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SERIAL NO. —	
VOLTAGE —	
PHASE —	
AMPS —	
HZ (CYCLES) —	
INSPECTED —	
MODEL —	

Instruction and Parts Manual

CHALLENGE

Model MS-10A Paper Drilling Machine

THIS MANUAL COVERS SERIAL NUMBERS 42437 thru 64718.

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 / PHONE: 616/842-8300

F-399-B

FOR YOUR CONVENIENCE

This manual is provided for your convenience. In it are instructions for installing, operating, and maintaining your new Challenge Paper Drill. These instructions are intended to help you install this drill in a minimum of time and the least effort, operate it in the most efficient manner, and maintain it so that it will provide you with years of trouble free operation.

Contained in this book also, is a complete list of parts indicated by number to make it easy for you to correctly identify and order spare or replacement parts. It may be a long time before you need this information so it's suggested that it be kept with the machine so that it is available when required.

When ordering parts, be sure to give part numbers **and** the machine's model and serial number. This information is essential and will enable us to fill your requirements quickly and help keep your equipment in efficient operation.

Remember: your authorized dealer is interested in seeing that you get the best performance possible from your machine. Rely on him for parts and service.

WARNING

1. Safety is the responsibility of the user of this machine.
2. Always disconnect from power before lubricating or making any adjustments on this machine.
3. Safety mechanism is for your protection and must not be altered.

TABLE OF CONTENTS

WARRANTY

This equipment is guaranteed to be free from defects in workmanship or material for a period of one year from 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.

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 authorization.

PACKING LIST FOR MS-10A PAPER DRILL

Part No.	Description	Quantity
	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 wrnech	1
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-B	Instruction and parts manual	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, examnine 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 to recognize the weight of the machine and have sufficient manpower available to handle the load without jarring or damaging the machine.

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

The machine is factory wired to the customers specification. It is the customers responsibility to wire the motor for the current and voltage specified on the name plate. (This information is also found on the cover of this manual.) 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.

Since our standard machine is intended for a three phase hookup, care must be exercised to be sure that the motors turn in the proper direction. Because these machines are wired, inspected and checked before they leave the factory, they are set up so that if one of the motors is turning in the proper direction, the other is also. The correct hookup is found mostly by trial and error. Fasten the three leads of the power cord to the designated terminals in any order and the ground wire to its designated terminal. Start the machine and check the rotation of the spline. Proper direction is indicated by the red arrow on the left spline bearing housing and motor. (A 'double check' can be made by checking the rotation of the pump motor, also indicated by a red arrow.)

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.

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

Final Installation

Be sure the cutting sticks are in position before trying to drill paper.

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

Check the hydraulic oil supply for the proper level. This check is made by removing the rear panel and taking the top off of the reservoir tank. The oil should be up to the scribe line, approximately 1" from the top of the tank. 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.

OPERATION INSTRUCTIONS

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 directly through a flexible coupling while the spindle motor drives the drill heads on a spline shaft through a belt and pulley. The two motors are started and stopped simultaneously by a "start" push button and a "stop" pushbutton located on the top of the left side frame. The pushbuttons are labeled by their function. The switches have a channel type 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 drawer removed when the drill is in operation, the motors will shut off and must be restarted when the drawer and cover 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 push-button 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 1¼" 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 drill heads down 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 drill in its downward stroke allowing it to return to its normal up position, thus preventing costly errors.

The vertical movement of the spindles (drill heads) is 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 heads to return to their up position. NEVER REST YOUR FOOT ON THE TREADLE WITHOUT INTENDING TO BRING DOWN THE DRILLS.

Using The Slide 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 approx. position required according to the size of sheet to be drilled. A micrometer adjustment screw permits final minor adjustments in the 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 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 (Ref. No. 34) which are provided, must be used. These blocks clamp to the backgage by means of a thumbscrew. The blocks are 1" wide and, therefore, when used, 1" must be subtracted from the scale reading to give the set up dimension. Example: To drill ¾" from the edge of the sheet, install the filler blocks and set the backgage to 1¾" on the scale.

Emptying The Drill Chips

A large capacity chip bin, accessible from the front of the machine, which can be easily taken out and emptied, is provided just below the table. Visual indication is also provided when the bin is full. Remember; If the bin is removed while the machine is running, it will shut off and cannot be restarted until the bin is in place.

Storing Accessories

A 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 side 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 the specific sections for details on these items.

ROUTINE ADJUSTMENTS

Adjusting The Vertical Stroke

Always raise the 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 on their upstroke.

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. Each spindle in each head must then be raised to its highest point by turning the spindle adjusting knob (on the top of the head) counter-clockwise. It is recommended that you place one sheet of paper, of the type to be drilled, under the drills and start the machine. (CAUTION: Make sure all objects are removed from the top of the machine before starting. The handwheel at the top of the machine moves with the vertical travel of the drills and objects may jam under the wheel causing a broken casting or a bent shaft.) Press the foot treadle to the full down position and adjust the drill heads down by turning the handwheel clockwise until the first one of the drills just cuts through the paper and creases the cutting stick. 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 the sample paper and crease the cutting stick. 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 part of the dovetail (Internal view, Ref. No. 18, 19, and 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, that is, not drilling paper). Maximum speed is 30 strokes per minute and this speed is used on the average run of work. 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."

This 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 2½ turns counter-clockwise as the drill will not bottom and engage the return cycle. Less than one turn counter-clockwise should suffice for all drilling operations. Also, slow speeds will cause the drill to "burn" through the paper. If burning occurs, either increase the vertical speed or sharpen the drills.

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

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. CAUTION: If the gib is too tight, the springs will not return the drill heads to the up position.

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 or breaking. 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.

Tightening The Drill Heads

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

Adjusting The Backgage

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

Adjusting The Valve Trip Lever Rod

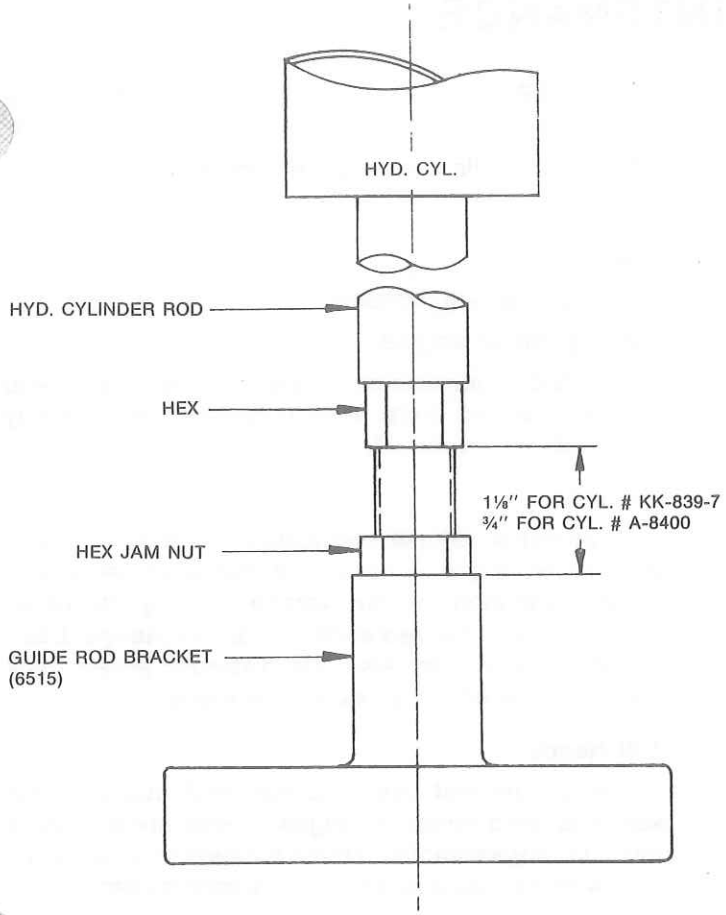
The valve trip lever rod, Internal View, Ref. No. 43, should be adjusted so that the cylinder is fully extended (bottomed) at the same time that the rod releases the valve. This adjustment is made by loosening the locknut, Ref. No. 46, and turning the rod into or out of the guide rod bracket, Ref. No.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

Adjusting The Cylinder

The MS-10A Paper Drill is designed to allow a 2½" pile under the pressure feet and provide adjustment for approx. ⅞" 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 recommended that this dimension be periodically checked. 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.

If adjustment is necessary, follow this procedure: 1) Disconnect power; 2) Raise spindles and heads to their high point as when changing drills; 3) Remove rear panel from machine; 4) Loosen hex jam nut on



hydraulic cylinder rod; 5) Turn cylinder rod into or out of guide rod bracket (6515) to set-up dimension shown; 6) Secure hex jam nut on cylinder rod; 7) Readjust valve trip lever rod (refer to previous section); 8) Follow procedure for setting drills.

Removing The Cutting Sticks

The cutting sticks are removed by simply lifting them from their groove. They should set flush with the table and with each other and may be shimmed 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 chip 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: Sometimes the drill becomes so firmly seated in the chuck that it is necessary to tap on the drift to get the drill to release.

ROUTINE MAINTENANCE

General

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

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 men 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 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.

ROUTINE MAINTENANCE

Service Checklist

Daily

1. Sharpen the hollow drills often and reset the handwheel if needed.
2. Lubricate the hollow drill frequently with the Drill-ease provided.
3. For better hollow drill life, remove the drills when not in use and soak in light oil or kerosene. Wipe off excess oil before drilling.
4. Oil 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. Wax the chip chute and buff to prevent chips from piling up.

(Cont. on page 6)

ROUTINE MAINTENANCE

2. Grease the drill head at the two 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 of the reservoir tank. The oil should be up to the scribe line, approximately 1'' from the top of the tank. Recommended oil is No. 21 Rycon (The American Oil Company) or one of the following:

American Industrial Oil No. 21	Standard Oil of Indiana
Pacemaker 200-T	Citgo
Terrestic 47	Humble Oil Company
DTE Medium	Mobil Oil Company
Puropale RX-Medium	Pure Oil Company
Tellus 29	Shell Oil Company
Chevron OC No. 11	Standard Oil of California
Limax 47	Standard Oil of Ohio
Sunvis 921	Sun Oil Company
Harmony 47	Gulf Oil Company
Ragal Oil B	Texaco

NOTE: These oils are cross referenced.

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, or loose spindles. Your old heads may be rebuilt or new heads purchased through your dealer.

TROUBLE SHOOTING

(Refer to parts list, pages 8 thru 20, for part location, number, and description.)

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 pulleys 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, the spindle should return to the up position as rapidly as possible to avoid the spinning of the drill in the stock on the upstroke.

Instead of punching slotted holes for five and seven hole universal binding work, save time and cost by drilling a ½ 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.

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.

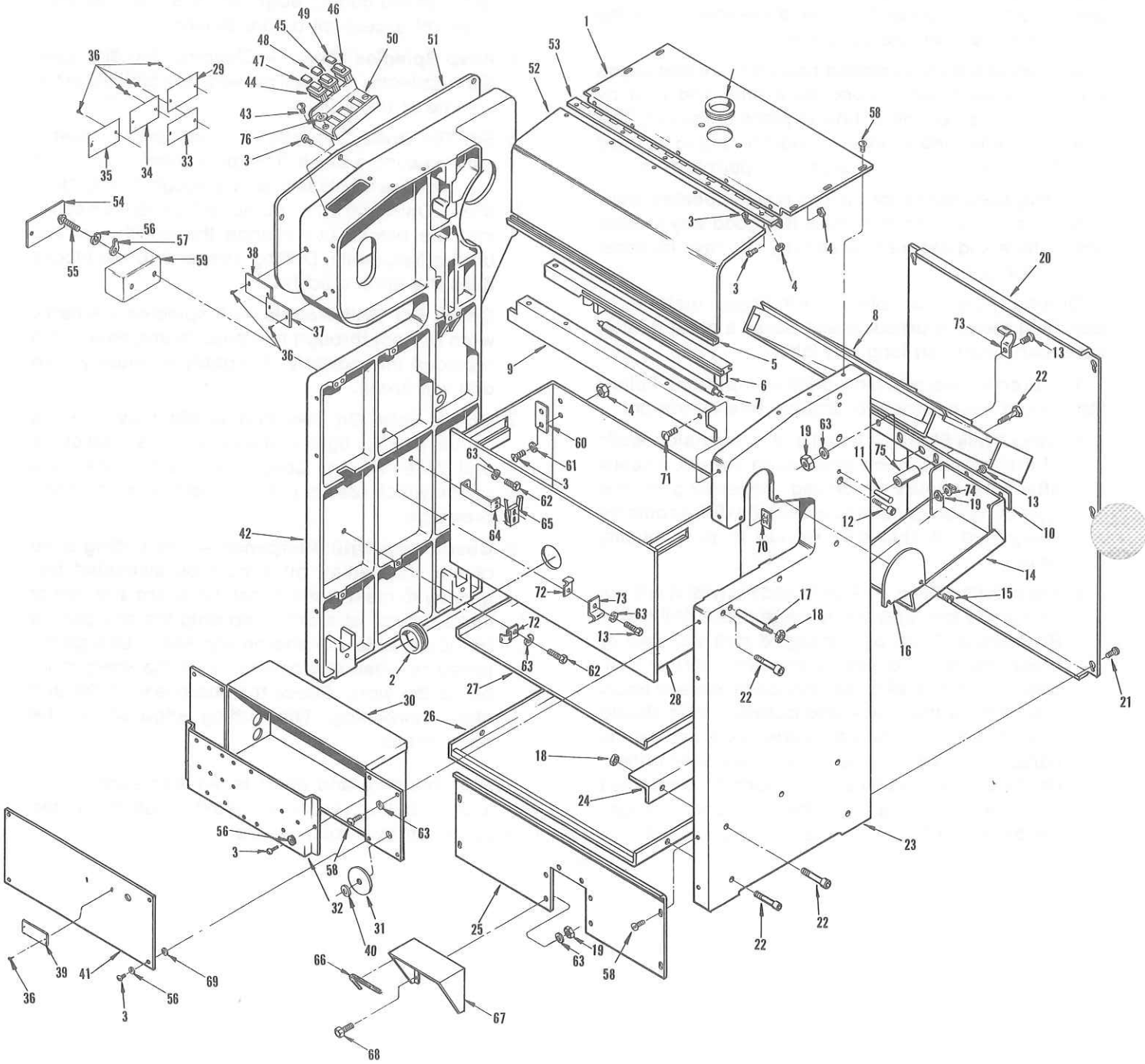
Drilling holes for plastic bindings, instead of punching them, is practical and saves a great deal of time, particularly on long run jobs.

The proper care of hollow drills is important. Follow these eight suggestions for trouble free operation:

1. **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.
2. **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 stock has been drilled. On these jobs the chips are frequently compacted into one solid mass when the drill cools — causing breakage the next time the drill is used.
3. **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.
4. **Keep Spindles Clean** — Clean out the drill spindle frequently. This will prevent any buildup in the spindle of the drill.
5. **Set The Drills Correctly** — Do not cut too deeply into the cutting block. The drills should just touch the block and cleanly drill through the bottom sheet. During drilling, do not set the drills deeper into the blocks but change the position of the blocks frequently. Drilling deeper into the blocks dulls the drills quickly.
6. **Check For Drill Wobble** — If spindles are badly worn or bent through mis-adjustment, have them replaced immediately. A wobbly or loosely held drill will break.
7. **Check Belts On The Drilling Machine** — Belts should be kept tight to assure proper speed of the drill. When the drill slows down it acts more like a punch which results in poor quality work and drill breakage.
8. **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.

EXTERNAL PARTS

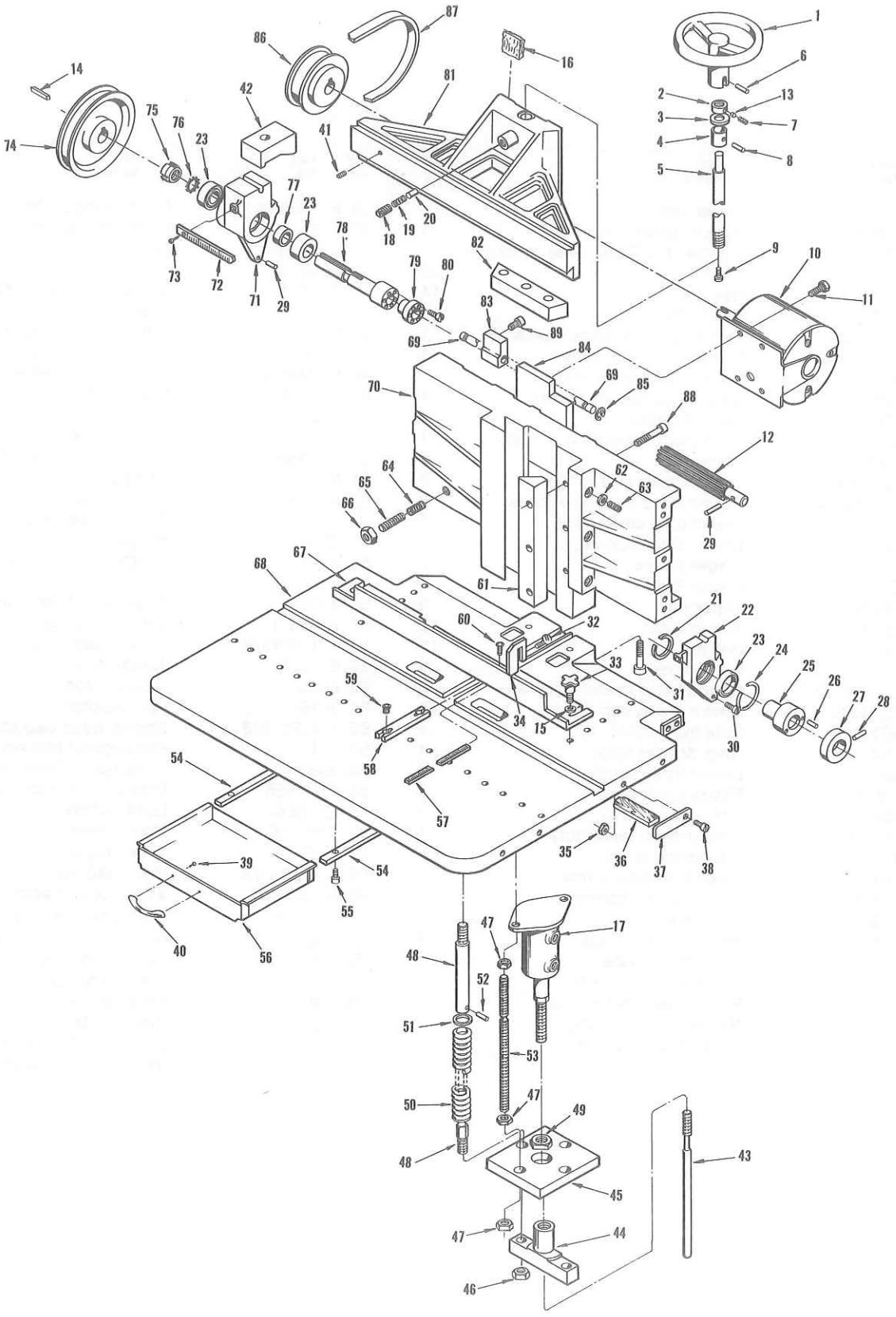


EXTERNAL PARTS

Ref. No.	Part No.	Part Name	Quan. Req'd.
1.	6552	Cover-top	1
2.	S-1678	Rubber grommet	1
3.	S-1739	#10-24x3/8 Truss head machine screw	30
4.	#10-24	Hex nut	14
5.	S-1682	Plastic trim	1
6.	EE-1489	Table light & interlock assembly	1
	SS-980-4M	Fluorescent unit-only	1
7.	S-845	Fluorescent tube (lamp)	1
8.	A-6538	Chip chute assembly-top	1
9.	6576	Lamp bracket	1
10.	6648	Chip chute mounting bracket	1
11.	#7 x 2-3/4	Taper pin	2
12.	1/2-13x2	Socket head cap screw	6
13.	1/4-20x3/4	Round head machine screw	6
14.	6547	Lower chip chute-R.H.	1
	6550	Lower chip chute-L.H.	1
15.	6067	Finger screw	2
16.	6575	Cover-R.H.	1
17.	S-1574-1	Taper pin	6
18.	3/8-16	Hex jam nut	13
19.	1/4-20	Hex nut	19
20.	6551	Back panel	1
21.	3/8-16x1/2	Round head machine screw	6
22.	3/8-16x2-1/2	Socket head cap screw	18
23.	6501-1	Side frame-R.H.	1
24.	6509	Chip drawer slide	1
25.	6522	Lower front panel	1
26.	6506-1	Power pack base	1
27.	6582	Chip drawer tray	1
28.	A-6523	Chip drawer assembly	1
29.	5177	U.L. listing plate	1
30.	EE-1083	Electrical control box	1
31.	S-1684	Decal-speed control	1
32.	E-1084	Sub panel	1
33.	E-1504-M	Specification plate	1
34.	S-1842	Instruction plate	1
35.	S-1236-6	Serial number plate	1
36.	#0x3/16	Round head drive screw	14
37.	S-1781	Name plate-warning	1
38.	S-1781-3	Crush hazard plate	1
39.	E-1503-M	Fuse rating plate	1
40.	1/2	Polished washer	1
41.	A-6578	Cover	1
42.	6502-2	Side frame-L.H.	1
43.	S-1751	#8-32x3/8 Truss head machine screw	2
44.	E-1045-3	Push button-stop (red)	1
45.	E-1045-1	Push button-start (amber)	1
46.	E-1045-2	Push button-table light (white)	1
47.	1103-4	Decal-stop	1
48.	1103-3	Decal-start	1
49.	1103-2	Decal-table light	1
50.	E-1088-1	Push button mounting plate	1
51.	6537	Belt guard	1
52.	A-6638	Cover assembly	1
	6640	Plexiglass shield only	1
53.	6553	Hinge	1
54.	E-1369-1	Junction box cover	1
55.	#10-24x1/2	Round head machine screw	2
56.	#10	Shakeproof lockwasher	9
57.	E-640-1	Grounding lug	1
58.	1/4-20x3/8	Truss head machine screw	16
59.	E-1370-1	Junction box	1
60.	6685	Drawer stop	2
61.	3/16	Lockwasher	4
62.	1/4-20x3/8	Socket head cap screw	3
63.	1/4	Shakeproof lockwasher	15
64.	3982	Limit switch bracket	1
65.	EE-1456	Drawer interlock assembly	1
	EE-866-1	Limit switch	1
66.	7032-M	Plastic trim	1
67.	4099	Treadle guard	1
68.	1/4-20x3/8	Hex head cap screw	6
69.	S-1864-2	#10 captive device	4
70.	S-1729	#10 Captive device	4
71.	#10-24 x 3/4	Round head machine screw	2
72.	E-509	1/2 Conduit clamp	2
73.	E-596	3/4 Conduit clamp	2
74.	1/4	Medium Lockwasher	2
75.	3/8 x 2	Pipe nipple	2
76.	#8	Shakeproof Lockwasher	2
77.	H-7327-12	3/8" Med. Lockwasher	4

Always Give SERIAL NUMBER When Writing – When Ordering Parts, Give PART NUMBER

INTERNAL PARTS

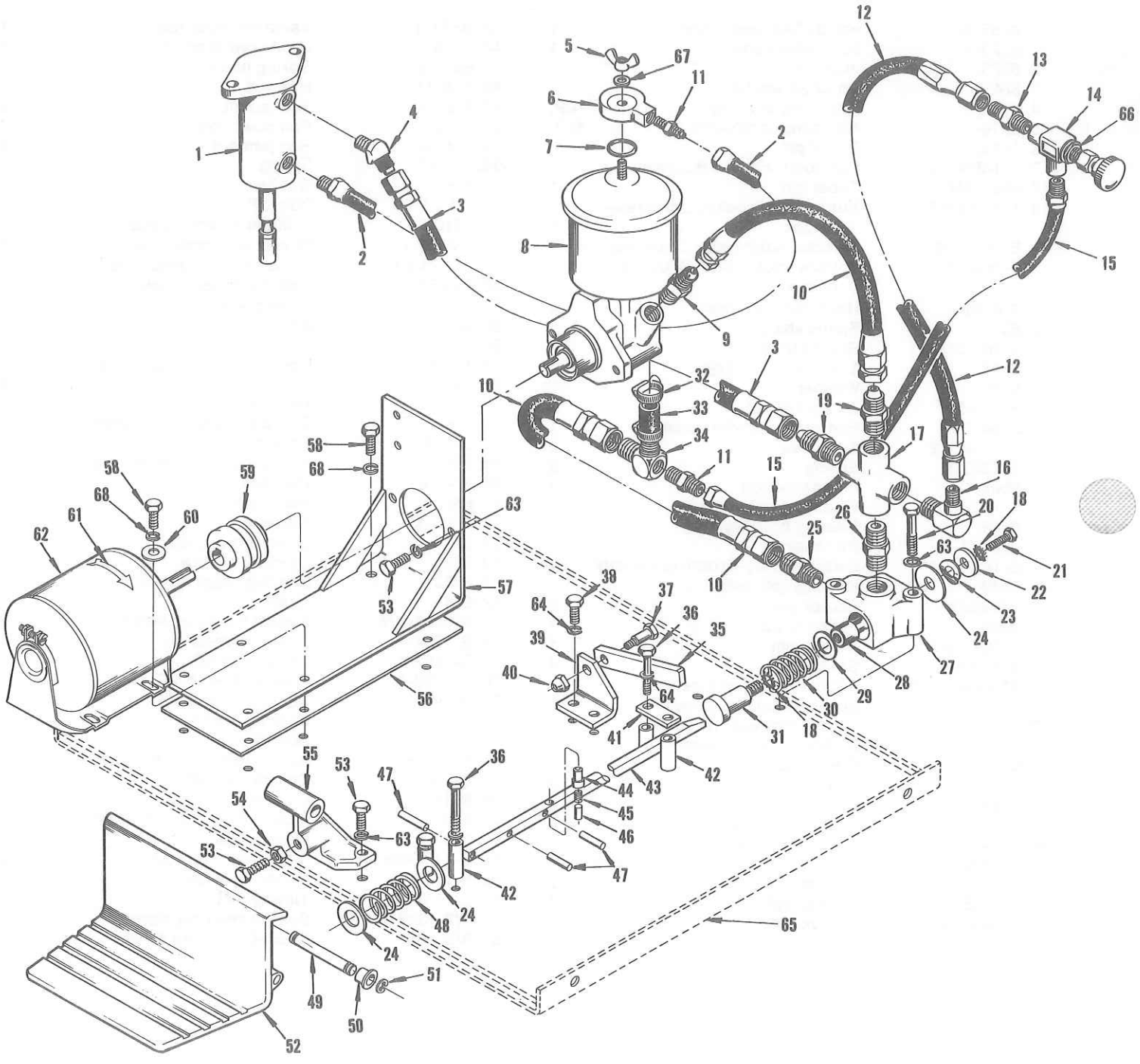


INTERNAL PARTS

Ref. No.	Part No.	Part Name	Quan. Req'd.
1.	A-6519-1	Handwheel assembly	1
	6520-1	Handwheel only	1
2.	6573	Jam nut	1
3.	3/4	Polished washer	1
4.	6574	Adjusting bushing	N.P.
5.	6518-1	Adjusting screw-drill	N.P.
6.	1/4 x 1-1/2	Dowel pin	1
7.	1/4-20x1/4	Flat point socket set screw	1
8.	#5x1-3/4	Taper pin	1
9.	1/4-20x1/2	Button head socket cap screw-Nylock	1
10.	E-1600-96	Spindle motor (208v.. 3 phase)	1
	E-1600-112	Spindle motor (230/460v., 3 phase	1
11.	3/8-16x1	Hex head cap screw	4
12.	6535	Spline shaft	1
13.	3/16 x 3/32	Brass button	1
14.	S-426	1/4x1/4x1-1/4 key	1
15.	5/16	Washer	2
16.	P-325-F	2 x 2 x 1/8 felt	2
17.	A-8400	Hydraulic cylinder assembly	1
18.	1/2-13x1/2	Set screw	2
19.	S-1255-1	Spring	2
20.	6609-1	Plunger-teflon	1
21.	S-1517-118	Retaining ring-Truarc	1
22.	6529	Bearing housing-R.H.	1
23.	S-1713	Ball bearing	3
24.	S-1437-2.44	Retaining ring-Truarc (Inverted)	1
25.	6530	Bearing spline-R.H.	1
26.	1/8 x 3/4	Sel-lok pin	2
27.	6536	Spline knob	1
28.	3/16x1-1/2	Sel-lok pin	1
29.	3/16 x 3/4	Sel-lok pin	4
30.	#10-24x1-1/4	Socket head cap screw	1
31.	3/8-16x3-1/4	Socket head cap screw	2
32.	S-1732	Thumb screw-5/16-18x3/4	2
33.	6587	Backgage knob assembly	2
34.	6563-2	Filler block	2
35.	1/4-20	Hex nut	2
36.	6564	Cutting stick	6
37.	6590	Cutting stick stop	2
38.	1/4-20x3/4	Truss head machine screw	2
39.	S-1729	#10-24x3/8 Truss head machine screw	2
40.	S-1738	Drawer pull	1
41.	3/16 x 1/2	Sel-lok pin	1
42.	6601-1	Clamp	1
43.	6521-1	Valve trip lever rod	1
44.	6515	Guide rod bracket	1
45.	6514-1	Spring plate	1
46.	5/8-11	Hex nut	2
47.	1/2-13	Hex jam nut	6
48.	6512	Pull down rod	2
49.	3/4-16	Hex jam nut	1
50.	6513-2	Spring	2
51.	6589	Washer	2
52.	1/4 x 1-1/4	Dowel Pin	2
53.	6510-1	Cylinder mounting stud	2
54.	A-6558-1	Drawer slide assembly	2
55.	#10-24 x 1/2	Truss head machine screw	5
56.	A-6555-1	Tool drawer assembly	1
57.	2236-6	Table scale	1
58.	6562-1	Key	1
59.	1/8	Pipe Plug	2
60.	1/4-20 x 1/2	Flat head socket cap screw	1
61.	6517-1	Gib	1
62.	3/8-16	Hex jam nut	3
63.	3/8-16x2	Cup point socket set screw	3
64.	S-1727	Spring	1
65.	6592	Adjusting screw-motor plate	1
66.	3/4-10	Hex jam nut	1
67.	6561-4	Backgage	1
68.	6503-1	Table	1
69.	6593-1	Shaft-motor plate	1
70.	6504	Dovetail-vertical	1
71.	6532-1	Bearing housing-L.H.	1
72.	6545	Scale	1
73.	#10-24x3/8	Socket head cap screw	2
74.	S-1714-1	Pulley drive-large	1
75.	S-1492-1	Lock nut N-06	1
76.	S-1493-1	Lock washer W-06	1
77.	6534	Bearing spacer	1
78.	6533	Bearing spline-L.H.	1
79.	S-1717	Bushing	1
80.	#10-24x3/4	Button head socket cap screw	6
81.	6516-3	Dovetail-spindle	1
82.	6511	Pull down bar	1
83.	6591-1	Mounting bracket-motor plate	2
84.	6584-1	Motor plate	1
85.	S-1193-50	Retaining ring-Truarc	2
86.	S-1714	Pulley drive-small	1
87.	S-1716	Timing belt	1
88.	1/2-13x2-1/4	Socket head cap screw	3
89.	3/8-16x1	Socket head cap screw	2

Always Give SERIAL NUMBER When Writing – When Ordering Parts, Give PART NUMBER

HYDRAULIC POWER PACK



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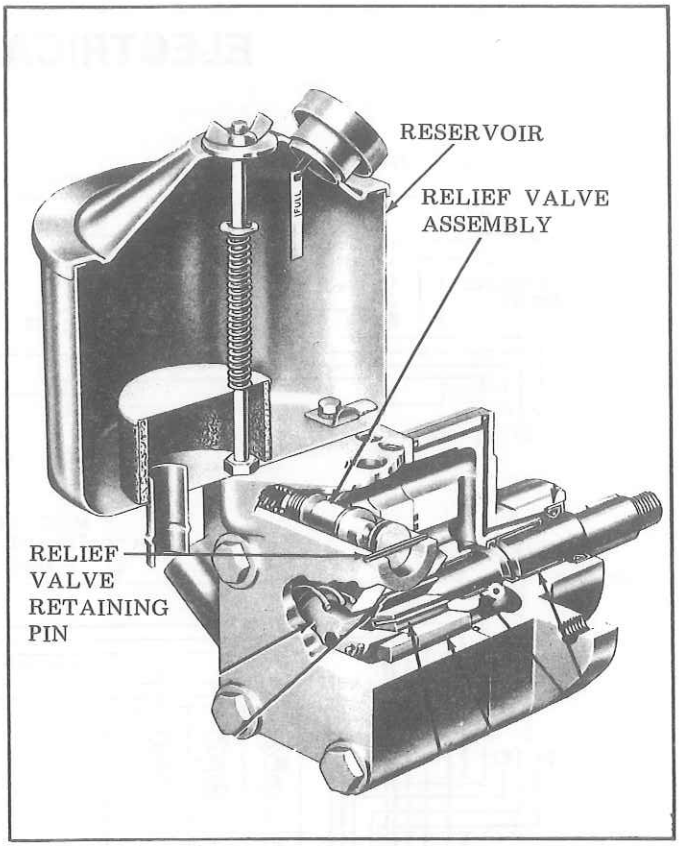
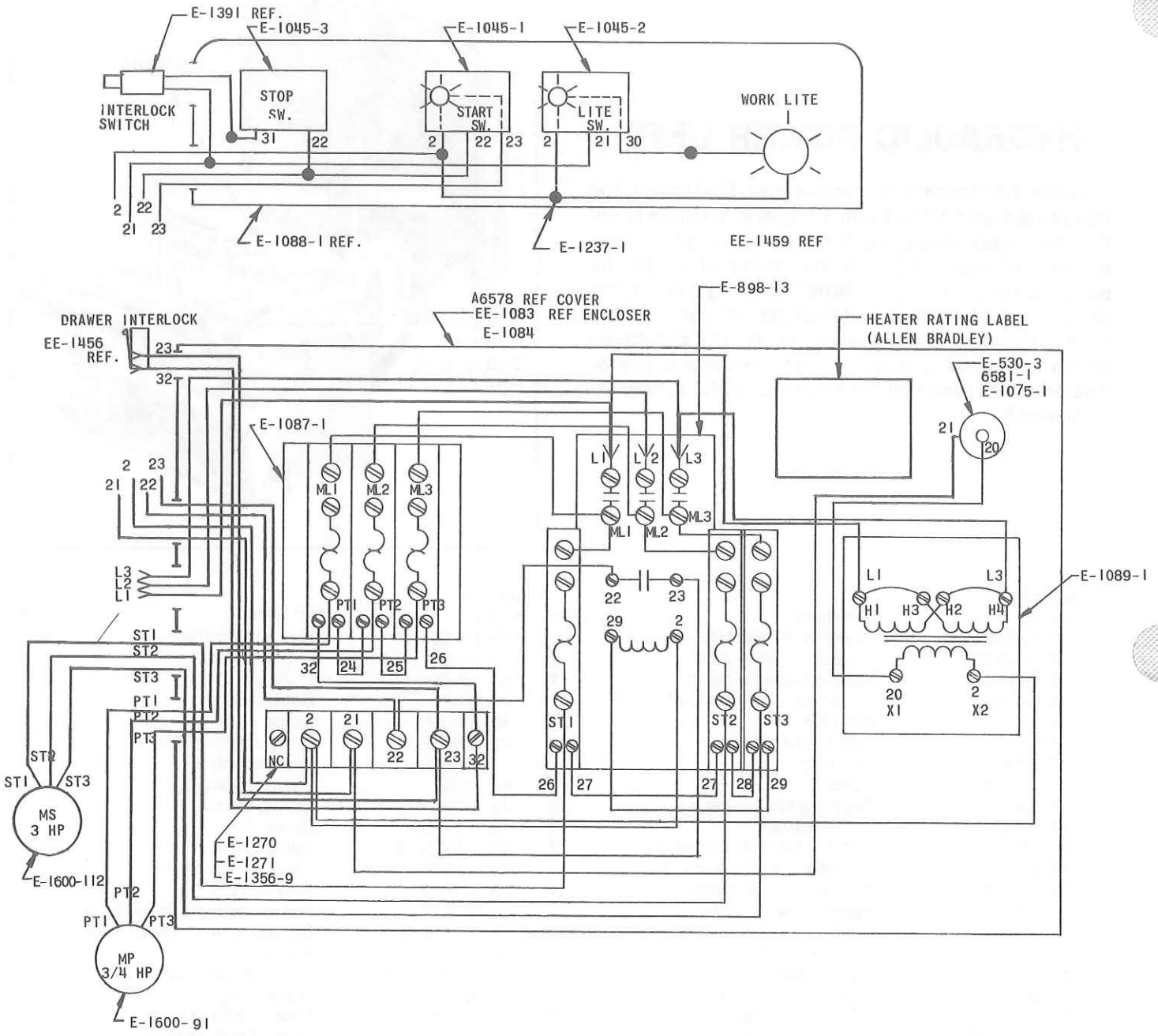
HYDRAULIC POWER UNIT

When the machine is shipped from the factory, the power pack unit is filled with 1.5 quarts 1.4 liters of oil. The oil supply should be checked about once every month and kept up to the line stamped inside the pump power pack oil tank. When re-filling the unit, the oil tank should be filled and then the unit run to fill the hoses, cylinder, and valve assembly. Oil should be added to the tank until the oil level remains at the indicated mark. (See Maintenance section for further information.)



Ref. No.	Part No.	Part Name	Qty
1.	A-8400	Power pack hydraulic cylinder	1
2.	K-845-2	Hose-cylinder to tank	1
3.	193-3035	Hose-cylinder to cross	1
4.	S-1144	45° elbow — 3/4 T x 1/4 P	1
5.	1/4	Wing nut	1
6.	6768	Fitting-tank drain	1
7.	S-1810-16	"O" ring	1
8.	4232-2	Pump	1
9.	S-1442	Coupling-str. connector	1
10.	K-843	Hose-hydraulic	2
11.	6293	7/16 T x 1/8 P str. connector	2
12.	4903	Hose-flow control to cross	1
13.	S-1731	3/8 T x 1/8 P str. connector	1
14.	4771-1	Needle valve-bronze	1
15.	4903-3	Hose-flow control to pump	1
16.	S-1094	9/16 T x 3/8 P 90° elbow	1
17.	S-1691	3/8 Pipe cross	1
18.	5/16	Shakeproof lockwasher	2
19.	S-1064	1/2 T x 3/8 P Male coupling	2
20.	3/8-16 x 2-3/4	Hex head cap screw	2
21.	5/16-18 x 3/4	Hex head bolt	1
22.	S-1083-1	3/8 Washer-special	1
23.	S-1814	Washer-cup	1
24.	3/4	Polished washer	3
25.	S-1693	3/4 T x 1/2P str. connector	1
26.	S-1692	1/2 P x 3/8 P str. connector	1
27.	KK-828	Selector valve	1
28.	non-procurable	Spool	1
29.	6651	Seal	2
30.	S-1424-1	Spring-valve spool	1
31.	K-833	Valve spool adapter	1
32.	S-1747	Clamp	2
33.	S-1748	Coupling hose	1
34.	6294-1	1/2 T x 3/8 P 90° elbow	1
35.	6647	Trip-finger	1
36.	1/4-20 x 2-1/4	Hex head cap screw	4
37.	5/16-18 x 3/4	Socket head shoulder screw	1
38.	1/4-20 x 3/4	Hex head cap screw	2
39.	6646	Trip bracket	1
40.	1/4-20	Lock nut	1
41.	6644	Spacer plate	1
42.	6643-1	Guide	4
43.	A-6507-1	Trip bar assembly	1
	6508-1	Trip bar only	1
44.	4802	Plunger housing	1
45.	K-300-4	Spring latch	1
46.	1/4 x 3/4	Dowel pin	1
47.	1/4 x 1-1/2	Sel-lok pin	3
48.	S-1308	Valve spring	1
49.	S-1689	Rod end pin	1
50.	S-1624-1	Nyliner bearing-flange type	2
51.	S-1193-37	Retaining ring 3/8-"E" type	2
52.	K-841-1	Foot treadle	1
53.	3/8-16 x 3/4	Hex head cap screw	5
54.	3/8	Hex jam nut	1
55.	K-838-1	Foot treadle bracket	1
56.	6645	Gasket-motor mount	1
57.	5008	Pump bracket	1
58.	5/16-18 x 1	Hex head cap screw	6
59.	5009	Flexible coupling	1
	5087	Insert only	1
60.	5/16	Washer	4
61.	S-1106	Arrow decal	1
62.	EE-1600-	Pump motor	Ref.
63.	3/8	Medium lockwasher	4
64.	1/4	Medium lockwasher	2
65.	6506-1	Power pack base	Ref.
66.	1/2	Polished washer	1
67.	1/4	Washer	1

ELECTRICAL SCHEMATIC



208 VOLT
3/4 HP = E-1600-91
3 HP = E-1600-109

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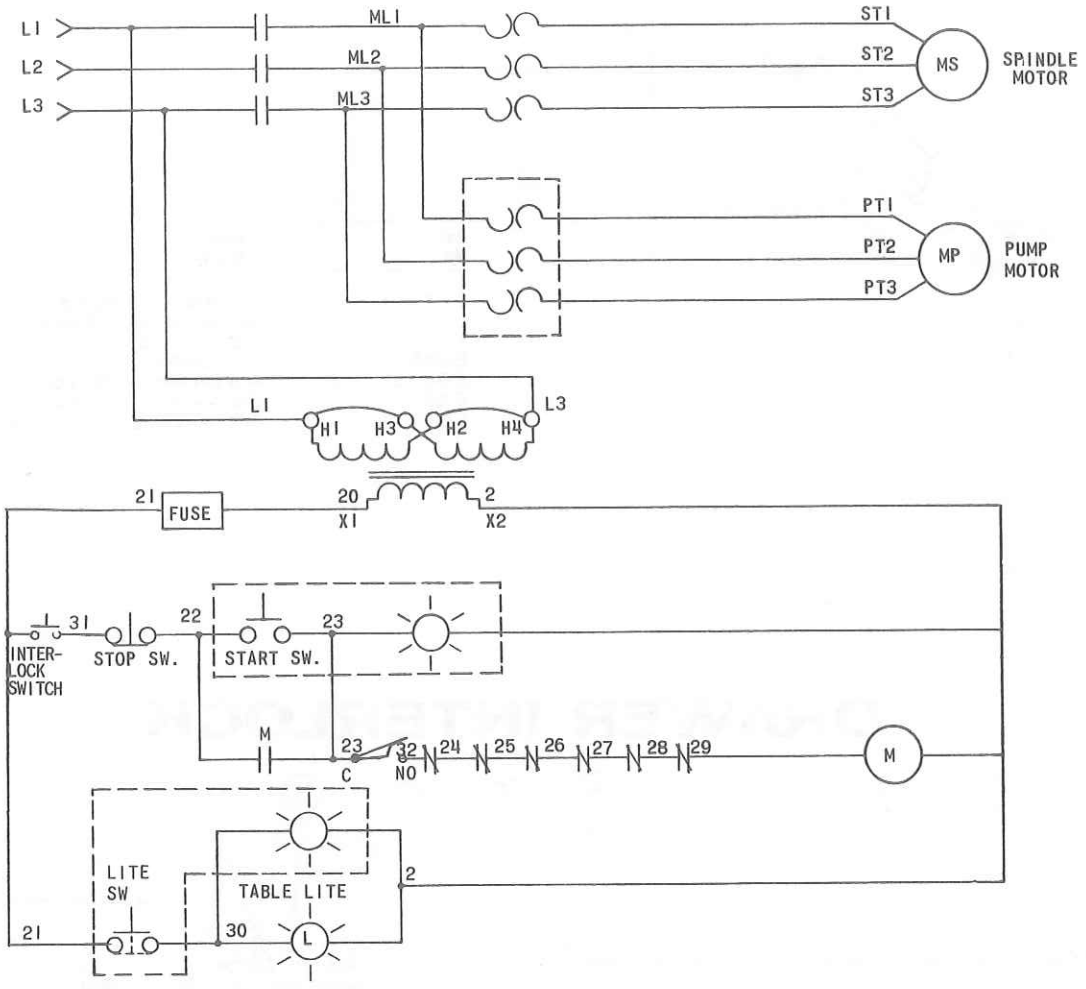
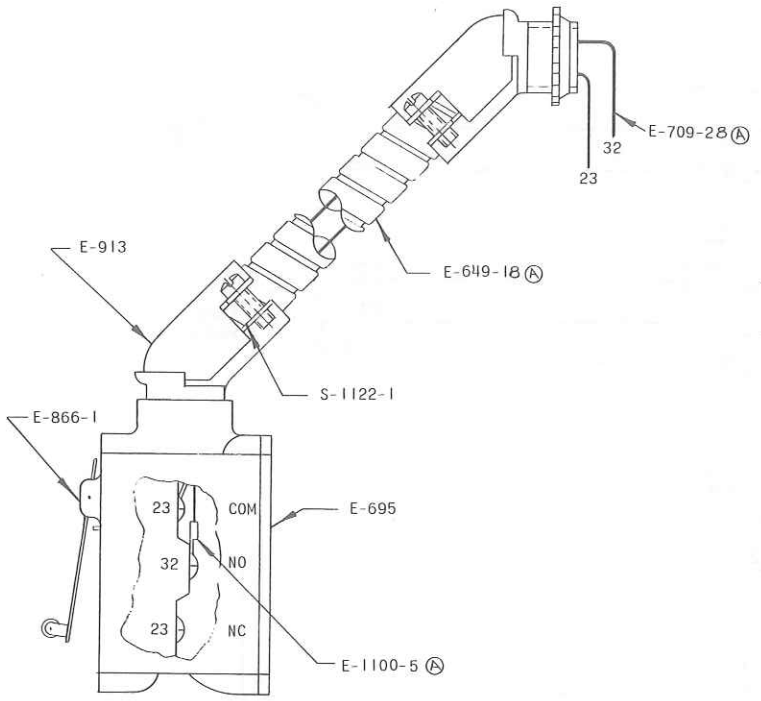
ELECTRICAL SCHEMATIC



Part No.	Part Name	Quan. Req'd.
6581-1	Mounting Bracket Fuse	1
E-530-3	Fuse Holder	1
E-898-13	Starter Size 0	1
E-1045-1	Push Button Switch Start	1
E-1045-2	Push Button Switch Lite	1
E-1045-3	Push Button Switch Stop	1
E-1075-1	1 AMP Fast Acting Fuse	1
E-1084	Power Sub Panel	1
E-1089-1	50 VA Transformer	1
E-1237-1	Wire Nuts	6
E-1270	Terminal Blocks	2
E-1271	Mounting Rail	2.5"
E-1356-9	Terminal Strip Marker	1
	Choice of One (208 V 3 Phase)	
E-1087-1	Overload Relays	3
E-510-N21	Heater Pump Motor	3

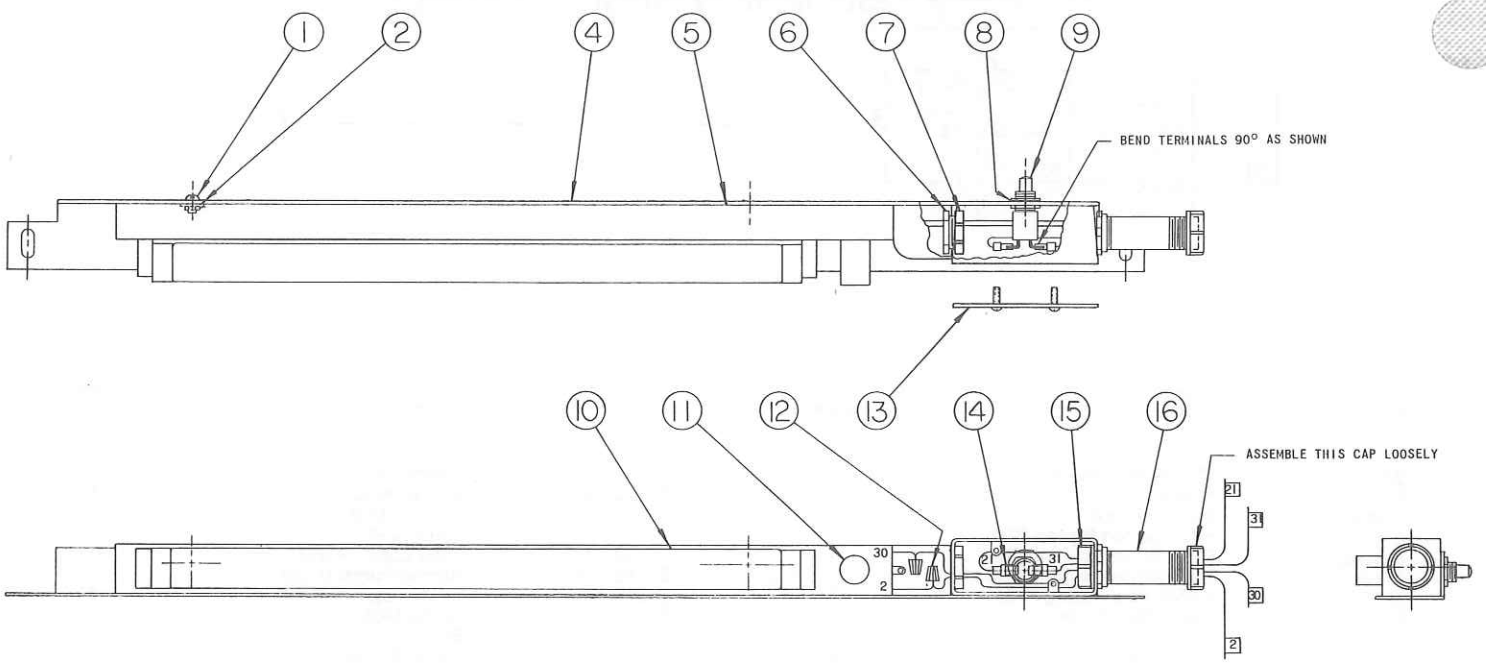
Part No.	Part Name	Quan. Req'd.
E-510-N33	Heater Spindle Motor	3
E-1600-91	Pump Motor 3/4 HP	1
E-1600-109	Spindle Motor 3 HP	1
	230 V 3 Phase	
E-1087-1	Over Load Relays	9
E-510-N20	Heater Pump Motor	3
E-510-N32	Heater Spindle Motor	3
E-1600-91	Pump Motor	1
E-1600-1-12	Spindle Motor	1
	460 V 3 Phase	
E-1087-1	Over Load Relays	3
E-510-N14	Heater Pump Motor	3
E-510-N26	Heater Spindle Motor	3
E-1600-91	Pump Motor 3/4 HP	1
E-1600-112	Spindle Motor	1

COVER INTERLOCK



Part No.	Part Name	Quan. Req'd.
S-1122-1	Insulator Bushing 3/8	2
E-1100-5	Solderless Conn. Eyelet	2
E-913	3/8 Flex Steel 45° Conn.	2
E-866-1	Limit Switch	1
E-709-28	#18 GA Wire — 24" Long	2
E-695	Enclosure — Side Mount	1
E-649-18	3/8 Flex Conduit — 15" Long	1

DRAWER INTERLOCK



Ref. No.	Part No.	Part Name	Quan. Req'd.
16	824-6405-1	1/2 x 3 Pipe Nipple	1
15	E-1459	Bushing	2
14	E-1214-19	Connector	2
13	E-1369-5	Cover — Junction Box	1
12	E-1237-1	Wire Nut	2
11	S-857-1	Bryant FS - 2 Starter	1
10	S-845	Fluorescent Lamp	1
9	E-1391	Pushbutton Switch	1

Ref. No.	Part. No.	Part Name	Quan. Req'd.
8	E-643	7/1C Shakeproof Lockwasher	1
7	E-519	Locknut	2
6	E-1458	Bushed Conduit Nipple	1
5	SS-980-4M	Assem. Fluorescent Unit	1
4	A-6576-1	Lamp Bracket Assembly	1
2	8-7324	1/4 Shakeproof Lockwasher	2
1	S-1739-1	1/4 - 20 x 3/8 Truss HD Mach Screw	2

DRILL HEAD

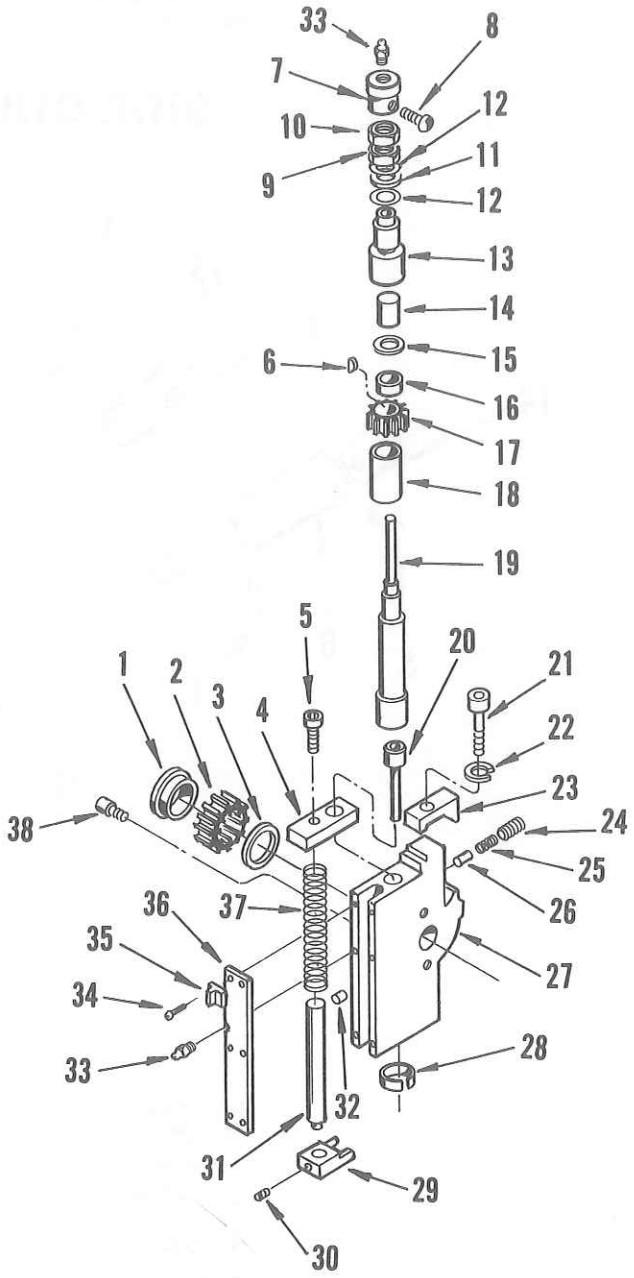
(A-6594-6)

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	Quan. Req'd.
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.	1/4-20x3/4	Socket head cap screw	2
6.	1/2 x 1/8	Woodruff key	1
7.	6602-2	Adjusting knob	1
8.	#6-32x1/4	Round head machine screw	2
9.	1/4-20	Hex-heavy jam nut	1
10.	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.	6596-3	Spindle	1
20.	CD-4-2-1/2	1/4" Hollow drill	1
21.	3/8-16x1-1/2	Sochet head cap screw	1
22.	3/8	Medium lockwasher	1
23.	6601	Clamp	1
24.	1/2-13x1/2	Set screw-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.	#10-24x1/4	Cup point socket set screw	1
31.	6604-4	Pressure foot bar	1
32.	1/8 x 3/8	Dowel pin	2
33.	S-1725	Alemite fitting	2
34.	#10-24x3/8	Button head socket cap screw	6
35.	6608	Pointer	1
36.	6607	Cover-pressure foot	1
37.	S-1724-2	Spring-pressure foot (inner)	1
	S-1724-3	Spring-pressure foot (outer)	1
38.	#8-32x1/4	Button head socket cap screw	2



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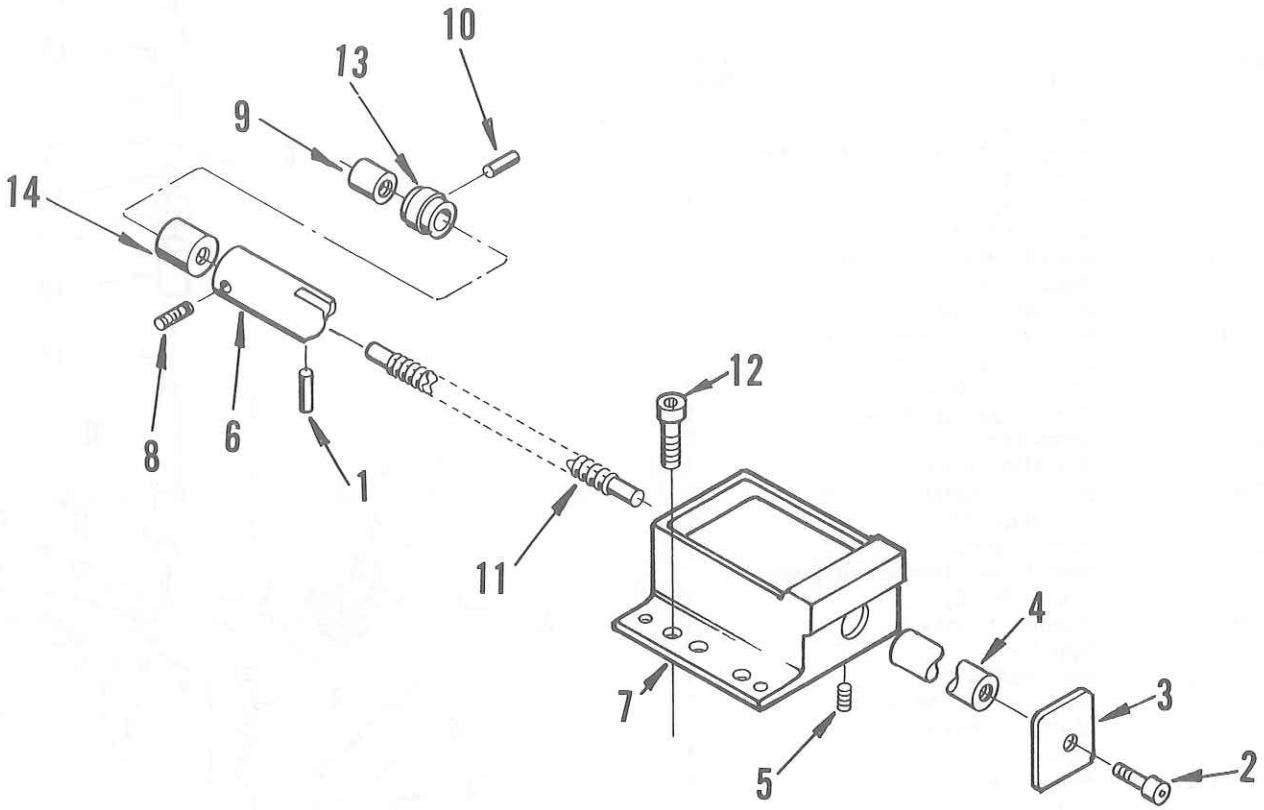
STANDARD SIDE GUIDE

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	Quan. Req'd.
1.	3/32 x 1/2	Sel-lok pin	1
2.	1/4-20x1/2	Button head socket cap screw-Nylock	1
3.	6569	Stop	1
4.	6568	Holder-side guide	1
5.	1/4-20x3/8	Dog point socket set screw-Nylock	2
6.	6567	Bearing-side guide	1
7.	6566	Side guide housing	1
8.	1/4-20x3/16	Cup point socket set screw	1
9.	6572	Adjusting knob	1
10.	1/8 x 1	Sel-lok pin	1
11.	6571	Adjusting stud	1
12.	3/8-16x1	Socket head cap screw	6
13.	S-1715	Locknut	1
14.	6570	Insert-side guide	1

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 predetermined stop. The major advantage of this option is that it permits step drilling.

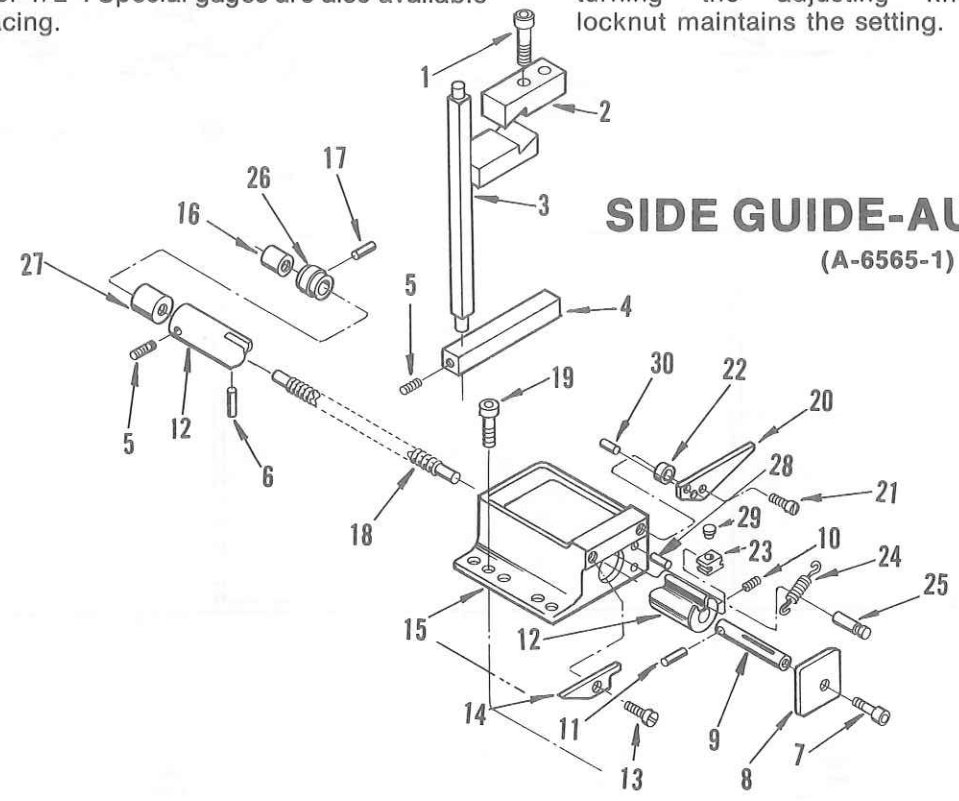
This is supplied with six moveable stops permitting hole spacings as close as 3/8" apart (center-to-center distance). Additional stops are available. Also available are fixed gages which fit in the side guide in place of the moveable stops. This permits hole spacing of 1/4", 3/8", or 1/2". Special gages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

INSTALLING THE AUTO TRIP SIDE GUIDE

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. Micro adjustments are made by turning the adjusting knob. The knurled locknut maintains the setting.

SIDE GUIDE-AUTO TRIP

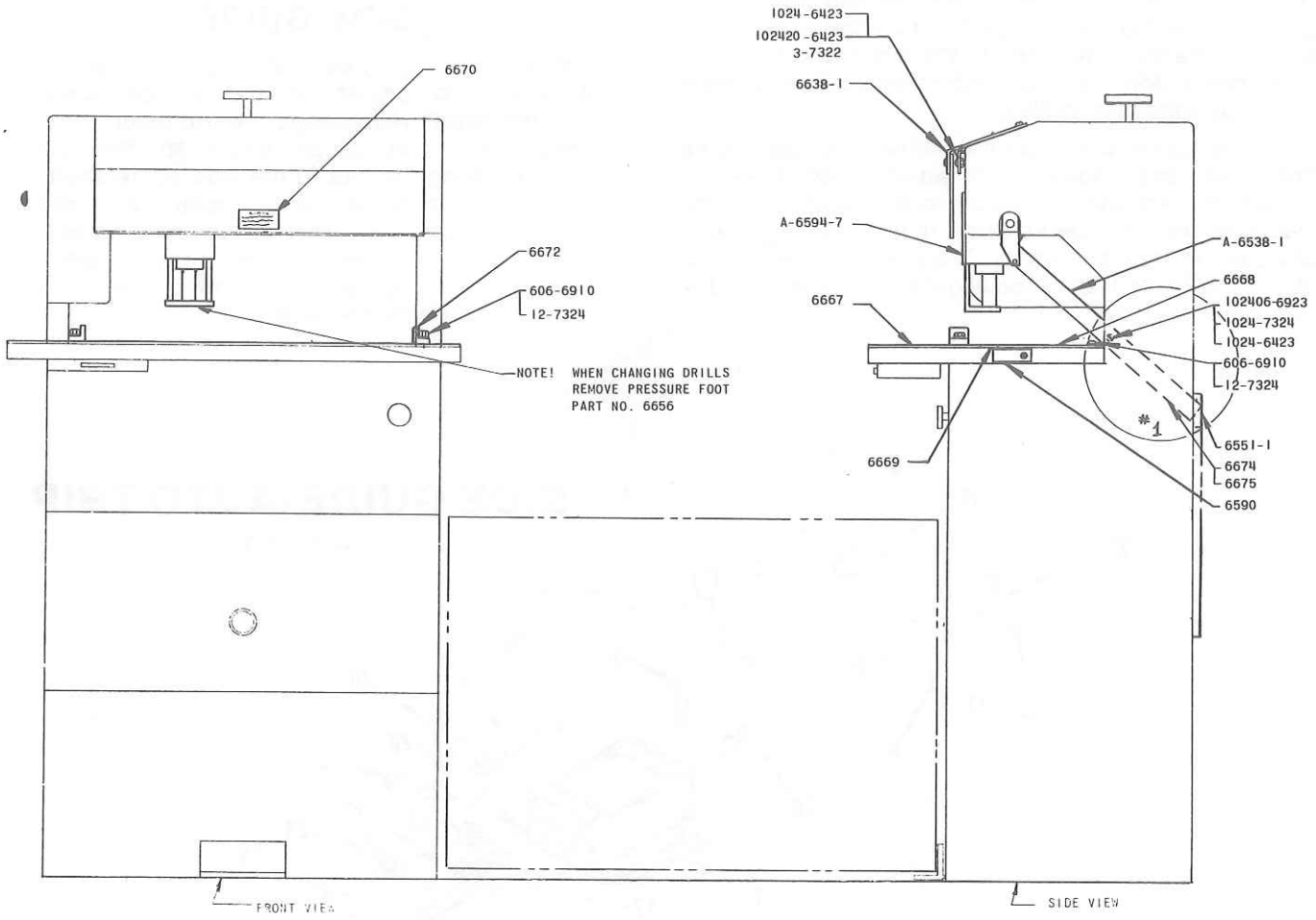
(A-6565-1)



Ref. No.	Part No.	Part Name	Qty
1.	3/8-16 x 3-1/2	Socket head cap screw	1
2.	6613-1	Clamp	1
3.	A-6615-1	Dovetail block & bracket	1
4.	6618-1	Trip rod	1
5.	1/4-20 x 3/16	Cup point socket set screw	2
6.	1/8 x 3/8	Dowel pin	1
7.	1/4-20 x 1/2	Button hd soc cap screw-Nylock	1
8.	6569	Stop	1
9.	6568	Holder-side guide	1
10.	1/4-20 x 3/8	Dog point soc set screw-Nylock	2
11.	3/32 x 1/2	Sel-lok pin	1
12.	6567-1	Bearing-side guide	1
13.	5/16-18 x 3/4	Socket head shoulder screw	1
14.	6611-1	Index lever	1
15.	6566-1	Side guide housing	1

Ref. No.	Part No.	Part Name
16.	6572	Adjusting knob
17.	1/8 x 1	Sel-lok pin
18.	6571-1	Adjusting stud
19.	3/8-16 x 1	Socket head cap screw
20.	6610	Trip lever
21.	5/16-18 x 1	Socket head shoulder screw
22.	S-1407	Spring
23.	S-1611-1	Stop
24.	S-1726	Spring
25.	6612	Spring pin
26.	S-1715	Lock nut
27.	6570	Insert-side guide
28.	3/16 x 1	Sel-lok pin
29.	H-6938-102406	Cup point soc set scr, 10/24 x 3/8
30.	1/3 x 1/2	Sel-lok pin

LARGE HOLE DRILLING ATTACHMENT



Part No.	Part Name	Quan. Req'd.
4687	Drifts	2
A-6594-7	Blueprint of Assembly	1
A-6500-5	Blueprint of Assembly	1
6670	Label	1
1024-6423	#10-24 NC Hex Nut	6
102420-6923	#10-24 NC x 1 - 1/4 Rd Hd Mach Screw	2
3-7322	3/16 Polished Washer	4
12-7324	3/8 Shakeproof Lockwasher	4
606-6910	3/8-16 NC x 3/4 Button Hd Soc Cap Screw	4
6672	Paper Guide	2
6669	Cutting Block — Plastic	6
6668	Table Adaptor — Rear	1
6667	Table Adaptor — Front	1
A-6638-1	Cover Front	1
6590	Stop-Drilling Block	2
A-6594-7	Drill Head Asm.	1
A-6538-1	Chip Chute	1

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LARGE HOLE DRILLING ATTACHMENT

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" pile.

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.

LARGE HOLE HOLLOW DRILLS

9/16" Dia.
5/8" Dia.
3/4" Dia.
1" Dia.
1 - 1/4" Dia.
1 - 3/8" Dia.
1 - 1/2" Dia.

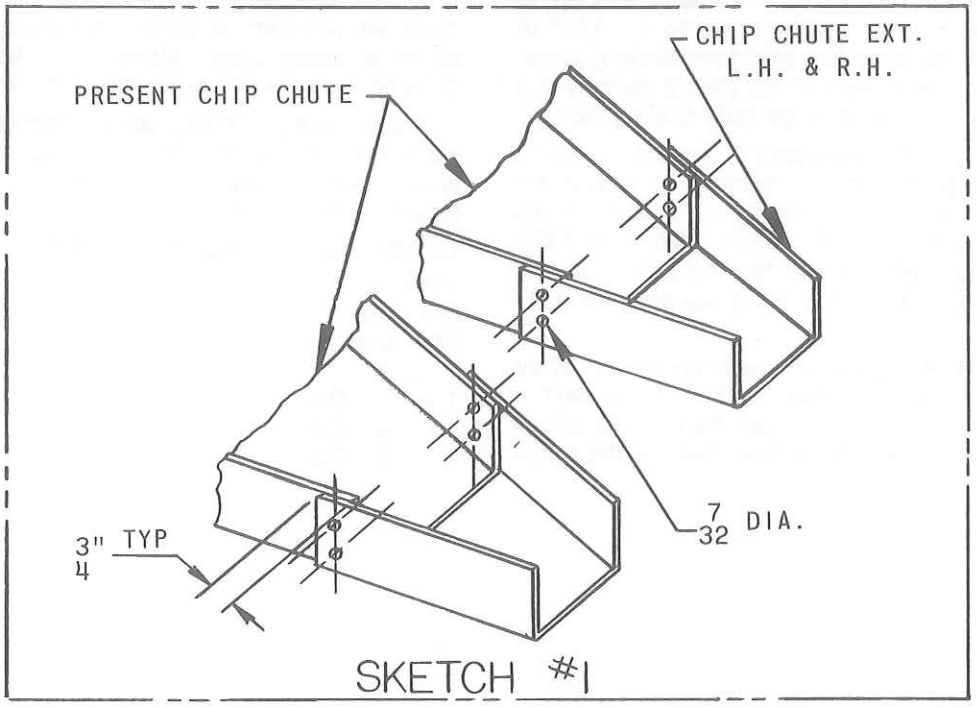
INSTRUCTIONS FOR INSTALLING ATTACHMENT

(#A-6500-5)

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. Stops for drilling blocks 6590
   I. Table light assembly 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 adaptor 6668
   C. Chip chute Note: If chip chute extensions are ordered, install them before mounting chip chute. See instructions for mounting extensions.
   D. (6) Plastic cutting sticks 6669
   E. Front table adaptor 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 permits 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 with chips quite rapidly, so this chute can be a real time-saver.



SKETCH #1

Part No.	Part Name	Quan. Req'd.
6674	Extension — Chip Chute — R.H.	1
6675	Extension — Chip Chute — L.H.	1
6551-1	Panel — Back	1
102406-6923	#10-24 NC x 3/8 Rd Hd Mach Scr	8
1024-7324	#10 Shakeproof Lockwasher	8
1024-6423	#10-24 NC Hex Nut	8
A-6500-5	Blueprint of Assembly	1

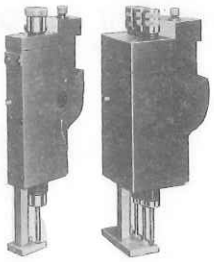
INSTRUCTIONS FOR INSTALLING CHIP CHUTE EXTENSION

1. Remove the following parts:
   - A. Rear panel — 6551
   - B. Chip chute mounting bracket with R.H. & L.H. lower chip chute — 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

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.



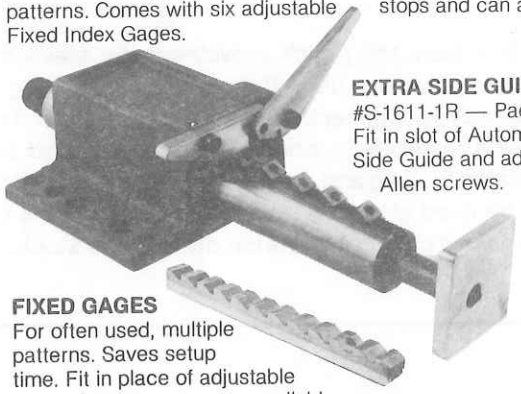
2½" CAPACITY HOLLOW DRILLS
Four sizes — ¼", 5⁄16", ⅜" & ½".

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.

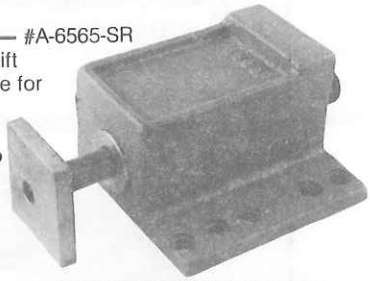
AUTOMATIC TRIP SIDE GUIDE — #A-6565-3 — Releases automatically after hole is drilled so lift can be moved to next position. Best application is with closely spaced multi-hole patterns. Comes with six adjustable stops and can accept Fixed Index Gages.

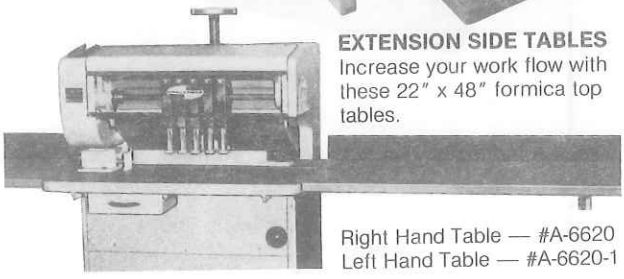


EXTRA SIDE GUIDE STOPS
#S-1611-1R — Package of 6. Fit in slot of Automatic Trip Side Guide and adjust with Allen screws.

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.)





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

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

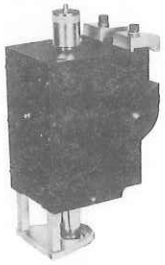
TWO-HAND PUSH BUTTON SAFETY CONTROLS — #A-4851-14 — Requires both hands on the buttons to bring the heads down.

LARGE HOLE CONVERSION KIT — #A-6500-5 — Converts the MS-10A to a large hole drilling machine for holes from 9⁄16" 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.

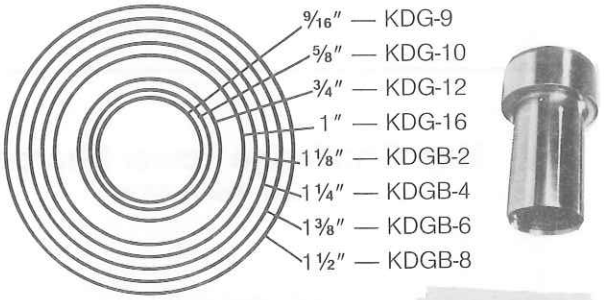
LARGE HOLE SPECIFICATIONS
Maximum number of large hole heads — 2
Center-to-Center drill range — 5"-17¾"
Backgage Range — 0"-2⅝"

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.

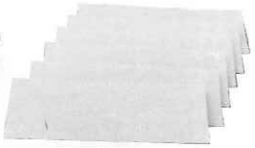
LARGE HOLE HOLLOW DRILLS — 2" capacity. Non-standard sizes are available on special order.



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.



ELECTRICAL SPECIFICATIONS — The MS-10A is U/L Listed.
¾ H.P. Pump — 3 H.P. Spindle

STANDARD THREE PHASE MOTORS — in 208, 230 or 460 Volts
OPTIONAL SINGLE PHASE MOTORS — in 208 or 230 Volts

Power cord is not furnished. Machine must be wired to an individual line through a disconnect box with the proper voltage at the machine.

SPECIFICATIONS	
Maximum number of drilling heads	10
Drill sizes available	*⅛-½" (3-13mm)
Maximum center-to-center distance	21"/53cm
Minimum center-to-center distance	**1¼"/32mm
Minimum distance between holes — with movable stops — with fixed gages	 ⅜" or 9.5mm ¼" or 6mm
Maximum drilling capacity	2½"/63mm
Strokes per minute — adjustable	18 to 26
Table size	24" x 36"/61 x 91cm
Backgage adjustment Drill center to edge of sheet	 0-9"/23cm
Up/Down adjustment of individual heads	¼" or 6mm
Table height	38"/97cm
Machine height	60"/152cm
Floor space needed (without side tables)	35" x 40"/89 x 102cm
Net weight	1060 lbs./480kg
Shipping weight (Approx. Domestic)	1250 lbs./565kg

*Special large hole heads available with drill from 9⁄16" to 1½" (14-38mm).
**Three-hole head available with 1" center to center for 7-hole pattern.

ACCESSORIES FOR CHALLENGE PAPER DRILLING MACHINES

Genuine Challenge Hollow Drills

In 13 Standard Sizes For Every Drilling Need

" 5/32" 3/16" 7/32" 1/4" 17/64 9/32" 5/16" 11/32" 3/8" 13/32" 7/16" 1/2"

This wide range of standard drill sizes is available to meet your drilling needs. Order by number and size.

Solid indicates drills available in 2½" sizes.

2" Drill

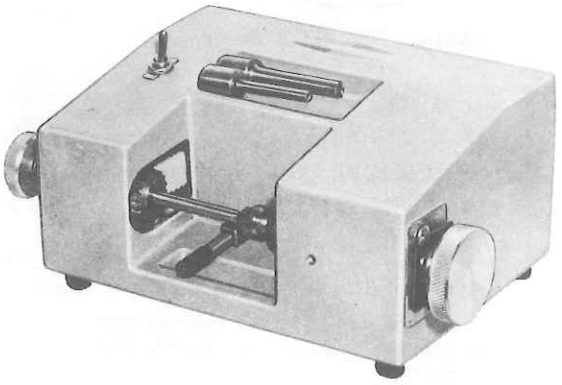
Size-Hole Diameter	Drilling Capacity
1/8 in.	5/8 in.
5/32 in.	1-1/8 in.
3/16	1-5/8 in.
7/32 in.	1-5/8 in.
1/4 in.	2 in.
17/64 in.	2 in.
9/32 in.	2 in.
5/16 in.	2 in.

Size-Hole Diameter	Drilling Capacity
11/32 in.	2 in.
3/8 in.	2 in.
13/32 in.	2 in.
7/16 in.	2 in.
1/2 in.	2 in.
*17/32 in.	2 in.
* 9/16 in.	2 in.

**Special order items*

New Challenge Power Sharpener

Cat. No. A-6450



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

6469 Replacement Cutting Bit
6469-R Resharpening Service — your old bit

Cat. No.
A-4950 Challenge Hollow Drill Sharpener
4952 Replacement Cutting Bit.

Resharpening Service
Resharpened Bits — Your Old Bit

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. It can also be used along the beveled edge of a paper cutter knife to make it cut easier. Will not discolor the stock.

Challenge Drilling Blocks

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

1¼" x 6" — #A-6626-24

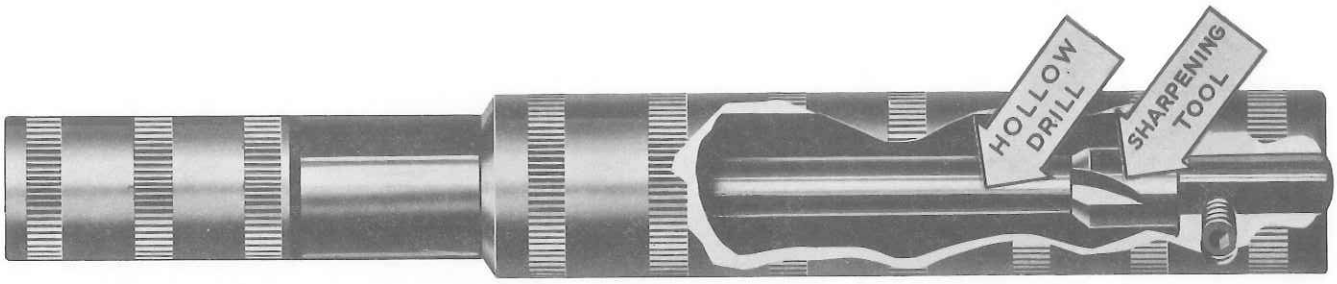
Plastic Blocks

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

2¼ x 6 — #6669

HOLLOW DRILL SHARPENER

For fast . . . easy . . . drill sharpening



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.

These units are supplied as standard equipment on the RH, RKH, EH-3A and MS-10A models of Challenge Paper Drilling Machines.

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

Instructions

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, then insert the sharpening section being very careful to bring the drill and cutting tool together without bumping.

   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.