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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.

\$10.00

SERIAL NO —

MODEL —

SAFETY ALERT



This safety alert symbol means CAUTION OR WARNING-PERSONAL SAFETY INSTRUCTION. Personal injury may result if safety precautions are not carefully read before attempting to operate or repair this machine. See SAFETY PRECAUTIONS, page 4.

- This machine is designed for **ONE PERSON OPERATION ONLY!**
- Always **DISCONNECT THE POWER** before working on this machine.
- **DO NOT OPERATE WITH ANY GUARDS REMOVED!** Replace all guards before operating.
- **CRUSH HAZARD** - Keep hands, hair, cleaning rags, & loose clothing away from drills.

Instruction and Parts Manual



MODEL MS-10A Paper Drilling Machine

**This manual covers serial numbers 64719 & up.
ALWAYS GIVE THE SERIAL NUMBER OF YOUR MACHINE WHEN WRITING.**

Sold and serviced by

THE CHALLENGE MACHINERY COMPANY

1433 Fulton Street / Grand Haven, Michigan 49417 U.S.A. / Phone: 616/842-8300/ Telex No. 228409

F.399-C

INTRODUCTION

WELCOME to the family of CHALLENGE® users. Challenge has been developing and manufacturing Graphics Arts Equipment for over 100 years and is today one of the world's leading producers and distributors of Paper Cutters, Paper Drills and Bindery Equipment.

THE CHALLENGE REPUTATION is important to you as a user for the continuous, ready availability of parts and service.

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.



SAFETY ALERT! This symbol means, **CAUTION OR WARNING: 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 or the Challenge Service Department. For the dealer nearest you or for service questions, call 1-800-592-0022; in Michigan, call 1-616-842-8300.

FOR PARTS OR 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 that the correct parts are sent as soon as possible.

Take a few moments right now and **RECORD YOUR MACHINE SERIAL NUMBER** in the space provided on the front cover of this manual. Also be sure to fill out the warranty card accompanying this manual and return it **DIRECT 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, 1433 Fulton St., Grand Haven, MI 49417. Phone (616) 842-8300.

CHALLENGE MODEL	SERIAL NUMBER	
ATTN	COMPANY	
ADDRESS		
CITY	STATE	ZIP
PHONE	DATE INSTALLED	
DEALER'S NAME AND CITY		

LIMITED WARRANTY

*This equipment is guaranteed to be free from defects in workmanship or material for a period of **one year** from the date of installation, except components purchased by Challenge which carry the manufacturer's warranty.*

*We will repair or replace, at our option, any equipment proving defective, not caused by accident, misuse or improper maintenance, if returned to our factory, transportation charges prepaid. This **warranty does not include the cost of labor** to replace defective components. Check the purchase agreement from your Dealer for a statement of labor warranty.*

Should you find anything wrong, contact the dealer from whom the equipment was purchased. Challenge will not be responsible for any charges incurred without its specific written authorization.

PACKING LIST

Part No.	Description	Qty.
	Basic Machine	1
A-6626	Drilling Blocks;6 per pkg.	1
4685	Hollow Drill Cleaner	1
4688	Drill Ease	1
A-4950	Hand Drill Sharpener	1
W-105	1/4" Hex Wrench	1
W-130	3/16" Hex Wrench	1
W-132	3/8" Hex Wrench	2
A-6588	Special "T" Wrench & Drift	1
S-1718	Grease Gun	1
6614	1 Pint Drill Head Grease	1
6629	1 Pint Gib Side Lubricant	1
W-137	5/32" Allen Wrench	1
5064	Cutting Stick Hook	1
F-399-C	Instruction and Parts Manual	1
W-164	5/16" Hex "T" Wrench	1

SPECIFICATIONS

Capabilities

Maximum Number of Drill Heads	10 Heads
Drill Sizes Available*	1/8" - 1/2" (3 - 13 mm)
Center-to-Center Maximum	21" (53 cm)
Distance of Heads Minimum**	1-1/4" (32 mm)
Minimum Distance Between Holes	
With Adjustable Stops	3/8" (9.5 mm)
With Fixed Gages	1/4" (6 mm)
Maximum Drilling Capacity	2-1/2" (63 mm)
Strokes Per Minute (Adjustable)	18 to 26
Backgage Adjustment	0 to 9" (0 to 23 cm)
Vertical Adjustment of Individual Heads	1/4" (6 mm)

* Special large hole drilling (up to 1-1/2" in diameter) is possible with the conversion kit.

** Three hole drilling heads are available for drilling 3 holes on 1" centers.

Dimensions

Table Size	24" x 36" (61 x 91 cm)
Table Height	38" (97 cm)
Overall Height	60" (152 cm)
Floor Space Needed	35" x 40" (89 x 102 cm)
Net Weight (approximate)	1350 lbs. (675 kgs)
Shipping Weight (approximate)	1660 lbs. (830 kgs)

Electrical - U/L Listed

Standard: 3 Phase, 60 Hz, AC, Pump - 3/4 H.P., Spindle - 3 H.P.

Available in 208 Volts/14 Amps, 230 Volts/12.8 Amps (service size 20 amps), or
460 Volts/6.6 Amps (service size 15 amps)

Optional: Single Phase, 60 Hz, AC, Pump - 3/4 H.P., Spindle - 3 H.P.

Available in 208 Volts/26.5 Amps, 230 Volts/24.2 Amps (service size 40 amps)

The MS-10A must be wired to an individual line through a disconnect box with the proper voltage at the machine.

Challenge reserves the right to make changes to any product or specification without notice and without incurring responsibility to existing units.

TABLE OF CONTENTS

	Page
Warranty	Inside Front Cover
Packing List	1
Specifications	2
▲ Safety Precautions	4
Installation Instructions & Operations	5
Routine Adjustments	7-8
Routine Maintenance	9-10
Trouble Shooting	11
Drilling Tips	12-13
MS-10A External Parts (drawing)	14
MS-10A External Parts (parts list)	15
MS-10A Internal Parts (drawing)	16
MS-10A Internal Parts (parts list)	17
Hydraulic Power Pack (drawing)	18
Hydraulic Power Pack (parts list)	19
Electrical Schematic	20-23
Electrical Wiring Assembly	24-27
Electrical Panel Assembly	28-31
Electrical Interlock (drawer)	32
Electrical Interlock (cover)	32
Standard Drill Head (drawing & parts list)	33
Standard Side Guide (drawing & parts list)	34
Auto-trip Side Guide (drawing & parts list)	35
Large Hole Drill Head (drawing & parts list)	36
Chip Chute Extension (drawing & description)	38
Accessories	39
Hollow Drill Sharpener	41

SAFETY PRECAUTIONS

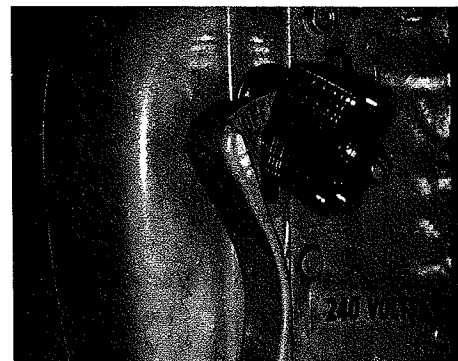


This safety symbol means **CAUTION/WARNING - PERSONAL SAFETY INSTRUCTION**. Read the instructions because it has to do with safety. Failure to comply with the following instructions may result in personal injury.

- This machine is designed and safeguarded for **ONE PERSON** operation. **NEVER** operate the machine with more than one person.
- Safety of this machine is the responsibility of the user and operator. Use good judgement and common sense when working with and around this machine.
- **READ** and understand all instructions thoroughly before using the machine. If questions still remain, call your Authorized Challenge Dealer - Failure to understand operating instructions may result in personal injury.
- Only trained and authorized persons should operate the machine.
- **DO NOT ALTER SAFETY GUARDS OR DEVICES**, they are for your protection and should not be altered or removed. Severe lacerations could result.
- **DISCONNECT POWER** before cleaning, lubricating, servicing or making adjustments not requiring power. Lock the disconnect switch in the **OFF** position, see Power Lockout Procedure below.
- **HIGH SPEED DRILL** - Keep rags, loose clothing and long hair away from rotating drill. Personal injury could result from items being caught on drill.
- Have your electrician make sure the machine is properly grounded, Power Hookup, page 5.
- Have your electrician check for sufficient power to operate the machine properly, page 5.
- **OBSERVE ALL CAUTION PLATES** mounted on this machine
- **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, see page 5.
- **KEEP THE FLOOR** around the machine free of trim, debris, oil and grease.
- When replacing hydraulic parts, loosen the connections slowly to release pressure. Never loosen connections with the machine running, page 11.
- If the machine sounds or operates unusually, turn it off and consult the Trouble Shooting section of this manual, page 9. If the problem cannot be corrected have it checked by a qualified service person or you Authorized Challenge Dealer.
- **CRUSH HAZARD**, keep feet off the pedal, page 6, when handling paper under the clamp. **DO NOT REST FOOT ON PEDAL** at any time!
- **DO NOT REACH UNDER THE DRILL AND CLAMP 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 when lowering drill head.

WARNING: POWER LOCK-OUT 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 thrown to the **OFF** position and a padlock placed in the loop. The key should be held by the person servicing the machine.



(fig. 1)

Installation Instruction

Refer to the parts lists and drawings in the back of this manual for part identification and orientation, as necessary.

All guards and instruction plates are installed for your safety and information and must remain on the machine as shipped from the factory.

Uncrating the Paper Drill


Unless otherwise specified, this machine is shipped in a wooden crate, completely assembled. The drill head(s) specified on the order are shipped already installed on the spline shaft. The machine should be unpacked by carefully removing the crate so as not to damage any of the machine parts.

Immediately after uncrating, check off parts received against the packing list. Also, examine for any physical signs of damage incurred during shipment. The machine is inspected before and after crating at our plant. The responsibility for filing a claim against the carrier for damages incurred during shipment rests with the receiver of the goods (FOB our factory).

The machine is held in place on its shipping skid by means of lag screws. To remove these screws, you must first remove the front and rear panels of the machine. If a fork lift is available, with the lower front panel removed, place the forks under the chip drawer slides and raise the machine from the skid and carefully position it on the floor. If a fork lift is not available, be sure you have sufficient equipment and manpower to handle the machine safely. The MS-10A weighs approximately 1350 lbs./675 kg.

Remove the protective coating of light oil from machined surfaces with a cleaning solvent, such as type wash. Clean all other surfaces with a solvent such as C.R.C.

Hooking Up the Power Line


 **WARNING: DISCONNECT POWER before cleaning, lubricating servicing, or making adjustments not requiring power. Lock the disconnect switch in the OFF position, see Power Lockout Procedure page 4.**

The machine is factory wired to the customer's specification. It is the customer's responsibility to wire the motor for the current and voltage specified on the name plate. It is important that the line voltage specified be maintained. Failure to do so will result in improper operation of the machine (see trouble

shooting section for specific problems). It may be necessary to provide a separate branch power line for the machine. A junction box is provided on the side of the machine for making the hookup to the power source.

The standard voltages that this machine may be ordered for are 208, 230 and 460. The 208 and 230 volt machines should be on 20 amp circuits and the recommended wire size for this hookup is #12 gauge. The 460 volt machine should be on a 15 amp circuit with #14 gauge wire for the hookup.

With the rear panel removed, briefly start and stop the machine to check the direction of motor rotation. If the motor turns in the direction opposite of the arrow, change terminals of any one wire with another. Again, check rotation of the motor to be sure it turns in the direction of the arrow. Replace the rear panel cover.


 **CAUTION: REPLACE ALL GUARDS. Do not operate this machine with any guards removed. Severe personal injury could result.**

Final Installation

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

Be sure the cutting stick is in position before trying to drill paper.

Insert the tapered head to the hollow drills into the spindles. Be sure that the drift hole covers are in place before operation.

 **WARNING: Always disconnect the power when cleaning, servicing or lubricating your drill. See Power Lock-out Procedure, page 4.**

Check the hydraulic oil supply for the proper level. This check is made by removing the rear panel and taking the top off the hydraulic tank. The oil should be up to the scribe line. Recommended oils are found in the maintenance section of this manual. These oils are cross-referenced.

Installing (and Removing) Drill Heads

First swing aside the plastic cover on the right side of the spline shaft. Align the spline lock knob pin with the release hole and pull the spline out as far as necessary. Load the drill heads onto the spline and clamp to the dovetail in the desired position by means of the socket head cap screw. Push the spline back in place and lock.

To remove drill heads, simply loosen the cap screw clamping the head to the dovetail and slide the head off of the spline. Reposition the spline and the machine is ready for operation.

Starting the Machine

The power for this machine is supplied by two motors; one is for the hydraulic power pack and the other is for the spindle. The hydraulic motor drives the pump through a flexible coupling while the spindle motor drives the drill heads. The two motors are started and stopped simultaneously by separate "start" and "stop" pushbuttons located on the control panel. The pushbuttons are labeled by their function. The on switch has a guard to reduce the possibility of accidental contact. Be sure both motors are operating before trying to drill paper.

NOTE: The MS-10A paper drill is equipped with a safety interlock system which prevents the machine from being started with the chip drawer removed or the cover up. Also, if the cover is raised or the chip drawer is removed while the drill is in operation, the motors will shut off and must be restarted when the cover and/or drawer are back in place. This is a safety feature provided to prevent accidental contact with moving parts and must not be tampered with.

Lighting the Machine

The table light is turned on by means of a pushbutton located directly above the start and stop buttons (on the left side frame).

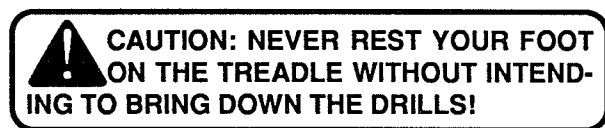
Operating the Drill

This machine handles one to ten drilling heads which are mounted on a belt driven spline shaft. Each head is independently adjustable allowing a minimum center-to-center distance of 1-1/4" to a maximum center-to-center distance of 21". To adjust for the desired hole spacing, lift the cover, loosen the socket head cap screw on the top of the head, slide the head to the required position (reading on the scale provided), and retighten the screw.

Any number of heads (up to ten) or combination of drill hole sizes can be drilled at one time. It is recommended, however, that no more than five half-inch hollow drills be used at the same time.

A slight pressure on the foot treadle brings the table up through the stock and returns them back again automatically. The pedal must be released and depressed again before drilling the next set of holes, assuring full control and allowing no repeat stroke. By releasing the pedal, the operator can stop the drills in their downward stroke allowing them to return to their normal up position, thus preventing costly errors.

The vertical movement of the drills are actuated by the hydraulic unit. Depressing the foot treadle sets the hydraulic unit into action. Keeping your foot on the treadle allows the drills to drill through the entire lift of stock and reach the bottom of their stroke. At this point, the treadle is tripped off of the valve, relieving the pressure off of the cylinder and allowing the drills to return to their up position.



Using the Side Guide

The adjustment for the location of the holes to the side edge of the sheet is provided by a sturdy side guide. The standard side guide is attached to the table in the approximate position required according to the size of sheet to be drilled. A micrometer adjustment screw permits fine adjustments of the final sheet position. Since the drilling head location is independently adjustable, the fine adjustment (after rough location) of the backgage is all that's necessary. A knurled locknut is used to maintain the side guide setting.

Setting Up the Backgage

The backgage is set up by aligning the hand screws (Internal View, Ref. No. 33) in any set of the tapped holes in the table and tightening them. A scale is provided in the table for setting up the backgage. The scale reads in inches/mm and will give you the dimension from the back of the sheet to the centerline of the holes. If it is necessary to drill within 1" of the edge of the sheet, two filler blocks which are provided (Internal View, Ref. No. 34) must be used. These blocks attach to the backgage by means of a thumbscrew. The blocks are 1" wide and, when used, 1" must be subtracted from the scale reading to give the actual set up dimension.

Example: To drill 3/4" from the edge to the sheet, install the filler blocks and set the backgauge to 1-3/4" on the scale.

Emptying the Drill Chips

A large capacity chip bin, accessible from the front of the machine below the table, can easily be taken out and emptied. Safety interlocked, the machine will shut off if the bin is removed while the machine is running. The machine will not start unless the bin is in place.

Storing Accessories

Two convenient tool drawer is provided under the table for storing tools, drill sharpener, drill drift, extra drills, etc.

Using Optional Equipment


Such items as extension tables, special drill heads, an automatic trip side guide, fixed gages, a right hand side guide, and a variety of drill sizes are available as optional equipment for your MS-10A Paper Drill. See page 37 or request specific product literature from your Authorized Challenge Dealer.

Routine Adjustments

Adjusting the Vertical Stroke

Always raise the drill head spindles to their highest point when changing drills. Adjust the spindles so that the drills will just cut through the bottom sheet of a lift before returning up. See DRILLING TIPS on page 10.

When the required number of drill heads are installed and hollow drills inserted in the spindles, the heads are raised to their highest point by turning the handwheel on the top of the machine counter-clockwise. The table must then be lowered to its lowest point by turning the knob under the table counter-clockwise.

 **CAUTION: Make sure all objects are removed from the top of the machine before starting. The handwheel moves down with the drill heads. Objects may jam under the wheel resulting in machine damage.**

Place one sheet of paper, of the type to be drilled, under the drills and start the machine. Press the foot treadle to the full down position and notice the height at which the drill heads return to the up position. Adjust the drill heads down by turning the handwheel

clockwise slightly and bring the heads down again. Continue to adjust the handwheel until one of the drills just cuts through the paper. Adjust the remainder of the drill heads individually with the adjusting knob on the top of each drill head so that all of the drills just cut through the sample paper. It will then be necessary to adjust the handwheel slightly when drilling a full lift of stock.

The handwheel must turn with a little drag. Adjust the drag by tightening the set screw in the upper front of the dovetail (Internal View, Ref. No. 18, 19 & 20).

Adjusting the Stroke Speed

The hydraulic unit is equipped with an adjustable valve for regulating the speed of the drill strokes per minute (up and down travel under no load – without drilling paper). Maximum speed is 30 strokes per minute and this speed is used on the average run of work. Light or soft stocks such as mimeographs, etc., are apt to wrinkle at high speeds, and the speed should, therefore, be regulated to a point where the best results are obtained. This is found mostly by "trial and error."

Stroke speed adjustment is made by turning the adjustable valve (located on the front of the drilling machine stand) counter-clockwise to reduce speed and clockwise to increase speed. Minimum speed should never be set for less than 18 strokes per minute.

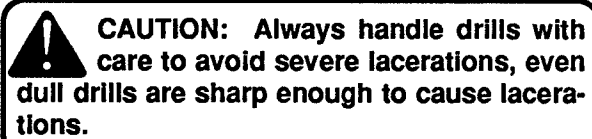
Never turn the speed control knob more than 2-1/2 turns counter-clockwise as the drill will not bottom and engage the return cycle. Less than one turn counter-clockwise should be enough for all drilling operations. Also, slow speeds will cause the drill to "burn" through the paper. If burning or burnishing occurs, either increase the vertical speed and/or sharpen the drills.

Slower vertical speeds are recommended when drilling with the maximum number of heads.

Removing the Cutting Sticks

The cutting sticks are removed by simply lifting them from their groove. They should set flush with the table and each other. Place shims underneath if necessary. For best use and longest life, turn them end for end, top and bottom.

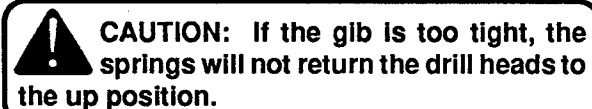
Removing Drills from the Chuck



Insert the drill drift, flat side down, into the hole in the chuck, and lift upward. The upward movement forces the drill down and releases it from the chuck. The spring clip on the end of the chuck is provided to cover the drift hole and prevent chips from flying out when drilling small diameter holes. NOTE: Drills may become so firmly seated in the chuck that it is necessary to tap on the drift to get the drill to release.

Adjusting the Dovetail and Gibs

When play is detected between the vertical dovetail and the gibs, loosen the three capscrews (Internal View, Ref. No. 88) and the three nuts (Internal View, Ref. No. 62). Tighten the upper two set screws (Internal View, Ref. No. 63) while the heads are up. Turn the speed control knob three turns counter-clockwise and bottom the drill heads (by operating the foot treadle). Adjust the bottom set screw while the head is down. It is important that the head always be behind the set screw being adjusted. Retighten the cap screws and the nuts. Return the speed control to normal and check for excessive play.



Adjusting the Pulley 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 from plugging/breaking. This belt is adjusted by loosening the locknut (Internal View, Ref. No. 46) and turning the rod into or out of the guide rod bracket (Internal View, Ref. No. 44).

Tightening the Drill Heads

When you have trouble holding a setting on a drill head, remove the head from the machine and tighten (put more tension on) the Allen set screw, (Drill Head Drawing, Ref. No. 24).

Adjusting the Backgage

If there is play in the backgage and it isn't holding its setting, tighten the adjusting screws (Internal View, Ref. No. 58 and 59).

Valve Trip Lever Rod (Foot Treadle) Adjustment

NOTICE – Procedure for cylinder A-8400, machine serial numbers 64719 to 69560:

The valve trip lever rod (Internal View, Ref. No. 43) should be adjusted so that the cylinder is fully extended (bottomed) at the same time that the rod releases the valve. This adjustment is made by loosening the locknut (Ref. No. 46) and turning the rod into or out of the guide rod bracket (Ref. No. 44).

NOTICE – Procedure for cylinder H-340, machine serial numbers 69561 and up (use this procedure whenever replacing A-8400 cylinder with H-340):

Insert a new drill and set up according to the Vertical Stroke Adjustment Procedure. Adjust the valve trip lever rod (Internal View, Ref. No. 43) so that the valve trips just after the drill ceases the drill block. Note the cylinder **does not** bottom out. This adjustment is made by loosening the locknut (Ref. No. 46) and turning the rod into or out of the guide rod bracket (Ref. No. 44). This adjustment is important and should be checked monthly.

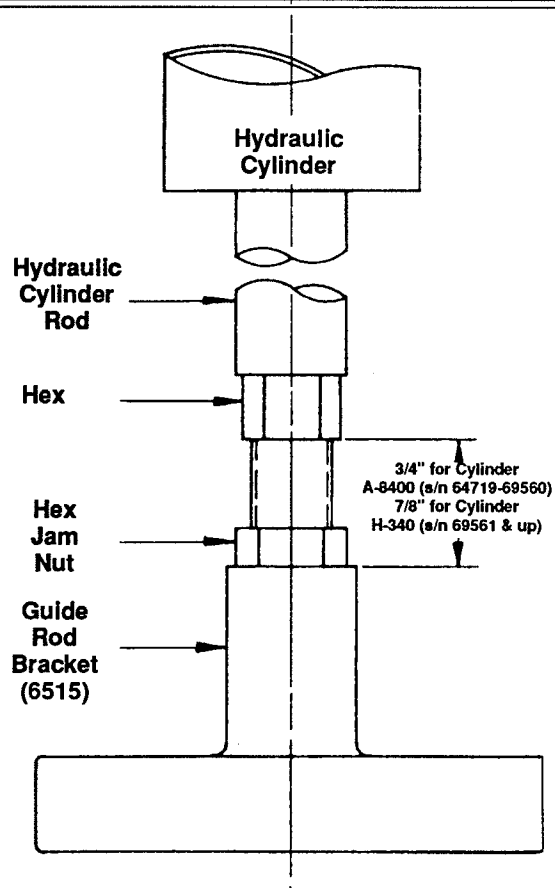
Adjusting the Cylinder

The MS-10A 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).

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 into 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) Readjust valve trip lever rod (see previous instructions);
- 8) Follow procedure for setting drills.



Routine Maintenance

General

Production losses can be reduced if good practices of preventive maintenance are followed. The following suggestions may be helpful in initiating a preventive maintenance procedure.

1. Recognize the fact that the user of hydraulic equipment has more control over maintenance than the manufacturer.
2. Operators should be familiar with use, care, and limitations of the equipment.
3. Use properly trained personnel for your maintenance.
4. Have a program of systematic preventative care for your equipment.
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 of it doesn't "sound right", stop the machine immediately and try to identify the problem.
7. Call the dealer for any problems that cannot be handled by your own personnel.

Service Checklist



CAUTION: 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 handwheel if needed.

2. Lubricate the hollow drill 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.



CAUTION: NEVER USE Automatic Transmission oil or brake fluid as a substitute! Oils other than the recommended type will cause seals, cups and O-rings to deteriorate. Unsafe operating conditions will result.

Weekly

1. Wax the chip chute and buff to prevent chips from piling up.
2. Grease the drill head at the Alemite fittings with the grease gun provided in the accessory kit. Wipe off excess grease around the spline shaft.

Monthly

1. Oil the spindle adjusting knob shaft with a light machine oil. Wipe off excess oil.
2. Oil the front and rear trip bar bracket with No. 30 oil.
3. Check the hydraulic oil supply for the proper level. This check is made by removing the rear panel, and taking the top off the reservoir tank. The oil should be up to the scribe line, approximately 1" from the top of the tank. Use only one of the recommended oils or an ISO VG 100 Hydraulic Fluid equivalent. Oils other than the recommended type will cause seals, cups and O-rings to deteriorate. See CAUTION.

Recommended Oils

Oil Name	Distributor
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	Sunoco
Rando HD 100	Texaco
Unax AW 100	Union Oil Co.

Yearly

1. Check all adjustments.
2. Tighten all screws.
3. Change hydraulic oil in reservoir. Oil may have to be changed more often if contamination of any kind gets in the oil.


Hydraulic

Through normal use, hydraulic systems gum up and seals wear. Signs of wear are hydraulic leaks and erratic operation of the vertical speed. Hydraulic cylinders may be replaced on an exchange basis through your dealer. Also, the hydraulic power pack may be replaced on an exchange basis.

Drill Heads

Through normal use, bearings and bushings will wear and need replacing. Signs of wear are excessive noise, heat, or loose spindles. Your old heads may be rebuilt or new heads purchased through your dealer.

Troubleshooting

 **WARNING: DISCONNECT THE POWER AND LOCK IT OUT** whenever working on the machine unless the directions specifically require the machine to be powered, see Power Lockout procedure, page 4. Several of the following tests may require the machine to be operational for checking and adjusting. Be very careful that tools and other people are clear of moving parts and that the drill is not accidentally operated while adjustments are being made.

 **CAUTION: Whenever repairing hydraulic components, loosen connections slowly to bleed off any trapped pressure.**

Problem	Area to Check	Solution
1. Lack of power	Relief valve in pump may be bad or have dirt in it.	Clean or replace relief valve or pump.
	Check oil level — may be low.	Add oil.
	Check voltage at machine — may be low.	Remove other machinery on line or provide a separate branch circuit.
	Check pump coupling — may be worn or slipping on shaft.	Tighten set screws or replace the coupling.
2. Spindle motor stalls	Dull drills.	Sharpen drills
	Check for low voltage.	(See above.)
	Check drive pulley and belt for tightness.	(See main. section for adjustment.)
	Check for paper plugging drills.	Clean out hollow drills — We recommend cleaning and soaking drills in oil overnight.

DRILLING TIPS

Important! To prevent the drill from overheating, always avoid drilling too slowly. The spindle should be brought down as rapidly as the drill will easily cut through the paper. Also, return the spindle to the up position as rapidly as possible to avoid spinning the drill in the stock on the upstroke.

Slotted Holes - Instead of punching slotted holes for five and seven hole universal binding work, save time and cost by drilling a 1/2 inch diameter hole in place of the slot. The slot is only intended to allow the post or ring to be used in either location, and the large hole permits this.

Plastic Bindings -Drilling holes for plastic bindings, instead of punching them, is practical and saves a great deal of time, particularly on long run jobs.

Keep Drills Sharp - A dull drill is the major cause of drill breakage and production tie-ups. Usually after three hours of drilling, depending on the type of paper being processed, the drill should be sharpened. A dull drill results in poor quality work.

Keep Drills Clean - A dirty and rusty drill will not permit the free upward passage of the drill chips. Pressure built up by a clogged drill will split or break the drill. To keep it free from dirt or rust, clean the drill of all chips after each use and apply a light oil to the inside and outside. Drills should be cleaned out immediately after each use. This is particularly true if a coated or varnished stock has been drilled. On these jobs the coating on the chips frequently fuse the chips into one solid mass when the drill cools, causing breakage the next time the drill is used.

Lubricate Drills - Lubrication assists in the passage of the chips and helps avoid overheating of the drills. Use readily available stick lubricants for this purpose. Hold the end of the stick against the side of the rotating drill. Be sure to touch the cutting edge with the lubricant also. Wipe off excess oil before drilling. **CARE MUST ALWAYS BE TAKEN WHEN HANDLING DRILLS.**

Keep Spindle Clean - Clean out the drill spindle frequently. This will prevent any buildup in the spindle of the drill.

Set the Drills Correctly - Do not cut too deeply into the cutting block. The drill should just touch the block and cleanly cut through the bottom sheet. During drilling, do not set the drill deeper into the block but change the position of the block frequently. Drilling deeper into the block dulls the drills quickly. Use a piece of chipboard underneath your stock. This will make handling the stock easier and will ensure that the last sheet is cut cleanly through.

Check for Drill Wobble - If spindles are badly worn or bent through misadjustment, have them replaced immediately. A wobbly or loosely held drill will break.

DRILLING TIPS

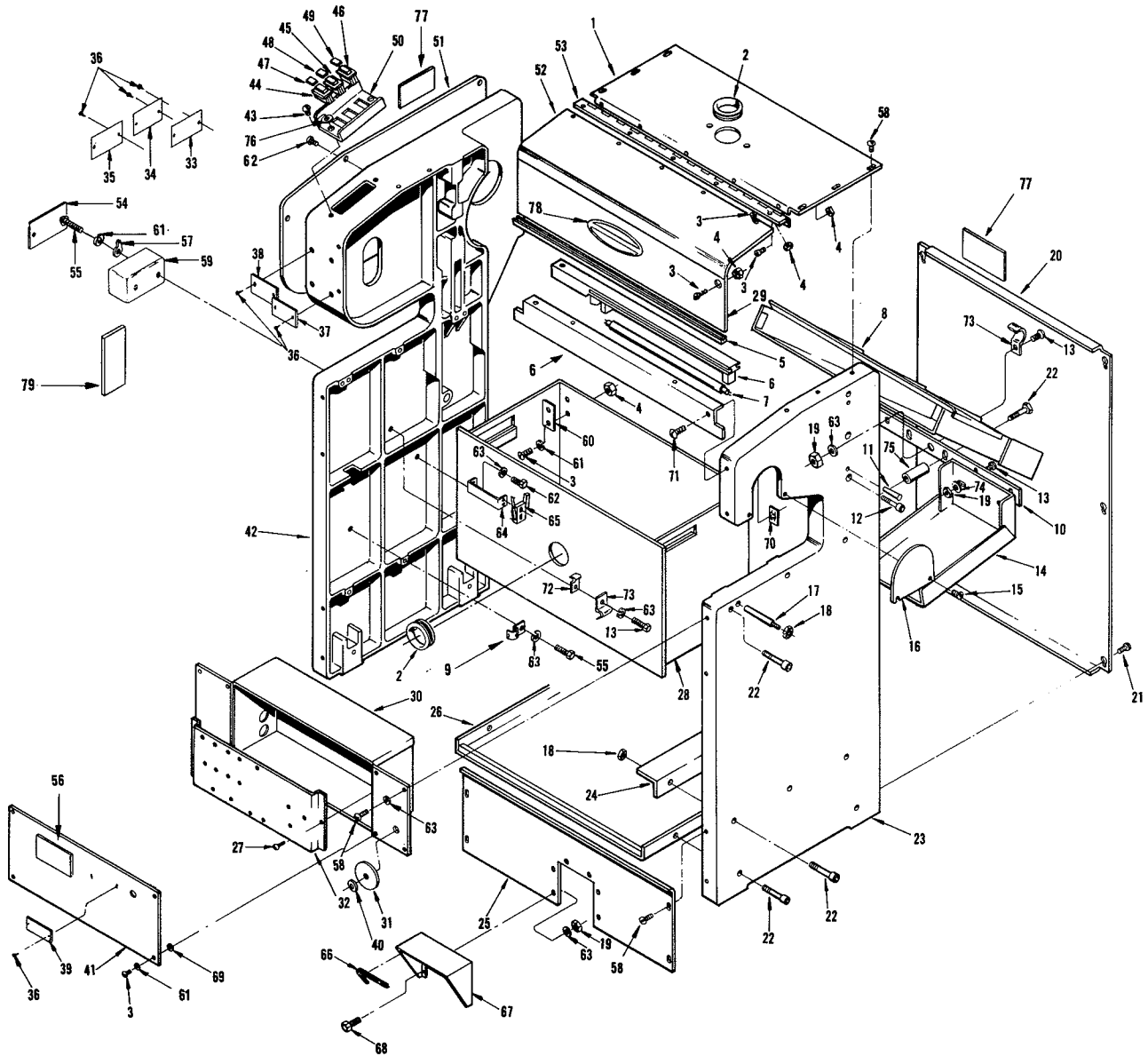
(continued)

Check Your Drill Sharpener - The cutting edge of the sharpening bit should be inspected frequently to make certain that it is sharp and free of nicks. Never let a drill drop onto the sharpening bit. It will chip the sharpening edge. Use gentle pressure when sharpening - let the sharpening bit do the work. Check the sharpness of the drill after sharpening. The cutting edge should be razor sharp.

Just a little time and effort taken with each use of your paper drilling machine should result in trouble free operation over many years.

Fixed Gages - Having fixed gages for all frequently repeated standard jobs, or even special ones, is a good way to save set-up time and assure that all runs will have identical hole spacing.

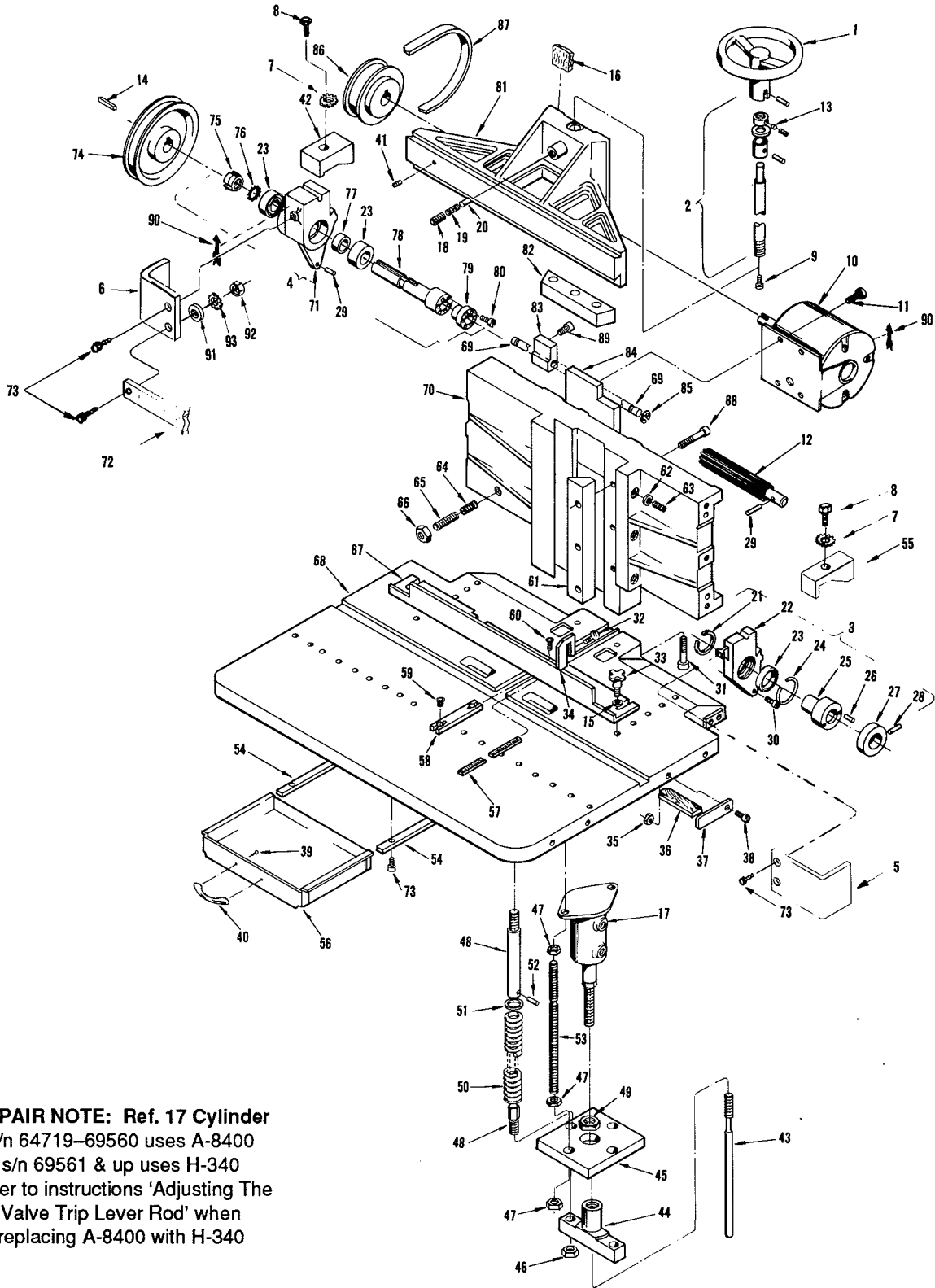
EXTERNAL PARTS LISTS



EXTERNAL PARTS LISTS

Ref. Part No.	Part Name	Qty.	Ref. Part No.	Part Name	Qty.
1. 6552	Cover, Top	1	41. A-6578	Cover Assembly	1
2. S-1687	Rubber Grommet	2	42. 6502-2	Side Frame, L.H.	1
3. H-6910-102403	#10-24 x 3/8" Butt. Hd. Soc. Cap Scr.	14	43. H-6910-83203	#8-32 x 3/8" Butt. Hd. Soc. Cap Scr.	2
4. H-6423-#10	#10-24 Hex Nut	6	44. E-1045-6	Push Button, Stop (red)	1
5. S-1682	Plastic Trim	1	45. E-1045-8	Push Button, Start (green)	1
6. EE-1489-1	Table Light & Interlock Assembly	1	46. E-1045-5	Push Button, Table Light (white)	1
E-2148	Fluorescent Unit (only)	ref.	47. E-1103-4	Decal, Stop	1
S-1429	Ballast (only)	ref.	48. E-1103-3	Decal, Start	1
S-857-1	Starter (only)	ref.	49. E-1103-2	Decal, Table Light	1
7. S-845	Fluorescent Tube (lamp)	1	50. E-1103-1	Plate, Push Button Mounting	1
8. A-6538	Chip Chute Assy, Top	1	51. 6537	Belt Guard	1
9. S-1046	3/8" Flex Conduit Clamp	1	52. A-6638	Cover Assembly	1
10. 6648	Bracket, Chip Chute Mounting	1	53. 6553	Hinge	1
11. H-6633-722	#7 x 2-3/4" Taper Pin	4	54. E-1369-1	Cover, Junction Box	1
12. H-6918-820	1/2-13 x 2-1/2" Soc. Hd. Cap Scr.	6	55. H-6910-102404	#10-24 x 1/2" Butt. Hd. Soc. Cap Scr.	2
13. H-6910-406	1/4-20 x 3/4" Butt. Hd. Soc. Cap Scr.	5	56. S-1781-11	Label, Caution	1
14. 6547	Chip Chute, Lower R.H.	1	57. E-640-1	Lug, Grounding	1
6550	Chip Chute, Lower L.H.	1	58. H-6910-403	1/4-20 x 3/8" Butt. Hd. Soc. Cap Scr.	14
15. 6067	Screw, Finger	2	59. E-1370-1	Box, Junction	1
16. 6575	Cover, R.H.	1	60. 6685	Stop, Drawer	2
17. S-1574-1	Taper Pin (special)	4	61. H-7324-#10	#10 Int. Tooth Lockwasher	10
18. H-6424-6	3/8-16 Hex Jam Nut	7	62. H-6910-404	1/4-20 x 1/2" Butt. Hd. Soc. Cap Scr.	9
19. H-6423-4	1/4-20 Hex Nut	11	63. H-7324-8	1/4 Int. Tooth Lockwasher	12
20. 6551	Back Panel	1	64. 3982	Bracket, Limit Switch	1
21. H-6923-604	3/8-16 x 1/2" Rd. Hd. Mach. Scr.	6	65. EE-1456	Drawer Interlock Assembly	1
22. H-6918-620	3/8-16 x 2-1/2" Soc. Hd. Cap Scr.	16	E-866-1	Limit Switch	ref.
23. 6501-1	Side Frame, R.H.	1	66. 7032-M	Trim, Plastic (25" long)	1
24. 6509	Chip Drawer Slide	2	67. 4099	Treadle Guard	1
25. 6522	Panel, Lower Front	1	68. H-6913-404	1/4-20 x 1/2" Hex Hd. Cap Scr.	6
26. 6506-1	Base, Hyd. Power Unit	1	69. S-1864-2	#10 Captive Retaining Device	4
27. H-6925-102403	#10-24 x 3/8" Truss Hd. Mach. Scr.	3	70. H-6416-1024-1	#10-24 Weld Nut	2
28. A-6523	Chip Drawer Assembly	1	71. H-6923-102412	#10-24 x 3/4" Rd. Hd. Mach. Scr.	2
29. 6640	Shield, Plexiglass	1	72. E-509	1/2" Conduit Clamp	1
30. EE-1083	Control Box Assembly	1	73. E-596	3/4" Conduit Clamp	2
31. S-1684	Decal, Speed Control	1	74. H-7327-8	1/4" Med. Lockwasher	6
32. E-1084-2	Sub Panel	1	75. H-6405-1-612	3/8 x 1-1/2" Pipe Nipple	2
33. E-1504-M	Plate, Specification	1	76. H-7324-#8	#8 Int. Tooth Lockwasher	2
34. S-1842	Plate, Instruction	1	77. S-1781-16	Label, Caution	3
35. S-1236-6	Plate, Serial Number	1	78. 4956-1	Label, Challenge	1
36. H-6924-004	#0 x 1/4" Rd. Hd. Drive Screw	12	79. S-1781-12	Label, Caution	1
37. S-1781	Plate, Warning	1			
38. S-1781-3	Plate, Crush Hazard	1			
39. E-1503-M	Plate, Fuse Rating	1			
40. H-7322-8	1/2" Polished Washer	1			

INTERNAL PARTS LIST



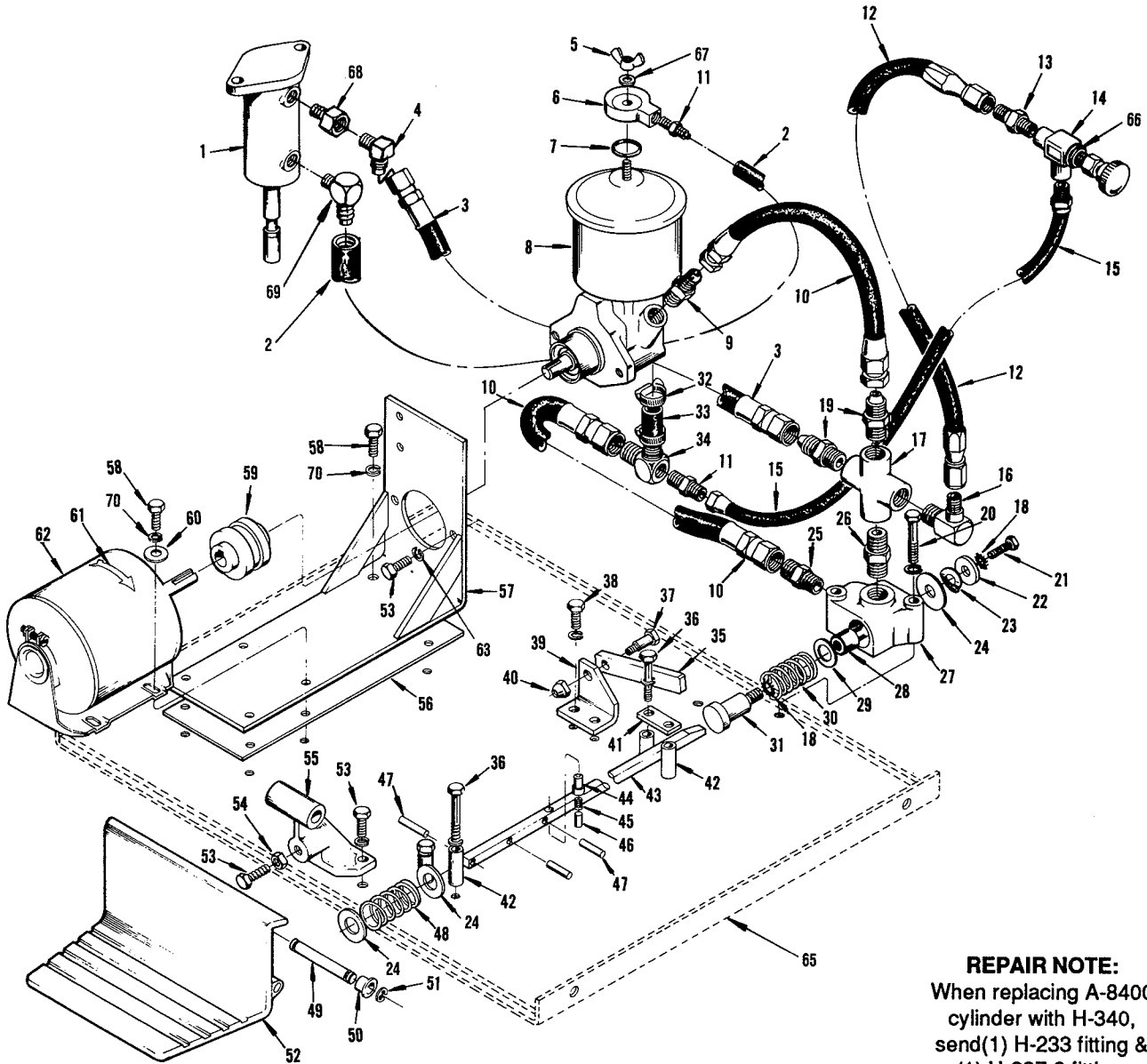
REPAIR NOTE: Ref. 17 Cylinder
 s/n 64719-69560 uses A-8400
 s/n 69561 & up uses H-340
 Refer to instructions 'Adjusting The
 Valve Trip Lever Rod' when
 replacing A-8400 with H-340

INTERNAL PARTS LIST

Ref. No.	Part No.	Part Name	Qty.	Ref. No.	Part No.	Part Name	Qty.
1.	6520-1	Handwheel (only)	1	51.	6589	Washer	2
2.	A-6519-1	Handwheel Assembly	1	52.	H-5246-410	1/4 x 1-1/4" Dowel Pin	2
3.	A-6528	Bearing Housing Assembly R.H.	1	53.	6510-1	Stud, Cylinder Mounting	2
4.	A-6531	Bearing Housing Assembly L.H.	1	54.	A-6558-1	Slide Assembly, Drawer	2
5.	16505	Bracket, Scale R.H.	1		6559-1	Slide	2
6.	16505-1	Bracket, Scale L.H.	1		A-6632	Bracket Assembly, Slide	2
7.	H-7327-12	3/8" Med. Lockwasher	2	55.	6601	Clamp	1
8.	H-6918-612	3/8-16 x 1/2" Soc. Hd. Cap Scr.	2	56.	A-6555-1	Drawer Assembly, Tool	1
9.	H-6903-404	1/4-20 x 1/2" Nylok Butt. Hd. Cap Scr.	1	57.	2236-6	Scale, Table	1
10.	E-1600-100	Spindle Motor (208 V. 3 Phase)		58.	6562-1	Key	1
	E-1600-112	Spindle Motor (230/460 V. 3 Phase)		59.	H-6671-2	1/8" Pipe Plug	2
	E-1600-79	Spindle Motor (230 V. 1 Phase)		60.	H-6909-404	1/4-20 x 1/2" Flat Hd. Soc. Cap Scr.	1
11.	H-6913-608	3/8-16 x 1" Soc. Hd. Cap Screw	4	61.	6517-1	Gib	1
12.	6535	Shaft, Spline	1	62.	H-6424-6	3/8-16 Hex Jam Nut	3
13.	303-5255	Brass Button	1	63.	H-6938-632	3/8-16 x 2" Soc. Set Scr.	3
14.	S-426	1/4 x 1/4 x 1-1/4" Key	1	64.	S-1727	Spring	1
15.	8815	Washer	2	65.	6592	Screw, Motor Plate Adjusting	1
16.	P-325-F	Felt, 2 x 2-1/8"	2	66.	H-6424-12	3/4-10 Hex Jam Nut	1
17.	H-340	Hydraulic Cylinder Assembly	1	67.	A-6561-2	Backgage Assembly	1
	HH-299-9	Seal Kit (repairs)	ref.		6561-4	Backgage (only)	ref.
18.	H-6951-808	1/2-13 x 1/2" Nylok Soc. Set Scr.	1	68.	6503-1	Table	1
19.	S-1255-1	Spring	1	69.	6593-1	Shaft, Motor Plate	1
20.	6609-1	Plunger, Teflon	1	70.	6504	Dovetail, Vertical	1
21.	S-1517-118	Retaining Ring	1	71.	6532-1	Bearing Housing, L.H.	1
22.	6529	Bearing Housing R.H.	1	72.	6545	Scale	1
23.	S-1713	Ball Bearing	3	73.	H-6910-102404	#10-24 x 1/2" Butt. Hd. Soc. Cap Scr.	8
24.	S-1437-2.44	Retaining Ring	1	74.	S-1714-1	Pully, Drive (large)	1
25.	6530	Bearing Spline R.H.	1	75.	S-1492-1	Lock Nut	1
26.	H-21S-214-0750	1/8 x 3/4" Roll Pin	2	76.	S-1493-1	Lockwasher	1
27.	6536	Knob, Spline	1	77.	6534	Spacer, Bearing	1
28.	H-21S-187-1500	3/16 x 1-1/2" Roll Pin	1	78.	6533	Bearing Spline, L.H.	1
29.	H-21S-187-0750	3/16 x 3/4" Roll Pin	1	79.	S-1717	Bushing	1
30.	H-6918-102410	#10-24 x 1-1/4" Soc. Hd. Cap Scr.	1	80.	H-6910-102406	#10-24 x 3/4" Butt. Hd. Soc. Cap Scr.	6
31.	H-6918-626	3/8-16 x 3-1/4" Soc. Hd. Cap Scr.	2	81.	6516-3	Dovetail, Spindle	1
32.	H-6955-506	5/16-18 x 3/4" Thumb Screw	2	82.	6511	Bar, Pull Down	1
33.	S-1770-1	Knob Assembly, Backgage	2	83.	6591-1	Bracket, Motor Plate Mounting	2
34.	6563-2	Block, Filler	2	84.	6584-2	Plate, Motor	1
35.	H-6423-4	1/4-20 Hex Nut	2	85.	S-1193-50	Retaining Ring	2
36.	6564	Drill Block	12	86.	S-1714	Pulley Drive (Small)	1
37.	6590	Stop, Drill Block	2	87.	S-1716	Belt, Timing	1
38.	H-6910-406	1/4-20 x 3/4" Butt Hd. Soc. Cap Scr.	2	88.	H-6918-818	1/2-13 x 2-1/4" Soc. Hd. Cap Scr.	3
39.	H-6910-102403	#10-24 x 3/8" Butt Hd. Soc. Cap Scr.	2	89.	H-6918-608	3/8-16 x 1" Soc. Hd. Cap Scr.	2
40.	S-1738	Drawer Pull	1	90.	S-1106	Arrow, Red	
41.	H-21S-125-0500	1/8 x 1/2" Roll Pin	1	91.	H-7324-#10	Washer, #10 Shakeproof Lock	2
42.	6601-1	Clamp	1	92.	H-6423-#10	#10-24 NC Hex Nut	2
43.	6521-1	Rod, Valve Trip Lever	1	93.	H-7321-#10	Washer, #10	2
44.	6515	Bracket, Guide Rod	1				
45.	6514-1	Plate, Spring	1				
46.	H-6423-10	5/8-11 Hex Nut	2				
47.	H-6424-8	1/2-13 Hex Jam Nut	6				
48.	6512	Rod, Pull Sown	2				
49.	H-6428-12	3/4-16 NF Hex Jam Nut	1				
50.	6513-2	Spring	2				

HYDRAULIC POWER PACK

REPAIR NOTE: Ref. 1 Cylinder
 s/n 64719-69560 uses A-8400
 s/n 69561 & up uses H-340
 Refer to instructions 'Adjusting
 The Valve Trip Lever Rod' when
 replacing A-8400 with H-340



REPAIR NOTE:
 When replacing A-8400
 cylinder with H-340,
 send(1) H-233 fitting &
 (1) H-237-2 fitting.

HYDRAULIC POWER UNIT

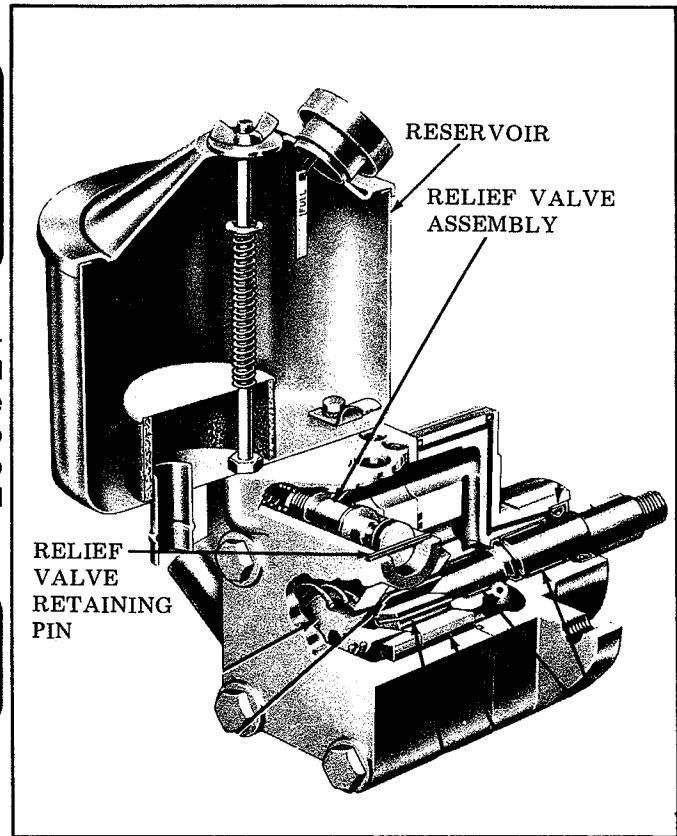


CAUTION: NEVER use Automatic Transmission Oil or Brake Fluid as a substitute for the proper hydraulic fluid (see chart, page 10)! Oils other than the recommended type will cause seals, cups and o-rings to deteriorate. Unsafe operating conditions could result.

Your machine is filled with 1.5 qts./1.4 liters of hydraulic fluid. The fluid level should be checked monthly and kept filled to the line stamped inside the tank. After any repairs, fill the tank, run the machine to fill hoses, cylinder and valve assembly and top off to the fill line. (See Maintenance Section for oil types and additional information.)



CAUTION: When making repairs to the hydraulic system, loosen connections to bleed off any trapped pressure!

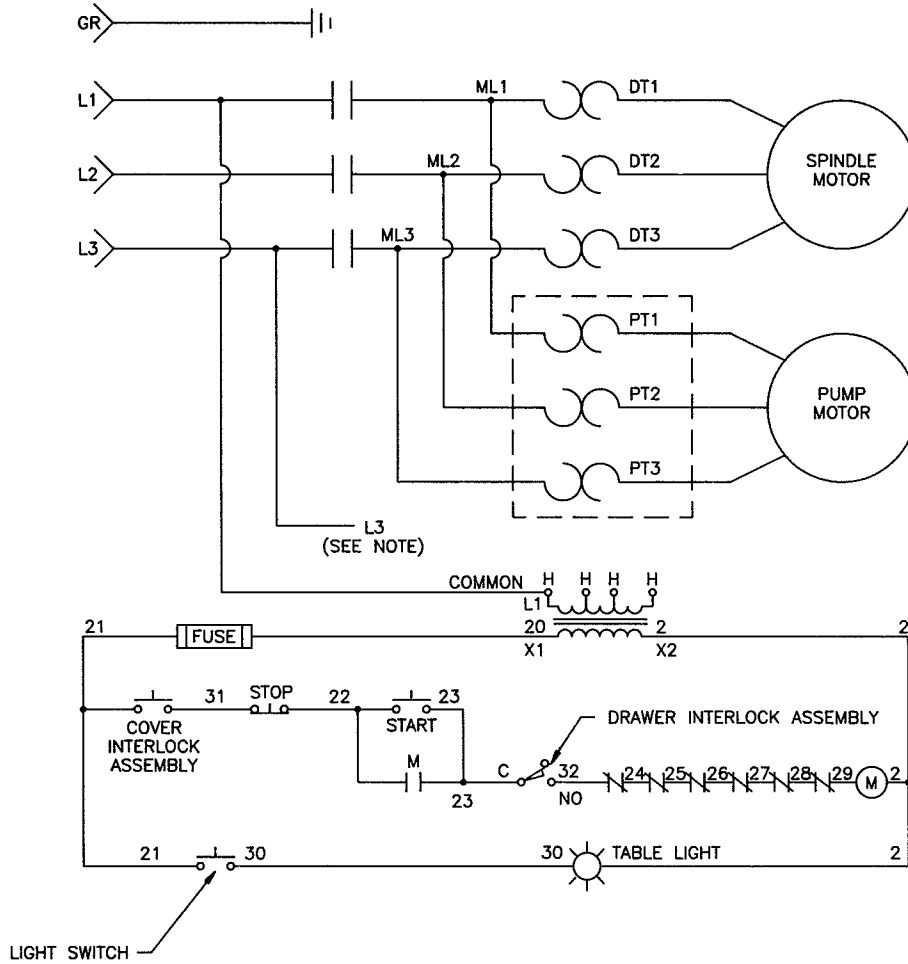


HYDRAULIC POWER PACK

Ref. No.	Part No.	Part Name	Qty.	Ref. No.	Part No.	Part Name	Qty.
1.	H-340	Cylinder, Hydraulic	1	36.	H-6913-418	1/4-20 x 2-1/4" Hex Hd. Cap Scr.	4
2.	P-240-1	1/4" I.D. Vinyl Tubing	1	37.	H-5254-506	5/16-18 x 3/4" Soc. Hd. Cap Scr.	1
3.	H-242-6	Hose Assembly	1	38.	H-6913-406	1/4-20 x 3/4" Hex Hd. Cap Scr.	2
4.	H-237-7	Elbow, 1/4 P. x 1/2 T.	1	39.	6646	Trip Bracket	1
5.	H-6425-4	1/4-20 Wing Nut	1	40.	H-5247	1/4-20 Lock Nut	1
6.	6768	Fitting, Tank Drain	1	41.	6644	Spacer Plate	1
7.	S-1810-16	"O" Ring	1	42.	6643-1	Guide	4
8.	4232-2	Pump	1	43.	A-6507-1	Trip Bar Assembly	1
9.	H-236-4	Adapter, "O" Ring To Tube	1		6508-1	Trip Bar (only)	1
10.	H-242-4	Hose Assembly	2	44.	4802	Plunger Housing	1
11.	P-267	Adapter, 1/8 P. x 1/4 T.	1	45.	16523	Spring	1
12.	H-242-10	Hose Assembly	1	46.	H-5246-406	1/4 x 3/4" Dowel Pin	1
13.	H-241-5	Adapter	1	47.	H-21S-250-1500	1/4 x 1-1/2" Roll Pin	3
14.	4771-1	Needle Valve	1	48.	S-1308	Spring, Valve	1
15.	H-306	Hose Assembly	1	49.	S-1689	Pin	1
16.	H-237-6	Elbow, Pipe To Tube	1	50.	S-1624-1	Bearing, Nylon	2
17.	H-278	Cross, Pipe (internal)	1	51.	S-1193-37	3/8" Retaining Ring	2
18.	H-7324-10	5/16 Int. Tooth Lockwasher	2	52.	K-841-1	Foot Treadle	1
19.	H-241-9	Adapter	2	53.	H-6913-606	3/8-16 x 3/4" Hex Hd. Cap Scr.	5
20.	H-6913-622	3/8-16 x 2-3/4" Hex Hd. Cap Scr.	2	54.	H-6424-6	3/8 Hex Jam Nut	1
21.	H-6906-512	5/16-18 x 3/4" Nylok Hex Hd. Cap Scr.	1	55.	K-383-1	Bracket, Foot Treadle	1
22.	8815	Washer, Special	1	56.	6645	Gasket, Motor Mount	1
23.	S-1814	Washer, Cup	1	57.	5008	Bracket, Pump	1
24.	H-7322-12	3/4" Polished Washer	3	58.	H-6913-508	5/16-18 x 1" Hex Hd. Cap Scr.	6
25.	H-241-8	Adapter	1	59.	5009	Coupling	1
26.	H-256	Adapter	1		5087	Insert, Coupling (repairs)	1
27.	KK-828	Selector Valve (complete)	1	60.	H-7321-5	5/16" Flat Washer	6
	A-6649	Valve	1	61.	S-1106	Arrow	1
28.	N/P	Spool	1	62.	E-1600-	Motor, Pump	1
29.	6651	Seal	2	63.	H-7327-12	3/8" Med. Lockwasher	4
30.	S-1424-1	Spring, Valve Spool	1	64.	H-7327-8	1/4" Med. Lockwasher	6
31.	K-833	Adapter, Valve Spool	1	65.	6506-1	Base, Power Unit	1
32.	A-9041	Clamp	2	66.	H-7322-8	1/2" Polished Washer	1
33.	H-244-11	Hose	1	67.	H-7321-4	1/4" Flat Washer	1
34.	6294-1	Elbow, Special	1	68.	H-233	Adapter	1
35.	6647	Trip, Finger	1	69.	H-355	Elbow	1
				70.	H-7327-10	5/16" Med. Lockwasher	4

ELECTRICAL SCHEMATIC THREE PHASE (Serial Nos. 66626 & up.)

NOTE:
HOOK-UP OF TRANSFORMER
WILL BE PER SPECIFIED
VOLTAGE. HOOK-UP L3 TO
CORRECT VOLTAGE TERRMINAL.

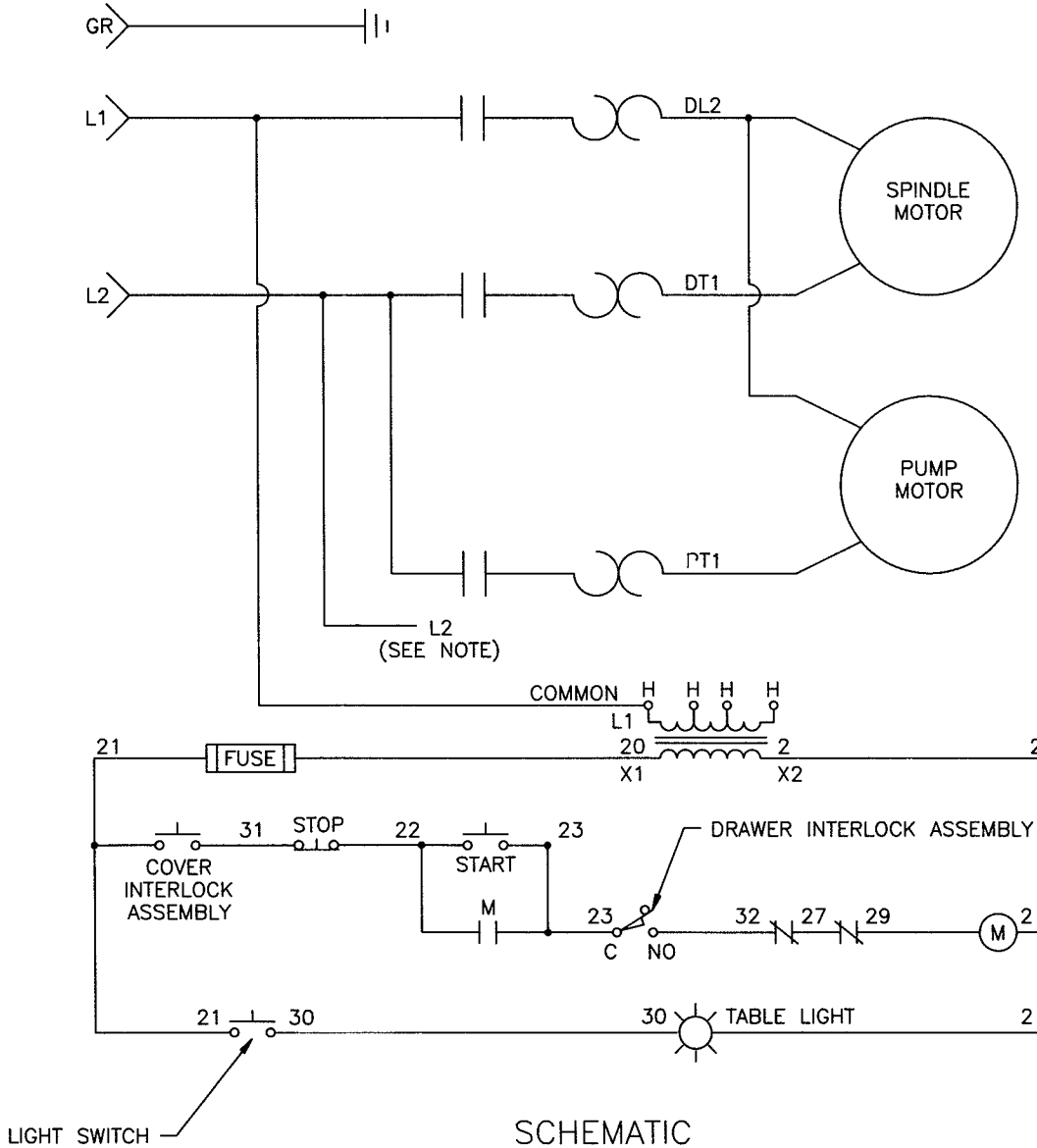


SCHEMATIC

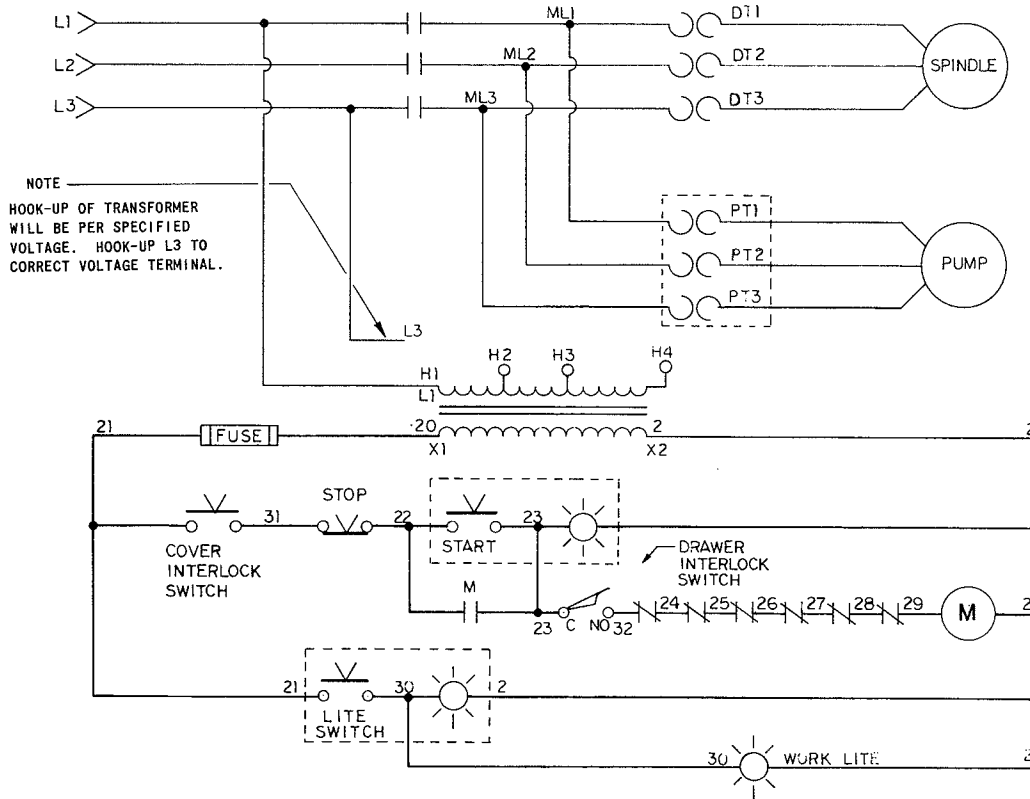
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230 V 3 PH 60 HZ
460 V 3 PH 60 HZ
208 V 3 PH 50 HZ
230 V 3 PH 50 HZ
460 V 3 PH 50 HZ
380 V 3 PH 50 HZ
415 V 3 PH 50 HZ
575 V 3 PH 60 HZ
346 V 3 PH 50 HZ

ELECTRICAL SCHEMATIC SINGLE PHASE (Serial Nos. 66626 & up.)

NOTE:
HOOK-UP OF TRANSFORMER
WILL BE PER SPECIFIED
VOLTAGE. HOOK-UP L2 TO
CORRECT VOLTAGE TERRMINAL.

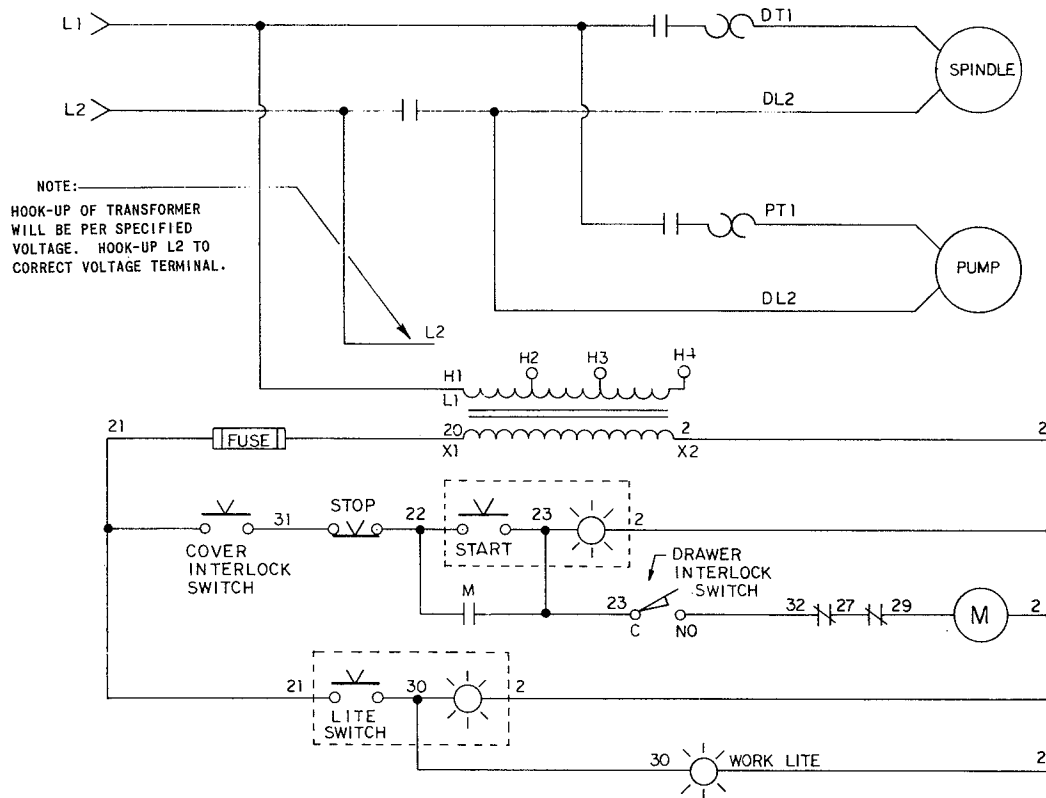


ELECTRICAL SCHEMATIC THREE PHASE (Serial Nos. 64719 thru 66625)

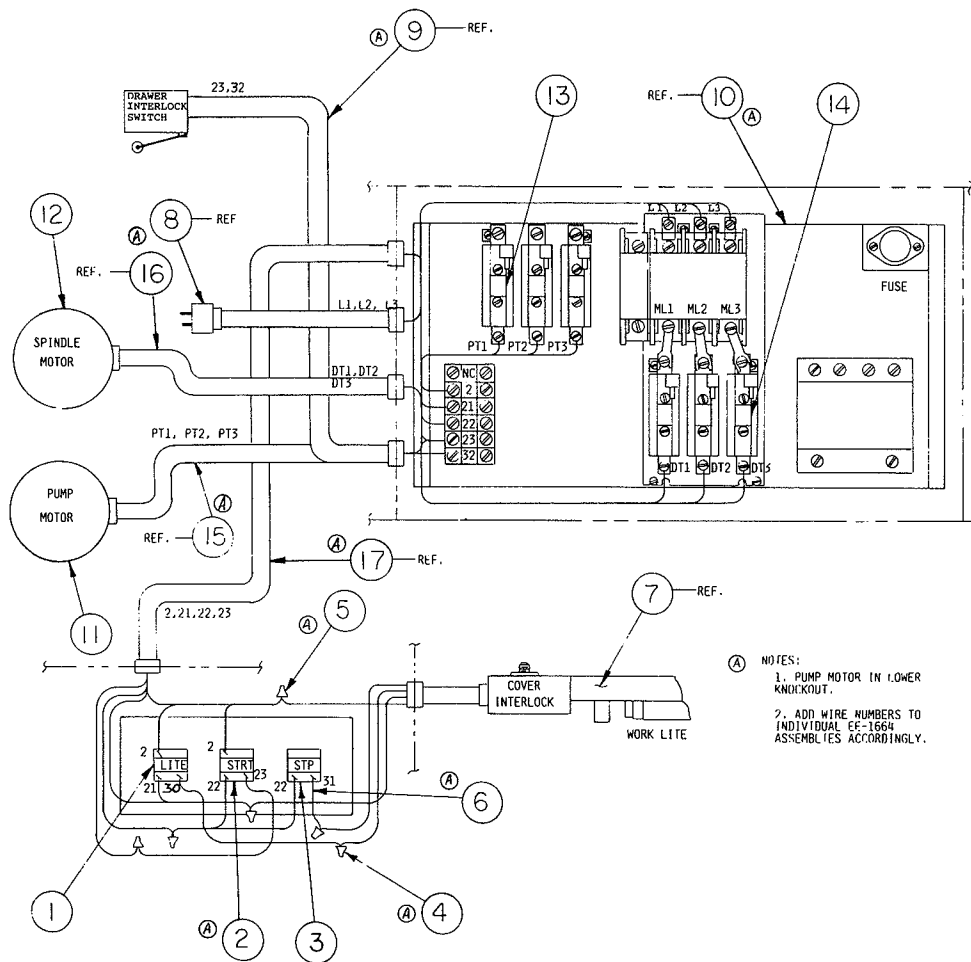


ELECTRICAL SCHEMATIC SINGLE PHASE

(Serial Nos. 64719 thru 66625)



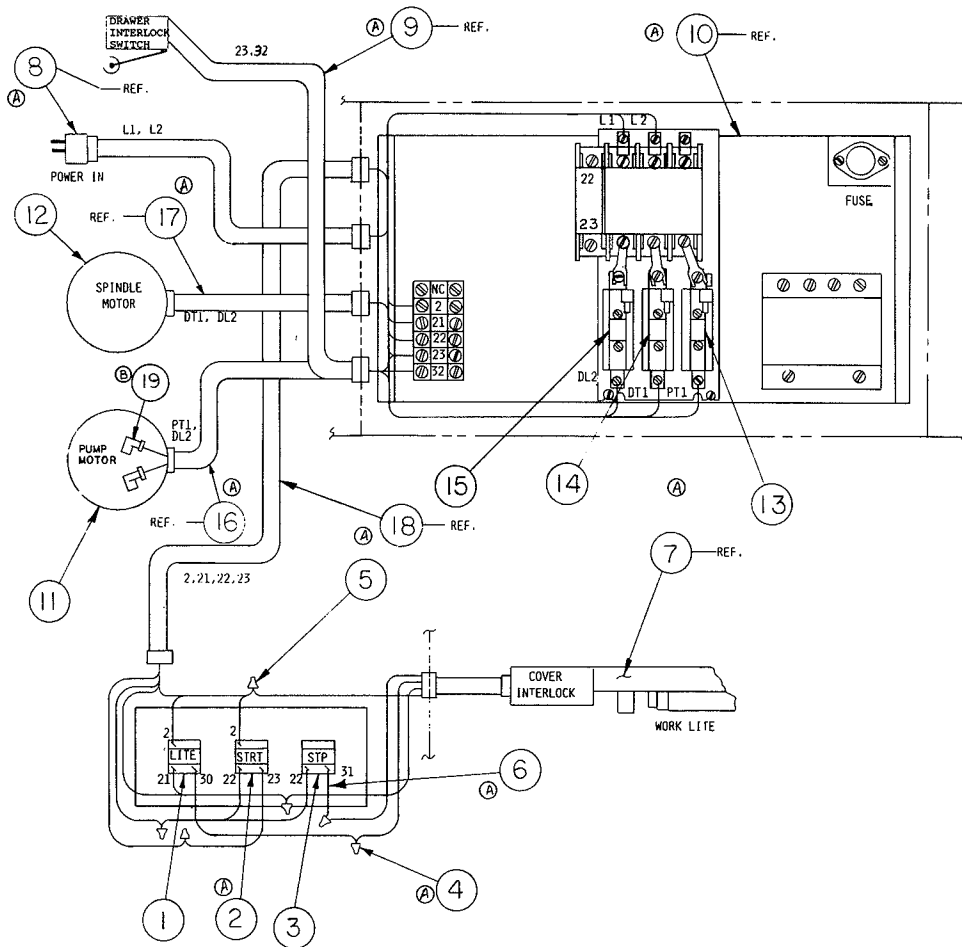
WIRING ASSEMBLY - THREE PHASE (Serial No. 66626 & up)



NOTES:
 1. PUMP MOTOR IN LOWER KNECKOUT.
 2. ADD WIRE NUMBERS TO INDIVIDUAL EF-1664 ASSEMBLIES ACCORDINGLY.

Ref. No.	Part No.	Part Name	Qty.	Ref. No.	Part No.	Part Name	Qty.
1.	E-1045-5	Pushbutton (OSLO) Switch -light	1	10.	E-1639-2	3 PH 460 V 50 or 60 HZ Electrical Panel Asm.	1 ref.
2.	E-1045-8	Pushbutton (OSLO) Switch -green	1	11.	E-1600-91	3/4 HP Pump Motor	1
3.	E-1045-6	Pushbutton (OSLO) Switch -red	1	12.	E-1600-112	3 HP Spindle Motor	1
4.	E-1237-1	Wire Nut (yellow)	10	13.	E-1578-27	Heater, Pump Motor	3
5.	E-1237-2	Wire Nut (red)	4	14.	E-1578-35	Heater, Spindle Motor	3
6.	EE-1664	Switch Wire Asm.	8				
7.	EE-1489-1	Lamp Interlock Asm.	1 ref.			3 PH 380 V 50 HZ	
8.	EE-1643	Power Conduit Asm.	1 ref.	10.	E-1639-3	Electrical Panel Asm.	1 ref.
9.	EE-1456	Drawer Interlock Asm.	1 ref.	11.	E-1600-93	3/4 HP Pump Motor	1
11.	EE-1647	3PH Pump Motor Conduit Asm.	1 ref.	12.	E-1600-114	3 HP Spindle Motor	1
12.	EE-1645	3PH Spindle Motor Conduit Asm.	1 ref.	13.	E-1578-22	Heater, Pump Motor	3
17.	EE1641	Switches/Work Light Conduit Asm.	1 ref.	14.	E-1578-42	Heater, Spindle Motor	3
		3 PH 208 V 50 or 60 HZ				3 PH 415 V 50 HZ	
10.	E-1639-2	Electrical Panel Asm.	1 ref.	10.	EE-1639-4	Electrical Panel Asm.	1 ref.
11.	E-1600-91	3/4 HP Pump Motor	1	11.	E-1600-94	3/4 HP Pump Motor	1
12.	E-1600-109	3 HP Spindle Motor	1	12.	E-1600-115	3 HP Spindle Motor	1
13.	E-1578-30	Heater, Pump Motor	3	13.	E-1578-27	Heater, Pump Motor	3
14.	E-1578-40	Heater, Spindle Motor	3	14.	E-1578-35	Heater, Spindle Motor	3
		3 PH 230 V 50 or 60 HZ				3 PH 575 V 60 HZ	
10.	E-1639-2	Electrical Panel Asm.	1 ref.	10.	EE-1639-5	Electrical Panel Asm.	1 ref.
11.	E-1600-91	3/4 HP Pump Motor	1	11.	E-1600-95	3/4 HP Pump Motor	1
12.	E-1600-112	3 HP Spindle Motor	1	12.	E-1600-116	3 HP Spindle Motor	1
13.	E-1578-30	Heater, Pump Motor	3	13.	E-1578-20	Heater, Pump Motor	3
14.	E-1578-40	Heater, Spindle Motor	3	14.	E-1578-33	Heater, Spindle Motor	3

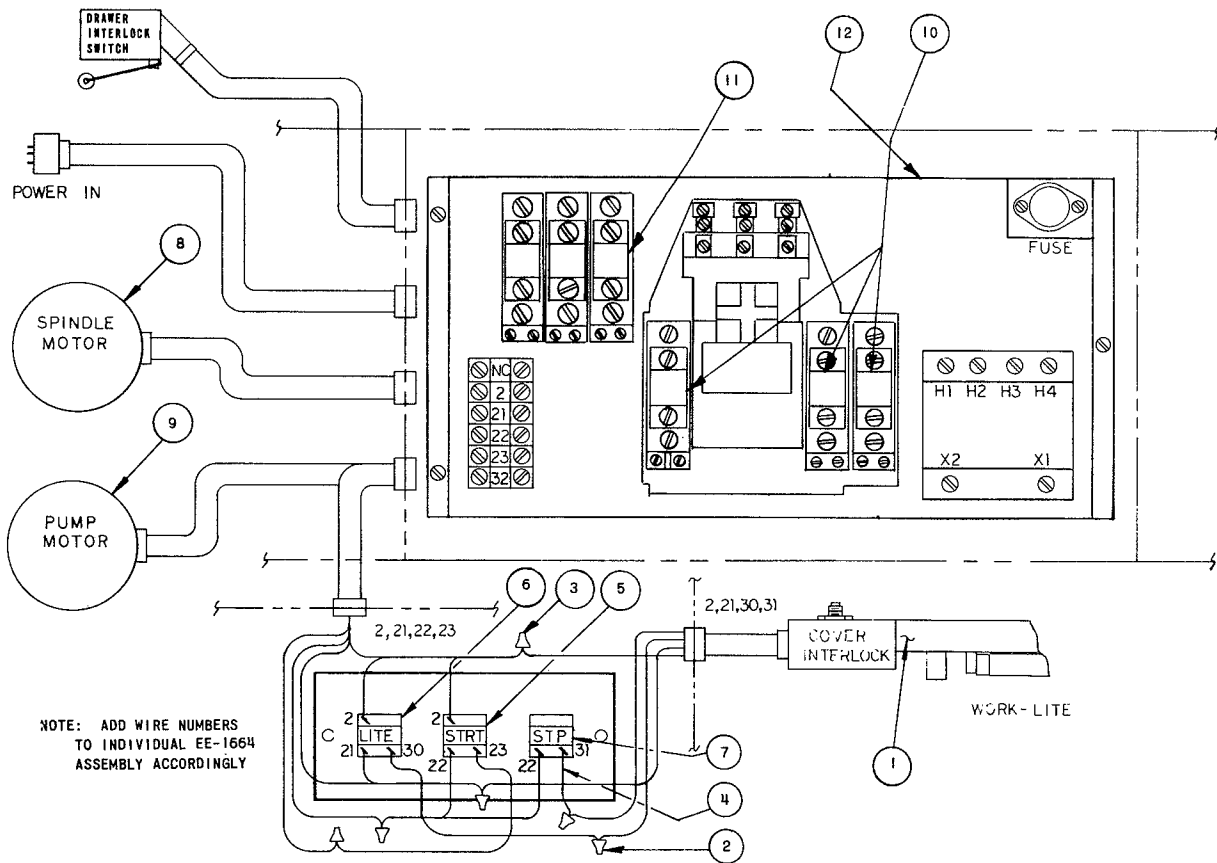
WIRING ASSEMBLY - SINGLE PHASE (Serial No. 66626 & up)



NOTE:
 1. PUMP MOTOR IN LOWER KNOCKOUT.
 2. ADD WIRE NUMBERS TO INDIVIDUAL EE-1664 ASSEMBLIES ACCORDINGLY.

Ref. No.	Part No.	Part Name	Qty.	Ref. No.	Part No.	Part Name	Qty.
1.	E-1045-5	Pushbutton (OSLO) Switch -lite	1	10.	E-1639 -1	Electrical Panel Asm.	1 ref.
2.	E-1045-8	Pushbutton (OSLO) Switch -green	1	11.	E-1600-64	3/4 HP Pump Motor	1
3.	E-1045-6	Pushbutton (OSLO) Switch -red	1	12.	E-1600-79	3 HP Spindle Motor	1
4.	E-1237-1	Wire Nut (yellow)	10	13.	E-1578-35	Heater, Pump Motor	1
5.	E-1237-2	Wire Nut (red)	4	14.	E-1578-44A	Heater, Spindle Motor	1
6.	EE-1664	Switch Wire Asm.	8	15.	E-1578-48A	Heater, Spindle & Pump Motor	1
7.	EE-1489-1	Lamp Interlock Asm.	1 ref.	1 PH 230 V 50 HZ			
8.	EE-1642	Power Conduit Asm.	1 ref.	10.	E-1639 -1	Electrical Panel Asm.	1 ref.
9.	EE-1456	Drawer Interlock Asm.	1 ref.	11.	E-1600-66	3/4 HP Pump Motor	1
16.	EE-1646	1PH Pump Motor Conduit Asm.	1 ref.	12.	E-1600-78	3 HP Spindle Motor	1
17.	EE-1644	1PH Spindle Motor Conduit Asm.	1 ref.	13.	E-1578-35	Heater, Pump Motor	1
18.	EE-1641	Switches, Work Light Conduit Asm.	1 ref.	14.	E-1578-44A	Heater, Spindle Motor	1
1 PH 208 V 60 HZ				15.	E-1578-48A	Heater, Spindle & Pump Motor	1
10.	E-1639 -1	Electrical Panel Asm.	1 ref.	1 PH 230 V 60 HZ			
11.	E-1600-65	3/4 HP Pump Motor	1				
12.	E-1600-80	3 HP Spindle Motor	1				
13.	E-1578-35	Heater, Pump Motor	1				
14.	E-1578-45A	Heater, Spindle Motor	1				
15.	E-1578-49A	Heater, Spindle & Pump Motor	1				

WIRING ASSEMBLY - THREE PHASE (Serial No. 64719 thru 66625)

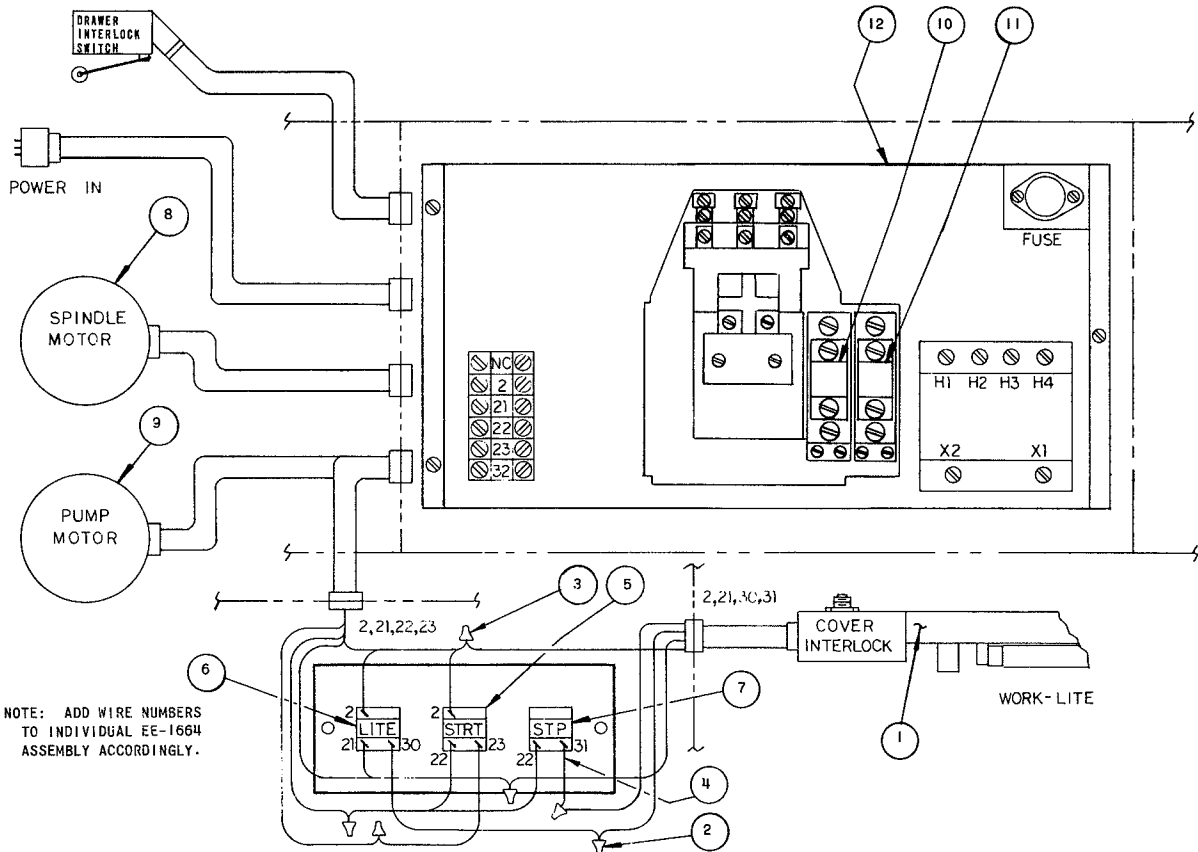


NOTE: ADD WIRE NUMBERS TO INDIVIDUAL EE-1664 ASSEMBLY ACCORDINGLY

Ref. Part No.	Part Name	Qty.	Ref. Part No.	Part Name	Qty.
1. EE-1489-1	Lamp Interlock Assembly	1	8. EE-1600-112	3 PH 460 V 50 or 60 HZ 3 HP Spindle Motor	1
2. E-1237-1	Wire Nut (yellow)	5	9. EE-1600-91	3/4 HP Pump Motor	1
3. E-1237-2	Wire Nut (red)	1	10. E-510N-26	Heater, Spindle Motor	3
4. EE-1664	Switch Wire Assembly	8	11. E-510N-14	Heater, Pump Motor	3
5. E-1045-4	Pushbutton (OSLO) Switch -green	1	12. EE-1639-2	Electrical Panel Assembly	1
6. E-1045-5	Pushbutton (OSLO) Switch -lite	1			
7. E-1045-6	Pushbutton (OSLO) Switch -red	1			
				3 PH 230 V 50 or 60 HZ	
8. EE-1600-116	3 PH 575 V 50 HZ 3 HP Spindle Motor	1	8. EE-1600-112	3 HP Spindle Motor	1
9. EE-1600-95	3/4 HP Pump Motor	1	9. EE-1600-91	3/4 HP Pump Motor	1
10. E-510N-24	Heater, Spindle Motor	3	10. E-510N-32	Heater, Spindle Motor	3
11. E-510N-9	Heater, Pump Motor	3	11. E-510N-20	Heater, Pump Motor	3
12. EE-1634-5	Electrical Panel Assembly	1	12. EE-1639-2	Electrical Panel Assembly	1
				3 PH 208 V 50 or 60 HZ	
8. EE-1600-115	3 PH 415 V 50 HZ 3 HP Spindle Motor	1	8. EE-1600-109	3 HP Spindle Motor	1
9. EE-1600-94	3/4 HP Pump Motor	1	9. EE-1600-91	3/4 HP Pump Motor	1
10. E-510N-27	Heater, Spindle Motor	3	10. E-510N-33	Heater, Spindle Motor	3
11. E-510N-15	Heater, Pump Motor	3	11. E-510N-21	Heater, Pump Motor	3
12. EE-1639-4	Electrical Panel Assembly	1	12. EE-1639-2	Electrical Panel Assembly	1
				3 PH 380 V 50 HZ	
8. EE-1600-114	3 PH 380 V 50 HZ 3 HP Spindle Motor	1			
9. EE-1600-93	3/4 HP Pump Motor	1			
10. E-510N-34	Heater, Spindle Motor	3			
11. E-510N-12	Heater, Pump Motor	3			
12. EE-1639-3	Electrical Panel Assembly	1			

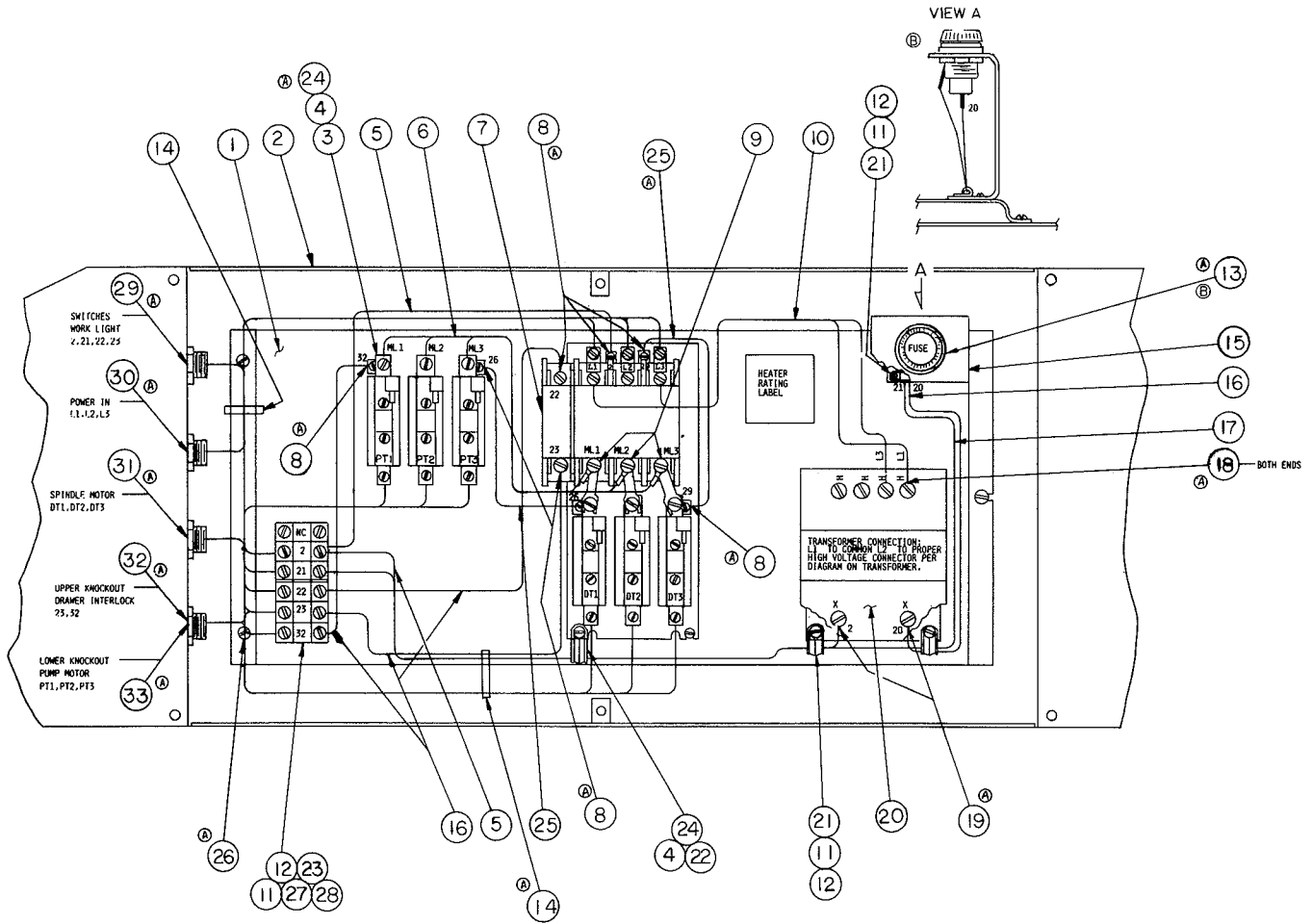
WIRING ASSEMBLY - SINGLE PHASE

(Serial No. 64719 thru 66625)



Ref. Part No.	Part Name	Ref. Part No.	Part Name	Ref. Part No.	Part Name	Qty.	
1.	EE-1489-1	Lamp Interlock Assembly	.....	1	1 PH 230 V 60 HZ	
2.	E-1237-1	Wire Nut (yellow)	.....	5	3 HP Spindle Motor	1
3.	E-1237-2	Wire Nut (red)	.....	1	3/4 HP Pump Motor	1
4.	EE-1664	Switch Wire Assembly	.....	8	Heater, Spindle Motor	1
5.	E-1045-4	Pushbutton (OSLO) Switch -green	.....	1	Heater, Pump Motor	1
6.	E-1045-5	Pushbutton (OSLO) Switch -lite	.....	1	Electrical Panel Assembly	1
7.	E-1045-6	Pushbutton (OSLO) Switch -red	.....	1		
8.	E-1600-78	1 PH 230 V 50 HZ		8.	E-1600-80	1	
9.	E-1600-66	3 HP Spindle Motor	1	9.	E-1600-65	1
10.	E-510N-37	3/4 HP Pump Motor	1	10.	E-510N-38	1
11.	E-510N-25	Heater, Spindle Motor	1	11.	E-510N-24	1
12.	EE-1639-1	Heater, Pump Motor	1	12.	EE-1639-1	1
		Electrical Panel Assembly	1			1
					1 PH 208 V 60 HZ		
					3 HP Spindle Motor	1	
					3/4 HP Pump Motor	1	
					Heater, Spindle Motor	1	
					Heater, Pump Motor	1	
					Electrical Panel Assembly	1	

ELECTRICAL PANEL ASSEMBLY THREE PHASE (Serial Nos. 66626 & up.)

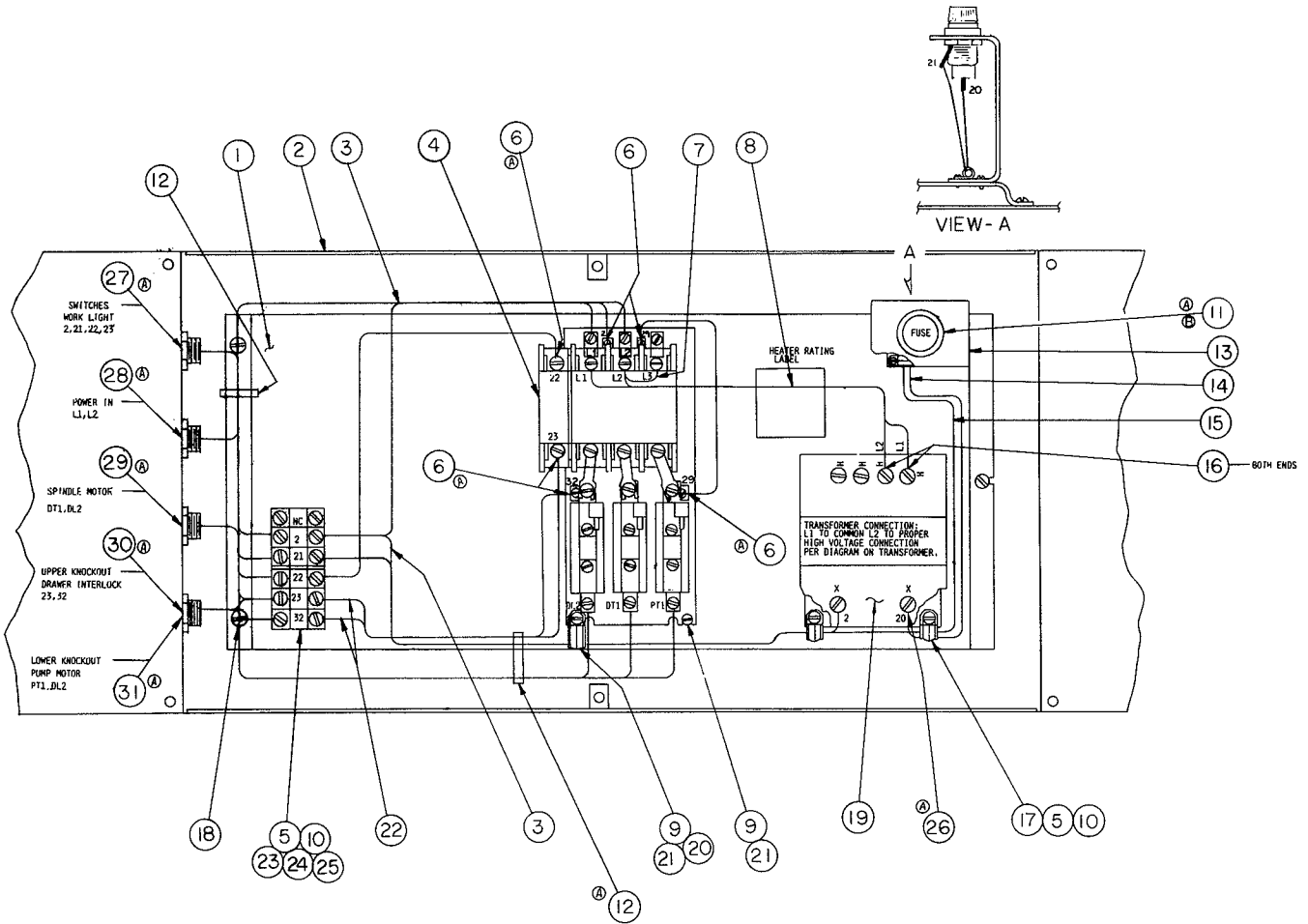


208 V

Ref. Part No.	Part Name	Qty.	Ref. Part No.	Part Name	Qty.
1. E-1084-2	Panel	1	24. H-7324-#10	#10 Shakeproof Washer	6
2. EE-1083	Enclosure	1	25. E-709-5	#18 GA. Wire MTW, 5" Long	2
3. E-2101-1	Overload Relay	1	26. H-6925-102406	#10-24 x 3/8" Truss Hd. Scr.	3
4. H-6910-102403	#10-24 x 3/8" Butt. Hd. Scr.	6	27. E-1270	Terminal Block	2
5. E-709-15	#18 GA. Wire MTW, 15" Long	2	28. E-1271	Mounting Rail, 2-1/2" Long	1
6. E-702-7	#14 GA. Wire MTW, 7" Long	3	29. EE-1641	Conduit Assembly -Switches, Work Light	1
7. E-1579	Starter	1	30. EE-1643	Conduit Assembly, Power In	1
8. E-1100-6	Terminal, #6 Eyelet	8	31. EE-1645	Conduit Assembly, Spindle Motor	1
9. E-1214-1	Terminal, Fork	3	32. EE-1456	Conduit Assembly, Drawer Interlock	1
10. E-702-8	#14 GA. Wire MTW, 8" Long	2	33. EE-1647	Conduit Assembly, Pump Motor	1
11. H-6910-83203	#8-32 x 3/8" Butt. Hd. Scr.	8			
12. H-7324-#8	#8 Shakeproof Washer	8		EE-1639-3	
13. E-530-10	Fuse Holder	1	20. E-1089-8	Transformer 220 -380 Volt 50 HZ	1
14. S-1694-1	Plastic Wire Tie	2		EE-1639-4	
15. 6581-1	Fuse Holder Bracket	1	20. E-1089-21	Transformer 415 Volt 50 HZ	1
16. E-709-13	#18 GA. Wire MTW, 13" Long	4		EE-1639-5	
17. E-709-24	#18 GA. Wire MTW, 24" Long	1	20. E-1089-2	Transformer 575 Volt 60 HZ	1
18. E-1100-4	Terminal, #10 Insulated Eyelet	4			
19. E-1214-8	Terminal, #10 Insulated Ring	2			
20. E-1089-14	Transformer -208, 230, 460 Volt	1			
21. E-968-2	Cable Clamp, 1/4"	3			
22. E-968-4	Cable Clamp, 3/8"	1			
23. E-1356-9	Marking Strip	1			

ELECTRICAL PANEL ASSEMBLY SINGLE PHASE

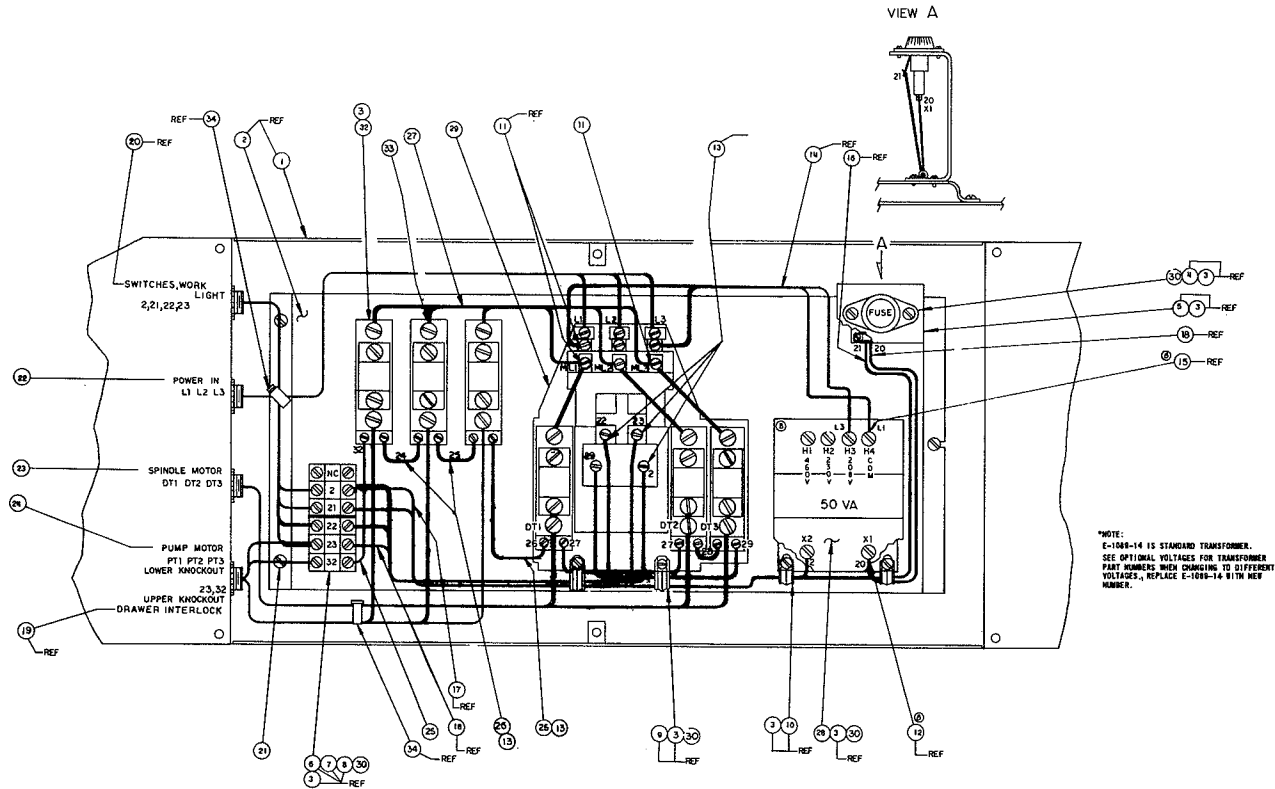
(Serial Nos. 66626 & up.)



208 / 230 V 50/60 HZ.

Ref. Part No.	Part Name	Qty.	Ref. Part No.	Part Name	Qty.
1. E-1084-2	Panel	1	17. E-698-2	Cable Clamp, 1/4"	3
2. EE-1083	Enclosure	1	18. H-6925-102406	10-24 NC x 3/8" Truss Hd. Mach. Scr. ...	3
3. E-709-15	Wire, 18 GA MTW 15" Long	2	19. E-1089-14	Transformer -208, 230, 460 V.	1
4. E-579	Starter	1	20. E-698-4	Cable Clamp, 3/8"	1
5. H-6910-83203	#8-32 NC 3/8" Butt. Hd. Scr.	8	21. H-7324-#10	#10 Shakeproof Lockwasher	3
6. E-1100-6	Terminal, #6 Fork	8	22. E-709-11	Wire, 18 GA MTW 11" Long	2
7. E-1213-4	Wire 10 GA MTW 4" Long	1	23. E-1270	Terminal Block	2
8. E-702-8	Wire 14 GA MTW 8" Long	2	24. E-1271	Mounting Rail, 2-1/2" Long	1
9. H-6910-102403	#10-24 NC x 3/8" Butt. Hd. Scr.	3	25. E-1356-9	Marking Strip	1
10. H-7324-#8	#8 Shakeproof Lockwasher	8	26. E-1214-8	Terminal, #10 Insulated Ring	2
11. E-530-10	Fuse Holder	1	27. EE-1641	Conduit Asm.-Switches, Work Light1	
12. S-1694-1	Plastic Wire Tie	2	28. EE-1642	Conduit Assembly, Power In	1
13. 6581-1	Fuse Holder Bracket	1	29. EE-1644	Conduit Assembly, Spindle Motor	1
14. E-709-13	Wire #18 GA MTW 13" Long	1	30. EE-1456	Conduit Assembly, Drawer Interlock	1
15. E-709-24	Wire #18 GA MTW 24" Long	1	31. EE-1646	Conduit Assembly, Pump Motor	1
16. E-1100-4	Terminal, #10 Insulated Ring	4			

ELECTRICAL PANEL ASSEMBLY THREE PHASE (Serial Nos. 64719 thru 66625.)

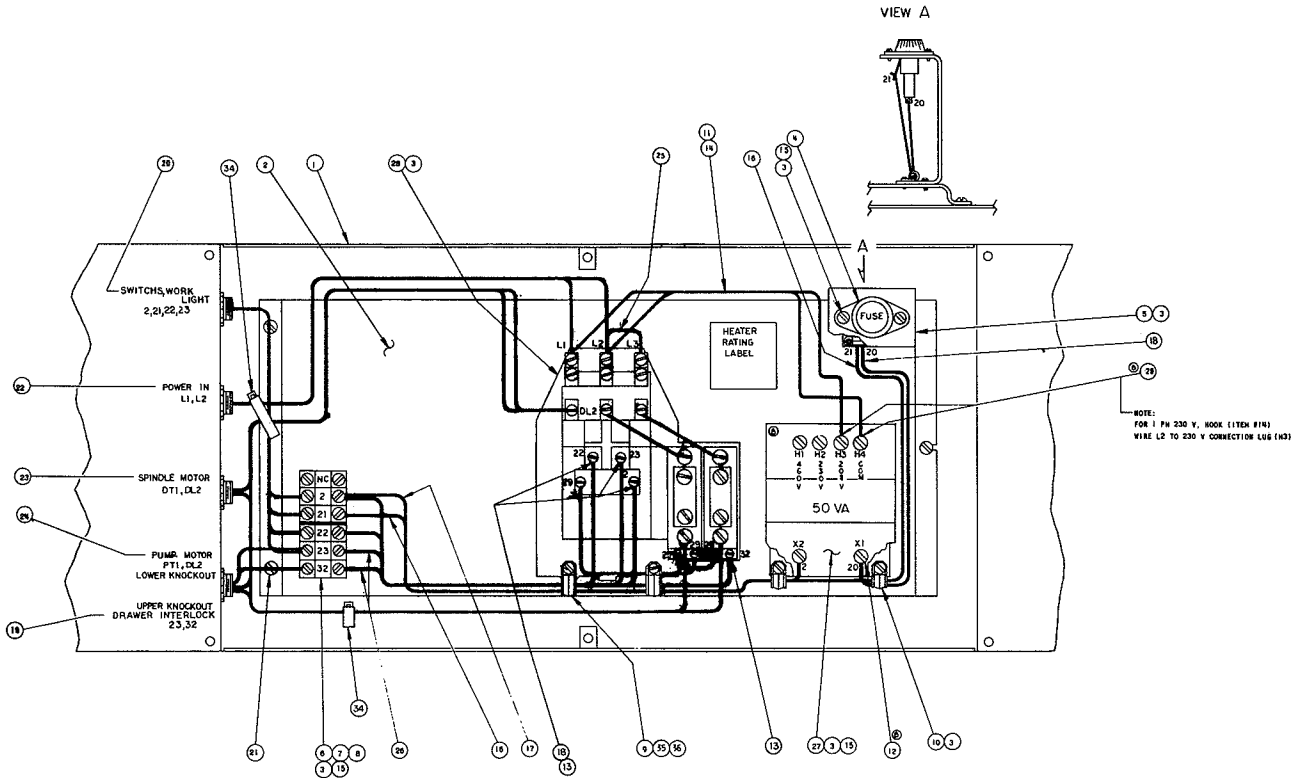


NOTE:
E-1088-14 IS STANDARD TRANSFORMER.
SEE OPTIONAL VOLTAGES FOR TRANSFORMER
PART NUMBERS WHEN CHANGING TO DIFFERENT
VOLTAGES, REPLACE E-1088-14 WITH NEW
NUMBER.

208 V

Ref. No.	Part No.	Part Name	Qty.	Ref. No.	Part No.	Part Name	Qty.
1.	EE-1083	Enclosure	1	24.	EE-1647	Conduit Assembly, Pump Motor	1
2.	E-1084-1	Panel	1	25.	E-709-	#18 GA. Wire MTW, Long	2
3.	H-6923-83206	8-32 x 3/8" Rd. Hd. Mach. Scr.	13	26.	E-709-3	#18 GA Wire 3" Long	2
4.	E-530-3	Fuse Holder	1	27.	E-702-7	#14 GA MTW 7" Long	3
5.	6581-1	Fuse Holder Bracket	1	29.	E-898-13	Starter, size 0	1
6.	E-1270	Terminal Blocks	2	30.	H-7324-#8	#8 Shakeproof Washer	11
7.	E-1271	Mounting Rail, 2-1/2" Long	2.50	31.			
8.	E-1356-9	Marking Strip	1	32.	E-1087-1	Overload Relay	3
9.	E-968-4	Cable Clamp, 3/8"	2	33.	E-1100-4	Mach. Applied 14-18 GA Eyelet	3
10.	E-968-2	Cable Clamp, 1/4"	3	34.	S-1694-3	7" TY Rap	2
11.	E-1100-3	Mach. Applied 14-16 GA Eyelet	5				
12.	E-1214-8	Wire Connector (crimp style)	2				
13.	E-1100-6	Mach. Applied 16-22 GA Fork	12	28.	E-1089-14	Transformer -208, 230, 460 Volt 50/60 HZ1	
14.	E-702-8	#14 GA. Wire MTW, 8" Long	2				
15.	E-1100-4	Mach. Applied 14-16 GA. Eyelet	2				
16.	E-709-24	#18 GA. Wire MTW, 24" Long	1	28.	E-1089-8	Transformer 220 -380 Volt 50-60 HZ	1
17.	E-709-15	#18 GA. Wire MTW, 15" Long	1				
18.	E-709-13	#18 GA. Wire MTW, 13" Long	4				
19.	EE-1456	Conduit Assembly, Drawer Interlock	1	28.	E-1089-21	Transformer 415 Volt 50-60 HZ	1
20.	EE-1641	Conduit Assembly -Switches, Work Light1					
21.	S-1739	#10-24 x 3/8" Truss Hd. Mach. Scr.	3				
22.	EE-1643	Conduit Assembly, Power In	1	28.	E-1089-2	Transformer 575 Volt 50-60 HZ	1
23.	EE-1645	Conduit Assembly, Spindle Motor	1				

ELECTRICAL PANEL ASSEMBLY SINGLE PHASE (Serial Nos. 64719 thru 66625.)

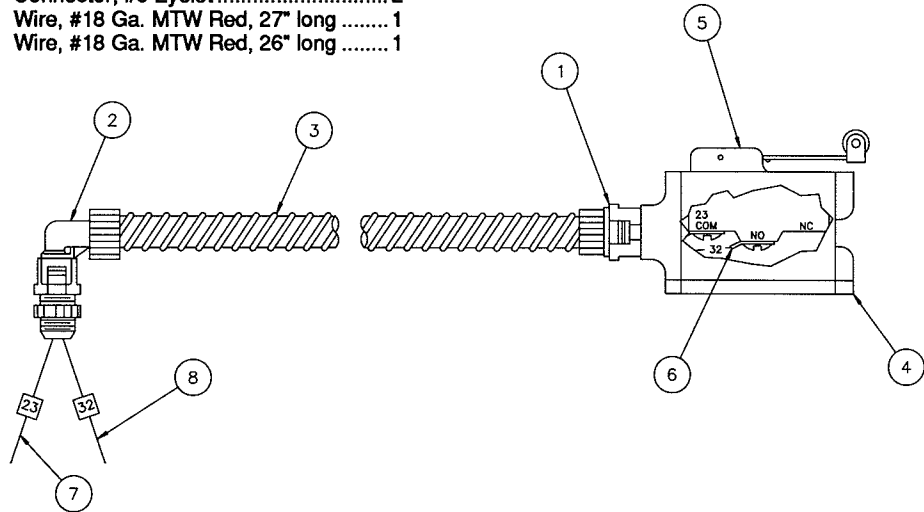


208 V 60 Hz; 208/230 V 50/60 Hz

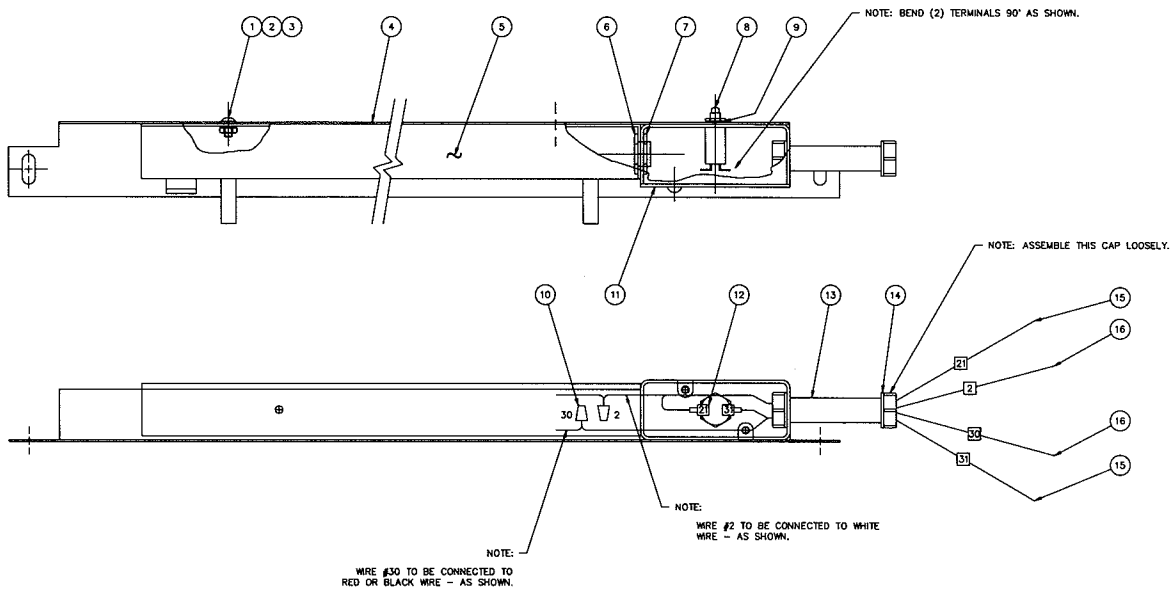
Ref. No.	Part No.	Part Name	Qty.
1.	EE-1083	Enclosure	1
2.	E-1084-1	Panel	1
3.	H-6923-83206	8-32 x 3/8" Rd. Hd. Mach. Screw	13
4.	E-530-3	Fuse Holder	1
5.	6581-1	Fuse Holder Bracket	1
6.	E-1270	Terminal Blocks	2
7.	E-1271	Mounting Rail, 2-1/2" Long	2.50
8.	E-1356-9	Marking Strip	1
9.	E-968-4	Cable Clamp, 3/8"	2
10.	E-968-2	Cable Clamp, 1/4"	3
11.	E-1214-1	Eyelet, Mach. Applied 14-16 GA.	5
12.	E-1214-8	Wire Connector (crimp style)	2
13.	E-1100-6	Fork, Mach. Applied 16-22 GA.	12
14.	E-702-8	Wire, #14 GA. MTW, 8" Long	2
15.	H-7324-#8	Lockwasher, #8 Shakeproof	11
16.	E-709-24	Wire, #18 GA. MTW, 24" Long	1
17.	E-709-15	Wire, #18 GA. MTW, 15" Long	1
18.	E-709-13	Wire, #18 GA. MTW, 13" Long	4
19.	EE-1456	Conduit Asm., Drawer Interlock	1
20.	EE-1641	Conduit Asm., Switches, Work Light	1
21.	S-1739	#10-24 x 3/8" Truss Hd. Mach. Screw ...	3
22.	EE-1642	Conduit Asm., Power In (1 ph)	1
23.	EE-1644	Conduit Asm., Spindle Motor (1 ph)	1
24.	EE-1648	Conduit Asm., Pump Motor (1 ph)	1
25.	E-1213-4	Wire, #18 GA. MTW, 4" Long	2
26.	E-709-11	Wire, #18 GA. 11" Long	2
27.	E-1089-14	Transformer, 208/230/460 Volt	1
28.	E-898-17	Starter	1
29.	E-1100-4	Eyelet, Mach. Applied 14-18 GA.	2
34.	S-1694-3	7" Ty-rap	2

DRAWER INTERLOCK EE-1456

Ref. No.	Part No.	Part Name	Qty.
1.	E-2191	3/8" Connector, Straight	1
2.	E-2190	3/8" Connector, 90° Elbow	1
3.	E-2189	3/8" Tubing, Flexible, 18" long	1
4.	E-695	Enclosure, Side Mount	1
5.	E-866-1	Switch, Limit	1
6.	E-1100-5	Connector, #6 Eyelet	2
7.	E-709-R	Wire, #18 Ga. MTW Red, 27" long	1
8.	E-709-R	Wire, #18 Ga. MTW Red, 26" long	1



COVER INTERLOCK



Ref. No.	Part No.	Part Name	Qty.	Ref. No.	Part No.	Part Name	Qty.
1.	H-6910-83203	#8-32 NC x 3/8" Butt. Hd. Cap Scr.	2	9.	E-643	Lockwasher, 7/8	1
2.	H-7324-#8	#8 Internal Tooth Lockwasher	2	10.	E-1237-1	Wire Nut	2
3.	H-6423-#8	#8-32 NC Hex Nut	2	11.	E-1369-5	Cover, Junction Box	1
4.	A-6578-2	Bracket Assembly, Lamp	1	12.	E-1214-19	Wire Connector	2
5.	E-2148	Light	1	13.	H-6405-1-624	1/2 x 3" Pipe Nipple	1
6.	E-1458	Bushed Conduit Nipple	1	14.	E-1459	Bushing	2
7.	E-519	Locknut	2	15.	E-709-15-R	#18 GA. MTW Wire 15" Long	2
8.	E-1391	Switch, Pushbutton	1	16.	E-709-17-R	#18 GA. MTW Wire 17" Long	2

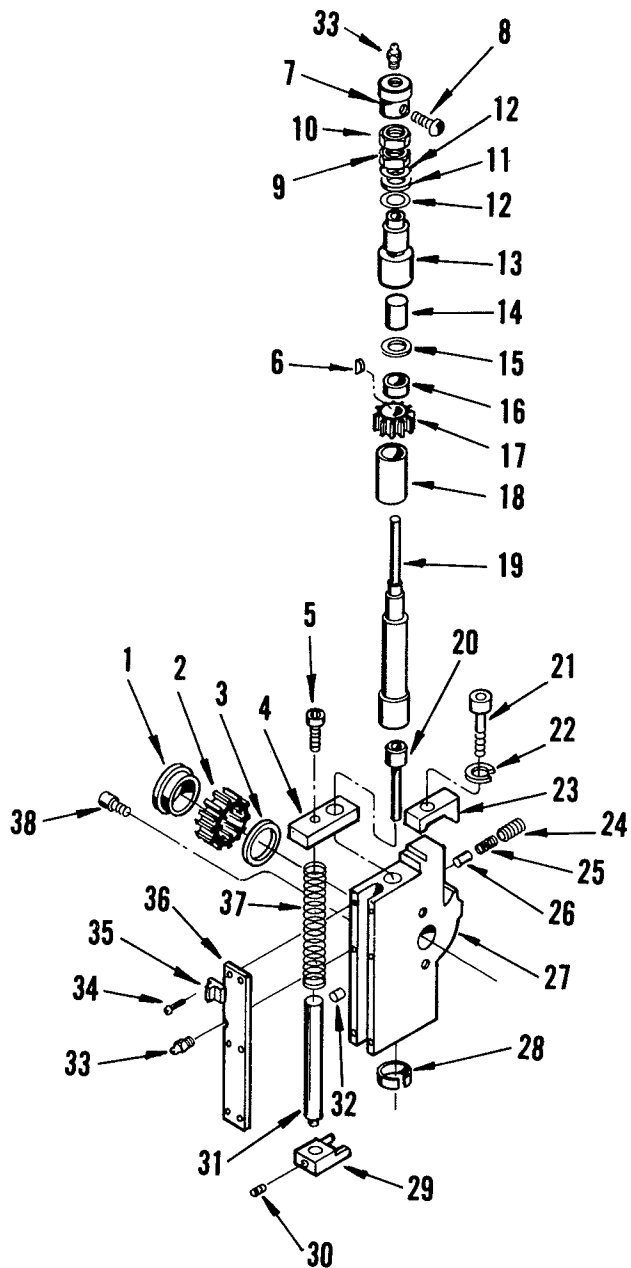
DRILL HEAD

WARNING: Always disconnect the power when cleaning, servicing or lubricating your drill. See Power Lock-out Procedure, page 4.

This is the standard drill head used on the MS-10A Paper Drill. Although no heads are included with the basic machine, any number may be ordered with the machine or added at a later date. They are each furnished with one hollow drill. Be sure to specify the drill size required when ordering.

DRILL HEAD ASSEMBLY (A-6594-6)

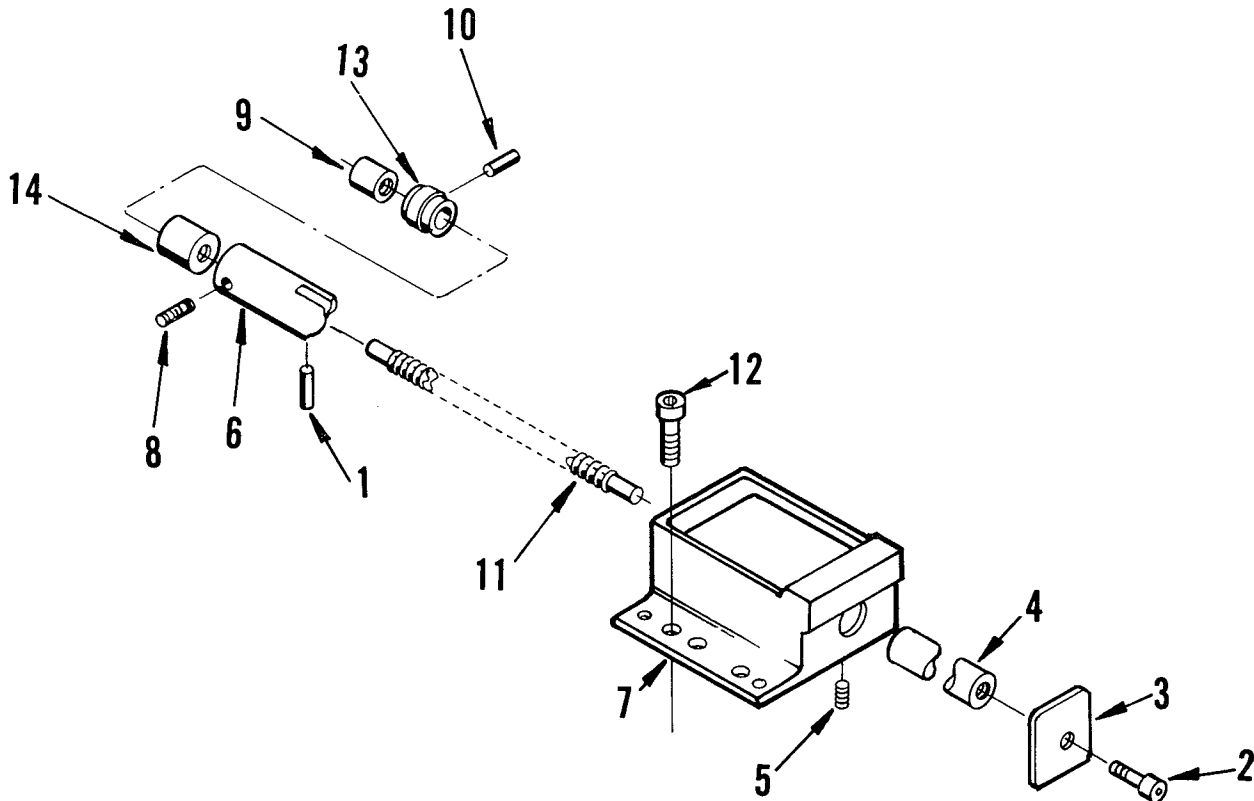
Ref. No.	Part No.	Part Name	Qty.
1.	6598-2	Cover, Gear	1
2.	S-1722	Helical Gear (replace in pairs with item 17)	1
3.	6597	Spacer, Gear	1
4.	6606-3	Block Bushing	1
5.	H-6918-406	1/4-20x3/4" Socket Hd. Cap. Scr.	2
6.	H-6121-804	1/2 x1/8" Woodruff Key	1
7.	6602-2	Adjusting Knob	1
8.	H-6923-63204	#6-32x1/4" Rd. Hd. Mach. Scr.	2
9.	H-6529-4	1/4-20 Hex, Heavy Jam Nut	1
10.	H-5240-4	1/4-20 Thin Height Lock Nut	1
11.	S-1742	Thrust Bearing (Oilite)	1
12.	6600-4	Shim, Spindle	2
13.	6603-2	Adjusting Bushing	1
14.	S-1720	Bushing, Bronze	1
15.	S-1723	Thrust Bearing	1
16.	6599	Spindle Spacer	1
17.	S-1721	Spindle Gear (replace in pairs with item 2)	1
18.	S-1719	Bushing, Bronze	1
19.	6569-3	Spindle	1
20.	CD-4-2-1/2	1/4" Hollow Drill	1
21.	H-6918-612	3/8-16x1-1/2" Socket Hd. Cap. Scr.	1
22.	H-7327-12	3/8" Medium Lockwasher	1
23.	6601	Clamp	1
24.	H-6951-808	1/2-13x1/2" Set Scr., Nylock	2
25.	S-1255-1	Spring	2
26.	6609	Plunger, Teflon	1
27.	6595	Housing, Spindle	1
28.	K-85	Cover, Drift Hole	1
29.	6605	Pressure Foot	1
30.	H-6938-102404	#10-24x1/4" Cup Point Soc. Set. Scr.	1
31.	6604-4	Pressure Foot Bar	1
32.	H-5246-203	1/8 x 3/8" Dowel Pin	2
33.	S-1725	Alemite Fitting	2
34.	H-6910-102403	#10-24x3/8" Button Hd. Soc. Cap. Scr. .6	6
35.	6608	Pointer	1
36.	6607	Cover, pressure foot	1
37.	S-1742-2	Spring, pressure foot (inner)	1
38.	S-1742-3	Spring, pressure foot (outer)	1
	H-6910-83202	#8-32x1/4" Butt. Hd. Soc. Cap. Scr.	2



STANDARD SIDE GUIDE

This is the side guide supplied as standard equipment on Challenge MS-10A Paper Drills. It is mounted to the table by means of the six socket head cap screws (ref. no. 12). Major adjustments are determined by which set of holes it is mounted in. Minor adjustments are made by the adjusting knob (ref. no. 9). The side guide is locked in position by the locknut (ref. no. 13).

SIDE GUIDE - STANDARD (A-6565)



Ref. No.	Part No.	Part Name	Qty.
1.	H-215-094-0500	Pin, Sel-lok, 3/32 x 1/2"	1
2.	H-6903-403	1/4-20 NC 1/2" Butt. Hd. Soc.	1
		Cap Scr., Nylock	1
3.	6569	Stop	1
4.	6568	Holder, Side Guide	1
5.	H-6957-406	1/4-20 NC x 3/8" Dog Point Soc.	1
		Set Scr., Nylock	2
6.	6567	Bearing, Side Guide	1
7.	6566	Side Guide Housing	1
8.	H-6938-403	1/4-20 NC x 3/16" Cup Point Soc.	1
		Set Scr.	1
9.	6572	Adjusting Knob	1
10.	H-21S-125-1000	1/8 x 1" Sel-lok Pin	1
11.	6571	Adjusting Stud	1
12.	H-6918-608	3/8-16 NC x 1" Soc. Hd. Cap Scr.	6
13.	S-1715	Locknut	1
14.	6570	Insert, Side Guide	1

AUTO TRIP SIDE GUIDE

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.

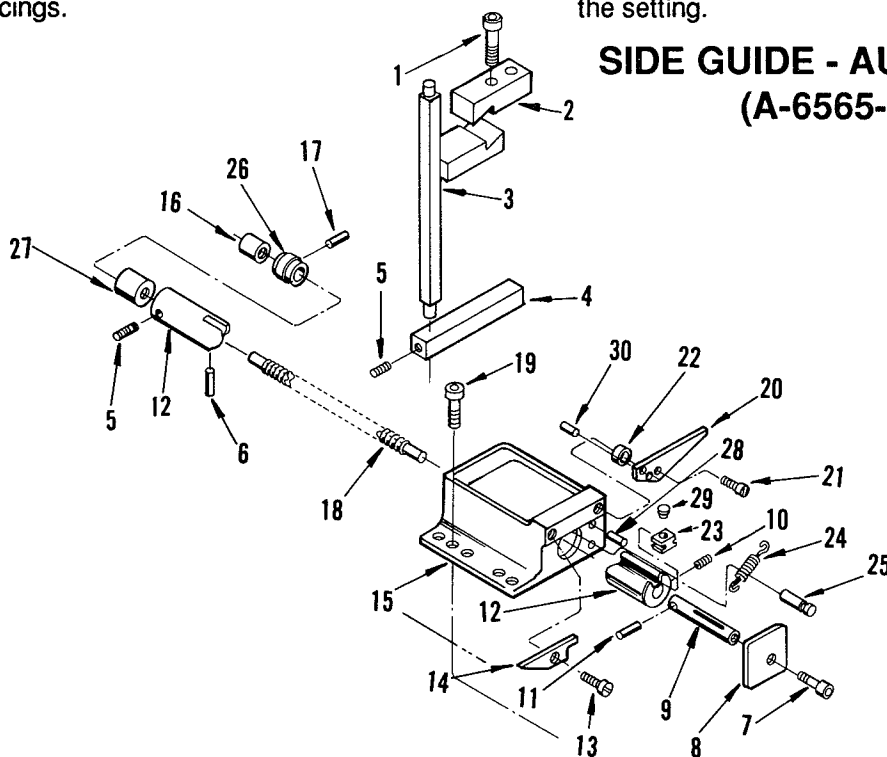
The auto trip side guide is supplied with six moveable stops permitting hole spacings as close as 3/8" apart (center-to-center distance). Additional stops are available. Also available are fixed gages which fit in the side guide in place of the moveable stops. The fixed gages permit hole spacings of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

WARNING: Always disconnect the power when cleaning, servicing or lubricating your drill. See Power Lock-out Procedure, page 4.

Installation

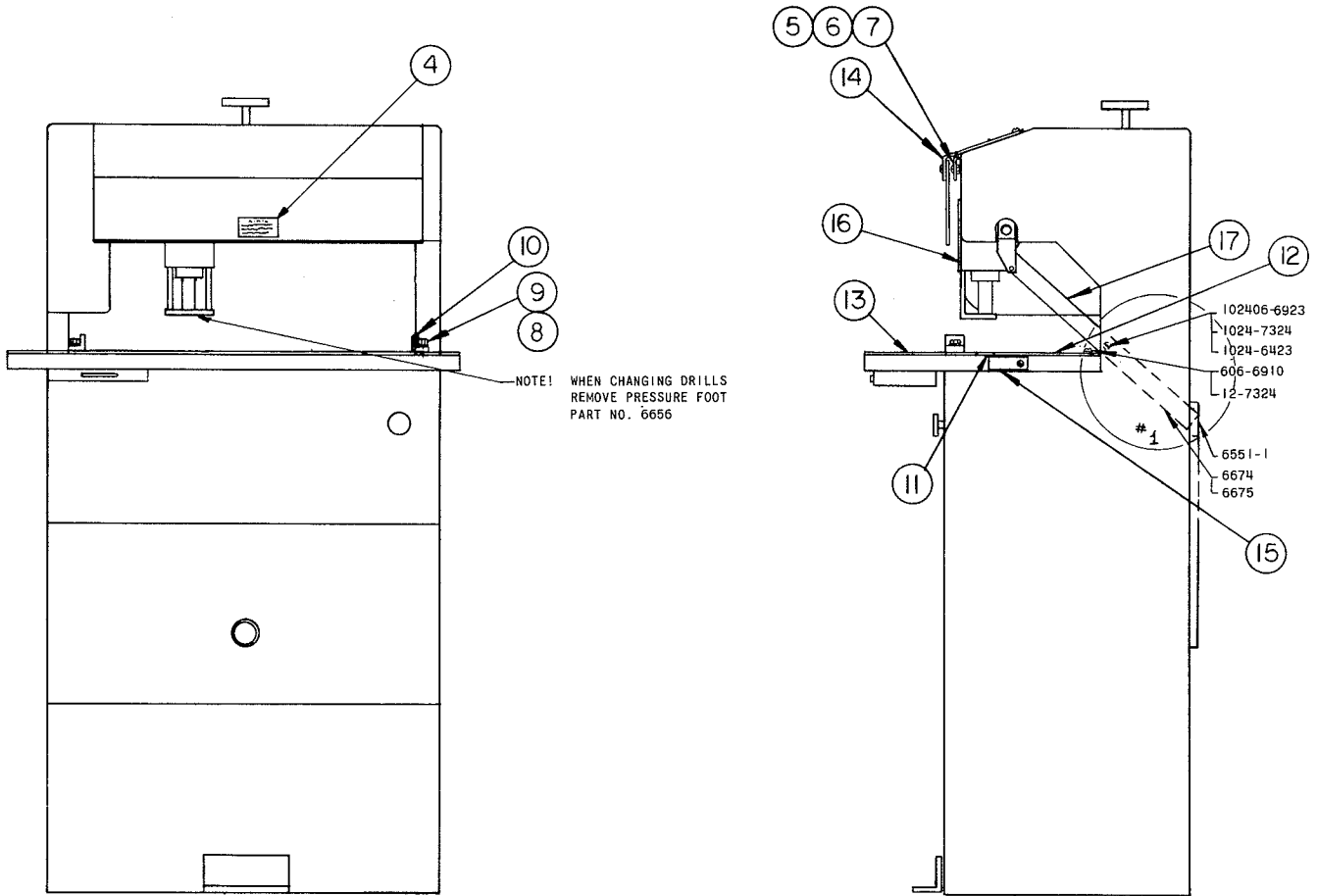
1. Install the side guide trip rod to the spindle dovetail and adjust so the vertical travel of the drill heads will engage the trip lever.
2. Install the side guide stops to the desired spacing along the slot in the side guide shaft.
3. Major adjustments are made by aligning screws along any set of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

SIDE GUIDE - AUTO TRIP (A-6565-3)



Ref. Part No.	Part Name	Qty.	Ref. Part No.	Part Name	Qty.
1. H-6918-628	3/8-16 x 3-1/2" Soc. Hd. Cap Scr.	1	16. 6572	Adjusting Knob	1
2. 6613-1	Clamp	1	17. H-21S-125-1000	1/8 x 1" Sel-lok Pin	1
3. A-6615-1	Dovetail Block & Bracket	1	18. 6571-1	Adjusting Stud	1
4. 6618-1	Trip Rod	1	19. H-6918-608	3/8-16 x 1" Soc. Hd. Cap Scr.	2
5. H-6938-403	1/4-20 x 3/16" Cup Point Soc. Set Scr.	2	20. 6610-1	Trip Lever	1
6. H-5246-203	1/8 x 3/8" Dowel Pin	1	21. H-5754-508	5/16-18 x 1" Soc. Hd. Shoulder Scr.	1
7. H-6903-405	1/3-20 x 5/8" Butt. Hd. Soc. Cap Scr., Nylock	1	22. S-1407	Spring	1
8. 6569	Stop	1	23. S-1611-1	Stop	6
9. 6568	Holder, Side Guide	1	24. S-1726	Spring	1
10. H-6957-406	1/4-20 x 3/8" Dog Point Soc. Set Scr., Nylock	2	25. 6612	Spring Pin	1
11. H-21S-094-0500	3/32 x 1/2" Sel-lok Pin	1	26. S-1715	Lock Nut	1
12. 6567-1	Bearing, Side Guide	1	27. 6570	Insert, Side Guide	1
13. H-5254-506	5/16-18 x 3/4" Soc. Hd. Shoulder Scr.	1	28. H-21S-187-1000	3/16 x 1" Sel-lok Pin	1
14. 6611-1	Index Lever	1	29. H-6938-102406	10/24 x 3/8" Cup Point Soc. Set Scr.	6
15. 6566-1	Side Guide Housing	1	30. H-21S-250-1000	1/4 x 1" Sel-lok Pin	1
			--- W-154	Wrench (not shown)	1

LARGE HOLE DRILLING ATTACHMENT A-6500-5



Ref. Part No. No.	Part Name	Qty.
1. 4687	Drifts	2
2. A-6594-7	Blueprint of Assembly	1
3. A-6500-5	Blueprint of Assembly	1
4. 6670	Label	1
5. H-6423-#10	#10-24 NC Hex Nut	6
6. H-6923-102420	#10-24 NC x 1-1/4" Rd. Hd. Mach. Scr.	2
7. H-7322-3	3/16" Polished Washer	4
8. H-7324-12	3/8" Shakeproof Lockwasher	4
9. H-6910-606	3/8-16 NC x 3/4" Butt. Hd. Soc. Cap Scr.	4
10. 6672	Guide, Paper	2
11. 6669	Cutting Block, Plastic	6
12. 6668	Table Adapter, Rear	1
13. 6667	Table Adapter, Front	1
14. A-6638-1	Cover, Front	1
15. 6590	Stop, Drilling Block	2
16. A-6594-7	Drill Head Assembly	1
17. A-6538-1	Chip Chute	1
-- W-134	7/32" Wrench (not shown)	1

LARGE HOLE DRILLING ATTACHMENT



WARNING: Always disconnect the power when cleaning, servicing or lubricating your drill. See Power Lock-out Procedure, page 4.

The MS-10A Paper Drill can be easily altered to handle drilling of one or two holes up to 1-1/2" in diameter, as well as handling standard drilling 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: Always handle drills with care to avoid severe lacerations, even dull drills are sharp enough to cause lacerations.

It is important to keep the hollow drills sharp. They are sharpened to a 35° bevel and if there isn't a machine shop in your area that can handle the job, a factory resharpening service is provided for the large hole hollow 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, may be desired to allow for continuous drilling work.

The large hole drilling conversion kit (#A-6500-5) 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. Backgage Knobs 6587
- G. Backgage 6561-2
- H. Drill Block Stops 6590
- I. Table Light Asm. SS-980-4M

2. Clean table – be sure present wood cutting blocks are flush with table.

3. Install the following parts:

- A. Mount table light assembly outside of 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 your chip chute. See instructions for mounting instructions.
- D. (6) Plastic cutting sticks 6669
- E. Front table adapter 6667
Attach with paper guides 6672 or A-6565 if desired.
- F. Stops for drilling blocks 6590
- G. Backgage 6561-2
- H. Backgage 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.

CHIP CHUTE EXTENSION

For shops doing substantial amounts of long run drilling work, a special chip chute extension is also available. This attachment allows chips to slide out the rear of the machine where they can empty directly into a scrap container, rather than into the regular bin in the base of the machine. With large hole drilling the regular bin fills up so rapidly this chute can be a real time-saver.

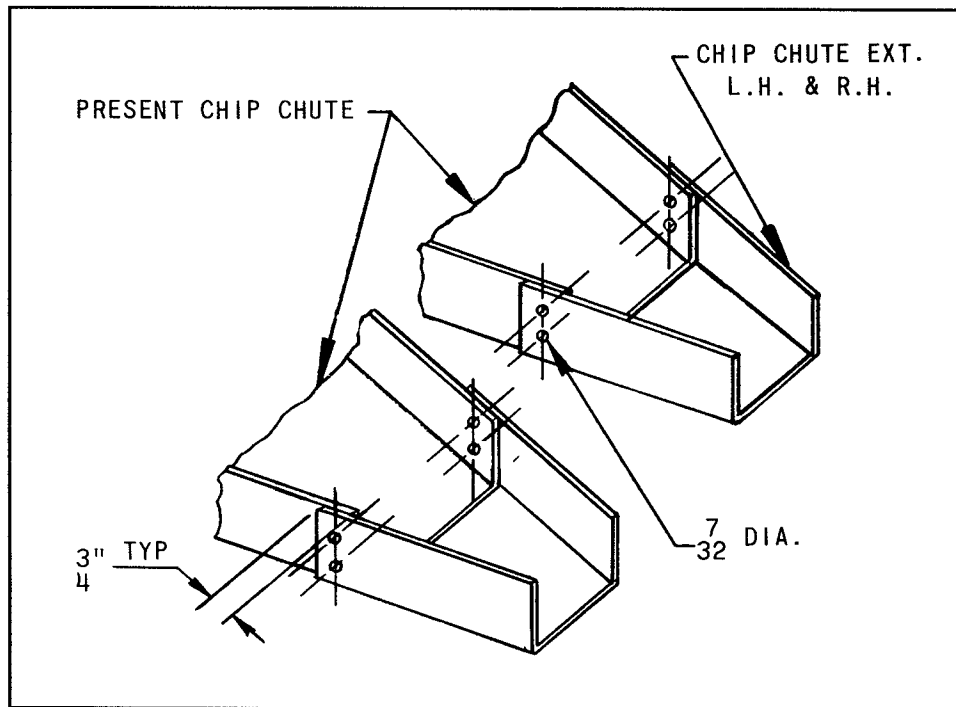
Installation Instructions

1. Remove the following parts:

A. Rear Panel	6551
B. Chip Chute Mounting Bracket with R.H. & L.H. Lower Chip Chutes	6648 6547 6550

2. Install the following parts:

A. R.H. Chip Chute Extension	6674
B. L.H. Chip Chute Extension	6675
C. Rear Panel	6551-1

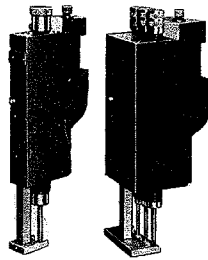


Part No.	Part Name	Qty.
6674	Extension, Chip Chute -R.H.	1
6675	Extension, Chip Chute -L.H.	1
6551-1	Panel, Back	1
H-6923-102406	#10-24 NC x 3/8" Rd. Hd. Mach. Scr. ...	8
H-7324-#10	#10 Shakeproof Lockwasher	8
H-6423-#10	#10-24 NC Hex Nut	8
A-6500-5	Blueprint of Assembly	1

MS-10A ACCESSORIES

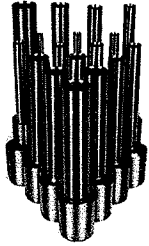
STANDARD DRILLING HEAD —

#A-6594-6 — Not included with the MS-10A. Must be ordered separately. Has 2½" Lift Capacity and comes with one ¼" hollow drill.



TRIPLE DRILLING HEAD —

#A3-6594-5 — Has 2½" Lift Capacity and comes with three ¼" hollow drills on fixed 1" centers.



2½" CAPACITY HOLLOW DRILLS

Four sizes — ¼", ⅜", ½" & ⅝".

2" HOLLOW DRILLS

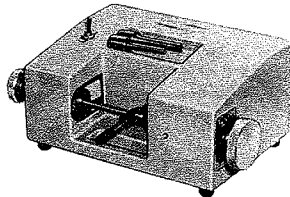
13 sizes from ⅛" to ½" diameter.

WOOD DRILL BLOCKS — #A-6626-24

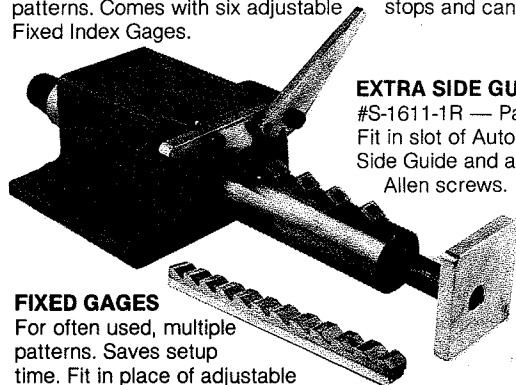
Pkg/24

POWER DRILL SHARPENER — #A-6450

Highly recommended for multiple spindle drill users. You can sharpen several standard 2" or 2½" hollow drills to similar lengths quickly and easily so adjustment on the machine is minimal.



AUTOMATIC TRIP SIDE GUIDE — #A-6565-3 — Releases automatically after hole is drilled so lift can be moved to next position. Best application is with closely spaced multi-hole patterns. Comes with six adjustable stops and can accept Fixed Index Gages.



EXTRA SIDE GUIDE STOPS

#S-1611-1R — Package of 6. Fit in slot of Automatic Trip Side Guide and adjust with Allen screws.

FIXED GAGES

For often used, multiple patterns. Saves setup time. Fit in place of adjustable stops. Custom gages are available.

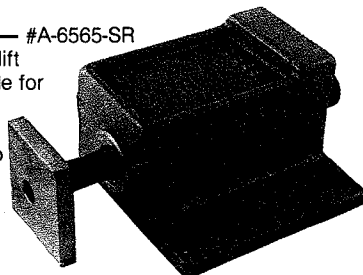
¼" spacing with 24 Stops — #24H-1/4-6653

⅜" spacing with 16 Stops — #16H-3/8-6653

½" spacing with 12 Stops — #12H-1/2-6653

RIGHT HAND SIDE GUIDE — #A-6565-SR

Can be used alone for single lift drilling; as a second side guide for drilling two lifts in one stroke; or for drilling a lift on the left and right side guides with two strokes. (Example: 7-hole pattern without triple heads.)



WHEELED DOLLY — #A-6686 — Steel base and heavy-duty casters. Make your drill portable for better use of your floor space.

TWO-HAND PUSH BUTTON SAFETY CONTROLS —

#A-4851-14 — Requires both hands on the buttons to bring the heads down.

LARGE HOLE CONVERSION KIT — #A-6500-5 — Converts the MS-10A to a large hole drilling machine for holes from ⅜" to 1½". Will still allow the use of Standard Heads. Includes one large hole head, front guard cover extension, table adapter, chip chute and six plastic drilling blocks. Hollow drills ordered separately.

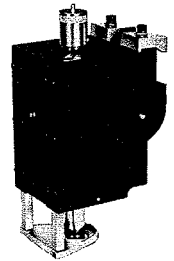
LARGE HOLE SPECIFICATIONS

Maximum number of large hole heads — 2
Center-to-Center drill range — 5"-17¾"
Backgage Range — 0"-2⅝"

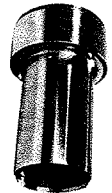
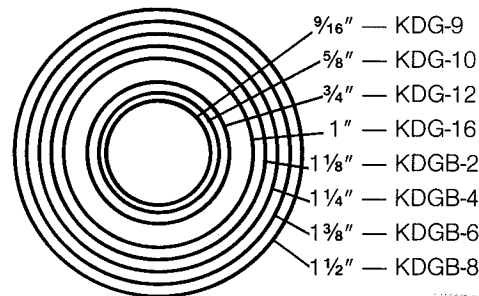
LARGE HOLE DRILL HEAD — #A-6594-7

This additional head can be used for drilling a second large hole. Hollow drill must be ordered separately.

LARGE HOLE HOLLOW DRILLS — 2" capacity. Non-standard sizes are available on special order.

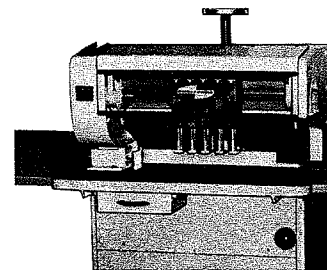


Large Hole



PLASTIC DRILL BLOCKS — #6669

Pkg/12 — Used in place of the wood drill blocks for large hole drilling. Not recommended for use with standard drills.



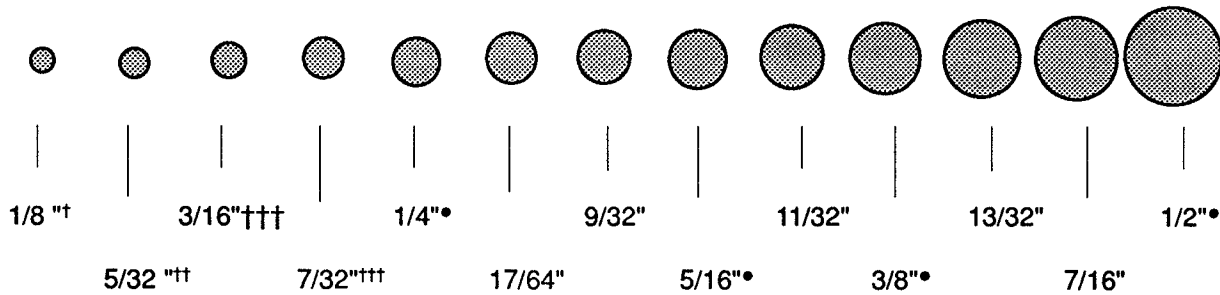
EXTENSION SIDE TABLES

Increase your work flow with these 22" x 48" formica top tables.

Right Hand Table — #A-6620
Left Hand Table — #A-6620-1

ACCESSORIES FOR CHALLENGE PAPER DRILLING MACHINES

Genuine Challenge Hollow Drills In 13 Standard Sizes For Every Drilling Need (2" drill capacity unless otherwise noted.)



17/32" & 9/16" available by special order

Drill Capacity: †=5/8"; ††=1-1/8"; †††=1-5/8";
• = available in 2 or 2-1/2"

This wide range of standard drill sizes is available to meet your every ordinary drilling need. Carried in stock by local Challenge dealers.

Challenge Drill-Ease Lubricant Stick

Cat. No. 4688

This lubricating stick provides a dry stainless lubricant which has many uses throughout the printing plant. It is specially recommended for use on hollow drills for easier drilling, particularly when drilling clay coated stock. It eliminates binding and excessive heating of the drill. Will not discolor the stock.

CARE MUST ALWAYS BE TAKEN WHEN USING STICK AND HANDLING DRILLS.

Challenge Drilling Blocks

Wood — 1-1/4 x 6"
Cat. No. A-6626-24

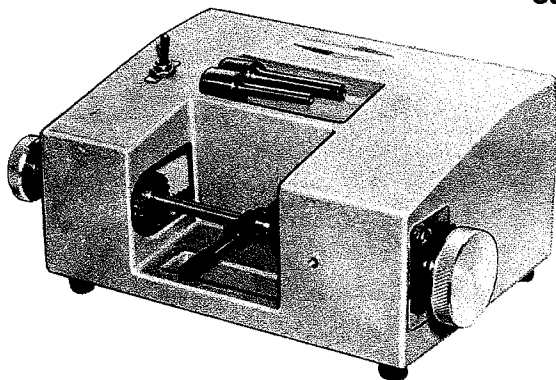
These Challenge End-Wood Drilling Blocks are for round hole drilling operations. Sold in lots of 24.

Plastic — 2-1/4 x 6"
Cat. No. 6669

These plastic cutting blocks are recommended for all large hole drilling. Sold in lots of 12.

Power Drill Sharpener

Cat. No. A-6450



A moderate-cost power drill sharpener. Plugs into any standard 115 volt, 60 cycle, AC outlet. Handles Challenge and any other taper shank drill bits. Adaptors also available for handling practically all other makes.

6469 Replacement Cutting Bit.
6469-R Resharpener Service—your old bit

HOLLOW DRILL SHARPENER *For fast . . . easy . . . drill sharpening*



CAUTION: Drills are sharp even after use. Be careful to keep edge away from your body. To prevent personal injury and/or damage to the drill, ALWAYS keep drills in protected area.

Here's a unit that really makes drill sharpening easy. All you do is place the hollow drill in the tapered end of the drill holder . . . insert the unit on the cylinder . . . then turn two or three times . . . and you have a perfectly sharpened drill.

This Challenge Hollow Drill Sharpener can pay for itself many times over through longer drill life . . . easier, faster drilling . . . and less sharpening time. All sizes of drills from 1/8 to 1/2 inch in diameter can be handled.

Important, too, the drill sharpener automatically puts just the right amount of bevel on the hollow drill for best drilling results. It's self centering, too, so that the center of the sharpening bit exactly meets the center of the hollow drill. The drill sharpener also has a replaceable sharpening bit.

Items	Part No.
Challenge Hollow Drill Sharpener	A-4950
Extra Cutting Bit	4952

Instructions:

NOTE: Always handle carefully

1. Be sure to wipe off all grease before using the sharpener.
2. Remove any paper chips from the hollow drill.
3. Place the hollow drill in the drillholder section. Insert the sharpening section, being very careful to bring the drill and cutting tool together without bumping.

CAREFUL: The cutting tool is made of a glass hard material and may be chipped by careless handling.

4. Turn the cutting unit clockwise, maintaining an even pressure until the hollow drill is sharpened (usually two or three turns). The cutting tool seldom requires regrinding, but when this does become necessary, the bit should be sent to the factory as regrinding must be done on a diamond wheel.

