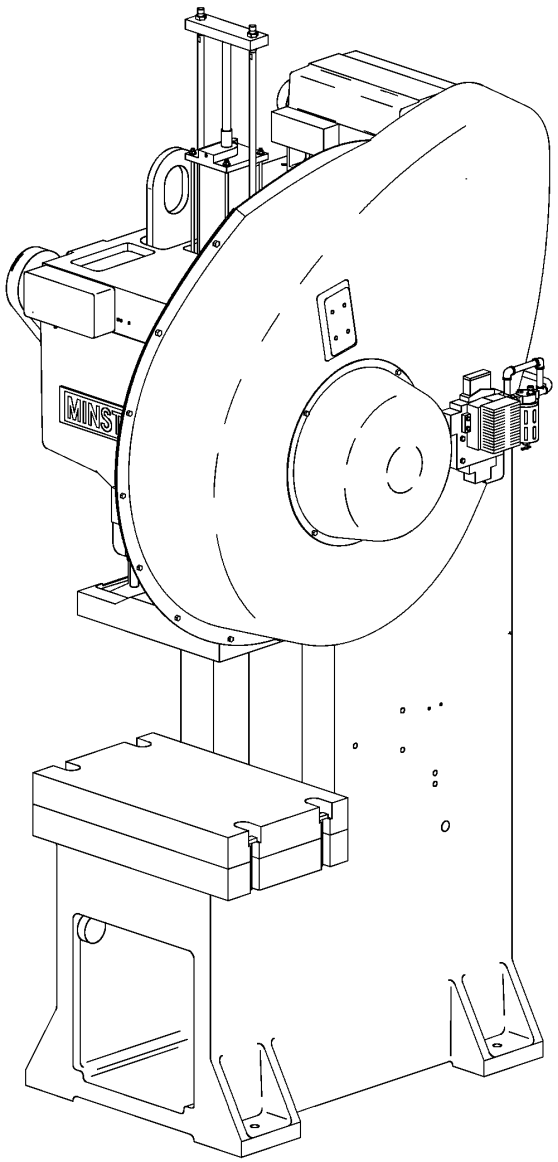
Manual No. 1010C

MINSTER®

OBI/OBS SERIES PRESS

MODEL 101



Service Manual

8952-399

$15.00

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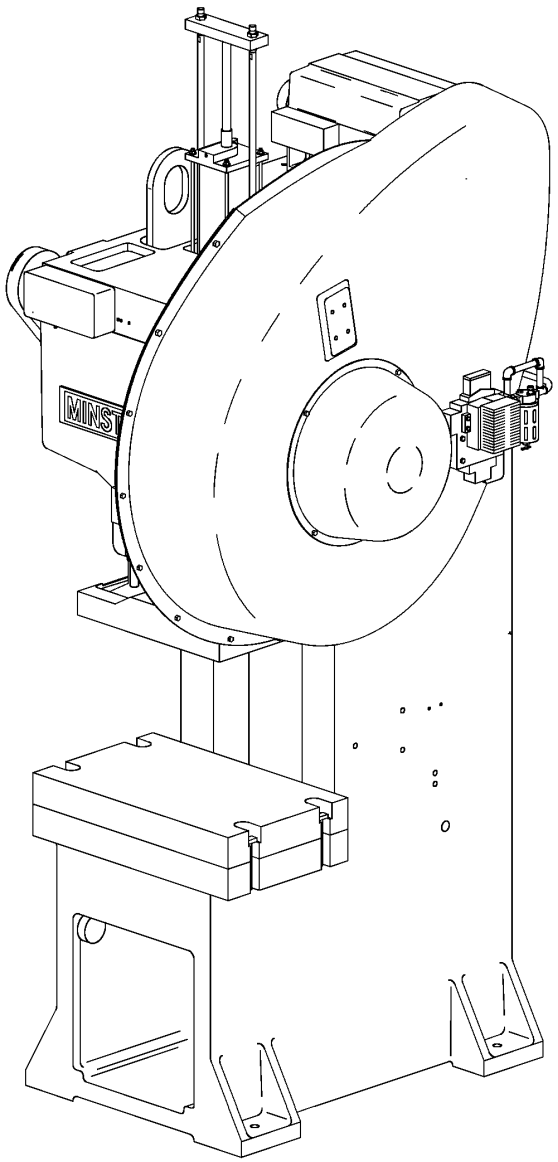

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SERVICE

This manual has been prepared to furnish the press user with sufficient information to set up, lubricate, connect air and electrical services, and stroke the press without outside assistance. Other valuable information detailing press inspection, service and repair procedures, as well as a spare parts list is included as a separate portion of the composite Service Manual.

Should additional maintenance assistance be required, please contact the Minster Service and Repair Parts Department. Personnel in this department are prepared to aid press users in retaining the dependable performance expected from their Minster equipment. Your inquiry will receive prompt and courteous attention. Field service personnel are also available upon request.

DESIGN CHANGES

Design changes between the press you received and the equipment illustrated in this manual are the result of continuing design improvement or special arrangement contracted at the time of purchase. Instructions are provided for the standard Minster Model 101 OBI/OBS Series press. Minster reserves the right to discontinue or change specifications, designs and materials, without notice, consistent with sound engineering principles and recognized modern practices.

IMPORTANT

In order to more clearly show details of the Minster Model 101 OBI/OBS Series press, some covers, shields, doors and guards have either been removed or left in the “open” position for certain illustrations used in this manual. All such covers and protective devices must be closed and/or installed in the correct position before attempting to operate the press. Failure to follow this instruction could result in personal injury or damage to the equipment.

SERIAL NUMBER

When contacting Minster (by fax, letter or telephone) for repair parts or information concerning your press, please furnish the press serial number. This number is stamped on the press Identification Plate and also stamped on the frame adjacent to one of the gibs. The number also appears on the press specification sheet included with press service manual. Manufacturing records, technical data and special information (in our possession) can be located quickly when the serial number is known.

PREFACE

This manual has been especially prepared for those persons responsible for the SAFE operation and maintenance of Minster **Model 101 OBI/OBS Series** power presses. The technical information which it contains has been correlated, where possible, into related sections. Supporting illustrations and charts are also included to provide readers with quick reference to a given component or activity and to show the association of that component with related parts. Additionally, illustrations used herein are representative of equipment available at the time of publication.

Throughout the manual, warnings are included as a part of the servicing procedures. If should be noted that some warnings refer to functions other than those required for direct operation of the press. Warning signs are also mounted at strategic points on the press to remind personnel of hazards that may not be obvious when, and if, improper procedures are followed. The objective here is to establish SAFE operating procedures for all personnel associated with POWER PRESSES — and to PREVENT ACCIDENTS.

Make every effort to keep all presses in good working condition and SAFE FOR PRODUCTION. If is imperative that the press user establish and follow a program of periodic and regular inspections to make certain the press and its auxiliary equipment are in a safe operating condition. Employers must keep records of those inspections and of the maintenance work performed.

We wish to acknowledge our indebtedness to the engineers, service personnel, and press users who contributed many valuable suggestion for the manual. Their cooperation is sincerely appreciated.

REGARDING WARRANTY

TERMS OF THE WARRANTY ARE FULLY DOCUMENTED IN THE MINSTER WARRANTY. A COPY OF THAT WARRANTY IS INCLUDED IN THE COMPOSITE SERVICE MANUAL; ADDITIONAL COPIES ARE AVAILABLE UPON REQUEST.

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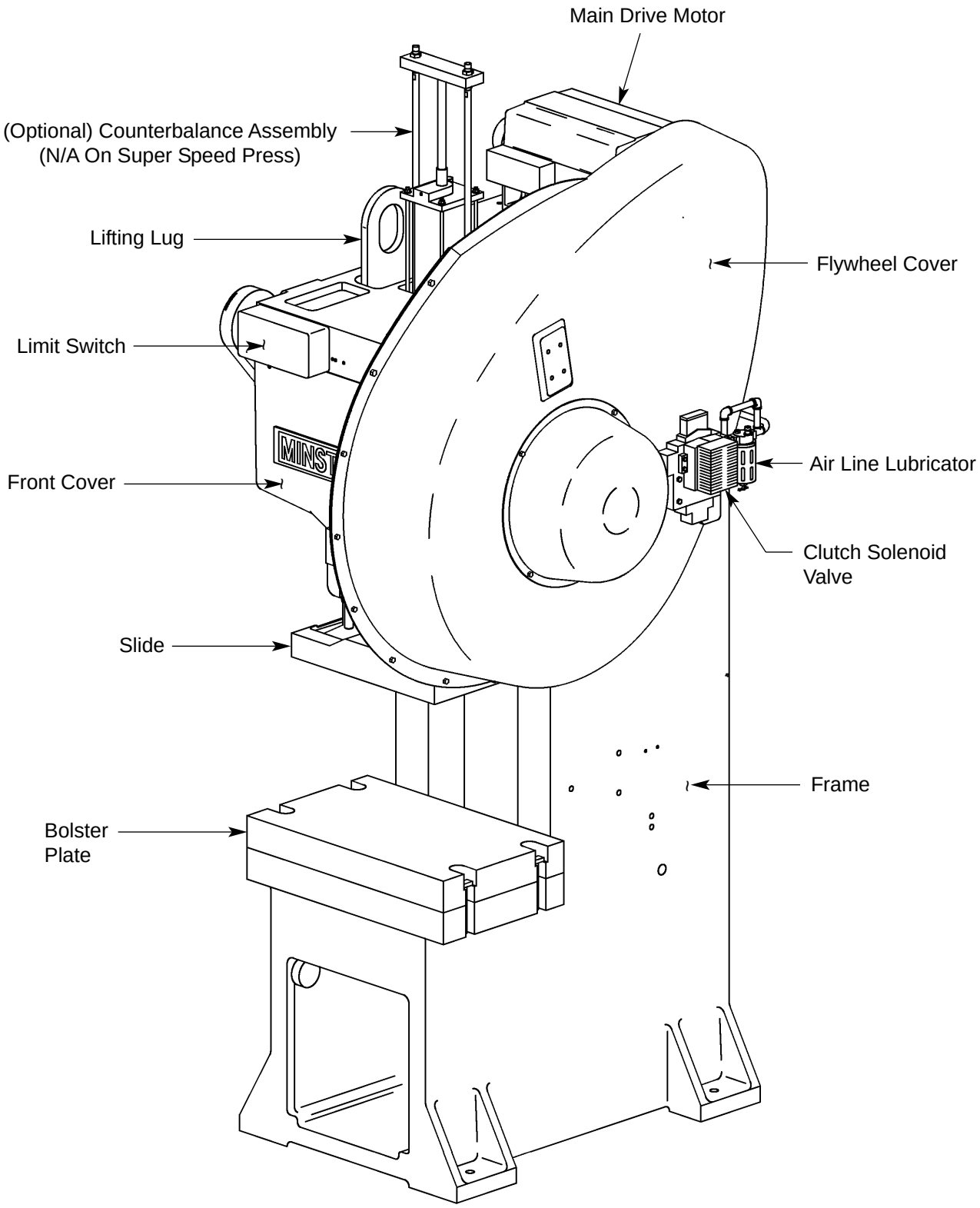
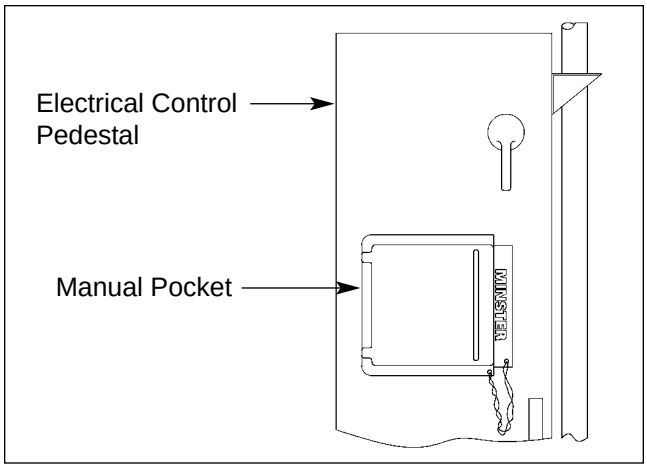
SECTION B

This Section Contains The Following: **Page**

PRESS IDENTIFICATION





NEVER remove the Operation or Service Manual from press.

⚠ WARNING

NEVER PLACE HANDS OR ANY OTHER PART OF THE BODY UNDER THE SLIDE OR WITHIN THE DIE AREA.

NEVER OPERATE, SERVICE OR ADJUST THIS PRESS, OR INSTALL DIES, WITHOUT PROPER INSTRUCTIONS AND WITHOUT FIRST READING AND UNDERSTANDING THE INSTRUCTIONS IN THE OPERATION AND/OR SERVICE MANUAL.

NEVER INSTALL DIES OR SERVICE THE PRESS WITH THE FLYWHEEL IN MOTION, MOTOR ON, OR THE SLIDE IN AN UNBLOCKED POSITION.

NEVER REMOVE THIS SIGN, THE OPERATION MANUAL, OR THE SERVICE MANUAL FROM THE PRESS.

NOTE: IT IS THE EMPLOYER'S RESPONSIBILITY TO ENSURE USAGE OF ALL GUARDS, SAFETY DEVICES, OR TOOLS THAT MAY BE NECESSARY AND/OR REQUIRED BY ANY PARTICULAR USE AND/OR OPERATION TO IMPLEMENT THE ABOVE.

PREPARATION FOR USE

NOTE: The press is not ready for production operation until the following conditions have been observed and all installation work performed in the order listed.

CAREFULLY PERFORM PRESS INSTALLATION PER INSTRUCTIONS

Install the press according to instructions given in the "Installation" section of this manual. Refer to the "Initial Lubrication" section, being certain to lubricate the press thoroughly. **DO NOT** set dies or attach any auxiliary equipment until instructed to do so; however, if the press was received with auxiliary equipment already installed, **DO NOT** remove.

UNDERSTAND PRESS OPERATING PROCEDURES

Read and understand all information provided in the Model 101 OBI/OBS Series Press "Operation" Manual. Learn to Inch and Stroke the slide before the dies are installed.

CHECK ALL OPERATING ADJUSTMENTS

Make certain that all operating adjustment procedures have been satisfactorily performed. Learn to properly adjust (and lock) slide height and know how to adjust the air pressure. Before installing dies, check slide parallelism and gib adjustment to make certain factory settings were not disturbed during shipment. **Readjust only if necessary**.

THEN . . .

Set dies. Adjust slide shutheight to the proper setting. Adjust pressure regulators for correct air pressure at clutch, counterbalance and die cushion if used.

Install auxiliary equipment and adjust or synchronize, as necessary, for proper operation with the press.

Check point-of-operation safeguarding being used for the specific operation being undertaken.

OBSERVE ALL SAFETY PRECAUTIONS

Check the point-of-operation safeguarding and make certain that it is appropriate for the operation being undertaken. Refer to the "MINSTER Power Press Safety Manual No. 805" for additional safety related information.

AND DON'T FORGET . . .

It is user-management's responsibility to make certain that all point-of-operation guards or devices are used, checked, maintained, and where applicable, adjusted on every operation performed on a production system for every individual exposed to a point-of-operation hazard.

PRESS SAFETY

***NEVER** operate, service or adjust the machine, or install dies without proper instructions and without first reading and understanding the instructions provided in the Service and Operation Manuals.*

Press operators and die setters can do much to make their own jobs safer by regularly demonstrating safety awareness and by taking a positive attitude toward the prevention of accidents. Die setters should **NEVER** attempt to install, adjust, or remove dies without first shutting off power to the press and waiting for the flywheel to stop. Press operators should **NEVER** place their hands or any part of their bodies with the point of operation.

Press user management must assume the responsibility for safe operation of power presses. All presses must be properly maintained and equipped with effective die guards or point-of-operation safety devices. When dies are designed, the importance of simplified feeding, part ejection and safeguarding must be considered. Essentially, the complete operation should make it unnecessary for operators to place their hands, or any part of their bodies, with the point of operation; secondly, the die should be fully guarded to prevent them from doing so. Dies that cannot be fully guarded, because of the nature of the operation, should be fed by methods making it unnecessary for the operator to place his hands within the point of operation and safeguarded, in accordance with the applicable Federal and State Regulations, with a safeguarding device.

Personal protective equipment such as safety helmets, tongs, gloves, hand pads, spats, and protective sleeves must also be provided as required to suit the operation. Don't forget ear protection. Ear plugs, muffs or noise enclosures should be used where noise is above critical levels. And, to realize maximum benefit from safeguards, make frequent evaluation checks — especially during actual production runs. Correct any unsafe practices or situations immediately.

The formation of an organized safety program is highly recommended. A safety committee — appointed by and responsible to management — should supervise the program and have regularly scheduled meetings. Through this committee, a good safety program can be constantly reviewed, kept up-to-date and effective. Minutes of all meetings should be recorded for future reference — they can be very beneficial.

Additional safety suggestions are presented in the "Minster Power Press Safety Manual No. 805." This manual was prepared as a guide for those persons who use, service and supervise the operation of mechanical power presses. It is included as a part of the composite press Service manual.

SECTION C

This Section Contains The Following: **Page**

PRESS INSTALLATION

SHIPPING AND RECEIVING

Each Minster Model 101 OBI/OBS Series press is carefully prepared for shipment to protect the press during transit and to enable the customer to install the press with a minimum of reassembly when it arrives at its destination.

When the press is received, it should be inspected immediately for any visual signs of damage. If any damage has occurred, notify MINSTER and the CARRIER for claims inspection. However, with F.O.B. shipments, a claim must be presented to the CARRIER by the customer since title of the equipment changes to the customer when shipment is accepted by the carrier.

UNLOADING AND LIFTING

REMOVE all accessories and boxes attached to the skids so that these parts will not be damaged in handling the press. The press should remain on the skids until it is placed under the handling equipment.

⚠ WARNING

MAKE CERTAIN THAT THE CRANE OR HOIST AND ASSOCIATED CABLES, CHAIN AND HOOKS ARE CAPABLE OF SAFELY LIFTING THE WEIGHT INVOLVED.

Two (2) lifting lugs are provided on the top of the press. (See Figure 1C.) Riggers should be cautioned never to place lifting slings around the press crankshaft. Workmen should also be instructed to use adequate blocking when placing slings around major frame parts to prevent cables from crushing oil lines or damaging electrical conduit and/or other exposed components.

⚠ CAUTION

NEVER USE A FORKLIFT UNDER THE SLIDE ASSEMBLY TO LIFT THE PRESS OR DAMAGE TO THE SLIDE COULD OCCUR.

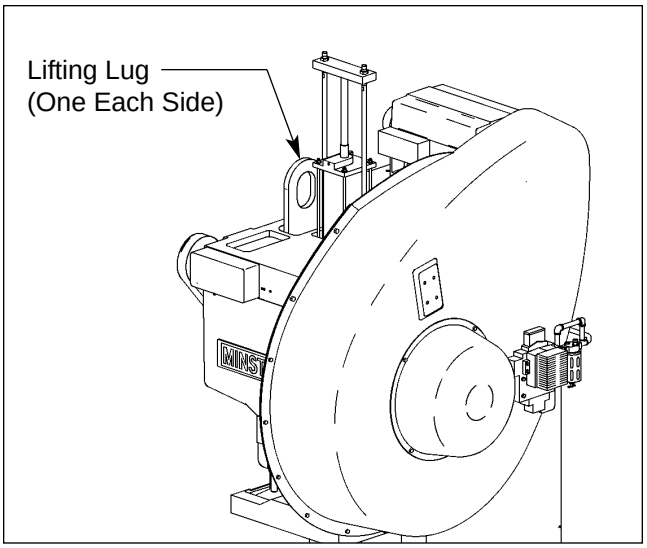


Figure 1C. Lifting lug location.

PRESS WEIGHT

The following table of press weights includes all factory supplied items mounted on the press when it is assembled. **All weights are approximate** and do not include the additional weight of dies, feeds, or other customer-added equipment.

PRESS WEIGHT CHART

PRESS SIZE	APPROXIMATE WEIGHT	
	POUNDS	KILOGRAMS
No. 4 Flywheel Type	7,500	3,402
No. 5 Flywheel Type	10,000	4,536
No. 6 Flywheel Type	13,000	5,897
No. 6 Geared Type	14,200	6,441
No. 7 Flywheel Type	18,000	8,165
No. 7 Geared Type	19,000	8,618

CLEANING

Before installing the press, clean it thoroughly to remove cinders, rust, salt, sand and other soil that may have accumulated during shipment. Carefully inspect and clean all exposed areas where foreign particles may have adhered. Use a good grade of commercial solvent to remove slushing and rust-preventing compounds. Use care when applying cleaning solvents to the press. Make certain that the solvent used will not cause damage to any seals that it might contact.

⚠ WARNING

CLEANING FLUIDS MAY BE TOXIC AND/OR FLAMMABLE AND CAN CAUSE SERIOUS OR FATAL INJURY. FOR SAFETY, USE ONLY WITH ADEQUATE VENTILATION; AVOID CONTACT WITH SKIN; AVOID INHALATION OF FUMES AND DO NOT EXPOSE TO FLAME OR SPARKS.

Use a stiff brush to clean hard-to-reach corners of the press; lint-free rags are suitable for cleaning flat surfaces. Then apply a coating of light oil to all unpainted, exposed surfaces to prevent rust and corrosion.

ASSEMBLY

Minster Model 101 OBI/OBS Series presses are normally shipped completely assembled, except for the front cover, and optional feed equipment. These items are usually removed to provide easier handling and better protection during transit. Please refer to specific instructions pertaining to reassembly of these items.

Minster field service engineers are available to check over the complete installation. They will assist in the initial start-up and also instruct interested personnel in the proper operation and maintenance of the press. Contact Minster's Service Department to schedule a field service engineer if required. Please allow at least one week to complete travel arrangements.

THREADED FASTENERS

SAE Grade 5 Standard threaded fasteners (bolts, screws, etc.) are used on Minster Model 101 OBI/OBS Series presses. When assembly torques greater than can be tolerated by Grade 5 hardware are required, Grade 8 fasteners are used. When a fastener is replaced (due to wear or damage), make certain to use a new fastener meeting the specified standard of the **fastener being replaced**.

The fasteners are tightened to the recommended Minster Standard torque value at the factory prior to shipment. Whenever any fasteners are loosened or removed to facilitate maintenance and/or repair procedures, it is imperative that they be tightened to the proper torque value. Also, apply Loctite Adhesive Grade 242 (Blue Liquid) to all threaded fasteners. The chart, shown below, lists the recommended torque values for fasteners used on Model 101 OBI/OBS Series presses.

Minster Standard Torque Value Chart

SAE GRADE 5 HEX. HEAD CAP SCREW TORQUE VALUES (LUBRICATED)

SCREW SIZE	FT-LBS.	N-m
1/4 - 20 (.250	6.3	8.5
5/16 - 18 (.312)	13	18
3/8 - 16 (.375)	23	31
1/2 - 13 (.500)	55	75
5/8 - 11 (.625)	110	149
3/4 - 10 (.750)	200	271
7/8 - 9 (.875)	300	407
1.00 - 8	480	651
1-1/4 - 7 (1.250)	840	1139
1-1/2 - 6 (1.500)	1460	1979
1-3/4 - 5 (1.750)	1714	2324
2.00 - 4.5	2578	3495

NOTE: Certain applications (described in this manual) may require a torque value different from the value shown in the chart. In that case, the required torque value will be specified for the application.

PRESS FOUNDATION & MOUNTING

Correct installation is an important step in the satisfactory long term operation of your press. The type of mounting can have an effect upon the operating efficiency, press alignment, stability, and noise and vibration levels. In order to provide the best and most economical installation, physical conditions at the site and operating characteristics of the press, as well as the type of work being performed, must be considered.

Because of the many variables associated with soil conditions, press application, and the type of work performed, it is not possible to prepare a universal foundation plan that is dimensionally and economically correct for all. It is suggested by Minster that **the user consult an experienced professional in the field of foundation layout when considering a suitable foundation for the press**.

The Minster Model 101 OBI/OBS Series press **must** be positively anchored to the floor. Instructions for proper installation are provided below.

INSTALLING AND LEVELING THE PRESS

It is **extremely important that each of the press feet bear the intended proportionate share of the load** and that they be mounted in an **undistorted plane**. Leveling of the press with a precision machinery level provides a convenient means of checking for any **distortion or twisting** of the press frame.

At the time of installation, the press should be carefully leveled in both directions — left-to-right and front-to-back — **in the exact location where the press will be installed**. Use a precision machinery level and level the press following the recommended procedure.

Follow the procedure outlined below to install and level the press.

1. Make certain the area of the foundation on which the press is to be mounted **is flat and on the same plane**. This is required in order to make certain that all **four (4) press feet are bearing evenly to avoid twisting the frame**.
2. Make certain the area of the foundation slab on which the press is to be mounted is free of debris.
3. Position the press on the foundation in the **exact location** where the press will be placed.
4. Clean the top surface of the bed or bolster plate thoroughly so that the level readings are accurate.
5. Position a **precision machinery level** on the top surface of the bed with the length of the level parallel to the front edge of the bed. Take readings at the **front**, **rear**, **and on both sides** of the bed or bolster plate. (See Figure 2C.)

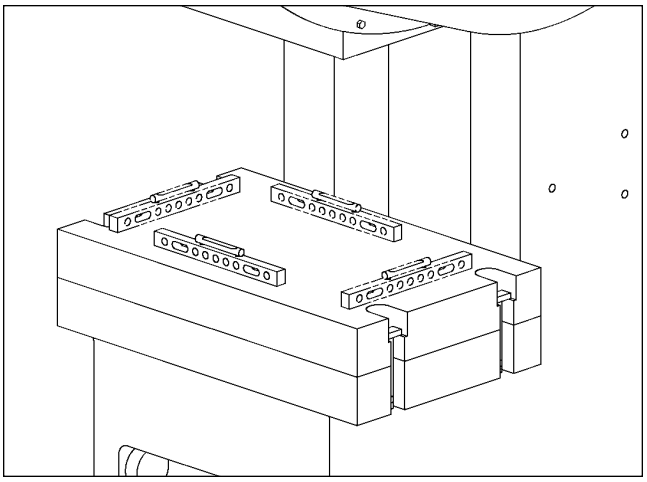


Figure 2C. Leveling the press.

6. If the press is low on one side, the various readings will indicate this and correction can be made by placing steel shims between the press feet and the foundation. Correction may be required under one or more of the press feet. The press should be level within .001 inch per foot (0.025 mm per each 300 mm) of bed width in the front-to-back direction. **Make certain that the level readings are exactly the same as the level is moved from front-to-back**.

   NOTE: If shims are added under the press feet for leveling purposes, the area of each shim should be equal to that of the press foot.

7. Reposition the precision machinery level so that its length is parallel to the side of the bed or bolster plate and take several readings as the level is moved to the opposite side. If the press is low on one side, make the necessary corrections as explained in Step 6.
8. When the press is level, it **must** be bolted to the floor in the manner described on the Foundation Layout which is included in the composite Service Manual (furnished).

   NOTE: Due to the unequal left-to-right weight ratio and the unequal front-to-rear weight ratio of the gap frame design, the use of press shock mounts to suppress vibration are absolutely not recommended due to the

rocking motion that could occur from their use. Such rocking motion may induce accelerated bearing wear. To suppress excessive vibration from the operation of your OBS stationary (not inclinable) press, only resilient laminated fabric or rubber pads are recommended for use, such as Fabreeka® or Unisorb® type brands. See **WARNING** posted on inclinable Minster OBI presses and as also found within the "Minster Power Press Safety Manual No. 805" in section entitled "Signs of Safety."

FRONT PANEL AND LUBE LINE INSTALLATION

The press front panel was removed, and lube lines relocated, to prevent damage during shipment. The lube lines may be installed in their proper location and the front cover may be reinstalled following the directions below.

1. Relocate the lube lines. The lines must be relocated from their shipping position within the press crown cavity, and reinstalled on the front of the press as shown in Figure 3C. Use line clips and hardware provided.

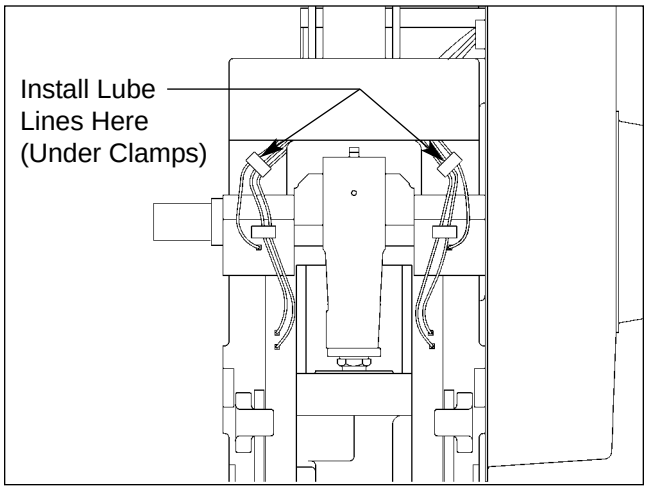


Figure 3C. Lube line installation.

2. Reinstall the front cover. Position the cover on the front of the press and secure with four (4) .375" - 16 x .750" long Hex. Head Cap Screws and flat washers.

DRIVE V-BELT INSTALLATION

The drive v-belts transmit energy from the main drive motor to the press flywheel. Install the drive v-belts following procedure outlined below.

⚠ WARNING

DISCONNECT POWER TO THE PRESS, LOCK THE DISCONNECT SWITCH IN THE OFF POSITION, AND ATTACH WARNING TAG TO PREVENT ACCIDENTAL STARTING OF THE MAIN DRIVE MOTOR WHILE INSTALLING, ADJUSTING, OR INSPECTING THE DRIVE BELT.

1. Using a large machinists square, check alignment of the motor sheave with the flywheel. If motor sheave and flywheel do not align, loosen the motor mounting bolts and shift the motor until both sets of grooves are aligned accurately; otherwise, belts will not track straight and will wear out rapidly. Misalignment of the sheaves will also cause needless belt groove wear and motor bearing damage. After sheaves are correctly aligned, tighten the motor mounting bolts fully.
2. Using the adjusting screw nuts, lower the main drive motor toward the flywheel until v-belts can be slipped over motor sheave and flywheel without strain. (See Figure 4C.)

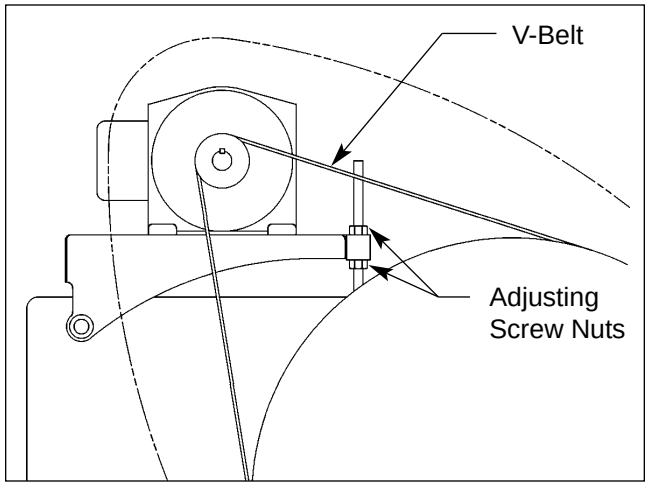


Figure 4C. Installing v-belts.

⚠ WARNING

DO NOT FORCE THE V-BELTS OVER THE SHEAVE GROOVES.

3. Turn adjusting screw nuts to tighten belts. Belt tightness is correct when belts can be depressed about one-half inch — **with normal thumb pressure** — at a point midway in the belt span. Also make certain that the motor bracket is level. Tighten adjusting screw jamnuts when belt adjustment is correct.
4. Observe power supply voltage, phase and frequency. Connect the electrical supply leads to the drive motor according to the press wiring diagram and the interconnection diagram on the motor nameplate. Refer also to "Electrical Connections" and "Flywheel Rotation" sections of this manual before the motor leads are connected.

ELECTRICAL CONNECTIONS

1. Make certain that the factory line voltage is correct for the press. Electrical requirements for the press are stamped on the Control Data Plate located near the disconnect switch handle on the control enclosure door. Voltage requirements are also listed on the Specification Sheet in the press service manual.

⚠ WARNING

VOLTAGE THAT COULD BE FATAL TO HUMAN LIFE IS PRESENT WITHIN THE ELECTRICAL CONTROL CIRCUITS.

ONLY AUTHORIZED, EXPERIENCED PERSONNEL SHOULD ATTEMPT THE INSTALLATION AND/OR SERVICING OF ELECTRICAL EQUIPMENT.

2. Refer to the wiring diagram shipped with the press for the correct procedure to follow when connecting incoming electrical power.

⚠ WARNING

NEVER CONNECT INCOMING ELECTRICAL POWER TO THE FUSE HOLDER; THIS WILL PREVENT THE DISCONNECT SWITCH FROM TURNING OFF POWER WHEN THE SWITCH IS IN THE OFF POSITION.

3. Make certain that all electrical enclosures and the press frame are properly connected to **earth ground** with an electrical conductor sized to comply with recognized codes. The installation should be in accordance with **your local electrical codes**.
4. Connect the "T" leads to the main drive motor. Check the motor identification plate to make certain that the electrical hookup is correct for the voltage, phase and frequency of the current to be applied. After the "T" leads are connected, check motor rotation for proper electrical phasing. Also, if the press is equipped with an Eddy Current Variable Speed Drive, the coupling control leads must be connected before flywheel rotation can be checked. (Refer to "Flywheel Rotation" section, page C-9, for the proper method of checking flywheel rotation.)
5. If a Minster Eddy Current Coupling is furnished, a separate service manual will be provided to fully explain the operation, adjustment, and troubleshooting procedures for the control. Coupling excitation and related speeds of the Eddy Current Variable Speed Drive are controlled by this solid state control.
6. If any auxiliary equipment is furnished, it will normally require a separate electrical hookup. When connecting electrical service to these items, follow the instructions supplied by the manufacturer of the auxiliary equipment.

DIGITAL METERS *(Optional)*

The press electrical equipment was checked and verified at Minster prior to shipment. If you determine that the accuracy and/or operation of either of the digital meters is questionable, perform the procedure outlined below on the applicable meter.

DIGITAL PERCENT OF LOAD METER CALIBRATION

The switch and potentiometer used for calibration of the Digital Percent Of Load Meter are accessible through a cutout in the rear cover plate of the unit. If the installation does not permit access to these controls, temporarily remove the meter mounting screws and position the unit so that the controls can be adjusted.

⚠ WARNING

WHEN PERFORMING CALIBRATION ADJUSTMENTS, POWER IS PRESENT IN THE PRESS CONTROL AND AT THE METER TERMINAL STRIP. USE EXTREME CAUTION WHEN CALIBRATING THIS UNIT TO PREVENT ACCIDENTAL ELECTRICAL SHOCK.

Equipment Required:

- Clamp-on type ammeter having a range greater than the full load current rating of the main drive motor.
- Small flat blade screwdriver.

To Calibrate The Digital Percent Of Load Meter:

1. Before calibrating the meter, it will be necessary to know the 100% or full load current rating of the drive motor. This amperage figure is shown on the motor specification tag. Take care when checking this item to record only the full load current for the **voltage** being applied. If the motor's full load current (FLA) is not known, check the specification tag **before** starting the motor and record the amount.
2. Start the main drive motor. If output speed is adjustable, set the speed control to a mid-range position. Then allow time for the flywheel speed to stabilize.
3. Using a clamp-on type ammeter, measure the current flowing through one of the drive motor line leads. Record this reading.

   NOTE: The slide must not be cycled during this amperage measurement.
4. To determine the percentage of full load current being used by the motor, divide the ammeter reading recorded in Step 3 by the full load current (FLA) stamped on the motor specification tag.

   Example:

   FLA specification of the drive motor = 48 amps.

   Ammeter measurement = 21.6 amps.

   Percentage of load = 21.6 ÷ 48 = .45 or 45%

   Therefore, the motor is using 45% of its full load current.
5. While holding motor current at the same rate as recorded in Step 3, adjust potentiometer and the High/Low Range Switch (this switch effects circuit adjustment gain only) so that the meter will display the Percent Of Load amount calculated in Step 4.

SERVICING PROCEDURE:

In the event a problem is encountered with the Bul. 490-0248 Digital Percent Of Load Meter, perform the following tests:

1. Check for the presence of 110 volts A.C. between the "A.C." meter terminals 1 (+) and 2 (-). (Voltage must be present.)
2. Check for the presence of signal voltage between the meter "INPUT" terminals 3 (+) and 4 (-). (Voltage should range between 0 and 10 volts A.C. with the drive motor running.)

Results Obtained:

If signal voltage is not present, or is present, but erratic:

1. Check for loose or broken wires attached to the current transformers.
2. Check the current transformers for possible damage, open or shorted windings.
3. If the power supply and signal voltages are present, but the meter does not function, return it to Minster for repair.

   NOTE: Field repair of the Minster Bul. 490-0248 Digital Percent Of Load Meter is not recommended; however, a parts list is available from Minster upon request.
4. If the Digital Percent Of Load Meter is equipped with an optional audible warning device, but the device does not sound when the percentage of load exceeds 100%, perform the following tests:

   A. Check for the presence of 14 volts D.C. (approx.) between terminals 5 (+) and 6 (-) on the meter terminal strip at the same time the meter is displaying a load in excess of 100%.

      NOTE: Motor current will normally exceed 100% for full load while the motor is accelerating from startup. If the press is equipped with an Eddy Current Variable Speed Drive, and the coupling control is equipped with a torque limiter board, it is normal for the motor current to pulse, repeatedly, up to values nearing 150% of full load while the output speed is accelerating.

Results Obtained:

A. If proper voltage is read between "WARNING Device" terminals 5 (+) and 6 (-) when the meter is displaying a load of 100% or more, but the audible warning device does not sound, replace the audible warning device.

   NOTE: Replace the audible WARNING device with an identical type only.

B. If the meter indicates a current draw in excess of 100%, but no voltage is present between "WARNING Device" terminals 5 (+) and 6 (-), even with the audible device disconnected, return the meter to Minster for repair.

When returning a unit to Minster for repair, make certain it is carefully packaged to protect it from damage during shipment. Include, with the unit, a description of the problems encountered and the serial number of the press on which it is used. Also include your purchase order covering the work to be performed and any special shipping instructions concerning return of the unit.

DIGITAL SPEED METER CALIBRATION

The switches and potentiometer used for calibration of the Digital Speed Meter are accessible through a cutout in the rear cover plate of the unit. If the installation does not permit access to these controls, temporarily remove the meter mounting screws and position the unit so that the controls can be adjusted.

⚠ WARNING

WHEN PERFORMING CALIBRATION ADJUSTMENTS, POWER IS PRESENT IN THE PRESS CONTROL AND THE METER TERMINAL STRIP. USE EXTREME CAUTION WHEN CALIBRATING THIS UNIT TO PREVENT ACCIDENTAL ELECTRICAL SHOCK.

Equipment Required:

- Tachometer or other equipment to accurately determine press speed.
- Small flat blade screwdriver.

To Calibrate The Digital Speed Meter:

1. Set the 0-200/0-2000 Switch to the correct range position. (See Figure 5C for switch location.) If maximum speed of the press is 200 S.P.M. or less, place the switch in the 0-200 position. If the maximum press speed exceeds 200 S.P.M., place the switch in the 0-2000 position. (This moves placement of readouts decimal point.)

   NOTE: With the switch in the 0-200 position, the digit on the extreme right side of the display is not used and will remain blank. In this position, the reading is obtained from the first three digits. In the 0-2000 position, the digit on the right is a fixed "0", which will require speed changed in increments of 10 S.P.M. before the display is changed.

2. The High/Low Range Switch extends the range or gain of the fine-adjustment potentiometer and should be used as necessary to achieve correct readout of the press speed. (See Figure 5C.)
3. With the slide cycling continuously at full speed, check the actual number of strokes per minute using an accurate tachometer or other dependable means.
4. Now adjust the potentiometer and the High/Low Range Switch so that the meter will display the correct press speed in strokes per minute.

SERVICING PROCEDURE:

In the event a problem is encountered with the Bul. 490-0246 Digital Speed Meter, perform the following tests:

1. Check for the presence of 100 volts A.C. between the "A.C." meter terminals. (Voltage must be present.)
2. Check for the presence of tachometer generator voltage between meter terminals marked "INPUT" (+) and (-). (Voltage should range between 30 to 60 volts A.C. with the slide cycling at full speed — or drive motor output shaft turning at full speed.)

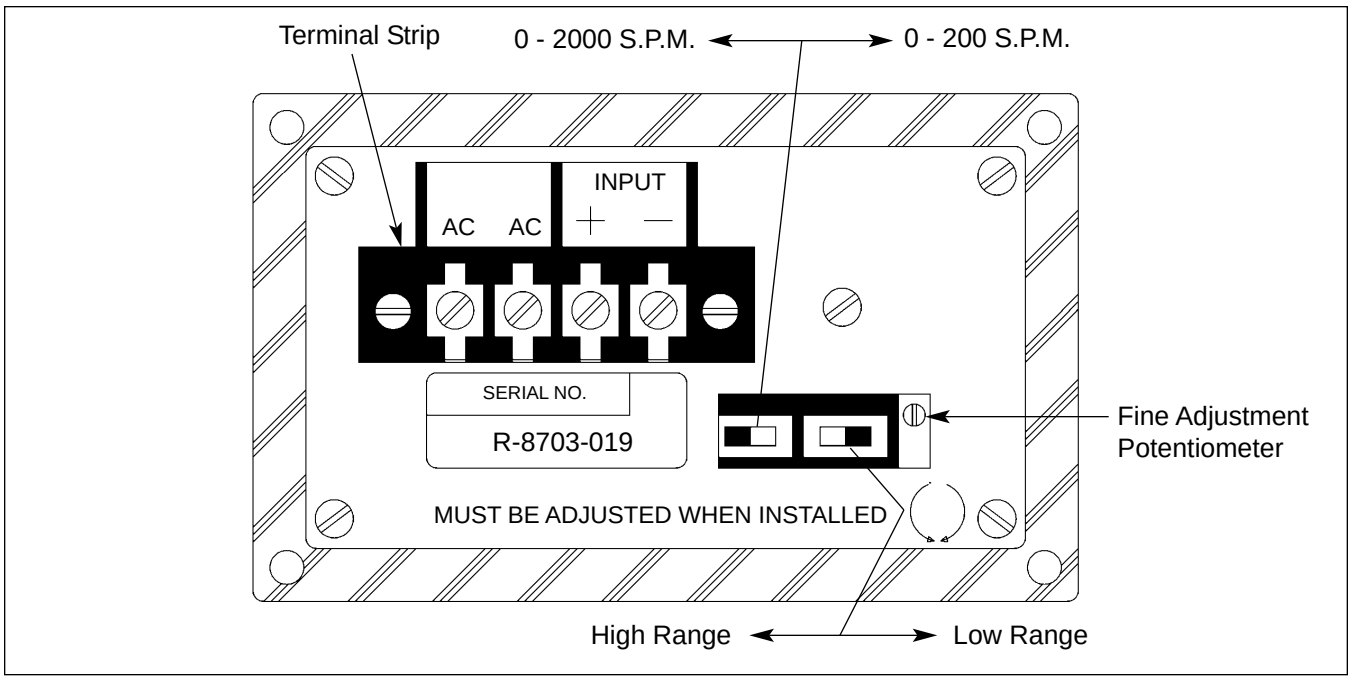


Figure 5C. Rear view of Digital Speed Meter.

Results Obtained

If tachometer generator voltage is erratic or not present, refer to the Troubleshooting Guide provided in the Minster SCRB Eddy Current Coupling Control Manual.

3. If the power supply and tachometer voltages are both present, but the meter does not function, return it to Minster for repair.

   NOTE: Field repair of the Minster Bul. 490-0246 Digital Speed Meter is not recommended; however, a parts list is available from Minster upon request.

When returning a unit to Minster for repair, make certain it is carefully packaged to protect it from damage during shipment. Include, with the unit, a description of the problem(s) encountered and the serial number of the press on which it is used. Also include your purchase order covering the work to be performed and any special shipping instructions concerning return of the unit.

REMOTE CONTROLS

If the controls or other off-press control mountings have been disconnected for ease of shipment, these wires must be reconnected exactly as shown on the electrical diagram shipped with the press. Terminal connections and control wires are numbered on the diagram to simplify wiring.

FLYWHEEL ROTATION

The flywheel is driven by the main drive motor and supplies energy to cycle the slide when the press clutch is engaged. **The flywheel must rotate in the proper direction**!

After the "T" leads are connected to the motor and coupling control leads are connected, if the drive is an eddy current type perform the steps listed below. Start the motor and check the direction of flywheel rotation, but **DO NOT CYCLE THE SLIDE**.

NOTE: Lube reservoir must be filled, the lube system must be operational and the air supplied to the press must be clean, dry, and of sufficient volume for proper device actuation before the drive motor can be started.

To Check Flywheel Rotation:

1. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
2. Place the Stroking Selector Switch in the OFF position.
3. Place the DRIVE MOTOR, FWD-REV Selector Switch (if supplied) to the FWD (Forward) position.

⚠ WARNING

NEVER RUN PRODUCTION WHEN THE MAIN DRIVE MOTOR IS OPERATING IN THE REVERSE DIRECTION.

4. Start the main drive motor.
5. With the main drive motor operating, the rotation of the flywheel (on a flywheel press) or the main gear (on a geared press) will be clockwise when viewed from the left-hand side of the press. (See Figure 6C.)

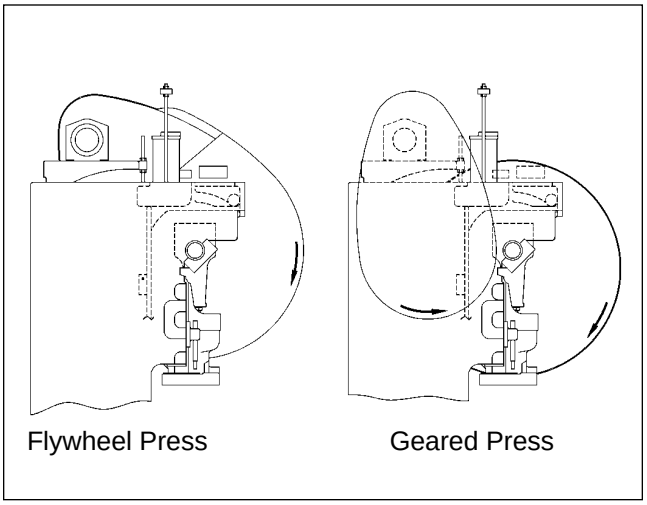


Figure 6C. Flywheel (or main gear) rotation.

6. If the flywheel (or main gear) rotates in the wrong direction, stop the main drive motor. Then turn OFF power to the motor and lock the electrical disconnect switch in the OFF position. Correct the motor and flywheel (or gear) rotation by reversing two of the "T" lead connections at the drive motor.

⚠ CAUTION

DO NOT CYCLE THE SLIDE UNTIL INITIAL LUBRICATION INSTRUCTIONS HAVE BEEN PERFORMED COMPLETELY.

AIR SUPPLY CONNECTIONS

Air supply to the press must be clean, dry, and of sufficient volume for proper device actuation. Supply pressure must be at least 80 to 125 psi (5.5 to 8.6 Bar). In addition to proper air supply pressure, it is the customer's responsibility to install an approved air relief valve — compatible with the pneumatic system — in the facility's air supply line if the air pressure exceeds 125 psi (8.6 Bar.)

NOTE: 1 Bar = 100 kilopascals (kPa)
1 Bar = 14.5038 Psi

Pipe construction from the air mains to a point near the press should be of **new** .75 inch (19 mm) pipe. As the distance from the main line increases, larger pipe will be required for the branch line.

NOTE: Pipe runs should not exceed 50 feet (15 meters) or difficulties from inadequate air pressure could result. All lines must be clean and free of rust.

Accumulated moisture should be removed from the supply line by coolers at the compressor. Any condensation in shop air mains can be controlled by sloping the supply line (in the direction of air flow) with drains installed at the lowest point of each downward run. (**NOTE:** Use a saw-toothed pattern for long pipe runs.) Any branch lines used for air supply to the press should be taken off the top side of the main air lines rather than the bottom.

Approved water separators may be installed ahead of the supply connection on the press (if necessary). Separators and supply tanks should be drained of any accumulated moisture on a daily basis. (Automatic draining water separators are commercially available for this purpose.)

At the press, use a length of .50 inch (12 mm) minimum flexible air hose to connect the press to the branch line because some movement of the press will occur during operation.

For servicing purposes, an air lockout valve is provided on the press. Make certain the valve is closed and locked before performing maintenance procedures on the press. Conversely, make certain the valve is fully open before attempting to operate the press.

INCLINING THE PRESS

Minster Model 101 OBI Series presses are inclinable. Flywheel presses may be inclined to one of four positions: 0º (vertical), 10º, 20º, or 30º. Geared presses may be inclined to one of three positions: 0º (vertical), 10º, 20º. The presses may be inclined as follows:

1. Make certain all power cables and air lines are in a position where they will not be pulled tight or otherwise caught on the press as the press is inclined. Check clearance around the top of the frame, motor, flywheel and gear covers, and press attachments. Move or reroute any object that may be struck as the press is inclined.
2. Loosen the front leg bolts. (See Figure 7C.) Loosen the bolts only enough to allow for movement without binding. **Do not remove the cotter pins that retain the nuts on the front leg bolts**.

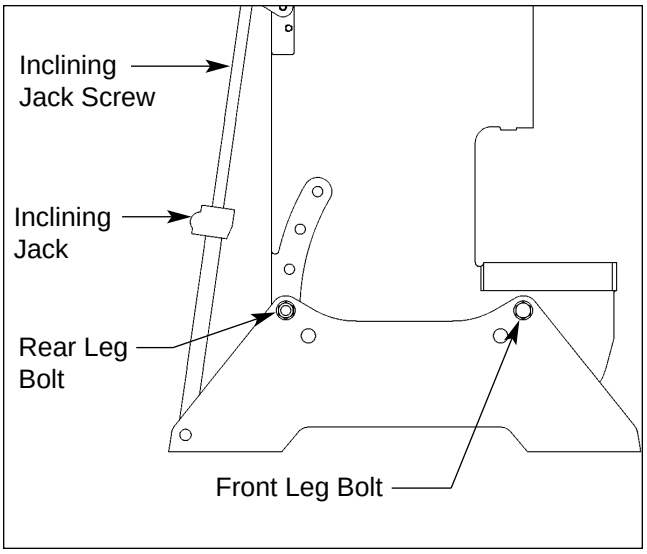


Figure 7C. Inclining the press.

3. Remove the cotter pins and nuts from the two rear frame bolts. Then remove the rear frame bolts from their respective holes.
4. Lubricate the inclining jack screw with an approved lubricant meeting the specifications of Minster Lubricant No. 1.

⚠ WARNING

NEVER ADJUST PRESS INCLINATION BEYOND THE LIMITS OF 0 (VERTICAL) AND 30 .

5. Turn the inclining jack handle to raise or lower the press inclination as desired. Position the press so that the rear frame bolt holes are aligned with the appropriate holes in the legs at the desired 0º (vertical), 10º, 20º, or 30º setting.
6. Insert both rear frame bolts through the aligned holes in the press legs and frame. Install a 1.25” Hex. Nut and flat washer on each bolt and tighten securely. Install cotter pins in the holes provided near the end of the bolts.

⚠ WARNING

NEVER OPERATE THE PRESS WITH THE REAR FRAME BOLTS REMOVED.

7. Tighten the front frame leg bolts.

⚠ WARNING

NEVER FORCE THE INCLINING MECHANISM AFTER THE REAR FRAME BOLTS ARE INSTALLED. PRESS RIGIDITY IS OBTAINED BY TIGHTENING BOTH THE FRONT AND REAR LEG BOLT NUTS. NEVER SUBJECT INCLINING JACK TO INTENSE COMPRESSION OR TENSION.

AUXILIARY EQUIPMENT

Auxiliary equipment (if any) should be cleaned, lubricated and ready to operate before stroking the press for the first time. Follow instructions on tags attached to the equipment. Read and observe operating and maintenance instructions supplied by the manufacturer of that equipment.

PRE-START LUBRICATION CHECK

The press must be lubricated in accordance with instructions contained in the “Press Lubrication” section of this manual. Procedures listed in the “Initial Lubrication” section, page D-3, must be completed before stroking the press for the first time.

All tubing and related fittings in the lubrication system must be checked to make certain they are in good condition. Occasionally, tubing is crushed or torn loose during transit or erection of the press. If any of the lubrication lines or hoses were disconnected for shipping or handling purposes, they must be reconnected at this time.

Minster Model 101 OBI/OBS Series presses are shipped without oil in the lube reservoir. Do not attempt to operate the press without first checking the oil level in the reservoir. Fill the reservoir to the proper level, if necessary, with an approved lubricant meeting the specifications of Minster Lubricant No. 1. (Refer to “General Lubrication Specifications For MINSTER Presses,” Manual No. 507, for recommended lubricants and suppliers.) Auxiliary or customer added equipment should be lubricated in accordance with instructions furnished by the manufacturer of that equipment.

SECTION D

This Section Contains The Following: **Page**

PRESS LUBRICATION

SYSTEM DESCRIPTION

Minster Model 101 OBI/OBS Series presses are equipped with a recirculating oil lubrication system that is mounted at the base of the press frame. Its basic pumping unit consists of a fixed displacement gear pump which provides lubricant to various lube points on the press. The pump is driven by a 1/15 horsepower electric motor through a flexible coupling.

NOTE: Refer to the Lube Schematic (furnished) for specific information pertaining to the lube system.

SERVICE AND MAINTENANCE

Because of its completely automatic operation, periodic checks of the lube system are often either forgotten or ignored. Such neglect could cause eventual bearing failure and costly equipment downtime. Maintenance personnel should make certain that the oil filter is replaced and the reservoir is cleaned at regular intervals. All lubrication lines, hoses, fittings, valves and safety switches should be checked on a regular basis to make certain that they are in good operating condition.

⚠ WARNING

DO NOT CYCLE A NEW PRESS UNTIL IT HAS BEEN PROPERLY LUBRICATED AND TESTED.

Components that comprise the lube portion of the Model 101 OBI/OBS Series presses recirculating pressure lubrication system are described and illustrated in this “Press Lubrication” section of the manual. Also included is service related information such as instructions for draining and refilling the oil reservoir, recommended procedures for replacing the oil filter, a list of lubrication areas, types of lubricants to be used and frequency of resupply. Operating and maintenance personnel should carefully read this section. It is important that they understand the lubrication system so that it may be operated correctly and serviced, as necessary, for continued, efficient operation.

In addition to those functions that relate to normal, daily operation of the lubrication system, a list of subsystem check points — items that should be inspected periodically — are included in the “Press Inspection Check List & Maintenance Record” in Section H. Lubrication system components are included in the comprehensive press inspection check list so that they may be conveniently checked at the same time regularly scheduled press maintenance checks are performed.

RESERVOIR CAPACITY

Never attempt to operate the press without first checking the lube reservoir to make certain it is filled to the proper level with an approved lubricant. (See “Filling And Maintaining Lube Reservoir Oil Level” and “Initial Lubrication” sections of this manual.)

The lube system oil reservoir capacity for Model 101 OBI/OBS Series press sizes is 1.5 gallons (5.67 liters). Actual capacity may vary slightly. The semi-transparent, fiberglass oil reservoir provides a convenient means for checking lubricant level. The reservoir should be filled to 1.50” (38 mm) from the top of the reservoir with an approved lubricant meeting the specifications of Minster Lubricant No. 1. (See “General Lubrication Specifications For MINSTER Presses,” Manual No. 507, for approved lubricants and recommended suppliers.)

FILLING AND MAINTAINING LUBE RESERVOIR OIL LEVEL

To fill the Model 101 OBI/OBS Series press lube reservoir, first turn OFF electrical power to the press. Then open the filler cap on the top of the lube unit reservoir (See Figure 1D, page D-3) and pour in Lubricant No. 1, as necessary, until the oil level is approximately 1.50” (38 mm) from the top of the reservoir. DO NOT OVER FILL. Close the filler cap after the oil is at the recommended level.

IMPORTANT: PRE-FILTERING THE LUBE OIL

Oil should always be filtered **before** being put into use. New oil is not necessarily clean. Therefore, when filling the lube reservoir, install a 10 micron oil filter in the supply line to filter the oil **before** it enters the reservoir.

⚠ WARNING

USE ONLY LUBRICANTS MEETING THE SPECIFICATIONS OF MINSTER LUBRICANT NO. 1. NEVER MIX DIFFERENT GRADES OF OIL OR ADD EVEN A SMALL AMOUNT OF NON-APPROVED LUBRICANT. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE DAMAGE TO THE PRESS AND/OR IMPROPER OPERATION OF THE CONTROL VALVES.

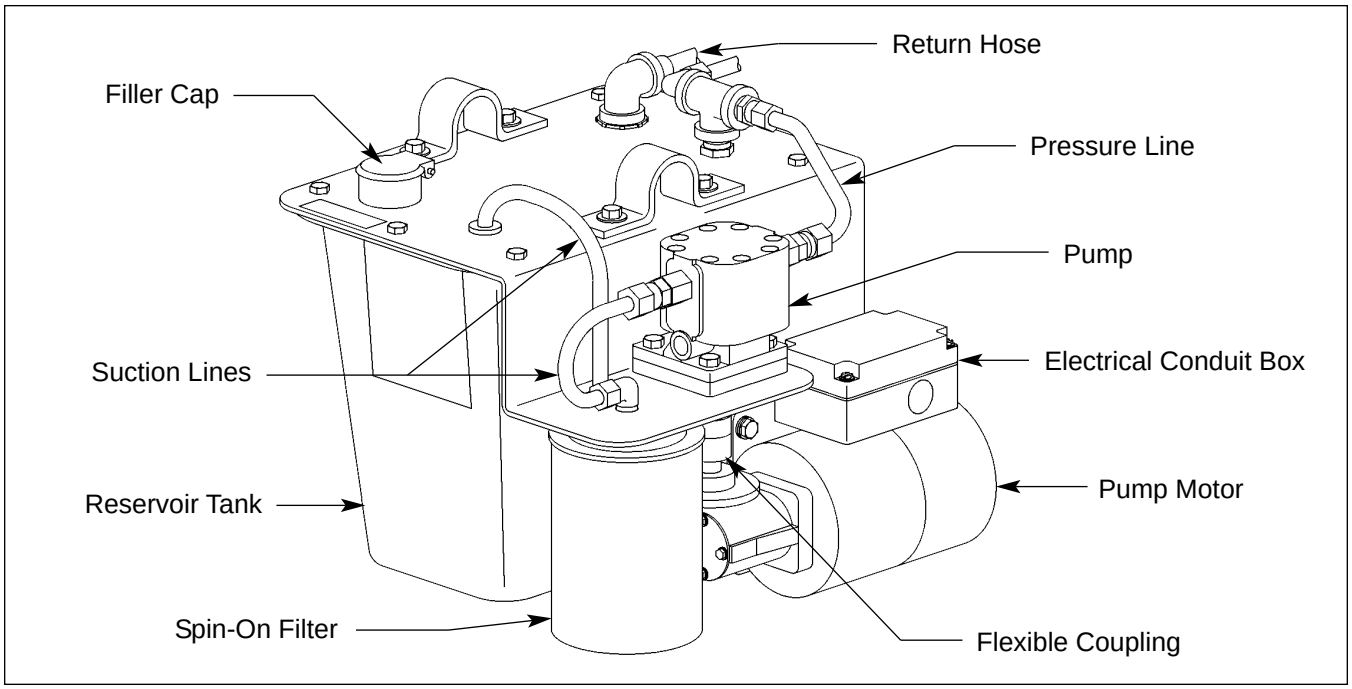


Figure 1D. Model 101 OBI/OBS lube unit.

It is normal for the oil level in the reservoir to lower while the lube system is in operation; however, the level should never be permitted to fall below 2.00" (50 mm) from the bottom of the reservoir — even during CONTINUOUS operation. Add oil, if necessary, to maintain proper level. To prevent over filling, turn OFF electrical power to the press and wait several hours for oil to drain from upper parts of the press to the reservoir.

INITIAL LUBRICATION

The press (and its auxiliary equipment) must be thoroughly lubricated **before** it is cycled. In most cases, dies are not in place when the press is received and their installation should be delayed until the press has been thoroughly lubricated, tested and found to be working properly. Model 101 OBI/OBS Series presses are shipped without oil in the lube reservoir.

⚠ CAUTION

DAMAGE TO THE PRESS DUE TO IMPROPER LUBRICATION IS CONSIDERED WILLFUL NEGLECT; SUCH ABUSE COULD RESULT IN EXTENSIVE REPAIRS AND COSTLY DOWNTIME.

Before operating the press for the first time, or if it is installed in a new location, complete the following checks and procedures:

1. Fill the lube reservoir following the instructions under "Filling And Maintaining Lube Reservoir Oil Level," page D-2.
2. Lubricate the counterbalance cylinder (if furnished). Fill the counterbalance rod cup (located near the top of the cylinder) with Minster Lubricant No. 1. (See Figure 2D.)
3. Pour one-half pint (0.24 liters) into the slide ball box. (See Figure 2D.)
4. Fill clutch/brake air line lubricator and slide adjust motor/die-namic fixture air line lubricator (if supplied) with an approved lubricant meeting the specifications of Minster Lubricant No. 3. (See Figure 2D.) (Refer to "Servicing the Pneumatic System" in Section E for further information.) **Do not over fill**.

   NOTE: Make certain the air line lubricators are set for the proper drip rate.
5. Lubricate the (optional) inclining jack (OBI presses only). Lubricate the jack gear box with one shot of an approved lubricant meeting the specifications of Minster Lubricant No. 2. (See Figure 3D.) Hand lubricate the screw threads with an approved lubricant meeting the specifications of Minster Lubricant No. 1.
6. If the press is equipped with a die cushion, and the die cushion is equipped with a one-shot lubricator, fill the lubricator with Minster Lubricant No. 1 and pull the one-shot lubricator handle. If the die cushion is not equipped with a one-shot lubricator, use a hand oil gun to lubricate the die cushion with one shot of Minster Lubricant No. 1 through the dot fitting provided on the die cushion.
7. Lubricate other applicable points as instructed in the "Summary Of Lubrication Areas" section on page D-9.

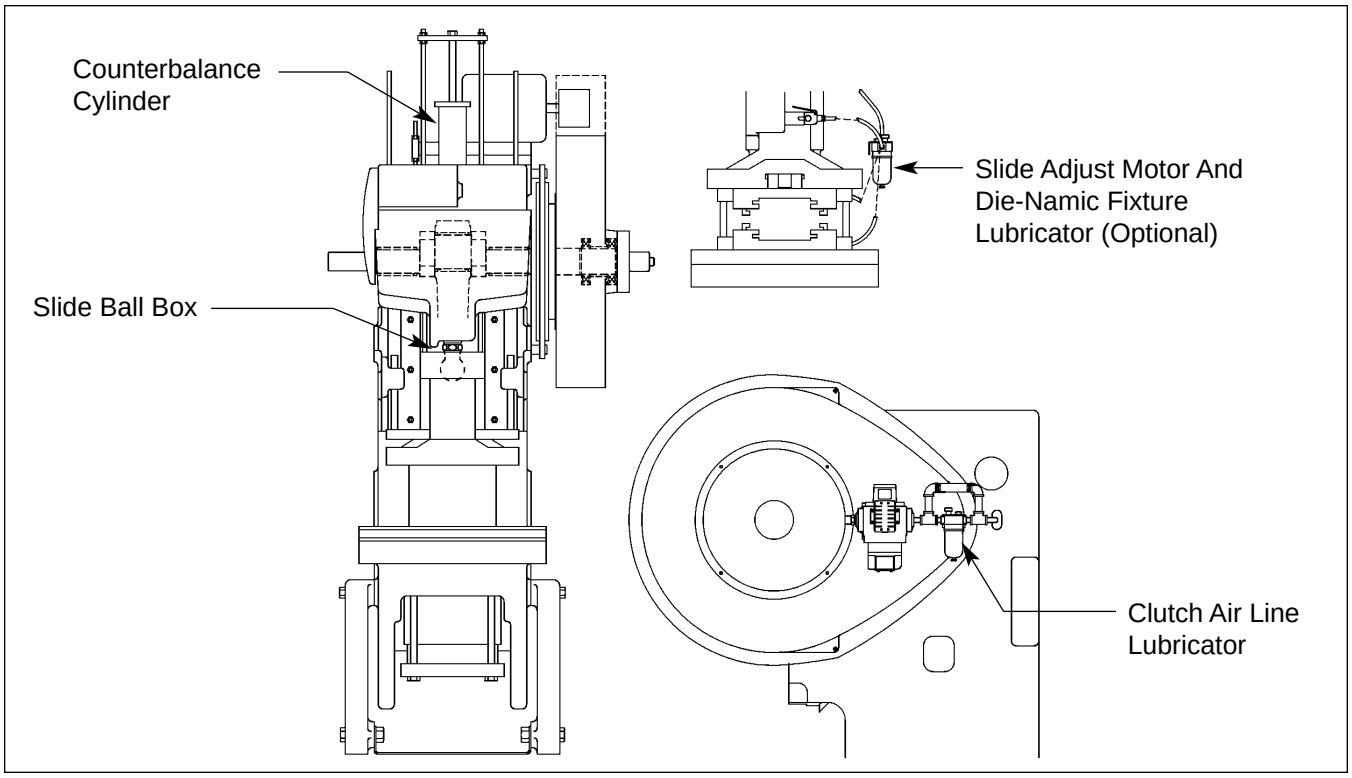


Figure 2D. Press initial lubrication.

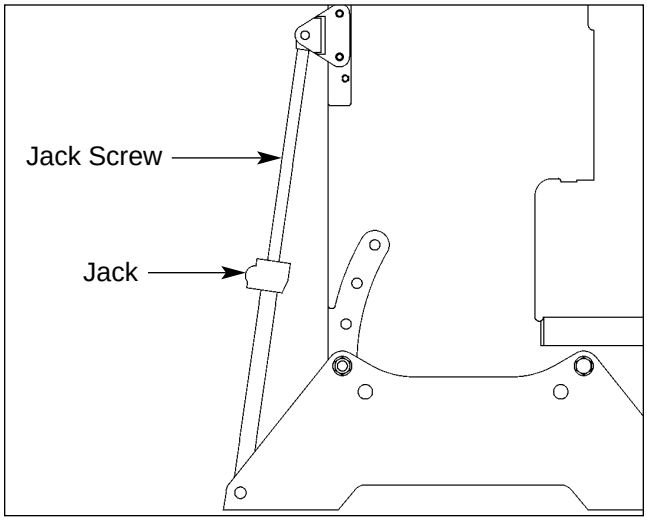


Figure 3D. Jack lubrication.

8. Place the POWER, OFF-ON-BAR Selector Switch in the ON position and place the Stroking Selector Switch in the OFF position. Then start the main drive motor. Allow the lube pump to operate for at least one hour before attempting to stroke the slide.
9. Check the air supply pressure to the press at the inlet(s). Supply pressure should be a minimum of 80 psi (5.5 Bar).
10. Check the clutch air pressure indicated on the associated air pressure regulator at the rear of the press. Normal operating clutch pressure is 55 psi (3.8 Bar).
11. Check the counterbalance air pressure (if applicable) indicated on the associated air pressure regulator at the rear of the press. Normal operating counterbalance pressure is 35 to 45 psi (2.4 to 3.1 Bar).
12. Make certain oil is dripping from the gibs.
13. Check the entire recirculating lubrication system for leaks. Also check for broken fittings, crushed or damaged tubing and hoses. Correct all faults before attempting to stroke the slide.
14. Place the Stroking Selector Switch in the INCH position. Then INCH the slide through several strokes following the procedure outlined under “Test Inching The Slide” in the Operation Manual.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

15. Cycle the slide in the CONTINUOUS mode following the procedure outlined under “Test Stroking The Slide” in the Operation Manual.
16. During the above tests, if any scraping or squealing sounds are heard, or slide motion is stopped automatically due to a lubrication or pneumatic system fault, determine the cause and correct the problem before attempting to cycle the slide any further.
17. After 30 minutes of CONTINUOUS operation, stop the main drive motor. Wait several hours for oil to drain from upper portions of the press, then recheck the oil level in the reservoir. Add lubricant if necessary.
18. Check the condition of the press lubricating oil. The oil must be clean, clear and free of any foreign particles.
19. Replace any covers which may have been removed and tighten their associated mounting screws securely.

OIL CLEANLINESS AND CONTROL

Clean oil is extremely important for maintaining long equipment life and optimum performance. Knowledgeable individuals in the oil industry have stated that . . .*“If oil is kept clean in the reservoir, not overheated and not contaminated, periodically analyzed by a laboratory and is replenished with the proper additives at regular intervals, it will **never** wear out.”*

To achieve this, a program must be established to monitor the condition of the oil and “recondition” it as necessary. Independent testing laboratories are available to test and evaluate the condition of the oil. (See **NOTE** below.) In addition to having the oil tested, an off-line filtration system should be installed to “recondition” the oil and the proper additives must be replenished to renew the oil to a “like-new state” and extend its life indefinitely. Testing is also beneficial in terms of preventive maintenance.

NOTE: It is strongly recommended that only qualified, experienced laboratories conduct these tests. Retain a copy of their test results for your records.

If the equipment user chooses not to establish a “reconditioning” program as mentioned above, the only alternative is to periodically drain the oil at the recommended intervals and refill the reservoir with **new** oil. (See “Changing Oil In The Lube System.”)

Minster reserves the right to void all equipment warranties unless only approved lubricants are used in our presses and auxiliary equipment. The lubricants must be periodically drained at recommended intervals and replaced with new oil or a “reconditioning” program established using qualified, experienced laboratories for testing.

WASTE DISPOSAL

Contaminated oil and oil filters must be disposed of in accordance with local government waste disposal regulations. Clearly mark all receptacles containing contaminated oil.

CHANGING OIL IN THE LUBE SYSTEM

On a new press, the recirculating lube system must be drained and refilled with new oil after the first four (4) weeks of operation. After the initial oil change — if the press is used under normal operating conditions — drain and replace oil in the lube reservoir after every six (6) months or 1300 hours of operation.

NOTE: If the press is used under **abnormal** operating conditions — or if the oil is overheated or becomes contaminated — it is recommended that the oil be changed more frequently.

Follow the procedure outlined below to change the oil in the lube system reservoir:

To Change Oil In The Lube System:

NOTE: The oil filter must be replaced with **a new filter of the same type** each time the oil in the reservoir is replaced. (See “Lube System Oil Filter,” below, for additional information pertaining to the replacement of this filter.)

1. Stop the main drive motor and make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
2. Place the POWER, OFF-ON-BAR Selector Switch in the OFF position and remove the key (if applicable) to lock the switch in the OFF position. Then lock the disconnect switch in the OFF position.
3. Place a support directly beneath the reservoir tank. The support should be high enough to prevent the oil reservoir tank from dropping as its mounting screws are removed.
4. Loosen and remove the six (6) .250” - 20 x .500” long Hex. Head Cap Screws which secure the reservoir tank to the tank mounting flange.
5. Lift the reservoir tank from the support, and dispose of the contaminated oil. Properly mark the receptacle containing the contaminated oil with appropriate labeling and dispose of it in accordance with local government waste disposal regulations.
6. Clean the interior and exterior of the reservoir tank. Wipe the surfaces clean with lint-free rags.

7. Reinstall the reservoir tank, and secure the tank to the tank mounting flange with six (6) .250” - 20 x .500” long Hex. Head Cap Screws.
8. Refill the reservoir following the instructions provided under “Filling And Maintaining Lube Reservoir Oil Level,” page D-2.

LUBE SYSTEM OIL FILTER

The recirculating oil lubrication system on Model 101 OBI/OBS Series presses is equipped with a 25 micron filter on the lubrication unit. (See Figure 1D.) Replace the filter with a new 25 micron filter of the same type after every six (6) months or 1300 hours of operation.

NOTE: The filter element should also be changed whenever oil is changed in the reservoir. If oil is not prefiltered, several filter changes may be required after an oil change.

To Replace The Lube Unit 25 Micron Oil Filter:

1. Stop the main drive motor and make certain the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
2. Place the POWER, OFF-ON-BAR Selector Switch in the OFF position and remove the key (if applicable) to lock the switch in the OFF position. Then lock the disconnect switch in the OFF position.
3. Place a receptacle under the filter to catch oil left in the supply line. Turn the filter housing counterclockwise (as viewed from bottom). Then slip the contaminated filter off the internal pipe stub.
4. Dispose of contaminated filter element and any oil drained from the supply line in accordance with local government waste disposal regulations.
5. Pour an approved lubricant meeting the specifications of Minster Lubricant No. 1 into the new filter to a level which is approximately 1.00” (25.4 mm) from the top of the filter.
6. Apply a light film of oil to the threads and sealing surface of the new filter. Install the new filter and **tighten it securely by hand**.
7. After new filter element is installed, restore electrical power to the press and start the main drive motor. Check for, and correct, any leaks relating to the filter.

LUBE DISTRIBUTION & METERING

Metering Units

Metering blocks serve as both the distribution and metering center of the system. The metering blocks contain small pistons which reciprocate in predetermined order to meter lubricant to the various bearings. Each piston must complete its travel before the following piston will start to move. In case of a plugged or mashed line, the piston cannot move against the solid head of oil and, consequently, none of the other pistons will move. This results in a “no-flow” condition and the flow switch will immediately stop the press. A detailed description on troubleshooting the meter blocks is included in this manual.

To Check the Metering Units:

1. Remove socket head test plugs “A,” (See Figure 4D) closest to the outlet side of each section. If oil surges from one test port, the fault is (probably) beyond the outlet side of the section which spurted oil.

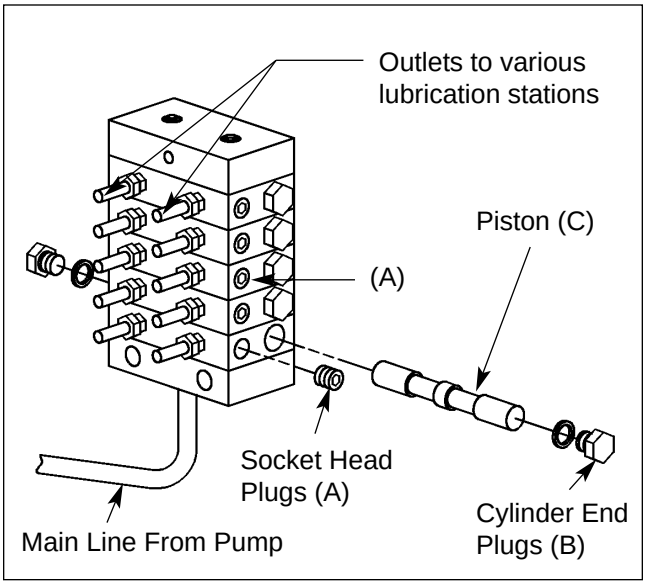


Figure 4D. Distribution and metering block assembly.

2. While test plugs are removed, check assembly by operating oil pump and observing a free flow of oil from test port in each section. No flow of oil (from one test port) indicates a stuck piston in that particular section. If this happens, see Step 4.
3. Replace socket head test plugs one at a time and operate the lube pump after plug is installed. At the same time, observe the lube FAULT light. If lube FAULT light turns ON after a plug is installed, the outlet line in common with the test plug just replaced is probably blocked. Remove the obstruction or replace the mashed tubing as necessary to correct the condition.

4. A jammed meter block piston will not allow oil to flow freely from test port when pump is running. Remove the defective distributor block assembly and place on a clean work location.
5. Loosen and remove hex cylinder end plugs (B) at opposite ends of the jammed piston (C). Try to move the piston back and forth with finger pressure, but DO NOT REMOVE PISTON. Piston should be tight but not immovable.

If unable to loosen from either end, permanent damage has occurred and the section must be replaced.

Flow Switch

Flow of oil through the switch displaces the piston with its enclosed permanent magnet. The magnet in turn, actuates the hermetically sealed switch which permits the press clutch electrical control system to function.

As long as a sufficient flow of oil passes through the flow switch, the press clutch may be engaged in the normal manner. However, if oil is stopped, as explained in the section on meter units, or if flow is severely diminished because of a plugged filter or lack of oil in the reservoir, the flow switch will open, disengaging the press clutch. A LUBE FAULT lamp is included in the circuitry to signal a lubrication system malfunction.

⚠ CAUTION

MAINTENANCE PERSONNEL SHOULD ALWAYS MAKE CERTAIN THAT POWER IS DISCONNECTED WHENEVER LEADS ARE REMOVED FROM THE FLOW SWITCH. GROUNDING ANY OF THE STATIC SWITCH TERMINALS, WITH POWER APPLIED, WILL USUALLY DESTROY THE DEVICE.

To Check The Flow Switch:

To check flow switch for proper operation, perform the following test:

1. Turn OFF power to press.
2. Disconnect the two (2) flow switch leads from the press electrical system. These connections are usually made inside an adjacent conduit box.
3. Disconnect lube lines from flow switch and remove flow switch from the press.
4. Attach the two (2) flow switch leads to a continuity meter. Then, working through the input port, push the piston up through its normal range of travel. (See Figure 5D.)

Results: With piston lifted, switch should indicate closed. Then allow piston to drop to its normal position and switch should remain open. If switch does not open and close as indicated, replace the flow switch.

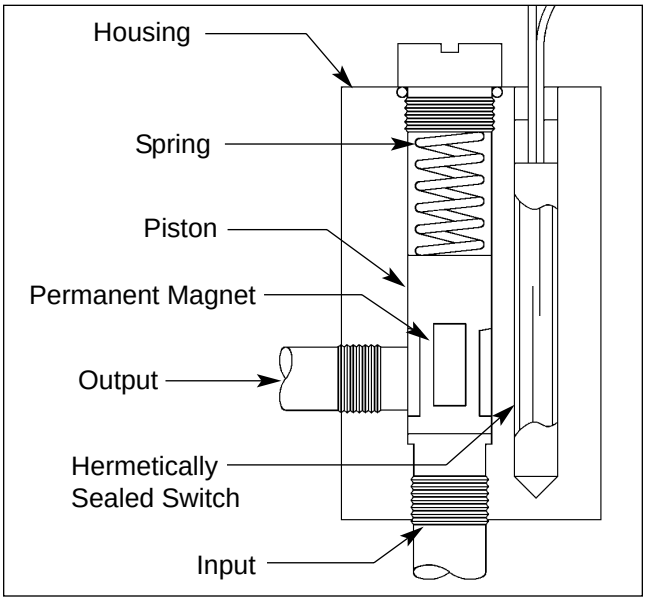


Figure 5D. Flow switch.

Minster Static Switch

Whenever the lube system flow switch is used to control inductive loads or high current circuits, the Minster Bul. 491-0011 static switch is furnished. This is a solid state A.C. switching unit which is completely encapsulated and sealed. Size is comparable to a small terminal block. Use of the static switch permits control of loads up to 500 watts at 120 V.A.C. from the flow switch. Its completely electrical operation provides the additional reliability of no moving parts. Three binding posts are provided for quick electrical connection. They are identified as terminals “A2”, “G” and “A1”. A typical wiring schematic for this device is shown in Figure 6D.

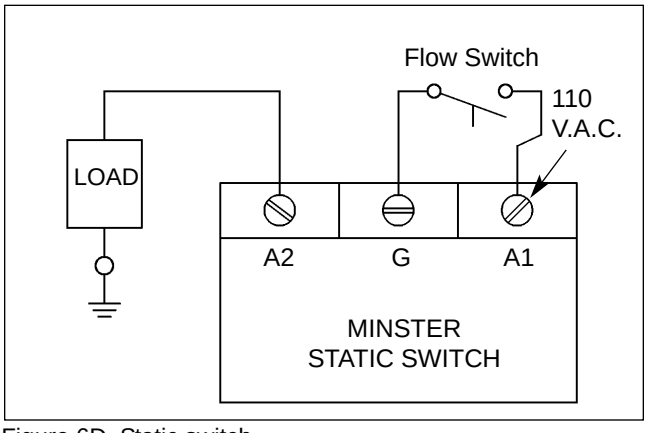


Figure 6D. Static switch.

The flow switch is connected between terminals “G” and “A1”. Closing the flow switch contacts will cause 110 V.A.C. to be applied to the load from terminal “A2”. The other lead from the load should be connected to the press electrical common (press ground connection).

To Check The Static Switch:

If the flow switch is closing normally, but press clutch cannot be engaged and lube fault light is illuminated, check operation of the static switch.

1. With Stroking Selector in the SINGLE STROKE mode and slide positioned at top of stroke, start the lube pump motor. Then check for presence of 110 V.A.C. between terminal A1 and press ground. (See Figure 6D.)

   Results required: 110 V.A.C. should be present at terminal A1.

2. Check for presence of 110 V.A.C. between terminal A2 and press ground.

   Results required: With the flow switch closed, 110 V.A.C. should be present at terminal A2.

3. If no voltage appears between terminal A2 and ground, simulate a closed flow switch by connecting jumper wire between terminals G and A1.

   Results required: 110 V.A.C. should now appear at terminal A2 — if not, static switch should be replaced.

⚠ CAUTION

DO NOT ALLOW JUMPER WIRE TO TOUCH PRESS GROUND.

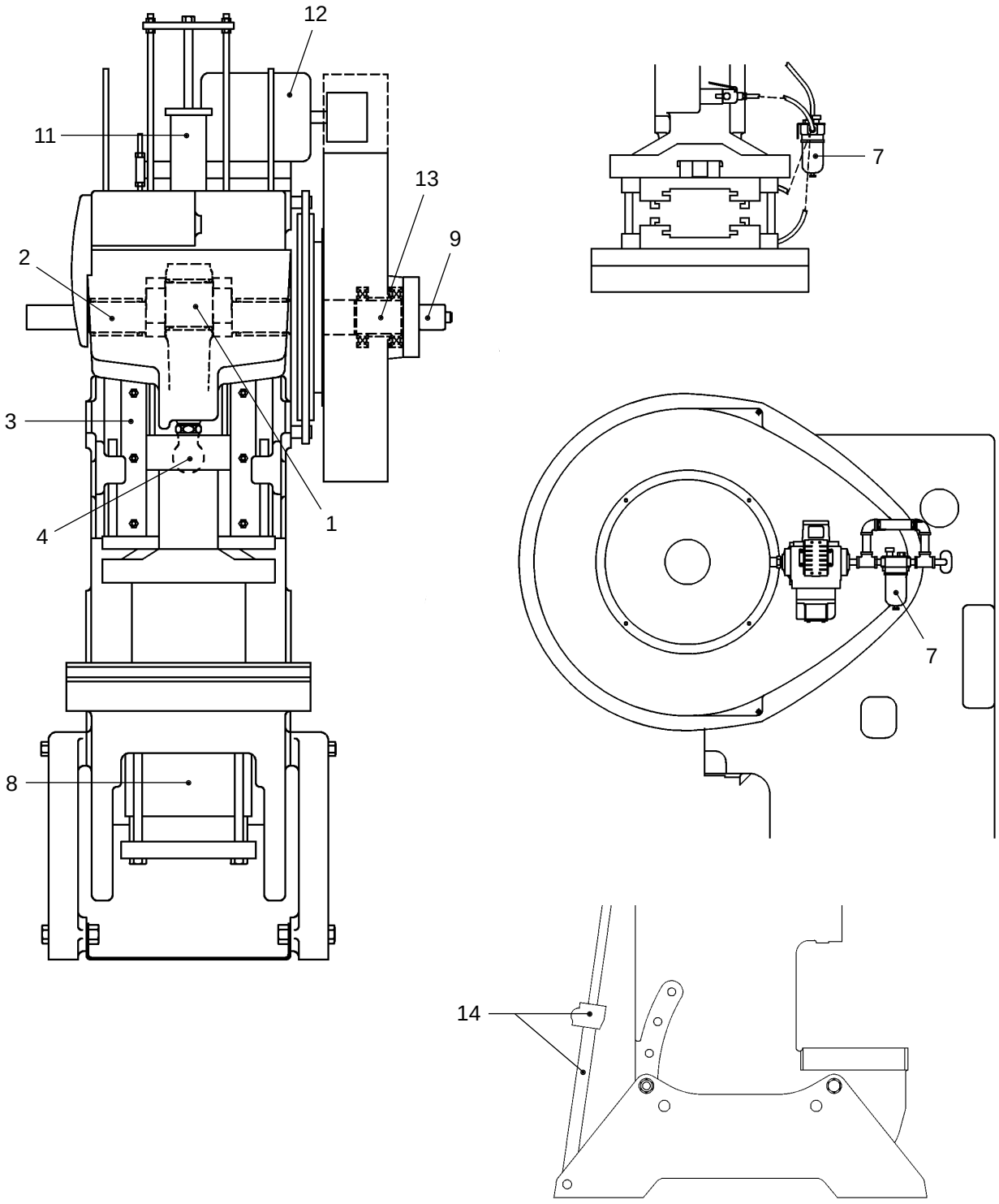
SUMMARY OF LUBRICATION AREAS

(Refer to "Lubrication Areas" on page D-10 for part locations.)

PART LUBRICATED	LUBRICATION INSTRUCTIONS
1. Connection 2. Main Bearings 3. Gibs 4. Ball Box 5. Main Gear Teeth (Geared Press Only) 6. Driveshaft Bearings (Geared Press Only)	These parts are lubricated by the recirculating oil lubrication system. Keep the oil filter clean and check reservoir oil level daily. Oil should appear within 1.50" (38 mm) from the top of reservoir when the pump is not running. With the pump in operation, oil may be lowered, but must always be within 2.00" (50.8 mm) from the bottom of the reservoir. Add oil when needed to maintain the proper oil level in the reservoir. Use an approved lubricant meeting the specifications of Minster Lubricant No. 1. (Refer to "General Lubrication Specifications For MINSTER Presses," Manual No. 507, for a list of approved lubricants and recommended suppliers.) Under normal operating conditions, drain the reservoir and refill with new oil after every 1300 hours of operation.
7. Air Line Lubricator(s)	Check level weekly. Keep lubricator filled with an approved lubricant meeting the specifications of Minster Lubricant No. 3. (Refer to "General Lubrication Specifications For MINSTER Presses," Manual No. 507, for a list of approved lubricants and recommended suppliers.)
8. Die Cushion (If Furnished)	A Minster die cushion is lubricated via a one shot lubricator. The lubricator handle should be pulled once every four (4) hours of operation. Check the lubricator lubricant level daily. Keep the lubricator filled with an approved lubricant meeting the specifications of Minster Lubricant No. 1. (Refer to "General Lubrication Specifications For MINSTER Presses," Manual No. 507, for a list of approved lubricants and recommended suppliers.) **NOTE:** A non-Minster die cushion should be lubricated in accordance the manufacturer's recommendations.
9. Rotor Seal	Lubricate every three (3) months with an approved grease lubricant meeting the specifications of Minster Lubricant No. 2. (Refer to "General Lubrication Specifications For MINSTER Presses," Manual No. 507, for a list of approved lubricants and recommended suppliers.)
10. Flywheel Brake	No periodic lubrication required. (If brake is disassembled, apply a thin coating of Molybdenum Disulfide grease to the inner walls prior to reassembly.)
11. Counterbalance Cylinder (If Furnished)	Check counterbalance rod oil cup monthly and refill as required. Use an approved lubricant meeting the specifications of Minster Lubricant No. 1. (Refer to "General Lubrication Specifications For MINSTER Presses," Manual No. 507, for a list of approved lubricants and recommended suppliers.) If internal seals are replaced, apply a thin coating of Molybdenum Disulfide grease to the inner walls prior to reassembly.
12. Main Drive Motor	Lubricate in accordance with the motor manufacturer's recommendations. DO NOT OVER LUBRICATE.
13. Clutch Flywheel Bearings	Flywheel bearings on Model 101 OBI/OBS presses equipped with Type 26-CFC clutches and smaller require no periodic lubrication. Flywheel bearings on presses equipped with Type 28-CFC and larger clutches should be checked every six (6) months. Bearings on these clutches should be repacked, if required, with an approved lubricant meeting the specifications of Minster Lubricant No. 2. (Refer to "General Lubrication Specifications For MINSTER Presses," Manual No. 507, for a list of approved lubricants and recommended suppliers.)
14. Inclining Jack	Hand lubricate screw threads monthly with an approved lubricant meeting the specifications of Minster Lubricant No. 1. Lubricate the jack gear box every twelve (12) months with an approved grease lubricant meeting the specifications of Minster Lubricant No. 2. (Refer to "General Lubrication Specifications for MINSTER Presses," Manual No. 507, for a list of approved lubricants and recommended suppliers.)

LUBRICATION AREAS

(Refer to "Summary of Lubrication Areas" on page D-9 for lubrication instructions.)



SECTION E

This Section Contains The Following: **Page**

PRESS SERVICING

Regulations require employers to establish and follow a program of regular periodic power press inspection. Additionally, records of the inspection and maintenance work performed must be kept. This portion of the manual is intended to describe servicing procedures applicable to various components on the press. Suggested inspection procedures and a press inspection check list are included in this manual beginning on page I-4.

SAFETY PRECAUTIONS

It will be necessary to momentarily turn on electrical power and pressurize the pneumatic and lubrication system in order to complete some of the press inspection checks.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS ARE CLEAR OF ANY PINCH POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT BEFORE THE POWER IS TURNED ON.

As a precaution against accidental starting during any press inspection, or while maintenance work is being performed, it is suggested that WARNING tags be attached to the press controls. The tags serve as a warning to others that someone is working on the press. Some sample WARNING TAGS are shown in Figure 1E.

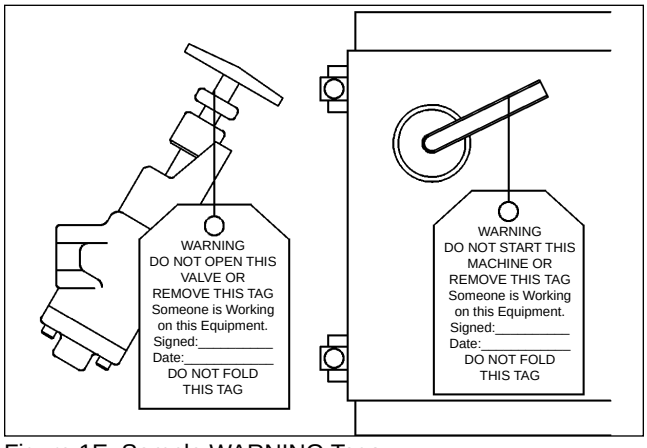


Figure 1E. Sample WARNING Tags.

LOCKABLE SWITCHES & VALVES

During service procedures, it is sometimes necessary to shut off pneumatic or electrical power to prevent accidental operation of press components and possible injury to service personnel. Regulations require that certain valves and switches must be lockable to prevent unauthorized release of hazardous energy until all service procedures are completed and all personnel are safely out of danger areas. **It is the user's responsibility to make certain that lockout procedures meet all applicable safety requirements**.

For further information on lockout procedures, refer to the section entitled "Lockout Procedures for Mechanical Power Presses" in the "Minster Power Press Safety Manual," Manual No. 805 (furnished).

⚠ WARNING

FOLLOW THE LOCKOUT PROCEDURES AS ESTABLISHED BY YOUR EMPLOYER.

SERVICING THE PNEUMATIC SYSTEM

Air supply to the press must be clean, dry, and of sufficient volume for proper device actuation. Supply pressure should be at least 80 to 125 psi (5.5 to 8.6 Bar). (See section entitled “Air Supply Connections,” page C-9.) In addition to proper air supply pressure, it is the customer’s responsibility to install an approved air relief valve — compatible with the pneumatic system — in the facility’s air supply line if the air pressure exceeds 125 psi (8.6 Bar).

On Model 101 OBI/OBS Series presses, the pneumatic system is used for the air operated clutch/brake and flywheel brake (standard). The pneumatic system may also include a counterbalance cylinder, die cushion, slide adjustment motor, and air blow-off (for part ejection).

Additional pneumatic system components may include air filter(s), air tank(s), air lockout valve(s), air pressure regulator(s), solenoid air valves, and air pressure switches. The size and amount of supporting pneumatic equipment (such as piping, pressure regulators, pressure switches) varies with the type and number of basic air components installed by Minster and may include optional items needed for the operation and control of customer-furnished equipment. The following descriptions apply to typical pneumatic components usually installed on Model 101 OBI/OBS Series presses.

AIR LOCKOUT VALVE

An air lockout valve is provided on the press to control the air supply to the press. It is normally on the left-hand rear of the press. (See Figure 2E.) Shut **OFF** the air supply to the press, close and “lock” the valve, and relieve any residual pressure **before** attempting to service any pneumatic system component. Conversely, make certain the valve is fully open and air pressure restored **before** attempting to operate the press.

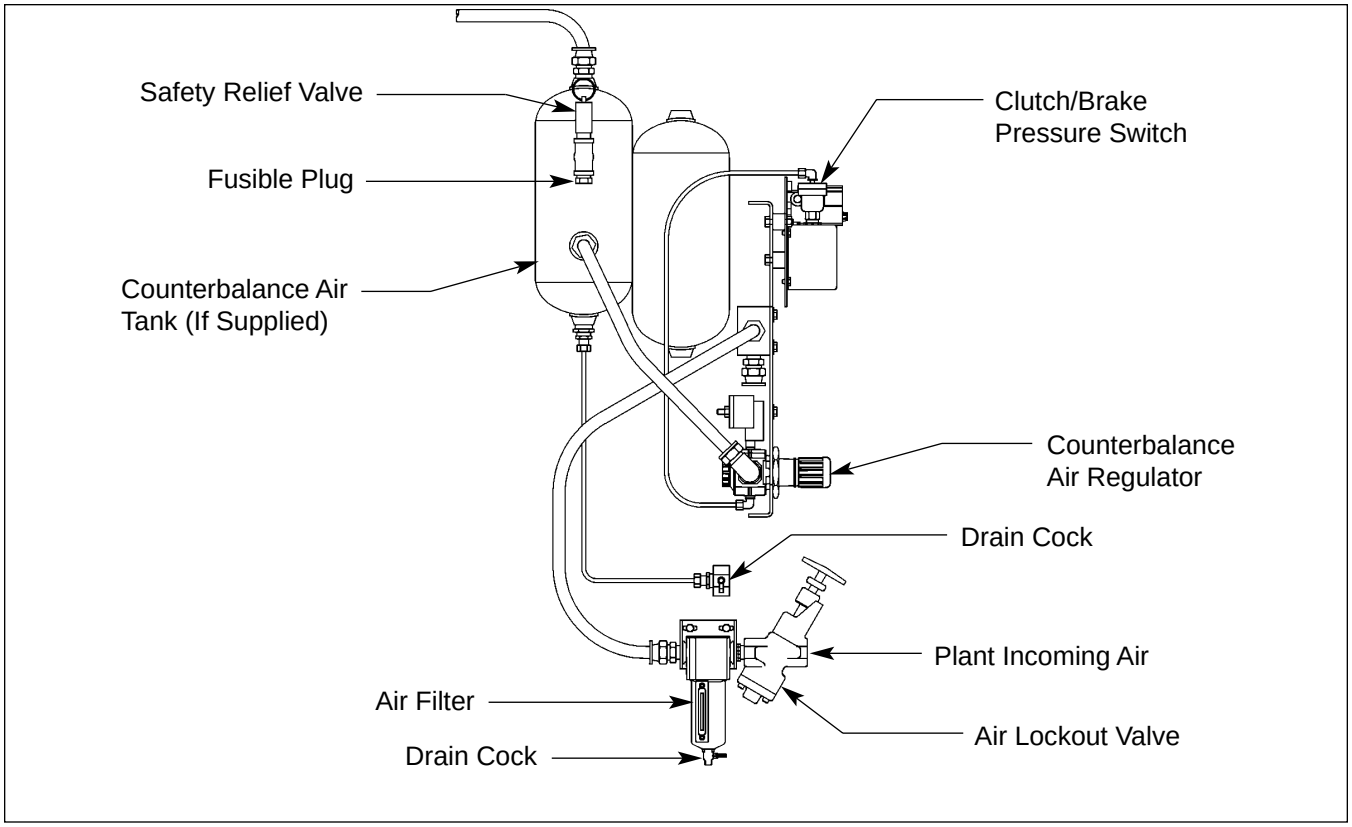


Figure 2E. Pneumatic system components located inside press frame.

⚠ WARNING

AFTER OPERATING AND LOCKING THE AIR LOCKOUT VALVE, OPEN ALL BLOWDOWN VALVES TO BLEED RESIDUAL PRESSURE. FOLLOW THE LOCKOUT PROCEDURES AS ESTABLISHED BY YOUR EMPLOYER ACCORDING TO REGULATIONS.

AIR FILTER

Moisture may enter the pneumatic system along with the shop air supply or form within the system as a result of temperature or humidity changes. Seasonal weather changes can also cause large amounts of moisture to form quickly. On Model 101 OBI/OBS Series presses, an air filter is provided to trap moisture and foreign matter which may enter the pneumatic system with incoming air. The filter is located on the left-hand rear of the press. (See Figure 2E.) A drain cock, located at the bottom of the filter, may be opened whenever filter drainage is necessary. Before opening the drain cock, close the air lockout valve and release system pressure.

AIR PRESSURE REGULATORS

(Ref. Figure 3E)

Air pressure regulators are provided on the press to control the amount of air pressure to the clutch/brake and counterbalance cylinder (if provided). A regulator is also supplied to control air pressure to the (optional) die cushion. Air pressure to the clutch/brake should be 55 psi (3.8 Bar) while the air pressure to the counterbalance cylinder should be 35 to 45 psi (2.4 to 3.1 Bar). Air pressure to the die cushion (if provided) is dependent upon customer requirements. To adjust the air pressure, turn the regulator handle until the desired pressure is indicated on the associated air pressure gauge. Turn the regulator handle clockwise to increase, counterclockwise to decrease, air pressure.

Check the air pressure regulators during each regular monthly press inspection. Make certain the associated pressure gauge reads correctly and that the regulation of pressure is accurate. Replace a worn or improperly operating regulator with a new one.

AIR PRESSURE GAUGES

(Ref. Figure 3E)

Air pressure gauges are provided to indicate air pressure at the outlet side of each regulator. Check the gauges during each regular monthly press inspection. Make certain the gauges are accurate and in good condition.

SOLENOID AIR VALVES

(Ref. Figures 4E and 7E)

Electrically-actuated solenoid air valves open or close in response to electrical impulse. They admit air pressure into an air-operated component, or stop the flow of air, and may also exhaust air pressure from the component. On Model 101 OBI/OBS Series presses, a solenoid air valve is used to control actuation of the clutch/brake, flywheel brake, and air blowoff (if applicable.)

Check the operation of the solenoid air valves once each month. Inspect for air leakage and make certain that response is immediate and snappy. Replace the complete solenoid valve if it is worn or working improperly.

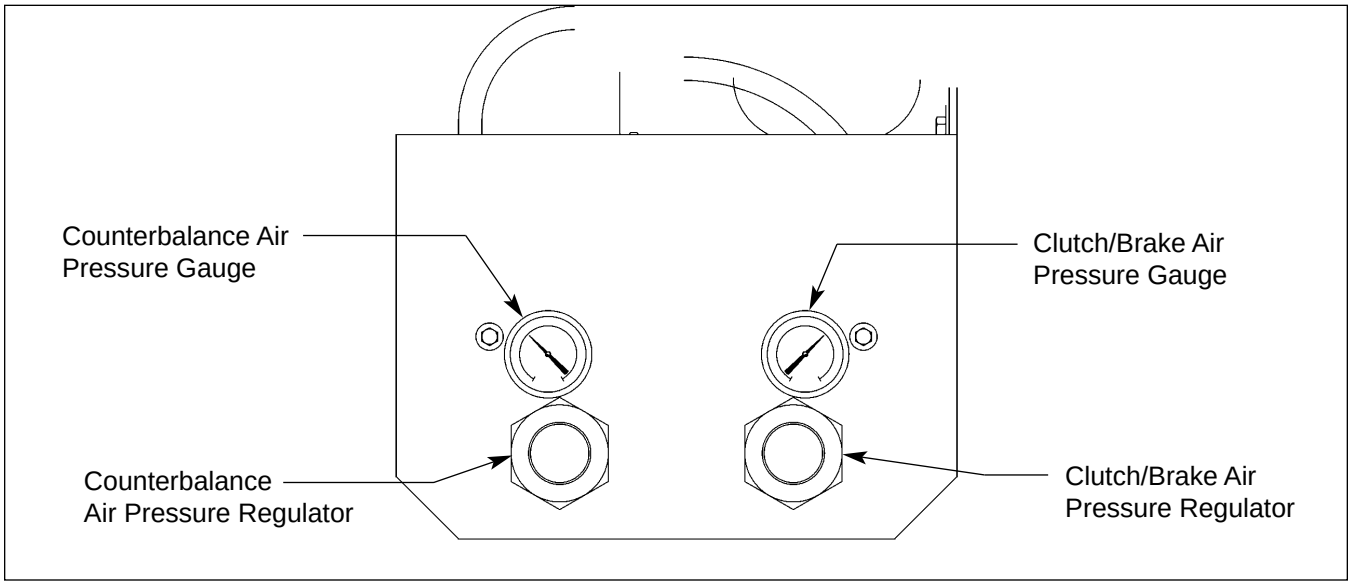


Figure 3E. Air pressure regulators (at rear of press.)

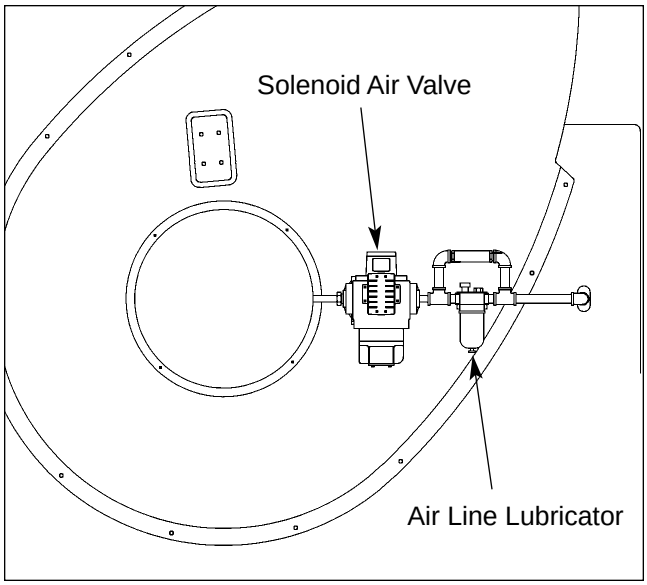


Figure 4E. Clutch/brake air components.

AIR PRESSURE SWITCHES

Regulations require automatic deactivation of the clutch control in the event of counterbalance or clutch/brake air supply failure. Pressure switches installed downstream from these components (connected so as to deactivate the main drive motor when insufficient air pressure is detected) is a method of meeting that requirement.

The pressure switches for the clutch/brake and counterbalance cylinder (if provided) are grouped on a electrical box in the rear cavity of the press so that air pressure used to actuate the controlled device can be monitored. The purpose of these pressure switches is to prevent starting of the main drive motor if the pressure applied to the pressure switch does not meet or exceed a preset minimum. The counterbalance pressure switch is factory preset at 20 psi (1.4 Bar). The clutch pressure switch is preset at 35 psi (2.4 Bar). The preset values for these switches should NOT be changed.

A pressure switch is included in the flywheel brake assembly. It is located on the flywheel brake base plate which is mounted on the rear of the press. The purpose of this pressure switch is to prevent starting of the main drive motor if the flywheel brake is engaged. The flywheel brake pressure switch is factory preset at 20 psi (1.4 Bar) and should NOT be changed.

Include a check of the pressure switches once a month. Replace a worn or improperly operating pressure switch with a new unit.

AIR LINE LUBRICATORS

An air line lubricator is used to supply a fine spray of lubricant to the clutch solenoid air valve. An additional lubricator is supplied if the press is equipped with motorized slide adjustment. A mist of rust-inhibited, light turbine oil should be carried by the flow of air into the solenoid valve (and slide adjust motor, if provided) to help keep it working freely and to prevent corrosive action of moisture that was not trapped by the air filter.

On Model 101 OBI/OBS Series presses, the air line lubricator for the clutch solenoid air valve is normally mounted on the clutch cover. (See Figure 4E.) The lubricator for the slide adjust motor is normally mounted on the right-hand side of the press. (See Figure 5E.)

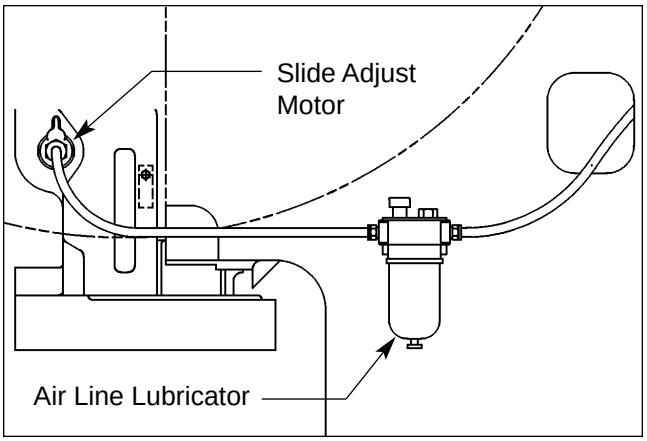


Figure 5E. Slide adjust components.

An arrow is included on the body of the lubricator to show the direction that air must flow through it. If the unit is removed from the press, for any reason, make certain that it is reinstalled with the arrow pointing in the direction of air flow.

To Fill The Air Line Lubricators:

1. Turn OFF the air supply to the press by closing the air lockout valve.
2. Exhaust air pressure in the line connected to the air line lubricator.
3. Unused oil may be drained from the unit, if necessary, by opening the drain cock at the bottom of the lubricator bowl. Collect oil in a suitable container and dispose of it in accordance with local government waste disposal guidelines.
4. Remove the fill plug from the lubricator.
5. Make certain that the drain cock is fully closed. Then fill the lubricator to the line on the bowl with an approved lubricant meeting the specifications of Minster Lubricant No. 3. (Refer to “General Lubrication Specifications For MINSTER Presses,” Manual No. 507, for recommended lubricants and suppliers.) **Do not over fill**.

6. Replace the fill plug and tighten securely.
7. Open the air lockout valve to restore air pressure to the press.

IMPORTANT: NEVER allow the lubricator to run dry. Check oil level in the lubricator bowl at least once a month.

To Adjust The Clutch/Brake Air Line Lubricator:

NOTE: The clutch/brake air line lubricator must be set to drip oil into the fog generator at a rate of **one drop for every 25 to 50 clutch engagements**.

1. Remove any covers or guards, if necessary, to obtain access to the air line lubricator.
2. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced. Then place the POWER, OFF-ON or POWER, ON-OFF-BAR Selector Switch (whichever is applicable) in the ON position and the Stroking Selector Switch in the INCH position.
3. Start the main drive motor.

⚠ WARNING

THE SLIDE WILL MOVE WHEN THE INCH BUTTONS ARE DEPRESSED. MAKE CERTAIN TO AVOID CONTACT WITH PRESS MOVING MEMBERS.

NOTE: Two (2) people are required to complete the following procedure.

4. While an assistant (i.e., press operator or other maintenance personnel) intermittently depresses the INCH buttons to engage the clutch, observe the sight-feed dome on the lubricator and watch for the first drop of oil.
5. When the first drop of oil is observed, the person depressing the INCH buttons should begin to count the number of clutch engagements while the person observing the lubricator watches for the next drop. The correct interval is one drop of oil for every 25 to 50 clutch engagements. If the next drop occurs within the correct interval, no adjustment is necessary. Replace any covers previously removed and tighten their associated mounting screws securely.
6. If the next drop does not occur within the correct interval, the drip rate should be adjusted as outlined in Steps 7 thru 11.
7. Stop the main drive motor and place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely.

⚠ WARNING

NEVER ATTEMPT TO ADJUST THE AIR LINE LUBRICATOR WHILE THE FLYWHEEL IS ROTATING OR THE DRIVE MOTOR IS TURNED ON.

8. Place the POWER, OFF-ON or POWER, OFF-ON-BAR Selector Switch (whichever is applicable) in the OFF position and remove the key to lock the switch in the OFF position. Then lock the disconnect switch in the OFF position.
9. Release the lock on the lubricator's adjustment knob by lifting the red lock ring.
10. Adjust the drip rate by turning the adjusting knob counterclockwise to increase flow or clockwise to decrease the flow. Then push the red lock ring (on the adjusting knob) DOWNWARD to lock the setting.

    NOTE: Always lock the setting after making an adjustment in the drip rate. The unit can also be made tamper resistant (after locking) by installing a seal-wire between the red lock ring and the adjusting knob.
11. Start the main drive motor. Then place the POWER, OFF-ON or POWER, OFF-ON-BAR Selector Switch (whichever is applicable) in the ON position and the Stroking Selector Switch in the INCH position.
12. Repeat Steps 2 thru 11, as necessary, until oil drips from the lubricator at the correct rate.
13. Replace any covers that were previously removed and tighten their associated mounting screws securely.

To Adjust The Slide Adjust Motor Air Line Lubricator:

1. Stop the main drive motor and make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
2. Turn the lubricator adjustment knob fully clockwise until no further adjustment can be made. Then set the adjusting knob for a minimum oil flow by turning the knob slightly counterclockwise.

COUNTERBALANCE SYSTEM

Theory of Operation

Counterbalances on mechanical power presses are used to offset or counterbalance the weight of the press slide and upper die. Air counterbalances are usually air cylinders mounted in the press frames and connected by the cylinder rod or rod brackets to the press slide. (See Figure 6E.) Included in the system is a safety pop-off valve, fusible plug and water drain plumbed to the cylinders. (See Figure 2E.) A check valve is usually found within the system to prevent a sudden loss of pressure (located just after the regulator.) A pressure switch or transducer should also be included (also located after the regulator) to detect when the pressure falls below a minimum level to prevent press operation.

As the counterbalance piston travels down in the stroke the volume decreases therefore pressure increases taking out the slide's bearing clearances. As the piston travels up in the stroke the volume increases thus decreasing pressure allowing lubrication of the bearings to occur.

The counterbalance system assists in the following:

- Maintains and reduces bearing clearance
- An aid to maintain main to pinion gear contact
- Aids press drive to overcome slide dynamics
- Aids shutheight adjust mechanism to raise or lower the slide

IMPORTANT:

Before making any shutheight adjustments, make certain air pressure to the counterbalance has been properly set to balance the weight of the slide and attached die. Failure to properly adjust counterbalance air pressure may result in damage to the slide adjust mechanism.

NOTE: If no die is installed, counterbalance air pressure should be set at balance point (0 die weight.)

⚠ CAUTION

NEVER OPERATE A COUNTERBALANCED PRESS WITHOUT PROPER AIR PRESSURE APPLIED TO THE COUNTERBALANCE SYSTEM.

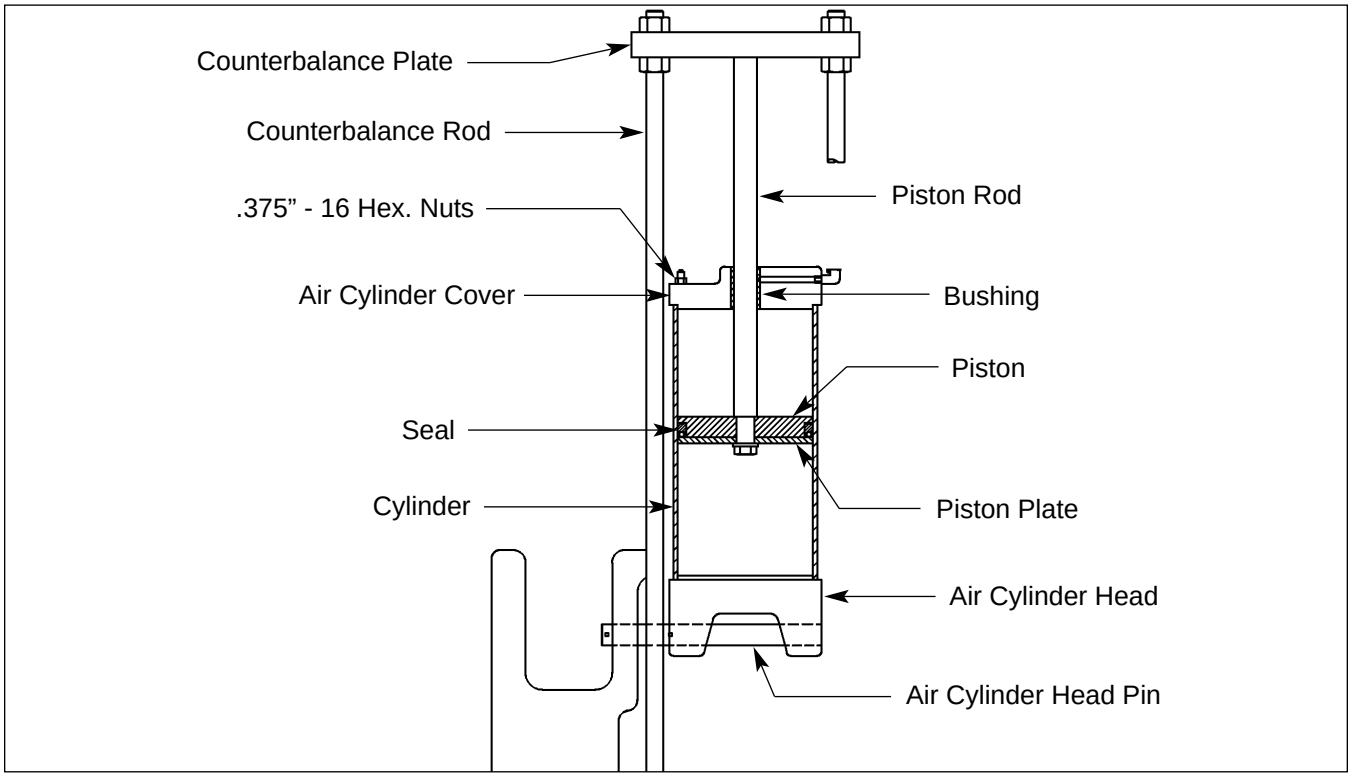


Figure 6E. Counterbalance cylinder.

Air Pressure Adjustments

The counterbalance air pressure can be regulated to offset various die weights by adjustment of the associated air regulator. An accurate and reliable pressure gauge and regulator must be part of the system. A counterbalance data plate (see Figure 7E for an example) should be attached to the press and may be used as a guide in setting the correct operating pressure.

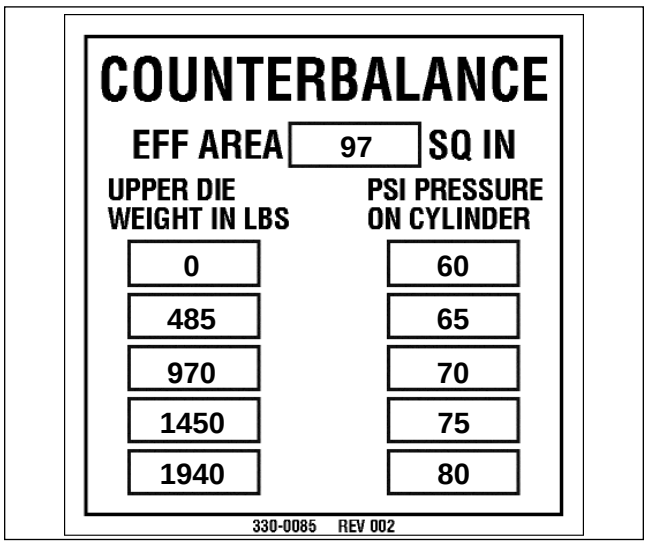


Figure 7E. Counterbalance data plate.

The plate indicates the amount of air pressure required for zero die weight and other selected amounts. The Minster data plate has a box marked as effective area (EFF. AREA XX SQ IN.) This effective area is the total square inches of surface area of your counterbalance cylinder pistons. In Figure 7E shown, with 1 psi the system will provide 97 lbs. of lift. Thus if it takes 60 psi to balance just the slide, the slide would weigh 5820 lbs., (60 lbs./in^2 x 97 in^2.) Any pressure above 60 psi is being used to balance the upper die weight. Thus if the die weighed 970 lbs. it would take 10 psi (970 lbs./ 97 in^2) plus 60 psi, or a total of 70 psi to balance the slide and upper die weight.

Each data plate is calibrated for specific use on the machine to which it is attached; retain its usefulness by checking the accuracy of the counterbalance pressure gauge frequently. If the data plate is missing from your Minster press, a replacement can be obtained from Minster (Minster part no. 330-0085.)

Determining Die Weight

Dies should have upper, lower and total die weight clearly identified to facilitate both safe die handling and correct counterbalance setting. Safety laws require that dies be stamped to indicate upper die weight for proper air counterbalance pressure adjustment and to assist in handling the total die during transport.

A general rule of thumb to determine the weight of your upper die is the following:

Take the length x width x height in inches of the upper die and divide by 4. Dividing by 4 is the same as multiplying by 0.25 (Approx. 0.283 LBS/in^3 minus the holes.)

Alternate Methods of Air Pressure Adjustment

Balancing Slide and Die Weight

If the upper die weight is not known, the following procedure can also be followed:

1. With the die installed INCH slide until it reaches a point midway up in the stroke.
2. Turn off the main drive motor and make certain flywheel has stopped turning completely.
3. Adjust counterbalance pressure to approximate the lift required to balance the slide and upper die weight.
4. Release clutch/brake by tapping the INCH buttons repeatedly and observe slide movement while actuating the INCH buttons. (As previously instructed-Flywheel must be STOPPED during the test.)
5. Adjust air pressure slowly until counterbalance holds the slide at the midstroke position while the INCH buttons are being actuated.

NOTE: Excessive counterbalance pressure will force the slide upward and conversely, low pressure will allow the slide to drift downward as the clutch/brake is momentarily released.

Percent of Motor Load

Counterbalance air pressure can be set by observing the press percent of load meter, or an ammeter in the main drive motor circuit. The upper die should be installed, but with no material being fed into the die. Then cycle press continuously, by holding INCH buttons depressed. Adjust counterbalance pressure until meter (percent of load meter or ammeter) registers minimum swing or deflection.

As an example assume the counterbalance pressure is low. As the slide travels up in the stroke the motor struggles to lift the weight of the slide/die thus the motor load increases. As the slide travels down in the stroke the motor is more free thus the motor load decreases. This action results in a swing from high to low motor load. Adjust the counterbalance pressure so that the swing in motor load is at a minimum.

Effects of Improper Pressure

Having insufficient counterbalance air pressure can lead to the following:

- Linkage clearances are opened causing hammering and die bounce
- Sags on heavier end of slide
- Motor and flywheel are required to lift unbalanced weight to top of stroke causing excessive strain on motor and clutch
- Low pressure may allow downward movement when clutch and brake are released
- Cause damage to the slide adjust mechanism
- Cause increased wear on bearings & gears

Having excessive counterbalance pressure can lead to the following:

- Excessive pressure may force slide upward when clutch/brake is released
- Takes energy out of the flywheel
- Adds additional force to start/stop
- Raises energy/air cost
- Adds force on drive components and may cause more wear.
- May not allow proper lubrication
- Cause damage to the slide adjust mechanism
- Cause increased wear and damage to bearings and gears

Both cases may have adverse effects on the bearings, gears and slide adjust mechanism.

⚠ CAUTION

IMPROPER COUNTERBALANCE AIR PRESSURE MAY CAUSE DAMAGE TO THE BEARINGS, GEARS AND SLIDE ADJUST MECHANISM. MAKE CERTAIN TO PROPERLY ADJUST COUNTERBALANCE PRESSURE BEFORE ADJUSTING SLIDE SHUTHEIGHT.

Service and Maintenance

Oil and other moisture accumulated in the bottom of counterbalance cylinders must be drained once a week - more often if necessary. An accumulation of oil or other liquid may form a type of hydraulic lock inside the cylinder, a condition that could cause extensive damage to cylinders and other press parts. Start the draining procedure by relieving all air pressure within the cylinders and surge tanks – then open the drain cocks and wait for moisture to drain completely.

With air pressure turned off, check tightness of counterbalance mounting bolts, rods and brackets. Perform this check at least once per month. At the same time check alignment of the cylinder with slide. A monthly check should be made of lubrication lines and associated fittings connected to the counterbalance. Make certain that they are not pinched shut, broken or leaking.

Once a month, counterbalance cylinders and the supply lines should be checked for leaks. The air supply lines should also be checked visually, for cracked and damaged fittings.

Re-Applying Air After Shutdown

After shutting off the incoming air supply to the press, do not open up the air lockout valve without first reducing counterbalance pressure. This is required so that when air is reapplied to the counterbalance system it will not experience a massive surge of air to the system creating a shock load on the brackets and rods. This could cause damage to the brackets and/ or rods.

NOTE: Newer automatic systems (i.e. the PMC control) may be pre-programmed to pulse air into the system negating the need to reduce air pressure before opening up the air lockout valve.

To Check For Air Leaks In The Counterbalance System:

1. Pressurize the counterbalance to approximately 60 psi (4.1 Bar) and then close the air lockout valve.
2. Observe counterbalance gauge for a sudden or rapid drop in pressure. If pressure drops rapidly, and external piping shows no signs of leakage (See “Air Leaks,” page E-15), then the problem is most likely caused by a worn seal within the cylinder. Replace seal as outlined in the following procedure.

To Replace Slide Counterbalance Cylinder Air Seal:

1. Stop the main drive motor.
2. Place the POWER, OFF-ON or POWER, OFF-ON-BAR Selector Switch (whichever is applicable) in the OFF position and remove the key (if applicable) to lock the switch in the OFF position.
3. Lock the disconnect switch in the OFF position. Make certain the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to advise other personnel that the press is currently being serviced.
4. Shut OFF the air supply to the press and lock the air lockout valve.

5. Discharge all air pressure from counterbalance surge tanks and cylinders at the air regulator or the remote drain cock. To be certain all pressure is released from the cylinders, disconnect the air supply lines that feed, and are directly attached to, the cylinder unit.

⚠ WARNING

NEVER ATTEMPT TO DISMANTLE ANY PART OF THE COUNTERBALANCE ASSEMBLY (CYLINDERS, RODS, OR BRACKETS) UNTIL ALL PRESSURE WITHIN THE CYLINDERS HAS BEEN COMPLETELY DISCHARGED.

6. Remove the two (2) 1.00" - 8 Hex. Nuts that secure the counterbalance plate to the counterbalance rods. Remove the counterbalance plate. (See Figure 6E.)
7. While an assistant holds the counterbalance piston rod from above, remove the .187" x 2.00" long cotter pins from the air cylinder head pins. Remove the air cylinder head pins, and lift the counterbalance cylinder from the press. Move the cylinder to a clean area for further disassembly.
8. Remove four (4) .375"- 16 Hex. Nuts that secure the air cylinder cover to the cylinder. Remove the air cylinder cover.
9. Remove piston and rod assembly by pulling it out through the top of the cylinder.
10. Remove bushing from the air cylinder cover and inspect for scoring. If bushing is scored, replace with a new one. Cross-drilled hole must be drilled after new bushing is in place in cylinder head.
11. Remove the cylinder air cylinder head. Inspect cylinder for scoring. If cylinder is scored, ream cylinder.
12. Remove the .750" - 10 x 1.00" long Hex. Head Cap Screw and flat washer which secures the piston, seal, and piston plate to the piston rod.
13. Remove seal from piston and discard.
14. Apply a liberal coat of grease lubricant to the new seal and install on piston.
15. Apply a liberal coat of grease lubricant to inside of cylinder.
16. Apply a liberal coat of grease lubricant to the cylinder rod. Then carefully insert rod and piston assembly through bottom of cylinder, being careful not to damage seal in piston.
17. Clean the mating surfaces of the air cylinder head and the air cylinder to remove any RTV Sealant adhering to the mating surfaces. Apply a new coating of RTV Sealant to the air cylinder head mating surface and install the cylinder on the air cylinder head. Wipe away any excess sealant.
18. Reinstall the air cylinder cover on cylinder and secure with four (4) .375"- 16 Hex. Nuts. Apply Loctite Adhesive Grade 242 (Blue Liquid) to the threads of the studs, install the nuts, and torque them to the value shown in the chart on page C-3.
19. With the aid of an assistant, lower the counterbalance cylinder into place. Secure the counterbalance cylinder to the press frame with two (2) air cylinder head pins. Secure each pin with a .187" x 2.00" long cotter pin.
20. Place the counterbalance plate over the two (2) counterbalance rods and the counterbalance piston rod. Secure the counterbalance plate to the counterbalance rods with two (2) 1.00" - 8 Hex. Nuts and torque the nuts to the value shown in the chart on page C-3.
21. Reconnect the air supply lines that feed, and are directly attached to, each cylinder unit. Apply Loctite Hydraulic Sealant (H/S) No. 569 (Brown Liquid) to the threads of the fittings.

FLYWHEEL BRAKE

(Ref. Figure 8E)

The function of the flywheel brake is to quickly stop the flywheel from free-wheeling after the main drive motor is turned OFF. As an option, additional control components can be included that will allow the brake to be applied, thereby slowing the flywheel, whenever press speed is reduced — a condition that occurs regularly when the operating mode of the press is changed from CONTINUOUS to INCH.

NOTE: The flywheel brake is not a primary brake and should not be confused with the pneumatically released/spring applied brake portion of the clutch/brake unit used to stop slide motion.

The flywheel brake consists of a brake anchor plate and a cylinder housing that contains an air-actuated piston. The brake anchor plate is bolted on the upper right-hand side of the press on flywheel presses, and to middle left-hand side of the press on geared presses. (See Figure 8E.) Brake friction material, attached to the piston, contacts the flywheel when air pressure is applied to the cylinder. Air pressure is supplied to the brake through a solenoid air valve. A pressure switch in the pneumatic circuit of the brake prevents starting of the main drive motor until air pressure is released from the cylinder.

⚠ WARNING

NEVER ATTEMPT TO INSTALL OR ADJUST DIES IN THE PRESS, OR REMOVE DIES, WHILE THE FLYWHEEL IS TURNING. KINETIC ENERGY REMAINING WITHIN A TURNING FLYWHEEL COULD STROKE THE SLIDE, IF THE CLUTCH WERE ACCIDENTALLY ENGAGED, AND POSSIBLY CAUSE A PERSONAL INJURY.

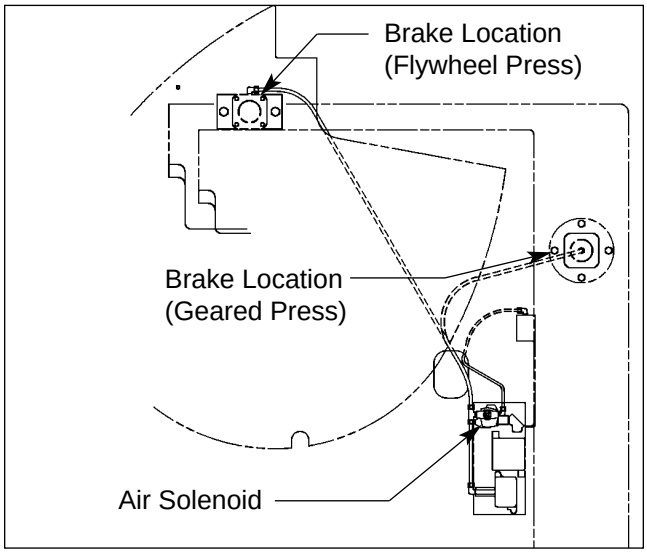


Figure 8E. Flywheel brake locations.

FLYWHEEL BRAKE MAINTENANCE

Once each month inspect the flywheel brake assembly and check the following items:

1. Observe operation of the brake piston to make certain it is braking properly. Normally, the brake should stop the flywheel within 5 to 10 seconds (See **NOTE** below) after depressing the motor stop button. Make certain the piston is retracting fully when air is exhausted.

   NOTE: Stopping times will vary depending upon the press speed. Higher speeds require greater stopping time.

2. Check the assembly and associated piping for air leaks. Repair if necessary.

⚠ WARNING

NEVER PRESSURIZE THE FLYWHEEL BRAKE WHILE IT IS REMOVED FROM THE PRESS FOR REPAIR OR OTHER MAINTENANCE. PRESSURIZING THE BRAKE UNDER THIS CONDITION COULD CAUSE EXPLOSIVE RELEASE OF AIR PRESSURE AND POSSIBLY RESULT IN SERIOUS OR FATAL INJURY.

3. Check friction material for wear and broken sections. The friction material is fastened to the brake piston with a single .250” - 20 x .500” long Socket (Low) Head Cap Screw.

   NOTE: If friction material is replaced, use a new screw and apply several drops of Loctite Adhesive Grade 242 (Blue Liquid) to the threads.

4. Make certain the flywheel brake pressure switch is operating properly. The switch should close if air pressure drops below 20 psi (1.4 Bar).
5. Check tightness of brake anchor plate and cylinder mounting screws. Retighten as necessary.
6. If unit is disassembled, apply a thin coating of Molybdenum Disulfide grease to the inside cylinder wall before reinserting the piston.

DIE CUSHION

⚠ CAUTION

MAKE CERTAIN THAT LOAD EXERTED ON THE CUSHION IS CENTRALLY LOCATED ON THE PAD. DO NOT LOAD DIE CUSHION OFF CENTER.

Model 101 OBI/OBS Series presses may be equipped with an optional pneumatic die cushion system. Die cushion pressure varies with each job and the correct pressure is determined by trial. If the workpiece tears, cushion pressure is too high; if the part wrinkles, pressure is too low. Do not operate the cushion at pressures exceeding 100 psi (6.9 Bar). Start with low pressure and alternately stroke press and increase pressure until the part is correctly formed and ejected with minimum die cushion pressure.

To Check For Air Leaks In The Die Cushion System:

1. Pressurize the die cushion to approximately 60 psi (4.1 Bar) and then close the air lockout valve.
2. Observe die cushion gauge for a sudden or rapid drop in pressure. If pressure drops rapidly, and external piping shows no signs of leakage (See "Air Leaks," page E-15,) the problem is most likely due to a worn air seal within the cylinder.

   NOTE: Two (2) types of die cushions are provided by Minster, a rail mounted die cushion and a trunion mounted die cushion. Refer to the applicable instructions, below, for servicing information.

To Replace Rail Mounted Die Cushion System Air Seals:

NOTE: The following procedure applies to Minster die cushions only. Refer to the service information supplied by the die cushion manufacturer when servicing a die cushion that was provided by an alternate vendor.

1. Stop the main drive motor.
2. Place the POWER, OFF-ON or POWER, OFF-ON-BAR Selector Switch (whichever is applicable) in the OFF position and remove the key (if applicable) to lock the switch in the OFF position.
3. Lock the disconnect switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to advise other personnel that the press is currently being serviced.
4. Remove the cylinder stop from lower cylinder. (See Figure 9E.)
5. Shut OFF the air supply to the press and lock the air lockout valve.
6. Discharge all air pressure from die cushion. To be certain all pressure is released from the unit, disconnect pipe unions in the air supply lines that feed, and are directly attached to, the die cushion unit.

⚠ WARNING

NEVER ATTEMPT TO DISMANTLE ANY PART OF THE DIE CUSHION ASSEMBLY UNTIL ALL PRESSURE WITHIN THE UNIT HAS BEEN COMPLETELY DISCHARGED.

7. Remove the four (4) .500" - 13 x 2.50" long Hex. Head Cap Screws that secure die cushion to the die cushion mounting rails. Remove die cushion from press.
8. Remove the four (4) .625" - 11 x 1.75" long Socket Head Cap Screws that secure the cover plate to the die cushion cylinder piston. Two (2) of the mounting bolt holes are tapped (.750" - 10) for handling purposes. Install eyebolts in these holes and remove the cover plate.

⚠ WARNING

MAKE CERTAIN THAT THE CRANE OR HOIST AND ASSOCIATED CABLES, CHAIN AND HOOKS ARE CAPABLE OF SAFELY LIFTING THE WEIGHT INVOLVED.

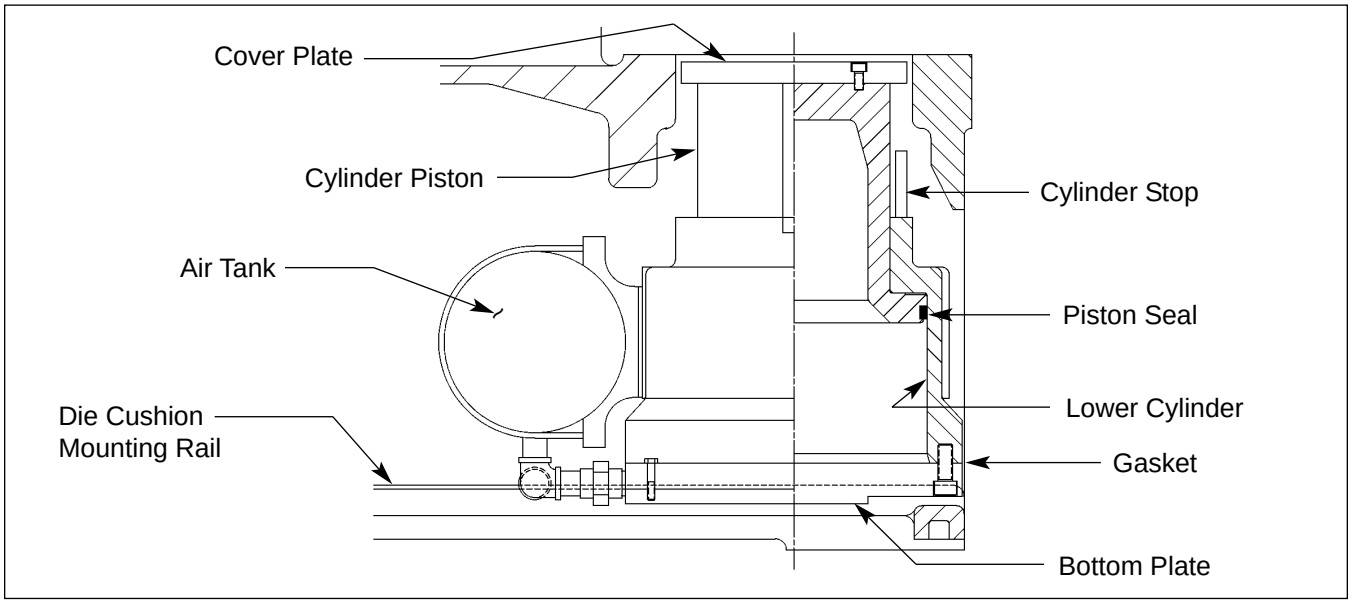


Figure 9E. Rail mounted die cushion.

9. Turn the die cushion assembly over so the bottom plate is facing upward. Remove the eight (8) 1.00" - 8 x 2.50" long Socket Head Cap Screws that secure the bottom plate to the lower cylinder. Two (2) of the mounting bolt holes are tapped (1.25" - 7) for handling purposes. Install eyebolts in these holes and remove the bottom plate and gasket.
10. Two (2) .500" - 13 tapped holes are provided in the bottom of the die cushion piston for handling purposes. Install eyebolts in the tapped holes and pull the die cushion piston from the lower cylinder.
11. Remove the piston seal and discard. Install new piston seal in the piston. Apply a liberal coat of grease lubricant to the new seal. Install piston seal over the piston (being especially careful not to nick or damage the seal) and push the seal into the seal groove.
12. Apply a liberal amount of grease lubricant on the inside of the lower cylinder and on the outside of the piston. Then reinstall piston in lower cylinder until piston bottoms out in lower cylinder, being careful not to damage the seal.
13. Place a new gasket on the lower cylinder and install the bottom plate. Secure the bottom plate to the lower cylinder with eight (8) 1.00" - 8 x 2.50" long Socket Head Cap Screws. Apply Loctite Adhesive Grade 242 (Blue Liquid) to the threads of the screws, install the screws, and torque them to the value shown in the chart on page C-3.
14. Turn the die cushion assembly over so the die cushion piston is facing upward. Install the cover plate on the die cushion piston and secure with four (4) .625" - 11 x 1.75" long Socket Head Cap Screws. Apply Loctite Adhesive Grade 242 (Blue Liquid) to the threads of the screws, install the screws, and torque them to the value shown in the chart on page C-3.
15. Reinstall die cushion unit in press, securing unit to press using the .500" - 13 x 2.50" long Hex. Head Cap Screws previously removed.
16. Reconnect pipe unions in the air supply lines that feed, and are directly attached to, the die cushion and air cylinder. Apply Loctite Hydraulic Sealant (H/S) No. 569 (Brown Liquid) to the threads of the fittings.
17. Apply enough air to the die cushion to lift the die cushion piston and allow the cylinder stop to be reinstalled. Apply Loctite Adhesive Grade 242 (Blue Liquid) to the threads of the cylinder stop, and reinstall the cylinder stop in lower cylinder.

To Replace Trunion Mounted Die Cushion System Air Seals:

(Ref. Figure 10E)

NOTE: The following procedure applies to Minster die cushions only. Refer to service information supplied by the die cushion manufacturer when servicing a die cushion that was provided by an alternate vendor.

1. Stop the main drive motor.
2. Place the POWER, OFF-ON or POWER, OFF-ON-BAR Selector Switch (whichever is applicable) in the OFF position and remove the key (if applicable) to lock the switch in the OFF position.
3. Lock the disconnect switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to advise other personnel that the press is currently being serviced.
4. Shut OFF the air supply to the press and lock the air lockout valve.
5. Discharge all air pressure from die cushion. To be certain all pressure is released from the unit, disconnect pipe unions in the air supply lines that feed, and are directly attached to, the die cushion unit.

⚠ WARNING

NEVER ATTEMPT TO DISMANTLE ANY PART OF THE DIE CUSHION ASSEMBLY UNTIL ALL PRESSURE WITHIN THE UNIT HAS BEEN COMPLETELY DISCHARGED.

6. Using a forklift, support the die cushion from below.
7. Remove the four (4) .625" - 11 x 1.75" long Socket Head Cap Screws that secure the cover plate to the die cushion cylinder piston. Two (2) of the mounting bolt holes are tapped (.750" - 10) for handling purposes. Install eyebolts in these holes and remove the cover plate.

⚠ WARNING

MAKE CERTAIN THAT THE CRANE OR HOIST AND ASSOCIATED CABLES, CHAIN AND HOOKS ARE CAPABLE OF SAFELY LIFTING THE WEIGHT INVOLVED.

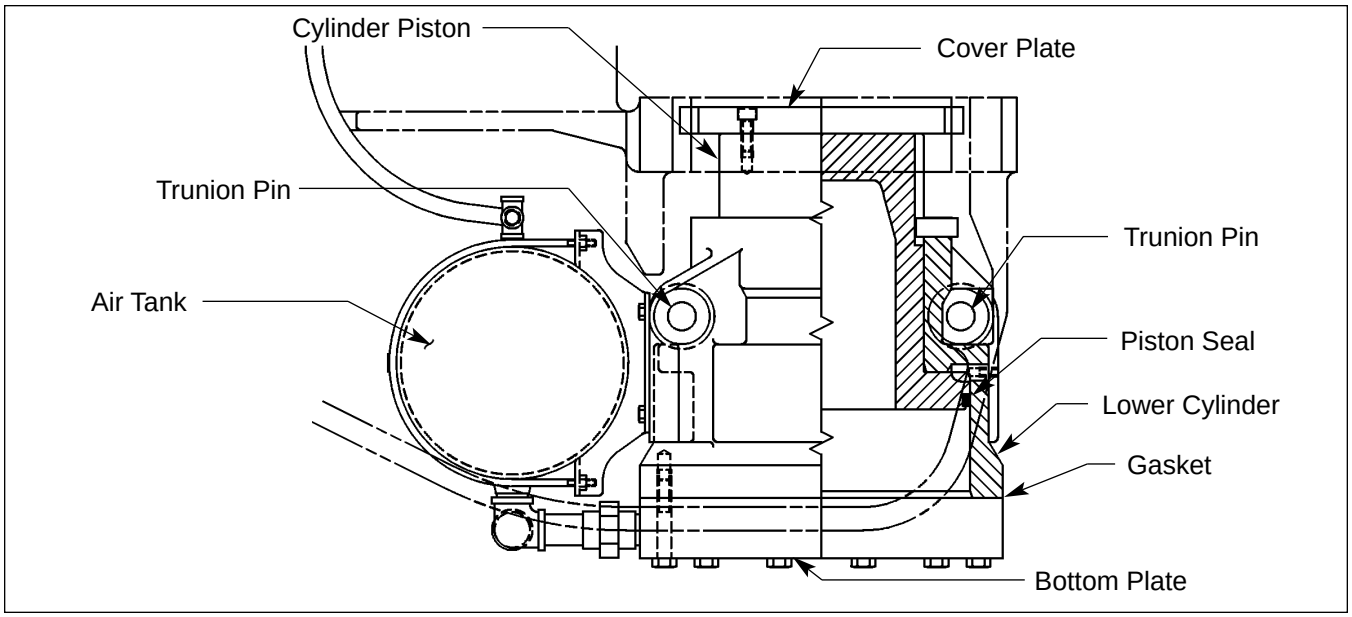


Figure 10E. Trunion mounted die cushion.

8. Remove the four (4) clamping collars from the trunion pins. Remove the two (2) trunion pins which secure the die cushion to the press frame. Remove the die cushion from the press.
9. Turn the die cushion assembly over so the bottom plate is facing upward. Then remove the twelve (12) .750" - 10 x 4.25" long Hex. Head Cap Screws that secure the bottom plate to the lower cylinder. Two (2) of the mounting bolt holes are tapped (1.00" - 8) for handling purposes. Install eyebolts in these holes and remove the bottom plate and gasket.
10. Two (2) .500" - 13 tapped holes are provided in the bottom of the die cushion piston for handling purposes. Install eyebolts in the tapped holes and pull the die cushion piston from the lower cylinder.
11. Remove the piston seal and discard. Install new piston seal in the piston. Apply a liberal coat of grease lubricant to the new seal. Install piston seal over the piston (being especially careful not to nick or damage the seal) and push the seal into the seal groove.
12. Apply a liberal amount of grease lubricant on the inside of the lower cylinder and on the outside of the piston. Then reinstall piston in lower cylinder until piston bottoms out in lower cylinder, being careful not to damage the seal.
13. Place a new gasket on the lower cylinder, then install the bottom plate. Secure the bottom plate to the lower cylinder with twelve (12) .750" - 10 x 4.25" long Hex. Head Cap Screws. Apply Loctite Adhesive Grade 242 (Blue Liquid) to the threads of the screws, install the screws, and torque them to the value shown in the chart on page C-3.
14. Turn the die cushion assembly over so the die cushion piston is facing upward. Then reinstall die cushion unit in press and lift the die cushion to align the trunion pin holes in the die cushion with the trunion pin holes in the press frame. Install the trunion pins and secure them with four (4) clamp collars.
15. Install the cover plate on the die cushion piston and secure it with four (4) .625" - 11 x 1.75" long Socket Head Cap Screws. Apply Loctite Adhesive Grade 242 (Blue Liquid) to the threads of the screws, install the screws, and torque them to the value shown in the chart on page C-3.
16. Reconnect pipe unions in the air supply lines that feed, and are directly attached to, the die cushion and air cylinder. Apply Loctite Hydraulic Sealant (H/S) No. 569 (Brown Liquid) to the threads of the fittings.

AIR RESERVOIR TANKS

(Ref. Figure 11E)

Reservoir tanks store a reserve of air and help to assure proper operation of a component by minimizing the pressure drop that occurs when a component is actuated. Reservoir tanks should be drained of all moisture at least once a week. Inspect the tanks periodically to make certain connections are tight and that the tanks do not leak.

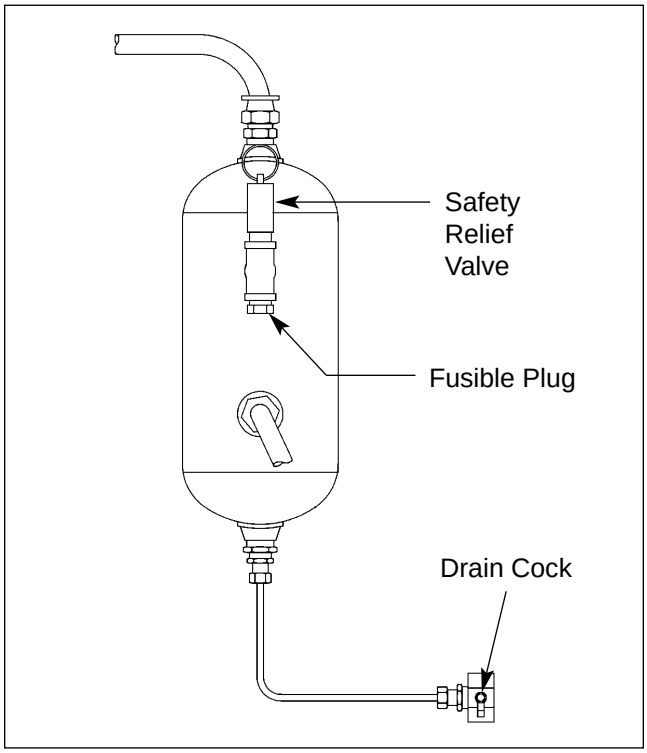


Figure 11E. Air tank.

SAFETY RELIEF VALVE

(Ref. Figure 11E)

The Model 101 OBI/OBS Series press pneumatic system is equipped with a safety relief valve (located on each air tank) that will open automatically and release air if the air pressure becomes unusually high. When sufficient pressure is released, the valve closes. If the safety relief valve opens, stop the press, determine the cause, and correct the condition before operating the press again.

FUSIBLE PLUGS

(Ref. Figure 11E)

A fusible plug is installed in each reservoir tank to protect personnel and equipment by releasing air pressure before it reaches a point of danger. The plug is an alloy (mostly lead) which melts at a temperature and pressure well within the safe limits of the tank and allows air to escape.

NOTE: A spent fusible plug is not repairable and must be replaced with an identical plug.

DRAIN COCKS

(Ref. Figure 11 E)

Drain cocks are used for draining moisture from the air operated clutch and (optional) counterbalance cylinder and/or die cushion reservoir air tanks. The drain cocks provided for this purpose are mounted in the lower rear press cavity. Before opening drain cocks, relieve the air pressure from the pneumatic system. Open drain cocks at least once a week — more often if necessary. Wait for water to drain completely, then close drain cocks fully before operating the press.

NOTE: DO NOT shut off the air by using the regulator adjustment.

AIR LEAKS

It is important to keep the pneumatic system air tight and in good operating condition. Correct small leaks before they become a major problem. With pressure on the system, some leaks may be difficult to locate because lost air is continuously being replaced. Small leaks may be located quickly by brushing the suspected component (tubing, fitting, etc.) with a soap and water solution and watching for bubbles which will form at the point where air escapes.

Include the pneumatic system in your periodic press inspection and maintenance program.

SECTION F

This Section Contains The Following: **Page**

SERVICING THE SLIDE ASSEMBLY

The inspection and servicing procedures described in this section should only be performed by authorized personnel who are experienced in the maintenance of mechanical power presses. Normally, the adjustments outlined need be performed only if related parts of the press have been disassembled or an inspection reveals the need for readjustment.

Servicing procedures in this section explain checking gib clearances; setting gibs for proper running clearance; checking slide angularity and parallelism; adjustments for correcting slide angularity and parallelism. Procedures for connection cap installation, and calibrating the shutheight indicator are also included in this section.

The slide assembly on Model 101 OBI/OBS Series presses are precisely guided with hydrodynamically lubricated V-type gibs at the rear corners. The gibbing consists of angled bearing surfaces that guide the slide in both the front-to-back and right-to-left directions. The gibs are accurately squared with the bed, set for proper running clearance, and clamped with heavy gib bolts to the frame. Both gibs are adjustable

GIB ADJUSTMENT

(Ref. Figure 1F)

Adjustable gibs are bolted to the press frame to provide guiding surfaces at the side of the slide. Correct gib adjustment holds the slide on the front-to-back center line of the press. Adjustable gibs are bolted to the frame and contact the side surfaces of the slide.

Properly adjusted gibs are an important factor in maintaining parallelism between the slide face and top of press bed or bolster. Loose gibs will cause unsatisfactory stamping or forming; tight gibs will squeeze out the oil film and damage the gib sliding surfaces.

Follow the suggested gib inspection and adjustment procedures outlined in this manual. If the inspection shows that adjustment is necessary, correct the clearances by adjusting the gib adjusting screws.

To Check Gib Clearance:

(Ref. Figure 1F)

1. If press is inclined, return the press to the full vertical position.
2. Remove dies or tooling from the press.

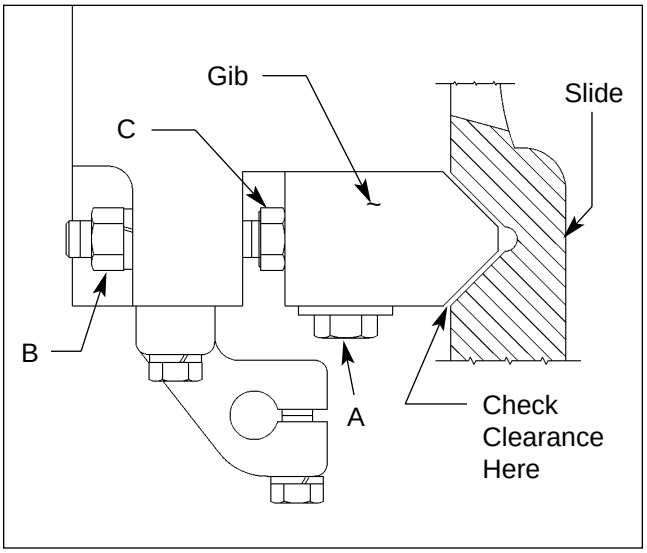


Figure 1F. Gib clearance and adjustment.

3. Turn ON the air supply to the press. Charge the counterbalance cylinder (if applicable) with air pressure that is at least equal to the amount shown for “0” die weight.
4. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
5. Start the main drive motor. Make certain that oil is dripping from the gibs.
6. Place the Stroking Selector Switch in the INCH position. Then position the slide at the bottom of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS ARE CLEAR OF ANY PINCH POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

7. Stop the main drive motor. Place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.

⚠ WARNING

MAKE CERTAIN THAT POWER IS DISCONNECTED FROM THE MAIN DRIVE MOTOR AND THAT THE FLYWHEEL HAS STOPPED TURNING BEFORE PROCEEDING.

8. Total gib clearance is set on one gib only. The gib adjusting screws are located on the frame as shown in Figure 1F. There is one set of adjusting screws for each gib.
9. Insert a pry bar between the slide and frame. Using the pry bar, carefully apply pressure at the center of the slide in order to force the slide against the opposite gib. **Do not force the pry bar**. Apply only enough pressure to achieve zero clearance at the opposite gib.
10. While an assistant maintains pressure on the slide, check clearance created between the slide and the gib. Total gib clearance should not exceed 0.003" to 0.004" (0.076 to 0.101 mm).
11. If measured gib clearance is not within the recommended range, adjust gib setting per instructions.

To Adjust Gib Clearance:

(Ref. Figure 1F)

1. Perform Steps 1 through 10 under "To Check Gib Clearance" to determine amount of adjustment required.
2. Make certain slide is at bottom of stroke.
3. Place the POWER, OFF-ON-BAR Selector Switch in the OFF position and lock the disconnect switch in the OFF position. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
4. To adjust gib, start by loosening the gib locking screws (A). Then loosen the lock nuts (B) on gib adjusting screws (C.)
5. Turn gib adjusting screws (C) as necessary to achieve proper clearance.
6. Recheck gib clearance, following the procedure under "To Check Gib Clearance" to make certain the new setting is satisfactory.

SLIDE ANGULARITY AND PARALLELISM

Accuracy of the press is directly related to the vertical angularity of the slide and its parallelism in relation to the press bed. It is most important that the slide face be parallel with the top surface of the bed or bolster, because parallelism affects die alignment and quality of the work produced. Angularity is correct if the slide can be moved from top to bottom of stroke without moving toward front or rear of the press or to either side. Maximum angularity of Model 101 OBI/OBS Series presses is .0004" (0.01 mm) per inch in the last third of downward stroke. Parallelism is correct when indicator readings are within .003". (0.0762 mm), or when the slide face is parallel to the bed within a tolerance of .001" per foot (0.0254 mm per each 300 mm) of slide width, whichever is greater.

To Check Slide Parallelism:

1. If press is inclined, return the press to the full vertical position.
2. Remove dies or tooling from the press.
3. Turn ON the air supply to the press. Charge the counterbalance cylinder (if applicable) with air pressure that is at least equal to the amount shown for "0" die weight.
4. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
5. Start the main drive motor. Make certain that oil is dripping from the gibs.
6. Place the Stroking Selector Switch in the INCH position. Then position the slide at the bottom of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS ARE CLEAR OF ANY PINCH POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

7. Stop the main drive motor. Place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.

⚠ WARNING

MAKE CERTAIN THAT POWER IS DISCONNECTED FROM THE MAIN DRIVE MOTOR AND THAT THE FLYWHEEL HAS STOPPED TURNING BEFORE PROCEEDING.

8. Adjust the slide shutheight to its upper limit. (See "Slide Shutheight Adjustment" in the Operation Manual (furnished) for further information.)

9. Exhaust air from slide counterbalance cylinder (if provided).
10. Clean the slide face and the top surface of the bed (or bolster).
11. Insert a pry bar between the slide and frame. Using the pry bar, carefully apply pressure at the center of the slide in order to force the slide against the opposite gib. **Do not force the pry bar**. Apply only enough pressure to achieve zero clearance at the opposite gib.
12. While an assistant maintains pressure on the slide, place a base mounted dial indicator between the slide face and bed (or bolster) and set it at the "0" reference mark. Now take readings near each of the four corners of the slide. (See Figure 2F.)

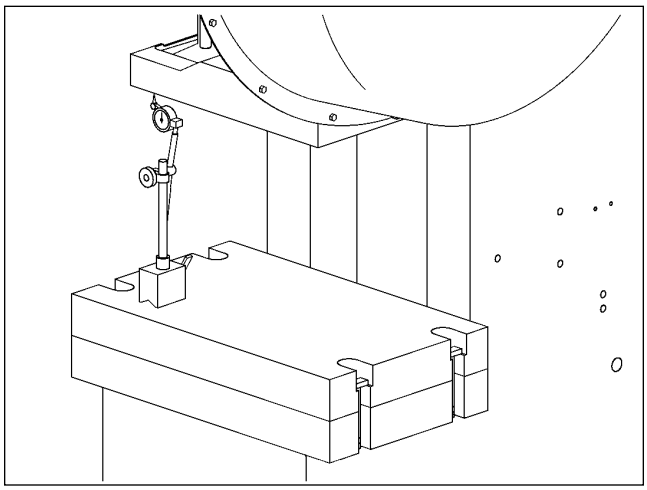


Figure 2F. Checking slide parallelism.

Results Obtained:

A. Slide parallelism is considered normal when indicator readings are within .003". (0.0762 mm), or when the slide face is parallel to the bed within a tolerance of .001" per foot (0.0254 mm per each 300 mm) of slide width, whichever is greater.

B. If the readings exceed recommended tolerance, refer to the chart entitled "Factors Affecting Parallelism And Vertical Movement," page F-11. Note possible causes and the corrective action to be taken.

To Check Slide Vertical Angularity:

1. If press is inclined, return the press to the full vertical position.
2. Remove dies or tooling from the press.
3. Turn ON the air supply to the press. Charge the counterbalance cylinder (if applicable) with air pressure that is at least equal to the amount shown for "0" die weight.
4. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
5. Start the main drive motor. Make certain that oil is dripping from the gibs.
6. Place the Stroking Selector Switch in the INCH position. Then position the slide at the bottom of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS ARE CLEAR OF ANY PINCH POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

7. Stop the main drive motor. Place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.

⚠ WARNING

MAKE CERTAIN THAT POWER IS DISCONNECTED FROM THE MAIN DRIVE MOTOR AND THAT THE FLYWHEEL HAS STOPPED TURNING BEFORE PROCEEDING.

8. Clean the slide face and the top surface of the bed (or bolster).
9. Set base leg of machinists square on bed (or bolster) (clamp if necessary) and position it in a front-to-back plane as shown in Figure 3F.

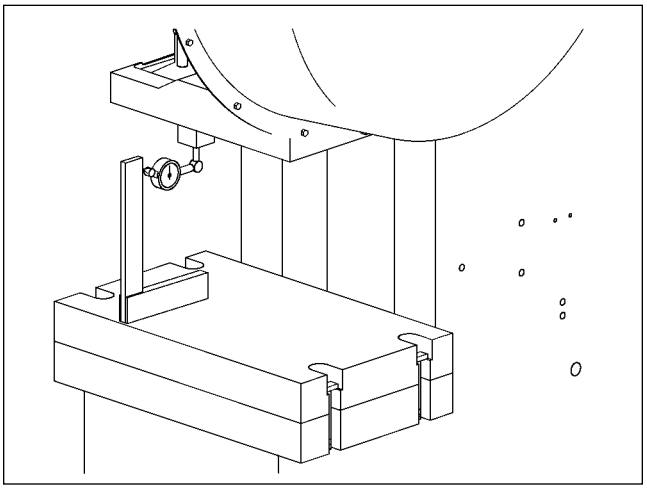


Figure 3F. Checking slide front-to-back vertical angularity.

10. Attach magnetic base dial indicator to the bottom of the slide. Position the dial indicator so that its spindle contact point is perpendicular to, and resting against, the flat inner surface of the square. (See Figure 3F.)

11. Start the main drive motor. Place the Stroking Selector Switch in the INCH position. Then INCH the slide through one complete stroke. Throughout the last third of the downward stroke, observe reading on the dial indicator (See **example** below). Note the maximum and minimum reading. This test will measure the amount of front-to-back vertical runout, if any.

    EXAMPLE: If the above measurement is being performed on a press with a 6.00" stroke, the last third of the downward stroke would be the last 2.00" of travel.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

12. Reposition machinists square so that its base leg is parallel to the front edge of the bed (or bolster). Reposition the dial indicator on the slide so that its spindle is perpendicular to, and resting against, the flat inner surface of the square. (See Figure 4F.)

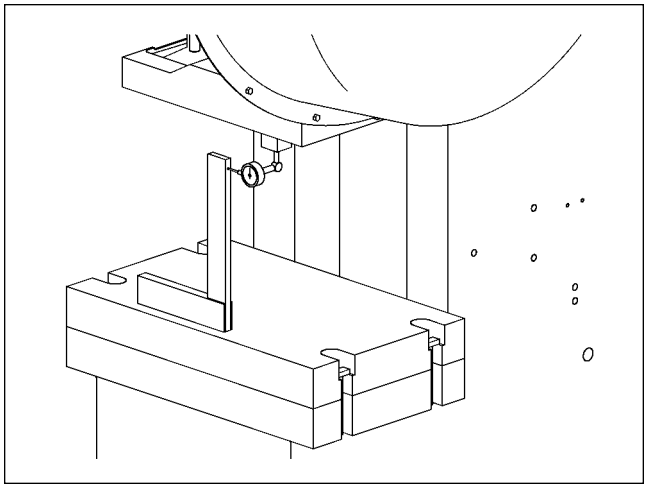


Figure 4F. Checking slide right-to-left vertical angularity.

13. INCH the slide through one complete stroke. Throughout the last third of the downward stroke, observe reading on the dial indicator (See **example** below). Note the maximum and minimum reading. This test will measure the amount of slide right-to-left vertical runout, if any.

    EXAMPLE: If the above measurement is being performed on a press with a 6.00" stroke, the last third of the downward stroke would be the last 2.00" of travel.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

14. Stop the main drive motor. Place the Stroking Selector Switch in the OFF position. Place the POWER, OFF-ON-BAR Selector Switch in the OFF position.

If the above tests indicate that slide is moving off vertical in either direction greater than the tolerances listed in the chart below, vertical angularity is not satisfactory and must be corrected — usually by adjusting the gibs. See chart entitled "Factors Affecting Parallelism And Vertical Movement," page F-11. Note possible causes and the corrective action to be taken.

STROKE LENGTH	MAX. VERTICAL ANGULARITY (LAST 1/3 OF STROKE)
2.00"	.00027"
3.00"	.0004"
4.00"	.00053"
5.00"	.00067"
6.00"	.0008"

CALIBRATION OF THE SHUTHEIGHT INDICATOR

(Ref. Figure 5F)

The optional shutheight indicator is a digital counter which is built into the slide assembly. It is connected directly to the slide adjustment mechanism through a gear train. The shutheight indicator displays a reading indicating the relative distance between the slide face and bed (or bolster) with the stroke down. The reading is displayed on the indicator in inches and thousandths of an inch or millimeters and hundredths of a millimeter.

Because of the positive type drive, the indicator should retain its accuracy for a considerable period of time. However, due to wear and/or certain adjustments in the press, the shutheight should be measured periodically and the meter must be recalibrated, if necessary. Recalibration will also be necessary if the slide or any part of the slide adjusting mechanism is disassembled.

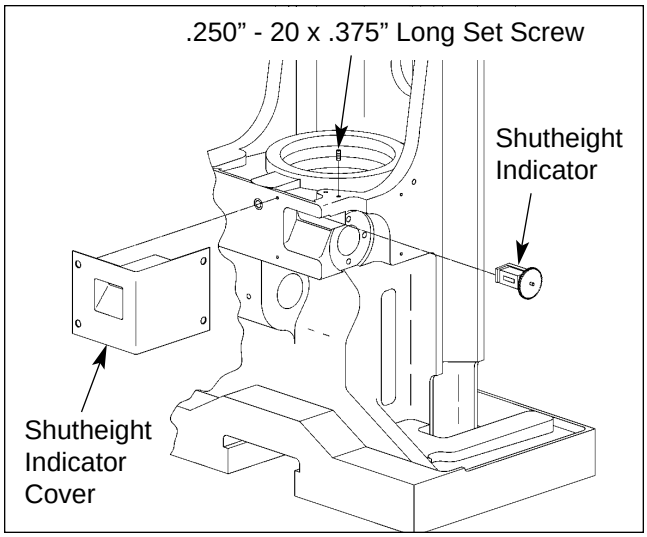


Figure 5F. Shutheight indicator calibration.

To Check Calibration Of The Shutheight Indicator:

1. Remove dies or tooling from the press.
2. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
3. Start the main drive motor. Make certain that oil is dripping from the gibs.
4. Place the Stroking Selector Switch in the INCH position. Then position the slide at the bottom of the stroke.

   NOTE: Slide must be at exact Bottom Dead Center of stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS ARE CLEAR OF ANY PINCH POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

5. Stop the main drive motor. Place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.

⚠ WARNING

MAKE CERTAIN THAT POWER IS DISCONNECTED FROM THE MAIN DRIVE MOTOR AND THAT THE FLYWHEEL HAS STOPPED TURNING BEFORE PROCEEDING.

6. Turn ON the air supply to the press. Charge the counterbalance cylinder (if applicable) with air pressure that is greater than the amount shown for "0" die weight. If the press is not equipped with a counterbalance cylinder, place a hydraulic jack between the slide face and the bed (or bolster). Place the jack directly under the connection screw.

   NOTE: To prevent damage to slide and bed (or bolster), place flat steel plates between jack and slide, and between jack and bed (or bolster).

7. Energize the hydraulic jack and apply enough pressure to support the slide assembly.

   NOTE: Applied jack pressure should never exceed 5 percent of press rated tonnage.

8. Using the inside micrometer or other precision measuring instrument, measure the exact distance between the slide face and bed (or bolster). Take a measurement near the center of the slide and record it to the nearest thousandths of an inch (or hundredths of a millimeter).
9. Check the actual reading on the shutheight indicator and compare it with the measurement just taken. If the indicator reading is incorrect, recalibrate the unit according to the procedure listed under "To Calibrate The Shutheight Indicator."

To Calibrate The Shutheight Indicator:

(Ref. Figure 5F)

1. Perform Steps 1 through 9 under "To Check Calibration Of The Shutheight Indicator."
2. Remove the shutheight indicator cover.
3. Loosen the two (2) indicator .250" - 20 x . 375" long mounting set screws which secure the indicator to the slide.
4. Remove the indicator with gear attached.
5. Rotate indicator gear by hand until the meter reading matches the shutheight measurement taken.
6. Reinstall the meter and cover on slide.

CONNECTION CAP INSTALLATION

The connection cap and its associated mounting cap screws are normally subjected to "snap-through" forces whenever blanking operations are performed on the press. To offset the effect of these forces, the connection caps are preloaded by tightening the cap screws to a prescribed torque value. That preload is correctly set at the factory.

If the connection caps are disassembled to remove the slide for replacing bushings or for any other reason, the cap screws must again be properly torqued when the

connection caps are reassembled. A chart of recommended torque values for the cap screws used to secure the main and slide connection bearing caps is provided in the "Torque Value Chart" on page G-6. Apply grease lubricant under the heads of these screws and install hardened flat washers. Then apply Loctite Adhesive Grade 242 (Blue Liquid) to the screw threads, install the screws, and tighten them to the recommended torque value.

If bushings are being replaced in the slide connection bearings, please refer to the recommended bushing fitting procedures outlined on page G-6.

⚠ WARNING

MAKE CERTAIN THE SLIDE IS SUPPORTED BY ADEQUATE BLOCKING BEFORE DISASSEMBLING THE CONNECTION CAPS.

SLIDE BALL BOX

After extended use, clearance in the slide ball box will increase due to wear. A threaded adjusting nut is included as part of the assembly so that the recommended clearance can be restored via a simple adjustment. Ball box clearance must be checked every six (6) months under normal operating conditions.

To Check Slide Ball Box Clearance:

1. Remove dies or tooling from the press.
2. Turn ON the air supply to the press. Charge the counterbalance cylinder (if applicable) with air pressure that is at least equal to the amount shown for "0" die weight.
3. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
4. Start the main drive motor. Make certain that oil is dripping from the gibs.
5. Place the Stroking Selector Switch in the INCH position. Then position the slide at Bottom Dead Center (BDC) of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS ARE CLEAR OF ANY PINCH POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

6. Stop the main drive motor. Place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.

⚠ WARNING

MAKE CERTAIN THAT POWER IS DISCONNECTED FROM THE MAIN DRIVE MOTOR AND THAT THE FLYWHEEL HAS STOPPED TURNING BEFORE PROCEEDING.

7. Exhaust air from slide counterbalance cylinder (if provided).
8. Place a base mounted dial indicator on the side of the connection assembly. Position the dial indicator so that its spindle contact point is perpendicular to the top of the slide. (See Figure 6F.)

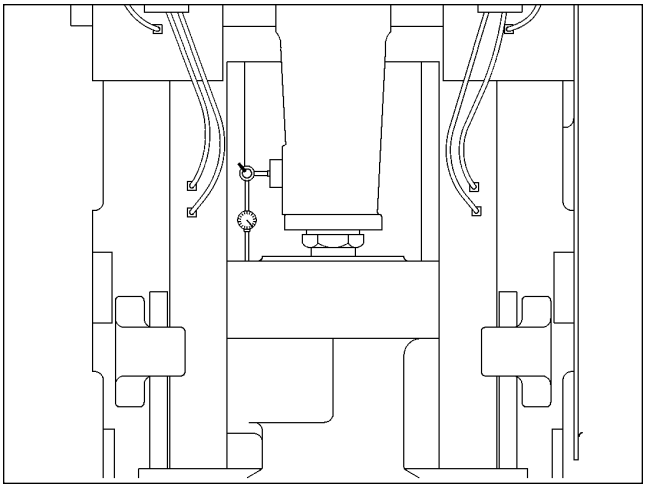


Figure 6F. Checking slide ball box clearance.

9. Place a hydraulic jack between the slide face and the bed (or bolster). Place the jack directly under the connection screw.

   NOTE: To prevent damage to slide and bed (or bolster), place flat steel plates between jack and slide, and between jack and bed (or bolster).

10. Energize the hydraulic jack and apply enough pressure to support the slide assembly.

    NOTE: Applied jack pressure should never exceed 5 percent of press rated tonnage.

11. The reading on the indicator dial now is the ball box clearance. Apply and release jack pressure several times until consistent readings are obtained. If readings exceed .003" (0.0762 mm), the ball box requires adjustment.

To Adjust Slide Ball Box Clearance:

NOTE: Instructions are provided for adjustment of both the manual type slide adjustment and motorized type slide adjustment mechanisms. (See Figure 7F.) Follow the procedures applicable to the slide arrangement furnished.

1. Perform Steps 1 through 8 under "To Check Slide Ball Box Clearance."
2. Loosen the set screw on the front of the slide.
3. Tighten the adjusting screw following Steps A or B below (as applicable).
   (A) **Manual Slide Adjustment:** Using a spanner wrench, turn the adjusting nut in the clockwise direction until it's tight, then back off the adjustment slightly (approximately 3 to 5 degrees.)
   (B) **Motorized Slide Adjustment:** Pull out the worm shaft locking knob and turn it one-quarter turn to disengage the locking mechanism. Actuate the slide adjustment motor (either up or down), using care not to exceed the shutheight adjustment limits. While the slide adjustment motor is running, turn the adjusting nut with a spanner wrench in the clockwise direction until the slide adjustment motor begins to slow, then back off the adjustment slightly (approximately 3 to 5 degrees) to allow slide adjustment motor to return to normal speed. Turn off slide adjustment motor and engage the locking mechanism.
4. Tighten set screw.
5. **Manual Slide Adjustment Only**: Make certain that ball box has not been tightened excessively by the loosening the connection screw clamp plug and turning the connection screw in through one full revolution. If excessive force is required to turn the screw, loosen the set screw and back off the adjusting nut a small amount. Retighten the set screw and then recheck the force required to turn the connection screw.
6. Recheck the ball box clearance, following the procedure above. Ball box clearance should now be .0005" to .001" (0.012 to 0.025 mm). Readjust ball box clearance if necessary.
   NOTE: If ball box adjustment is too tight, heat will build up in the ball box area during operation. Should the temperature in the ball box area exceed 100° F. (37.8° C.), loosen the adjusting nut slightly.
7. After adjusting the ball box clearance, adjust the (optional) shutheight indicator. (See "Calibration Of The Shutheight Indicator," page F-5.)

CROSSBAR KNOCKOUT ADJUSTMENT

(Ref. Figure 8F)

Model 101 OBI/OBS Series presses may be equipped with an optional crossbar knockout. The knockout bars run from left-to-right through the center of the slide (See Figure 8F.)

Knockout rods are clamped in position by cap screws in knockout brackets. The knockout brackets are attached to the press frame. Movement of the slide on the upstroke allows the knockout bar to contact knockout rods which force the bar down against the customer-installed knockout pin (or pins).

If a jam should occur, the knockout rod will slip inside the bracket. Therefore, damage to knockout parts, or die, will be greatly reduced.

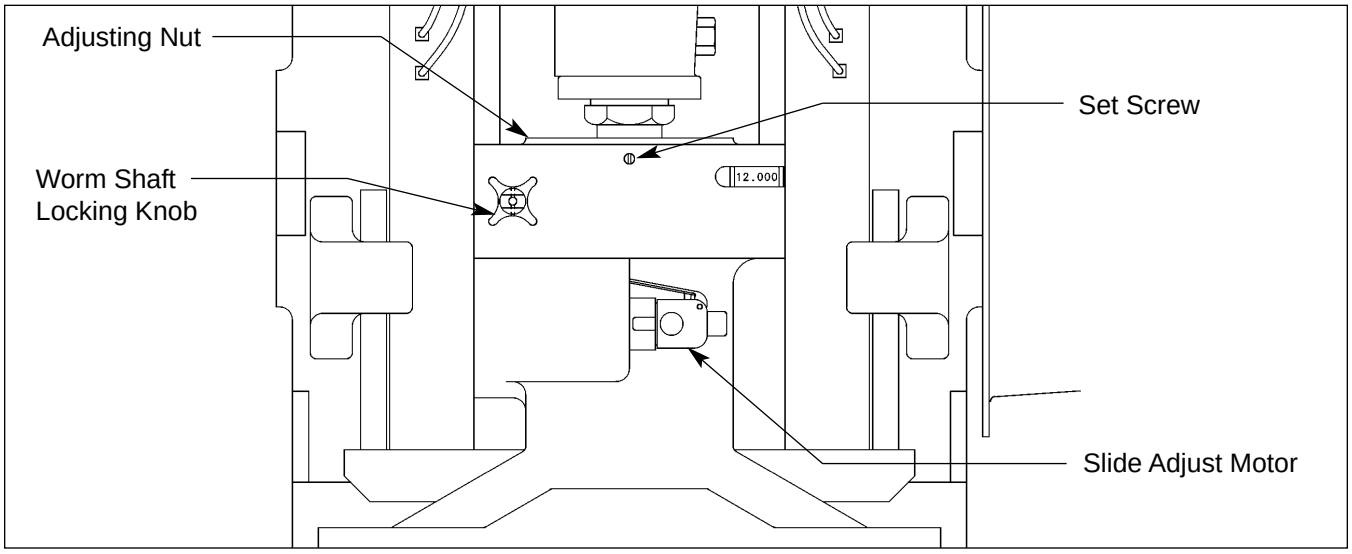


Figure 7F. Setting ball box clearance (motorized adjust shown.)

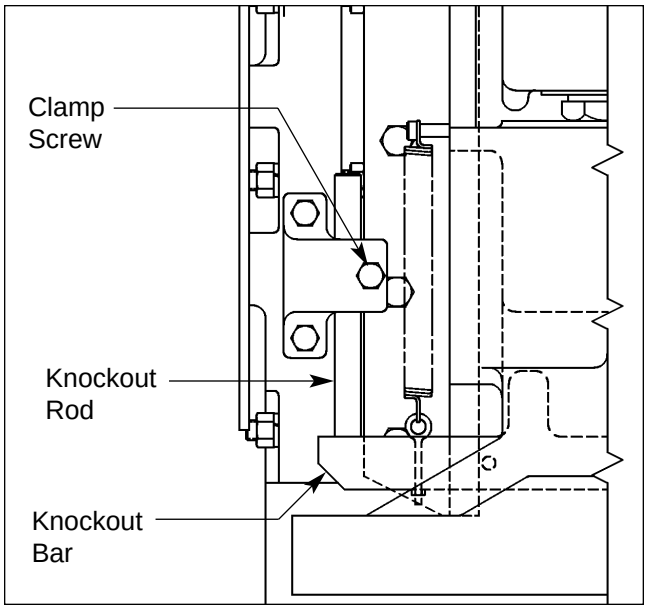


Figure 8F. Crossbar knockout adjustment.

To Adjust Crossbar Knockout:

1. Make certain the die is installed and the shutheight is set correctly for that die. Do not place material between dies.
2. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
3. Start the main drive motor and place the Stroking Selector Switch in the INCH position. Place the SPEED, SLOW-FAST Selector Switch (if provided) in the SLOW position. Then inch the slide to the bottom of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

4. Continue inching the slide slowly on the upstroke until the top of the knockout bar is approximately one inch below the bottom of the knockout rods.
5. Loosen bracket clamp screws on both front and rear brackets, allowing knockout rods to slip down and rest on the knockout bar.
6. Continue to inch the slide to the top of the stroke with knockout rods loose. Make certain knockout bar is in the lowest position of knockout travel.
7. With the slide at the top of the stroke, tighten clamp screws. Knockout mechanism should now be ready for use. Run a sample part to check adjustment.

CAM KNOCKOUT

A cam knockout arrangement is also available as an option. This mechanism, however, requires a special slide and is available only when ordered on a new press or by replacing the complete slide assembly. A cam knockout requires adjustment when the slide shutheight is changed.

To Adjust The Cam Knockout:

(Ref. Figure 9F)

NOTE: An improper cam knockout adjustment may cause gib alignment problems or galling.

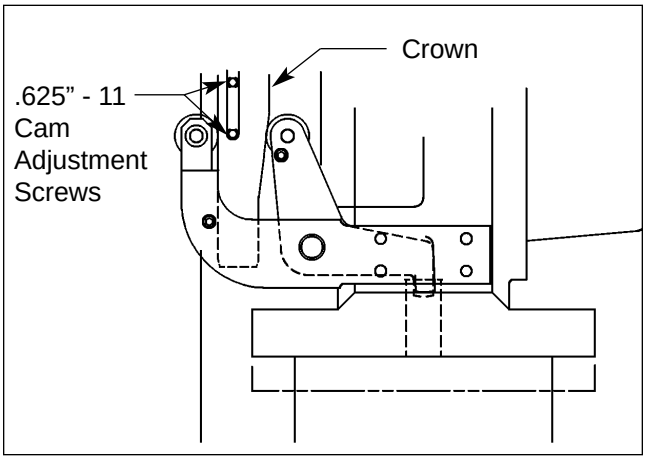


Figure 9F. Cam knockout adjustment.

1. Adjust the slide shutheight, following the proper procedure outlined under "Slide Shutheight Adjustment" in the Operation Manual (furnished). **Do not place material between dies**. Record the direction and distance of shutheight change.
2. Loosen the two (2) .625" - 11 Hex. Head Cap Screws which secure the cam to the press frame. Adjust the cam the same direction and distance as the shutheight change.
3. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
4. Start the main drive motor and place the Stroking Selector Switch in the INCH position. Place the SPEED, SLOW-FAST Selector Switch (if provided) in the SLOW position. Then inch the slide toward the bottom of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

5. As the slide approaches the bottom of the stroke, make certain that the cam follower remains in contact with the cam. If the cam follower will not remain in contact with the cam, stop the main drive motor. Place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
6. Readjust the cam following the procedure described in Step 2, above, until the cam follower remains in contact with the cam throughout the entire stroke.

SLIDE INSTALLATION

If the press slide has been removed for remachining, or any other purpose, it may be reinstalled as follows:

1. Make certain that the slide gib ways are perpendicular to the slide face and are parallel with each other. Gib ways must be perpendicular to the slide face within 0.0015" (.0381 mm) and must be parallel to each other within 0.002" (.0508 mm).
2. Check the position of the press crankshaft. Crankshaft should be placed at the Bottom Dead Center of the stroke, and all air should be exhausted from slide counterbalance cylinder (if provided).
3. With the slide and connection preassembled, install the connection on the crankshaft. Install and torque the connection cap screws in accordance with the procedure listed under "Connection Cap Installation" on page F-6.
4. Install the gibs on the press frame and into the slide gib ways. Tighten the gib mounting bolts finger tight, then tighten the gib adjusting bolts until the back sides of each gib are approximately .875" (22.2 mm) from the frame. (See Figure 10F.)
5. Adjust the slide shutheight to its upper limit. (See "Slide Shutheight Adjustment," in the Operation Manual (furnished) for further information.)
6. Clean the slide face and the top surface of the bed (or bolster.)
7. Insert a pry bar between the slide and frame. Using the pry bar, carefully apply pressure at the center of the slide in order to force the slide against the opposite gib. **Do not force the pry bar**. Apply only enough pressure to achieve zero clearance at the opposite gib.
8. While an assistant maintains pressure on the slide, place a base mounted dial indicator between the slide face and bed (or bolster) and set it at the "0" reference mark. Now take readings near each of the four (4) corners of the slide.

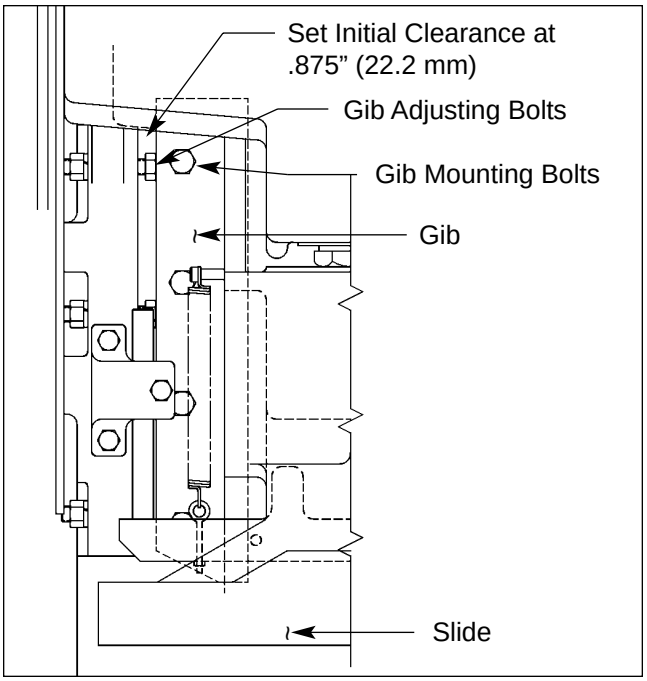


Figure 10F. Installing the slide.

9. Slide parallelism is considered normal when indicator readings are within .003". (0.0762 mm), or when the slide face is parallel to the bed within a tolerance of .001" per foot (0.0254 mm per each 300 mm) of slide width, whichever is greater. If the readings exceed recommended tolerance, adjust the gibs until parallelism is achieved.
10. Check the clearance between the connection and the crankshaft. (See Figure 11F.) Clearance on each side of the connection should be .03" (.762 mm) nominal ± .01" (.254 mm). Adjust the gibs until proper clearance is achieved, then recheck slide parallelism.

    NOTE: If parallelism and connection/crankshaft clearances cannot be met, refer to "Factors Affecting Parallelism And Vertical Movement," page F-11, for possible causes and/or corrections.
11. When parallelism and connection/crankshaft clearances are within specifications, **tighten the gib mounting bolts on one gib only.** Then lock the gib adjusting screws for that gib in place.
12. Insert a pry bar between the slide and frame on the side of the slide with the untightened gib. Using the pry bar, carefully apply pressure at the center of the slide in order to force the slide against the opposite gib. **Do not force the pry bar**. Apply only enough pressure to achieve zero clearance at the opposite gib.

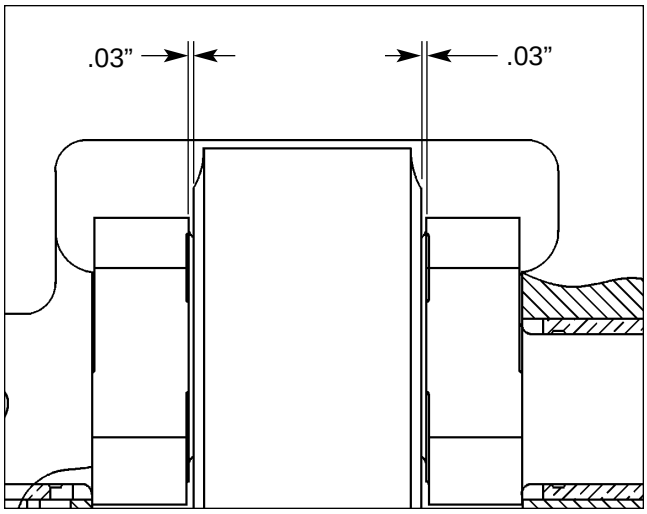


Figure 11F. Checking connection to crankshaft clearance.

13. While an assistant maintains pressure on the slide, check clearance between the slide and the untightened gib. Total gib clearance should not exceed 0.003” to 0.004” (0.076 to 0.101 mm).
14. If gib clearance is satisfactory, relieve pressure on the slide and tighten gib mounting bolts and lock adjusting screws. If gibs require adjustment, adjust the gibs following the procedure listed under “To Adjust Gib Clearance,” page F-3.
15. When gib clearance is set, reinstall any covers previously removed and tighten their associated mounting screws securely.

Factors Affecting Parallelism And Vertical Movement

DUE TO	POSSIBLE CAUSE	CORRECTION
Frame distorted.	1. Press not level (in twist).	Level press carefully.
Gibs not adjusted properly or gibs are damaged.	1. Sliding surfaces worn due to usage.	Set gibs as explained on page F-2.
	2. Improper setting of gibs.	Set gibs as explained on page F-2.
	3. Gibs damaged (probably due to lack of oil).	Repair or replace gib and wear plate, if necessary. (Problem cannot be corrected by adjustment.)
	4. Gibs damaged (due to excessive counterbalance pressure).	Repair or replace gib and wear plate if necessary. Make certain counterbalance pressure is set properly to avoid future damage.
Worn or damaged bearings.	1. Normal wear.	Check bearing clearances. (See page G-4.) Replace bushings if clearance is excessive. Eliminate the overload or off-center loading condition.
	2. Overheating or lack of lubrication.	
	3. Overloading or frequent off-center loading.	
Slide adjusting nuts not turning equally.	1. Slide adjustment bevel gears loose on shaft or cross shaft brackets loose.	Check condition of slide adjusting cross shaft and bevel gear assembly. Replace keys and tighten the set screws or cap screws as necessary. Make certain slide parallelism is correct before locking components in the final position.

SECTION G

This Section Contains The Following: **Page**

SERVICING THE FRAME AND DRIVE ASSEMBLY

This section contains instructions for relieving a slide from a "stuck on bottom" condition, checking bearing clearances, and installing replacement bushings. It is recommended that these services be performed only by authorized personnel who are experienced in the care and maintenance of mechanical power presses.

RELIEVING A SLIDE FROM A "STUCK ON BOTTOM" CONDITION

If the slide and upper die should become "stuck" on or near the bottom of the stroke, the press user can normally relieve this condition using one of the following methods.

- Using air pressure to "lift the slide off bottom."
- Using the (optional) "clutch bumping arrangement."

It should be noted that method used is dependent upon the severity of the condition. The press user should attempt to use the simplest method first. If that method does not relieve the condition, the user should use the next method (in the order listed above). A procedure for each of the methods (listed above) is described below.

Using Full Line Air Pressure To Free A "Stuck On Bottom" Press:

1. Stop the main drive motor and place the Stroking Selector Switch in the OFF position. Make certain the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
2. Determine slide position (i.e., before or after bottom of stroke). Then place the DRIVE MOTOR, FWD-REV Selector Switch in the appropriate position. (See **NOTE** below.)

   NOTE: If the slide is stuck "before bottom," place the switch in REV (Reverse) position. If the slide is stuck "after bottom," place the switch in the FWD (Forward) position.
3. Turn ON the air supply to the press. Then adjust the clutch air pressure regulator to apply **full line** air pressure to the clutch.
4. Set the SPEED, SLOW-FAST speed control (if applicable) to maximum speed.
5. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
6. Start the main drive motor and place the Stroking Selector Switch in the INCH position. Then **intermittently** depress the INCH buttons and inch the slide off the bottom of the stroke. If the slide does not move after several (4 to 6) attempts, clutch bumping arrangement method (if provided) will have to be used. Continued inching with the slide "stuck on bottom" may result in damage to the clutch/brake unit.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

7. Stop the main drive motor and place the Stroking Selector Switch in the OFF position.
8. Place the POWER, OFF-ON-BAR Selector Switch in the OFF position.
9. Set the SPEED, SLOW-FAST speed control (if applicable) to a moderate speed.
10. Adjust the air pressure regulators for proper air pressure to the counterbalance cylinder (if applicable) and the clutch.

Using The (Optional) Clutch Bumping Arrangement To Free A "Stuck On Bottom" Press: *(Flywheel Press only)*

1. Stop the main drive motor and place the Stroking Selector Switch in the OFF position. Make certain the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
2. Place the POWER, OFF-ON-BAR Selector Switch in the OFF position and lock the disconnect switch in the OFF position.
3. Shut OFF the air supply to the press.
4. Remove the hub cover from the flywheel cover to obtain access to the bumping hole in the flywheel.

   NOTE: It may be necessary to remove the entire flywheel cover.

5. Determine slide position (i.e., before or after bottom of stroke). This will determine the direction the flywheel should be rotated.
6. Remove the bumping pin from the bumping pin receptacle. Then insert the bumping pin into the hole in the flywheel web.

⚠ WARNING

KEEP FINGERS CLEAR OF BUMPING HOLE IN THE FLYWHEEL.

7. Rotate the flywheel until the bumping pin can be inserted into the slotted portion of the clutch end-driven disc. Then manually pull on the bumping pin to rotate the flywheel in the direction determined in Step 5 and let the pin strike against the striking lug on the clutch. Repeat this step several times to release the slide.

TOTAL BEARING CLEARANCE

Total bearing clearance is the total accumulation of clearances in the main, connection, and ball box bearings of the press. Check total bearing clearance every six (6) months or more frequently if the press is operated in excess of 50 hours per week.

TO CHECK TOTAL BEARING CLEARANCE:

EQUIPMENT REQUIRED:

- Base Mounted Dial Indicator (calibrated 0.001” or 0.01 mm)
- Hydraulic Jack

1. Remove dies or tooling from the press.

⚠ WARNING

MAKE CERTAIN THAT THE FLYWHEEL IS COMPLETELY STOPPED AND THAT THE POWER HAS BEEN DISCONNECTED FROM THE DRIVE MOTOR BEFORE REMOVING DIES.

2. Clean the slide face and the top surface of the bed (or bolster).
3. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
4. Turn ON the air supply to the press.
5. Start the main drive motor and lubrication pump motor and make certain that oil is dripping from the gibs.
6. Place the Stroking Selector Switch in the INCH position. Then position the slide at Bottom Dead Center (BDC) of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

7. Stop the main drive motor and place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
8. Exhaust all air pressure from the counterbalance cylinder.
9. Place a hydraulic jack between the slide face and the bed (or bolster). Position the jack on the bed so that it is centered beneath the slide connection screw.

   NOTE: To prevent damage to the slide and/or bed, place flat steel plates between the jack and the slide and between the jack and the bed.

10. Energize the hydraulic jack and apply enough pressure to support the slide assembly and crankshaft.

    NOTE: Applied jack pressure should **never** exceed 5 percent of press rated tonnage.

11. Place a dial indicator between the slide and the bed (or bolster) directly beneath the connection screw. Set the indicator dial to “0” reading.
12. Release jack pressure.
13. The reading on the indicator dial now is the total bearing clearance (lift).
14. Apply and release jack pressure several times until consistent readings are obtained.
15. The nominal total bearing clearance for Model 101 OBI/OBS Series presses is shown in the “Total Bearing Clearance Chart,” below. If the total bearing clearance exceeds, by more than 20 percent, the maximum allowable clearance for new presses, check the individual bearing clearances.
16. If no further checks are necessary, remove the hydraulic jacks and dial indicators from the press.

TOTAL BEARING CLEARANCE CHART	
PRESS SIZE	**TOTAL CLEARANCE**
No. 4 - 101	.0065” to .011” (.165 mm to .279 mm)
No. 5 - 101	.008” to .013” (.203 mm to .330 mm)
No. 6 - 101	.008” to .013” (.203 mm to .330 mm)
No. 7 - 101	.010” to .015” (.254 mm to .381 mm)

INDIVIDUAL BEARING CLEARANCES

The individual bearing clearances that exist between the crankshaft and main bearing bushings; crankshaft and connection bushing; and the connection screw and slide ball box add up to the total bearing clearance.

The “Individual Bearing Clearance Chart,” shown below, lists the nominal bearing clearances for the major bearing assemblies in Model 101 OBI/OBS Series presses. It may be used as guide in determining whether looseness or excessive wear has taken place in a particular bearing location. Please note that actual clearances may vary slightly (even on new presses) due to the accumulation of part tolerances and the geometry of assembled parts.

Replace any single bushing that has excessive clearance, because this looseness will increase rapidly. Determine the cause of excessive clearance and take corrective action.

TO CHECK INDIVIDUAL BEARING CLEARANCES:

EQUIPMENT REQUIRED:

- Base Mounted Dial Indicator (calibrated 0.001” or 0.01 mm)
- Hydraulic Jack

1. Remove dies or tooling from the press.

⚠ WARNING

MAKE CERTAIN THAT THE FLYWHEEL IS COMPLETELY STOPPED AND THAT THE POWER HAS BEEN DISCONNECTED FROM THE DRIVE MOTOR BEFORE REMOVING DIES.

2. Clean the slide face and the top surface of the bed (or bolster).
3. Place the POWER, OFF-ON-BAR Selector Switch in the ON position.
4. Turn ON the air supply to the press.
5. Start the main drive motor and lubrication pump motor and make certain that oil is dripping from the gibs.
6. Place the Stroking Selector Switch in the INCH position. Then position the slide at Bottom Dead Center (BDC) of the stroke.

⚠ WARNING

MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE OPERATION OF THE PRESS AND/OR ITS AUXILIARY EQUIPMENT.

INDIVIDUAL BEARING CLEARANCE CHART (NEW PRESS)			
PRESS SIZE	**MAIN BEARING**	**CONNECTION BEARING**	**BALL BOX BEARING**
No. 4 - 101	.0025” to .004” (.064 to .102 mm)	.004” to .006” (.102 to .0152 mm)	.000” to .001” (.000 to .025 mm)
No. 5 - 101	.003” to .005” (.076 to .127 mm)	.005” to .007” (.127 to .178 mm)	.000” to .001” (.000 to .025 mm)
No. 6 - 101	.003” to .005” (.076 to .127 mm)	.005” to .007” (.127 to .178 mm)	.000” to .001” (.000 to .025 mm)
No. 7 - 101	.004” to .006” (.102 to .152 mm)	.006” to .008” (.152 to .203 mm)	.000” to .001” (.000 to .025 mm)

7. Stop the main drive motor and place the Stroking Selector Switch in the OFF position. Make certain that the flywheel has stopped turning completely. Attach a WARNING sign to the press controls to warn other personnel that the press is currently being serviced.
8. Exhaust all air pressure from the counterbalance cylinder.
9. Place a hydraulic jack between the slide face and the bed (or bolster). Place the jack directly under the slide connection screw.

   NOTE: To prevent damage to the slide and/or bed, place flat steel plates between the jack and the slide and between the jack and the bed.
10. Place a dial indicator on the press frame and indicate to the crankshaft. Make certain the indicator is placed on the flywheel (or main gear) side of the press. (See Figure 1G.) Set the indicator dial to “0” reading.
11. Energize the hydraulic jack and apply enough pressure to support the slide assembly and crankshaft.

    NOTE: Applied jack pressure should **never** exceed 5 percent of press rated tonnage.
12. The reading on the indicator dial now is the main bearing clearance on the flywheel (or main gear) side of the press. Record this reading.
13. Apply and release jack pressure several times until consistent readings are obtained.

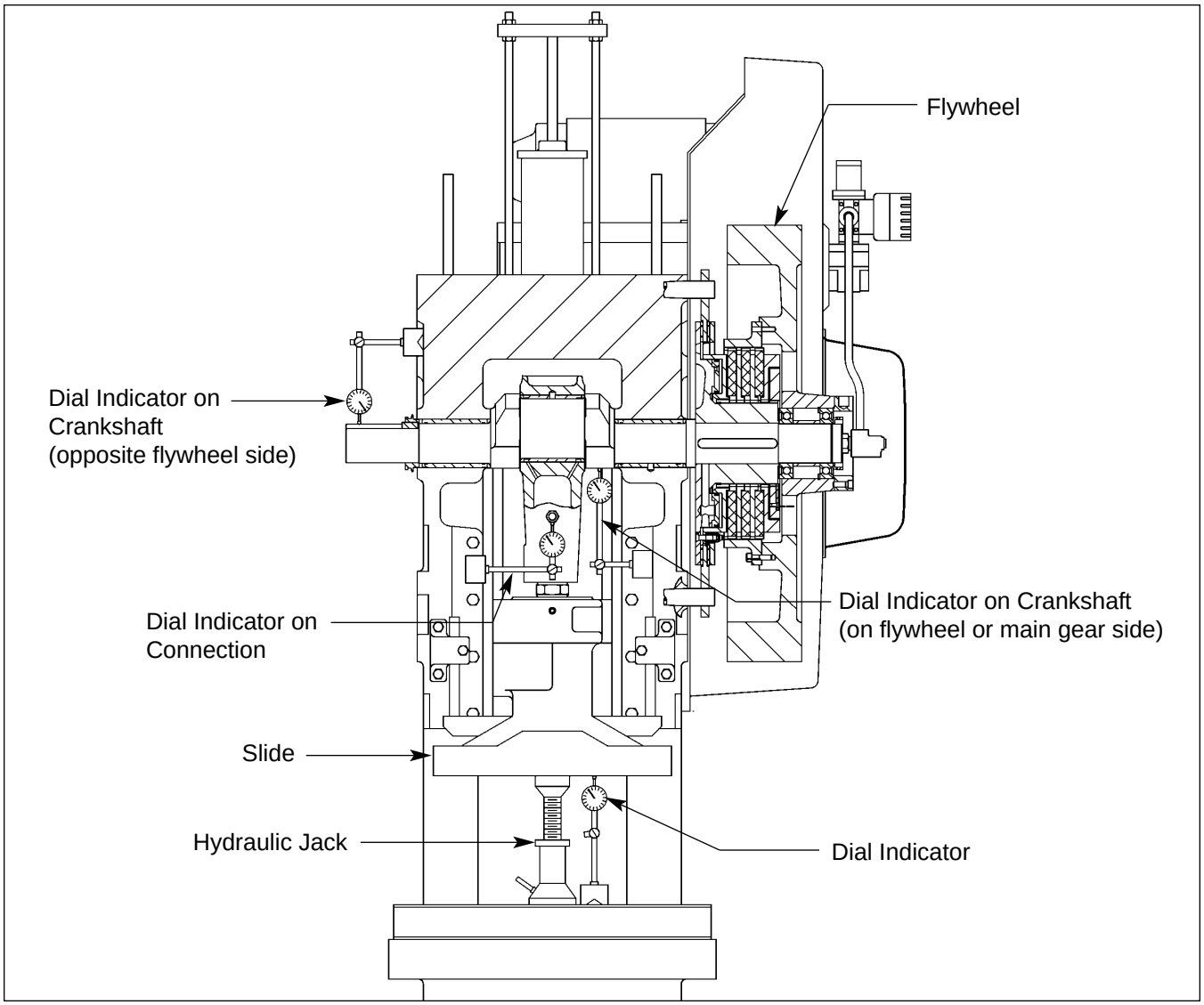


Figure 1G. Checking individual bearing clearances.

14. Release jack pressure and reposition the dial indicator to the opposite side of the crown. Indicate to the top of the crank sprocket of crankshaft extension. Set the indicator dial to “0” reading.
15. Energize the hydraulic jack and apply enough pressure to support the slide assembly and crankshaft.
16. The reading on the indicator dial now is the main bearing clearance on the side opposite the flywheel (or main gear) of the press. Record this reading.
17. Add the clearances obtained in Steps 12 and 16 above. Divide this result in half to determine the average main bearing clearance. Record this reading.
18. Release jack pressure and place the dial indicator on the frame near the connection. Indicate to the flat on the clamp screw or a similar fixed point on the connection. Set the indicator dial to “0” reading.
19. Energize the hydraulic jack and apply enough pressure to support the slide assembly and crankshaft.
20. Subtract the reading recorded in Step 17 from the reading currently displayed on the indicator. This difference is the clearance between the connection bushing and crankshaft.
21. Determine the ball box clearance by subtracting the clearances obtained in Steps 17 and 20 above from the total bearing clearance.
22. This completes the slide individual bearing clearance checks. Remove the hydraulic jack and dial indicator from the press. Reinstall any covers which were previously removed from the press. Tighten the associated mounting screws securely.

MAIN BEARINGS AND CONNECTION BEARINGS

Precise fitting and checking of bearings during assembly of the press helps assure long and trouble-free bearing life, provided they are lubricated properly and the press is not overloaded. A check of bearing clearances should be made at least every six (6) months, depending upon the press application and environmental conditions. This check should be made to determine if any excessive wear has taken place.

BUSHING FITTING PRACTICE

If a check of bearing clearances reveals the need to replace the main or connection bushings, it is most important that the recommended fitting practice be observed. These bushings are split and must be preloaded by squeezing them in the bore with the bearing cap. The outside diameter of the bushing is made approximately .002” to .003” (0.05 to 0.07 mm) larger than the bore of the associated part. Therefore, after the bushing is installed, the bearing cap must be drawn down the prescribed amount. The chart below shows the required torque values of cap screws for the related bearings.

Torque Values For Main And Connection Bearing Cap Screws

PRESS SIZE	CAP SCREW TORQUE
No. 4 - 101	110 lb-ft (149 N-m)
No. 5 - 101	200 lb-ft (271 N-m)
No. 6 - 101	200 lb-ft (271 N-m)
No. 7 - 101	430 lb-ft (583 N-m)

After the bearing cap is fully seated and properly torqued, the bushing bore should be checked with a bore gauge at several places. Then compare that bore with the diameter of the mating shaft and make corrections, if necessary, to achieve the proper running clearance.

SPLIT MAIN AND CONNECTION BUSHINGS

Connection Bushing — Replacement connection bushings, available from Minster, will normally have additional stock allowed in the bore so that the bore can be honed with the bushing torqued in assembly with its mating connection. This method is preferred for accomplishing precise fit.

Connection bushings may also be ordered with the bores machined for the proper running clearance, but the bushing may still have to be honed for proper fit after it is installed and torqued in the connection assembly. When ordering new connection bushings, please advise the Minster Repair Parts Department whether bushings should be furnished with or without honing stock.

NOTE: If bushings must be honed, make certain a “jump” hone is used because of the axial type oil spreader grooves in the bore.

Main Bushings — Replacement main bushings, available from Minster, are normally supplied with bores machined to provide proper running clearance. Further honing, scraping, or fitting is seldom required; however, make certain the bore of the new bushing is correct for the application. Bore must be checked with a bore gauge to assure proper clearance.

SECTION H

This Section Contains The Following: **Page**

PRESS APPLICATION

In order that the most efficient and intelligent use can be made of mechanical power presses, it is important that press users fully understand the operation of each machine; that they have dies of the proper size correctly installed, and that they install point-of-operation safeguarding complying with the applicable codes, standards, and laws for their particular area.

The tonnage, size, and operating characteristics of all available presses should be known so that a press closely matching requirements of the die can be selected. MINSTER presses are built in a wide range of tonnages, widths, drives, stroke lengths and speeds. Each of these factors should be considered when planning the installation of a die. Failure to do so could result in overload of the press or its drive train.

The die designer can be most helpful by supplying capacity requirements for a die. This amount should be stamped on the die set at a position that can be easily seen. If such information has not been furnished, several types of calculators, charts, tables and published technical data are available to help determine capacity requirements for a particular die. Be conservative when calculating tonnages for complex dies so that a press of ample capacity will be used for the job. Then, after dies are installed, confirm calculations by checking actual press loading. Care should also be taken to avoid off-center loading.

It is important that press users understand the difference between geared and non-geared presses, **and that they know the type of work most suitable for each**. They should also be aware that it is possible to overload the press drive by installing dies requiring work to be performed far above bottom of stroke. This situation can occur even though the load requirements of the workpiece fall within the rated capacity of press frame members. Reference to the applicable Tonnage Chart should be helpful.

Detailed information concerning the selection and application of mechanical presses is not within the scope of this manual. However, some of the salient points of press construction and mechanics are included as a guide for those who may be interested.

TONNAGE

The most basic of all press load measurements is tonnage. It is the force exerted by the press against the workpiece and is usually measured in tons. Although this is one of the most basic measurements, it is probably one of the least understood.

The amount of direct tonnage that a mechanical press is able to exert is at minimum near mid-stroke; however, it increases progressively from that point to its maximum rating at a specified point near bottom of stroke. The reason for this is that the crankshaft lever arm becomes effectively shorter as the stroke progresses downward. Actually, this action could be compared to moving the fulcrum point of a lever gradually closer to the load. Additional information regarding this concept is given on page H-3.

It can be established then, that in a mechanical press, the drive is designed to deliver full rated tonnage only at, or below, a specified point above bottom of stroke. Of course, because of the mechanics involved, the drive could deliver greater force below the specified point except for other limiting factors such as frame and bearing stress.

Frame parts are built to sustain the full rated tonnage capacity of the press no matter what the position of the press stroke. The parts are capable of withstanding full rated tonnage without deflecting beyond standards which are consistent with good engineering practice, provided the load is evenly spread over the center two-thirds of the right-to-left bolster dimension.

Some press users spend an amount of time calculating press loads and then unintentionally overload the press by adjusting the slide too low. Dies that bottom on the material can cause severe overloads if set too low, especially when large areas of the material are contacted. An increase in material thickness after the dies are set can also cause tremendous loads to be imposed on the machine.

It is also possible to induce shock loads into a press that will exceed calculated blanking forces. This situation may occur when slide force is suddenly released, the result of breakthrough when blanking thick or high carbon steel. A torsional twist is applied to the crankshaft as pressure is applied to the stamping. Suddenly, as the material shears, the load is released and a rebound occurs in the crankshaft, main gear, pinion, drive keys, connection and other press parts. Use of short stroke presses with shutheight set for minimum punch penetration will help to ease this condition.

Extra care should be exercised in setting coining, embossing or forming dies since these dies are of the closed type and do not provide relief for flow or displacement of excess material. Also, if wrinkles should start to develop with draw dies, the cause should be checked and corrected. Never attempt to iron wrinkles

out by setting the slide down “a little more” because coining loads may be developed which reach dangerous proportions; frame parts could be damaged.

To summarize, remember that it is possible to pressure overload a press near bottom of stroke because of the increased mechanical advantage of certain drive parts at that point. And, it is possible to induce excessive stress into both frame and drive members by improper die setting and loading. Avoid situations of this kind by installing only dies which have capacity requirements falling within maximum tonnage rating of the press, by setting shutheight correctly, and by making certain that the dies are physically large enough to prevent concentrated loading.

TONNAGE/STROKE RELATIONSHIP

Mechanical power presses use a crankshaft (or eccentric shaft) to convert rotary motion from the flywheel and gears to sliding straight line motion of the slide. The geometry of this combination of parts will result in a changing mechanical advantage between the drive and slide. **For example, mechanical advantage of the crank arm and connection assembly will vary from zero, at a point near midstroke, to infinity at the bottom of the stroke**.

This changing lever concept is illustrated in Figure 1I, views A, B and C. Note that in View “A”, the crank is positioned near the midstroke where the mechanical advantage is about **1 to 1** (*or no mechanical advantage at all*). Assuming that a torque input of **600 inch tons** is applied to the shaft, which has a crank throw of **6 inches**, a force of **100 tons** would be delivered by the slide at that point.

To illustrate how the tonnage will change with regard to stroke position, select another point where the effective moment arm is about half as long as it was at midstroke. The slide will be nearer bottom of stroke and the effective moment arm will be one-half of distance **“L”**, or **3 inches**. Substitute the value of 3 inches into the calculation and note that the force delivered by the slide will now be **200 tons**, an increase of two times the amount at midstroke. See View “B”.

Finally, it can be shown in view “C” that on dead bottom of stroke the effective moment arm would be zero, and zero divided into any number other zero would produce a quotient of infinity. Therefore, the drive could theoretically deliver infinite tonnage at bottom of stroke. From a practical standpoint, however, the elasticity of frame parts would allow them to deflect under excessive loads. And, if the overload should exceed elastic limits of the frame components, they may be permanently damaged or broken. Press users should make every effort to keep the applied load within the design limits of the press.

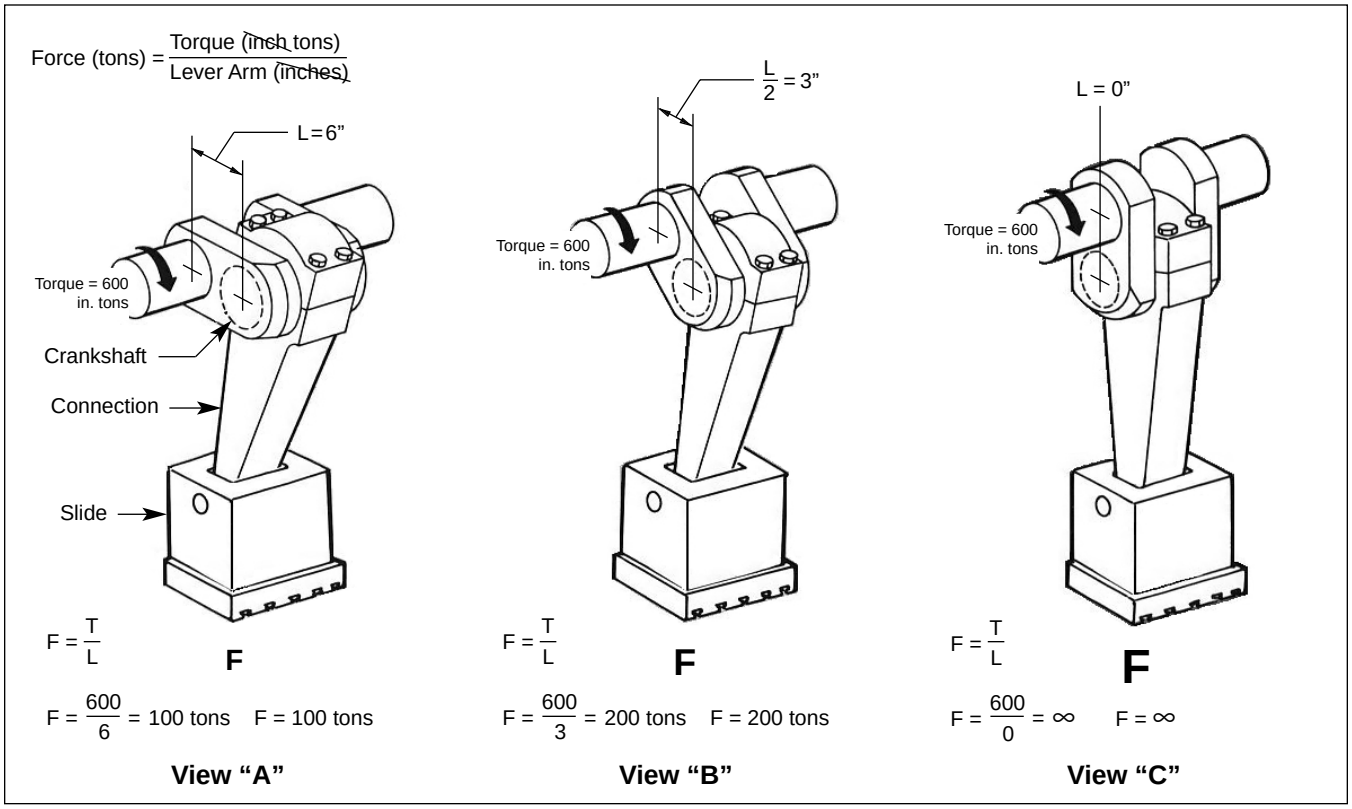


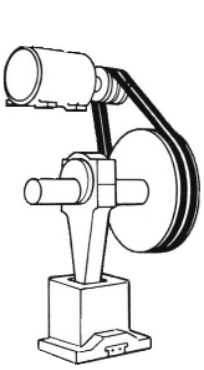
Figure 1I. Changing lever concept showing tonnage/stroke relationship.

The illustration shows how press tonnage is affected by a change in length of the crank lever arm, or effective moment arm, as the slide nears bottom of its stroke. From this it also follows that a press with a short stroke will not have the same tonnage characteristics as a press with a long stroke, even though both may be rated for full tonnage the same distance off bottom. This relationship is further illustrated by the curves shown on the Tonnage Charts, pages H-5 thru H-7. Six different tonnage charts are included in the manual — for the #4 thru #7 Minster O.B.I. flywheel type press and the #6 & #7 Minster O.B.I single geared presses.

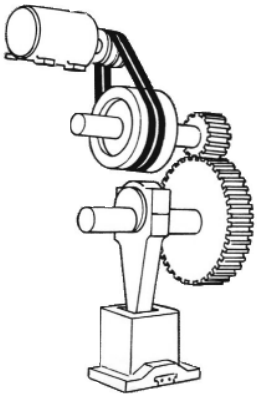
PRESS DRIVES

The electric motor supplies energy to the press flywheel at an almost constant rate. Here the kinetic energy is stored until a portion of it is expended to help perform work by the press. Position of the flywheel within the press drive is very important because its location will have an effect upon the operating characteristics of the press. It may be located directly on the crankshaft, or on a driveshaft connected to the crankshaft through a gear train.

A press which has the flywheel located directly on the crankshaft is called a flywheel type or non-geared press. In presses of this type, flywheel energy which has been spent during each stroke should be recovered during the unloaded portion of the stroke. To meet these operating conditions, flywheel type presses should be used primarily for work where flywheel energy is expended only very near bottom of the stroke. Operations such as blanking, cutting or piercing thin stock are usually best suited for this application.



Flywheel Type Press (non-geared)

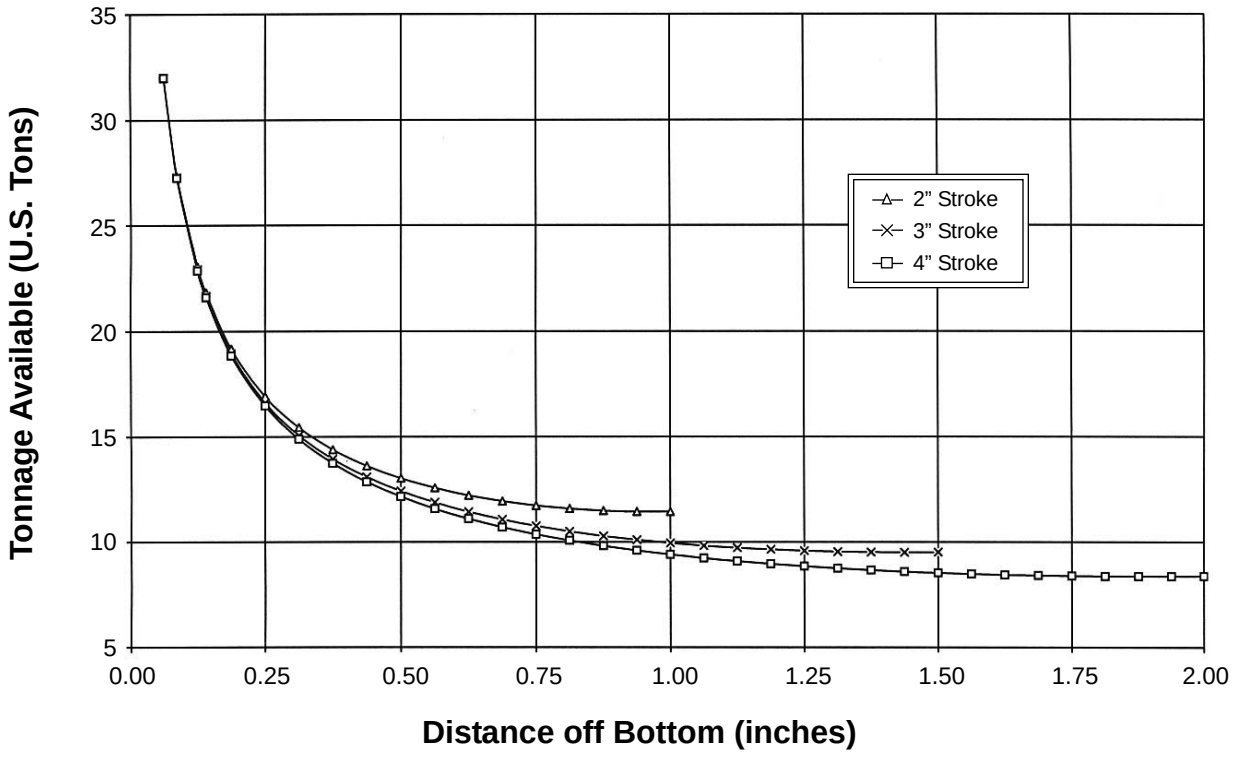


Single Geared Press

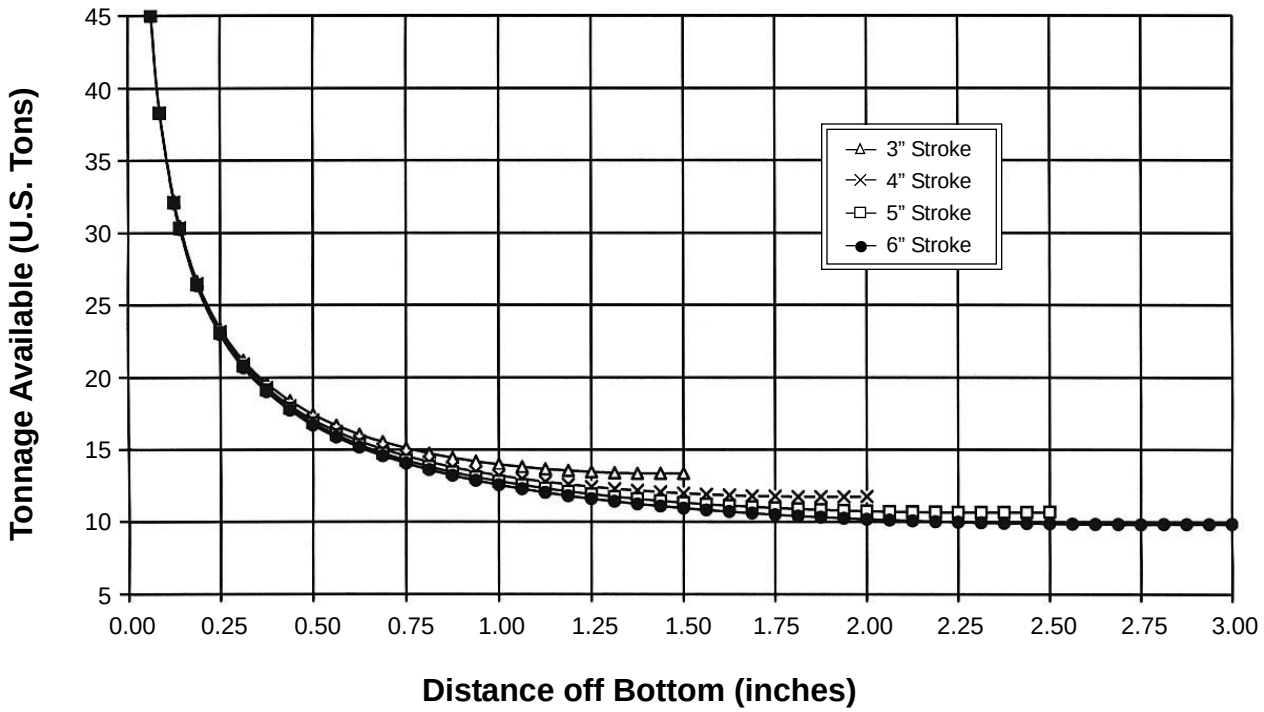
Speed of flywheel type presses will be higher than geared presses because the flywheel is mounted on the press crankshaft and all flywheels are subject to certain minimum speeds. Slow flywheel speed will provide only very little energy for work. Speed of flywheel type (*non-geared*) presses is usually in excess of 80 strokes per minute.

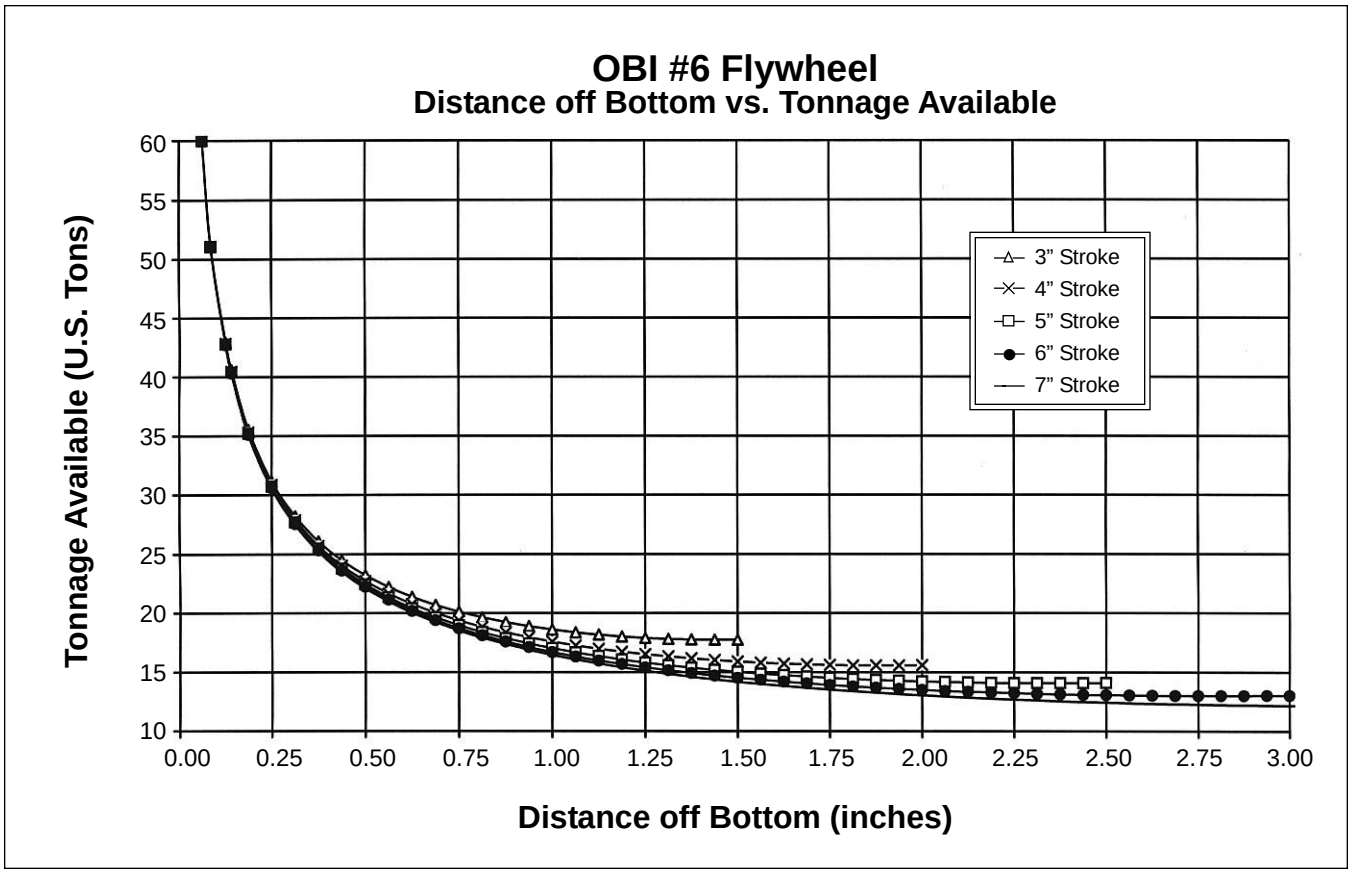
On single geared presses, flywheel energy is transmitted to the slide through a single gear reduction, The gear ratio permits greater flywheel speeds with resultant higher energy to perform heavier work than the non-geared press. Single geared press usually fall in an intermediate range of from **30 to 80 strokes per minute**. Presses of this type are best suited for shallow draw work, forming and blanking of heavier materials.

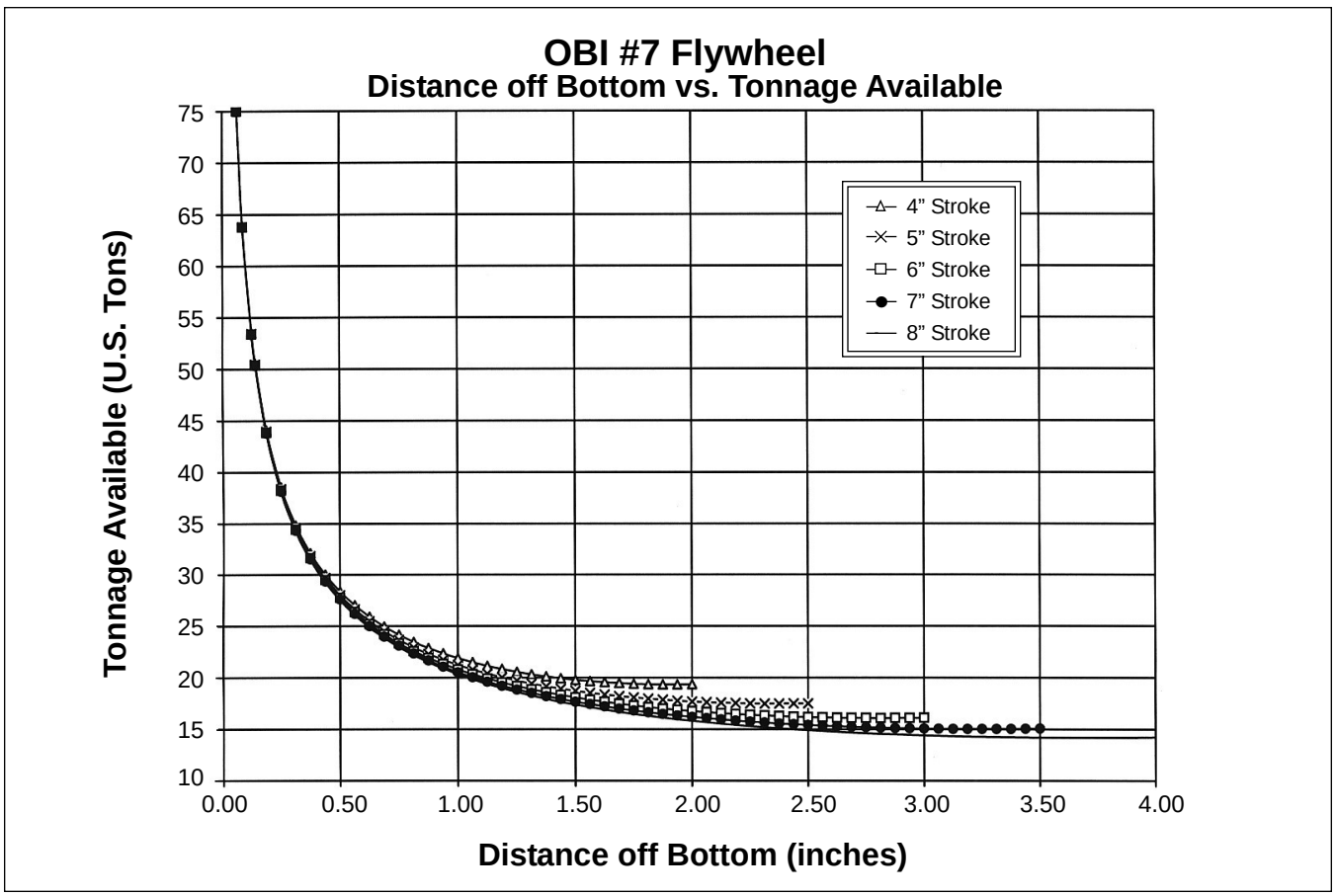
OBI #4 Flywheel
Distance off Bottom vs. Tonnage Available

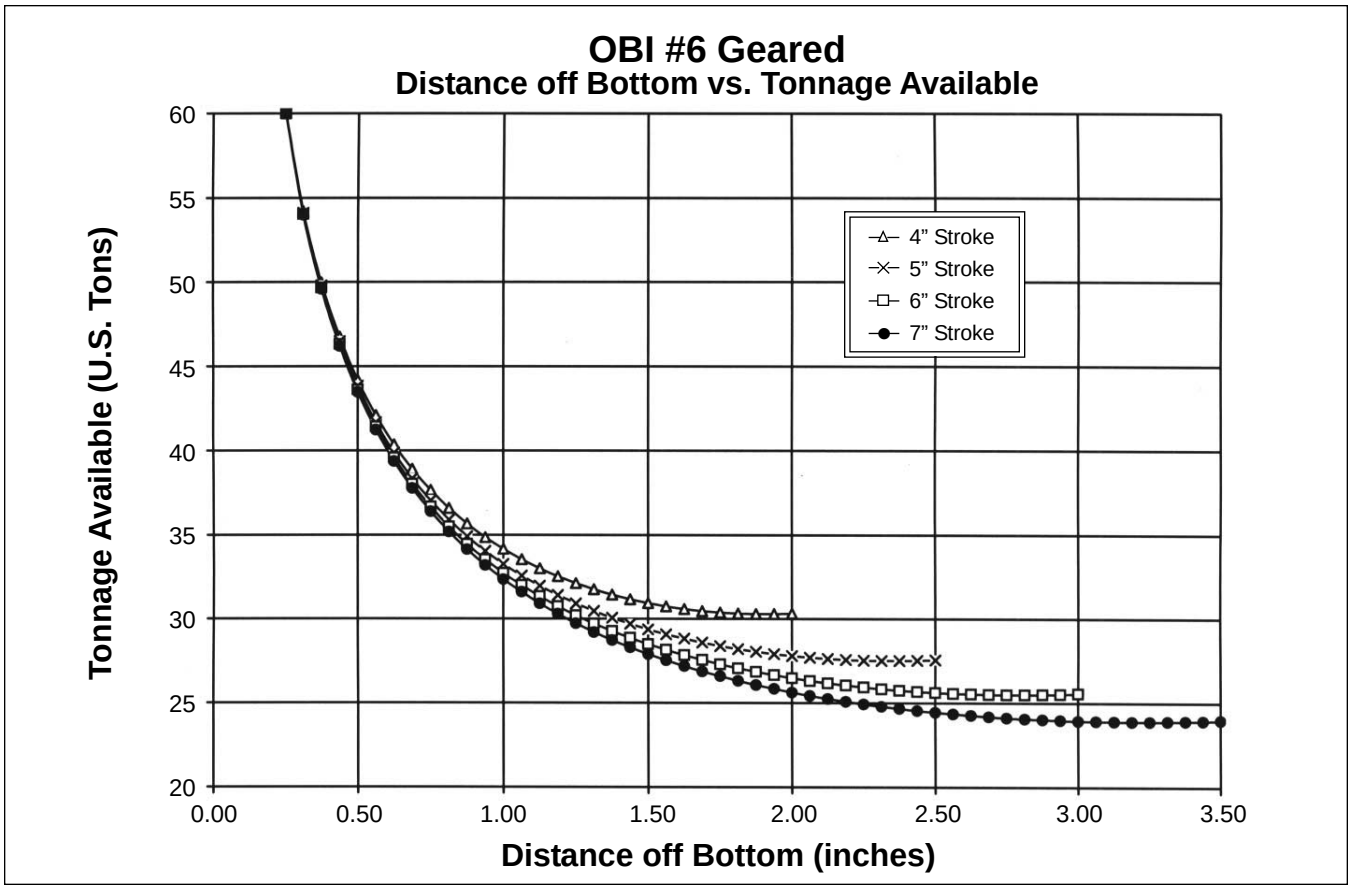


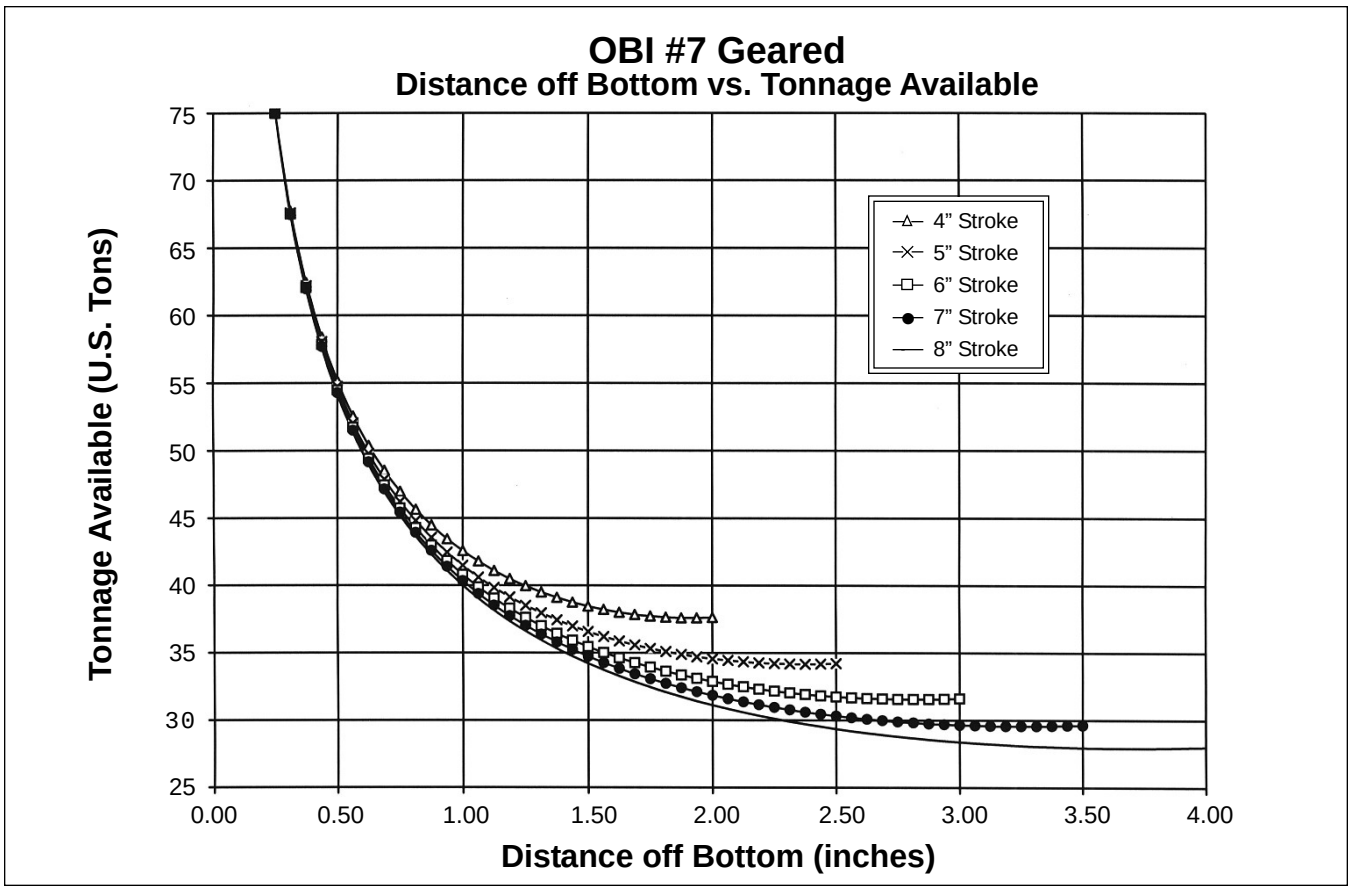
OBI #5 Flywheel
Distance off Bottom vs. Tonnage Available




OBI #6 Flywheel
Distance off Bottom vs. Tonnage Available
Tonnage Available (U.S. Tons)
60
55
50
45
40
35
30
25
20
15
10
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
Distance off Bottom (inches)
3” Stroke
4” Stroke
5” Stroke
6” Stroke
7” Stroke


OBI #7 Flywheel
Distance off Bottom vs. Tonnage Available
Tonnage Available (U.S. Tons)
75
70
65
60
55
50
45
40
35
30
25
20
15
10
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
Distance off Bottom (inches)
4” Stroke
5” Stroke
6” Stroke
7” Stroke
8” Stroke


OBI #6 Geared
Distance off Bottom vs. Tonnage Available
Tonnage Available (U.S. Tons)
60
55
50
45
40
35
30
25
20
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Distance off Bottom (inches)
4” Stroke
5” Stroke
6” Stroke
7” Stroke


OBI #7 Geared
Distance off Bottom vs. Tonnage Available
Tonnage Available (U.S. Tons)
75
70
65
60
55
50
45
40
35
30
25
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
Distance off Bottom (inches)
4” Stroke
5” Stroke
6” Stroke
7” Stroke
8” Stroke

PUNCH SPEEDS

Velocity of the slide at the time the die strikes the workpiece has a very definite affect upon quality of the part, scrap loss, die life and economics of the operation. Certain types of press work, such as blanking and punching, are not restricted to maximum slide velocities. In fact, the only limitations seem to be those presented by feeding the stock, removing the blanks, and speed of the press itself. On the other hand, speed of the press used for deep drawing operations must be limited and will depend upon the type of material being processed.

Numerous charts and books are available which indicate maximum drawing speeds for various metals. For example, maximum drawing speed for steel will average about 55 feet per minute. Stainless steel is normally drawn at 35 feet per minute, while certain soft deep drawing steels may be drawn at speed up to 80 feet per minute. Comparing this with other metals, aluminum may be drawn at 175 feet per minute and brass at 200 feet per minute. In each case, a press should be selected which has a slide velocity, near midstroke, appropriate for the material being processed.

Note that drawing speeds are indicated in feet per minute, whereas press speeds are specified as number of strokes per minute. The relationship becomes further complicated because stroke lengths will vary from one press to another. In order that the press user may quickly determine slide velocity from these known values, various charts and calculators are available. However, if these aids are not handy, the following equation may be used to determine approximate slide velocity. The answer will be an approximation of the slide speed encountered from 25% up on the stroke to midstroke.

$$\text{Speed (ft. per min.)} = \frac{\text{Stroke x S.P.M.}}{4}$$

Example: Find the approximate slide velocity at midstroke for a press with a 10” stroke, operating at a continuous speed of 40 stroke per minute.

$$\text{Speed} = \frac{10 \times 40}{4} = 100 \text{ feet per minute}$$

ENERGY CAPACITY

Energy capacity of a press is a measurement in engineering units of the motor/flywheel capabilities. This combination of parts is required to produce power, store it, and then deliver it when needed to stroke the press and complete the work therein. Usually energy capacity is expressed in units of inch tons per stroke available for work. Energy is supplied by the main drive motor and stored as flywheel energy by rotating the flywheel mass through a predetermined speed range.

It should be pointed out that not all of the energy stored in the flywheel can be used in normal press operation. Actually, just a portion of the stored energy is used to do the work of forcing the slide and its associated dies through a distance. By multiplying the amount of force required times the distance through which it is applied, the product will equal the energy load on the press. In order to release any part of its energy for the work at hand, however, the flywheel will be slowed down. It then becomes necessary for the motor to restore the spent energy by bringing the flywheel back to its original speed.

Ideally then, the flywheel only releases a small portion of its total energy through a short burst of power during each stroke of the press. But, if the flywheel is slowed more than a recommended amount, depending on size of flywheel and type of motor used, the motor may be overworked. Whenever the flywheel is slowed down, the motor is also slowed. As a result, the motor will pull a heavier current in an effort to regain speed. If repeated overload occurs, the motor temperature will rise and open the thermal overload relays, if it is so equipped.

Actual amount of energy released by the flywheel through one stroke of the press can be calculated if the rim weight, initial and final speeds are known. Initial and final speeds can be found by using a tachometer; rim weight can be calculated from the flywheel measurements. Substitute known values into the formula:

$$E_1 = \frac{W(V_1^2 - V_2^2)}{64.32}$$

E_1 = Energy in foot-pounds which the flywheel will expend when speed is reduced from V_1 to V_2.

W = Weight of flywheel rim, in pounds.

V_1^2 = Square of velocity in feet per second at mean radius of flywheel, before energy is given out.

V_2^2 = Square of velocity in feet per second at mean radius of flywheel, after energy is given out.

64.32 = Constant which is two times acceleration due to gravity.

SECTION I

This Section Contains The Following: **Page**

INSPECTION & MAINTENANCE

An active program of regular press inspection and preventive maintenance must be developed by the press user management. Such a program is vital to the safety of press operators and necessary for continuous, efficient production from the equipment. The complete maintenance program should be set up as an organized procedure of routine press inspection, preventive maintenance, repair or replacement of component parts as required, and complete checkout after repair. Regulations require records to be kept of press inspections and of the maintenance work performed.

Press inspection should be arranged to be performed in varying degrees at predetermined intervals. For example, daily inspections of a routine nature may be handled by the press operators, die setters or foremen during the course of their normal duties. This inspection should cover obvious items such as point-of-operation guards, lubricant levels, oil leaks, loose bolts, unusual noises, loose belt, unusual vibrations, blown fuses, varying speeds and operation of electrical controls.

More thorough inspections should be made on a weekly basis, usually with reference to a check list. These inspections should include checks of fault detection circuits and checks for less obvious items such as cracked or broken oil lines in concealed areas of the press, condition of oil filters and proper operation of press electrical controls through all functions.

In addition to the daily and weekly inspections, a scheduled inspection should be performed each month. Intensity of the monthly inspection will depend, to a great degree, on how thoroughly the weekly inspections are conducted. There is little to be gained by duplicating checks of certain items while others go unnoticed. Inspect items such as the clutch/brake unit, slide parallelism, flywheel brake, solenoid valves, drive belts, flywheel sheave and motor sheave. Also make certain that all protective covers are securely installed.

Besides daily, weekly and monthly checks, a semiannual inspection should be performed to reveal general condition of the press. At this time, check major frame parts for cracks and broken sections; check bearing clearances, press foundation and levelness; inspect all components and wiring inside the electrical control panel. Oil in the recirculating lube system should be “reconditioned” or replaced after every 1300 hours of operation and critical press parts inspected for cracks, worn or broken sections. Parts needing replacement should be ordered and time to perform repairs should be scheduled.

As mentioned previously, a check list should be made to cover each individual press installation. It should include checkpoints recommended by Minster, plus others that are special or applicable to the particular press and its associated equipment. The list should be arranged so that positive step by step inspections will be performed at specific parts of the press on prescribed dates. Copies of the list should be made so that the inspector can check off or note results of each check as it is made. The inspection reports may then be filed as a part of the complete press record.

For your convenience, a sample “Press Inspection Check List & Maintenance Record” is included in this manual. Checkpoints normally required on most Model 101 OBI/OBS Series presses are listed. Make certain to add any other items such as auxiliary equipment or special features that are a part of the complete press installation.

PERIODIC CLEANING

Press cleanliness is a very important part of good maintenance. Cleanliness contributes to safer and more pleasant working conditions and the actual removal of dirt, grime, oil and grease may reveal items that require attention. Also, reduce the damaging effects of dirt and other foreign particles by keeping cover plates in place, by keeping cabinet doors tightly closed (except when necessary to have them open) and by wiping up oil and grease spills as soon as they occur.

Improperly controlled or misdirected air blowoffs, used for part and scrap removal, may result in small parts being blown into critical areas of the press. Adjoining equipment and personnel may also be struck by these particles. Safeguard personnel and increase protection of the equipment by keeping air blowoff systems under control. When cleaning the press, be sure to check for any foreign particles that may be accumulating. Severe damage to bearings, cylinders, motors, gears and other parts may occur if these metal particles work their way into them. Clean all accumulated metal particles, chips and work pieces from press cavities, housings and lube drains.

After each die installation, the press should be cleaned and all wrenches, nuts, bolts, clamps and rags removed. The floor around and under the press should also be cleaned and kept free of finished parts, scrap material and litter.

When an inspection reveals the need for corrective maintenance, take action at once. Many minor difficulties grow into major maintenance problems because of neglect.

SPARE PARTS LIST

By keeping a supply of selected spare parts on hand, the user can usually hold press downtime to a minimum. To simplify that effort, Minster now supplies users with a suggested spare parts list that is computer generated for a specific press from its manufacturing Bill Of Material. This type of list has proven to be more valuable than placing a generalized list in the manual because subsequent design improvements, specification changes and/or special features can be included.

If an additional copy of the “Suggested Spare Parts List” is required, please send your request to the attention of the Minster Repair Parts Department. Be sure to specify the serial number of the press. Spare or replacement parts may be ordered from any of the Minster dealerships throughout the world, or directly from the Minster Repair Parts Department.

MINSTER®

MODEL 101 OBI/OBS Series Press

Press Inspection Check List & Maintenance Record

Press Serial No. _____

Press Model _____ Feed _____ Scrap Shear _____

User's Equip. No. _____ Reel _____ Cradle _____

Location _____ Straightener _____ Stock Oiler _____

Tonnage _____ Other _____

Installation Date _____ Type Of Point Of Operation Guarding _____

Inspection Date _____

Auxiliary Equipment

⚠WARNING

USE EXTREME CAUTION WHEN PERFORMING INSPECTIONS. DISCONNECT POWER TO THE PRESS, LOCK THE AIR LOCKOUT VALVE AND ELECTRICAL DISCONNECT SWITCH IN THE OFF POSITION, AND INSERT THE DIE SAFETY BLOCK. ATTACH WARNING TAGS TO PREVENT ACCIDENTAL STARTING. MAKE CERTAIN THAT THE FLYWHEEL HAS STOPPED TURNING. IF NECESSARY TO MOMENTARILY RESTORE ELECTRICAL POWER OR AIR PRESSURE, MAKE CERTAIN THAT ALL PERSONS AVOID ANY PINCHING POINTS ASSOCIATED WITH THE PRESS AND/OR ITS AUXILIARY EQUIPMENT. PRESS INSPECTIONS SHOULD BE PERFORMED ONLY BY AUTHORIZED, EXPERIENCED PERSONNEL.

Mechanical Press Parts

Weekly Checks

Satisfactory	Unsatisfactory		
☐	☐	Cleanliness	☐ Clean press inside and out. Remove any foreign material, rags, chips, scrap, etc. which may have accumulated. ☐ Clean-up floor and area surrounding the press.
☐	☐	Protective Covers	☐ Check flywheel (or main gear) cover to make certain it is in place and secure. ☐ Make certain all covers are closed and properly secured. ☐ Check feed and scrap shear cover, if applicable, to make certain it is in place and secure. ☐ Check for any other covers that are missing or broken and replace as necessary.
☐	☐	Feeding Equipment (If Furnished)	☐ Check automatic feeding equipment for loose mounting bolts, brackets, rods and levers. Tighten if necessary. ☐ Check scrap shears for dull knives and improper setting. ☐ Make certain gear case gear teeth and all other feed equipment bearings are properly lubricated per feed manufacturer's instructions.
☐	☐	Die Installation	☐ Check physical size of die for compatibility with press. (Die **should not** extend beyond edge of slide face or bolster. Small die area may cause concentrated loading.) ☐ Check tonnage requirements of die or dies to be installed. (**Do not exceed tonnage capacity of press**.)
☐	☐	Overload	☐ If dies are set, test press to determine if it is overloaded. Do not operate press above maximum rated tonnage.

Mechanical Press Parts (Continued)

Monthly Checks

Bolster Plate	☐ Make certain no foreign material is lodged between bolster and bed. ☐ Make certain bolster is mounted securely to bed.
Clutch Assembly	☐ Check clutch brake anchor pins for tightness. ☐ Check clutch for loose or broken parts. ☐ Check clutch for air leakage. (Procedure is explained in separate clutch manual.) ☐ Check brake lining wear. (Check clutch drive disc wear whenever clutch is disassembled for replacement of brake linings.) ☐ Check clutch adjustment by measuring amount of pressure plate travel. (See clutch manual for procedure and tolerances.) ☐ Perform additional checks listed in the clutch service manual.
Cap Screws and Fasteners	☐ Check all cap screws and stud nuts for tightness. ☐ Replace all missing screws, nuts, and washers.
Power Slide Adj. Parts (If Furnished)	☐ Make certain slide adjusting motor is mounted securely. ☐ Check slide adjustment gears for condition and tightness on shaft. ☐ Check micro shutheight indicator for accuracy. (Follow procedure given in manual.) ☐ Check slide adjustment locking knob and pin assembly. Make certain pin is not broken and that the adjustment setting can be locked.
Knockout Parts	☐ Check knockout brackets to be sure they are fastened securely and that they are not cracked or broken. ☐ Check condition of clamping screws and knockout rods. ☐ Make certain knockout bar is straight. Repair or replace as necessary.
Inclining Mechanism	☐ Check inclining frame bracket for cracks or looseness. ☐ Check inclining jack assembly and attachment pins for loose or broken parts.
Motor Sheave & Flywheel	☐ Check motor sheave for looseness on motor shaft. ☐ Check alignment of motor sheave with flywheel sheave. ☐ Check motor sheave and flywheel for cracks, wear, and rough areas.
V-Belts	☐ Check v-belts for proper tension. ☐ Check for worn, cracked, or frayed belts.
Timing Belts and Sheaves (If Applicable)	☐ Check timing belts for proper tension. ☐ Check timing belts for worn, cracked, or frayed sections. ☐ Check timing belt sheaves for tightness on the shaft and for proper alignment. ☐ Check condition of sheaves.

Semi-Annual Checks

Levelness	☐ Check the levelness of the press. Press should by level in both the right-to-left and front-to-back directions. ☐ Make certain press weight is being supported proportionately by all four feet and that **the bed is not being twisted**.
General Condition of Press and Installation	☐ Evaluate general condition of the press and accessory equipment. Repair or replace as necessary. ☐ Check major frame components (not previously inspected) for cracks, broken sections, and worn parts. ☐ Check press for missing or broken accessory items. ☐ Check press foundation. Replace foundations that are broken, sinking, uneven or loose. ☐ Check appearance of press. Repaint or clean thoroughly if necessary. ☐ Check floor area surrounding press. Floor should be clean and free from obstructions. ☐ Check aisleways to make certain they are clear and free from protruding objects.

Mechanical Press Parts (Continued)

Semi-Annual Checks

Satisfactory	Unsatisfactory		
☐	☐	Bearing Clearance	☐ Check total bearing clearance. (**NOTE:** Checking procedures and clearances are given in the manual.) ☐ Check R.H. main bearing clearance. ☐ Check L.H. main bearing clearance. ☐ Check connection bearing clearance. ☐ Check ball box clearance.
☐	☐	Slide and Gibs	☐ Check parallelism between slide and bolster.* ☐ Check for proper running clearance between slide and gibs.* ☐ Check slide for cracked or broken sections. ☐ Check tightness of ball box adjustment set screw. *__NOTE:__ Checking procedure explained in manual.
☐	☐	Frame	☐ Check frame for cracked or broken sections. ☐ Check for loose brackets or components attached to the frame.
☐	☐	Gears (If Furnished)	☐ Check for uneven wear and broken teeth. ☐ Make certain gears are tight on shafts. ☐ Check for cracks in the gear. ☐ Check for proper lubrication.
☐	☐	Legs	☐ Check for cracked or broken sections. ☐ Check leg bolts, or studs, and make certain legs are secured to the frame.

COMMENTS:

CORRECTIVE STEPS TAKEN:

_____ Press approved for operation.

_____ Press **NOT** approved for operation.

Inspected By _____

Satisfactory ☐ Unsatisfactory ☐

Pneumatic Components

Weekly Checks

Air Filter	☐ Close the air lockout valve and release system air pressure. Open filter drain cock to release trapped moisture and other foreign matter. **NOTE:** Open filter drain cock daily if excessive moisture is present in the air supply.
Air Tanks	☐ Drain accumulated moisture from all air tanks.
Slide C'Bal. Cylinder (If Applicable)	☐ Drain accumulated moisture from bottom of counterbalance cylinder.
Die Cushion (If Applicable)	☐ Drain accumulated moisture from bottom of cushion cylinder.
Solenoid Air Valves	☐ Check for air leakage from valves. With main drive motor turned OFF and flywheel stopped, energize clutch solenoid valve by actuating INCH buttons. While valve is held energized, have another person check it for leakage. **WARNING:** Clutch will engage when clutch valve in energized. ☐ Make certain all solenoid valves are operating properly and that their response is immediate and snappy. Replace the complete solenoid valve if it is worn or working improperly.

Monthly Checks

Air Gauges	☐ Check accuracy and condition of air pressure gauges.
Air Piping	☐ With air pressure turned on, check air lines for leaks and mashed sections. Also check for broken or loose supporting hardware. Replace all hoses, tubing, and fittings that are worn or damaged.
Air Pressure Regulators	☐ Check operation of regulators. With air pressure turned on, turn regulator adjustment knob clockwise and note whether associated gauge reading increases. Then turn adjustment screw counterclockwise and actuate the related component, or momentarily open air lockout valve. Gauge should now indicate a lower reading. Replace a worn or improperly operating regulator with a new one.
Air Pressure Switches	☐ Check operation of air pressure switches by reducing air pressure to a point below the preset operating range. Pressure switch must prevent normal press operation under this condition.
C'Bal. Cylinder	☐ Check for air leakage. (Procedure explained in manual.) ☐ Check oil level in lube cup. Resupply, if necessary, with Minster Lubricant No. 1. ☐ Check for tightness of mounting bolts and alignment with slide.
Die Cushion (If Furnished)	☐ Check for air leakage. (Procedure explained in manual.) ☐ Check to make certain cylinder is being lubricated properly. ☐ Check for tightness of mounting bolts, stud nuts, or clamp screws, if used.
Safety Valves	☐ Check condition of air pressure safety valves.
Flywheel Brake	☐ Check lining wear. Replace if necessary. ☐ Check operation of flywheel brake and associated pressure switch. ☐ Check tightness of mounting screws.

COMMENTS:

CORRECTIVE STEPS TAKEN:

_____ Press approved for operation.

Inspected By _____

_____ Press **NOT** approved for operation.

Electrical Equipment

Weekly Checks

Satisfactory	Unsatisfactory		
☐	☐	Push Buttons	☐ Inspect all control buttons for broken, cracked, or loose sections. Replace entire switch if any part of it is damaged or worn. ☐ Check all Stop Control and Top Stop buttons to make certain they function properly. ☐ Check all two-hand controls to make certain they function properly and that the slide cannot be stroked by depressing one button only.
☐	☐	Selector Switches	☐ Check condition of each selector switch. Replace any switch that is worn, damaged, or not functioning properly. ☐ Check for proper response from each designated function of each selector switch.

Monthly Checks

☐	☐	Electrical Control Panel	☐ Check to make certain control panel and press frame are properly connected to earth ground. ☐ Check all electrical components inside panel to make certain they are mounted securely. Note also, any signs of damaged or overheated components. ☐ Check fuses and motor heaters for proper size. ☐ Check for loose wire terminals and connections. Tighten if necessary. ☐ Check wiring for burned or damaged insulation.
☐	☐	Operator's Controls & Associated Components	☐ Make certain ring protectors, or shrouds, are secured around operator's RUN buttons. ☐ Make certain controls are being used properly and in a safe manner. ☐ Make certain all electrical covers are in place. ☐ Make certain guard switch receptacle is being used where necessary and that it is functioning properly.
☐	☐	Point-Of-Operation Guards & Devices	☐ Check all point-of-operation guards to make certain they are in place and secure. ☐ Make certain that all point-of-operation guards are working properly by performing all the checkout procedures (if applicable) outlined under "Interlocked Barrier Guard Checkout Procedures" Technical Bulletin (furnished).
☐	☐	Motor(s)	☐ Check main drive motor mounting bolts and motor bracket mounting bolts for tightness. Tighten if necessary. ☐ Check drive motor safety cable or bracket if used. ☐ Remove any accumulated dirt, oil, or grease from motor frame. (CAUTION: DO NOT allow cleaning solution to drip inside motor.) ☐ Check condition of power supply wires to all motors in the press. ☐ Lubricate motors only as recommended in the motor manufacturer's instructions. DO NOT over lubricate.
☐	☐	Limit Switch	**NOTE:** The following procedures are applicable if the limit switch supplied is furnished by Minster. If controls are supplied by someone other than Minster, refer to the information furnished with that equipment. ☐ Check drive to limit switch for loose, worn, or damaged parts. Check the condition and tightness of protective cover. ☐ Check tightness of terminal connections and condition or wiring. Correct or replace as necessary.

COMMENTS:

CORRECTIVE STEPS TAKEN:

_____ Press approved for operation.

Inspected By _____

_____ Press **NOT** approved for operation.

Satisfactory ☐ Unsatisfactory ☐

Lubrication Equipment

Weekly Checks

Lube Distribution System	☐ Check lubrication lines for cracked, crushed, or damaged tubing or fittings. Also, check condition of hoses or flexible tubing supplying lubricant to upper connections and other applicable points. ☐ Check out lubrication return lines if they restrict the flow of oil. (CAUTION: DO NOT pour cleaning solution through lube drain lines — this will contaminate press lubrication oil.) ☐ Check for oil leakage from oil seals.
Air Line Lubricators	☐ Remove any accumulation of water from bowl. ☐ Check condition of unit. ☐ Fill to line on bowl with Minster Lubricant No. 3. ☐ If, after a week of press operation, oil level has not lowered, observe drip rate to make certain oil is being dispensed by the unit.

Monthly Checks

Pump Unit	☐ Perform lubricator pump unit maintenance as directed in the separate manual covering type of unit furnished. ☐ Check flexible coupling between motor and pump to make certain it is not loose or slipping under load.
Inclining Jack	☐ Hand lubricate screw threads with Lubricant No. 1.
Oil Reservoir	☐ Check level of oil in reservoir. Oil should appear near the top of the reservoir with the lube pump not running. Never fill reservoir while pump is running. Allow sufficient time for oil in system to drain back after pump is stopped before adding oil. Never permit oil level to fall below 2.00” from the bottom of the reservoir while press in is operation.

Quarterly Checks

Rotor Seal	☐ Lubricate as necessary. (See instructions in manual.)
Lube System Oil Filter	☐ Install a new 25 micron filter element on the lube unit. Make certain filter is not leaking oil. **NOTE:** Filter must be replaced with **new filter of the same type** each time the oil in the reservoir is replaced.
Feed Drive Gearbox (If Furnished)	☐ Lubricate in accordance with the gearbox manufacturer's recommendations. **Do not over lubricate**.

Annual Checks

Oil Reservoir	☐ Drain all oil from press reservoir after every 1300 hours of operation. ☐ Remove sediment and sludge from reservoir by flushing or, if necessary, clean inside with lint-free rags. ☐ Refill press reservoir to within 1.5” (38 mm) of the top with an approved lubricant meeting the specifications of Minster Lubricant No.1.
Lube System Oil Filter	☐ Install a new 25 micron filter element on the lube unit. Make certain filter is not leaking oil. **NOTE:** Filter must be replaced with **new filter of the same type** each time the oil in the reservoir is replaced.
Inclining Jack	☐ Once a year, apply one shot of Minster Lubricant No. 2 through the fitting provided on the jack gear box.

COMMENTS:

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_____ Press approved for operation.

Inspected By _____

_____ Press **NOT** approved for operation.

ADDITIONAL COMMENTS:

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