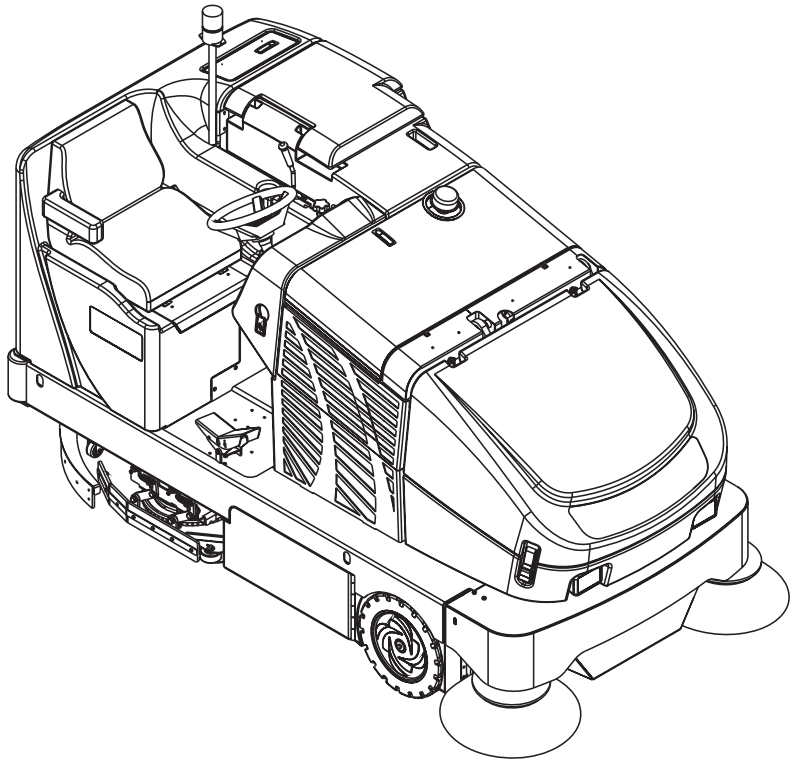
Captor™ 4300, 4800, 5400
CR 1100, 1200, 1400



MECHANICAL REPAIR SERVICE MANUAL

Advance MODELS 56304000, 56304001, 56304002, 56304003, 56304004, 56304005, 56304006, 56304007, 56304008

Nilfisk MODELS 56304009, 56304010, 56304011, 56304012, 56304013, 56304014, 56304015, 56304016, 56304017

This manual applies to Diesel, Gasoline/Petrol and LPG models.

Nilfisk Advance

setting standards

4/04 revised 1/06 Form Number 56043094

TABLE OF CONTENTS

TABLE OF CONTENTS

Note: All references to right, left, front, or rear in this manual are as seen from the operator's stand-point.

*See *OTHER MANUALS AVAILABLE* for list of available engine information.

GENERAL INFORMATION

INTRODUCTION

This manual will help you get the most from your Nilfisk-Advance rider scrubber sweeper. Read it thoroughly before servicing the machine.
Note: Bold numbers and letters in parentheses and underlined indicate an item illustrated on pages 5-6 i.e. (B).
This product is intended for commercial use only.

PARTS AND SERVICE

Repairs, when required, should be performed by your Authorized Nilfisk-Advance Service Center, who employs factory trained service personnel, and maintains an inventory of Nilfisk-Advance original replacement parts and accessories.

Call the NILFISK-ADVANCE DEALER named below for repair parts or service. Please specify the Model and Serial Number when discussing your machine.

(Dealer, affix service sticker here.)

NAME PLATE

The Model Number and Serial Number of your machine are shown on the Nameplate on the machine. This information is needed when ordering repair parts for the machine. Use the space below to note the Model Number and Serial Number of your machine for future reference.

MODEL NUMBER _____

SERIAL NUMBER _____

HOPPER SAFETY SUPPORT

⚠ WARNING!

Make sure the Hopper Safety Support (KK) is in place whenever attempting to do any maintenance work under or near the raised hopper. The Hopper Safety Support (KK) holds the hopper in the raised position to allow work to be performed under the hopper. NEVER rely on the machine's hydraulic components to safely support the hopper.

JACKING THE MACHINE

⚠ CAUTION!

Never work under a machine without safety stands or blocks to support the machine.

- When jacking the machine, do so at designated locations (Do Not jack on the hopper) – see jacking locations (44).

TRANSPORTING THE MACHINE

⚠ CAUTION!

Before transporting the machine on an open truck or trailer, make sure that…

- The machine is tied down securely - see tie-down locations (6).
- All access doors and covers are secured (tape and strap as necessary).
- The machine parking brake is set.

TOWING OR PUSHING A DISABLED MACHINE

The machine's drive propelling pump is manufactured with a tow valve. This valve prevents damage to the hydraulic system when the machine is being towed/pushed short distances without use of the engine.

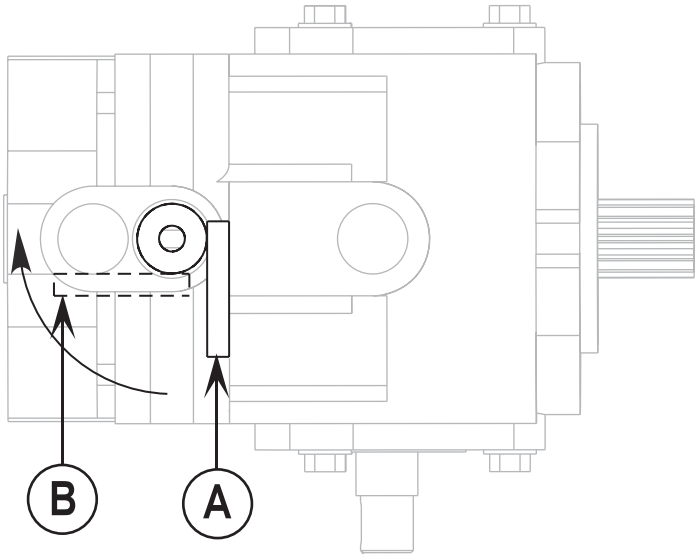
To access the valve, open the Engine Compartment Door (22) and lift off the Right Engine Compartment Access Panel (37). Locate the valve as shown on the underside of the hydrostatic pump by reaching under the radiator. Turn the valve 90 degrees, this disengages the hydrostatic lock between the motor and pump.

⚠ CAUTION!

The hydraulic propelling pump can be damaged if the machine is towed with the valve in the normal working position (A).

Reference the illustrations below for the normal working setting (A) (vertical) and the free wheeling towing setting (B) (horizontal). Note: If the tow valve is left in free wheeling (B) (horizontal) position the propelling pump can't drive the machine FWD or REV. No damage will result, just re-set valve to the normal working setting (A) (vertical). NOTE: Tow or push machine no faster than a normal walking pace (2-3 mph - 3-5 km/h) and for short distances only. If the machine is to be moved long distances the drive wheel needs to be raised off the floor and placed on a suitable transport dolly.

BOTTOM VIEW OF HYDROSTATIC PUMP



OTHER MANUALS AVAILABLE

The following manuals are available from the Nilfisk-Advance Literature Service Department, for your Rider Scrubber/Sweeper:

- Parts List - Form Numbers: 56042440 (all systems except hydraulic); 56042445 (hydraulic system)
- Operation Manual - Form Numbers: 56041546 (Danish, Norwegian, Swedish, Finnish); 56041547 (German, French, Dutch, Russian); 56041548 (Spanish, Portuguese, Italian, Greek); 56041578 (Estonian, Latvian, Lithuanian, Slovenian); 56041579 (Slovakian, Czech, Polish, Hungarian); 56041580 (English)
- Quick Start Service Manual: 56043093
- Engine Manuals

1.6L Industrial Engine Operator Manual (excerpt from 16LECSS)	56041564
1.6L Industrial Engine Service Manual	36100009*
1.6L Emission Certified Industrial Engine Emission Control System Service Manual	16LECSS*

*Available in electronic format only

CAUTIONS AND WARNINGS

SYMBOLS

Nilfisk-Advance uses the symbols below to signal potentially dangerous conditions. Always read this information carefully and take the necessary steps to protect personnel and property.

⚠ DANGER!

Is used to warn of immediate hazards that will cause severe personal injury or death.

⚠ WARNING!

Is used to call attention to a situation that could cause severe personal injury.

⚠ CAUTION!

Is used to call attention to a situation that could cause minor personal injury or damage to the machine or other property.

GENERAL SAFETY INSTRUCTIONS

Specific Cautions and Warnings are included to warn you of potential danger of machine damage or bodily harm.

⚠ DANGER!

- This machine emits exhaust gases (carbon monoxide) that can cause serious injury or death, always provide adequate ventilation when operating this machine.

⚠ WARNING!

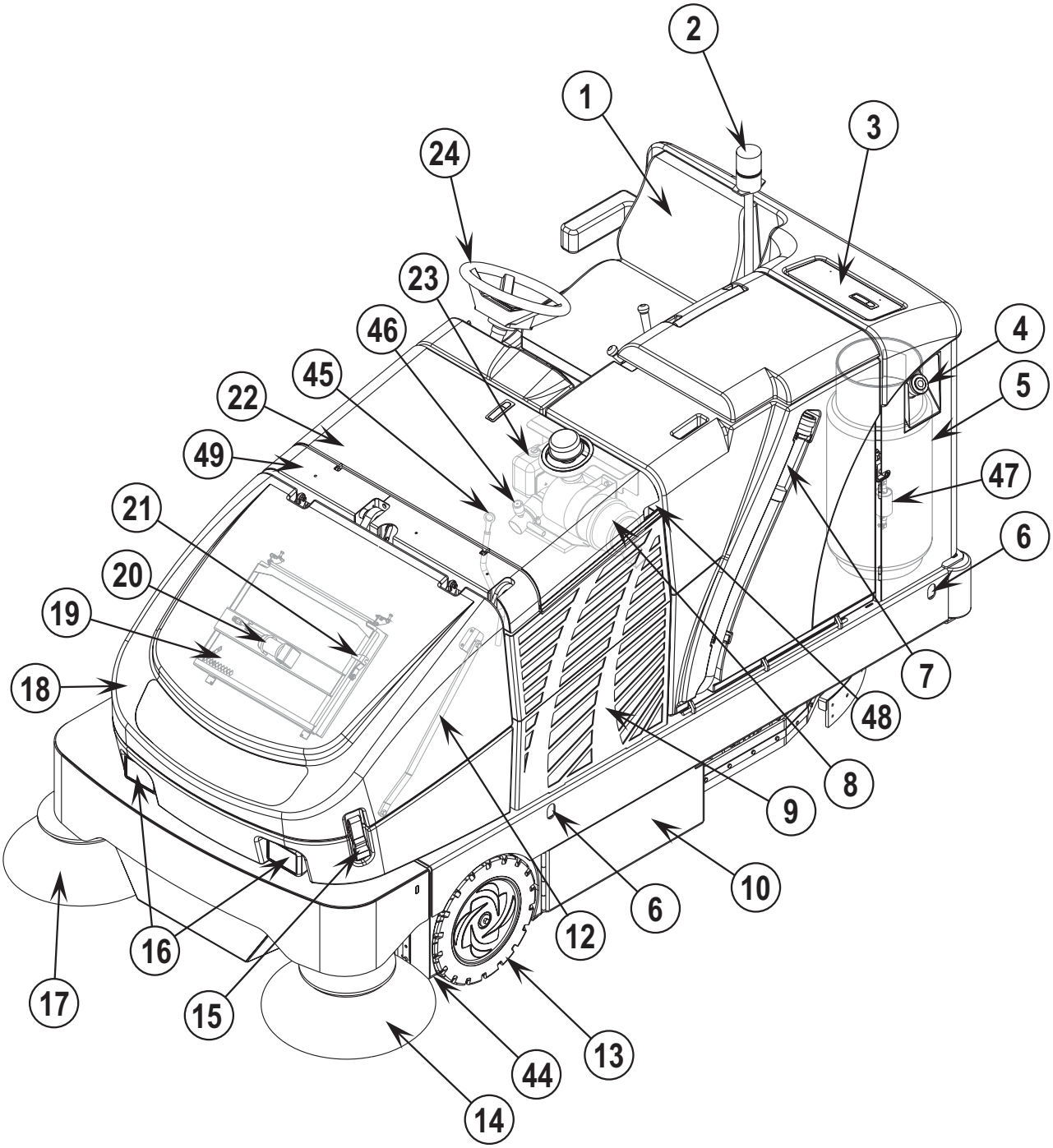
- This machine shall be used only by properly trained and authorized persons.
- While on ramps or inclines, avoid sudden stops when loaded. Avoid abrupt sharp turns. Use low speed down hills. Clean only while ascending (driving up) the ramp.
- Keep sparks, flame and smoking materials away from the battery and fuel system.
- Remove all jewelry when working near electrical components.
- Take precautions to prevent hair, jewelry, or loose clothing from becoming caught in moving parts.
- Turn the key switch off (O), disconnect the battery, and set the parking brake before servicing the machine.
- Never work under a machine without safety blocks or stands to support the machine.
- Do not dispense flammable cleaning agents, operate the machine on or near these agents, or operate in areas where flammable liquids exist.
- Do not clean this machine with a pressure washer.
- Keep the LP tank Service Valve closed when the tank is not in use.

⚠ CAUTION!

- This machine is not approved for use on public paths or roads.
- This machine is not suitable for picking up hazardous dust.
- When operating this machine, ensure that third parties, particularly children, are not endangered.
- Before performing any service function carefully read all instructions pertaining to that function.
- Do not leave the machine unattended without first turning the key switch off (O), removing the key and applying the parking brake.
- Turn the key switch off (O) before changing the brushes, and before opening any access panels.
- Use caution when moving this machine in below freezing temperature conditions. Any water in the solution or recovery tanks or in the hose lines could freeze, causing damage to valves and fittings. Flush with windshield washer fluid.
- The battery must be removed from the machine before the machine is scrapped. The disposal of the battery should be safely done in accordance with your local environmental regulations.

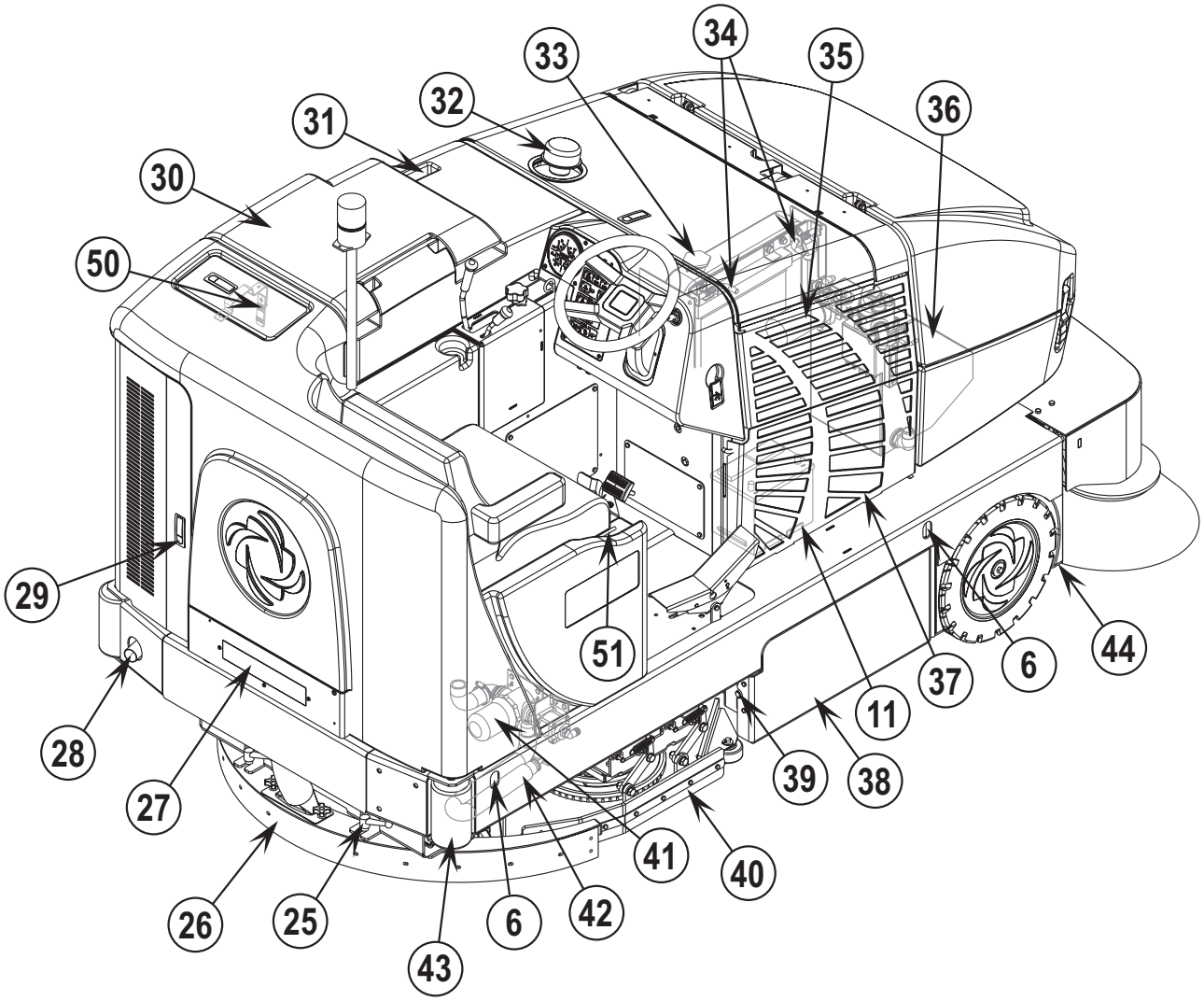
SAVE THESE INSTRUCTIONS

1 Operator's Seat
2 Strobe Light (optional)
3 Solution Tank Fill
4 Gasoline Tank Cap
5 Fuel Tank
6 Tie Down Locations
7 Recovery Tank Drain Hose
8 Engine Air Filter
9 Left Engine Compartment Access Panel
10 Main Broom Left Access Door
11 Battery
12 Hopper Lid Prop Rod
13 Front Wheel
14 Left Side Broom
15 Hopper Lid Latch
16 Headlights
17 Right Side Broom
18 Hopper Cover
19 Dust Control Filter
20 Dust Control Shaker Assembly



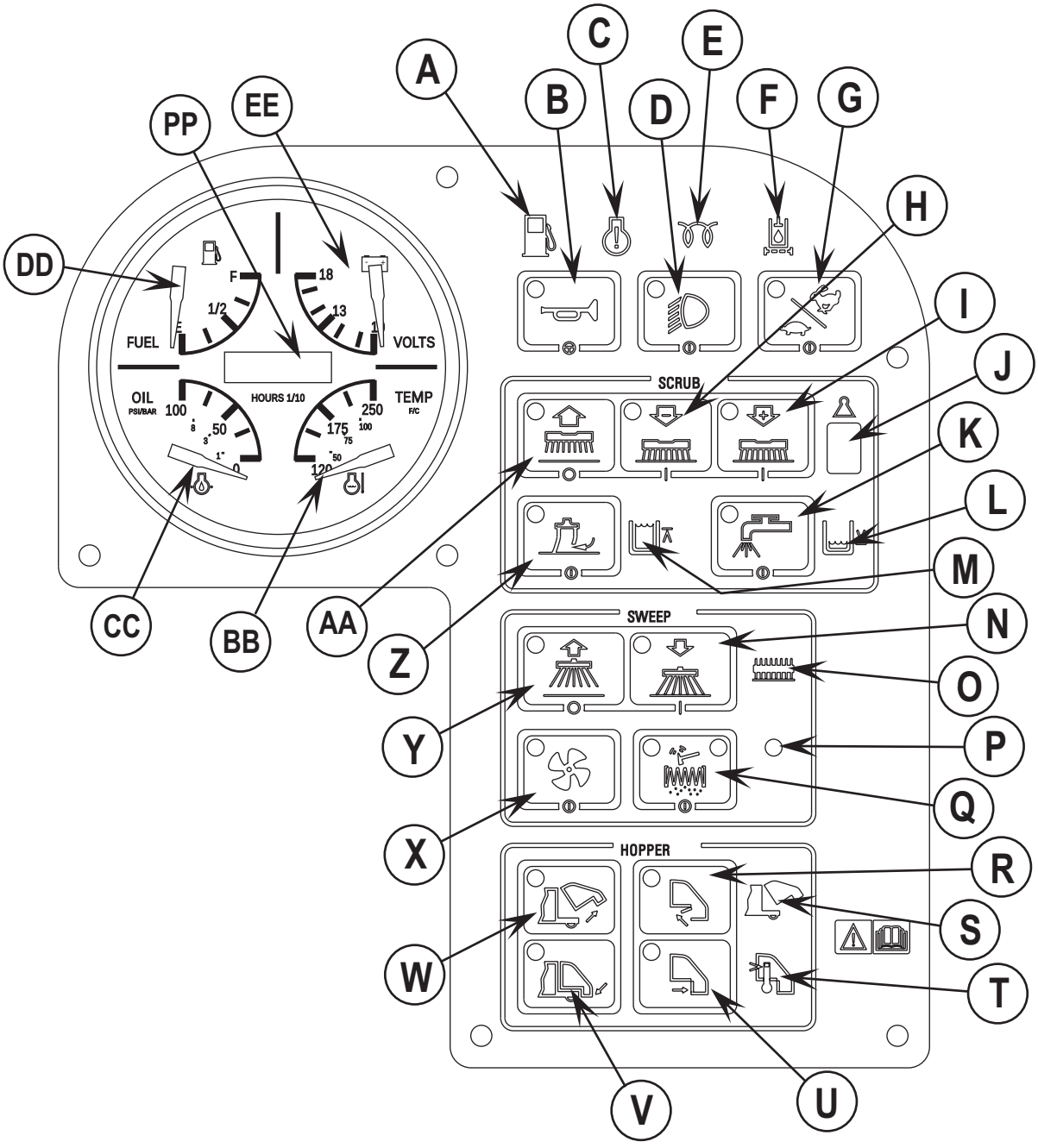
KNOW YOUR MACHINE

21 Shaker Assembly Latch
22 Engine Compartment Door
23 Coolant Recovery Tank
24 Steering Wheel
25 Squeegee Handle
26 Squeegee Tool Assembly
27 Tail Light
28 Exhaust Tail Pipe
29 Fuel Tank Compartment Door
30 Recovery Tank Lid
31 Recovery Tank "Tip-Out" Grip
32 Engine Air Filter Hood
33 Radiator Cap
34 Oil Cooler "Tip-Out" Latches
35 Hydraulic "Charge" Oil Filter
36 Hydraulic Reservoir / In Tank Return Oil Filter
37 Right Engine Compartment Access Panel
38 Main Broom Right Access Door
39 Access Door Latch
40 Skirt Assembly
41 Inline Solution Filter
42 Solution Tank Drain Hose
43 Rear Roller Bumper
44 Jacking Location
45 Engine Oil Dipstick
46 Air Filter Service Indicator
47 Fuel Filter (Gas Models)
48 Recovery Tank Latch
49 Hydraulic Reservoir Access Panel
50 Water Level Gauge
51 Operator Seat Adjustment Lever



OPERATOR'S COMPARTMENT

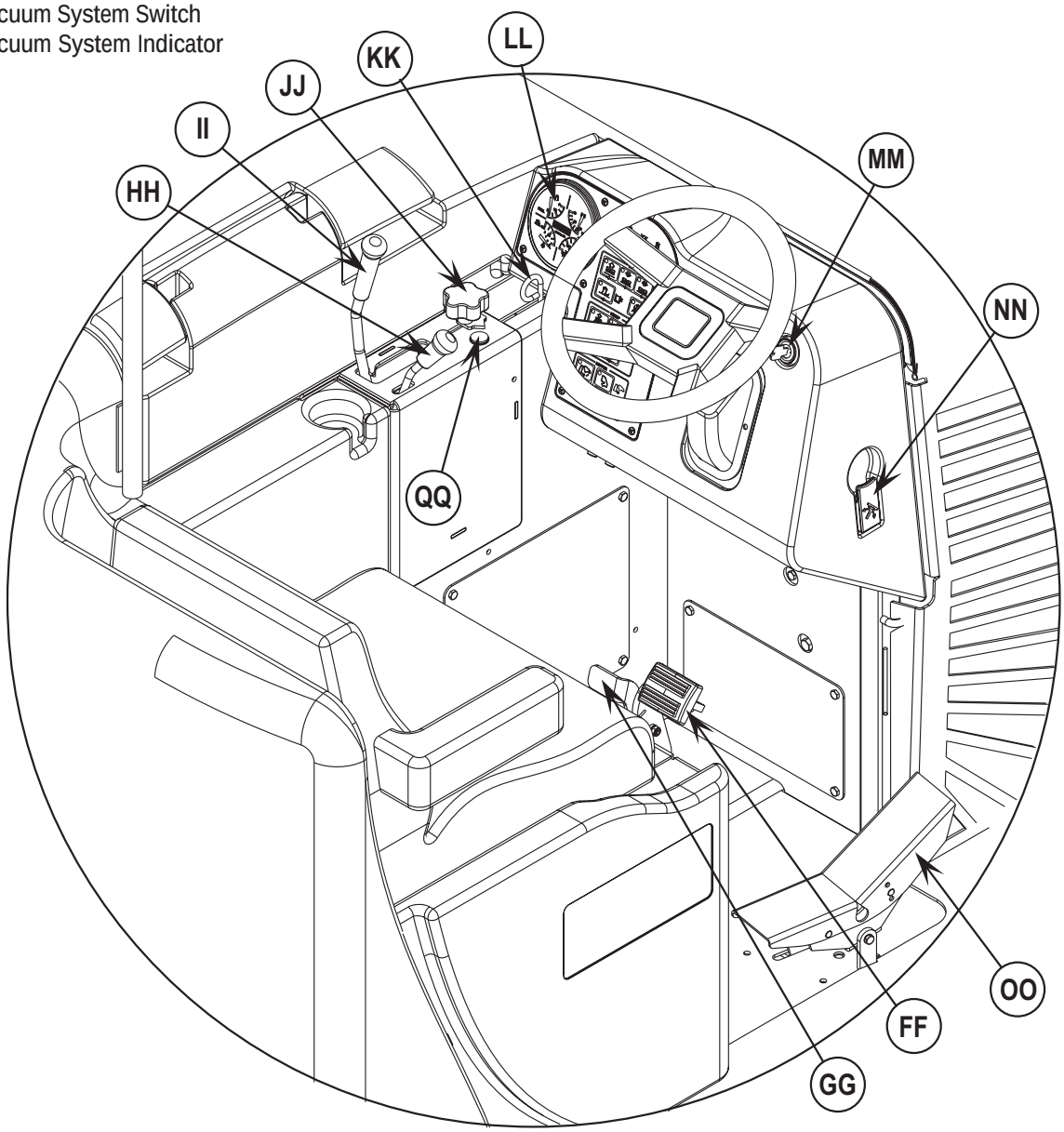
A Low Fuel Indicator (LP)
B Horn Switch
* Horn ON Indicator
C Engine Service Indicator (triggered by ECU)
D Headlight Switch
* Headlight ON Indicator
E Glow Plug Indicator (Diesel / Release key after indicator turns OFF)
F Hydraulic Filter Plugged Indicator
G Engine Speed Switch
* Engine Speed Switch Indicator
H Scrub Pressure Decrease Switch
* Scrub Pressure Decrease Indicator
I Scrub Pressure Increase Switch
* Scrub Pressure Increase Indicator
J Scrub Pressure Display
K Solution Switch
* Solution System Indicator
L Solution Tank Empty Indicator
M Recovery Tank Full Indicator
N Side Broom DOWN/ON Switch
* Side Broom ON Indicator
O Main Broom ON Indicator



OPERATOR'S COMPARTMENT

P Light Sensor
Q Shaker Switch
* Shaker Indicator (left)
* Dust Filter Plugged Indicator (right)
R Open Dump Door Switch
* Open Dump Door Indicator
S Hopper Open Indicator
T Hopper Overtemp Indicator
U Close Dump Door Switch
* Close Dump Door Indicator
V Lower Hopper Switch
* Lower Hopper Indicator
W Raise Hopper Switch
* Raise Hopper Indicator
X Dust Control Switch
* Dust Control ON Indicator
Y Side Broom UP/OFF Switch
* Side Broom OFF Indicator
Z Vacuum System Switch
* Vacuum System Indicator

AA Scrub System OFF Switch
* Scrub System OFF Indicator
BB Coolant Temperature Gauge
CC Oil Pressure Gauge
DD Fuel Gauge (Gas / Diesel)
EE Voltmeter
FF Brake Pedal
GG Parking Brake Latch
HH Solution Flow Control Lever
II Main Broom Raise/Lower (ON/OFF) Lever
JJ Main Broom Adjust Knob
KK Hopper Safety Support Lever
LL Control Panel
MM Ignition Switch
NN Tilt Wheel Lever
OO Drive Pedal
PP Hour meter
QQ Main Broom Overload Indicator Light



STEERING WHEEL REMOVAL

1 See Figure 1. Pry up steering wheel Cap (A).
2 Remove center hex Nut (B). Note: This is a metric nut, you will need a 24mm socket.
3 Use a steering wheel puller to remove steering wheel from splined shaft. NOTE: It may be necessary to enlarge holes in steering wheel, also be sure to support the metal splined bushing in the center of the steering wheel (see Figure 2) when pulling the wheel.

HYDRAULIC STEERING UNIT REMOVAL

1 Follow steps 1-3 in the *Steering Wheel Removal* section.
2 Remove the (5) screws that secure the bottom console panel (location operator's compartment below steering wheel).
3 See Figure 1. Remove the (4) item (C) Screws and pull off the rubber Steering Boot (D).
4 Remove the (4) hex screws (10mm) that secure the hydraulic steering unit to its Mounting Bracket (E).
5 Adjust the tilt steering to help in removing the steer unit and separate the column. Note: Grip steering column and pull down on steer unit to easily separate.
6 Remove the (5) hydraulic hoses to complete removal of steering unit.

⚠ CAUTION!

There will be oil in the motor and hoses, be prepared to plug and cap system connections.

FIGURE 1

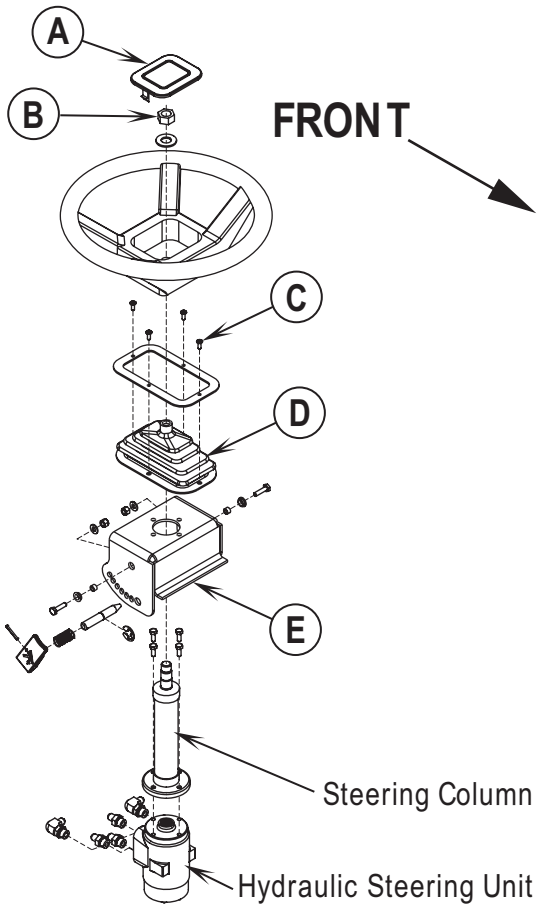
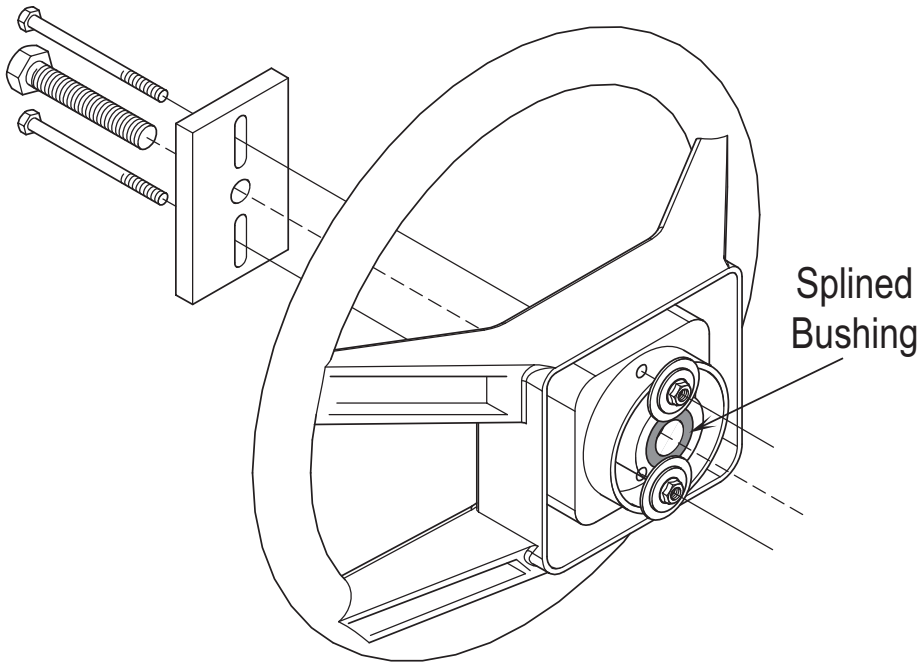


FIGURE 2



STEERING SYSTEM

HYDRAULIC STEERING CYLINDER REMOVAL

1 Remove the recovery tank assembly from the machine.
2 Follow steps in the *Solution Tank Removal* section.
3 Remove the (2) screws that secure the electrical relay mount assembly and pull it out from the control box compartment.
4 See Figure 3. Remove the Hairpin (F) and then slide out the cylinder Mount Pin (G).
5 Remove the cylinder hoses, then plug and cap to prevent oil lose and system contamination.
6 Mark the steering rack and spur gear location with a center punch to help when reassembling.
7 Lift the rack and cylinder assembly straight up to complete its removal from the chassis.
8 With the rack and cylinder assembly removed inspect the nylon wear plates. Replace when mounting screws are exposed and striking the rack.

WEAR ADJUSTMENT FOR CYLINDER RACK

1 See Figure 3. Loosen the (2) Hex HD Screws (H). Then using a large flat bladed screwdriver pry between the Adjustment Bracket (I) and the steer spindle. This will remove any excessive play in the nylon wear plate and the rack, then tighten bracket-mounting screws to secure.

STEERING SPINDLE ASSEMBLY REMOVAL

1 Remove the squeegee tool assembly from the machine then remove the ignition key, set the parking brake and block the front wheels.
2 Remove the solution tank assembly (see *Solution Tank Removal* section for instructions).
3 See Figure 3. Remove the (2) (H) Hex Screws that fasten the rack adjustment Bracket (I) then rotate the bracket to clear the spur gear and remove.
4 Remove from the spindle shaft the Cotter Pin (J) and Castle Nut (K). Next remove the (2) Set Screws (L) using a 4mm hex key wrench.
5 Pull the spur gear from its shaft then remove the square shaft Key (M) and Gear Spacer (N). Note: The gear spacer bevel faces down to reassemble.

⚠ WARNING!

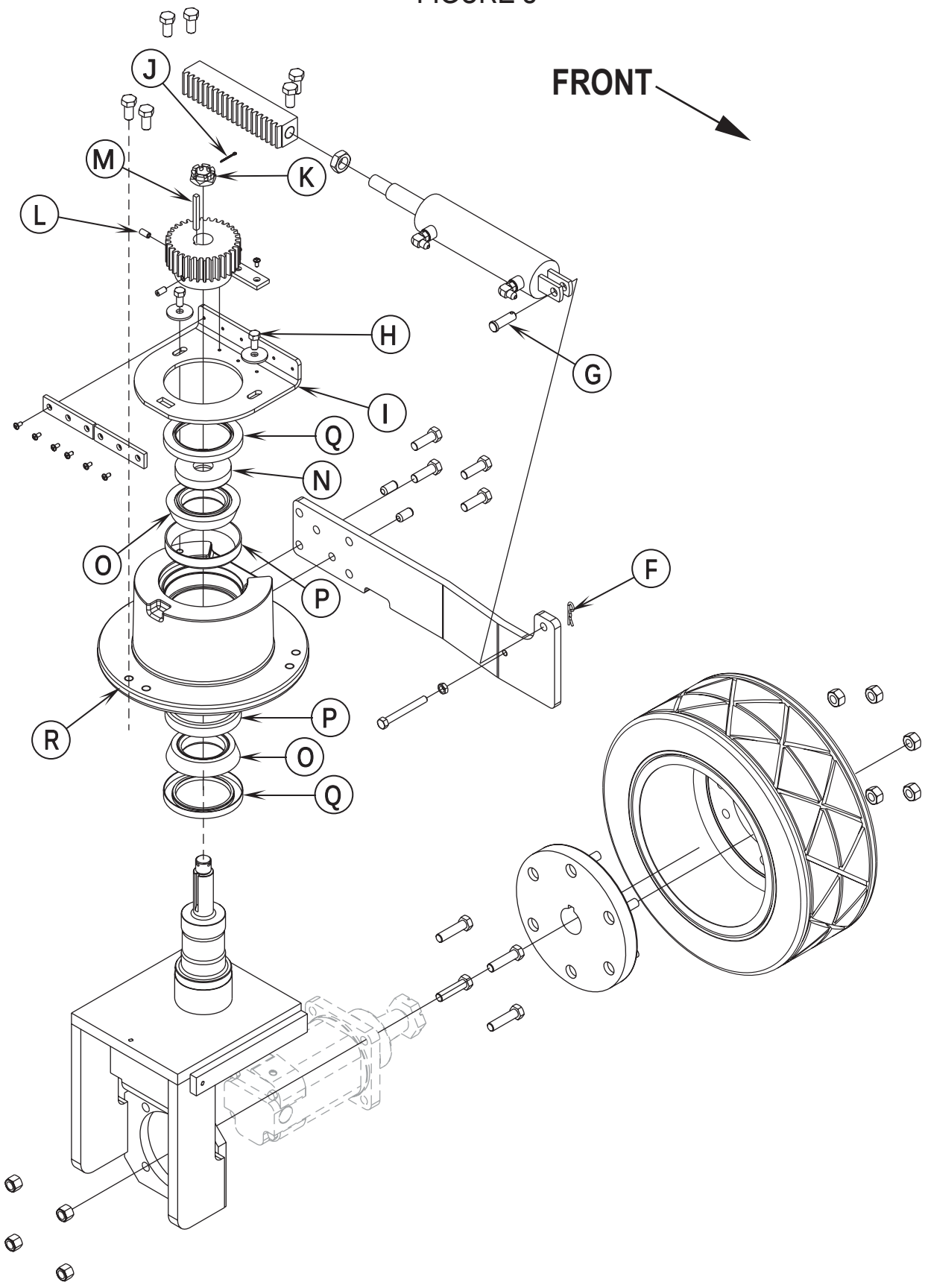
Never work under a machine without safety blocks and stands to support machine.

6 Jack up the rear of the machine approximately 24 inches (60cm) and put the jack stands in place under rear corner supports. Note: Guide the spindle and wheel assembly out from under its frame housing being careful not to damage shaft threads and bearing surfaces.
7 Important Service Tip: Observe the hydraulic wheel motor hoses their routing and correct fitting locations then disconnect the (3) hoses, (2) P-clamps (plug and cap hoses and fittings).
8 Service Tip: When installing or removing the spindle wheel assembly, use a piece of cardboard underneath the wheel to help in sliding the assembly around (positioning).

BEARING REPLACEMENT AND SPINDLE INSTALLATION

1 You now have access to the upper and lower bearing cones, cups and seals (O, P & Q). Note: If replacing or inspecting bearings be sure to (re) pack bearings with white lithium grease before installing.
2 To reassemble, first install the lower bearing cup, cone and seal into the Steering Casting (R). Note: It is important that the shaft goes through the lower bearing as straight as possible, it may be easier to install the spindle with the tire removed placing the spindle weldment on top of a movable service jack.
3 Slowly lower the rear of the machine guiding and repositioning the shaft through the center of the housing until the drive wheel supports the machine.
4 Install the upper bearing cup, cone, seal, spacer and spur gear.
5 Install and tighten the castle nut, torque to 40 ft/lbs. (54Nm). Then loosen nut to align cotter pin.
6 Follow the spindle removal steps 1-4 in reverse order. Check that the drive wheel is positioned straight ahead, align the rack and gear (marked teeth). Next follow the adjustment instructions for the cylinder rack and spur gear clearance (fit up) to eliminate any sloppy steering operation.

FIGURE 3



WHEEL DRIVE SYSTEM

DRIVE TIRE REMOVAL

⚠ WARNING!

Never work under a machine without safety block or stands to support machine.

Disconnect battery before servicing.

1 Turn steering wheel to the right full lock position and also remove the squeegee tool.
2 Turn off engine, set parking brake and block front wheels.
3 See Figure 1. Remove the (6) Wheel Lug Nuts (A) (use a 21mm socket). Installation torque is100 ft/lbs. (135 N/M).
4 If removing drive motor, remove the Cotter Pin (B) and loosen the motor shaft Castle Nut (C). Note: You will need a 1-7/16 inch socket for castle nut (see torque notes Figure 1).
5 Thread (2) 1/2-13 x 2" threaded to HD Pusher Bolts (D) into the (E) Tire Hubs threaded holes.
6 Jack up machine until wheel clears the floor and place jack stands under machine.
7 Turn (thread) in equally both bolts to separate the tire assembly from the wheel motor Drive Hub (F).

WHEEL DRIVE MOTOR REMOVAL

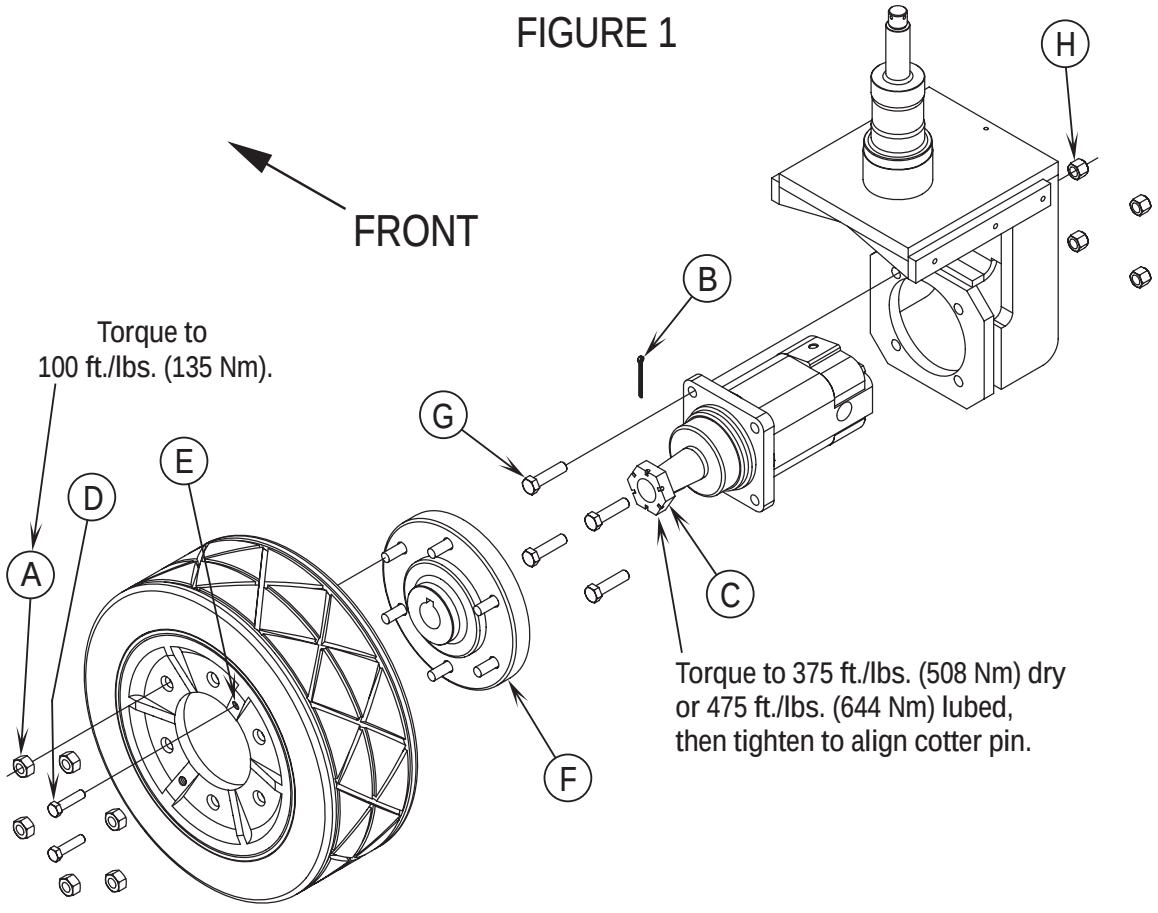
1 Follow steps 1-7 in *Drive Tire Removal* section.
2 Remove the drive motor shaft castle nut.
3 Mark and remove the three hydraulic hoses at the motor.

⚠ CAUTION!

There will be oil in the hoses and motor, be prepared to plug hoses and cap motor fittings.

4 Remove the (4) Hex Screws (G) and Nuts (H) and remove the motor from the spindle weldment. Use a puller to remove the drive hub assembly from the tapered motor shaft and reuse (salvage).
5 Reassemble in reverse order (see torque notes Figure 1). Operate the machine and check for leaks and proper performance.

FIGURE 1



HYDROBACK DRIVE PEDAL NEUTRAL ADJUSTMENT

When servicing the hydrostatic drive system, always check for any machine creeping (movement) in the neutral position. The machine must not move in either Fwd or Rev after the drive pedal is released. If machine creeping is experienced the neutral position of the hydro back must be adjusted.

⚠ WARNING!

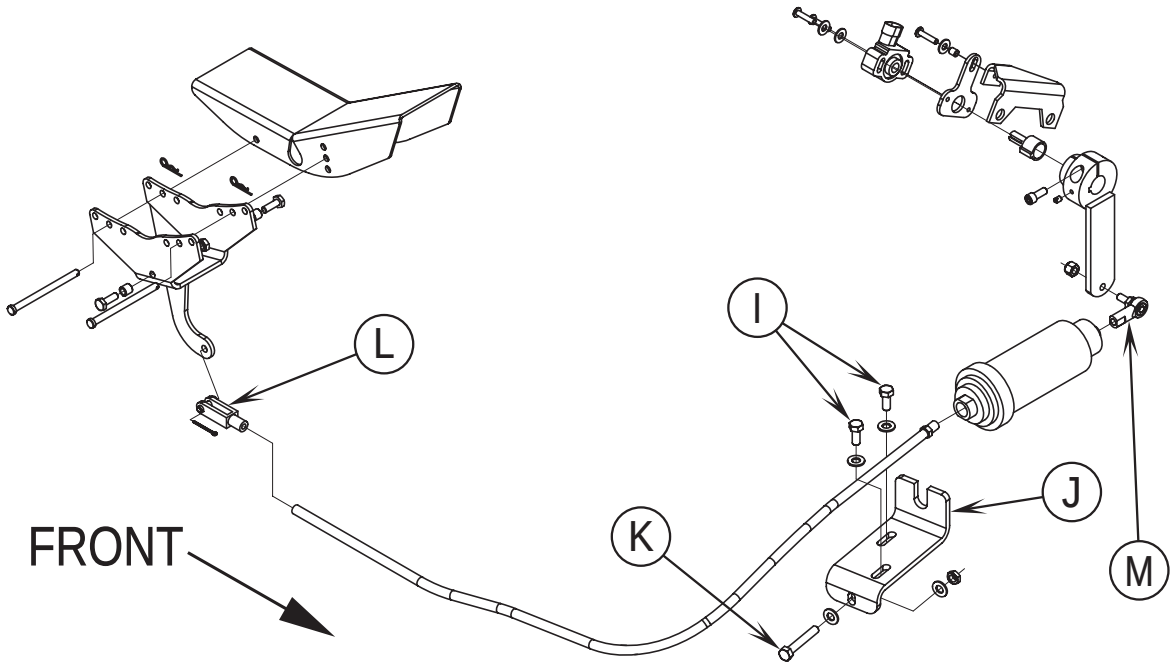
Use jack stands to support the machine when setting the neutral drive pedal adjustment.

1 Block the front wheels. Jack up machine until the rear drive wheel is off the floor. Place supports at the rear corners of the machine.
2 Remove the right side engine cover to access the hydroback adjustment bracket.
3 See Figure 2. Loosen the two Lock Screws (I) that secure the moveable cable mount Bracket (J) to the chassis.
4 Start the engine and observe the direction of the drive wheel rotation. Next turn the adjustment Screw (K) clockwise (CW) or counterclockwise (CCW) to move the cable mounting bracket (in or out) enough to stop any wheel movement. The pump arm is now in neutral, tighten the two lock screws to secure the neutral pump arm setting.
5 Test the neutral adjustment by activating the drive pedal in both FWD & REV to confirm proper wheel motor control. Readjust again if neutral setting is not repeatable. Replace the hydroback and or its linkage if a neutral adjustment can not be obtained.
6 Turn the engine off then check to see that it will restart. If engine will not start the pedal sense switch is probably out of its neutral (dead band) setting and needs to be reprogrammed. See the sense switch replacement manual section for programming instructions.

HYDROBACK CABLE ASSEMBLY REMOVAL

1 Disconnect at both cable ends (foot pedal and pump arm) the Clevis (L) and Rod End (M).
2 Loosen both cable anchor connector nuts.
3 Slide hydroback assembly from its chassis and cable adjustment mounting brackets.
4 After installing a new cable/hydroback see the hydroback pedal neutral adjustment instructions.

FIGURE 2



FRONT WHEEL SYSTEM

FRONT WHEEL REMOVAL AND BRAKE INSPECTION

1 Raise hopper and engage safety support.
2 Open broom-housing door (LH or RT) and remove the top gasket seal (so not to damage). Place jack towards front of housing and jack on machine frame to where the front wheel clears the floor.
3 Place safety blocking under the front frame member to support.
4 Remove the Wheel Screw (A) then work the tire off of wheel spindle. Note: the parking brake must be released to allow wheel to be removed. Also tap on the backside of wheel with wood blocking to help loosen a stubborn stuck wheel.
5 Inspect the spindle; wheel bearings and brake shoe linings for abnormal wear and replace all worn parts. A new brake shoe lining thickness will measure 11/64 (.172) inches or 4.4 mm.
6 Check for approximately one inch (25mm) of operator brake pedal free-play (see instructions below to adjust) and test drive machine for proper operation.

FRONT BRAKE SHOE ADJUSTMENT

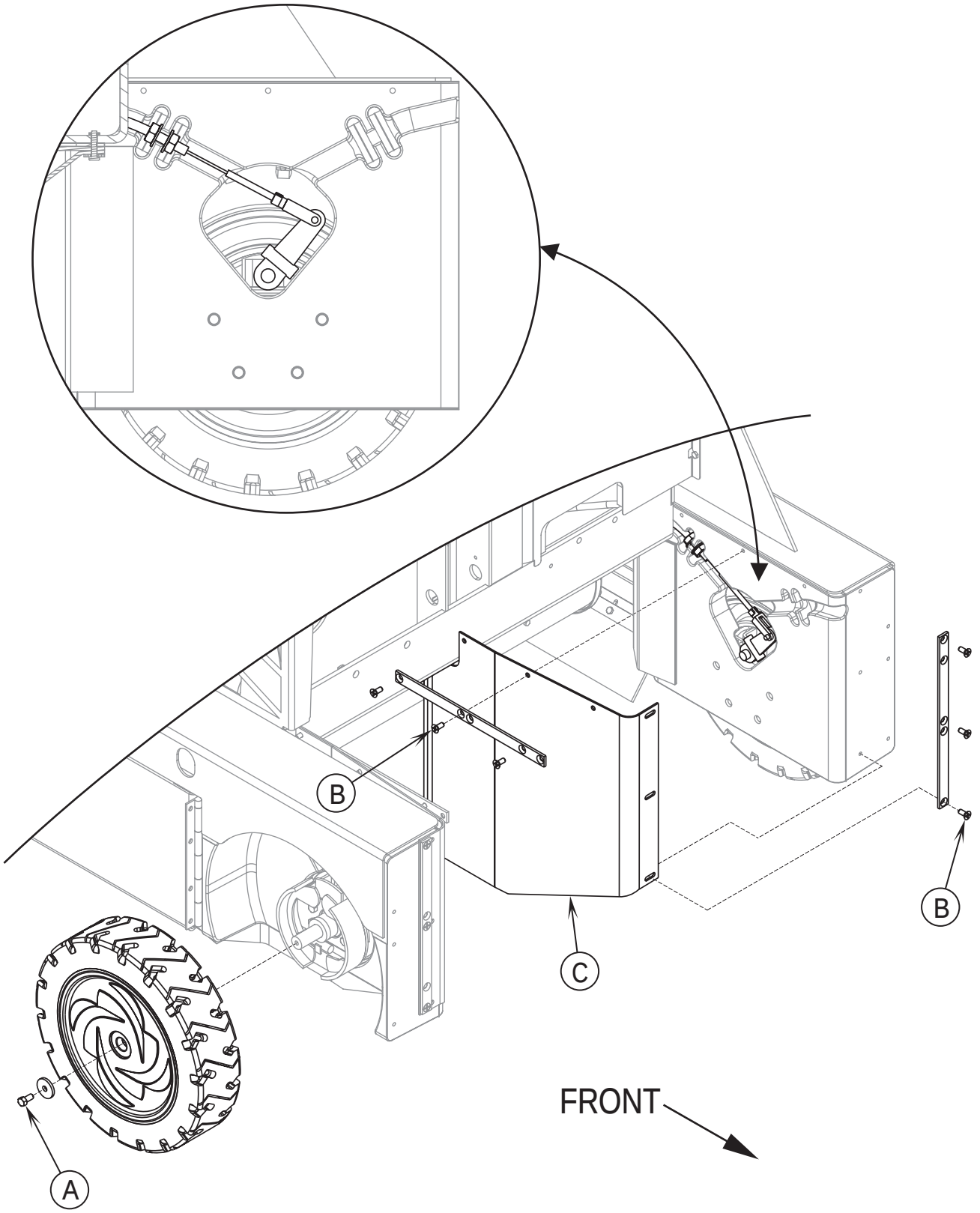
1 Raise hopper and engage safety support.
2 See Figure 1. Remove the (6) Philips Screws (B) then pull the broom Housing Skirt (C) to the side to access the brake cable clevis.
3 See Figure 1 detail of clevis adjustment, length or shorten its threaded end to obtain the correct brake pedal free play. Note both brakes (LH & RT) need to be adjusted equally.
4 If the brake cable clevis adjustment does not eliminate excessive pedal travel (poor braking performance) check for worn out brake shoes and a stretched brake cable. The ends of the brake cable at the wheels have adjustable threaded cable anchor fittings. Shorten the length of cable wire extending out of the cable casing by adjusting the cable anchor fittings at the wheel casting pocket (inset).

BRAKE CABLE REPLACEMENT

1 Follow the scrub deck removal instruction in the scrub system manual section. The removal of the deck is necessary to access the brake pedal cable guide pulley and cable anchor points (location middle of machine under operator floor plate).
2 See the brake shoe adjustment instructions above to remove the brake cable ends at the wheels.

FRONT WHEEL SYSTEM

FIGURE 1



HYDRAULIC SYSTEM

REMOVAL OF HYDRAULIC OIL COOLER

⚠ CAUTION!

Disconnect the battery before servicing.

1 Remove the right side engine panel.
2 See Figure 1. Remove the (2) hydraulic hoses attached to the Pre-charge Filter Housing (A). Then remove the (2) inlet and outlet oil cooler hoses (plug and cap all hoses).
3 Remove the (2) Pivot Bolts (B) that fasten the oil cooler to the radiator mount. Then pull the cooler out of the machine.

REMOVAL OF ENGINE COOLANT RADIATOR

⚠ CAUTION!

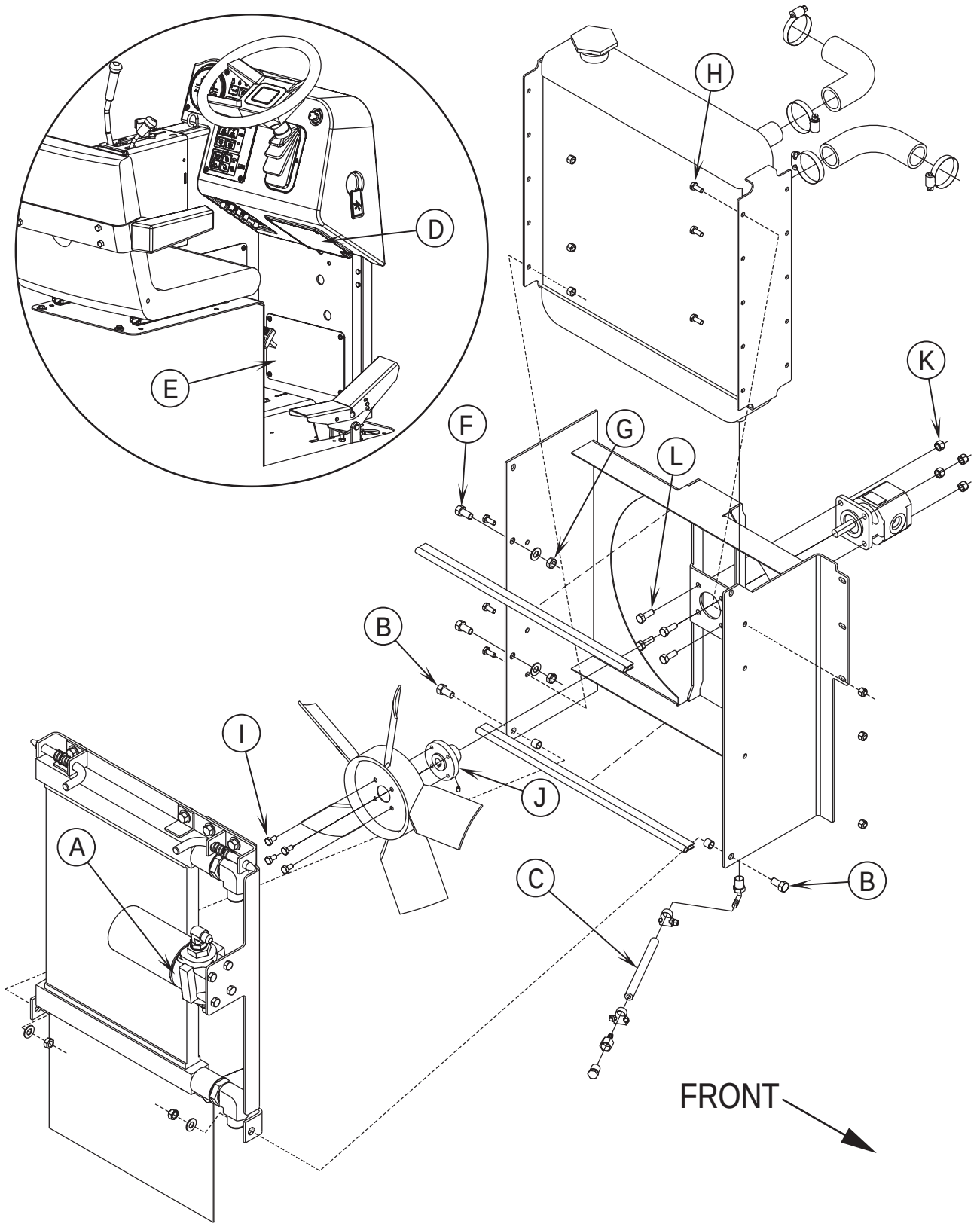
Disconnect the battery before servicing.

1 Remove the hydraulic oil cooler by following the instructions in this manual section.
2 See Figure 1. Remove the radiator cap and coolant over-flow hose then drain the coolant from the radiator using the Drain Hose (C).
3 Remove the two front operator compartment Access Panels (D & E) located in front of operator's feet and below the steering wheel console.
4 Remove both the upper and lower radiator hoses. Note: To remove the bottom hose work through the operator compartment access panel.
5 Work through the two previously removed access panels to remove the (2) Hex Screws (F) and (2) Hex Nuts (G) that fasten the left side radiator mount.
6 Remove the (6) Screws (H) that hold the radiator to its mount. Then carefully slide the radiator out of the machine. Note some loss of coolant will occur when removing.

REMOVAL OF HYDRAULIC ENGINE FAN MOTOR

1 Remove the hydraulic oil cooler and engine radiator by following the two separate sets of instructions in this manual section.
2 See Figure 1. Remove the (4) fan mounting Screws (I) then pull off the fan from the Fan Spacer Hub (J).
3 Loosen the (2) spacer hub set screws then pull the hub from the fan motor shaft.
4 Remove the (3) fan motor hydraulic hoses (plug and cap).
5 Remove the (4) Nuts (K) and (4) Bolts (L) to complete the removal of the motor from its mounting bracket.

FIGURE 1



HYDRAULIC SYSTEM

ACCESSORY PUMP ASSEMBLY REMOVAL

⚠ CAUTION!

Disconnect the battery before servicing.

1 Remove right side engine panel.
2 See Figure 2. Disconnect the (3) accessory pump Outlet Hoses (M, N & O) (plug & cap).
3 Remove the (3) tee fittings from the pump housing assembly and plug. Note: The fittings need to be removed to access the right housing mounting bolt.
4 Remove the two-pump flange Mounting Bolts (P) and separate the accessory pump assembly from the propulsion pump. Note: Be prepared to collect oil loss when the pump is pulled apart.
5 Raise the pump assembly above the height of the oil reservoir before disconnecting the large pump assembly inlet Feed Hose (Q) to prevent excessive oil loss from the reservoir (plug & cap). Service Note: When removing the accessory pump assembly to remove the propulsion pump (create the necessary service working clearance). Leave the large hydraulic feed hose on the accessory pump attached. No need to plug and cap it, just tie it safely to the chassis above the oil reservoir. This will prevent the unnecessary need to disconnect the hose and eliminate any leakage of hydraulic oil.

PROPULSION PUMP REMOVAL

⚠ CAUTION!

Disconnect the battery cables then remove the battery before servicing.

1 Remove the hydraulic oil cooler, engine radiator and the accessory pump assembly by following the three separate sets of instructions in this manual section.
2 See Figure 2. Remove the Sense Switch (R) secured with the Screw (S) from the Lever Weldment (T). Note: Do not lose the small Bushing (U) and Washer (V).
3 Disconnect the Ball Joint (cable rod end) (W) from the Lever (T).
4 Remove the lever weldment from the propulsion pump shaft secured by hardware items (X & Y).
5 Disconnect the (4) Hoses (Z, AA, AB & AC) as shown from the propulsion pump (plug and cap).
6 Remove the (2) Hex HD Screws (AD) that fasten the pump assembly to the engine bell housing. Technical Note: Reference Figure 3, this illustrates a Special Tool (AE) that a mechanic will need to fabricate to remove the bottom pump retaining screw.
7 To complete the removal of the pump from the machine pull straight back to separate it from the engine flywheel coupler.
8 To reassemble follow the above steps in reverse order and read the service notes shown below if the engine will not start or machine creeps when drive pedal is in neutral.

Service Note 1: If engine will not start see captor Quick Start Service Manual, engine starter will not crank troubleshooting flow chart. The pedal sense switch is probably out of its neutral dead band setting and needs to be reprogrammed. Follow the foot pedal neutral and dead band adjustment programming instructions shown in this manual's sense switch replacement section.

⚠ WARNING!

Jack up the rear drive tire before starting machine to check for possible drive wheel creep, linkage out of adjustment.

Service Note 2: If machine creeps without operator pedal input see *Hydroback Drive Pedal Neutral Adjustment* in this manual to re-set neutral.

FIGURE 2

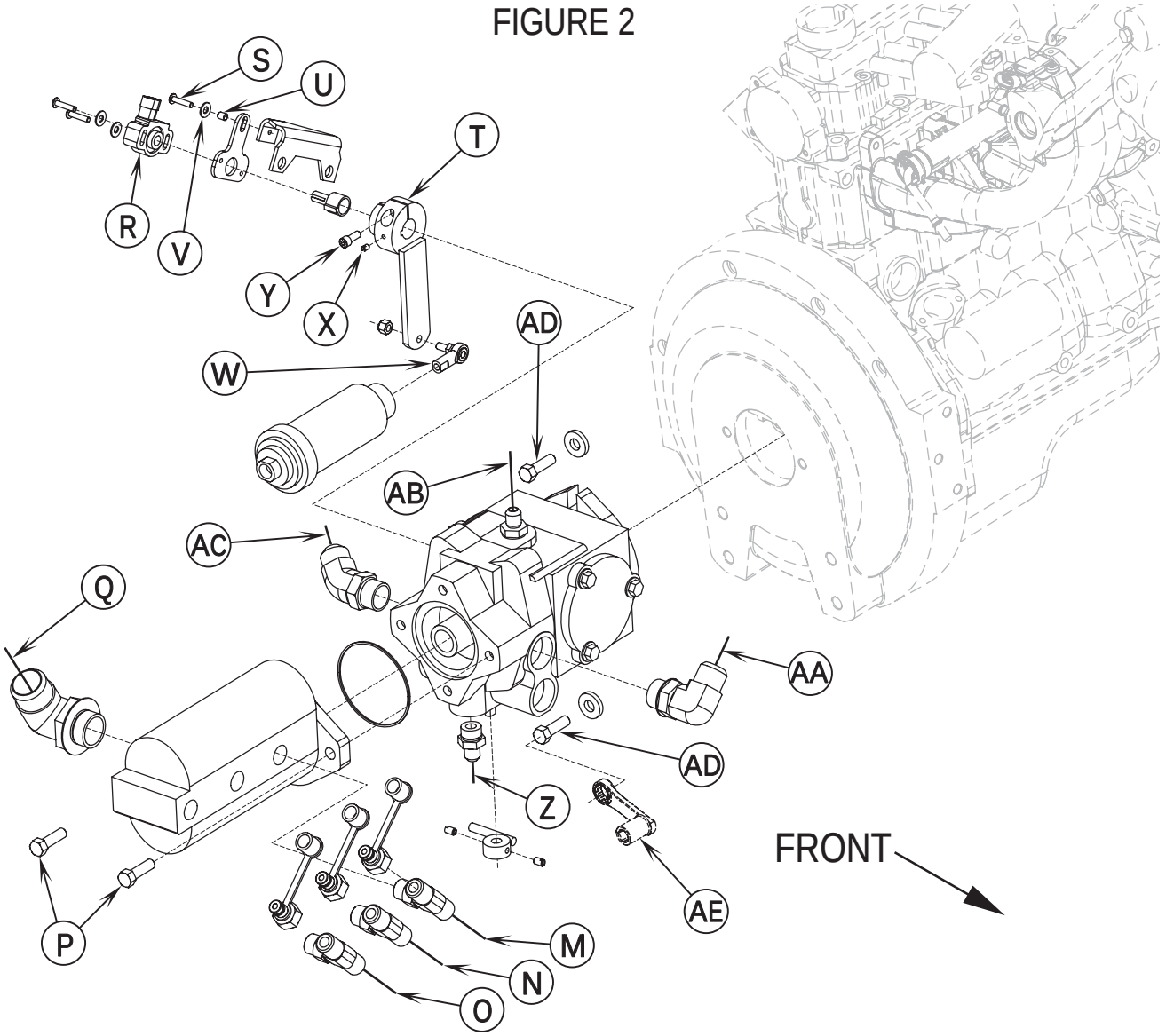
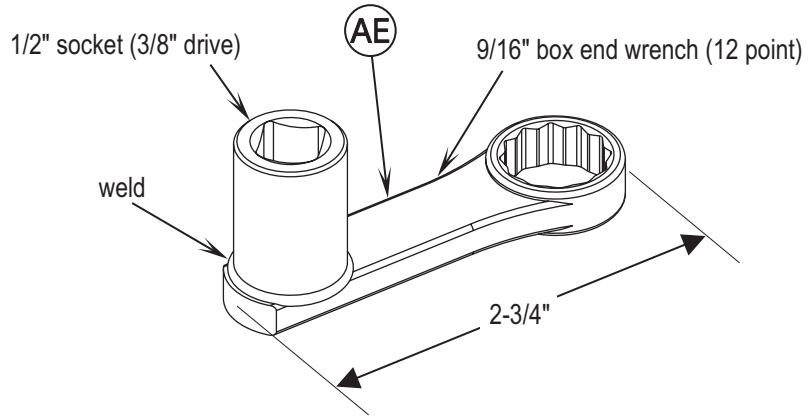


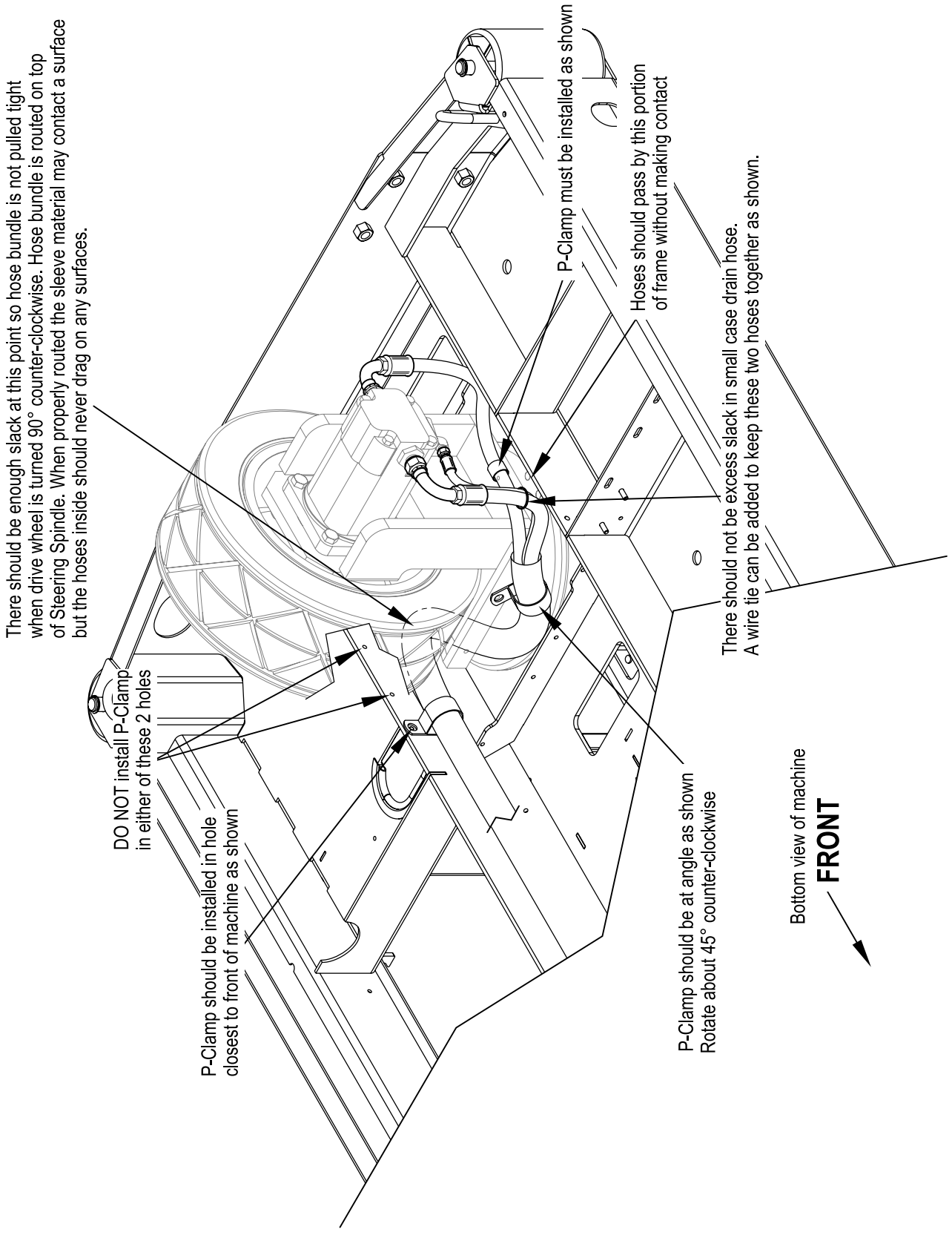
FIGURE 3



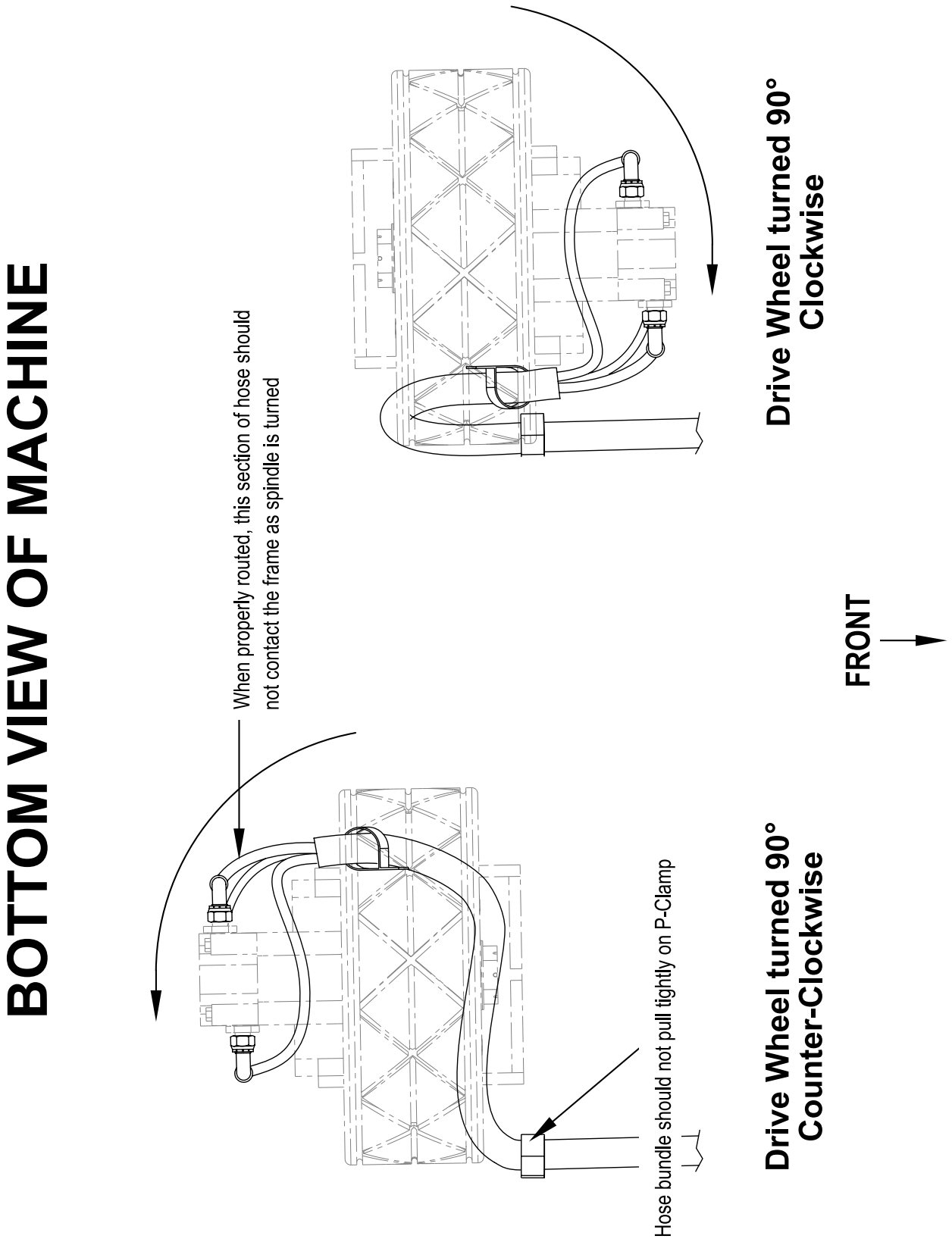
HYDRAULIC SYSTEM

HYDRAULIC HOSE ROUTING INSTRUCTIONS WHEEL DRIVE MOTOR

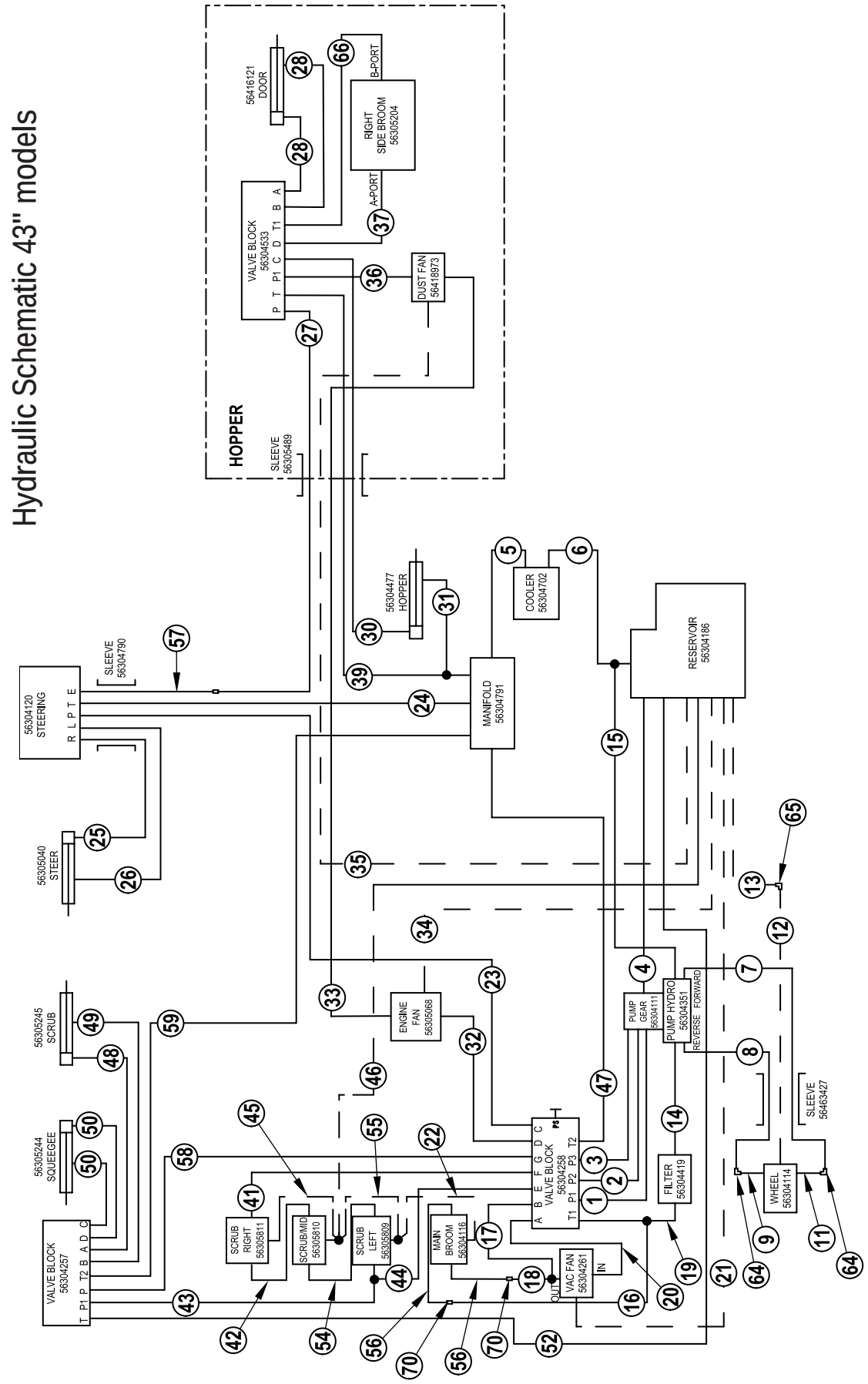
The illustrations below show the proper routing for the hydraulic hoses which feed the wheel drive motor.



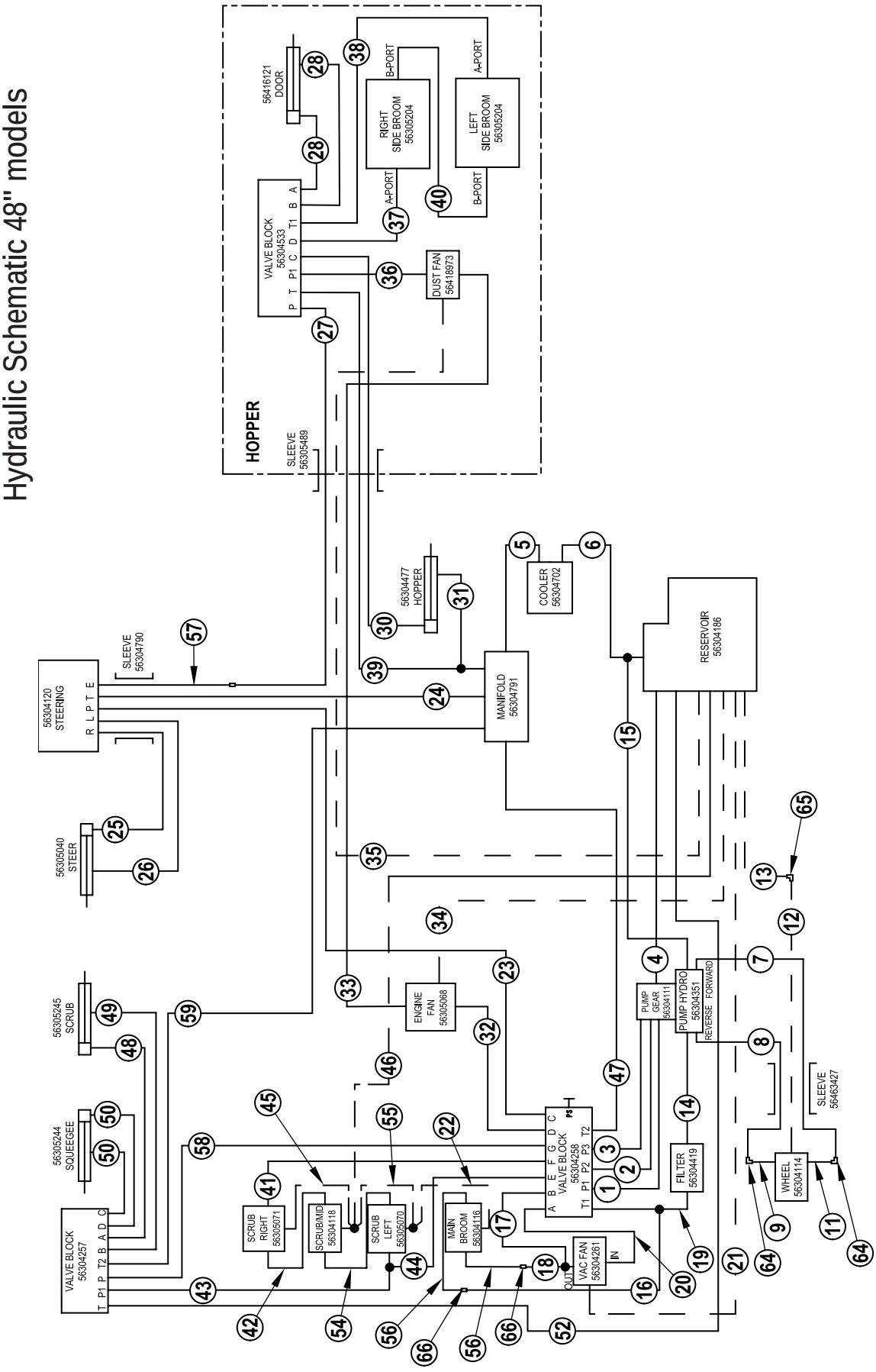
HYDRAULIC HOSE ROUTING INSTRUCTIONS WHEEL DRIVE MOTOR (CONTINUED)



HYDRAULIC SYSTEM

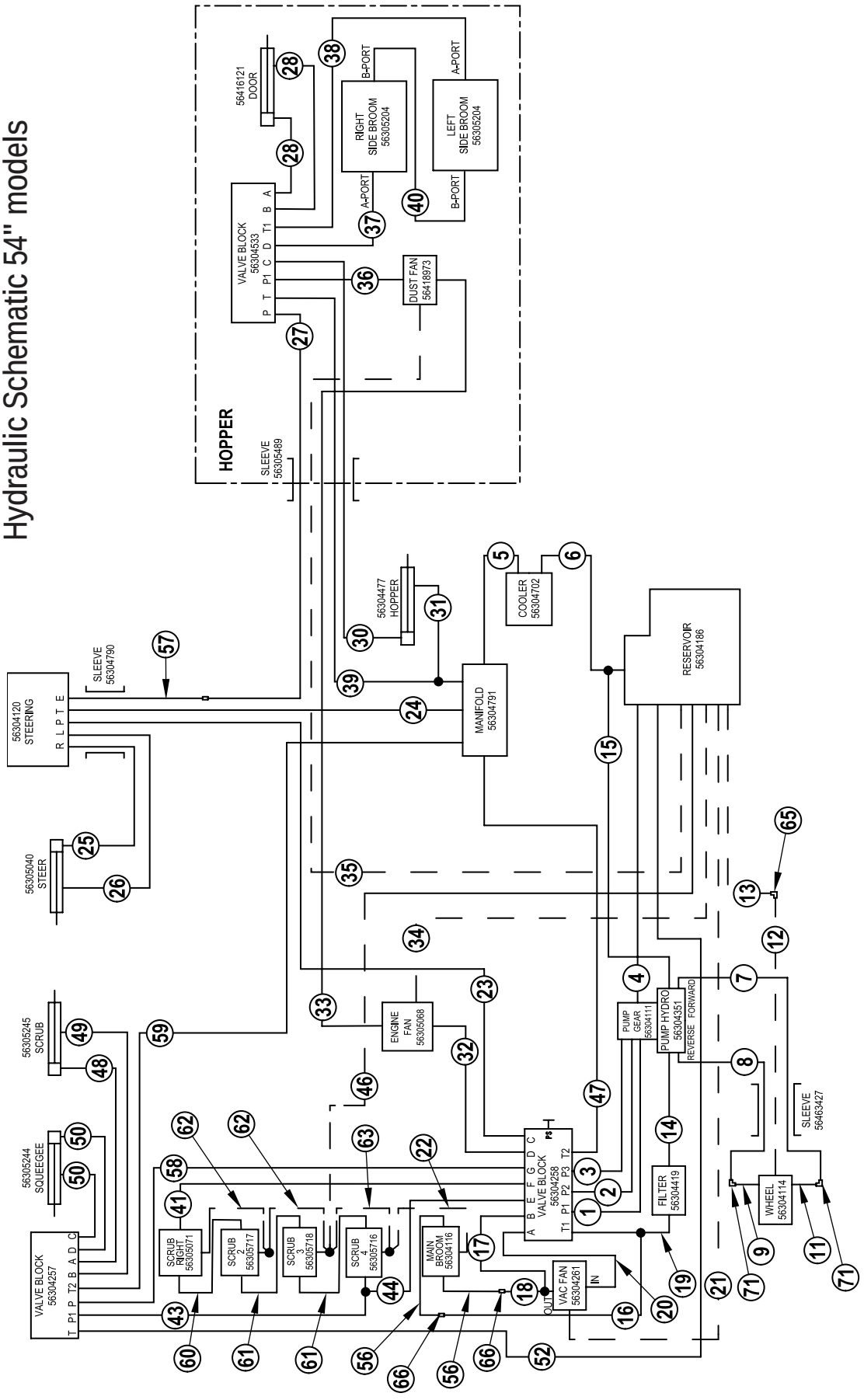


Hydraulic Schematic 48" models



HYDRAULIC SYSTEM

Hydraulic Schematic 54" models



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SWEEPING SYSTEM

MAIN BROOM MAINTENANCE

Since the Main Broom Motor always turns in the same direction, the bristles on the broom eventually become curved, reducing sweeping performance. Sweeping performance can be improved by removing the broom and turning it around (end-for-end). This procedure, known as "rotating" the main broom, should be done once every 30 hours of operation.

The main broom should be replaced when the bristles are worn to a length of 2-1/2 inches (6.35 cm). The main broom stop (JJ) must be re-adjusted when the broom is replaced. NOTE: Bristle length on a new broom is 3-1/4 inches (8.25cm).

NOTE: The machine should be stored with the Main Broom in the raised position.

⚠ WARNING!

The engine must not be running when performing this procedure.

To Rotate or Replace the Main Broom...

1 Turn the Ignition Key Switch (MM) OFF.
2 Put the Main Broom Raise / Lower (ON / OFF) Lever (II) in the DOWN position.
3 Open the Main Broom Right Access Door (38).
4 See Figure 1. Remove the large T-Bolt (A) from the side of the broom idler arm. Pivot the idler arm assembly out of the main broom core.
5 Pull the main broom out of the broom housing and remove any string or wire wrapped around it. Also inspect the skirts at the front, back and sides of the broom housing. The skirts should be replaced or adjusted if they are torn or worn to a height of more than 1/4 inch (6.35 mm) off the ground.
6 Turn the broom around (end-for-end) and slide it back into the broom housing. Make sure that the Lugs (B) on the broom drive hub (left side of machine) engage the slots in the broom core.
7 Swing the idler arm assembly back into the broom core and re-install the T-Bolt that holds the idler arm in place.
8 Close and latch the Main Broom Right Access Door (38).

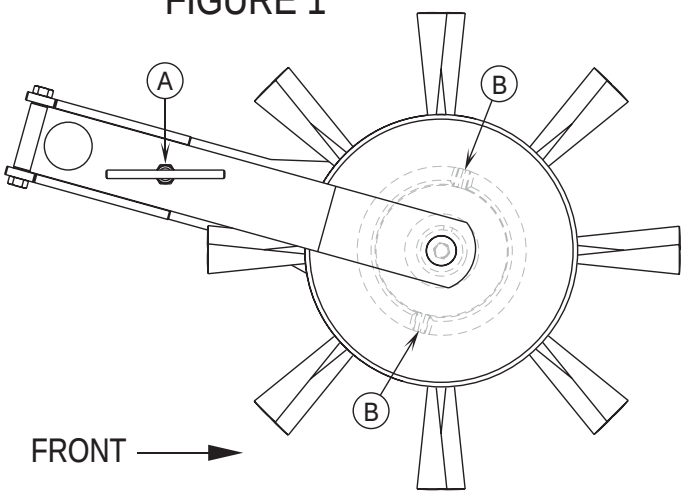
To Adjust the Main Broom Height...

1 Drive the machine to an area with a level floor and set the parking brake (GG).
2 Pull the Main Broom Raise / Lower (ON/OFF) Lever (II) back and slide to the right and up to lower the main broom. Push lightly on the front of the Drive Pedal (OO) to start the main broom rotating. DO NOT move the machine.
3 Let the main broom run in place for 1 minute. This allows the broom to polish a "strip" on the floor. After 1 minute, raise the broom, release the parking brake and move the machine so that the polished strip is visible.
4 Inspect the polished strip on the floor. If the strip is less than 2 inches (5.08 cm) or more than 3 inches (7.62cm) wide, the broom needs to be adjusted.
5 To adjust, loosen the Main Broom Adjust Knob (JJ) and slide forward or backward to lower or raise the Main Broom. The farther the Knob (JJ) travels up in the slot, the lower the Main Broom will be. Tighten Knob (JJ) after adjustment is complete.
6 Repeat steps 1-5 until the polished strip is 2-3 inches (5.08-7.62cm) wide. The width of the polished strip should be the same at both ends of the broom. If the strip is tapered, move the machine to a different area and follow steps below "To Level the Main Broom".

To Level the Main Broom...

1 Follow the steps "To Adjust the Main Broom Height" and determine if the taper is larger on the right or left side of the broom.
2 See Figure 2. Loosen the lock nut on Bolt (C), then loosen the two Screws and Nyloc Nuts (D and E) for the right pillow block Bearing (F).
3 If the taper is larger on the right side raise the Adjuster Weldment (G), if the taper is larger on the left side lower the Adjuster Weldment (G).
4 Tighten the lock nut on the adjustment Bolt (C), Nyloc nuts, and screws, and then run the broom.
5 Check the polished strip left by broom, if the broom strip is not even all the way across, repeat the above steps.

FIGURE 1



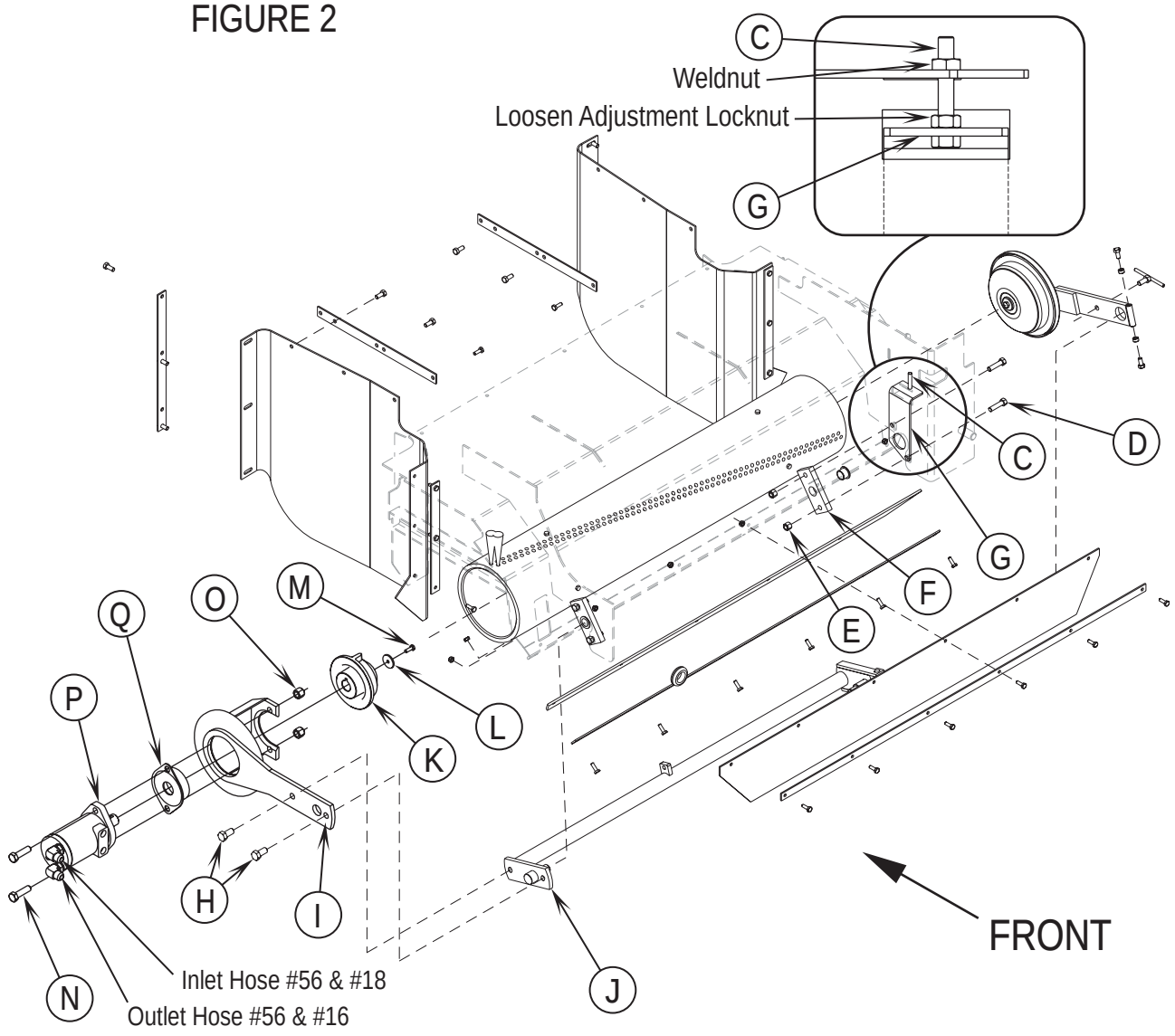
BROOM LEVER SWITCH S16 REPLACEMENT AND ADJUSTMENT

1 Drain, unlatch and swing open the recovery tank to locate the switch access panel.
2 Remove the (4) screws from the access panel near the location of the broom lever.
3 Remove the two wire connectors from the broom switch (S16) and then remove the screw and nut that fasten it to the chassis.
4 Install new switch but leave the mounting screws loose. Insert a continuity tester (or Ohm meter) in the switch wiring, then adjust switch to read continuity when the broom lever is in the raised (stored) position and no continuity when lever is lowered (in sweep positions). The broom switch type is magnetic and the switch circuit is closed when placed next to the metal broom lever.
5 Tighten screws; reconnect switch wiring and test for proper operation.

MAIN SWEEPING BROOM MOTOR REMOVAL

1 Lower the main broom then remove the broom from its housing.
2 See Figure 2. Mark the broom motor hydraulic hoses (for reassembly) then remove hoses (plug and cap).
3 Remove the (2) item (H) Hex Screws that secure the broom motor Mount Arm (I) to the broom hanger (lift) Weldment (J).
4 Remove the broom Hub Driver (K) secured to the motor shaft with the (L) Washer and (M) Hex Screw.
5 Remove the (2) (N) Screws and (O) Nuts that fasten the (P) Motor and (Q) String Guard to the chassis arm weldment. Service Note: When re-installing the motor string guard, position it between the motor and mount arm as shown.

FIGURE 2



SWEEPING SYSTEM

SIDE BROOM MAINTENANCE

The side broom(s) move dirt and debris away from walls or curbs and into the path of the main broom. Adjust the side broom so that the bristles are contacting the floor from the 10 O'clock (R) to the 3 O'clock (S) area shown in Figure 3 when the broom is down and running.

To adjust the Side Broom...

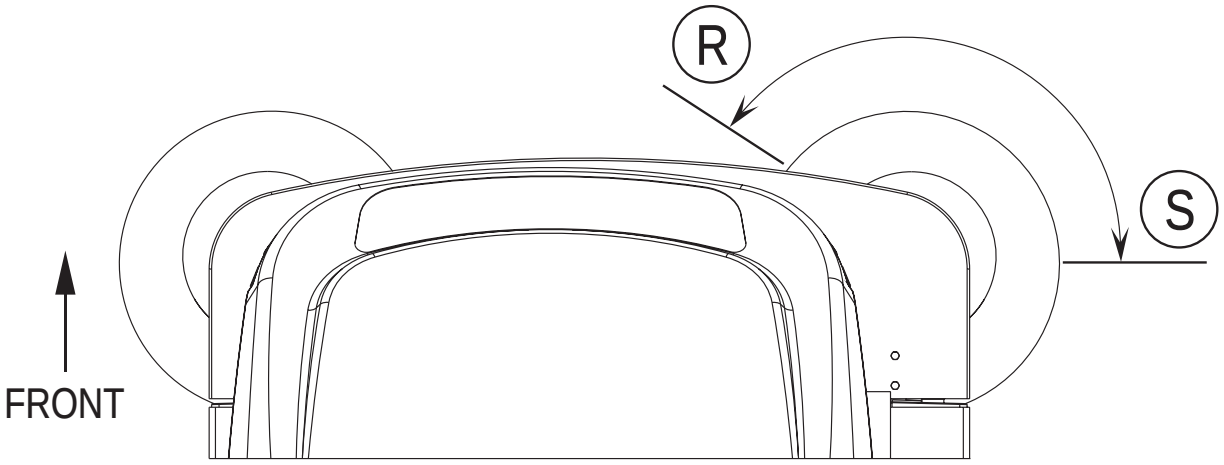
1 The side broom(s) are adjusted simply by pressing and holding the Side Broom DOWN/ON Switch (N) or the Side Broom UP/OFF Switch (Y) until the desired amount of bristles are contacting the floor.

NOTE: The machine should be stored with the Side Broom(s) in the raised position. The Side Broom(s) should be replaced when the bristles are worn to a length of 3 inches (7.62 cm) or they become ineffective.

To replace the Side Broom...

1 Raise the Side Broom(s).
2 See Figure 4. Reach under the Side Broom and remove the large Thumb-Nut (T) holding the side broom on and remove the broom and plastic disc. Note: The right side broom thumb nut is a right hand thread and the left side thumb nut is a left hand thread.
3 Install the new broom and plastic disc by aligning the three alignment pins and pushing on. Re-install the Thumb-Nut and tighten.

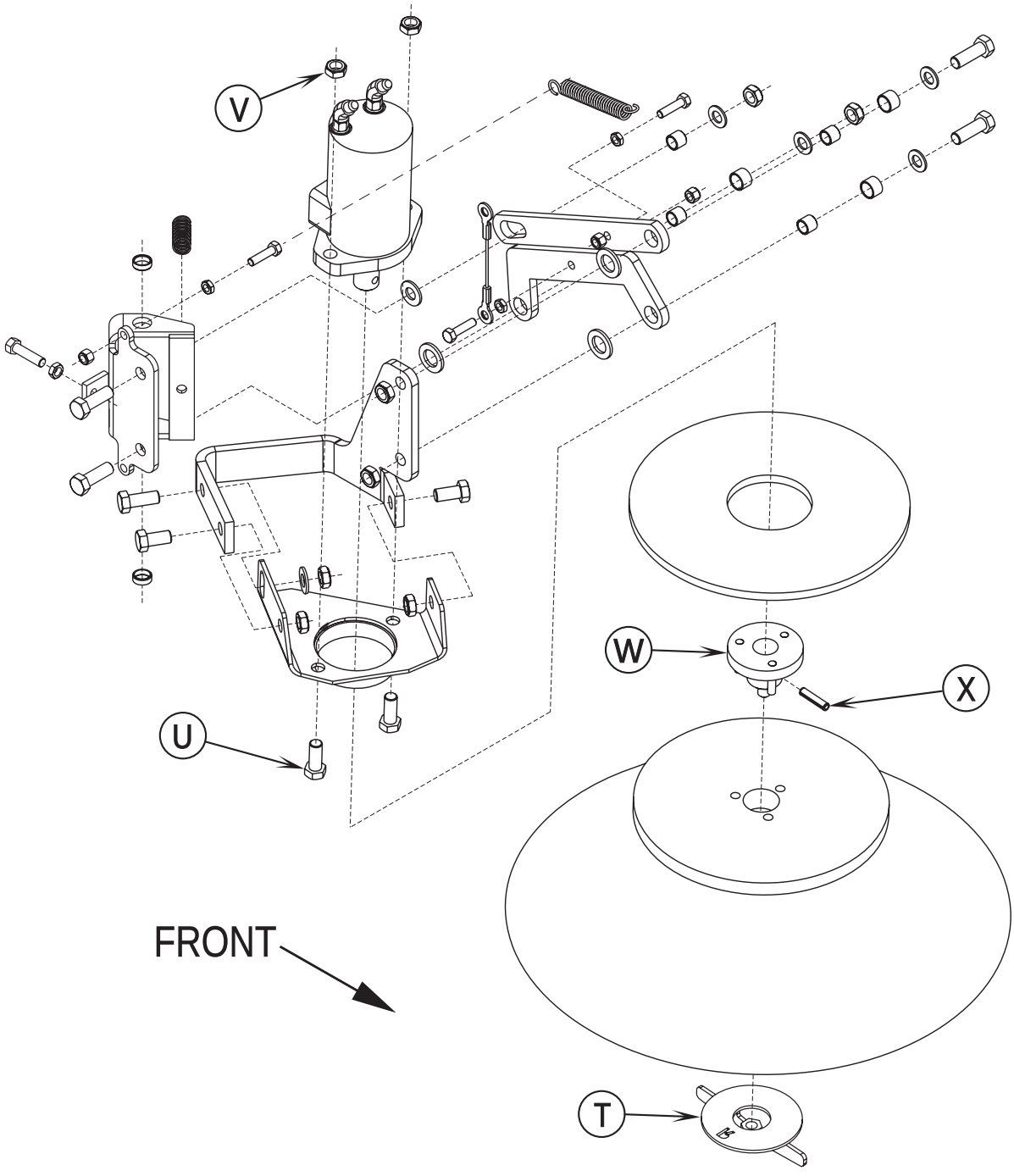
FIGURE 3



SIDE BROOM MOTOR REMOVAL

1 Lower the side broom(s). Note: The main broom must be first lowered to allow the side brooms to be lowered.
2 Raise hopper to a comfortable work position (eye level). Then remove the side broom and plastic broom guard.
3 Mark and remove the hydraulic hoses to the motor that needs to be serviced (plug and cap).
4 See Figure 4. Pull out motor bracket to (extend) gain access to motor mounting hardware. Then remove the (2) (U) Screws and (V) Nuts that fastens the motor to its mount. Complete the removal of the motor by lifting it through the hole on the motor bracket.
5 Salvage the motor Drive Hub (W). Use a pin punch to drive out the Roll Pin (X) and pull the hub from the motor shaft. Install a serviced or new motor by following the above steps in reverse order.

FIGURE 4



SWEEPING SYSTEM

SIDE BROOM LIFT ACTUATOR MOTOR REPLACEMENT

Removal

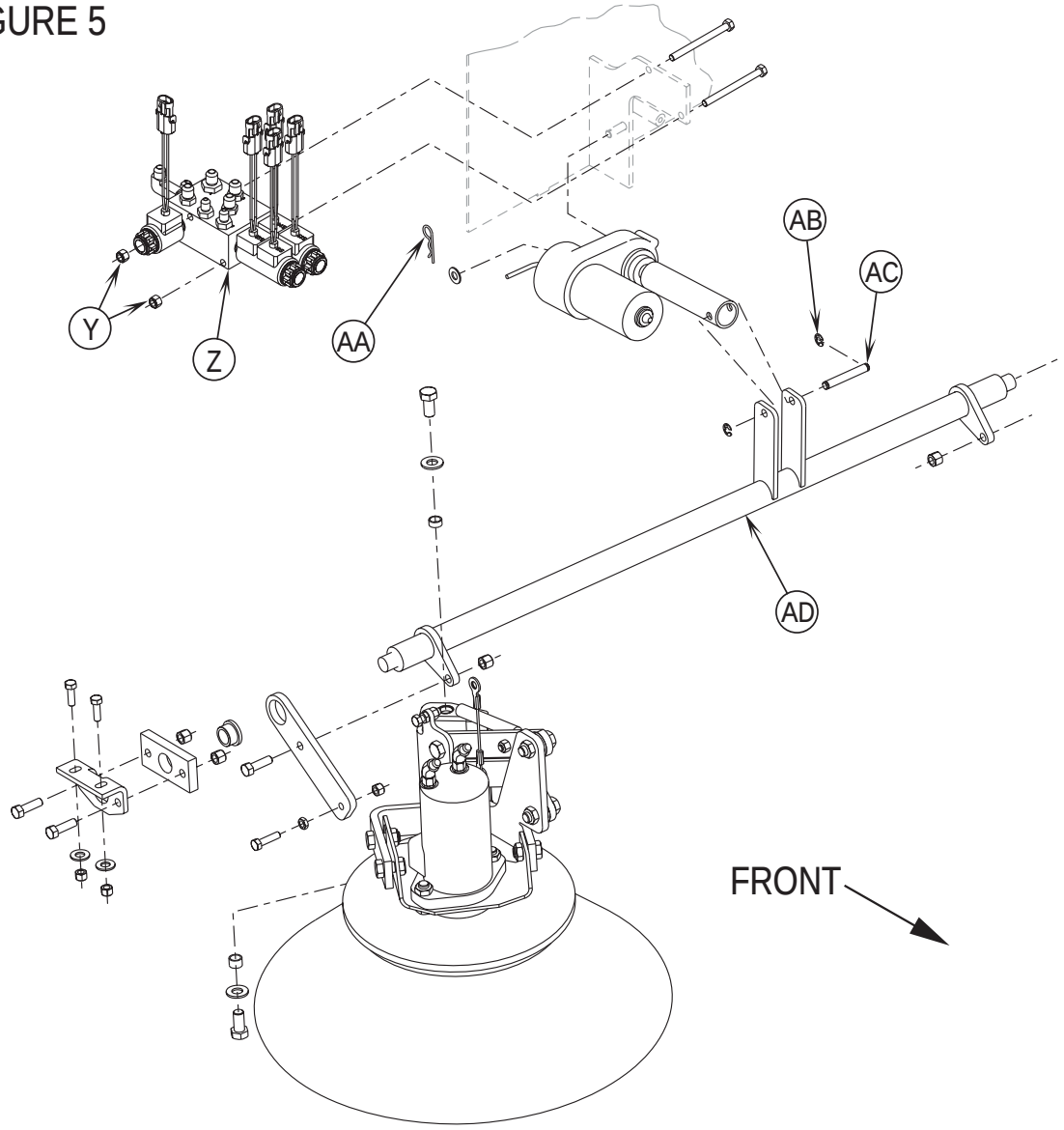
1 Place the side brooms in the lowered position if possible or blocking underneath the brooms to remove weight from the lift linkage.
2 Open hopper cover, set cover prop rod, remove hopper filter, and latch filter rack. Then remove the hopper access panel held in-place by (11) Philips head screws.
3 Disconnect the lift actuator motor wiring harness connector.
4 See Figure 5. Remove the (2) Hex Huts (Y) that secure the Hopper Cylinder Valve Block (Z) to its mount.
5 Pull the valve body block away from its mounted position and then rest it on the corner of the mount (this needs to be done to access the rear actuator motor mount). Next remove the Hairpin (AA) from its mount pin.
6 Remove both the front Retainer Ring (AB) and the Mount Pin (AC) that attaches the actuator drive tube to the Lifting Shaft Weldment (AD). Then pull out the lift motor to complete its removal from the machine.

Installation

Service Note: New replacement lift actuator motors do not come with lift drive tube pre-adjusted.
Important: After removing the actuator motor and before replacing a new motor or drive tube the IN & OUT limit switches must be set (or checked) to their correct installation dimensions. Follow the side broom lift actuator motor adjustment instructions in this manual section if the drive nut (tube) is in need of adjustment.

1 After setting the correct actuator lift nut dimensions follow the removal steps above in reverse order to re-install.

FIGURE 5



SIDE BROOM LIFT ACTUATOR MOTOR ADJUSTMENT

1 See Figure 6. This shows the jumper wiring needed to connect the machine's battery to the actuator motor's three-wire connector. Note: Reference the bill of material for building the two jumper wires. Important Service Note: The P.N. 56407502 power cord adapter normally used on all other two-wire actuator motors should not be used.

2 See Figures 6-A & 6-B. The wiring diagrams illustrates the correct battery polarity (+ & -) power inputs to operate the actuator motor for both extending and retracting the drive nut.

3 See Figure 6-A. Connect the jumper wiring as shown to run the actuator motor in the retracted (IN) mode. Next hold the drive nut tube (AE) and press the switch to run the drive nut towards the motor housing (it's IN limit).

4 Measure the position of the drive nut on the actuator shaft then compare it to the retracted dimension specification shown in Figure 6. Manually turn the steel drive nut tube to match the IN position shown.

5 See Figure 6-B. Connect the jumper wiring to run the actuator motor in the extended (OUT) mode. Next hold the drive nut tube (AE) and press the switch to run the drive motor to the out position waiting for the motor to stop (reaching its Out limit).

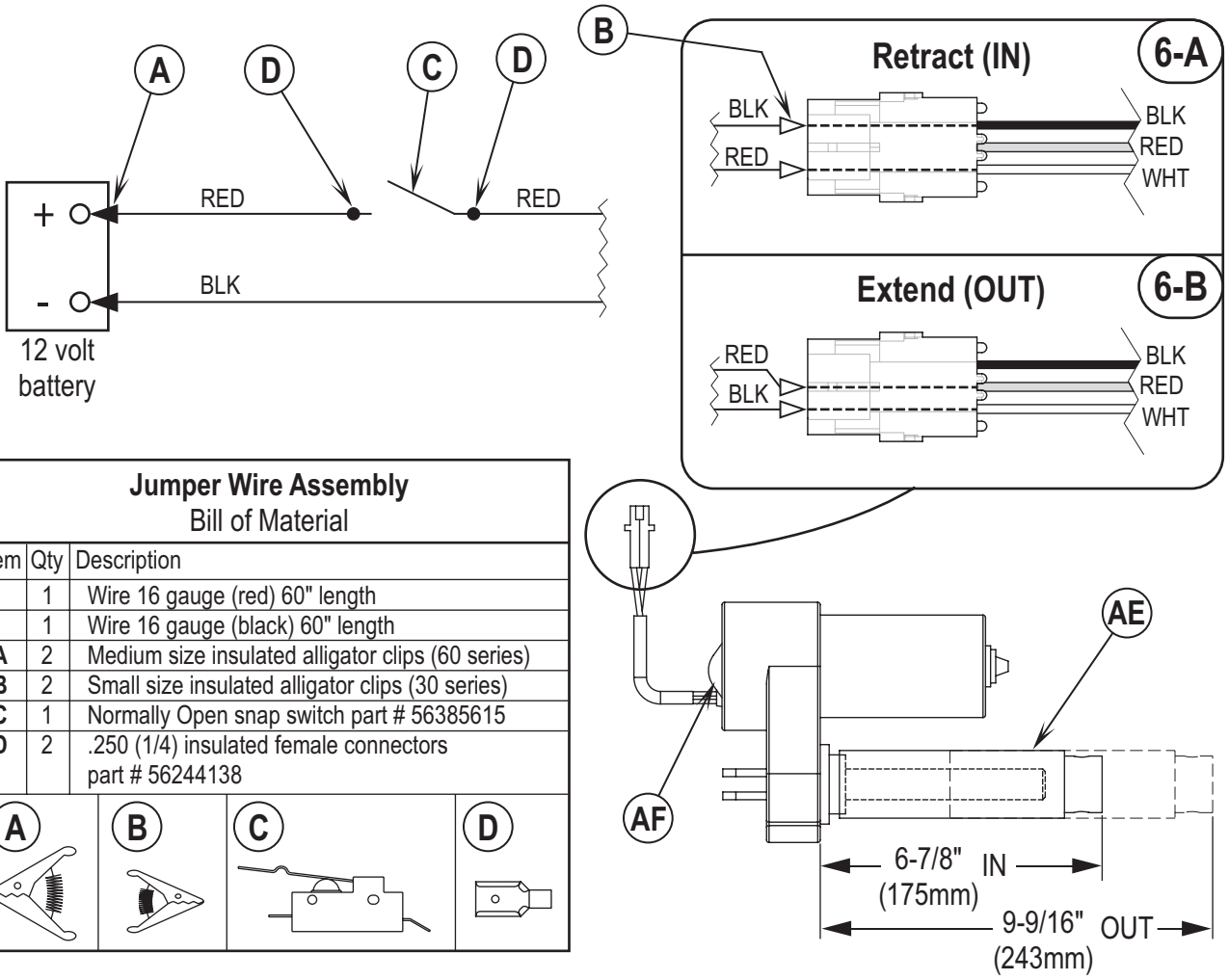
6 Measure the position of the drive nut on the actuator shaft and compare the measurement with the Out position shown in Figure 6.

7 When the measurement doesn't match the dimension shown it is necessary to remove the large rubber Adjuster Cover (AF). Note: Use a 1/2" (13mm) socket to turn the outside hex adjuster. Each click of the top adjuster (cam) will change the nut travel 1/16" (1.6mm). To extend the travel of the drive nut, turn the adjuster clockwise (CW). To retract the travel of the nut, turn the adjuster counter clockwise (CCW).

8 After each adjustment, hold the drive nut tube, run the actuator IN & OUT and check both dimensions. Note: When checking the directional travel dimensions remember to change the connections (battery polarity) of the jumper wires. Then after checking that the drive nut limits are set correctly, replace the Adjuster Cover (AF).

9 Service Tip: Leave a correctly adjusted actuator motor in the out (extended) setting to reinstall the side broom lift actuator motor.

FIGURE 6



Jumper Wire Assembly
Bill of Material

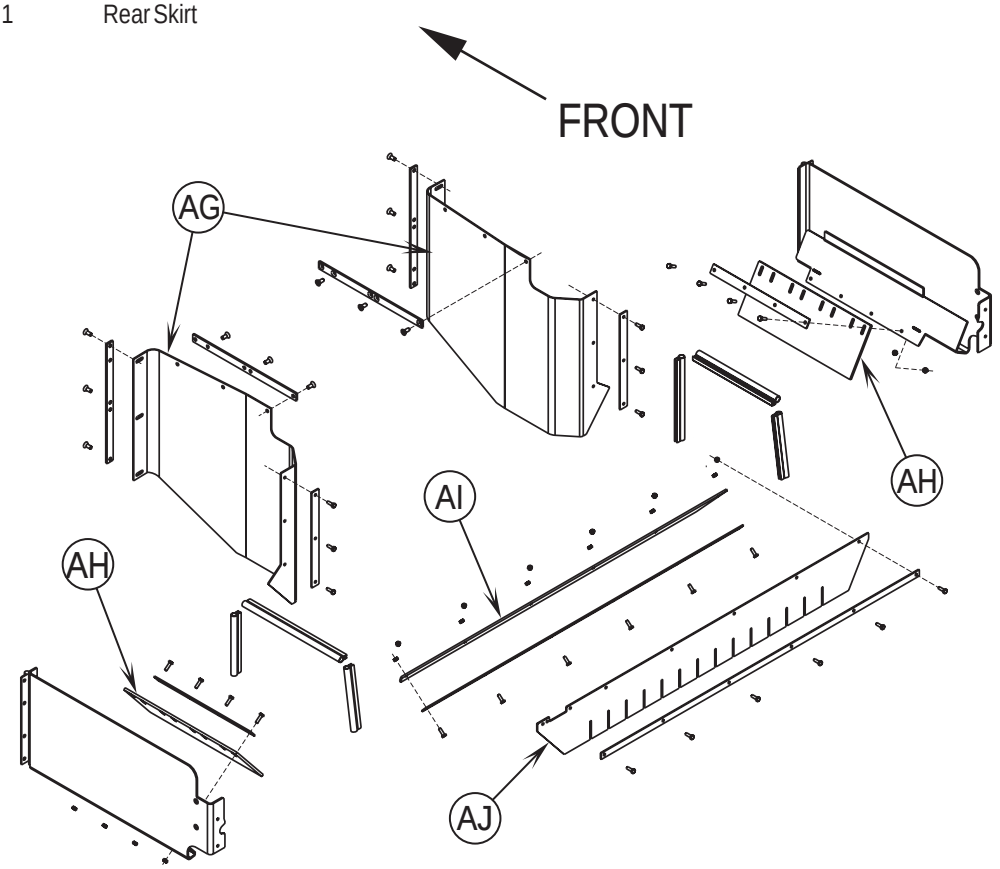
Item	Qty	Description
	1	Wire 16 gauge (red) 60" length
	1	Wire 16 gauge (black) 60" length
A	2	Medium size insulated alligator clips (60 series)
B	2	Small size insulated alligator clips (30 series)
C	1	Normally Open snap switch part # 56385615
D	2	.250 (1/4) insulated female connectors part # 56244138

SWEEPING SYSTEM

SKIRT IDENTIFICATION AND REPLACEMENT

FIGURE 7

	Qty	Description
AG	2	Broom Housing Skirt
AH	2	Broom Door Skirt
AI	1	Rear Skirt
AJ	1	Rear Skirt



SWEEPING PERFORMANCE CHECK LIST

Complaint	Possible Cause
Leaving debris behind	Rear skirt damaged
	Main broom worn
	Main broom out of adjustment
	Hopper full
Debris coming out sides	Worn side skirts
	Main broom not level
	Hopper full
Not sweeping evenly	Rear skirt worn
	Main broom not level
	Main broom worn
Side broom kicking out debris	Side broom out of adjustment
	Side broom angle not correct
Poor sweeping performance	Main broom worn
	Main broom out of adjustment
	Worn skirts
	Wrong type of broom or broom material

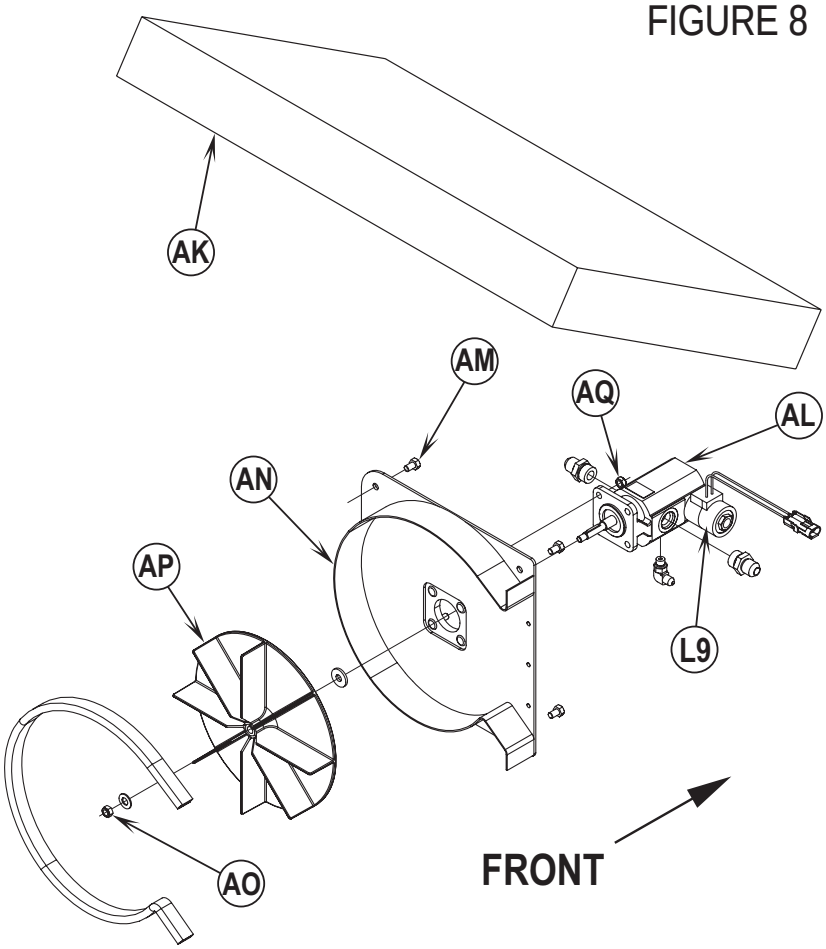
IMPELLER MOTOR REMOVAL

⚠ WARNING!

Remove key and disconnect battery before servicing impeller.

1 Raise and support hopper cover.
2 See Figure 8. Raise and support shaker assembly and remove Filter (AK).
3 Remove 11 bolts from access cover and remove cover.
4 Remove three hoses to impeller Motor (AL). Note: There may be oil in hoses and motor be prepared to cap motor and plug hoses. Mark hose locations for reassembly.
5 Disconnect two-wire connector at the L9 Impeller Solenoid Valve. Next remove the four Bolts (AM) from Impeller Bracket (AN) and remove impeller assembly from machine.
6 Remove center Nut (AO) and washer from impeller motor shaft and remove Impeller Fan (AP).
7 Remove the four Nuts (AQ) from impeller bracket and remove motor from bracket.
8 Reassemble in reverse order. Note: Be sure the impeller assembly is mounted with the case drain (small hose) on motor facing down.

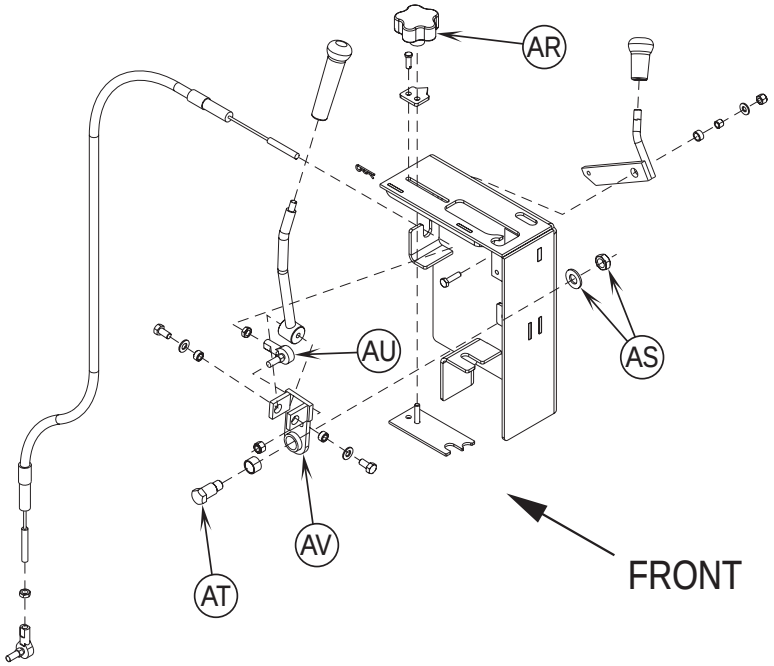
FIGURE 8



MAIN BROOM LIFT CABLE REPLACEMENT

1 Remove both side brush deck skirt assemblies and also the squeegee tool.
2 Drain the recovery tank then remove the tank completely from the machine by disconnecting its support strap and wiring connector. This is done to access the broom cable and solution cable inspection cover.
3 Remove the inspection cover held in place by (2) screws.
4 Loosen the broom height adjustment Knob (AR) and lower the broom lever.
5 See Figure 9. Remove Nut and Washer (AS) and Shoulder Bolt (AT) to gain access to the cable ball joint connector.
6 Remove the Cable Ball Joint End (AU) from the Pivot Bracket (AV) then remove the ball joint and jam nut from the cable end.
7 Loosen the cable anchor hardware (jam nuts) & pull the cable casing from the mounting bracket slot.

FIGURE 9



SWEEPING SYSTEM

MAIN BROOM LIFT CABLE REPLACEMENT (CONTINUED)

8 Start the engine and lower the scrub deck and then remove the rear engine panel to access the exhaust system.

⚠ CAUTION!

Allow a hot exhaust system to cool before disassembling.

9 See Figure 10. Remove the (2) item (AW) Exhaust Flange Bolts and separate the exhaust pipe inlet tubing Connection (AX). Next remove the Muffler Clamp (AY) and separate the outlet exhaust Tube (AZ) from the muffler.

10 From underneath the machine remove the (3) item (BA) Screws that secure the muffler assembly to the chassis and move it to the side to gain access to the broom lift cable Hanger Weldment (BB). Then remove the cable ball joint end from the broom hanger mount.

11 Loosen the cable casing anchor jam nuts and pull the cable from its mounting bracket. Note: Also remove the jam nuts from the cable casing.

12 Remove the A1 controller access panel (4 screws) located in the driver's compartment below the solution lever.

13 Remove the A1 control box to help route the cable through the machine chassis.

14 Remove all the jam nuts from the new cable then attach securely the new cable to the old cable at the lower broom hanger.

15 Remove the cable by pulling on the original cable from the operator's handle. Guide the old cable out and at the same time fish the new cable up through the frame and control box opening and reattach at the operator's handle.

16 Reattach both cable ends and adjust the cable's anchor connector ends to obtain the correct broom raise/lower operational limits. See Figure 11 for approximate cable anchor mounting dimensions.

17 Reinstall all the previously removed components and reset the correct broom pattern width of between 2-3 inches (50-75mm).

FIGURE 10

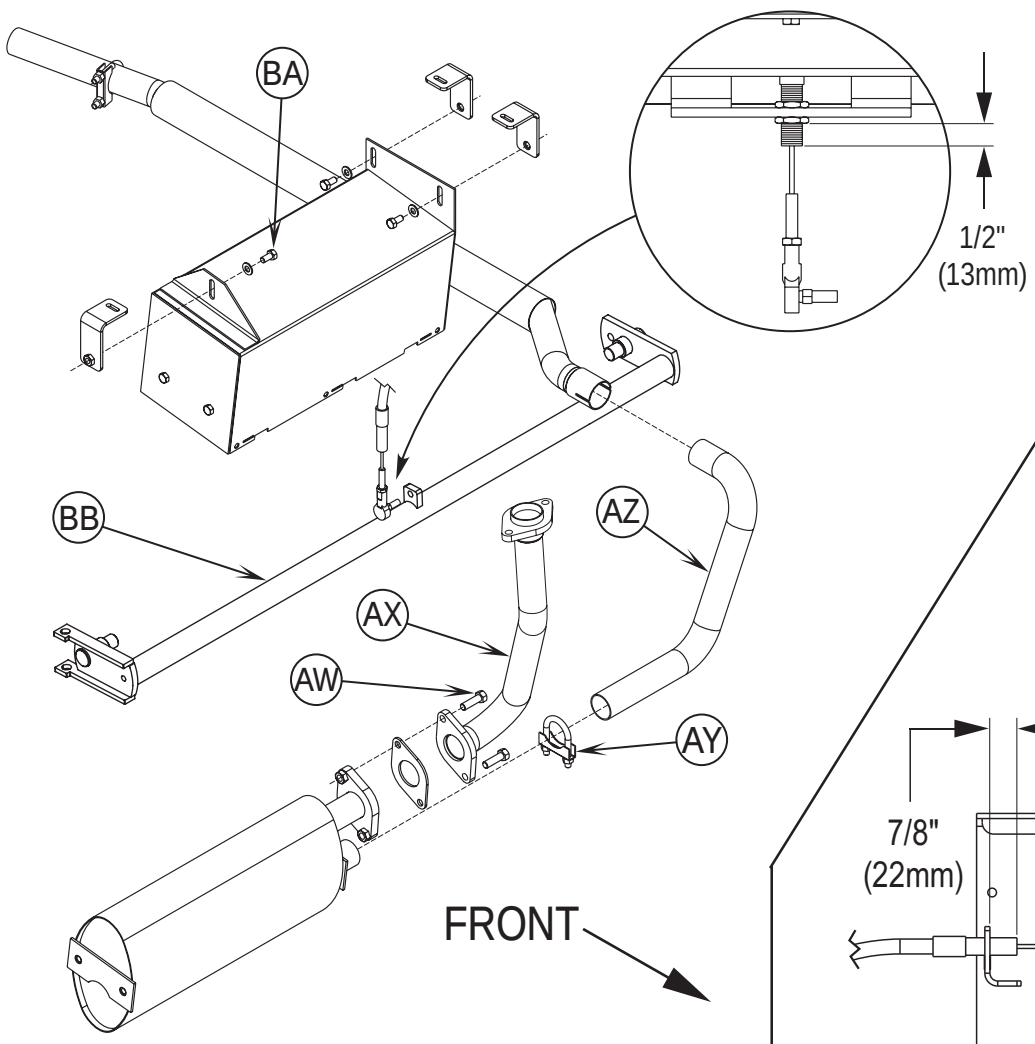
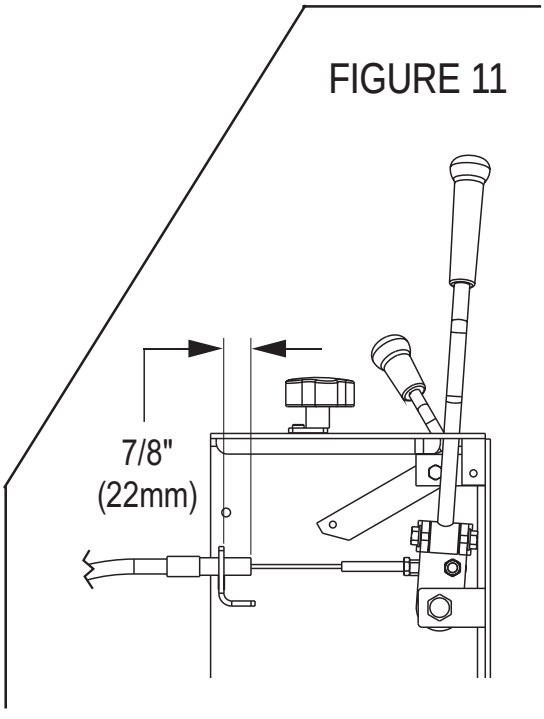


FIGURE 11



SEALS AND SKIRTS IDENTIFICATION AND REPLACEMENT

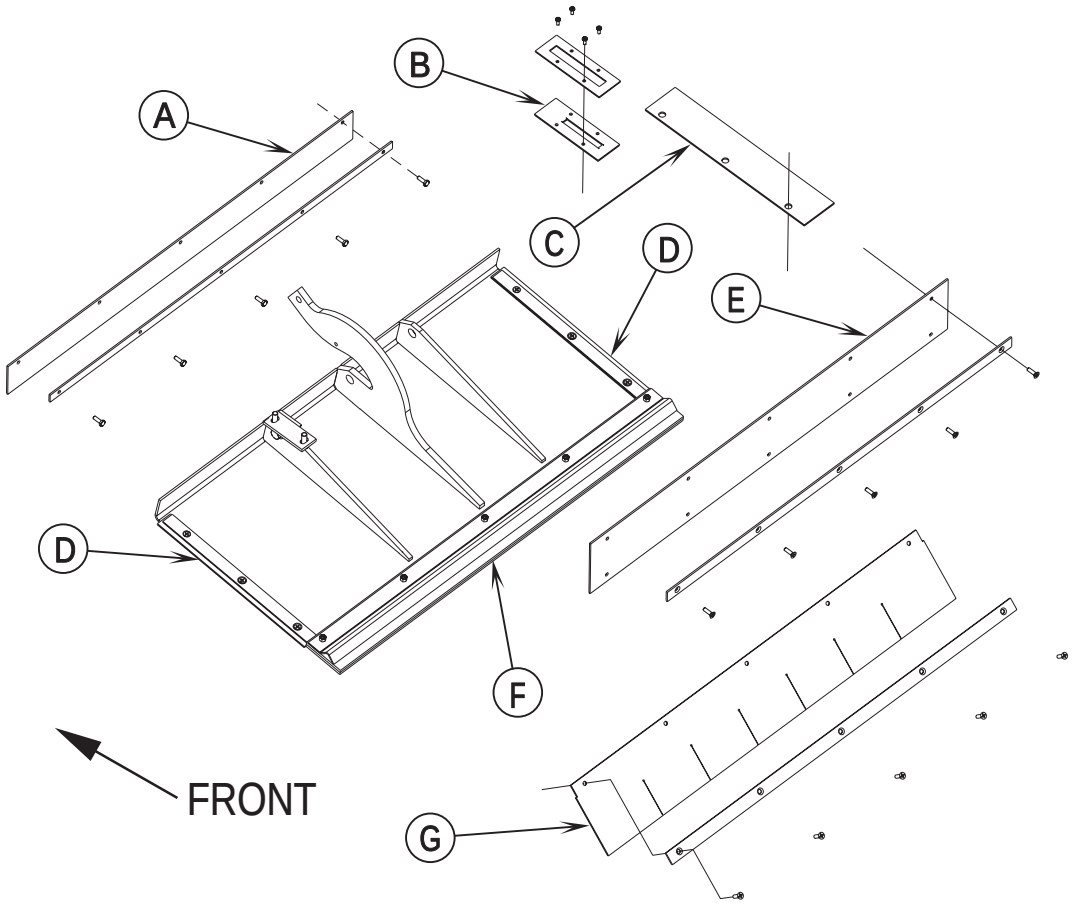
To access: Hopper should be empty. Raise and support the hopper, open the dump door.

⚠ WARNING!

Do not have engine running when working under hopper.

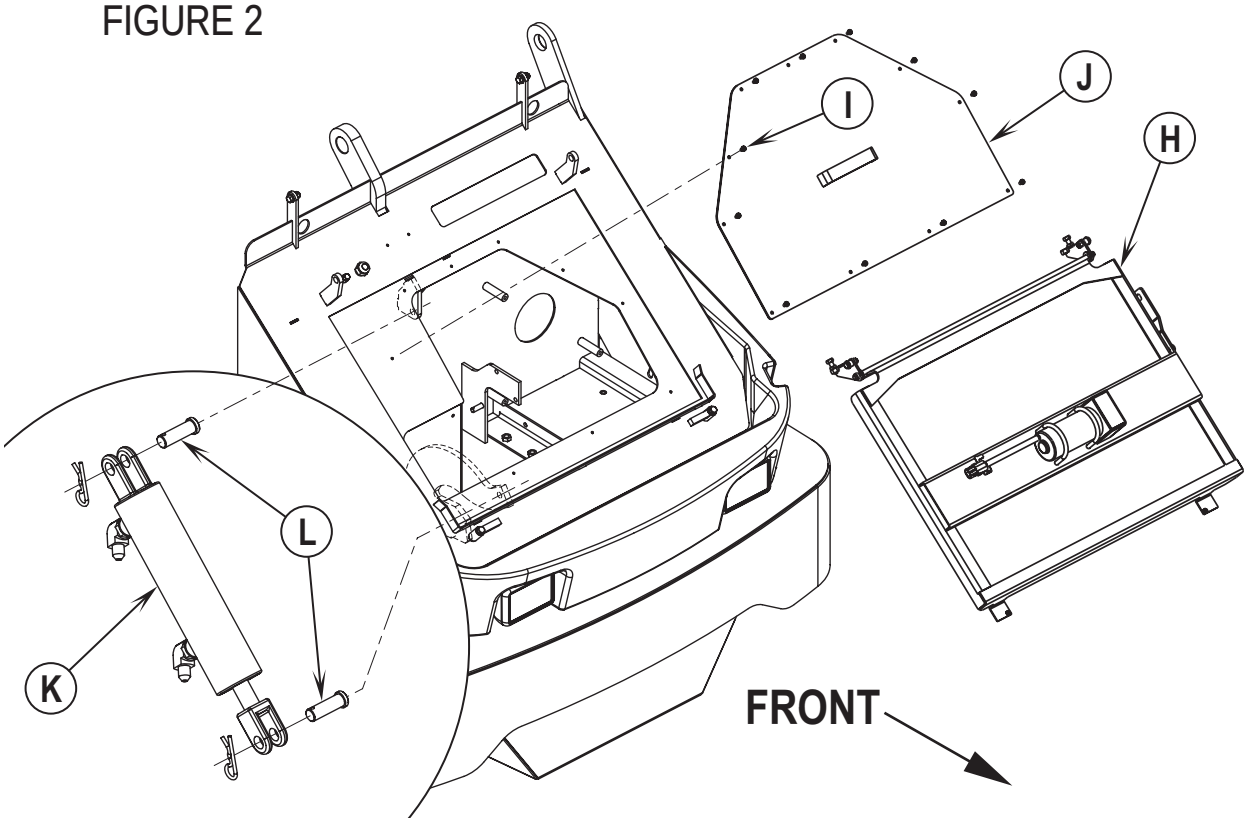
	Qty	Description
A	1	Blade
B	1	Hopper Boot
C	1	Dust Shield Blade
D	2	Dump Door Wiper
E	1	Seal Horizontal
F	2	Hopper Door Blade
G	1	Hopper Skirt

FIGURE 1



HOPPER SYSTEM

FIGURE 2



DUMP DOOR CYLINDER REMOVAL

To access:

1 Raise Hopper Cover and engage hopper cover prop rod.
2 See Figure 2. Raise and support Shaker Assembly (H).
3 Remove filter assembly.
4 Remove (11) Bolts (I) and remove Access Panel (J).

To remove cylinder:

1 Remove the two hoses from Door Cylinder (K). Note: Mark hose locations to insure correct connections when reassembling.

⚠ CAUTION!

There may be oil in hoses and cylinder, be prepared to plug hoses and cap cylinder connections.

2 Remove lower and upper cotter pins and Cylinder Pins (L).
3 Remove cylinder.

To reassemble:

1 Mount cylinder end to upper mounting bracket using pin and cotter pin.
2 Pull cylinder rod out until clevis meets with dump door arm.
3 Mount cylinder rod end to dump door arm using pin and cotter pin.
4 Reconnect the two hoses in correct position.
5 Check for proper operation and leaks.
6 Reinstall access cover and filter assembly.
7 Close Hopper Cover.

HOPPER LIFT CYLINDER REMOVAL

Note: To remove the cylinder it is necessary for the hopper to be in the raised position. If the cylinder will not raise under its own power it will be necessary to press and hold the hopper raise switch with the key switch on and raise the hopper with an overhead hoist or some other alternate method. The reason the hopper switch needs to be activated is to turn on the hydraulic solenoid cartridge to allow the cylinder oil to return to tank.

⚠ CAUTION!

There will be oil in cylinder and hoses, be prepared to plug hoses and recover cylinder oil.

⚠ WARNING!

Use common sense safety practices when performing this repair.

⚠ WARNING!

When removing the hopper cylinder do not rely solely on prop rod to support hopper. Support the hopper with some additional means such as overhead hoist, stands etc.

To Remove:

1 Raise the hopper and pull the safety prop rod into position then lower hopper until the rod is secure.
2 Turn the engine off and then disconnect the battery.
3 Separate the engine's ECU module-wiring harness located on the front engine access panel, then remove the engine access door panel.
4 Remove the Retaining Ring (M) from the Rod Pin (N) and completely remove the pin.
5 Remove the Screw (O) that fastens the lower Hinge Pin Weldment (P) to the chassis then pry pin to the side.
6 Pull the hopper cylinder forward and remove the two hydraulic hopper cylinder hoses to complete cylinder removal from machine (mark hoses for correct installation).

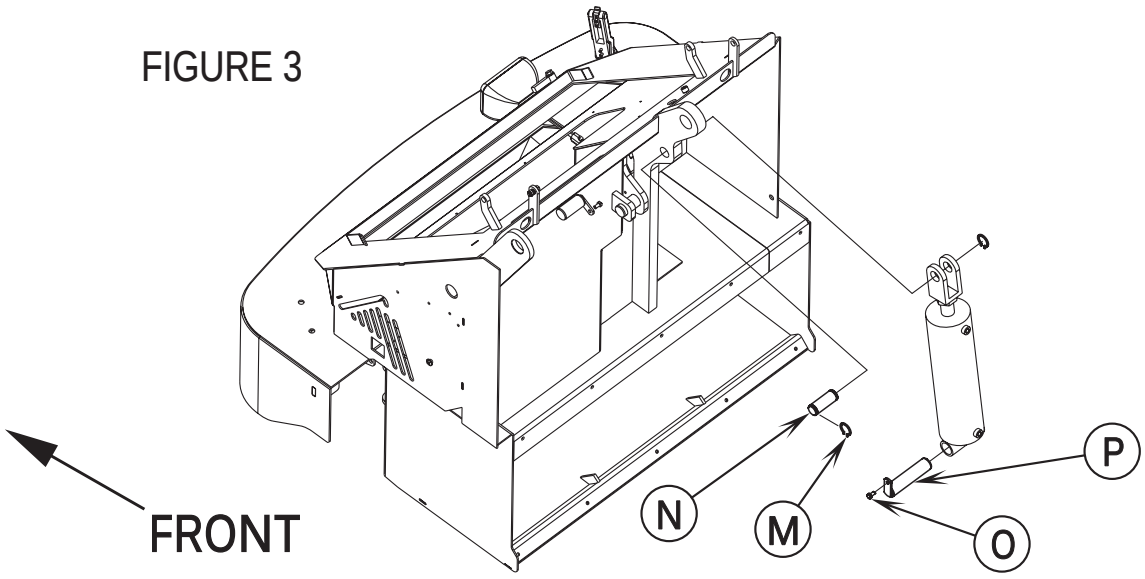
⚠ WARNING!

Make sure hopper is securely supported before working under hopper.

To Install:

1 With the hopper securely supported, mount the cylinder piston end to the chassis and pry the pin weldment back into position and secure in place with previously removed screw.
2 Pull the cylinder rod end out until you are able to align (match up) the cylinder rod clevis to hopper mount (don't install pin at this time). Then reconnect the two cylinder hoses and secure the cylinder rod end to the hopper with its pin and retaining rings.
3 Reinstall the front engine access panel and also reconnect the ECU module wiring harness. Next reconnect the battery, start engine and raise hopper to release safety prop rod. Then run the cylinder up and down several times and check for leaks.

FIGURE 3



SOLUTION SYSTEM

SOLUTION TANK REMOVAL

1 Drain both the solution and recovery tanks using the tanks' drain hoses, then start machine and lower the scrub deck.
2 Remove the A1 control board Access Panel (A) and disconnect the solution float wire harness connector.
3 Swing open the recovery tank, separate the support strap, and disconnect tank full indicator wiring harness and lift tank off its hinge plate.
4 Remove the fuel tank. Investigate any special precautions in proper handling of the different fuel types (gasoline, LP and diesel fuel).
5 Remove the tail light panel secured by (3) Screws (B).
6 See Figure 1. Remove the (5) Hex HD Screws (C) that fastens the solution tank to the chassis.
7 Loosen the Hose Clamp (D) at the solution tank feed outlet fitting. Note: Remove the solution filter housing bowl to allow the needed access for the clamp.
8 Lift the left rear corner of the solution tank and tilt tank towards operator side, then brace properly to support (may use tail light panel).

SOLUTION VALVE CONTROL CABLE REPLACEMENT

1 Drain the recovery tank then unlatch and swing it open to access the broom and solution cable inspection cover.
2 Remove the inspection cover held in place by (2) screws.
3 Remove the right side brush deck skirt assembly and also the squeegee tool.
4 Start engine and lower the brush deck, then turn the engine off. This is done to gain service clearance at the solution valve cable attachment arm and mounting bracket.
5 Remove the cable ball joint end at the operator control handle bracket. Then loosen the cable casing anchor hardware and pull the cable free from its slotted mounting bracket.
6 Remove the A1 controller Access Panel (A) (4 screws) located in the driver's compartment below the solution lever.
7 Remove the A1 control box and relay bracket assembly to route the cable through the machine chassis.
8 From underneath the machine at the solution control valve arm remove its cable ball joint end. Next loosen the cable casing anchor hardware and pull the cable free from its slotted mounting bracket.
9 Remove the (2) cable P-clamps (E) that fasten the cable casing to the machine frame.
10 Attach (wire or tape together) a new solution cable to the end of defective cable at the solution valve. Note: Remove all hex nuts and ball joint end pieces from both the old and new cable to help reduce the overall diameter of the cable assembly for ease of installation.
11 Remove the cable by pulling on the original cable from the operator's handle. Guide the old cable out and at the same time fish the new cable up through the frame and control box opening and attach at the operator's handle.
12 Reassemble all mounting hardware and adjust the cable's anchor connector ends to obtain the correct On/Off solution handle movement.

TROUBLESHOOTING GUIDE

Problem	Possible Cause
Inadequate or no solution flow	No solution in the tank
	Main solution flow control valve lever is in the off position
	Clogged solution filter, valves, hoses
	Defective solution solenoid valve (L16)
	Solution system fault in the main controller A1*

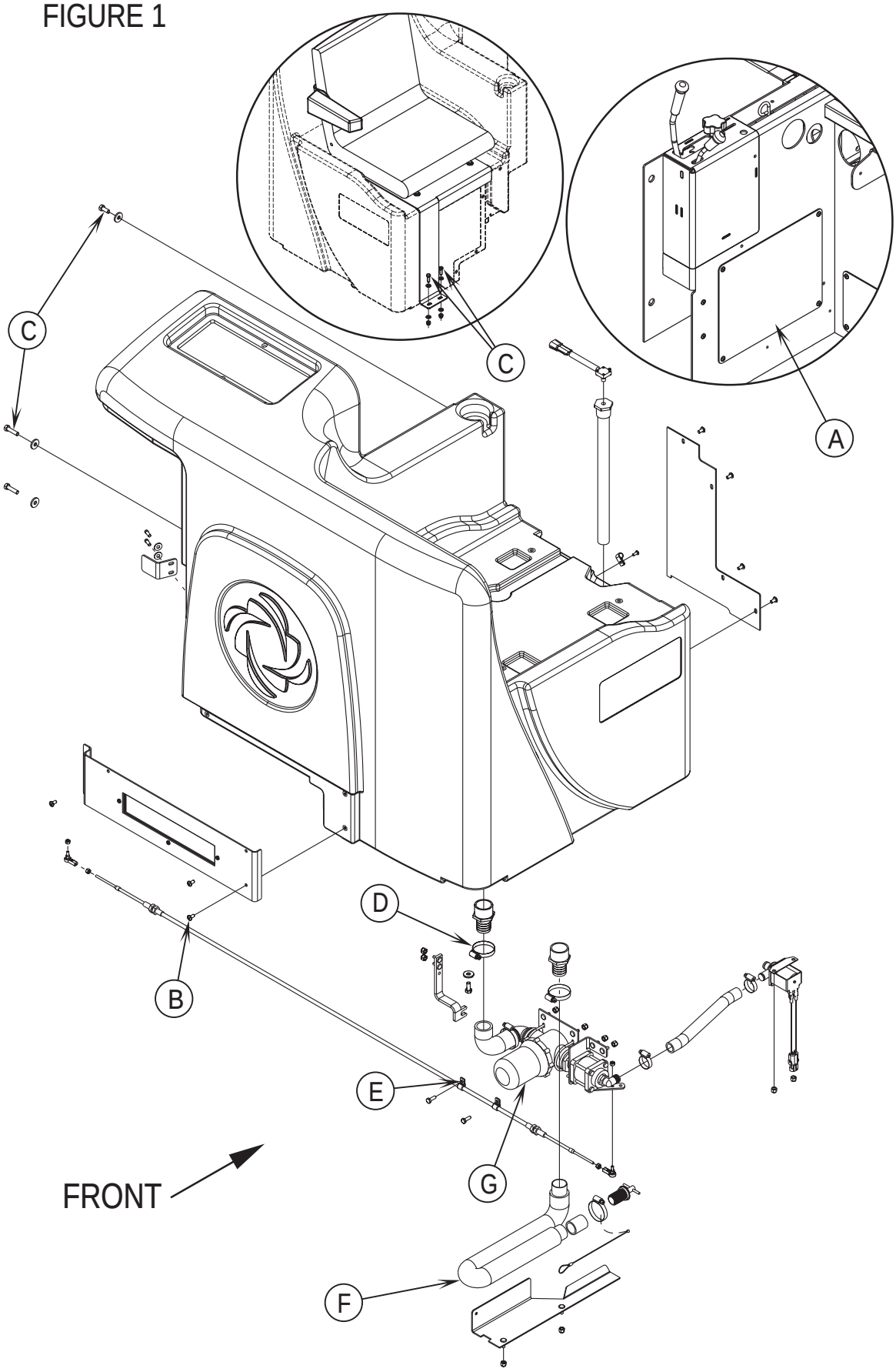
*Reference the *Main Control Board Troubleshooting Guide* in the Electrical System of this manual for further information.

SOLUTION SYSTEM MAINTENANCE

• Solution Tank: See Figure 1. Weekly empty the solution tank; remove the solution Drain Hose (F) from its storage area (located underneath the right side brush skirt frame). Direct the hose to a designated "Disposal Site" and flush the tank with clean water.

• Solution Filter: Important Service Tip You must first empty the solution tank (use drain hose) to prevent an uncontrollable loss of solution. Then service (remove and clean) the inline Solution Housing (G). To access the filter housing for removal, work underneath the solution tank (see solution system maintenance decal attached to chassis). No tools are needed to remove the filter (hand tighten only).

FIGURE 1



SCRUB SYSTEM

SCRUB DECK ASSEMBLY REMOVAL

1 Remove both scrub deck side skirt assemblies. Then lower the scrub deck and leave the scrub brushes on so that the deck can slide easily to remove.
2 See Figure 1. Loosen the Hose Clamp (A) and pry the solution feed hose off from the solution manifold barbed Fitting (B).
3 Important General Service Note: When removing hydraulic hoses cap and plug all open hoses and fittings. This will help prevent dirt from entering hydraulic system and reduce oil leakage.
4 Remove the inside hydraulic hose #41 from the right side brush drive motor (inboard fitting).
5 On the center brush motor remove the #46 case drain hose (small hose).
6 Remove the (4) (C) Nuts and (D) Screws that fasten the Lifting Arms (E) to their scrub deck mount holes. Service Note: Be careful not to lose the deck lifting arm Bushings (F).
7 Using the steering wheel turn the rear drive wheel so that the drive motor points toward the rear of machine (tire right angle to chassis).
8 Remove the scrub deck lift cylinder Screw (G) from its deck mount. Service Note: Then raise by hand either end of scrub deck to retract (shorten) deck cylinder to allow needed clearance so the cylinder rod clears the deck-mounting pocket.
9 On the left side of the deck assembly remove the two hoses #16 & #18 as shown. Service tip: Mark hoses for proper re-installation.
10 From the left side brush motor remove the #22 case drain hose, then remove the two bulk head fittings and Nuts (H) (P.N. 56900404) that are the hose feed connections for the previously removed hoses #16 & #18.
11 Complete the deck removal by pulling the deck assembly out from underneath the machine by maneuvering it around the remaining hoses and lift arms.

SCRUB DECK ASSEMBLY INSTALLATION

Installation note for the lower scrub deck lift cylinder mounting bolt: Position the bottom end of the hydraulic lift cylinder directly over its deck mount attachment point (pocket). Then start engine (run at high speed) and lower the cylinder by pressing either the operator increase or decrease switch. With the cylinder extended insert the Mounting Bolt (G) and tighten to finish the deck installation.

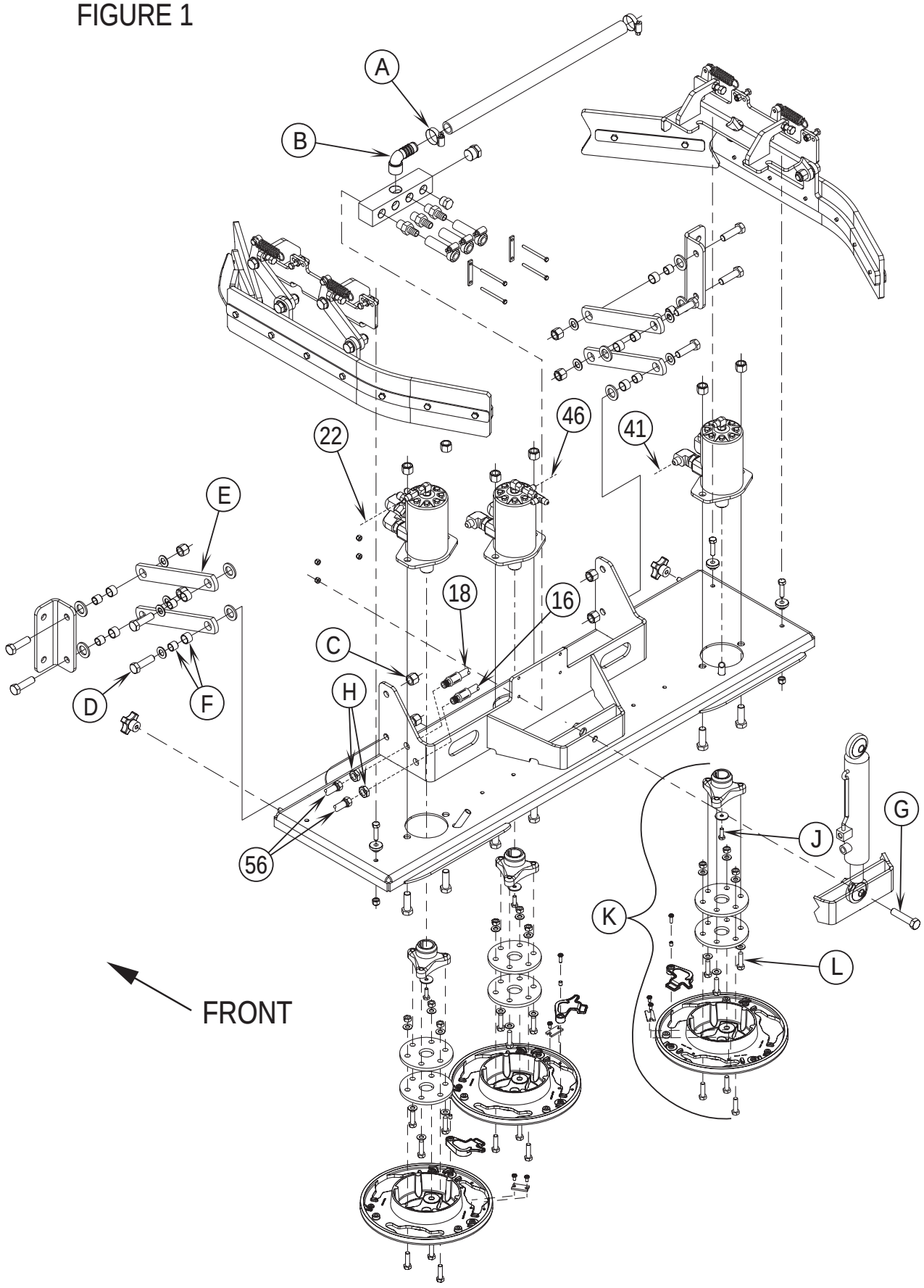
SCRUB DECK CYLINDER REMOVAL

1 Remove both scrub deck side skirt assemblies. Next remove the scrub brushes and then lower the scrub deck.
2 Remove the scrub deck lift cylinder Screw (G) from its deck mount. Service Note: Then raise by hand either end of scrub deck to retract (shorten) deck cylinder to allow needed clearance so the cylinder rod clears the deck-mounting pocket.
3 Remove the two hydraulic hoses from the cylinder (cap & plug).
4 Remove the front solution tank panel (location operator's compartment). This allows the needed service access to the top cylinder mount bracket.
5 Remove the hex HD screw that secures the cylinder then remove the cylinder through the bottom of the machine.

SCRUB BRUSH MOTOR REMOVAL

1 Remove the scrub deck assembly by following the *Scrub Deck Assembly Removal* instructions in this manual section.
2 With the scrub deck assembly removed tip it on its edge to access the non-functioning brush motor and remove the scrub brush on the motor to be serviced.
3 See Figure 1. Remove the center drive hub retaining Screw (J), then pry off the complete Brush Holder Assembly (K) from the motor shaft. Service Tip: When experiencing difficulty removing the brush holder assembly (stubborn drive hub) it will be necessary to remove the (3) (L) Coupler Screws that fastens the brush holder to the drive hub. This will allow the needed work area to use a gear puller to remove the drive hub.
4 Identify the correct motor hose connections then remove hoses, cap and plug. Next remove the motor mounting hardware and separate the motor from the deck.

FIGURE 1



RECOVERY SYSTEM

TROUBLESHOOTING GUIDE

If water flows around the ends of the squeegee tool, instead of being pulled into the tool, the vacuum system is not working properly. When a vacuum system performs poorly, it is usually because of one of the following problems:

Vacuum Leak(s) – Air flowing into the vacuum system past a bad gasket or leaky hose, damaged tank, or a leaky drain valve. A vacuum leak below the water line will create turbulence in the recovery tank, causing water to enter the vacuum motor.

Restriction(s) – Anything that blocks the flow of air through the system. Restrictions may also be caused by built-up debris in the squeegee tool, vacuum hoses, vacuum motor screen or wherever the airflow is forced to make a sharp turn.

Both leaks and restrictions decrease the quantity of air flowing through the squeegee tool. The air that does go through the squeegee tool moves slower, so it has less pick-up power.

VACUUM / RECOVERY SYSTEM SERVICE MAINTENANCE CHECKLIST

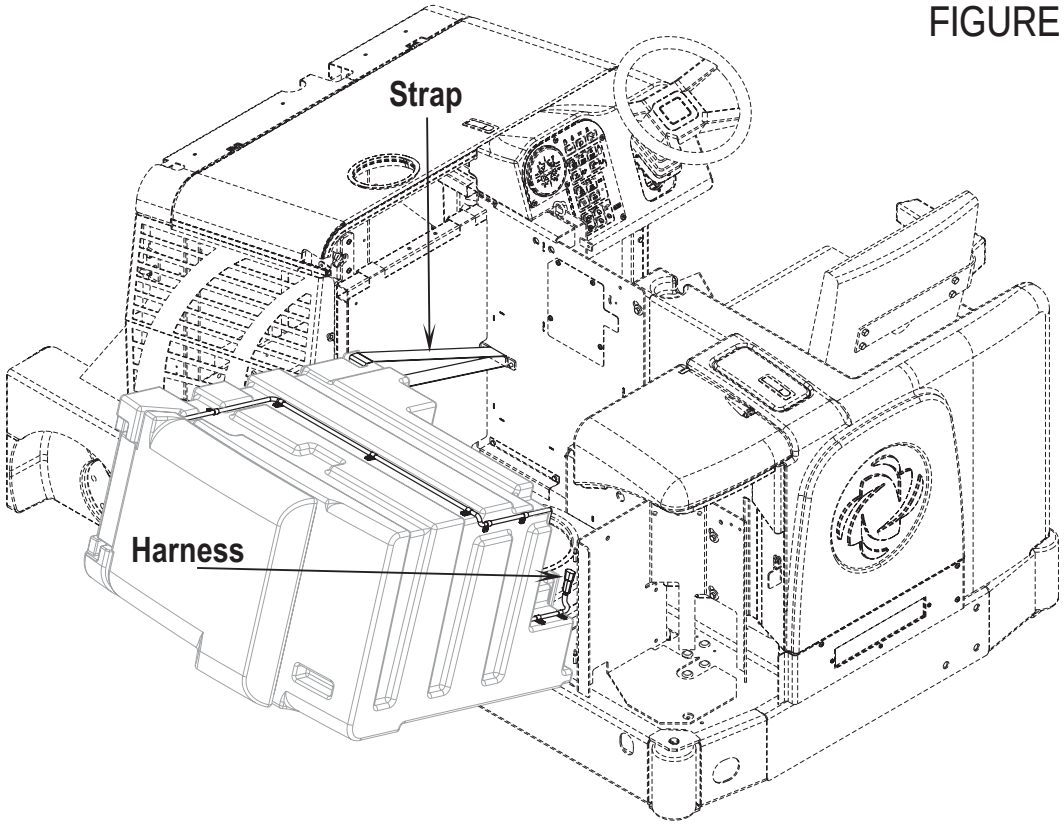
Whenever there is a vacuum problem, it's best to check over the entire system. Use the checklist below as a guide, to thoroughly check the vacuum system.

- ☐ Clean built-up dirt from the inside of the squeegee tool.
- ☐ Replace the squeegee blades if they are nicked or torn.
- ☐ Inspect the hose between the squeegee tool and the recovery tank, rinse any built-up dirt from the hose. Replace the hose if it is kinked or damaged.
- ☐ Inspect and make sure the gaskets on the recovery tank covers are sealing and not damaged.
- ☐ Inspect and clean the vacuum motor screen.
- ☐ Make sure that the recovery tank drain valve seals airtight.

RECOVERY TANK REMOVAL

1 Drain the recovery tank using the tank's drain hose. Unlatch the recovery tank latch, swing the tank open, disconnect tank full indicator wiring harness, separate the support strap and then lift the tank off its hinge plate.

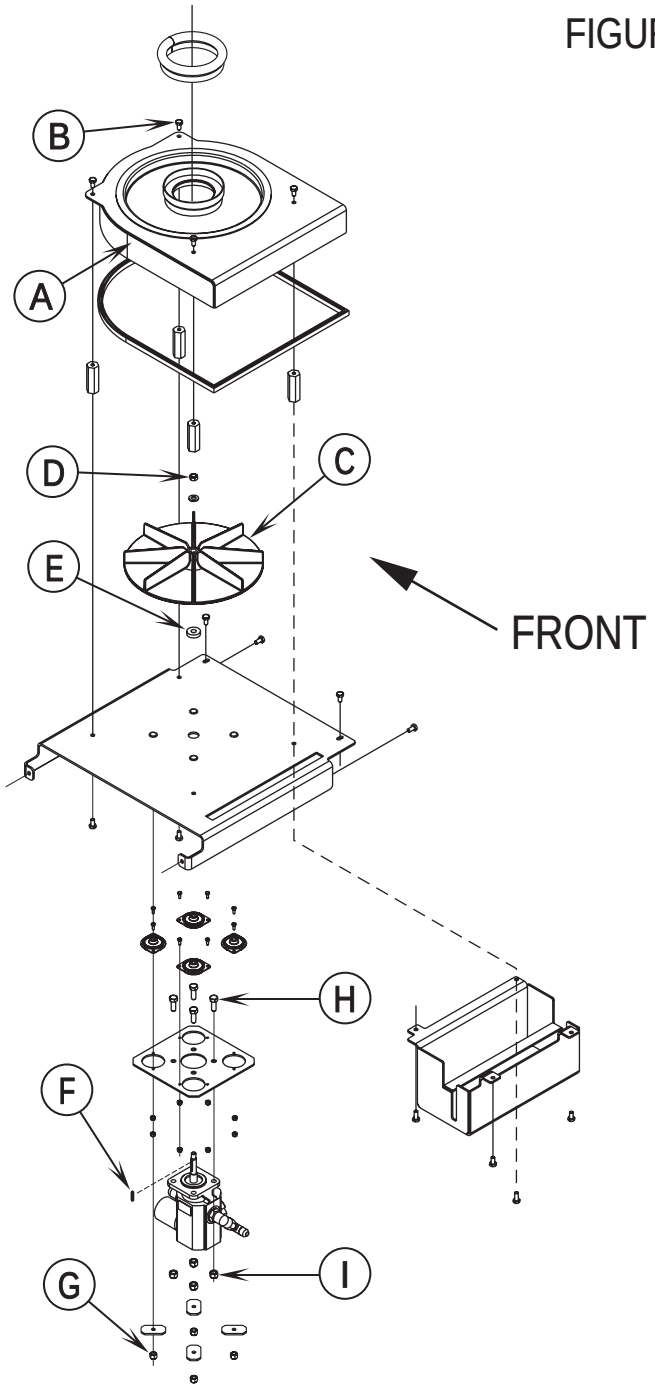
FIGURE 1



VACUUM FAN MOTOR REPLACEMENT

1 Remove recovery tank; following the steps in *Recovery Tank Removal* manual section.
2 See Figure 2. Remove the Top Plate (A) held in place by (4) item (B) hex HD screws.
3 Remove the Vacuum Fan (C) secured by the Hex Nut (D). Note: Do not lose the Fan Spacer (E) and the Keyway (F).
4 Remove the three hydraulic hoses #18, #20 & #21 at the motor fittings. General Service Note: Cap and plug the motor fittings and hoses.
5 Remove the (4) item (G) Hex Nuts then separate the motor plate assembly from their mounting studs to remove assembly from the machine. Then remove the (4) Screws and Nuts item (H & I) that fastens the vacuum fan motor to its mount plate.
6 Reassemble the vacuum motor components in reverse order following the steps above and check for leaks and proper fan operation.

FIGURE 2



SQUEEGEE SYSTEM

SQUEEGEE MAINTENANCE

After each use, clean the squeegee tool and check the blades for damage. If the squeegee leaves water in the middle of its path or at both ends of its path, it probably needs to be adjusted. Reverse or replace the blades if they are cut, torn, wavy or worn.

To adjust the squeegee:

1 Park the machine on a level floor, lower the squeegee and drive forward a short distance.
2 See Figure 1. Loosen the two Squeegee Adjustment Lock Nuts (A).
3 Turn the two Squeegee Adjustment Bolts (B) counter-clockwise for forward tilt or clockwise for backward tilt. Pull forward a short distance after each adjustment to see if the rear squeegee blade touches the floor evenly across the entire width of the squeegee tool. Then re-tighten the two Nuts (A). NOTE: Hold Bolts (B) with wrench while tightening Lock Nuts (A).

To reverse or replace the rear squeegee blade:

1 Unlatch the Rear Squeegee Blade Latch (C) and remove the (2) Wing Nuts (D).
2 Remove both Rear Straps (E) and the Rear Squeegee Blade (F) from the machine.
3 The squeegee blade has 4 working edges. Turn the blade so a clean, undamaged edge points toward the front of the machine. Replace the blade if all 4 edges are nicked, torn or worn to a large radius.
4 Install the blade, following the steps in reverse order and adjust the squeegee tilt.

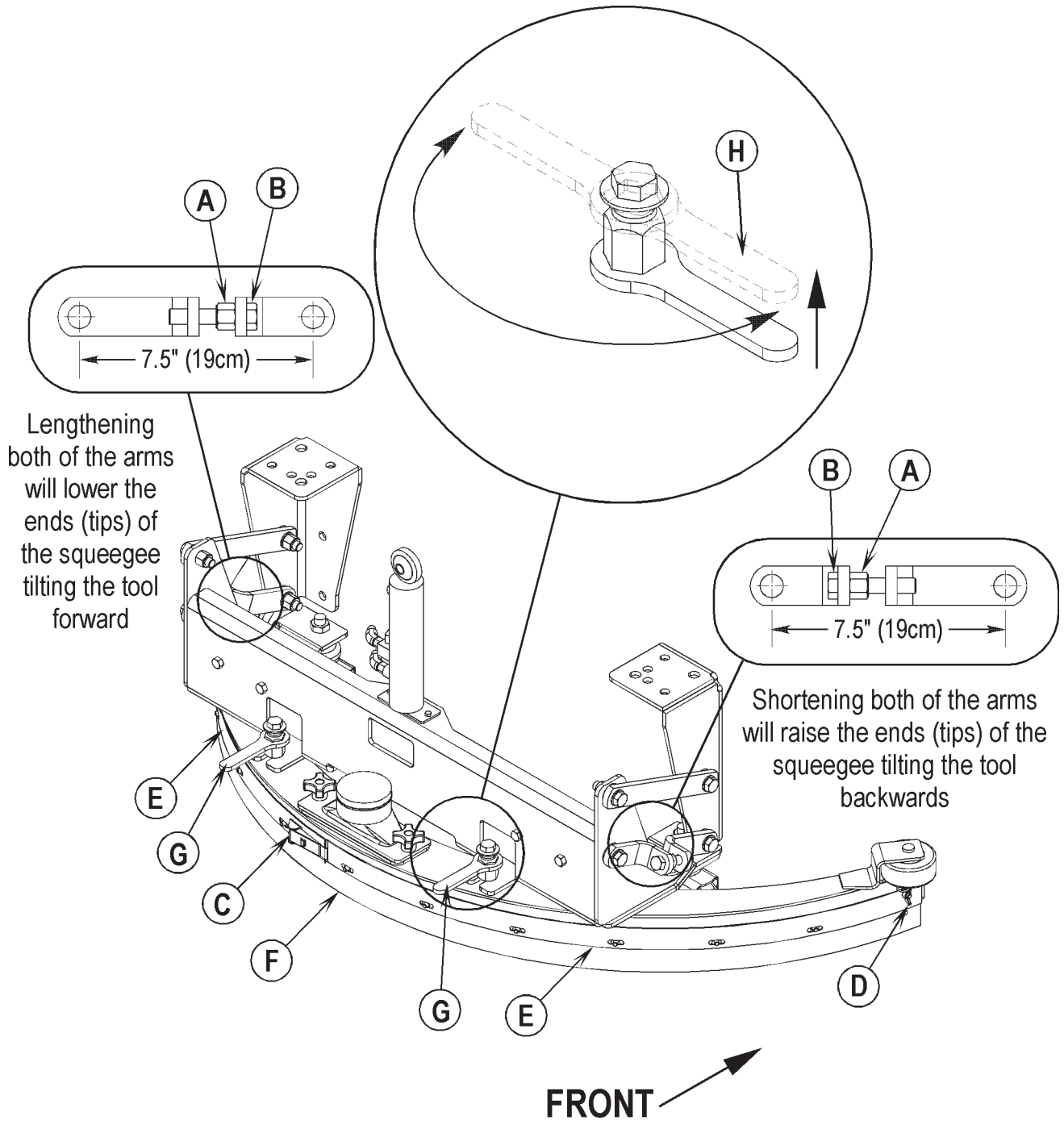
To reverse or replace the front squeegee blade:

1 Disconnect the Squeegee Hose from the squeegee tool.
2 Loosen the (2) Squeegee Levers (G) and slide the squeegee assembly off of the squeegee mount.

SERVICE NOTE: Depending on the position of the Squeegee Lever Handle (H), you may not be able to rotate the lever far enough to loosen or tighten depending on which you are trying to do. In this case, simply lift UP on the Handle (H) and rotate the lever in the direction necessary to acquire adequate turning space and then allow the lever to drop back DOWN into place on the hex. You can then either tighten or loosen as needed.

3 Remove all of the Wing Nuts from the front squeegee blade strap.
4 Remove the strap and blade from the squeegee assembly.
5 The squeegee blade has 4 working edges. Turn the blade so a clean, undamaged edge points toward the front of the machine. Replace the blade if all 4 edges are nicked, torn or worn to a large radius.
6 Install the blade, following the steps in reverse order and adjust the squeegee tilt.

FIGURE 1


A
B
7.5" (19cm)
Lengthening both of the arms will lower the ends (tips) of the squeegee tilting the tool forward
H
B
A
7.5" (19cm)
Shortening both of the arms will raise the ends (tips) of the squeegee tilting the tool backwards
E
G
C
F
G
E
D
FRONT

SQUEEGEE SYSTEM

REMOVAL OF SQUEEGEE MOUNT ASSEMBLY

1 Remove the squeegee tool assembly from the machine then start the engine and lower the squeegee mount.
2 See Figure 3. Remove the (4) Parallel Arms (J) (two per side) from the squeegee mount Towers (K) as shown. This will allow movement of the Mount Assembly (L) and allow easy access to the lift cylinder rod Nut (M).
3 Remove the lift cylinder rod nut. Next start the engine and raise the lift cylinder to separate it from the mount. This allows the needed clearance to remove the mount assembly from underneath the machine.

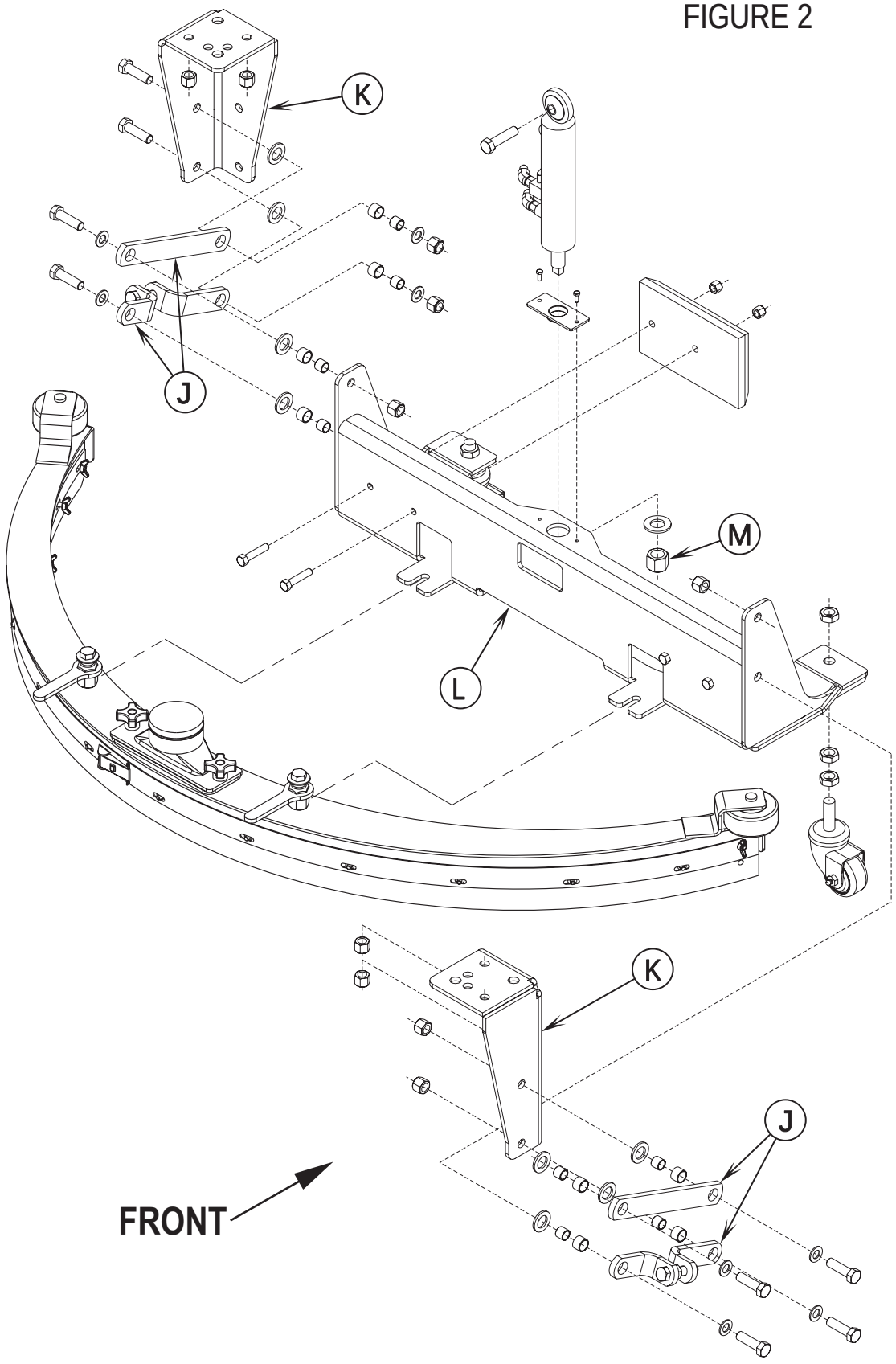
Reinstallation Steps

1 Position the mount assembly under machine and block up the center of the mount (3" approx.) then reattach arms. Note: Reference Figure 3 for the correct orientation of the L & R side arm assemblies.
2 Add additional blocking under the mount to raise it to where the cylinder rod end is installed through its mounting hole. Then install the washer and nut to retain the lift cylinder to the mount. Note: Tighten cylinder nut so there is no play between the cylinder and mount, but do not over-tighten.
3 Remount the squeegee tool and test squeegee for proper water pick-up. See in this manual *Squeegee Maintenance* for tool adjustment instructions.

SQUEEGEE LIFT CYLINDER REMOVAL

1 Remove the squeegee tool assembly from the machine then start the engine and lower the squeegee mount. This will allow easy access to the lift cylinder rod Nut (M) (see Figure 3).
2 Then remove the lift cylinder rod Nut (M). Next start the engine and raise (shorten) the cylinder to separate it from its mount.
3 Remove the two hydraulic hoses and plug and cap.
4 Remove the rear solution tank panel assembly (lighted lens) secured by (3) screws. This allows access to the cylinders top mount bracket. Remove the hex screw and pull the cylinder out from underneath the machine.
5 To reinstall follow the above directions in reverse order and test for proper operation and check for leaks.

FIGURE 2



ELECTRICAL SYSTEM

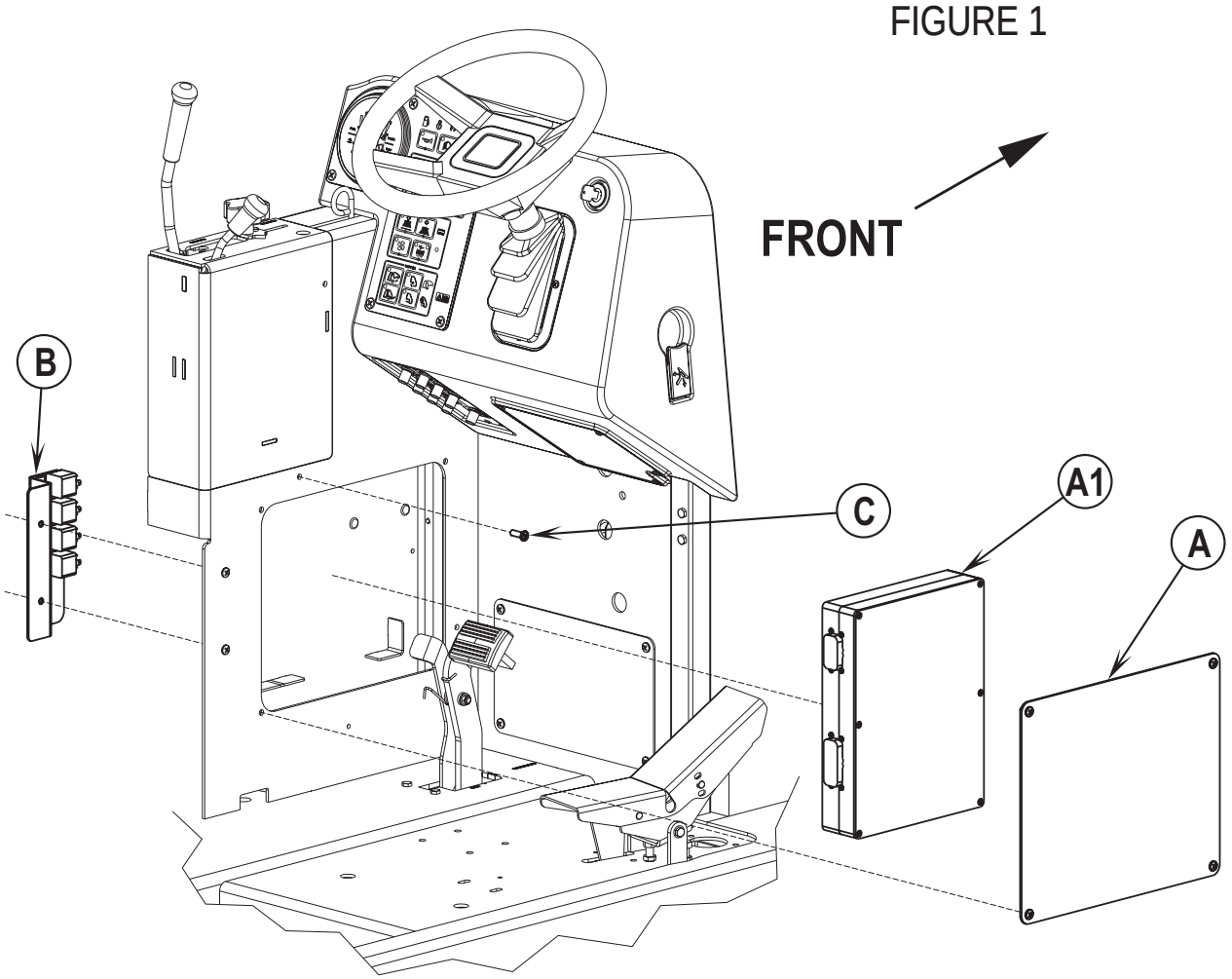
A1 MAIN CONTROL BOARD REMOVAL

⚠ WARNING!

Disconnect the battery before servicing.

1 Set the foot pedal activated parking brake (press it all the way forward).
2 Remove the A1 board's Access Panel (A) held in place by (4) screws.
3 Remove the Relay Bracket Assembly (B) fastened by (2) screws from the control board compartment. Then lay the relay bracket to the side onto the floor plate.
4 Disconnect the two wiring harness terminal connectors from the A1 board.
5 Optional step, remove the (C) Screw located at the upper left corner of the compartment opening. This will allow additional clearance to remove the board.
6 Carefully maneuver the tight fitting A1 board from its chassis compartment.

FIGURE 1



ENGINE DISABLED ECM REMOVAL

1 Turn the LP fuel tank service valve off if servicing an LP model.
2 Open the top engine cover and remove the long console cover, secured with (2) wing nuts.
3 Position a flashlight between the hopper (left side) and engine panel to view the purple colored ECM wiring connector.
4 Use a long handled flat bladed screwdriver on the purple ECM locking harness latch to gently pry up on and complete its disconnection from the ECM.
5 Next remove the left side metal engine cover to access the left front engine panel ECM escape passage.
6 Remove the front engine Belt Guard (D) fastened with (3) screws. Then remove the engine air Intake Hose (E) secured with (2) hose clamps.

ENGINE DISABLED ECM REMOVAL (CONTINUED)

7 If servicing a gasoline model skip the next two steps.

LP Model

8 Disconnect the wire connector at the LP fuel lock-off Valve (F). Then remove the LP Fuel Feed Hose (G) at the fuel lock-off valve.

⚠ CAUTION!

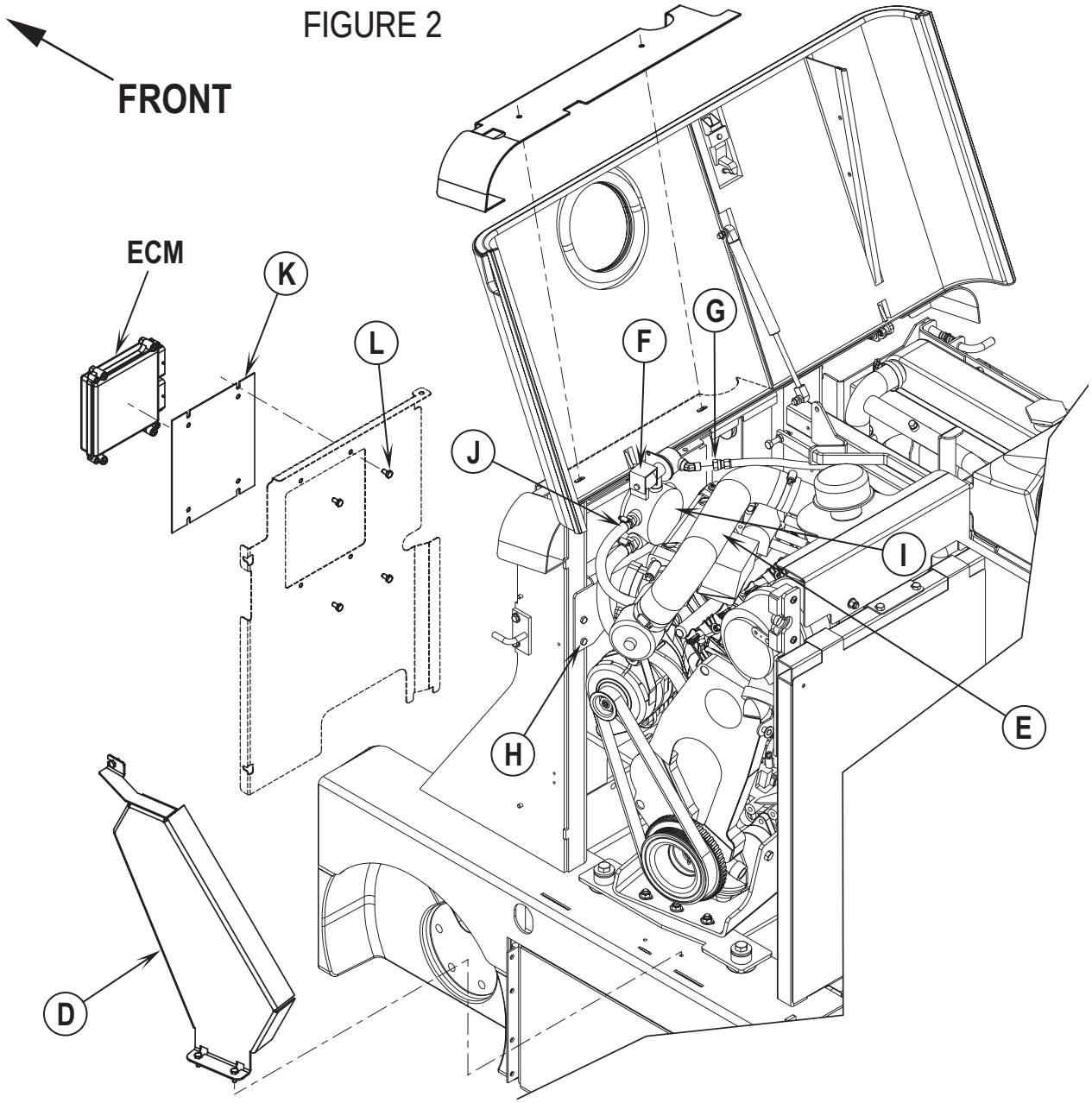
Wear gloves to protect hands from possible fuel frosting and vent trapped fuel in a well-ventilated area.

9 Remove the (2) Screws (H) that fasten the LP Regulator Assembly (I) to the machine chassis. Next using a small locking pliers pinch off the regulator's water Coolant Hose (J) (closest to the fuel lock-off valve). Then pull the regulator up enough to remove the coolant hose and clamp.

10 Position (hang) the complete fuel regulator assembly and mount on the outside of the engine compartment. This step is done to create the needed workspace (clearance) to access the ECM Escape Panel (K).

11 See Figure 2. Remove the (4) Hex HD Screws (L) which are partially covered by a piece of foam insulation. Then maneuver the ECM mount panel out of the escape opening passage to complete its removal.

FIGURE 2



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