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This manual may not be complete in all aspects of product maintenance and repair. **All products should be used only by qualified and properly trained personnel, following proper safety procedures.** All products should be regularly inspected and maintained, and their condition, application and use should be periodically evaluated by qualified personnel. Only qualified and properly trained technicians should perform maintenance, repair and replacement procedures. Attempting these procedures without proper training may cause machine damage or operator injury!

Products may be unsupported by The Challenge Machinery Company due to age or the unavailability of parts from their original manufacturer. No parts or product support will be available to repair or maintain unsupported products. Older products may not be UL listed (if the product does not have a UL label it is not a listed product), and may not comply with applicable installation or other regulations or requirements if relocated to a new facility. Many municipalities require a product to be UL listed before an electrician will connect power to them. Often the cost of updating an older product to comply with current safety regulations is greater than the value of the product.



**The Challenge Machinery Company**  
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Norton Shores, MI 49441-6081 USA

ChallengeMachinery.com

## ***MODEL MS-10B***

### ***Technical Service and Parts Manual***

**Serial Numbers:**  
095305 through 159999,  
MS10-B-159999 and up

*Sold and Serviced by*

**F.399-DT**  
August 2015

# 1.0 Introduction

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THIS MANUAL is designed to help you get the most from your Challenge equipment. Keep this manual in a safe, convenient place for quick reference by operators and service personnel.



## CAUTION

**SAFETY ALERT!** This symbol means **CAUTION: Personal safety instructions!** Pay special attention to the instructions in bold type. Personal injury may result if the precautions are not read and followed.

**READ THIS MANUAL BEFORE OPERATING!** Follow precautions and instructions given and you should have years of trouble-free operation. If after reading the manual questions still remain, contact your Authorized Challenge Dealer.

**FOR PARTS AND SERVICE,** contact the Authorized Challenge Dealer from whom you purchased your machine. Use the illustrations and parts lists at the back of this manual to identify the correct parts needed. Always give the **SERIAL NUMBER** and **MODEL** of your machine to insure the correct parts are sent as soon as possible.

Take a few minutes right now to **RECORD YOUR MACHINE SERIAL NUMBER** in the space provided below. Also be sure to fill out the warranty card accompanying your machine and return it **DIRECTLY TO CHALLENGE.**

If you bought a used machine, it is important to have the following information on record at Challenge. Copy this page, fill in the information and send it care of The Challenge Service Department, 6125 Norton Center Drive • Norton Shores • MI 49441-6081.

CHALLENGE MODEL	SERIAL NUMBER	
ATTN	COMPANY	
ADDRESS		
CITY	STATE/PROVINCE	ZIP
PHONE	DATE INSTALLED	
DEALER NAME & CITY		

### \* WARRANTY INFORMATION \*

It is very important that you read and understand the conditions outlined in the *Warranty Information Sheet* attached to the outside of the shipping container of your machine.

The *Warranty Information Sheet* must be filled out completely and returned to THE CHALLENGE MACHINERY COMPANY in order for the warranty to be issued for this machine.

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# 2.0 Safety

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## 2.1 Precautions

- This machine is designed for one-person operation. Never operate the machine with more than one person.
- Safe use of this machine is the responsibility of the operator. Use good judgment and common sense when working with and around this machine.
- Read and understand all instructions thoroughly before using the machine. If questions remain, contact the dealer from which you purchased this machine. Failure to understand the operating instructions may result in personal injury.
- Only trained and authorized people should operate this machine.
- Do not alter safety guards or devices. They are for your protection. Severe personal injury may result.
- Disconnect power before cleaning or performing maintenance. See Section 2.2 Power Lockout Procedure.
- Observe all caution labels on this machine.
- High Speed Drill - Keep rags, loose clothing and long hair away from rotating drill. Personal injury could result from items being caught on drill.
- Keep foreign objects off table and away from drill.
- Be extremely careful when handling and changing the drills. Severe lacerations or dismemberment could result from careless handling procedure.
- Keep the floor around the machine free of trim, debris, oil and grease.
- If the machine sounds or operates abnormally, turn it off and consult the Trouble Shooting section of this manual. If the problem cannot be corrected, have it checked by a qualified service person or your Authorized Challenge Dealer.
- CRUSH HAZARD, keep feet off the pedal when handling paper under the pressure feet. DO NOT REST FOOT ON PEDAL at any time!
- DO NOT REACH UNDER THE DRILL AREA!
- DO NOT OPERATE WITH ANY GUARDS REMOVED! Replace all guards after adjusting, lubricating or servicing the machine.
- Severe Lacerations - Contact with high-speed drill could cause severe injury. Always turn machine off and wait for drill to stop before removing drill bits. Keep hands away from drill(s) when operating.

## 2.2 Power Lockout Procedure

For maximum safety when making adjustments or repairs to your machine, be sure to lock out the main power control switch to which the machine is connected. The switch should be moved to the OFF position and a padlock placed in the loop. The person servicing the machine should hold the key.

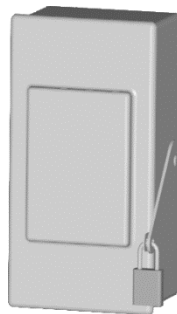


Figure 1

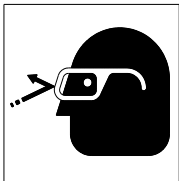
### 2.3 Warning Label Definitions

The following warning labels are found at various locations on your machine. Read and understand the meaning of each symbol. If a label is lost from the machine, it should be replaced. The item number and location of each label can be found in Section 17.0, Schematics and Parts List.



**HAZARDOUS AREA**

Disconnect power before cleaning, servicing, or making adjustments not requiring power. Do not alter safety guards or devices; they are for your protection. Replace all guards. Do not operate with any guards removed.



**EYE WEAR**

Always wear eye protection when operating this machine.



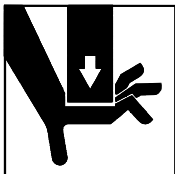
**SHOCK HAZARD**

Disconnect power before removing cover. Replace cover before operation.



**SINGLE OPERATOR**

Do not operate with more than one person.



**CUT/CRUSH HAZARD**

Keep hands from under drills.

## 3.0 Maintenance Guide

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# **NOTICE**

**The instructions on the following pages are for the use of trained service personnel only!**

**Attempting to perform repair and replacement procedures without proper training may cause machine damage or operator injury!**

**PARTS CUSTOMERS:** The Challenge Machinery Company provides parts with the express understanding that they are to replace parts found missing or no longer serviceable on equipment designed and/or manufactured by Challenge. The Challenge Machinery Company assumes no liability for any modification or alteration to any Challenge products, and any such modification or alteration to any Challenge product is not authorized by The Challenge Machinery Company. Any modification or alteration of any Challenge product will void any remaining warranty.

## 3.1 Routine Maintenance

### General

Production losses can be reduced if good maintenance practices are followed. The following suggestions may be helpful:

1. Recognize the fact that the user of hydraulic equipment has more control over maintenance than the manufacturer.
2. Technicians should be familiar with use, care, and limitations of the equipment. Technicians and/or maintenance personnel **SHOULD READ THIS MANUAL COMPLETELY**.
3. Use properly trained maintenance personnel.
4. Establish a program of systematic preventative care for your equipment or put this machine on an existing preventative maintenance program.
5. Analyze and isolate trouble before having any part of the equipment dismantled.
6. Be aware of how your machine should sound and perform. If the machine is not operating properly or if it doesn't "sound right", stop running your job immediately and try to identify the problem.
7. Call the dealer for any problems that cannot be handled by your own personnel.



Always handle drills with care to avoid severe lacerations, even dull drills are sharp enough to cause lacerations.

### Daily

1. **Keep drills sharp!** Sharpen drills often and reset the drill depth if needed.
2. Lubricate the hollow drills frequently with the Drillease provided.
3. For better hollow drill life, remove the drills when not in use and soak in light oil. Wipe off excess oil before drilling.
4. Oil the vertical gibs through the two oil ports in the top cover of the machine. Wipe excess oil from the bottom of the gibs.
5. Wipe off excess grease from the spline shaft and drill heads.

### Weekly

1. Spray the chip chute with silicone spray to prevent the drill chips from sticking and piling up.
2. Grease the drill heads with the grease gun provided in the tool kit.

### Monthly

1. Oil the spindle adjusting knob shaft with light machine oil. Wipe off excess oil.
2. Oil the front and rear trip bar bracket.
3. Check the hydraulic oil for the proper level. This check is made by removing the rear panel and visually inspecting the level of the oil in the clear reservoir. The oil should be filled to the fill line on the tank. Use only an ISO VG 100 hydraulic fluid when refilling or replacing. (See Recommended Oils below.)

### 3.1.1 Recommended Hydraulic Oils



Use one of the recommended oils or an ISO VG 100 Hydraulic Fluid equivalent only. Oils other than the recommended type will cause seals and O-rings to deteriorate. Unsafe operating conditions will result.

<u>Oil Name</u>	<u>Distributor</u>
Rykon No. 100	AMOCO
Duro AW Oil 465	Arco
AW Machine Oil 100	Chevron
Pacemaker XD No. 100	Citgo
Super Hydraulic 100	Conoco
Nuto H-100	Exxon
Harmony 100 AW	Gulf
HO 2A Hydraulic Oil	Lubriplate
DTE No. 18	Mobil
Pennzoil AW 100	Pennzoil
Magnus A Oil 215	Phillips
Tellus 100	Shell
Energol HLP 100	Sohio
Industron 100	Std. Oil
	Indiana/Boron
Sunvis 851 WR	Sun Oil Co.
Rando HD 100	Texaco
Unax AW 100	Union Oil Co.

#### Yearly

1. Check all adjustments.
2. Tighten all hardware.
3. Replace hydraulic fluid.
4. Grease lift springs.

#### HYDRAULICS

Through normal use, hydraulic fluid breaks down and seals leak. Signs of wear may be leaks and/or erratic operation.

#### DRILL HEADS

Through normal use, bearings, gears and bushings will wear and need replacing. Signs of wear are excessive noise, heat, or loose spindles.

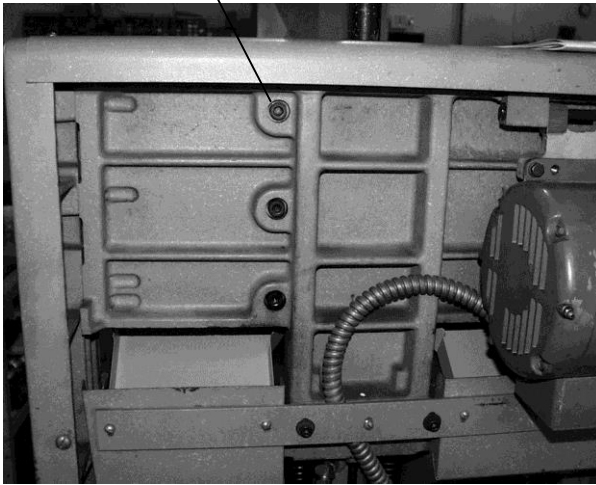


## 3.2 Maintenance Adjustments

### 3.2.1 Adjusting the Dovetail and Gibs

When play is detected between the vertical dovetail and the gibs, loosen the three cap screws that secure the gib and loosen the three jam nuts that lock the gib adjusting screws. (See below.)

Cap screws



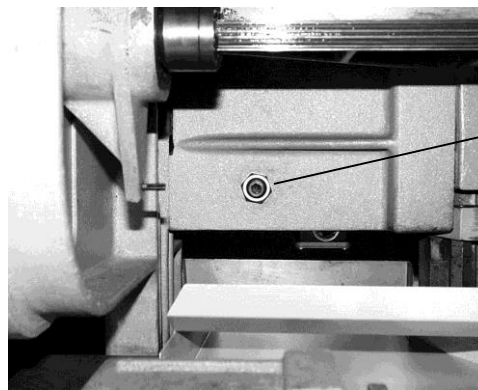
Adjusting screws and Jam nuts



Tighten the two upper adjusting screws while the drill head is up. Block the head in the down position and tighten the bottom adjusting screw. It is important that the head be behind the screw being adjusted. After adjusting, retighten the cap screws and jam nuts. **Note: If the gib is too tight the head will not return to the full up position.**

### 3.2.2 Adjusting the Drive Belt

Always avoid excessive or insufficient belt tension. The belt must be kept just tight enough to drive the spline shaft and keep the drills for plugging/breaking. The chip chute must be lowered to access the adjusting screw. The belt is adjusted by loosening the lock nut on the adjusting screw and turning the screw in to increase belt tension.



Lock nut and adjusting screw.

### 3.2.3 Tightening the Drill Heads

If you have trouble holding a depth setting with a drill head, remove the head from the machine and tighten the allen screw on the back of the head. This will put more tension on the adjusting spindle.

### 3.2.4 Adjusting the Backgauge

If there is side to side play in the backgauge as it is moved front to back in the table, Tighten the adjusting screws located on the top of the backgauge (see Main Assembly – Table).

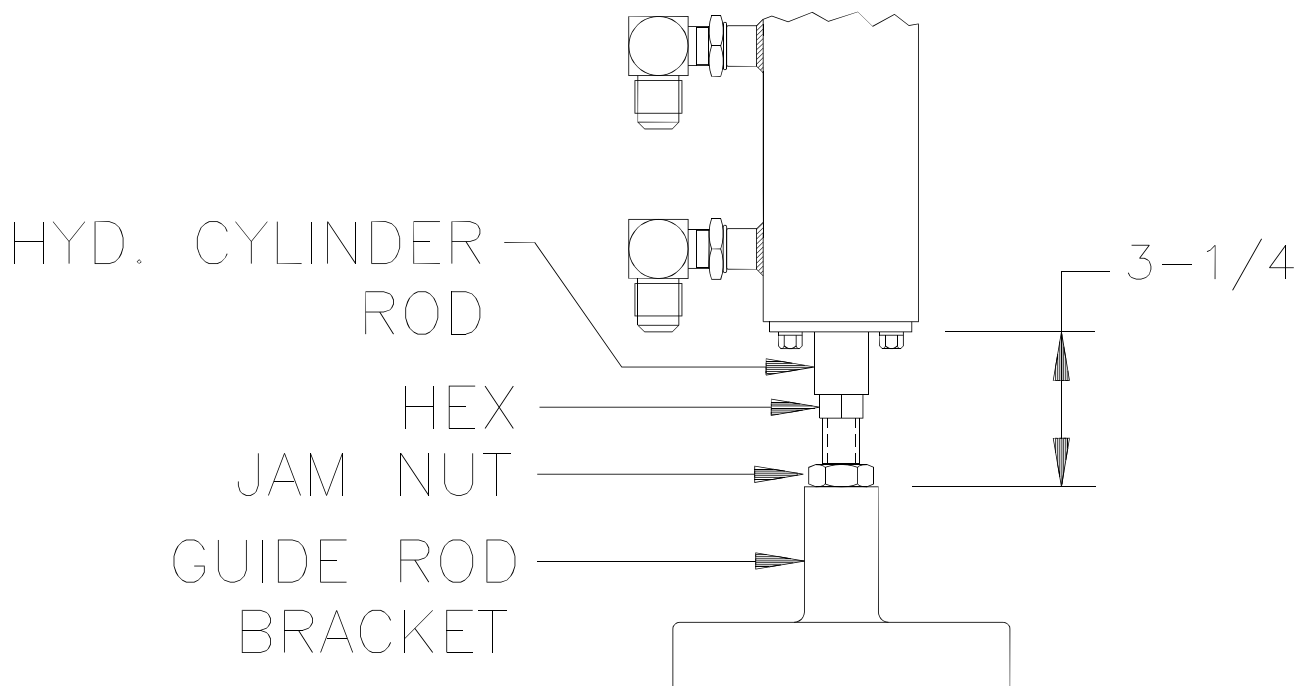
### 3.2.5 Adjusting the Cylinder

The MS10-B Paper Drill is designed to allow a 2-1/2" pile under the pressure feet and provide adjustment for approximately 7/8" of drill life. In order to obtain these results, it is necessary to maintain a specific set-up dimension for the cylinder (see drawing below).

It is important that this dimension be maintained so that when the drill heads and the spindles are adjusted for the maximum amount of drill life, the spindle drive pulley will not hit the inside of the (L.H.) side frame. It is recommended that this dimension be periodically checked.

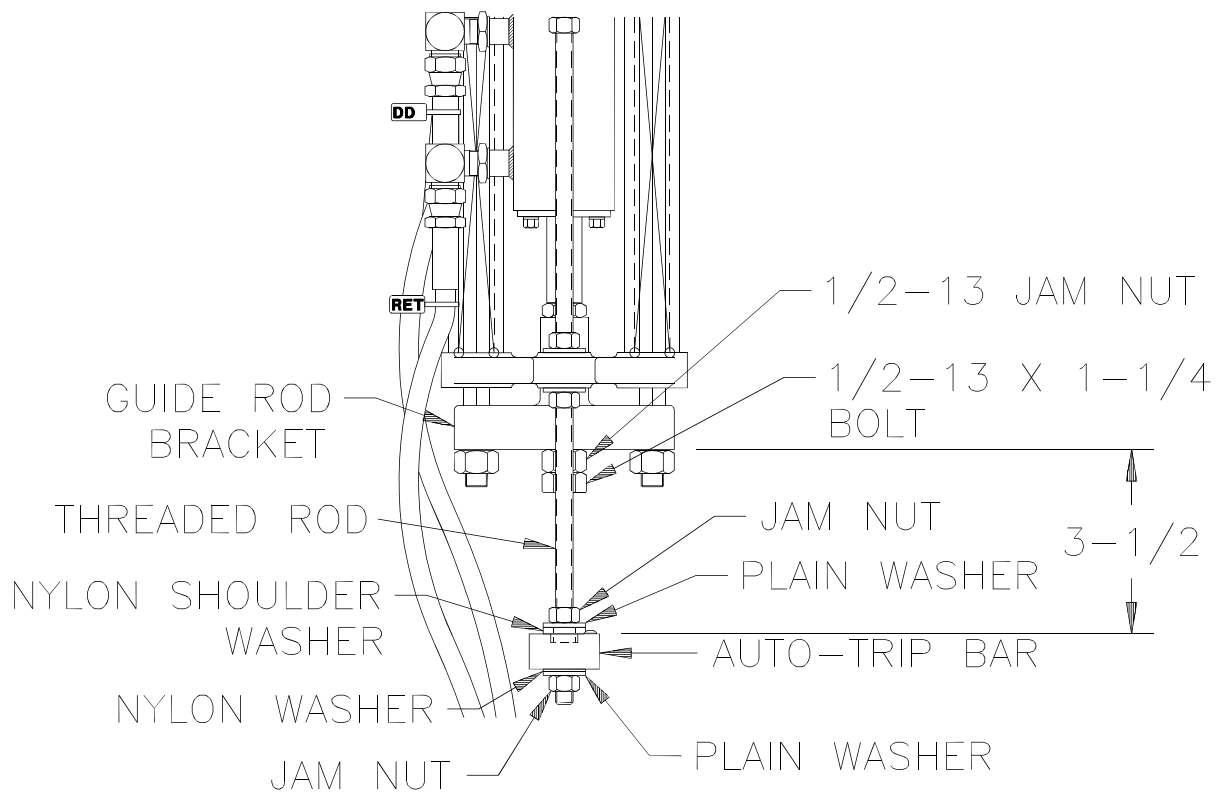
If adjustment is necessary, follow this procedure:

- 1) Disconnect the power and lock it out (see Power Disconnect Procedure, page 4).
- 2) Use the handwheel to raise the spindles and heads to their high point as when changing drills
- 3) Remove the rear panel from the machine
- 4) Loosen the hex jam nut on the hydraulic cylinder rod
- 5) Turn the cylinder rod in or out of the guide rod bracket (part no. 6515) to the set-up dimension shown
- 6) Secure the hex jam nut on the cylinder rod
- 7) Follow procedure for setting drills.



Auto-trip adjustment – The auto-trip mechanism on this machine works like a switch being closed. The lower auto trip bar is isolated from the rest of the machine and when the guide rod bracket is brought down as in a drilling cycle, the bolt on the under side of the guide rod bracket touches the auto-trip bar, completing the circuit that turns the hydraulic valve off thus sending the drill heads back up.

To adjust the Auto-trip, screw the ½” bolt and the jam nut on the bottom of the guide rod bracket all the way up and tighten. Now following the detail below, bring the auto trip bar up the threaded bars until it is 3-1/2” away from the bottom of the guide rod bracket. Bring the two lower jam nuts up to the auto-trip bar. Bring the two upper hex jam nuts down to the auto-trip bar and tighten securely. With a continuity meter – check that the auto trip bar is isolated from the guide rod bracket. (see the detail below)



# 4.0 Troubleshooting

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**CAUTION** Never work on this machine with the power on unless the instructions say the machine power must be on. Lock the power off at the wall disconnect switch. See 2.2 Power Lockout Procedure page, 4.

## WON'T START

1. Blown fuse.
2. Main Power Switch in off position
3. Defective start button.
4. Safety shield or chip bin interlock switches not contacted or defective.
5. Defective starter.
6. Loose wire.

## LACK OF POWER

1. Low voltage.
2. Hydraulic fluid low.
3. Pump coupling may be slipping or worn.
4. Relief valve in pump stuck open.
5. Check speed control valve.
6. Hydraulic cylinder needs to be replaced.

## SPINDLE MOTOR STALLS

1. Low voltage.
2. Drive belt is loose.
3. Drill bits are dull.
4. Drill bits are plugged.
5. Drill heads need to be repaired.

## DRILL HEAD WON'T COME DOWN.

1. Foot switch defective.
2. Lack of lubrication of dovetail.
3. Dovetail gib too tight or scored.
4. Pump coupling slipping.

## DRILL HEAD WON'T RETURN

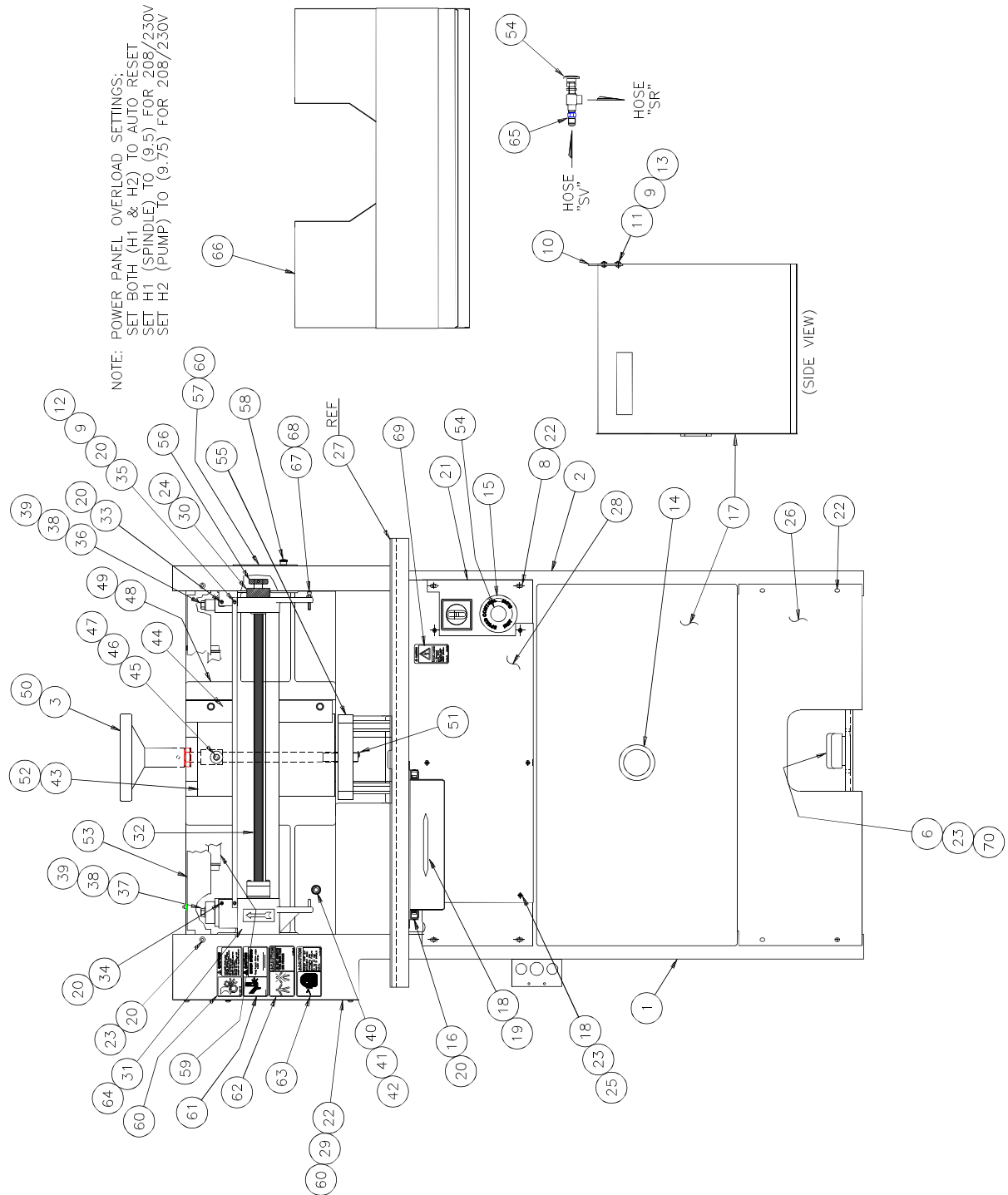
1. Lack of lubrication.
2. Return springs broken or need adjustment.
3. Dovetail gib needs adjustment.

**NOTES**

# 5.0 Main Assemblies

## 5.1 Main Assembly – Front View

A-6500-7 Rev. B



## Main Assembly – Front View – Parts List

A-6500-7 Rev. B

NO.	PART NO.	DESCRIPTION	QTY
1	6501-1	SIDE FRAME - RIGHT HAND	1
2	6502-2	SIDE FRAME - LEFT HAND	1
3	6520-1	HANDWHEEL	1
4			
5			
6	EE-3246	FOOTSWITCH ASSEMBLY	1
7	H-6913-406	SCREW - 1/4-20 X 3/4 HEX HD	2
8	H-7324-8	WASHER - 1/4 INT TOOTHLOCK	6
9	H-6423-4	NUT - 1/4-20 HEX	8
10	6685	DRAWER STOP	2
11	H-7325-6	WASHER - 3/16 LOCK	4
12	H-7321-#10	WASHER - #10 FLAT POLISHED	2
13	H-6925-102406	SCREW - #10-24 X 3/8 TRUSS HO	4
14	S-1678	RUBBER GROMMET	1
15	S-1684	DECAL - SPEED CONTROL	1
16	A-6558-1	SLIDE ASSEMBLY – DRAWER	2
17	A-6523	DRAWER ASSEMBLY - CHIP	1
18	H-6910-102403	SCREW - #10-24 X 3/8 BUT HD SOC CAP	8
19	S-1738	DRAWER PULL	1
20	H-6910-102404	SCREW - #10-24 X 1/2 BUT HD SOC CAP	10
21	EE-3232	ENCLOSURE ASSEMBLY - ELECTRICAL	1
22	H-6910-403	SCREW - 1/4-20 X 3/8 BUT HD CAP	15
23	H-7324-#10	WASHER - #10 SHAKEPROOF	8
24	H-21S-187-0750	PIN - 3/16 X 3/4 ROLL	1
25	S-1864-2	#10 CAPTIVE RETAINING DEVICE	4
26	6522-2	COVER - FRONT, LOWER	1
27	6503-1	TABLE - WELDMENT	REF
28	6578-1	COVER - FRONT, ELECTRICAL ENCLOSURE	1
29	6537	COVER - BELT GUARD	1
30	A-6528	BEARING HOUSE ASSEMBLY - RIGHT HAND	1
31	A-6531	BEARING HOUSE ASSEMBLY - LEFT HAND	1
32	6535	SHAFT - SPLINE	1
33	16505	BRACKET - SCALE, RIGHT HAND	1
34	16505-1	BRACKET - SCALE, LEFT HAND	1
35	6545	SCALE	1
36	6601	CLAMP - HOUSING, RIGHT HAND	1
37	6601-1	CLAMP - HOUSING, LEFT HAND	1
38	H-6913-612	SCREW - 3/8-16 X 1-1/2 HEX HD CAP	2
39	H-7327-12	WASHER - 3/8 MEDIUM LOCK	2
40	S-1727	SPRING	1
41	6592	SCREW - MOTOR PLATE ADJUSTMENT	1
42	H-6424-12	NUT - 3/4-10 HEX JAM	1
43	6516-3	DOVETAIL – SPINDLE	1
44	6517-1	GIB - VERTICAL DOVETAIL	1
45	H-6951-808	SCREW - 1/2-13 X 1/2" NYLOC SET	1
46	S-1255-1	SPRING	1
47	6609-1	PLUNGER - TEFLON	1
48	H-6424-6	NUT - 3/8-16 HEX JAM	3
49	H-6938-632	SCREW - 3/8-16 X 2" SOC SET	3
50	A-6519-1	HANDWHEEL ASSEMBLY	1

# Main Assembly – Front View – Parts List

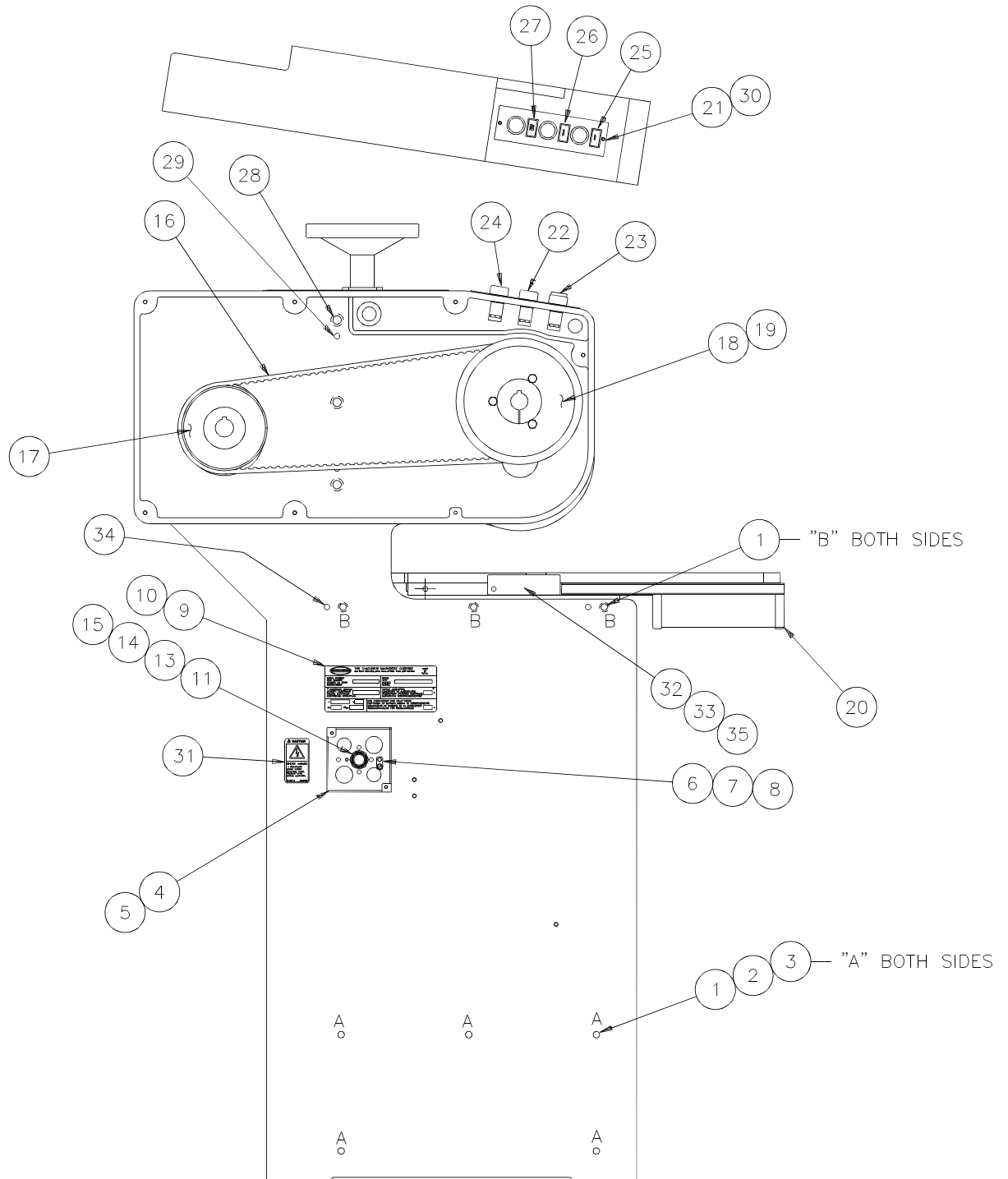
A-6500-7 Rev. B

NO.	PART NO.	DESCRIPTION	QTY
51	H-6903-404	SCREW - 1/4-20 X 1/2" NYLOC BUT HD CAP	1
52	P-325-F	FELT - 2 X 2-1/8"	2
53	EE-1489-3	LIGHT ASSEMBLY - TABLE/INTERLOCK SWITCH	1
54	4771-1	VALVE - BRONZE NEEDLE	1
55	6511	PULL DOWN BAR	1
56	6536	KNOB - SPLINE	1
57	6575	COVER - R.H. SIDE, PLEXIGLASS	1
58	7957-5	KNOB – ADJUSTMENT	2
59	S-845	BULB - FLORESCENT	1
60	S-1781-16	WARNING LABEL - CRUSH HAZARD (GEARS)	3
61	S-1781-3M	WARNING LABEL - CRUSH HAZARD (CLAMP)	1
62	S-1781-31	WARNING LABEL - SINGLE OPERATOR	1
63	S-1781-82	WARNING LABEL - EYE WEAR	1
64	S-1106	LABEL - DIRECTION ARROW	1
70	H-6910-102406	SCREW - #10-24 X 3/4 BUT HD SOC CAP	2
69	S-1781-12	LABEL - SHOCK WARNING	1
68	H-6423-#10	NUT - #10-24 HEX (KEP)	1
67	H-6918-102410	SCREW - #10-24 X 1-1/4 SOC HD CAP	1
66	A-6538	ASSEMBLY - CHIP CHUTE	1
65	H-241-5	ADAPTER - PIPE (EXT.) TO TUBE	1



## 5.2 Main Assembly – Left Side Elevation

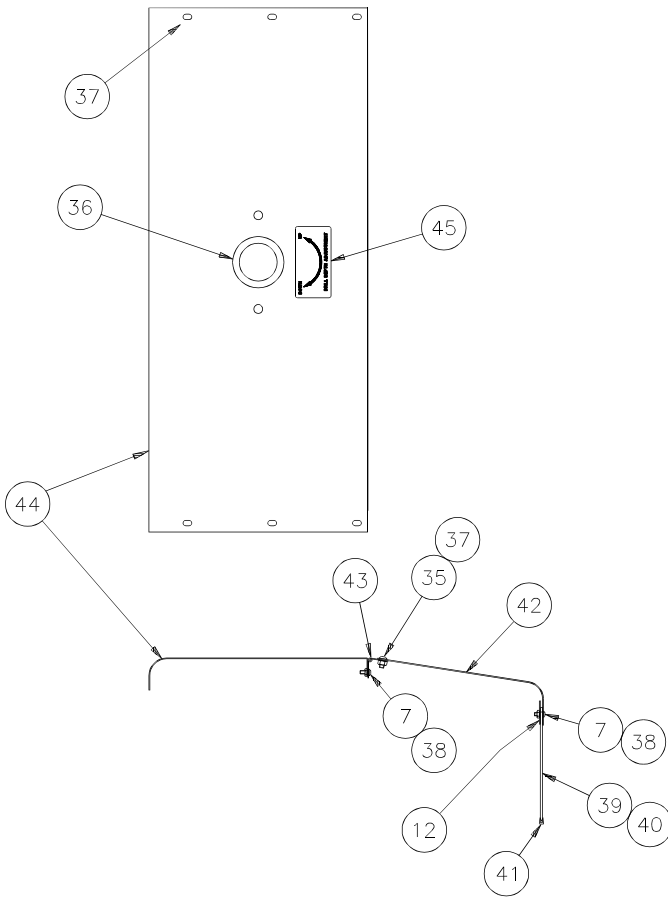
A-6500-7 Rev. A



# Main Assembly – Left Side Elevation – Parts List

A-6500-7 Rev. A

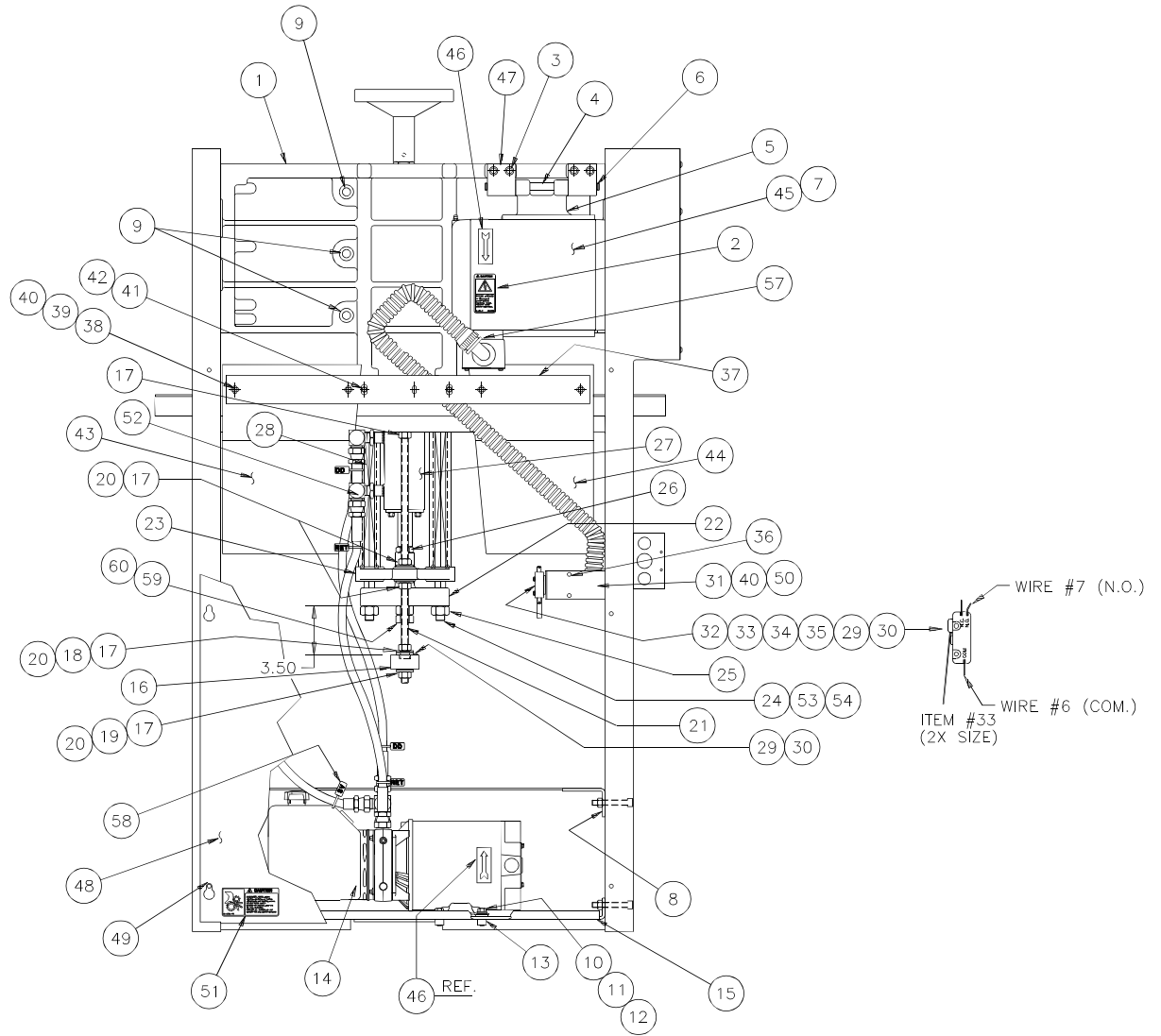
TOP COVER ASSEMBLY DETAIL



NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
1	H-6918-620	SCREW - 3/8-16 X 2-1/2 SOC HD CAP	16
2	H-6424-6	NUT - 3/8-16 HEX JAM	10
3	H-7327-12	WASHER - 3/8 MEDIUM LOCKWASHER	10
4	E-1369-1	BOX - JUNCTION	1
5	E-1370-1	COVER - ELECTRICAL JUNCTION BOX	1
6	E-640-1	GROUND LUG	1
7	H-6910-102404	SCREW - #10-24 X 1/2 BUT HD CAP	10
8	H-7324-#10	WASHER - #10 SHAKE PROOF	2
9	41130	LABEL - SPECIFICATION	1
10	H-6924-004	SCREW - #0 X 1/4 RD HD DRIVE	2
11	E-1459	BUSHING - 1/2 CONDUIT	1
12	6642	SUPPORT - SHIELD	1
13	E-519	LOCK NUT - 1/2 CONDUIT	1
14	H-6405-1-816	PIPE NIPPLE - 1/2 X 2	1
15	H-5350-8	PIPE COUPLING - 1/2 X 1-1/2	1
16	S-1716	TIMING BELT	1
17	S-1714	PULLEY - DRIVE	1
18	S-1714-1	PULLEY - DRIVEN	1
19	S-426	KEY - 1/4 X 1/4 X 1-1/4	1
20	A-6555-1	DRAWER ASSEMBLY - TOOL	1
21	E-1088-2	PLATE - SWITCH	1
22	E-3129	SWITCH - PUSHBUTTON, GREEN (1) N.O.	1
23	E-3129-2	SWITCH - PUSHBUTTON, RED (1) N.C.	1
24	E-3129-3	SWITCH - PUSHBUTTON, BLACK (1) N.O.	1
25	E-1103-4	LABEL - SWITCH, "STOP"	1
26	E-1103-3	LABEL - SWITCH, "START"	1
27	E-1103-2	LABEL - SWITCH, "TABLE LIGHT"	1
28	H-6918-820	SCREW - 1/2-13 X 2-1/2 SOC HD CAP	6
29	H-6633-722	PIN - #7 X 2-3/4 TAPER	4
30	H-6910-83203	SCREW - #8-32 X 3/8 BUT HD SOC CAP	2
31	S-1781-12	LABEL - SHOCK WARNING	1
32	H-6910-406	SCREW - 1/4-20 X 3/4 BUT HD SOC CAP	2
33	6590	INSERT STOP - TABLE SLOT	2
34	S-1574-1	TAPER PIN	4
35	H-6423-4	NUT - 1/4-20 (KEP) HEX	7
36	S-1678	GROMMET - RUBBER	1
37	H-6910-404	SCREW - 1/4-20 X 1/2 BUT HD SOC CAP	5
38	H-6423-#10	NUT - #10-24 (KEP) HEX	8
39	4956-1	DECAL - CHALLENGE	1
40	6640	SHIELD - FRONT	1
41	7032-M	TRIM - BLACK, PLASTIC 29-3/8" LONG	1
42	6639	COVER - FRONT (STD)	1
43	6553	HINGE	1
44	6552	COVER - TOP	1
45	S-1781-86	LABEL - DRILL DEPTH ADJUSTMENT	1

### 5.3 Main Assembly – Rear Elevation

A-6500-7 Rev. D



## Main Assembly – Rear Elevation – Parts List

A-6500-7 Rev. D

NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
1	6504	DOVETAIL - VERTICLE	1
2	S-1781-12	LABEL - SHOCK WARNING	1
3	H-6918-608	SCREW - 3/8-16 X 1" SOC HD CAP	4
4	6593-1	SHAFT - SPINDLE MOTOR MOUNT	1
5	6584-2	PLATE - SPINDLE MOTOR	1
6	S-1193-50	RETAINING RING - .500 DIA. STYLE 'E'	2
7	H-6913-608	SCREW - 3/8-16 X 1-1/2" HEX HD CAP	4
8	6509	SLIDE - CHIP DRAWER	2
9	H-6918-818	SCREW - 1/2-13 X 2-1/4" SOC HD CAP	3
10	H-6913-508	SCREW - 5/16-18 X 1" HEX HD	4
11	H-7327-10	WASHER - 5/16 MEDIUM LOCK	4
12	H-7321-5	WASHER - 5/16 PLAIN	4
13	A-10042	BUSHING - 5/16-18 THR'D ANTI-VIB	4
14	H-566	HYDRAULIC UNIT ASSEMBLY	1
15	6506-2	BASE	1
16	6539	PLATE - AUTO RETURN	1
17	H-6424-8	NUT - 1/2-13 HEX JAM	10
18	47214-3	WASHER - SHOULDER, NYLON	2
19	11288-2	WASHER - NYLON	2
20	H-7321-8	WASHER - 1/2 PLAIN	7
21	6510-2	STUD - CYLINDER MOUNTING, 1/2-13 THR'D	2
22	6515	BRACKET - GUIDE ROD	1
23	6514-1	SPRING PLATE	1
24	6512	PULLDOWN ROD	2
25	H-6423-10	NUT - 5/8-11 HEX	2
26	H-6428-12	NUT - 3/4-16NF HEX JAM	1
27	H-340	CYLINDER ASSEMBLY - HYDRUALIC	1
28	6513-2	SPRING	2
29	H-6910-102403	SCREW - #10-24 X 3/8 BUT HD CAP	3
30	H-7324-#10	WASHER - #10 INT. TOOTHLOCK	1
31	3982-1	BRACKET - CHIP DRAWER INTERLOCK	1
32	41034-1	BRACKET - MICRO SWITCH	1
33	E-3112	SWITCH - SNAP ACTION (SPST)	1
34	H-6918-44008	SCREW - #4-40 X 1" SOC HD	2
35	H-7324-#4	WASHER - #4 INT. TOOTHLOCK	2
36	S-1694	TYRAP - WIRE	1
37	6648	BRACKET - CHIP CHUTE MOUNT	1
38	H-6910-406	SCREW - 1/4-20 X 3/4" BUT HD SC cAP	4
39	H-6423-4	NUT - 1/4-20 HEX	4
40	H-7327-8	WASHER - 1/4 MED. LOCK	6
41	H-6405-1-612	PIPE NIPPLE - 3/8 X 1-1/2"	2

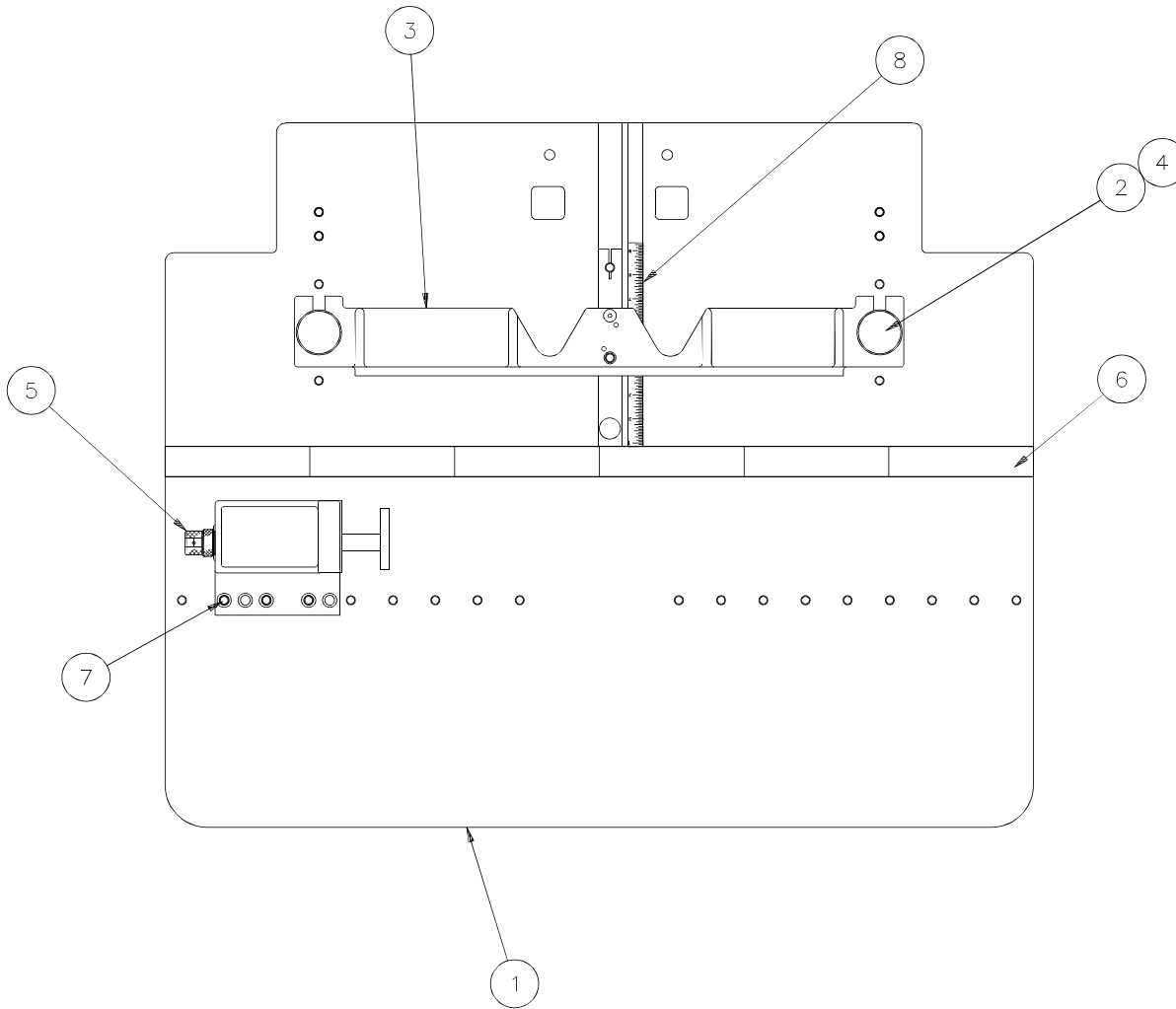
## Main Assembly – Rear Elevation – Parts List – (cont.)

A-6500-7 Rev. D

NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
42	H-6918-620	SCREW - 3/8-16 X 2-1/2" SOC HD CAP	2
43	6547	CHIP CHUTE - LOWER, RIGHT HAND	1
44	6550	CHIP CHUTE - LOWER, LEFT HAND	1
45	E-1600-113	MOTOR- SPINDLE, 230V 3PH 50HZ	1
45	E-1600-112	MOTOR- SPINDLE, 208/230V 3PH 60HZ	1
45	E-1600-110	MOTOR- SPINDLE, 208V 3PH 50HZ	1
46	S-1106	DECAL - ARROW	1
47	6591-1	BRACKET - MOTOR PLATE MOUNTING	2
48	6551	PANEL - BACK	1
49	H-6923-604	SCREW - 3/8-16 X 1/2" RD HD MACH.	6
50	H-6910-404	SCREW - 1/4-20 X 1/2" BUT HD SOC CAP	2
51	S-1781-16	WARNING LABEL - CRUSH HAZARD	1
52	H-230	90% $\circ$ ELBOW - SAE 'O' RING TO TUBE	2
53	6589	WASHER - SPECIAL	2
54	H-5246-410	PIN - 1/4 X 1-1/4 DOWEL	2
55	S-1694-3	TYRAP - 1/4" SCREW MOUNT	3
56			
57	E-2190-1	CONDUIT CONNECTOR - 90 1/2" ELBOW	1
58	S-1694-5	TYRAP - IDENTIFICATION TAG	4
59	H-6913-810	BOLT - 1/2-13 X 1-1/4" HEX	1
60	H-6424-8	NUT - 1/2-13 HEX JAM	1

## 5.4 Main Assembly – Table

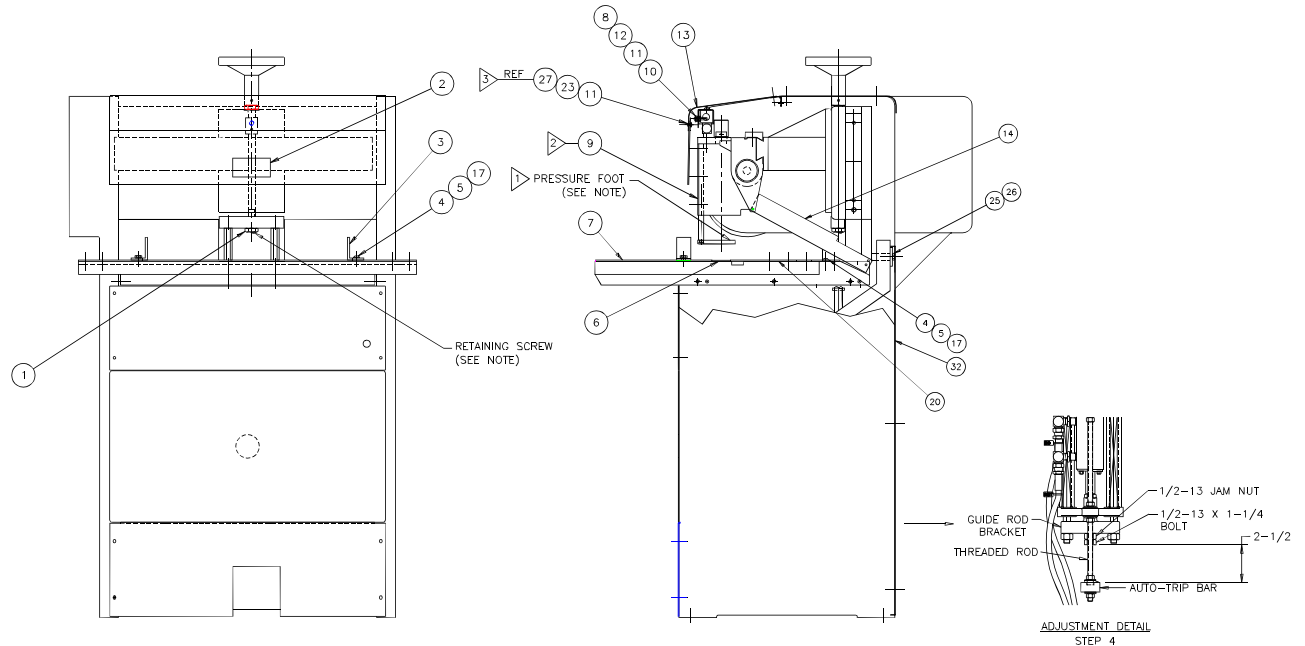
A-6500-7 Rev. A



NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
1	6503-1	TABLE – WELDMENT	1
2	S-1770-1	KNOB – BACKGAGE	2
3	A-6561-2	ASSEMBLY – KEY & BACKGAGE	1
4	8815	WASHER – BACKGAGE KNOB	2
5	A-6565	SIDE GUIDE ASSEMBLY (STD.)	1
6	6564	DRILL STICK – WOOD	6
7	H-6918-606	SCREW – 3/8-16 X 3/4" SOC HD	3
8	2236-6	SCALE – TABLE, BRASS	1

# 5.5 Main Assembly – Large Diameter Drill Head Field Conversion

A-6500-7 Rev. B



### INSTRUCTIONS FOR LARGE DIA DRILL FIELD CONVERSION:

- |                                 |              |                           |                  |
|---------------------------------|--------------|---------------------------|------------------|
| 1. REMOVE THE FOLLOWING PARTS:  | PART NO.     | STEP 3 CONT'D:            | PART NO.         |
| A. COVER                        | 6639         | D. (6) PLASTIC CUT STRIPS | 6669             |
| B. SCALE                        | 6545         | E. FRONT TABLE ADAPTOR    | 6667             |
| C. HEADS                        | A-6594-6     | F. STOPS FOR DRILL BLOCKS | (SEE NOTE BELOW) |
| D. CHIP CHUTE                   | A-6538       | G. CHIP CHUTE             | 6590             |
| E. SIDE GUIDE                   | A-6565       | H. BACKGAGE               | A-6538           |
| F. BACKGAGE                     | A-6561-2     | I. HAND KNOBS             | A-6561-2         |
| G. B.G. KNOBS                   | S-1770-1     | J. DRILL HEAD             | S-1770-1         |
| H. STOPS FOR DRILL BLOCKS       | 6590         | K. COVER                  | A-6594-7         |
| I. TABLE LIGHT ASSY             | EE-1489-2    | L. (2) SCREWS (ITEM 26)   | 6639-1           |
| J. RETAINING SCREW              | (SEE DWG)    | M. (2) NIPPLES (ITEM 25)  | H-6913-624       |
| K. (2) CHIP CHUTE BRKT MTG SCRS | H-6918-620   |                           | H-6405-1-616     |
| L. (2) NIPPLES - 3/8 X 1-1/2    | H-6405-1-612 |                           |                  |
2. CLEAN TABLE – BE SURE WOOD CUTTING BLOCKS ARE FLUSH WITH TABLE.
3. INSTALL THE FOLLOWING PARTS:
- |   |           |
|---|-----------|
| A. TABLE LIGHT ASSY (MOUNTS OUTSIDE OF FRAME)   | EE-1489-2 |
| B. REAR TABLE ADAPTER   | 6668      |
| M. 3/4-16 THIN FLEX LOCK NUT (TURN HANDWHEEL CW TO EXPOSE ROD & INSTALL NUT FLUSH WITH END OF ROD.) | H-5239-12 |
| N. RETAINING SCREW (SEE DWG) (TURN HANDWHEEL CCW UNTIL NUT HITS BRKT)                               | (SEE DWG) |
4. ADJUSTMENT  
ON THE REAR ON THE MACHINE – LOCATE THE BOLT AND JAM NUT ON THE BOTTOM OF THE GUIDE ROD BRACKET. TURN THE BOLT OUT SO THAT IT IS 2-1/2 INCHES FROM THE TOP SURFACE OF THE TRIP BAR – TIGHTEN THE JAM NUT TO LOCK THE BOLT IN PLACE. (SEE DETAIL ABOVE)
5. ADJUST DRILLING DEPTH:  
FOLLOW NORMAL PROCEDURE FOR NEW DRILL ADJUSTMENT.
- NOTE: WHEN USING TWO DRILL HEADS, DO NOT USE (6672) PAPER GUIDES. USE THE STANDARD SIDE GUIDE (P/N A-6565).

NOTES:

MAX. BACK MARGIN = 2-5/8" (67mm)

- 1. WHEN CHANGING DRILLS, REMOVE PRESSURE FOOT.
- 2. TWO DRILL HEADS ARE NOT RECOMMENDED FOR SINGLE PHASE MACHINES.
- 3. REQUIRED OF MACHINES PRIOR TO 10-1-89.

Main Assembly – Large Diameter Drill Head Field Conversion – Parts List  
A-6500-7 Rev. B

NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
28	A-6500-7 SHT 5	BLUEPRINT OF ASSEMBLY	1
1	H-5239-12	3/4-16 LT TH FLEX LOCK NUT	1
2	6670	LABEL	1
3	6672	PAPER GUIDE	2
4	H-6910-606	3/8-16 X 3/4 BUTT HD SCR	4
5	H-7324-12	3/8 SHAKEPROOF LOCKWASHER	4
6	6669	CUTTING BLOCK - PLASTIC	6
7	6667	TABLE ADAPTOR - FRONT	1
8	H-7322-#10	WASHER - #10 POLISHED FL	4
9	A-6594-7	LARGE DIA DRILL HD ASSY	1
10	H-6923- 102420	#10-24 X 1-1/4 LG RD HD SCR	2
11	H-6423-#10	#10-24 HEX NUT	6
12	H-7324-#10	#10 INT TOOTH LOCK WASHER	6
13	6639-1	COVER - FRONT	1
14	A-6538	CHUTE - CHIP	REF
15	S-887	3/8 X 90%%D CONN (NOT SHOWN)	1
16	S-1122-1	3/8 INS. SLEEVE AS -1 (NOT SHOWN)	2
17	H-7322-6	WASHER - 3/8 POLISHED FL	4
18	B-180	3 X 5 MAIL BAG (NOT SHOWN)	1
19	E-2196-11	KNOCK-OUT PLUG (NOT SHOWN)	1
20	6668	TABLE ADAPTER - REAR	1
21	W-134	WRENCH - 7/32 (NOT SHOWN)	1
22	4687	DRIFT (NOT SHOWN)	2
23	6642	SUPPORT - SHIELD (SEE NOTE #3)	REF
24	E-807	3/8" EX. FLEX CONDUIT (NOT SHOWN)	0.5
25	H-6405-1-616	3/8 X 2" NIPPLE, BLK EX HVY	2
26	H-6913-624	3/8-16 X 3" HEX HD SCR	2
27	H-6910- 102403	#10-24 X 3/8 BUTT HD SCR (QTY 3)	REF



## Main Assembly – Large Diameter Drill Head Field Conversion – Installation Instructions

A-6500-7 Rev. A



### CAUTION

**Always Disconnect the main power when cleaning, servicing or lubricating your drill. See Power Lock-Out Procedure, page 5.**

The MS-10B Paper Drill can be easily altered to handle drilling of one or two holes up to 1-1/2" diameter, as well as handling standard drill work. Seven standard size hollow drills (listed below) are available for use with these large hole drilling heads.

The adjustment for hole spacing is done in the same manner as for a standard drill head. The maximum center-to-center distance of heads is 17-3/4", while the minimum distance is 5". The maximum back margin is 9". The machine can handle either one or two heads with a maximum drilling capacity of a 2" lift.



### CAUTION

**WARNING: drills are very sharp (even after use), handle with care to avoid severe lacerations. Even dull drills are sharp enough to cause severe lacerations.**

It is important to keep the hollow drills sharp. They are sharpened to a 35 degree bevel and if there isn't a machine shop in your area that can handle the job, a factory resharpening service is provided for large hole drills. Two drills are provided with each head so one can be sent in for sharpening while the other is being used. More drills, however, maybe desired to allow for continuous drilling work.

The large hole drilling conversion kit (#A-6500-7) includes one large hole drilling head (#A-6594-7) which is supplied with two hollow drills, 1-3/8" diameter, unless otherwise specified.

### Standard Large Hole Hollow Drill Sizes

9/16" dia.

5/8" dia.

3/4" dia.

1" dia.

1-1/4" dia.

1-3/8" dia.

1-1/2" dia.

### Installation Instructions:

- 1) Remove the following parts:
 

A. cover assembly	A-6638
B. scale	6545
C. heads	A-6594-1 or -6
D. chip chute	A-6538
E. side guide	A-6565
F. backgauge knobs	6587
G. backgauge	6561-2
H. drill block stops	6590
I. table light assembly	EE-1489-2
- 2) Clean table – be sure present wood drilling blocks are flush with the table
- 3) Install the following parts:
 

A. mount the table light assembly outside the frame with (2) 1-1/4" round head machine screws and (4) hex nuts.	
B. Rear table adapter	6668
C. Chip chute	

Note: If chip chute extensions are ordered, install them before mounting the chip chute. See instructions for mounting instructions.

- D. (6) plastic drilling blocks 6669
- E. Front table adapter 6667  
Attach with paper guides 6672 or A-6565 if desired
- F. stops for drilling blocks 6590
- G. backgauge 6561-2
- H. backgauge knobs 6587
- I. drill head A-6594-7
- J. cover assembly 6638-1

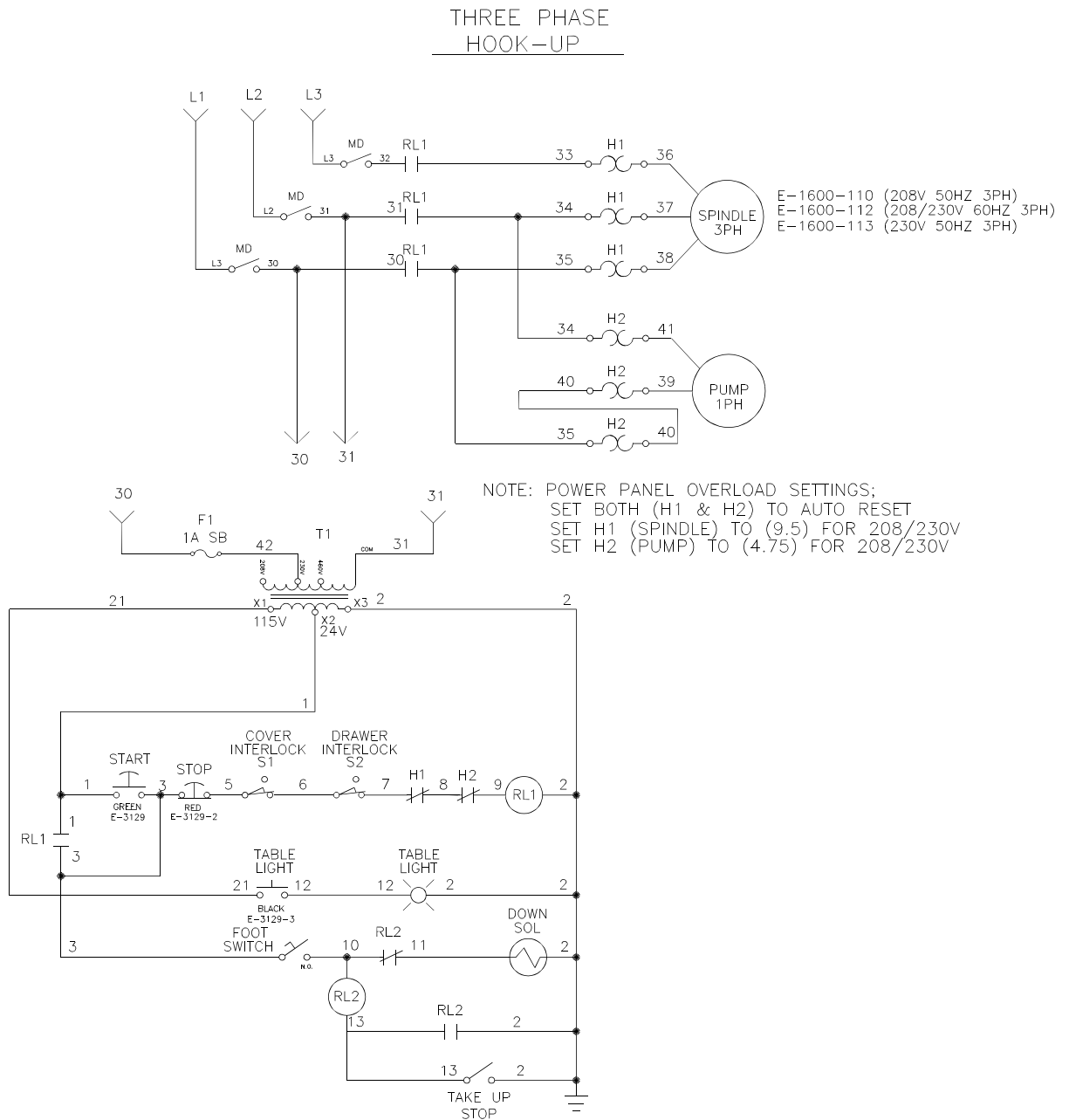
4) Adjust drilling depth – follow normal procedure for new drill adjustment.

5) When using two drill heads do not use paper guides 6672, use standard side guide A-6565



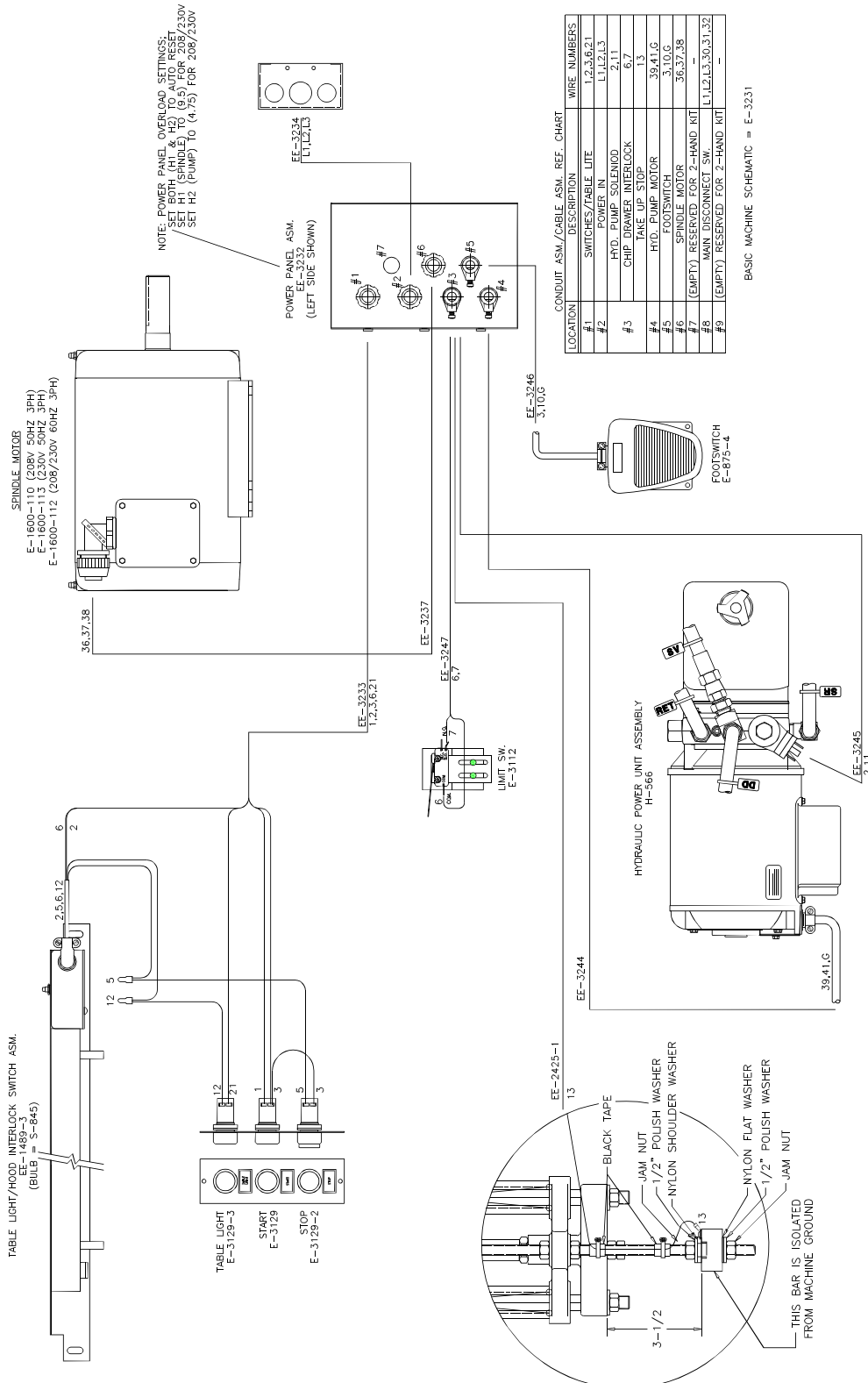
## 5.6 Basic Machine Schematic

E-3231 Rev. A



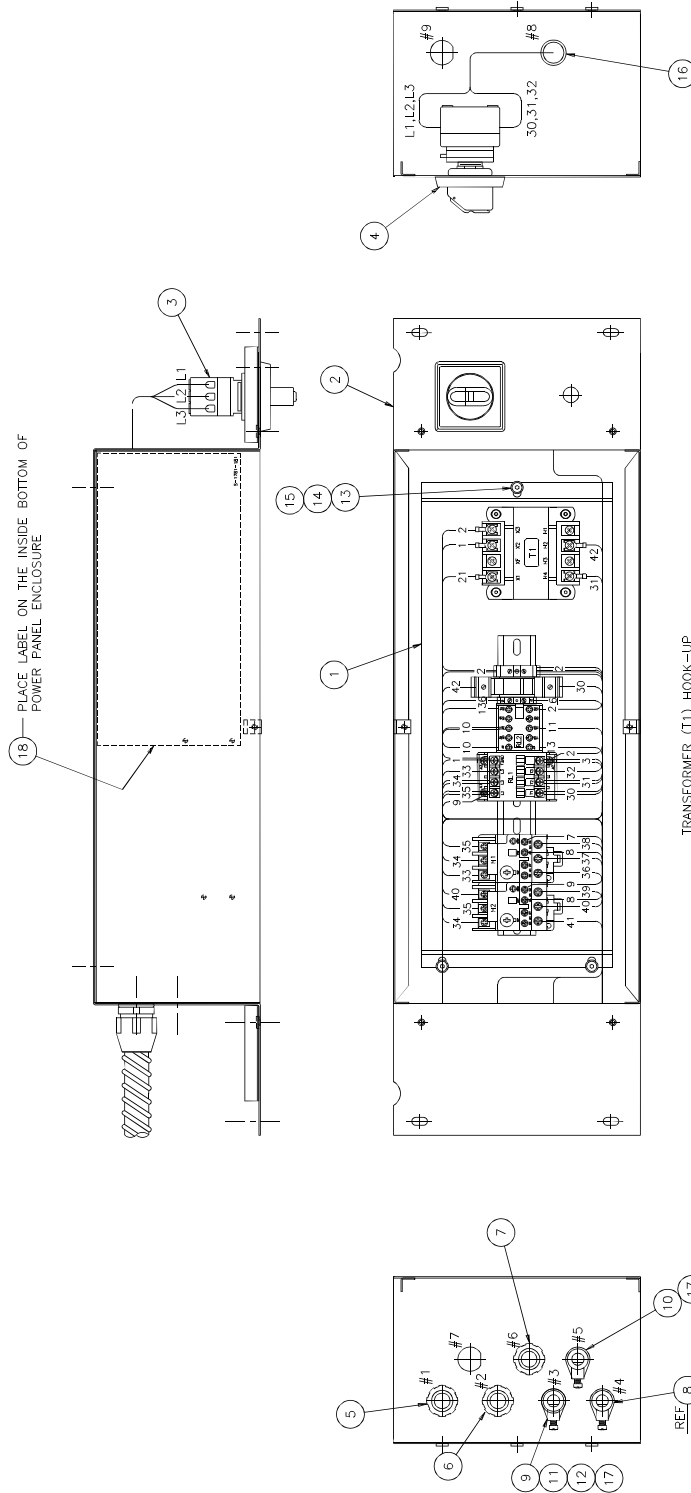
# 5.7 Interconnection Diagram

E-3248 Rev. B



# 5.8 Electrical Enclosure Assembly

EE-3232 Rev. C



TRANSFORMER (T1) HOOK-UP

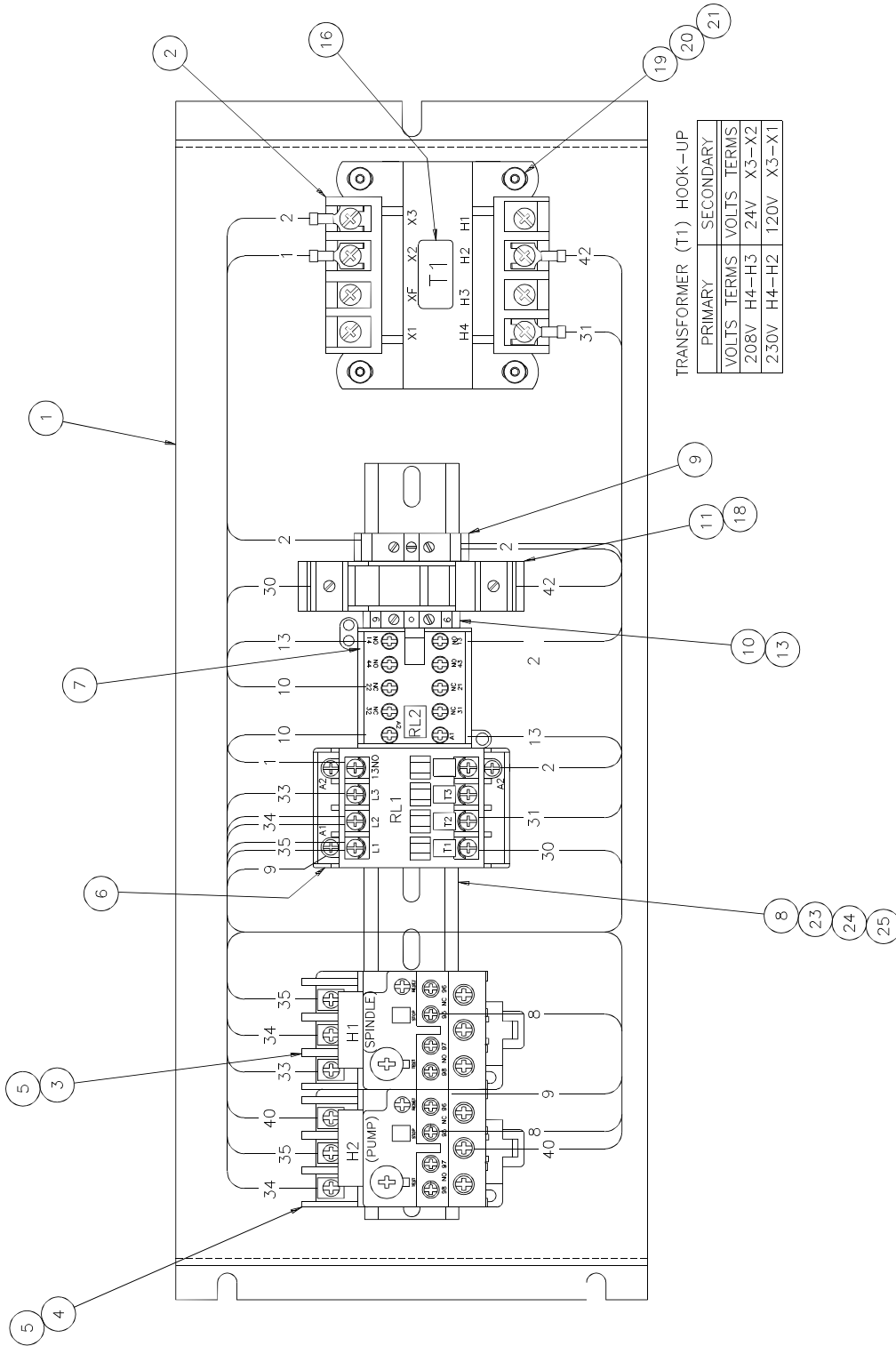
PRIMARY VOLTS	SECONDARY VOLTS	TERMS
208V	H4-H3	24V X3-X2
230V	H4-H2	120V X3-X1

LOCATION	ITEM NO.	WIRE NUMBERS	DESCRIPTION
#1	5	1,2,3,6,21	SWITCHES/TABLE LITE
#2	6	L1,L2,L3	POWER IN
#3	9	2,11	HYD. PUMP SOLENOID
#3	11	6,7	CHIP DRAWER INTERLOCK
#4	12	13	TAKE UP STOP
#4	8	39,41,G	HYD. PUMP MOTOR
#5	10	3,10,G	FOOTSWITCH
#6	7	36,37,38	SPINDLE MOTOR
#7	-	-	(EMPTY) RESERVED FOR 2-HAND KIT
#8	-	-	MAIN DISCONNECT SW.
#9	-	-	(EMPTY) RESERVED FOR 2-HAND KIT

NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY.
1	EE-3230	PANEL ASSEMBLY - POWER ENCLOSURE	1
2	EE-1083-1	ENCLOSURE - POWER PANEL	1
3	E-3082	SWITCH - MAIN DISCONNECT (BODY)	1
4	E-3083	SWITCH FACE - MAIN DISCONNECT	1
5	EE-3233	CONDUIT ASM. - SWITCH/TABLE LIGHT (#1)	1
6	EE-3234	CONDUIT ASM. - POWER IN, 3PH (#2)	1
7	EE-3237	CONDUIT ASM. - SPINDLE MOTOR (#6)	1
8	EE-3244	CABLE ASM. - HYD. PUMP MOTOR (#4) [REF]	1
9	EE-3245	CABLE ASM. - HYD PUMP SOL. (#5)	1
10	EE-3246	CABLE ASM. - FOOTSWITCH (#5)	1
11	EE-3247	CABLE ASM. - DRAWER INTERLOCK (#3)	1
12	EE-2425-1	WIRE ASM. - TAKE UP STOP (#3)	1
13	H-0910-102403	SCREW - #10-24 X 3/8 BUT HD 50C CAP	3
14	H-7321-#10	WASHER - #10 FLAT	3
15	H-7324-#10	WASHER - #10 INT. TOOTHLOCK	3
16	E-1172-10	BUSHING - SNAP-IN PLASTIC	1
17	S-1350-16	STRAIN RELIEF - CABLE	3
18	S-1781-181	LABEL - INTERCONNECTION/FUSE	1

# 5.9 Electrical Assembly – Control Panel

EE-3230 REV. "C"



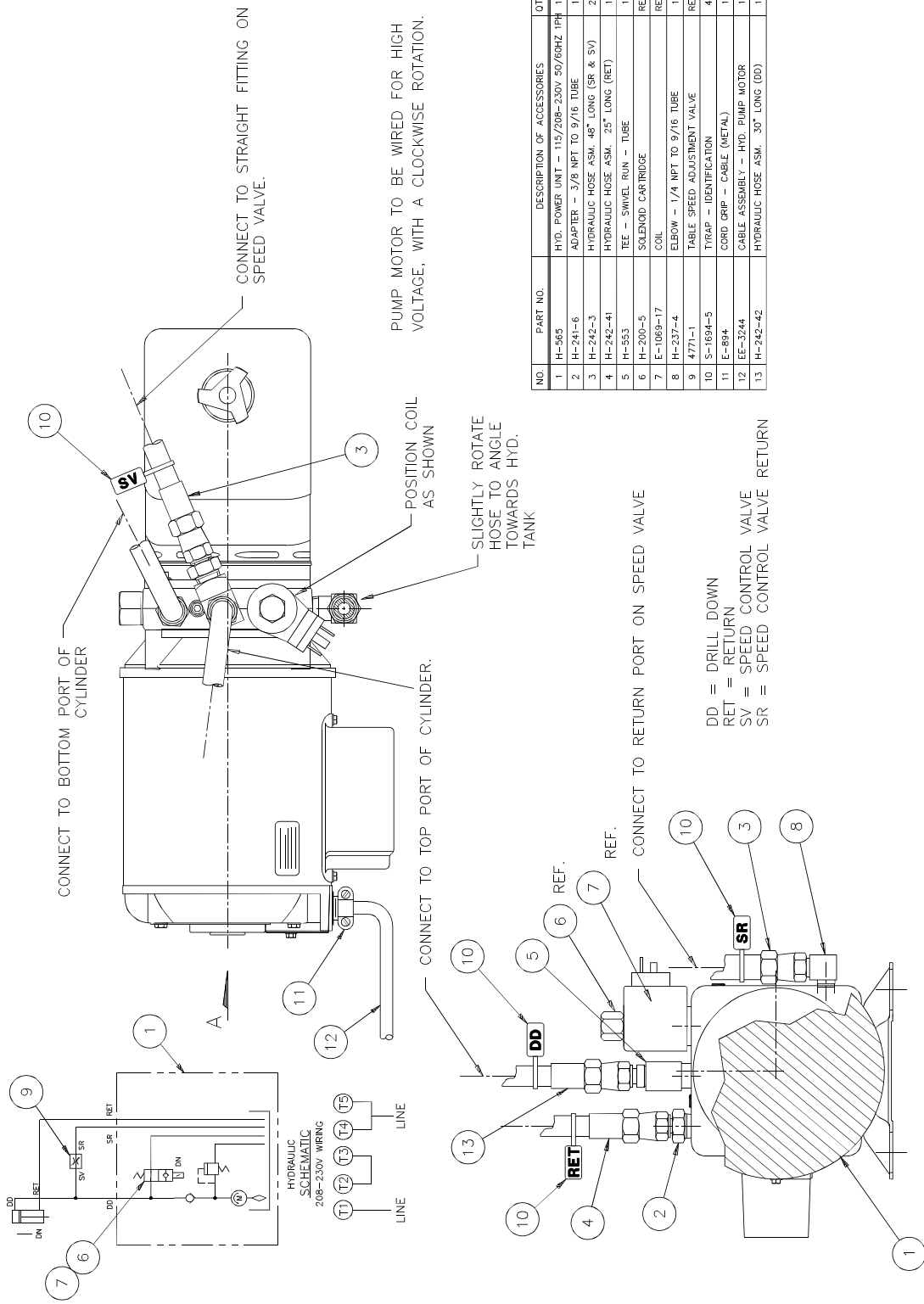
**Electrical Assembly - Parts**

EE-3230 REV. "C"

NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
1	E-1084-4	PANEL – ELECTRICAL	1
2	E-1089-40	TRANSFORMER - 208/230/460 75VA	1
3	E-2441-13	RELAY - OVERLOAD (H1), 7.5A to 11A (SPINDLE)	1
4	E-2441-14	RELAY - OVERLOAD (H2), 4.5A to 6.5A (PUMP)	1
5	E-2445-1	BRACKET - OVERLOAD RELAY	2
6	E-2805	STARTER - 24V COIL (A16-30-10-81) (RL1)	1
7	E-2403-8	RELAY - RL2	1
8	E-1977-7	RAIL - MOUNTING (11" LONG)	1
9	E-2068-3	TERMINAL BLOCK – GROUND	1
10	E-2068-8	TERMINAL BLOCK - FEED THROUGH	1
11	E-1974-10	TERMINAL BLOCK - MIDGET FUSE HOLDER	1
12	EE-3236	WIRES - CUT LIST (208/230V 3PH)	1
13	E-1356-( )	LABEL - TERMINAL BLOCK	1
14			
15			
16	E-1584-51	LABEL - TRANSFORMER "T1"	1
17	S-1694	TYRAP ( NOT SHOWN )	2
18	E-1075-1SB	FUSE - MIDGET, 1A SLO-BLO	1
19	H-6910-83204	SCREW - #8-32 X 1/2" BUT HD SOC CAP	4
20	H-7321-#8	WASHER - #8 USS FLAT	4
21	H-7330-#8	LOCKWASHER - #8 SHAKEPROOF	4
22	H-6910-102403	SCREW - #10-24 X 3/8" BUT HD SOC CAP	4
23	H-7330-#10	LOCKWASHER - #10	4
24	H-7321-#10	WASHER - #10 USS FLAT	4

# 5.10 Hydraulic Power Unit Assembly

H-566 Rev. B

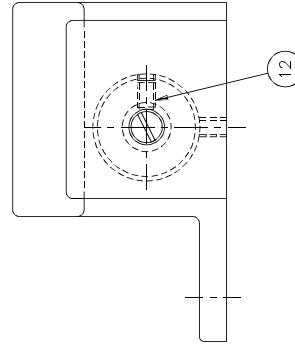
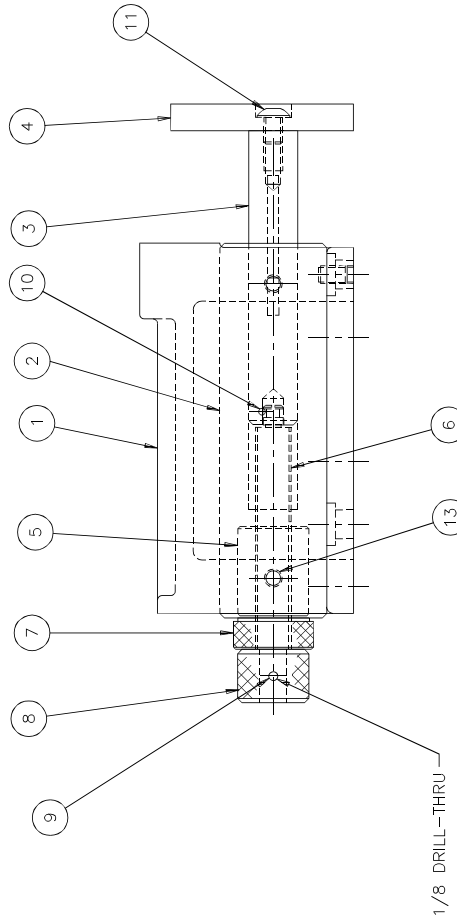
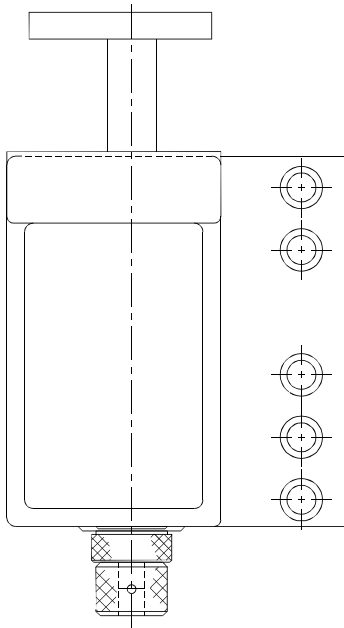




## 5.11 Standard Side Guide Assembly

A-6565 Rev. B

NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
1	6566	SIDE GUIDE HOUSING	1
2	6567	BEARING SIDE GUIDE	1
3	6568	HOLDER-SIDE GUIDE	1
4	6569	STOP	1
5	6570	INSERT	1
6	6571	ADJUSTING STUD	1
7	S-1715	LOCK NUT	1
8	6572	ADJUSTING KNOB	1
9	H-21S-125-1000	PIN - 1/8 x 1 SEL-LOK	1
10	H-21S-093-0500	PIN - 3/32 x 1/2 SEL-LOK	1
11	H-6903-405	SCREW-1/4-20x5/8 NYLON BUTTON. HD. CAP	1
12	H-6957-406	SCREW-1/4-20x3/8 SOC. SET. DOG PT. NYLON	2
13	H-6938-403	SCREW - 1/4-20 x 3/16 CUP PT. SOC. SET	1



## 5.12 Auto-Trip Side Guide Assembly

A-6565-3 Rev. F

The auto-trip side guide, available as optional equipment, is mounted to the table in the same manner as the standard side guide. As the drill heads reach the bottom of their stroke, the trip lever is engaged, releasing the side guide and allowing the operator to slide the side guide to the left, to the next pre-determined stop. The major advantage of this option is that it permits step drilling

The auto-trip side guide is supplied with six movable stops permitting hole spacings as close as 3/8" apart (center-to-center distance). Additional stops are available. Also available are fixed gages which fit in the side guide in place of the moveable stops. The fixed gages permit hole spacings of 1/4", 3/8" or 1/2". Special gages are also available with other spacings.

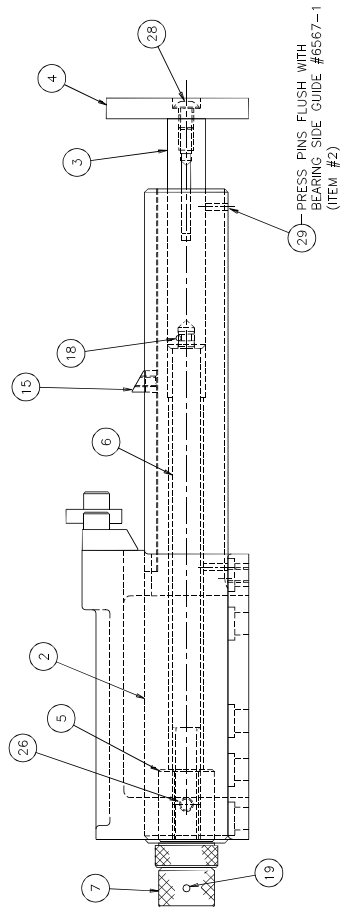
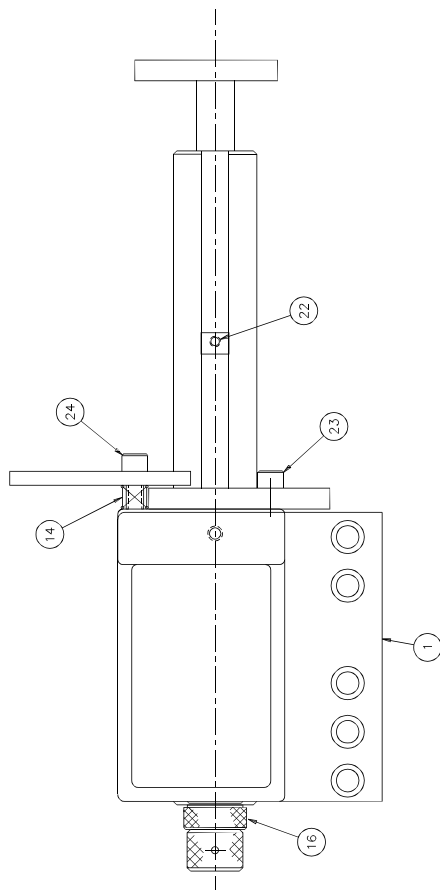
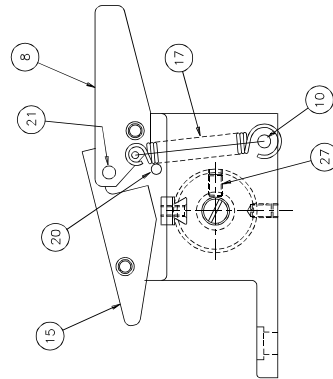
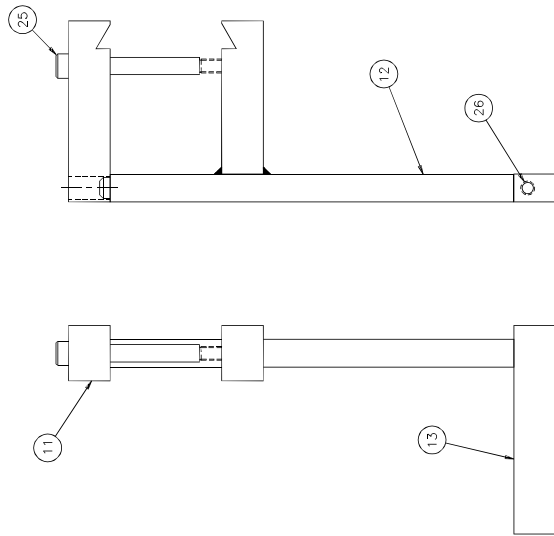
### INSTALLATION

1. Install the side guide trip rod to the spindle dove tail and adjust so the vertical travel of the drill heads will engage the trip lever.
2. Install the side guide stops to the desired spacing along the slot in the side guide shaft.
3. Major adjustments are made by aligning screws along any set of tapped holes provided in the table. Micro adjustments are made by turning the adjusting knob. The knurled locknut maintains the setting.

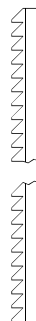
NO.	PART NO.	DESCRIPTION OF ACCESSORIES	QTY
1	6566-1	SIDE GUIDE HOUSING	1
2	6567-1	BEARING SIDE GUIDE	1
3	6568	HOLDER-SIDE GUIDE-R.H.	1
4	6569	STOP	1
5	6570	INSERT	1
6	6571-1	ADJUSTING STUD	1
7	6572	ADJUSTING KNOB	1
8	6610-1	TRIP LEVER	1
9	6611-1	INDEX LEVER	1
10	6612	SPRING PIN	1
11	6613-1	CLAMP	1
12	A-6615-1	DOVETAIL BLOCK & BRK'T ASSEMBLY	1
13	6618-1	TRIP ROD	1
14	S-1407	SPRING	1
15	S-1611-1	STOP	6
16	S-1715	LOCK NUT	1
17	S-1726	SPRING	1
18	H-21S-094-0500	PIN - 3/32 x 1/2 SEL-LOK	1
19	H-21S-125-1000	PIN - 1/8 x 1 SEL-LOK	1
20	H-21S-187-1000	PIN - 3/16 x 1 SEL-LOK	1
21	H-21S-250-0500	PIN - 1/4 x 1/2 SEL-LOK	1
22	H-6938-102406	SCREW - #10-24 X 3/8 CUP PT SOC SET	6
23	H-5254-506	SCREW- 5/16 X 3/4 SOC HD SHOULDER	1
24	H-5254-508	SCREW- 5/16 X 1" SOC HD SHOULDER	1
25	H-6918-628	SCREW - 3/8 X 3-1/2 SOC HD CAP	1
26	H-6938-403	SCREW - 1/4-20 X 3/16 CUP PT SOC SET	2
27	H-6957-406	SCREW - 1/4 X 3/8 DOG PT SOC SET (NYLOK)	2
28	H-6903-405	SCREW - 1/4-20 X 5/8 BUT HD CAP (NYLOK)	1
29	H-5246-203	PIN - 1/8 X 3/8 DOWEL	2
30	W-154	WRENCH - 3/32 ALLEN (NOT SHOWN)	1

# Auto-Trip Side Guide Assembly

A-6565-3 Rev. F

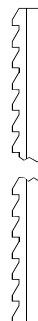


FIXED GAGE BARS AVAILABLE ON REQUEST



24H-1/4-6653

1/4 CENTER DISTANCE (REF.)



16H-3/8-6653

3/8 CENTER DISTANCE (REF.)

