

V. SHRINKER DRIVE RING HYDRAULIC CYLINDER RECALIBRATION:

1. To enable the four (4) Shrinker Drive Ring Cylinders to recalibrate or zero-out, set the Reset-Hand-Auto Selector Switch in "RESET" position.
2. Set the Mode of Operation Selector Switch to "SHK" position (Shrink Only).
3. Start Pump by depressing "HYDRAULIC START" push-button.
4. Depress "JOG SHK" pushbutton to run the Shrinker Drive Ring to full down position.
5. Depress "JOG SHK RET" pushbutton to run Shrinker Drive Ring to full up position.

CAUTION: The "RESET" mode of operation disables the Shrinker Limit Switches. Reset all selector switches to mode of operation selected.

NOTE: It is recommended, in view of the existing safety regulation, only those personnel directly concerned with Start-Up procedures be present.

CAUTION: DO NOT EXPAND PARTS WITHOUT A FULLY ENCLOSING SHIELD OR GUARD TO PROTECT PERSONNEL IN THE EVENT A WORK-PIECE BREAKS UNDER EXPANSION.



## II. TIMER SETTING:

The Expander & Shrinker dwell time is controlled by two (2) sets of thumbwheel switches located at the bottom of the remote control station. The time is calibrated from 0.1 sec. thru 99.9 sec.

## III. DIAMETER SETTING - EXPLANATION AND PROCEDURE:

The Expander/Shrinker has been provided with dial adjust, diameter control coupled with a position read-out 5 digit counter. This permits direct die setting figures for each workpiece and corresponding tool without use of conversion factors for stroke-to-diameter settings, etc.

The counter has been preset to read zero at true position, and reads in increments of 0.01 inch.

A reset type add-subtract counter has been provided. The reset knob is rendered inaccessible by a shield. It is essential that the shield be kept in place unless the engineer in charge for some reason must reset the counter to change the calibration. Any changes in reset must be reflected in corresponding change in your die setting charts.

## IV. AUTOMATIC LUBRICATION SYSTEM:

The Lube Pump is operated periodically when the Expander Driver or Shrinker Drive Ring reaches true position to provide proper lubrication to the Driver, Master Jaws, and T-Keys, etc.. The automatic lube system is operational in either the Manual or Auto Mode. Operate the Expander/Shrinker until clear, air free lubricant is discharged at all lubricant points.

The Driver-Master Jaw bearing surfaces and Table T-Key surfaces are all individually and automatically grease lubricated. A very small amount of grease on these bearing surfaces is sufficient; just enough to provide a thin but complete film. The lube adjustment has been set accordingly; See Installation for grease type.

The automatic lubrication system has been electrically interlocked with the machine control circuit. Failure of the system to complete a lube cycle within a set time will cause the Lube Fault (Red Indicator Pilot Light) to illuminate and disable the Cycle Start Pushbutton until the problem is corrected. Also, in the event of low lubricant level in the reservoir, the Low Lube Level Light (Red Indicator Light) will illuminate. The machine will still operate, but the reservoir should be refilled as soon as possible, or the Lube Fault condition will eventually occur.



# I. EXPANDER OPERATION SEQUENCE CONTD....

## C. Automatic Mode - Shrink then Expand

1. Shrinker & Expander must be in full retract position.
2. Set Reset-Hand-Auto Selector Switch in "AUTO" position.
3. Set Mode of Operation Switch in "S-E" position, (Shrink then Expand).
4. Start pump by depressing "HYDRAULIC START" pushbutton.
5. Depress "CYCLE START" pushbutton and the machine will automatically go thru a Shrink-Dwell-Expand-Dwell-Expand Retract-Shrink Retract-to Stop Cycle.

NOTE: The retract sequence may be changed to Shrink Retract then Expand Retract by adjusting the dwell timer settings.

## D. Automatic Mode - Expand Only

1. Expander must be in full retract position.
2. Set Reset-Hand-Auto Selector Switch in "AUTO" position.
3. Set Mode of Operation Selector Switch in "EXP." position, (Expand only).
4. Start Pump by depressing "HYDRAULIC START" pushbutton.
5. Depress "CYCLE START" pushbutton and the machine will automatically go thru a Expand-Dwell-Retract-to Stop Cycle.

## E. Automatic Mode - Shrink Only

1. Shrinker must be in full retract position.
2. Set Reset-Hand-Auto Selector Switch in "AUTO" position.
3. Set Mode of operation Selector Switch in "SHK." position, (Shrink only).
4. Start pump by depressing "HYDRAULIC START" pushbutton.
5. Depress "CYCLE START" pushbutton and the machine will automatically go thru a Shrink-Dwell-Retract-to Stop Cycle.



# I. EXPANDER OPERATION SEQUENCE:

Control Panel Settings as Follows:

## A. Jog Mode

1. Set Reset-Hand-Auto Selector Switch in "HAND" position.
2. Start pump by depressing "HYDRAULIC START" pushbutton.
3. "JOG" - Expand to desired diameter setting by depressing "JOG EXP."
4. "JOG" - Shrink to desired diameter setting by depressing "JOG SHK."
5. "JOG" - Retract to release expanded part by depressing "JOG EXP RET."
6. "JOG" - Retract to release parts by depressing "JOG SHK. RET."

NOTE: The sequence of operation may be varied depending on the part and tooling in use.

CAUTION: DO NOT EXPAND PARTS WITHOUT A FULLY ENCLOSING SHIELD OR GUARD TO PROTECT PERSONNEL IN THE EVENT A WORKPIECE BREAKS UNDER EXPANSION.

## B. Automatic Mode - Expand then Shrink

1. Expander & Shrinker must be in full retract position.
2. Set Reset-Hand-Auto Selector Switch in "AUTO" position.
3. Set Mode of Operation Switch in "E-S" position, (Expand then Shrink).
4. Start pump by depressing "HYDRAULIC START" pushbutton.
5. Depress "CYCLE START" pushbutton and the machine will automatically go thru an Expand-Dwell-Shrink-Dwell-Shrink Retract-Expand Retract- to Stop Cycle.

NOTE: The retract sequence may be changed to Expand Retract, then Shrink Retract by adjusting the dwell timer settings.



# OPERATING INSTRUCTIONS

## MANUAL/AUTOMATIC

### OPERATION SEQUENCE

This machine is operated from the operator's pushbutton station. It is provided with complete controls so that it can be operated in the following modes by pushbutton and selector switch settings at the pushbutton station:

#### A. MANUAL CYCLE

- |                         |                         |
|-------------------------|-------------------------|
| 1. Jog - Expand         | 3. Jog - Shrink         |
| 2. Jog - Expand Retract | 4. Jog - Shrink Retract |

(The system has been arranged so that even in the Jog Modes the diameter adjust and retract settings are operative.)

#### B. AUTOMATIC CYCLES:

Mode E.S. (Expand then Shrink)	Mode S.E. (Shrink then Expand)
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- |                   |                   |
|-------------------|-------------------|
| 1. Expand         | 1. Shrink         |
| 2. Dwell          | 2. Dwell          |
| 3. Shrink         | 3. Expand         |
| 4. Dwell          | 4. Dwell          |
| 5. Shrink Retract | 5. Expand Retract |
| 6. Expand Retract | 6. Shrink Retract |
| 7. Cycle Stop     | 7. Cycle Stop     |

Mode EXP. (Expand Only)

Mode SHK. (Shrink Only)

- |                   |                   |
|-------------------|-------------------|
| 1. Expand         | 1. Shrink         |
| 2. Dwell          | 2. Dwell          |
| 3. Expand Retract | 3. Shrink Retract |
| 4. Cycle Stop     | 4. Cycle Stop     |



START-UP  
DATA SHEET

<u>MASTER JAW SPECIFICATIONS</u>	<u>EXPANDER</u>	<u>SHRINKER</u>
DIAMETER - MAXIMUM	9.160	37.850
DIAMETER - TRUE	9.000	36.000
DIAMETER - MINIMUM	7.160	35.850
DIAMETRAL TRAVEL - TOTAL	2.000	2.000

MASTER JAW SPECIFICATIONS  
WITH DIE SPACERS INSTALLED

	<u>EXPANDER</u>
DIAMETER - MAXIMUM	14.160
DIAMETER - TRUE	14.000
DIAMETER - MINIMUM	12.160
DIAMETRAL TRAVEL - TOTAL	2.000