

CARELIFT EQUIPMENT LIMITED

SERVICE MANUAL

MODEL ZB20032 ZOOM BOOM

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FOREWORD

This service manual has instructions and procedures for CareLift Forklifts. The information, specifications, and illustrations used in this manual are based on information that was current at the time this issue was written.

Correct servicing will promote a long productive life. Before attempting to start a test, repair or rebuild job, be sure that you have studied the respective sections of this manual, and know all the components you will work on.

Safety is not only your concern but everybody's concern. Safe working habits cannot be bought or manufactured; they must be learned through the job you do. By learning what **NOTE**, **CAUTION**, **WARNING** and **DANGER** symbols emphasize, you know what is safe and what is not safe. If necessary, consult your supervisor for specific instructions on a job and the safety equipment required.

NOTE, CAUTION, WARNING and DANGER

NOTE, CAUTION, WARNING and DANGER are used in this manual to emphasize important and critical instructions. They are used for the following conditions:

- | | |
|----------------------|---|
| NOTE | An operating procedure, condition, etc., essential to highlight. |
| CAUTION | Operating procedures, practices, etc., which if not strictly observed, will result in damage or injury.
BLACK LETTERS ON YELLOW BACKGROUND |
| WARNING | Operating procedures, practices, etc., which if not correctly followed, will result in personal injury or loss of life.
BLACK LETTERS ON ORANGE BACKGROUND |
| DANGER | If not observed, will result in serious injury or loss of life.
WHITE OR BLACK LETTERS ON RED BACKGROUND |

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WARNING

SAFETY

WARNING

WARNING

The proper and safe lubrication and maintenance for this machine, recommended by CareLift, is outlined in the **OPERATION & MAINTENANCE GUIDE** for this machine.

Improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand the **OPERATION & MAINTENANCE GUIDE** before performing any lubrication or maintenance.

Do not operate this machine unless you have read and understand the instructions in the **OPERATOR'S GUIDE**. Improper machine operation is dangerous and could result in injury or death.

The mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. Knowledge of the system and/or components is important before the removal or disassembly of any component.

Because of the size of some of the machine components, the mechanic should check the weights of the components. Use proper lifting procedures when removing any components.

Following is a list of basic precautions that should always be observed:

1. Read and understand all Warning plates and decals on the machine before operating, lubricating or repairing the product.

2. Always wear protective glasses and protective shoes when working around machines. In particular, wear protective glasses when pounding on any part of the machine or its attachments with a hammer or sledge. Use welders gloves, hood/goggles, apron and other protective clothing appropriate to the job being performed. Do not wear loose-fitting or torn clothing. Remove all rings from fingers when working on machinery.

3. Do not work on any machine that is supported only by lift jacks or a hoist. Always use blocks or jack stands to support the machine before performing any disassembly.

4. Lower the forks or other implements to the ground before performing any work on the machine. If this cannot be done, make sure the forks or other implements are blocked correctly to prevent them from dropping unexpectedly.

5. Use steps and grab handles when mounting or dismounting a machine. Clean any mud or debris from steps, walkways or work platforms before using. Always face the machine when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work platforms to perform safe repair operations.

6. To avoid back injury, use a hoist when lifting heavy components. Make sure all chains, hooks, slings, etc., are in good condition and are of the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.

7. To avoid burns, be alert for hot parts on machines which have just been stopped and hot fluids in lines, tubes and compartments.

8. Use caution when removing cover plates.

9. Use caution when removing filler caps, breathers and plugs on the machine. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the machine has just been stopped because fluids can be hot.

10. Always use tools that are in good condition and be sure you understand how to use them before performing any service work.

11. Reinstall all fasteners with same part number. Do not use a lesser quality fastener if replacements are necessary. Do not mix metric fasteners and standard nuts and bolts.

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SECTION 1

1.0.0 ENGINE AND COMPONENTS

1.1.0 ENGINE CUMMINS MANUAL

The standard engine used on CareLift ZB20032 forklift is the Cummins 6 cylinder 6BT 5.9 Turbo @ 153 HP.

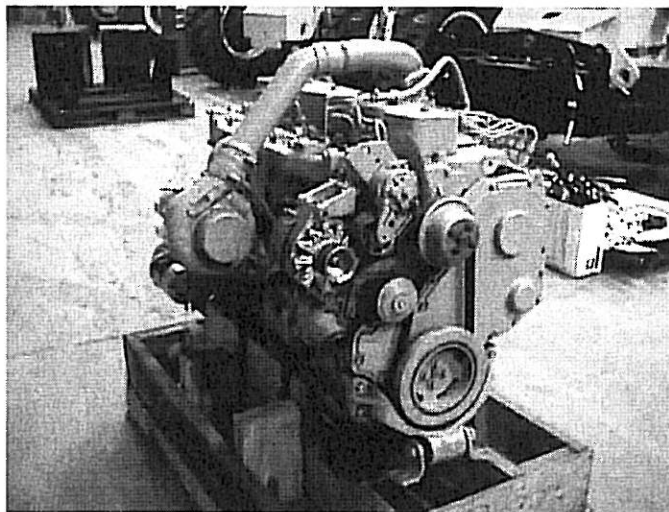
All required engine service information can be found in the Cummins engine manuals.

It should be noted that all engine warranty service work required should be directed to your nearest authorized Cummins dealer/distributor. CareLift cannot enter into any warranty work requirements.

Parts included in/and covered by Cummins are the basic engine – fan to flywheel and include:

1. Starter
2. Alternator
3. Injectors
4. Pump
5. Fuel lift pump
6. Fuel solenoid

Air cleaner and exhaust systems are not part of the engine package and are covered later in this manual.



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SECTION 1 (Cont'd)

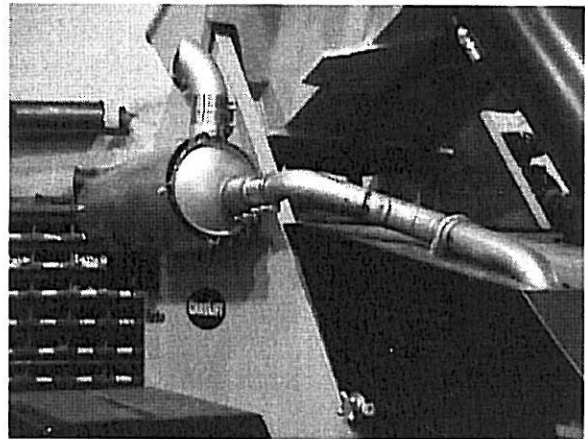
1.2.0 EXHAUST SYSTEM

1.2.1 STANDARD EXHAUST SYSTEM PARTS

Standard exhaust parts are shown in the individual sections of the parts manual covering this model.

Standard exhaust systems consist of a baffled muffler and necessary piping to carry the exhaust away from the operator on the right side of the machine.

The 6BT 5.9 Cummins turbo exhaust system runs off the turbo outlet and is directed to the right side of the unit through a flex tube into a baffled muffler located on the right side frame plate, exhausting to the vertical.



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SECTION 1 (Cont'd)

1.3.0 AIR CLEANER ASS'Y

1.3.1 AIR CLEANER MAKES AND MODELS

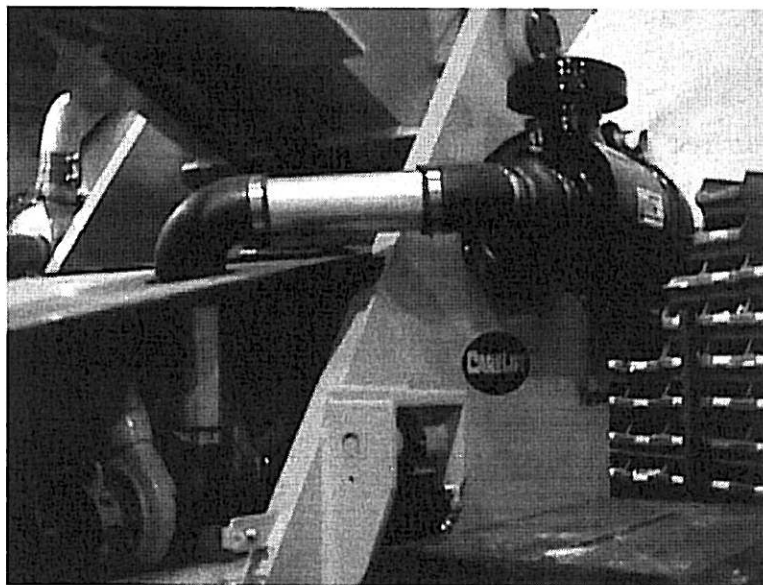
Donaldson air cleaners are used on all models. Part numbers and individual parts are listed in the parts book by model numbers.

The air cleaner for the 6BT 5.9 turbo engine is mounted on the left side of the frame up near the boom pivot pin.

The air cleaner is mounted as high as possible to stay out of the dirt and remain within the outer perimeter of the unit to help protect it from damage.

Air cleaners are dual dry element types and all new units are shipped with both elements installed for maximum protection.

It is recommended that both elements be replaced when servicing units.



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SECTION 1 (Cont'd)

1.4.0 ACCELERATOR ASSEMBLY

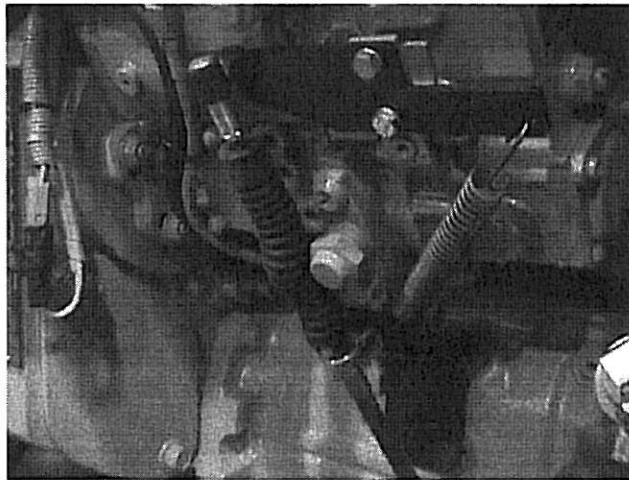
1.4.1 ACCELERATOR PARTS

All units incorporate a Morse Throttle Pedal assembly.

Actuation to injector pump is by cable.

The throttle pedal pivot pin and all moving joints should be lubricated during regular service intervals to prevent it from seizing or wearing.

The foot pedal to cable assembly is standard throughout all models produced.



The cable to injector pump attachment varies depending on the type of injector pump/engine combination. See parts manual for individual part numbers.

Serial numbers are required to identify specific engine mounted injector pumps, etc.

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SECTION 1 (Cont'd)

1.5.0 ENGINE AND TRANSMISSION ASSEMBLY

1.5.1 ENGINE AND TRANSMISSION

Engine to Transmission Match-up is as follows:

The transmission is a Clark 28000 series with electric shift.

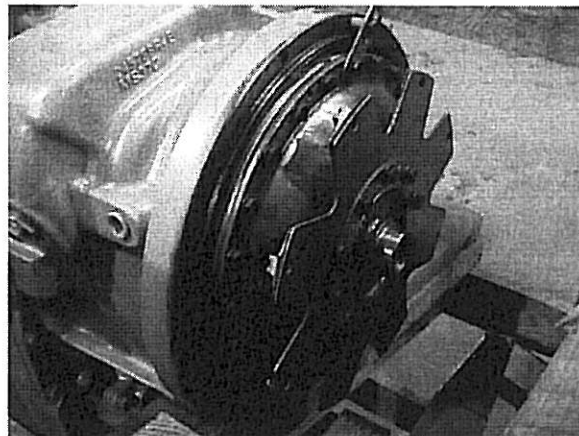
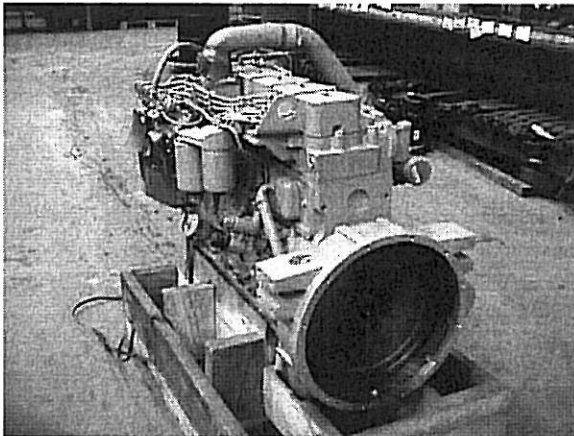
Cummins engine is mounted to the Clark 28000 Transmission on the ZB20032.

The engine to transmission drive is through a flex drive plate.

The flex drive plate is fastened to the engine flywheel by bolts through the flywheel into nuts mounted to the rear of the flex plate. These bolts must be removed first to separate the engine and the transmission.

The bolts are inserted through access holes in the bell housing into the flywheel and through to the flex plate threaded inserts.

See Spicer Clark Hurth transmission service manual for details on mounting specifications.



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SECTION 2

2.0.0 TRANSMISSION

2.1.0 TRANSMISSION TYPES AND MODELS

The transmission used is a 3-speed full reversing power shift transmission with electric shift.

A 3 speed Clark 28000 series long drop power shift transmission is used on all ZB20032 models and incorporates a steer column mounted electric shifter.

The transmission has a brake activated clutch disconnect.

The brake disconnect pressure is adjustable to allow for more or less pedal pressure required to activate the clutch disconnect.

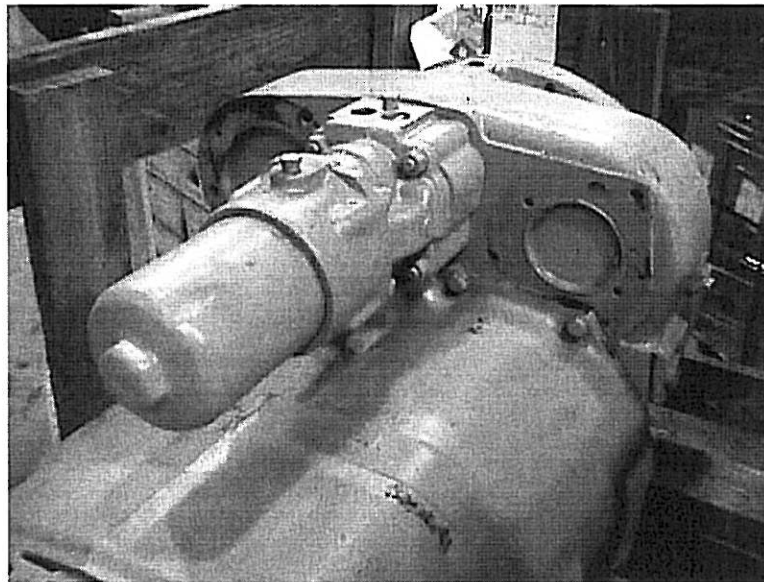
The transmission control valve is remote mounted.

See the Clark service manual for more detailed information.

2.2.0 TRANSMISSION FILTER

2.2.1 FILTER TYPE AND LOCATION ON TRANSMISSION

The 28000 series transmission is fitted with an element type oil filter and is direct mounted on the rear face of the transmission.



SECTION 2 (Cont'd)

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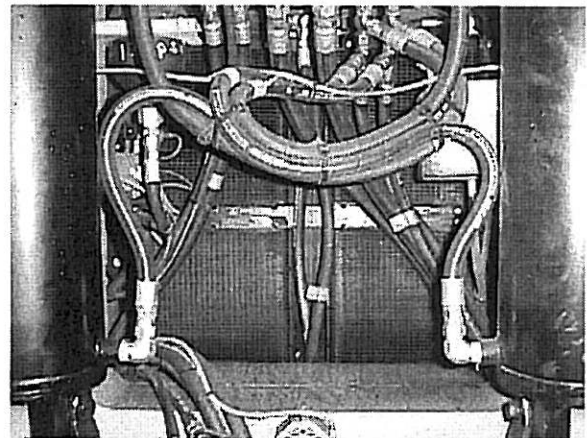
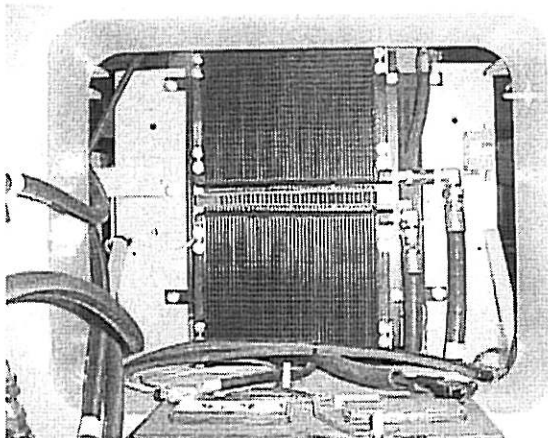
2.3.0 TRANSMISSION OIL COOLER

2.3.1 TRANSMISSION COOLER LOCATION AND MOUNTING DESCRIPTION

Four air-over oil coolers mounted to the face side of the radiator cool the transmission oil.

The coolers are mounted to the radiator using rubber standoff mounts.

The air-over coolers on the ZB20032 are plumbed in series for oil flow and uniform cooling.



NOTE – See parts listing for mounting and location of parts.

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SECTION 2 (Cont'd)

2.4.0 TRANSMISSION ACCESSORIES

2.4.1 TRANSMISSION DISCONNECTS

All power shift transmissions are fitted with brake actuated transmission clutch disconnects.

The brake disconnect will shift the transmission into neutral any time the service brake or park brake is applied.

The brake pedal pressure that is required to disconnect the transmission is adjusted by raising or lowering the switch pressure setting.

2.4.2 TRANSMISSION PARK BRAKE DISCONNECTS

All models fitted with the spring actuated park brake will shift the transmission into neutral when the park brake is applied. This stops the possibility of driving through the park brake which will cause unnecessary wear to the park brake linings requiring frequent adjustments. It should also be noted that applying brake while the unit is still moving will cause increased lining wear and may cause damage to the drive train.

The transmission disconnect is actuated by the loss of battery power to the forward reverse clutch pack solenoids.

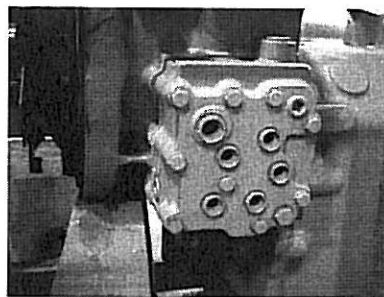
NOTE – Lack of battery power to the transmission clutch solenoids for any reason will cause the transmission to remain in neutral.

WARNING:

Do not apply park brake while unit is moving.

Do not set park brake or leave operator's seat before unit has come to a full stop (cowboy dismount). Dismounting before unit has come to a full stop is dangerous to the operator as well as other workers in the area.

See brake section for additional information.



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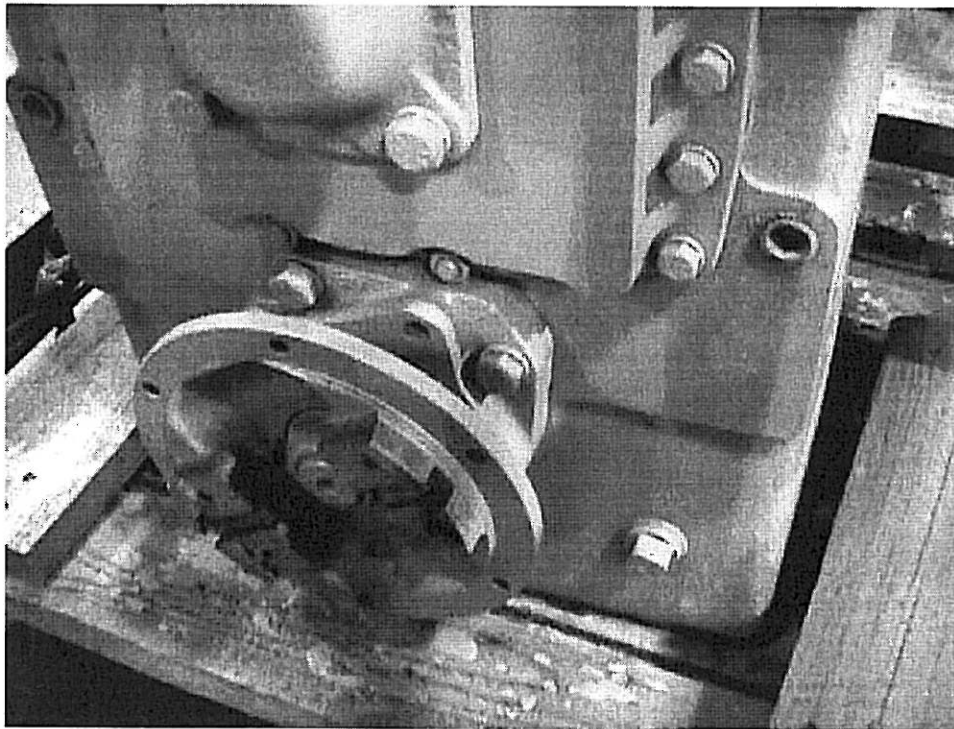
SECTION 2 (Cont'd)

2.5.0 DROP BOX / TRANSFER CASE

2.5.1 DROP BOX TYPES AND APPLICATION

The function of the drop box is to transfer the transmission output to the axle input level and divide the power for four-wheel drive operation.

The drop box on a 28000 series transmission is part of the main transmission assembly.



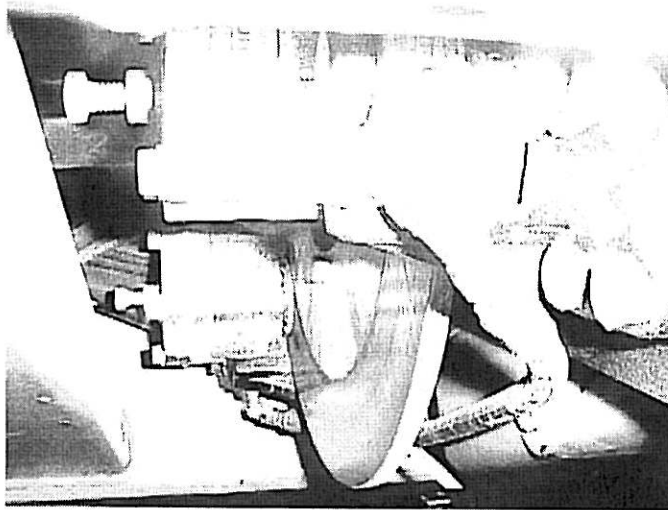
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SECTION 2 (Cont'd)

2.5.2 DROP BOX BRAKE MOUNTING

The actual caliper (two units) disc brakes are mounted to the rear face of the transmission drop box.



- The park brake is mounted to the rear transmission face (facing front of unit).
- Dual calipers are used on a single disc for maximum holding power.
- The park brake should never be used to bring the unit to a stop except in an emergency situation.
- Using park brake to stop unit will cause accelerated brake-pad wear.

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SECTION 2 (Cont'd)

2.6.0 DRIVE SHAFTS

2.6.1 DRIVE SHAFT IDENTIFICATION OF PARTS

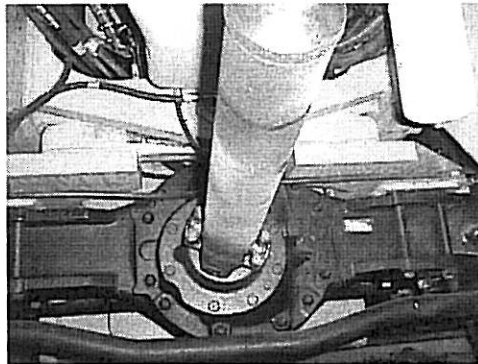
All drive shafts are made up of Mechanics 6C and 1550 series Spicer driveline parts.

All axle end drive shaft universal joints are Mechanics 6C series.



ZB20032:

All universal joints on this model with the Clark 28000 Series transmission are 6C Mechanics and 1550 Spicer series.



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SECTION 3

3.0.0 AXLES

3.1.0 AXLE MANUFACTURERS

All ZB20032 models are equipped with Meritor (Rockwell) planetary drive axles.

3.1.1 AXLE BRAKE TYPES

All ZB20032's are equipped with Meritor (Rockwell) planetary drive axles and are equipped with hydraulic disc brakes.

3.1.2 AXLES BY MODELS

Note: Over the years, specification and ratios may change to better suit the input power requirements of the overall power train.

When ordering differential gear parts, be sure to have **axle model number** and **serial number** to be sure you are getting the right parts.

3.2.0 WHEELS

3.2.1 WHEEL TYPES

All ZB20032's use three-piece 14" wide base rim assemblies with 16 5/8" dia. B.C. 12 stud mounting and use 3/4 NF Budd type wheel nuts.

3.2.2 WHEEL SERVICING

IMPORTANT

All tire/wheel mounting should be done by an experienced tire service person.

WARNING:

Tire work performed by other than experienced service people may result in serious injury or death due to an exploding tire or rim when being filled with air due to improper assembly.

Never mix and match three-piece wheel parts as a dangerous condition may result.

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SECTION 3 (Cont'd)

3.3.0 TIRES

3.3.1 TIRE TYPES AND SIZES

All ZB20032's are mounted on 17.5 x 25/16ply Rock Grip tires and are mounted on a 14" wide three-piece rim.

The standard tire is a super rock grip type.

All tire service should be done by an experienced tire repair service person.

IMPORTANT:

Before adding air to a soft tire, you should inspect the assembly to be sure all flanges and lock rings, etc., are fitted in their proper place to reduce the risk of the rim coming apart when air is added.

WARNING:

When adding air to a tire, you should always stand off to the side to avoid possible injury if tire/rim were to come apart.



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SECTION 4

4.0.0 ELECTRICAL

The electrical system and wiring is common throughout the entire CareLift model line (see parts book).

A twelve-volt negative ground system is used on all models.

4.1.0 ELECTRICAL SYSTEM USED

A dual battery system is standard on all ZB20032 models.

The dual battery system uses 2 group 24 batteries of 725 cranking amps each with 135 minutes reserve capacity resulting in a 1450 total cranking amp capacity and a 270 minute reserve capacity.

Each battery is connected directly with an independent battery cable to the starter solenoid and a ground cable to engine and frame.

All electrical diagnostics should be referred to the electrical schematics in the parts manual.

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SECTION 5

5.0.0 HYDRAULICS

5.1.0 EXPLANATION OF HYDRAULIC SYSTEM

The hydraulic system is a load sensing priority type with an open centre valve.

Oil pressure is supplied by two piston pumps mounted in tandem and direct mounted to the transmission P.T.O.

The piston pumps are load sensing with low pressure standby. Low pressure standby is set at 500PSI for #2 pump and 550PSI for #1 pump.

The pump pressure is set up in such a way that the pump that supplies oil to the steering and brake circuit will come on line first when the priority valve calls for oil and supply only the oil required for that circuit however if more oil is called for than the first pump can supply the second pump will come on line until requirements are met or the pumps reach maximum output.

The oil in the hydraulic system is drawn to the pumps through two sump filters of 100 mesh and equipped with bypass valves, which are in the bottom of the oil tank. The sump filters are washable.

Oil that does pass through the system is returned to the hydraulic oil tank through a return filter. The return filter element is 15 micron.

To stop any possibility of back pressure in the brake system, the oil from the return manifold bypasses the return filter and goes directly to tank.

Any back pressure in the brake system will cause the brakes to drag. The amount of drag on the brake will increase with any increase in system back pressure.

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SECTION 5 (Cont'd)

5.1.1 ELECTRICAL JOYSTICK (DANFOSS) – TROUBLE SHOOTING

PROBLEM: Hydraulic steering and brakes function but no other hydraulics operate.

SOLUTION: Check emergency shut down button to right side of the operator on console. The function of the emergency shut down button is to stop all hydraulic boom functions. This may be necessary if a control wire cable is damaged or otherwise causes unwanted boom movement.

PROBLEM: A hydraulic function does not operate properly (i.e. lift does not lift or is slow).

SOLUTION: If an electronic function does not operate properly, it is important to find out if the problem is electronic, hydraulic or mechanical.

If you have one function that does not work properly, move the Herschmann connectors to a valve section that does.

If the section you have moved the connectors to works properly, then the problem is in the hydraulic system.

If the problem is now in the new section you selected, your problem is in the electric controller.

5.1.2 OPERATION WITH WALVOIL PILOT OPERATED CONTROL VALVE

- FUNCTIONS:**
1. Lift
 2. Extend
 3. Tilt (depress joystick thumb button using lift motion of joystick through diverter-valve in console)
 4. Frame level
 5. Aux. functions – 3 functions at carriage using 3-way diverter valve mounted in boom yoke.

THREE FUNCTIONS OF DIVERTER VALVE AT BOOM TIP

- #1. Carriage lock cyl-forward/rear motion of rear joystick while holding bomb switch back (two hand operation for safety). Upper coil E-F Ports.
- #2. Forward and rear motion of rear joystick, no power is required to diverter valve in yoke, open & close clamp, C-D Ports.

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SECTION 5 (Cont'd)

- #3. Forward and rear motion of rear joystick with thumb button depressed power to solenoid to lower coil G-H Ports.

5.2.0 LOAD SENSING

5.2.1 LOAD SENSING OPERATION

The load sensing on the priority valve diverts up to 6 GPM of oil to either the steering or brake system from the main pump flow only when required. This system also has load-sensing pumps that only come on line when oil flow is called for by one of the load sense systems.

5.2.2 ZB20032

Procedure for Setting Pressures on A Tandem Load Sensing Pump System.

Note:

- A. All pump adjustments are made from the right hand side of the forklift and therefore all directions will be; left is to the rear of the machine, and right is to the front.
- B. The pump #1 is the one mounted to the transmission and is the farthest to the left.
- C. The pump #2 is the pump mounted to the back of #1 pump and is the farthest to the right and the furthest from the transmission mount face. There are two (2) pressure-adjusting screws on each pump.

The left adjusting screw on each pump is the low-pressure standby adjustment.

The right adjusting screw on each pump is this high-pressure adjustment.

Important: Back off both adjusting screws on each pump until no resistance is felt when turning the screw (do not screw right out). Turn adjusting screw back until resistance is felt, plus 4-5 full turns to obtain pressure.

- 1. Install a 0-4000 psi gauge in the main valve inlet section (#5 SAE "O" ring port facing rear of machine Danfoss Valve)
- 2. The #2 pump (right) low pressure standby is adjusted first.
 - A. Reading pressure gauge in the main valve adjust low pressure compensator to 500 psi
 - B. The #1 pump (left) low-pressure compensator is adjusted next. Increase until pressure gauge reads 500 psi.

Note: The #1 pump low pressure compensator is adjusted 50 psi higher than #2 pump to get a differential in pressure between the two pumps so that they do not fight each other.
- 3. The #2 pump (right) high-pressure setting is adjusted next. Cycle boom retract function, bottom out cylinder, and read pressure on gauge. Adjust the right hand high pressure adjusting screw until gauge reads 3150 psi.

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SECTION 5

The #1 pump (left) high pressure is adjusted last. Once again as in pump #2 adjustments cycle boom retract function and bottom out cylinder and read pressure-adjusting screw until gauge reads 3200 psi.

Note: The #2 pump supplies oil to the brake and steering circuit through the priority valve-this pump will cycle more often however at a lower pressure.

5.3.0 LOAD SENSING STEERING SYSTEM

5.3.1 LOAD SENSING STEERING OPERATION

This system provides smooth pressure compensated steering because pressure variations do not affect steering response or steering rate.

Only the flow required by the steering manoeuvre goes to the steering circuit, and only the oil volume and pressure required is pumped by the load sense pump.

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SECTION 5 (Cont'd)

5.4.0 LOAD SENSING BRAKES SYSTEM

5.4.1 LOAD SENSING BRAKE OPERATION

The brake also uses hydraulic oil supplied by the main hydraulic system to provide the power same as with the steering system.

The brake is a Mico closed centre system and only uses oil when the brake pedal is depressed. The brake is backed up by accumulators in the event of engine or pump failure.

The brake system is a dual system with independent accumulators for each system.

Different brake charge values are used for single and dual brake systems. A system using two accumulators has a dual brake system. The ZB20032 has a dual system.

5.4.2 BRAKE PEDAL FEEL / FEEDBACK

The brake pedal valve has internal valving to give pedal feel/feedback depending on and in relation to the amount of pedal force used to activate the brakes. Lubricate Brake Pedal mount pin regularly and keep clean under the pedal to allow full return.

5.4.3 BRAKE SYSTEM ACCUMULATORS

The brake system on the ZB20032 has two accumulators to store hydraulic pressure in the event of an engine or pump failure.

The ZB20032 has a dual brake system.

The dual brake system has two totally independent braking systems. The front axle is on one system, and the rear axle is supplied by the second. Either system will operate independently of the other.

The brake system accumulator(s) is charged through the Mico brake charge valve by oil from the CF port on the priority valve.

The CF port supplies oil to both steering and brakes simultaneously or separately as required.

5.4.4 BRAKE CHARGING PRESSURES

When the low-pressure setting is reached the load sensing port on the brake charge valve sends a signal to the priority valve to pressurize the CF port. The oil is directed through the brake charge valve to the accumulators.

When the accumulators reach the high pressure setting the CF port on the priority valve closes and oil flow from the load sense piston pump stops.

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SECTION 5 (Cont'd)

5.4.5 CHARGING BRAKE ACCUMULATORS

The accumulator(s) is pre-charged with nitrogen gas to 375 psi. A special bladder should be used for arctic or sub-arctic regions.

A special valve is used to charge/check accumulator(s) (see procedure below).

The loss of accumulator charge pressure will result in insufficient reserve braking capacity. Brake reserve can be checked by testing as listed in Section 5.4.6.

CAUTION:

Note: The loss of accumulator pressure will not effect the actual wheel end braking pressure, however it will result in little or no reserve braking and a slightly slower initial brake actuation.

Never try to check accumulators with a tire gauge type tester, as you may lose the gas charge and/or freeze your fingers.

5.4.6 TESTING FOR ACCUMULATOR PRE-CHARGE

Check the accumulators and brake charge valve for proper operation by performing the following:

1. Run engine for several minutes until the brake accumulators are fully charged. When the engine runs freely it should indicate the accumulators are charged.
2. Stop the engine.
3. Actuate brake pedal until no pedal pressure is evident.
4. Start engine – brake pressure light on the dash should come on. The engine should have a slight labouring sound. After the engine runs for about 15 – 30 seconds, there should be a noticeable difference in engine sound when it stops labouring (your accumulators should now be charged and the brake pressure light on the dash should now be off).
5. Depress brake pedal 2 – 3 times and you should hear the engine again begin to labour for 10 – 15 seconds. This is normal operation when the accumulator charging system is working.

NOTE – To check the brake system for accumulator pre-charge the following steps should be followed:

1. With the engine stopped depress brake pedal 15 – 20 times – this will empty accumulators of any oil pressure.
2. Start engine and run until it stops labouring, 15 – 30 seconds. The accumulators should now be fully charged with hydraulic oil.
3. Stop the engine.

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SECTION 5 (Cont'd)

5.4.6 TESTING FOR ACCUMULATOR PRE-CHARGE (Cont'd)

4. Turn ignition key to on position only (do not restart engine).
5. Depress brake pedal and release, repeating the process. Keep count of the number of times the pedal is depressed. After 5 – 6 depressions, the brake pressure light on the dash should light (if light does not come on after 12 depressions, check the bulb).
6. If the light comes on as described above, the accumulators are fully charged.

IMPORTANT:

If the CF port pressure on the priority valve is set too low or if there is a leak in the brake pedal assembly, the engine may continue to labour indefinitely because the brake charge valve cannot reach the high pressure cut-off limit. Adjust as required.

5.4.7 ADJUSTING RELIEF VALVE

Too low a relief setting on the priority valve CF port can cause insufficient hydraulic pressure to charge the brake system.

NOTE – The same relief valve also controls the steering relief which will cause hard steering if set too low.

Prior to adjusting relief valve, check the system pressure with a gauge.

If no pressure gauge is available, check with the factory service department for a suitable way to check/increase priority system pressure.

The relief valve is adjusted by removing the hose and adapter from the “T” port. A 7/32 Allen wrench is inserted into the opening and the pressure is increased by turning to the right.

IMPORTANT:

Do not increase pressure above that recommended: 1800 – 1900 psi.

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SECTION 5 (Cont'd)

5.5.0 PARK BRAKE

5.5.1 PARK BRAKE ACTUATION

The park brake is actuated whenever the key is turned off or the park brake switch and light on the dash is on.

The transmission also shifts into neutral when the park brake is actuated.

5.5.2 PARK BRAKE OPERATION

The park brake is spring-actuated and requires hydraulic pressure to disengage it.

The park brake should be adjusted to .015 - .020" clearance in the disengage position. The braking power will not be increased by decreasing the brake off clearance to the disc.

NOTE – Low park brake reservoir pressure (accumulator) will cause park brake to engage automatically.

A dual park brake caliper setup is used on the B20032 park brake disc with the Clark 28000 series transmission mounted to a single disc on the front transmission output flange.

5.5.3 PARK BRAKE ELECTRICAL REQUIREMENT

A disruption of electric power such as key off, low battery park brake actuation or low hydraulic pressure will cause the park brake to engage.

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SECTION 5 (Cont'd)

5.5.4 PARK BRAKE ADJUSTMENT AND SET-UP

The park brake is adjusted and set up as follows:

IMPORTANT:

Park the unit on a flat surface and block wheels in both directions as the park brake must be in the off position when adjusting.

1. Check for clearance between the brake pads and the brake disc.
2. Take hold of the main body of the housing and push toward and pull away from the brake disc (longitudinally).

The body should have movement. If no movement is detected check to see if it is due to no pad clearance or possibly the brake body is seized to the mounting pin. If the brake has seized to the pin this problem must be resolved before brake adjustment can begin.

3. Loosen lock nut 11/16-wrench stud at back of brake housing.
4. Turn stud in until tight and then back the stud out approximately ½" turn.
5. Check clearance from brake pad to brake disc (.015 to .020).
6. Tighten lock nut and recheck clearance.

NOTE – Any 1996 or later unit that requires frequent brake adjustments would indicate that the brake is being applied when the unit is still moving, causing increased wear to the pads. When the park brake is applied the transmission shifts into neutral to prevent driving through the park brake.

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SECTION 5 (Cont'd)

5.5.5 PARK BRAKE CUSHION VALVE SETTING

A flow control valve is fitted to the park brake hydraulics circuit.

The purpose of this valve is to slow down the engagement of the brake caliper to the brake disc.

The reason for wanting to slow down the park brake engagement is to eliminate high loading and windup in the drivelines.

This windup in the driveline will cause the unit to rock back and forth very abruptly until all energy has been dispersed.

To set up the park brake flow control cushion valve:

1. Sep up park brake for proper clearance; see Section 5.5.4.
2. Loosen lock nut on valve stem.
3. Turn lock valve stem to the right until it stops (sealed).
4. Back valve stem out ½" turn maximum.
5. Retighten valve stem lock nut – (be sure valve stem does not turn when tightening lock nut).
6. Check for proper brake engagement by applying brake when moving at 2 – 3 MPH. Unit should come to a smooth stop.

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SECTION 5 (Cont'd)

5.6.0 REAR AXLE LOCK

5.6.1 REAR AXLE LOCK OPERATION

A rear axle lock system is installed as standard equipment on all ZB20032's. The purpose of the axle lock system is to stop rear axle pivoting when the boom is raised above 45 degrees. When the boom is raised above 45 degrees the indicator light on the dash will be on (if it does not light, check the bulb).

When the boom is raised additional weight is transferred to the rear axle. The increased weight may cause the forklift frame to rock to one side or the other and will tend to lean to the heaviest side, which is usually the operator and cab side. When the rear axle locks the frame will remain stable.

The rear axle lock system requires electric power to release (open) the solenoid. Without electrical power the rear axle will lock in whatever position it is in when the power is cut off, i.e. ignition switch turned off. The rear axle lock system is a self-contained hydraulic system. An accumulator takes up the volume difference of the rear cylinder between rod and base end in the system.

The rear axle lock system has been modified to allow for a more versatile system.

The rear axle operates normally when the boom is below the 45-degree angle. Whenever the boom is raised above the 45-degree angle the rear axle movement is slowed down.

When the service brake is applied or the park brake is engaged with the boom above 45 degrees, the rear axle locks totally.

NOTE – See Section 5.6.3 for Frame Level Hydraulic System.

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SECTION 5 (Cont'd)

5.6.2 CHARGING THE REAR AXLE LOCK SYSTEM

The rear axle lock system is charged from the front frame level system. There are two #4 hoses laid into the frame from the main valve to the rear axle lock solenoid valve body. These hoses are fitted with quick disconnects at both ends. There are also quick disconnects mounted to the ports on the main valve axle level section as well as on the rear axle lock valve body at the left side over the rear axle. These hoses should be connected only when charging the rear axle lock system. When the system is operating, both ends of the charging hoses must be removed from the quick disconnects.

The following steps should be used to charge the rear axle lock:

NOTE – The accumulator is pre-charged with nitrogen gas to 100 psi to force the oil to move in and out of the cylinder to prevent any cavitation in the system.

1. Connect #4 hose in the frame to the quick disconnects at the main valve and the solenoid valve at the rear (hoses are marked for proper connection).
2. Two of the solenoids in the rear solenoid-mounting block have manual (unlocking) capability. These are unlocked by pulling up on the knob and turning 90 degrees so the point sits on top of the vee stem. This position allows free flow through the lock valve for charging.
3. Actuate the frame level control valve to tilt the frame from side to side while holding the valve open at end of each cycle for several seconds to pressurize the system fully. This will help eliminate any air in the system.

Step #3 should be repeated four times.

4. After axle has been cycled four times, tilt the frame fully to the right.
5. The two manual solenoid overrides should now be returned to their closed position.
6. Remove the quick disconnect hoses at both ends and leave in frame.
7. Check system for proper operation by cycling frame level from left to right. (Rear axle cylinder should stroke fully in both directions.)

DANGER:

Frame leveling shall not be attempted when boom is elevated.

- When the boom is elevated above 45 degrees, if frame leveling is attempted it is very slow.
- Unstable conditions can result if frame leveling is attempted when boom is elevated above 45 degrees.

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SECTION 5 (Cont'd)

5.6.3 FRAME LEVEL HYDRAULIC SYSTEM

All ZB20032's are equipped with frame leveling.

When the boom angle is below 45 degrees, the frame level speed is normal and the rear axle will follow the terrain as the vehicle moves.

The frame leveling speed is adjustable; however, it is best to leave it at factory set levels for safer operation.

When the boom is above 45 degrees the frame leveling will still operate; however, the speed of operation will be greatly reduced.

The reduced speed is a safety measure to prevent rapid movements that can cause instability. The reduced speed of operation is not adjustable.

When the boom is above 45 degrees the rear axle also operates at a reduced speed; this will help dampen any rapid side movement when the boom is elevated.

The frame level will cease operation and the rear axle will lock totally if the parking brake is applied.

The service brake will also lock up the frame level and axle lock system.

To allow operator to operate frame level while traveling and still allow for some braking a moderate pedal pressure is required to lock up the system totally.

If frame leveling is stopped by either park brake or service brake application, it is necessary to reinitiate the frame level function; this is to eliminate unintended continuation of frame leveling.

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ZB20032

SECTION 7

BOOM ASSEMBLIES

7.0.0 BOOM COMPONENTS

All CareLift's boom sections are fabricated from plate steel in box sections producing a very strong and rigid tube section.

Each section is fabricated to nest together keeping the overall size to a minimum.

Each boom consists of the following sections as shown in the parts manuals:

- 7.1.0 Main section
- 7.2.0 Primary section
- 7.3.0 Sub carriage
- 9.1.0 Carriage assembly
- 9.2.0 Attachments (options)

All CareLift's booms use the same type of slider load bearing pads.

The ZB20032 uses a 12" long pad of the same type in all locations. Side pads are machined thinner for space application.

The standard boom on a ZB20032 consists of two welded boom assemblies with a yoke attached to the second section, and a sub-carriage that will allow for quick attachment of a fork carriage or other special attachments. (see Attachments section 9-0-0)

Access to the inside of the boom is through the two side cover plates at the front of the primary boom section, two side cover plates at the middle of the main boom section and also through the rear boom cover plate that is held in place with the hand nut. The rear cover removal will allow access to hoses and fittings.

It should also be ensured that no unwanted foreign items have entered the boom. This occurs most often from the front of the boom when it is elevated to a near vertical position. Any foreign items inside the boom that can get caught between moving sections of the boom may cause hose, chain roller, or chain damage.

Load bearings should be greased regularly to diminish wear. The load bearings can be checked for wear by measuring the thickness. A new bearing is 7/8" thick, and should be replaced when it is worn to 5/8" thick.

Note: Do not measure thickness of backup spacers.

Note: All load bearings, top and bottom, are the same throughout the boom and can be interchanged if necessary. They are 12" long.

Two extension chains are	107" Long AL888.
The return chain is	98" Long AL888.

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7.1.0 MAIN BOOM SECTION

The main section is the outermost boom section. The main boom mounts, lift cylinder mounts, and tilt slave cylinder mounts are attached to this section.

The main boom section moves in an arc between its base mount and the lift cylinders. The tilt slave cylinders are mounted to the rear of the main boom section and are required to keep the carriage at the predetermined angle selected.

The main boom section is the base of the boom assemblies and it supports the primary boom section. It is to this section that the lift cylinders are mounted. The extension cylinder is mounted internally on the bottom side of the main boom section.

The lift cylinders are mounted between the frame and the boom, and these raise and lower the boom.

The tilt slave cylinders are also mounted between the frame and the main boom tube assembly. The tilt slave cylinders react to the movement of the boom and direct oil to the carriage tilt cylinders to keep the load level.

Note: When the carriage cylinders reach their minimum or maximum length, the oil in the tilt slave cylinders must be allowed to escape back to the tank. The oil return to the tank is accomplished through the port reliefs mounted in the main valve.

Adjusting Tilt Cylinder Port Relief

The port relief valves must be adjusted as follows:

1. Place a 4000-psi pressure gauge in rod and base ports of the tilt slave cylinder at the rear of the unit.
2. Raise boom approximately 10 feet.
3. Tilt carriage fully back.
4. Lower boom and read pressure on gauge in rod port adjust as required.

To Check the Slave Cylinder Base Port Relief Setting

1. Raise boom approximately 5 feet.
2. Tilt carriage forward to full stroke of the tilt cylinder.
3. Raise boom and read required pressure on gauge in tilt slave cylinder base port.
4. Adjust port relief as required.

When both port reliefs have been set, check again using the same procedure but with the engine running at about 2000 RPM. You will note that cylinder pressures will be higher by about 300-400 psi. This is normal.

7.2.0 Primary Boom Section

The primary boom section is the moving section inside the main tube assembly. The primary section is moved in and out by the extension cylinder, which is mounted at the back end of the main section on the inside bottom, and is attached to the roller assembly.

The tilt cylinder and auxiliary hydraulic hoses are mounted to the bulkhead mounts on the bottom outside near the front of the primary section.

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Important

If the boom is equipped with multiple hydraulic functions at the boom tip/carriage it will also have a multi-wire cable going to the front of the boom to control the two or three position diverter valve mounted to the yoke. The wire runs through flexible tubing inside the primary boom.

Important

The extension chains go from the chain tensioners, on the underside of the bottom plate of the main boom, to the rollers of the roller assembly and back to the anchors on the rear of the primary tube.

The return chain is attached to the chain anchor on the bottom plate of the main tube. It travels from the main to the primary tube by means of the roller assembly and forward to the anchor on the bottom of the primary section.

When adjusting the chains, it is only necessary to adjust the pull chains, as the return chain will become tight at the same time. This is because the chains are working against each other.

It is important to adjust the chains only tight enough so when the boom is extended you have approximately 3/4" of droop in the center of the chain.

DO NOT OVER TIGHTENED CHAINS!

Since the chains are working against each other, over tightening will only cause them to stretch, or it may bend the boom mounts.

7.3.0 Sub Carriage Assembly

The sub carriage is of a quick switch design that allows for easy attachment changes. The quick switch attachment mounts over the sub carriage mounting bar with "J" style hooks and is locked in place with pins at the base to prevent it from lifting off of the hooks.

An optional hydraulic cylinder is available to lock the attachment in place from the driver's position.

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SECTION 7

7.0.0 BOOM ASSEMBLIES

7.1.0 BOOM COMPONENTS

All CareLift Booms are fabricated box sections for high strength and rigidity.

The sections nest together with slide type bearings to keep size to a minimum.

Each 20032 boom consists of the following sections and has only one moving section.

- 7.2.0 Main Section
- 7.3.0 Primary Moving Sections with yoke mounted to it
- 7.4.1 Yoke Assembly mounted to primary boom section
- 7.5.0 Sub Carriage
- 9.1.0 Standard Carriage Assembly
- 9.3.0 Optional Attachments

All B20032 slide pads are the same in all locations front and rear, top, bottom and sides (1" thick and 12" long). The standard B20032 boom consists of two welded tube assy's with the yoke welded to the Primary Section.

The Primary or moving section of boom is driven by the extension cylinder through a chain roller system mounted to the rod of the extension cylinder. The cylinder and chain roller assy are mounted to and roll on the inside of base plate of the main boom tube assy.

Access to chain / hose roller assy is through access covers on the side of the main tube or from the front with cylinder extended fully and/or from the rear by removing rear boom cover plate. Rear pad greasing is accomplished with rear cover plate removed.

When servicing the boom it is recommended that the inside is given a good visual inspection to be sure all hose chains and bearings are in good order. It should also be checked for any foreign objects that may have entered and may cause interference with moving parts inside.

Note: Foreign items may enter the boom when in an elevated position through the front of the yoke.

All bearings should be greased on a regular basis. Boom load bearing slide pad life will be greatly increased with regular greasing.

Note- New load bearings are 7/8" thick and when they reach 5/8" thick they should be replaced.

All load pad bearings throughout the boom are the same and can be interchanged if necessary.

The boom slide pad bearing mounting bolts are locked with lock tite and will be tight if removing.

Important: Never use heat on bearing pad mounting bolts to remove as bearing is plastic and will soften or melt allowing bearing insert nut to turn.

Chain lengths:

Two extension chains 107 " long AL888

One retraction chain 98 " long AL888

7.2.0

MAIN BOOM SECTION

The main section is the outermost boom section. The main boom mounts, lift cylinder mounts, and tilt slave cylinder mounts are attached to this section.

The main boom section moves in an arc between its base mount and the lift cylinders. The tilt slave cylinders are mounted to the rear of the main boom section and are required to keep the carriage at the predetermined angle selected.

Main section boom parts as listed below:

The main boom section is the base of the boom assembly and supports the primary boom section. It is to this section that the lift cylinders are mounted. The extension cylinder is mounted internally on the bottom side of the boom section.

The extension cylinder rod is mounted to the chain and hose roller carrier assembly. The lift cylinders are mounted between the frame and the boom, and they raise and lower the boom.

The tilt slave cylinders are also mounted between the frame and the main boom tube assembly. The tilt slave cylinders react to the movement of the boom and direct oil to the carriage tilt cylinders to keep the load at the predetermined angle selected.

Note: When the carriage cylinders reach their minimum or maximum length, the oil in the tilt slave cylinders must be allowed to escape back to the tank. The oil return to the tank is accomplished through port reliefs mounted in the main valve.

To check or adjust Tilt Cylinder Port Relief

The port relief valve must be adjusted as follows:

Place a 4000-psi pressure gauge in rod and base ports of the tilt slave cylinder at the rear of the unit.

1. Raise boom approximately 10 feet
2. Tilt carriage fully back.
3. Lower boom and read pressure in tilt slave cylinder rod port.
4. Adjust port relief pressure as required (3100 psi).

To Check or adjust Slave Cylinder Base Port Relief Setting

1. Raise boom approximately 8 feet.
2. Tilt carriage forward to full stroke of the tilt cylinder
3. Raise boom and read pressure on gauge in tilt slave cylinder base port.
4. Adjust port relief pressure as required (1500 psi).

When boom port reliefs have been set, check again using the same procedure but with the engine running at about 2000 RPM. You will note that cylinder pressures will be higher by about 300-400 psi. This is normal.

The extension cylinder is mounted to the bottom surface on the inside of the main boom section with 3/4 x 1 1/2 NC Grade 8 bolts. Six bolts at the base end of the cylinder and two bolts at the rod end for rigid alignment of cylinder.

The chain and hose roller carrier assy is mounted to the extension cylinder rod with the same pin that mounts the two pull/extend chain roller assemblies.

The return chain roller is mounted to the front side of the chain/hose roller carrier assy with a pin and lock plate assembly to hold it in place and also prevent it from rotating.

The return chain roller mount pin is tapped at both ends to accept the hose roller mounting pin. To mount or remove hoses it is necessary to remove the hose roller mount pin and the hose roller to get the hoses over the rollers.

7.3.0

PRIMARY BOOM SECTION

The primary boom section is the only moving section inside the main tube assembly. The primary section is moved in and out by the extension cylinder header and chain roller assy which is mounted to the main section bottom plate and the bottom side of the primary section by the leaf chains.

The tilt cylinder and auxiliary hoses are mounted to the bulkhead mounts on the bottom outside near the front of the main section.

Important

If the boom is equipped with multiple hydraulic functions at the boom tip/carriage it will also have a multi-wire cable going to the front of the boom to control the two or three position diverter valve mounted to the yoke.

The primary section is extended and retracted by use of the chain and a hose roller carrier assy mounted to the rod of the extension cylinder.

The extension chains are mounted rigid to the base end of the primary section. They travel forward over the chain/hose roller carrier assy and return to the rear. They pass through the two openings in the bottom of the main sections and are mounted to chain adjusters on underside of main boom section.

The return chain is rigid mounted to the chain mount on the underside of the primary boom section (over the center chain roller facing front on roller carrier and back up to the chain mount at the front end of main boom).

The chains are adjusted by tightening the adjusters on the underside of the main boom.

NOTE: Both pull/extension chains must be adjusted equally to allow chain roller carrier to remain square to the boom.

Important

The retraction chain will tighten equally with the extension chains when they are adjusted.

It is important to not overtighten chain assemblies. The chain should have a deflection of approx 1/2 " at the center point of the upper chain when fully retracted.

Overtightening will cause chains to stretch or bend mount!

Hydraulic Hoses

The extension cylinder hoses go from the bulkhead mounted at rear of main boom section to the lock valve mounted under the main boom tube. Two steel tube assy's go from the lock valve under the boom to the rear and attach to the extension cylinder ports.

Tilt cylinder and auxiliary hydraulic hoses extend under the boom from the bulkhead mount at the rear of the boom to the bulkhead elbows in the underside of the main tube at the front.

The hoses then extend from the front of the main boom section under the hose roller and around back to the bulkheads mounted to the underside at the front of the primary boom section. Tilt hoses and auxiliary hydraulic hoses over rollers must be stretched tight over the rollers to keep them from drooping down and/or coming off the rollers.

The tilt hoses travel from the bulkhead at the front of the secondary boom to the lock valve mounted to the back side of the yoke and then on to the tilt cylinders.
The auxiliary hydraulics travel to the diverter valve if so equipped.

If the boom is equipped with multiple hydraulic functions at the boom tip/carriage a multiwire cable is required for the two or three position diverter valve mounted to the yoke.

The multiwire cable enters at the rear of the boom in a channel mounted to a nylatrac between main and primary section via a channel mounted to the back of the main boom section and a nylatrac mounted to the channel end and the primary boom section.

The wire and hoses go up the inside of the primary boom and must be tied together to stay in the center so as not to interfere with the Nylatrac.

7.4.1

CARRIAGE YOKE ASSY

The carriage yoke is mounted to the front of the primary tube assembly and is the attaching point of the subcarriage and the tilt cylinders.

7.5.0

SUB CARRIAGE ASSEMBLY

The sub carriage is the same on all B200XX series booms.

Some subcarriages are fitted with the optional hydraulic quick attach lock cylinder.

This attachment requires auxiliary hydraulics to tip of boom to operate.

9.0.1

B20032 OR B20044 ATTACHMENTS

Including the following standard carriages

Side/Sift Carriages various widths

Fork Shift Carriages various widths

Winches - varying in capacity from 6000 to 15000 lb capacity

Note: winch capacities vary depending on number of cable wraps on the drum and whether a one, two or three part line is used.

Light Material Bucket (bucket not intended for excavating)

Bridge Stripper to handle "I" beams and remove concrete forms etc on the underside of concrete structures

Gripper/Clamp for handling round and odd shape columns for 9" dia to 22" diameter vertical and rotates to horizontal.

Grapple Carriage for round or odd shape items

Stinger -Coil Handling Attachment

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Section 9

9.0.0 B20032 Attachments

Attachments include the following:

- Carriages of various widths and types
- Winches
- Light materials bucket
- Bridge stripper for handling I beams
- Gripper/Clamp for handling and manipulating round or oddly shaped columns from a 9" diameter to 22" diameter.

9.6.0 Winch attachment

Auxiliary Hydraulic Circuit required:

Tulsa Winch Model H938 Series

Worm Gear Drive

Cable Size 7/1

Cable Capacity 135' w/11' Drum

Maximum single line pull

9000 lb. – first layer

5500 lb. – fourth layer

Maximum single line speed, 23 FPM, 4th layer @ 18 GPM

To increase lift capacity, a 2-part or 3-part line would be required.

The winch is mounted to the quick attach assembly used for mounting the carriage.