# AIR OVER OIL BOOSTER SYSTEM

## B-250 THROUGH B-500

## INSTALLATION, OPERATING,
## & MAINTENANCE INSTRUCTIONS

**Black & Webster Assembly Equipment Division**
545 Hupp Ave. · P.O. Box 831 · Jackson, Michigan 49204
Phone: (517) 787-9444 · Fax: (517) 787-7585
www.airhydraulics.com  Email: info@airhydraulics.com

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Phone: (517- 787-9444 Fax: (517) 787-7585
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## Warranty

Air-Hydraulics, Inc. warrants to the original user that all products manufactured will be free from defects in material and workmanship and will possess the characteristics represented in writing by us. Claim for breach of the above warranty must be made within a period of one year from date of delivery to the user. Upon satisfactory proof of claim, we will make any necessary repairs or corrections, or at our discretion, replace defective parts at the factory, transportation charges prepaid. Charges for correcting defects will not be allowed, nor can we accept goods returned for correction unless we are notified in writing and the return or correction is authorized by us in writing. **The foregoing is in lieu of all other warranties, expressed or implied, including any warranties that extend beyond the description of the product.** This paragraph set forth the extent of our liability for breach of any warranty in connection with the sale or use of our products. It is understood we will not be liable for consequential damages such as loss of profit, or expense, whether based on tort or contract. This warranty is void if the articles covered by the warranty have not been properly installed, maintained and used.

## NOTE

The Air Hydraulic booster system has been carefully and accurately built to give long, trouble-free service if properly installed and maintained. Follow carefully the instructions, making sure no dirt or foreign materials are allowed to get into the cylinder or other working parts. If you have any unusual problems regarding controls or tooling, notify AIR-HYDRAULICS, INC., JACKSON, MICHIGAN, at 1-800-837-4355 and our Engineering Department will be glad to assist you.

## BOOSTER SYSTEM INSTALLATION INSTRUCTIONS

The booster is generally installed in a vertical position but may be installed horizontally. The reservoir must always be located higher than the top of the booster or the ram cylinder. Securely fasten the booster to a machine frame that does not move. Install the ram cylinder in a frame sufficient to withstand the forces that the cylinder produces. Failure to do so will result in damage and potential danger to the machine operator.

Install incoming air supply (35-110 P.S.I.) through an approved safety lockout valve which is upstream of an FRL unit. The FRL unit consists of a filter, pressure regulating valve, and an air lubricator connected in proper order with arrows indicating the direction of air flow. It should be installed in the air line in a horizontal position as close to the booster system as possible with the pressure gauge visible from the operating position in front of the system.

The ability to bleed air out of the system is absolutely necessary. Be sure to install bleed caps near the top of the booster and near the top of the ram cylinder when plumbing the system. When filling the system, make sure the ram is in the fully retracted position, the booster piston is fully retracted and then fill the system with the proper oil. Also fill the reservoir so that it is half full and no air bubbles are seen in the tube from the bottom of the reservoir. After filling, make sure no air is left in the lines and install the and reinstall the bleed caps.

Turn on air and make sure there are no air leaks. Unscrew filler plug in lubricator and fill with a good grade of number 10 lubricating oil. Operate system and adjust nut on top of lubricator until an occasional drop of oil is passed into the air line. Use Mobil 24 or 25 hydraulic oil or the equivalent.

**Caution: Incoming air pressure should never exceed 110 psi.**

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## CONTROLS

Booster system may be operated by electrical or pneumatic anti-tie-down or PLC controls with dual palm button activators. Also available at additional cost are special controls for automatic operation (pressure switch, limit switches, etc.).

## SPEED CONTROL

The operating speed of the press is controlled by a speed control valve located on the back of the press (part # 28). To increase speed, turn the adjusting screw counter-clockwise. Turn clockwise to decrease speed.

## RESERVOIR

The reservoir is located at the top inside of the booster cylinder and contains a reserve supply of oil. The oil level should be checked occasionally so that the reservoir is never allowed to become completely empty. Try to keep the reservoir about ¾ full at all times. The proper volume of oil in the hydraulic system is maintained from the reservoir supply. Use Mobile 24 or 25 hydraulic oil to refill the reservoir.

## RAM STROKE

This may be adjusted up to two-inches shorter with the downstop nut and the downstop locknut (Part Numbers 26 and 27).

## MACHINE GUARDING

Machine guarding is the responsibility of the user. Provisions must be made to protect the operator and other employees from injury as a result of contact with work in progress, moving parts, mechanical motions of the press, etc. AIR-HYDRAULICS, INC. cannot provide “standard” guards for its systems due to the variety of tooling used by press owners. However, AIR-HYDRAULICS, INC. will be happy to install guards and similar safety devices for operator protection. These safety devices must be produced at the request of, and with design approval of the purchaser.

## NOTICE

When shutting down the press, the ram should be left in the full up position before turning off the air supply. Should the ram not be in the full up position when the air supply is turned off, the ram may drift after the air supply is turned off until all air from the system is exhausted.

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### System Bleeding:

***Note:*** A loss of ram pressure or a jumping action of the ram indicates air in the hydraulic system. The air should be bled from the hydraulic system as follows:

a. Make sure the reservoir has an adequate supply of oil.
b. Turn the main air line pressure on and place the control valve so that the ram is in the full up position.
c. Remove the cap nut from the hydraulic booster top cap.
d. Fill the system through the pipe plug hole and allow the air to bubble out.
e. When there are no more signs of air bubbling out and the system is full of oil, replace the pipe plug and the press is ready for operation.

## Do Not Short Stroke the B-Series Package

The B-Series, B-250, B-300, B-400 & B-500 Booster Package uses a sealed air/oil system. Seals in time wear and may allow air into the closed hydraulic circuit. The B-Series' proprietary self bleeding system will remove any air trapped in the hydraulic oil on each stroke of the unit. For this to happen, the working ram MUST return to the full up position after each stroke, or the trapped air will build up, decreasing its effectiveness and keep the unit from reaching full tonnage.

### AIR & OIL FLOW FOR AIR-HYDRAULIC BOOSTER SYSTEMS

FOR MODEL NUMBERS B-250, B-300, B-400, and B-500

1. When the valve is energized, line "B" is filled with air, causing the booster piston and ram to rise.

2. As the booster ram enters the oil chamber, pushing the oil out, pressure is developed and transferred to the ram cylinder. This pressure is maintained throughout the stroke.

3. Air from the downward stroke of the ram cylinder and the upward stroke of the booster cylinder is exhausted through line "A" throughout the stroke.

4. The oil which is flowing through the speed control valve enters the ram cylinder and pushes the ram down.

5. When the valve is de-energized, line "A" is filled with air causing the ram cylinder to move up and the booster cylinder to move down.

6. The only function of the booster fill line is to replenish the oil in the event a leak occurs somewhere in the system. The oil enters the chamber through the middle head of the booster cylinder and a small hole in the top of the booster ram.

7. The only function of the booster bleed off line is to return oil back to the reservoir in the event oil does leak by the seal in the booster.

8. The bleed hole which is located near the end of the ram cylinder is for the bleeding of oil in the event any leakage occurs in the seals.

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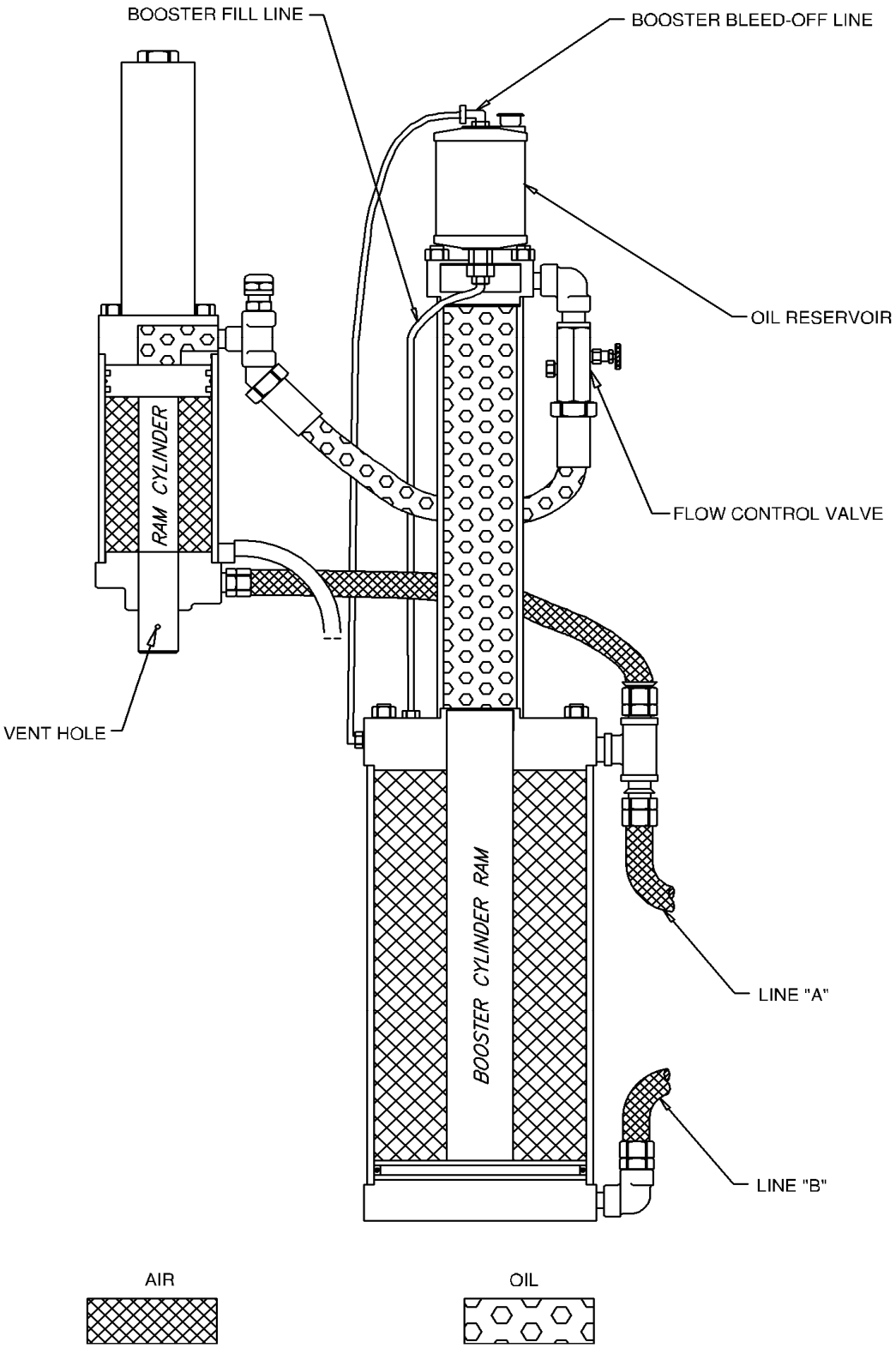

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# Air-Hydraulic Booster System Parts List

| Det. # | Part Name | PART NUMBERS | | | | Quan. |
|---|---|---|---|---|---|---|
| | | B-250 | B-300 | B-400 | B-500 | |
| | | | | | | |
| | | | | | | |
| 3 | Air Cyl. Piston Seal | 568-433 | 568-443 | 568-443 | 568-452 | 1 |
| 4 | Air Cyl. Body | C2-04 | C3-04 | C4-04 | C5-04 | 1 |
| 5 | Air. Cyl. Top Head | C2-05 | C3-05 | C4-05 | C5-05 | 1 |
| 5A | Hyd. Cyl. Body | | C3-05A | C4-05A | C5-05A | 1 |
| 5B | Hyd. Cyl. Top Head | C2-05B | C3-4-05B | | C5-05B | 1 |
| 6 | High Press Hose | H-10-21-ASSY | H-C3-4-ASSY | H-C3-4-ASSY | H-C500-31 | 1 |
| 7 | Air Cyl. Bottom Hyd. | C2-07 | C3-4-07 | C3-4-07 | C5-07 | 1 |
| 8 | Air Cyl. Piston | C2-08 | C3-4-08 | C3-4-08 | C5-08 | 1 |
| 9 | Air Cyl. Ram | C2-09 | C3-09 | C4-09 | C5-09 | 1 |
| 10 | Air Cyl. Tie Rods | C2-10 | C3-10 | C4-10 | C5-10 | 4 |
| 11 | Ram Cyl. Bot. Head. | C2-11 | C3-4-11 | C3-4-11 | C5-11 | 1 |
| 12 | Ram | C2-12 | C3-12 | C4-12 | C5-12 | 1 |
| 12a | Ram Cyl. Piston | C2-12A | C3-4-12 | C3-4-12 | C5-12A | 1 |
| 13 | Ram Cyl. Body | C2-13 | C3-13 | C4-13 | C5-13 | 1 |
| 14 | Ram Cyl. Top Head | C2-14 | C3-14 | C3-4-14 | C5-14 | 1 |
| 15 | Ram Cyl. Tie Rods | C2-15 | C3-15 | C4-15 | C5-15 | 4 |
| 16 | Hyd. Cyl. Tie Rods | C2-16 | C3-16 | C4-16 | C5-16 | 4 |
| 17 | Air Cyl. Ram Seal | 1870-2125 | | 1870-1875 | 1870-3250 | 3 |
| 18 | Ram Seal | 1250-1000 | 1870-1500 | 1870-1500 | 1870-2750 | 1 |
| 19 | Static Seal | 568-115 | 568-214 | 568-214 | 568-218 | 2 |
| 20 | Ram Piston Seal | 1870-2625 | 1870-3625 | 1870-3625 | 2500-5250 | 2 |
| 21 | Flex-loc Nut-Ram | FN-0.875-14 | FN-1.250-12 | FN-1.250-12 | FN-1.500-12 | 1 |
| 22 | Ram Top Head Seal | 1250-0750 | 1250-1000 | 1250-1000 | 1250-1250 | 1 |
| 23 | Down Stop Plate | C2-23 | C3-4-23 | C3-4-23 | C5-23 | 1 |
| 24 | Oil Reservoir | RESERVOIR | RESERVOIR | RESERVOIR | RESERVOIR | 1 |
| 25 | Hex Nuts-Tie Rods | 36509 | 36509 | 36509 | 36515 | 12 |
| 26 | Down Stop Nut | C2-A28-50-26 | C3-4-26 | C3-4-26 | C5-26 | 1 |
| 27 | Down Stop Lock Nut | 36513 | 36368 | 36368 | 36372 | 1 |
| 28 | Speed Cont. Valve | PPC-FCV-F35BK | PPC-FCV-F35BK | PPC-FCV-F35BK | PPC-FCV-EFL40S | 1 |
| 29 | Air Cyl. Gaskets | V-6.000X6.500 | V-8.000X8.5000 | V-8.000X8.5000 | V-12.000X12.500 | 2 |
| 30 | Ram Cyl. Gaskets | V-3.000X3.500 | V-4.000X4.500 | V-4.000X4.500 | V-5.750X6.500 and 568-257 | 1 |
| 30a | Ram Cyl. Ring Seal | 2-149 | 568-240 | 568-240 | 568-254 | 1 |
| 30b | Ram Cyl. Seal - B/U | - | 8-240 | 8-240 | - | 2 |
| | | | | | | |
| 32 | Hyd. Cyl. Seal | 2-142 | 2-149 | 2-149 | 568-242 | 2 |
| 32a | Hyd. Cyl. Seal - B/U | - | 8-149 | 8-149 | 8-242 | 2 |
| 32b | Hyd. Cyl. Gasket | D -2.500x3.00 | D - 3.00x3.500 | D - 3.00x3.500 | - | 2 |
| 33 | Low Press. Hose | 10LOLA | 10LOLA | 10LOLA | 12LOLA | 1 |
| 34 | Guard Tube | C2-34 | C3-4-5-34 | C3-4-5-34 | C3-4-5-34 | 1 |
| | | | | | | |
| 36 | Reservoir Bracket | C250-100 | C250-100 | C250-100 | C250-100 | 1 |

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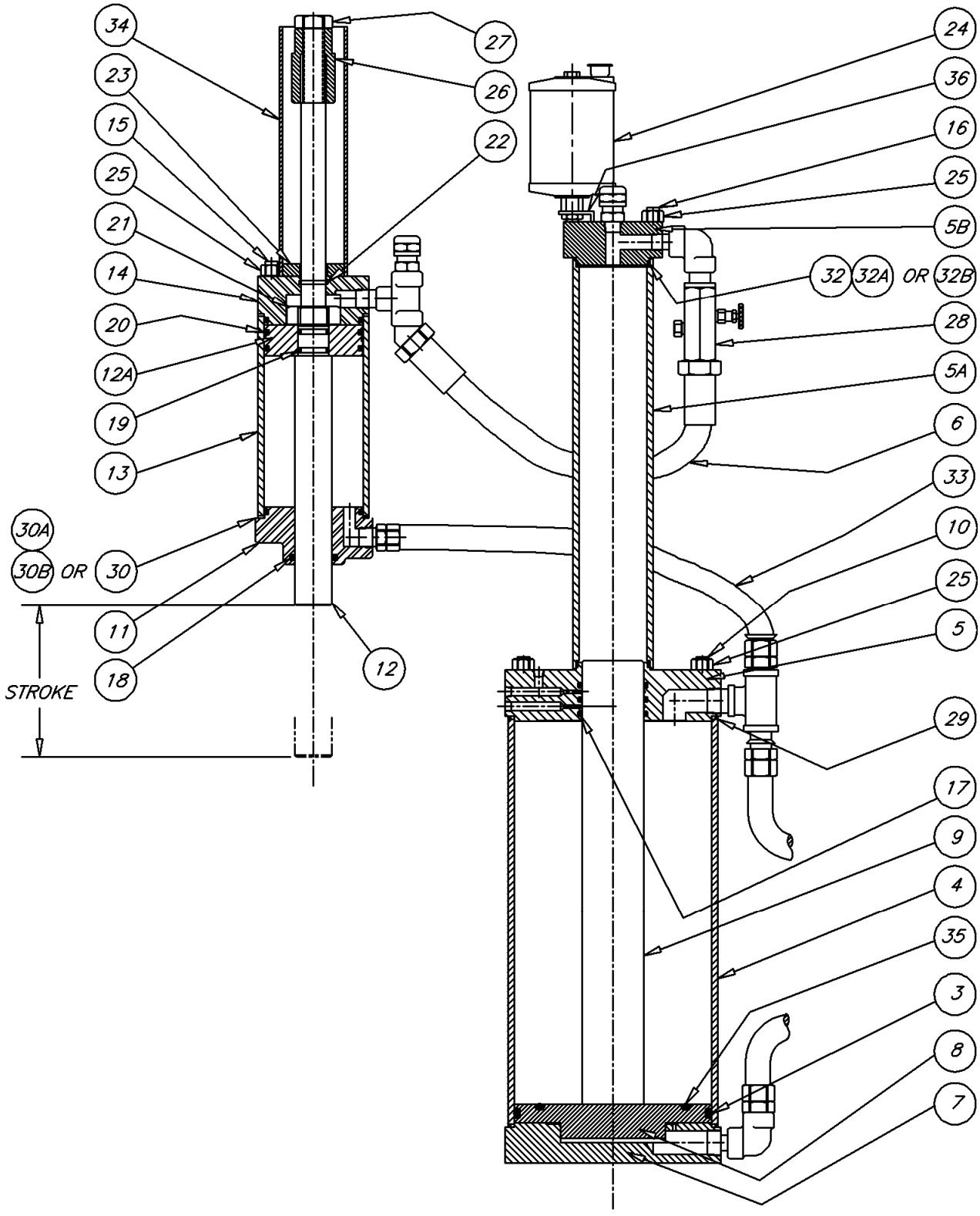
## Air-Hydraulics' Booster System Parts



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| GENERAL SPECIFICATIONS | | | | |
|---|---|---|---|---|
| **Model No.** | **B-250** | **B-300** | **B-400** | **B-500** |
| Tons at 100 PSI Air | 2-1/2 | 5-1/2 | 10 | 15 |
| Power Ratio (No. x air line PSI= Approx. Force | 50 | 110 | 200 | 300 |
| Max. Ram Stroke (adjustable 2" shorter) | 5-3/16 | 6 | 4 | 6 |
| Cubic in. of Pressurized Air Per Full Stroke Cycle | 577 | 1562 | 1865 | 4521 |
| Air Cyl. Port Pipe Size - 4 Way Control Valve | 1/2 | 3/4 | 3/4 | 3/4 |
| Return Force at 100 PSI | 628 | 1080 | 1080 | 2003 |
| **AIR CYLINDER** | | | | |
| Inside Diameter | 6 | 8 | 8 | 12 |
| Rod Diameter | 2-1/8 | 2-1/2 | 1-7/8 | 3-1/4 |
| Stroke | 10-1/4 | 15-5/8 | 18-1/2 | 20-3/16 |
| **RAM CYLINDER** | | | | |
| Inside Diameter | 3 | 4 | 4 | 5-3/4 |
| Top Rod Diameter | .750 | 1.000 | 1.000 | 1.250 |
| Bottom Rod Diameter | 1.00 | 1.500 | 1.500 | 2.750 |
| **NET WEIGHT** | 350 | 500 | 650 | 800 |

## Air-Hydraulics Booster Systems
## Model's B-250, B-300, B-400 and B-500

## Preventative Maintenance and Trouble Shooting

1. Before any preventative maintenance is performed, turn off air supplies to system and block up ram, following OSHA and local Lock out/Tag out procedures.

2. Keep the oiler/lubricator filled with Mobil DTE grade 24 or equivalent. Lubricator is adjusted at the factory, but it should be reviewed monthly. The larger the cylinder area, the more lubrication the press needs. Use the following chart for a general rule of thumb.

| Model No. | Cycles per drop |
|---|---|
| | |
| B-250 | 10 |
| B-300 | 7 |
| B-400 | 7 |
| B-500 | 5 |

   If the ram is chattering, then you may need to increase lubrication. If you are getting too much oil out of the exhaust air muffler, then you may need to turn down the lubricator.

3. Review and inspect air filter, it should be removed and replaced once the filter element turns tan or a brownish color.

4. Oil should be changed in the booster if the color is dark brown or after 5 years, which ever comes first

5. Oil Reservoir should be check daily and filled to proper level.

6. Check press for oil leakage at the following indicators;

    a. Bleed off hole or ram vent hole; a small 1/8" diameter hole located in the front of the machine, at the ram guide. If oil or air is coming out of this hole, this indicates that the seal need replacing. Note, this hole can not be blocked or covered.

    b. Booster Bleed-off Line; the 1/8" tube located in the back of the machine, coming from the side of the middle of the booster, going to the TOP of the oil reservoir. If there is oil in this line, this is an indication that the seals need to be replaced.
    c. Air muffler; if an excessive amount of oil is coming out of the air muffler; this too is an indicator that seals need to be replaced or the lubricator needs to be turned down.
    d. Oil Reservoir; if you have to fill reservoir frequently, then there is a possibility that seals could be worn and need replacing.

7. Check all safety devices DAILY, for proper operation. If they are not functioning properly, DO NOT OPERATE THE SYSTEM!

8. Frequently asked questions;

QUESTION: Why is hydraulic oil is coming out of the reservoir?

ANSWER: There are excessive amounts of air in top side of the ram cylinder or in the top of the oil side of the booster. With the ram in the home position, bleed oil side of system by unscrewing the two caps until all air has been exhausted. Do not remove caps. See page 4 of manual sent with machine. This could be caused by short cycling the system, preventing the ram from returning to the home position. Or it may be caused by ram drift down; over time the reservoir may appear to be empty, refilling it at this time will overfill the system. If this doe not solve the problem, then seals are the problem. They are either installed wrong or need replacing.

QUESTION: Hydraulic oil levels in the reservoir go up and down when press is cycled.

ANSWER: There is a small amount air trapped in the hydraulic system. You need to bleed the air out of the system, see page 4 of manual

QUESTION: After several cycles, I lose ram pressure or force.

ANSWER**:** The air volume to the system is not adequate or the filter(s) needs replacing. Make sure you have a minimum of 3/4" air line to the system from the drop. Check air pressure drop at inlet when press cycles; it should not drop below 75 psi. Increase air volume to system.

QUESTION: Hydraulic oil is in the vent tube, the tube that comes out of "top" of the reservoir and goes down into the "side" of the air cylinder top head (middle of the booster); is that normal?
ANSWER: No, this indicates that the hydraulic seals in the air cylinder top head are worn and eroded and need to be replaced. Make sure new seals are installed properly. If seals are installed upside down or are damaged while being installed, the problem will still remain.

QUESTION: I'm not sure, but I think air is getting into my hydraulic system. How can I test this?

ANSWER: There are two places which air can by pass seals and enter into the hydraulic system; through the booster or the ram. You can test the ram cylinder in the following way: Make sure ram is in the retracting mode. Remove the ram guide from the ram, exposing the 1/8" by- pass hole, located on the front side of the ram. Place soapy water over the 1/8" hole (similar to finding leaks in a gas line). If it blows a bubble, air is "by passing" the seal and entering the hydraulic system. The bottom seal of the ram cylinder needs replacing. When assembling the ram guide, be sure the slit is in position over the hole, therefore

not plugging it. You can test the booster again by applying air to the booster through the ram retraction side. Remove the 1/4" tube going to the top of the reservoir and coming out of the side (not the top) of the booster cylinder (air side) top cap. Put the tube in jar of water, if it blows a bubble, the bottom seal in the booster needs replacing.

QUESTION: During the first cycle of the press, after being shut down over the weekend, oil will erupt from the reservoir top. What is causing that?

ANSWER: To prevent the eventual drifting down or closing, when the air supply to this press is turned OFF, the die set or tooling should be blocked in an OPEN position due to weight of tooling attached to the ram of this press. This will keep the closed hydraulic circuit of this press from becoming imbalanced, misleading the circuit to siphon oil from reservoir top unnecessarily, which could damage the press.

QUESTION: After several cycles, I get oil bubbling out of the oil reservoir and there is air coming out of the vent hole of the ram.

ANSWER: The problem is in your Ram Cylinder. The "U" Cup seals are installed incorrectly, damaged or worn, and/or the "O"-rings (located where the piston attaches to the ram) are in need of repair, replacement or are missing. Air is coming from the rod/bottom of the cylinder, going up through the button "U" seal on the piston, or through the "O"-rings; allowing air to enter into the closed hydraulic system, therefore, being relieved through the reservoir. If the oil is bubbling to the point of over flowing, then the seals/"O"-rings are extremely damaged, or the seals are installed backwards or are missing.

QUESTION: There is air building up in my reservoir. I can feel it when I put my finger over the hole, but it is NOT bubbling up through the oil in the reservoir.

ANSWER: The problem may be in the booster. You can further test this by applying air to the booster through the ram retraction side (top port). Remove the 1/4" tube going to the top of the reservoir and coming out of the side (not the top) of the booster cylinder (air side) top cap. Put the tube in jar of water, if it blows a bubble, the bottom seal in the booster needs replacing or was installed incorrectly.