

Operation & Maintenance

Broce Broom

FMJ470

**Front Mount
4-Wheel Construction Sweeper**



Broce Manufacturing Co. Inc. 1460 South 2nd Avenue Dodge City, KS 67801
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M-F 7:00 AM-6:00 PM CST

1-866-283-2759

www.brocebroom.com

Broce Manufacturing Company, Inc.

WARRANTY REGISTRATION

Purchased From (Dealership)

Company: _____
Address: _____
City: _____ State: _____ ZIP: _____
Delivery Date to Dealer: ____ / ____ / ____ Unit Hours: _____
Model Number: _____ Serial Number: _____

Purchaser

Company: _____
Address: _____
City: _____ State: _____ ZIP: _____
Delivery Date to Dealer: ____ / ____ / ____ Unit Hours: _____

Purchaser - Type of Business

Construction/Highway	Rental	Asphalt Contractor	
Equipment Dealer	Municipality	Other	

- The Purchaser has been instructed and/or has read the manual and understands proper preventive maintenance, operation and safety precautions.*
- The Warranty and Limitations of Liability are found in the Warranty pages enclosed in the Parts and Operators Manuals.*
- Broce Manufacturing Co. Inc. reserves the right to make design changes or modifications to Broce products at any time without incurring any obligation to make similar changes or modifications to previously sold units.*
- If this Document is not signed and returned to Broce Manufacturing Co. Inc., the warranty begins at the date of delivery to the Dealership.*

I hereby acknowledge acceptance of above and conditions in the Warranty Policy

Purchaser/Owner: _____

Dealer Representative: _____

Broce Manufacturing Co. Inc.
1460 South 2nd Avenue
Dodge City, KS 67801
(877) 227-8811

BROCE MANUFACTURING COMPANY

BROCE BROOM LIMITED TWELVE-MONTH WARRANTY

For a period of twelve (12) months or 1,000 hours whichever comes first, from the date of delivery of product to the original user, Broce Manufacturing of Dodge City, Kansas warrants each product to be free from manufacturing defects, subject to the limitations contained in this policy. This limited warranty covers parts and labor.

This warranty does not apply to defect caused, in whole or in part, by unreasonable use while in the possession of the user, including, but not limited to, failure to properly set up product, failure to provide reasonable and necessary maintenance, normal wear, routine tune ups or adjustments, improper handling, accidents, operation at speed or load conditions contrary to published specifications, improper or insufficient lubrication, or improper storage. This warranty is not a guarantee that the performance of each product will meet the expectations of the purchaser.

Broce Manufacturing shall not be liable for consequential damage of any kind, including, but not limited to: consequential labor costs or transportation charges in connection with the replacement or repair of defective parts, lost time or expense which may have accrued because of said defects. In no event shall Broce Manufacturing's total liability hereunder exceed the product purchase price.

Many components used by Broce Manufacturing are subject to the warranties of their respective manufacturers. These warranties will be considered void if the product is modified or repaired in any way not expressly authorized, or if closed components are disassembled prior to return. Closed components include, but are not limited to gearboxes, hydraulic pumps, motors, cylinders and actuators.

Our obligation under the warranty is expressly limited, at our option, to the replacement or repair at Broce Manufacturing of Dodge City, KS or at a service facility designated by us. We are not responsible for unauthorized repairs or replacements. Any implied or statutory warranties, including any warranty of merchantability or fitness for a particular purpose, are expressly limited to duration of this written warranty. We make no other express warranty. This warranty cannot be extended, broadened, or changed except in writing by an authorized officer of Broce Manufacturing.

Broce Manufacturing Co. Inc.

1460 South 2nd Avenue

Dodge City, KS 67801

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**NOTICE: THIS VEHICLE DOES NOT CONFORM TO ALL
SAFETY AND EMISSIONS STANDARDS APPLICABLE TO
ON-ROAD VEHICLES IN THE UNITED STATES.**

OPERATOR QUALIFICATIONS

Operation of this equipment shall be limited to competent and experienced persons. In addition, anyone who will operate or work around this equipment must use good common sense. In order to be qualified, he or she must also know and meet all other requirements, such as:

1. Some regulations specify that no one under the age of 16 may operate power machinery. It is your responsibility to know what these regulations are in your area or situation.
2. Current OSHA regulations state in part: "At the time of initial assignment and at least annually thereafter the employer shall instruct EVERY employee in the safe operation of servicing of all equipment with which the employee is or will be involved."
3. Unqualified persons are to STAY OUT of the work area.
4. A person who has not read and understood all operating and safety instructions is not qualified to operate the machinery.

**FAILURE TO READ THIS MANUAL AND ITS SAFETY INSTRUCTIONS
IS A MISUSE OF THE EQUIPMENT AND WILL VOID FACTORY WARRANTY.**

SIGN OFF SHEET

As a requirement of OSHA, it is necessary for the employer to train the employee in the safe operation and safety procedures with this equipment. We include this sign off sheet for your convenience and personal record keeping.

Date	Employer's Signature	Employee's Signature

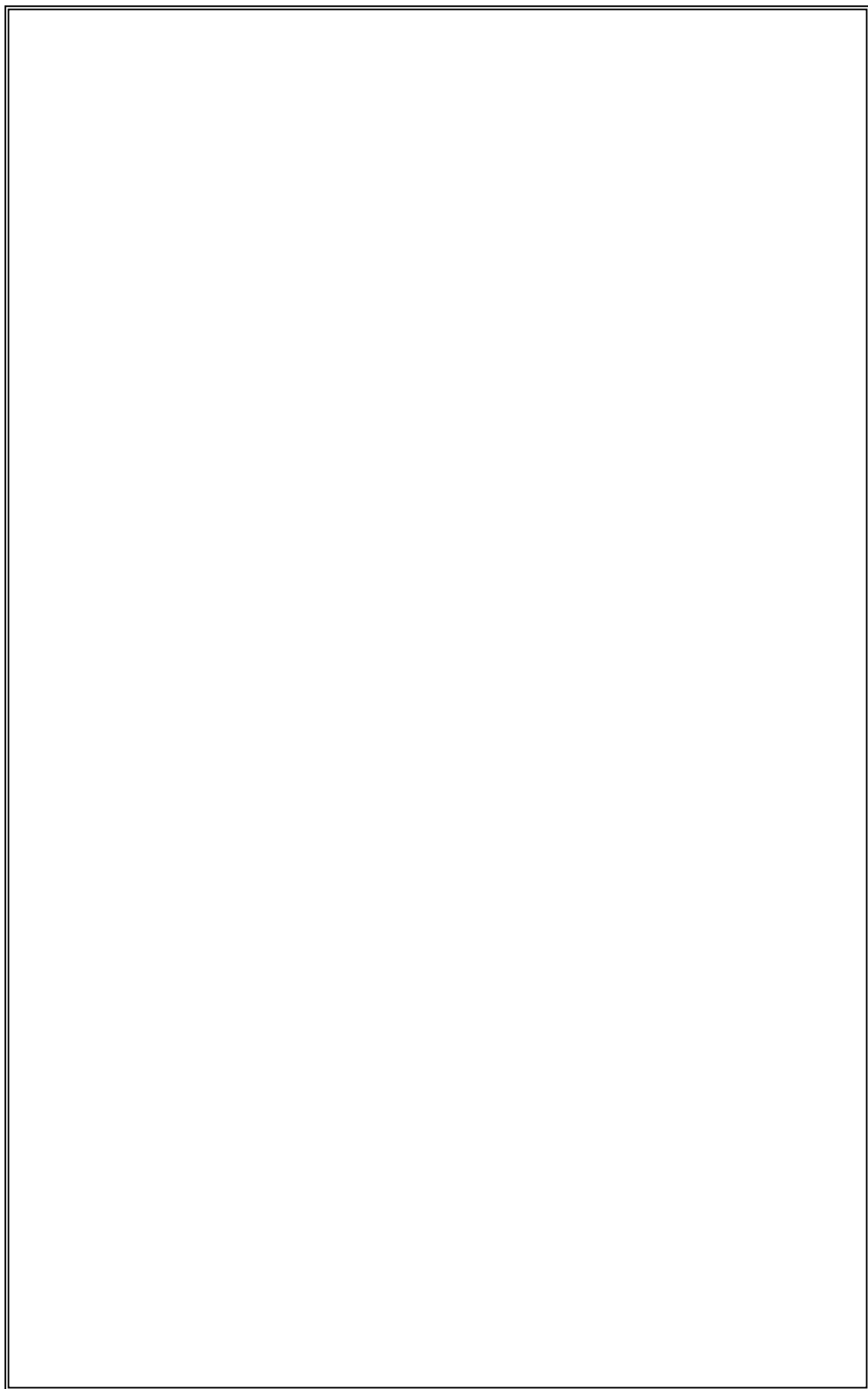


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SAFETY PRECAUTIONS



CAUTION



1. Keep all shields in place.
2. Stop machine, turn off engine and remove key to repair or clean.
3. Keep hands, feet, and clothing away from power driven parts.
4. Keep off of machinery unless a platform is provided.
Do not crawl on equipment.
5. When equipment becomes disabled, shut off power before attempting repairs.
6. Check for hydraulic leaks with a piece of paper and not your hands.
Hydraulic oil under pressure can cause serious injury!

**BE A SAFE OPERATOR BY
THINKING BEFORE ACTING AND
BY READING YOUR OPERATORS
MANUAL.**

AVOID ACCIDENTS

Most accidents, whether they occur in industry, on the farm, at home, or on the highway, are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason, most accidents can be prevented by recognizing the real cause and doing something about it before the accident occurs. Regardless of the care used in the design and construction of any type of equipment, there are many conditions that cannot be completely safe guarded against without interfering with reasonable accessibility and efficient operation.

A careful operator is the best insurance against an accident.

The complete observance of one simple rule would prevent many thousand serious injuries each year.

Never attempt to clean, oil, or adjust a machine while it is in motion!



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SAFETY PRECAUTIONS

BEFORE OPERATING THIS MACHINE

Read this manual completely. It contains information on safety and maintenance procedures which must be followed to insure years of trouble free service.

WARNING STATEMENTS

READ AND UNDERSTAND THE FOLLOWING
WARNING LABELS BEFORE OPERATING THIS MACHINE



**OPERATOR MUST BE SEATED WITH SAFETY BELT ADJUSTED
PROPERLY & SECURE WHEN ENGINE IS RUNNING.**

The seat belt and roll over protection structure were designed to be used together to prevent operator injury in the event of an accident. The seat belt must be worn at all times in order to hold the operator in place so that the roll bar can protect the operator. Adjust the slack out of the seat belt by pulling the unused portion of the belt to the left. The belt should fit snug over the operator's hips.



**TRAVEL SPEED MUST BE GOVERNED BY
GOOD JUDGMENT. DO NOT OVERSPEED**

Although a high travel speed is available with the Broce Broom, we caution all operators to use good judgment, especially on rough terrain.



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SAFETY PRECAUTIONS



The operator must be aware at all times of any people, vehicles, or any other objects which might be in the path of flying debris from the sweeper. The sweeper can throw small rocks and other objects several feet. This debris can cause serious injury to people and damage to property. Always check that the area around, and in front of the broom core is free of obstructions before adjusting the broom angle or activating the core.



NO RIDERS!

**UNDER NO CIRCUMSTANCES SHOULD PASSENGERS BE
ALLOWED TO RIDE ON THIS MACHINE.**



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MACHINE SPECIFICATIONS

Engine Specifications:

See Engine Manufacturer's Manual (included) for engine specifications.

Specification Sheet:

Engine Horsepower	74 HP
Machine Length	17'3"
Machine Weight	8,200 lbs
Machine Weight with Water	9,452 lbs
Brush Diameter	10-1/4" ID x 32" OD
Broom Length	8'
Broom Drive	2 Speed Hydraulic
Motor	
Broom Angle	35° Degrees
Steering	Hydraulic Orbital
Fuel Capacity	30 Gallons
Hydraulic Oil Capacity	25 Gallons
Speed	18 mph
Water Capacity	145 Gallons



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MACHINE SPECIFICATIONS

FLUID CAPACITIES

Fluid Capacities

Component	Fluid Type	Quantity
Hydraulic Tank	DYNA-PLEX 21C Cursa Hydraulic Oil Multifunctional Medium	25 Gal.
Fuel	#2 Diesel	30 Gal.
Radiator	ETHYLENE GLYCOL 50/50 MIX	2.5 Gal.
Engine Crankcase	API Classification CI-4, CE or CD CCMC Specification D4 or D5	10 Qts.
Front Axle	85/140 Gear Lube	5.9 Qts. *

* 2 Quarts is approximate. Fill to the level of the filler plug.

ATTENTION

R-134a A/C Refrigerant Factory Charge:

John Deere = 3.0 lb (1.36kg)

Ester Oil Change:
Compressor = 8.0 oz
System = 4.0 oz



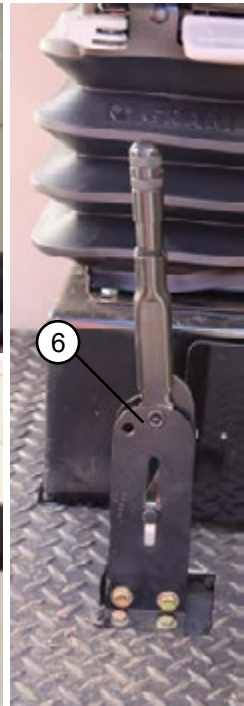
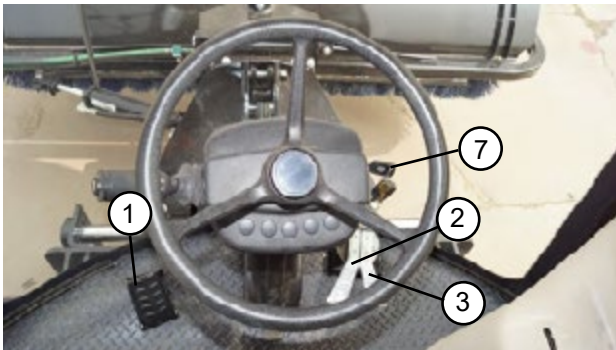
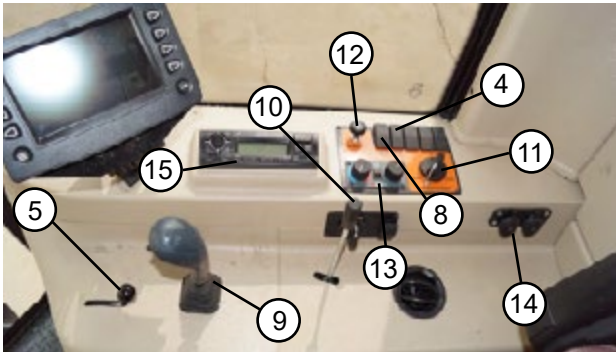
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MACHINE OPERATION

The Broce Broom is hydro-statically driven. The directional control is achieved through the use of the Forward & Reverse pedal, located near the operator's foot. Arrows on the pedals indicate direction of travel. Rate of travel is governed by the distance the pedal is depressed and the throttle position. The pedal will return to neutral when the pressure is released.

Familiarize yourself with the following controls before operating this machine.

- | | |
|--|------------------------------|
| 1) Brake pedal | 9) Broom position Joystick |
| 2) Forward Pedal | 10) Side Shift Joystick |
| 3) Reverse Pedal | 11) Broom Control Dial |
| 4) Broom on/off | 12) Windshield wiper Control |
| 5) Throttle | 13) Heater & AC Controls |
| 6) Parking brake (lower left side of seat) | 14) USB Ports |
| 7) Ignition switch | 15) Radio |
| 8) Two speed switch | |



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MACHINE OPERATION

Prior to initial startup of the machine each day, the following inspection checks must be performed:

1. Visually inspect the entire machine for damage and fluid leaks. Repair critical items before machine is used.
2. Check all fluid levels; engine oil, radiator, and hydraulic reservoir, etc. Fill fluid reservoirs if necessary.
3. Check wheels and tires for excessive wear or damage; also check air pressure and lug nut tightness.
4. Seat belt, core cover, and rubber rock guard should be installed and serviceable.
5. Lights, windshield wipers, reverse alarm, horn, etc. must be in operating condition.
6. Test brakes before operating this machine. Refer to BRAKES area in the MAINTENANCE Section in this manual for details.
7. Check water system filters, nozzle screens and cycle system.

Any defects or damage found during this inspection must be repaired before operating this machine.

MACHINE STARTUP



CAUTION



1. Before starting the engine, be sure the parking brake is set (pull handle up to vertical position). The brake pedal should be depressed and the right foot is not on a control pedal.
2. Turn the key switch to the starting position (all the way forward). Add fuel as necessary using the hand operated throttle near the operator's right hand. Release the key switch when the engine starts.



IMPORTANT



Do not exceed 1500 RPM until the hydraulic fluid has warmed up.



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MACHINE OPERATION

1. Choose the desired gear using the two-speed switch located on the right-hand side of the dashboard. Low gear is normally used while sweeping in order to maintain sufficient RPM, to run the hydraulics. Leave the two-speed in Low gear until the operator is familiar with the machine. High gear is used for travel only. Shifting from Low to High can be accomplished at any speed; however, shifting from High to Low should be done at a speed lower than 5 mph. Shifting at higher speeds can damage the drive motor. Optimal sweeping is normally achieved at manufacturer's recommended engine speed of 1800-2000 rpm in Low gear with forward travel speed of 2 ½ -5 mph.
2. After gear selection, raise engine RPM to about half throttle. Release parking brake. Slowly depress a control pedal in the desired direction. Engine speed may be adjusted to obtain desired travel speed.



IMPORTANT



**Do not propel this machine with the parking brake engaged.
This will damage the rear brake assemblies**

3. Do not over speed! Although a high rate of travel is available with a Broce Broom, we caution all operators to use good judgment, especially on rough terrain.
4. If the control pedal is released while traveling, the machine will slow down rapidly. This is called "Dynamic Braking". Using Dynamic Braking at low speeds is fine as long as the operator is ready to use the brake pedal if needed.
5. Do not reverse the direction of travel while the broom is in motion. This could damage the drive motor and cause brush distortion and imbalance.
6. The core should be in the raised position and the lift cylinder safety collar should be placed on the lift cylinder. This prevents the core from drifting down to the ground and creating a "flat spot" in the brushes while the machine is parked. These flat spots can cause the broom to bounce or hop while sweeping.
7. To stop the engine, turn the key back to the center position. The parking brake must be set prior to leaving the operator's seat..



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MACHINE OPERATION

SWEEPING CORE

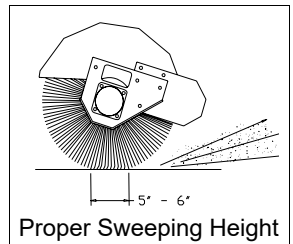
SWEEPING CORE OPERATION

RAISE/LOWER

To raise the sweeping core, position and pull the joystick to the **"UP"** position until the core is raised all the way. The joystick will return to the center position and core height will be maintained.

To lower the core during normal sweeping conditions, push the joystick to the **"DOWN"** position until the core reaches the desired position.

The figure shows the optimum broom height for most sweeping conditions. Using the proper height will also extend the life of the broom.



ANGLE OPERATION OF BROOM

The broom core may be set at any angle from 37° left to 37° right, simply moving the handle in the corresponding direction. Release the handle when the desired angle is achieved.

BROOM ON/OFF

The Broom Core motor is activated when the switch is moved to the **"BROOM ON"** position.

SIDE TO SIDE OPERATION OF BROOM

The sweeper is equipped with a side shift mechanism which allows the broom to move 14" to the left or right. This function is activated with the side shift joystick.



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SWEEPING TIPS

Optimal sweeping is normally achieved at manufacturer's recommended engine speed of 1800-2000 rpm in Low gear with forward travel of 2 ½ - 5 mph.

1. If the broom starts to "hop" or "bounce", the propelling speed is too high, reduce the forward travel speed, but maintain high engine speed. Slowing the forward travel speed of the machine down will help prevent you from having to make a second pass over the sweeping area with the broom.
2. In areas where the dirt is "caked", try to clean it by going over it a second or third time.
 - When changing the direction of travel, allow the machine to come to a complete stop before moving the directional control pedals. Failure to completely stop the machine before changing direction can cause premature failure of the drive components.
 - If the dust cloud becomes so thick that it obscures your vision, use the water sprinkling system or stop the machine until the dust clears. If possible, angle the sweeper so that the dust and debris is swept downwind.
 - Ensure that the operator of the machine is properly trained and follows all safety procedures described in this manual.



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DISPLAY SCREEN

Navigation



Soft Key Commands

Columns of vertical commands may be located to the left and/or right of the display. They will change according to the options available for the screen being displayed.

Function Keys

The function keys correspond to the soft key commands and allow selections to be made accordingly.

MENU Key

Pressing the MENU key at any time displays the list of menu options.

ENTER Key

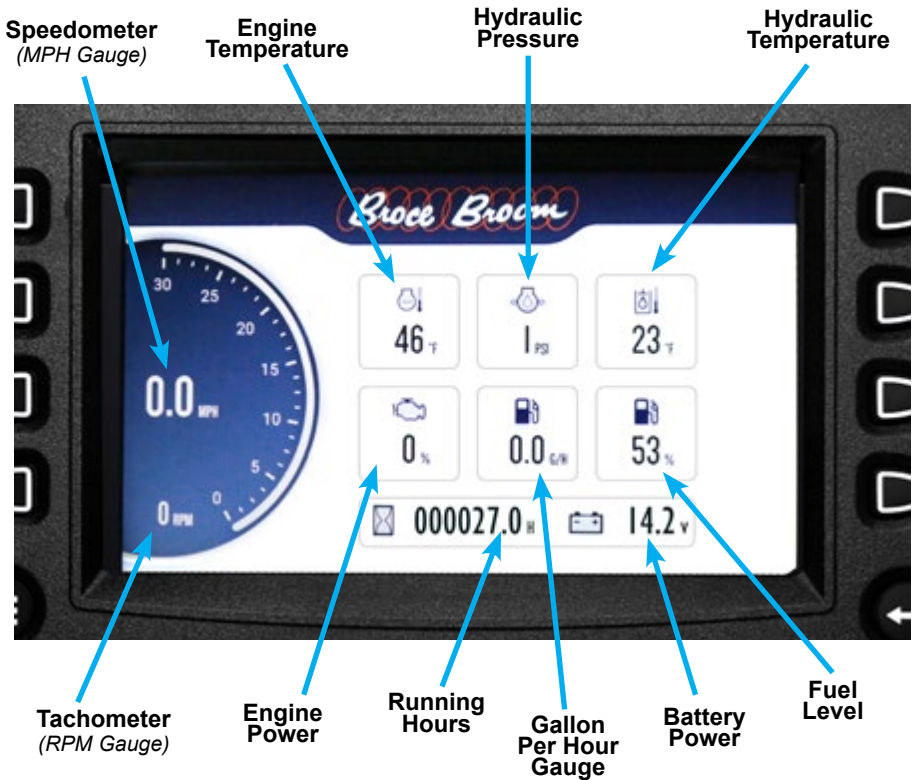
Pressing the ENTER key will select the option displayed much like the ENTER key on a keyboard. The ENTER key also brings up the soft keys. Press once to display the left and right arrows. Press twice to display all the soft keys. Press three times to hide all the soft keys.



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DISPLAY SCREEN

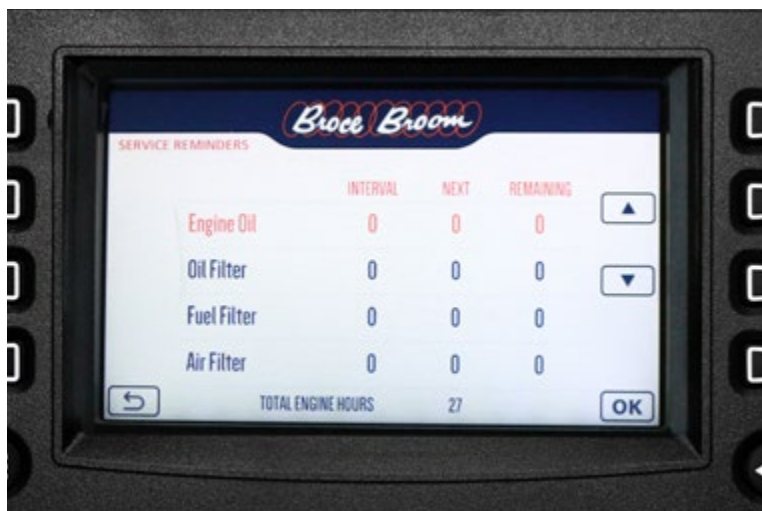
Main Screen



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DISPLAY SCREEN

Additional Screens



Service Reminder Screen

This screen shows how many hours each filter has been used. Please reference the manual when to change each one.



Active Faults Screen

This screen shows all current active faults and how many times the fault has been shown.



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DISPLAY SCREEN

Additional Screens



Historic Faults Screen

This screen shows the history of all faults that have been displayed since the machine has been running and how many times the fault has been shown.



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DISPLAY SCREEN

Hydraulic Temp



Hydraulic
Temperature

Hydraulic Temperature

The hydraulic temperature should not exceed 210°F.

If the temperature exceeds 210°F you will receive a warning message shown on Fig.1.2 below.



Fig. 1.2



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DISPLAY SCREEN

Hydraulic Temp (cont.)

When receiving this message please turn the machine off and let it cool down or it can cause permanent damage to the machine. After your machine has cooled down check your hydraulic fluid level, then inspect all the hydraulic hoses and make sure there are no leaks.



WARNING



Hydraulic system parts and connections can contain high pressures which, if suddenly and unexpectedly released, can cause serious injury or death.



WARNING



Hydraulic fluid under pressure can cause skin injection injury.

If you suspect an injury, no matter how minor it may seem, get medical attention immediately. Failure to do so can lead to gangrene and loss of limb.



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HYDRAULIC SYSTEM DETAILS

The Hydraulic System on this machine operates the hydrostatic drive, steering circuit, brush functions, and brush rotation. It employs two supply pumps sharing the same reservoir. In order to simplify the description of this system, it will be separated into five parts.

Hydrostatic Drive:

The current production machines are equipped with Rexroth drives. A current schematic and trouble-shooting guide are included in this manual.

This system utilizes a Rexroth variable displacement piston pump and a fixed displacement piston motor. Oil, supplied from the reservoir, passes through a 10-micron filter with a bypass setting of 3 psi, before entering the pump. Pressurized oil from the pump is delivered to the motor by high pressure hoses.

Steering Circuit:

Oil from the reservoir supplied to the auxiliary pump is pulled through the suction filter with a 10 micron filter. The circuit has a flow divider, which delivers priority oil to the steering circuit and the to the broom circuit. The priority flow is 4 gpm. The steering unit is an orbital type metering valve that supplies oil to the steering cylinders and also has power beyond capabilities that are used to control the brush functions.



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Brush Functions:

Forward movement of the joystick lever will lower the core. Pulling the lever back will raise the core.

Movement to the right will angle the core to the right, and movement to the left will angle the core to the left.

Brush Rotation:

The Broom Switch must first be turned on. The Broom Control Dial can be adjusted to rotate the broom in either the forward or reverse directions.

Placement of the dial will also determine speed of the broom rotation.



Side Shift Function:

Actuation of the side shift joystick will move the broom from left to right.



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HYDRAULIC SYSTEM DETAILS

SYSTEM DESCRIPTION:

Pump:

The hydraulic system operates on a 2.48 cubic inch gear pump that is mounted on the rear of the hydrostatic pump. This pump produces flow for the steering, broom functions, and broom rotation.

Steering Unit:

The steering unit is an open center type motor that has power beyond and dead steering capabilities. The power beyond capability is used to power the brush functions.

Steering Cylinder: Two 2" X 6" double acting cylinders

Brush Function Valve: The brush function valve is a five-spool mono block design that receives its oil supply from the steering unit power beyond port.

Lift Cylinder: 3" X 8" double acting cylinder

Shift Cylinder: 2" X 16" double acting cylinder

Brush Rotation Valve: The brush control valve is a single spool.

Core Motors: SAE styles mount with a splined shaft used on the internal drive cores.

Return Filters: The return filter is a 10-micron, spin-on type, with a 25 psi bypass attached to the return hydraulic hose.

Suction Filter: There are two suction filters. The main pump suction filter is a 7 micron spin-on filter. The auxiliary pump suction filter is a 100 mesh with a 5psi bypass.



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HYDRAULIC SYSTEM DETAILS

Reservoir: The hydraulic reservoir has a 25 US gallon capacity, lockable cap, sight level indicator with thermometer. The reservoir outlet feeds two suction filters.

Hoses & Adapters: All hose adapters are boss O-ring/flat face in the cylinders, valves, steering unit, pumps, and motors. All the hoses are flat-face type design.

System Plumbing: The system plumbing diagrams can be found in the Hydraulic Section of the parts manual.



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MAINTENANCE ENGINE AIR CLEANER

The manufacturer has endeavored to build the Broce Broom as maintenance free as possible. The service points are easily accessible and are similar to those on many types of construction equipment. This section will cover many of these points in some detail and will briefly mention those which should be standard on all equipment.



IMPORTANT

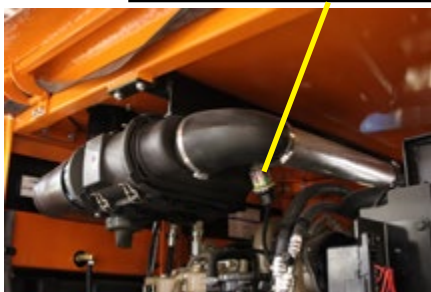


The air cleaner is one of the most important components of this machine. Due to the extremely dusty conditions in which this machine operates, the air cleaner must be maintained constantly. If the air cleaner is not serviced properly, the machine's engine life will be reduced. This machine is equipped with a dry type air cleaner.

When the clear ring on the Service Indicator turns red, the air filter must be replaced immediately.

Inspect the service indicator daily.

Clamp



Engine Air Filter



Safety Filter



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MAINTENANCE

CABIN AIR CLEANER



IMPORTANT



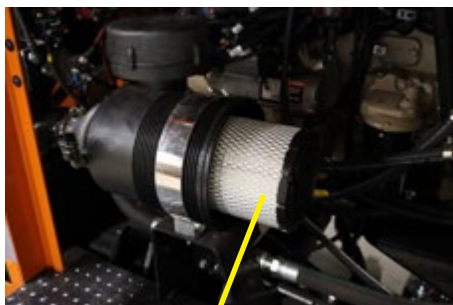
The air cleaner provides clean air to the air cleaner system.

Inspect the service indicator daily.
When the clear ring on the service indicator turns red, the air filter must be replaced immediately.

Inspect the service indicator daily.



Clamp



Cabin Air Filter



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MAINTENANCE SERVICE SCHEDULE

Service Schedule:

250 Hours: Replace both service element and safety element every 250 hours or sooner if needed or damaged.

Hydraulic System

Replace the disposable filter elements after the first 50 hours of service, and every 500 hours thereafter. Always maintain sufficient hydraulic oil in the reservoir as indicated in the level sight glass on the left side of the hydraulic tank. When it is time to add or replace oil in the system, refer to the Machine Specifications section for recommended hydraulic oil specifications.

Periodically check all hydraulic hoses. As a general guide, if unsure of the condition of a hose for any reason, it should be replaced before the machine is sent out on a job. This will minimize downtime and expense associated with this type of failure.

Again, cleanliness must be stressed during this type of maintenance. Contamination of this system will cause pump and/or motor failure. Avoid servicing hydraulic system components in the field where cleanliness of the environment cannot be controlled.



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MAINTENANCE

RADIATOR & HEAT EXCHANGER



CAUTION



Do not attempt to clean the radiator or heat exchanger while the engine is running. If hands or equipment come in contact with spinning fan blades, serious injury will result. Engine must be completely stopped.

Due to the dusty conditions in which this machine operates, the heat exchanger and radiator must be cleaned every 4 to 8 hours of service, depending upon sweeping conditions. If either one becomes clogged with dirt, it will overload the cooling capacity of the other, causing both the engine and hydraulic system to operate at higher than acceptable temperatures.

Use water or compressed air directed from the engine side of the radiator to remove dirt build up. The engine must be completely stopped while performing this maintenance. Inspect radiator and heat exchanger for dirt deposits and/or damage before resuming operation.

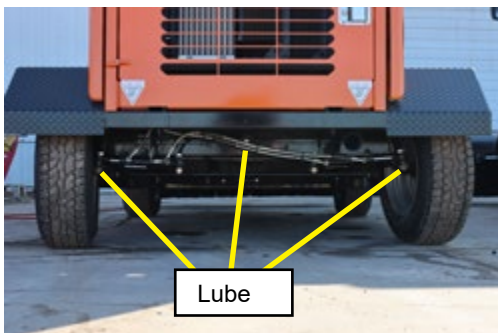


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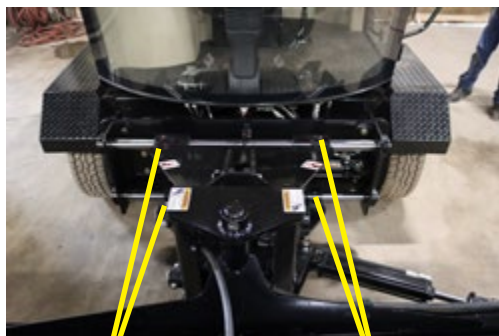
MAINTENANCE LUBRICATION

Spindles:

Lube upper and lower mounts steering shaft tie rod ends on both on both steering cylinders, and the axle pivot every 10 hours of operation.



Rear Axle Assembly



Side Shift:

Lubricate the upper and lower pivots bosses every 10 hours of operation. There are 4 places on the side shift mechanism.



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MAINTENANCE

LUBRICATION

Differential

The axle bearings do not receive lubrication from the gear oil. Periodically remove the axle shafts and repack the bearings.

Check the level every 210 hours of operation. Change oil every 1000 hours of operation.



Core/Brush Bearing

This is a sealed bearing and may require no lubrication throughout its service life. If lubrication is deemed necessary however, no more than “one-shot” of grease at 250 hour intervals is recommended. Seals are often destroyed by over-greasing sealed bearings.



Engine Lubrication

Refer to the Engine Manufacturer's manual (included) for recommendation and procedures for servicing the engine.



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MAINTENANCE LUBRICATION CHART

BROCE BROOM LUBRICATION CHART

ITEM	QTY	ReMARKS	Initial (Hours)			Thereafter (Hours)			
			25	50	100	100	250	500	1000
Engine Oil	1	Change Oil			O		O		
Differential	1	Change Oil	O				Check		O
Hydraulic Disposable Filter	1	Replace		O				O	
Hydraulic Oil	1	Replace					O		

GREASE ZERKS

Tie Rod End	2	Lubricate					O		
Steering Cylinder Mount	1	Lubricate					O		
Core/Brush Bearing	1	Lubricate					O		

Brakes:

This machine is equipped with self-adjusting front-wheel hydraulic brakes with a mechanical parking brake. The operation of the brakes should be tested daily. If the pedal feels “spongy”, there may be air in one or more of the brake lines and must be serviced prior to operating this machine.

Inspect brake lines every 50 hours of operation for leaks and/or damage. Inspect mechanical parking brake linkage for proper adjustment, routing and/or damage ever 50 hours.



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MAINTENANCE

FASTENERS, CORE DRIVE, ETC.



CAUTION



DO NOT ALLOW THIS MACHINE TO BE OPERATED WITH FAULTY BRAKES. THIS WILL PUT THE OPERATOR IN EXTREME DANGER AND COULD CAUSE BODILY INJURY AND PROPERTY DAMAGE.

Fasteners:

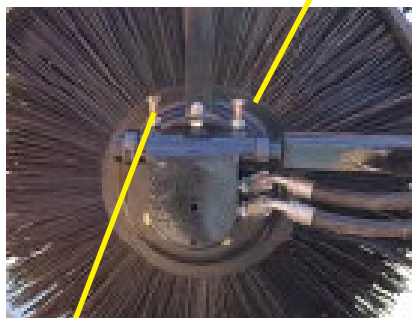
Like any construction equipment, this machine requires periodic tightening of fasteners. During normal engine service intervals, check all nuts and bolts, clevis pins, and clamps and tighten as needed.

Frame, Gussets, and Welds:

The frame on this machine was designed to withstand normal operating conditions, however under abuse components and welds can fail. Periodically check all frame welds and gussets for development of fatigue and stress cracks.

Core Drive:

The direct drive uses a core motor with a splined shaft that fits a hub fastened inside the broom core mandrel. The direct drive core is preset at the factory and does not normally need adjusting unless the drive hub begins to show uneven or excessive wear. To adjust, remove the broom from the machine and remove all of the wafers from the core frame (see Broom Wafer Replacement Section for details on removing the broom core and wafers).



Hub

Set-Screws

Loosen the lock bolts and lock collars slightly. Install the core mandrel and position the motor so that the core will slide on and off of the splined shaft easily. After alignment, tighten both set-screws and jam nuts as well as the lock collar on the pillow block bearing at the other end of the broom core.



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MAINTENANCE

ENGINE & TIRE

Engine:

The normal engine operation and maintenance procedures are covered in a separate manual, which is furnished by the engine manufacturer.

Tires:

Inflate tires to manufacturer's recommended pressure as specified on the tire sidewall. This will provide the longest tire life. A lower pressure will provide a more comfortable ride, and make rough off-highway conditions easier to negotiate, but is not recommended.



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MAINTENANCE

AIR CONDITIONER PREVENTIVE

A well maintained A/C system would save on downtime and premature component failures.

Weekly inspections or every 2 days in severe environments should include:

1. Inspect compressor clutch drive belts (tightness, wear).
2. Inspect compressor-mounting brackets (bolts, alignment).
3. Inspect mounting hardware on evaporator unit and condensers.
4. Check Air Filter Service Indicator Replace filter if necessary.
5. Inspect evaporator and condenser coils. Clean using air pressure.

(DO NOT USE WATER OR PRESSURE WASHER).

6. Inspect hose and wire harness for proper routing. Leaks and wear.
7. Cabin return air filter is located on the left hand side of the seat base.

Inspect the filter and replace if necessary.

Broce thanks you for purchasing our unit/s. It is our endeavor to provide you with a quality A/C unit with trouble-free service.



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MAINTENANCE

TROUBLESHOOTING- A/C SYSTEM

Troubleshooting Chart

The following chart lists some of the common problems that plague A/C systems and refer them to the pressure readings on your test gauges. They are referred to as "low" or "high" due to the fact that different systems and conditions have different normal readings.

SUCTION	DISCHARGE	POSSIBLE PROBLEM
LOW	HIGH	1. Restriction between the discharge of the compressor and inlet of receiver drier. Check condenser and condenser lines for a point of restriction that may create flashing. Condition indicated by an extreme differential in temperature at the point of restriction.
LOW	LOW	1. Possible restriction between drier and suction side of compressor. 2. Low refrigerant charge _ bubbles in sight glass. 3. Restriction at drier or expansion valve _ sight glass usually clear.
HIGH	HIGH	1. Air in system. 2. Overcharged system (oil or refrigerant). 3. Condenser fan not working. 4. Air flow restriction on condenser
HIGH	LOW	1. Weak compressor _ indicated by accelerating the engine and watching the suction and discharge readings. Normally, suction moves lower and discharge side should rise. 2. Expansion valve flooding or stuck open _ this would cause high and low sides to become less distinguishable.

ATTENTION

R-134a A/C Refrigerant Factory Charge:

John Deere = 3.0 lb (1.36kg)

Ester Oil Change:
Compressor = 8.0 oz
System = 4.0 oz



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Warranty Claim Form for Broce A/C Systems and Components

Ambient temperature before repairs were made: _____

Static Pressure before repair is made: High: _____ Low: _____

Running Pressure before repair is made: _____

Any odd or unusual noises before repairs are made: _____

How much refrigerant was recovered: _____ lbs.

Automated flush of system (by flush mechanic) Yes: _____ No: _____

Manual flush (by tech changing oil and/or drier) Yes: _____ No: _____

Repairs made and parts replaced: _____

Ambient temperature after repairs are made: _____

How much refrigerant was charged: _____ lbs. _____ oz. (Virgin or Recovered)

Static Pressure: High: _____ Low: _____

Running Pressure: High: _____ Low: _____

Vent Temperature: _____

Cab Temperature: _____

Broom S/N: _____

Hr.: _____ Date: _____

Company or Facility who made repairs: _____

Technicians initials: _____

MAINTENANCE

BROOM WAFER REPLACEMENT

BROOM WAFER REPLACEMENT

The standard Broce Broom core uses 10" x 32" flat wafers and metal spacers. The standard eight-foot core requires approximately 54 wafers and 53 metal spacers (this will vary by wafer manufacturer and type of end-caps ordered on broom). The amount of wafers required as well as specific installation instructions may be obtained from the wafer manufacturer.

DIRECT DRIVE CORES (Standard Equipment):

- With the core resting on or near the ground, remove the bolts securing the pillow block bearing to the core support frame.
- Pull the core to the right side of the machine until you feel the splined hub come off the shaft. At this time, the core will be close to or touching the right support arm.
- Angle the core toward the rear of the machine and slide it out from under the sweeper.
- Clean the spindle from the lock ring out using an emery cloth or sandpaper.
- Loosen the setscrew and remove the lock ring and pillow block bearing.
- Remove the spindle and install the Broce Core Service Ring in its place.
- Remove the end cap from the drive end of the core.
- Raise the core support frame and slide the rebuilt core under the sweeper. The core will have to come in from an angle in order for it to be started over the motor mount. Once the core has been started onto the motor mount, swing the right side under the right support frame.
- Lower the support frame slowly until the motor mount is centered in the core.
- Using a back and forth twisting motion, pull the core onto the splined shaft.
- Install the pillow block bearing on the right side of the core using the original mounting bolts.
- Raise the core. Slide the core to the left as far as it will go. Using a pry bar, slide it back to the right until the bolts on the end cap will clear the hydraulic hose fittings.
- Install the lock ring on the spindle securely. This lock ring is all that maintains core alignment.

Do not try to readjust the motor mount unless it becomes damaged or otherwise unserviceable. The alignment of this mount is preset at the factory. If it does become necessary, refer to the alignment procedures in the MAINTENANCE section of this manual.



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MAINTENANCE

BROOM WAFER REPLACEMENT (cont.)

- Install the end cap using two (2) 1/2" x 3" all thread bolts in two of the holes which are 180° apart. Slowly and evenly tighten these until the end cap is close enough to the core to install the standard mounting bolts. Start two of the standard bolts with lock washers in the two remaining holes. Remove the two long bolts and install the other two standard mounting bolts. Tighten all four bolts evenly in a diagonal fashion until the end cap is tightly secured to the core.
- The core must now be tipped over onto the ground so that the core comes to rest laterally on the bristles. Clear an area fifteen feet in all directions of the core of personnel and property before tipping the core. Always tip the core by pushing it over. Once the core begins to fall, get away from it in case the stand falls off. Carelessness in this procedure could result in serious bodily injury and/or property damage.
- With the core resting on the ground, slide the stand off of the spindle and tighten the end cap in the same fashion as before.
- Using emery cloth or sandpaper, clean both spindles to remove any burs or tar which may interfere with sprocket or bearing installation.
- Install the sprocket as using the flat washers as spacers. The sprocket must be installed in this manner in order to ensure proper chain alignment.
- Slide the rebuilt core back under the sweeper.
- Slide the pillow block bearings on the spindles until they roughly line up with the core support frame. With the flat part of the bearing up, slowly lower the core support frame until it is close enough to line up and secure the bearings with the original mounting bolts. When the bearings are secure, raise the core, and align the chain drive. Once the chain drive alignment has been achieved, recheck the lock rings to ensure that they are secure and reinstall the chain guard.

If you have any questions regarding these procedures or would like to obtain the core service ring and stand, please contact your nearest dealer or call us direct at (620) 227-8811.



Core Service Ring and Stand



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TROUBLESHOOTING

Before troubleshooting can be done, characteristics of normal operation of this machine must be understood. As discussed earlier in this manual, this system uses an open center control valve. This can lead to the belief that a problem may exist when in fact, the system is operating normally.

Normal Operation

With the engine running approximately 1/2 throttle and the core motor turned off, the lift and shift cylinders will actuate quickly and smoothly. Once the core motor is started, the cylinder action will slow down dramatically. In fact, if the core is not contacting the ground, the shift cylinder may not move at all unless the engine is at full throttle. The lift cylinder should be able to lift the core slowly off the ground but will probably not reach its full stroke. When slight positive down pressure is applied to the broom core, the shift cylinder performance should improve slightly but the lift cylinder performance will remain basically unchanged. As more down pressure is added, the core will eventually stop spinning. The system will be "relieving."

Although these characteristics may sound less than adequate, in real working applications they are almost unnoticeable. Most of the time that small angle adjustments are made, the brush is in use and the cylinder operation is adequate. Most full swing left to right angle adjustments are made while turning the machine around or while lining the machine up for sweeping. It is best at these times to not have the brush spinning in order to prevent throwing debris in an unwanted direction. There is generally no reason to lift the brush while sweeping. Most lifting is done when the sweep has been completed and the sweeper is ready to be repositioned. The brush is normally turned off at this time.

MAINTENANCE (TROUBLESHOOTING)

COMMON PROBLEMS

PROBLEM	PROBABLE CAUSE	SOLUTION
Brush stalls while sweeping	1. Too much positive down pressure 2. Too much material to move 3. Weak Pump 4. Relief valve stuck open 5. Worn hub or shaft (Broken key on chain drive core motor) 6. Internal leakage in motor	1. Raise Broom. Make two passes 2. Raise Broom. Make two passes 3. Check system pressure 4. Check relief valve 5. Replace hub and/or motor 6. Follow steps 1-5. If all checks out, replace motor.
Brush bounces or "hops" while sweeping	1. Worn/loose core mount pins and/or worn mount bushings 2. Loose circle bearings	1. Drill out and replace bushings and pins that mount the lift cylinder and the core hanger. These must be extremely tight (zero tolerance). Any gaps whatsoever can cause bouncing. 2. Tighten circle bearings underneath the circle.



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MAINTENANCE (TROUBLESHOOTING)

PROBLEM	PROBABLE CAUSE	SOLUTION
Broom Core drifts from preset angle while sweeping	1. Too much material to sweep 2. Leakage in shift cylinder	1. Raise Broom. Make 2 passes. 2. Test system pressure. If pressure OK, rebuild or replace cylinder.
Core motor shaft seal leak	1. String line wrapped around shaft 2. Over use of positive down pressure feature (Too much side load) 3. Core misaligned	1. Remove string line and reseal motor 2. Reseal motor. Instruct operator to use down pressure only when necessary. 3. Re-align motor mount. Refer to Maintenance section for procedures.
Core motor shaft broken	1. Over use of positive down pressure feature (Too much side load) 2. Core misaligned	1. Replace motor. 2. Replace motor. Re-align motor mount. Refer to Maintenance section for procedures.



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MAINTENANCE (TROUBLESHOOTING)

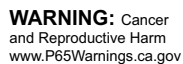
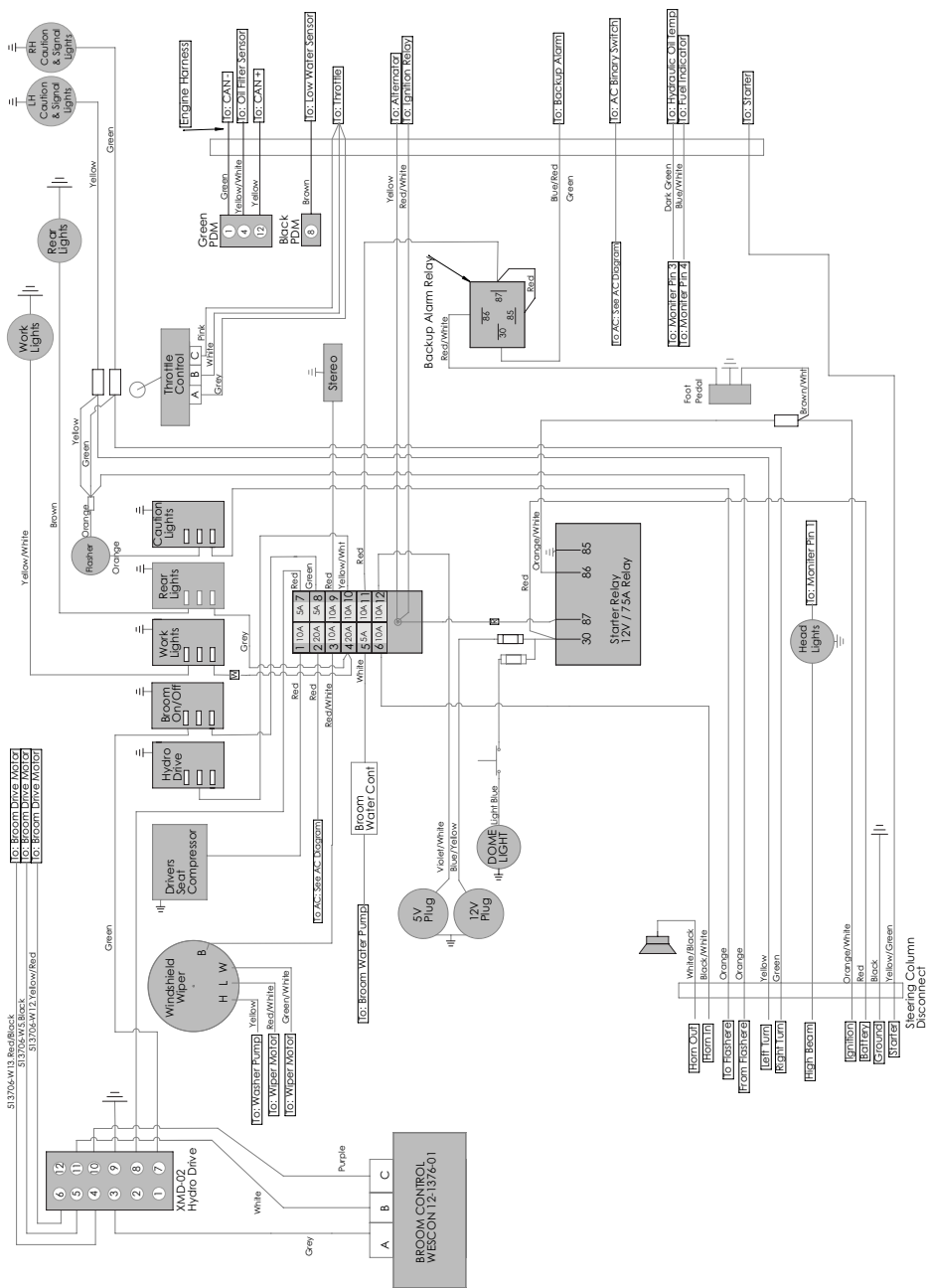
PROBLEM	PROBABLE CAUSE	SOLUTION
Hydraulic System has very little power. Power steering operates OK.	1. Relief valve stuck open 2. Weak pump	1. Check relief valve. 2. Check system pressure.
No hydraulic power including steering but hydrostatic system seems OK.	1. Bad gear pump	1. Replace gear pump.
No hydraulic power including steering and hydrostatic drive.	1. Broken shaft or coupler in hydrostatic pump	1. Refer to hydrostatic trouble shooting section in Sauer-Danfoss Manual.



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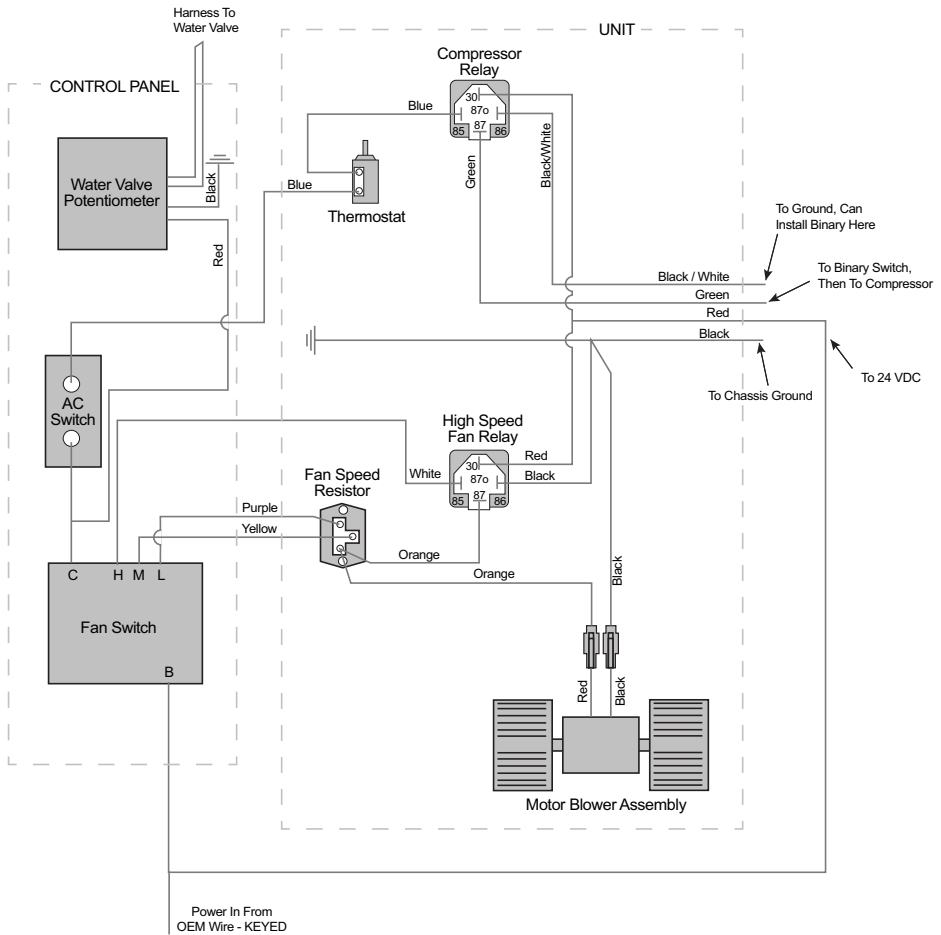
SCHEMATICS

(Wiring Diagram)



SCHEMATICS

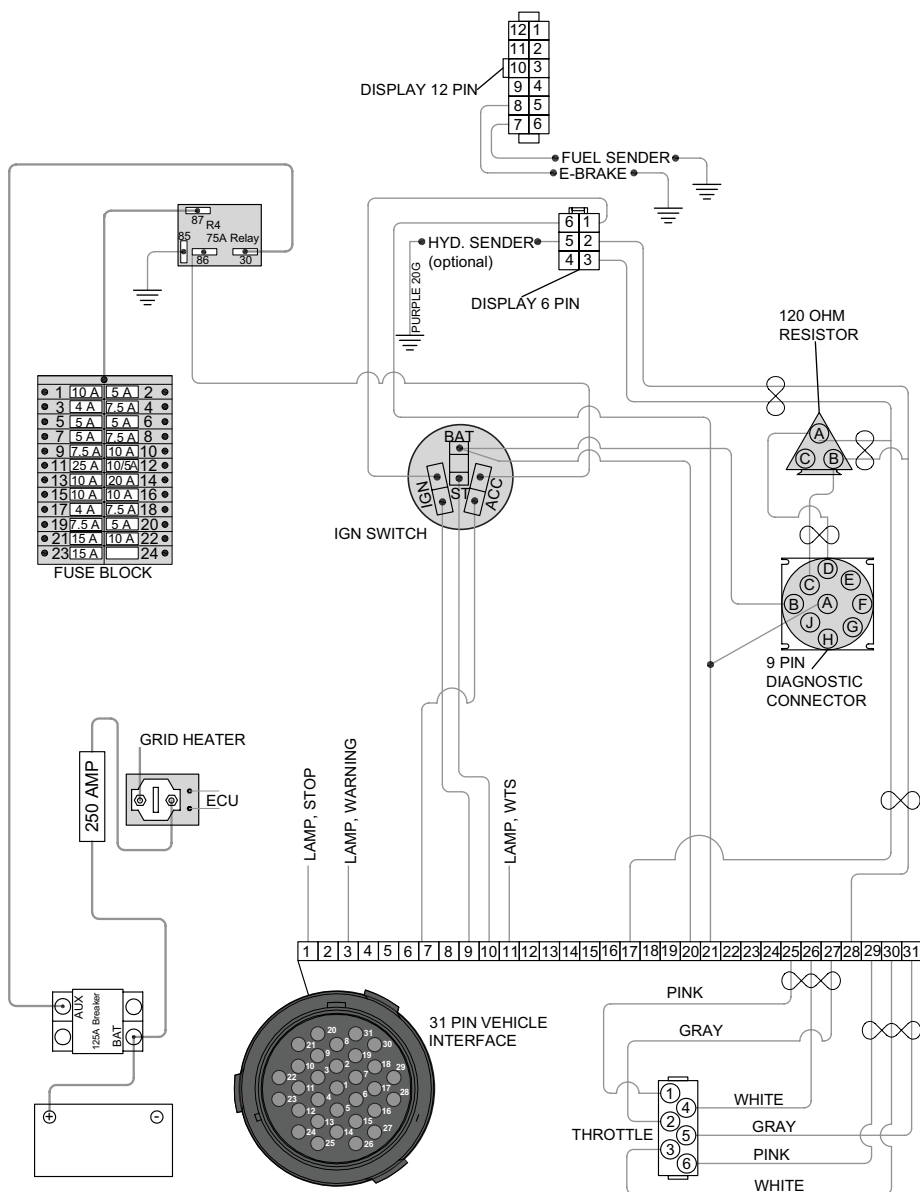
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SCHEMATICS

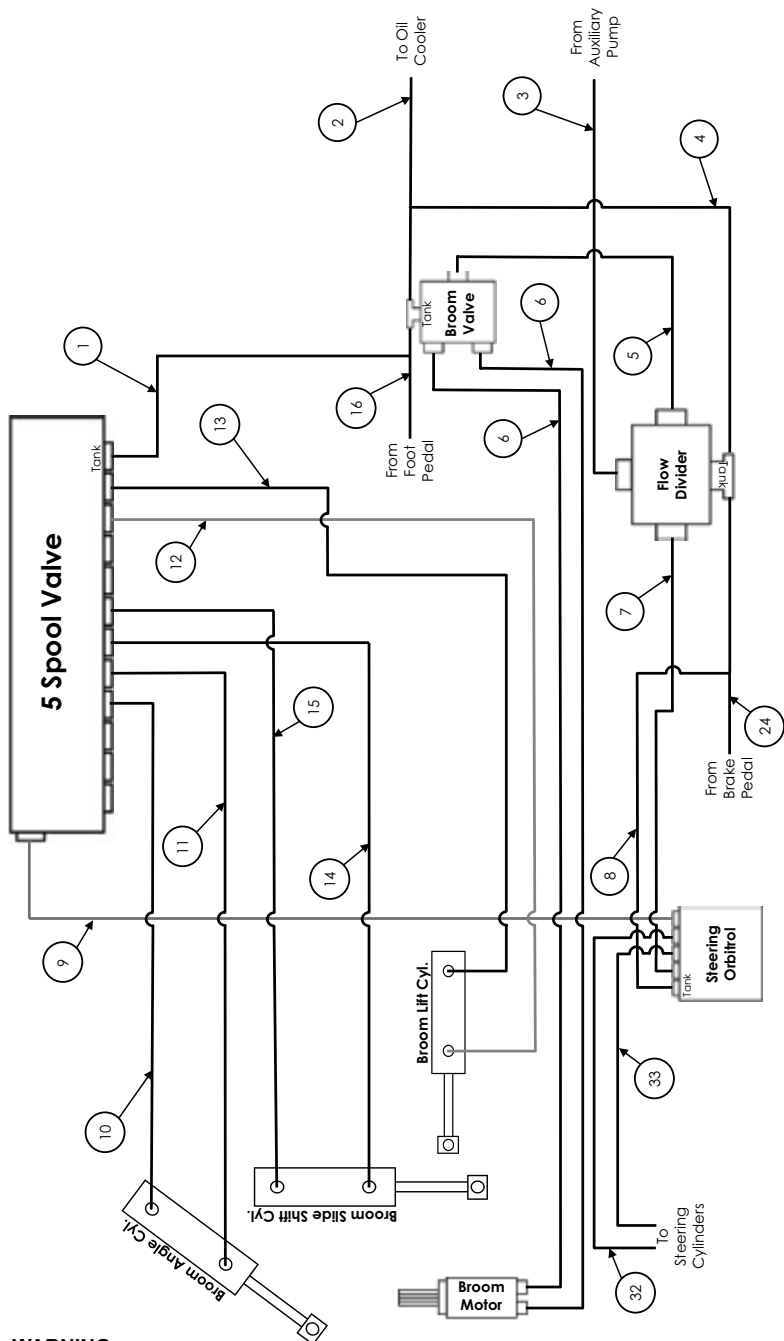
(Wiring Diagram)



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SCHEMATICS

(Hydraulic Diagram)

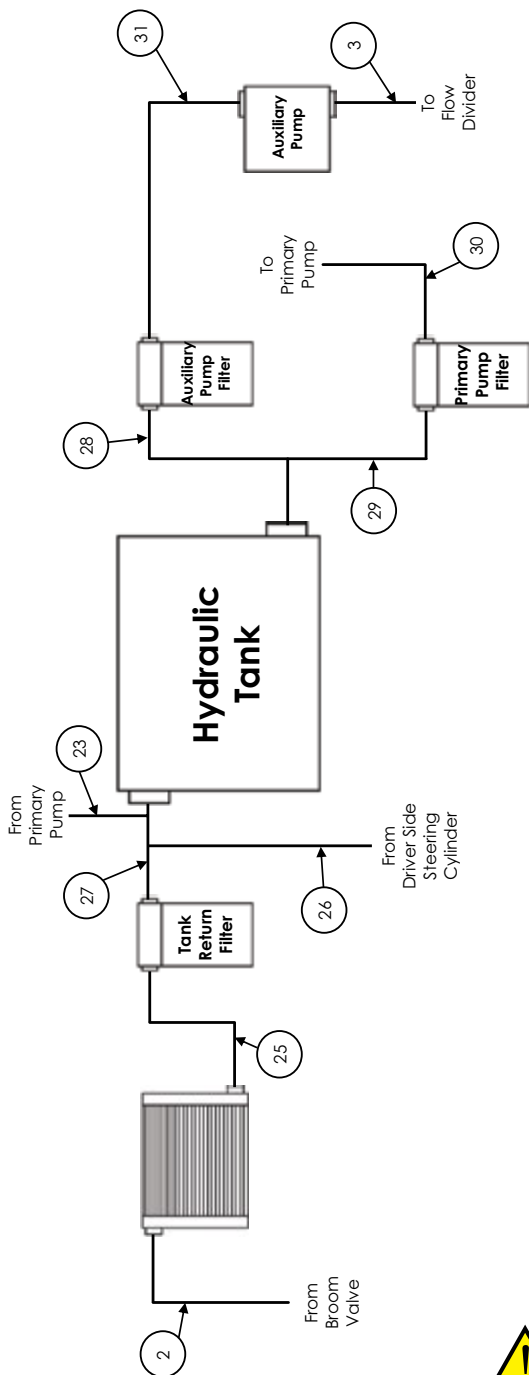


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SCHEMATICS

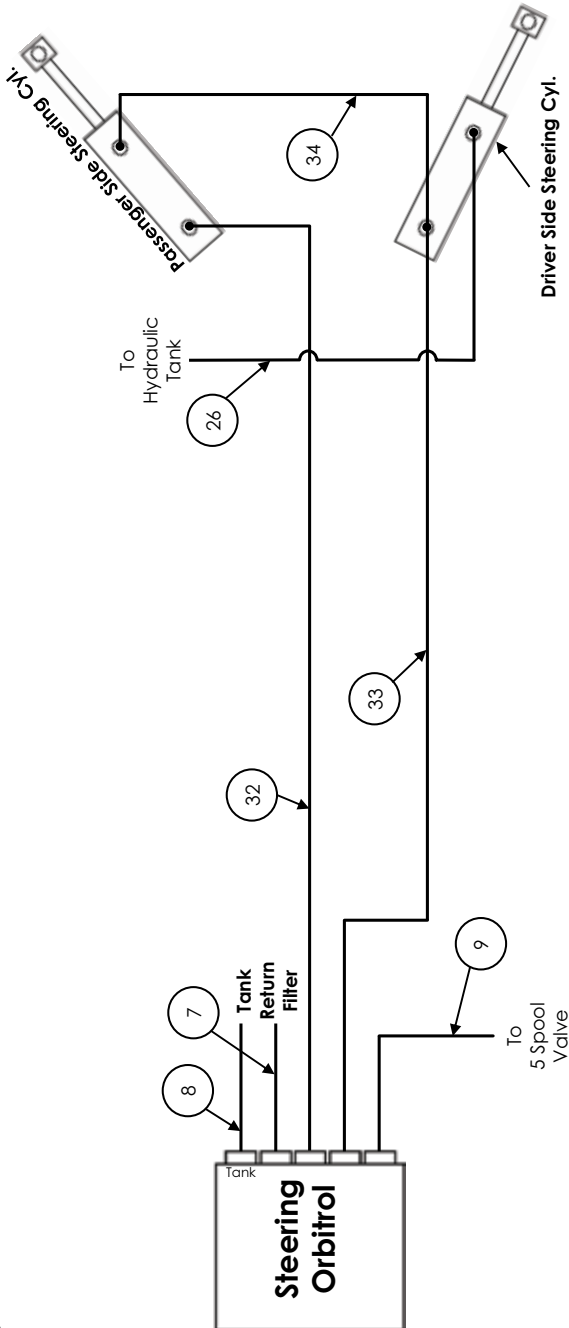
(Hydraulic Diagram)



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SCHEMATICS

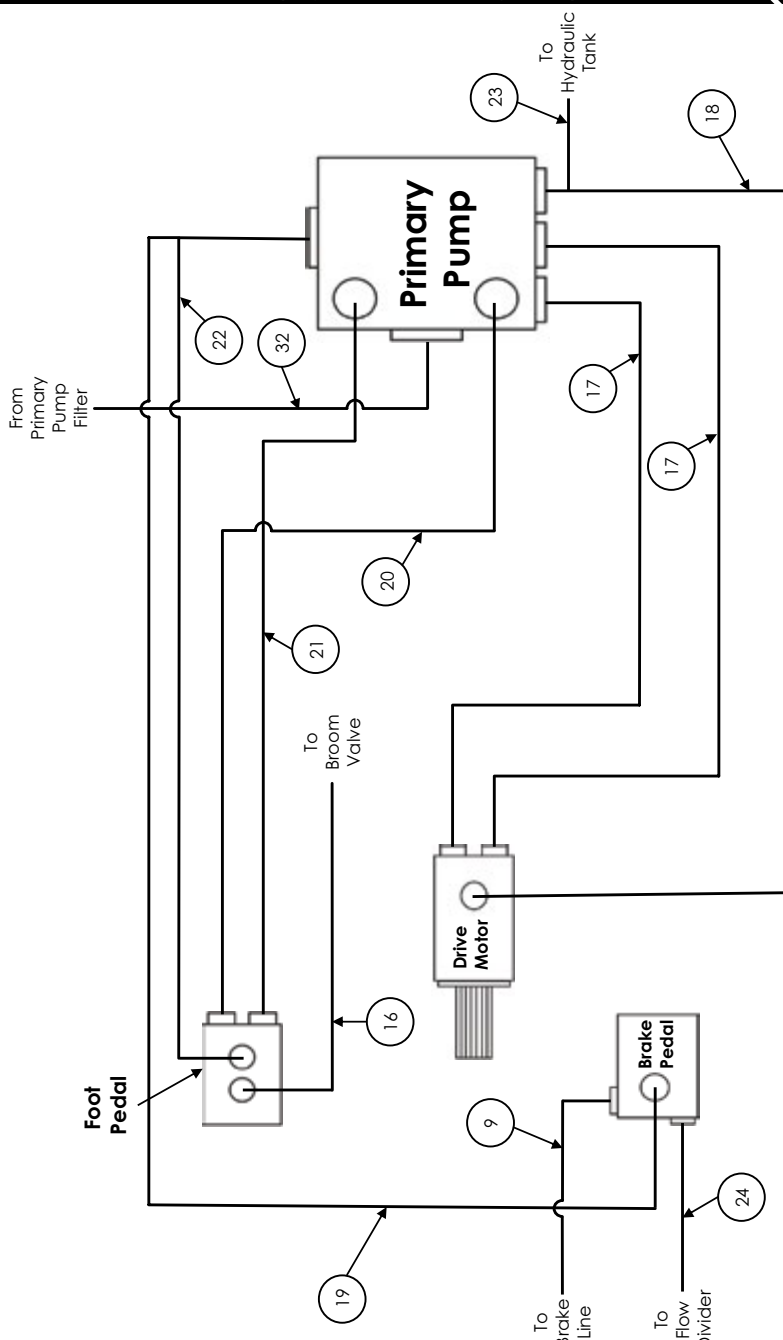
(Hydraulic Diagram)



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SCHEMATICS

(Hydraulic Diagram)



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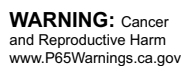
SCHEMATICS

(Hydraulic Diagram)

ITEM NO.	PART #	DESCRIPTION	QTY.
1	513376	5 Spool Valve Tank Return Hose Assembly	1
2	513404	Broom Valve Tank Return Assembly	1
3	513426	Auxiliary Pump Hose Assembly	1
4	513404	Broom Valve Tank Return Assembly	1
5	513402	Broom Valve Hose Assembly	1
6	513388	Broom Motor Hose Assembly	2
7	513398	Orbitrol Hose Assembly	1
8	513397	Orbitrol Tank Return Hose Assembly	1
9	513374	5 Spool Valve Supply Hose Assembly	1
10	513366	Angle Cylinder Hose Assembly Piston Side	1
11	513368	Angle Cylinder Hose Assembly Rod Side	1
12	513364	Lift Cylinder Hose Assembly Rod Side	1
13	513362	Lift Cylinder Hose Assembly Piston Side	1
14	513372	Side Shift Hose Assembly Rod Side	1
15	513370	Side Shift Hose Assembly Piston Side	1
16	513386	Foot Valve Tank Return Hose Assembly	1
17	513360	Drive Motor Hose Assembly	2
18	513378	Drive Motor Tank Return Hose Assembly	1
19	513410	Brake Valve Hose Assembly	1
20	513410	Forward Pedal Hose Assembly	1
21	513380	Reverse Pedal Hose Assembly	1
22	513384	Foot Valve Charve Pressure Hose Assembly	1
23	513428	Main Pump Tank Return Hose Assembly	1
24	513412	Brake Valve Tank Return Hose Assembly	1
25	513418	Oil Cooler to Filter Hose Assembly	1
26	513400	Steering Cylinder Tank Return Hose Assembly	1
27	513416	Filter Tank Return Hose Assembly	1
28	513424	Tank to Auxiliary Suction Filter Hose Assembly	1
29	513420	Tank to Main Suction Filter Hose Assembly	1
30	513422	Main Pump Hose Assembly	1
31	513426	Auxiliary Pump Hose Assembly	1
32	513392	Left Setting Cylinder Hose Assembly Piston Side	1
33	513390	Right Setting Cylinder Hose Assembly Piston Side	1
34	513394	Steering Cylinder Crosslink Hose Assembly	1



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This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, leaving small margins at the top and bottom. There are no vertical margin lines, and the page is completely blank except for the lines themselves.



**CALIFORNIA
Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

For more information, visit: www.P65Warnings.ca.gov

WARNING: Battery posts, terminal and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, and other reproductive harm. Wash hands after handling.

For more information, visit: www.P65Warnings.ca.gov

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