohms Full CW--0 ohms Red to black wires Full CCW--0 ohms Full CW--10,000 ohms If Yes, pot is O.K. If No, replace potentiometer. Wiper inside of potentiometer controls speed. Wiper may be bad and not making contact.</p>

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
--MECHANICAL--			
<p>Carriage traversing (varies speed) while grinding.</p>	<p>A--Traverse belt is slipping.</p> <p>B--Lineal bearings in carriage do not rotate freely.</p>	<p>Adjust clamping tip belt tension. See Traverse clamp force in Adjustments Section.</p> <p>Replace the lineal bearings in the main carriage. (For more detail, see lineal bearing replacement in the adjustment section of the manual.)</p>	<p>Driving torque is lost because the belt is slipping.</p> <p>Grinding grit over a period of time does get into the lineal bearings and cause excessive drive torque of carriage. Abrasive noise is detectable when excessive grit is in the lineal bearings.</p>
<p>Traverse speed is too slow.</p>	<p>A--Lineal bearings in the carriage are set too tight.</p>	<p>Readjust bearings for proper tension. (For more detail see lineal bearing replacement in the adjustment section of the manual.)</p>	<p>When bearing preload is too tight, it causes excessive loading to drive the carriage. When lineal actuator is disengaged, the proper traverse load 2 to 3 lb. Use a tension scale to check. (A general guide only.)</p> <p>NOTE: Check with linear actuator released.</p>

TROUBLESHOOTING (Continued) STRAIGHTNESS OF GROUND REEL

--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 set up gauge.

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 set up gauge while mower unit is in the spin grinder (see reel set up gauge instructions in operating instruction section).

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
See Above.	A--Too heavy a grind on the final grinding pass.	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 25 percent 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.	For close tolerance in roundness the sparking out process is critical on final grinding of a reel.
	B--Overhead clamps and fixture clamps are not holding mower unit tight.	Tighten down eight locking hand knobs. Four hand knobs for the square tube top and bottom clamps, two knobs for the mower holding clamps, and two knobs for the mower clamp swivel. Check alignment of overhead clamp so there is no binding before locking down of hand knobs.	To eliminate reel movement during grinding.
	C--Square tubing tooling bar for fixture holding is not rigid.	The pivot end is bolted stationary and must be tight. On adjustable end, tighten slide end locking handles one for vertical and one for horizontal locking.	To eliminate reel movement during grinding.

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
<p>Reel ground in a concave , convex shape or irregular shape.</p>	<p>D--Grinding wheel head moving.</p>	<p>Tighten up two head mounting bolts, torque screws to 19 ft. lbs.</p>	<p>To prevent grinding head from moving.</p>
	<p>There are two adjusting handles to tighten. They are located on the slots on the adjusting arm. There is also one set screw with a nylon plug for tension for grinding wheel vertical height adjustment locking screw.</p>	<p>The two adjusting arm locks will not hold the motor base rigid when locked down tightly.</p>	
	<p>E--Gibs loose on carriage.</p>	<p>Tighten gib screws to prevent movement.</p>	<p>To prevent grinding head from moving during grinding.</p>
	<p>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>F--Tooling bar support brackets are loose.</p>	<p>All reels are mounted with two V-support brackets or two center support 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 the supports are not held tight to the square tube, the reel can move during grinding.</p>
	<p>When using center supports, check to see if the fixed center is screwed in tight using a wrench. The adjustable center is to be locked tight with locking knobs.</p>	<p>Loose centers effect grinding accuracy.</p>	
<p>Vise chain clamps are to have sufficient tension.</p>	<p>Clamps must be tight to prevent movement during grinding.</p>		

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
<p>Reel ground in a concave , convex shape or irregular shape.</p>	<p>H--Carriage has varying load in either direction from grinding grit buildup inside of linear bearings.</p>	<p>With belt clamp released from the traverse belt, check for a 2 to 3 lb. traversing load in both directions.</p>	<p>With grit buildup uneven loading to linear bearings can effect the straightness of grinding.</p>
		<p>When there is a varying load or excessive noisy bearings, have linear bearings replaced. (For more detail, see replacing carriage linear bearing in the adjustment section.)</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>I--Rails not straight. Check rail towards the reel side for straightness in the horizontal plane.</p>	<p>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>Rail straightness directly effects grind straightness of outside diameter of the reel in the horizontal plane.</p>
<p>J--Rails not straight vertical plane straightness of rails.</p>	<p>Use a 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>This plane is not as critical for reel grinding accuracy, but still must be held to tolerance listed to hold grind straightness of outside diameter of the reel.</p>	

--PROBLEM--

Roundness of reel varies: Reel blades are high or low.

(Use set up gage to check roundness; see set up gage instructions in manual.) The high and low indicator readings on the reel outside diameter should not vary over .001.

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
See Above.	Did not sparkout properly on final grinding pass.	Infeed approximately .002 (on the infeed dial) 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 25 percent for final grinding sparkout. The spin drive to be towards the higher RPM. (See chart in Operating Instruction Section of the manual.) 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.	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. The rule of thumb is a higher spin drive RPM and a slower traverse speed gives a higher quality of finish required in the final grind.
Grinding stock removal from reel irregular when reversing directions of grind.	A--Gibs loose on carriage.	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.	To prevent grinding head from moving during grinding.
	B--Grinding wheel head moving.	Tighten up head mounting bolts that holds the head in a vertical locked position, torque screw to 19 ft. lbs. There are two hand adjusting knobs to tighten. They are located on the slots of the adjusting arm. Also, the set screw with a nylon plug located on the vertical adjustment shaft should be tight.	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.

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
<p>Grinding stock removal from reel irregular when reversing directions of grind.</p>	<p>C--Carriage has varying load in either direction from grinding grit buildup inside of linear bearings.</p> <p>D--Carriage has vertical movement.</p>	<p>With belt clamp released from the traverse belt, check for a 2 to 3 lb. traversing load in both direction. When there is a varying load or excessive noisy bearings, have linear bearings replaced. (For more detail, see replace carriage linear bearings in the adjustment section.)</p> <p>Adjust linear bearings. (For more detail, see adjustment section for proper adjustment.</p>	<p>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>Proper linear bearing adjustment is needed to eliminate zero vertical movement.</p>
<p>Too heavy a burr on cutting edge of reel blades.</p>	<p>Too heavy a grind on final grinding pass.</p>	<p>Make two infeeds of .002 (on the infeed dial) each for grinding, then let the grinder sparkout. For sparking out in grinding always traverse grinding head with no infeed for final 20 passes. Use a hardwood board or a deburring tool is desired for complete burr removal. The spin drive to be towards the higher RPM. (See chart in Operating Instruction Section of the manual.) 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>Light grinds in final passes create less of a burr and would remove some of previous burrs from heavy grind passes.</p>
<p>Cone shape of reel.</p>	<p>Reel position not parallel to carriage travel.</p>	<p>Use reel setup gage procedure touching off on reel hub to zero out the reel position from each end. (For more detail, see reel setup gage procedure in manual.)</p>	<p>Reel hub has to be parallel to carriage traverse rails so reel is not cone shaped.</p>

--PROBLEM--	--POSSIBLE CAUSE--	--REMEDY--	--REASON--
Relief grind on the reel blades do not go full length.	Large finger guide is mounted on backwards.	Mount the large finger guide so that the corner of the wheel doing the grinding and the high point of finger guides are in the same location. (For more detail, see relief grinding section in operating instructions of the manual.)	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 of the grinding wheel.
	Large finger guide is too wide.	Use smaller finger.	Smaller finger will allow traversing complete length of reel.

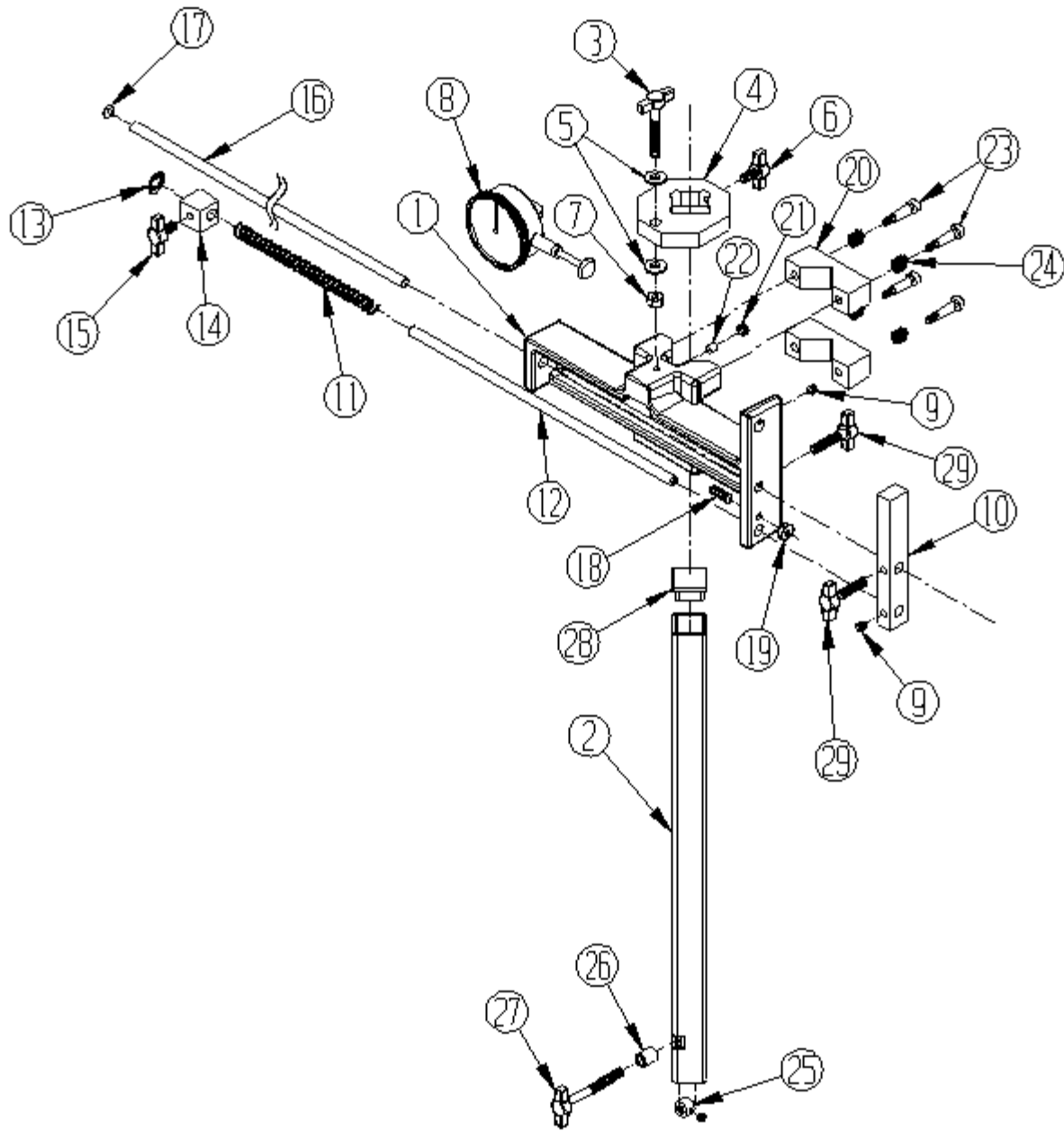
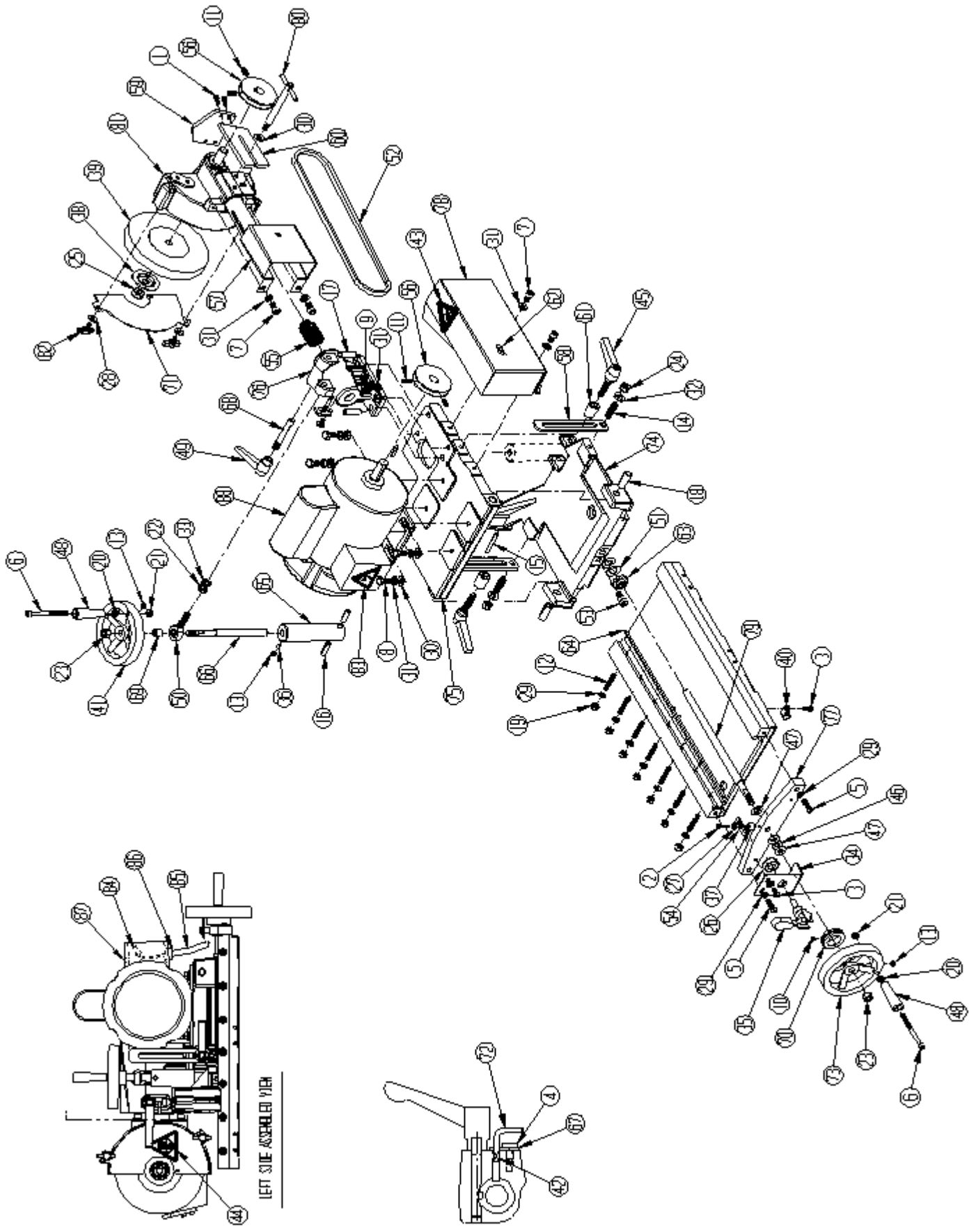


DIAGRAM NO.	PART NO.	DESCRIPTION
1	6009089	Slide, Setup Gage
2	18003	Tube, Gage Slide
3	6009599	Tee Knob Assembly 1.75 lg.
4	6009049	Block, Adjust Slide
5	K250001	1/4 Flat SAE Washer
6	7469533	T-Knob Assembly .88 Long
7	J257100	Locknut--Nylon 1/4-20 Full
8	3579123	Dial Indicator
9	C250420	SKSS, CP-PT, 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	6009598	Tee Knob Assembly
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	6009057	Square
27	6009597	Tee Knob Assembly 2.25 Lg.
28	3708154	Plug--Spacer
29	6009596	Tee Knob Assembly, Nylon

18503 GRINDING HEAD ASSEMBLY

EXPLODED VIEW



LEFT SIDE ASSEMBLY VIEW

VPI 666

PARTS LIST

18503 GRINDING HEAD ASSEMBLY

DIA. NO.	PART NO.	PART NAME	DIA. NO.	PART NO.	PART NAME
1	B190831	10-32x1/2 Socket Head Cap Screw	48	3709370	Handle
2	B191233	10-32x3/4 Pan Head Machine Screw	49	3709437	3/8-16 Adj Handle
3	B250816	1/4-20x1/2 Button Head Cap Screw	50	3709463	Rod End Bearing
4	B250819	1/4-20x1/2 Truss Head Machine Screw	51	3709620	Conical Washer
5	B251616	1/4-20x1 Button Head Cap Screw	52	3709764	V-Belt
6	B255011	1/4-20x3-1/8 Socket Head Cap Screw	53	3709809	.375 Dia x .38 Lg Shoulder Bolt
7	B310811	5/16-18x1/2 Socket Head Cap Screw	54	3809047	Clear Indicator
8	B311001	5/16-18x5/8 Hex Head Cap Screw	55	3889059	1.13 OD 2.0 Lg Compr. Spring
9	B311401	5/16-18x7/8 Hex Head Cap Screw	56	3889088	.62 Bore Pulley
10	C250420	1/4-20x1/4 Socket Setscrew Cup Pt.	57	3889509	Belt Guard Weldment
11	C251020	1/4-20x5/8 Socket Setscrew Cup Pt.	58	3969027	Adjusting Arm
12	C252420	1/4-20x1-1/2 Socket Setscrew Cup Pt.	59	3969057	Reel Guide Finger
13	C310420	5/16-18x1/4 Socket Setscrew Cup Pt.	60	3969058	Guide Finger Support
14	C372020	3/8-16x1-1/4 Socket Setscrew Cup Pt.	61	3969065	.406ID x 1Lg Steel Spacer
15	H252802	.25 Dia x 1.75Lg Roll Pin	62	4509385	Rotation Decal
16	H311602	.31 Dia x 1 Lg Roll Pin	63	6009024	1/2-10 ACME Backlash Nut
17	H372002	.38 Dia x 1.25 Lg Roll Pin	64	6009025	Gib Plate
18	H502001	.50 Dia x 1.25 Lg Dowel Pin	65	6009026	Tapped Pivot Sleeve
19	J251000	1/4-20 Hex Nut	66	6009027	ACME Adjusting Shaft
20	J252000	1/4-20 Hex Jam Nut	67	6009029	Keeper Plate
21	J257000	1/4-20 Thin Locknut	68	6009030	Shaft Locking Stud
22	J371100	3/8-24 Hex Nut	69	6009031	.386 ID x .56Lg Steel Spacer
23	J377000	3/8-16 Locknut Jam Nylon	70	6009034	Calibrated Ring
24	J377100	3/8-16 Locknut Hex Nylok Full	71	6009037	Wheel Guard
25	J502100	1/2-20 Hex Jam Nut	72	6009041	Angle Locking Pin
26	J627200	5/8-18 Locknut Jam Nylon	73	6009044	4.50 Dia Modified Handwheel
27	K190001	#10 Flat Washer	74	6009083	Grinding Head Slide Base
28	K250001	1/4 Flat Washer	75	6009084	Grinding Head Pivot Base
29	K251501	1/4 Split Lock Washer	76	6009088	Grinding Head Swivel Base
30	K310001	5/16 Flat Washer	77	6009136	Feed Screw Guide
31	K311501	5/16 Split Lock Washer	78	6009216	Rear Belt Guard
32	K370001	3/8 Flat Washer	79	6009218	ACME Adjusting Shaft
33	K371501	3/8 Split Lock Washer	80	6009535	Tee Handle Assembly
34	18067	Traverse Clamp Bracket	81	6009587	Grinding Head Arbor Assembly
35	80335	Destaco Clamp	82	6009598	1/4-20 x .5Lg Tee Knob Assy.
36	3579109	Nylon Plug 3/16 Dia.	83	3708448	Electrical Warning Decal
37	3589081	Spacer .191 ID x .438 OD x .43 Lg	84	3707155	Black Wire Nut w/Setscrew
38	3649018	Outer Flange	85	6009195	Grind Motor Cord
39	3700090	Grinding Wheel 6" Dia x .75" Wide	86	3707976	3/8 Cable Connector
40	3707935	Cord Clip	87	3709372	.50 Dia Hole Plug
41	3708148	Handwheel 4.5 Dia	88	3707991	3/4 HP Motor
42	3708213	.24 OD x .62 Lg Comp. Spring			
43	3708458	Sharp Warning Decal			
44	3708461	RPM Warning Decal			
45	3708561	3/8-16x1.56Lg Adj. Handle			
46	3709062	Conical Washer			
47	3709304	Thrust Washer			

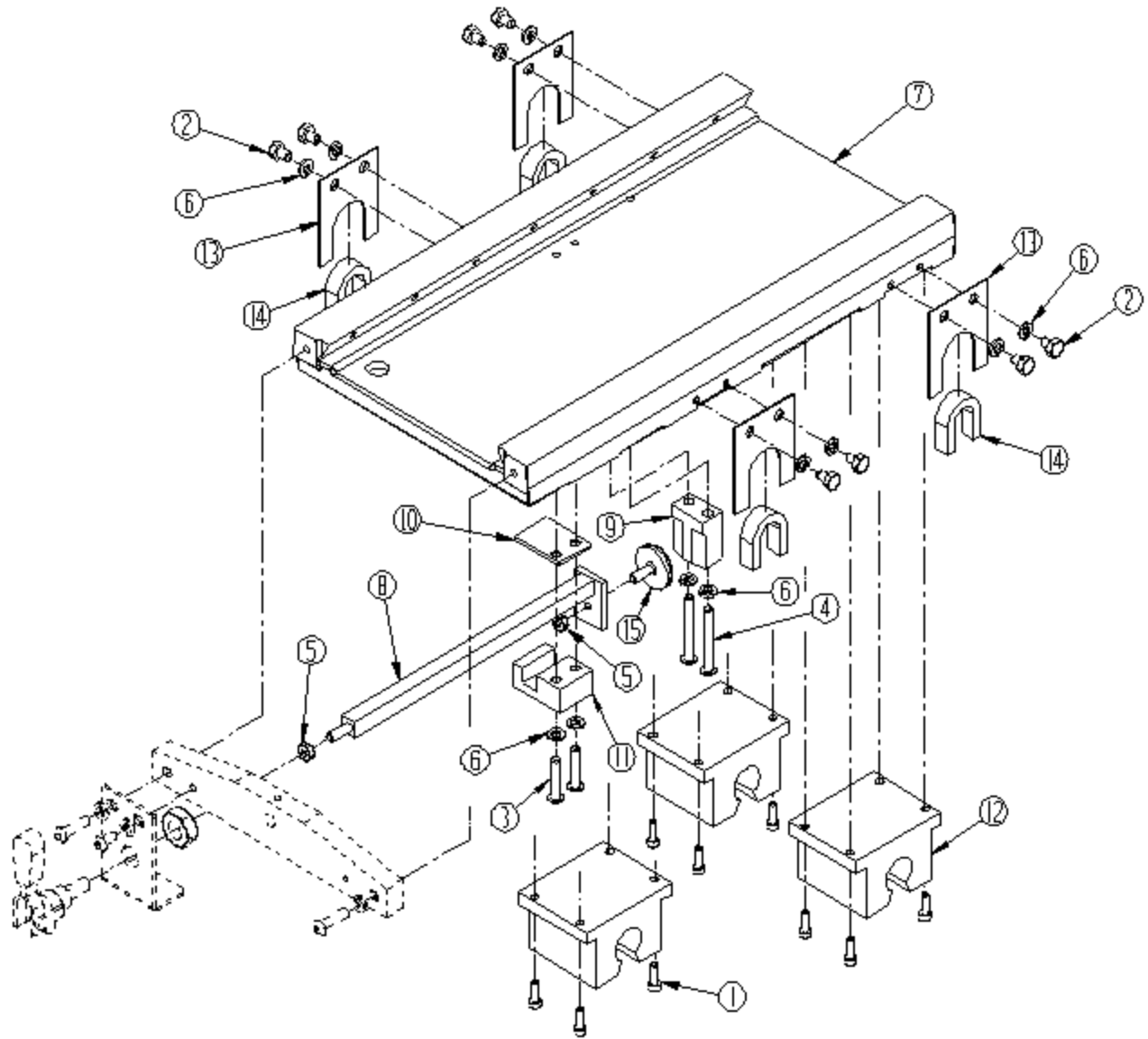


DIAGRAM NO.	PART NO.	DESCRIPTION
1	B191011	#10-24x5/8 Socket Head Cap Screw
2	B250601	1/4-20x3/8 Hex Head Cap Screw
3	B252016	1/4-20x1-1/4 Button Head Socket Cap Screw
4	B253216	1/4-20x2 Button Head Socket Cap Screw
5	J252000	1/4-20 Hex Jam Nut
6	K251501	1/4 Split Lockwasher
7	18065	Carriage Base
8	18571	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

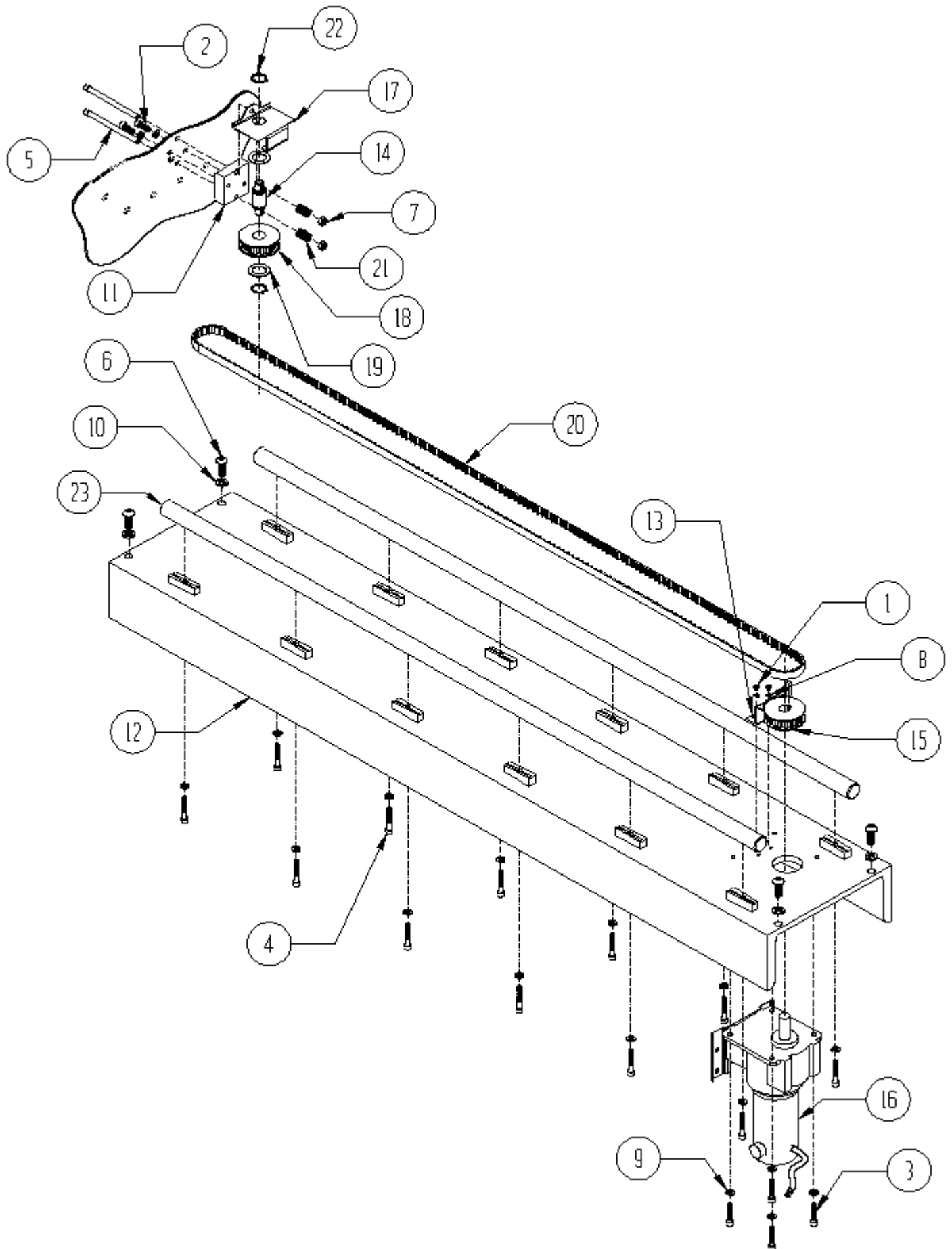


DIAGRAM NO.	PART NO.	DESCRIPTION
1	B160607	8-32 x 3/8 Button Head Socket Cap Screw
2	B251211	1/4-20 x 3/4 Socket Head Cap Screw
3	B251611	1/4-20 x 1/4 Socket Head Cap Screw Full Thread
4	B252411	1/4-20 x 1-1/2 Socket Head Cap Screw
5	B256411	1/4-20 x 4 Socket Head Cap Screw
6	B371616	3/8 - 16 x 1 Button Head Socket Cap Screw
7	J257000	1/4-20 Locknut Thin
8	K161501	#8 Lockwasher Split
9	K251501	1/4 Lockwasher Split
10	K371501	3/8 Lockwasher Split
11	28192	Support - Travel Pulley
12	28195	Channel - Machined
13	28197	Guard - Travel RH
14	50309	Shaft- Travel Pulley
15	50354	Pulley - Cog Drive
16	50361	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 - Compr Danly
22	3709331	Ring - Retaining Ext
23	6509063	Shaft - Carrier

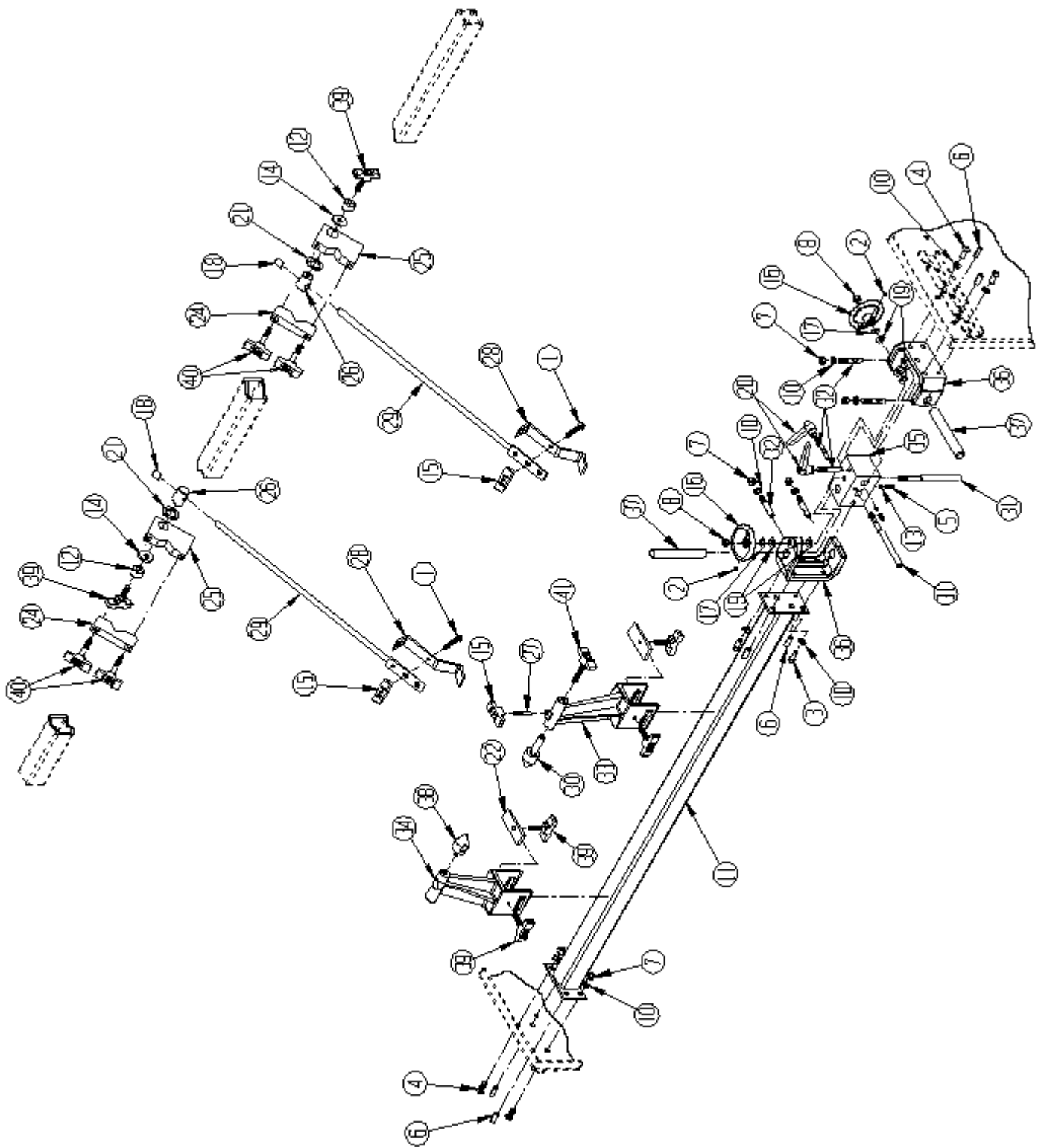


DIAGRAM NO.	PART NO.	DESCRIPTION
1	A313601	5/16-18x2-1/4 Hex Head Cap Screw Full
2	C250420	1/4-20 x 1/4 Long Socket Set Screw
3	B371201	3/8-16x3/4 Hex Head Cap Screw
4	B371616	3/8-16x1 Button Head Socket Cap Screw
5	C311220	5/16-18x3/4 Socket Setscrew Cup Pt.
6	H371602375 Dia. x 1 Lg Roll Pin
7	J371000	3/8-16 Hex Nut
8	J377000	3/8-16 Locknut Jam Nylon
10	K371501	3/8 Split Lockwasher
11	18573	Tooling Bar Weldment
12	3109026406 ID x .75Lg Steel Spacer
13	3579109	3/16 Dia. Nylon Plug
14	3589106	Flat Washer
15	3708262	5/16-18 T-Knob
16	3708393	3.50 Dia Handwheel
17	3709062	Conical Washer
18	3709258	Bumper
19	3709304	Thrust Washer
20	3709437	3/8-16 Adj. Handle
21	3709808	Flat Washer
22	3889066	Center Stand Lock
24	3969094	Top Clamp
25	3969095	Bottom Clamp
26	3969096	Clamp Bar
27	3969160	Shaft Locking Stud
28	3969162	Clamp Lip
29	3969547	Mower Clamp Weldment
30	6009020	Adjustable Center
31	6009027	ACME Adjusting Shaft
32	6009035	Shaft Locking Stud
33	6009221	Adjustable Center Stand
34	6009222	Center Stand - Fixed
35	6009081	Cross Slide
36	6009082	Cross Slide Support
37	6009095	Slide Shaft
38	6009517	Fixed Center Assembly
39	6009555	3/8-16x1.5Lg T-Knob
40	6009566	3/8-16x3.25Lg T-Knob
41	6009577	3/8-16x2.25Lg T-Knob

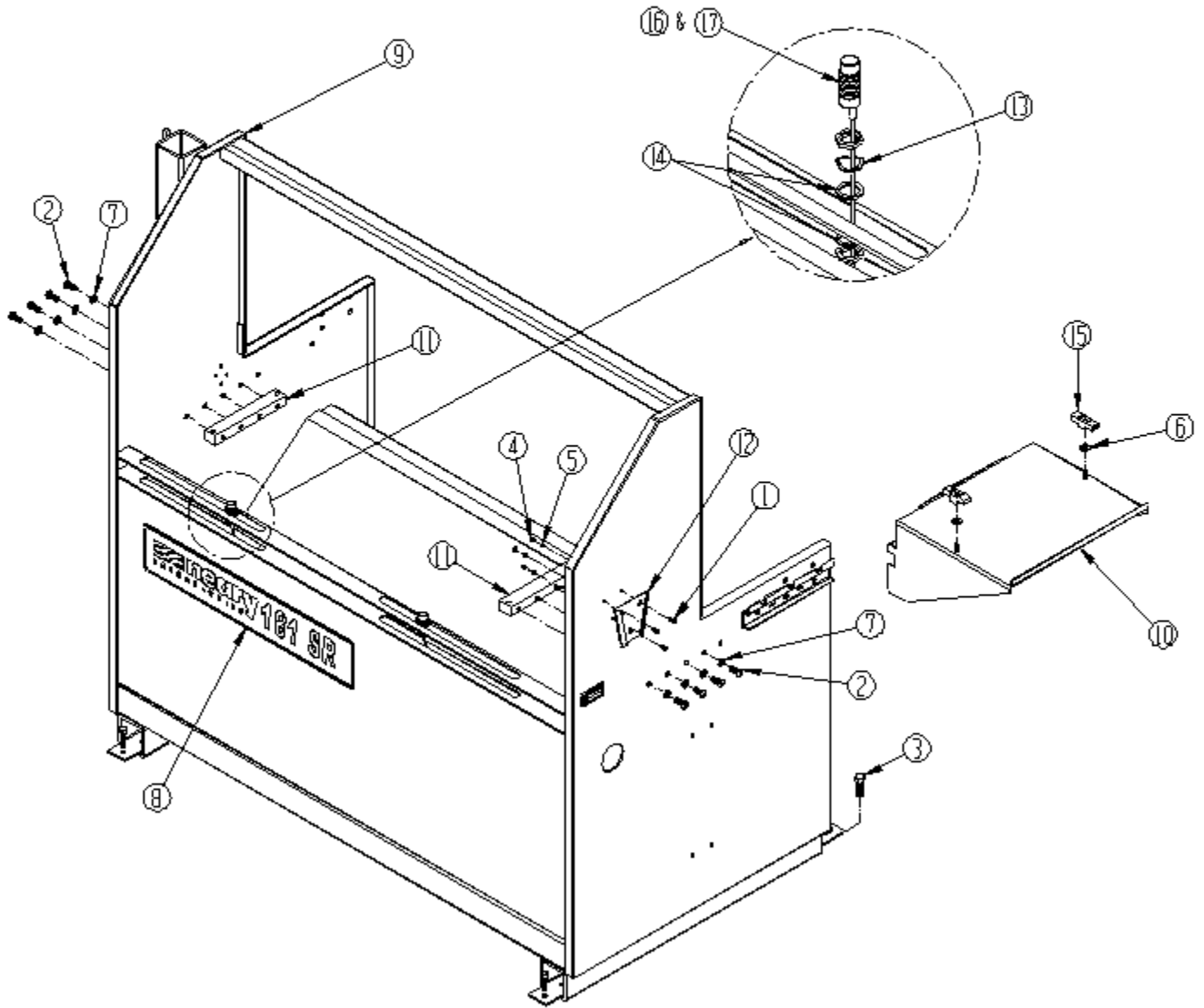


DIAGRAM NO.	PART NO.	DESCRIPTION
1	B190811	10-24X1/2 Socket Head Cap Screw
2	B371616	3/8-16x1 Button Head Socket Cap Screw
3	B502401	1/2-13x1-1/2 Hex Head Cap Screw
4	J191000	10-24 Hex Nut
5	K191501	#10 Split Lockwasher
6	K370001	3/8 Flat Washer
7	K371501	3/8 Split Lockwasher
8	18074	181SR Neary Decal
9	18502	Frame Weldment
10	18565	Lapper Shelf Weldment
11	28182	Channel Support Bar
12	80186	Control Box Bracket
13	3708419	Wave Spring
14	3708421	Flat Washer
15	3708662	3/8-16 T-Knob
16	27107	RH Proximity Switch
17	27106	LH Proximity Switch

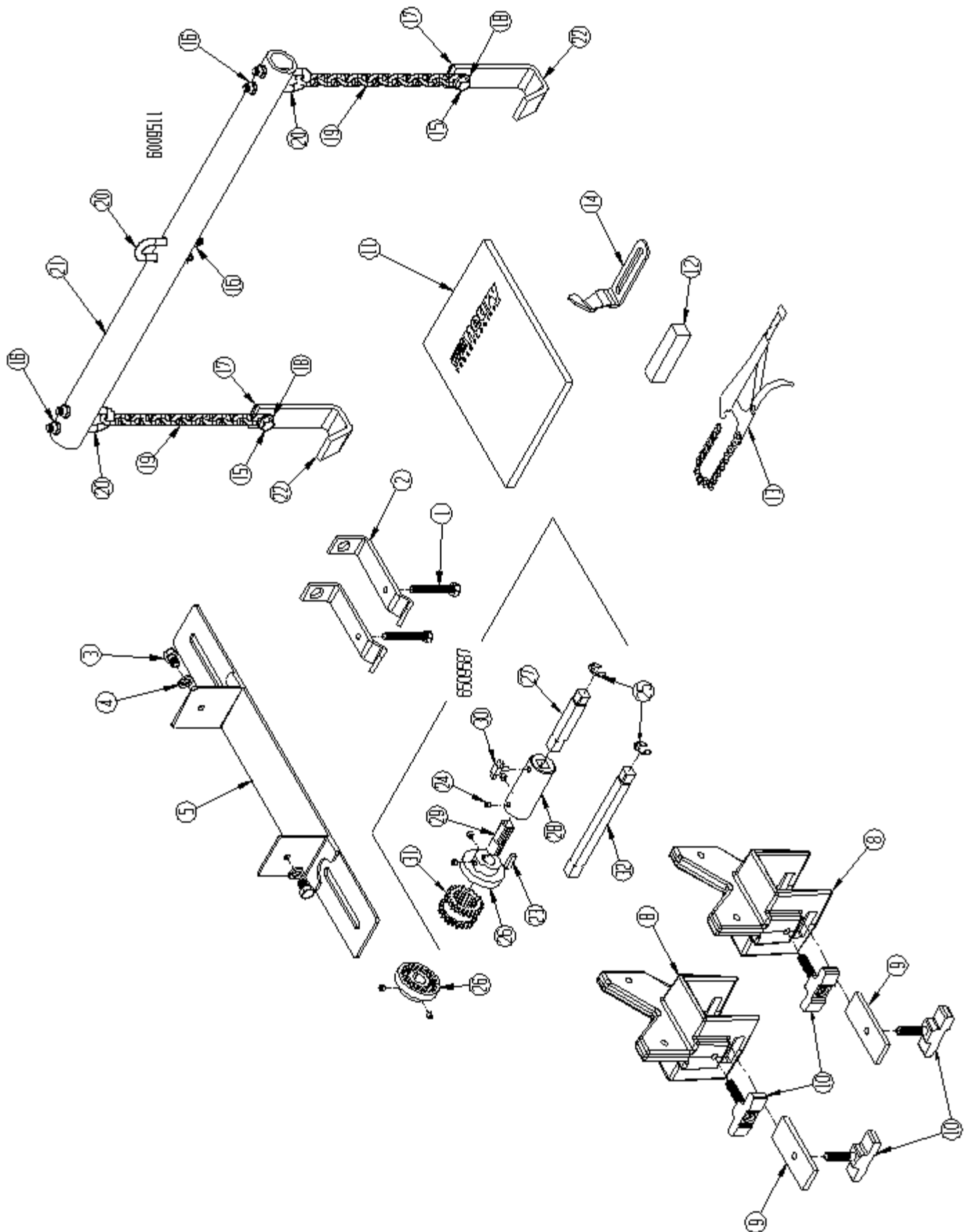


DIAGRAM NO.	PART NO.	DESCRIPTION
1	A313601	5/16-18x2-1/4 Hex Head Cap Screw Full
2	3649078	Clamp Tip
3	B370801	3/8-16x1/2 Hex Head Cap Screw
4	K371501	3/8 Split Lockwasher
5	18004	Lapper Bracker Weldment
8	3969017	Mower Support
9	3889066	Center Stand Lock
10	6009555	3/8-16x1.5Lg T-Knob
11	18100	Manual
12	3702508	Dressing Stick
13	3709298	Vise Grip Chain Clamp
14	6009133	Guide Finger
15	B371601	3/8-16x1 Hex Head Cap Screw
16	J317100	5/16-18 Locknut Nylon Full
17	J377100	3/8-16 Locknut Nylon Full
18	R000454	Flat Washer
19	3649005	Chain
20	3709316	5/16-18x3Lg U-Bolt
21	6009011	Spreader Bar
22	6009102	Grab Hook
23	R000377	3/16 x 3/4Lg Square Key
24	C250620	1/4-20x3/8 Socket Setscrew Cup Pt.
25	3709073	Retaining Ring
26	3709584	Flange Coupler
27	6009051	1/2 Square x 3.5Lg Drive Adapter
28	6009052	Adapter
29	6009217	Drive Coupler Adapter
30	6009598	1/4-20x.50Lg T-Knob
31	3709585	Sleeve Coupler
32	18053	1/2 Square x 6.0Lg Drive Adapter

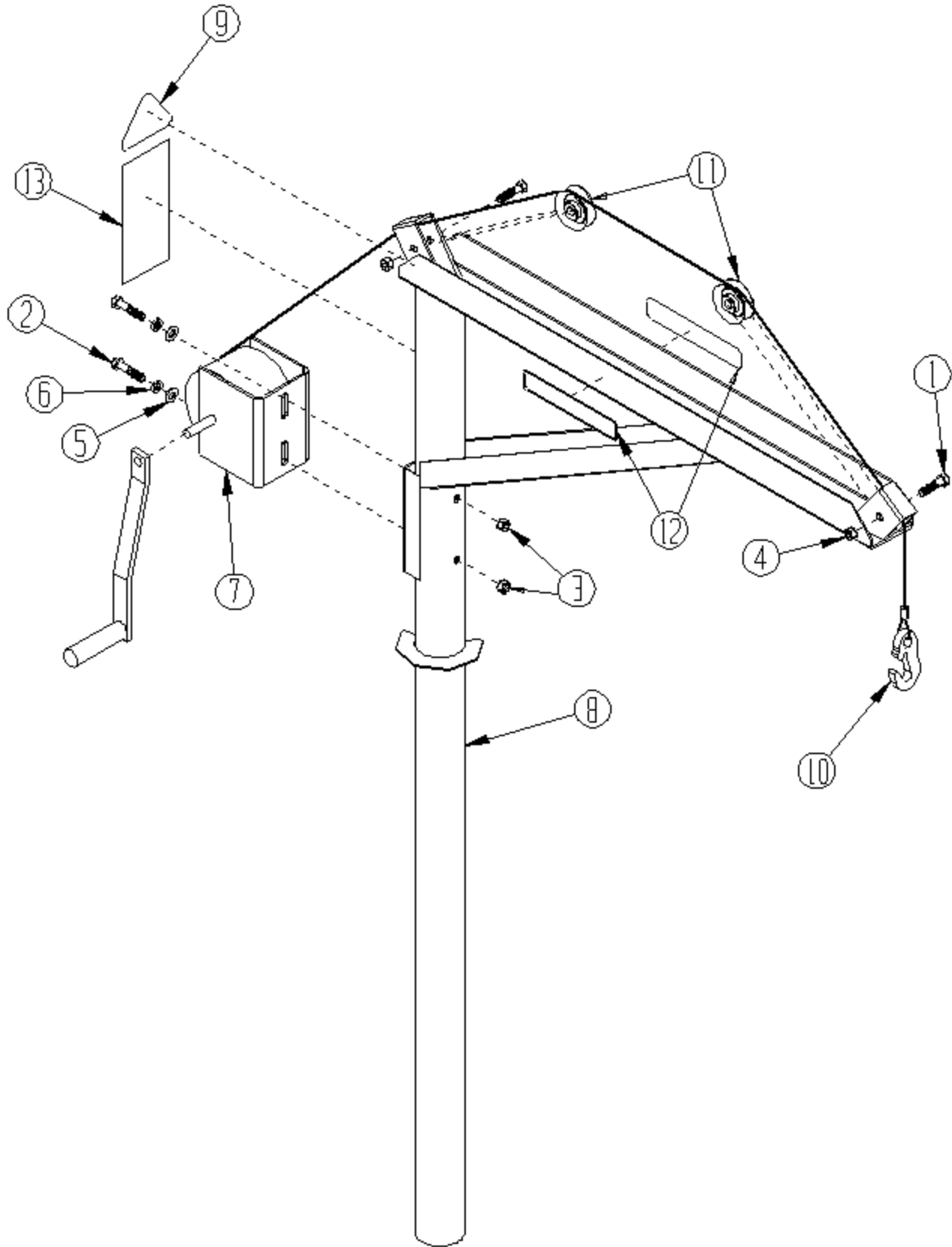
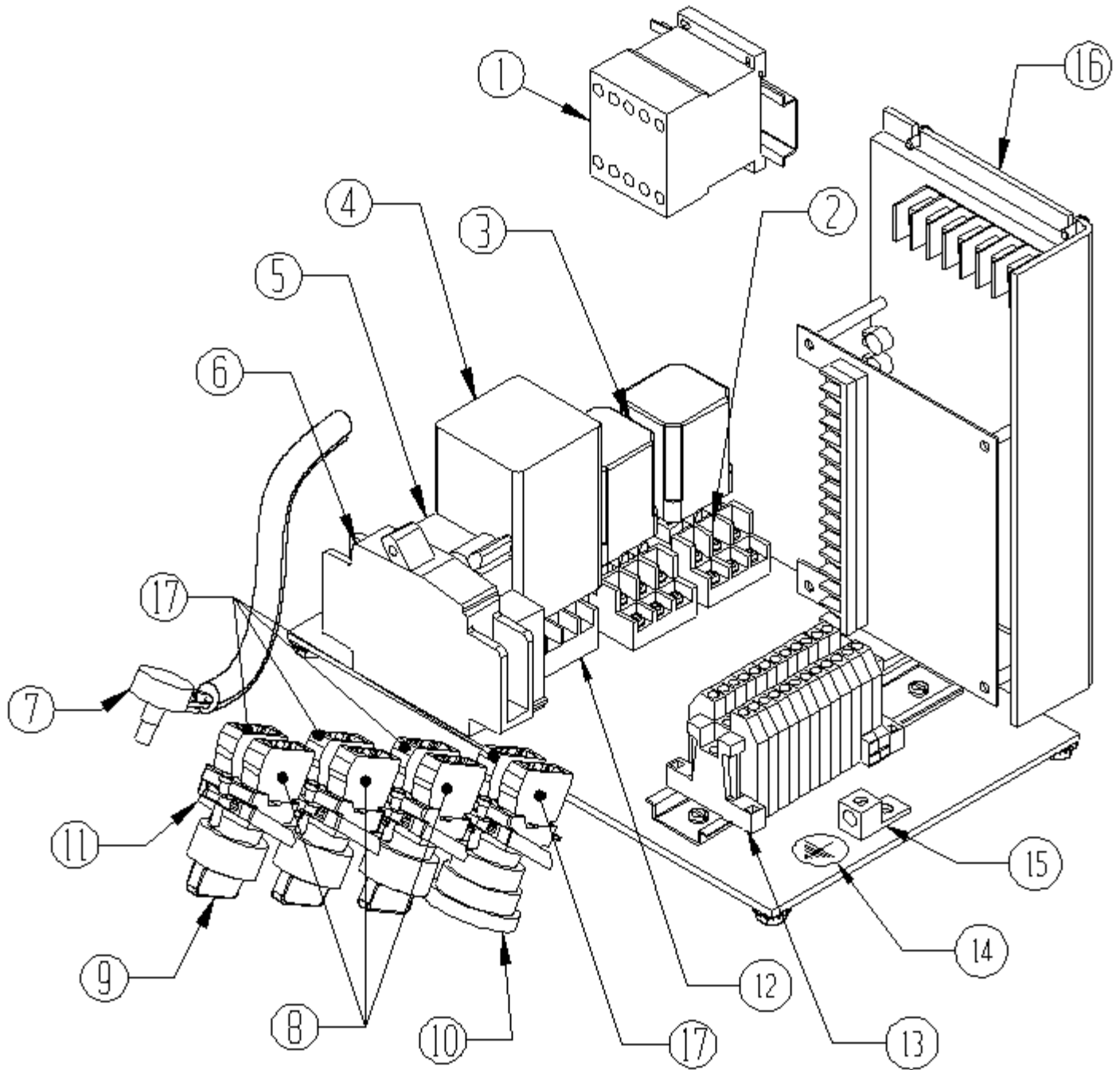
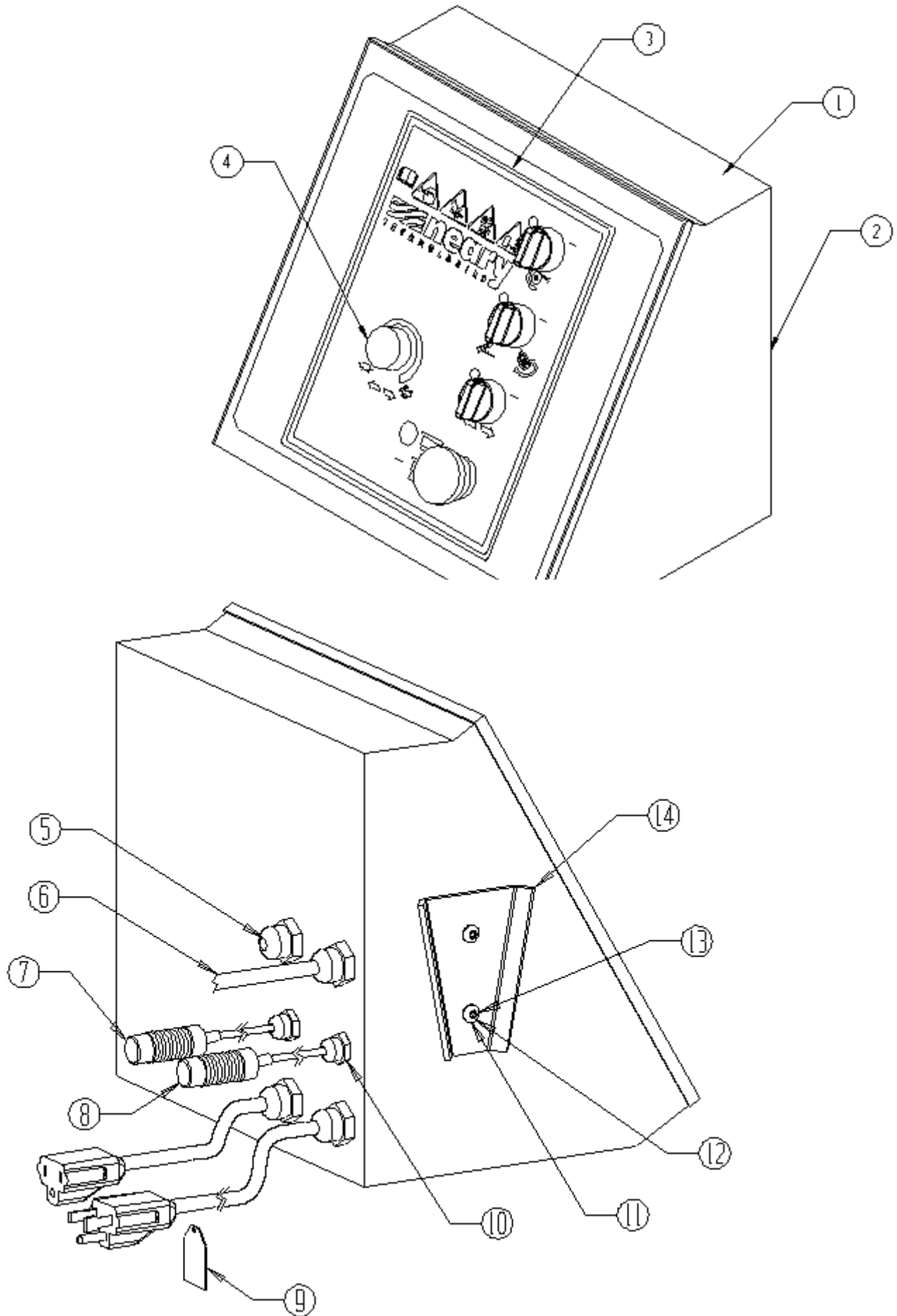


DIAGRAM NO.	PART NO.	DESCRIPTION
1	B372801	3/8-16X1-3/4 Hex Head Cap Screw
2	B375601	3/8-16x3-1/2 Hex Head Cap Screw
3	J371000	3/8-16x Hex Nut
4	J377100	3/8-16 Locknut Nylon Full
5	K370001	3/8 Flat Washer
6	K371501	3/8 Split Lockwasher
7	3708645	Winch with 11' Handle
8	18566	Boom Weldment
9	3708456	Boom Capacity Warning Decal
10	3709407	Hook & Cable Assembly
11	3709795	Pulley
12	6309036	Boom Capacity Warning Decal
13	6309037	Winch Warning Decal



<u>DIAGRAM NUMBER</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
1	27112	Mini Contactor
2	50938	Relay base
3	50937	Relay
4	3707558	Undervoltage Relay
5	80384	4 Amp Circuit Breaker
6	80383	20 Amp Circuit Breaker
7	6009199	Potentiometer
8	80388	Contact Block - NO
9	80386	Switch
10	80385	Emergency Stop Switch
11	80387	Collar - Switch
12	3707073	Undervolt Relay Base
13	27110	Terminal Strip Assembly
14	3707163	Ground Decal
15	3707164	Ground Lug
16	3707550	Traverse Board
17	80389	Contact Block - NC



<u>DIAGRAM NUMBER</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
1	3708448	Electrical Warning Decal
2	27509	Control Box Assembly (See Pages 58-59)
3	17093	Decal Control Box
4	3707446	Knob with pointer
5	3707049	Wire Strain Relief
6	27109	Cord Grinding Motor
7	27107	Proximity Switch RH
8	27106	Proximity Switch LH
9	6009215	Electrical Warning Tag
10	3707029	Cord Strain Relief
11	J251000	1/4-20 Hex Jam Nut Thin
12	K252501	1/4 Split Lock Washer
13	B250816	1/4-20 x.50 BHSCS
14	80327	Male Bracket Hanger
15	3708683	Decal Undervoltage Relay (not shown)

