



Established 1930

Distributors of new & used workshop Equipment

“BULLDOZER”

P500 20 TON 415V

P502 20 TON 240V

P503 25 TON 240V

P504 25 TON 415V

INSTRUCTION & PARTS MANUAL

20-2-12

Installation, Operation, and Maintenance Manual: Bulldozer Bender Original Instructions (English)

Designations

Bulldozer Bender Single-Phase 20T (BDB-0001)
Bulldozer Bender Three-Phase 20T (BDB-0002)
Bulldozer Bender Single-Phase 25T (BDB-0003)
Bulldozer Bender Three-Phase 25T (BDB-0004)

Introduction

The "Bulldozer Bender" is a hydraulically driven horizontal bending machine.

It is intended for use in industrial applications including (but not limited to) the manufacture of handrails, structural work, and sheet metal bending. It consists of four models of base bending unit, and may be fitted with interchangeable tooling for making different kinds of bend. It is intended to be operated by persons having familiarity and experience operating industrial metalworking machinery.

The four base models are:

Model No.	Name	Description
BDB-0001	Bulldozer Bender Single-Phase 20T	Single-phase motor; factory-set pressure to 1550-1600 psi.
BDB-0002	Bulldozer Bender Three-Phase 20T	Three-phase motor; factory-set pressure to 1550-1600 psi.
BDB-0003	Bulldozer Bender Single-Phase 25T	Single-phase motor; pressure end-user adjustable to maximum of 1650-1700 psi.
BDB-0004	Bulldozer Bender Three-Phase 25T	Three-phase motor; pressure end-user adjustable to maximum of 1650-1700 psi.

Pre-Assembly Instructions

Visually inspect all components for shipping damage. If any shipping damage is found, notify the carrier at once. Shipping damage is not covered by the warranty. The carrier is responsible for all repair or replacement costs resulting from damage in shipment.

Read all **CAUTIONS**, **WARNINGS**, and **INSTRUCTIONS** included with, or attached to, the Bulldozer Bender and any additional accessories. Follow all safety precautions to avoid personal injury or property damage during operation. **R AUTON LIMITED CANNOT BE HELD RESPONSIBLE OR LIABLE FOR DAMAGE OR INJURY RESULTING FROM UNSAFE USE OF THE BULLDOZER BENDER OR ITS ACCESSORIES, OR INCORRECT PRODUCT OR SYSTEM APPLICATION.** Contact R Auton Limited or its authorised distributors should you need any setup or operating assistance.

WARNINGS

Always comply with all local and national safety codes.

The hydraulic hoses and other accessories and spares must only be replaced with genuine parts.

Unpacking

Check that your Bulldozer Bender package contains the following items (**Note:** Machines made to special order may differ from the list below). Please contact your distributor if any of the items are missing.

Packing List

Item	Qty
Base Bulldozer Bender, complete with two side panels and one top cover	1
On-Off Switch, including thermal overload and instruction sheet	1
Toolpost	1
Flat Bending Die A	1
Flat Bending Die B	1
Die Mounting Nut & Bolt	2
Operating Handle	1
Stroke Adjuster Knob	1
Bulldozer Bender Operating Instructions	1
EC Declaration of Conformity	1

IMPORTANT: Please refer to these instructions when using Flat Bending Die C (available separately). Its operation is identical to Dies A and B and therefore no separate instructions are required.

Instructions for the hydraulic ram are available upon request if performing a seal change. The latest version of all manuals etc. can be downloaded from our website, www.bulldozerbender.com/manuals.

Initial Setup

Wire up the on-off switch according to the instruction sheet supplied with the switch and attach to the side of the machine. Ensure that the motor is running clockwise (as viewed from the toolpost end of the machine) - if not, reverse the polarity.

Wire the machine to a single-phase (models BDB-0001 and BDB-0003) or three-phase (models BDB-0002 and BDB-0004) local plug.

Note: All electrical work must be performed by a qualified electrician.

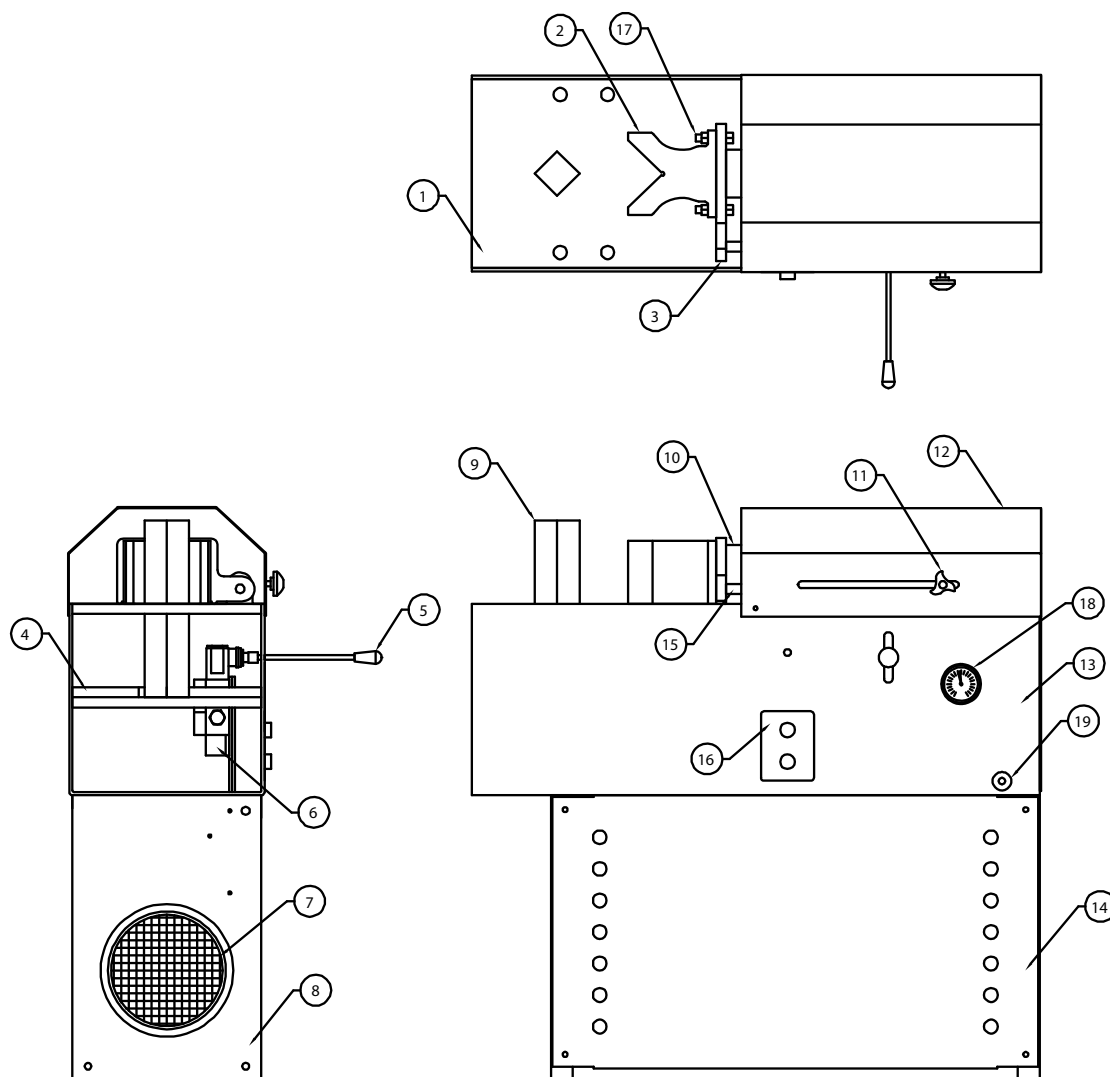
Screw the stroke adjuster knob into the small collar within the horizontal slot in the top cover.

Screw the operating handle into the threaded port inside the vertical slot in the machine body.

Note: The operating handle should be removed when transporting the machine.

Assembly Diagram

Item	Qty	Description	Item	Qty	Description
1	1	Machine Bed	11	1	Stroke Adjuster Knob
2	1/1	Die A / Die B	12	1	Top Cover
3	1	Ram Head	13	1	Upper Chassis
4	1	Vee-Block	14	2	Side Panel
5	1	Operating Handle	15	1	Stroke Adjuster Rod
6	1	Relief Valve	16	1	On-Off Switch
7	1	Motor	17	2	Accessory Bolts
8	1	Lower Chassis	18	1	Pressure Gauge (BDB-0002 & BDB-0004 only)
9	1	Toolpost	19	1	Pressure Adjustment Knob (BDB-0002 & BDB-0004 only)
10	1	Ram Shaft			



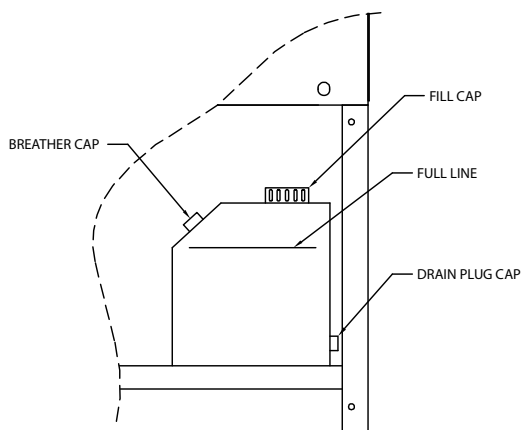
Oil Filling Procedure

IMPORTANT: Ensure that the machine is isolated from the power supply before removing any covers.

Remove either side panel by undoing the four bolts to gain access to the oil tank.

Single-phase models (BDB-0001 and BDB-0003)

Single-phase models have a plastic oil tank, as shown below:



Check that the drain plug is secure. Do not overtighten as this may damage the threads.

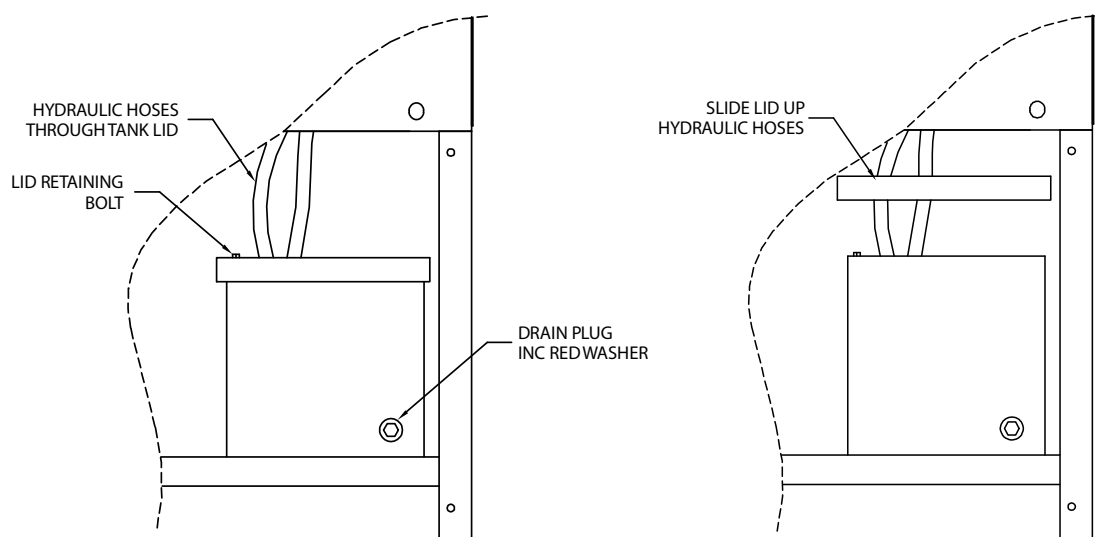
Remove the fill cap and the breather cap.

Fill the tank with hydraulic oil until the oil covers the maximum level (use of a funnel is advised). Note that the first use of the machine will fill the ram and hydraulic hoses, so a top up may be necessary. The oil should be Castrol Hyspin 68 or similar. The ram may stutter during first cycle as air is removed from the system.

Replace the fill cap and breather cap, taking care not to overtighten.

Three-Phase Models (BDB-0002 and BDB-0004)

Three-phase models have a metal tank, as shown below:



Check that the drain plug is secure. Do not overtighten as this may damage the red fibre washer seal.

Undo the tank lid retaining bolt and slide the lid up the hydraulic hoses a short distance, taking care not to damage them.

Hold the tank lid clear and fill tank with hydraulic oil until the pump inside the tank is fully covered. This will take approximately 10-15 litres from empty. Note that the first use of the machine will fill the ram and hydraulic hoses, so a top up may be necessary. The oil should be Castrol Hyspin 68 or similar. The ram may stutter during first cycle as air is removed from the system.

Replace the tank lid and lid retaining bolt.

All models

Replace the side cover using the four bolts.

WARNING: Do not operate the machine with any covers removed, unless advised to do so by the manufacturer for repair, testing or maintenance purposes.

Before Operating

Ensure machine is standing firmly on level ground.

WARNING: Refer to section below on clearance distances required for machine operation when determining a suitable location.

Place toolpost in toolpost hole, ensuring it sits snugly in the V-block below.

WARNING: It is essential to ensure that the V-block is free from debris and that the toolpost is firmly seated in the V-block. Failure to do so can be extremely dangerous.

Place die A or B up against the ram head. Attach the die to the ram head using the bolts supplied, ensuring they are fully tightened.

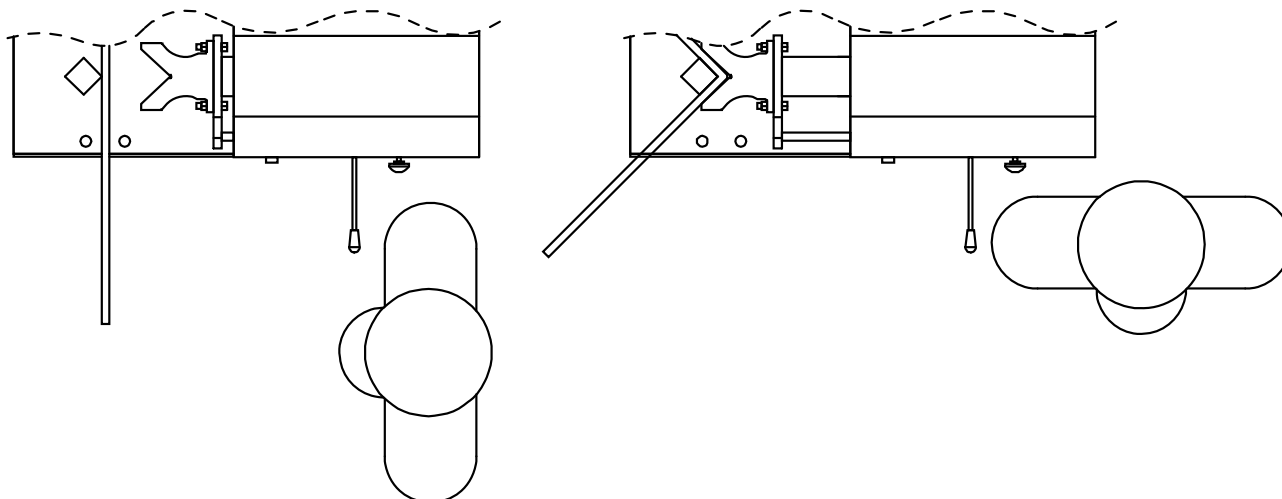
IMPORTANT: Refer to section below on clearance distances required before attempting to bend long work pieces.

Connect to the power supply appropriate for that model.

Clearance Distances and Operator Workstation

When determining the location and prior to operating the machine, it is important to take into consideration the movement and mass of the workpiece and the needs of the operator.

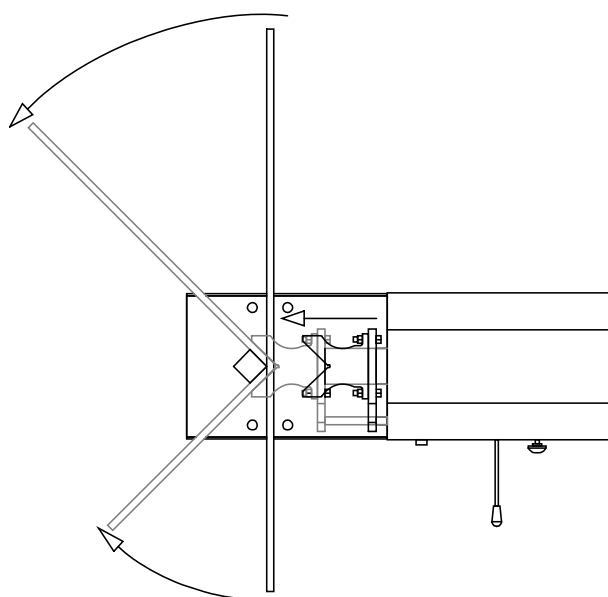
The machine is designed to be operated from the position shown below:



When actually performing the bend, it is advisable to turn away from the machine, as in the second image above. It is still possible to access the operating handle and on-off switch from this position.

Long workpieces are likely to be heavy and should be supported at their ends by suitable roller tables or similar, such as a jockey wheel. This is particularly important where the bend is being performed off-centre. Note that once the ram head and die have gripped the workpiece it should no longer require support. However, care must be taken to support the workpiece again once the bend is complete, before relaxing the grip of the die and ram, to ensure that the workpiece does not drop suddenly.

The area that will be 'swept' by a long workpiece must also be considered. The diagram below shows the movement when using dies A and B. Note that the longer the workpiece the faster the ends will swing.



IMPORTANT: Refer to the instructions supplied with the other accessories for details of where their expected movement will deviate from that shown above.

To Operate

Push **green** start button.

If desired, the length of the ram stroke can be controlled using the stroke adjuster knob. Moving the knob towards the ram head shortens the stroke; moving it away from the ram head lengthens the stroke.

Push operating handle **DOWN** - ram operates **OUTWARD**.

Pull operating handle **UP** - ram operates **INWARD**.

RELEASE operating handle - ram movement stops.

NOTE: The hydraulics operate on a continuous circuit, from the pump, through the valve, and back to the tank. The oil is diverted to the ram only when the operating handle is engaged.

NOTE: Once bend is performed, check for accuracy. The material will need to be overbent to allow for springback. Springback can vary considerably depending on the material and its grade, so manually adjusting the stroke ensures the greatest bend accuracy.

IMPORTANT: Take care not to damage the ram shaft. Chipping/denting the hard chrome shaft will prevent the ram seals from functioning correctly. The machine will leak oil from this point and may fail to obtain full pressure depending on the severity of the damage. This is not covered by the warranty.

Although the ram is made from 3" hard chrome bar, it is still not designed to withstand undue side loading, which may damage the bar or ram seals.

Always retract the ram fully when not in use.

25T Models Only

The 25T model has a pressure gauge and knob to allow adjustment of pressure up to 1700 psi. This allows the operator to adjust the bending pressure of the machine to the minimum required to bend the material. This helps to prevent malformation and exterior damage to softer materials, for example copper buzz bars where malformation affects conductivity.

Operation and Safety Tips

Wear safety glasses at all times and keep loose clothing away from all moving parts. This is a heavy industrial machine and all due care must be taken when operating it.

Hearing protection must be worn when operating the machine. Ensure that others around you are aware that you may not be able to hear audible alarms, instructions etc.

Keep hands clear of the machine bed. Do not hold the workpiece while bending. If the workpiece is too long or heavy to be supported by the machine bed, a roller table or similar means of supporting the work must be used.

In the event of a blockage, the machine may be backed off from the obstruction or, if not practicable, the machine may be switched off - isolated from the power supply if necessary - and the operating handle worked up to release pressure from the system back to the tank. Note that in this case some pressure may still exist within the lines.

Do not stand in front of the machine or within the bend radius of the workpiece while operating. Refer to the diagram above for the correct operating position.

The machine is designed to bend mild steel, and all softer alloys.

Do not bend on a previous bend, as material will break.

Always operate machine with toolpost or accessories firmly in place.

Always bolt accessories up tight to machine bed or ram head, as appropriate.

When bending small solid bar or round it is advisable to lift the workpiece slightly off the machine bed (taking care to ensure that it remains level) to prevent the workpiece from slipping below the die and exerting upwards pressure on the ram and damaging the seals.

Do not touch frayed or damaged hydraulic hoses. Contact R Auton Limited regarding replacement hoses and engage a hydraulic specialist for safe removal and replacement.

Maintenance

General Housekeeping

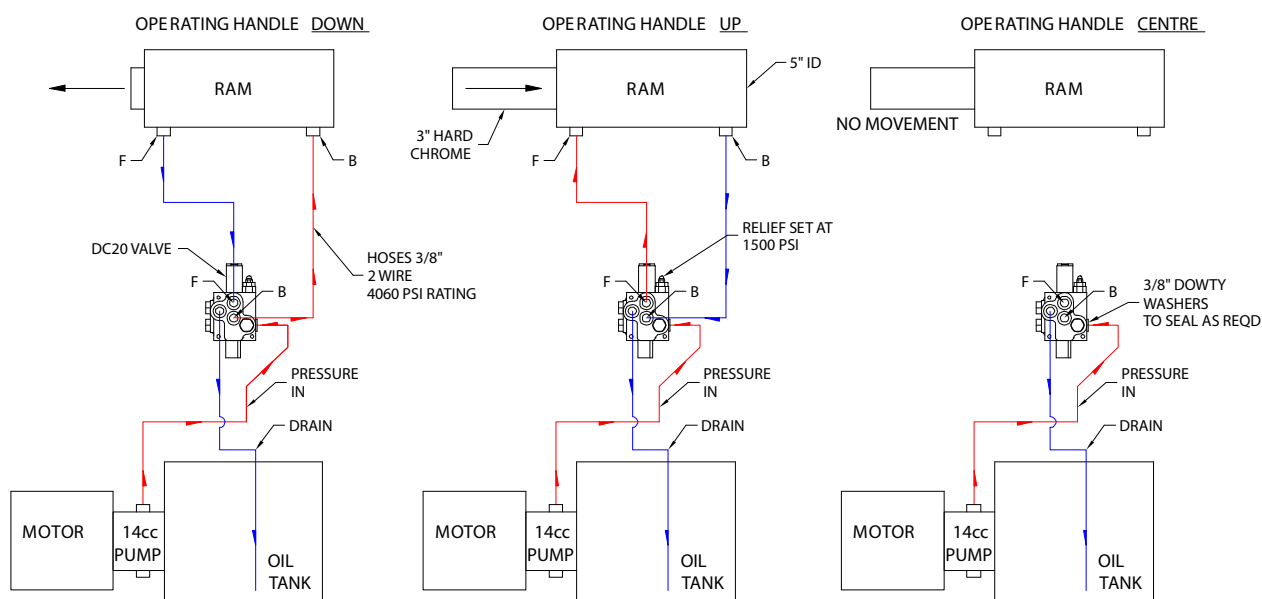
Always keep toolpost, V-block, ram, and machine bed clear of debris.

Care should be taken when removing any swarf as it may be sharp. Protective gloves and a brush should be used to avoid risk of injury.

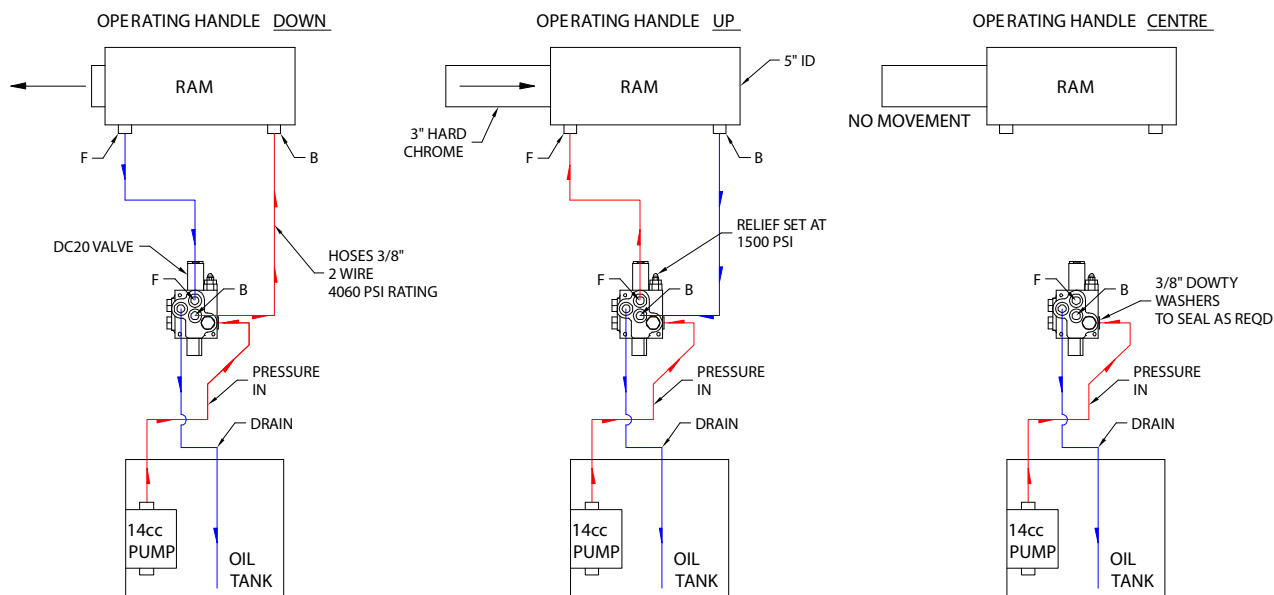
The hydraulic hoses must be inspected regularly for damage. They should only be replaced by a suitably qualified person using genuine parts.

WARNING: The use of damaged hydraulic equipment carries a high risk of personal injury. Under no circumstances should any servicing of the hydraulics be carried out while the system is under pressure. Excess pressure can be relieved into the tank by working the operating handle up and down. Ensure that the machine has been isolated from the power supply before attempting this.

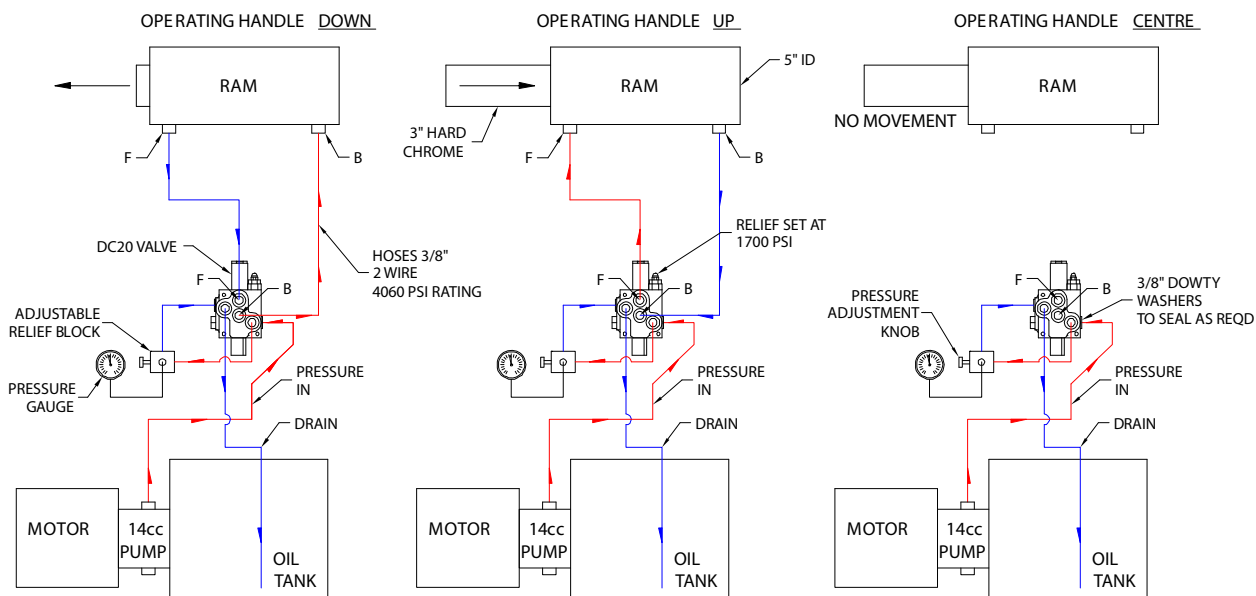
The connection diagram below shows the correct configuration of the hoses:



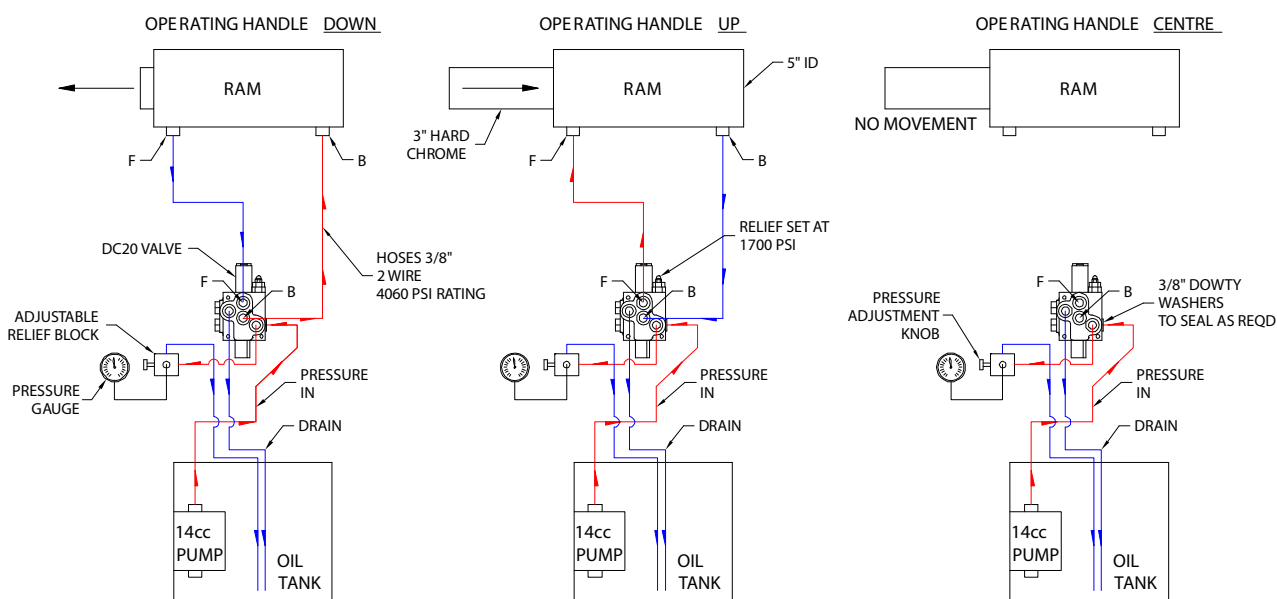
HYDRAULIC ASSEMBLY - BDB-0001: 20T SINGLE PHASE



HYDRAULIC ASSEMBLY - BDB-0002: 20T THREE PHASE



HYDRAULIC ASSEMBLY - BD B-0003: 25T SINGLE PHASE



HYDRAULIC ASSEMBLY - BD B-0004: 25T THREE PHASE

Oil and Servicing

The biggest factor in prolonging the life of your machine is keeping the oil clean. It is recommended that the bulldozer is cleaned down after each use and if possible kept in a tidy corner of the workshop or factory.

Like a car it requires regular inspections and oil changes. The first oil change should be within three months of purchase in order to retain warranty cover. After which the oil should be changed every six to twelve months, depending on usage.

Draining and Replacing the Hydraulic Oil

The level of hydraulic oil must be checked periodically. Follow the procedure given in 'Oil Filling Procedure' above to check the oil level. Ensure that the machine is isolated from the power source before removing the side cover.

The hydraulic oil must be replaced completely after the first three months, and thereafter at six to twelve month intervals, depending on usage. To remove the oil, follow the procedure below. Note that the location of the drain plug

is slightly different depending on whether the model of machine has a plastic or metal tank - refer to the images in section 'Oil Filling Procedure' above. The general procedure is the same for both types.

Refer to 'Oil Filling Procedure' above to gain access to the tank.

Place a tray beneath the machine of sufficient capacity to contain the drained oil. It may be necessary to lift the machine slightly to achieve this - extreme care must be taken in this case to do so in a safe manner, and to keep the machine level while lifting to avoid cavitation damage to the pump. Refer to 'Transportation and Storage' below for information regarding the machine lift points.

Undo the drain plug and allow the oil to drain into the tray. Any remaining oil should be removed using a hand pump. Where practicable any debris should also be removed from the tank. Metal tanks may have a high-powered magnet at the bottom of the tank. This should be cleaned and replaced.

Replace the drain plug (metal tanks must ensure that the red fibre sealing washer has been replaced along with the sealing bolt; do not overtighten the plug in either type of tank). Refill the tank with fresh oil, following the appropriate procedures outlined in 'Oil Filling Procedure' above.

Lubricating the Stoke Adjuster

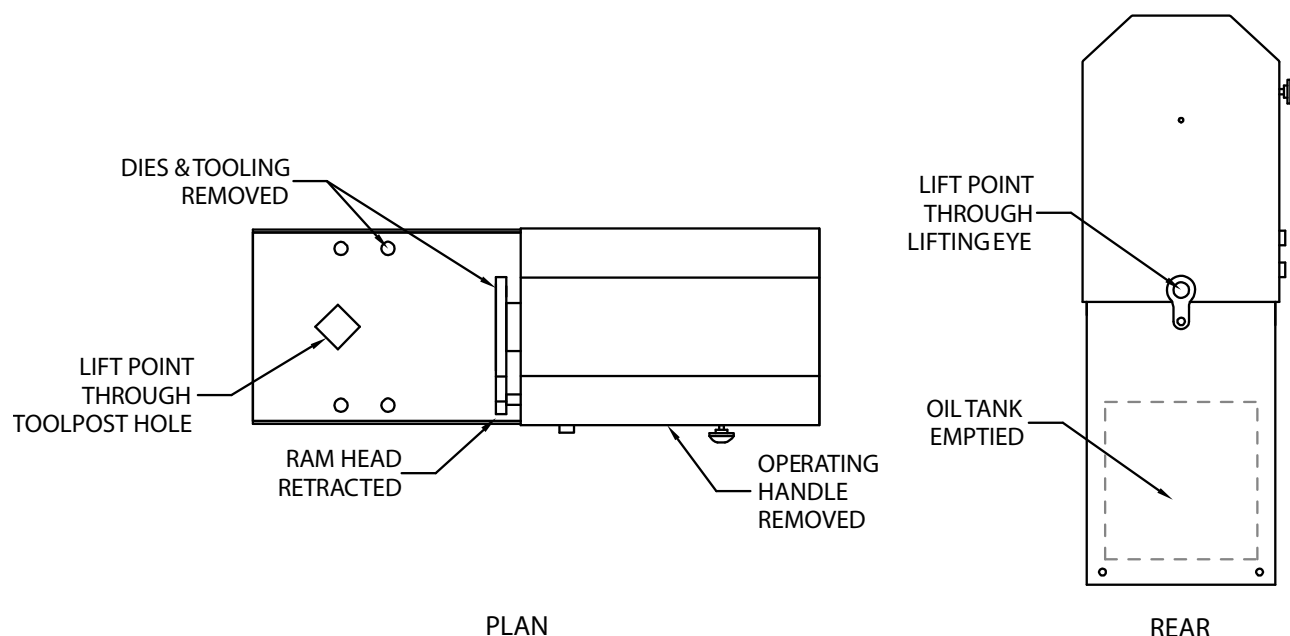
The top cover must be removed to lubricate the stroke adjuster rod. Isolate machine from power supply before removing the cover.

Lubricate the rod along its length using grease – preferably marine, as required.

Transportation and Storage

It is recommended that the ram is fully retracted and the operating handle is removed prior to transportation.

CAUTION: Do **NOT** lift by removing the side covers and using a forklift under the upper machine chassis – this will damage the hydraulic hoses. Instead strap securely to a pallet or use the lifting points shown below:



Take care not to tip the machine when the oil tank is full as this may cause cavitation damage to the pump. It is advisable to fully drain the oil tank when transporting or moving the machine, following the procedure outlined in the section 'Draining and Replacing the Hydraulic Oil' above. The oil should also be drained when the machine is to be stored for any length of time.

Servicing and Repair

Under normal conditions, the machine should require little maintenance beyond that outlined above. However, in the event that the machine loses ram pressure or movement, or shows sign of other malfunction, please contact the manufacturer for advice.

IMPORTANT: All repairs must be carried out by the manufacturer or by a suitably qualified person under the manufacturer's guidance. Any worn or faulty parts or accessories must be replaced by genuine parts.

WARNING: Under no circumstances should the valve relief be set above the rated pressure of the machine (1500 psi for 20T models and 1700 psi for 25T models). Setting the pressure above this rating will damage the machine, trip the overload, and in extreme cases could result in personal injury or death.

Spares and Accessories

Spares

Please contact R Auton Limited or one of their authorised distributors in the event that any part needs replacing.

Accessories

Part No.	Part Name
PBJ-0001	Pipe Bending Jig No. 1
PBJ-002	Pipe Bending Jig No. 2
PBF-0001	15mm (0.5") Pipe Bending Former
PBF-0002	20mm (0.75") Pipe Bending Former
PBF-0003	25mm (1") Pipe Bending Former
PBF-0004	32mm (1.25") Pipe Bending Former
PBF-0005	38mm (1.5") Pipe Bending Former
PBF-0006	50mm (2") Pipe Bending Former
PBF-0007	64mm (2.5") Pipe Bending Former
PBF-0008	75mm (3") Pipe Bending Former
PBS-0002	Pipe Bending Slippers
FBD-0001	Flat Bending Die A
FBD-0002	Flat Bending Die B
FBD-0003	Flat Bending Die C
TLP-0001	Standard Toolpost
RBF-0001	25mm (1") RHS Bending Former
RBF-0002	38mm (1.5") RHS Bending Former
TBA-0001	Tube Bending Attachment for Thin Walled Tube
TBD-0001	12mm Tube Bending Die
TBD-0002	16mm Tube Bending Die
TBD-0003	20mm Tube Bending Die
TBD-0004	22mm Tube Bending Die
TBD-0005	25mm Tube Bending Die
TSF-0001	22.2mm Square Tube Former
TSF-0002	12.7mm, 16mm, & 19mm Square Tube Formers
TSF-0003	25.4mm Square Tube Former
TSF-0004	12.7mm Square Tube Former
TSF-0005	16mm Square Tube Former
TSF-0006	19mm Square Tube Former

Information on Airborne Noise Emissions

Noise emission tests have established that The Bulldozer Bender's C-weighted airborne noise emissions peaks under load at less than 80 dB when functioning normally. The level at standby/idling is less than 75dB. Please contact the manufacturer if you believe that your machine exceeds these levels, as it may indicate a malfunction.



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R Auton Limited • General Engineers and Steel Fabrication Specialists
Unit B • 20 Helanca Avenue • Wainoni • Christchurch 8061 • New Zealand
Tel: +64 (0) 3 389 2353 • Fax: +64 (0) 3 389 2355 • Email: sales@bulldozerbender.com • Web: www.bulldozerbender.com

Bulldozer Bender Die and Tooling Capabilities – Which Tool for the Job? Original Instructions (English)

Part No.	Part Name	Material Size
PBJ-0001	Pipe Bending Jig No. 1	Pipe from 0.5" to 2"; RHS/SHS 1" & 1.5" (with appropriate former)
PBJ-002	Pipe Bending Jig No. 2	2.5" & 3" pipe (with appropriate former)
PBF-0001	15mm (0.5") Pipe Bending Former	15mm (0.5") NB pipe - wall thickness min 2.5mm max 5mm – use jig no. 1
PBF-0002	20mm (0.75") Pipe Bending Former	20mm (0.75") NB pipe - wall thickness min 2.5mm max 5mm – use jig no. 1
PBF-0003	25mm (1") Pipe Bending Former	25mm (1") NB pipe - wall thickness min 2.5mm max 5mm – use jig no. 1
PBF-0004	32mm (1.25") Pipe Bending Former	32mm (1.25") NB pipe - wall thickness min 2.5mm max 5mm – use jig no. 1
PBF-0005	38mm (1.5") Pipe Bending Former	38mm (1.5") NB pipe - wall thickness min 2.5mm max 5mm – use jig no. 1
PBF-0006	50mm (2") Pipe Bending Former	50mm (2") NB pipe - wall thickness min 2.5mm max 5mm – use jig no. 1
PBF-0007	64mm (2.5") Pipe Bending Former	64mm (2.5") NB pipe - wall thickness min 3mm max 6mm – use jig no. 2
PBF-0008	75mm (3") Pipe Bending Former	75mm (3") NB pipe - wall thickness min 3mm max 6mm – use jig no. 2
PBS-0002	Pipe Bending Slippers	Required for use with jig no. 1 for pipe 0.5" to 2".
FBD-0001	Flat Bending Die A	Flat bar max 80 x 10mm thk. Std Rebar up to 25mm Dia – use standard toolpost.
FBD-0002	Flat Bending Die B	Flat bar max 100 x 14mm thk or 130 x 10mm thk. Std rebar up to 28mm dia – use standard toolpost.
FBD-0003	Flat Bending Die C	Flat bar max 150 x 12mm thk. Std rebar up to 28mm dia – use standard toolpost.
TLP-0001	Standard Toolpost	Use with flat bending dies.
RBF-0001	25mm (1") RHS Bending Former	25mm (1") RHS/SHS – wall thickness min 2.5mm max 4mm – Use Jig No. 1
RBF-0002	38mm (1.5") RHS Bending Former	38mm (1.5") RHS/SHS – wall thickness min 2.5mm max 4mm – Use Jig No. 1
TBA-0001	Tube Bending Attachment for Thin Walled Tube	Required for use with all round tube bending dies and square tube formers.
TBD-0001	12mm Tube Bending Die	12mm furniture grade tube (ERW) – wall thickness min 1.2mm max 2mm
TBD-0002	16mm Tube Bending Die	16mm furniture grade tube (ERW) – wall thickness min 1.2mm max 2mm
TBD-0003	20mm Tube Bending Die	20mm furniture grade tube (ERW) – wall thickness min 1.2mm max 2mm
TBD-0004	22mm Tube Bending Die	22mm furniture grade tube (ERW) – wall thickness min 1.2mm max 2mm
TBD-0005	25mm Tube Bending Die	25mm furniture grade tube (ERW) – wall thickness min 1.2mm max 2mm
TSF-0001	22.2mm Square Tube Former	22.2mm furniture grade RHS/SHS - (ERW) – wall thickness min 1.2mm max 2mm
TSF-0003	25.4mm Square Tube Former	25.4mm furniture grade RHS/SHS - (ERW) – wall thickness min 1.2mm max 2mm
TSF-0004	12.7mm Square Tube Former	12.7mm furniture grade RHS/SHS - (ERW) – wall thickness min 1.2mm max 2mm
TSF-0005	16mm Square Tube Former	16mm furniture grade RHS/SHS - (ERW) – wall thickness min 1.2mm max 2mm
TSF-0006	19mm Square Tube Former	19mm furniture grade RHS/SHS - (ERW) – wall thickness min 1.2mm max 2mm



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R Auton Limited • General Engineers and Steel Fabrication Specialists
Unit B • 20 Helanca Avenue • Wainoni • Christchurch 8061 • New Zealand
Tel: +64 (0) 3 389 2353 • Fax: +64 (0) 3 389 2355 • Email: sales@bulldozerbender.com • Web: www.bulldozerbender.com