



OPERATOR'S MANUAL

Metal Working



ROTARY DRAW BENDER MODEL: RDB-480

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THANK YOU & WARRANTY

Thank you for your purchase of a machine from Baileigh Industrial Holdings LLC. We hope that you find it productive and useful to you for a long time to come.

Inspection & Acceptance. Buyer shall inspect all Goods within ten (10) days after receipt thereof. Buyer's payment shall constitute final acceptance of the Goods and shall act as a waiver of the Buyer's rights to inspect or reject the goods unless otherwise agreed. If Buyer rejects any merchandise, Buyer must first obtain a Returned Goods Authorization ("RGA") number before returning any goods to Seller. Goods returned without an RGA will be refused. Seller will not be responsible for any freight costs, damages to goods, or any other costs or liabilities pertaining to goods returned without a RGA. Seller shall have the right to substitute a conforming tender. Buyer will be responsible for all freight costs to and from Buyer and repackaging costs, if any, if Buyer refuses to accept shipment. If Goods are returned in unsalable condition, Buyer shall be responsible for full value of the Goods. Buyer may not return any special-order Goods. Any Goods returned hereunder shall be subject to a restocking fee equal to 30% of the invoice price.

Specifications. Seller may, at its option, make changes in the designs, specifications or components of the Goods to improve the safety of such Goods, or if in Seller's judgment, such changes will be beneficial to their operation or use. Buyer may not make any changes in the specifications for the Goods unless Seller approves of such changes in writing, in which event Seller may impose additional charges to implement such changes.

Limited Warranty. Seller warrants to the original end-user that the Goods manufactured or provided by Seller under this Agreement shall be free of defects in material or workmanship for a period of twelve (12) months from the date of purchase, provided that the Goods are installed, used, and maintained in accordance with any instruction manual or technical guidelines provided by the Seller or supplied with the Goods, if applicable. The original end-user must give written notice to Seller of any suspected defect in the Goods prior to the expiration of the warranty period. The original end-user must also obtain a RGA from Seller prior to returning any Goods to Seller for warranty service under this paragraph. Seller will not accept any responsibility for Goods returned without a RGA. The original end-user shall be responsible for all costs and expenses associated with returning the Goods to Seller for warranty service. In the event of a defect, Seller, at its sole option, shall repair or replace the defective Goods or refund to the original end-user the purchase price for such defective Goods. Goods are not eligible for replacement or return after a period of 10 days from date of receipt. The foregoing warranty is Seller's sole obligation, and the original end-user's exclusive remedy, with regard to any defective Goods. This limited warranty does not apply to: (a) die sets, tooling, and saw blades; (b) periodic or routine maintenance and setup, (c) repair or replacement of the Goods due to normal wear and tear, (d) defects or damage to the Goods resulting from misuse, abuse, neglect, or accidents, (e) defects or damage to the Goods resulting from improper or unauthorized alterations, modifications, or changes; and (f) any Goods that has not been installed and/or maintained in accordance with the instruction manual or technical guidelines provided by Seller.

EXCLUSION OF OTHER WARRANTIES. THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. ANY AND ALL OTHER EXPRESS, STATUTORY OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. NO WARRANTY IS MADE WHICH EXTENDS BEYOND THAT WHICH IS EXPRESSLY CONTAINED HEREIN.

Limitation of Liability. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY OTHER PARTY FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR DOWN TIME) ARISING FROM OR IN MANNER CONNECTED WITH THE GOODS, ANY BREACH BY SELLER OR ITS AGENTS OF THIS AGREEMENT, OR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY OF LIABILITY. BUYER'S REMEDY WITH RESPECT TO ANY CLAIM ARISING UNDER THIS AGREEMENT IS STRICTLY LIMITED TO NO MORE THAN THE AMOUNT PAID BY THE BUYER FOR THE GOODS.



Force Majeure. Seller shall not be responsible for any delay in the delivery of, or failure to deliver, Goods due to causes beyond Seller's reasonable control including, without limitation, acts of God, acts of war or terrorism, enemy actions, hostilities, strikes, labor difficulties, embargoes, non-delivery or late delivery of materials, parts and equipment or transportation delays not caused by the fault of Seller, delays caused by civil authorities, governmental regulations or orders, fire, lightening, natural disasters or any other cause beyond Seller's reasonable control. In the event of any such delay, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay.

Installation. If Buyer purchases any Goods that require installation, Buyer shall, at its expense, make all arrangements and connections necessary to install and operate the Goods. Buyer shall install the Goods in accordance with any Seller instructions and shall indemnify Seller against any and all damages, demands, suits, causes of action, claims and expenses (including actual attorneys' fees and costs) arising directly or indirectly out of Buyer's failure to properly install the Goods.

Work By Others; Safety Devices. Unless agreed to in writing by Seller, Seller has no responsibility for labor or work performed by Buyer or others, of any nature, relating to design, manufacture, fabrication, use, installation or provision of Goods. Buyer is solely responsible for furnishing and requiring its employees and customers to use all safety devices, guards and safe operating procedures required by law and/or as set forth in manuals and instruction sheets furnished by Seller. Buyer is responsible for consulting all operator manuals, ANSI or comparable safety standards, OSHA regulations and other sources of safety standards and regulations applicable to the use and operation of the Goods.

Remedies. Each of the rights and remedies of Seller under this Agreement is cumulative and in addition to any other or further remedies provided under this Agreement or at law or equity.

Attorney's Fees. In the event legal action is necessary to recover monies due from Buyer or to enforce any provision of this Agreement, Buyer shall be liable to Seller for all costs and expenses associated therewith, including Seller's actual attorney fees and costs.

Governing Law/Venue. This Agreement shall be construed and governed under the laws of the State of Wisconsin, without application of conflict of law principles. Each party agrees that all actions or proceedings arising out of or in connection with this Agreement shall be commenced, tried, and litigated only in the state courts sitting in Manitowoc County, Wisconsin or the U.S. Federal Court for the Eastern District of Wisconsin. Each party waives any right it may have to assert the doctrine of "forum non conveniens" or to object to venue to the extent that any proceeding is brought in accordance with this section. Each party consents to and waives any objection to the exercise of personal jurisdiction over it by courts described in this section. Each party waives to the fullest extent permitted by applicable law the right to a trial by jury.

Summary of Return Policy.

- 10 Day acceptance period from date of delivery. Damage claims and order discrepancies will not be accepted after this time.
- You must obtain a Baileigh issued RGA number PRIOR to returning any materials.
- Returned materials must be received at Baileigh in new condition and in original packaging.
- Altered items are not eligible for return.
- Buyer is responsible for all shipping charges.
- A 30% re-stocking fee applies to all returns.

Baileigh Industrial Holdings LLC makes every effort to ensure that our posted specifications, images, pricing and product availability are as correct and timely as possible. We apologize for any discrepancies that may occur. Baileigh Industrial Holdings LLC reserves the right to make any and all changes deemed necessary in the course of business including but not limited to pricing, product specifications, quantities, and product availability.

For Customer Service & Technical Support:

Please contact one of our knowledgeable Sales and Service team members at:
(920) 684-4990 or e-mail us at sales@baileigh.com



INTRODUCTION

The quality and reliability of the components assembled on a Baileigh Industrial Holdings LLC machine guarantee near perfect functioning, free from problems, even under the most demanding working conditions. However, if a situation arises, refer to the manual first. If a solution cannot be found, contact the distributor where you purchased our product. Make sure you have the serial number and production year of the machine (stamped on the nameplate). For replacement parts refer to the assembly numbers on the parts list drawings.

Our technical staff will do their best to help you get your machine back in working order.

In this manual you will find: (when applicable)

- Safety procedures
- Correct installation guidelines
- Description of the functional parts of the machine
- Capacity charts
- Setup and start-up instructions
- Machine operation
- Scheduled maintenance
- Parts lists

GENERAL NOTES

After receiving your equipment remove the protective container. Do a complete visual inspection, and if damage is noted, **photograph it for insurance claims** and contact your carrier at once, requesting inspection. Also contact Baileigh Industrial Holdings LLC and inform them of the unexpected occurrence. Temporarily suspend installation.

Take necessary precautions while loading / unloading or moving the machine to avoid any injuries.

Your machine is designed and manufactured to work smoothly and efficiently. Following proper maintenance instructions will help ensure this. Try and use original spare parts, whenever possible, and most importantly; **DO NOT** overload the machine or make any modifications.



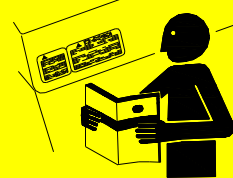
Note: This symbol refers to useful information throughout the manual.



IMPORTANT

PLEASE READ THIS OPERATORS MANUAL CAREFULLY

It contains important safety information, instructions, and necessary operating procedures. The continual observance of these procedures will help increase your production and extend the life of the equipment.



SAFETY INSTRUCTIONS

LEARN TO RECOGNIZE SAFETY INFORMATION

This is the safety alert symbol. When you see this symbol on your machine or in this manual, **BE ALERT TO THE POTENTIAL FOR PERSONAL INJURY!**



Follow recommended precautions and safe operating practices.

UNDERSTAND SIGNAL WORDS

A signal word – **DANGER**, **WARNING**, or **CAUTION** – is used with the safety alert symbol. **NOTICE**, which is not related to personal injury, is used without a symbol.

DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE: Indicates a situation which, if not avoided, could result in property damage.

 **DANGER**

 **WARNING**

 **CAUTION**

NOTICE

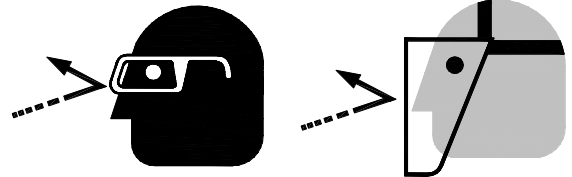


SAVE THESE INSTRUCTIONS.
Refer to them often and use them to instruct others.



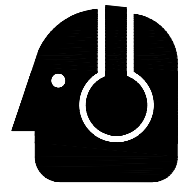
PROTECT EYES

Wear safety glasses or suitable eye protection when working on or around machinery.



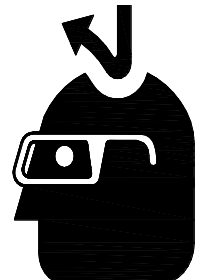
PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protective devices such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



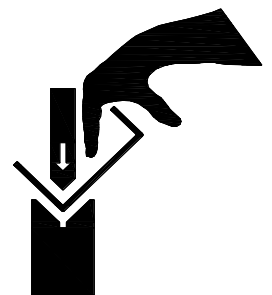
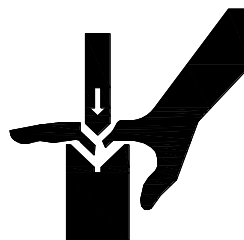
KEEP CLEAR OF MOVING OBJECTS

Always be aware of the position of the material and the swing area in which the material will travel. The material will swing with significant force. This swing area will create pinch points and the force of the material movement may cause serious bodily injuries.



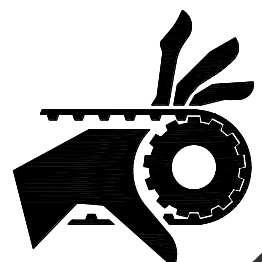
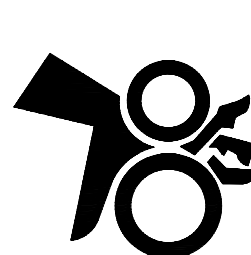
BEWARE OF CRUSH HAZARD

NEVER place your hands, fingers, or any part of your body in the die area of this machine. Be aware of the area on either side of the dies for crush points created by material movement.



BEWARE OF PINCH POINTS

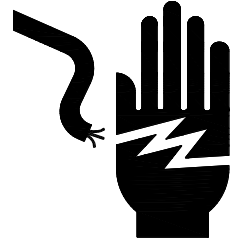
Keep hands and fingers away from the drive mechanisms, cylinders, ratchets, and other moving linkage while the machine is in operation.





HIGH VOLTAGE

USE CAUTION IN HIGH VOLTAGE AREAS. DO NOT assume the power to be off.
FOLLOW PROPER LOCKOUT PROCEDURES.



CALIFORNIA PROPOSITION 65

WARNING: Cancer and Reproductive Harm.
www.P65Warnings.ca.gov



SAFETY PRECAUTIONS



Metal working can be dangerous if safe and proper operating procedures are not followed. As with all machinery, there are certain hazards involved with the operation of the product. Using the machine with respect and caution will considerably lessen the possibility of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result.

Safety equipment such as guards, hold-downs, safety glasses, dust masks and hearing protection can reduce your potential for injury. But even the best guard will not make up for poor judgment, carelessness or inattention. **Always use common sense** and exercise **caution** in the workshop. If a procedure feels dangerous, don't try it.

REMEMBER: Your personal safety is your responsibility.



WARNING: FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY

Dear Valued Customer:

- All Baileigh machines should be used only for their intended use.
- Baileigh does not recommend or endorse making any modifications or alterations to a Baileigh machine. Modifications or alterations to a machine may pose a substantial risk of injury to the operator or others and may do substantial damage to the machine.
- Any modifications or alterations to a Baileigh machine will invalidate the machine's warranty.



PLEASE ENJOY YOUR BAILEIGH MACHINE!PLEASE ENJOY IT SAFELY!

1. **FOR YOUR OWN SAFETY, READ INSTRUCTION MANUAL BEFORE OPERATING THE MACHINE.** Learn the machine's application and limitations as well as the specific hazards.
2. **Only trained and qualified personnel can operate this machine.**
3. **Make sure guards are in place and in proper working order before operating machinery.**
4. **Remove any adjusting tools.** Before operating the machine, make sure any adjusting tools have been removed.
5. **Keep work area clean.** Cluttered areas invite injuries.
6. **Overloading machine.** By overloading the machine, you may cause injury from flying parts. **DO NOT** exceed the specified machine capacities.
7. **Dressing material edges.** Always chamfer and deburr all sharp edges.
8. **Do not force tool.** Your machine will do a better and safer job if used as intended. **DO NOT** use inappropriate attachments in an attempt to exceed the machine's rated capacity.
9. **Use the right tool for the job. DO NOT** attempt to force a small tool or attachment to do the work of a large industrial tool. **DO NOT** use a tool for a purpose for which it was not intended.
10. **Dress appropriately. DO NOT** wear loose fitting clothing or jewelry as they can be caught in moving machine parts. Protective clothing and steel toe shoes are recommended when using machinery. Wear a restrictive hair covering to contain long hair.
11. **Use eye protection.** Always wear ISO approved protective eye wear when operating machinery. Wear a full-face shield if you are producing metal filings. Eye wear shall be impact resistant, protective safety glasses with side shields which comply with ANSI Z87.1 specification. Use of eye wear which does not comply with ANSI Z87.1 specification could result in severe injury from breakage of eye protection.
12. **Do not overreach.** Maintain proper footing and balance at all times. **DO NOT** reach over or across a running machine.
13. **Stay alert.** Watch what you are doing and use common sense. **DO NOT** operate any tool or machine when you are tired.
14. **Check for damaged parts.** Before using any tool or machine, carefully check any part that appears damaged. Check for alignment and binding of moving parts that may affect proper machine operation.
15. **Observe work area conditions. DO NOT** use machines or power tools in damp or wet locations. Do not expose to rain. Keep work area well lighted. **DO NOT** use electrically powered tools in the presence of flammable gases or liquids.



16. **Keep children away.** Children must never be allowed in the work area. **DO NOT** let them handle machines, tools, or extension cords.
17. Keep visitors a safe distance from the work area.
18. **Store idle equipment.** When not in use, tools must be stored in a dry location to inhibit rust. Always lock up tools and keep them out of reach of children.
19. **DO NOT operate machine if under the influence of alcohol or drugs.** Read warning labels on prescriptions. If there is any doubt, **DO NOT** operate the machine.
20. **Turn off** power before checking, cleaning, or replacing any parts.
21. **DO NOT** touch live electrical components or parts.
22. Be sure **all** equipment is properly installed and grounded according to national, state, and local codes.
23. Keep **all** cords dry, free from grease and oil, and protected from sparks and hot metal.
24. Inspect power and control cables periodically. Replace if damaged or bare wires are exposed. **Bare wiring can kill!** **DO NOT** touch live electrical components or parts.
25. **DO NOT** bypass or defeat any safety interlock systems.



TECHNICAL SPECIFICATIONS

Maximum Center Line Radius (CLR)*	28" (711mm)
Minimum Center Line Radius (CLR)*	6" (152mm)
Minimum OD	2.5" (63.5mm)
Mild Steel Pipe (Schedule 80)	4" (102mm)
Mild Steel Round Tube (Wall)	5" (.083) (127mm [2.1mm])
Maximum Bend Degree	180°
Maximum Speed to 180°	25 Seconds
Bend Rotation Direction	Clockwise
Power Supply	220VAC, 30A, 3ph, 60Hz 480VAC, 18A, 3ph, 60Hz
Motor	10hp (7.45kws) 220VAC, 30A, 3ph, 60Hz 10hp (7.45kws) 480VAC, 15A, 3ph, 60Hz
Sound level	<70db
Shipping Weight	7000lbs. (3175kg)
Shipping Dimensions (L x W x H)	72 x 44" x 50" (1829 x 1118 x 1270mm)
Based on a material tensile strength of *64000 PSI – mild steel	

TECHNICAL SUPPORT

Our technical support department can be reached at 920.684.4990 and asking for the support desk for purchased machines. Tech Support handles questions on machine setup, schematics, warranty issues, and individual parts needs: (other than die sets and blades).

For specific application needs or future machine purchases contact the Sales Department at: sales@baileigh.com, Phone: 920.684.4990, or Fax: 920.684.3944.



Note: The photos and illustrations used in this manual are representative only and may not depict the actual color, labeling or accessories and may be intended to illustrate technique only.



Note: The specifications and dimensions presented here are subject to change without prior notice due to improvements of our products.



UNPACKING AND CHECKING CONTENTS

Your Baileigh machine is shipped complete. Separate all parts from the packing material and check each item carefully. Make certain all items are accounted for before discarding any packing material.



WARNING: SUFFOCATION HAZARD! Immediately discard any plastic bags and packing materials to eliminate choking and suffocation hazards to children and animals.

If any parts are missing, **DO NOT** place the machine into service until the missing parts are obtained and installed correctly.

Cleaning



WARNING: DO NOT USE gasoline or other petroleum products to clean the machine. They have low flash points and can explode or cause fire.



CAUTION: When using cleaning solvents work in a well-ventilated area. Many cleaning solvents are toxic if inhaled.

Your machine may be shipped with a rustproof waxy coating and/or grease on the exposed unpainted metal surfaces. Fully and completely remove this protective coating using a degreaser or solvent cleaner. Moving items will need to be moved along their travel path to allow for cleaning the entire surface. For a more thorough cleaning, some parts will occasionally have to be removed. **DO NOT USE** acetone or brake cleaner as they may damage painted surfaces.

Follow manufacturer's label instructions when using any type of cleaning product. After cleaning, wipe unpainted metal surfaces with a light coating of quality oil or grease for protection.



Important: This waxy coating is **NOT** a lubricant and will cause the machine to stick and lose performance as the coating continues to dry.



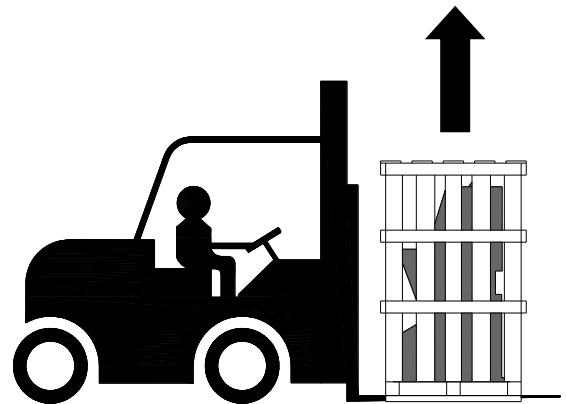


TRANSPORTING AND LIFTING

NOTICE: *Lifting and carrying operations should be carried out by skilled workers, such as a truck operator, crane operator, etc. If a crane is used to lift the machine, attach the lifting chain carefully, making sure the machine is well balanced.*

Follow these guidelines when lifting with truck or trolley:

- The lift truck must be able to lift at least 1.5 – 2 times the machines gross weight.
- Make sure the machine is balanced. While transporting, avoid rough or jerky motion, and maintain a safe clearance zone around the transport area.
- Use a forklift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
- Remove the securing bolts that attach the machine to the pallet.
- Approaching the machine from the side, lift the machine on the frame taking care that there are no cables or pipes in the area of the forks.
- Move the machine to the required position and lower gently to the floor.
- Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.



Follow these guidelines when lifting crane or hoist:

- Use lift equipment such as straps, chains, capable of lifting 1.5 to 2 times the weight of the machine.
- Take proper precautions for handling and lifting.
- Check if the load is properly balanced by lifting it an inch or two.
- Lift the machine, avoiding sudden accelerations or quick changes of direction.
- Locate the machine where it is to be installed, then lower slowly until it touches the floor.



INSTALLATION

IMPORTANT:

Consider the following when looking for a suitable location to place the machine:

- Overall weight of the machine.
- Weight of material being processed.
- Sizes of material to be processed through the machine.
- Space needed for auxiliary stands, worktables, or other machinery.
- Clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for safety.
- Have the work area well illuminated with proper lighting.
- Keep the floor free of oil and make sure it is not slippery.
- Remove scrap and waste materials regularly, and make sure the work area is free from obstructing objects.
- If long lengths of material are to be fed into the machine, make sure that they will not extend into any aisles.
- **LEVELING:** The machine should be sited on a level, concrete floor. Provisions for securing it should be in position prior to placing the machine. The accuracy of any machine depends on the precise placement of it to the mounting surface.
- **FLOOR:** This machine distributes a large amount of weight over a small area. Make certain that the floor is capable of supporting the weight of the machine, work stock, and the operator. The floor should also be a level surface. If the unit wobbles or rocks once in place, be sure to eliminate by using shims.
- **WORKING CLEARANCES:** Take into consideration the size of the material to be processed. Make sure that you allow enough space for you to operate the machine freely.
- **POWER SUPPLY PLACEMENT:** The power supply should be located close enough to the machine so that the power cord is not in an area where it would cause a tripping hazard. Be sure to observe all electrical codes if installing new circuits and/or outlets.



ASSEMBLY AND SET UP



WARNING: For your own safety, **DO NOT** connect the machine to the power source until the machine is completely assembled and you read and understand the entire instruction manual.

1. Remove the machine from the skid it was shipped on.
2. Position the machine as desired following the installation guidelines to be certain that the machine is supported evenly at all contact points.
3. Follow the electrical guidelines to connect the machine to a power supply.
4. Read through the remainder of the manual and become familiar with the die installation and settings as well as normal operation.

GENERAL DESIGN DESCRIPTION

You have made a practical choice in purchasing the RDB-480 Fully Programmable Bending Machine. It has been carefully built of high-quality materials and designed to give many years of efficient service. The simplicity of design and minimum effort required to operate the machine contributes towards meeting schedules and producing greater profits.

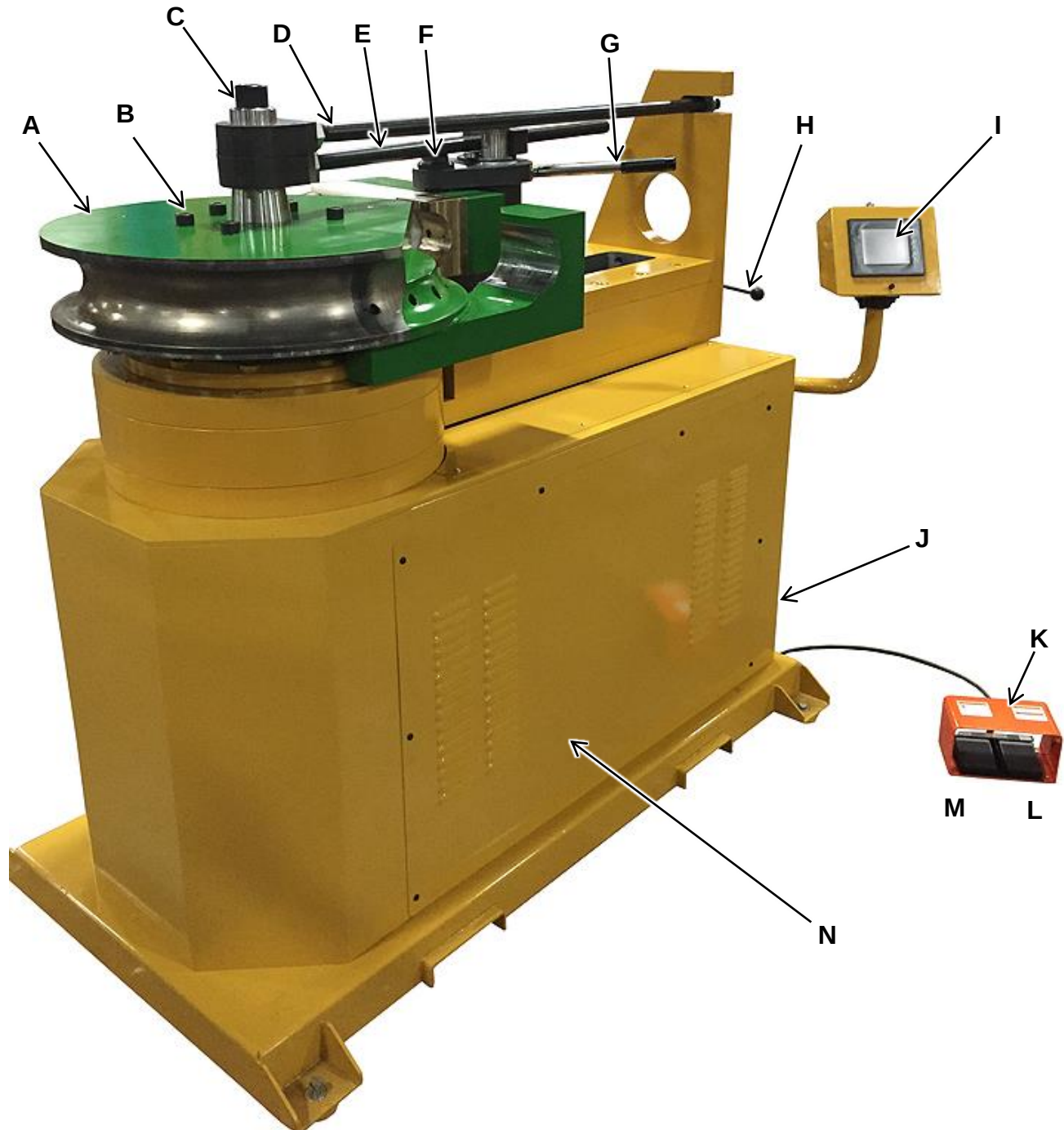
The RDB-480 is an electric powered "Rotary Draw" bending machine. To bend material, a bending die and counter die are required. The material is hooked by the bending dies' hook arm and is powerfully rotated in the clockwise direction. As the bending die rotates, the counter die remains stationary, forcing the material to conform to the radius and shape of the bending die. This machine can rotate in both the clockwise and counterclockwise directions. A user-friendly touch screen operating station can store up to 170 bend programs with 10 sequential bends inside of the main program.

The RDB-480 Bending Machine you have purchased is built of solid steel ensuring maximum rigidity. Tongue and groove design with grade 8 bolts throughout provide very high rigidity and stability.

Throughout this manual are listed various safety-related descriptions for attention. These matters for attention contain the essential information to the operators while operating and maintaining. Failure to follow these instructions may result in great damage to the machine or injury to the operator.



GETTING TO KNOW YOUR MACHINE





Item	Description	Function
A	Forming Die	This is the die which the material will form around. This die will be specific to a material size and to a specific radius.
B	Die Retaining Bolts	Bolts used to secure the die down to the spindle drive. These MUST be installed and tightened during the bending process.
C	Main Spindle and Drive Keys (Drive keys are not shown as the forming die is installed and covering the keys.)	For Supporting the Bend Dies and driving the die rotation to complete the bend.
D	Upper Spindle Drag Link	Works between the spindle and the frame to eliminate spindle deflection during the bend.
E	Lower Spindle Drag Link	Works between the spindle and the counter die mount to eliminate deflection between the spindle and the counter die during the bend.
F	Hitch Pin (shown with a counter die installed)	For mounting the counter die.
G	Quick Release	For pivoting counter die away from bend die to remove material quickly
H	3 Spoke Handwheel	For adjusting the counter die position.
I	Touch Screen Controller	For programming bend data
J	Power Cord (hidden)	The power cord exits the cabinet on the operator end of the machine, to be routed to the power supply.
K	Foot Pedal Guard	Protect against accidental operation
L	Forward Foot Pedal	Will operate the machine in the cw direction
M	Reverse Foot Pedal	Will operate the machine in the ccw direction
N	Cabinet	Houses the electrical components as well as the drive motor and gear case assembly.



ELECTRICAL



WARNING: Baileigh Industrial Holdings LLC is not responsible for any damage caused by wiring up to an alternative 3-phase power source other than direct 3-phase. If you are using an alternate power source, consult a certified electrician or contact Baileigh Industrial Holdings LLC prior to energizing the machine.



CAUTION: HAVE ELECTRICAL UTILITIES CONNECTED TO MACHINE BY A CERTIFIED ELECTRICIAN!
Check if the available power supply is the same as listed on the machine nameplate.



WARNING: Make sure the grounding wire (green) is properly connected to avoid electric shock. DO NOT switch the position of the green grounding wire if any electrical plug wires are switched during hookup.

Power Specifications

Your machine is wired for 220 volts, 60hz alternating current. Before connecting the machine to the power source, make sure the power source is OFF.

Before switching on the power, you must check the voltage and frequency of the power to see if they meet with the requirement, the allowed range for the voltage is $\pm 5\%$, and for the frequency is $\pm 1\%$.

Considerations

- Observe local electrical codes when connecting the machine.
- The circuit should be protected with a time delay fuse or circuit breaker with an amperage rating slightly higher than the full load current of machine.
- A separate electrical circuit should be used for your machines. Before connecting the motor to the power line, make sure the switch is in the "OFF" position and be sure that the electric current is of the same characteristics as indicated on the machine.
- All line connections should make good contact. Running on low voltage will damage the motor.
- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This machine is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.



WARNING: In all cases, make certain the receptacle in question is properly grounded. If you are not sure, have a qualified electrician check the receptacle.

- Improper connection of the equipment-grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.
- Check with qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the machine is properly grounded.
- Repair or replace damaged or worn cord immediately.

Power cord connection:

1. Turn the main disconnect switch on the control panel to the OFF position.
2. Unwrap the power cord and route the cord away from the machine toward the power supply.
 - a. Route the power cord so that it will NOT become entangled in the machine in any way.
 - b. Route the cord to the power supply in a way that does NOT create a trip hazard.
3. Connect the power cord to the power supply and check that the power cord has not been damaged during installation.
4. When the machine is clear of any obstruction. The main power switch may be turn ON to test the operation.
5. Turn the switch OFF when the machine is not in operation.



OPERATION

 **CAUTION:** Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges.

 **CAUTION:** Keep hands and fingers clear of the dies and swing arms. Stand to the front of the machine to avoid getting hit with the material during the bending process. When handling large heavy materials make sure they are properly supported.

Programmer Overview

- This draw bender utilizes a fully programmable touch screen operator interface. The unique operator interface allows you to write and save 170 programs with 10 bends per program. Operation is extremely simple to learn. Simple foot pedal controls allow you to easily produce fast and accurate bends. The following instructions will walk you through the basic functions.
- Be sure to follow the dry running instructions to familiarize yourself with all the functions of the control before any actual bending of material is performed.



Note: See the Screen Shots section of the manual to match the figure call outs.

Machine Start up and Homing

1. Turn the main power switch to the "ON" position.
2. It takes about 1 minute for the programmer to boot up. The machine has been homed from the factory and does not need to be re-homed unless the encoder or drive motor needs servicing. In the Home or "0" position, the flat of the spindle drive keys are parallel to the machine frame. (The hook arm of the die will also be parallel when a die is installed.)
3. The programmer will display the "RMD MAIN SCREEN" see Fig.1.
4. On the RMD MAIN SCREEN, you can choose "MANUAL MODE" or "RUN, VIEW OR EDIT A PROGRAM".

Programmer Display and Key Functions

1. The touch screen control is very self-explanatory. By touching the labeled touch boxes on the screen, the listed parameter or function will be selected. The exit box will return you to the previous screen and get you back to the RMD MAIN SCREEN. When entering names and degrees, a keypad will be displayed Fig 2 and 3.



Main Menu Choices

1. "RUN, VIEW OR EDIT A PROGRAM" Select this Feature if you want to:
Run a program
View the settings of an existing program
Edit or create a program.
 - a. Up to 170 programs with 10 bends per program can be created using any alphanumeric characters.
 - b. From the Program selector screen Fig 4, choose the program you wish to edit by touching the name of the program from the right side column. Use the up and down arrows to move the screen up or down one line or one page at a time. Dashed lines in the name indicate that no program is saved to that location.
 - c. After selecting the program. Touch the VIEW/EDIT button and the program parameters will be displayed Fig 5. Press the View button in the upper right corner to change to the Edit mode.
 - d. Verify that the bend to be edited is selected. Press the box for the parameter to be changed and the digit key pad will open. Enter the desired numbers. Add zeros as needed to move the decimal position.
 - e. When the changes have been completed, press the Save button near the top of the screen. If this is a new program, the alpha key pad will open to allow the program to be named and saved.

Edit a Program

1. Select this feature when you want to edit an existing program.
 - a. From the Program selector screen Fig 4, choose the program number to be edited.
Use the up and down arrows to move the screen up or down one line or one page at a time. Dashed lines in the name indicate that no program is saved to that location.
 - b. After selecting the program line. Touch the VIEW/EDIT button and the program parameters will be displayed Fig 5. Press the View button in the upper right corner to change to the Edit mode.
 - c. Verify that the bend to be edited is selected. Press the box for the parameter to be changed and the digit key pad will open. Enter the desired numbers. Add zeros as needed to move the decimal position.
 - d. When the changes have been completed, press the Save button (Fig. 5) near the top of the screen. If this is a new program, the alpha key pad (Fig. 3) will open to allow the program to be named and saved.
2. After selecting the program touch the RUN button and the program parameters will be displayed Fig 6.



3. At this point, pressing the forward foot pedal will start the bending process. The machine will rotate in the selected direction at the chosen speed to the desired degree totaling the bend angle plus the spring back degrees.
4. When at the final position, the control will prompt you to "Press REV Pedal to Home" Fig 8.

Delete Program

1. Follow the above steps to get to the edit screen Fig 5. Press and hold the CLEAR PROGRAM button to erase all of the bend data for the selected program.

Creating a Program

1. Choose "RUN, VIEW OR EDIT A PROGRAM" from the RMD MAIN SCREEN Fig 1.
2. Select an open program number from 1 to 170 Fig 4. If all of the program numbers have been filled, then an existing file will need to be overwritten to the new program parameters.
3. When the desired program slot has been selected, press, VIEW EDIT Fig 4.
4. After selecting the program line. Touch the VIEW/EDIT button and the program parameters will be displayed Fig 5. Press the View button in the upper right corner to change to the Edit mode.
5. On the edit screen enter the desired PROGRAM NAME by touching the name field Fig. 5.
6. The alpha key pad (Fig. 3) will open. Name the file for future reference, (There is an 8 character limit) and press enter to save the name and return to the previous screen.
7. Enter the bend ANGLE Fig 5.
8. Enter the SPRING BACK Fig 5.
9. Enter the SPEED from 1-6. Fig 5, 1 or 2 recommended. The closer to bend capacity, the slower the speed setting should be.
10. Enter a MATERIAL ROTATION if desired. (Normally the first bend is at zero.)
11. Repeat above steps for Bends #2 to #10.
12. Press the "Exit" button in the upper left corner of the screen. The save confirmation screen (Fig. 10) will display.
13. Press Yes or No as desired to save or erase the changes.
14. From the edit screen (Fig 5) press Run to run the program.



Dry Running

- Once you are familiar with the machine and programming unit, it is important to dry run a few programs without any tooling or material installed.
- Follow the steps in the Running a Program sections to dry run the program.
- Repeat this process as many times as needed to fully understand the functions and controls.



CAUTION: Do not attempt to operate if you are not confident or do not understand the controls! Feel free to consult the factory with any questions.

Manual Bend

1. Select this feature to bend manually without the need to create a program. The actual degree will be displayed while in this mode. This mode also allows you to enter in one bend angle and on spring back value Fig 9.
2. With the arrow keys a bend speed from 1-6 can be selected.

Running a Program

1. Choose "RUN, VIEW OR EDIT A PROGRAM" from the RMD MAIN SCREEN Fig 1.
2. To edit a program, choose the program you wish to edit by touching the name of the program from the right side column. Use the up and down arrows to move the screen up or down one line or one page at a time. Dashed lines in the name indicate that no program is saved to that location.
3. After selecting the program touch the RUN button and the program parameters will be displayed Fig 6.
4. Verify the spindle is clear and ready to perform a dry run or that the die is secure and material properly loaded.
5. Press and hold the Forward foot pedal down to produce the sample bend.
6. When at the final position, the screen will read, "Bend Done. Release FWD Pedal" and then "Press REV Pedal to Home" Figs 7 and 8.
7. Press and hold the reverse foot pedal until the spindle reaches "0" degrees.
8. If a second or more bends have been programmed, the Bend # display will change to the next bend number. This will be the next bend and so on all the way to the last programmed bend up to bend 10.
9. Reposition or load the material for the next bend.
10. If only 1 bend is programmed, bend 1 will be repeated until the program is exited and a different program is loaded.



Homing

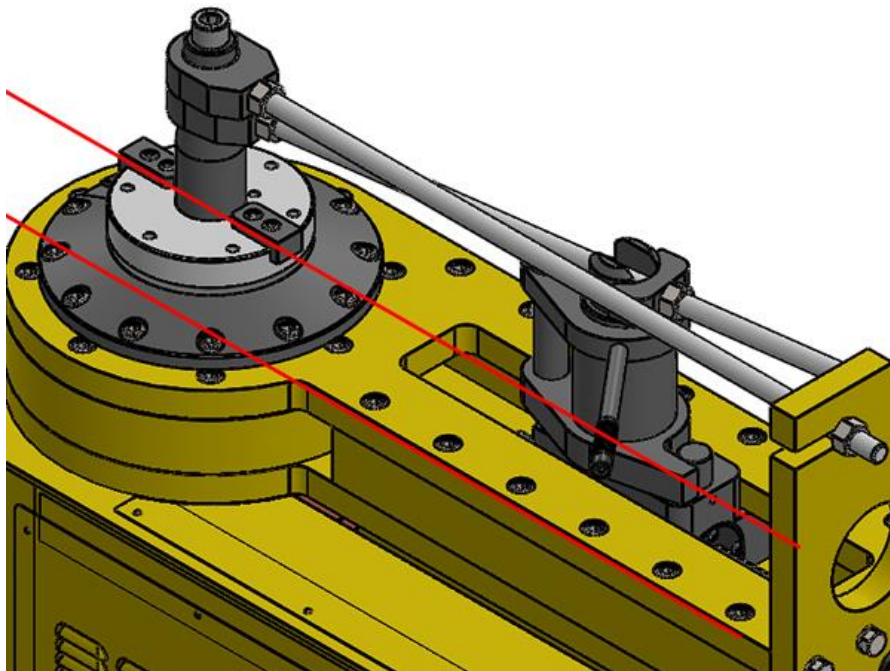


IMPORTANT: *Don't Change the home position unless you are sure the position was lost, damage to the machine and tooling can occur if the home position is set incorrectly.*

1. The machine has been homed from the factory and does not need to be re-homed unless the encoder or drive motor needs servicing. In the Home or "0" position, the flat of the spindle drive keys are parallel to the machine frame. Verify that the spindle is at the home position using the manual function before moving to the next step.
 - a. Use a straight edge as needed to verify that the drive keys are exactly parallel to the edge of the bending frame in the Home position. Slow the Motor Speed to the slowest position if having difficulties tapping the foot pedals to get the exact setting. (The hook arm of the die will also be parallel when a die is installed.)
2. To set the home position, press the "Help" button on the OEM screens Fig 1 to display at "Set Home" button.
3. Press the Set Home button to enter the Machine Homing screen Fig 12.
4. Once in the Machine Homing screen, follow the directions on the screen to set the home position.

The Home position is saved forever even if the power is shut down. You may lose the home position if power is lost to the machine during a move or if wiring or electronics are disconnected inside the electrical cabinet.

5. Press the Exit button to keep the existing Home position. Press and hold the save button at the bottom of the screen to save the new Home position.

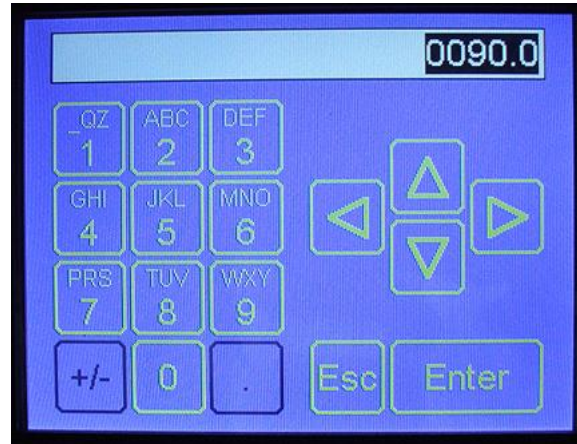




Operation Screen Shots



OP Screen Figure 1



OP Screen Figure 2



OP Screen Figure 3



OP Screen Figure 4



OP Screen Figure 5



OP Screen Figure 6



OP Screen Figure 7



OP Screen Figure 8



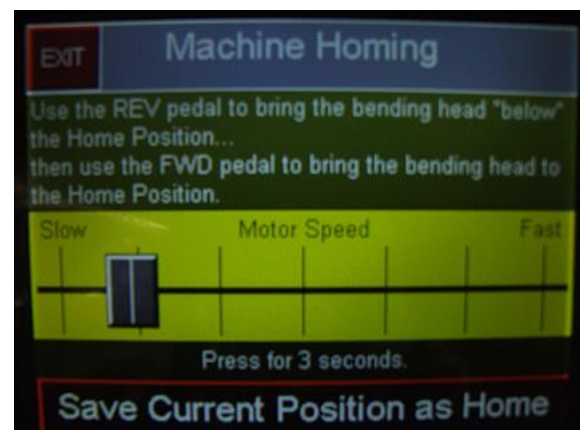
OP Screen Figure 9



OP Screen Figure 10



OP Screen Figure 11



OP Screen Figure 12



OEM Screens and Bending More than 180 Degrees

- Parameters in the OEM MENU should only be done after consulting the factory. Changing these parameters without consulting the factory will void the warranty.
- This machine is capable of bending more than 180 degrees. Contact Baileigh Industrial about your application.
 - It will require a password to make the machine go past 200 degrees.
 - Requires special tooling to allow removal of bent part. If standard tooling is used, the material will be locked onto the die.
- Activation of bi directional option should only be done at the factory. Consult the factory for specific information.

OEM Screen Shots



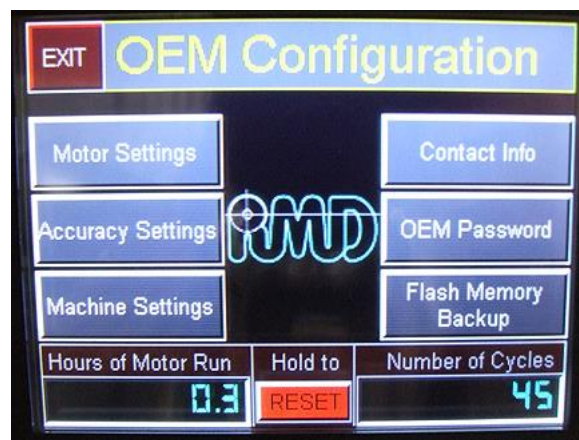
OEM Screen Figure 1



OEM Screen Figure 2



OEM Screen Figure 3



OEM Screen Figure 4



Motor Settings			
Speed 1:	30.0Hz	Gearbox Ratio: 1226.34:1	
Speed 2:	40.0Hz	Encoder Teeth: 38	
Speed 3:	50.0Hz	Accel Time	Decel Time
Speed 4:	60.0Hz	1.0s	0.3s
Speed 5:	65.0Hz	Set Machine Home Position	
Speed 6:	70.0Hz		

OEM Screen Figure 5

Accuracy Settings			Help!
Soft OverTravel:	Warmup Angle:	Enable Warmup	OFF
200°	45°		
Don't start at full speed if within 2400 counts.			
Slowdown Stage 1: Motor at Bend Speed until...			
0.500s before angle is reached,		slow to 20.0Hz.	
Slowdown Stage 2: Motor at Stage 1 speed until...			
2.800° before angle is reached,		slow to 10.0Hz.	
100 counts before bend angle, stop the motor.			

OEM Screen Figure 6

Machine Settings		SYSTEM RESET
NOTE: Only changeable when at Home Position		
Machine Bend Direction	Standard Clockwise	
Allow non-OEM bend direction changes?	NO	
Allow non-OEM machine homing?	YES	
Allow Flash Backups?	YES	Flash Bends? YES
Motor Amp Meter Scale	0-25A 0-50A	
Comm Scan Time	50 Valid	149458 E-Code 0
No Response	Corrupt	MCB 0

OEM Screen Figure 7

Contact Info	
Edit HELP Screen Contact Information	
Name:	Rusch Machine & Design, Inc.
Address:	1911 Columbus Street
City/ST/Zip:	Two Rivers WI 54241
Phone/Ext:	920 - 793 - 2936 x0
Note: Phone extension will only show if other than 0.	

OEM Screen Figure 8

OEM Password	
Passwords are numeric and contain 1 to 9 digits.	
Current Password:	*****
New Password:	*****
New Password Confirm:	*****
Change Password	

OEM Screen Figure 9

Flash Memory Backup	
Status:	
BACKUP	Flash Manager RESTORE
Backup machine settings to Flash Memory	Restore machine settings from Flash Memory
BACKUP SETTINGS	RESTORE SETTINGS
Backup all 170 Programs to Flash Memory	Restore all 170 Programs from Flash Memory
BACKUP PROGRAMS	RESTORE PROGRAMS

OEM Screen Figure 10



UNDERSTANDING SPRINGBACK

Springback can be difficult to understand. As material is bent, the materials yield strength resists being formed. As a final degree is reached, the machine will have enough power to hold the bend at a set degree, but as the pressure of the machine is released, the material has a resistance built in, so it "springs back"

Springback will vary with every size, type and wall thickness, so it will never be consistent from size to size.

The best way to determine a materials springback is to do sample bends to 90 degrees until a perfect 90 is obtained.

- At that point document the actual machine degrees.
- Full manual mode is the best place to do these tests.
- Use the overbend amount and enter that value into the springback field.

MATERIAL SELECTION



CAUTION: It must be determined by the customer that materials being processed through the machine are **NOT** potentially hazardous to operator or personnel working nearby.

When selecting materials keep these instructions in mind:

- Material must be clean and dry. (without oil)
- Material should have a smooth surface so it processes easily.
- Dimensional properties of material must be consistent and not exceed the machine capacity values.
- Chemical structure of material must be consistent.
- Buy certificated steel from the same vendor when possible.



DIE SELECTION AND INSTALLATION

Before any bending can take place, the proper die set must be chosen to match the material being bent. (EX) 1-1/2" diameter tubing requires a die set marked 1-1/2" tube.



Note: Pipe and Tube are not the same, (see table 1) for nominal pipe sizes. All BAILEIGH INDUSTRIAL dies are color coded to avoid confusion between pipe and tube (see table 2).



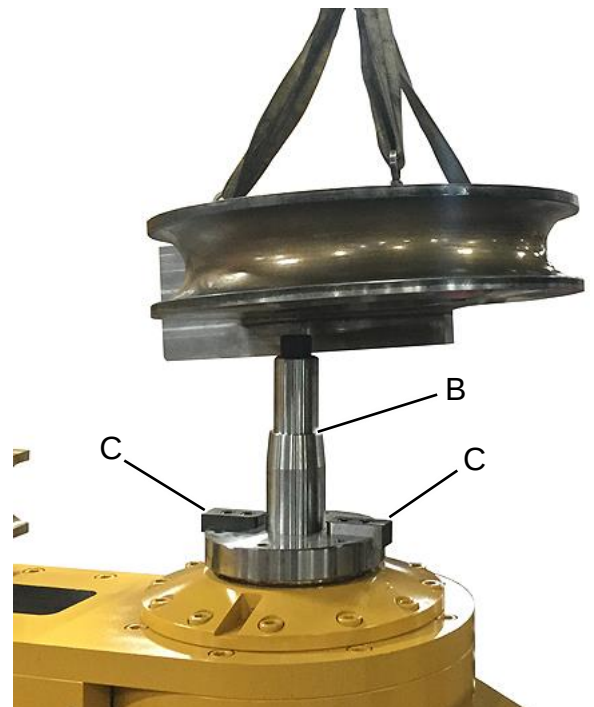
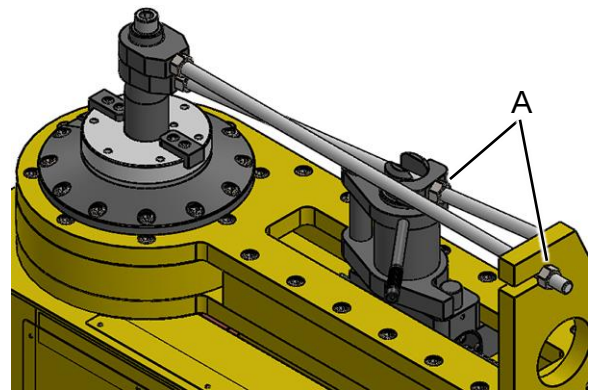
IMPORTANT: Damaged or worn tooling should be replaced before attempting to bend material. This will ensure that bends are correct and provide a longer life to machine components.

1. Loosen the anchor nut (A) for the two strut rods and remove the strut rods.
2. Choose the desired bend die and with 3 lifting eye bolts and a forklift, hoist, or cherry picker, pick the die and position over the spindle. Use a rag and some cleaner to wipe the spindle face and the bottom of the die.
3. Begin to lower the die onto the spindle, slowly line up the center bore (B) and rock if needed to get the die to slide down. Watch the orientation so the drive keys (C) line up correctly.



Note: The die will only fit one way.

4. When the drive keys (C) line up the die will drop all the way down to the spindle.
5. Install and tighten the 1/2-13 socket head bolts provided with the die. Tighten these bolts enough to hold the die firmly down to the spindle. Approximately 80-100ft-lb. (108-135N•m).



IMPORTANT: FAILURE TO PROPERLY BOLT DOWN DIE WILL RESULT IN DAMAGE TO MACHINE AND TOOLING.



6. To install the counter die, remove the hitch pin and insert the counter die in the opening in the counter die mount until the holes line up.
7. Now insert the hitch pin through all the holes, reinstall clip on the hitch pin with the engraved side of the counter die facing up.



IMPORTANT: Be sure the long end of the counter die points away from the hook arm, or to the right of machine.

8. Install the strut rods and tighten just so there is tension on the rods.

Material Layout

In order to create accurate parts, you will have to layout the material in flat form. First you will need to determine how much material is used per degree of bend. Use the multiplier table on Table #3 to determine the arc lengths for the die in use. Or use the following formula:

Alternate arc length formula:

Example: $6.0 \text{ clr} \times 2 = 12$ $12 \times 3.14 = 37.699$ $37.699 / 360 = 0.1047''$ per degree
 $0.1047'' \times 90 \text{ degrees} = 9.425''$ of material used for a 90 degree bend.

Once the arc lengths are determined you can begin layout of the material using Diagram #1 as a reference.

- Diagram #1 shows a simple part bent on the same plane in the same direction.
- Diagram #2 shows bending based off of a centerline in two directions.
- For symmetrical bends, centerline bending is easiest.
- For non-symmetrical bends, continuous one direction bending is best.
- Another way to layout material is to draw them in a 2D computer software program like Auto Cad. There are many free programs on the internet. In a 2D program you will draw the parts centerline only with corresponding clr's. Then you will be able to list individual segments of the bent part. This data can be directly entered into the control.
- Another program available is BEND-TECH which is a program specifically designed for tube bending and will give you all of the required data to make a part. This software is available from Baileigh Industrial.
- Bending with a rotary draw bender requires determining the start of bend point which will line up with the "0" mark on the die. The portion of the tube toward the hook arm will be locked to the die, the portion toward the counter die is the draw side and will slide along the counter die and conform to the dies shape/radius.

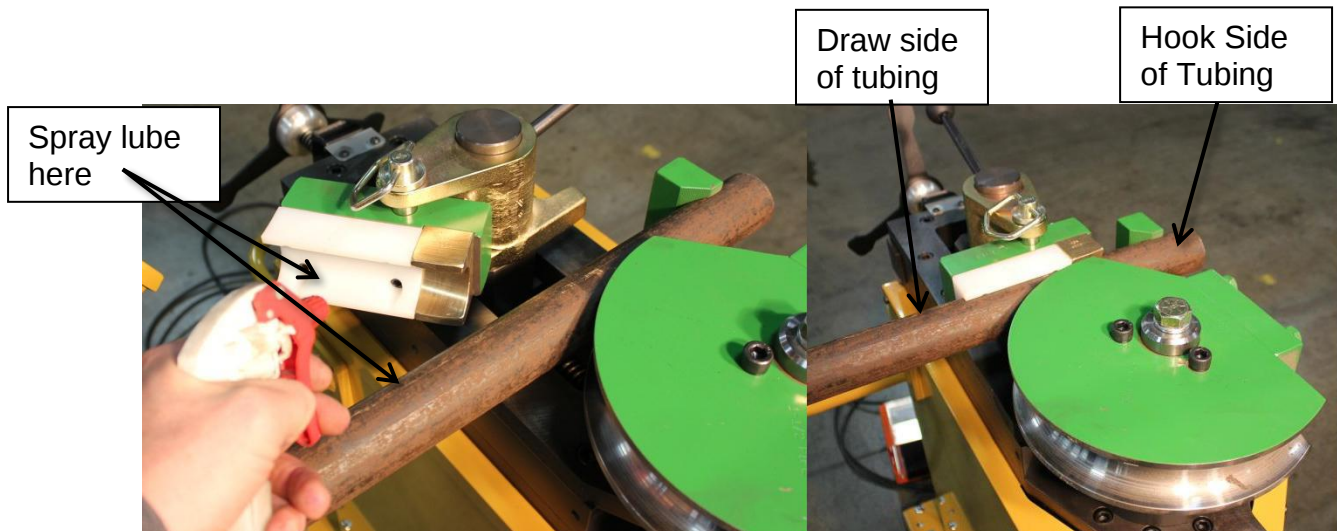


Material Insertion



Note: The photos and illustrations used in this manual are representative and may not depict the actual color, labeling or accessories and may be intended to illustrate technique only.

1. At the start page, choose "RUN PROGRAM" and choose program to run following screen instructions.
2. Once the die set is properly installed and the desired program is loaded and performs as needed, the correct size material can now be inserted.



3. With the die head at home or "0" position, insert material past the hook arm aligning the "0" mark on the die with where the bend will start on the material.

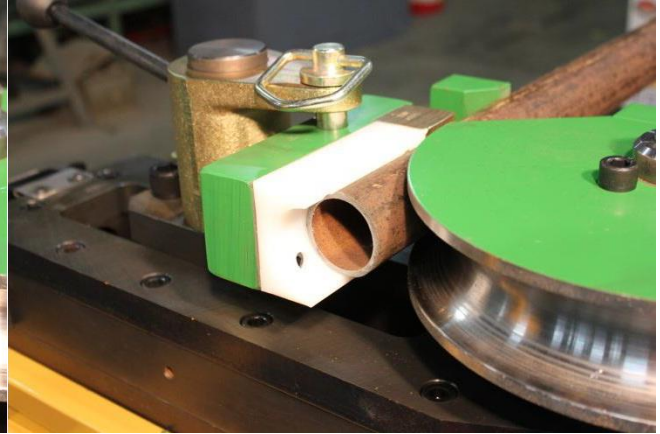


Important: Liberally apply lubricant along the counterdie and the 1/2 of the material that contacts the counter die with a WD-40 style lubricant or equivalent. Do not lubricate the bending die. Lubricating the bending die will encourage slipping of material in the bending die.

4. Tighten the counter die assembly applying moderate pressure on the material.
5. With the counter die tight, document the number displayed on the Leadscrew counter, you will want to return to the same exact number every time to ensure exact counter die positioning and repeatable bends. This number can be entered in the control for programmed bends.
6. Be sure there are no obstructions along the draw side of the material.
7. Be sure to leave enough material past the plastic slide to produce the desired bend.



Left



Right

- The left figure shows the recommended minimum / correct amount of material remaining to be fully supported in plastic slide.
- The right figure shows the maximum amount the material can be pulled through the counter die. Pulling the material further than shown into the counter die, it will destroy the plastic slide.



Left



Right

- In the left figure, there is not enough material to complete the bend. This bend will damage the dies.
- The right figure shows a correct bending orientation.



IMPORTANT: Orienting your tubing in this fashion will cause damage to your tooling and machine!! DO NOT pull bent tubing into the counter die! Make sure you have enough straight material on the draw side of the tube to create your bend.

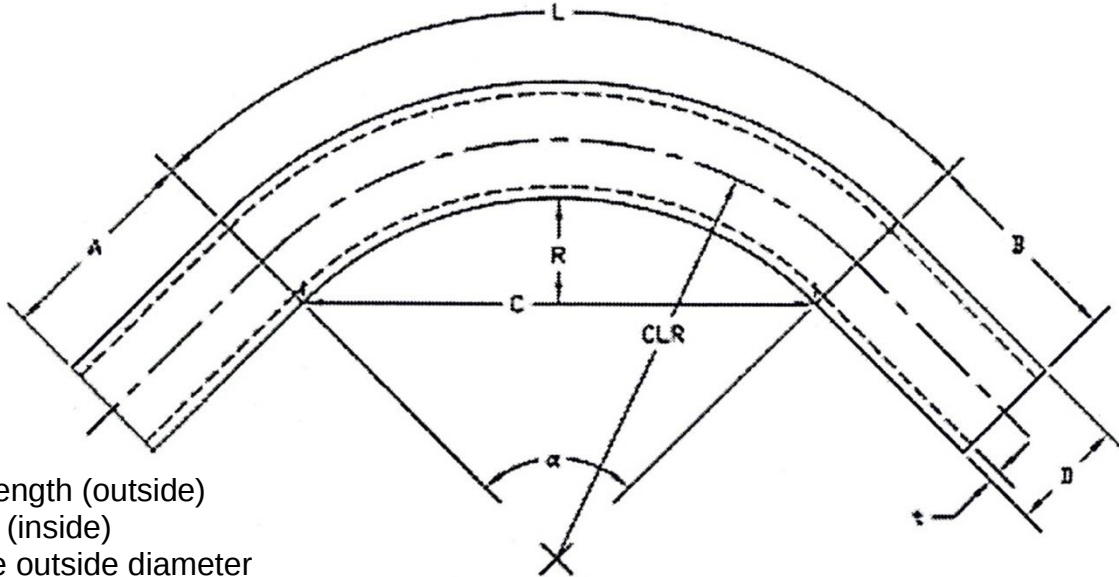


Material Removal / Advancement

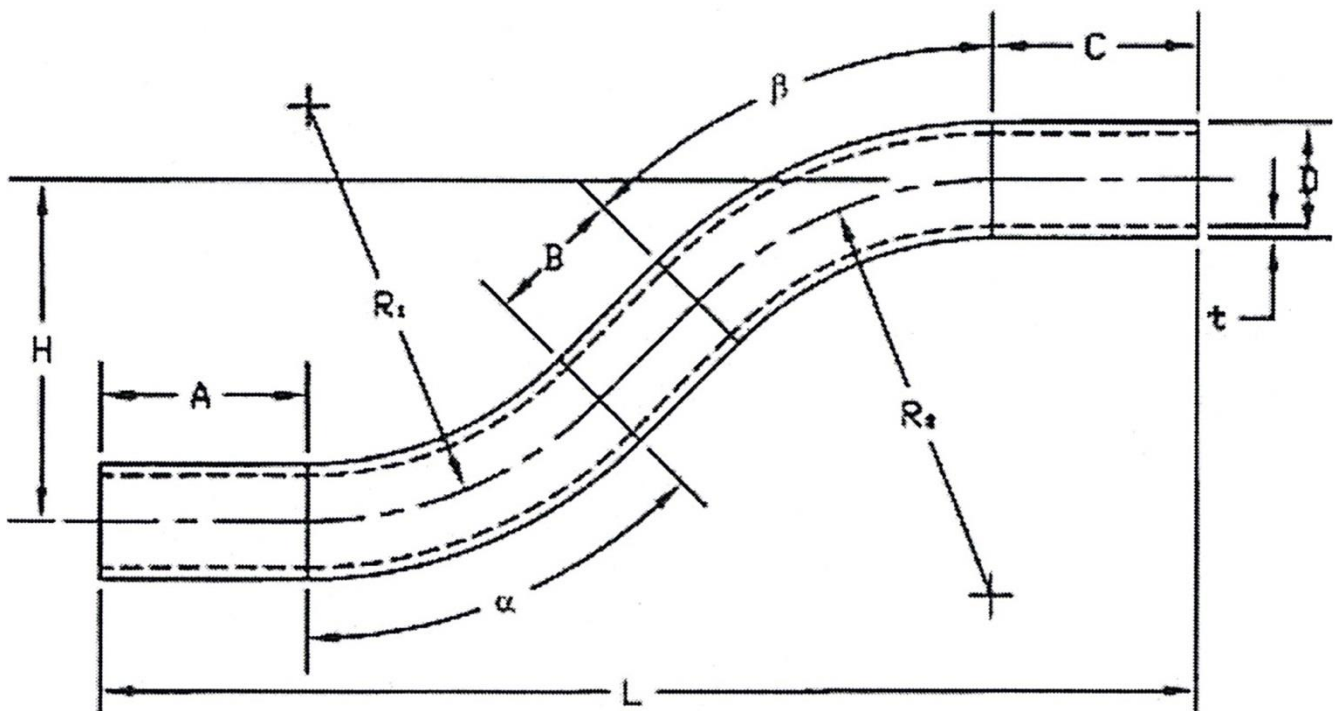
1. After the die stops at the desired angle, the material needs to be removed or advanced.
2. Activate the reverse foot pedal. As the die starts going backwards, the counter die and its quick release will swing out of the way allowing for easy material removal.
3. Activate the Reverse foot pedal and hold until the die reaches its home or "0" position. If you are advancing the material, open the counter die and then reverse machine, holding the material in place. Be careful when reversing with material still in die, not to catch it on the hook arm of the die. Once the die is at the home position, the material can be removed or advanced.
4. Repeat previous steps for next bend in line.



PIPE AND TUBE BENDING DIAGRAMS



L = Arc length (outside)
 R = Rise (inside)
 D = Tube outside diameter
 t = Tube wall thickness



a = First bend arc angle
 b = Second bend arc angle
 A = First tangent
 B = Straight between bends
 C = Second tangent
 D = Tube outside diameter

H = Height of offset
 L = Length of offset
 R_1 = First radius
 R_2 = Second radius
 t = Tube Wall Thickness



BENDING GLOSSARY

Arc Length	The length of material along the centerline of the tubing
Centerline Radius (CLR)	Distance in inches from the center of curvature to the centerline axis of the tube bending or pipe bending bends. Abbreviated as CLR. See Tube Bending and Pipe Bending Diagram
Degree	Angle in degrees to which the tube/pipe bends are formed (i.e. 45 degrees, 90 degrees, 180 degrees, etc.)
Easy Way (EW)	Bending of a rectangular tube with its short side in the plane of the tube or pipe bend
Hard Way (HW)	Bending of a rectangular tube with its long side in the plane of the tube or pipe bend
I.D.	Inside diameter of the tube or pipe bends
Minimum Tangent	The minimum straight on the end of pipe bends required by the bending machine to form the bend
Neutral Axis	That portion of the pipe or tube that is neither in compression or tension.
O.D.	Outside diameter in inches of the tube or pipe
Out of Plane	The deviation of the horizontal plane of a single pipe bend between its tangent points, based on the theoretical center-line of the pipe bend
Ovality	The distortion or flattening of pipe or tube from its normal, round shape caused by the pipe bending process
Springback	Amount of degrees material will return after bending pressure is released
Tangent	The straight portion of material on either side of arc of bending bends. See Tube Bending and Pipe Bending Diagrams.
Tangent Point	The point at which the bend starts or ends. See Tube Bending and Pipe Bending Diagrams.
Wall	The thickness in inches of tubular pipe bending material.
Wrinkles	Waving or corrugation of pipe bending bends in the inner radius.



BENDING SUGGESTIONS

Aluminum Bending

If bending aluminum, lubrication is very important, if the results are less than desirable with WD-40 other lubricants can be used such as:

- Johnson Paste Wax (seems to work the best)
- High Pressure grease
- Highly rich dish soap
- The bronze counter die must be polished and have no aluminum deposits or it will continue to pick up metal.
- If using BAILEIGH INDUSTRIAL's standard counterdie is not producing desired results, roller counter dies are also available.
- BAILEIGH INDUSTRIAL has both steel rollers as well as plastic rollers. Plastic rollers are used primarily for polished aluminum. Steel rollers would be used for non-polished materials.
- Some aluminum will crack as it is being bent, 6061-T6 is very hard and may need to be annealed or ordered in the "T-0" condition. Aluminum will age harden so if possible try to get freshly run material.

Heavy Wall DOM tubing

If heavy wall materials are bent to a tight radius, they can tend to slip in the hook arm causing a poor bend result, below are some suggestions

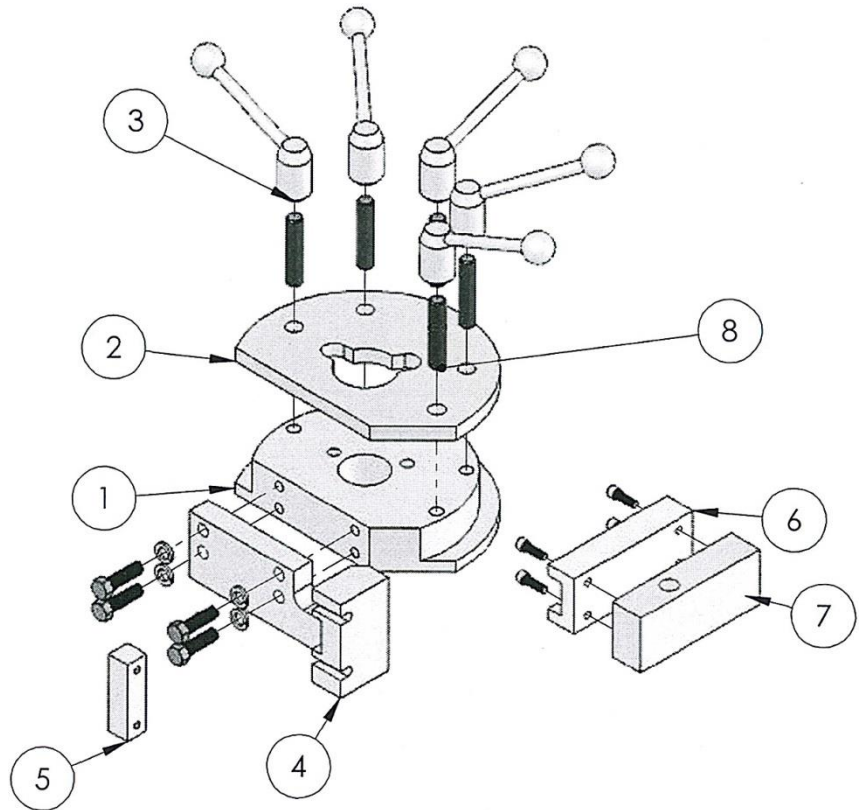
- Use a vise clamp on the outside of the hook arm to "lock" the material in place.
- Use a piece of two sided coarse emery cloth in between the hook arm and the material, this works very well.
- In only this application, high pressure grease applied to the DIE GROOVE also helps.
- BAILEIGH INDUSTRIAL can make special clamps to hold material in place.



Bending With Square Dies

- Die Parts

- 1 Main Bending Die
- 2 Die Cap
- 3 Quick Release Handles
- 4 Hook-Arm
- 5 Hook-Arm Clamp
- 6 Plastic Slide
- 7 Slide Mount
- 8 Quick Release Studs



Square Tooling Setup

1. Install the bending die (1) on to the spindle. Be careful not to pinch your fingers as you lower the die on to the spindle. The die will only fit on the spindle one way. Bolt the die to the spindle using the holes in the die.
2. Install the plastic counter die assembly (6, 7) with the long end pointing away from the hook arm.
3. Snug up the cap clamps (3). Do not over tighten! Or they will be overly difficult to loosen after the bend is complete. Note: tighten clamps without material in the die. The clamps are lift and turn, so you can position them anywhere. This allows the handles to clear the counter-die mount during bending.
4. Insert the material in to the hook arm (4) and pull in to the die. It may be a tight fit. Continue to pull until the material is fully seated in the die's groove.
5. Lube the counter die and the material that will slide along the counter die. Bring the plastic counter die assembly up to the material, leaving about 1/8" to 1/4" gap. (Note: on some thinner material it helps to keep the counter die approx. 1" away from the material)



IMPORTANT: Do not lube the bending die surfaces. This will increase the possibility for slippage. Make sure all the die cap clamp handles (3) are inside the die diameter. They could catch the counter die mounting assembly and break off.



6. If the material slips during the bending operation, install the hook arm clamp (5). Do not use it unless you have to.
7. Activate the bender and bend to the desired angle.
8. To remove the material, open the counter die and return bender to the "home position". Using a soft mallet, gently tap the cap clamps open and the material will spring out of the die (1). Remove the material and re-snug the cap clamps.
9. Install the next piece of material to be bent and repeat these steps.

Large Size Square

When bending larger than 1.5" (38.1mm) thinner wall square tubing, the counter die position seems to work better between 1/2" and 1" (12.7-25.4mm) farther away from the die. This seems to reduce side wall distortion and inner wrinkling. Although this suggestion is to help on large size, the same steps can be used for any square, if trying to achieve better results. If the square material slips in the hook arm, use the supplied clamp and bolts to hold in place.

BAILEIGH INDUSTRIAL offer crush bend dies to form a concave crease on the inside of square bends to reduce the possibility of wrinkling.



LUBRICATION AND MAINTENANCE



WARNING: Make sure the electrical disconnect is OFF before working on the machine.

Maintenance should be performed on a regular basis by qualified personnel.

Always follow proper safety precautions when working on or around any machinery.

- Check daily for any unsafe conditions and fix immediately.
- Check that all nuts and bolts are properly tightened.
- On a weekly basis clean the machine and the area around it.
- Lubricate threaded components and sliding devices.
- Apply rust inhibitive lubricant to all non-painted surfaces.



Note: *Proper maintenance can increase the life expectancy of your machine.*

Gear Box Oil

The main Planetary Gear Box is lubed with 80W90 gear lube. Check and replace the gear lube every 3 years or 200hrs of continuous use.





TROUBLESHOOTING



WARNING: Make sure the electrical disconnect is OFF before working on the machine. Use the lockout provided on the main disconnect switch. Wait at least 1 min before working on any circuit, because the VFD capacitors may have energy stored. Always follow proper safety precautions when working on or around any machinery.

FAULT	PROBABLE CAUSE	REMEDY
Machine does not power up	Wrong or non-existent input power source. Blown fuse or tripped circuit breaker.	Check input power and verify voltage Check and replace fuses. Reset circuit breakers
Oil leaking from breather	Normal expansion of gearbox oil	Let oil purge from gearbox and take no further action.
Home position is not in correct position.	Loss of power during bending, or service work was performed	Go to homing screen on controller and repeat homing sequence. If not accessible, contact factory.
Material slips in hook arm	Too much oil on tubing or oil is on the die groove. Clear Radius is too tight. Material has too thin of wall thickness.	Clean material and die groove with solvent. Increase clear radius. Increase wall thickness. Material may need to be clamped top hook arm to prevent slipping. Only the counter die should be lubed
Poor bend results	Worn counter die. Worn die groove. Wrong size material and or wall thickness. Too tight of a clr.	Replace counter die. Replace die. Verify material size is correct. Verify clr
Twisting material	Bend die is not bolted down, Misaligned counter die, worn spindle bearing	Verify the bend die is bolted down to the spindle. Check counter die alignment. Replace spindle bearing
Machine overloads and wont bend	Material is too big for machines capacity. Tensile strength of material is too high. Input power is too low. Bending speed is too fast. No lube on counter die.	Verify material wall thickness and diameter for capabilities. Get material with lower tensile strength. Lower bend speed. Verify input power.
Inaccurate bending	Counter Die leadscrew position is changing. Material diameter is not consistent	Verify that the counter die leadscrew is holding its position via the counter. Verify material diameter with a caliper size.



TABLES, CHARTS, & DIAGRAMS

Table 1 Standard Pipe Sizes and Schedules

PIPE SIZES	O.D.	Pipe Schedules and Wall Thickness					
		5	10	40	80	160	XX STRONG
1/8	0.405	0.400	0.050	0.068	0.095		
1/4	0.540	0.500	0.070	0.088	0.119		
3/8	0.675	0.500	0.070	0.091	0.126		
1/2	0.840	0.700	0.080	0.109	0.147	0.188	0.294
3/4	1.050	0.700	0.080	0.113	0.154	0.219	0.308
1	1.315	0.700	0.110	0.133	0.179	0.250	0.358
1-1/4	1.660	0.700	0.110	0.140	0.191	0.250	0.382
1-1/2	1.900	0.700	0.110	0.145	0.200	0.281	0.400
2	2.375	0.700	0.110	0.154	0.218	0.344	0.436
2-1/2	2.875	0.800	0.120	0.203	0.276	0.375	0.552

Table 2 Die Color Code Chart

Material	Color
Pipe	Green
Tube	Blue
Metric	Red
Square or Rectangle	Gray



Table 3 ARC LENGTH TABLE

EXAMPLE: Arc Length = Constant x Bend Radius. Example: 90deg bend with 6" clr

EXAMPLE: 1.575 (from table) x 6" (clr) = 9.45" (Arc Length)

For bends more than 90deg, Constants can be added together.

Degrees	Constant	Degrees	Constant	Degrees	Constant
1	0.0175	31	0.5410	61	1.0645
2	0.0349	32	0.5584	62	1.0819
3	0.0524	33	0.5759	63	1.0994
4	0.0698	34	0.5933	64	1.1168
5	0.0873	35	0.6108	65	1.1343
6	0.1047	36	0.6282	66	1.1517
7	0.1222	37	0.6457	67	1.1692
8	0.1396	38	0.6631	68	1.1866
9	0.1571	39	0.6806	69	1.2041
10	0.1745	40	0.6980	70	1.2215
11	0.1920	41	0.7155	71	1.2390
12	0.2094	42	0.7329	72	1.2564
13	0.2269	43	0.7504	73	1.2739
14	0.2443	44	0.7678	74	1.2913
15	0.2618	45	0.7853	75	1.3088
16	0.2792	46	0.8027	76	1.3262
17	0.2967	47	0.8202	77	1.3437
18	0.3141	48	0.8376	78	1.3611
19	0.3316	49	0.8551	79	1.3786
20	0.3490	50	0.8725	80	1.3960
21	0.3665	51	0.8900	81	1.4135
22	0.3839	52	0.9074	82	1.4309
23	0.4014	53	0.9249	83	1.4484
24	0.4188	54	0.9423	84	1.4658
25	0.4363	55	0.9598	85	1.4833
26	0.4537	56	0.9772	86	1.5007
27	0.4712	57	0.9947	87	1.5182
28	0.4886	58	1.0121	88	1.5356
29	0.5061	59	1.0296	89	1.5531
30	0.5235	60	1.0470	90	1.5705



Diagram 1

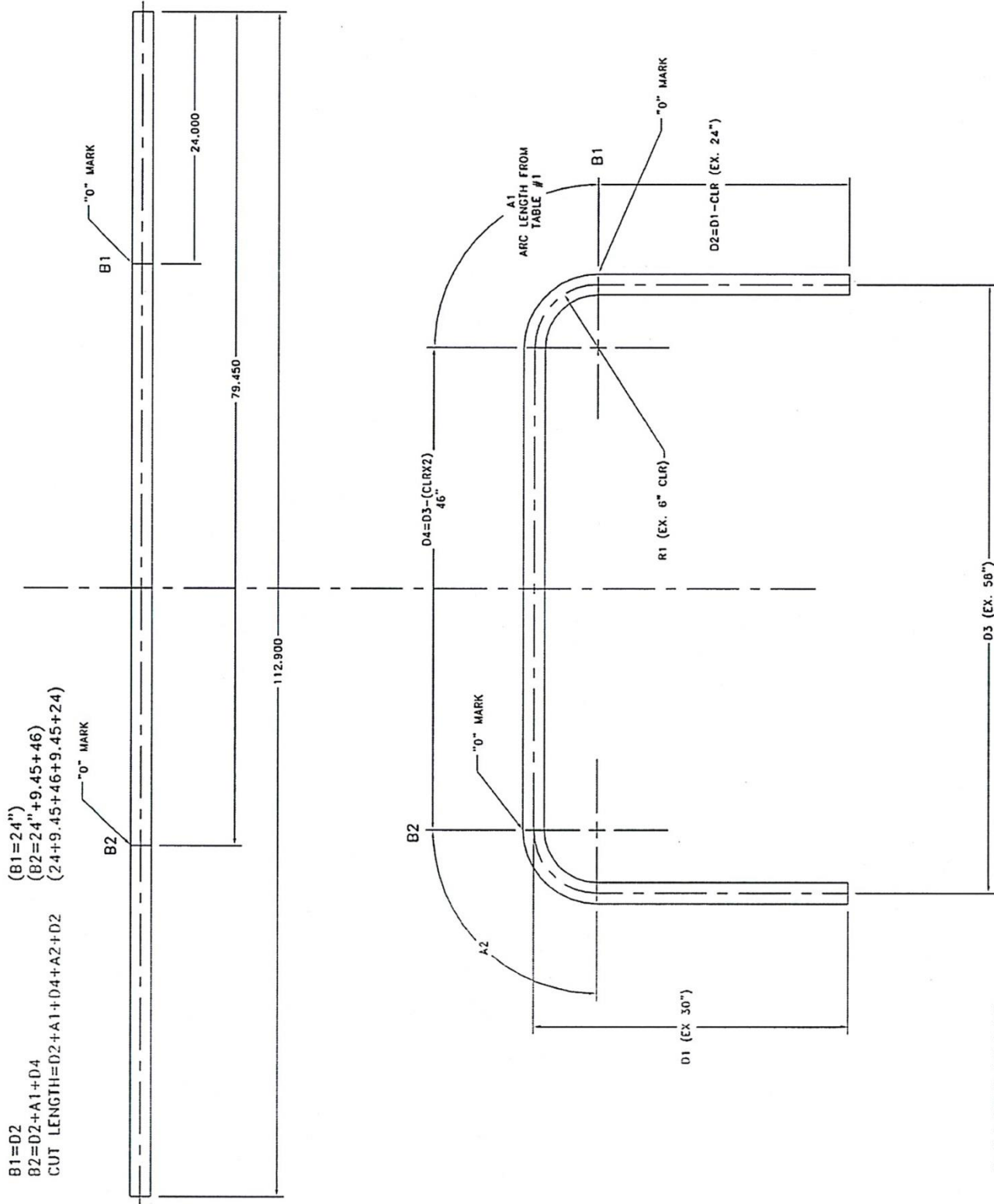


DIAGRAM #1

CONTINUOUS
LAYOUT



Diagram 2

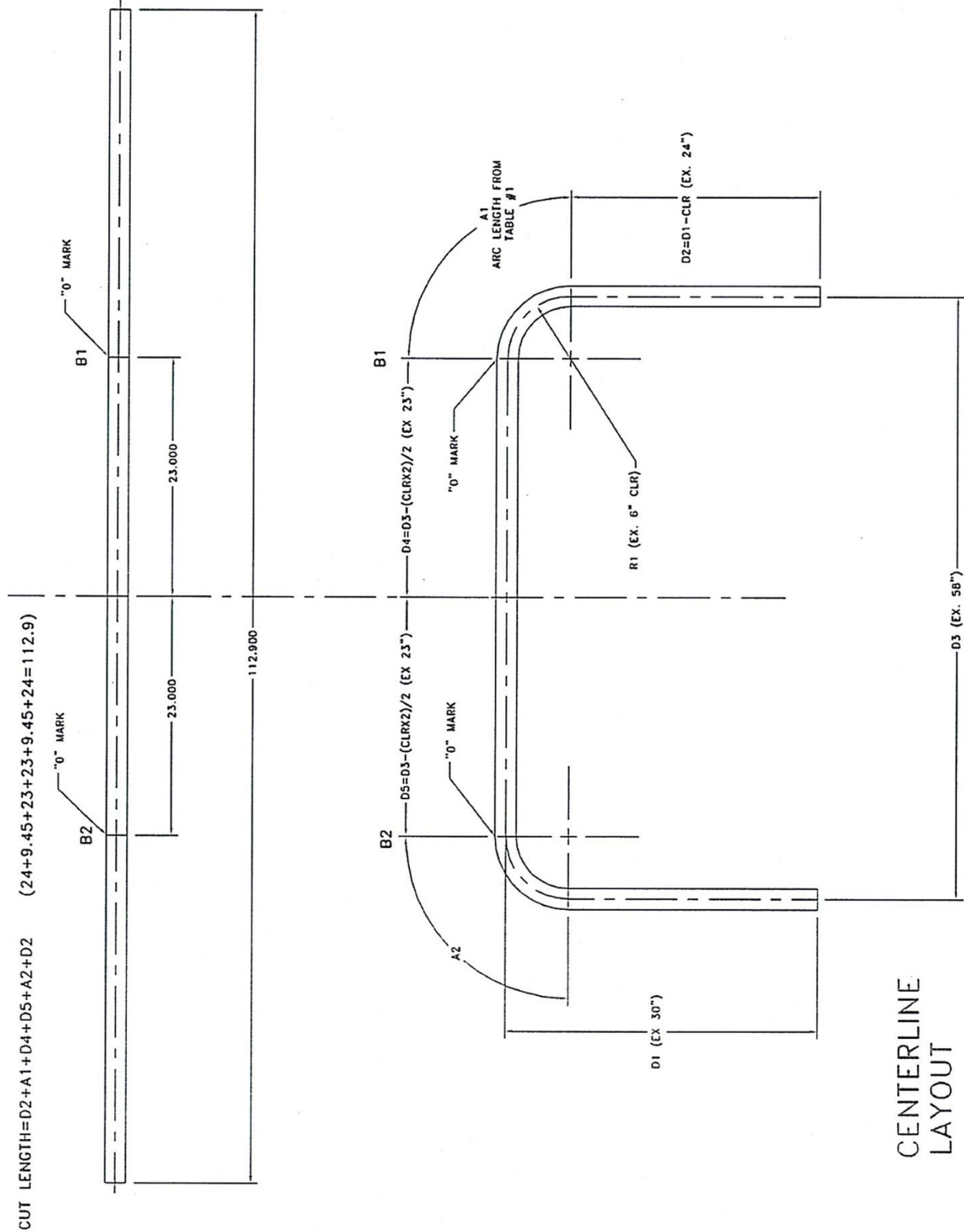


DIAGRAM #2



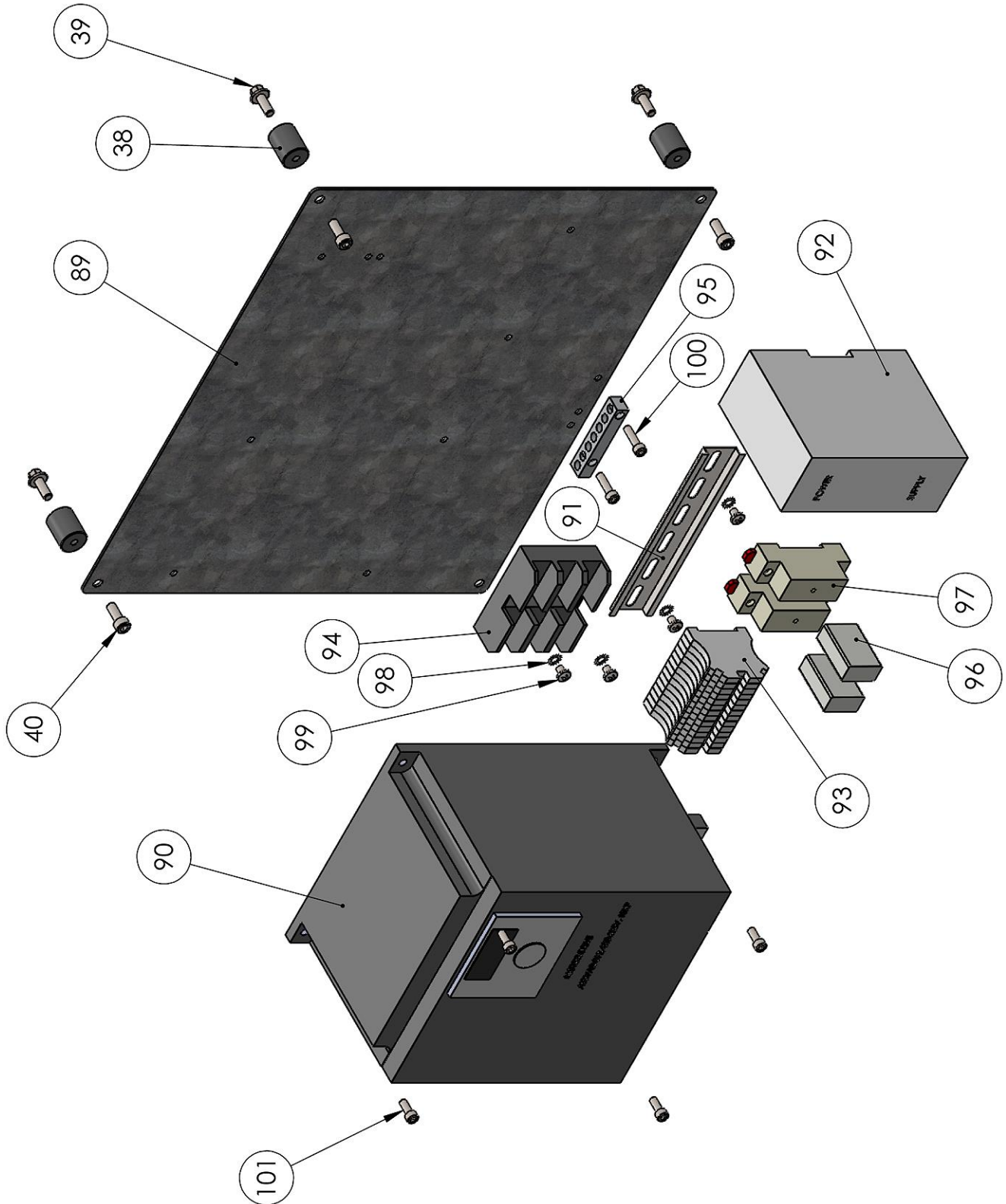
This exploded view diagram illustrates the assembly of a mechanical unit. The main components are labeled as follows:

- 1**: A large, yellow, L-shaped structural plate with a circular cutout.
- 6**: A yellow structural plate forming the base of the main housing.
- 30**: A yellow L-shaped bracket or support piece.
- 38**: A black electronic control module with a digital display and buttons.
- 40**: A black rectangular component, possibly a sensor or actuator, mounted on the control module.
- 41**: A black circular component, likely a wheel or roller.
- 42**: A yellow mechanical component, possibly a lever or actuator.
- 56**: A small red and black component, possibly a sensor or switch.
- 57**: A black rectangular component, possibly a sensor or actuator.
- 72**: A black circular component, likely a wheel or roller.
- 73**: A black rectangular component, possibly a sensor or actuator.
- 74**: A black rectangular component, possibly a sensor or actuator.
- 75**: A black rectangular plate with a grid of small holes, likely a filter or a base plate.
- 84**: A yellow structural plate forming the side of the main housing.

The diagram shows the assembly of these components into a main housing structure. Dashed lines indicate the alignment and assembly sequence of the parts.

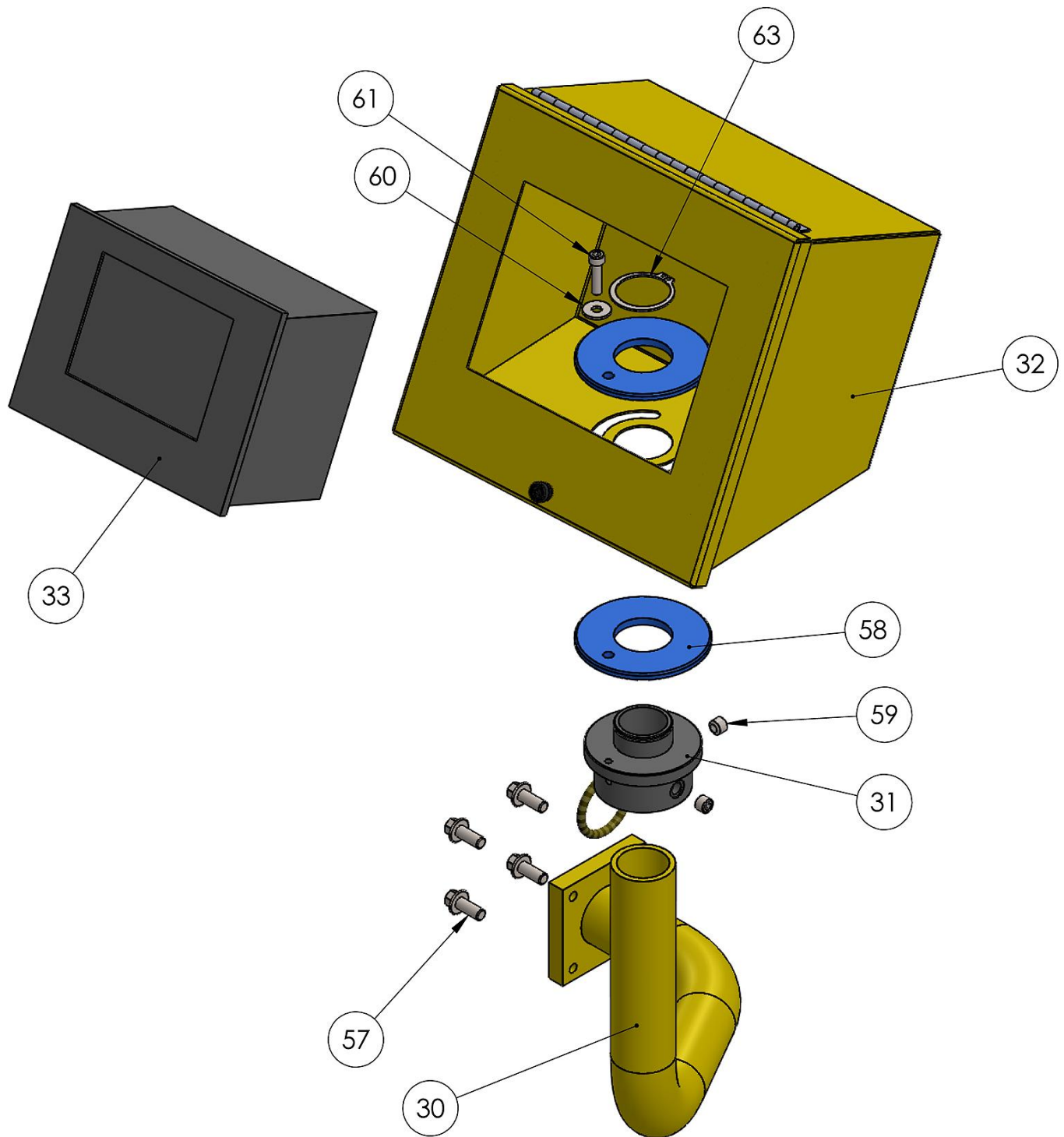


Electrical Panel



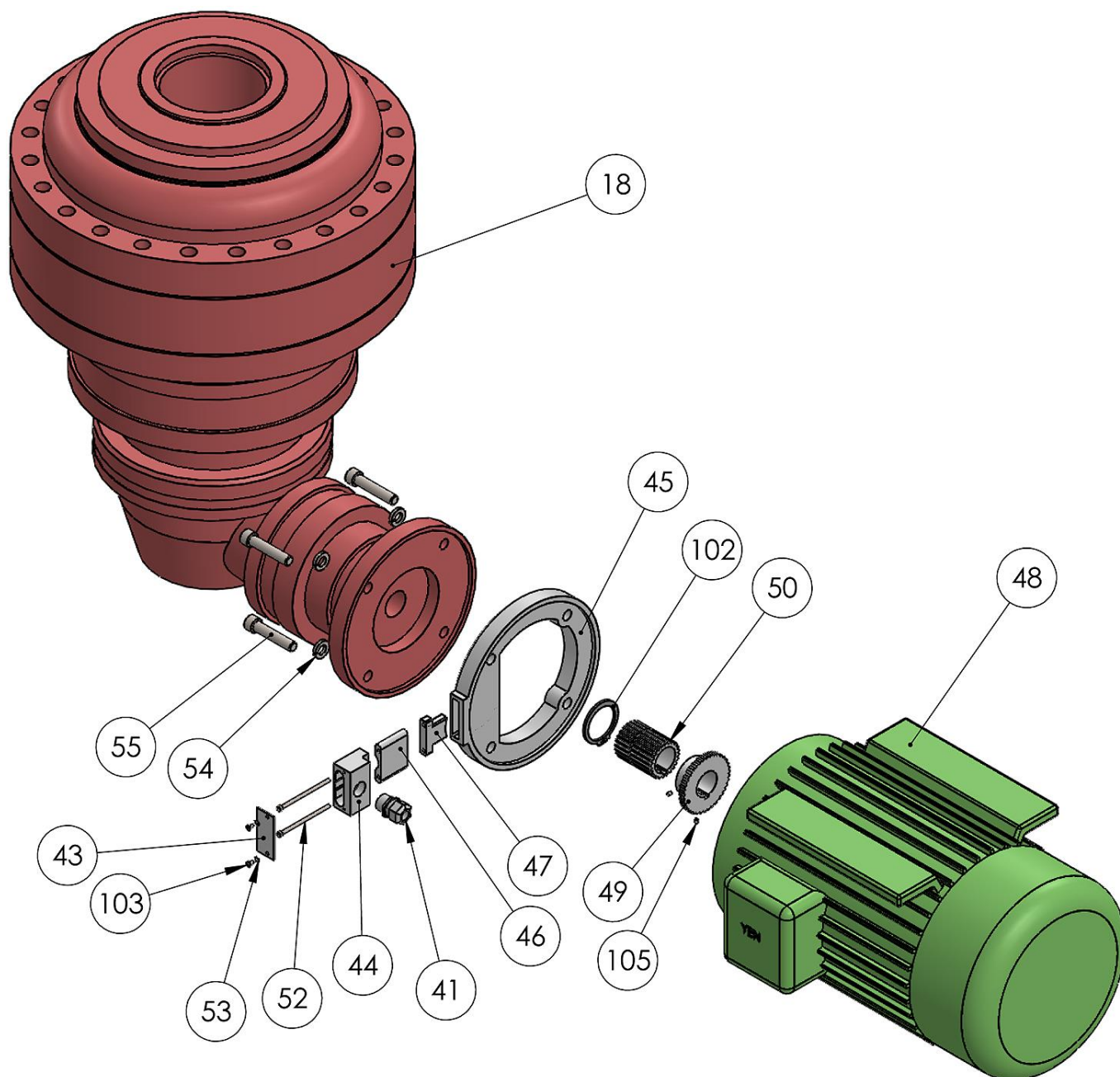


Controller and Arm Assembly



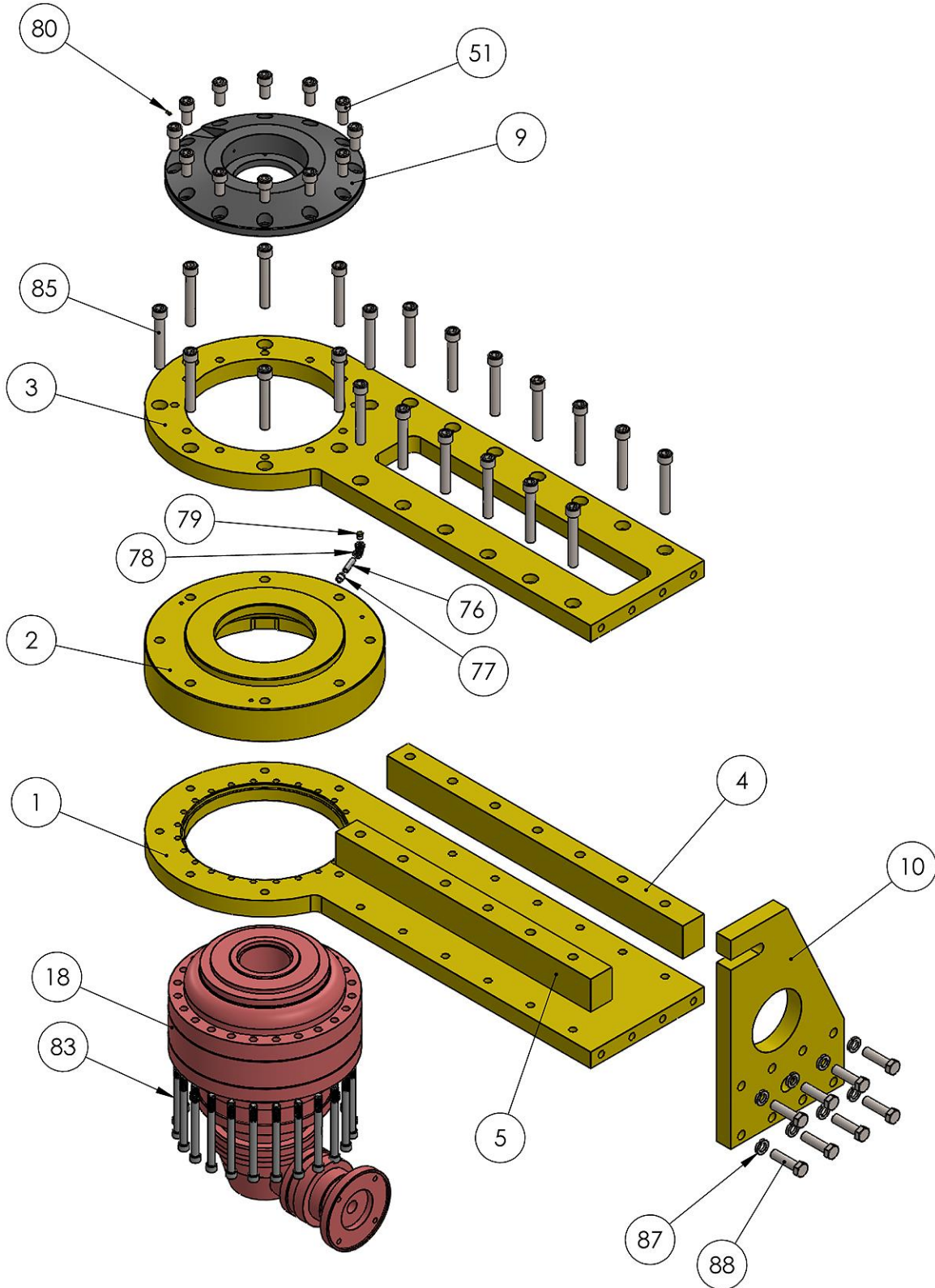


Motor and Gearbox



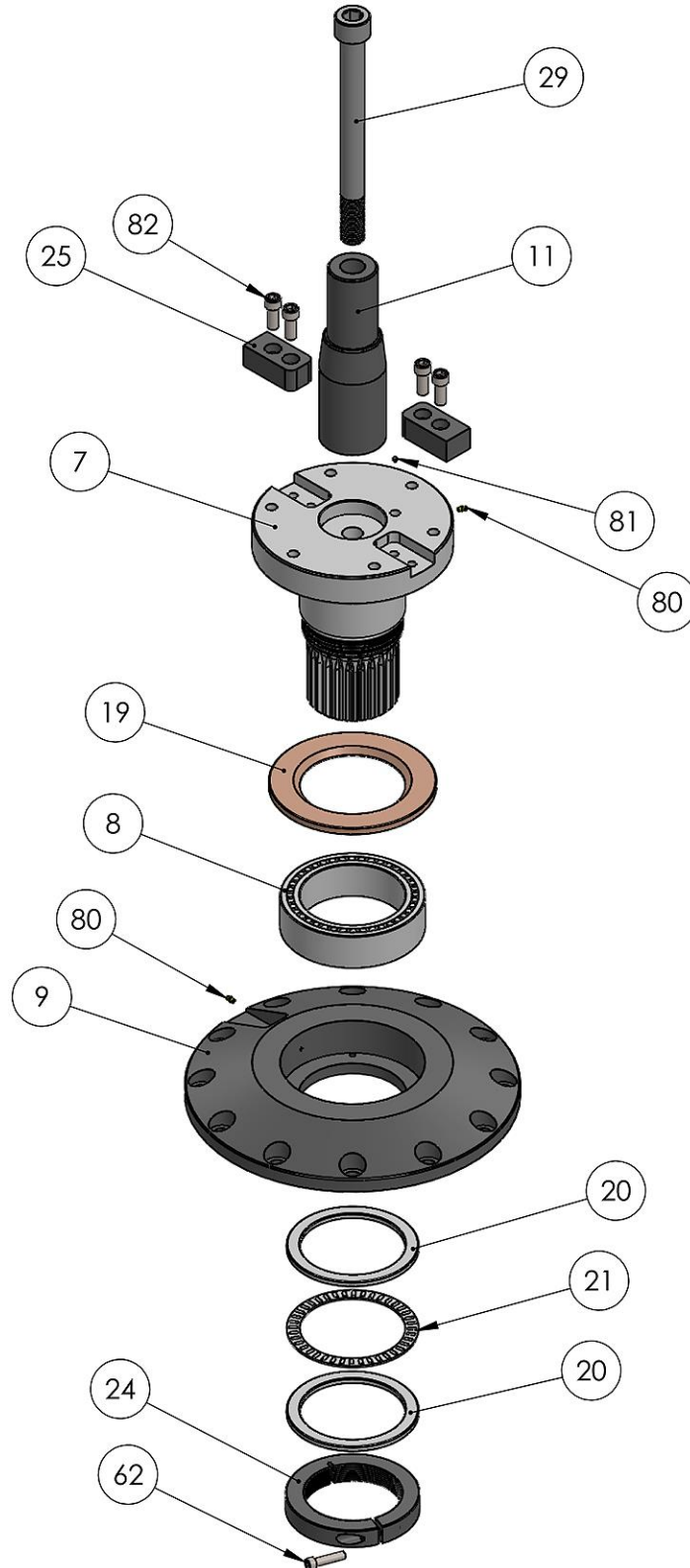


Top Plate Assembly



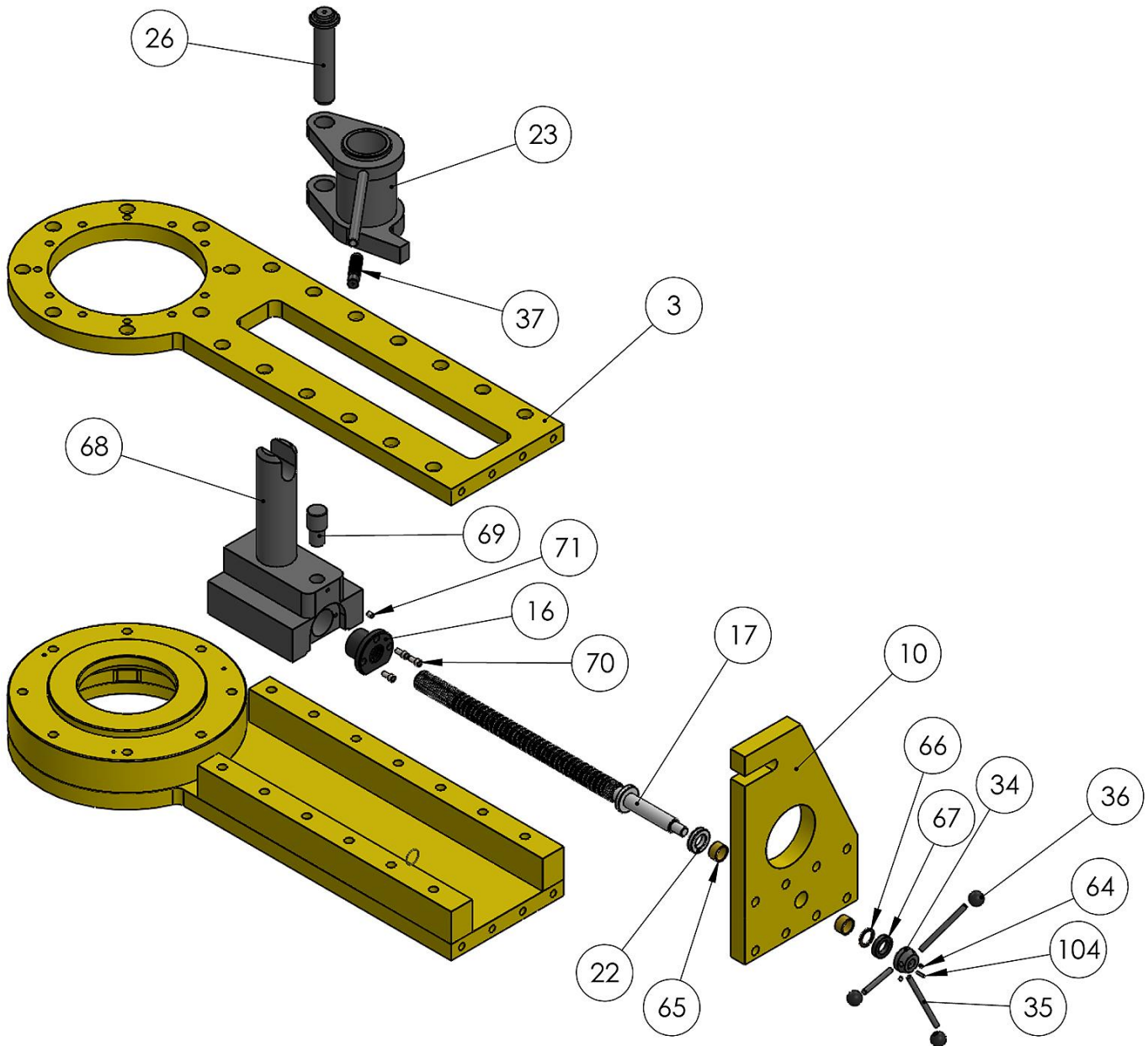


Spindle Assembly



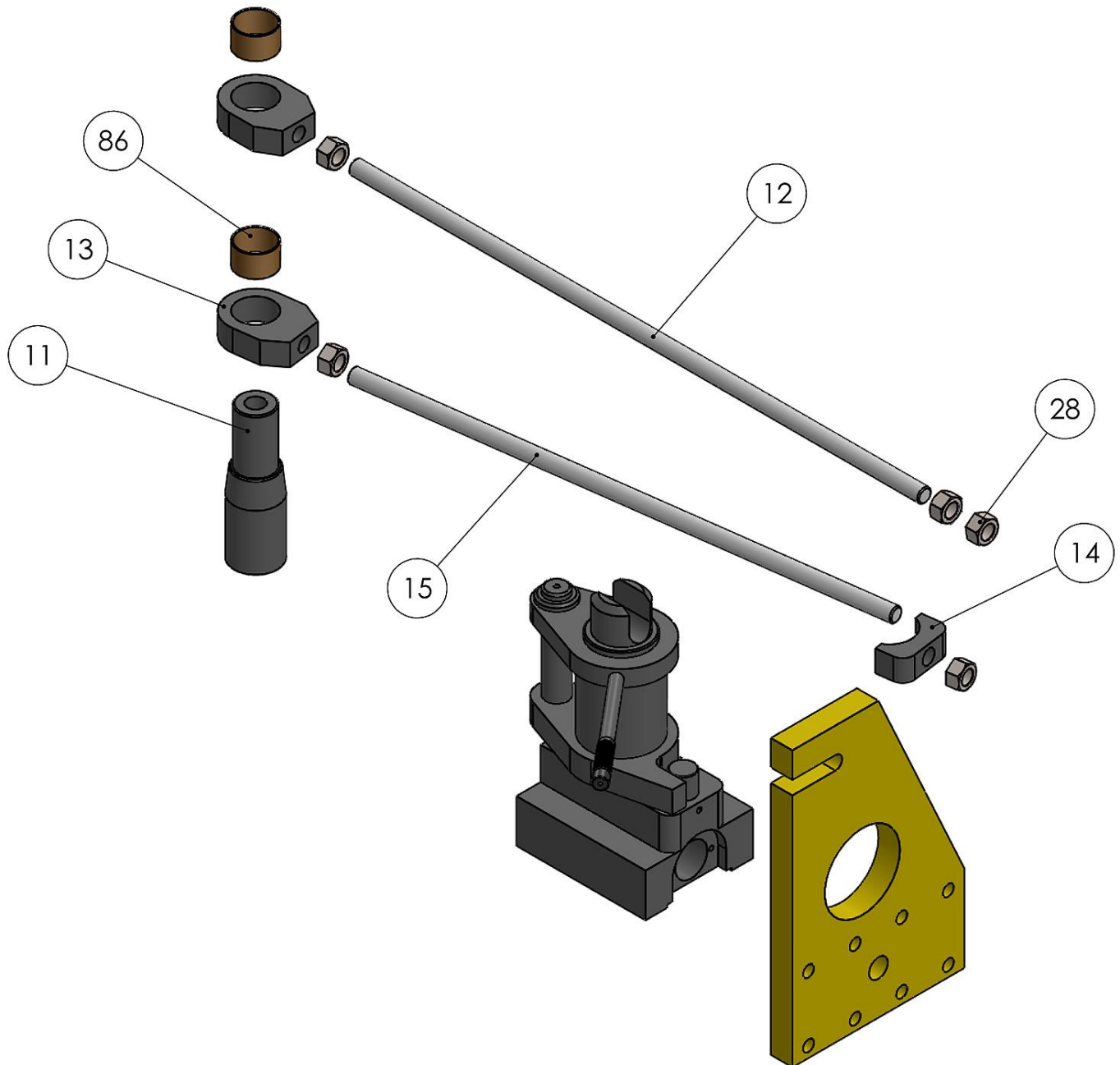


Lead Screw Assembly





Strut Rods





Parts List

Item	Part Number	Description	Qty.
1	M480-6A014	Bottom Plate	1
2	M480-7A001	Main Bearing Hub	1
3	M480-6A002	Top Plate	1
4	M480-6A003	Side Frame	1
5	M480-6A004	Side Frame (L.H.)	1
6	M480-5A005	Cabinet Assy	1
7	M480-7A011	Spindle (Dynamic Oil)	1
8	PP-1629	220 x 160 x 60 Roller Bearing	1
9	M480-7A003	Bearing Hub	1
10	M480-6A008	End Bar	1
11	M480-7A004	Center Pin	1
12	M480-7A005	Drag Link (Long)	1
13	M480-6A009	Rod End	2
14	M480-6A010	Capture Plate	1
15	M480-7A007	Drag Link (Short)	1
16	M480-7A008	Acme Nut	1
17	M480-5A006	Lead Screw	1
18	PP-1540	Gearbox	1
19	M480-7A012	Washer Spacer	1
20	PP-1580	160 x 200 x 9.5 Thrust Washer	2
21	PP-1581	160 x 200 x 5 Thrust Bearing	1
22	PP-1582	1.50 Thrust Ball Bearing	1
23	M480-5A009	Quick Release Assembly	1
24	M480-7A019	Locking Collar	1
25	M480-6A025	Spindle Drive Key	2
26	M480-5A011	Counter Die Pin	1
27	M480-6A026	Top Cabinet Cover	1
28	BS-0372	1.25-12 Hex Nut	5
29	BSM-0228	M36 x 4.0 x 380 SHCS	1
30	ME-M250-5A009	Control Box Arm	1
31	ME-M350-7A057-V2	Electrical Box Pivot Hub	1
32	M350-5A029	Touch Screen Enclosure	1
33	PP-1082	M350 Controller	1



Item	Part Number	Description	Qty.
34	ME-M400-7A003-3	Spider Hub	1
35	M150-7A013	Quick Release Shaft	3
36	PP-0133	Black Ball Knob	3
37	PP-0060	Grip	1
38	ME-M200-7A005	Stand Off	4
39	BSM-0279	M6 x 1.0 x 16 Hex FLG	4
40	BSM-0001	M6 x 1.0 x 14 SHCS	4
41	PP-0023	Cord Grip	2
42	PP-0290	Cord Grip	1
43	PP-0453-A	Housing Cover	1
44	PP-0453-B	Encoder Housing	1
45	PP-0453-C	Encoder Adaptor	1
46	PP-0453-D	Spacer	1
47	PP-0453-G	Encoder	1
48	PP-1583	10hp 3 Phase Motor	1
49	M480-7A028	38T Ring Gear 1.375 Bore	1
50	PP-1540-A	Spline Coupler	1
51	BSM-0293	M24 x 3.0 x 45 SHCS	12
52	BS-0409	10-32 x 3.25 SHCS	2
53	BS-0397	#6 Star Washer	2
54	BS-0075	1/2 Lock Washer	4
55	BS-0123	1/2-13 x 2.5 SHCS	4
56	PP-1588	Main Disconnect	1
57	BSM-0052	M8 x 1.25 x 20 Hex FLG	4
58	M350-7A058	Electrical Box Washer	2
59	BSM-0086	M10 x 1.5 x 8 Set Screw	2
60	BSM-0087	M6 Flat Washer	1
61	BSM-0003	M6 x 1.0 x 25 SHCS	1
62	BSM-0026	M12 x 1.75 x 50 SHCS	1
63	BS-0269	1.50 Ext. Retaining Ring	1
64	BSM-0113	M8 x 1.25 x 10 Set Screw	2
65	PP-0835	1.50ID x 1.75OD x 1.0 Bushing	2
66	PP-1195	1.50 Thrust Washer	1
67	PP-1196	1.50 Clamp Collar	1
68	M480-5A010	Center Slide Block Assembly	1



Item	Part Number	Description	Qty.
69	M480-7A026	Stop Pin	1
70	BSM-0022	M12 x 1.75 x 25 SHCS	3
71	BSM-0239	M12 x 1.75 x 16 Set Screw	1
72	M480-7A029	Foot Pad	4
73	BSM-0292	M24 x 3.0 x 90 HHCS Fully Threaded	4
74	BSM-0109	M24 x 3.0 Jam Nut	4
75	BSM-0138	M6 x 1.0 x 12 BHCS	13
76	PP-0587	1/4" x 2" Pipe	1
77	PP-0586	3/8" to 1/4" Reducer	1
78	PP-0589	1/4" Elbow	1
79	PP-1121	1/4 NPT Breather	1
80	BS-0070	.25-28 Grease Zerk	2
81	BSM-0340	1/4-28 x .25 Set Screw	1
82	BSM-0030	M16 x 2.0 x 40 SHCS	4
83	BSM-0226	M18 x 2.5 x 215 SHCS	24
84	BSM-0075	M16 x 2.0 x 30 Hex FLG	6
85	BSM-0221	M24 x 3.0 x 170 SHCS	21
86	PP-2194	3.0ID x 3.25OD x 2.0 Bushing	2
87	BSM-0097	M24 Lock Washer	8
88	BSM-0227	M24 x 3.0 x 90 HHCS	8
89	M350-6A100	M350 Electrical Panel	1
90	PP-1340 CE PP-1584 US	10hp 380-500V Drive	1
91	PP-0029-6	Din Rail	1
92	PP-0654	Power Supply	1
93	PP-0924	Terminal Block	14
94	PP-0933	2 Position Fuse Block	1
95	PP-1199	5 Hole Ground Strip	1
96	PP-0761	24V 15A Relay	2
97	PP-0762	Relay Socket	2
98	BS-0080	#10 Star Washer	4
99	BS-0288	10-24 x .25 PPHMS	4
100	BS-0003	10-24 x .75 SHCS	2
101	BS-0001	10-24 x .50 SHCS	4
102	BS-0238	1.0 Ext. Retaining Ring	1



Item	Part Number	Description	Qty.
103	BS-0398	6-32 x .25 Machine Screw	2
104	M480-6A028	.25 x .25 x 1.0 Key	1
105	BSM-0294	M4 x 0.7 x 6 Set Screw	2

NOTES



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