



OPERATOR'S MANUAL

Metal Working



RECTANGULAR TUBE MANDREL BENDER MODEL: MB-4X2

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THANK YOU & WARRANTY

Thank you for your purchase of a machine from Baileigh Industrial. 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 a 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 30 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's 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 attorneys' 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 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 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 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
- Set-up 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 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.

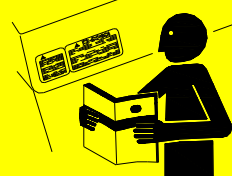


Note: This symbol refers to useful information throughout the manual.



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. **DANGER** identifies a hazard or unsafe practice that will result in severe **Injury or Death.**



Safety signs with signal word **DANGER** or **WARNING** are typically near specific hazards.



General precautions are listed on **CAUTION** safety signs. **CAUTION** also calls attention to safety messages in this manual.



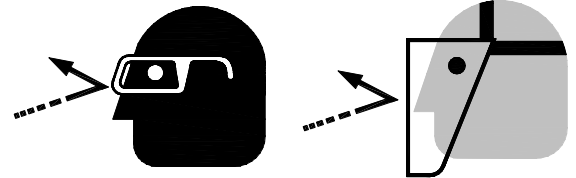


SAVE THESE INSTRUCTIONS.
Refer to them often and use them to instruct others.



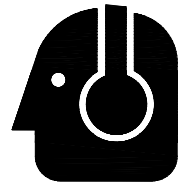
PROTECT EYES

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



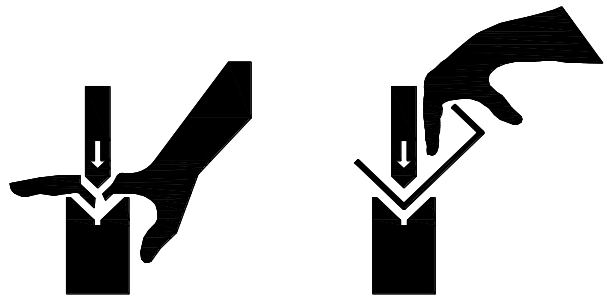
PROTECT AGAINST NOISE

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



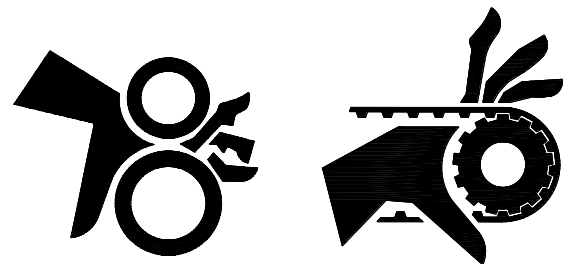
BEWARE OF CRUSH HAZARD

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

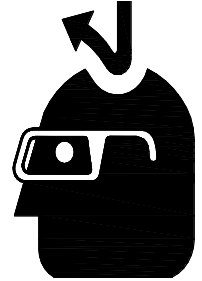
Keep hands and fingers away from the drive mechanisms, cylinders, ratchets, and other moving linkage while the machine is in operation.





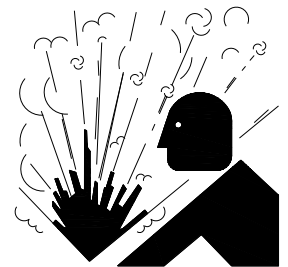
KEEP CLEAR OF MOVING OBJECTS

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.



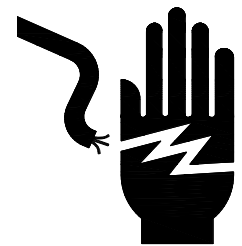
HYDRAULIC HOSE FAILURE

Exercise **CAUTION** around hydraulic hoses in case of a hose or fitting failure.



HIGH VOLTAGE

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



EMERGENCY STOP BUTTON

In the event of incorrect operation or dangerous conditions, the machine can be stopped immediately by pressing the **E-STOP** button. Twist the emergency stop button clockwise (cw) to reset. Note: Resetting the E-Stop will not start the machine.





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 won't 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. **Only trained and qualified personnel can operate this machine.**
2. **Make sure guards are in place and in proper working order before operating machinery.**
3. **Remove any adjusting tools.** Before operating the machine, make sure any adjusting tools have been removed.
4. **Keep work area clean.** Cluttered areas invite injuries.
5. **Overloading machine.** By overloading the machine you may cause injury from flying parts. **DO NOT** exceed the specified machine capacities.
6. **Dressing material edges.** Always chamfer and deburr all sharp edges.



7. **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 machines rated capacity.
8. **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.
9. **Dress appropriate.** **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.
10. **Use eye and ear protection.** Always wear ISO approved impact safety goggles. Wear a full-face shield if you are producing metal filings.
11. **Do not overreach.** Maintain proper footing and balance at all times. **DO NOT** reach over or across a running machine.
12. **Stay alert.** Watch what you are doing and use common sense. **DO NOT** operate any tool or machine when you are tired.
13. **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.
14. **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.
15. **Keep children away.** Children must never be allowed in the work area. **DO NOT** let them handle machines, tools, or extension cords.
16. **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.
17. **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.
18. **DO NOT** touch live electrical components or parts.
19. **Turn off** power before checking, cleaning, or replacing any parts.
20. Be sure **all** equipment is properly installed and grounded according to national, state, and local codes.
21. **DO NOT** bypass or defeat any safety interlock systems.
22. Keep visitors a safe distance from the work area.



TECHNICAL SPECIFICATION

Working Table Size*	Depends on length chosen
Bend Capacity Square	3" x 3" x 11ga. (76.2 x 76.2 x 3mm)
Rectangle Capacity	2" x 4" x 11ga. (50.8 x 101.6 x 3mm) Hardway
Degree of Bend (Maximum)	100°
Bend Direction	Clockwise
Maximum Bend Speed	90° in 5 seconds
Maximum Center Line Radius (CLR)	12" (304.8mm)
Maximum Hydraulic Pressure	3000 psi. (206.8bar)
Hydraulic Capacity	20gal. (75L)
Hydraulic Motor	7.5hp (5.5kw) 208-230VAC 60hz, 19.9-18.4A
Power	220VAC / 3-phase / 60hz
Shipping Weight	3000lbs (1361kg)
*Special Notes: Must purchase appropriate table in order for machine to function properly!	

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

⚠ CAUTION: Lifting and carrying operations should be carried out by skilled workers, such as a truck operator. Make sure the machine is well balanced. Choose a location that will keep the machine free from vibration and dust from other machinery. Keep in mind that having a large clearance area around the machine is important for safe and efficient working conditions.

Follow these guidelines when lifting:

- 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 fork lift 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.

INSTALLATION

IMPORTANT:

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

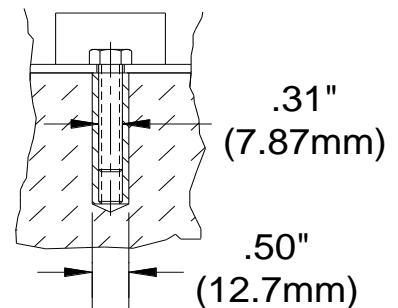
- Overall weight of the machine.
- Weight of material being processed.
- Sizes of material to be processed through the machine.
- Space needed for auxiliary stands, work tables, or other machinery.
- Clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for 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. For stationary machines, 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 tool 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.

Anchoring the Machine

- Once positioned, anchor the machine to the floor, as shown in the diagram. Use bolts and expansion plugs or sunken tie rods that connect through and are sized for the holes in the base of the stand.
- This machine requires a solid floor such as concrete at a minimum of 4" (102mm) thick. 6" (153mm) minimum is preferred.



Tank Filling

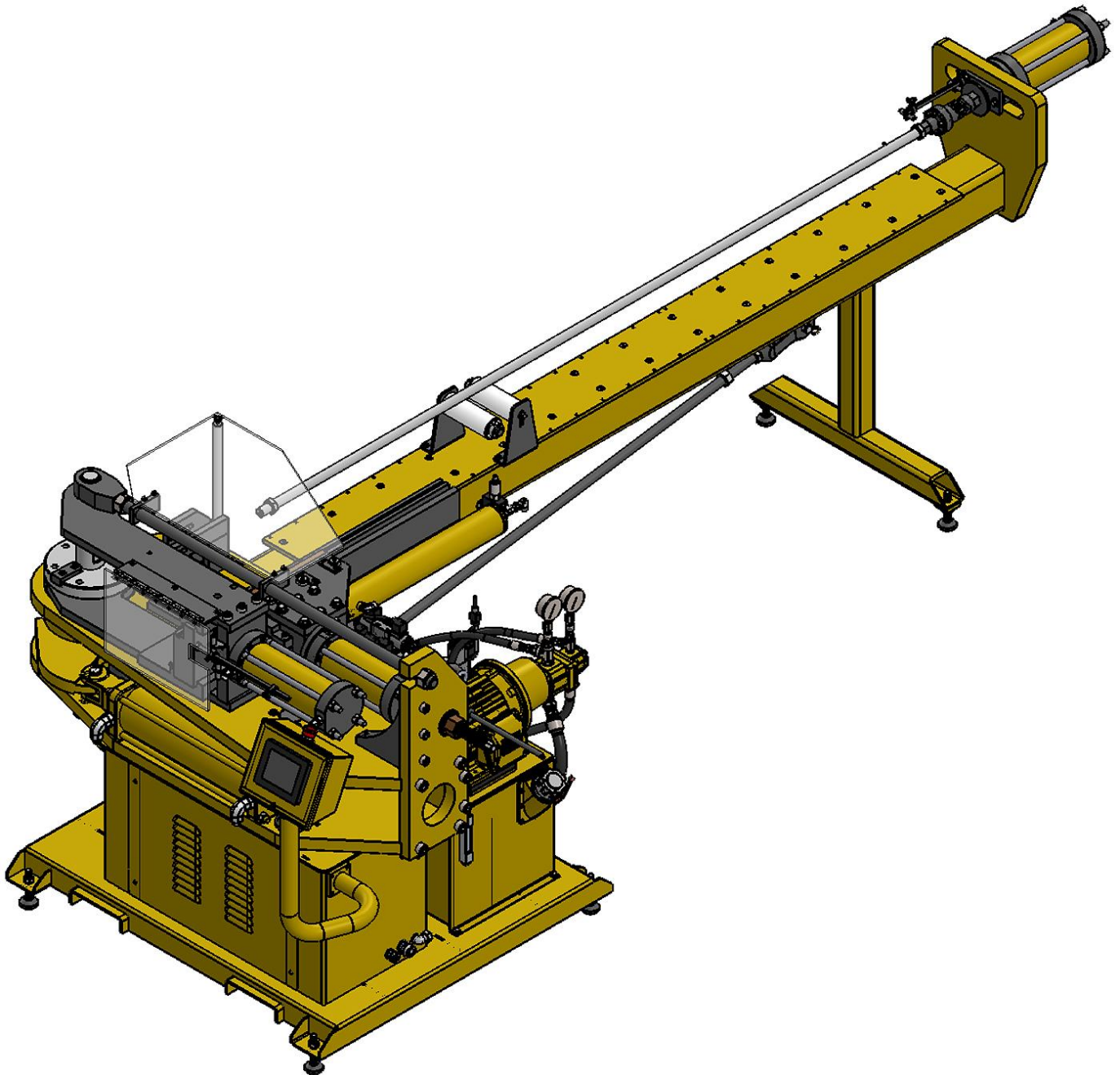
The hydraulic oil is the primary medium for transmitting pressure and also must lubricate the running parts of the pump.

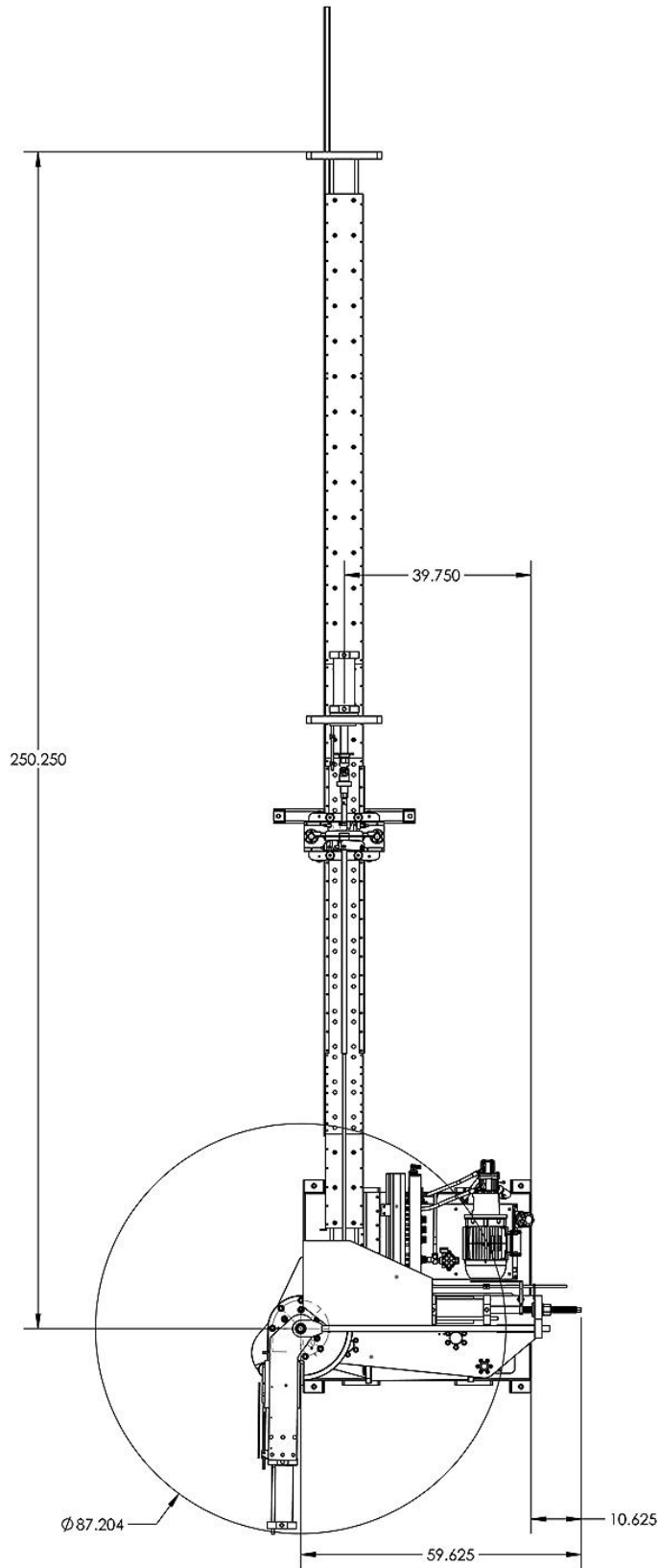
After installation of the machine and before machine startup, bring the oil level up to 90% of capacity. Verify that any cylinder rams are in the retracted position to prevent overfilling of the tank. Recheck the oil level after the first few hours of operation and again after the first full week of operation.

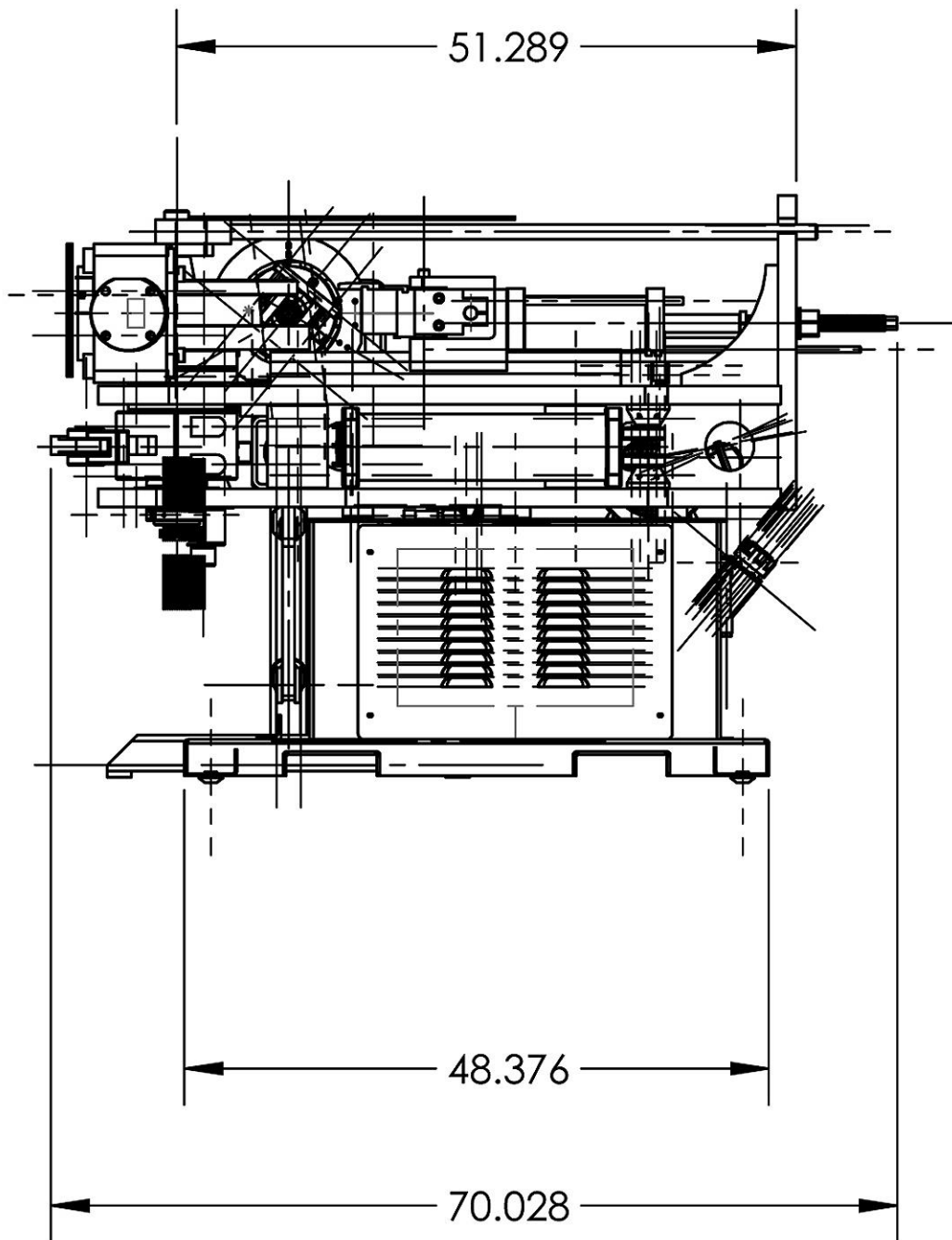
A shortage of hydraulic oil can cause hydraulic system breakdown and damage to major mechanical parts due to overheating.

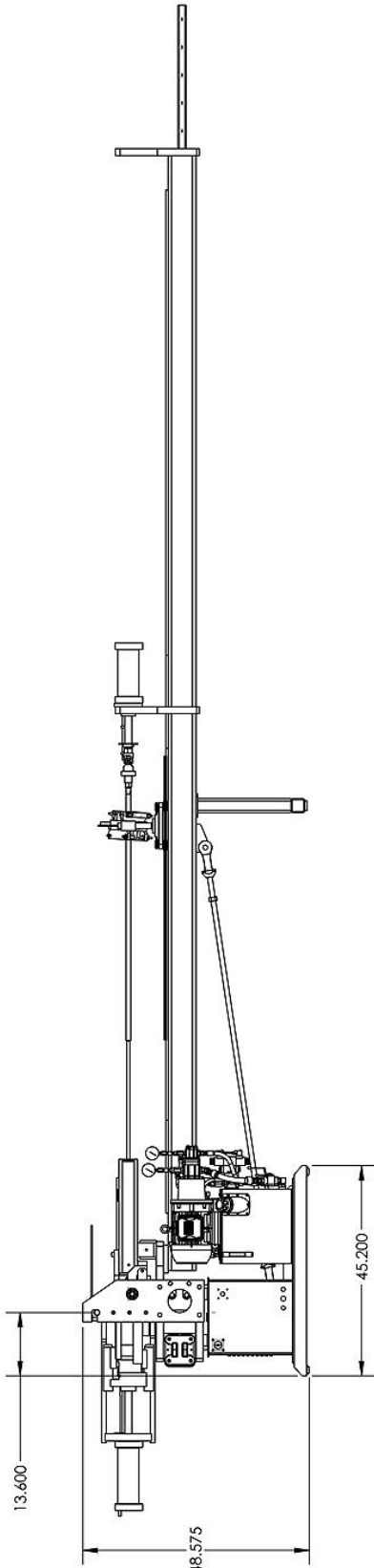


OVERALL DIMENSIONS





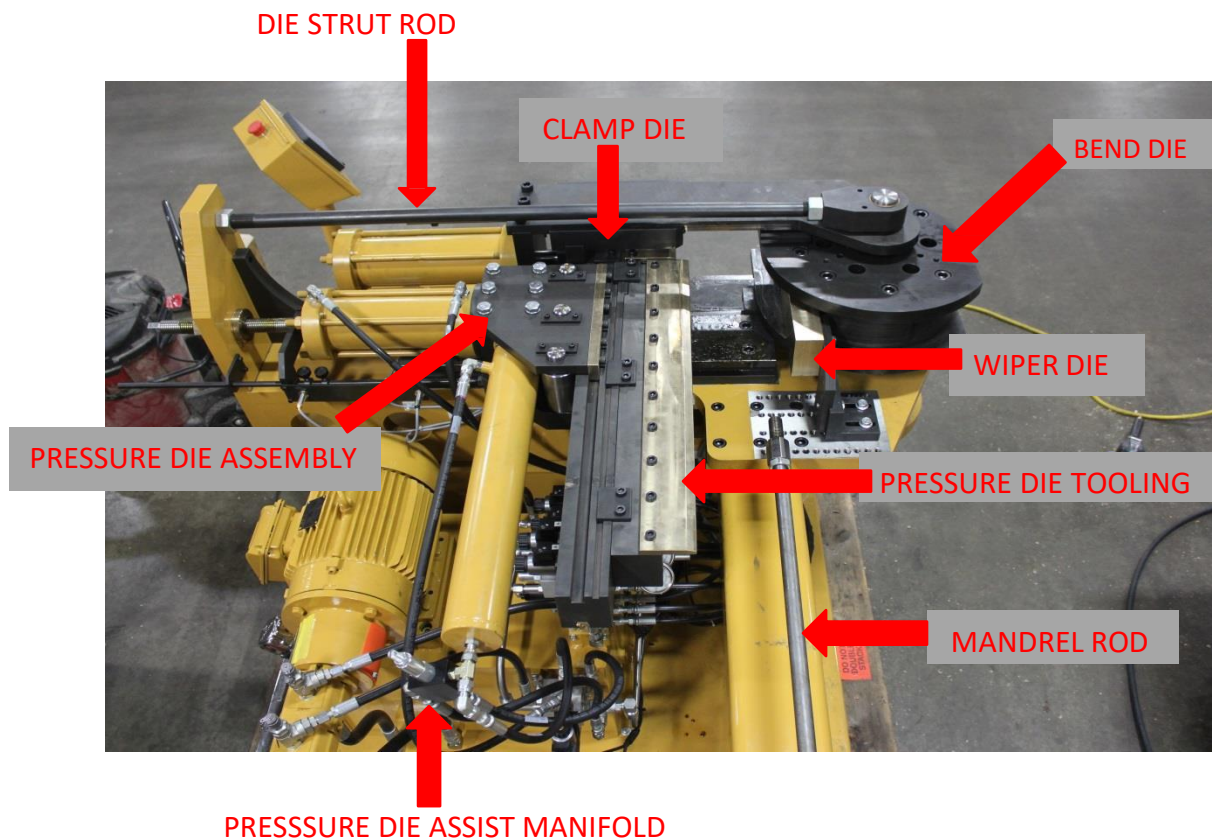






UNPACKING & CHECKING CONTENTS

1. Separate all contents from packing material; separate the machine and table from skids.
2. Move the machine and table to the desired area. Make sure area has plenty of work area around the machine with ample lighting.
3. Check over parts carefully to ensure all parts are accounted for and undamaged.
4. Your machine is tested by our technicians before leaving our factory.
5. Inspect your machine again after it is operational. Please notify us if something is missing or if damaged has occurred.





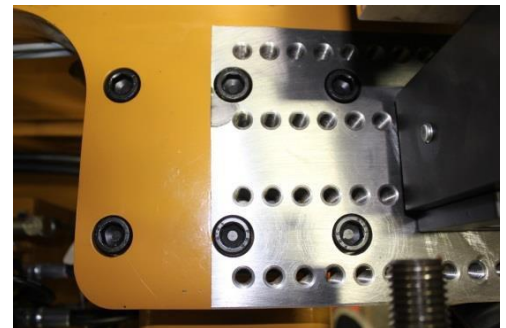
INSTALLATION/ ASSEMBLY

1. First, the machine itself needs to be leveled without the table. Use the provided foot pegs and level the machine. It is recommended that machines with a 20-foot index table be bolted or securely fastened to the concrete floor.
2. Once the machine is level, the index table can now be carefully moved into place.



Note: *It may take several adjustments to properly align the counter bored holes in the machine to the tapped holes on the table.*

3. Next, attach the table to the machine using the provided hardware, (6) M16 SHCS. (Fig. 1)
4. Make sure that the table is leveled using the provided foot pegs (unless it is a 20-foot table, in which we recommend it be fastened to the concrete).
5. Attach the hydraulic hoses from the table to the corresponding parts on the machine manifold (cylinder extend hose goes to port A on the manifold).
6. Next, connect the proximity cable to the mating plug on the machine.
7. Now that the table is level and attached to the machine, the mandrel strut rod can now be attached to the machine and table. The end of the strut rod with the nut is going towards the table. (Fig. 2)
8. With the mandrel strut rod attached, tighten the nut on the rod until the rod comes under tension, and then tighten the jam nuts on the strut rod clevis. Do not over tighten the mandrel strut rod.





ELECTRICAL

⚠ WARNING: Baileigh Industrial 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 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 tool is wired for 220 volts, 60Hz alternating current. Before connecting the tool to the power source, make sure the machine is cut off from power source.

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 a amperage rating slightly higher than the full load current of machine.
- A separate electrical circuit should be used for your tools. 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 tool.
- 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 tool 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.

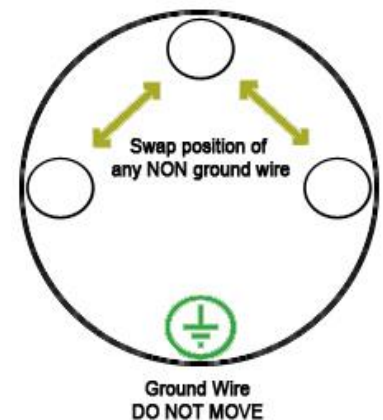


⚠ WARNING: In all cases, make certain the receptacle in question is properly grounded. If you are not sure, have a qualified electrician check the receptacle.

- 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 a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.
- Repair or replace damaged or worn cord immediately.

Plug Connection

1. Have a certified electrician verify that the power source is correct for the machine's specifications, and that the plug is correct and properly grounded to an earth ground. The warranty is void if incorrect power is supplied to the machine.
2. Have an electrician install the correct plug for the application.
3. Once hooked up, test the machine for proper operating direction.
4. Start the hydraulic motor and observe the motor rotation. The motor should turn clockwise; if it turns counter clockwise the input power leads can be swapped to reverse the motor's direction.
5. If not, cut the power to the machine. Swap the position of any two of the three power wires; but **DO NOT** change the position of the green grounding wire!
6. The machine is supplied with a lockable disconnect switch, the machine must be locked out for any maintenance work.





SETUP GUIDE

⚠ CAUTION: Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges. When handling large heavy materials make sure they are properly supported.

TOOLING REMOVAL

1. Remove the wiper die assembly.
2. Remove the pressure die assembly.
3. Remove the clamp die assembly.
4. Remove the mandrel.
5. Remove the top strut rod from the die spindle.
6. Remove the top clamp swing arm plate.
7. Loosen the (6) die hold down bolts and remove bolts. Do not loosen the (9) die cap bolts, those are set at the factory.
8. Insert 3 lifting eye bolts, and with straps, slowly pick the bend die vertically off of the spindle with forklift, hoist, or cherry picker, it may need some persuasion with a soft faced mallet.
9. The machine is now “empty” and ready for the next tooling choice.

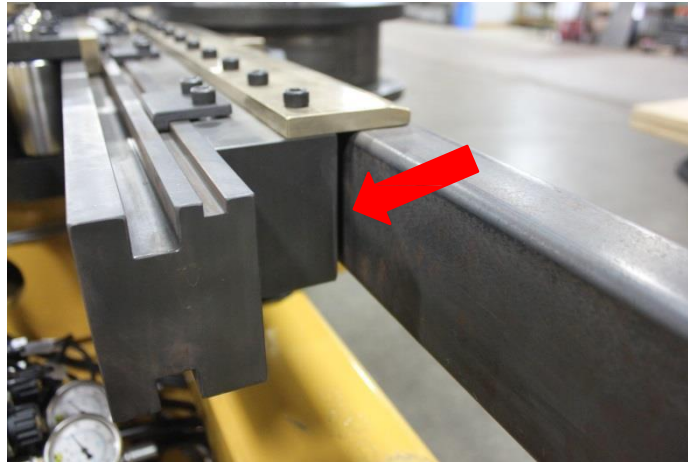


TOOLING INSTALL

1. 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. (Fig. 4)
2. Begin to lower the die onto the spindle, slowly line up the center bore and rock if needed to get the die to slide down. Watch the orientation so the drive key line up correctly. Once completely down insert the hold down bolts and tighten to 100 ft./lbs.
3. Install the top clamp swing arm plate, and tighten the three bolts.
4. Install the strut rod and tighten just so there is tension on the rod.
5. Install the mating clamp die assembly.
6. Install the pressure die assembly. The stroke of the pressure die actuator is 8”, so we need to adjust the pressure die leadscrew to make sure there is enough clearance for the pressure die to actuate without colliding with the material, leave at least ½” of clearance. Measure from the bend die, plus material width, plus at least ½” to the pressure die face. This ensures

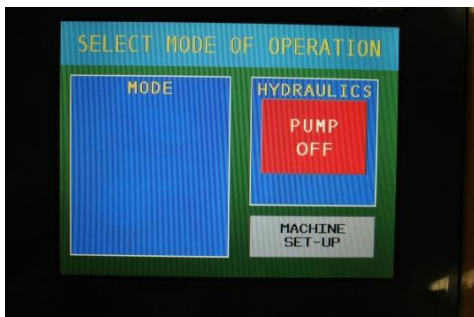


that there won't be any interference with the material. Final adjustment of the pressure die assembly will come later on in tooling setup. (see step 17)

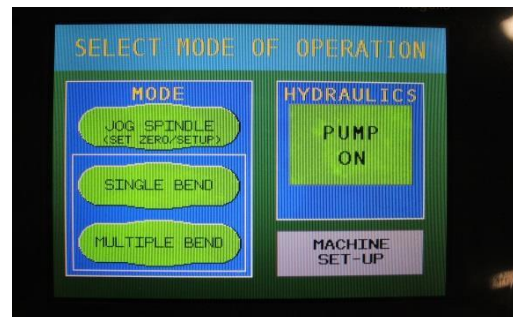


(Fig. 5. - ¼ - ½” gap between material and pressure die.)

7. Install the correct mandrel; we will set the distance later.
8. Using a piece of set up material about 3 ft. long, insert onto the mandrel and let sit on the lower shelf of the bend die.
9. Now the hydraulics can be turned on, on the control, press the 'Pump Off' switch to turn the power unit on. (Fig. 6a)



(Fig. 6a-Pump off screen)

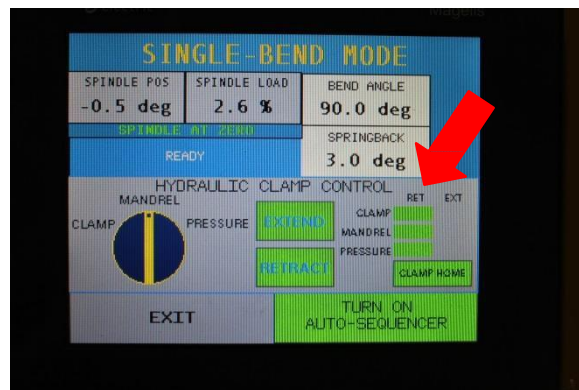


(Fig. 6b- Pump on screen)

10. The "Home" position needs to be set so press the "Jog Spindle" tab. (Fig. 6b)
11. With the foot pedals, press the left pedal or "reverse" until the bend cylinder is dead headed in reverse. Press and hold the "set home" button. Your home is now set until the next power cycle.
12. Now press "exit" and press the "Single Bend" button.
13. Ok, here is where we need to pay attention!!

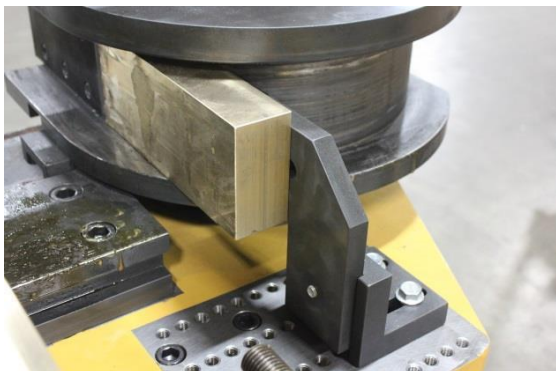


14. Make sure the tube sample is correctly in the die and select “Mandrel” on the rotary switch and press “Extend” it may want to push the tube, that’s normal. Once fully extended, push the tube back into the machine if needed.
15. Now we are going to clamp up the material to the die (Warning!! Do not activate the clamp without material in place) select “clamp die” using the selector switch, press extend and the clamp die will travel until it engages the material. Make sure that the material is properly seated in the die square (not crooked). If the material is not seated properly in the die, the clamp die blade can catch the top of the tube causing damage. Adjust the micro switch if needed.
16. Double check the pressure die clearance, from the face of the material to the pressure die face, there should be at least 8-1/2” if not, using a 2” wrench adjust the pressure die nut.
17. When there is sufficient clearance, select pressure die and press “extend”

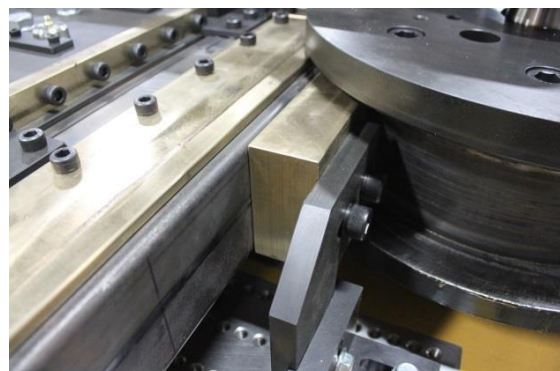


(Fig. 7-Single bend home screen; All axis' retracted.)

18. Now you can adjust the pressure die right up to the material, so it just touches and a little more.
19. The basic set up is done, now to install the wiper die. Select the wiper and begin to insert it into the die/material wedge, push in by hand and then “seat” it with a few taps from a plastic faced hammer. Set it so it is tight against the material and install the angle bracket and tighten all of the bolts.



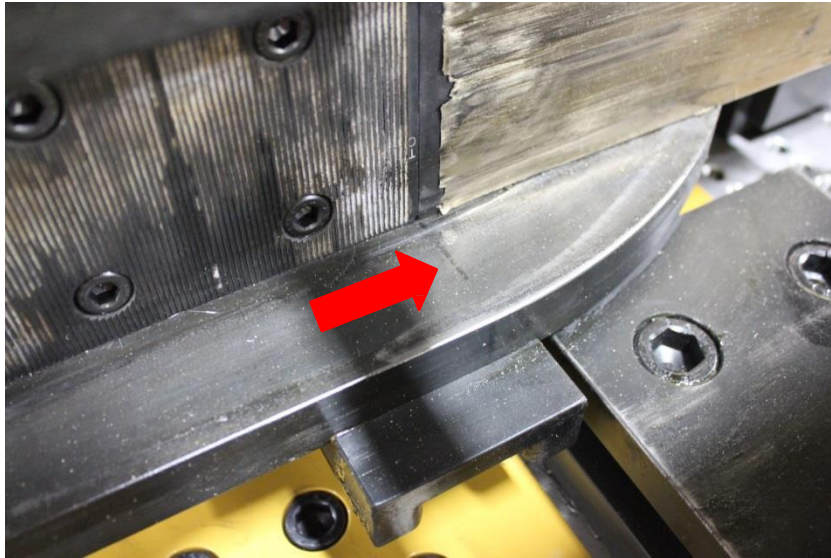
(Fig. 8a- Wiper die with no material.)



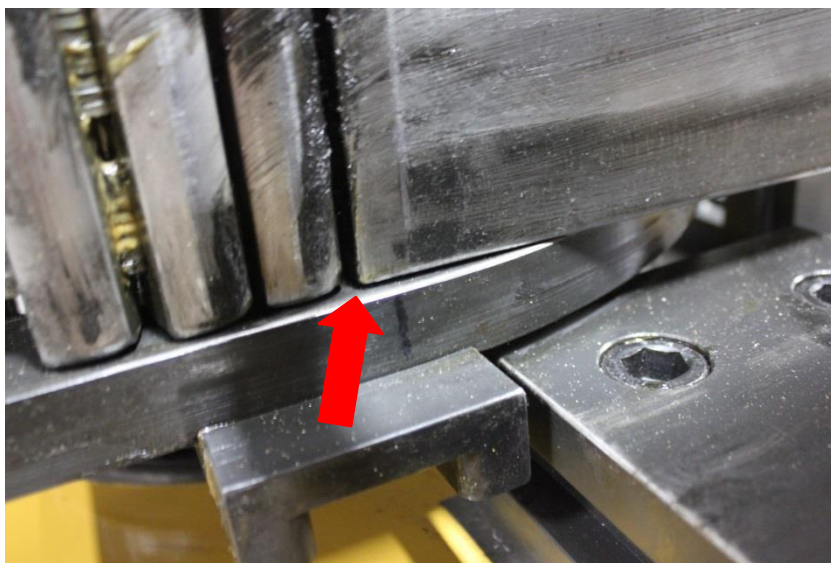
(Fig. 8b- Wiper die with clamped material.)



20. The only setting left is the mandrel, using the selector switch select "Mandrel" and press retract, now pressure die "Retract", and finally clamp "Retract", we now have to repeat the mandrel extend, once extended turn the pump switch off and remove the material. The mandrel setting is critical, so the body of the mandrel needs to protrude $\frac{1}{4}$ - $\frac{1}{2}$ " "PAST" the tangent line of the die, set this using a straight edge. (Fig. 9a&b) After successful bends have been completed, the mandrel position could be documented from the back of the mandrel body to a known spot on the machine, for ease of set up.



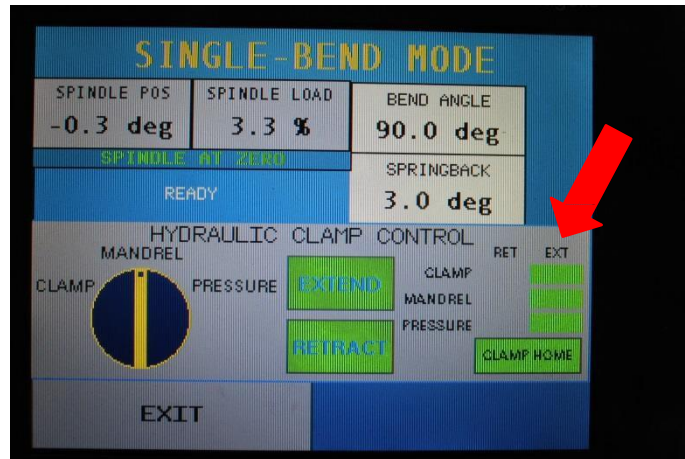
(Fig. 9a- Notice the marker line on the die, that is the tangent line.)



(Fig. 9b- Notice how the front of the mandrel body is about 1/4" past the tangent line.)



21) Press retract for the mandrel and the machine is now ready for bending. (Fig. 10)



(Fig.10- All axis' extended, ready for bending.)

BENDING IN SINGLE BEND MODE

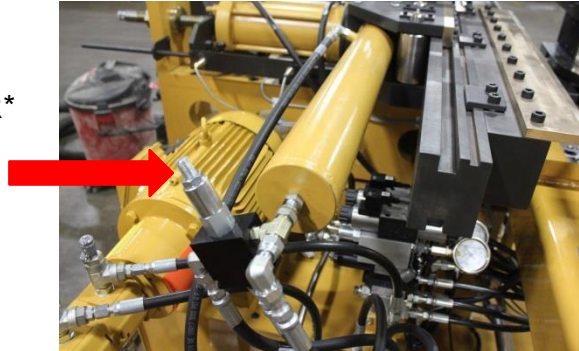
1. Mandrel lubrication is critical, so at this point with the pump off, apply liberal amounts of lube to the mandrel covering all sides. Apply lube to the inside of the material to be bent. Insert the material onto the mandrel and position for the first bend.
2. Turn on the pump.
3. Select "single bend". (Fig. 6)
4. The mandrel switch should be in the correct position, press mandrel "Extend"; remember, when the mandrel extends, it may push the tube, so the tube will have to be pushed back to desired starting point. (Fig. 7)
5. Then clamp "Extend".
6. And finally pressure die "Extend".
7. All of the green indicator lights on the controller need to all read 'Extend'. This is to ensure all of the axis' are in the proper position for bending.
8. Select the amount of degrees desired for the bend, and enter a spring back value.
9. The machine and material are now ready to be bent, press the "Forward" pedal and the bend die will rotate and produce the bend.
10. There is a pressure die assist speed adjustment that may need to be tweaked from size to size. Typically, the speed of the pressure die assist should be set to it travels slightly faster than the material when it is being bent. To adjust the pressure die assist speed, there is a valve on the manifold block that is attached to the end of the pressure die assist cylinder; the screw on the end of that valve can be screwed in or out which will change the speed of the cylinder.



CLOCKWISE=FASTER

COUNTERCLOCKWISE=SLOWER


SPEED ADJUSTMENT SCREW



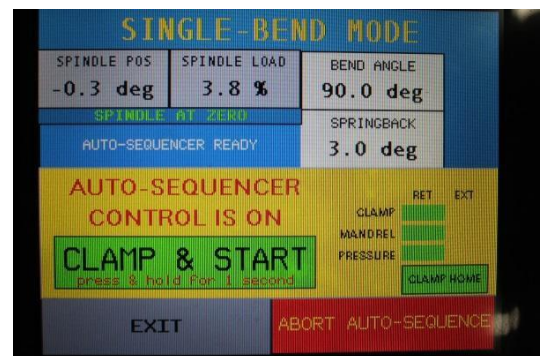
11. Continue to hold the pedal down until the bend is complete, “unless something goes wrong”.
12. When the bend is at the final degree setting, the axis’s can be opened up, the mandrel should always come out first, press the “Retract” button, once completed, the selector will automatically switch to pressure die, press the “Retract” button, once completed, the selector will be on the clamp die position, finally press the “Retract” button.
13. The swing arm assembly needs to be pushed back into its home position. This can only be done when the clamp die is retracted.
14. Press the REV foot pedal to rotate the spindle back to home position. The spindle will not move unless all axis’ are returned to their home position, including the swing arm.
15. The tubing can now be advanced/Rotated as needed and positioned for the next bend.

AUTO SEQUENCE MODE

1. In Auto sequence mode, the hydraulic axis’s will operate automatically and in the correct order, but before using auto sequence, the first one or two bends must be proven in manual mode to make sure all of the settings are correct. (Fig. 11)
2. Before activating auto sequence, be sure the material is installed/lubed and ready to be bent.

 **IMPORTANT: NEVER** activate auto sequence without material in the machine, major machine damage will occur.

3. With material installed, in single bend mode, press the auto sequence button for 2 seconds, the control will ask that you agree the machine is set up properly to continue. One you activate the button, auto sequence will begin, starting with the mandrel extending, then the clamp die and finally the pressure die. When all axis’s are ready, you are in control of the bend with the foot pedal. Press the “Forward” pedal, continue to hold until the bend is





completed. When the machine reaches the final degree setting the auto sequence will take over and start with retracting the mandrel, then the pressure die and finally the clamp die.

4. You are now ready to advance the material for the next bend.

MULTI BEND MODE

1. In Multi Bend mode, the user is able to program multiple bend angles and the machine will run the programs in succession. (Fig. 12)
2. The programming is very simple, from the multi bend screen, select “View /Edit Programs” tab. A screen will pop up showing the available parameters for changing.
3. You can set the name of the program; bend angle, spring back, linear position and rotation. Once the values are entered, select “manage” and you can either “save” or “save and run” if you select “save and run”, it will put you back into the multi-bend screen. (Fig. 13)



4. After a program is created and selected, you can run the program and bend the part, again, “Never activate the auto bend sequence without material installed!!”
5. Install material and position the start of bend to the “0” or centerline axis of the machine.
6. Press the “auto sequence” button and agree if you already made successful bends. The axis’ will automatically clamp just like described in the single bend mode.
7. Press the forward pedal to produce the bend, once at the final degree, the axis’ will open up. Advance the material and rotate as needed.
8. Return the clamp swing arm manually back to home.
9. Reverse the bender using the “reverse” pedal. Caution! Be sure the material is advanced enough to allow reversal of the bend die.
10. Position the material for the next bend in line, and press the forward pedal, this will begin the auto sequence again. The control will have automatically switched to the next bend in line.
11. Repeat the previous steps, as needed. When the final bend in sequence is made, the control will cycle to the first bend and repeat.





12. Once in Multi bend mode and running parts, you should never have to touch the screen again until a change is made, otherwise it will continue to cycle thru the bends.

⚠ CAUTION: When repositioning material always keep your hands away from the clamping and bending zone, especially when in auto sequence mode!

13. If something doesn't look right or a problem occurs, press the RED E-STOP button!!!

BENDING ALLOWANCE

In order to bend sheet metal accurately, you will need to consider the total length of each bend. This is referred to as bend allowance. Subtract the bend allowance from the sum of the outside dimensions of the piece part to obtain the actual overall length or width of the piece. Because of differences in sheet metal hardness, and whether the bend is made with the grain or against it, exact allowances must sometimes be made by trial and error. However bend allowances for general use can be obtained from metal working books or from the Internet.

UNDERSTANDING SPRINGBACK

Springback, also known as elastic recovery, is the result of the metal wanting to return to its original shape after undergoing compression and stretch. After the bending leaf is removed from the metal and the load is released, the piece part relaxes, forcing the bent portion of the metal to return slightly to its original shape. The key to obtaining the correct bend angle is to over bend the metal a little and allow it to spring back to the desired angle. All metals exhibit a certain amount of spring back.

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.



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.

Daily

- Check daily for any unsafe conditions and fix immediately.
- Check that all nuts and bolts are properly tightened.

Weekly

- Clean the machine and the area around it.
- Lubricate threaded components and sliding devices.
- Apply rust inhibitive lubricant to all non-painted surfaces.
- Check periodically for leaks. If a leak is detected, stop operation and repair the leak. On very hot days, gear oil may drip from the breather; this is normal expansion of the oil.
- Be sure to keep the slide blocks and lead screw lubricated with light hydraulic oil or equivalent.
- Check for any worn or damaged parts and replace immediately.

Quarterly

- There are two grease zerks on the machine that feed the main spindle bearing. Grease these zerks every three months with 3 - 4 pumps from a standard grease gun.



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.



Hydraulic System Maintenance

This machine utilizes a self-contained hydraulic power unit; it is used to supply hydraulic pressure to 3 individual hydraulic circuits, the clamp die, mandrel extraction shaft and the pressure die. The system pressure is set to 2800 psi.

3000 psi is the maximum output of this unit and is not recommended as the operating pressure. Pressure can be adjusted by loosening the outer locknut and rotate center screw until desired pressure is reached.

There are two gauges; one for system pressure and one for clamp die pressure. The only hydraulic circuit that is adjustable is the clamp die, adjust pressure by loosening the locknut and rotate center screw until desired pressure is reached.

The clamp die pressure cannot exceed the system pressure.



Figure 2 System pressure gauge Figure 3 Clamp Die Pressure Gauge



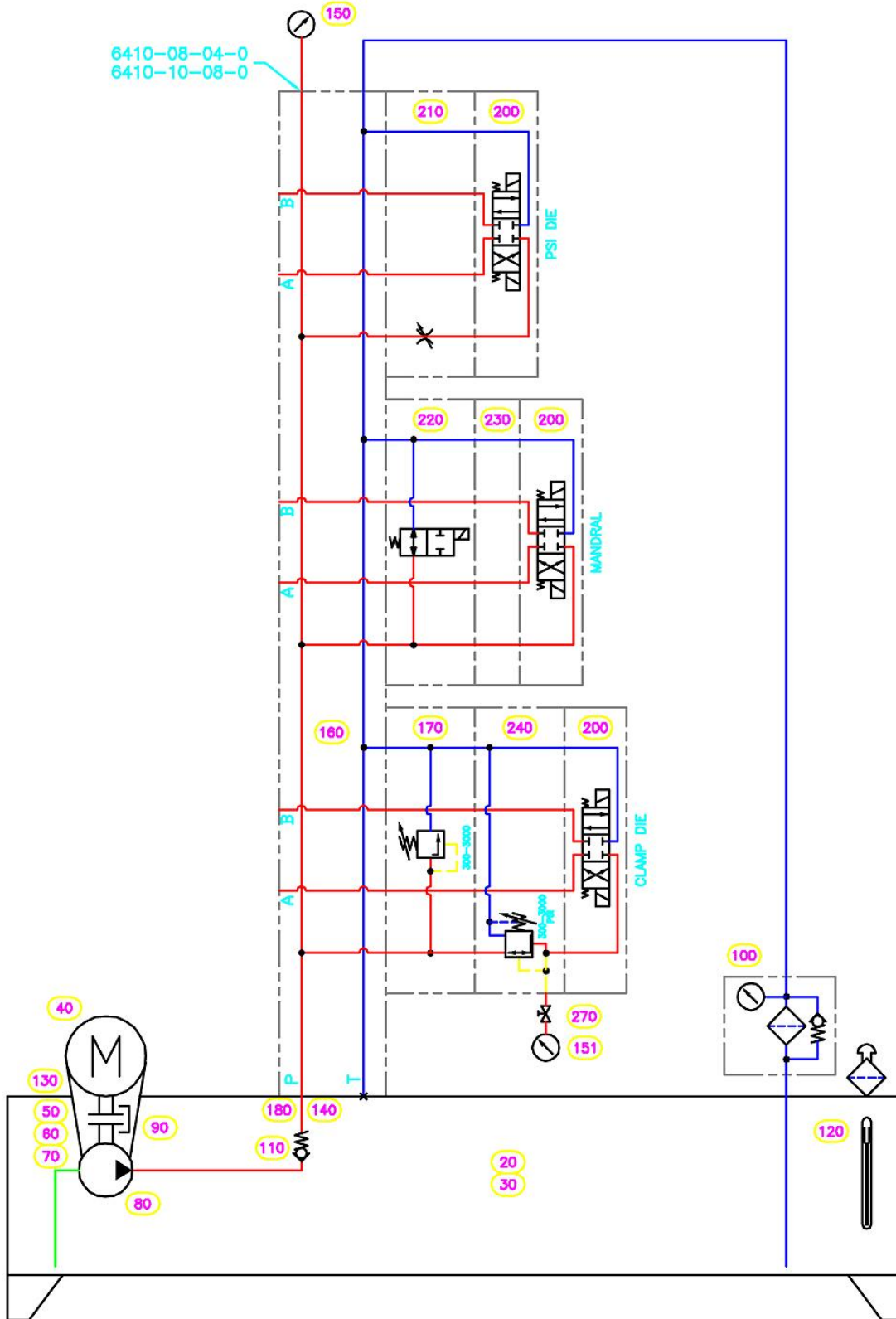
Figure 4 Pressure adjusting screws

- Check fluid level periodically, Change only when filter gauge indicator is in the red. If the hydraulic motor overloads, it can be reset inside of the main cabinet.

⚠ IMPORTANT: NEVER OPERATE THE MACHINE WITH DAMAGED OR LEAKY HOSES AND/OR FITTINGS.



HYDRAULIC SCHEMATIC



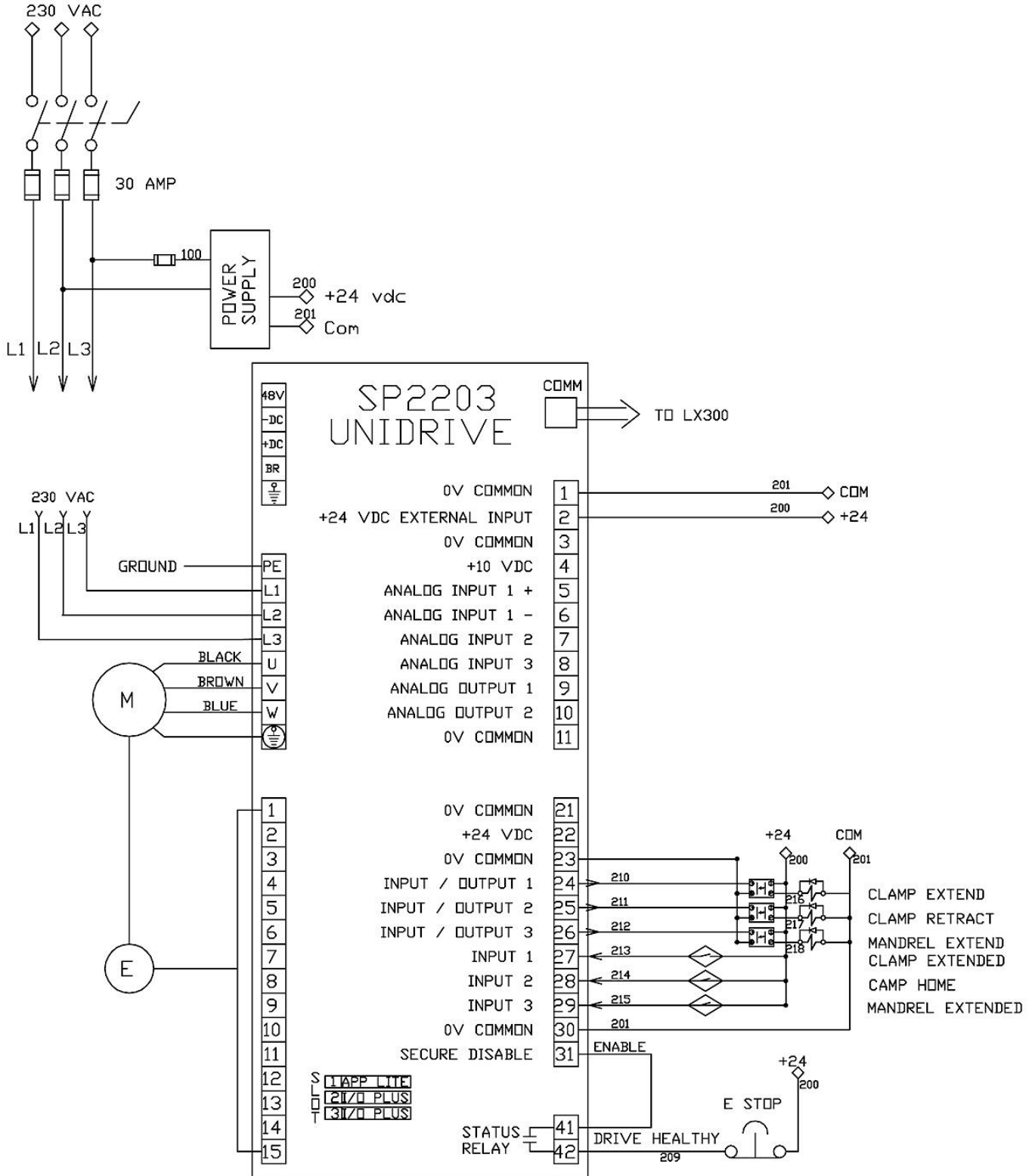


Hydraulic Components

Item	Part Number	Description	Qty.
20	R978812487	Reservoir 5PUA40-15 STD.	1
30	R978813462	Reservoir Cover 5 Gal Opt 2 3+5hp Rev1	1
40	R978805330	Motor B5H1800R184TCNFT230/460/3/60 TEFC	1
50	R978802995	Coupler HUB L095 Bored 1-1/8x1/4 key 33-20	1
60	R978807566	Coupler HUB L095 SPL SAE A 33-20	1
70	R978889101	Coupler Insert L090/095 Hytrel	1
80	9510290015	Hydraulic Pump AZ-P-F-12-004-RRR12MB	1
90	R978889498	Bell Housing VE6026 182-256 SAE A2 4B 33-15B	1
100	R978002577	Filter Head Assembly RFMMM90BC15E2.0/12T-BRI	1
100A	0090R015MM	Replacement Filter Element	
110	R978840148	Check Valve RV12-01.X/12 00705837	1
120	R978905853	Sight Glass CS3615-200236 Lube Devices	1
130	R978810409	Gasket Bell Housing 182 Frame	1
140	R978812549	Gasket Reservoir 5gal.	1
150	R978886009	Press Gauge 2 1/2/0000PUA30-11A-4 SAE	1
151	R978837839	Pressure Gauge GSV 2 1/2/0000PUA30-11A SAE	1
160	R978813582	Hydraulic Manifold D03 3 ST AL AGA8853	1
170	R900564564	Pressure Relief Valve – Main, ZDBK 6 VP2-1X/210V	1
180	R978800064	Bulkhead Union 8S 37 PUA20-07-00	1
200	R900561278	Directional Valve 4WE6E6X/EG24N9K4	3
210	7472857530	Flow Control Block Z2FG6PY2-1X/V/60	1
220	R978706654	2 Way Normal Closed Valve SV10-25-S030-N024DG	1
230	R978706653	Spacer Plate Kit 6299021 Buna	1
240	R900433350	Pressure Relief Valve – Die Clamping, ZDR 6 DP2-4X/210YM/12	1
250	R900004823	Plug Z45 A GDM2012 RE-BR *BG	3
260	R900011039	Plug Z45 B GDM2012 RE-SW *BG	4
270	R978800004	Valve DV08-01.X/12 (00705022)	1

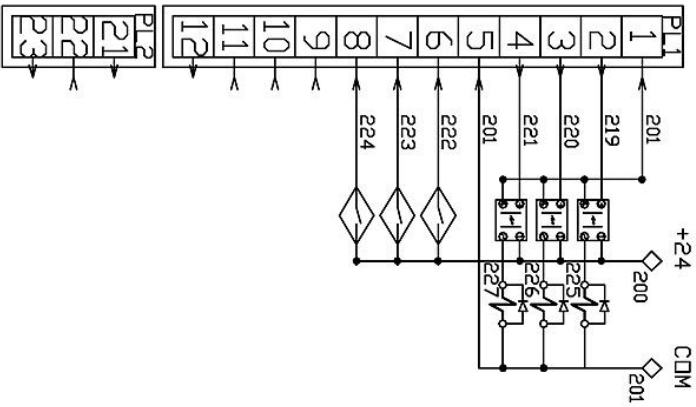


ELECTRICAL SCHEMATIC



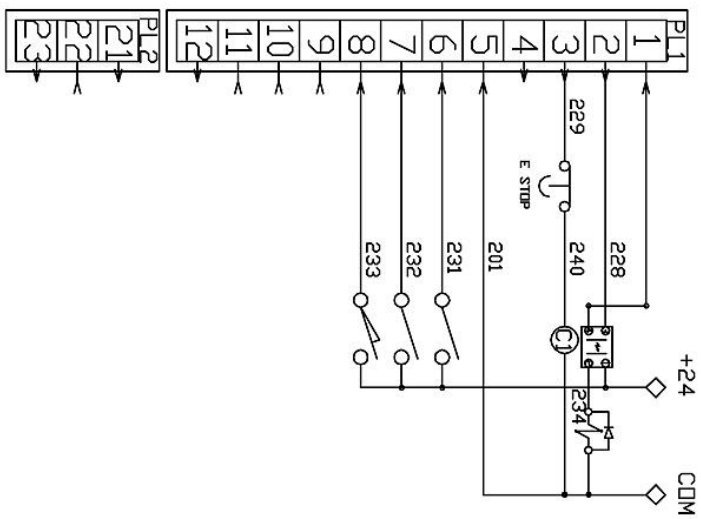


UNDRIVE SP - SLOT 2
SM I/O PLUS

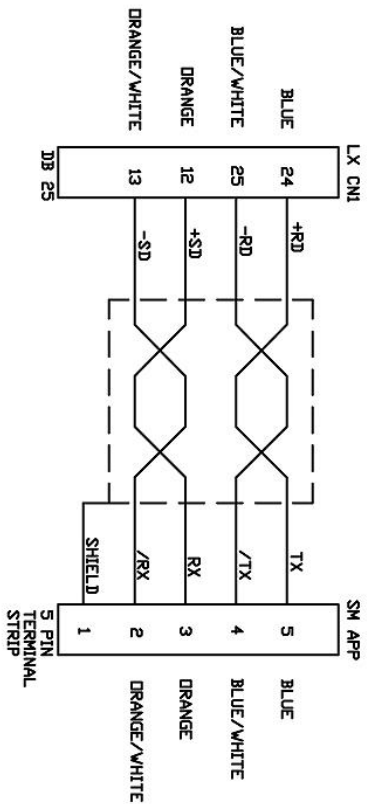
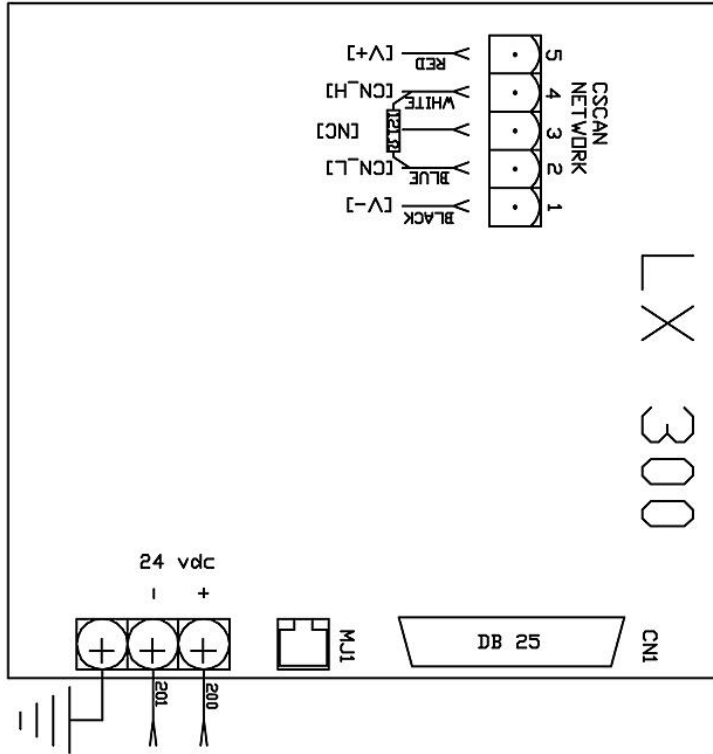


- DV COMMON
- MANDREL RETRACT
- PRESSURE EXTEND
- PRESSURE RETRACT
- DV COMMON
- MANDREL HOME
- PRESSURE EXTENDED
- PRESSURE HOME
- <ANALOG INPUT 4>
- <ANALOG INPUT 5>
- <DV COMMON>
- <ANALOG OUTPUT 3>
- <RELAY 1>
- <RELAY COMMON>
- <RELAY 2>

UNDRIVE SP - SLOT 3
SM I/O PLUS



- DV COMMON
- BLOCKING
- PUMP
- <I/O #3>
- DV COMMON
- LEFT PEDAL(REV)
- RIGHT PEDAL(FWD)
- OVERTRAVEL
- <ANALOG INPUT 4>
- <ANALOG INPUT 5>
- <DV COMMON>
- <ANALOG OUTPUT 3>
- <RELAY 1>
- <RELAY COMMON>
- <RELAY 2>



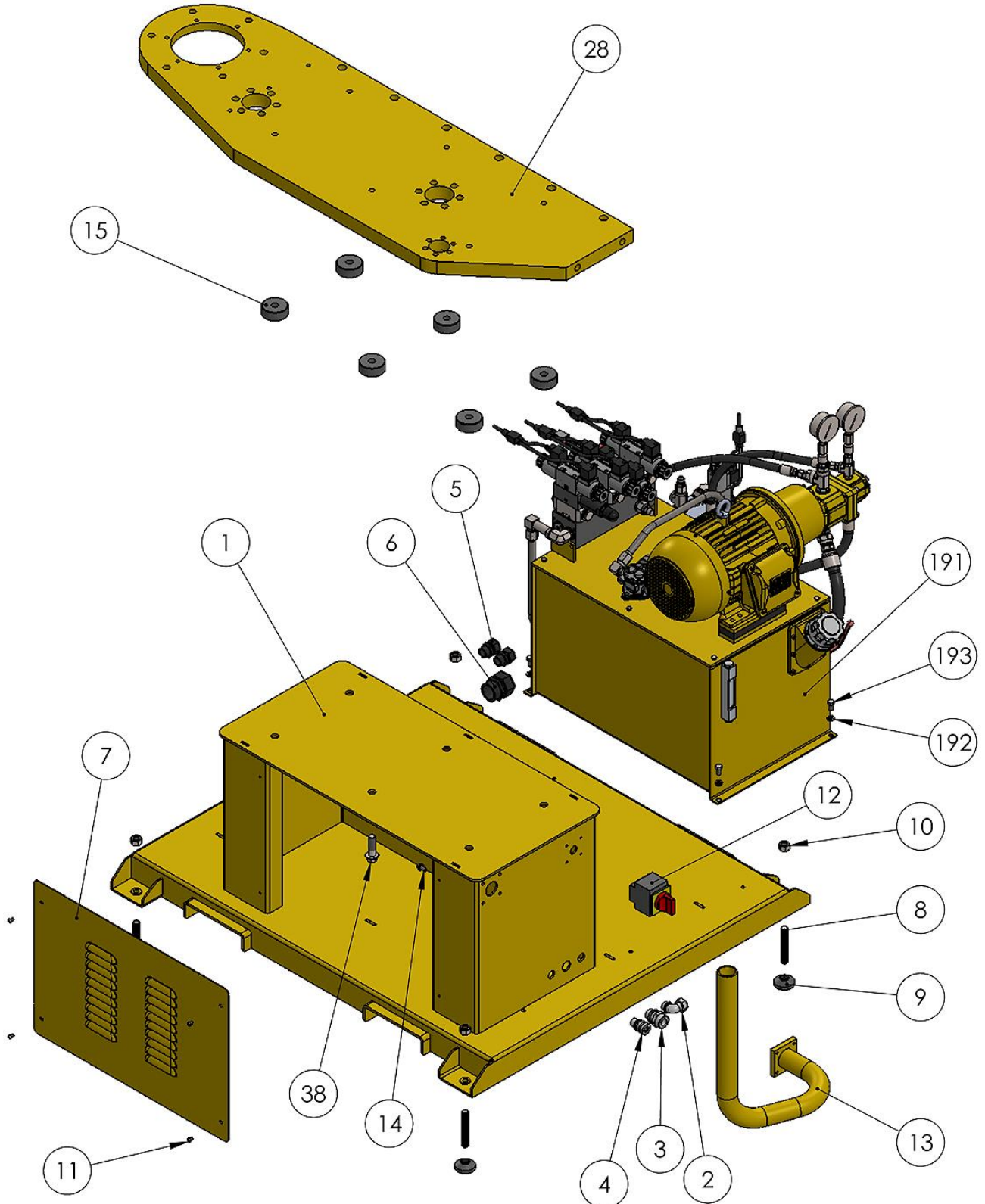


Trouble Shooting

Problem	Causes
Wrinkles on the inside of the bend	Wiper die has too much Rake
	Wiper die is not close enough to tangent
	Not enough pressure on pressure die
	Wrong size mandrel
	Clamp die slipping
	Too much wiper die lube
	Wall thickness of tubing doesn't match mandrel size
Clamp Die Slipping	Not enough pressure
	Tube too small
	Serrations/ knurling worn out on clamp die
Humps on the outside of the bend	Mandrel is too far forward
Flat on the outside of the bend	Mandrel is too far back
Machine doesn't move	Hydraulic conditions not met (green/red indicator lights)
	Communication Failure
Mandrel Lockup	Not enough lube on mandrel
	Pressure die set to loose
	Clamp die slipped
	Mandrel is too large for the tube being bent.
Hydraulics do not work	Hydraulic pump is off
	Overload tripped
	Pressure set too low
	Mechanical parts are jammed up
Machine Overloads	Tubing wall thickness is to heavy
	Bend speed is to high
	Too much pressure on the die
	Mandrel too large

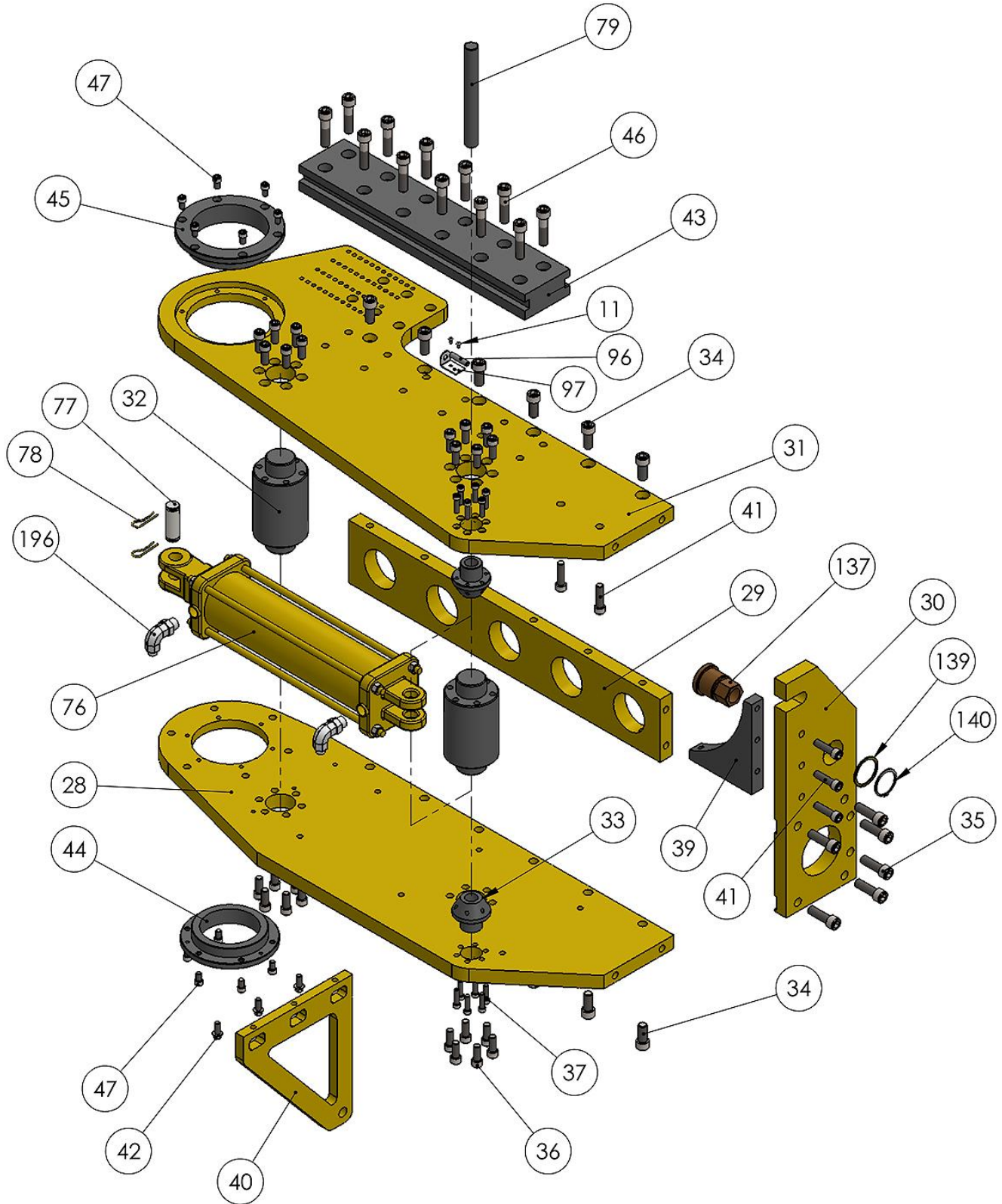


CART ASSEMBLY



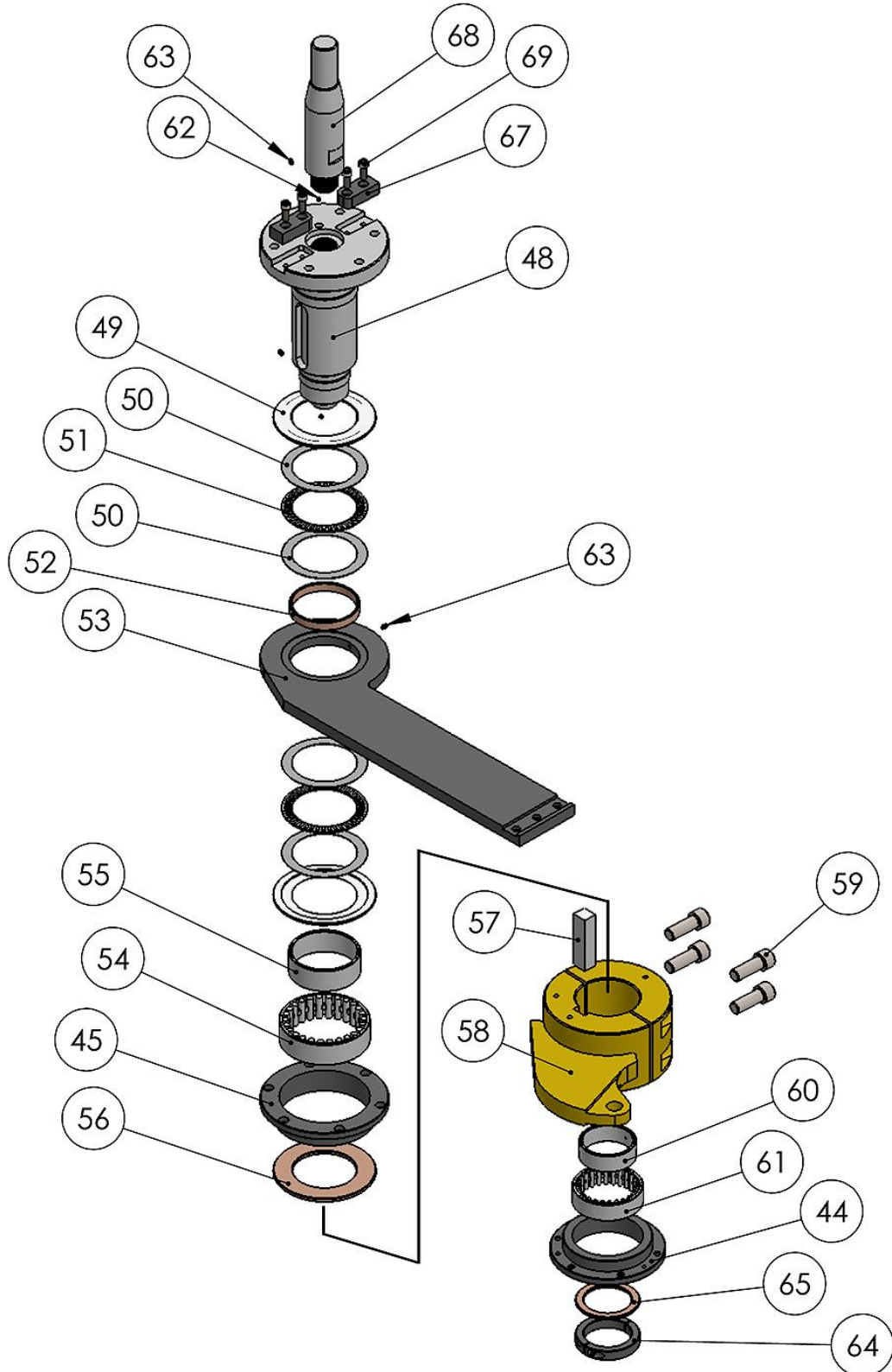


MAIN FRAME ASSEMBLY



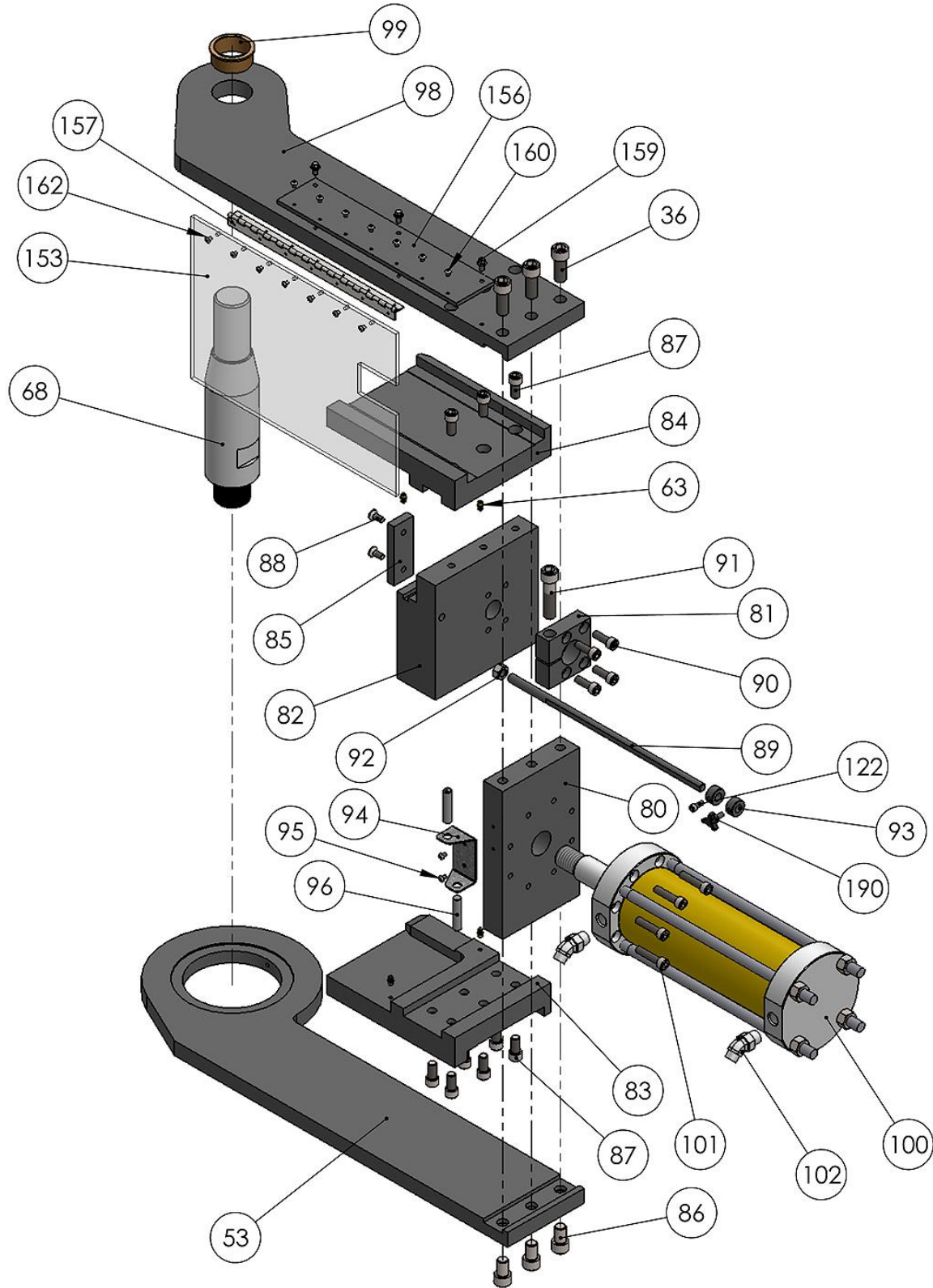


SPINDLE STACK ASSEMBLY



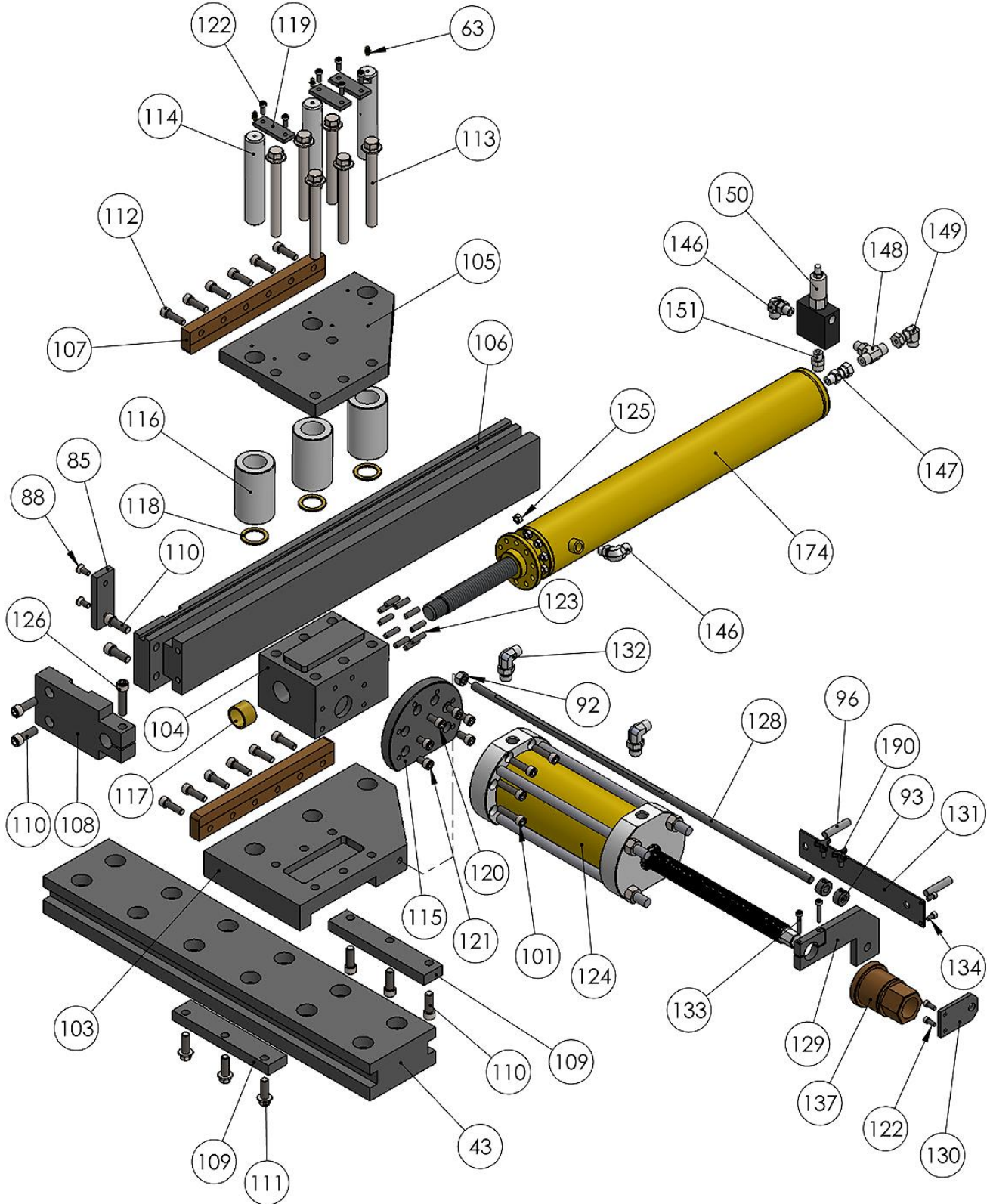


SWING ARM ASSEMBLY



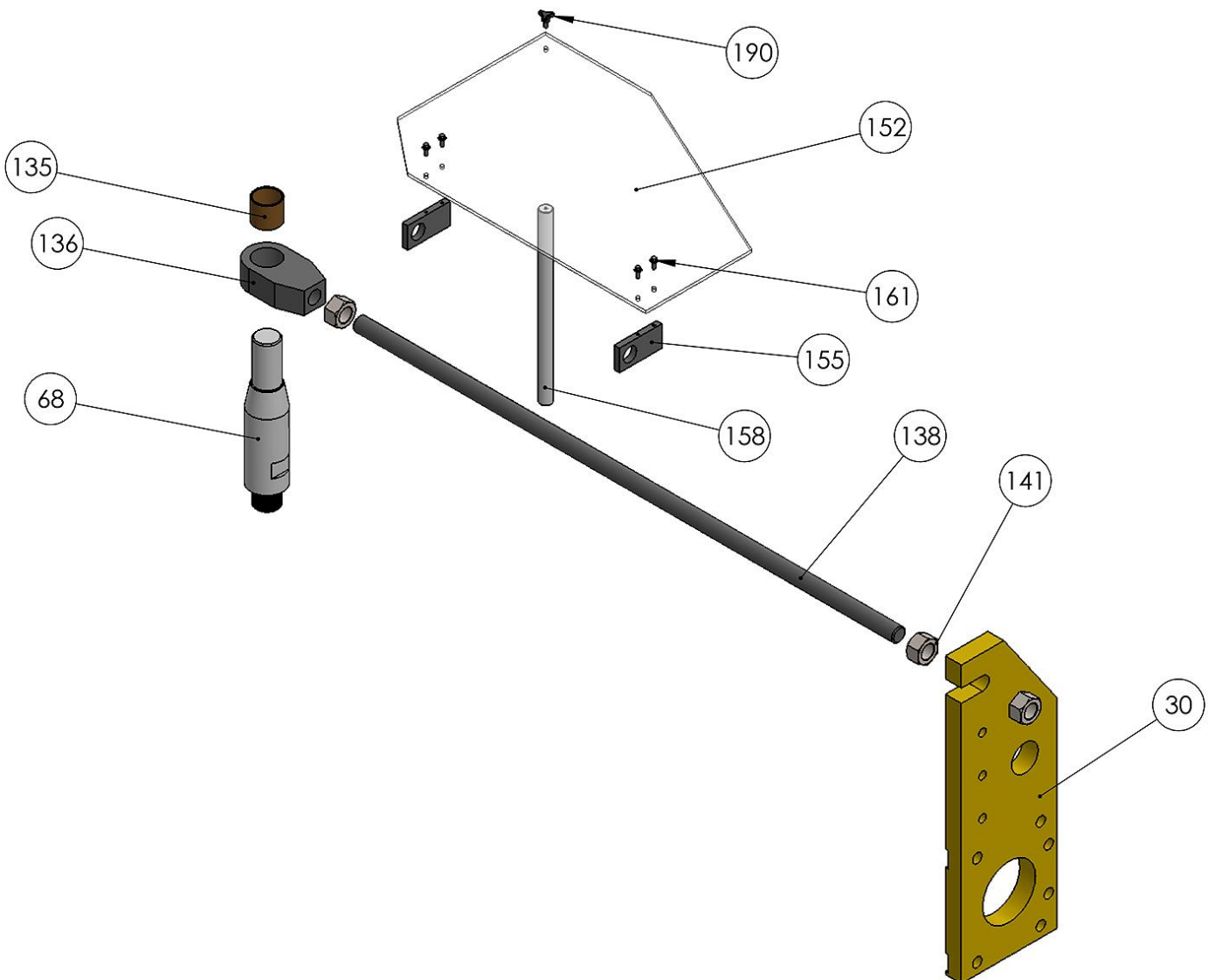


MODIFIED PRESSURE DIE ASSEMBLY

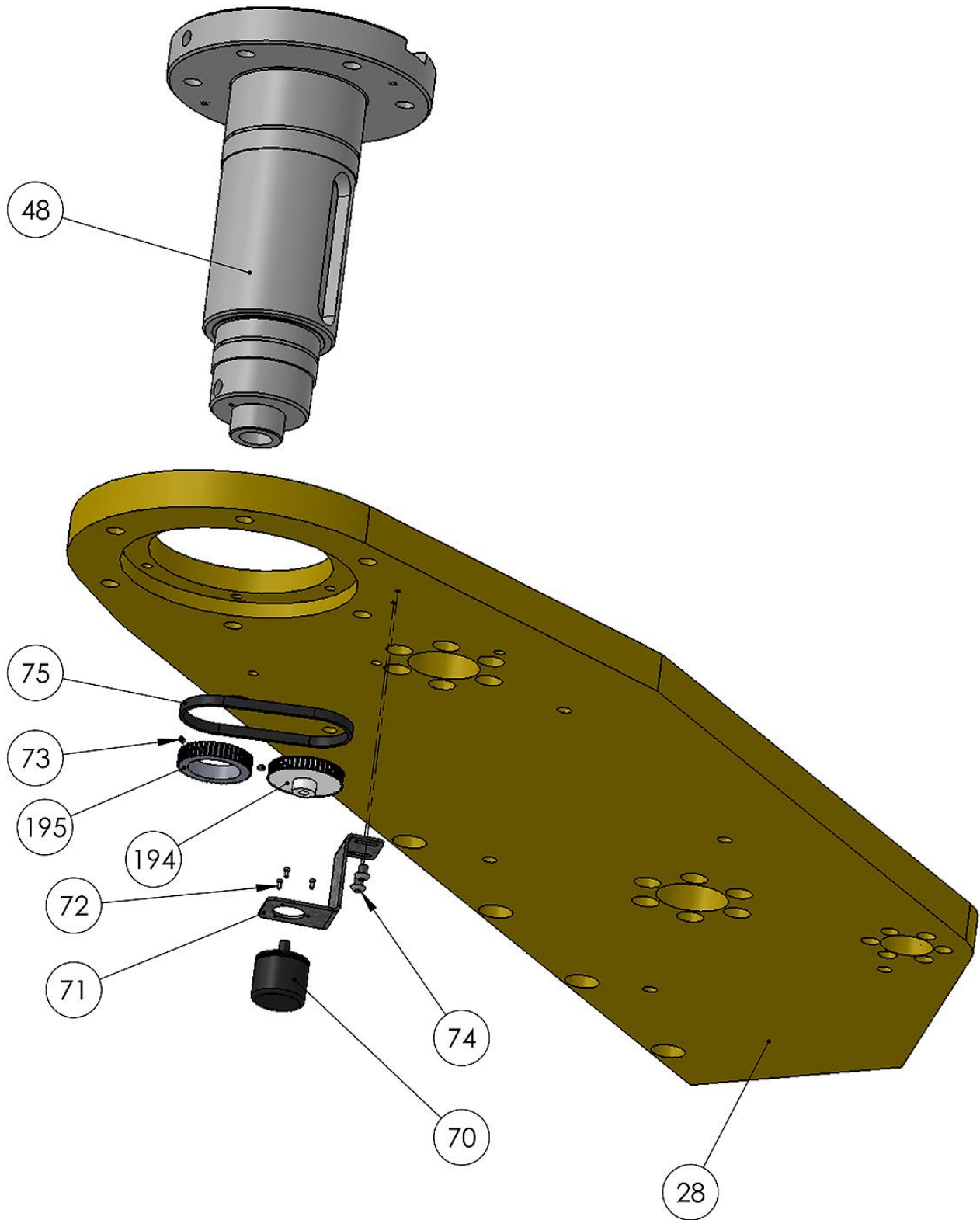




STRUT BAR ASSEMBLY

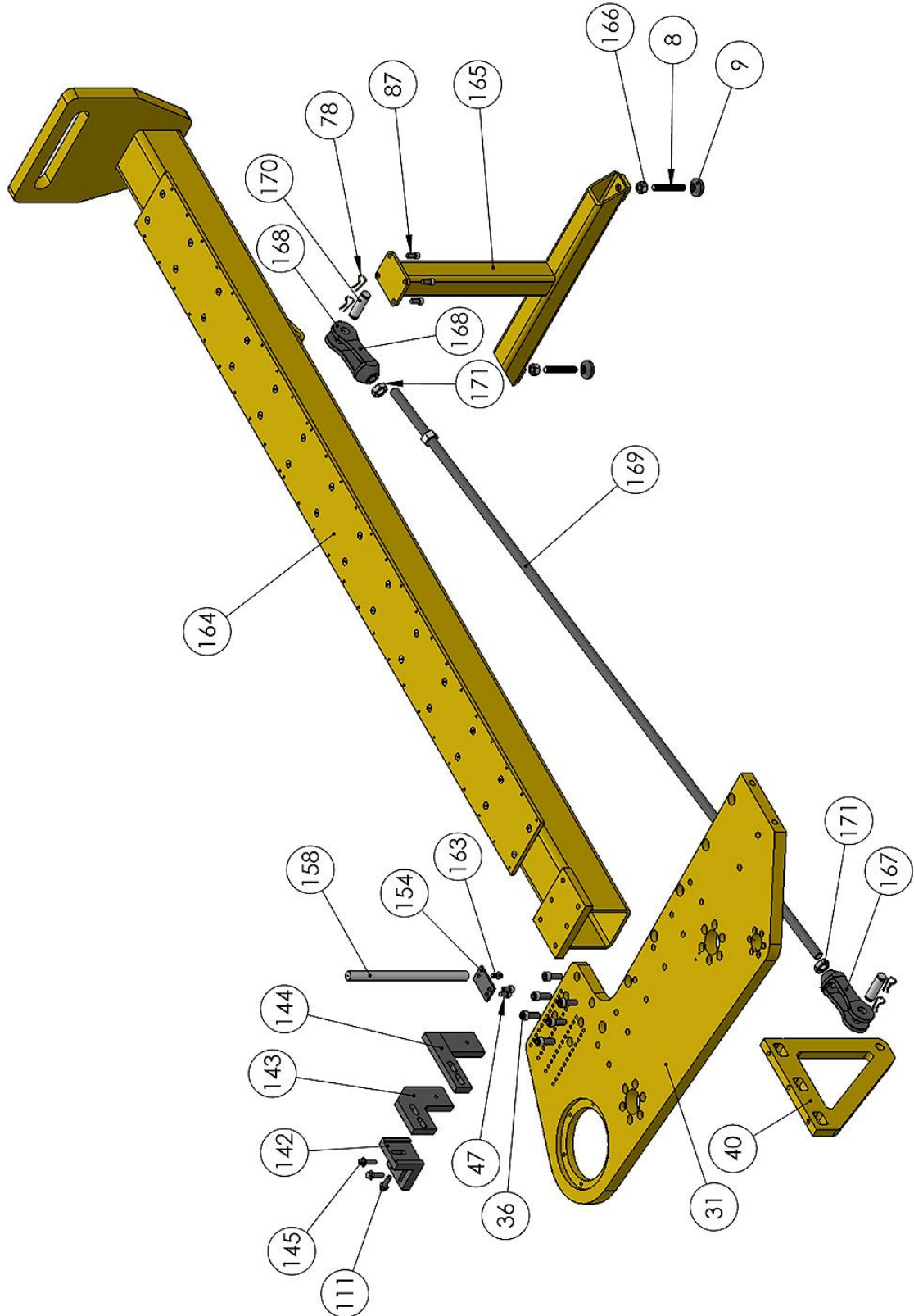


ENCODER ASSEMBLY



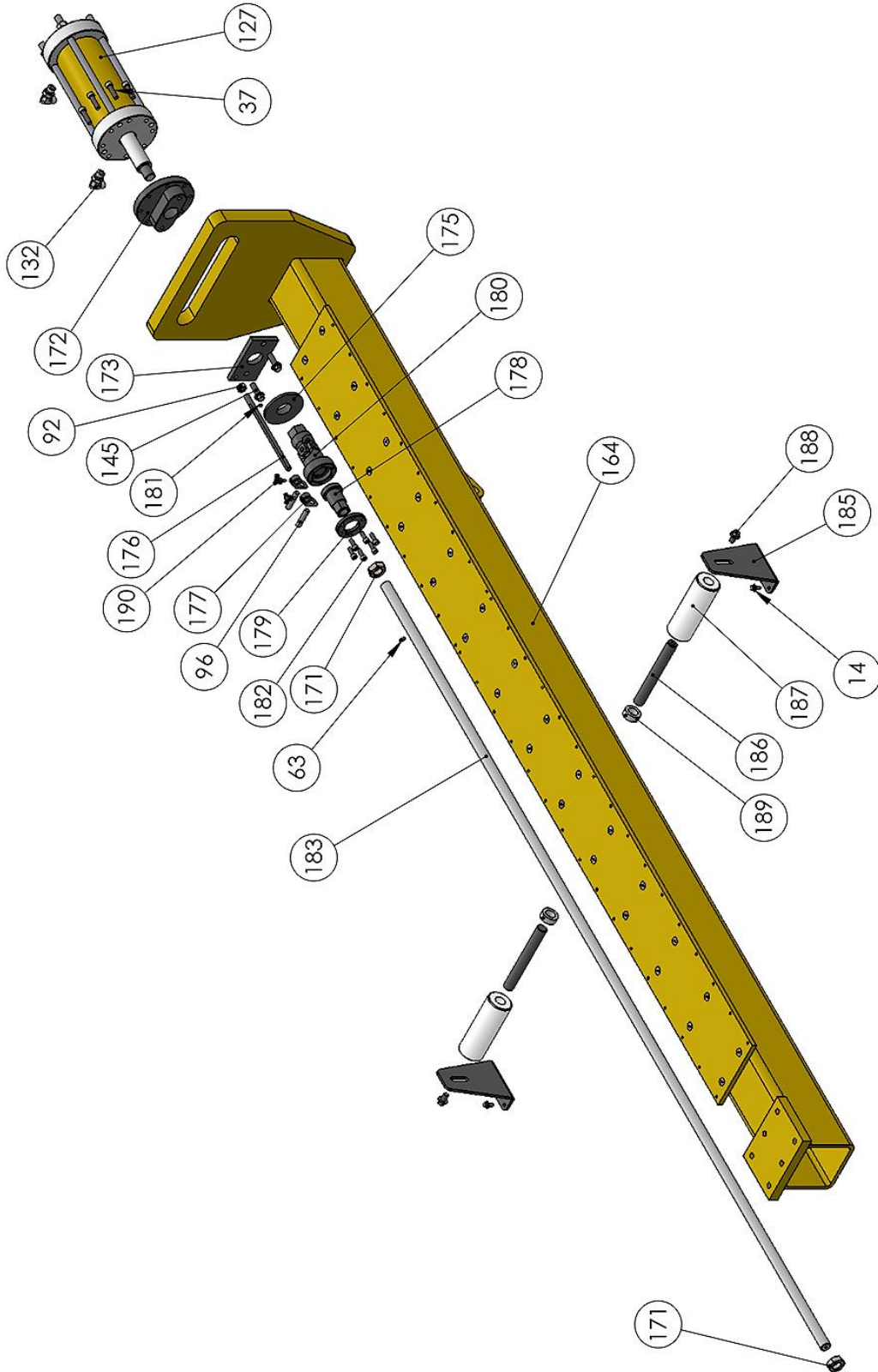


MANDREL TABLE ASSEMBLY



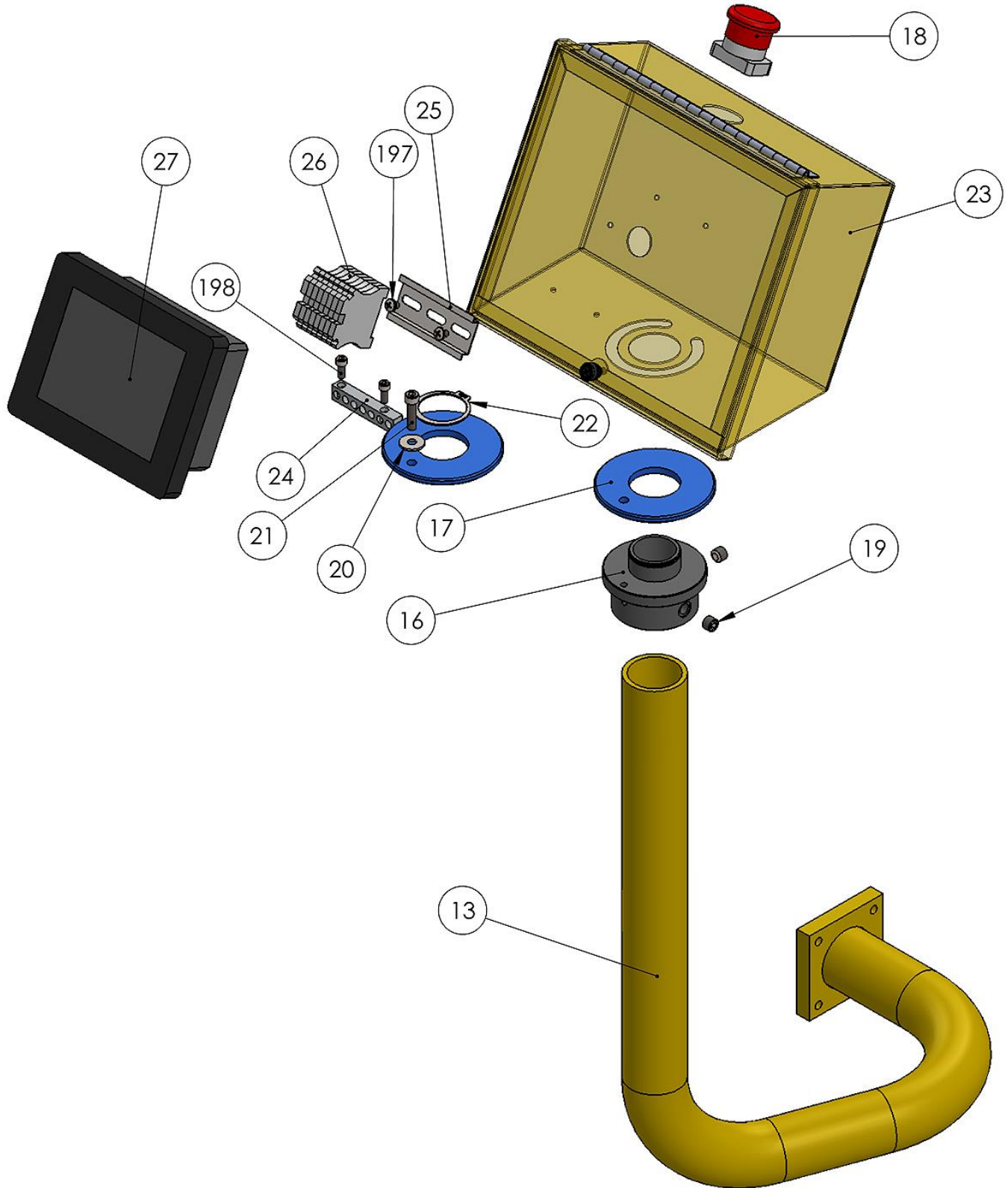


MANDREL EXTRACTION CYLINDER ASSEMBLY





CONTROL BOX ASSEMBLY





Parts List

Item	Part Number	Description	Qty.
1	M550-5A003	M550 Cabinet	1
2	PP-0022	1/2" Elbow	1
3	PP-0290	3/4" Cord Grip	1
4	PP-0023	Cord Grip	1
5	PP-1662	4 Wire Cord Grip	2
6	PP-1661	6 Wire Cord Grip	1
7	M550-6A069	Cabinet Cover	1
8	BS-0323	Foot Pad Shaft	6
9	M350-7A071	Leveling Foot	6
10	5/8-11	Hex Nut	4
11	M6 X 1.0 X 10	Button Head	6
12	PP-1588	Power On/Off Switch	1
13	BOX TUBE ASSEMBLY	Box Arm Assembly	1
14	M8 X 1.25 X 14	Hex Flange	8
15	M550-7A039	Mounting Boss	6
16	M550-7A071	Electrical Box Pivot Hub	1
17	M350-7A058	Electrical Box Washer	2
18	PP-0683	'E' Stop	1
19	M10 X 1.5 X 8	Set Screw	2
20	M6 FLATWASHER	Std.	1
21	M6 X 1.0 X 25	SHCS	1
22	1.50 EXT. RETAINING RING	Std.	1
23	M550-5A012	Controller Box	1
24	PP-1199	5 Hole Ground Strip	1
25	PP-0029-3	Din Rail	1
26	PP-0924	Terminal Block	8
27	PP-1509	Touch Screen Controller	1
28	M550-6A003-V2	Bottom Plate	1
29	M550-6A018	Middle Brace	1
30	M550-6A014	End Brace	1
31	M550-6A002-V2	Top Plate	1
32	M550-7A012	Plate Spacer	2
33	M550-7A017	Pin Sleeve	2



Item	Part Number	Description	Qty.
34	M20 X 2.5 X 45	SHCS	12
35	M20 X 2.5 X 65	SHCS	6
36	M16 X 2.0 X 40	SHCS	33
37	M10 X 1.5 X 40	SHCS	26
38	M16 X 2.0 X 55	Hex Flange	6
39	M550-6A015	Angle Brace	1
40	M550-6A048	Triangle Brace	1
41	M16 X 2.0 X 60	SHCS	5
42	M12 X 1.75 X 30	Hex Flange	3
43	M550-6A006-V2	Slide Block	1
44	M550-7A019	Bearing Hub (Lower)	1
45	M550-7A018	Bearing Hub (Upper)	1
46	M20 X 2.5 X 80	SHCS	12
47	M12 X 1.75 X 20	SHCS	14
48	M550-7A001	M550 Spindle	1
49	M550-7A027	Thrust Ring	2
50	PP-1561	Thrust Washer Thin 130 X 170 X 1	4
51	PP-1560	Thrust Bearing 130 X 170 X 5	2
52	M550-7A042	Custom Bushing	1
53	M550-6A079	Swing Plate (Lower)	1
54	PP-1562	Roller Bearing (NA-4926)	1
55	PP-1562-IR	Inner Race	1
56	M550-7A040	Thrust Washer	1
57	M550-6A090	Hub Key	1
58	M550-5A004	Clamp Hub Weldment	1
59	1-8 X 2.75	SHCS	4
60	PP-1563-IR	140 X 100 X 40 Inner Race	1
61	PP-1563	NA4920 Roller Bearing	1
62	1/4-28 X .25	Set Screw	2
63	STD.	Straight Grease Zerk	11
64	PP-1660	3.75 Clamp Collar	1
65	M550-7A050	Thrust Washer	1
66	3/8-16 X 1.0	SHCS	2
67	M550-6A054	Spindle Drive Key	2
68	M550-7A002	Spindle Center Pin	1



Item	Part Number	Description	Qty.
69	M12 X 1.75 X 30	SHCS	4
70	PP-1577	Encoder	1
71	M550-6A051	Encoder Mounting Bracket	1
72	#4-40 X .25	SHCS	3
73	M5 X 0.8 X 6	Set Screw	2
74	M8 X 1.25 X 10	Button Head	2
75	PP-1576	Encoder Belt	1
76	PP-1564	5 X 18 Bend Cylinder	1
77	STD.	1.25 Pin	1
78	PP-0476-A	Cotter Pin	6
79	M550-7A072	Cylinder Pin	1
80	M550-6A008	Clamp Cylinder Mount	1
81	M550-6A050	Rod Clamp Block	1
82	M550-6A078	Clamp Block	1
83	M550-6A081	Lower Engagement Slide	1
84	M550-6A082	Top Engagement Slide	1
85	M550-6A052	Lock Key	2
86	M16 X 2.0 X 25	SHCS	3
87	M12 X 1.75 X 25	SHCS	13
88	M8 X 1.25 X 20	FHCS	4
89	M550-7A045	Clamp Die Switch Shaft	1
90	M10 X 1.5 X 30	SHCS	4
91	M16 X 2.0 X 65	SHCS	1
92	1/2-13 HEX NUT	Std.	3
93	M550-7A049	Stop Ring	4
94	M550-6A061	Switch Bracket	1
95	M5 X 0.8 X 8	Button Head	2
96	PP-0643	Proximity Sensor	7
97	M350-6A089	Swing Arm Sensor Mount	1
98	M550-6A080	Swing Plate (Top)	1
99	PP-0295	Flanged Sleeve Bearing	1
100	M550-5A013	Clamp Die Cylinder	1
101	M10 X 1.5 X 45	SHCS	8
102	PP-1647	#8 To #6 45 Deg. Fitting	2
103	M550-6A093	Lower Slide Block	1



Item	Part Number	Description	Qty.
104	M550-6A094	Pressure Die Main Block	1
105	M550-6A095	Top Cap	1
106	M550-6A096	Pressure Die Mount	1
107	M550-6A097	Guide Bar	2
108	M550-6A098	Pressure Die End Block	1
109	M550-6A099	Slide Key	2
110	M12 X 1.75 X 35	SHCS	7
111	M12 X 1.75 X 35	Hex Flange	4
112	M10 X 1.5 X 35	SHCS	12
113	M16 X 2.0 X 150	Hex Flange	6
114	M550-7A069	Roller Shaft	3
115	M550-7A068	Adapter Plate	1
116	M550-7A067	Pressure Die Roller	3
117	PP-0842	1.25 ID X 1.50 OD X 1.0 L Bushing	1
118	PP-1004	1.25 ID X 1.75 OD X .125 Thrust Washer	3
119	MH19-6A030	Shaft Keeper	3
120	M10 X 1.5 X 20	SHCS	3
121	M10 X 1.5 X 14	SHCS	3
122	M6 X 1.0 X 14	SHCS	9
123	M8 X 1.25 X 30	Set Screw	10
124	M550-5A014	Pressure Die Cylinder	1
125	M8 X 1.25	Hex Nut	10
126	M12 X 1.75 X 50	SHCS	1
127	M550-5A015	Mandrel Extract Cylinder	1
128	M550-7A047	Pressure Die Switch Shaft	1
129	M550-6A063	Shaft Guide Block	1
130	M550-6A064	Guide Plate	1
131	M550-6A065	Switch Bracket	1
132	PP-0853	Elbow	4
133	M6 X 1.0 X 35	SHCS	2
134	M6 X 1.0 X 12	SHCS	2
135	PP-1658	2.0 ID X 2.25 OD X 2.0 Bushing	1
136	M550-6A013	Rod End	1
137	M550-7A007	Adjusting Nut	1
138	M550-7A010	Spindle Strut Rod	1



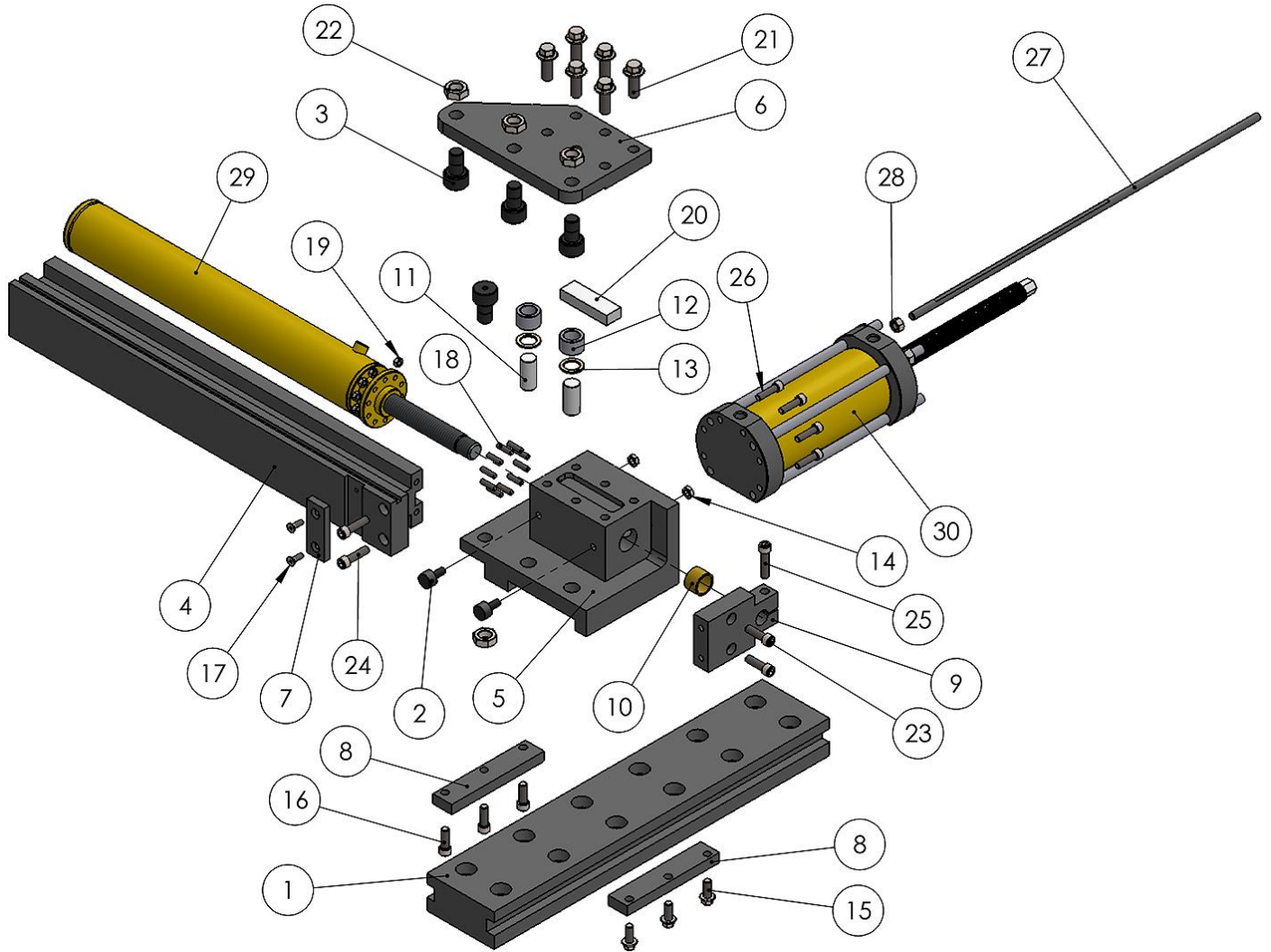
Item	Part Number	Description	Qty.
139	PB24-7A022	Washer	1
140	2.5" EXT. RETAINING RING	Std.	1
141	1.25-12	Hex Nut	3
142	M550-6A066	Angle Bracket	1
143	M550-6A067	Wiper Mount Easy Way	1
144	M550-6A092	Wiper Mount Hard Way	1
145	M12 X 1.75 X 40	Hex Flange	4
146	PP-1276	#6 Threaded Elbow	2
147	PP-1680	#6 Female Straight Swivel Fitting	1
148	PP-1724	#6 Male 'T' Fitting	1
149	PP-0969 (6-C6LO-S)	90 Degree Adapter	1
150	CONTACT RMD (1CB6-AB)	PDA Cylinder Manifold	1
151	PP-0858	#6 To #6 Straight Face Seal	1
152	M550-6A100	Pressure Die Guard	1
153	M550-6A101	Clamp Guard	1
154	M550-6A105	Guard Mount	1
155	M550-6A106	Guard Pivot	2
156	M550-6A107	Hinge Mount	1
157	M550-6A108	Guard Hinge	1
158	M550-7A073	Guard Spacer	1
159	M6 X 1.0 X 12	Hex Flange	3
160	M5 X 0.8 X 6	Button Head	7
161	M6 X 1.0 X 14	Hex Flange	4
162	PP-0487	M800 Guard Rivets	7
163	M10 X 1.5 X 20	Hex Flange	1
164	M550-5A001	Extraction Tube Assembly	1
165	M350-5A009	Index Leg	1
166	3/4-10	Hex Nut	2
167	PP-0778	Clevis End (L.H.)	1
168	PP-0777	Clevis End (L.H.)	1
169	M550-7A026	Strut Rod	1
170	PP-0403-J	Pin	2
171	1"-8 JAM NUT	Std.	4
172	M550-7A037	Cylinder Adapter	1
173	M550-6A019	Slide Cap	1



Item	Part Number	Description	Qty.
174	M550-5A016	3.0 Pressure Die Assist Cylinder	1
175	M550-7A046	Switch Disc	1
176	M550-7A048	Mandrel Extract Switch Shaft	1
177	M550-5A006	Proximity Sensor Mount	2
178	M550-7A031	Rotatable Nut	1
179	M550-7A038	Lock Ring	1
180	M550-7A044	Custom U-Joint	1
181	M6 X 1.0 X 8	Set Screw	1
182	M8 X 1.25 X 25	SHCS	6
183	M350-7A022	Mandrel Extract Shaft	1
184	1/8 NPT PIPE PLUG	Std.	1
185	M550-6A088	Mandrel Rod Support Bracket	2
186	M550-7A070	Roller Shaft	2
187	M550-7A075	Mandrel Rod Roller	2
188	M12 X 1.75 X 20	Hex Flange	2
189	PP-0035	1" Set Screw Collar	2
190	PP-1533	Knob	6
191	PP-1688	Hydraulic Power Unit	1
192	3/8" LOCK WASHER	Std.	4
193	.375-16 X .75	HHCS	4
194	PP-1574	44t Pulley (Plastic)	1
195	PP-1575	44t Spindle Pulley	1
196	PP-1646	#12 To #8 Elbow	2
197	10-24 X .25	Cross Machine Screw	2
198	10-24 X .50	SHCS	2



ORIGINAL PRESSURE DIE PARTS DIAGRAM





Original Pressure Die Parts List

1	M550-6A006-V2	SLIDE BLOCK	1
2	PP-0674	1.0" CAM FOLLOWER	2
3	PP-1572	CAM FOLLOWER #CFH-1.5-B	4
4	M550-6A009	PRESSURE DIE MOUNT	1
5	M550-6A010	PRESSURE DIE BLOCK	1
6	M550-6A043	TOP BEARING CAP	1
7	M550-6A052	LOCK KEY	1
8	M550-6A060	SLIDE KEY	2
9	M550-6A022	PRESSURE DIE END BLOCK	1
10	PP-0842	1.25 ID X 1.50 OD X 1.0 LNG BUSHING	1
11	M550-7A076	CAM FOLLOWER STUD	2
12	M550-7A077	CAM FOLLOWER	2
13	PP-0056	1.0 ID X 1.5 OD X .125 THK	2
14	7/16-20 HEX NUT	STD.	2
15	M12 X 1.75 X 30	HEX FLANGE	3
16	M12 X 1.75 X 35	SHCS	3
17	M8 X 1.25 X 25	FHCS	2
18	M8 X 1.25 X 30	SET SCREW	10
19	M8 X 1.25	HEX NUT	10
20	M550-6A109	PRESSURE DIE COVER KEY	1
21	M16 X 2.0 X 45	HEX FLANGE	6
22	7/8-14 HEX NUT	STD.	4
23	M12 X 1.75 X 40	SHCS	2
24	M12 X 1.75 X 45	SHCS	2
25	M12 X 1.75 X 50	SHCS	1
26	M10 X 1.5 X 40	SHCS	6
27	M550-7A047	PRESSURE DIE SWITCH SHAFT	1
28	1/2-13 HEX NUT	STD.	1
29	M550-5A016	3.0 PRESSURE DIE ASSIST CYLINDER	1
30	M550-5A014	PRESSURE DIE CYLINDER	1



NOTES



NOTES



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