

NORTH ALABAMA PIPE

MO

MACHINE MANUAL

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CAUTION:

To ensure the safe operation of this machine and the safety of the operator this manual must be read and understood before proceeding.



THIS DOCUMENT HAS BEEN PREPARED BY:

NORTH ALABAMA PIPE

185 GRIMES DRIVE

GUNTERSVILLE, ALABAMA

35976

U.S.A.

ISO SAFETY SYMBOLS - DEFINED

CAUTION - GENERAL



Do not operate this Machine until Operators Manual has been read.

Use Fork Lift to move machine into area machine is to be used.
There is a risk of personal injury if attempted to move by hand.

Be sure machine is connected to Building Electrical Safety Ground.

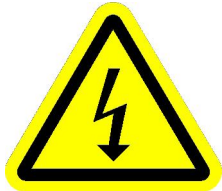
Be sure to disconnect, Lock Out and Tag Out the power before performing machine maintenance.

Do not operate machine with guards removed.

Do not wear loose clothing or jewelry while operating this machine.

Do not use this machine in a manner for which it is not intended to be used.

CAUTION - ELECTRICAL



High voltage present inside Control Cabinet.

To reduce the risk of electrical shock, Do not attempt to open Control Cabinet while power is on.

Do not operate this equipment from any power source that does not match the voltage rating stamped on the equipment. Refer to the Manufacturer's Identification Label for operational requirements.

Refer servicing to qualified personnel only.

CAUTION - CRUSH HAZARD



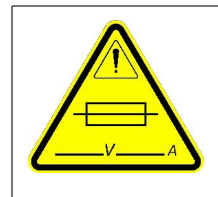
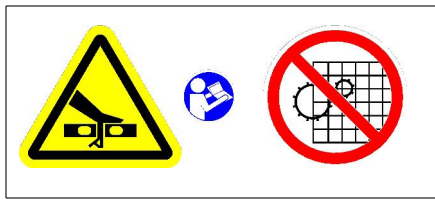
Clamping Devices contained behind guards.

Keep hands and other objects not intended to be near clamps away during operation.

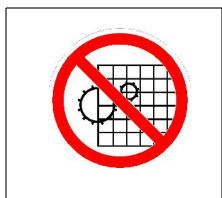
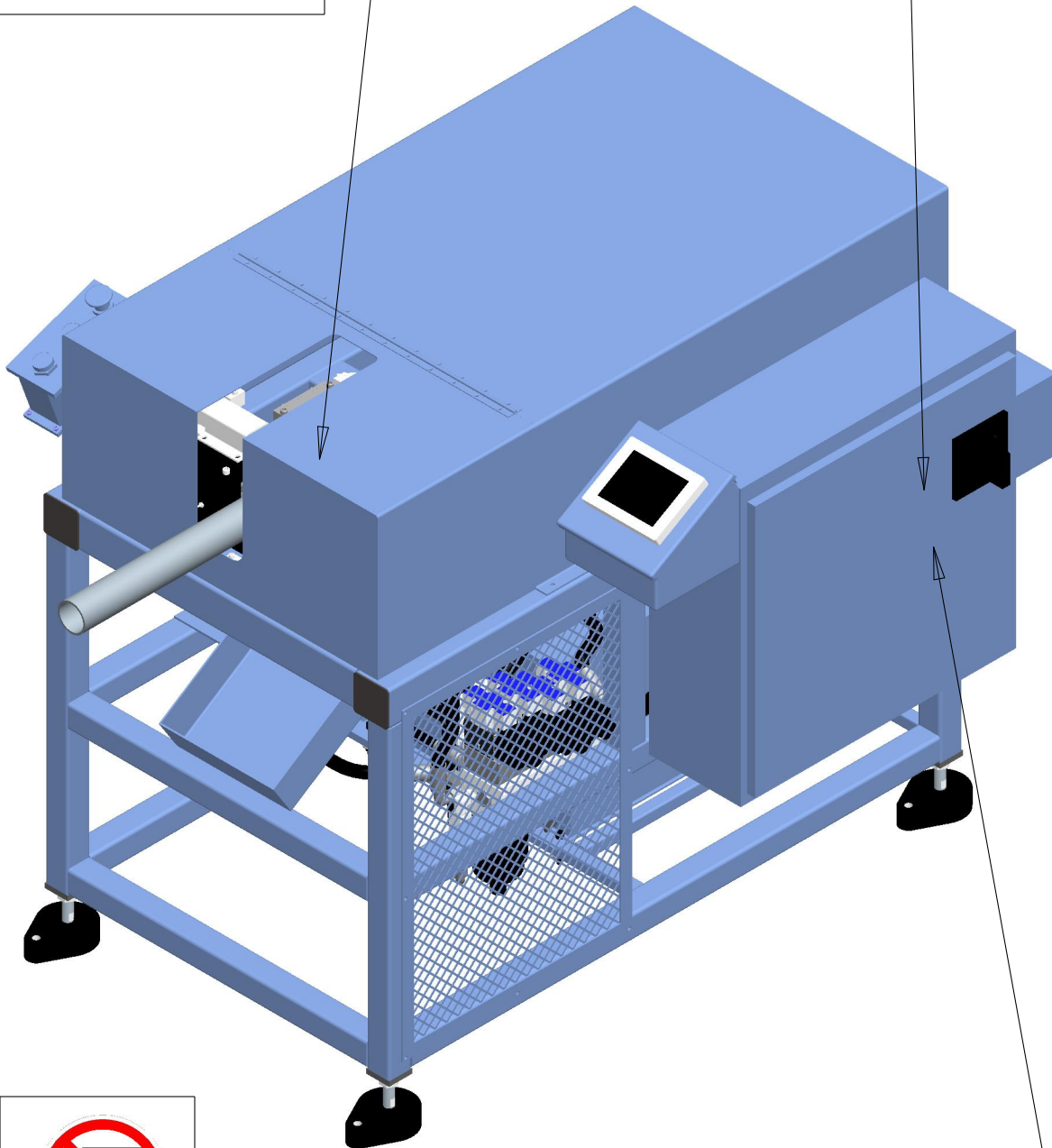
Severe personal injury and or dismemberment may occur.

ISO SAFETY SYMBOLS - DEFINED

	<p><u>CAUTION - DO NOT REMOVE GUARDS</u></p> <p>Moving and rotating parts contained behind guards.</p> <p>Do not operate machine with guards removed.</p> <p>Severe personal injury and or dismemberment may occur.</p>
	<p><u>MANDATORY</u></p> <p>This machine must be Locked and Tagged Out before proceeding.</p>
	<p><u>MANDATORY</u></p> <p>Supporting documentation must be read and understood before operating or maintaining this machine.</p> <p>Failure to do so may result in severe personal injury and or dismemberment.</p>
	<p><u>CAUTION - SLIP HAZARD</u></p> <p>If a hydraulic spill or any other spill occurs in the operation area of this machine, it must be cleaned before Operator can continue using this machine.</p>



Inside
Control
Box



On all Removable
Guards



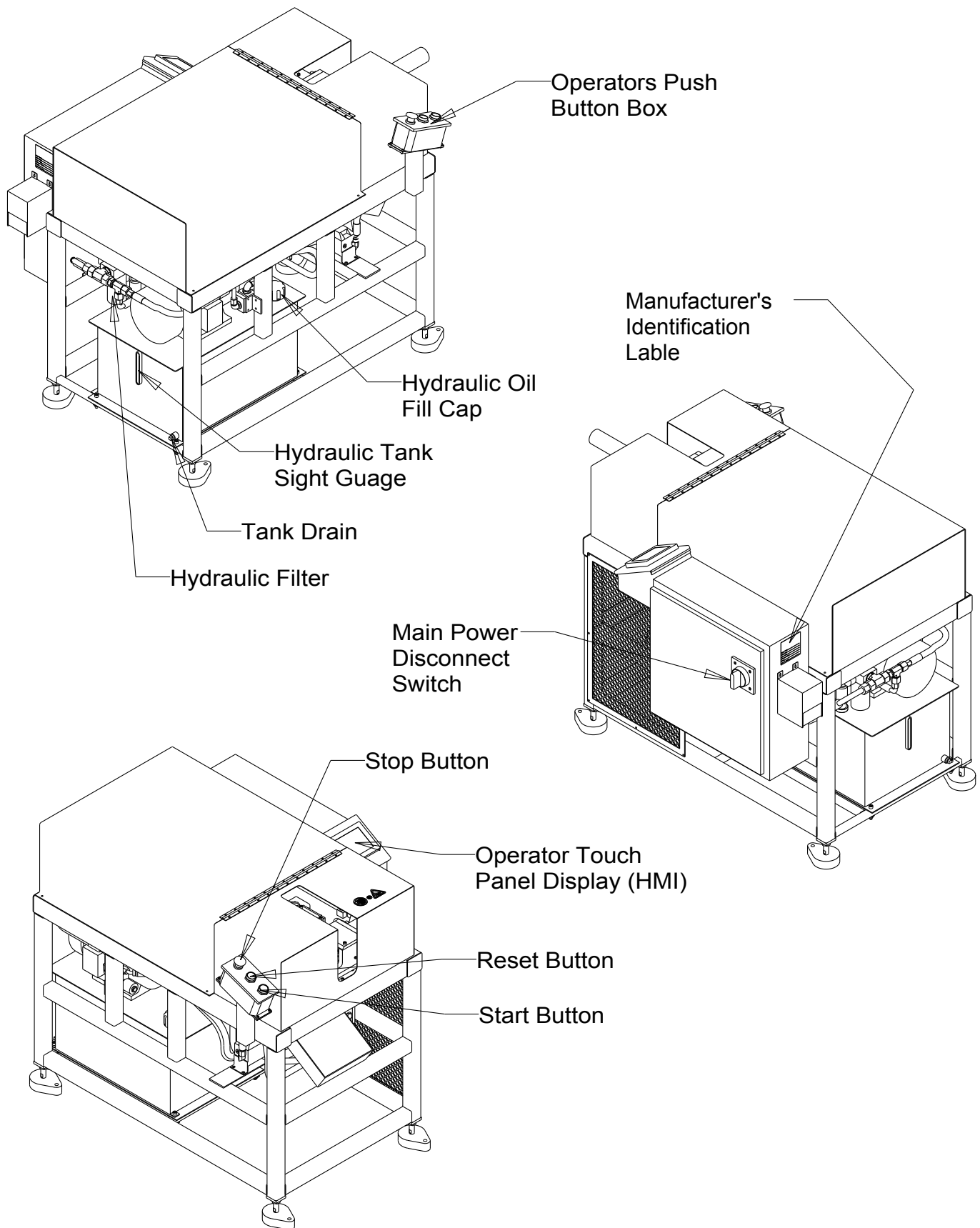
ISO Safety Symbols Location

General Machine Description:

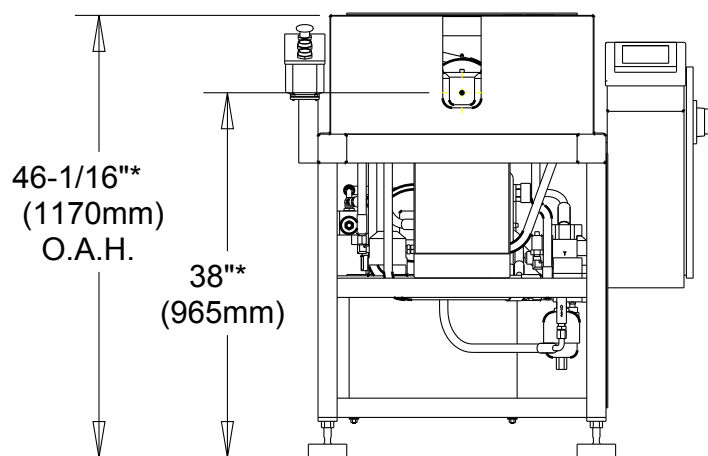
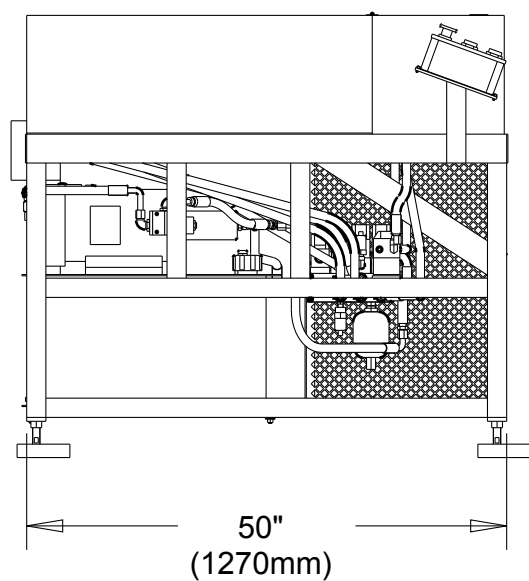
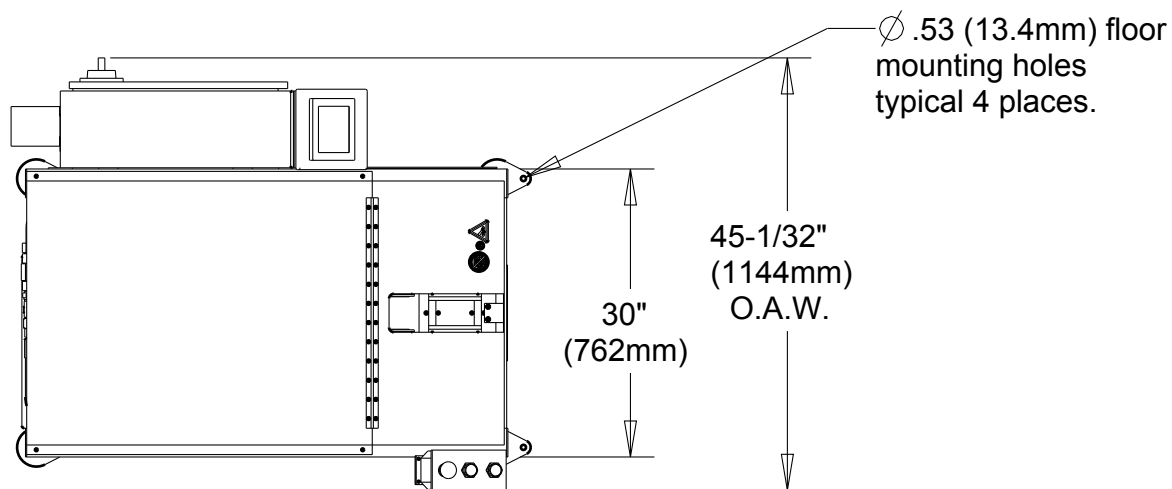
The Make-on machine is an automatic hydraulic powered machine used to assemble pipe fittings to threaded pipe in a fabrication shop setting. The Make-on utilizes a hydraulic powered Pipe Clamp and a hydraulic powered Fitting Clamp that rotates by the aid of a Hydraulic Motor to torque the fitting onto the pipe.

SPECIFICATIONS

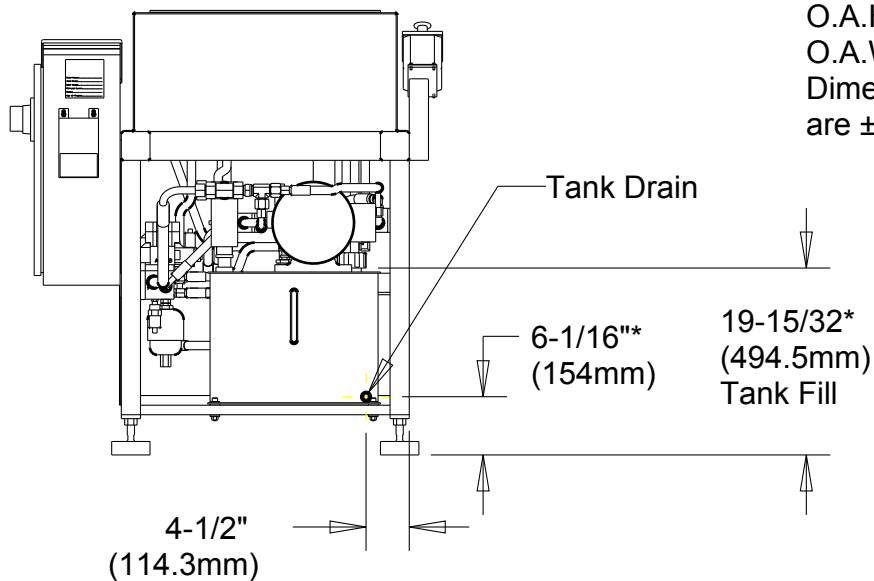
Year of Construction	
Voltage	400 VAC
Number of Phases	3~
Frequency	60 HZ
Full Load Current	8.5 Amperes
Maximum Hydraulic Pressure	2000 P.S.I./138 BARS
Hydraulic Oil Type	AW-32
Hydraulic System flow rate	4.5 GPM/17 LPM
Hydraulic Tank Oil Volume	20 US GALLONS/75.7 LITERS
Maximum Hydraulic Oil Temperature	140°F/60° C - Controlled by Internal Tank Temperature Switch
Maximum Fitting Clamp R.P.M.	90 R.P.M No Load
Noise Level	Below Noise Leve Requirements



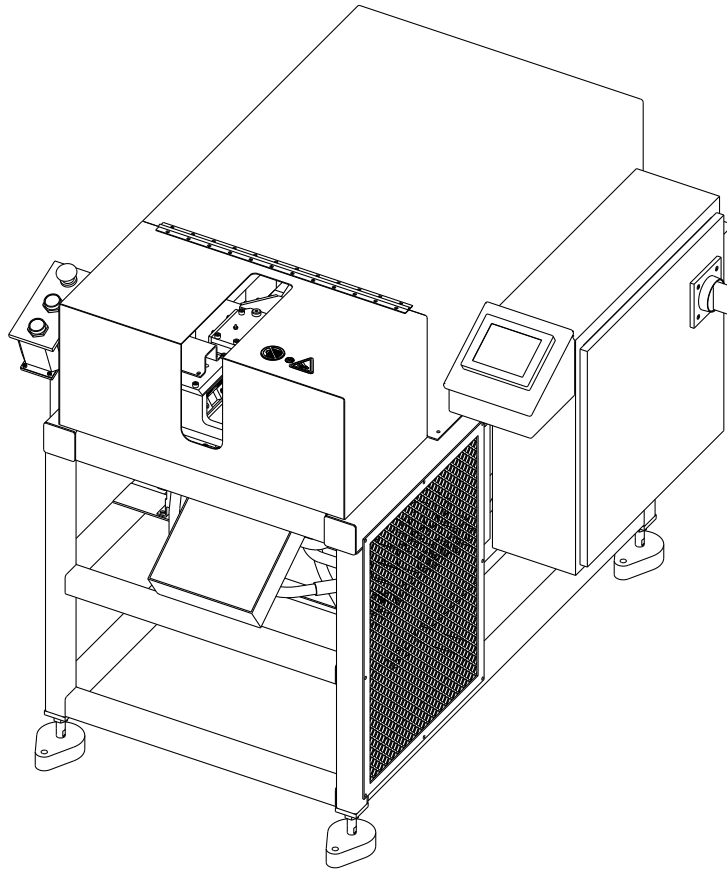
Machine Components Location



Notes:
 O.A.H.= Over All Height
 O.A.W.= Over All Width
 Dimensions marked with (*) are $\pm 1\text{-}1/2"$ (38mm).



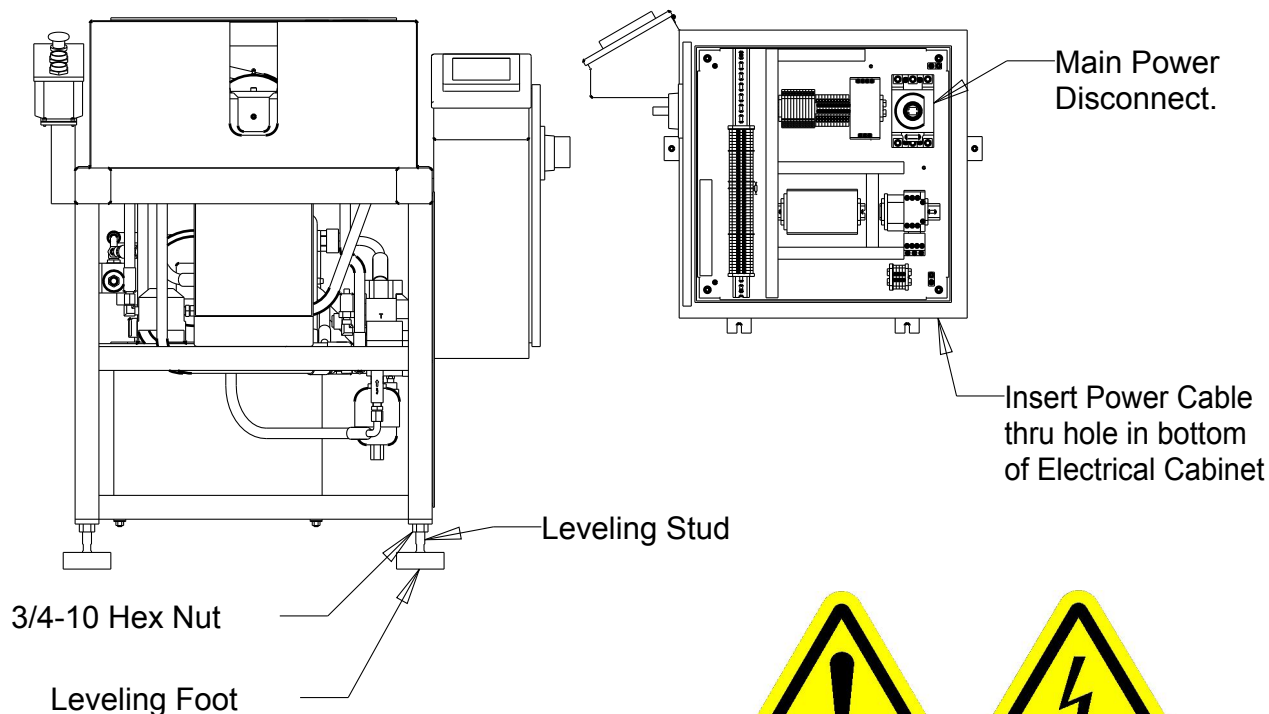
Machine Dimensions



Operator and Maintenance Manual

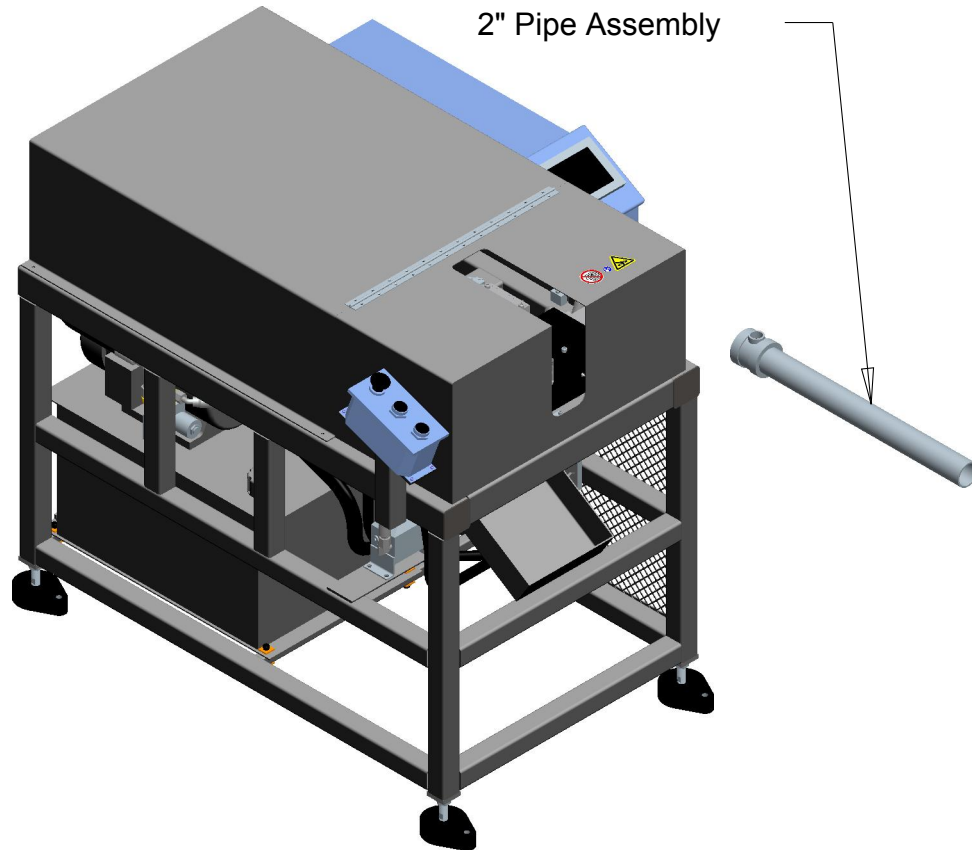
Read and understand all safety precautions contained in this manual before operating machine. Failure to do so may result in personal injury and or dismemberment.

1. Machine Set-Up - Sheet #11.
2. Machine Operation - Sheet #12.
3. Pipe Holders for Short Pipe - Sheet #13.
4. Maintenance - Aligning Fitting Clamp and Pipe Clamp - Sheet #14.
5. Maintenance - Rotation Chain Tension - Sheet #15.
6. Maintenance - Setting Pipe Size Linear Transducer - Sheet #16.
7. Operator Touch Panel Display (HMI) - Sheet #17 thru #20.
8. Hydraulic System - Sheet #21 thru #24.
9. Machine Lubrication - Sheet #25 thru #28.
10. Machine Cleaning - Sheet #29.
11. Packing and Shipping Check List - Sheet #30.
12. Recommended Spare Parts List - Sheet #31.



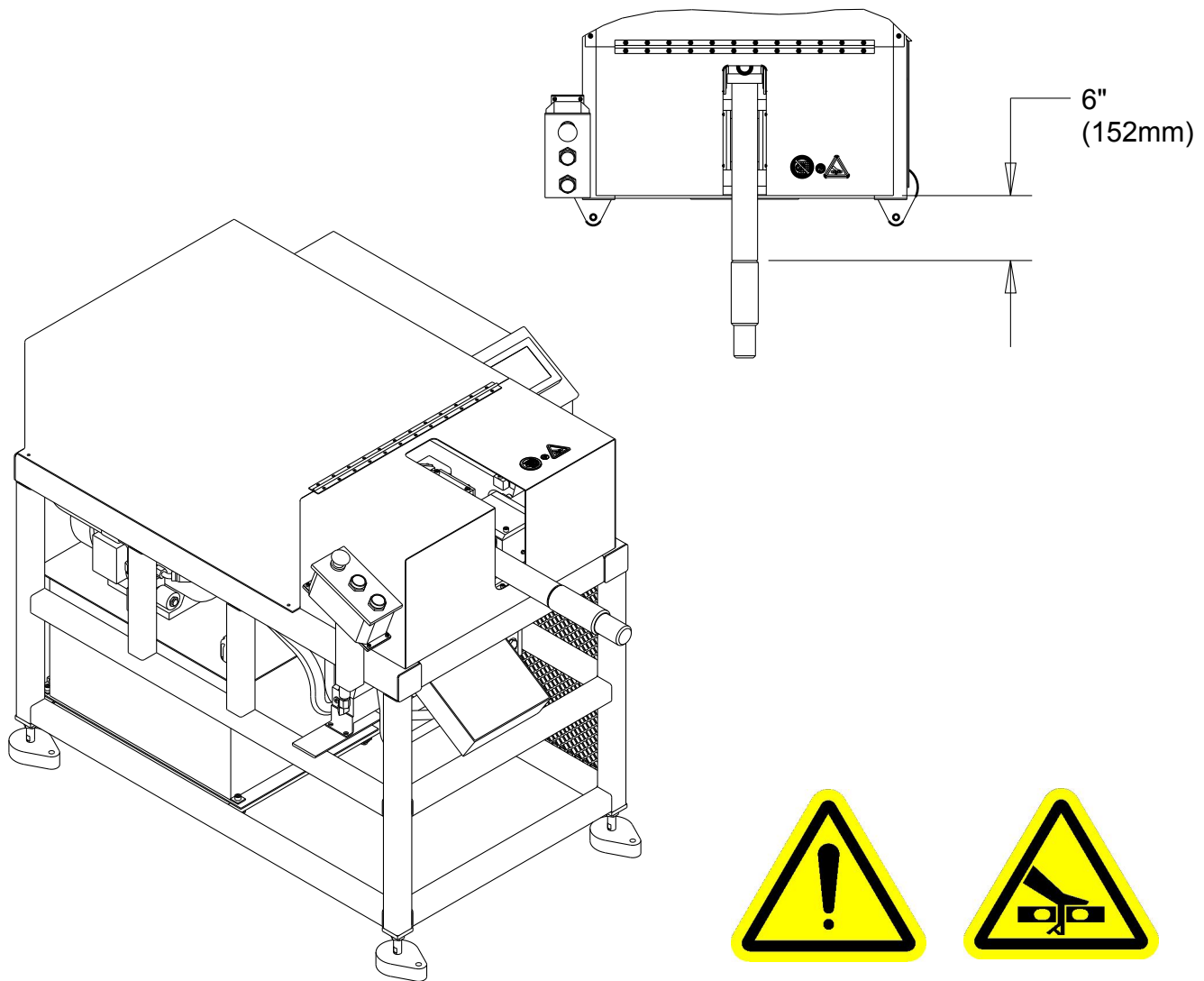
Machine Set-up Procedures:

Upon receiving machine, Carefully un-crate and inspect for physical damage caused during shipping. Remove Lag Bolts that secures the machine to the pallet and move machine with a Fork Lift. Forks will go under the bottom Frame members and place in location for machine. Please Note: The machine can not be placed closer than 3ft. (900mm) to any object that will interfere with the maintenance of the Electrical Panel. Anchoring of the machine to the floor is to be done according to the descretion of shop requirements. Adjust the Leveling Feet to required height and level machine. Loosen thr #/4-10 Hex Nuts and rotate Leveling Stud to raise or lower machine. When machine is level and to desired height, tighten the 3/4-10 Hex Nuts. Fill Hydraulic Reservoir with the Oil shipped with the machine. Caution!! Do not operate the Hydraulic Unit without Oil, the Pump will be damaged and will have to be replaced. The following is to be done by qualified service personnel only. Check the Manufacturer's Identification Lable (See Sheet #8) This Lable lists the correct voltage to be connected to this machine. The power cable is to be inserted thru the bottom of the Electrical Cabinet in the hole provided. Purchaser is to provide the power cable to connect from their power source to the machine. Connect the power cable to the top of the Main Power Disconnect of the machine. Close the Electrical Cabinet Door and secure. Turn the Main Power Disconnect Switch to the on position and allow the system to boot up. To check for proper rotation of the Hydraulic Pump Motor, press the Hydraulic Pump Start button on the Touch Panel (HMI) unce and press it again very fast co Motor will only jog. Observe the fan direction on the rear of the Pump Motor for direction according to Arrow on Fan Guard. If Motor rotation is incorrect, remove the power from from the machine and remove the cover on the Motor Junction Box and interchange any two wires to reverse rotation. This is shown on a chart located on the Pump Motor above the Junction Box. Check rotation again, if it is correct, allow the Pump to run for 10 minutes before operating machine.



Machine Operation:

After Hydraulic Pump has been running for 10 minutes the Make-on is ready to operate. Press and hold the Reset Button on the Operators Push Button Box, this allows the Fitting Clamp to rotate and reset Home position. This will change the Stop Mode Light on the Touch Screen from Red to Green. Resetting the Fitting Clamp home position may have to be done 2 or 3 times in order for system to reset. When system has been reset, the machine is ready to operate. Operator inserts a pipe with fitting partially screwed onto the pipe, into the opening of the Front Guard, allowing the pipe to rest on the Pipe Clamp and the fitting against the Fitting Clamp. Press the Start Button and the Pipe Clamp will clamp and center the pipe, then the Fitting Clamp will clamp the fitting and rotation will start to torque the fitting onto the pipe. When the proper torque setting is reached, the Pipe Clamp will open, rotation will slow down and the Fitting Clamp will rotate to Home Position, stop and open releasing the assembled pipe. Machine is ready for the next piece. To remove a fitting from a piece of pipe, press the Tighten Button on the Touch Screen, this changes rotation direction and the machine is in Reverse Mode and the operation is the same as putting on a fitting. To switch back to regular mode, press the Tighten Button again and press and hold the Reset Button to change back. Always hold the Reset Button until the Fitting Clamp has reset.

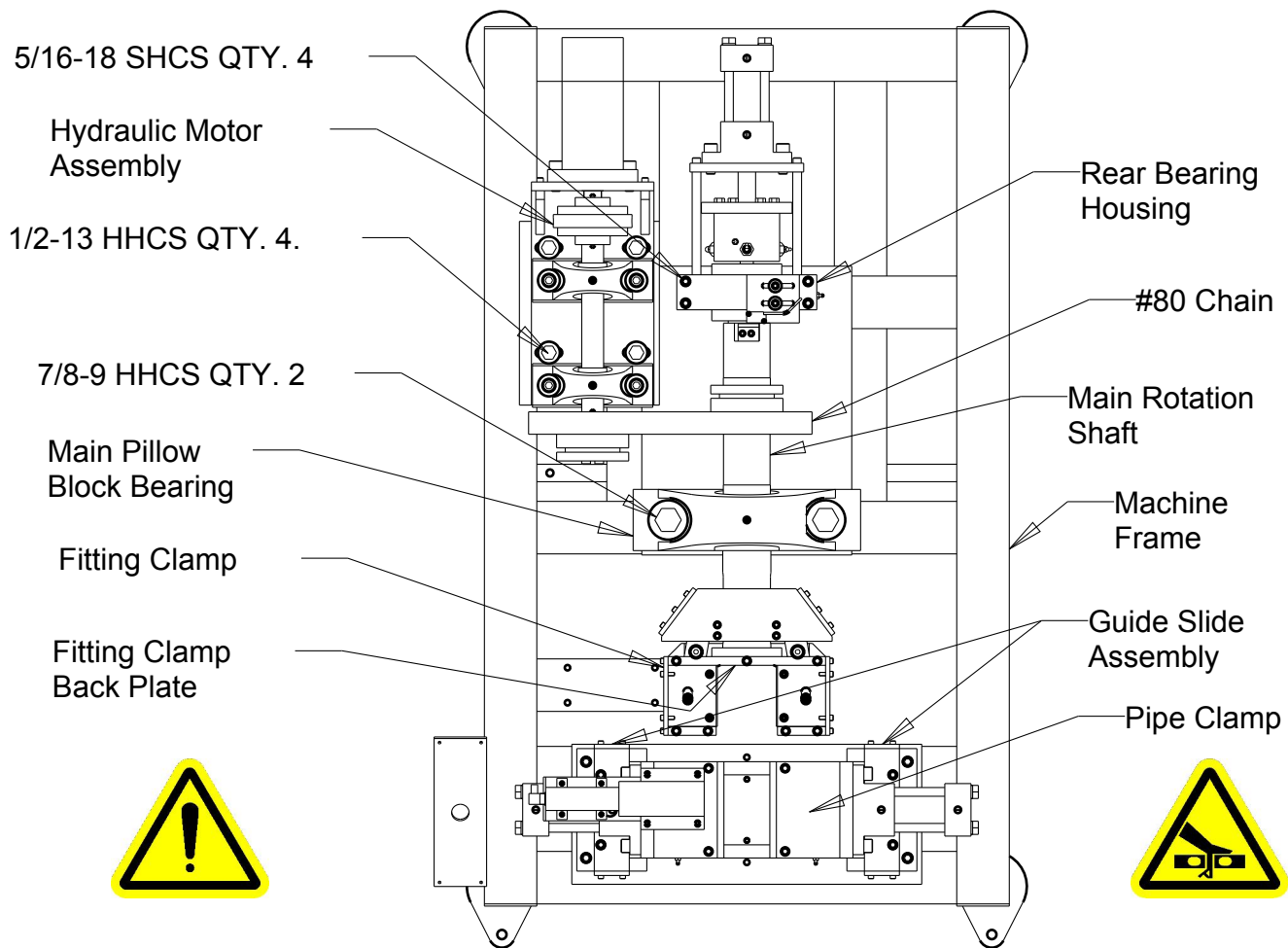


Pipe holders for Short Pipe:

Caution!!: there is a risk of personal injury and or dismemberment.

Please read and understand all safety precautions contained in this manual.

The use of Pipe Holders are required when short pipe is being assembled with this machine. Never hold the pipe when it is within 6" (152mm) of the Front Machine Guard. The Pipe Clamp is behind the Front Guard and is a Hazard Area. The Pipe Holders, 1 for each size pipe are supplied with each machine to make it safe for the Operator when short pipe is being assembled.



Aligning Fitting Clamp and Pipe Clamp:

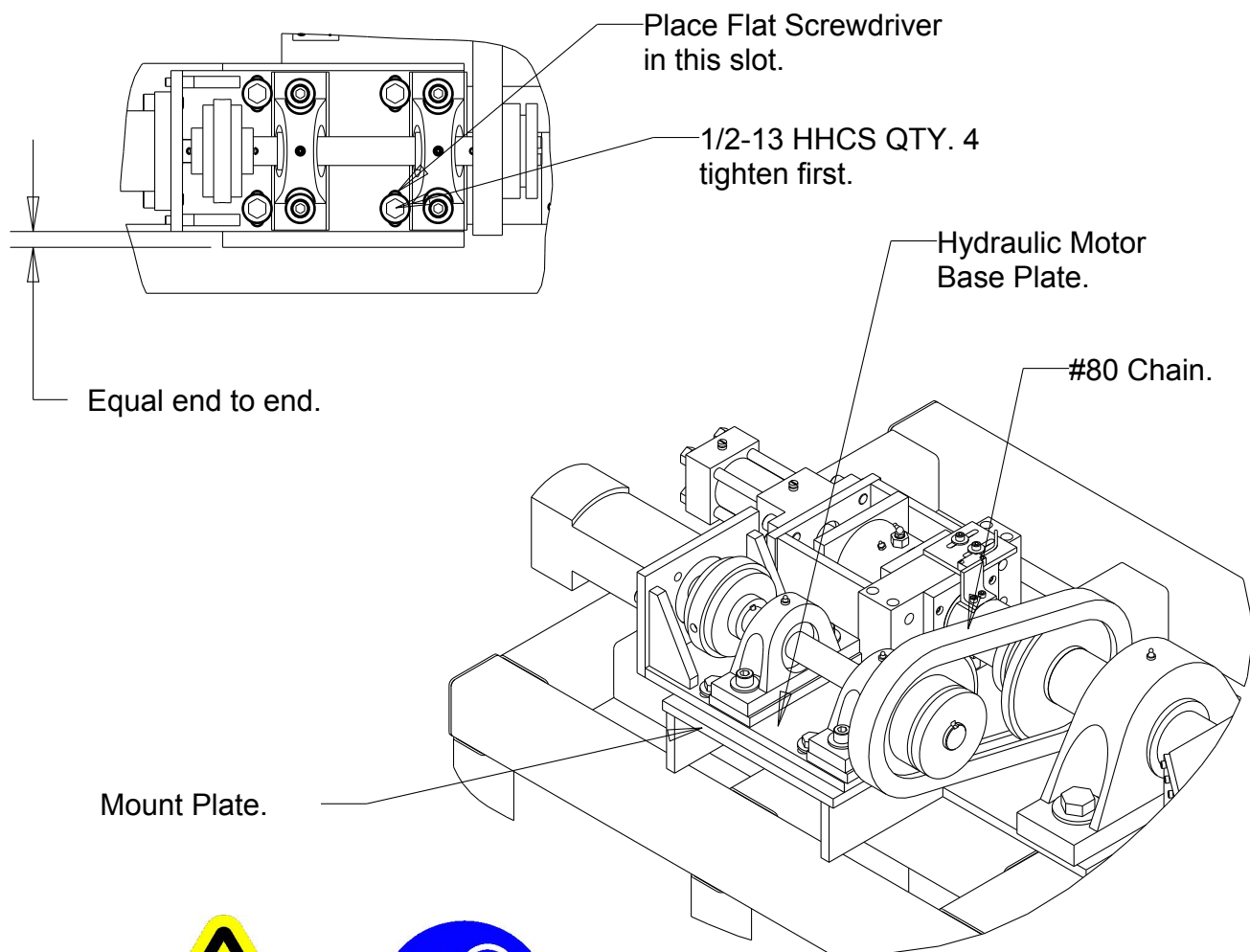
Caution!!: This maintenance function has to be done with the Top Guards removed and power on. 2 people are required to remove and replace the Top Guards.

Tools required - 3/16" Hex Wrench, 1/4" Hex Wrench, 1-5/16" Open End Wrench. This has to be performed if the Main Pillow Block Bearing is replaced or the Rear Bearing housing has to be removed to replace the Taper Roller Bearing. To center the Fitting Clamp to The Pipe Clamp, loosen the 7/8" Bolts on the Main Pillow Block Bearing, the 5/16 SHCS in the Rear Bearing Housing and the 1/2-13 HHCS the mount the Hydraulic Motor Assembly, Chain must be loose. With the machine running, push the Stop Button down, go to the Maintenance Screen on the Operator Touch Panel. Place a pipe, without a fitting into the Pipe Clamp, and against the Back Plate of the Fitting Clamp. Press the Pipe Clamp Close Button to hold the pipe in place, press the Fitting Clamp Close Button, this will bring and hold the 2 Clamps in alignment together. The Main Rotation Shaft should be parallel with the Machine Frame, and the Pipe Clamp is centered in the Guide Slide Assemblies. The Fitting Clamp is aligned with the Pipe Clamp. Remove the noted bolts and screws, one at a time and apply Loctite #242 on all fasteners and torque as follows:

5/16-18 SHCS - Torque to - 21.5 Ft/Lb (36N/M)

7/8-9 HHCS Torque to - 322 Ft/Lb (436N/M)

Once all fasteners are tight, open all Clamps, remove pipe, pull Stop Button up, shut off Machine and remove Power. Tighten Chain as explained on Page #15 of this Manual. Replace all Guards when Chain is tightened.



Rotation Chain tension:

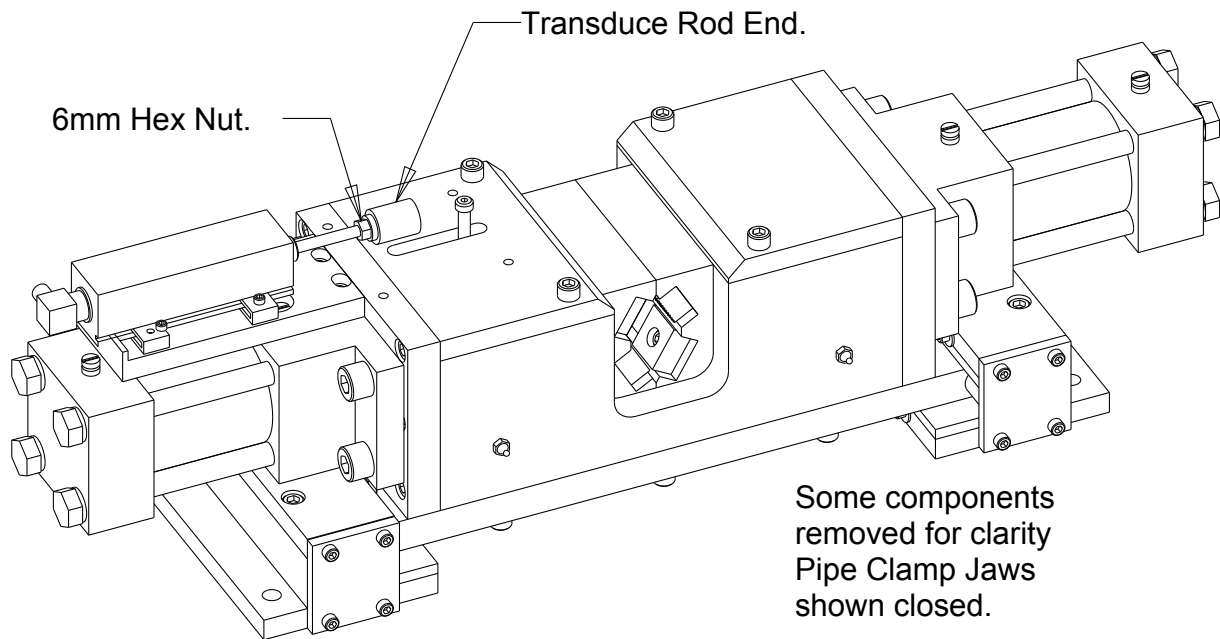
This maintenance function must be done with Top Guards removed and Power off. 2 people are required to remove the Top Guards.

Tools required - 3/6" Hex Wrench, 3/4" Open End Wrench and Standard Flat Screwdriver.

Chain tension is preset at factory. This procedure must be done after the machine has been in operation for some time (see Machine Maintenance Chart) or parts have been replaced. To tighten the Chain, loosen the 1/2-13 HHCS that mounts the Hydraulic Motor Assembly to the Machine Frame. Place a Flat Screwdriver in the Slot as noted above and pry the Motor Assembly over. When Chain is tight, tighten the 1/2-13 HHCS as noted above. Check the distance between the Motor Base Plate and the Mount Plate on the Frame, they should be equal from end to end. When Plates are parallel tighten remaining bolts.

Torque bolts to - 80 Ft/Lb (108N/M)

Replace all Guards.



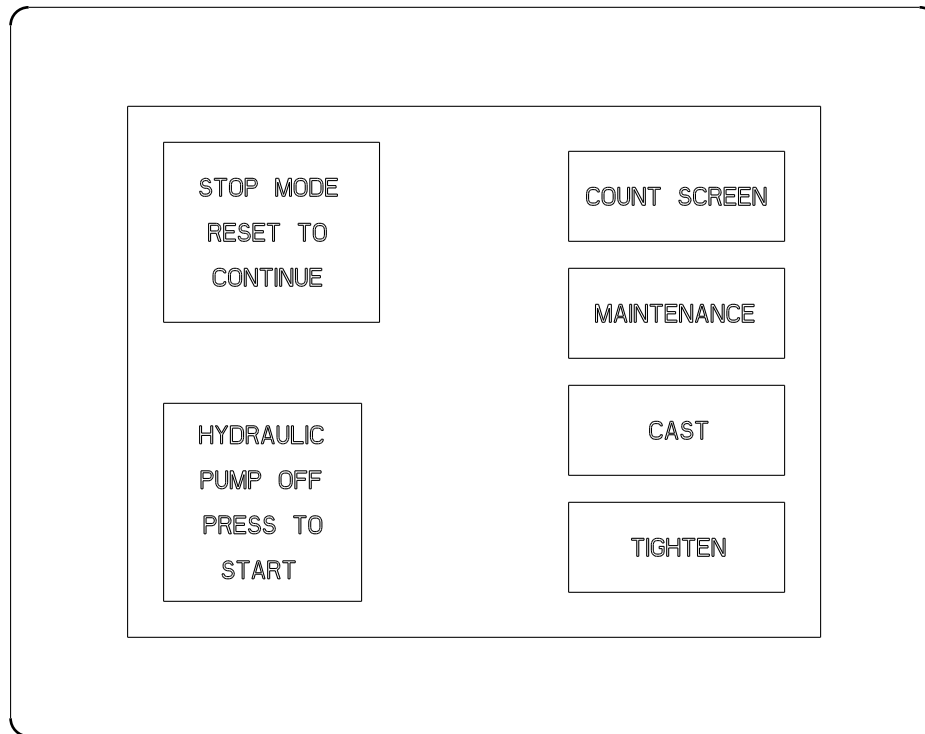
Some components
removed for clarity
Pipe Clamp Jaws
shown closed.

Setting Pipe Size Linear Transducer:

Tools required - 3/16" Hex Wrench, 10mm Open End Wrench.

Caution!!: Machine must have Main Power on and running for this procedure. There is a risk of personal injury and or dismemberment and is to be done by Qualified Service Personnel Only.

The Pipe size Linear Transducer detects the pipe size when the Pipe Clamp closes on the pipe. This signals the PLC in the Electrical Control Box what torque setting is needed for that size pipe. The Transducer has been preset at the factory, however as the machine has been in operation for a period of time or if the Linear Transducer or the parts attached to it are replaced, the Linear Transducer will need to be reset. Raise the Top Front Guard and remove the Linear Transducer Cover. Set the Operator Touch Screen to the Transducer Screen (refer to the Transducer Screen Sheet #20). Insert a 1-1/4" Pipe into the Pipe Clamp and press Pipe Clamp closed button which will close the Clamp and hold the pipe. If the parameter is not within what is shown for 1-1/4" pipe on the Transducer Screen, the Transducer will have to be reset. Loosen the 6mm Hex Nut on the Transducer Shaft, move the Spring (not shown) over to make room for the Wrench. Rotate the Rod End and watch the Bottom Window on the Transducer Screen, the number reading will be a guide as to which direction the Rod End must be rotated in. When the Bottom Window reading is approximately half way between the minimum and maximum numbers for 1-1/4" Pipe the Transducer is set. It has been noted that when the reading is correct for 1-1/4" Pipe, the settings for sozes 1", 1-1/2" and 2" Pipe will be set also. Open the Pipe Clamp, remount the Transducer Cover and close the Top Front Guard.



Operator Touch Panel Display (HMI)

Machine Start Screen (HMI):

Turn Main Power on with Main Circuit Breaker on the Electrical Box and allow system to boot up. When the Start Screen is displayed, press the Hydraulic Pump Button. When the Pump starts the Button will change from Blue to Green. Allow the Pump to pressurize the machine system. Press and hold the Reset Button on the Operators Push Button Box. The Fitting Clamp will rotate around to Home position, this may have to be done 2 or 3 times in order for system to reset. The Stop Mode Button will change from Red to Green, Machine is ready to operate. This Screen allows the Operator to navigate to the other Screen explained as follows.

1. Count Screen, Torque Adjustment Screen - See Sheet #18.
2. Maintenance Screen - See Sheet #19.
3. Transducer Screen - See Sheet #20.
4. Cast Button - Allows aoperator to switch from Cast Fittings to Malleable Fittings.
5. Tighten Button - Allows Operator to change the direction of rotation of the Fitting Calmp, if a fitting has to be taken off.

RESET TOTAL MACHINE COUNT START

00000

1" COUNT 00000 1-1/2" COUNT 00000

1-1/4" COUNT 00000 2" COUNT 00000

1" TORQUE 1-1/4" TORQUE 1-1/2" TORQUE 2" TORQUE

Count Screen:

This Screen allows the aoperator to reset the number of pieces run on this Machine. Press the Number Count for each pipe size and press Reset. This may have to be done for Production purposes. When finished resetting, press the Start Button to return to the Start Screen. The Torque Adjustment Screen can be accessed from this Screen. Press the Button for the desired Pipe Size Torque and that Screen will appear, and will be discussed below.

1" TORQUE ADJUSTMENT

CAST MALLEABLE

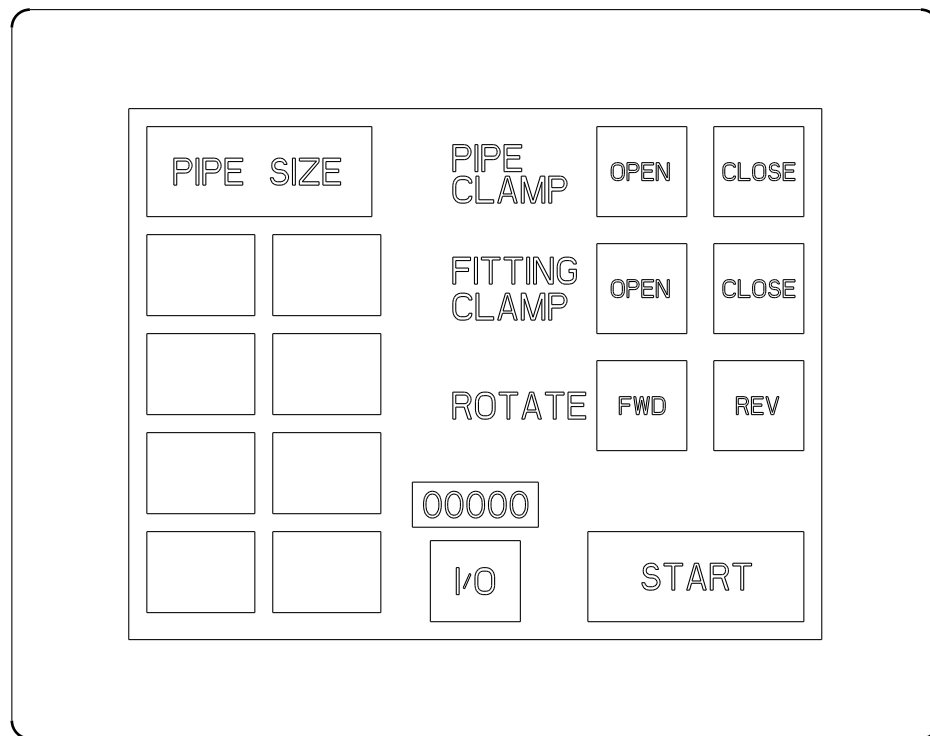
00000 00000

COUNT SCREEN

Torque Adjustment Screen:

This Screen allows the Torque Settings to be set for each pipe size and for the different types of material the fittings are produced from. Press the Count Screen Button to return to the Count Screen.

SIZE	CAST	MALLEABLE
1"	1600	1500
1-1/4"	1900	1800
1-1/2"	2400	2050
2"	2700	2500



Maintenance Screen:

This Screen is used when maintenance needs to be performed on this machine. The Stop Button on the Operators Push Button Box must be pressed down for this screen to function. The Stop Button has a Detent to keep the Button down. Maintenance of this Machine may include replacement of a Hydraulic Cylinder, Control Valve, a Hydraulic Hose or Filter. When air is allowed into the system, it must be bled from the system. This will be discussed later in this Manual. Press the Start Button to return to the Start Screen and pull the Stop Button up for Machine to run. From this Screen the Pipe Size Transducer Screen can be accessed by pressing the Pipe Size Button (See Sheet #20).

PIPE SIZE	TRANSDUCER		PIPE CLAMP
	MIN	MAX	
1"	5200	5750	<div>M</div> <div>OPEN</div> <div>CLOSE</div>
1-1/4"	4700	5080	
1-1/2"	4000	4500	
2"	3000	3530	
00000			

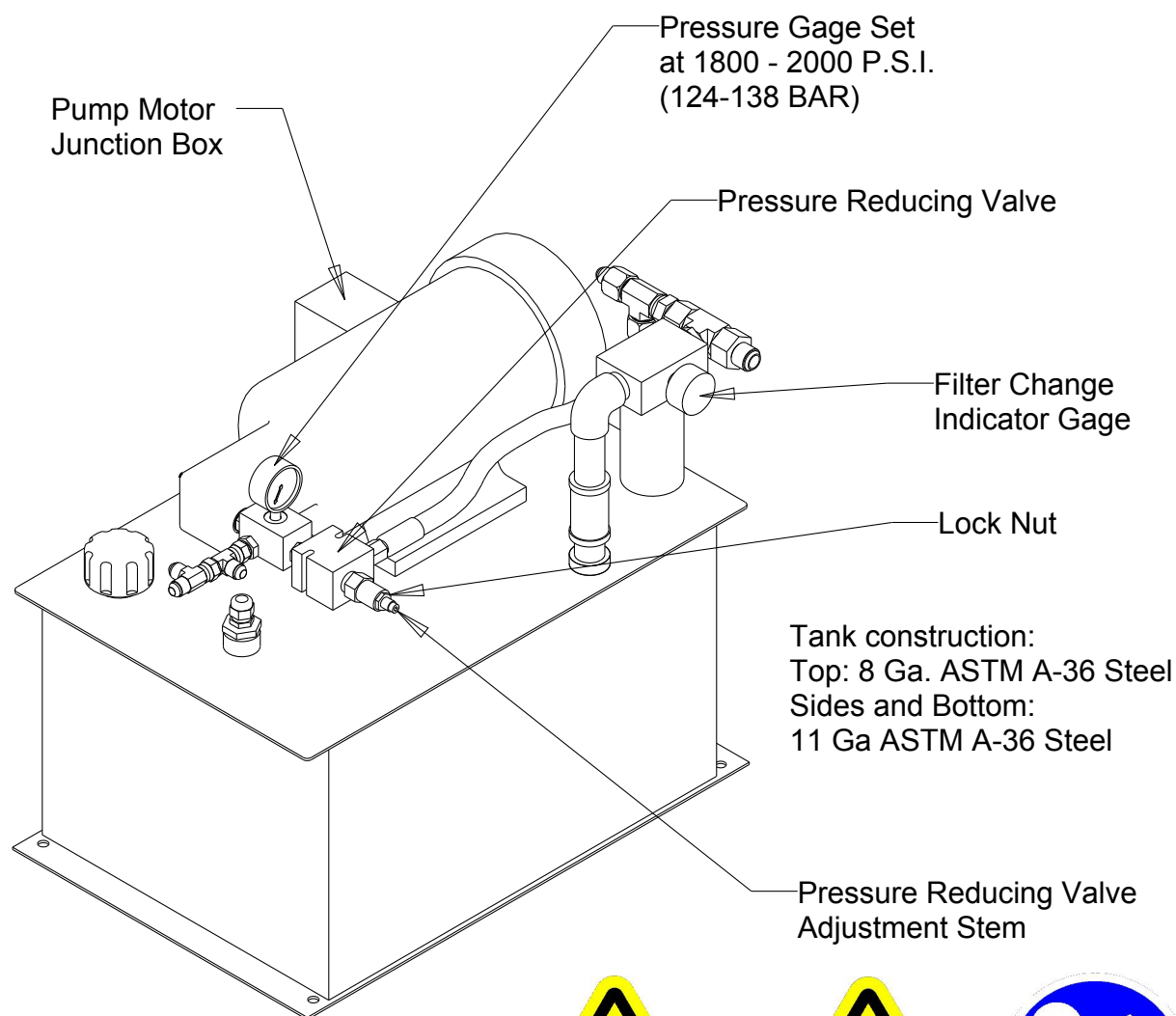
Transducer Screen:

The Transducer located on top of the Pipe Clamp Assembly, sends information back to the PLC what size pipe is in the Pipe Clamp so the system can set the proper parameters to torque the fitting onto the pipe. These numbers are pre-set at the factory, but may need to be changed as the machine is used and wear will require setting to be changed. There is a minimum and maximum range the Transducer uses for the proper pipe size setting. To change the setting for 1" Pipe, place a piece of 1" Pipe in the Pipe Clamp and press Pipe Clamp Closed. A number value will be displayed in the Bottom Window. This number should be approximately half way between the minimum and maximum number value for 1" Pipe. If the min/max numbers need to be changed the Transducer will have to be adjusted (See Sheet #16).

STOP	PIPE PRESSURE SWT
RESET	FITTING PRESSURE SWT
START	OIL TEMP GOOD
CAST/MALL	STOP BIT
HYD PUMP START	
REVERSE SWT	
PIPE 1	
PIPE 2	
ROTATION HOME	<div>M</div>

I/O Screen:

This Screen is accessed from the Maintenance /screen and shows Machine Conditions during operation. No values can be set or changed. Press the "M" Button to return to the Maintenance Screen.

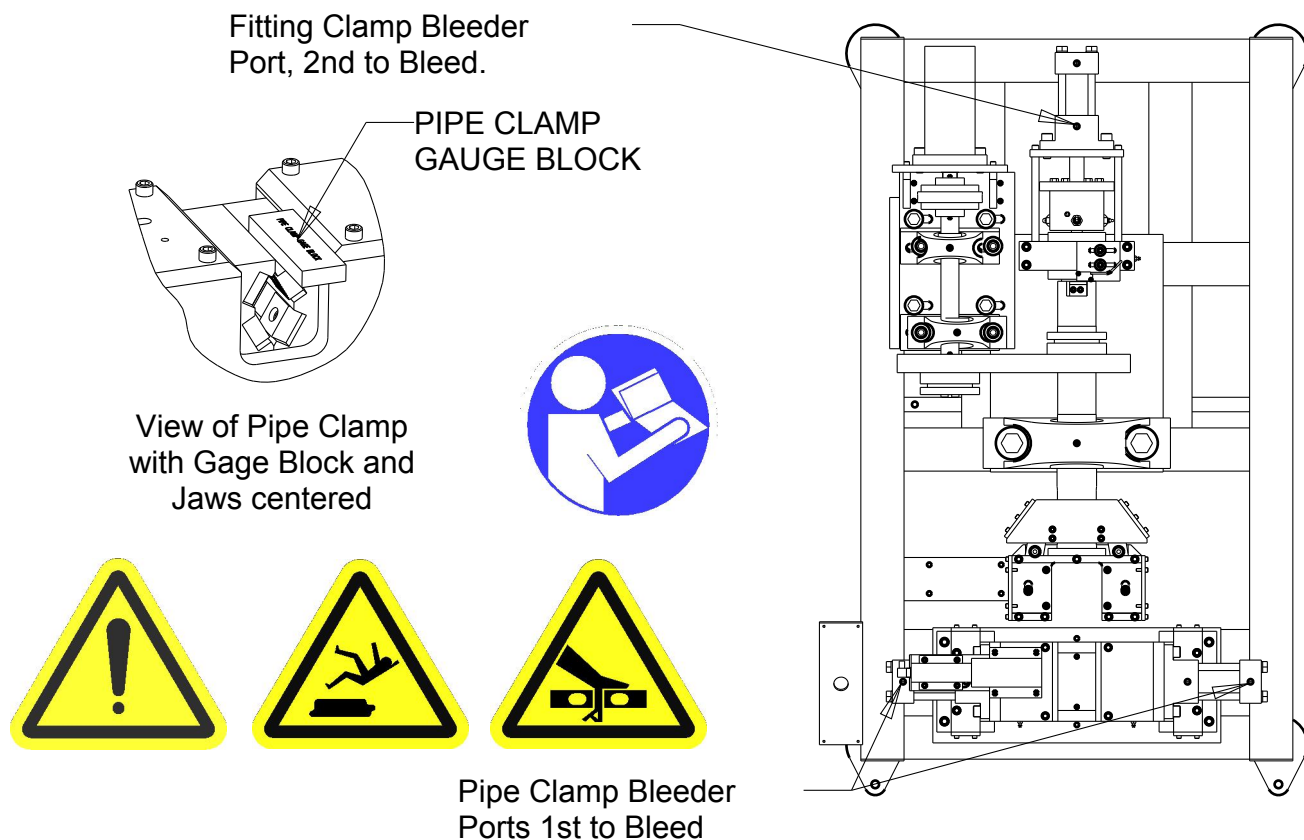


Hydraulic System:

Caution!!: This must be performed by Qualified Personnel Only!

Tools required - Adjustable Wrench, 3/16" Hex Wrench.

Machine must be filled with Hydraulic Oil shipped with machine. Please note Hydraulic System Pressure is pre-set at the factory. If pressure has to be reset, do the following. Turn the Hydraulic Pump on and set the Operator Touch Screen to the Maintenance Screen (See Sheet #19). This may require 2 people to set the pressure. Remove the Side Guard next to the Electrical Box to get access to the Pressure Reducing Valve and Pressure Gauge. The Stop Button must be in the down position. Loosen the Lock Nut on the Pressure Reducing Valve Adjustment Stem. Press and hold the Pipe Clamp Closed Button and use a 3/16" Hex Wrench to rotate the Adjustment Stem on the Pressure Reducing Valve and set pressure to 1800-2000 P.S.I (124-138 BAR) . When pressure is set, tighten Lock Nut on Stem and reinstall Side Guard.



Bleeding Hydraulic cylinders:

Caution!!: This must be performed by Qualified Service Personnel Only.

2 people are required to perform this procedure.

Tools required - Standard Flat Screwdriver Shop Rags.

The Hydraulic System has been bled at the Factory. Bleeding the system should only be done if a Cylinder, Hoses or Valves have been removed or replaced.

Pipe Clamp Cylinder Bleeding:

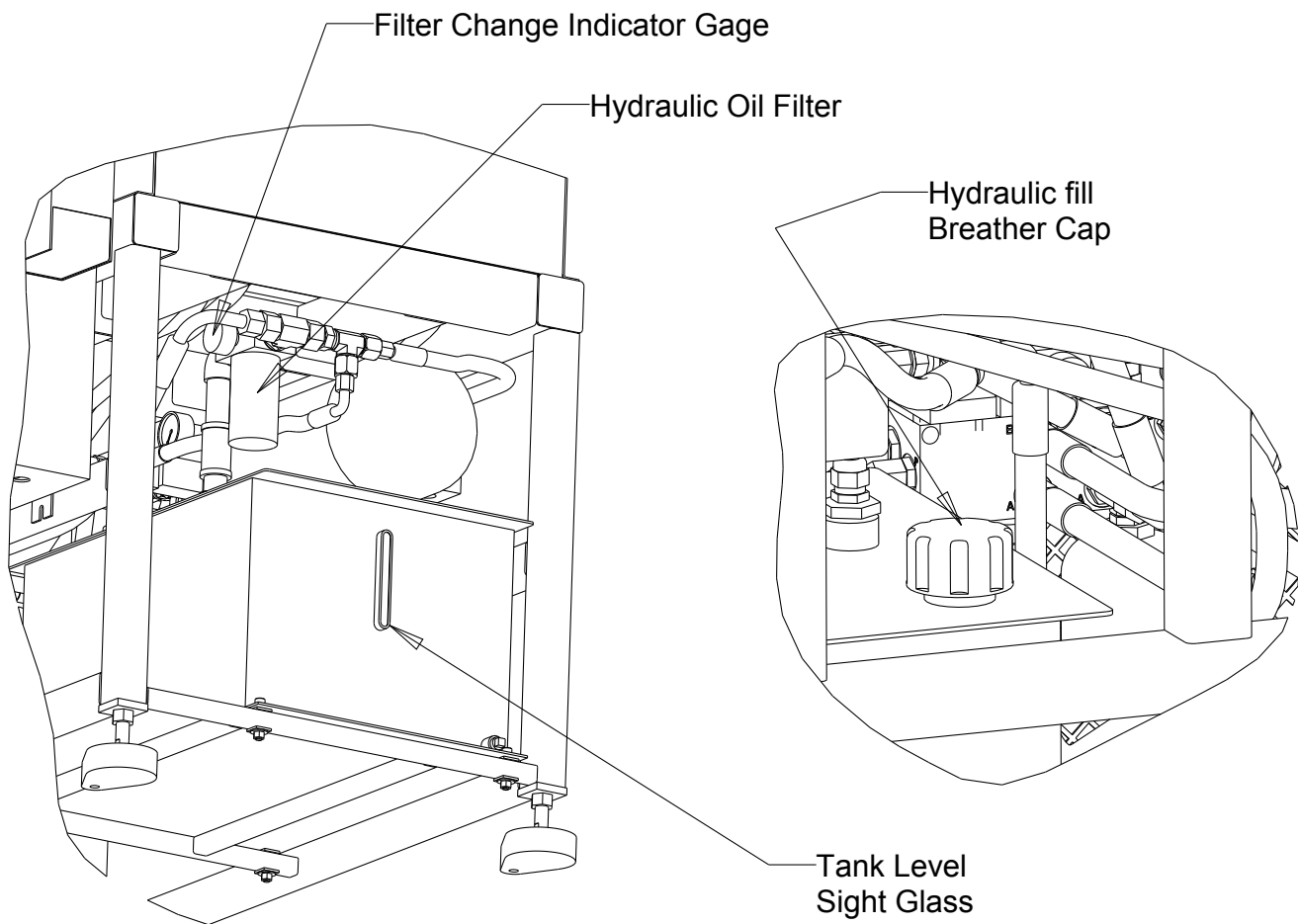
Turn on Power and start the Hydraulic Pump. The Stop Button must be in the down position and go to the Maintenance Screen. Press and hold the Pipe Clamp Closed Button. Use a shop rag to place around the Bleeder Port to catch the Hydraulic Oil that will come out of the Bleeder Port and with a Standard Flat Screwdriver slowly open the Bleeder Port to remove the air from the lines. Continue until the Hydraulic Oil shows no sign of air and the Pipe Clamp Jaws are centered as shown above using the Pipe Clamp Gage Block. The Pipe Clamp Gage block is shipped with the machine in a box marked Special Tools. Tighten Bleeder Port and pull Stop Button up when finished.

Fitting Clamp Cylinder Air Bleeding:

This procedure is the same as above except press and hold the Fitting Clamp Closed Button and bleed air from the Fitting Clamp Cylinder as shown at top of view above.

After all bleeding is done clean all Hydraulic Oil from Machine and Floor.

A slip hazard is present if Oil is allowed to remain on the Machine and Floor. Disposal of all clean-up material and shop rags are to be according to shop procedures.

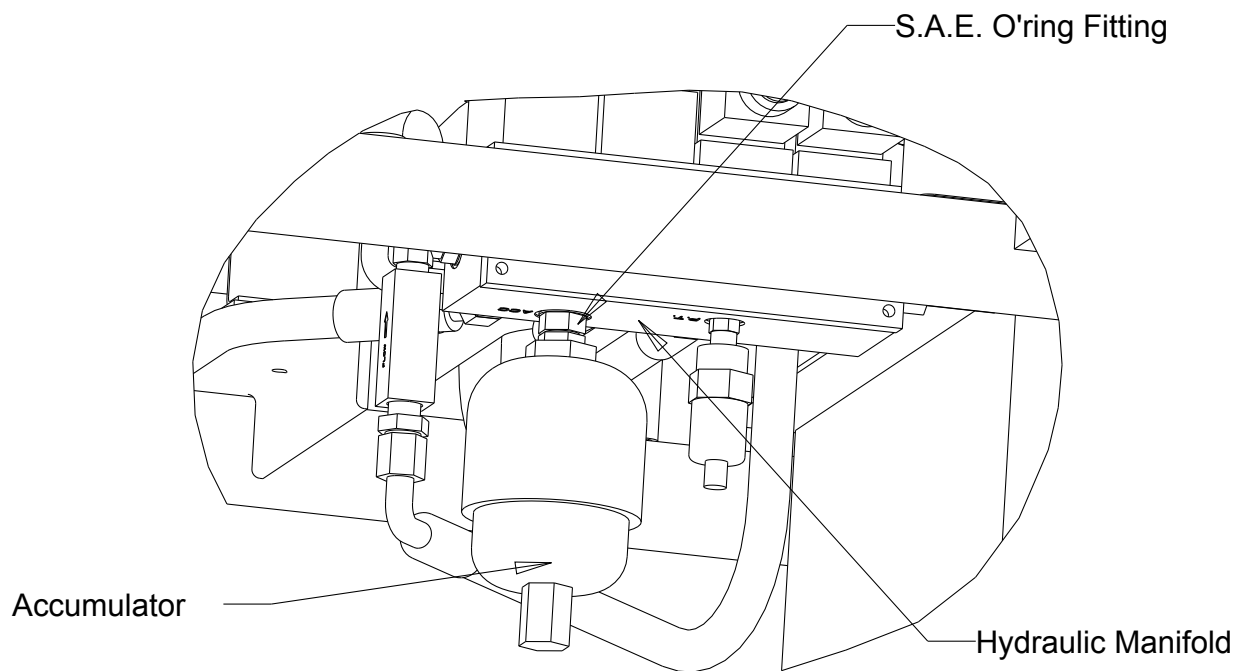


Maintenance of Hydraulic Filter and Hydraulic Oil:

Tools required - 7/8" Open End Wrench, filter Removal Tool.

Remove Power from machine and Lock Out. The Hydraulic Filter should be checked once a week and changed per Indicator Gage on Hydraulic Power Unit. Clean up any spilled Oil and dispose per shop procedure. See Lubrication Sheet (See Sheet #28) for Filter Number and Oil type. Add Hydraulic Oil as required to maintain safe working level of Oil. Check Oil level at the Tank Sight Glass. There is a full level mark (Black Line) and a low level mark (Red Line), when the level gets close to the Red Line add Oil.

Hydraulic Tank Oil capacity - 20 US gallons (75.7 Liters).



Maintenance of Hydraulic Accumulator:

Tools required 3/16" Hex Wrench, 7/8" Open End Wrench.

Caution!!: The Hydraulic Accumulator should be serviced by Qualified Personnel Only. This is a Nitrogen charged vessel and it is recommended not to be disassembled after removal from Hydraulic Manifold. If the Accumulator needs to be replaced, remove Power from Machine and Lock Out. If the Machine has been in operation, wait 15 minutes, this will allow the Hydraulic pressure in the system to disapeate. During the 15 minutes remove the Right Side Guard. After the waiting period take a 7/8" Open End wrench and remove the Accumulator from the Hydraulic Manifold. Remove the S.A.E O'ring Fitting from the Accumulator. Lubricate the O'ring and Threads with Hydraulic Oil on the fitting before reinstalling into the new Accumulator. Hand tighten the Accumulator bach into the Hydraulic Manifold and torque to 27 Ft/Ls (38N/M). Reinstall the Right side Guard and clean up any spilled Hydraulic Oil and dispose per shop procedure.

Accumulator Information:

Manufacturer: SAIP For ACCUMULATORS INC.

Date of Manufacture: 2013

Manufacturer Serial No.: 07/13

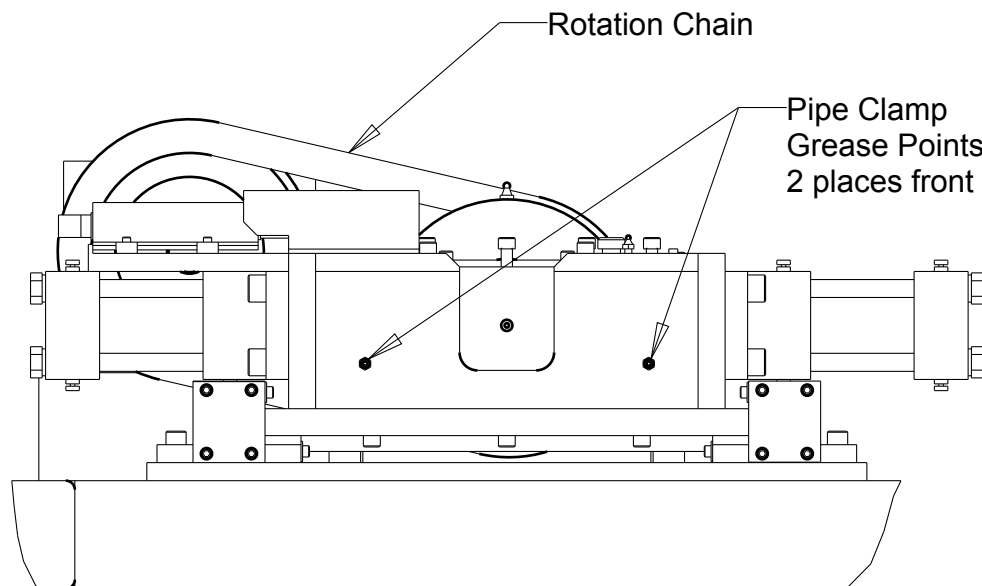
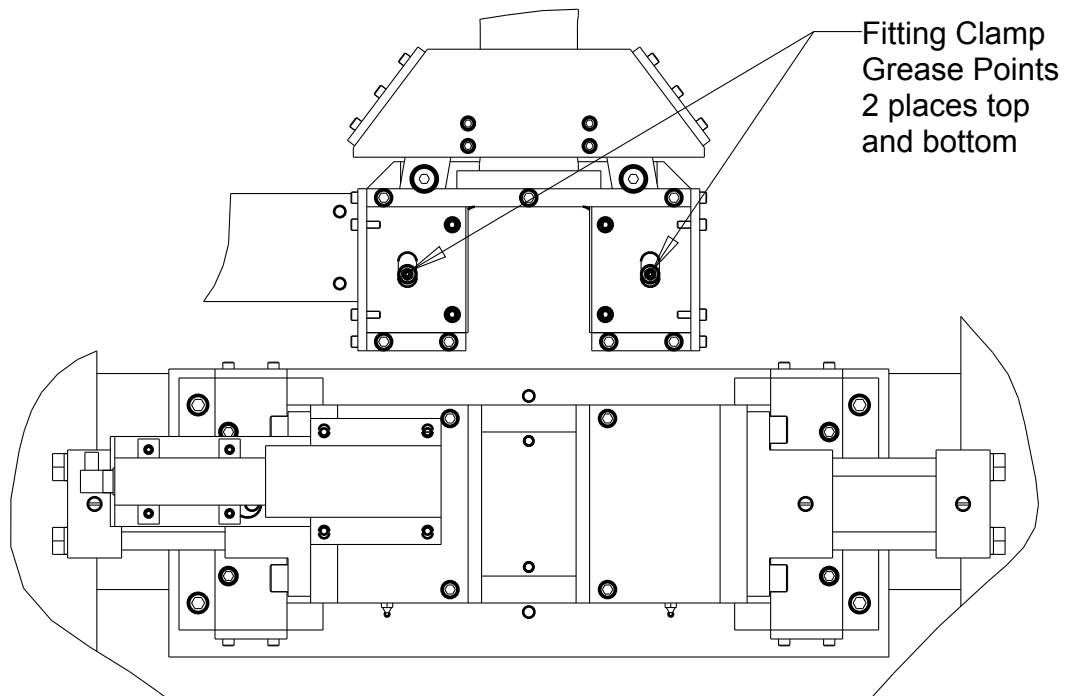
Item No.: AM-20-250

Total Shell Volume: 21.36 CUBIC INCHES/.35 LITER

Allowable Temperature Range: 5° F TO 176° F/-15° C - 80° C

Maximum Pressure: 3045 P.S.I./210 BAR

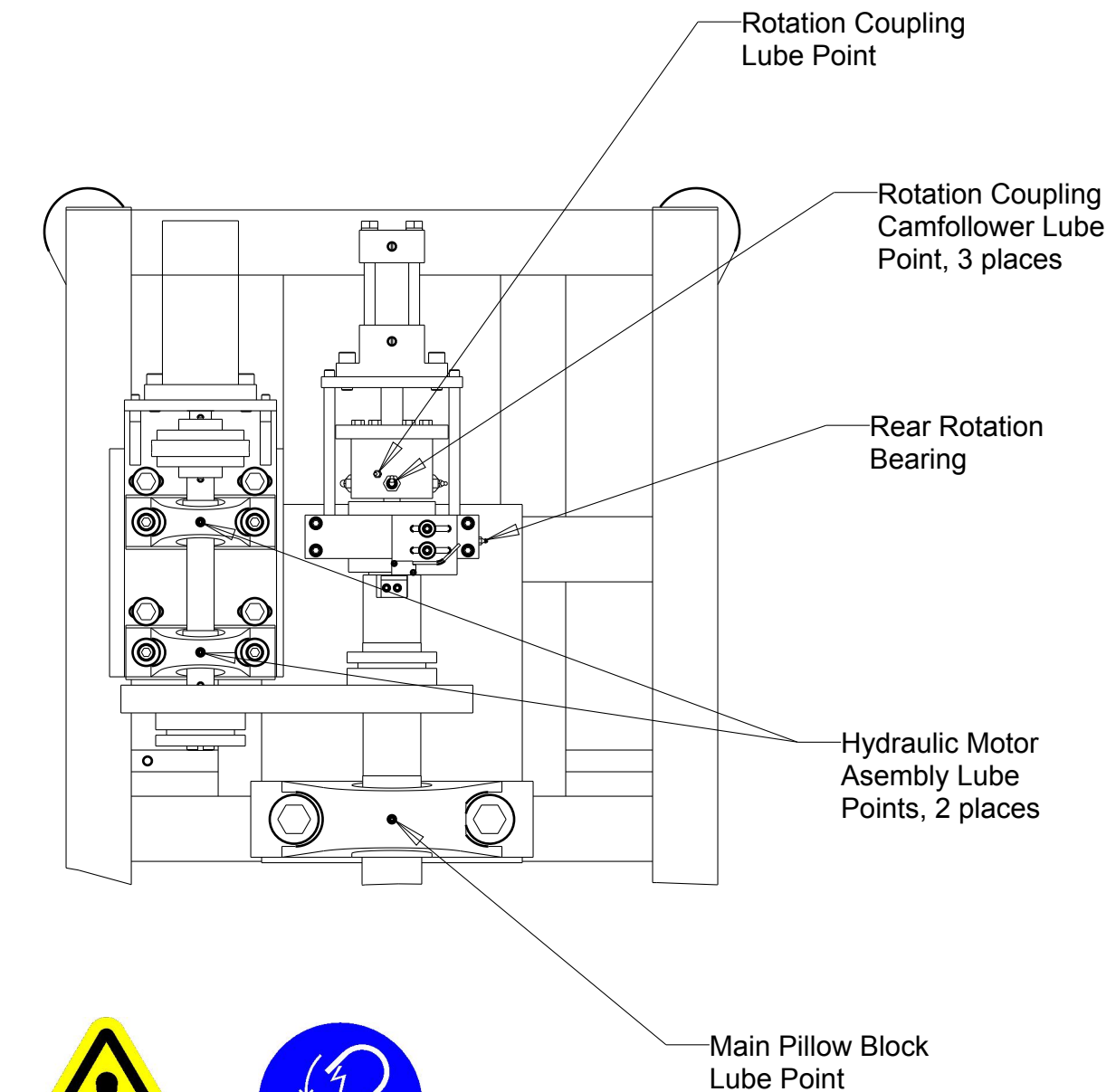
Test Pressure: 4569 P.S.I./315 BAR



Machine Grease Points:

Tools required 3/16" Hex Wrench, Grease Gun.

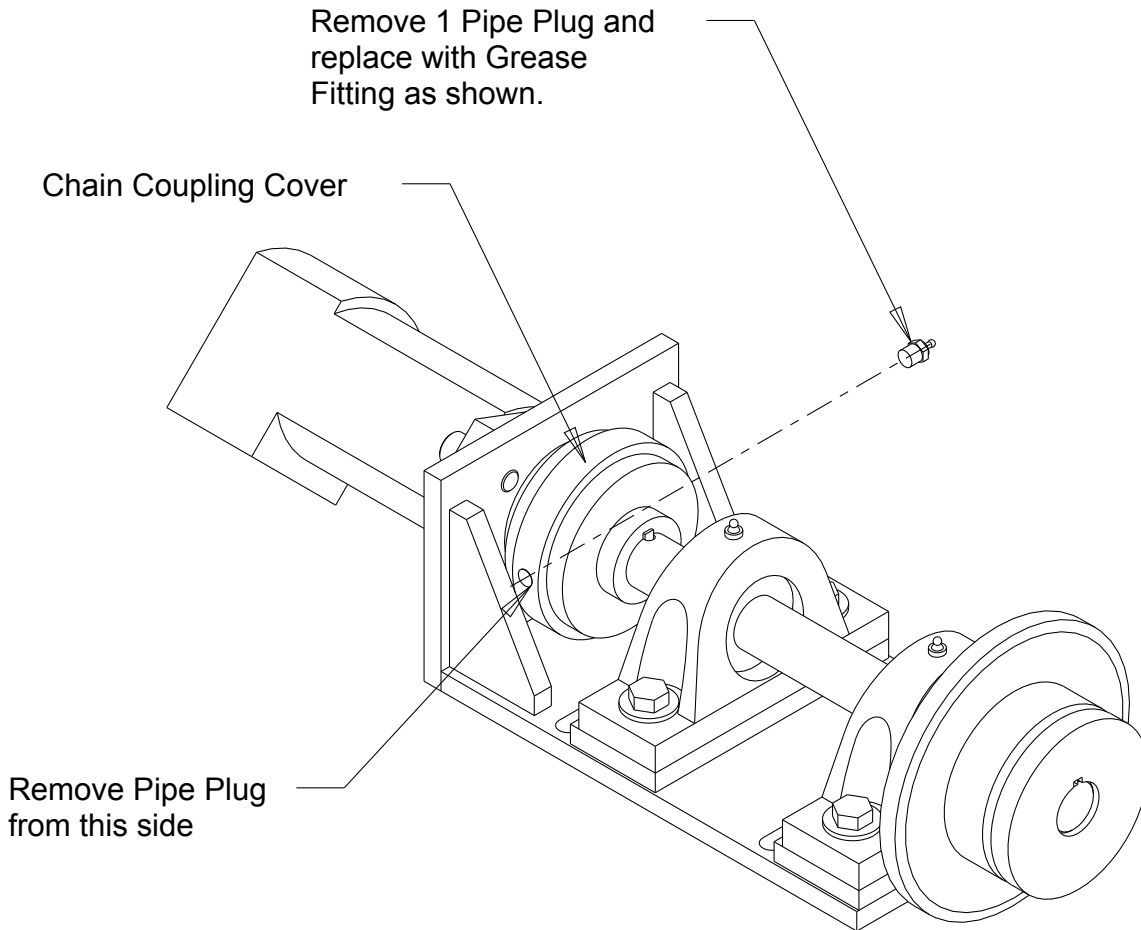
Machine Power to be off and Locked Out. Raise Front Guard and apply Grease to points as shown. See Lubrication Sheet (Sheet #28) for Schedule and Lube Type. Clean up any excess Grease and lower Front Guard.



Machine Lubrication Points:

Tools required - 3/16" Hex Wrench, Grease Gun.

Machine Power off and Locked Out. Remove Top Guards, 2 people are required to remove. Lube Points as shown. See Lubrication Sheet (Sheet #28) for Schedule and Lube type. Clean up any excess Grease and replace Top guards.



Hydraulic Motor Chain Coupling Lubrication:

Tools required - 3/16" Hex Wrench, 7/16" Open End Wrench, Grease Gun and Grease Fitting located in Electrical Cabinet and Grease Gun.

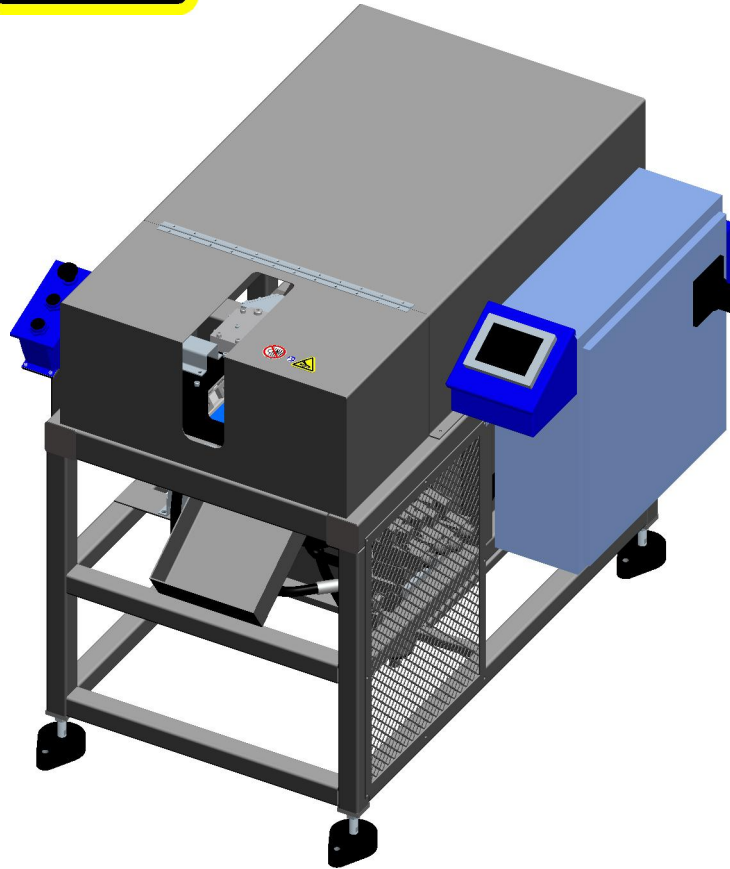
See Lubrication Sheet (Sheet#28) for Schedule and Lube Type. Machine Power off and Locked Out. Remove the Top Guards, 2 people are required to remove.

Remove both Pipe Plugs from Chain Coupling and replace one with Grease Fitting located in the Electrical Cabinet. Pump Grease into Coupling until Grease flows from port on opposite side of Coupling. When filled remove Grease Fitting and replace both Pipe Plugs in coupling Cover. Place Grease Fitting back into the Electrical Cabinet and replace Top Guards.

LUBRICATION SCHEDULE CHART

REF. DRAWING	LOCATION	FILTER REFERENCE NUMBER	CHECK INTERVALS	HYDRAULIC OIL TYPE
Sheet #23	HYDRAULIC TANK ASSEMBLY	VICKERS #V0191B1R05	WEEKLY	
Sheet#23	HYDRAULIC TANK ASSEMBLY		DAILY START EACH SHIFT	AW-32

REF. DRAWING	LOCATION	TYPE BEARING	LUBRICATION INTERVALS	LUBRICATION TYPE.
Sheet #25	PIPE CLAMP	JAW SLIDE	WEEKLY	NLGI GRADE #2 GREASE
Sheet #25	FITTING CLAMP	JAW SLIDE	WEEKLY	NLGI GRADE #2 GREASE
Sheet #25	ROTATION CHAIN	#80 ROLLER CHAIN	WEEKLY	NLGI GRADE #2 GREASE
Sheet #26	MAIN ROTATION PILLOW BLOCK BEARING	PILLOW BLOCK Ø 2-11/16"	WEEKLY	NLGI GRADE #2 GREASE
Sheet #26	HYDRAULIC MOTOR SHAFT BEARING	PILLOW BLOCK Ø 1-1/4"	WEEKLY	NLGI GRADE #2 GREASE
SHEET #26	REAR ROTATION BEARING	TAPER ROLLER	WEEKLY	NLGI GRADE #2 GREASE
Sheet #26	ROTATION COUPLING	ROTATION COUPLING BODY	WEEKLY	NLGI GRADE #2 GREASE
Sheet #26	ROTATION COUPLING	CAM FOLLOWER	WEEKLY	NLGI GRADE #2 GREASE
Sheet #27	HYDRAULIC MOTOR CHAIN COUPLING	ROLLER CHAIN AND GEARS	3 MONTHS	NLGI GRADE #2 GREASE



Electrical Cleaning:

Electrical Box, Operators Push Button Box and Operator Touch Panel Screen. If it should become necessary to clean this Equipment, disconnect the Unit from its Power source first. do not use Liquid Cleaners, Aerosols, Abrasive Pads Scouring Powders or Solvents, such as Benzine or Alcohol. Use a soft cloth lightly moistened with a mild detergent solution. Ensure the surface cleaned is fully dry before reconnecting POWER.

Hydraulic Cleaning:

Wipe all surfaces with a clean dry shop cloth to remove as much Hydraulic Oil as possible. Follow same procedures as noted for Electrical items. Use a soft cloth lightly moistened with a mild detergent and wipe all surfaces of the Machine to clean residue from Machine. There is a Slip Hazard when Hydraulic Oil is not cleaned up when it spills. Clean all Hydraulic Oil spills as they happen.

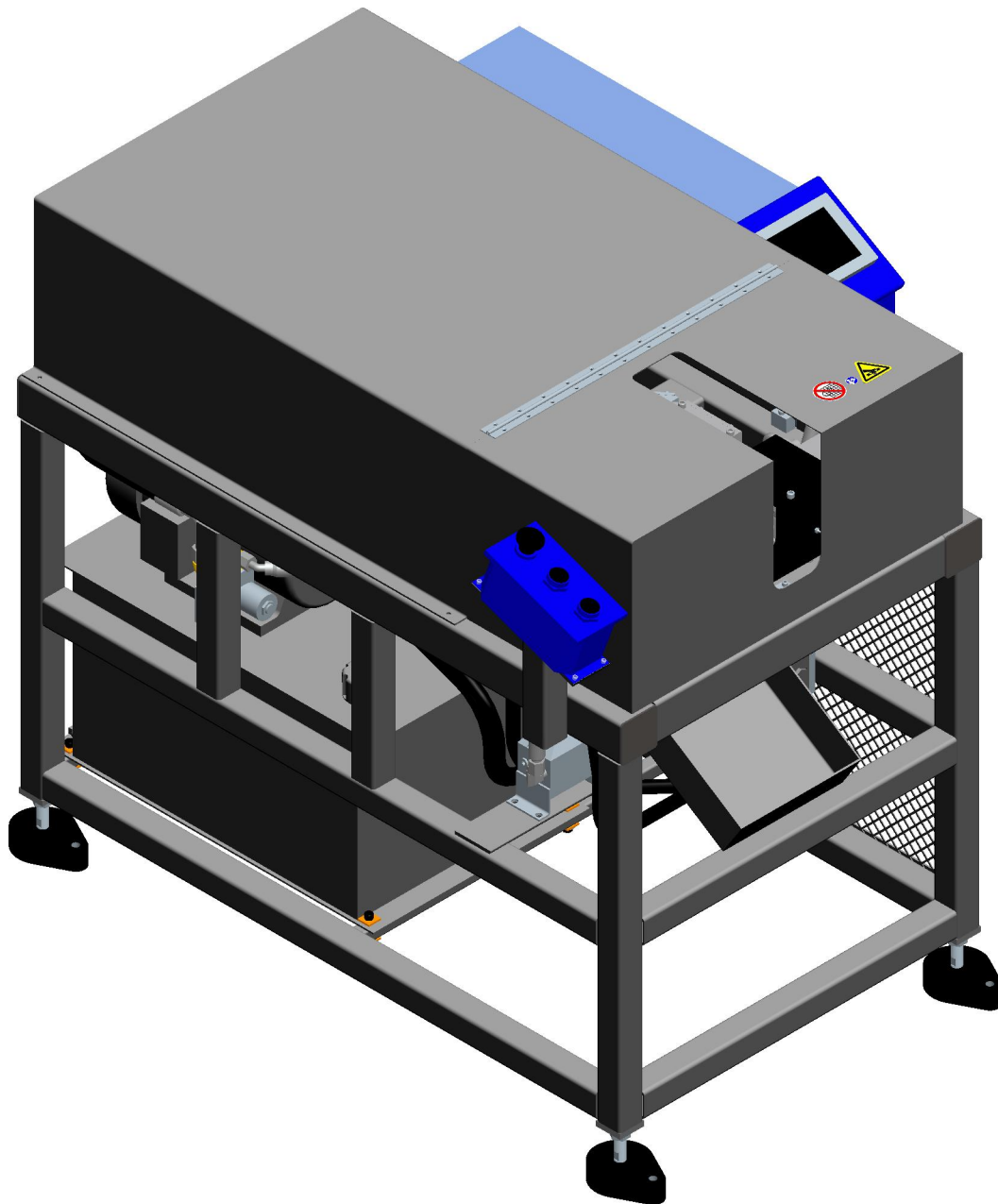
PACKING AND SHIPPING CHECK LIST

- ☐ DRAIN HYDRAULIC OIL FROM TANK.
- ☐ DRAIN PLUG INSTALLED IN HYDRAULIC TANK.
- ☐ ALL GUARDS COMPLETE WITH FASTENERS AND MOUNTED IN PLACE.

1 BOX SPECIAL TOOLS INCLUDES.

- ☐ PIPE CLAMP CENTERING TOOL QTY - 1.
- ☐ PIPE HOLDER 1" QTY - 1.
- ☐ PIPE HOLDER 1-1/4" QTY - 1.
- ☐ PIPE HOLDER 1-1/2" QTY - 1.
- ☐ PIPE HOLDER 2" QTY - 1.
- ☐ MACHINE SECURED TO PALLET.
- ☐ HYDRAULIC OIL QTY - 4, 5 GAL. CONTAINERS, MOUNTED AND SECURED.
- ☐ OPERATORS MANUAL IN ELECTRICAL PANEL BOX.
- ☐ CRATE FRAMED AND ENCLOSED.

RECOMMENDED SPARE PARTS LIST		
N.A.P. PART NUMBER	QTY	DESCRIPTION
MMP-3047	2	PIPE CLAMP JAW HARDENED PAD
MMP-3104	4	FITTING CLAMP JAW INNER WEAR PAD
EPP-0123	2	3 AMPERES FUSE
EPP-0263	2	10 AMPERES FUSE
EPP-0274	2	PLC RELAY PHOENIX CONTACT #PLC-RSC-24DV/21
MSC-604	4	JAW PAD FAIRLANE MSC #9713983
PLC-279	2	600 VAC FUSE #FNQ-9-2-1/2, 2-1/2 AMPERES
SWT-0024	2	EFECTOR IS5026 IS-2002-FROG SWITCH



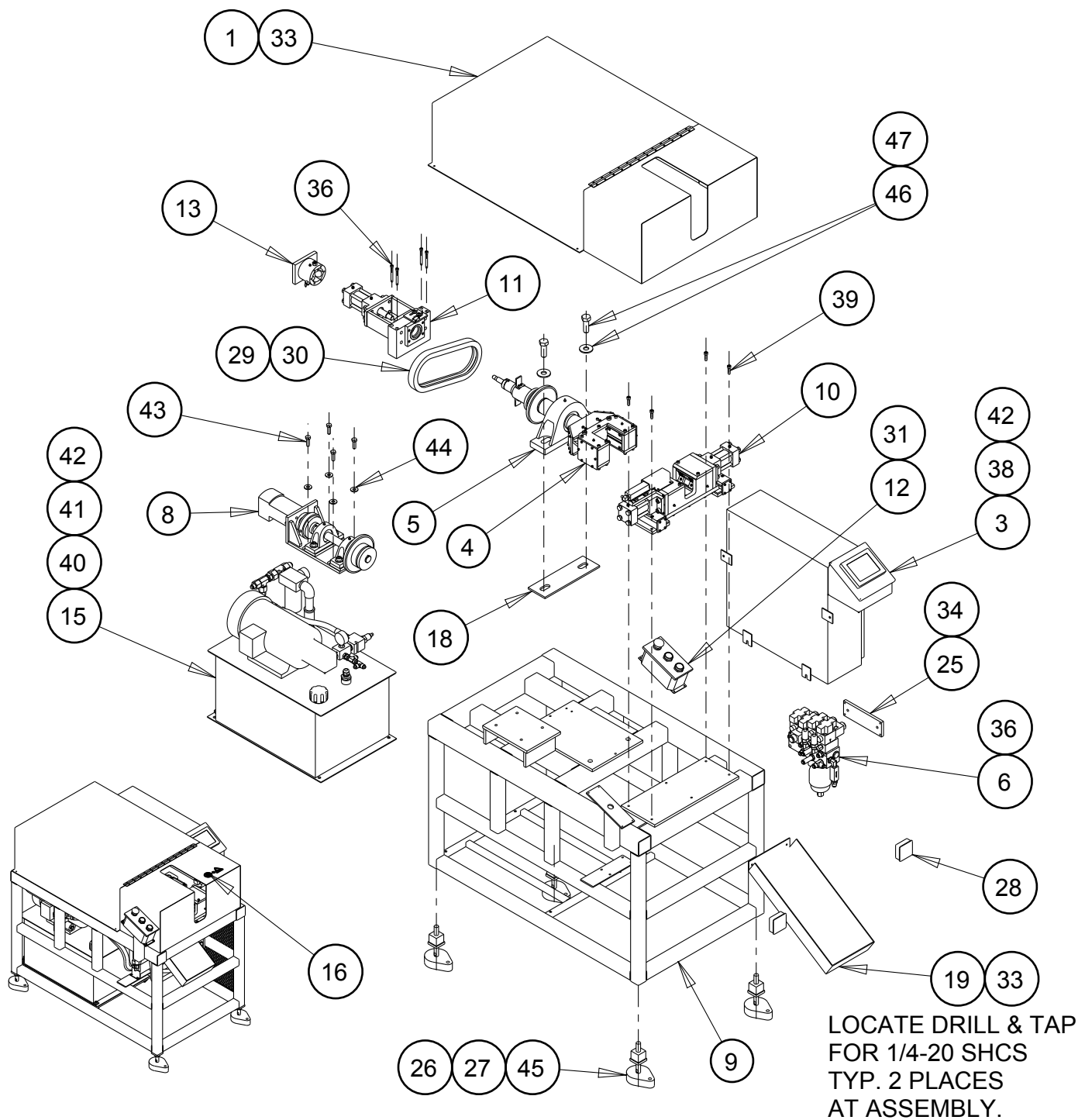
MAKE-ON PARTS MANUAL

MAKEON DRAWING SHEET INDEX

SHEET NUMBER	PART NUMBER	DESCRIPTION
SHEET 32		MAKE-ON PARTS LIST COVER SHEET
SHEET 33		MAKE-ON PARTS LIST SHEET INDEX
SHEET 34 & 35	20-MAS	MAKE-ON MACHINE ASSEMBLY
SHEET 36 & 37	20-MAS-01	GUARD ASSEMBLY
SHEET 38 & 39	20-MAS-0101	GUARD MOUNTING
SHEET 40 & 41	20-MAS-02	ELECTRICAL CABINET ASSEMBLY
SHEET 42 & 43	20-MAS-0201	ELECTRICAL CABINET BACK PLATE ASSEMBLY
SHEET 44 & 45	20-MAS-0202	TOUCH PANEL CABLE ASSEMBLY
SHEET 46 & 47	20-MAS-03	FITTING CLAMP ASSEMBLY
SHEET 48 & 49	20-MAS-04	FITTING CLAMP ROTATION ASSEMBLY
SHEET 50 & 51	20-MAS-0415	ROTATION SHAFT ASSEMBLY
SHEET 52 & 53	20-MAS-05	HYDRAULIC MANIFOLD ASSEMBLY
SHEET 54 & 55	20-MAS-06	HYDRAULIC HOSE ASSEMBLY
SHEET 56 & 57	20-MAS-07	HYDRAULIC MOTOR ASSEMBLY
SHEET 58 & 59	20-MAS-09	PIPE CLAMP ASSEMBLY
SHEET 60 & 61	20-MAS-0928	PIPE SIZE SWITCH ASSEMBLY
SHEET 62 & 63	20-MAS-0929	PIPE CLAMP JAW ASSEMBLY
SHEET 64 & 65	20-MAS-0932	GUIDE SLIDE ASSEMBLY
SHEET 66 & 67	20-MAS-10	PULL CYLINDER ASSEMBLY
SHEET 68 & 69	20-MAS-11	PUSH BUTTON BOX ASSEMBLY
SHEET 70 & 71	20-MAS-12	ROTATION COUPLING ASSEMBLY
SHEET 72 & 73	20-MAS-13	WIRING HARNESS ASSEMBLY
SHEET 74 & 75	20-MAS-14	HYDRAULIC POWER UNIT ASSEMBLY
SHEET 76 & 77	20-MAS-1402	HYDRAULIC SCHEMATIC
SHEET 78	20-MAS-0201	ELECTRICAL SCHEMATIC SHEET #3
SHEET 79	20-MAS-0201	ELECTRICAL SCHEMATIC SHEET #4
SHEET 80	20-MAS-0201	ELECTRICAL SCHEMATIC SHEET #5
SHEET 81	20-MAS-0201	ELECTRICAL SCHEMATIC SHEET #6
SHEET 82	20-MAS-0201	ELECTRICAL SCHEMATIC SHEET #7
SHEET 83	20-MAS-0201	ELECTRICAL SCHEMATIC SHEET #8
SHEET 84	20-MAS-0201	ELECTRICAL SCHEMATIC SHEET #9

REVISION - A, 03/18/2016

REVISED SHEET NUMBERS, ADDED NEW HYDRAULIC SCHEMATIC
AND NEW ELECTRICAL SCHEMATICS.



ITEMS NOT SHOWN

7 14 20 21 22 23
24 32 48 49 50

NOTE: SEE BOM SHEET FOR REVISIONS.
REVISION "G" 3/3/14

MAKE-ON MACHINE ASSEMBLY



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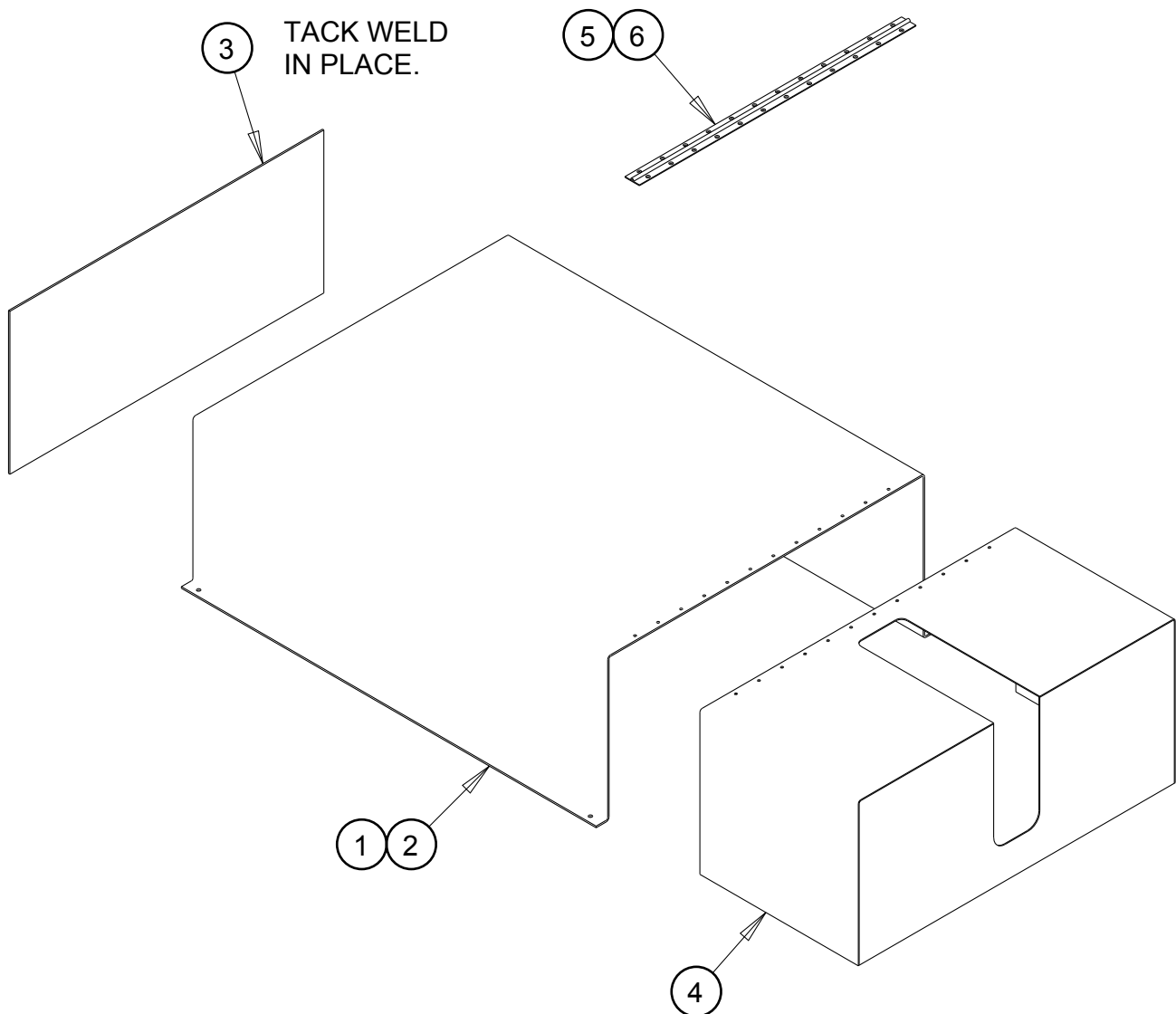
Innovators Of Pipe Fabrication Equipment

20-MAS
Sheet #34

MAKE-ON MACHINE PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MAS-01	1	GUARD ASSEMBLY
3	20-MAS-02	1	ELECTRICAL CABINET
4	20-MAS-03	1	FITTING CLAMP ASSEMBLY
5	20-MAS-04	1	FITTING CLAMP ROTATION ASSEMBLY
6	20-MAS-05	1	HYDRAULIC MANIFOLD ASSEMBLY
7	20-MAS-06	1	HYDRAULIC HOSE ASSEMBLY
8	20-MAS-07	1	HYDRAULIC MOTOR ASSEMBLY
9	20-MAS-08	1	MAIN FRAME WELDMENT
10	20-MAS-09	1	PIPE CLAMP ASSEMBLY
11	20-MAS-10	1	PULL CYLINDER ASSEMBLY
12	20-MAS-11	1	PUSH BUTTON BOX ASSEMBLY
13	20-MAS-12	1	ROTATION COUPLING ASSEMBLY
14	20-MAS-13	1	WIRING HARNES ASSEMBLY
15	20-MAS-14	1	HYDRAULIC POWER UNIT ASSEMBLY
16	20-MAS-15	1	SET SAFETY LABLES
18	20-MMP-3000	1	LARGE BEARING SPACER
19	20-MMP-3082	1	DROP PAN
20	20-MMP-3083	1	1" PIPE HOLDER
21	20-MMP-3084	1	1-1/4" PIPE HOLDER
22	20-MMP-3085	1	1-1/2" PIPE HOLDER
23	20-MMP-3086	1	2" PIPE HOLDER
24	20-MMP-3089	1	SIDE GUARD
25	20-MMO-3094A	1	MANIFOLD MOUNT PLATE
26	20-MSC-559	4	ADJUSTABLE NYLATHANE FOOT
27	20-MSC-560	4	THREADED TUBE END FOR FOOT
28	20-MSC-601	4	3" TUBE END CAP
29	20-PLY-500	1	#80 ROLLER CHAIN X 37" LG.
30	20-PLY-511	1	#80 MASTER LINK
31	20-FAS-E16	4	#10-24 X 1/2" LG. SHCS
32	20-FAS-F01	8	1/4-20 X 5/8" LG. BHSCS
33	20-FAS-F23	6	1/4-20 X 1/2" LG. SHCS
34	20-FAS-F24	4	1/4-20 X 3/4" LG. SHCS
36	20-FAS-G26	8	5/16-18 X 2-1/4" LG. SHCS
38	20-FAS-H9	4	3/8-16 X 1/2" LG SHCS
39	20-FAS-H11	4	3/8-16 X 1-1/4" LG. SHCS
40	20-FAS-H13	4	3/8-16 X 2" LG. SHCS
41	20-FAS-H19	4	3/8-16 HEX NUT
42	20-FAS-H22	4	3/8" FLAT WASHER
43	20-FAS-I01	8	1/2-13 X 1-1/2" LG. SHCS
44	20-FAS-I22	4	1/2" FLAT WASHER
45	20-FAS-K02	4	3/4-10 HEX JAM NUT
46	20-FAS-MM-01	2	7/8-9 X 2-1/2" LG. HHCS
47	20-FAS-MM-02	2	7/8" FLAT WASHER
48	20-FAS-E30	4	#10 FAT WASHER
49	20-FAS-H10	4	3/8-16 X 1" LG. SHCS
50	20-FAS-MM-09	4	1/2-10 HEX JAM NUT

REVISION "G" 3/3/14 - ADDED ITEMS, 48,49 & 50, REMOVED ITEMS 2 & 17,35 & 37.



NOTE:
 USE HOLES IN HINGE AS TEMPLATE,
 DRILL THRU WITH #11 (\varnothing .191) DRILL,
 USE EVERY OTHER HOLE IN HINGE
 FOR TOTAL OF 14 HOLES.

REVISION "A"
 SEE 20-MAS-01 BOM SHEET.

GUARD ASSEMBLY



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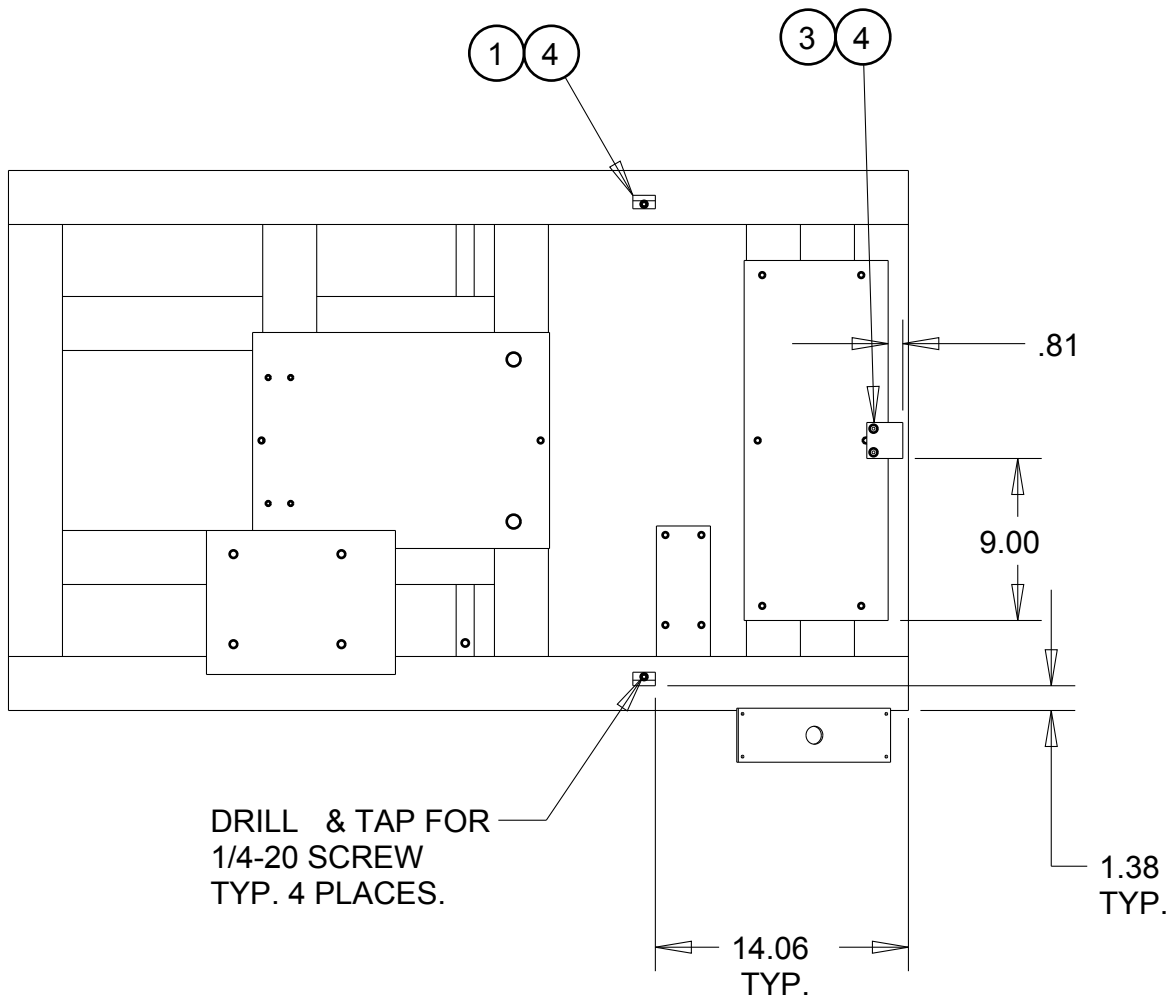
Innovators Of Pipe Fabrication Equipment

20-MAS-01
 Sheet #36

GUARD ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MAS-0101	1	GUARD MOUNTING ASSEMBLY
2	MMP-3077	1	REAR GUARD
3	MMP-3078	1	REAR GUARD BACK INSERT
4	MMP-3081-A	1	FRONT GUARD
5	20-MMP-3113	1	GUARD HINGE
6	20-FAS-RIVET #03	14	Ø 3/16", .126-.250 GRIP RANGE

REVISION - "A" 8/26/13, REPLACED FRONT MOLDED GUARD
WITH SHEET METAL FRONT GUARD, ADDED #20-MMP-3113 GUARD HINGE
AND #20-FAS-RIVOT #03



REVISION "A"
SEE 20-MAS-0101 BOM SHEET.

GUARD MOUNTING



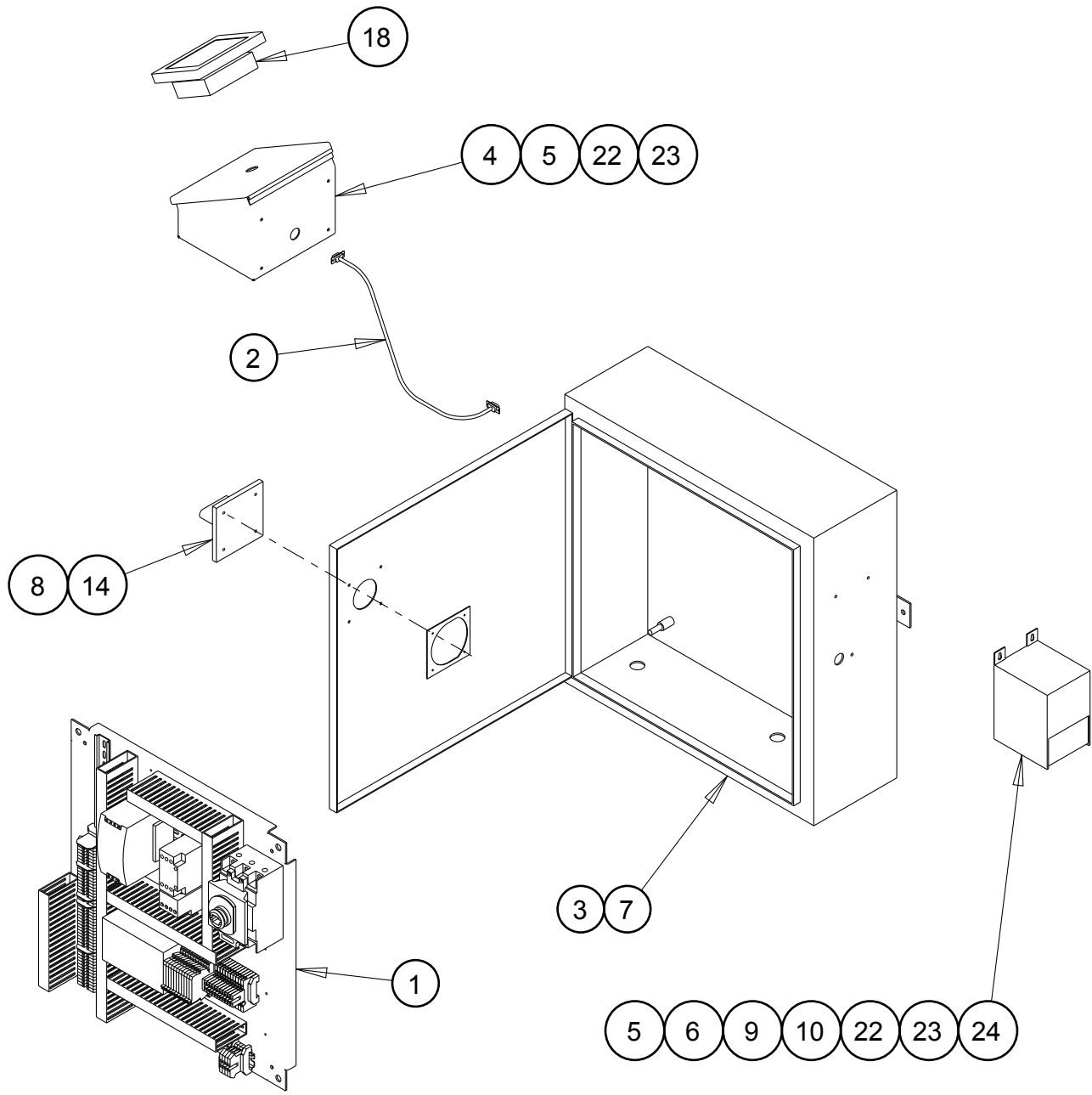
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20-MAS-0101
Sheet #38

GUARD MOUNTING PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MMP-3091	2	HOOD GUIDE BLOCK
2			
3	20-MMP-3093-A	1	FRONT GUARD MOUNT
4	20-FAS-F26	4	1/4-20 X 1-1/4" LG. SHCS

REVISION "A" 8/26/13, REMOVED ITEM #2 - #20-MMP-3092,
CHANGED ITEM #3 - #20-MMP-3093 MOULDED GUARD FRONT MOUNT
TO #20-MMP-3093-A FRONT GUARD MOUNT, CHANGED ITEM #4 FROM 20-FAS-F3 TO
20-FAS0F26 QTY. - 4.



11 12 13 15 16

NOT SHOWN

FOR REVISION - SEE BOM SHEET.
 REVISION "C" 2/29/11.
 REVISION "D" 3/6/13.
 REVISION "E" 12/9/13.

ELECTRICAL CABINET ASSEMBLY



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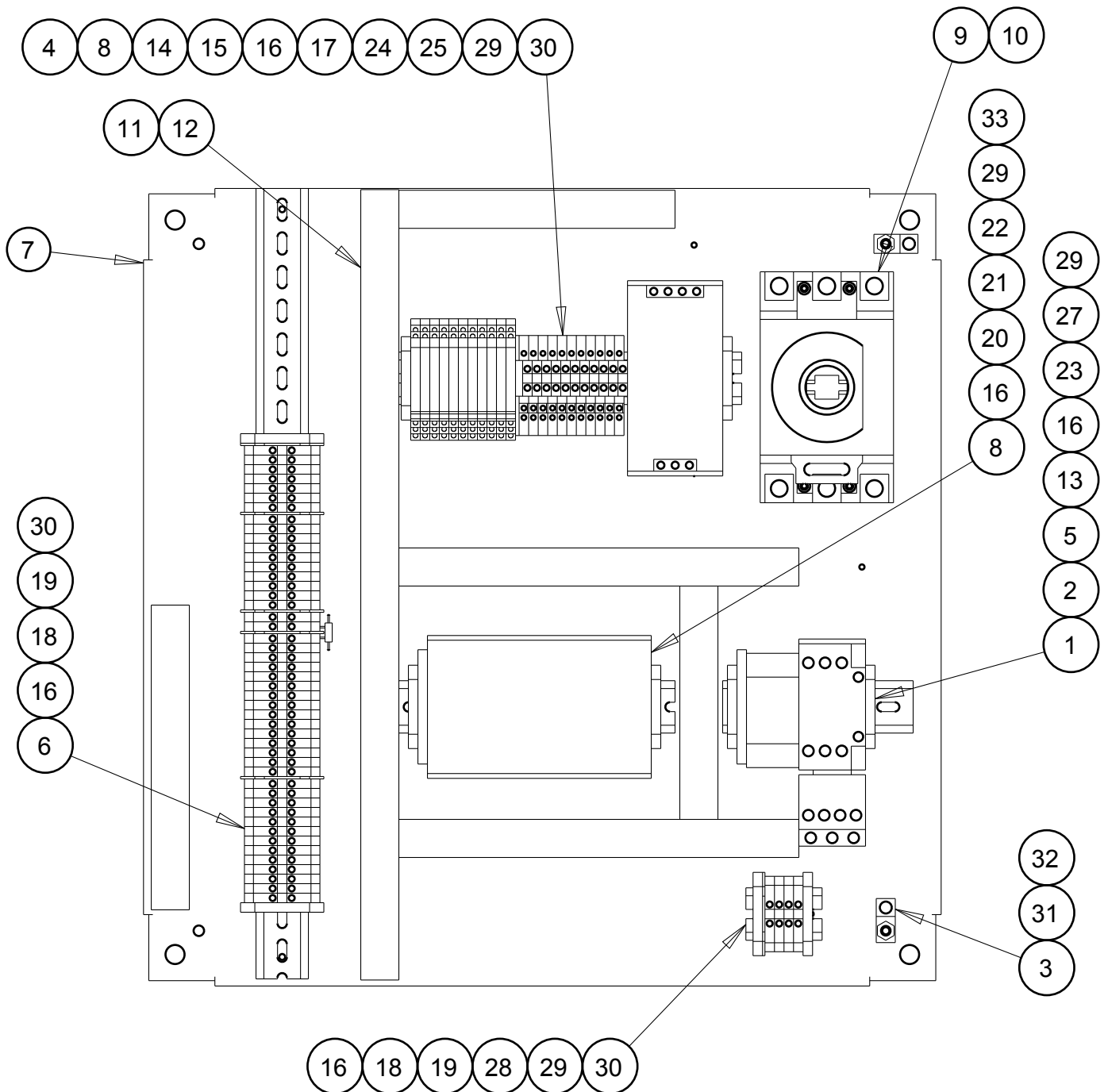
Innovators Of Pipe Fabrication Equipment

20-MAS-02
 Sheet #40

ELECTRICAL CABINET PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MAS-0201	1	ELECTRICAL CABINET BACK PLATE ASSEMBLY
2	20-MAS-0202	1	TOUCH PANEL CABLE ASSEMBLY
3	20-MMP-3087	1	ELECTRICAL ENCLOSURE (MODIFICATION)
4	20-MMP-3114	1	TOUCH SCREEN ENCLOSURE (MODIFICATION)
5	20-EPP-0135	2	SMALL STRAIN RELIEF
6	20-EPP-0256	1	CONDUIT LOCKNUT 1/2"
7	20-EPP-0258	1	ELECTRICAL HAZZARD LABLE LARGE
8	20-EPP-0276	1	ROTARY HANDLE
9	20-EPP-0304	2	BLUE WIRE NUT
10	20-EPP-0314	1	240V X 480V TRANSFORMER #QC50LECB
11	20-EPP-0322	1	3/4" 90° CONNECTOR
12	20-EPP-0328	1	3/4" CORD GRIP CONNECTOR
13	20-EPP-0329	1	3/4" CONDUIT LOCKNUT
14	20-EPP-0331	1	HANDLE EXTENSION SHAFT
15	20-EPP-0341	2	BOX ADAPTER NUT 1/2"
16	20-EPP-0342	1	1/2" CLOSE NIPPLE
17	20-MS-512	1	MODEL\SERIAL NUMBER PLATE
18	20-PLC-234	1	INTERFACE TOUCH PANEL
22	20-FAS-E16	7	#10-24 X 1/2" LG. SHCS
23	20-FAS-E23	7	#10-24 HEX NUT
24	20-FAS-E30	3	#10-FLAT WASHER

REVISION "A" 2/10/10 - ADDED ITEM EPP-0304
 REVISION "B" 3/8/11 GREEN PILOT LIGHT WAS
 SWT-0032 CHANGED TO SWT-0023.
 REVISION "C" 6/29/11 - ADDED ITEMS EPP-0328
 AND EPP-0329.
 REVISION "D" 3/6/13 - ADDED ITEM NUMBERS
 TO ALL PARTS. ADDED 20-EPP 0322,0328,0329,
 0331, 0341 & 0342.
 REVISION "E" 12/9/13 - REVISED PER NEW TOUCH SCREEN,
 REMOVED ITEMS 19, 20 & 21, QUANTITIES FOR ITEMS
 #22 & #23 WAS 3 EACH.



NOTES: PANEL MAY BE NOT BE ASSEMBLED AS SHOWN.
 REVISION "C" SEE DRAWING #20-MAS-0201 BOM SHT.

ELECTRICAL CABINET BACK PLATE ASSEMBLY



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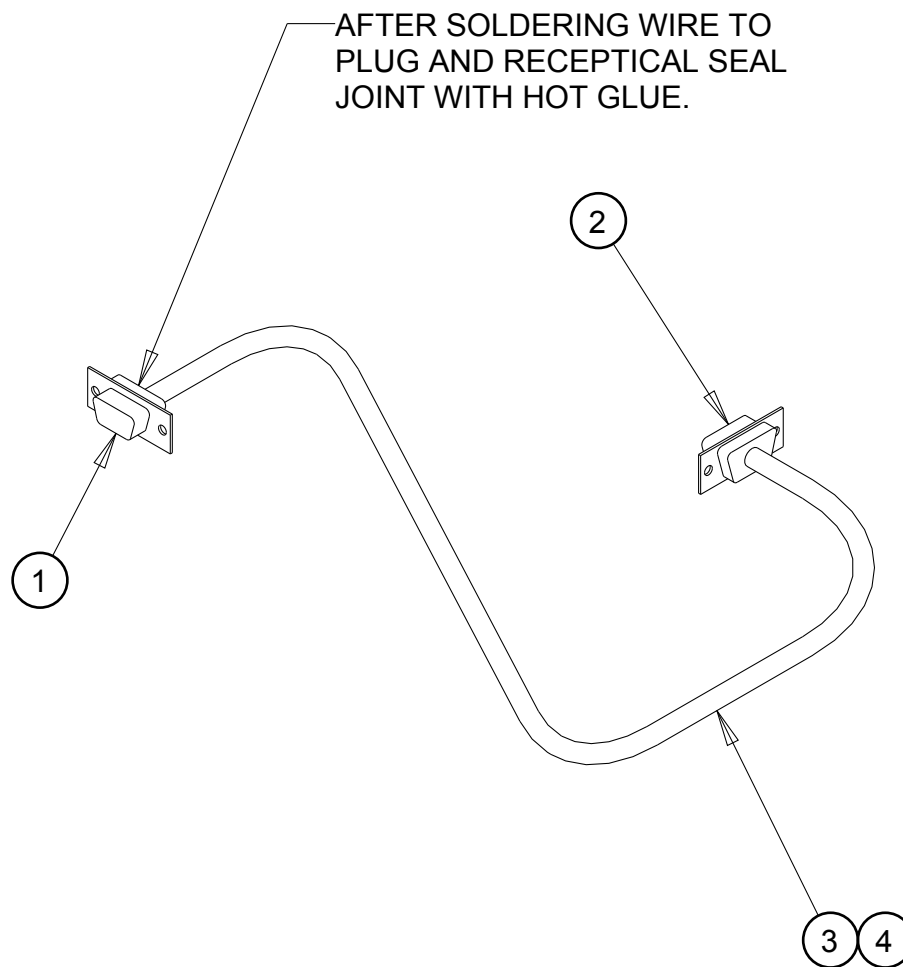
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20-MAS-0201
 Sheet #42

ELECTRICAL CABINET BACK PLATE PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-DRV-177	1	STARTER 5 HP 230V
2	20-DRV-188	1	RELAY 12-18A
3	20-EPP-0164	2	GROUND LUG
4	20-EPP-0262	11	DIODE
5	20-EPP-0263	1	10 AMPERE 125V FUSE
6	20-EPP-0265	1	RESISTOR
7	20-EPP-0273	1	PANEL FOR 24 X 24 X 8 ENCLOSURE
8	20-EPP-0274	11	PLC RELAY 24VDA SPDT
9	20-EPP-0275	1	MAIN CIRCUIT BREAKER
10	20-EPP-0276	REF	ROTARY HANDLE
11	20-EPP-0311	1	WIREWAY 55" LG.
12	20-EPP-0312	2	WIREWAY COVER 55" LG.
13	20-PLC-279	2	600 VAC FUSE #FNQ-R-2-1/2
14	20-EPP-0308	6	BLADES FOR RELAY
15	20-EPP-0309	3	JUMPERS FOR DOUBLE T BLOCK
16	20-PLC-210	1	DIN RAIL X 44" LG.
17	20-PLC-226	1	POWER SUPPLY 24VDC UW
18	20-PLC-230	50	TERMINAL BLOCK UW-CNT
19	20-PLC-231	7	TERMINAL BLOCK END CAP
20	20-PLC-232	1	OMRON PLC
21	20-PLC-233	1	MODULE FOR CP1H PLC
22	20-PLC 235	1	24VDC FUSE TERMINAL BLOCK
23	20-PLC-236	1	250V FUSE TERMINAL BLOCK
24	20-PLC-237	11	DOUBLE TERMINAL BLOCK
25	20-PLC-238	1	DOUBLE TERMINAL BLOCK END
26			
27	20-PLC-278	2	FUSE BLOCK 600V 30 AMP MARATHON #6SC30AI
28	20-PLC-255	1	GROUND TERMINAL BLOCK
29	20-PLC-256	8	DIN RAIL END BRACKET
30	20-FAS-E11	25	#10-24 X 1/2" LG. RHMS
31	20-FAS-F09	2	1/4-20 X 3/4" LG. HHCS GR8
32	20-FAS-F18	4	1/4-20 HEX NUT
33	20-EPP-0123	1	3 AMPERE FUSE

REVISION "B" 3/6/13 REVISED PER LATEST BILL OF MATERIALS REPORT.
 REVISION "C" 3/4/14 UPDATED BOM



REVISION "A" 2/21/11
SEE DRAWING #20-MAS-0202 BOM

TOUCH PANEL CABLE ASSEMBLY



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20-MAS-0202
Sheet #44

TOUCH PANEL CABLE ASSEMBLY PARTS LIST

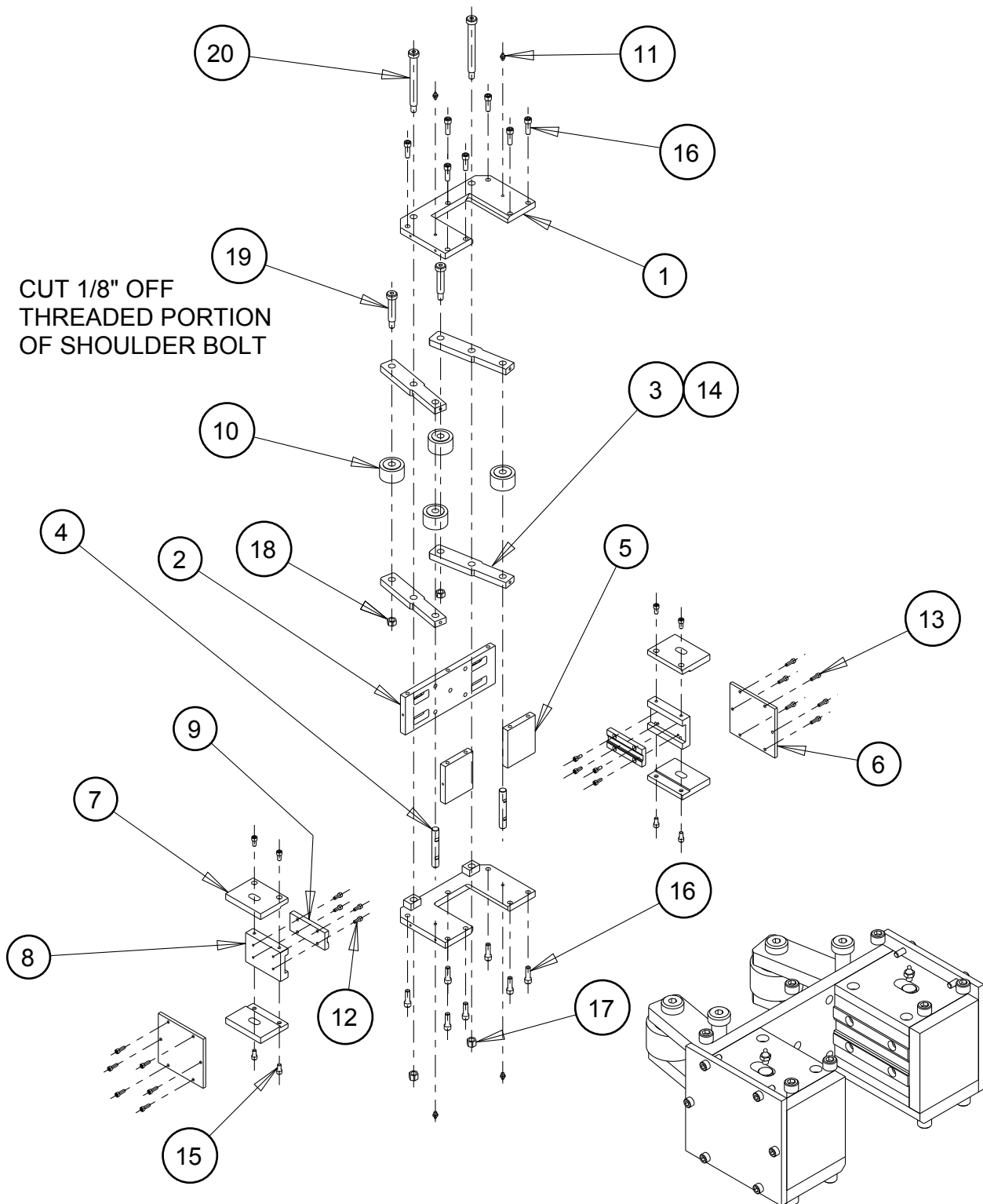
ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-EPP-0216	1	AIM D-SUB CONN 9 PIN
2	20-EPP-0324	1	AIM D-SUB CONN 9 PIN MALE
3	20-EPP-0158	2	Ø 1/4" HEAT SHRINK TUBING X 1-1/4" LG.
4	20-WIR-822	1	18 GA. 3 CONDUCTOR CABLE X 27" LG.

REVISION "A" 2/21/11

ITEM #1 WAS 20-EPP-0113 NOW 20-EPP-0216

ITEM #2 WAS 20-EPP-0114 NOW 20-EPP-0324

ITEM #4 WAS 20" LG. NOW 27" LG.



FITTING CLAMP ASSEMBLY MAKE-ON MACHINE

REVISION "C" 3/7/13
SEE BOM SHEET



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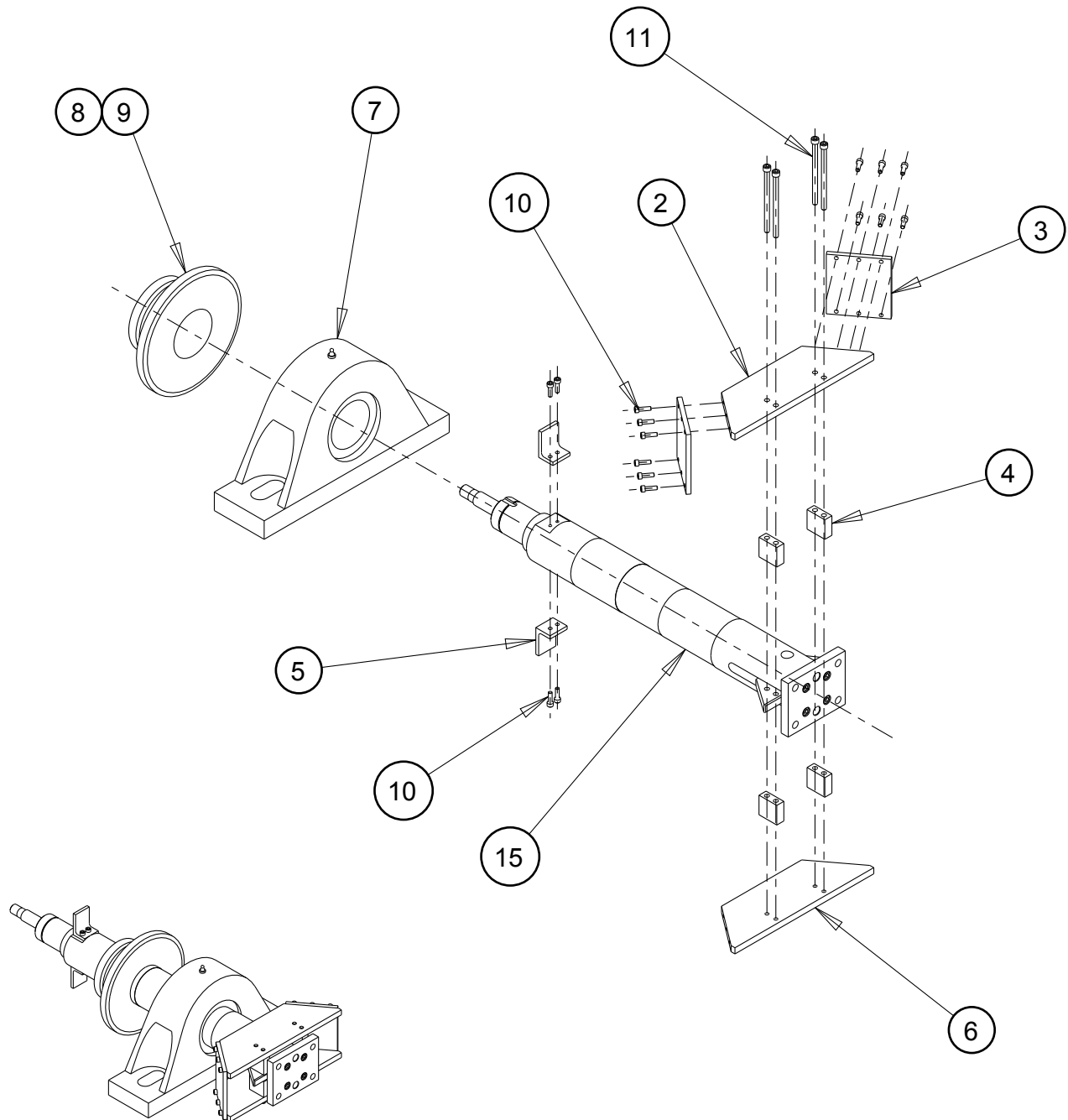
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20-MAS-03
Sheet #46

FITTING CLAMP PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MAS-0313	2	FITTING CLAMP TOP PLATE
2	20-MAS-0314	1	FITTING CLAMP REAR PLATE
3	MMP-3003	4	FITTING CLAMP PIVOT ARM
4	MMP-3004	2	FITTING CLAMP JAW PIVOT PIN
5	MMP-3005	2	FITTING CLAMP FRONT PLATE
6	MMP-3008	2	FITTING CLAMP SIDE PLATE
7	MMP-3102	4	FITTING CLAMP JAW OUTER PLATE
8	MMP-3103	2	FITTING CLAMP JAW FACE PLATE
9	MMP-3104	2	FITTING CLAMP JAW INNER WEAR PLATE
10	BRG-1000	4	McGILL CAM ROLLER #CRY-1-3/4-S
11	MSC-602	4	GREASE FITTING McMASTER CARR #1105K71
12	FAS-E16	8	#10-24 X 1/2" LG. SHCS
13	FAS-E17	12	#10-24 X 5/8" LG. SHCS
14	FAS-E27	4	#10-24 X 1/4" LH. SHSS
15	FAS-F23	8	1/4-20 X 1/2" LG. SHCS
16	FAS-G8	14	5/16-18 X 1" LG. SHCS
17	FAS-H18	2	3/8-16 LOCK NUT
18	FAS-MM12	2	3/8-16 LOW HEADHEX LOCK NUT NUT
19	FAS-I12	2	Ø 1/2" X 2" LG. SHSB
20	FAS-MM-03	2	Ø 1/2" X 4-1/4" LG. SHOULDER BOLT

REVISION "B" 5/16/12 - REVISED FITTING CLAMP JAW.
 REMOVED ITEMS 3006 & 3007. ADDED ITEMS 3102,
 3103, 3104, FAS-E16, AND FAS-F24.
 REVISION "C" 3/7/13 - REVISED BALLOONS



FITTING CLAMP ROTATION ASSEMBLY



North Alabama Pipe

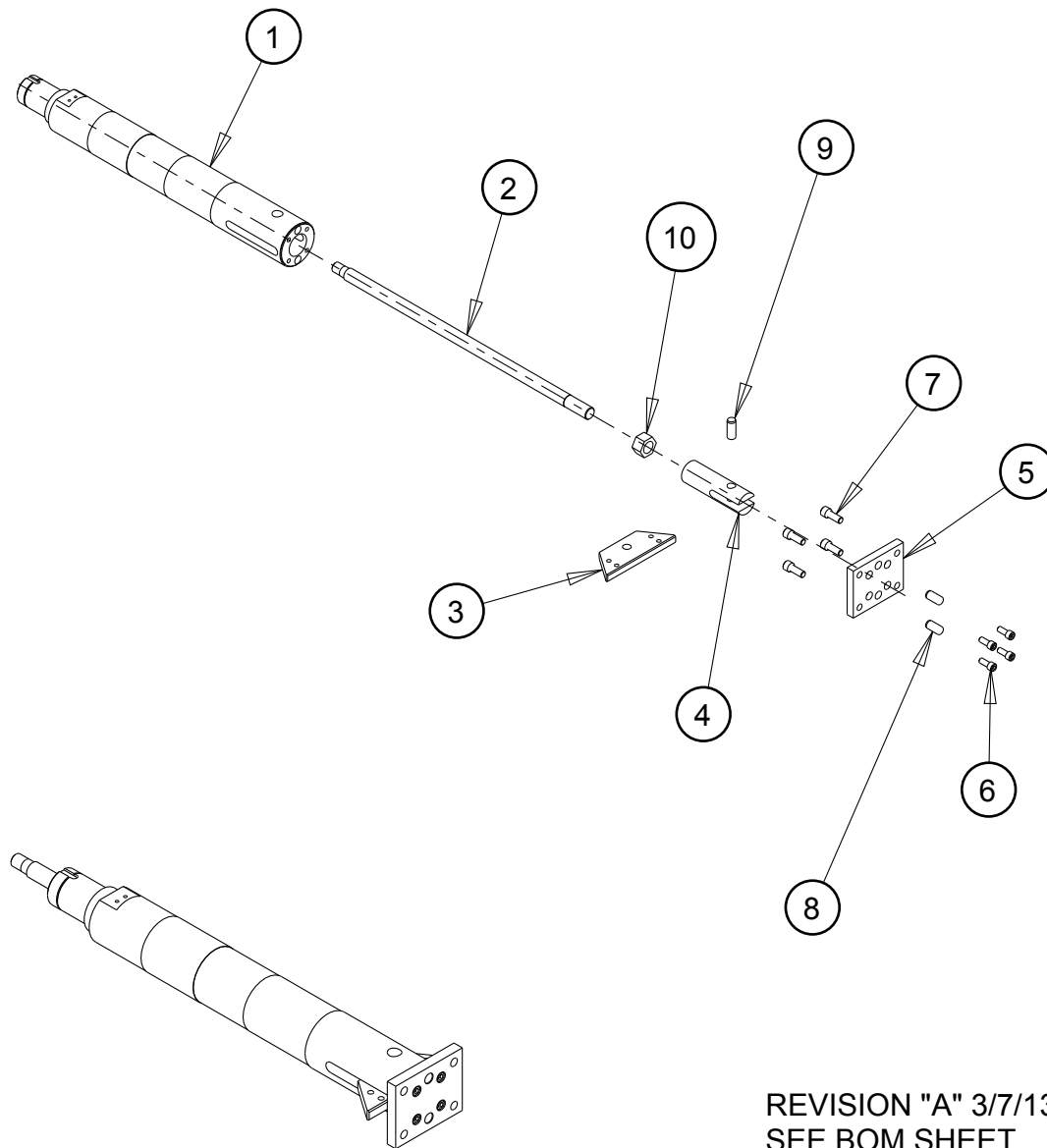
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Innovators Of Pipe Fabrication Equipment

20-MAS-04
Sheet #48

FITTING CLAMP ROTATION ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MAS-0415	1	ROTATION SHAFT ASSEMBLY
2	20-MMP-3013	1	JAW TRACK MOUNT TOP
3	20-MMP-3014	2	JAW TRACK PLATE
4	20-MMP-3015	4	JAW TRACK MOUNT SPACER
5	20-MMP-3016	2	ROTATION PROX ACTUATOR
6	20-MMP-3017	1	JAW TRACK MOUNT BOTTOM
7	20-BRG-1001	1	PILLOW BLOCK BEARING SEAL MASTER #SLMS-MP47 \varnothing 2-11/16"
8	20-PLY-502	1	TAPER LOCK BUSHING BROWNING Q1 \varnothing 2-11/16"
9	20-PLY-509	1	SPROCKET BROWNING #80Q20
10	20-FAS-E17	16	10-24 X 5/8" LG. SHCS
11	20-FAS-MM-04	4	1/4-20 X 3-3/4" LG. SHCS



REVISION "A" 3/7/13
SEE BOM SHEET.

ROTATION SHAFT ASSEMBLY



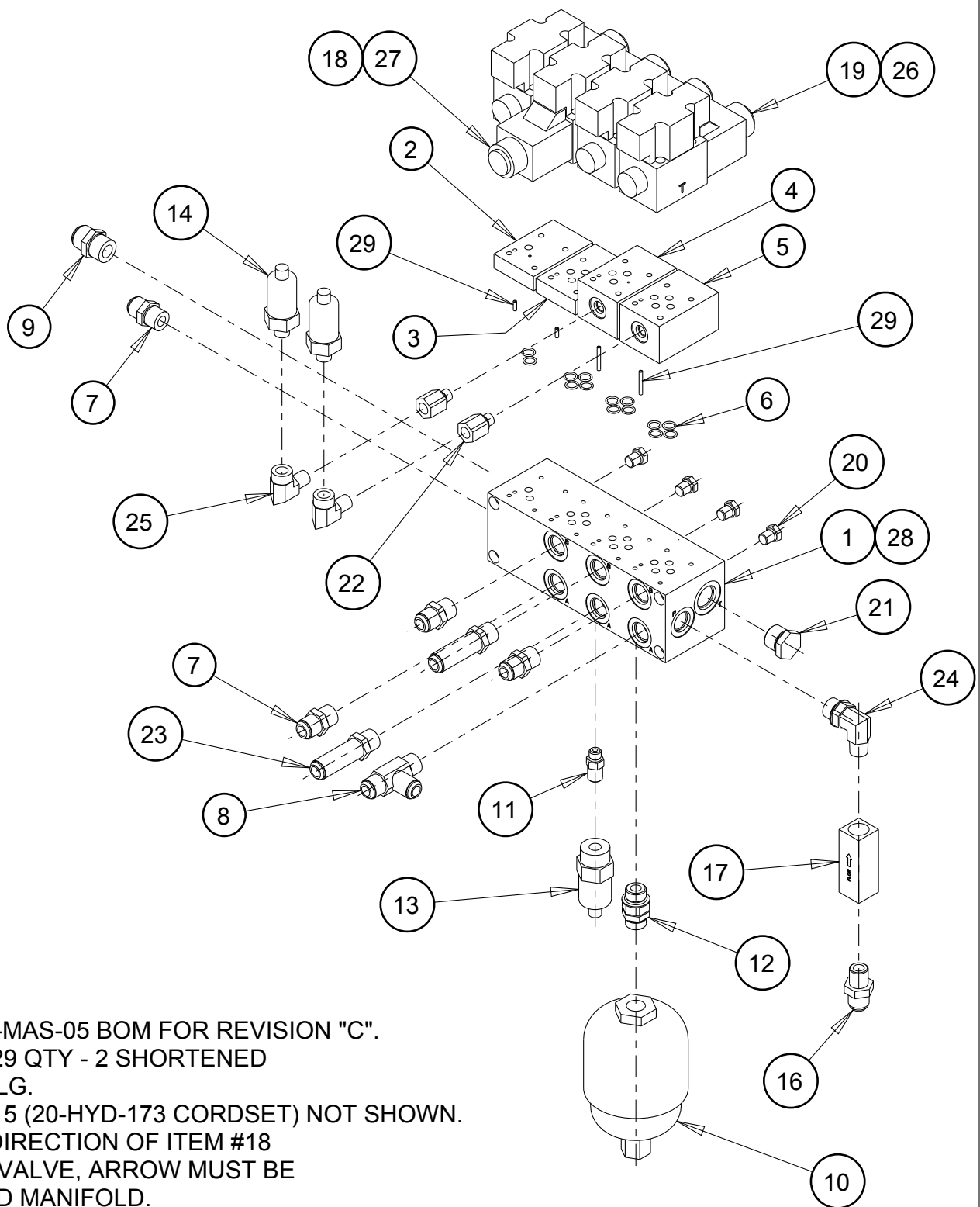
North Alabama Pipe
A Division of Anvil International
Innovators Of Pipe Fabrication Equipment

20-MAS-0415
Sheet #50

ROTATION SHAFT ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MAS-041534	1	MAIN ROTATION SHAFT
2	20-MMP-3071	1	PULL ROD
3	20-MMP-3072	1	WEDGE PLATE
4	20-MMP-3073	1	WEDGE MOUNT
5	20-MMP-3074	1	MAIN ROTATION SHAFT MOUNT PLATE
6	20-FAS-G10	4	5/16-18 X 3/4"LG. SHCS
7	20-FAS-H10	4	3/8-16 X 1" LG. SHCS
8	20-FAS-I20	2	Ø 1/2" X 1" LG. DOWEL PIN
9	20-FAS-DPIN9	1	Ø 1/2" X 1-1/4" LG. DOWEL PIN
10	20-FAS-MM-07	1	3/4-10 HEX NUT LEFT HAND THREADS

REVISION "A" 3/7/13 - REVISED ITEM NUMBERS.



NOTES:

1. SEE 20-MAS-05 BOM FOR REVISION "C".
2. ITEM #29 QTY - 2 SHORTENED TO 3/8" LG.
3. ITEM #15 (20-HYD-173 CORDSET) NOT SHOWN.
4. NOTE DIRECTION OF ITEM #18 CHECK VALVE, ARROW MUST BE TOWARD MANIFOLD.

HYDRAULIC MANIFOLD ASSEMBLY



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20-MAS-05
Sheet #52

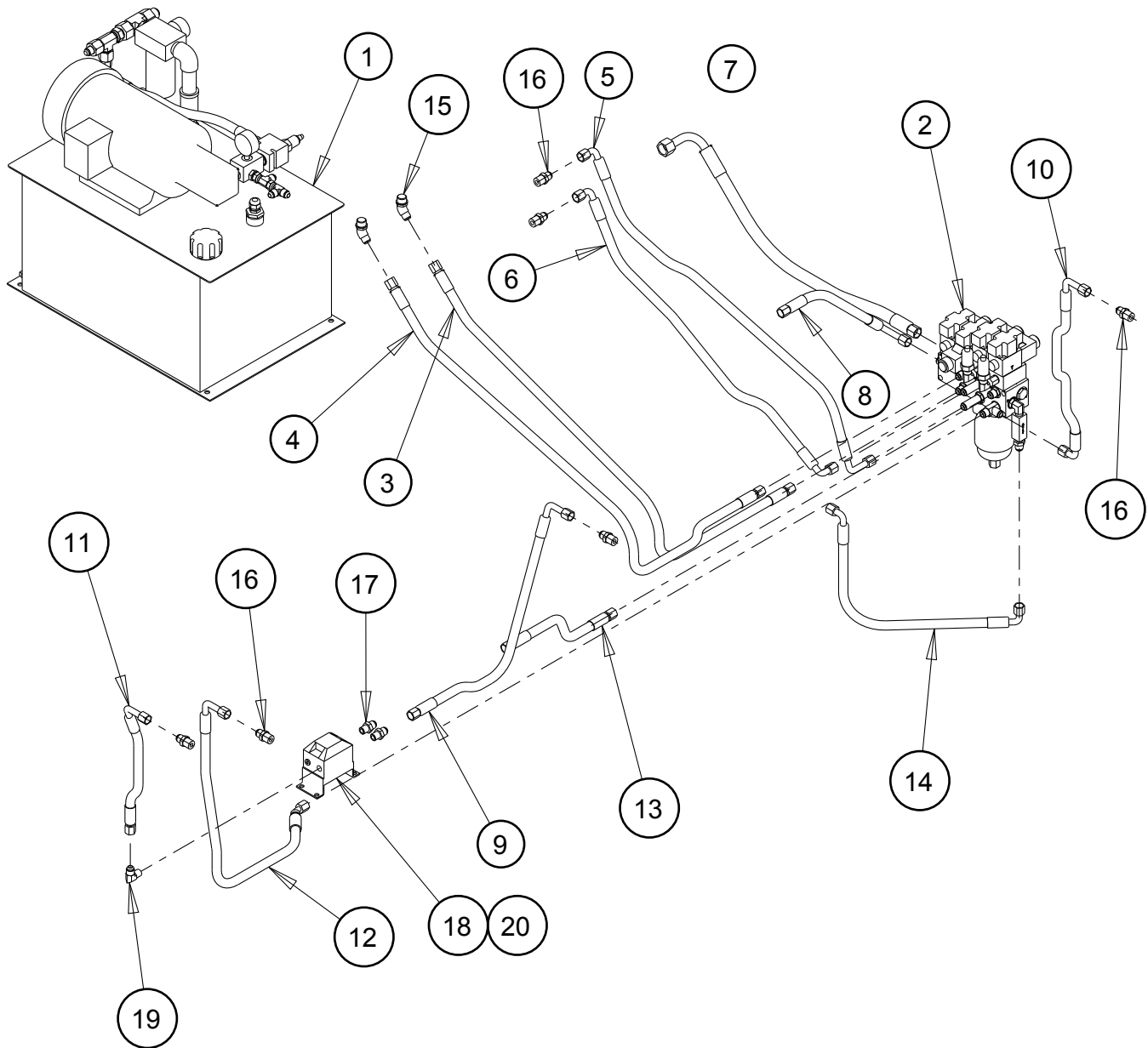
HYDRAULIC MANIFOLD ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MMP-3105	1	D03 4 STATION HYDRAULIC MANIFOLD
2	20-MMP-3106	1	#1 VALVE SUBPLATE
3	20-MMP-3107	1	#2 VALVE SUBPLATE
4	20-MMP-3108	1	#3 VALVE SUBPLATE
5	20-MMP-3109	1	#4 VALVE SUBPLATE
6	20-BRG-956	14	#012 O-RING
7	20-HYD-112	4	37° JIC TO SAE ORING CONNECTOR
8	20-HYD-114	1	37° JIC TO SAE ORING RUN TEE
9	20-HYD-147	1	37° JIC TO SAE ORING CONNECTOR
10	20-HYD-167	1	ACCUMULATOR
11	20-HYD-168	1	SAE ORING TO MALE PIPE CONNECTOR
12	20-HYD-169	1	SAE ORING UNION
13	20-HYD-171	1	PRESSURE TRANSDUCER
14	20-HYD-172	2	PRESSURE SWITCH
15	20-HYD-173	3	CORDSET
16	20-HYD-174	1	37° JIC TO MALE PIPE CONNECTOR
17	20-HYD-181	1	CHECK VALVE
18	20-HYD-182	1	4 WAY 3 POSITION VALVE
19	20-HYD-183	3	3 WAY 2 POSITION VALVE
20	20-HYD-187	4	#4 SAE PLUG
21	20-HYD-188	1	#10 SAE PLUG
22	20-HYD-189	2	SAE ORING TO FEMALE PIPE ADAPTER
23	20-HYD-190	2	JIC O-RING EXTENDED CONNECTOR
24	20-HYD-191	1	SAE ORING TO MALE PIPE CONNECTOR
25	20-HYD-192	2	1/4 NPT 90° STREET ELBOW
26	20-FAS-E37	8	#10-24 X 3-1/4" LG. SHCS
27	20-FAS-E38	8	#10-24 X 2-1/2" LG. SHCS
28	20-FAS-G15	4	5/16-18 X 3" LG. SHCS
29	20-FAS-RPIN2	4	Ø 1/8" X 1" LG. ROLL PIN

NOTE:

1. ITEM #29 (Ø 1/8" X 1" LG. ROLLPIN)
QTY - 2, MUST BE SHORTENED TO
3/8" LG.

REVISION - "B" - 5/14/12
REVISED PER NEW NAP MANIFOLD.
REVISION "C" 3/7/13
ADDED 20-HYD-173 CORDSET,
20-FAS-G15 5/16-18 X 3" LG. SHCS



REVISION "J" - 6/21/12
REVISED HYDRAULIC SYSTEM.

HYDRAULIC HOSE ASSEMBLY



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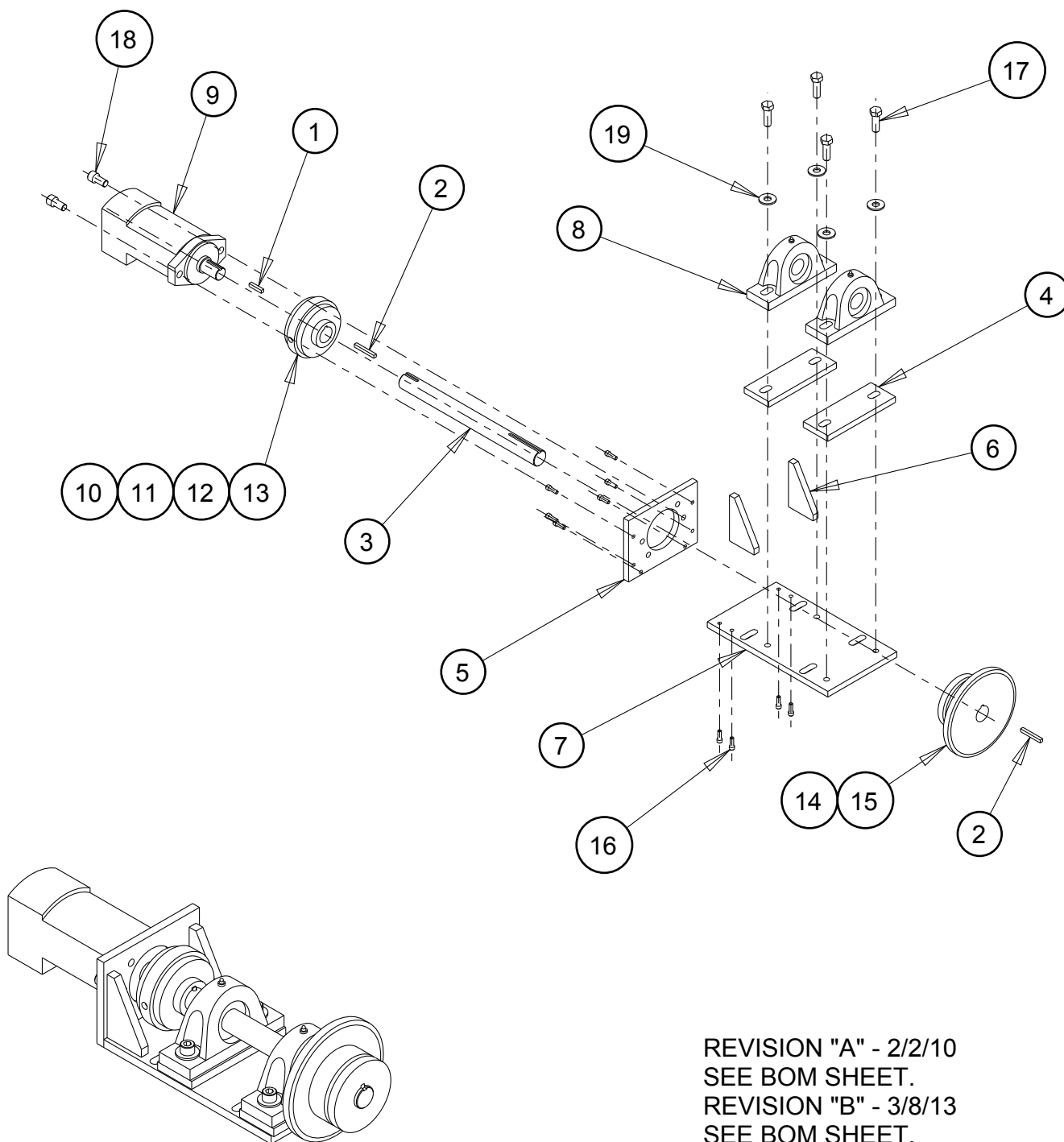
20-MAS-06
Sheet #54

HYDRAULIC HOSE ASSEMBLY PARTS LIST

ITEM	ASSEMBLY PART NO.	PART NO.	QTY	DESCRIPTION
1	20-MAS-14		REF.	HYDRAULIC POWER UNIT
2	20-MAS-05		REF.	HYDRAULIC MANIFOLD ASSEMBLY
3	20-MAS-0616	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 45" LG.
		HYD-121	2	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
4	20-MAS-0617	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 47" LG.
		HYD-121	2	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
5	20-MAS-0618	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 35" LG.
		HYD-117	1	WEATHERHEAD JIC 37° SWVL S DROP 90° EL 1/2" #08U-668
		HYD-120	1	WEATHERHEAD JIC 37° SWVL LG DROP 90° EL 1/2" #08U-648
6	20-MAS-0619	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 36" LG.
		HYD-117	2	WEATHERHEAD JIC 37° SWVL S DROP 90° EL 1/2" #08U-668
7	20-MAS-0620	HYD-138	1	WEATHERHEAD 100R2 #H42512 HOSE \varnothing 3/4" X 28" LG.
		HYD-123	1	WEATHERHEAD SWVL ST ADAPT 3/4" 12U-612
		HYD-139	1	WEATHERHEAD L DROP 90° EL 12U-652
8	20-MAS-0621	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 10" LG.
		HYD-121	1	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
		HYD-120	1	WEATHERHEAD JIC 37° SWVL LG DROP 90° EL 1/2" #08U-648
9	20-MAS-0622	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 24" LG.
		HYD-120	1	WEATHERHEAD JIC 37° SWVL LG DROP 90° EL 1/2" #08U-648
		HYD-121	1	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
10	20-MAS-0623	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 17-1/4" LG.
		HYD-117	1	WEATHERHEAD JIC 37° SWVL S DROP 90° EL 1/2" #08U-648
		HYD-120	1	WEATHERHEAD JIC 37° SWVL LG DROP 90° EL 1/2" #08U-648
11	20-MAS-0624	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 12-1/4" LG.
		HYD-117	1	WEATHERHEAD JIC 37° SWVL S DROP 90° EL 1/2" #08U-648
		HYD-121	1	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
12	20-MAS-0625	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 28" LG.
		HYD-120	1	WEATHERHEAD JIC 37° SWVL LG DROP 90° EL 1/2" #08U-648
		HYD-193	1	WEATHERHEAD JIC 37° SWVL 45° EL 1/2" #08U-688
13	20-MAS-0626	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 11-7/8" LG.
		HYD-121	2	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
14	20-MAS-0627	HYD-137	1	WEATHERHEAD 100R2 #H42508 HOSE \varnothing 1/2" X 20-1/2" LG.
		HYD-120	2	WEATHERHEAD JIC 37° SWVL LG DROP 90° EL 1/2" #08U-648
15		HYD-113	2	ORING TO JIC 45° EL #C5365X8X10
16		HYD-115	6	WEATREERHEAD JIC TO M PIPE CONN #C5205X8X8
17		HYD-174	3	WEATHERHEAD JIC TO M PIPE CONN C5205X8
18		HYD-175	1	FLOW DIVIDER #PM2
19		HYD-194	1	WEATHERHEAD JIC 37° TO MALE PIPE 90° ELBOW #C5405X8
20		FAS-H9	4	3/8-16 X 1/2" LG. SHCS

REVISION "J" 6/21/12. REVISED HYDRAULIC SYSTEM

20-MAS-06 BOM Sheet #55



HYDRAULIC MOTOR ASSEMBLY MAKE-ON MACHINE



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20-MAS-07
Sheet #56

HYDRAULIC MOTOR ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-BLK-642	1	1/4" X 1-1/4" LG. KEY
2	20-BLK-642	2	1/4" X 2" LG. KEY
3	20-MMP-3027	1	DRIVE SHAFT
4	20-MMP-3028	2	BEARING SPACER
5	20-MMP-3029	1	MOTOR MOUNT PLATE
6	20-MMP-3030	2	MOTOR MOUNT GUSSET
7	20-MMP-3031	1	MOTOR MOUNT BASE PLATE
8	20-BRG-1002	2	PILLOW BLOCK BEARING
9	20-HYD-133	1	HYDRAULIC MOTOR
10	20-PLY-504	1	COUPLING HUB ϕ 1"
11	20-PLY-505	1	COUPLING HUB ϕ 1-1/4
12	20-PLY-506	1	COUPLING CHAIN
13	20-PLY-507	1	COUPLING COVER
14	20-PLY-508	1	TAPERLOCK BUSHING 1-1/4"
15	20-PLY-509	1	SPROCKET
16	20-FAS-F24	10	1/4-20 X 3/4" LG. SHCS
17	20-FAS-I1	4	1/2-13 X 1-1/2" LG. HHCS
18	20-FAS-I17	2	1/2-13 X 1-1/4" LG. SHCS
19	20-FAS-I22	4	1/2" FLAT WASHER

REVISION "A" 2/2/10

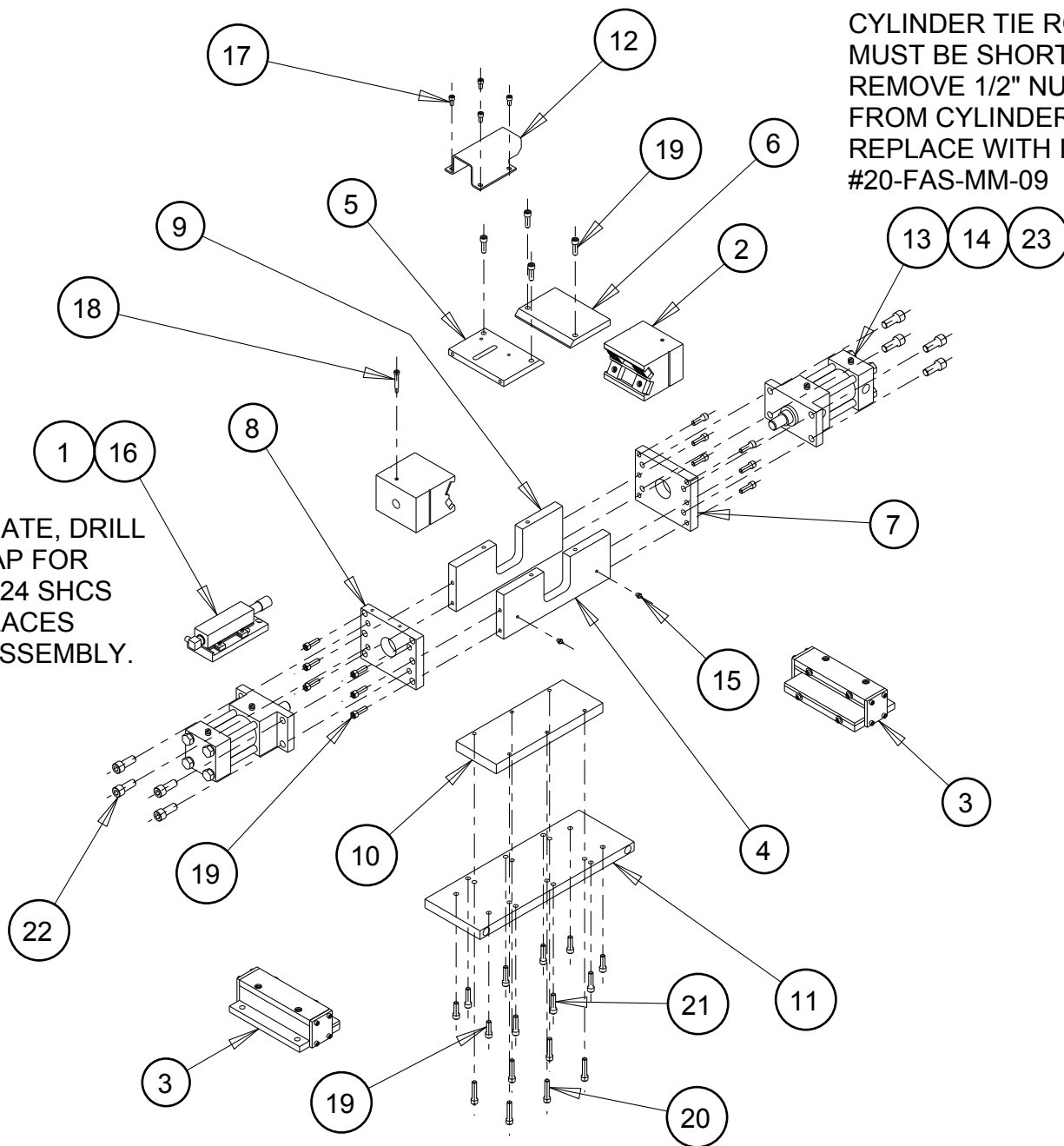
ITEM FAS-12, 1/2-13 X 1/34" LG. HHCS

WAS FAS-11, 1/2-13 X 1-1/2" LG. HHCS.

REVISION "B" 3/8/13

REVISED PART NUMBERS FOR 1/4" KEYSTOCK

ITEM #17 WAS 20-FAS-I2, ITEM #18 WAS 20-FAS-I16.



NOTE: FOR REVISIONS SEE BOM SHEET.
 REVISION "A" 5/25/10. REVISION "B" 9/24/10.
 REVISION "C" 10/4/10. REVISION "D" 3/11/13.
 REVISION "E" 8/27/13.

PIPE CLAMP ASSEMBLY



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20-MAS-09
 Sheet #58

PIPE CLAMP ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MAS-0928	1	PIPE SIZE SWITCH ASSEMBLY
2	20-MAS-0929	2	PIPE CLAMP JAW ASSEMBLY
3	20-MAS-0932	2	GUIDE SLIDE ASSEMBLY
4	20-MMP-3036	1	PIPE CLAMP SIDE PLATE
5	20-MMP-3038	1	PIPE CLAMP TOP PLATE LEFT
6	20-MMP-3039	1	PIPE CLAMP TOP PLATE RIGHT
7	20-MMP-3040	1	PIPE CLAMP END PLATE
8	20-MMP-3040-A	1	PIPE CLAMP END PLATE
9	20-MMP-3041	1	PIPE CLAMP SIDE PLATE
10	20-MMP-3044	1	PIPE CLAMP JAW SLIDE PLATE
11	20-MMP-3045	1	PIPE CLAMP BOTTOM PLATE
12	20-MMP-3098	1	LINEAR TRANSDUCER COVER
13	20-HYD-110	2	HYDRAULIC CYLINDER
14	20-HYD-176	4	1/8" BLEEDERS
15	20-MSC-602	2	GREASE FITTING McMASTER CARR #1105K71
16	20-FAS-E16	2	#10-24 X 1/2" LG. SHCS
17	20-FAS-F23	4	1/4-20 X 1/2" LG. SHCS
18	20-FAS-F55	1	Ø 1/4" X 1-1/4" LG. SHSB
19	20-FAS-G8	20	5/16-18 X 1" LG. SHCS
20	20-FAS-G11	6	5/16-18 X 1.50 LG. SHCS
21	20-FAS-G12	6	5/16-18 X 1.25 LG. SHCS
22	20-FAS-I17	8	1/2-13 X 1-1/4" LG. SHCS
23	20-FAS-MM-09	8	1/2-20 HEX JAM NUT

REVISION "A" 5/25/10 - REVISED PIPE SIZE SWITCH, & REMOVED RACK & PINION FROM JAWS.

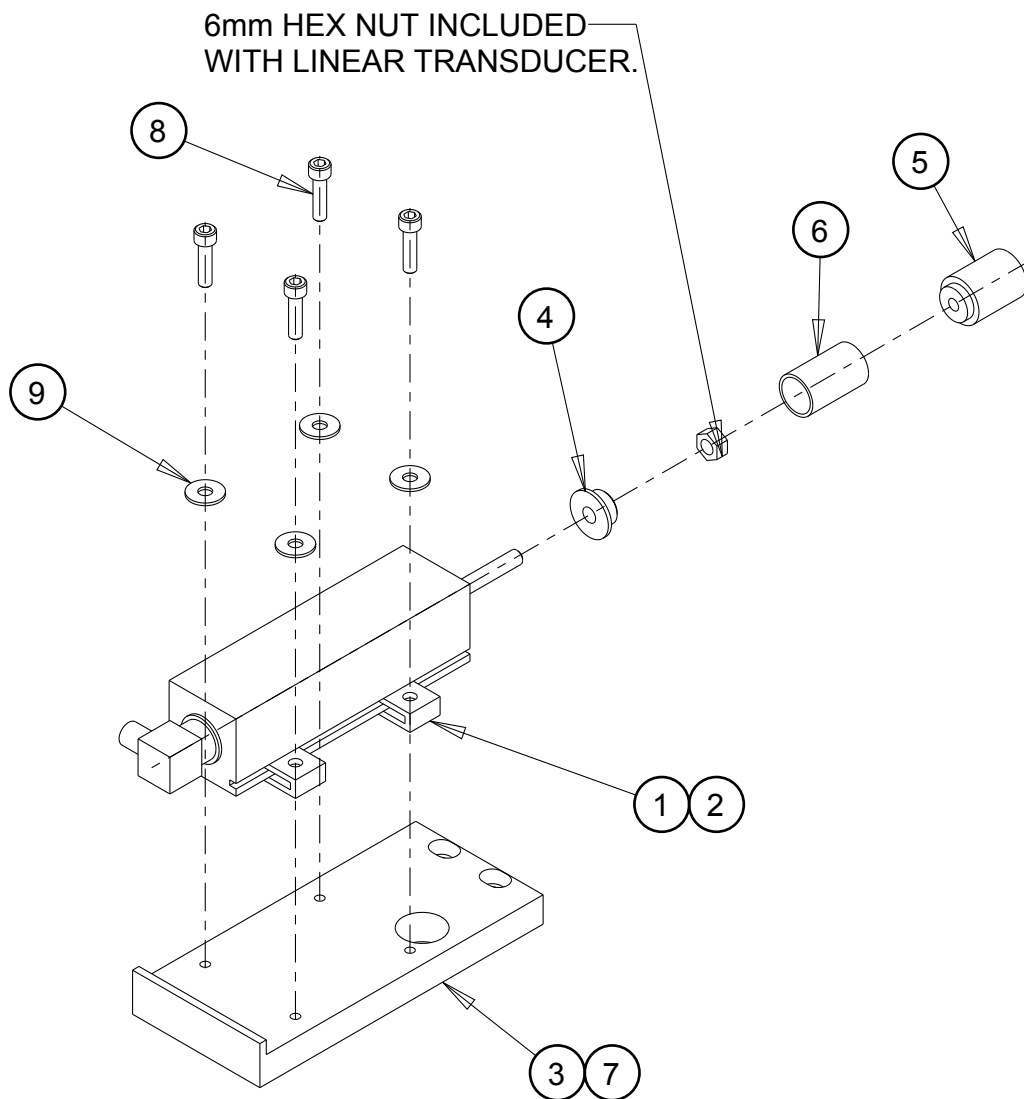
REVISION "B" 9/24/10 - ADDED ITEMS MMP-3040-1, MMP-3098, FAS-E16, FAS-F24, AND AND CHANGED QTY OF MMP-3040 FROM 2 TO 1.

REVISION "C" 10/4/10 - CHANGED FAS-F51 Ø 1/4" X 1-1/2" LG. SHSB TO FAS-F55 Ø 1/4" X 1-1/4" LG. SHSB.

REVISION "D" 3/11/13 - UPDATED BOM, AND ADDED ITEM NUMBERS.

ADDED ITEM #14, ITEM #18 WAS QTY. 4 NOW QTY 20.

REVISION "E" 8/27/13 - REVISED ITEM #12 20-MMP-3098 TRANSDUCER COVER, ITEM #17 WAS 20-FAS-F24 1/4-20 X 3/4" LG. SHCS - NOW 20-FAS-F23 1/4-20 X 1/2" LG. SHCS.



NOTE: SEE BOM SHEET
REVISION "B" 10/14/10
REVISION "C" 3/8/13

PIPE SIZE SWITCH ASSEMBLY



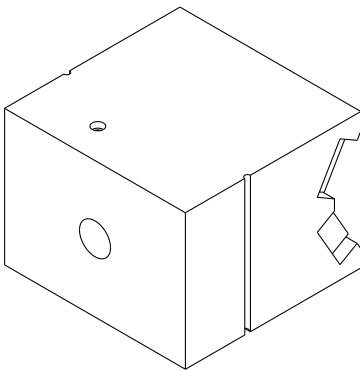
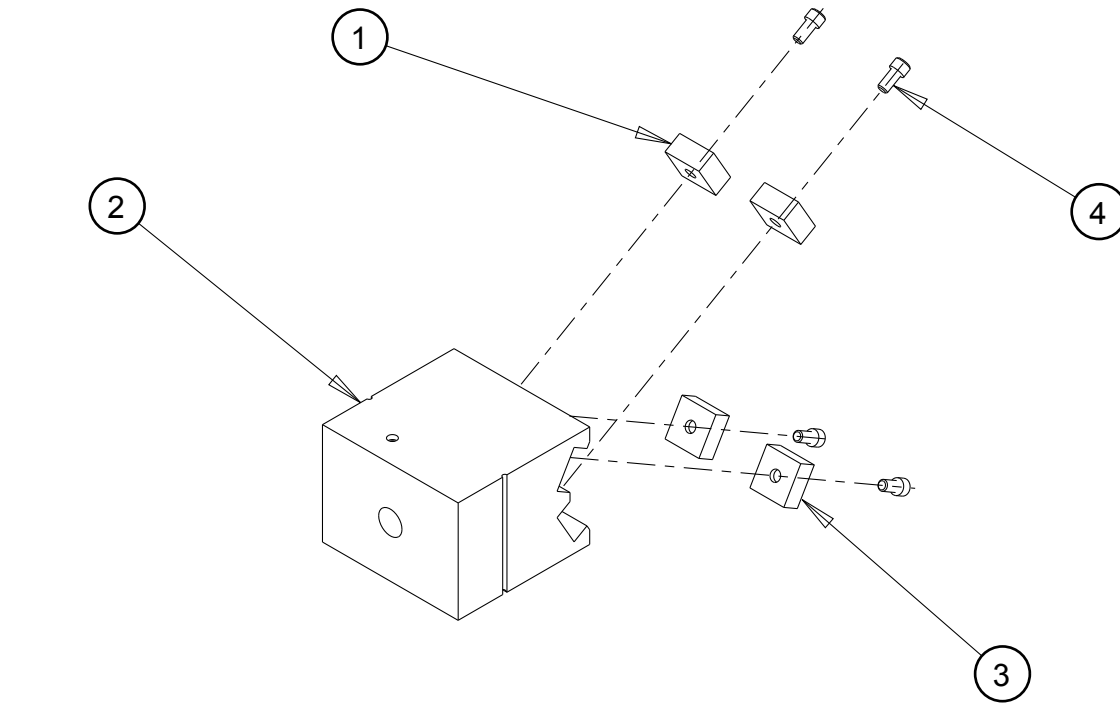
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20-MAS-0928
Sheet #60

PIPE SIZE SWITCH ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-EPP-0318	1	LINEAR TRANSDUCER
2	20-EPP-0319	1	LINEAR TRANSDUCER DIN CONNECTOR
3	20-MMP-3096	1	LINEAR TRANSDUCER MOUNT PLATE
4	20-MMP-3099	1	SPRING SLEEVE
5	20-MMP-3100	1	ROD END
6	20-MSC-613	1	COMPRESSION SPRING
7	20-FAS-E17	2	#10-24 X 5/8" LG. SHCS
8	20-FAS-E18	4	#10-24 X 3/4" LG. SHCS
9	20-FAS-E39	4	#10 LARGE FLAT WASHER

REVISION "B" 10/14/10
CHANGED PER NEW LINEAR TRANSDUCER TYPE.
REVISION C" 3/8/13
ITEM #8 WAS 20-FAS-C9, ADDED ITEM #9.



NOTE: SEE 20-MAS-0929 BOM
SHEET FOR REVISION.
REVISION "A"
REVISION "B"

PIPE CLAMP JAW ASSEMBLY



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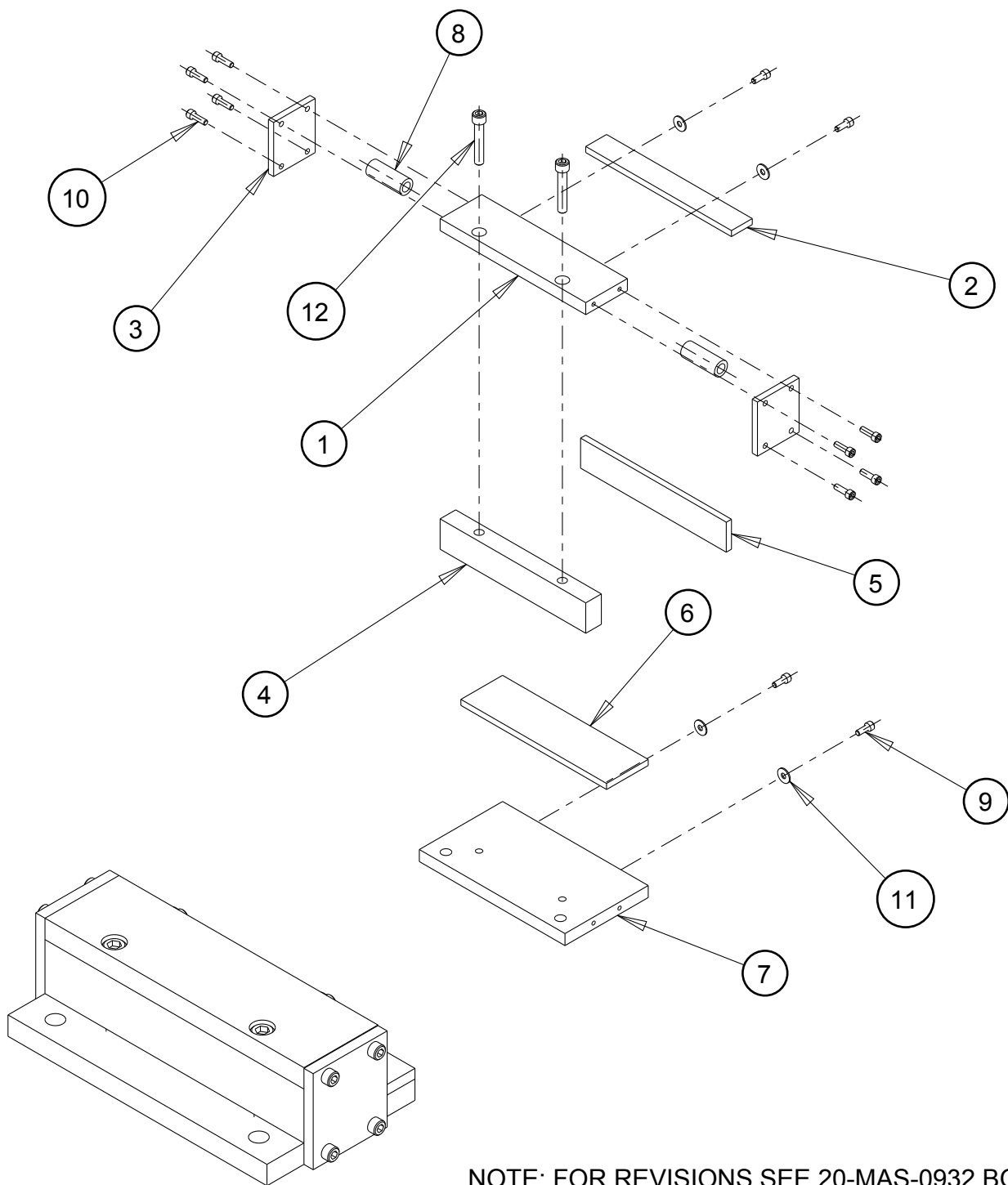
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20-MAS-0929
Sheet #62

PIPE CLAMP JAW ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MMP-3047	2	PIPE CLAMP JAW HARDENED PAD
2	20-MMP-3048	1	PIPE CLAMP JAW
3	20-MSC-604	2	JAW PAD FAIRLANE MSC #9713983
4	20-FAS-F23	4	1/4-20 X 1/2" LG. SHCS

REVISION "A" 5/7/10
REMOVED ITEMS MMP-3049, MMP-3050,
FAS-H5,. FAS-F23 QTY. WAS 6 NOW 2.
REVISION "B" 3/11/13
UPDATED BOM AND ADDED ITEM NUMBERS.



NOTE: FOR REVISIONS SEE 20-MAS-0932 BOM.
REVISION "A" 3/11/13 LKG.

GUIDE SLIDE ASSEMBLY



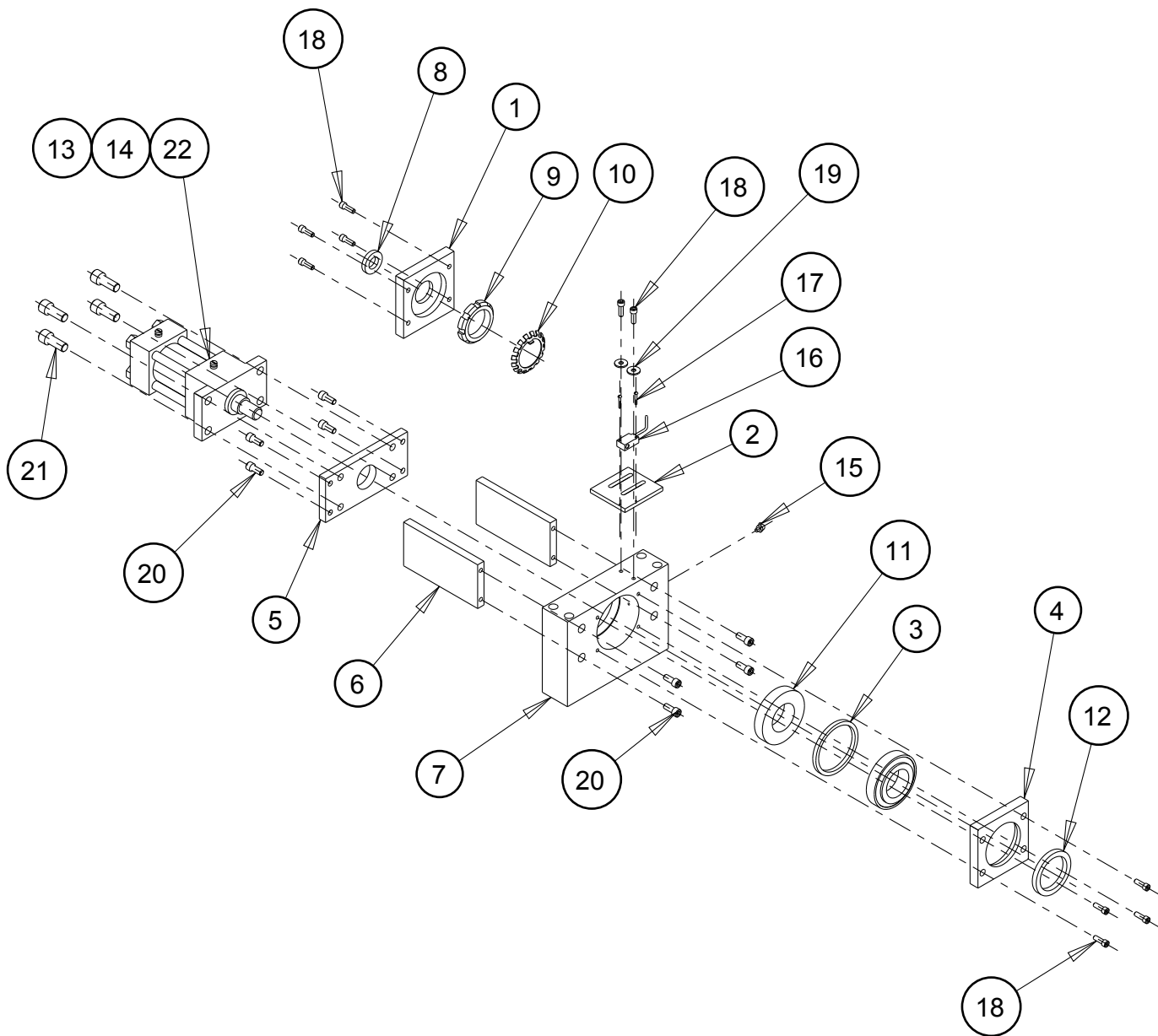
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20-MAS-0932
Sheet #64

GUIDE SLIDE ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MMP-3018	1	GUIDE TOP PLATE
2	20-MMP-3019	1	TOP SLIDE
3	20-MMP-3020	2	RETAINING PLATE
4	20-MMP-3021	1	GUIDE SIDE PLATE
5	20-MMP-3022	1	SIDE SLIDE
6	20-MMP-3023	1	BOTTOM SLIDE
7	20-MMP-3024	1	GUIDE BOTTOM PLATE
8	20-MSC-603	2	COMPRESSION SPRING
9	20-FAS-E16	4	10-24 X 1/2" LG. SHCS
10	20-FAS-E17	8	10-24 X 5/8" LG. SHCS
11	20-FAS-E30	4	#10 FLAT WASHER
12	20-FAS-G27	2	5/16-18 X 1-3/4" LG. SHCS

NOTE: REVISION "A" 3/11/13, LKG.
UPDATED BOM AND ADDED ITEM NUMBERS.



NOTE: SEE BOM SHEET
 REVISION "A"
 REVISION "B"

PULL CYLINDER ASSEMBLY



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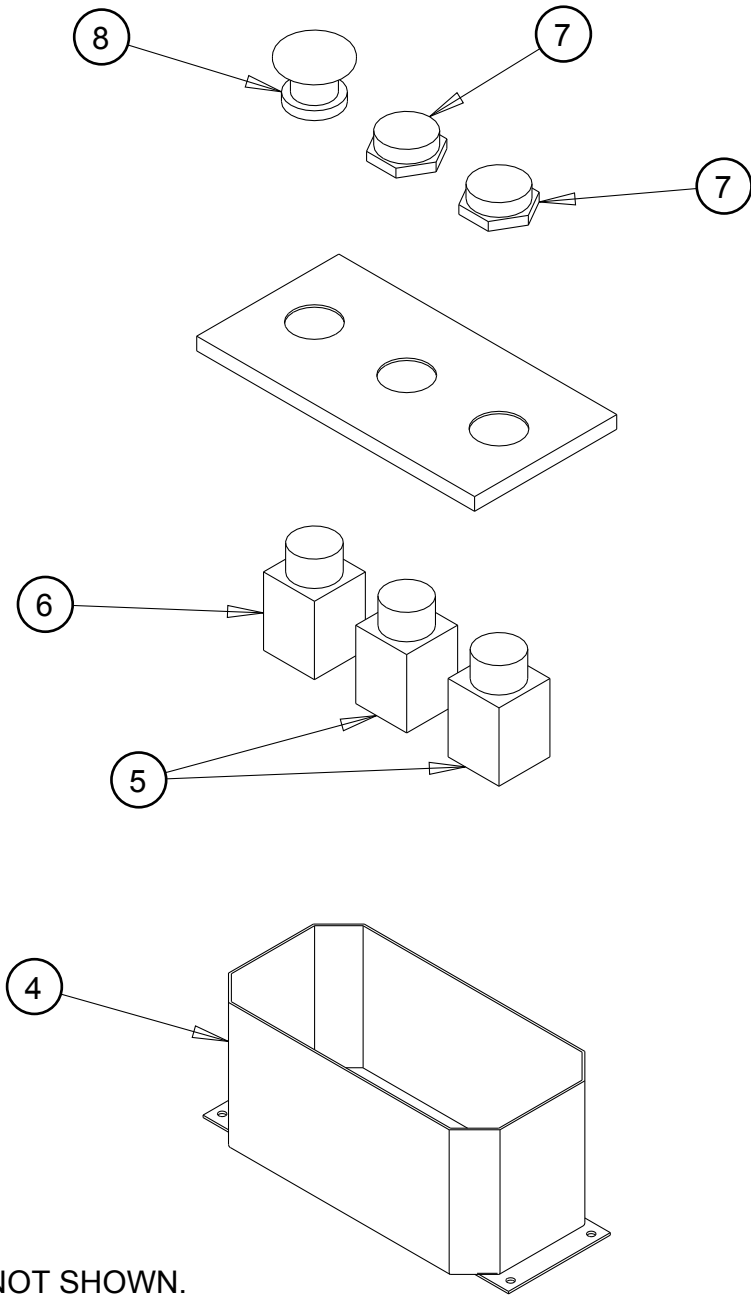
20-MAS-10
 Sheet #66

PULL CYLINDER ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MMP-3058	1	REAR BEARING COVER
2	20-MMP-3059	1	PROX SWITCH MOUNT
3	20-MMP-3060	1	TAPER ROLLER BEARING SPACER
4	20-MMP-3061	1	FRONT BEARING COVER
5	20-MMP-3062	1	PULL CYLINDER MOUNT"C"
6	20-MMP-3063	2	PULL CYLINDER MOUNT "B"
7	20-MMP-3064	1	PULL CYLINDER MOUNT "A"
8	20-BRG-1005	1	SEAL
9	20-BRG-1006	1	RETAINING NUT L.H.
10	20-BRG-1007	1	LOCKING WASHER
11	20-BRG-1008	2	TAPER ROLLER BEARING
12	20-BRG-1009	1	SEAL
13	20-HYD-110	1	HYDRAULIC CYLINDER
14	20-HYD-176	2	1/8" BLEEDER
15	20-MSC-608	1	GREASE FITTING
16	20-SWT-0024	1	FROG SWITCH
17	20-FAS-B3	2	#4-40 X 3/4" LG. RHMS
18	20-FAS-F24	10	1/4-20 X 3/4" LG. SHCS
19	20-FAS-F38	2	1/4" FLAT WASHER
20	20-FAS-G10	8	5/16-18 X 3/4" LG. SHCS
21	20-FAS-I17	4	1/2-13 X 1-1/4" LG. SHCS
22	20-FAS-MM09	4	1/2-20 HEX JAM NUT

REVISION "A" 02/04/10 ADDED ITEM SWT-0024

REVISION "B" 3/11/13 UPDATED BOM, ADDED ITEM NUMBERS,
ADDED ITEMS 13,14,21 & 22, ITEM 20 WAS 20-FAS-G8.



NOTE: ITEMS NOT SHOWN.

1 2 3

NOTE: SEE BOM SHEET.
REVISION "A"

PUSH BUTTON BOX ASSEMBLY



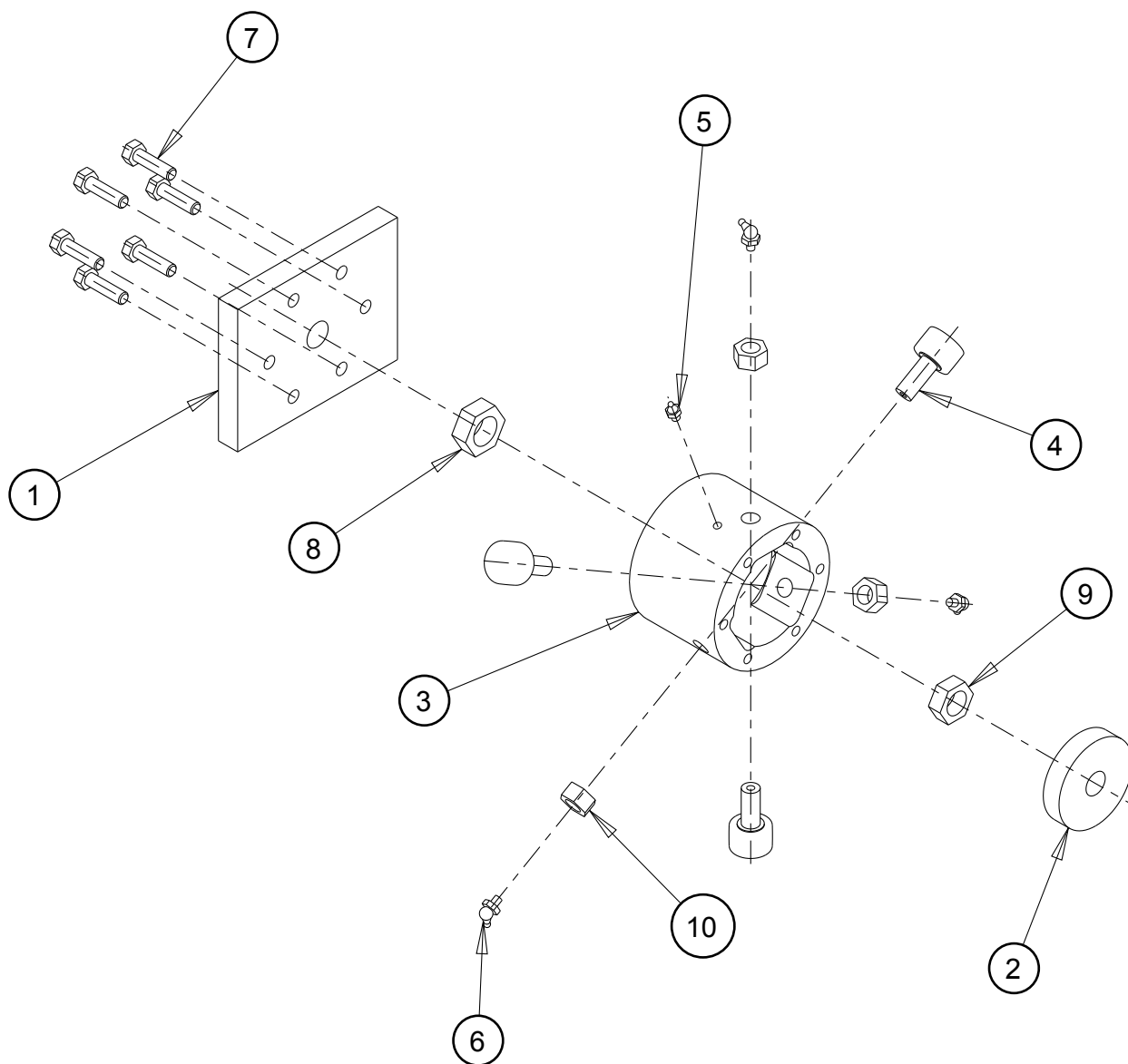
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20-MAS-11
Sheet #68

PUSH BUTTON BOX PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-EPP-0167	2	2 PIN MALE N/LOCKING
2	20-EPP-0168	1	4 PIN MALE N/LOCKING
3	20-EPP-0170	2	6 PIN FEMALE N/LOCKING
4	20-EPP-0271	1	3 HOLE PUSH BUTTON ENCLOSURE
5	20-SWT-0020	2	CONTACT BLOCK 1 NO
6	20-SWT-0021	1	CONTACT BLOCK 1 NC
7	20-SWT-0029	2	PUSH BUTTON SWITCH
8	20-SWT-0057	1	RED PUSH/PULL E-STOP

REVISION "A" 3/11/13
UPDATED BOM AND ADDED ITEM NUMBERS.



NOTE: SEE BOM SHEET
FOR REVISION.
REVISION "D" 3/14/13

ROTATION COUPLING ASSEMBLY



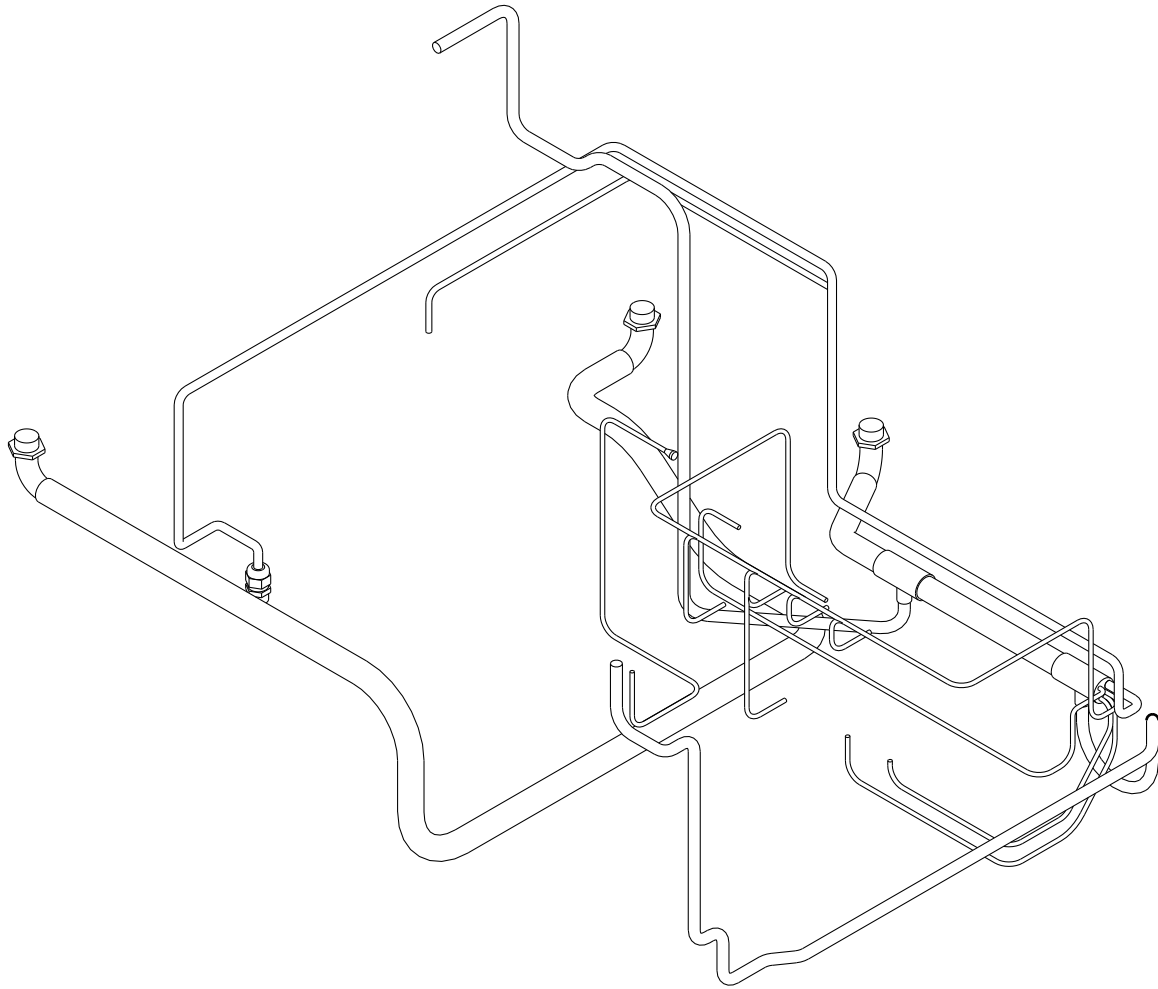
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20-MAS-12
Sheet #70

ROTATION COUPLING ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-MMP-3068	1	ROTATION COUPLING CAP
2	20-MMP-3069	1	PULL ROD INSERT
3	20-MMP-3070	1	ROTATION COUPLING BODY
4	20-BRG-1019	3	McGILL CAMROL BEARING #CCF-1SB
5	20-MSC-602	1	GREASE FITTING McMASTER CARR #1105K71
6	20-MSC-609	3	GREASE FITTING McMASTER CARR #1102K44
7	20-FAS-G4	6	5/16-18 X 1" LG. HHCS
8	20-FAS-K1	1	3/4-16 HEX JAM NUT
9	20-FAS-MM-06	1	5/8-11 HEX NUT L.H. THREAD
10	20-FAS-MM-10	3	7-16-20 HEX NUT

REVISION "C" - REMOVED ITEMS 20-MMP-3088,
 20-FAS-MM11 AND 20-FAS-SPRING8, ADDED 20-FAS-K1.
 REVISION "D" 3/14/13 - UPDATED BOM AND ADDED ITEM NUMBERS,
 ADDED ITEM #8.



NOTE:

1. THIS DRAWING IS NOT TO BE USED FOR WIRE ROUTING.
SEE 20-MAS-13 BOM FOR MATERIAL CALLOUT.
2. SEE 20-MAS-13 BOM SHEET FOR REVISIONS.
REVISION "A" 3/18/13.

WIRING HARNESS ASSEMBLY



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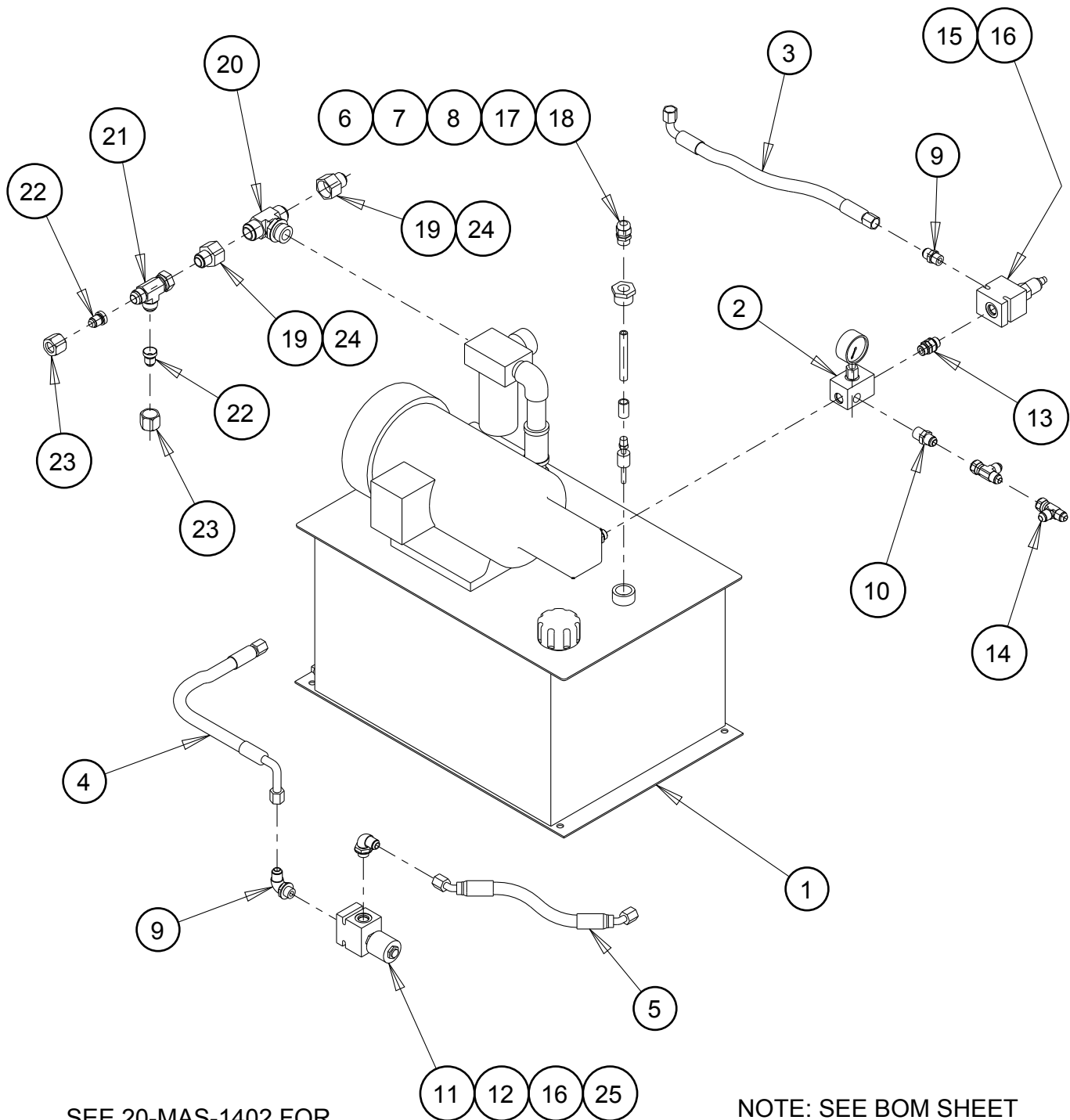
20-MAS-13
Sheet #72

WIRING HARNESS ASSEMBLY PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	20-EPP-0149	50	1/2" PVC CONDUIT
2	20-EPP-0154	25	8" CABLE TIE
3	20-EPP-0157	1	1/8" HEAT SHRINK
4	20-EPP-0256	2	1/2" CONDUIT LOCKNUT
5	20-EPP-0277	16	TIE WRAP MOUNTING PLATE
6	20-EPP-0281	2	CORRUGATED TUBING FITTING
7	20-EPP-0282	120	.42" CORRUGATED TUBING
8	20-EPP-0283	60	.76" CORRUGATED TUBING
9	20-EPP-0338	2	3/4 TO 1/2 REDUCER
10	20-EPP-0339	2	1/2" FLEX CONDUIT ELBOW
11	20-WIR-813	25	#18 YELLOW
12	20-WIR-816	9	6 COND 20 AWG
13	20-WIR-847	34	#18 ORG MTW-STR
14	20-WIR-854	8	#18 2 COND - GREY
15	20-WIR-858	10	#18 RED
16	20-WIR-859	1	#18 BLACK
17	20-WIR-860	20	#18 BLUE
18	20-WIR-866	5.50	#12 BREEN
19	20-WIR-867	16.50	#12 BLACK
20	20-WIR-868	1	#18 GREEN
21	20-FAS-RIVET#02	16	3/16" - 1/4" GRIP RANGE

NOTE:

REVISION "A" 3/18/13 - UPDATED PER BILL OF MATERIALS REPORT.



SEE 20-MAS-1402 FOR
HYDRAULIC SCHEMATIC

NOTE: SEE BOM SHEET
FOR REVISION.
REVISION "A" 3/18/13

HYDRAULIC POWER UNIT ASSEMBLY



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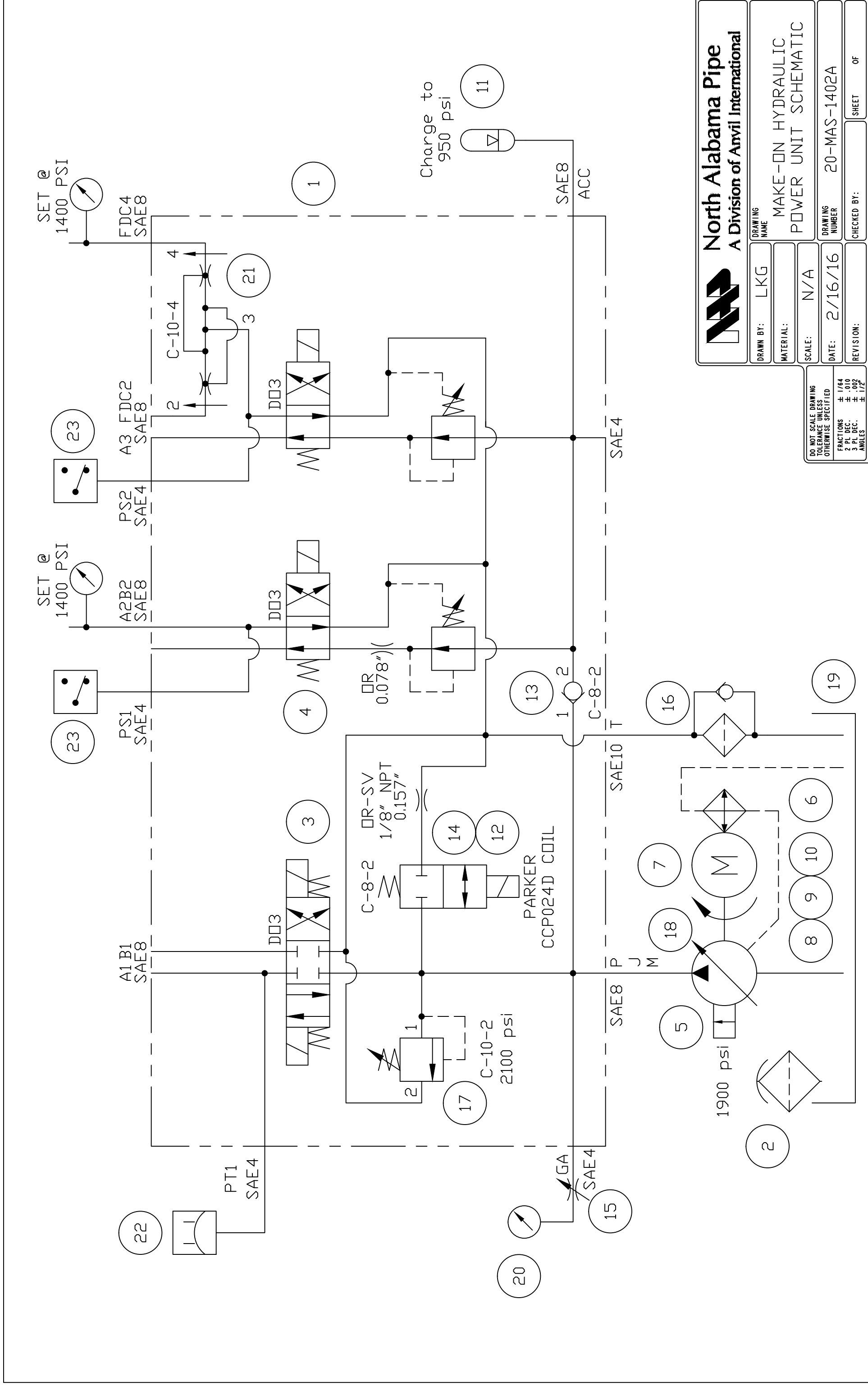
20-MAS-14
Sheet #74

HYDRAULIC POWER UNIT ASSEMBLY PARTS LIST

ITEM	ASSEMBLY PART NO.	PART NO.	QTY	DESCRIPTION
1	20-MAS-1401		1	HYDRAULIC POWER UNIT
2		20-MMP-3110	1	PRESSURE GUAGE MOUNT BLOCK MODIFICATION
3	20-MAS-0628	20-HYD-120	1	WEATHERHEAD JIC 37° SWVL LONG DROP 90° 1/2" #08U-648
		20-HYD-121	1	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
		20-HYD-137	1	WEATHERHEAD 10092 #H42508 HOSE ϕ 1/2" X 16" LG.
4	20-MAS-0629	20-HYD-120	1	WEATHERHEAD JIC 37° LONG DROP SWVL 90° 1/2" #08U-648
		20-HYD-121	1	WEATHERHEAD JIC 37° SWVL ST ADAPT 1/2" #08U-608
		20-HYD-137	1	WEATHERHEAD 10092 #H42508 HOSE ϕ 1/2" X 17" LG.
5	20-MAS-0630	20-HYD-193	2	WEATHERHEAD JIC 37° SWVL 45° EL #08U-688
		20-HYD-137	1	WEATHERHEAD 10092 #H42508 HOSE ϕ 1/2" X 10-1/4" LG.
6		20-AIR-448	1	1/4" NPT COUPLING
7		20-AIR-533	1	1/4" PIPE NIPPLE X 4" LG.
8		20-EPP-0135	1	SMALL STRAIN RELIEF
9		20-HYD-111	2	WEATHERHEAD 37° JIC O-RING 90° EL #C5515X8
10		20-HYD-115	1	WEATHERHEAD 37° JIC TO MNPT CONNECTOR #C5205X8X8
11		20-HYD-150	1	VALVE SOLINOID
12		20-HYD-153	1	VALVE
13		20-HYD-169	1	WEATHERHEAD S.A.E. O-RING UNION #C5314X8X8
14		20-HYD-170	2	WEATHERHEAD SWIVEL NUT RUN TEE #C5706X8
15		20-HYD-179	1	PRESSURE REGULATOR VALVE
16		20-HYD-180	2	VALVE BODY
17		20-HYD-184	1	LEVEL SWITCH/TEMP
18		20-HYD-185	1	LEVEL SWITCH MOUNT BUSHING
19		20-HYD-196	2	WEATHERHEAD 37° JIC REDUCER #C5015X16X12
20		20-HYD-197	1	WEATHERHEAD STRGHT THRD O-RING BRANCH TEE #C5715X16
21		20-HYD-198	1	WEATHERHEAD SWIVEL NUT RUN TEE #C5706X12
22		20-HYD-199	2	WEATHERHEAD REDUCER #C5015X12X8
23		20-HYD-200	2	WEATHERHEAD NUT 3 PIECE #C5105X12
24		20-HYD-201	2	WEATHERHEAD 3 PIECE NUT #C5015X16
25		20-FAS-F56	2	1/4-20 X 2-1/4" LG. SHCS

REVISION "A" 3/18/13
 UPDATED BILL OF MATERIAL AND ITEM NUMBERS.

20-MAS-14 BOM
 Sheet #75



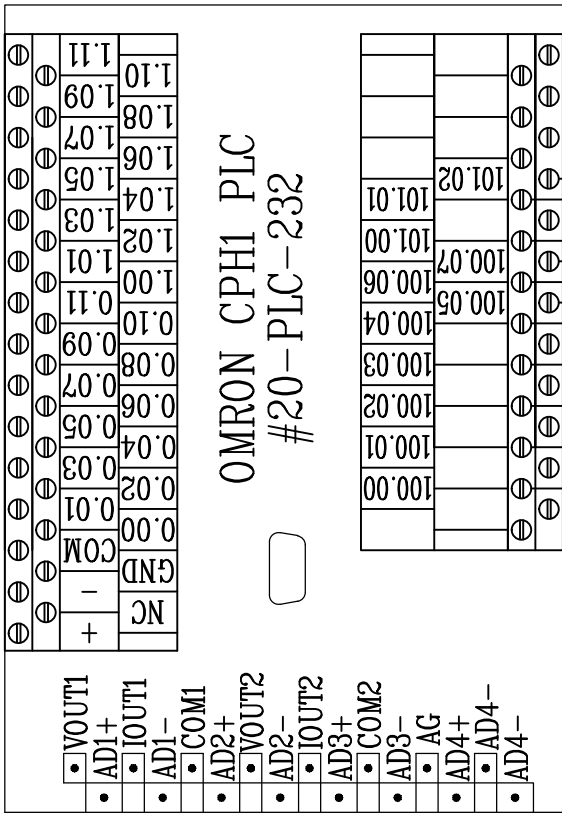
MAKE-ON HYDRAULIC POWER UNIT SCHEMATIC PARTS LIST

ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	C-46489	DAMAN MANIFOLD
2	1	P565858	DONALDSON TRAP BREATHER
3	1	DS3-S1/10N-D24K1	DUPLOMATIC 3 POSITION 4 WAY VALVE
4	2	DS3-T1/10N-D24K1	DULLOMATIC 2 POSITION 4 WAY VALVE
5	1	VPPL-008PC5-R00B/20N	DUPLOMATIC PUMP
6	1	2015K-MM-3P-JE	EMMEGI HEAT EXCHANGER
7	1	HH15-18-184TC	HUNDAI 5 HP MOTOR
8	1	11338	LOVEJOY COUPLING
9	1	11344	LOVEJOY COUPLING
10	1	11492	LOVEJOY INSERT
11	1	AD032BT9A1	PARKER ACCUMULATOR
12	1	CCPD24D	PARKER COIL
13	1	CVH081P	PARKER CHECK VALVE
14	1	DSL082C	PARKER SOLENOID
15	1	N420S	PARKER NEEDLE VALVE
16	1	PT2205QBPGS121	PARKER FILTER
17	1	RD102S30	PARKER RELIEF VALVE
18	1	1960	VESCOR BELL HOUSING
19	1	5141	VESCOR RESERVOIR
20	1	AHP3K2.5BMSAEST	WINTERS GAUGE
21	1	FDC101A33	PARKER FLOW DIVIDER/COMBINER
22	1	LE33000	WINTERS PRESSURE TRANSDUCER 4-20 mA.
23	2	CD-1A6-10001/HR	NASON PRESSURE SWITCH
24	1	57144	GEMS TEMP/LEVEL SWITCH



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WIRE COLOR LEGEND	
R	- RED
Y	- YELLOW
GY	- GRAY
GR	- GREEN
B	- BLUE
W	- WHITE
BK	- BLACK
O	- ORANGE
BR	- BROWN
V	- VIOLET
GR/Y	- GREEN/YELLOW
BK1	- BLACK
BK2	- BLACK



CONNECT TO TERMINAL A2-
ON PLC RELAY.

NOTE: INSTALL RELAY JUMPER BLADE
ITEM #9 (20-EPP-0309) TO TERMINALS
A1+ & 11 OF PLC RELAY.

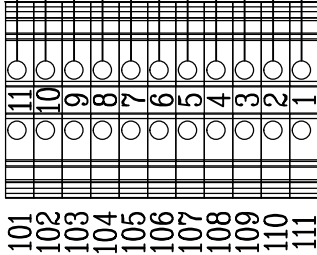
PLC RELAY
ITEM #7 (20-EPP-0274)
QTY - 11

DIODE ITEM #3 (20-EPP-0262)
QUANTITY 11

DOUBLE TERMINAL
BLOCK ITEM #33 (20-PLC-237)
QTY - 11

CONNECT TO TERMINAL 14-
ON PLC RELAY.

Notes:
1. See Sht. #3 for drawing notes.

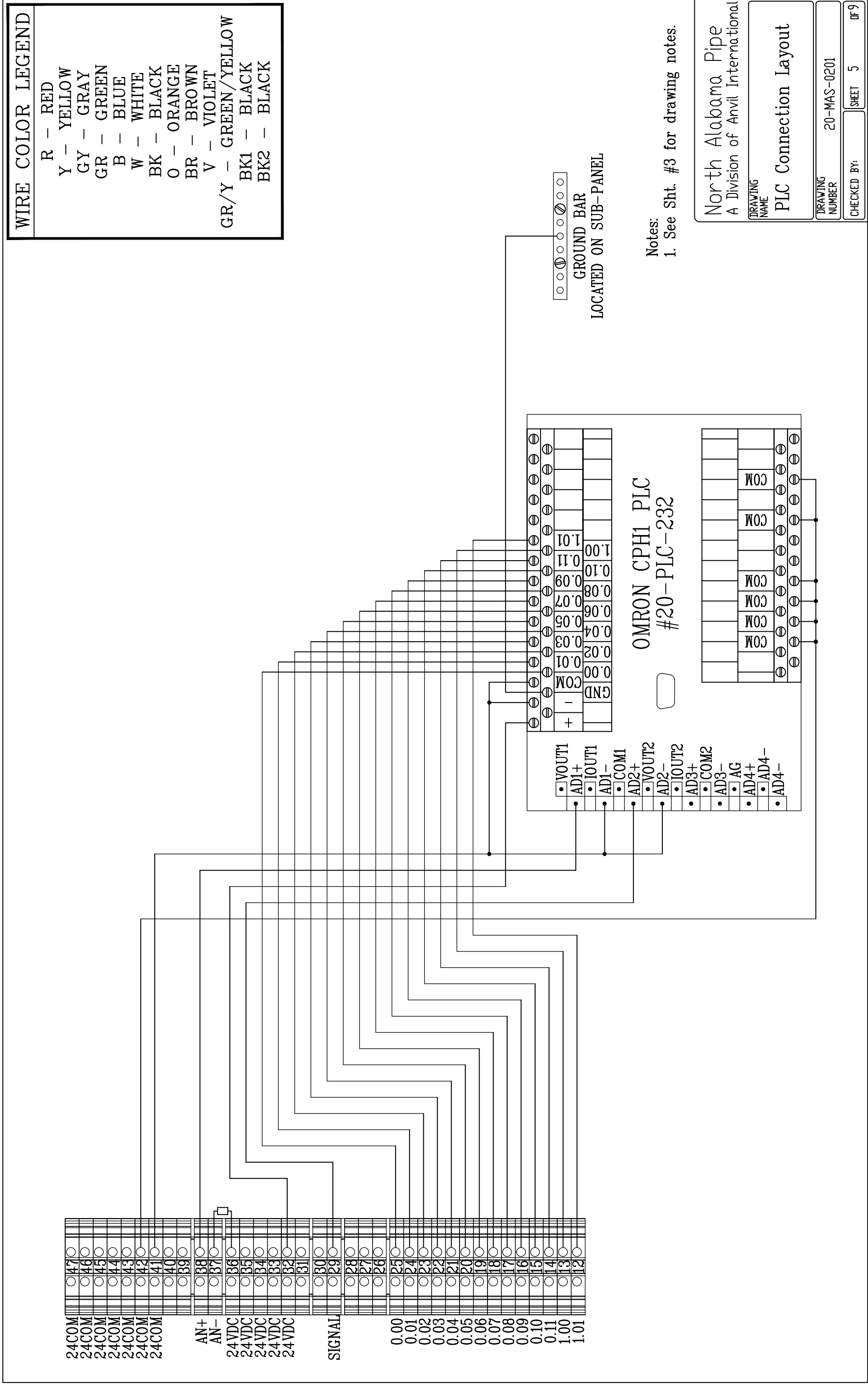


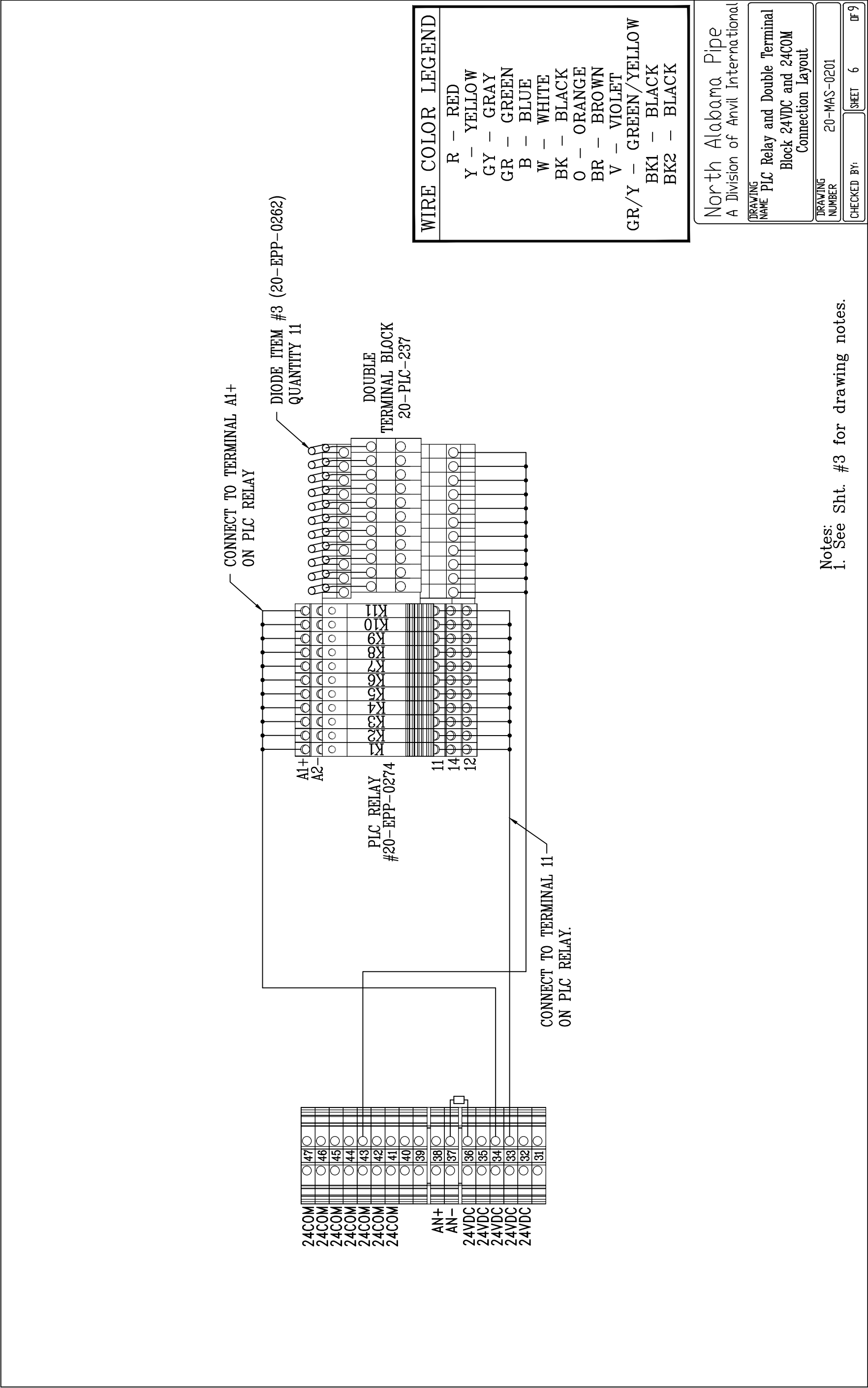
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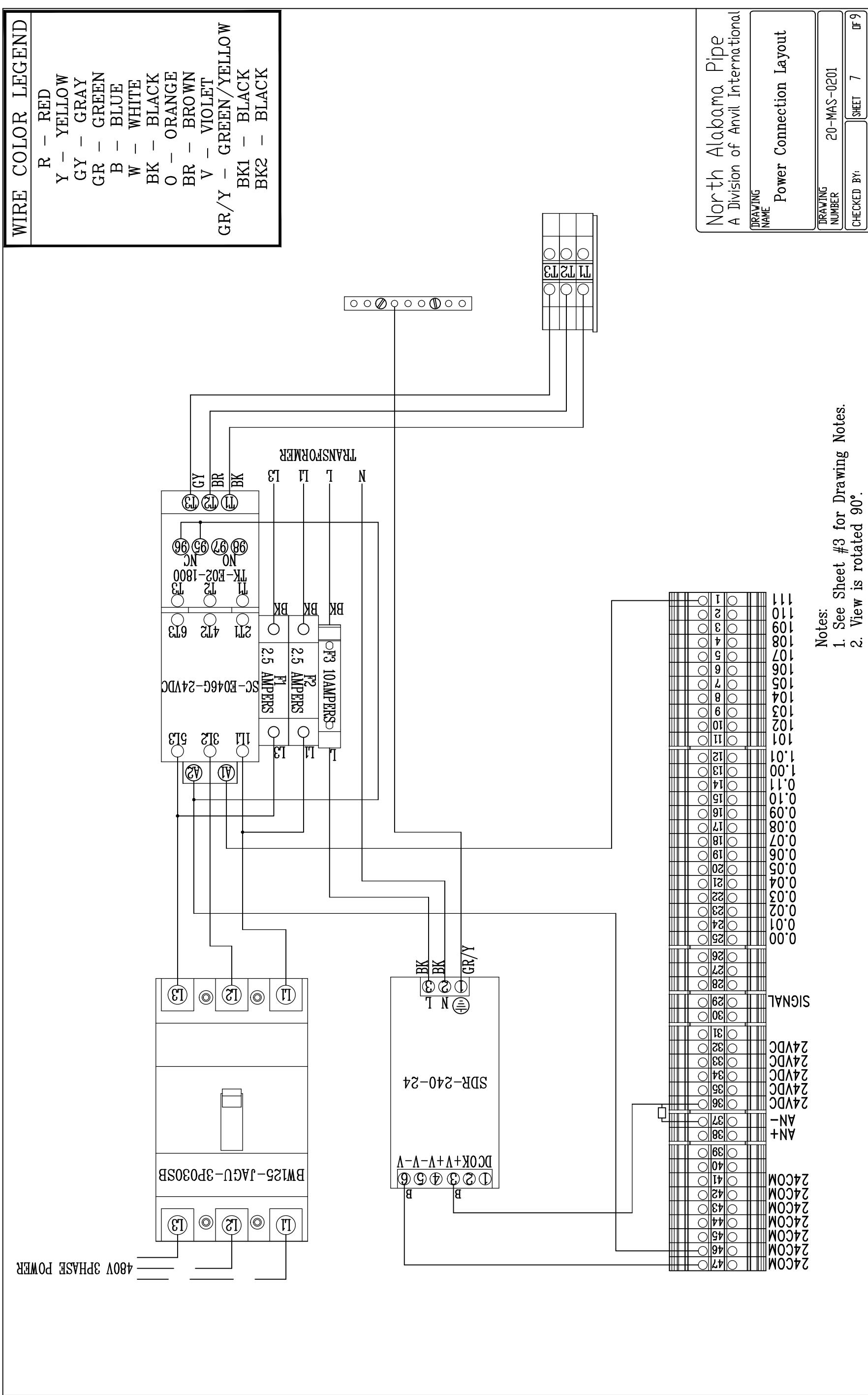
DRAWING
NAME
PLC to PLC Relay and Double
Terminal Block Connection Layout

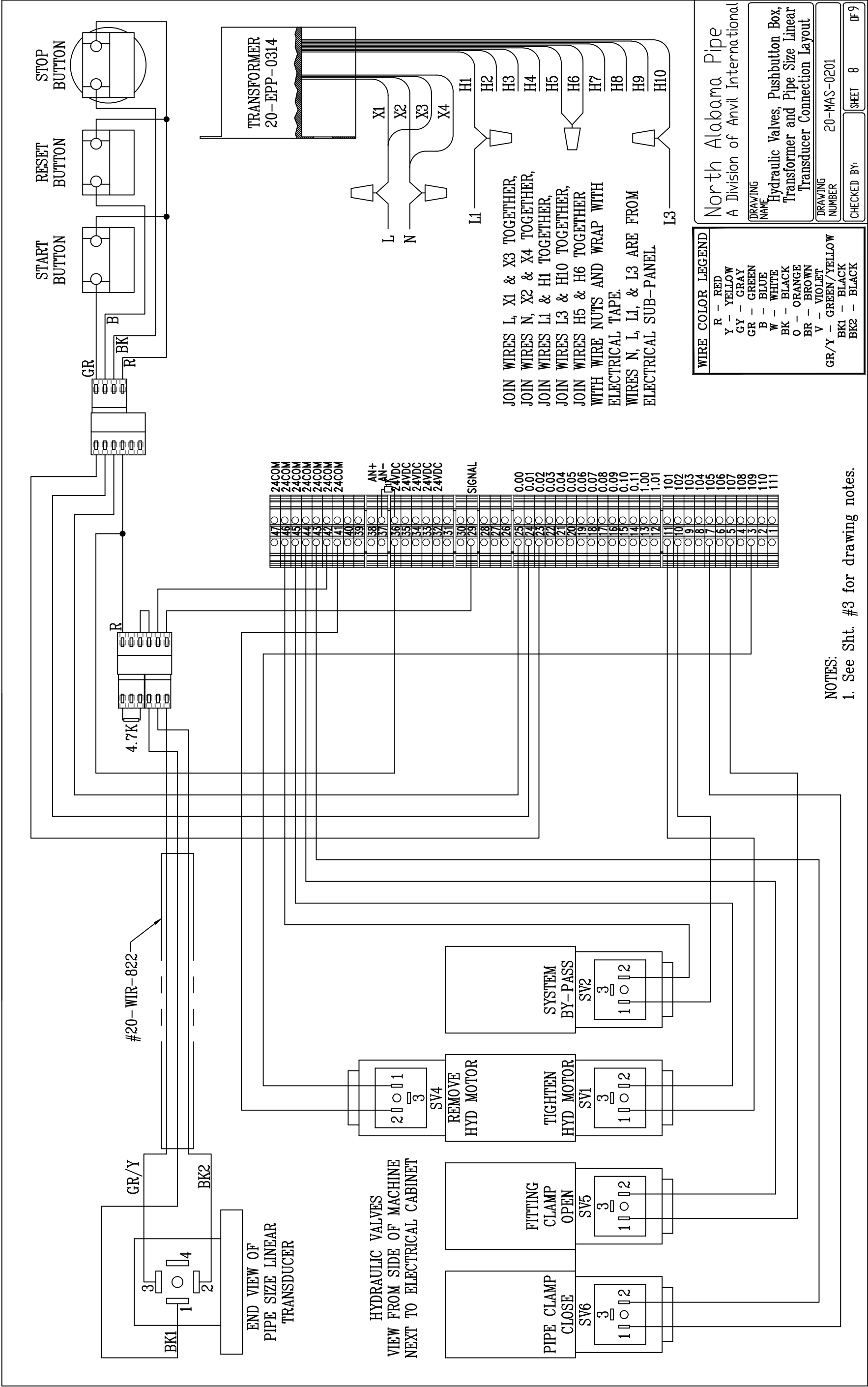
DRAWING
NUMBER
20-MAS-0201

CHECKED BY: SHEET 4 OF 9



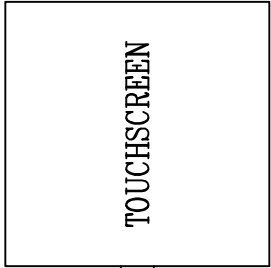






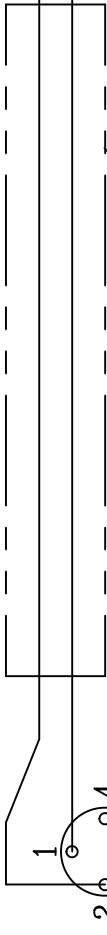
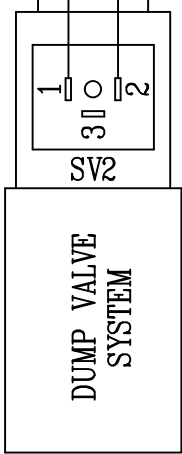
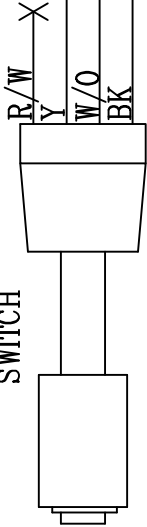
NOTES:
1. See Sht. #3 for drawing notes.

WIRE COLOR LEGEND	
R	– RED
Y	– YELLOW
GY	– GRAY
GR	– GREEN
B	– BLUE
W	– WHITE
BK	– BLACK
O	– ORANGE
BR	– BROWN
V	– VIOLET
GR/Y	– GREEN/YELLOW
BK1	– BLACK
BK2	– BLACK

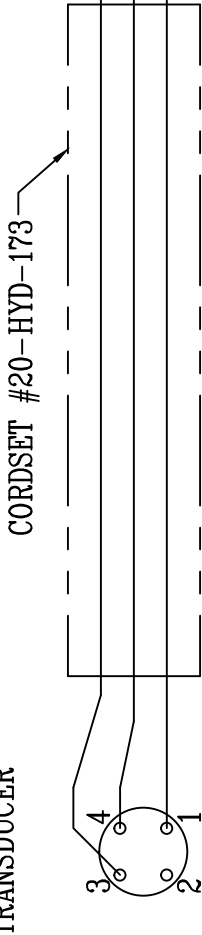


47	24COM	AN+	24VDC	0.00
46	24COM	AN-	24VDC	0.01
45	24COM		24VDC	0.02
44	24COM		24VDC	0.03
43	24COM		24VDC	0.04
42	24COM		24VDC	0.05
41	24COM		24VDC	0.06
40				0.07
39				0.08
38				0.09
37				0.10
36				0.11
35				1.00
34				1.01
33				101
32				102
31				103
30				104
29				105
28				106
27				107
26				108
25				109
24				110
23				111
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LEVEL/TEMPERATURE
SWITCH

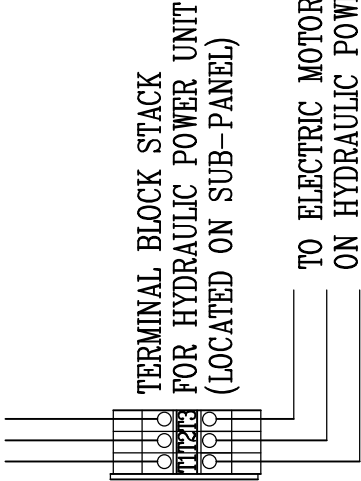
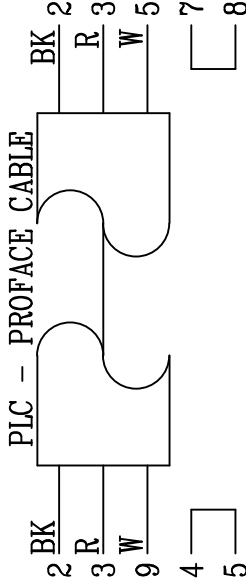
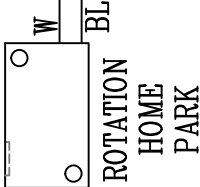
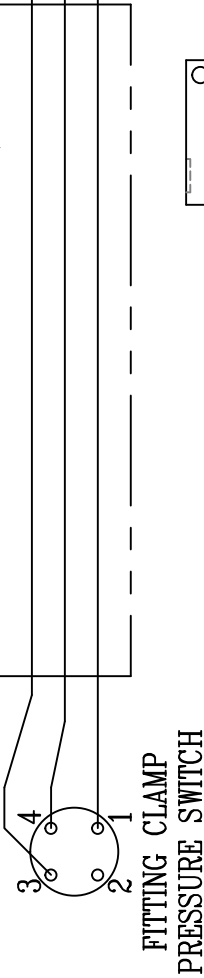


CORDSET #20-HYD-173



CORDSET #20-HYD-173

CORDSET #20-HYD-173



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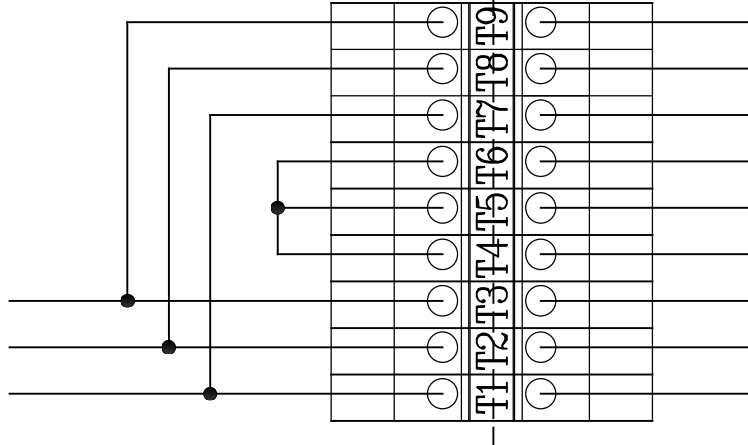
DRAWING NAME	Pressure Transducer, Pressure Switches, Dump Valve, Level/Temp Switch, Touchscreen, PLC, Proface Cable, Rotation Home Park Switch and Terminal Block Stack for Hydraulic Power Unit Motor Connection Layout
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DRAWING NUMBER	20-MAS-0201
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CHECKED BY:	SHEET 9	OF 9
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- NOTES:
- See Sht. #3 for drawing notes.

L1 L2 L3

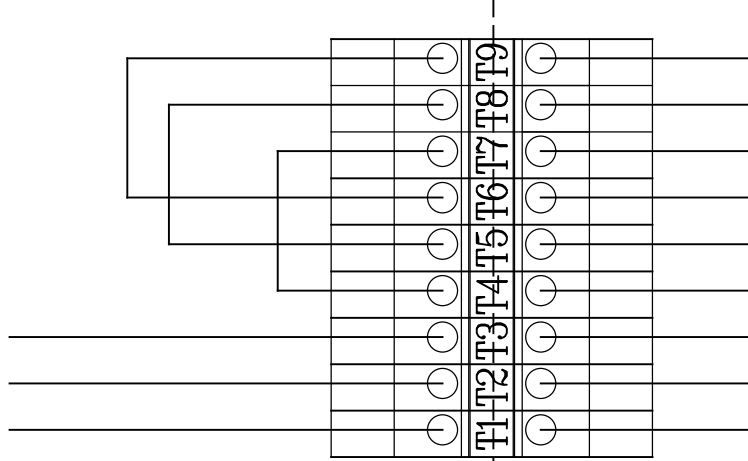


WIRING TO BACK PANEL COMPONENTS

WIRING TO MOTOR WEATHERHEAD

LOW VOLTAGE - 208/240V

L1 L2 L3



HIGH VOLTAGE - 460/480V

NOTES:

1. THE WIRING LAYOUT SHOWN DOES NOT REPRESENT THE ACTUAL ROUTING OF THE WIRES, JUST THE POINTS OF CONNECTION.



North Alabama Pipe Corporation

DRAWN BY: AHB	DRAWING DESCRIPTION: MAKEON 3 PHASE VOLTAGE CONNECTIONS
MATERIAL: N/A	FILE NAME
SCALE: N/A	DATE: 06/16/16
DO NOT SCALE DRAWING TOLERANCE UNLESS OTHERWISE SPECIFIED	
FRACTIONS ± 1/64 2 PL DEC: ± .010 3 PL DEC: ± .002 ANGLES ± 1/2°	
SHEET 1 OF 1	