



HUTH

www.huthbenders.com

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Hartford, WI 53027
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Operator's Manual



Model 1674



Model 1673

TO THE OWNER :

INTRODUCTION

Carefully read and understand this manual before operation begins. Every HUTH product is constructed from the finest materials by highly trained, experienced craftsmen.

They have profound interest in its successful performance and have prepared this manual to give you the benefit of their experience.

The manner in which you operate and the care you provide for this unit, will have a direct bearing on its continued successful performance. The manual has been prepared to make it easy for you to learn the methods for proper operation and care.

READ THIS ENTIRE MANUAL. KEEP IT FOR FUTURE REFERENCE.

Huth's policy is to improve its products whenever possible. Huth reserves the right to make changes and/or improvements without incurring any obligation to do so on previously sold products.

This manual relates to models 1673 and 1674 built after September 1, 2003. For more details on specifics of older units, please call Huth.

WARRANTY OF HUTH PRODUCTS

This warranty is made for the exclusive benefit of the original owner and is not transferable. There is no other warranty applicable to HUTH PRODUCTS, and no representative has any authority to make any representation, promise or agreement except as stated in the warranty.

ONE YEAR WARRANTY*

For one year from the date of invoice, the seller will repair the unit if found to be defective in material and workmanship without cost to the purchaser. Following the first 90 days from the date of original invoice, replacement parts are shipped from the seller to the purchaser freight collect.

Return parts are shipped prepaid to the seller.

In effecting such repairs, the seller may at its election, repair or replace any part which it finds to be defective.

Tools and dies are warranted for a period of (90) ninety days against defect in material and workmanship.

* During the first 90 days from date of original invoice the seller will pay freight charges for replacement of defective parts.

Model Number _____

Serial Number _____

Date Delivered _____

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UPON DELIVERY

INTRODUCTION

Upon delivery of the Huth Model 1673 or 1674, check the following:

1. Carefully uncrate and discard all packing material properly.
2. Inspect for signs of damage due to shipment. Report any shipping damage promptly to the carrier.
3. Review enclosed Packing List. Be certain all components have been shipped.

4. Check the voltage and the phase of your electrical supply. All Huth Model 1673 or 1674 operate on 220 volts or more! The phase will be indicated on the motor plate and the electrical control box.

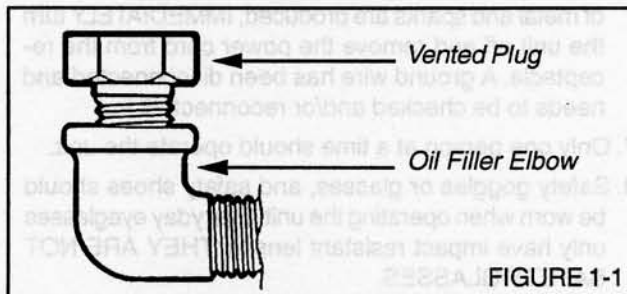


FIGURE 1-1

5. Remove oil filler plug and replace with vented plug. See FIGURE 1-1.

IMPORTANT SAFETY INSTRUCTIONS

INTRODUCTION

Common sense should always be used when equipment is operating. Ensure safe usage - **READ AND UNDERSTAND ALL SAFETY WARNINGS AND PROCEDURES BEFORE OPERATION BEGINS.**

DANGER

1. Do not operate this machinery without safety guards in their proper position!
2. Make sure electrical connections are good, solid connections. Never use an extension cord! If the power cord becomes damaged or frayed, have a qualified person examine or replace it.
3. Ensure an unrestricted power cord. Do not place cord where damage may occur.
4. Never alter electrical components used on this machine.
5. Always unplug equipment from electrical outlet when not in use. Never use the cord to pull the plug from the outlet. Grasp the plug, twist and pull to disconnect.

WARNING

6. Unplug the machine from the power source before servicing. Electrical shock may result if this is not done.

WARNING

7. Risk of explosion. This equipment has internal arcing or sparking parts which should not be exposed to flammable vapors. This equipment should not be located in a recessed area or below floor level.

WARNING

8. This equipment uses earth ground protection for operator safety. This equipment must be grounded. If the ground is broken do not use this equipment until it is repaired by a qualified service person.

DANGER

9. Keep hands clear when dies are in motion.

DANGER

10. Use caution while removing and installing dies. They are heavy.
11. Before using the swager/expander, make sure no tools have been left in the swager frame. These can cause the swager shaft to bend or break.
12. Do not use frayed or loose fitting gloves while operating this machine. Gloves alter the sense of touch and can be caught in moving parts.
13. After pipe is cut, the ends may be sharp. Use caution when handling pipe. Good practice is to file the inside edges after cutting.

14. One hand should always be kept free to operate the control lever. Never use another part of the body to operate the control.
15. Be careful when moving unit. Do not pull on cord. Do not use cord to pull unit.
16. If tubing comes in contact with an independent piece of metal and sparks are produced, IMMEDIATELY turn the unit off and remove the power cord from the receptacle. A ground wire has been disconnected and needs to be checked and/or reconnected.
17. Only one person at a time should operate the unit.
18. Safety goggles or glasses, and safety shoes should be worn when operating the unit. Everyday eyeglasses only have impact resistant lenses; THEY ARE NOT SAFETY GLASSES.
19. Do not use the unit below garage floor or grade level.
20. Keep the expansion collar, arbors, and segments lightly greased.
21. Read and understand all decals on the unit and replace decals that are damaged or unreadable.

WARNING

22. Before operation, check rotation of hydraulic pump/electric motor. (See page 19. Pump Motor Rotation.)

WARNING

23. Never use hands to check for hydraulic leaks. Hydraulic oil under pressure can penetrate skin causing serious injury.
24. Keep hair, loose clothing, fingers and all parts of body away from moving parts.
25. To reduce the risk of fire, do not operate equipment in the vicinity of open containers of flammable liquids (gasoline).
26. Use machinery only as described in this manual. Use only manufacturer's recommended attachments.

SAVE THESE INSTRUCTIONS

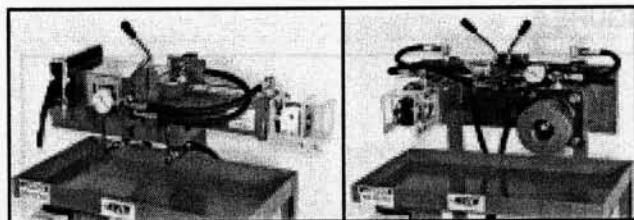
Huth Tooling

All Huth tooling is machined, not cast, gas-carburized, oil-quenched, heat-treated. Minimum hardness: 58 Rockwell "C". Swaging tooling is available for 1" to 3". Expanding tooling is available for 1" to 6".

All Huth tooling available from shelf stock. Huth will manufacture to your tooling specifications sizes not listed in this schedule. Call factory for details. 800-558-7808.

INTRODUCTION

FIGURE 1



Model 1673

Model 1674

WARNING

Be sure all safety guards are securely in position before operating the unit.

Model 1673 and 1674 are stand alone units. Model 1673 expands on one end and swages on the other. Model 1674 expands tubing utilizing two cylinders at different power levels. These units will end finish all tubes to equipment specifications determined by tooling. These units are controlled manually by the operator at all times.

CAUTION

Safety is a must when using the Models 1673 or 1674 due to the high pressure used by these units.

WARNING

Alteration or removal of any guards could result in injury.

CAUTION

When swaging or, expanding always lubricate tooling with grease.

SWAGING OPERATIONS - Model 1673

The swager portion of the swager/expander unit will make ball joints, flares and slip joints. In addition, it will expand tubing (swage up) and reduce tubing (swage down). The following procedure is provided as a basic step-by-step process used to install the tooling and begin the swaging operation.

To produce a specific end finish it will be necessary to refer to the appropriate topic. (For example: to produce a flare, read the basic swaging operation, then read the operation on the topic "Flare".)

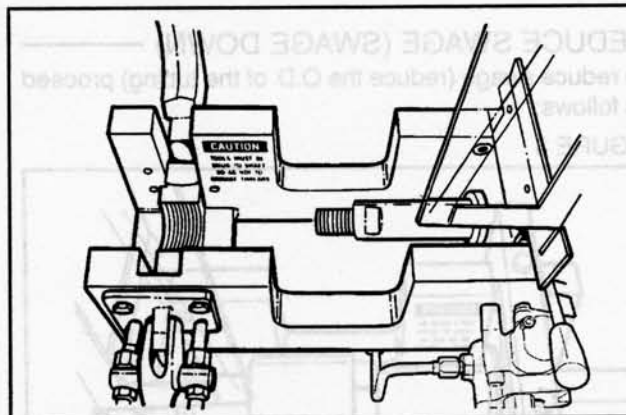
To begin basic operation, proceed as follows:

1. Turn the machine on.

SWAGING AND EXPANDING

2. Depress the swager control valve handle and extend the threaded cylinder shaft into the swager box approximately three inches. (See FIGURE 2.)

FIGURE 2



3. Turn the machine off.
4. Install the required tool, per tubing size or specification, onto the threaded cylinder shaft.
5. Install one-half of a collet set in the collet closer, threads facing up.

NOTE

Always use the correct O.D. size collets to match the O.D. tube size.

6. Insert the end of the tubing at least three inches from the inside edge of the 1/2 collet.
7. Install other collet half over the tubing and close the collet holder.
8. Secure the collet clamp in the down position.
9. Turn the machine on.
10. Slowly, while tapping the swager control handle, move the cylinder shaft with tooling into the tube end.
11. See appropriate topic on specific tooling being used.
12. After tubing has been shaped and the cylinder shaft has been retracted, **Turn off the machine.**
13. Raise the collet closer handle. The collet will release and separate from the tubing.

NOTE

Should the collets not release from the tubing use a screwdriver to pry them apart.

WARNING

Do not beat the collets on the swager/expander.

CAUTION

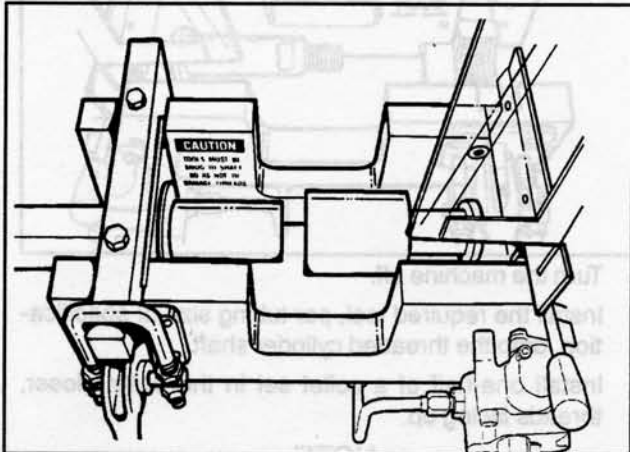
Always remove the tooling from the swager box after each use to avoid damage when expanding on the expander side.

14. Remove the tooling and return it to the storage rack.

REDUCE SWAGE (SWAGE DOWN)

To reduce swage (reduce the O.D. of the tubing) proceed as follows:

FIGURE 3



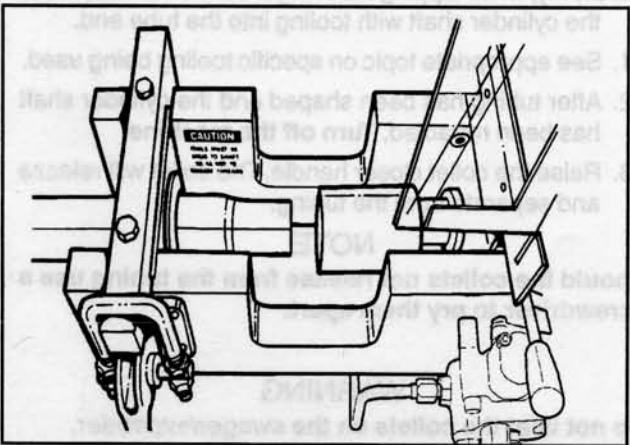
1. Select and install the proper collet set tooling and reducing tool. (See FIGURE 3.)

2. Follow steps 1 through 10 of topic "Swaging Operations".

3. Move cylinder shaft forward slowly until tool is over the tube. Continue to move shaft until the tube has been formed.

4. Retract the cylinder shaft and tool. (See FIGURE 4.)

FIGURE 4

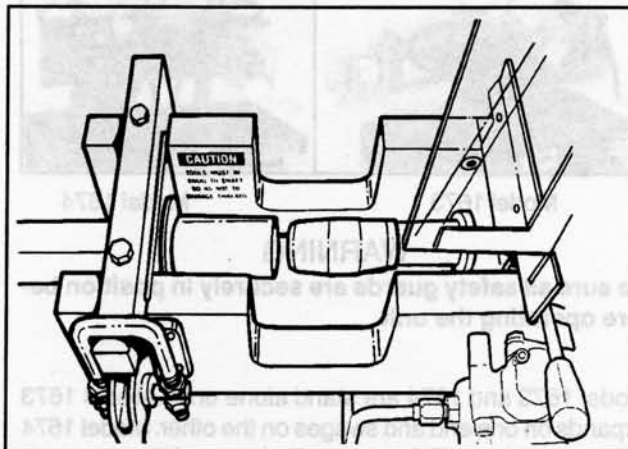


5. Follow steps 12, 13, and 14 of topic "Swaging Operations".

INTERNAL SWAGE (SWAGE UP)

To internal swage (enlarge the O.D. of the tubing), proceed as follows:

FIGURE 5

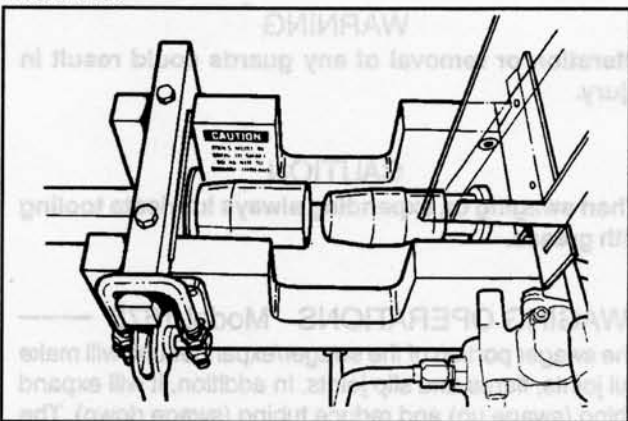


1. Select and install the proper collet set tooling and swage die. (See FIGURE 5.)

2. Follow steps 1 through 10 of topic "Swaging Operations".

3. Move cylinder shaft forward slowly until the tool enters the tubing. Continue to move the shaft forward until the tool reaches the marking ring on the end of the swage die.

FIGURE 6



4. Retract shaft and tool. (See FIGURE 6.)

5. Follow steps 12 through 14 of topic "Swaging Operations".

45° FLARE

It is necessary to install a flange over the tube prior to finishing the ends. To make a Flare or Flat Flare the same tool is used, one side flares, the other side flattens.

The tools required to make a flare are:

Die Holder #815 or #820 Quick Disconnect

Flaring Tool #853

Collet Set (pair in matching O.D. size)

To make a flare proceed as follows: (See figures 7 and 8.)

FIGURE 7

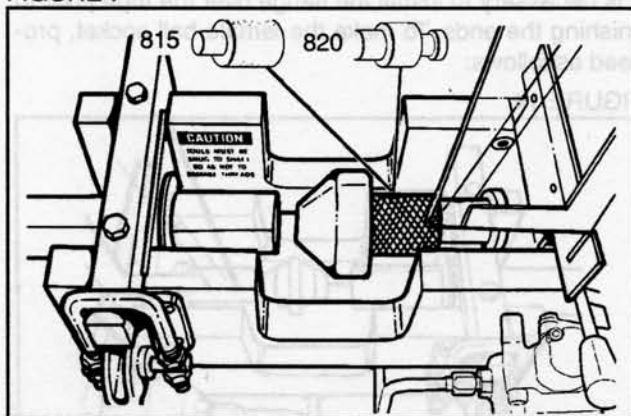
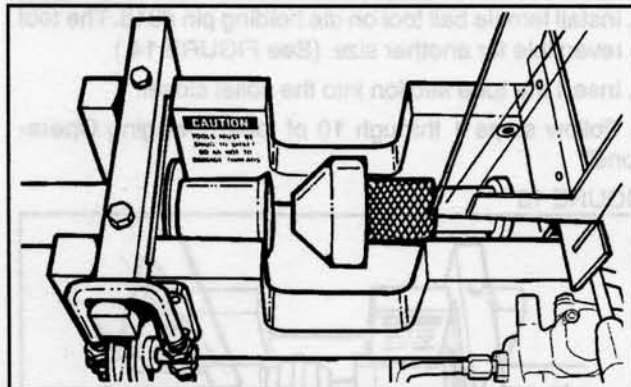


FIGURE 8



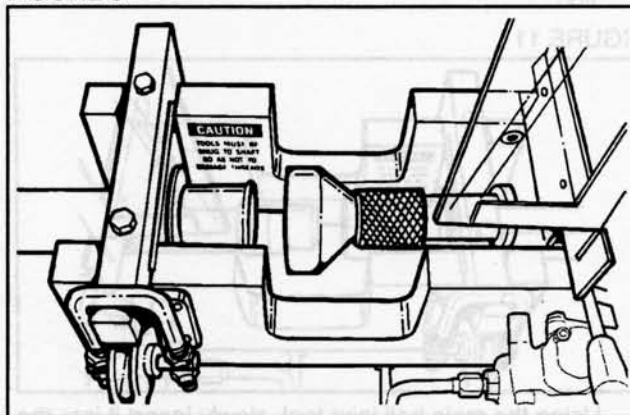
1. Install die holder #815 on threaded shaft or non-threaded adaptor #820 in Quick Trick holder.
2. Insert Flaring Tool #853 on the die holder with 45-degree flaring facing the tubing.
3. Follow steps 1 through 10 of topic "Swaging Operation".
4. When a desired flare is achieved, follow steps 12 through 14 of topic "Swaging Operations".

FLAT FLARE

It is necessary to install the flange over the tube prior to finishing the ends. To complete a Flat Flare, proceed as follows:

1. Complete the 45° flare process as described above.
2. After retracting the cylinder shaft, reverse flaring tool #853 and install onto the cylinder shaft. Extend the shaft forward until the tool meets the flared tube.

FIGURE 9



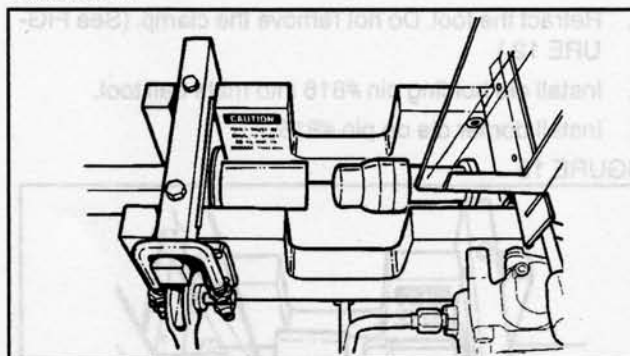
3. Slowly move the shaft forward until the flare forms a flat surface. (See FIGURE 9.)
4. Follow steps 12 through 14 of topic "Swaging Operations".

MALE BALL JOINTS

A male ball and female socket are generally made at the same time. In each case, it is necessary to install the flange over the tube prior to finishing the ends.

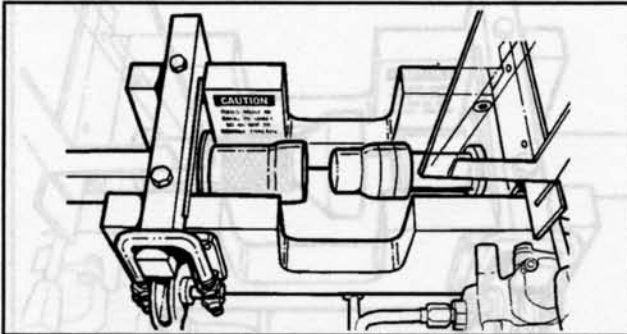
To make a Ball Joint, proceed as follows: (See FIGURE 10.)

FIGURE 10



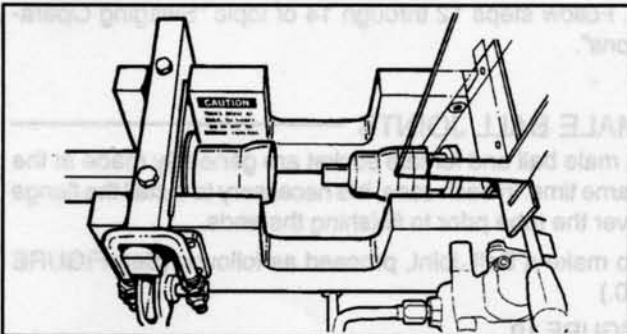
1. Select and install the proper tools. Tools required are
 - A. Collet Sets (matching O.D. size).
 - B. Male Ball (in the specific size).
 - C. Domer (in the specific size).
 - D. Female Ball (in the specific size).
 - E. Die Holding Pin - #816.
2. Follow steps 1 through 10 of topic "Swaging Operation".

FIGURE 11



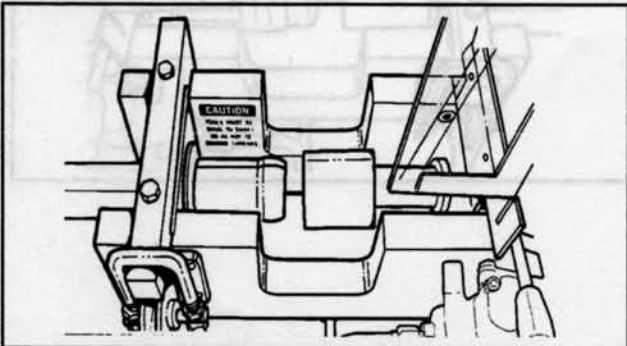
3. Using the male ball joint tool, slowly insert it into the tube until it reaches the second marking ring on the end of the tool. (See FIGURE 11.)

FIGURE 12



4. Retract the tool. Do not remove the clamp. (See FIGURE 12.)
5. Install die holding pin #816 into male ball tool.
6. Install domer die on pin #816.

FIGURE 13

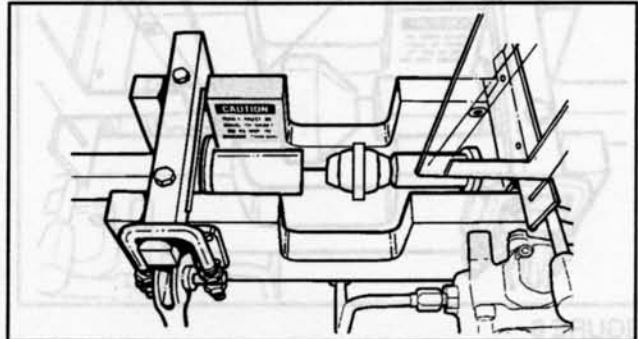


7. Move the shaft with the tool forward over the tube. Continue to move forward until a desired ball is formed. When it is achieved, retract the piston and turn off the unit. Remove the domer and the tube. (See FIGURE 13.)
8. This completes the male ball forming process. Do not remove any other tooling if a female ball socket is to be made. If a socket is not required remove tooling.

FEMALE BALL SOCKET

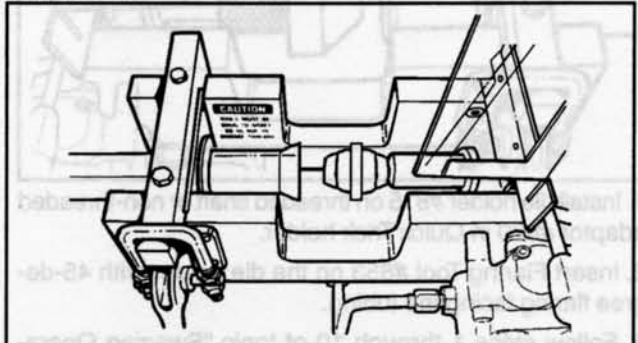
It is necessary to install the flange over the tube prior to finishing the ends. To make the female ball socket, proceed as follows:

FIGURE 14



1. Install female ball tool on die holding pin #816. The tool is reversible for another size. (See FIGURE 14.)
2. Insert the tube section into the collet closer.
3. Follow steps 1 through 10 of topic "Swaging Operations".

FIGURE 15



4. Insert the tool slowly into the tubing, until the socket is formed. The tool will meet flush with the stop on the tool. (See FIGURE 15.)
5. Follow steps 12 through 14 of topic "Swaging Operations".

FLARE FLANGE - For Manifold Gasket

It is necessary to install the flange over the tube prior to finishing the ends. Certain finishing applications require a round manifold gasket. To make this application, it is necessary to use a scrap piece of tubing, approximately 1½" long, in the next smaller O.D. size. This piece may have to be expanded so that its O.D. is the same as the tubing's I.D. This tubing scrap, or nipple, will be inserted into a formed tube end. The tools required to make a flare flange are:

Collet set (matching O.D. size)

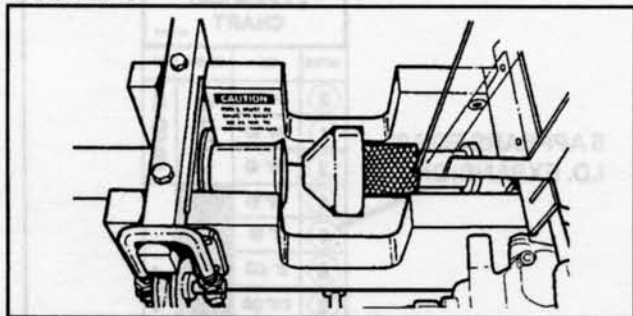
Flanger tool - #853

Die Holder - #815 or #820

To make a flare flange, proceed as follows:

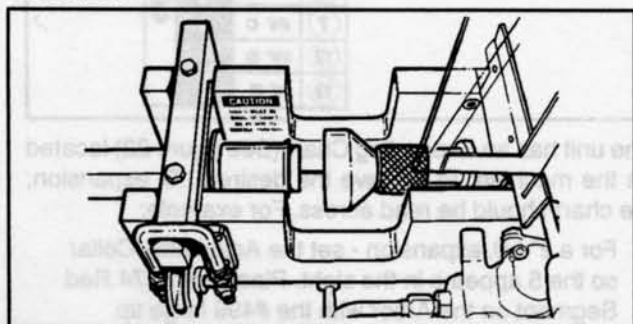
1. Follow steps 1 through 10 of topic "Swaging Operation".

FIGURE 16



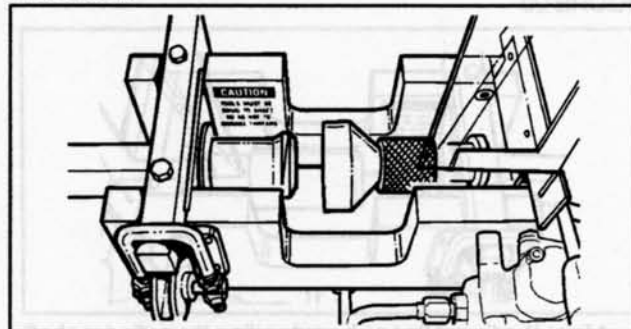
2. Slowly insert the tool into the tube, making a flared shape. (See figure 16.)

FIGURE 17



3. Retract the shaft and reverse the tool on the die holder so the flat side is facing tube. (See figure 17.)
4. Turn off the unit.

FIGURE 18



5. Insert (by hand) the scrap pipe nipple into the flared tube. The nipple will hold itself into the tube opening.
6. Remove your hands from the swager box and slowly move the tool forward, forcing the nipple into the tube until it protrudes ½". This forms the seat for the round gasket. (See figure 18.)
7. Follow steps 12 through 14 of topic "Swaging Operations".

AUTO FLARE FLANGE - 2"

It is necessary to install the flange over the tube prior to finishing the ends. An Auto Flange System (Part #1987), which forms the flanges in one step, will produce a 2" flare flange and flat flanges in 1½", 1⅝" and 1¾" sizes. The tools required to make a 2" auto flare flange are:

Collet Set #1720 D.F.

Flare Flange Tool #518

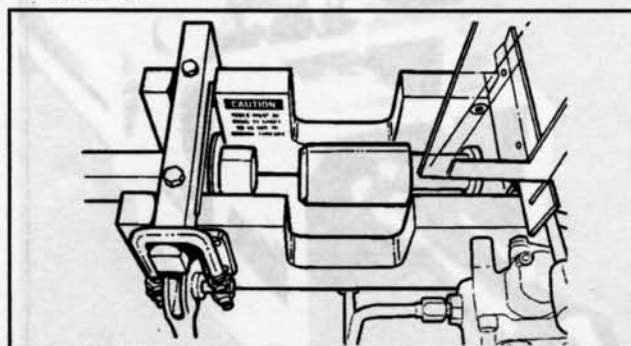
To make an auto flare flange, proceed as follows.

1. Follow steps 1 through 10 of topic "Swaging Operations".

NOTE

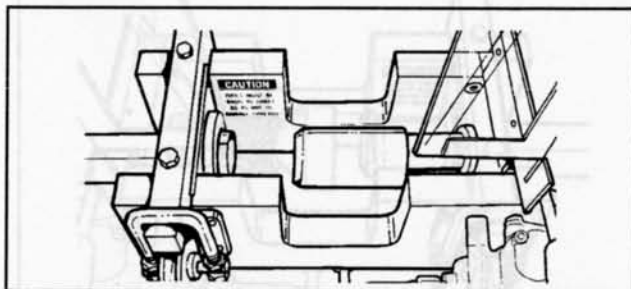
For this operation, the tubing should extend 1⅞" beyond the end of the collet and the flared end of the collet should face tool #518.

FIGURE 19



2. Slowly insert the tool onto the tubing. (See figure 19.)

FIGURE 20



3. Make the flared flange by extending the cylinder shaft until tool is stopped by the collet. Apply full pressure for this operation and make no hesitations. (See figure 20.)
4. Follow steps 12 through 14 of topic "Swaging Operations".

FLAT FLANGES

It is necessary to install the flange over the tube prior to finishing the ends. Flat flanges can also be produced. The tools required are:

Collet Set (Pair in matching O.D. and size)

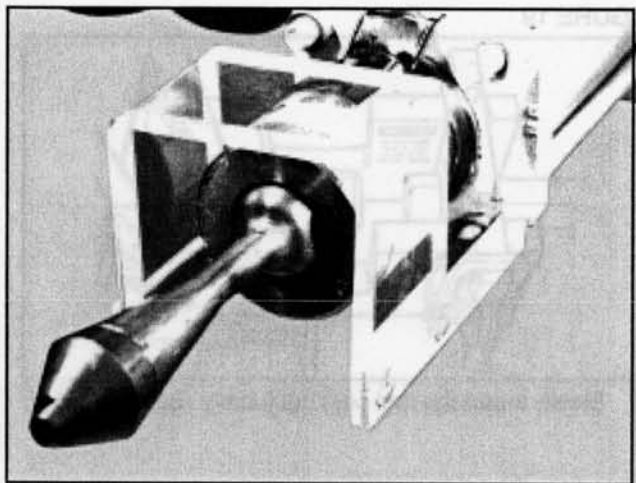
Flat Flange Tool (matching O.D. size).

To make a flat flange, follow the steps listed for topic Auto Flare Flange "2". (See figures 19 and 20.)

EXPANDING OPERATIONS

Models 1673 and 1674 have expanding capability with the ACCU-SIZER™ Expanding Kit. The ACCU-SIZER needs to be installed into position on the face of the cylinder with the 1 1/4" shaft. Once the ACCU-SIZER is installed, your expander will have additional capabilities of expanding tubing. To install the ACCU-SIZER on your expander, proceed as follows: (See figure 21.)

FIGURE 21



1. Slip the adjustable collar guard assembly (part # 41047) over the cylinder shaft and tie rod.
2. Secure the assembly to the cylinder using two 1/2"-13 jam nuts (part #97208) which are provided. Locate these in opposite corners.
3. Screw the arbor (part #508) securely onto the cylinder shaft. A wrench may be used to secure the arbor and tip. **Do not overtighten.**
4. Screw the large arbor tip (part #499) onto the arbor.
5. Lightly grease the arbor and face of the adjustable collar.

The adjustable collar has been calibrated at the factory. Therefore, once it has been installed, you are ready to expand tubing.

FIGURE 22

EXPANDING CHART			
SETTING	SIZE	SEGMENT	TIP
2	1 1/2" ID	4	4
1	1 3/4" ID	7	9
3	1 3/4" ID	3	8
4	1 3/4" ID		
5	2" ID	4	
8	2" OD	7	4
9	2 1/4" OD	4	9
10	2 1/4" ID		
11	2 1/4" OD		
6	2 1/4" ID	4	9
7	2 1/4" ID	7	5
12	2 1/4" ID	4	7
13	3" ID	7	6

5 APPEARS FOR 2"
I.D. EXPANSION

The unit has an Expanding Chart (See figure 22) located on the machine. To achieve the desired I.D. expansion, the chart should be read across. For example:

For a 2" I.D. expansion - set the Adjustable Collar so the 5 appears in the sight. Place the #474 Red Segment on the Arbor with the #499 large tip.

NOTE

Should the Calibration decal need to be replaced, see "Machine Repair" section.

NOTE

Always be sure the Arbor and Tips are securely screwed in place and greased before expanding begins.

NOTE

The #498 Small Tip is only used for 1½" - 1¾" expansion with the #473 Yellow Segment. All other expansion greater than 1¾" will use the #499 Arbor Tip.

Model 1674 adjustable collar is installed similar to ACCUSIZER.

USING EXPANDING TOOLS

The following procedure is a basic step-by-step process to install tooling and begin the expanding operation. To produce a specific end finish, it will be necessary to refer to the appropriate topic. (For example: to produce a flare, read the basic operation steps, then read the steps of the topic "FLARE".)

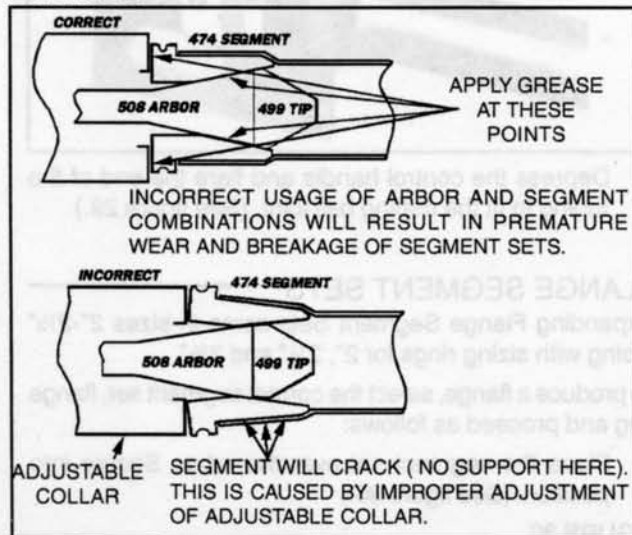
To begin the basic operation, proceed as follows.

1. Turn the machine on.
2. Lift the control valve handle and extend the cylinder shaft out.
3. Install the appropriate arbor, being certain it is threaded all the way onto the cylinder shaft.
4. Grease the arbor and face of collar thoroughly.

NOTE

Arbor and face of adjustable collar should always be well lubricated with grease.

FIGURE 23



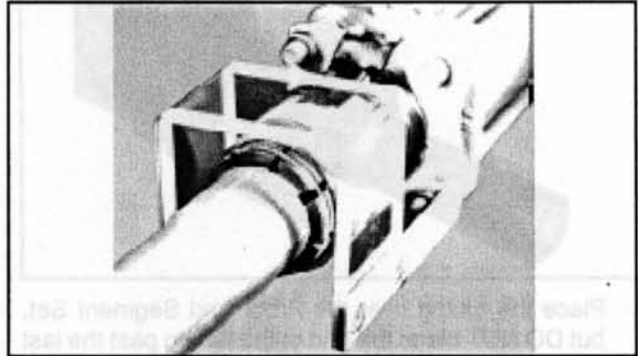
5. Install the appropriate segment set on the arbor by simply forcing the set over the end of the arbor. (See figure 23.)

CAUTION

Always use the correct segment with the correct arbor and arbor tip. Failure to do so will result in tool breakage.

6. Place tube halfway over the segments and tap the control handle slightly. This will remove any burrs.
7. Close the segments and run the tube to the base of the segments.

FIGURE 24



8. Hold the handle down and expand the tube until the cylinder bottoms out to the end of the stroke.
9. Tapping the control handle up and down while turning the tube clockwise at the same time will give a smooth, round expansion. (See figure 24.)
10. Segments may be removed from the arbor without disassembling the tool. Simply pull the segment off the arbor.

WARNING

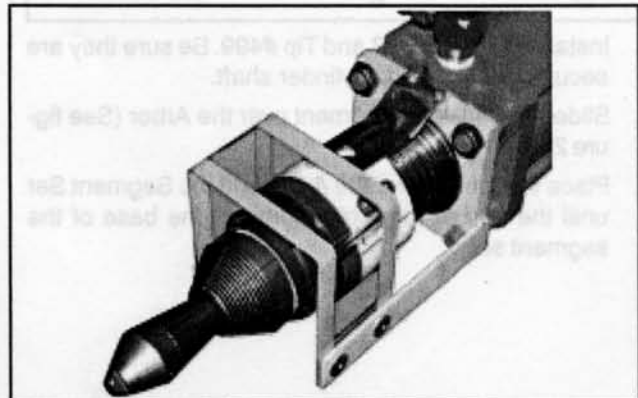
When performing an end finish other than a calibrated I.D., always begin with the adjustable collar located inward and advance it to make the desired finish. If the collar is left fully extended, prolonged use may distort the end threads and may lock up the collar.

#440 FLARING SEGMENT SET

With a #440 Flaring Segment Set, flares from 1½" to and including 2½" can be completed quickly using the expander. To produce a flare, proceed as follows:

1. Install the Arbor and Tip #499 being sure they are securely tightened onto the cylinder shaft.

FIGURE 25



- Slide the Flaring Segment Set over the Arbor. (See figure 25.)

FIGURE 26



- Place the tubing over the Arbor and Segment Set, but DO NOT place the end of the tubing past the last step (tooth) on the segment. (See figure 26.)
- Depress the control handle and rotate the tubing to produce the desired flare.

NOTE

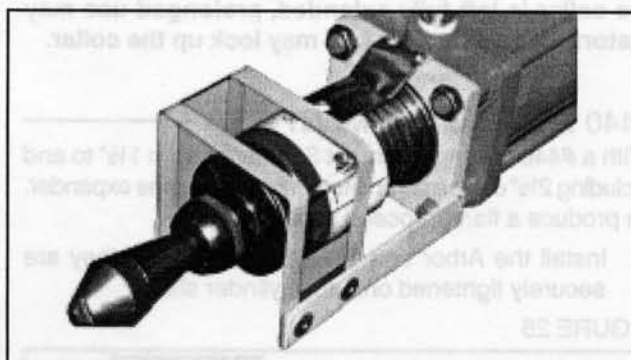
Smaller diameter should be gradually worked up onto the Segment Set.

BALL JOINT SEGMENT SET

Ball Joint Segment Sets are used to produce male and female joints on tubing from 1 1/4" to, and including, 3".

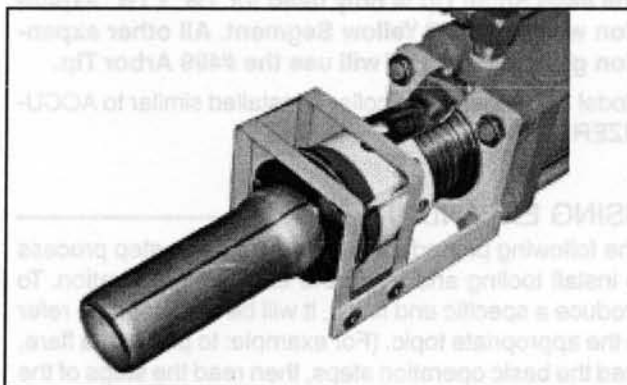
The joints can be made quickly using the expander. To produce a ball joint, proceed as follows:

FIGURE 27



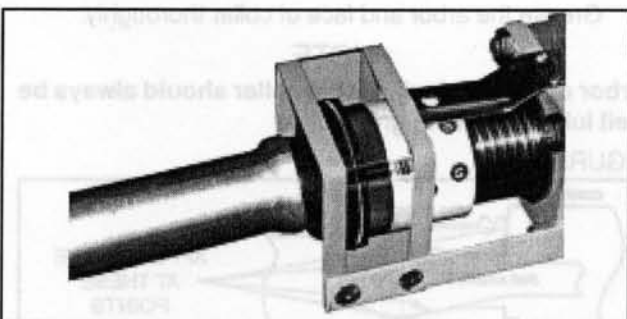
- Install the Arbor #508 and Tip #499. Be sure they are secured tightly to the cylinder shaft.
- Slide the Ball Joint Segment over the Arbor (See figure 27.)
- Place the tubing over the Arbor and the Segment Set until the end of the tubing touches the base of the segment set.

FIGURE 28



- Depress the control handle to form the ball, being careful not to distort the open end of the tubing. (See figure 28.)
- To make the female, place the tubing over the Arbor and Segment Set until the end of the tubing is at the groove on the ball.

FIGURE 29



- Depress the control handle and flare the end of the tubing to fit the mating ball joint. (See figure 29.)

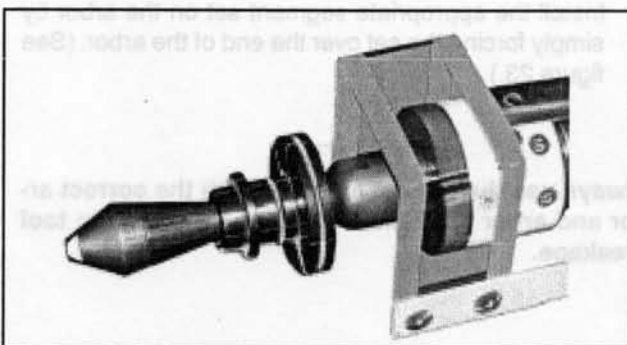
FLANGE SEGMENT SETS

Expanding Flange Segment Sets come in sizes 2"-2 1/2" tubing with sizing rings for 2", 2 1/4" and 2 1/2".

To produce a flange, select the correct segment set, flange ring and proceed as follows:

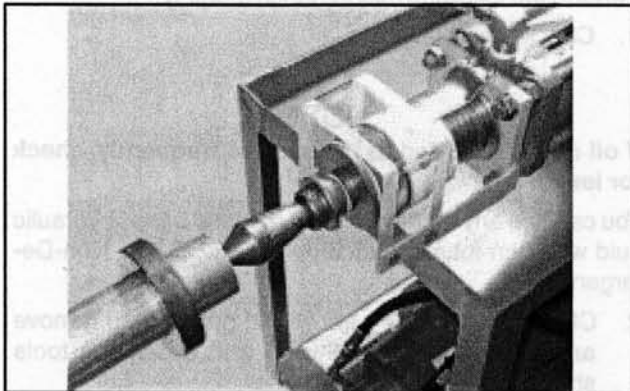
- Place the segment set over the arbor. Secure into position. (See figure 30.)

FIGURE 30



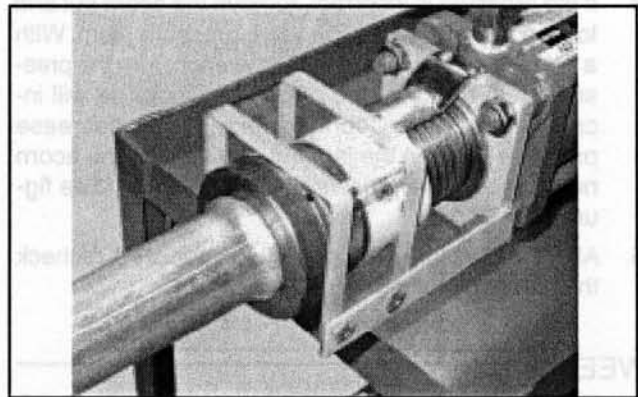
2. Place the flange ring over the end of the tubing.

FIGURE 31



3. Place the tubing over the arbor and segment set until it meets the base of the segment set. (See figure 31.)
4. Push the sizing ring forward until it also touches the base of the segment set

FIGURE 32



5. Press the control handle to form the flange.
6. The flange will be formed when the tubing meets the inside of the flange ring. (See figure 32.)

PERIODIC MAINTENANCE

INTRODUCTION

The following maintenance should be performed regularly to ensure the long life and proper performance of your unit.

DAILY

Verify pressure settings: 2800 - 3000 psi.

To change the pressure setting:

WARNING

Remove tooling from unit.

1. Turn on the unit.

FIGURE 33

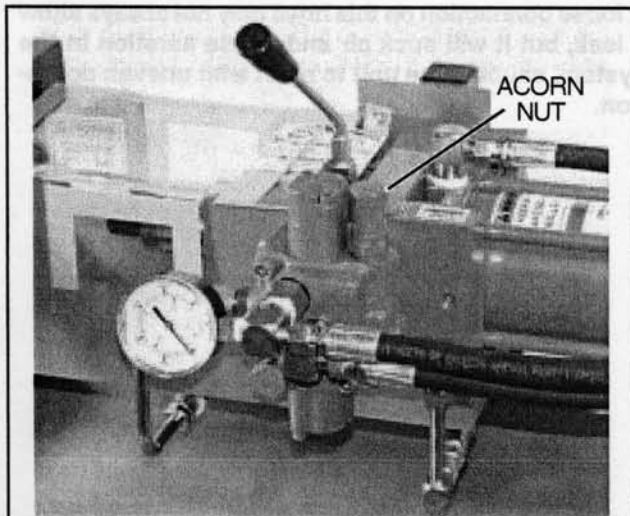
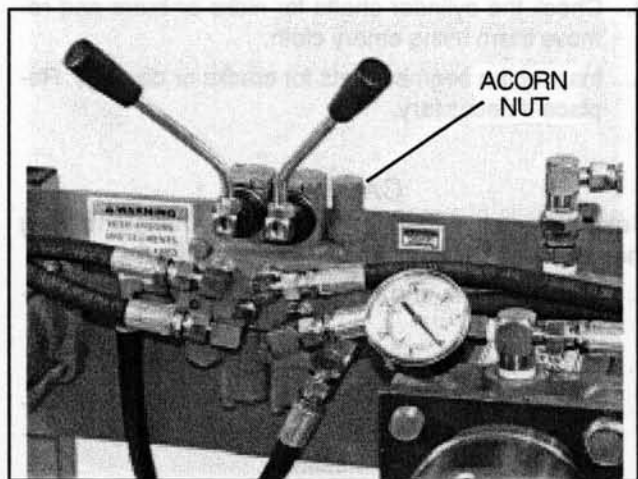


FIGURE 34



2. Press control handle down until cylinder bottoms out completely in the working direction. The pressure can only be read as the cylinder is completely engaged. When the pressure is relieved from the cylinder the gauge should read 0 psi.

WARNING

Never allow pressure to exceed 3000 psi.

3. Read the pressure on the gauge. Pressure should be approximately 3,000 psi. Pressure should not exceed 3,000 psi. **If pressure exceeds 3,000 psi, release the valve lever immediately; pull the valve lever up to relieve pressure and reset the valve to a lower pressure.**

4. If the pressure is incorrect, remove the acorn nut and loosen the jam nut on the valve pressure stem. With a flat blade screwdriver or allen wrench, turn the pressure stem to adjust the pressure. Clockwise will increase pressure. Counterclockwise will decrease pressure. Tighten the jam nut and replace the acorn nut to secure the pressure adjusting stem. (See figure 33 or 34.)
5. After the pressure setting has been adjusted, recheck the pressure setting.

WEEKLY

CAUTION

Do not use strong solvents to clean dirt from the unit. Solvents may damage some components.

1. Using a mild detergent, remove all dirt buildup.

CAUTION

Do not use an air hose near the control box.

2. Clean dirt and oil from the bending dies and remove any burrs.
3. Check the cylinder shafts for nicks or burrs and remove them using emery cloth.
4. Inspect the segment sets for cracks or damage. Replace if necessary.

CAUTION

Hose fittings are made of soft metal. Overtightening may damage the fittings and cause leaks.

5. Inspect hoses and fittings for leaks. Tighten as required.
6. Check for bolts or nuts that may have loosened.
7. Inspect all the electrical components, i.e. plug, receptacle, cord, conduit, etc. Replace any damaged electrical components immediately.

MONTHLY

Perform the following maintenance monthly:

1. Check the oil level.

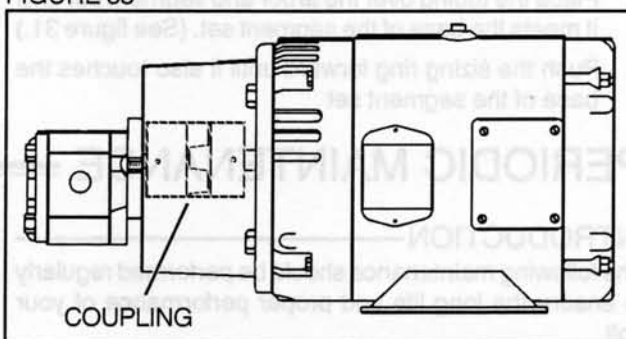
NOTE

If oil must be added to the system frequently, check for leaks.

You can use any medium weight, mineral based hydraulic fluid with non-foaming additive (ISO 32 Grade Non-Detergent).

2. Clean all tooling to remove old grease and remove any nicks and burrs. Swage and expanding tools should be lightly greased.

FIGURE 35



3. Inspect the coupling between the pump and the motor to ensure the allen set screws have not loosened. (See figure 35.)

A. Separate the pump from the motor to inspect the coupler halves and rubber spider. Make sure the two halves of the coupling are separated by the rubber spider.

4. Check and tighten any loose connections in the hose leading from the reservoir to the pump.

NOTE

A loose connection on this hose may not always show a leak, but it will suck air and cause aeration in the system, causing the unit to react with uneven operation.

TROUBLESHOOTING

INTRODUCTION

The troubleshooting procedures charted on the following pages contain the problem, the possible cause and the corrective action to be taken.

There are two basic sections: Electrical Troubleshooting and Hydraulic Troubleshooting.

Identify the problem and proceed with the appropriate corrective action. The chart is organized from the most simple to the more difficult procedures. Be certain the person performing the work has the necessary ability and skills. Observe all safety rules when working on the machine.

WARNING

Turn off unit and LOCK OUT, TAG OUT power before servicing.

ELECTRICAL TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Motor does not run	<ol style="list-style-type: none"> 1. Circuit breaker is off 2. Incorrect wiring 3. Poor connection at plug. 4. Cut in power cord. 5. Defective start/stop switch 6. Motor defective 7. Defective starter 	<ol style="list-style-type: none"> 1. Turn breaker on. 2. Check voltage supply, phase and wiring 3. Check wiring. 4. Check and replace at once. 5. Test and replace if needed 6. Test motor - check with local electrical motor supplier for service center. Replace if needed. 7. Test and replace if needed.
Motor smokes	<ol style="list-style-type: none"> 1. Centrifugal switch sticking in open position. 	<ol style="list-style-type: none"> 1. Remove motor - service at local service center.
Motor shuts off	<ol style="list-style-type: none"> 1. Overload safety turning motor off. 2. Motor starter defective 	<ol style="list-style-type: none"> 1. If problem persists, check wiring for short circuits. Check to determine if motor is overloaded. 2. Replace starter.
Unit emits shocks	<ol style="list-style-type: none"> 1. Lost ground connection. 	<ol style="list-style-type: none"> 1. Check plug-to-receptacle fit. Check plug wiring. Check cord for damage. Check the ground connection at control box.

HYDRAULIC TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Loss of power	Low pressure. Pump not functioning properly. Low oil. Filter clogged.	Adjust pressure. See pressure settings on page 14. Key sheared on coupling/coupling loose. Test pump. See topic "Loss of Power to Entire Machine". Fill tank. Remove in-line filter, clean and replace if needed.
Hydraulic pressure is low.	Improper adjustment. Connectors on intake hose from reservoir to pump are loose. Air leaking in. Low oil.	Adjust pressure. (See Section Periodic Maintenance topic "Operating Pressure Check".) Tighten connectors. Fill tank.
Hydraulic pressure drops.	Pump defective.	Test pump. See problem "Loss of Power". Check coupler. Replace Pump.
Hydraulic pump noisy.	Motor-to-pump coupling loose. Key on motor or pump shaft is sheared. Spider on coupling is worn. Key on motor or pump shaft out of keyway on coupling.	Tighten coupling. Replace key; inspect motor/pump shaft for damage; replace coupling if damaged. Replace coupling or spider. Replace key.
Hydraulics are "jumpy" or erratic.	Air in hydraulic system. Air in hydraulic pump. Low oil. Tube not completely on segment.	Check all hoses and fittings are tight. 1. Top off oil level in reservoir with fresh oil. 2. Run unit through its cycle several times until entire system is purged of air bubbles. Fill tank. Tube must be placed completely to the base of the segment.
Segment set teeth break.	Arbor or tip wrong size. Arbor needs lubrication. Segment not fully inserted into tubing. Adjustable collar is not being used correctly.	Select correct arbor. (See page 29.) Apply a thin coating of grease to the arbor and face of the adjustable collar. See "Expanding Operations" on page 11. See "Expanding Operations" on page 11.
Loss of hydraulic power to entire machine.	Defective pump. Low oil. Clogged Filter.	Hold down swager valve handle and look at the pressure gauge. If pressure decreases during reading, replace pump. Fill tank. Remove in-line filter, clean and replace if needed.
Motor runs but pump does not develop pressure.	Motor rotating in wrong direction. (Three phase only.) Coupler between motor and pump is loose. Low oil. Defective pump. Clogged filters.	TURN OFF MOTOR IMMEDIATELY. Motor should be turning counterclockwise as seen when facing the pump. See section - "Machine Repair" topic "Pump/Motor Rotation". Tighten coupler. Check keyways. See section "Periodic Maintenance". Fill tank. Test pump. See "Loss of Power to Entire Machine". Remove in-line filter, clean and replace if needed.

MACHINE REPAIR

GENERAL REPAIR

CALIBRATION DECAL REPLACEMENT

Should the Calibration Decal of the Accu-Sizer need to be replaced, proceed as follows:

1. Remove the old decal and clean the area.
2. Be sure the #508 Arbor and #499 Arbor Tip are securely tightened to the cylinder shaft.
3. Place the #474 Red Segment on the Arbor.
4. Expand a piece of 2" tubing just enough to insert another piece of tubing into it. (2.015" I.D.)
5. Locate # 5 of the Calibration Decal in the hole of the gun sight.
6. Secure the decal to the adjustable collar.

HYDRAULIC REPAIR

INTRODUCTION

The following hydraulic repair section contains step-by-step instructions for replacing major hydraulic components on your machine. Repair procedures not listed here should be left to qualified service personnel. If you are unfamiliar with hydraulic servicing, contact your distributor for professional service.

WARNING

Serious injury can occur if hydraulic hoses are connected incorrectly. Pump damage may also occur. Always note the location of hydraulic hoses before removing components to ensure that the hose is connected properly during reassembly.

CONTROL VALVE(S) REPLACEMENT

To replace control valve(s), proceed as follows:

1. Start unit.
2. Drop hydraulic pressure to 0 on the control valve.

WARNING

LOCK OUT, TAG OUT electric plug. (Secure the plug so that it cannot be plugged into the receptacle or place a warning tag on it to prevent it from being plugged into a receptacle.)

3. Turn off and LOCK OUT, TAG OUT all power to the machine.
4. Manually cycle all valves several times to relieve pressure which may be present in hydraulic lines.
5. Tag and disconnect the hydraulic lines and any wiring to the valve which is to be replaced.

6. Remove the attaching hardware that holds the valve in place. Be sure to note the size and quantity of hardware in each location.
7. Remove the valve.

CAUTION

Overtightening of valve attaching hardware may distort or damage the valve body.

8. Install the replacement valve and secure using the original attaching hardware.
9. Connect hydraulic hoses or lines to the valve body. Be careful not to overtighten the fittings on the hose ends. They are usually made of soft metal and can be easily damaged.
10. Turn on the machine and test the new valve for proper operation. Cycle the valve several times to remove any air which may be trapped inside the valve.
11. Calibrate the pressure setting. See page 14.

ELECTRICAL REPAIR

INTRODUCTION

The following electrical repair section contains schematics and illustrations to aid in electrical repair. Most of the electrical components cannot be repaired and require only removal and replacement. If replacement parts are installed, refer to the electrical schematic for the correct connections. All repairs must be done by a certified electrician. Be sure all safety rules have been read and understood before beginning servicing.

NOTE

For foreign voltages, be sure voltage, phase, and cycle are identical within the electrical power source.

CAUTION

Control box contains high voltage.

CAUTION

Do not use an extension cord between machine and receptacle.

DANGER

Disconnect power at the receptacle before performing any electrical repairs.

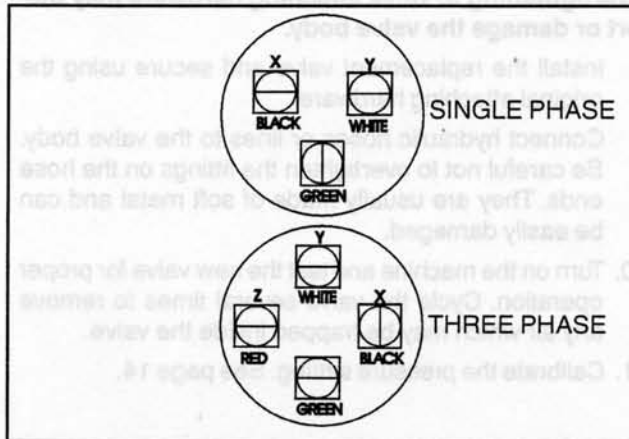
WARNING

LOCK OUT, TAG OUT electric plug. Secure the plug so that it cannot be plugged into the receptacle or place a warning tag on it to prevent it from being plugged into receptacle prior to servicing.

PLUG AND RECEPTACLE

For plug and receptacle wiring hookup, see figure 36.

FIGURE 36



MOTOR

For motor lead connections, refer to the charts below.

Single Phase

T1 + T5	Together
T8 + T4	Black Motor Lead
P1	Black Motor Lead

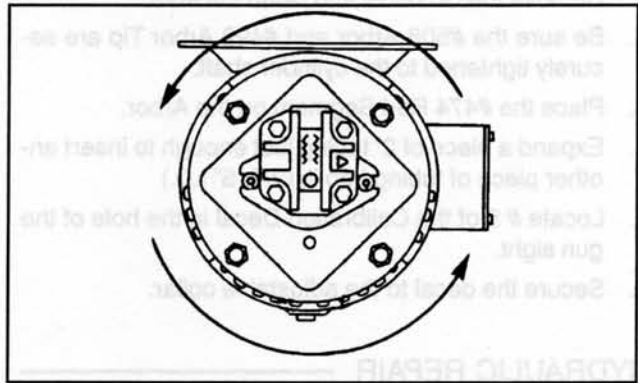
Three Phase

T4 + T5 + T6	Together
T7 + T1	Black Motor Lead
T8 + T2	Black Motor Lead
T9 + T3	Black Motor Lead

PUMP/MOTOR ROTATION

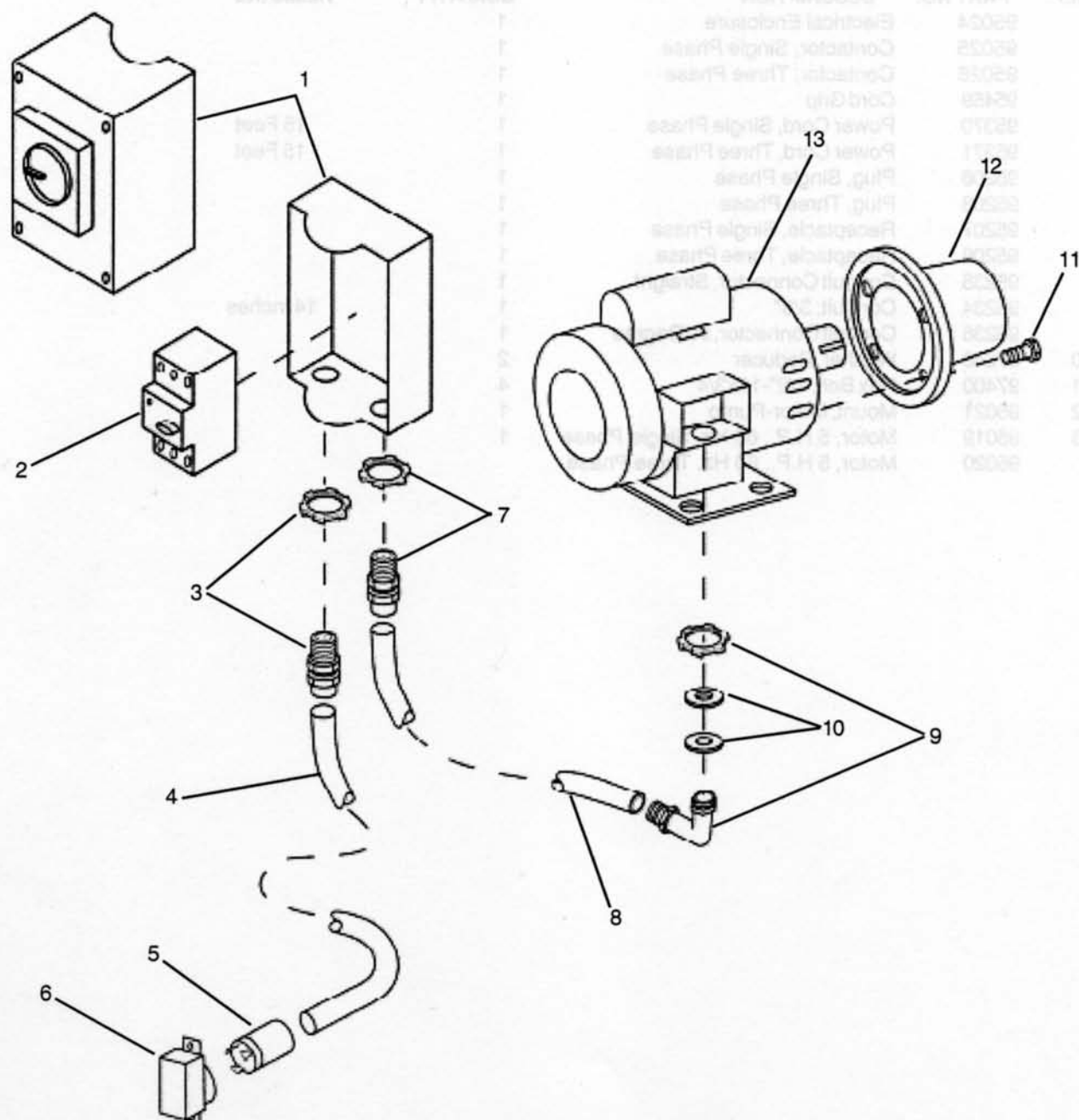
When starting a 3-phase motor, check motor rotation. It should rotate counterclockwise as seen when facing the pump. To check the pump/motor rotation, proceed as follows: (See figure 37.)

FIGURE 37



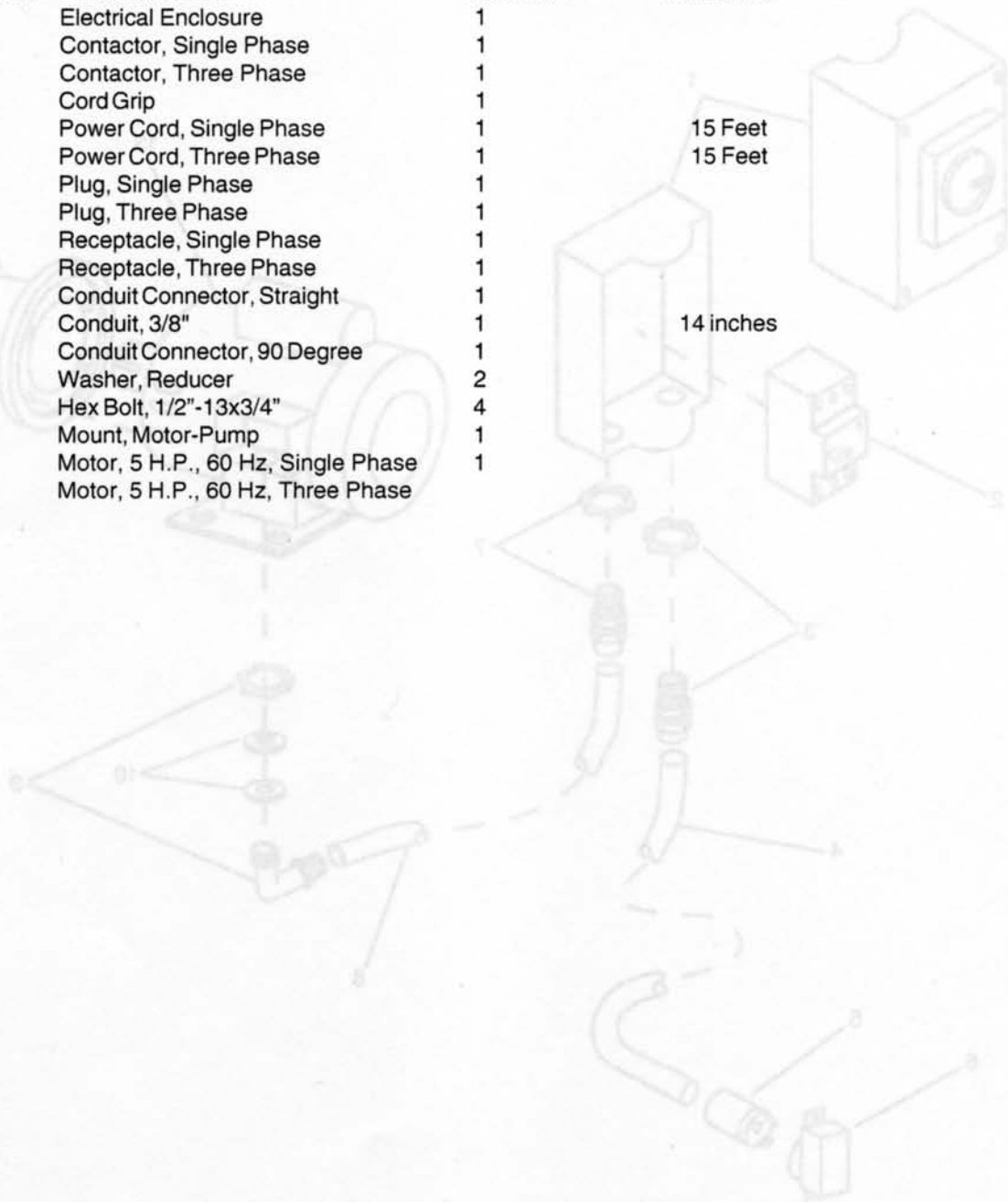
1. Plug in machine.
2. Turn unit on.
3. Depress control handle. If the cylinder shaft moves, rotation is correct. If cylinder shaft does not move, rotation is incorrect.
4. If rotation is incorrect, unplug the unit.
5. Disassemble the plug and reverse the red and black wires.
6. Reassemble plug and test again.

ELECTRICAL COMPONENTS - 1673 & 1674

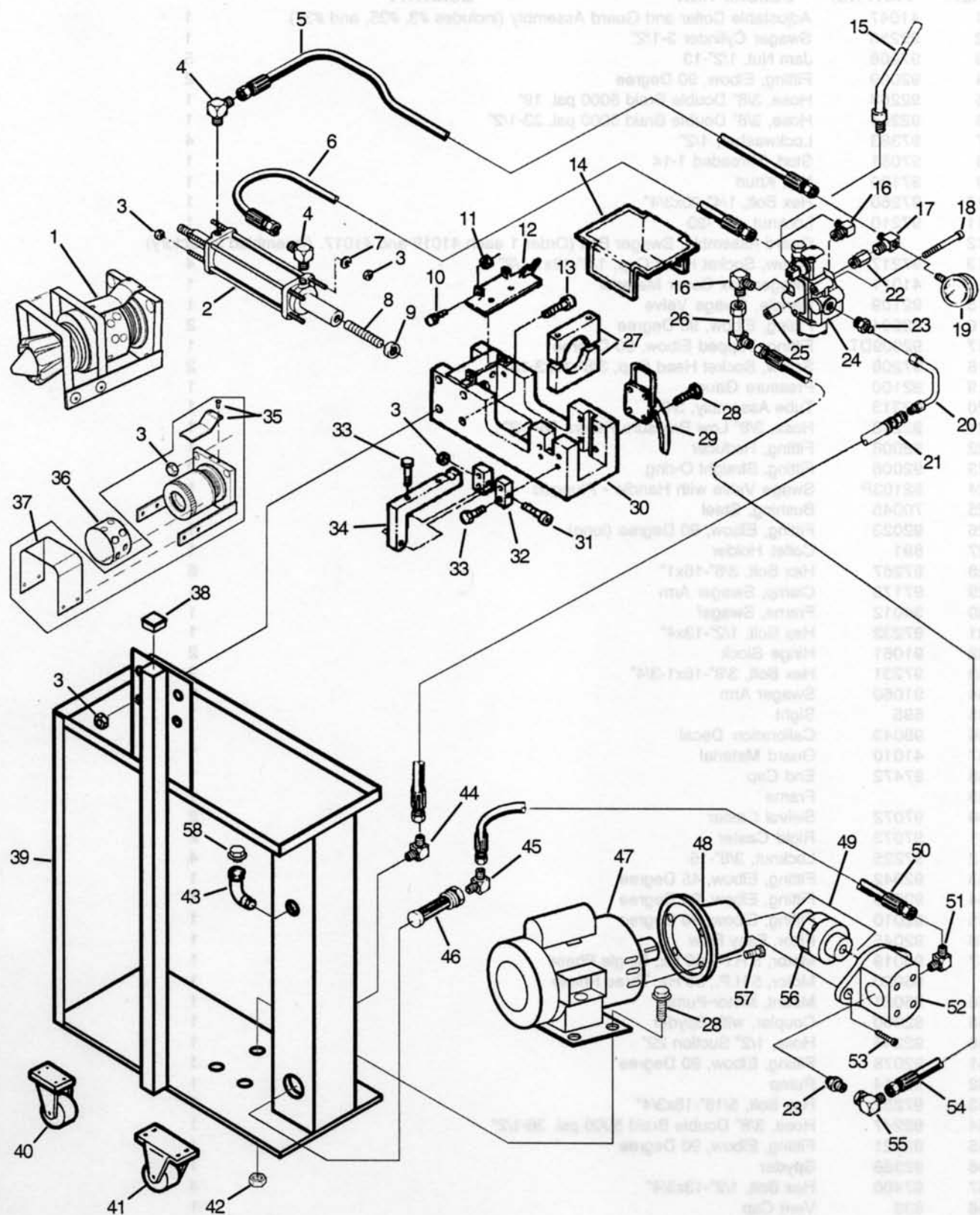


ELECTRICAL COMPONENTS - 1673 & 1674

REF.	PART NO.	DESCRIPTION	QUANTITY	REMARKS
1	95024	Electrical Enclosure	1	
2	95025	Contactor, Single Phase	1	
	95026	Contactor, Three Phase	1	
3	95459	Cord Grip	1	
4	95370	Power Cord, Single Phase	1	15 Feet
	95371	Power Cord, Three Phase	1	15 Feet
5	95206	Plug, Single Phase	1	
	95208	Plug, Three Phase	1	
6	95207	Receptacle, Single Phase	1	
	95209	Receptacle, Three Phase	1	
7	95235	Conduit Connector, Straight	1	
8	95234	Conduit, 3/8"	1	14 inches
9	95236	Conduit Connector, 90 Degree	1	
10	97248	Washer, Reducer	2	
11	97400	Hex Bolt, 1/2"-13x3/4"	4	
12	95021	Mount, Motor-Pump	1	
13	95019	Motor, 5 H.P., 60 Hz, Single Phase	1	
	95020	Motor, 5 H.P., 60 Hz, Three Phase	1	



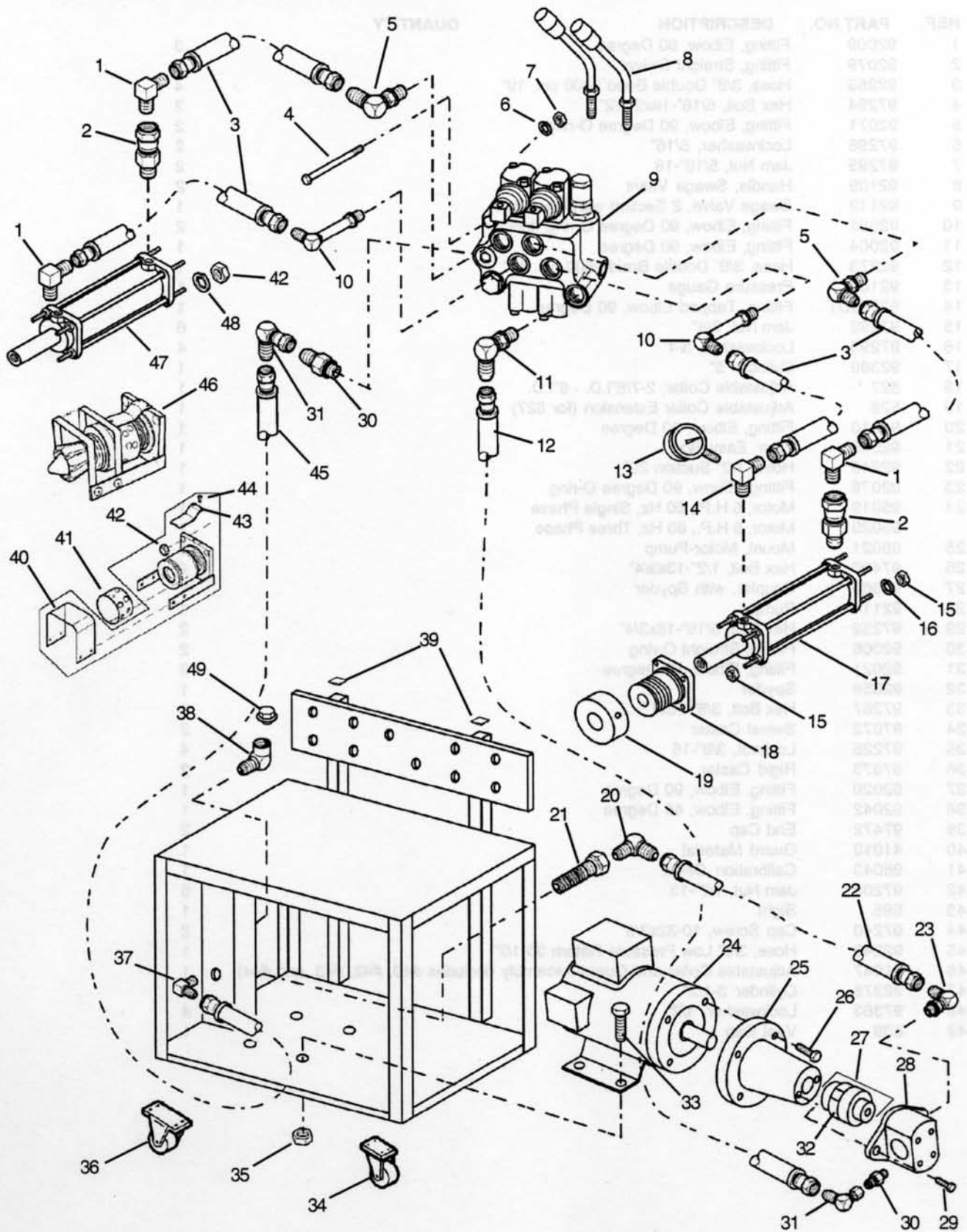
FRAME and HYDRAULIC COMPONENTS - 1673



FRAME and HYDRAULIC COMPONENTS - 1673

REF.	PART NO.	DESCRIPTION	QUANTITY
1	41047	Adjustable Collar and Guard Assembly (includes #3, #35, and #37)	1
2	92256	Swager Cylinder 3-1/2"	1
3	97208	Jam Nut, 1/2"-13	5
4	92009	Fitting, Elbow, 90 Degree	2
5	92263	Hose, 3/8" Double Braid 5000 psi. 19"	1
6	92264	Hose, 3/8" Double Braid 5000 psi. 23-1/2"	1
7	97383	Lockwasher, 1/2"	4
8	97051	Stud, Threaded 1-14	1
9	97100	Nut, Knurl	1
10	97260	Hex Bolt, 1/4"-20x3/4"	1
11	97210	Locknut, 1/4"-20	1
12		Guard Assemble, Swager Box (Order 1 each 41019 and 41017. Assembled at factory)	
13	97217	Screw, Socket Head Cap, 1/2"-13x1-1/2"	4
14	41011	Swager Box Cover Material	1
15	92109	Handle, Swage Valve	1
16	92004	Fitting, Elbow, 90 Degree	2
17	92009DT	Fitting, Tapped Elbow, 90 Degree	1
18	97206	Screw, Socket Head Cap, 3/8"-16x3-1/4"	2
19	92100	Pressure Gauge	1
20	92313	Tube Assembly, 3/8"	1
21	92248	Hose, 3/8" Low Pressure Return 36-1/2"	1
22	92008	Fitting, Reducer	1
23	92006	Fitting, Straight O-ring	2
24	92103P	Swage Valve with Handle - Plugged	1
25	70045	Bushing, Steel	2
26	92023	Fitting, Elbow, 90 Degree (long)	1
27	891	Collet Holder	1
28	97267	Hex Bolt, 3/8"-16x1"	8
29	97176	Clamp, Swager Arm	1
30	34012	Frame, Swager	1
31	97232	Hex Bolt, 1/2"-13x4"	1
32	91061	Hinge Block	2
33	97231	Hex Bolt, 3/8"-16x1-3/4"	2
34	91060	Swager Arm	1
35	595	Sight	1
36	98043	Calibration Decal	1
37	41010	Guard Material	1
38	97472	End Cap	1
39		Frame	1
40	97072	Swivel Caster	2
41	97073	Rigid Caster	2
42	97225	Locknut, 3/8"-16	4
43	92042	Fitting, Elbow, 45 Degree	1
44	92020	Fitting, Elbow, 90 Degree	1
45	92010	Fitting, Elbow, 90 Degree	1
46	92045	Filter, Easy Flow	1
47	95019	Motor, 5 H.P., 60 Hz, Single Phase	1
	95020	Motor, 5 H.P., 60 Hz, Three Phase	1
48	95021	Mount, Motor-Pump	1
49	92360	Coupler, with Spyder	1
50	92246	Hose, 1/2" Suction 29"	1
51	92078	Fitting, Elbow, 90 Degree	1
52	92114	Pump	1
53	97252	Hex Bolt, 5/16"-18x3/4"	2
54	92247	Hose, 3/8" Double Braid 5000 psi. 36-1/2"	1
55	92021	Fitting, Elbow, 90 Degree	1
56	92358	Spyder	1
57	97400	Hex Bolt, 1/2"-13x3/4"	4
58	839	Vent Cap	1

FRAME and HYDRAULIC COMPONENTS - 1674



FRAME and HYDRAULIC COMPONENTS - 1674

REF.	PART NO.	DESCRIPTION	QUANTITY
1	92009	Fitting, Elbow, 90 Degree	3
2	92079	Fitting, Straight Swivel	2
3	92263	Hose, 3/8" Double Braid 5000 psi. 19"	4
4	97294	Hex Bolt, 5/16"-18x2-1/2"	2
5	92071	Fitting, Elbow, 90 Degree O-ring	2
6	97296	Lockwasher, 5/16"	2
7	97295	Jam Nut, 5/16"-18	2
8	92109	Handle, Swage Valve	2
9	92112	Swage Valve, 2 Section with Handles	1
10	92065	Fitting, Elbow, 90 Degree O-ring (long)	2
11	92004	Fitting, Elbow, 90 Degree	1
12	92273	Hose, 3/8" Double Braid 5000 psi. 41"	1
13	92100	Pressure Gauge	1
14	92009DT	Fitting, Tapped Elbow, 90 Degree	1
15	97292	Jam Nut, 3/4"	6
16	97293	Lockwasher, 3/4"	4
17	92389	Cylinder 5"	1
18	527	Adjustable Collar, 2-7/8" I.D. - 6" I.D.	1
19	528	Adjustable Collar Extension (for 527)	1
20	92010	Fitting, Elbow, 90 Degree	1
21	92045	Filter, Easy Flow	1
22	92246	Hose, 1/2" Suction 29"	1
23	92078	Fitting, Elbow, 90 Degree O-ring	1
24	95019	Motor, 5 H.P., 60 Hz, Single Phase	1
	95020	Motor, 5 H.P., 60 Hz, Three Phase	1
25	95021	Mount, Motor-Pump	1
26	97400	Hex Bolt, 1/2"-13x3/4"	4
27	92360	Coupler, with Spyder	1
28	92114	Pump	1
29	97252	Hex Bolt, 5/16"-18x3/4"	2
30	92006	Fitting, Straight O-ring	2
31	92021	Fitting, Elbow, 90 Degree	2
32	92358	Spyder	1
33	97267	Hex Bolt, 3/8"-16x1"	4
34	97072	Swivel Caster	2
35	97225	Locknut, 3/8"-16	4
36	97073	Rigid Caster	2
37	92020	Fitting, Elbow, 90 Degree	1
38	92042	Fitting, Elbow, 45 Degree	1
39	97472	End Cap	2
40	41010	Guard Material	1
41	98043	Calibration Decal	1
42	97208	Jam Nut, 1/2"-13	6
43	595	Sight	1
44	97240	Cap Screw, 10-32x3/8"	2
45	92248	Hose, 3/8" Low Pressure Return 36-1/2"	1
46	41047	Adjustable Collar and Guard Assembly (includes #40, #42, #43, and #44)	1
47	92375	Cylinder 3-1/2"	1
48	97383	Lockwasher, 1/2"	4
49	839	Vent Cap	1

END FINISHING TOOLS - SWAGER

Swage Dies



No.	Size
110	1"
118	1-1/8"
114	1-1/4"
138	1-3/8"
112	1-1/2"
158	1-5/8"
134	1-3/4"
178	1-7/8"
120	2"
128	2-1/8"
125	2-1/4"
123	2-3/8"
150	2-1/2"
129	2-3/4"
130	3"

Flaring/Flanging Tools



518



519

Reducing Dies*



No.	Size
780	2" to 1-3/4"
781	2-1/4" to 2"
782	2-1/2" to 2-1/4"
783	3" to 2-1/2"
784	2" to 1-7/8"
785	1-3/4" to 1-5/8"
786	1-5/8" to 1-1/2"
787	1-1/2" to 1-3/8"
788	1-3/8" to 1-1/4"
789	1-1/4" to 1-1/8"
790	3" to 2-3/4"



853

No.	Description
518	Flare Tool 1-1/2", 2" (2" requires 1720DF)
519	Flare Tool 1-3/4", 1-5/8"
853	Pipe Flanger 1-1/2" to 3" (Replaces Pipe Flangers 848, 849, 850, 851)

Header Collector Tool



No.	Size
101	3"
102	3-1/2"

* Requires clamp collet 890, 891, or 892

Ball Joint Tools



550, 555



No.	Size
550	1-3/4" (Male)
551	1-7/8" (Male)
552	2" (Male)
553	2-1/4" (Male)
554	2-1/2" (Male)
557	1-3/4" to 2-1/2" (Domer)
558	2-5/8" to 2-3/4" (Domer)
555	1-3/4", 1-7/8", 2" (Female)
556	2-1/4" to 2-1/2" (Female)



557

Clamp Collets (All Models After Jan '85) —

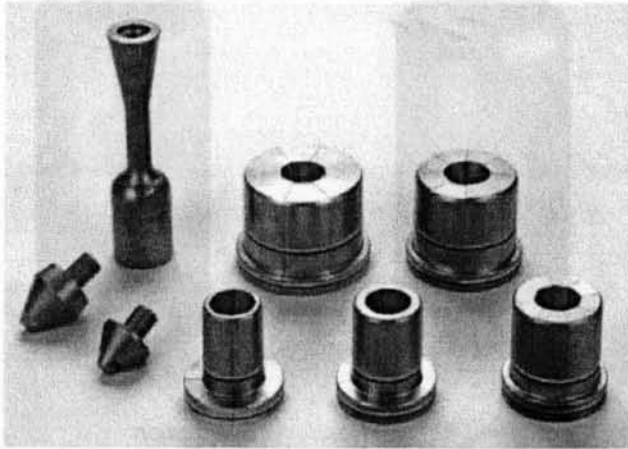


No.	Size
1710	1"
1718	1-1/8"
1714	1-1/4"
1756	1-5/16"
1738	1-3/8"
1712	1-1/2"
1758	1-5/8"
1734	1-3/4"
1778	1-7/8"
1720	2"
1720DF	2"
1728	2-1/8"
1725	2-1/4"
1723	2-3/8"
1750	2-1/2"
1729	2-3/4"
1730	3"

*Requires 892 Collet Holder

END FINISHING TOOLS - EXPANDER

Accu-Sizer™ System

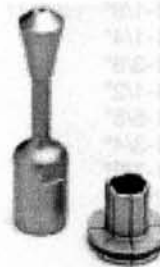


499, 498

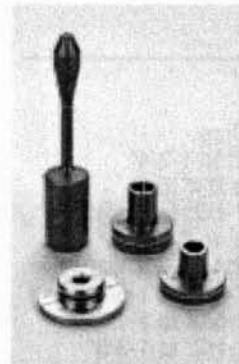
477, 476,
473, 474, 475

No.	Size
508	Arbor, 1-3/8" to 3-1/2"
498	Tip: 1-1/2" to 1-3/4"
499	Tip: 1-3/4" to 3-1/2"
473	Segment 1-3/8" to 1-3/4" (YELLOW)
474	Segment 1-3/4" to 2-1/8" (RED)
475	Segment 2-1/8" to 2-1/2" (BLACK)
476	Segment 2-1/2" to 3" (GREEN)
477	Segment 3" to 3-1/2"
All sizes are I.D.	

Pre Accu-Sizer™ System



500, 400



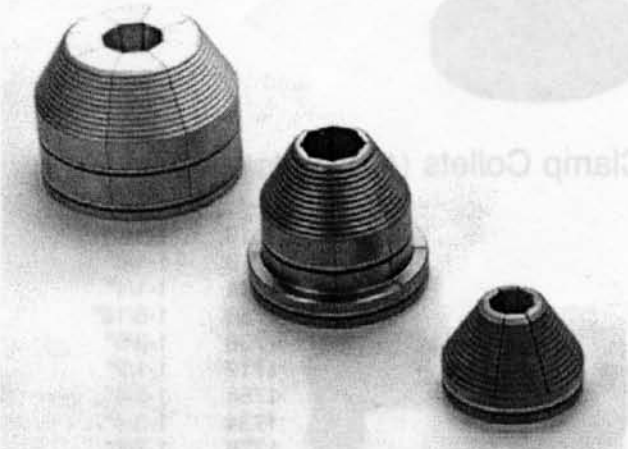
575, 570, 470, 404

No.	Size
575*	Arbor 15/16" to 1-1/4"
500	Arbor 1-1/4" to 1-1/2"
503	Arbor 2-3/4" to 5-1/2"
470	Segment 15/16" to 1-3/32"
404	Segment 1-3/32" to 1-1/4"
400	Segment 1-3/16" to 1-1/2"
403	Segment 2-3/4" to 3-1/8"
406	Segment 3-1/8" to 3-1/2"
408	Segment 3-1/2" to 4"
450	Segment 4" to 4-7/8"
451	Segment 4-7/8" to 5-1/2"

All sizes are I.D.

*570 Spacer Required

45° Flaring



441, 440, 405

405	Flaring Segment Set* 1" I.D. to 1-1/2"
440	Flaring Segment Set 1-1/2" I.D. to 2-1/2"
441	Flaring Segment Set 2-1/2" I.D. to 3-1/2"

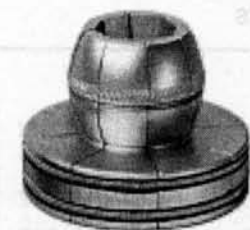
*Requires 575 Arbor 570 Spacer



503, 451, 450,
403, 406, 408

END FINISHING TOOLS - EXPANDER

Ball Joints



419

No.	Size
410	Segment 1-3/4"
419	Segment 2"
420	Segment 2-1/4"
421	Segment 2-1/2"
452	Segment 3"

O-Rings, Rubber



No.	Size
870	Assortment of 50 for Segment Sets: 400, 403, 404, 405, 406, 408, 410, 411, 412, 419, 420, 421, 422, 423, 424, 425, 440, 452, 470, 473, 474, 475, 476, 477, 570 Spacer for Arbor 575

Flanges



411

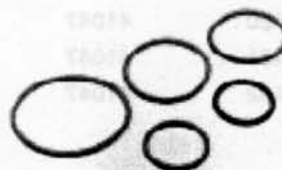
No.	Size
411	Segment 2", 2-1/4"
413	Flange Ring 2"
414	Flange Ring 2-1/4"
412	Segment 2-1/2"
418	Flange Ring 2-1/2"



413

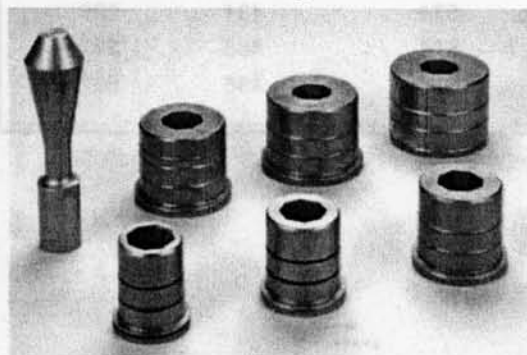
No.	Size
871	Assortment of 10 for Segment Sets: 400, 403, 404, 405, 406, 408, 410, 411, 412, 419, 420, 421, 422, 423, 424, 425, 440, 452, 470, 473, 474, 475, 476, 477, 570 Spacer for Arbor 575

O-Rings, Steel



No.	Size
859	Assortment of 25 for Segment Sets: 400, 403, 406, 408, 410, 411, 412, 419, 420, 421, 422, 423, 424, 425, 440, 450, 451, 452, 470, 473, 474, 475, 570 Spacer for Arbor 575

5" Cylinder Tooling



574, 484, 485, 486,
481, 482, 483

No.	Size
574*	Arbor 2-7/8" to 6"
481	Segment 2-7/8" to 3-1/2"
482	Segment 3-3/8" to 4"
483	Segment 3-7/8" to 4-1/2"
484	Segment 4-3/8" to 5"
485	Segment 4-7/8" to 5-1/2"
486	Segment 5-3/8" to 6"

All sizes are I.D.

O-Rings, Urethane



No.	For Segments
872	481
873	482
875	483
877	408, 450
878	450, 481, 482
879	451, 483, 485
880	451, 484, 486
881	484
882	485, 486

Huth Expanding Tool Chart

A Ready Reference For What Tools Are Used With What Arbors

For The Accu-Sizer™

Size	Arbor	Tip	Seg. Set	Collar
1 1/2" - 1 3/4"	508	498	473	41047
1 3/4" - 2 1/8"	508	499	474	41047
2 1/8" - 2 1/2"	508	499	475	41047
2 1/2" - 3"	508	499	476	41047
3" - 3 1/2"	508	499	477	41047

For 45° Flaring Work

Size	Arbor	Tip	Seg. Set	Collar
1" - 1 1/2"	575*		405	41047
1 1/2" - 2 1/2"	508	499	440	41047
2 1/2" - 3 1/2"	508	499	441	41047

*Requires 570 Spacer

For Making Ball Joints

Size	Arbor	Tip	Ball Joint Tool	Collar
1 3/4"	508	499	410	41047
2"	508	499	419	41047
2 1/4"	508	499	420	41047
2 1/2"	508	499	421	41047
3"	508	499	452	41047

For Flanges

Size	Arbor	Tip	Seg. Set Flange	Collar
2"	508	499	411 w/413 Flange Ring	41047
2 1/4"	508	499	411 w/414 Flange Ring	41047
2 1/2"	508	499	412 w/418 Flange Ring	41047

For Expansion Work

Size	Arbor	Seg. Set	Collar
1 5/16" - 1 3/32"	575**	470	41047
1 3/32" - 1 1/4"	575**	404	41047
1 3/16" - 1 1/2"	500	400	41047
2 3/4" - 3 1/8"	503	403	523
3 1/8" - 3 1/2"	503	406	523
3 1/2" - 4"	503	408	523
4" - 4 7/8"	503	450	523
4 7/8" - 5 1/2"	503	451	523

**Requires a 570 Spacer

5" Cylinder Tooling

Size	Arbor	Seg. Set	Collar
2 7/8" - 3 1/2"	574	481	527
3 3/8" - 4"	574	482	527
3 7/8" - 4 1/2"	574	483	527
4 3/8" - 5"	574	484	527
4 7/8" - 5 1/2"	574	485	527
5 3/8" - 6"	574	486	527

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