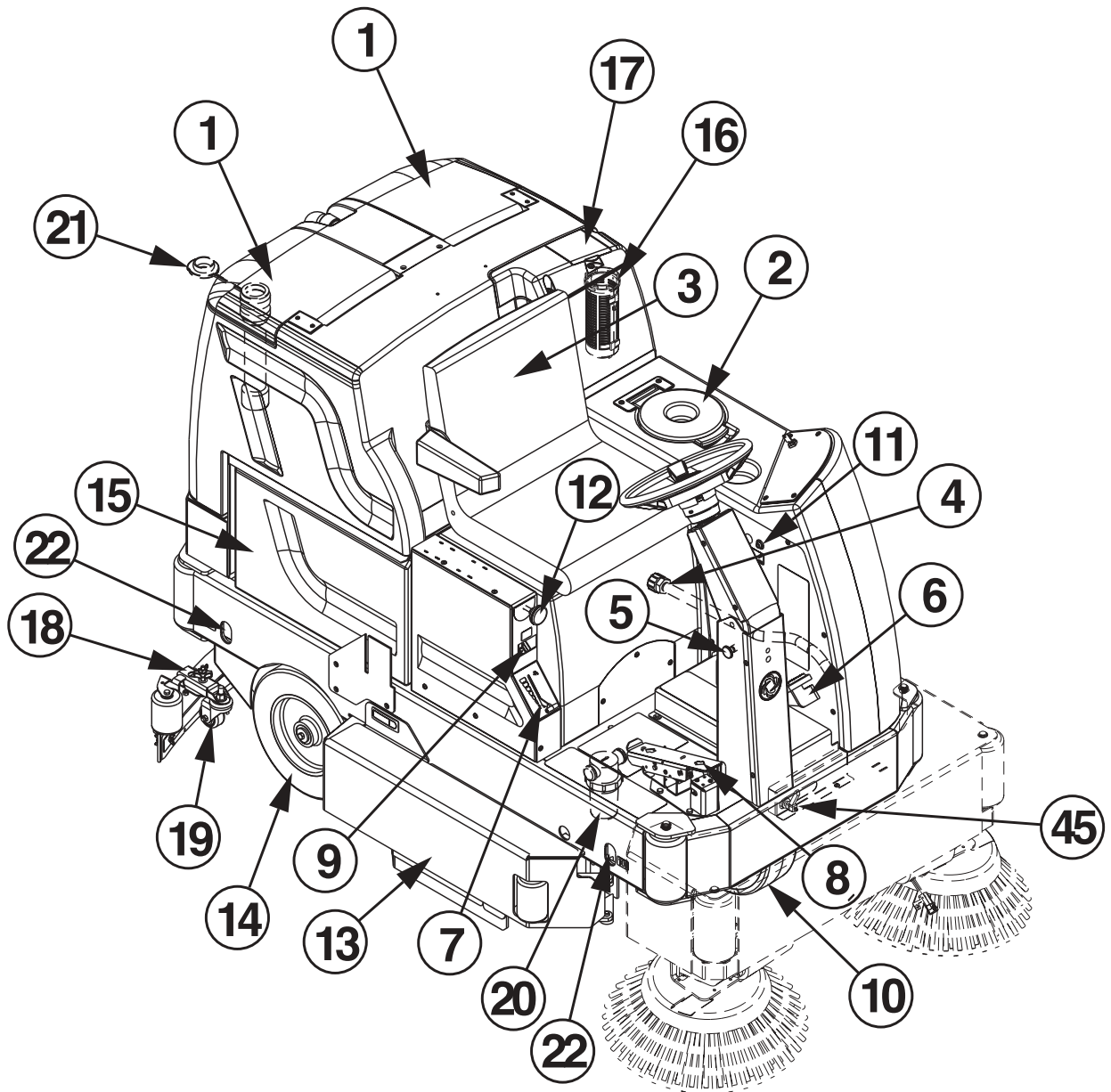


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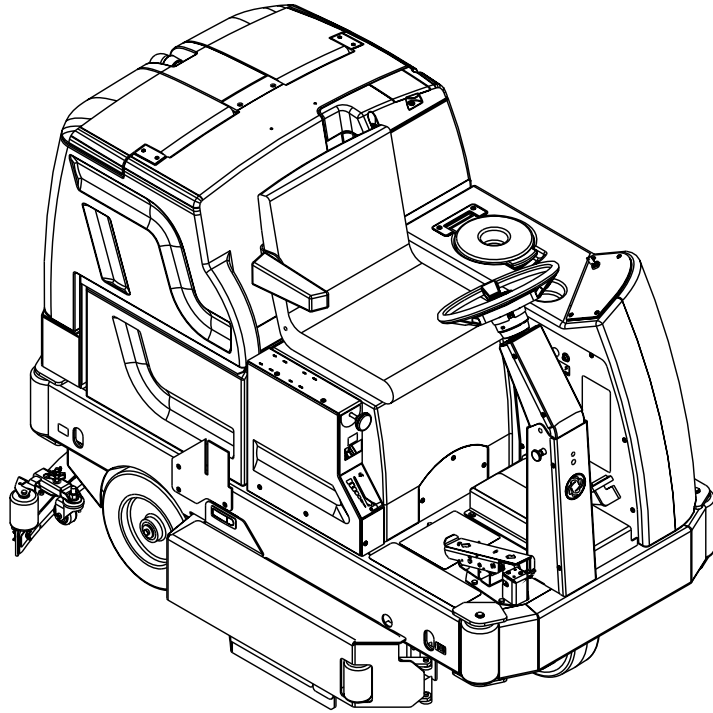
- | | | | |
|----|---|----|--|
| 1 | Recovery Tank Covers | 12 | Emergency Stop Switch / Battery Disconnect |
| 2 | Solution Tank Fill Cover | 13 | Scrub Brush Deck and Side Skirts |
| 3 | Operator Seat w/Safety Switch | 14 | Rear Wheel |
| 4 | Solution Tank Drain Hose | 15 | Battery Compartment |
| 5 | Steering Wheel Adj. Tilt Knob | 16 | Recovery Tank Shutoff Float |
| 6 | Brake Pedal & Parking Brake Set/Release Lever | 17 | Vacuum Motor Filter Housing |
| 7 | Solution Flow Control Lever | 18 | Squeegee Assembly |
| 8 | Drive Pedal Directional/Speed | 19 | Squeegee Casters |
| 9 | Charger Plug | 20 | Solution Filter |
| 10 | Drive and Steer Wheel | 21 | Recovery Tank Drain Hose |
| 11 | Circuit Breakers | 22 | Tie Down Locations (4) |
| | | 45 | Side Broom Wear Adjustment Lever |



Hydro-Retriever™ 3800

Hydro-Retriever™ 2042

BR 1100, 1100C, 1100C-XL



SERVICE MANUAL

**Advance MODELS 56410000 (disc), 56410350 (cyl.),
56410001 (2042), 56410500 (cyl. rollout),
56410501 (disc rollout), 56410502 (2042 rollout)
Nilfisk MODELS 56410002 (disc), 56410351 (cyl.),
56410425 (1100C-XL)**



**Nilfisk
Advance**

setting standards

1/01 revised 2/05 Form Number 56043058

KNOW YOUR MACHINE

DESCRIPTION OF INDICATORS ON THE CONTROL PANEL:

In general, the following guidelines apply to the control panel indicators:

A steady red indicator means that the function is inhibited for some reason. For example, if the scrub system is off and the operator is not on the seat, the scrub system indicator will be red indicating that the system cannot be turned on until the operator is on the seat.

A flashing red indicator means that a fault has occurred in the particular system. An example of this would be an over-current fault.

A yellow indicator means that the particular function has been enabled but is not currently on. For example, if a scrub mode is selected and the throttle is in neutral, the scrub system, vacuum, and solution indicators will all be yellow indicating that the systems are enabled and ready to turn on when the throttle is moved to forward or reverse.

A green indicator means that the particular system is on.

A flashing green indicator means that the particular system is in a delayed-off condition. An example of this is when a scrub mode is selected and the throttle goes from forward or reverse to neutral. When this happens the vacuum indicator will flash green indicating that the vacuum is still on but that it will be turning off after the delay period.

Scrub Mode Off Indicator (34):

- This indicator will be RED if the scrub system is inhibited for any reason. Possible reasons are:
 - Seat switch is open
 - The scrub deck has not returned to the UP position.
 - A system fault
 - Low voltage condition
- This indicator will be GREEN if the system is ready to be placed in either the normal or heavy scrub modes.
- This indicator will be OFF if either the normal or heavy scrub modes have been selected.
- This indicator will flash RED if there is a fault in one of the scrub system components. This will be accompanied by an error indication on the Hour Meter / Status Display (32).

Normal Scrub Mode Indicator (35):

- This indicator will be YELLOW if the normal scrub mode has been selected but the scrub motor is off. This will be the case if the throttle is in the neutral position. The scrub motor will stay on for approximately 3 seconds after the throttle returns to the neutral position.
- This indicator will be GREEN if the normal scrub mode has been selected and the scrub motor is on.
- This indicator will be OFF if the scrub mode is off or if the heavy scrub mode has been selected.

Heavy Scrub Mode Indicator (36):

- This indicator will be YELLOW if the heavy scrub mode has been selected but the scrub motor is off. This will be the case if the throttle is in the neutral position. The scrub motor will stay on for approximately 3 seconds after the throttle returns to the neutral position.
- This indicator will be GREEN if the heavy scrub mode has been selected and the scrub motor is on.
- This indicator will be OFF if the scrub mode is off or if the normal scrub mode has been selected.

Vacuum System Indicator (37):

- This indicator will be YELLOW if the vacuum/squeegee system is in the AUTO mode and the throttle is in the neutral position. This indicates that the vacuum system is enabled but the vacuum is currently off.
- This indicator will be GREEN if the vacuum is currently on. This indicates that the system is in the AUTO mode and the throttle is not in neutral or that the vacuum system is in the ON mode.
- This indicator will FLASH GREEN if the shutoff delay is keeping the vacuum on. This occurs if the vacuum system is in the AUTO mode and the throttle goes to the neutral position. This will also occur if the vacuum system is turned off while it was in either the AUTO or ON modes. The shutoff delay will turn the vacuum off after the delay period.
- This indicator will be OFF if the vacuum/squeegee system is in the OFF mode.

Vacuum System Fault Indicator (38):

- This indicator will flash red if there is a fault in the vacuum or squeegee systems. This will be accompanied by an error indication on the Hour Meter / Status Display (32).
- This indicator will be RED and the Hour Meter / Status Display (32) will show "FULL" if the recovery tank float valve has closed. If this indication occurs and the tank is not full, see the Troubleshooting section.

Solution System Indicator (28):

- This indicator will be YELLOW if the solution system is in the AUTO mode and the throttle is in the neutral or reverse positions. This indicates that the solution system is enabled but the solution flow is currently off.
- This indicator will be GREEN if the solution system is in the AUTO mode and the throttle is in the forward position. It will also be GREEN if the solution system is in the MOMENTARY ON mode. This indicates that the solution flow is currently on.
- This indicator will be OFF if the solution system is in the OFF mode.

Solution System Fault Indicator (24):

- This indicator will flash red if there is a fault in the solution system. This will be accompanied by an error indication on the Hour Meter / Status Display (32).

FUNCTIONAL DESCRIPTION OF CONTROL BUTTONS:

The controls were designed with one touch operation in mind. For single pass scrubbing the user can simply press one button and all systems on the machine will be ready to go.

For most single-pass scrubbing operations, the operator should only need to use the first three buttons on the control panel. These are the Scrub Off (25), Normal Scrub (26), and Heavy Scrub (27) buttons. For this reason these buttons are outlined in bright white on the control panel while the other buttons are outlined in a darker color.

Scrub Off Button (25) - Pressing this button when the unit is in a scrub mode will cause the following to occur:

- The scrub brushes will turn off
- The scrub deck will raise to the UP position
- The solution flow will be stopped
- The first time that this button is pressed, the vacuum/squeegee system will NOT be turned off. This is so that any remaining water may be picked up without having to turn the vacuum back on. If this button is pressed a second time (pressed after the scrub mode has been turned off) the squeegee will raise and the vacuum will shut off after a 6-second delay.

Normal Scrub Button (26) - Pressing the normal scrub button will enable the scrub system and set the scrub pressure to the last selected value for the normal scrub mode. The status display will momentarily display the scrub pressure setting. This is indicated by "PA" followed by a number. Subsequent presses of the normal scrub button will step the pad pressure setting through the allowable range up to the maximum value programmed for the normal scrub mode. Once the maximum value is reached the pressure setting will step back to 1. The factory default maximum for the normal scrub mode is 4. The following will occur when this button is pressed:

- The scrub deck will be lowered
- The vacuum and solution systems will be enabled (vacuum and solution modes = AUTO)
- As soon as a direction is commanded by the throttle (forward or reverse) the brushes will start turning and the vacuum will turn on. If the direction is forward, the squeegee will lower and the solution flow will start. If the direction is reverse, the squeegee will go to the up position and the solution flow will be stopped.

Heavy Scrub Button (27) - Pressing the heavy scrub button will enable the scrub system and set the scrub pressure to the last selected value for the heavy scrub mode. The status display will momentarily display the scrub pressure setting. This is indicated by "PA" followed by a number. Subsequent presses of the heavy scrub button will step the pad pressure setting through the allowable range up to the maximum value programmed for the heavy scrub mode. Once the maximum value is reached the pressure setting will step back to (normal scrub limit + 1). The factory default maximum for the heavy scrub mode is 7 (cylindrical) or 12 (disc). The following will occur when this button is pressed:

- The scrub deck will be lowered
- The vacuum and solution systems will be enabled (vacuum and solution modes = AUTO)
- As soon as a direction is commanded by the throttle (forward or reverse) the brushes will start turning and the vacuum will turn on. If the direction is forward, the squeegee will lower and the solution flow will start. If the direction is reverse, the squeegee will go to the up position and the solution flow will be stopped.

Vacuum Button (29) - This button is used to select the mode of operation for the vacuum/squeegee system. There are 3 modes of operation for this system. These modes are OFF, AUTO, ON. Following is a description of each mode and how they are selected.

OFF MODE: In this mode the vacuum is off and the squeegee is in the up position. As mentioned above, when a scrub mode is selected, the vacuum system will be placed in the AUTO mode. If it is desired to double-scrub (scrub without recovering the solution) the vacuum system can be turned off by pressing this button.

AUTO MODE: This mode is automatically selected when a scrub mode is selected. In this mode the squeegee will be in the down position unless the reverse direction is selected via the throttle. The vacuum will turn on if either direction is selected. While in this mode the vacuum will remain on for 10 seconds after the throttle returns to the neutral position. This is so that the solution in the squeegee and hose can be drawn into the tank. This mode can be selected independently of the scrub mode by pressing and releasing the vacuum button.

ON MODE: In this mode the squeegee will remain in the UP position and the vacuum will be on regardless of the throttle position. This mode is selected by pressing and holding the vacuum button for approximately 1.5 seconds. The vacuum mode must first be OFF before entering this mode. This mode is included in the event an external wand is to be used with this machine or if the operator wants to clean the squeegee using the vacuum hose.

Solution Button (30) - This button is used to select the mode of operation for the solution system. There are 3 modes of operation for this system. The modes are OFF, AUTO, MOMENTARY ON. Following is a description of each mode and how they are selected.

OFF MODE: In this mode the solution flow is turned off. As mentioned above, when a scrub mode is selected, the solution system will be placed in the AUTO mode. If it is desired to scrub without dispensing solution, the solution can be turned off by pressing this button.

AUTO MODE: This mode is automatically selected when a scrub mode is selected. In this mode the solution flow will be turned on whenever the forward direction is selected via the throttle. The solution flow will be turned off otherwise.

MOMENTARY ON MODE: This mode can only be selected when the scrub mode is OFF. Solution can be dispensed by pressing and holding the solution button. Solution will be dispensed for as long as the button is held. This is for pre-wetting the floor prior to scrubbing.

Presweep Dust Control Button (opt) (39) - Use this button in conjunction with the optional presweep kit. The dust control feature will only work when the brooms are running on the presweep unit.

Sweep System Control Button (2042 / BR 1100C-XL only) (43) - Use this button to turn the sweep system ON or OFF. The side brooms will only run when the scrub system is ON and the machine is in motion (not in neutral). If the scrub system is turned OFF while the sweep system is still ON, the side broom will automatically lower and run the next time the scrub system is turned ON.

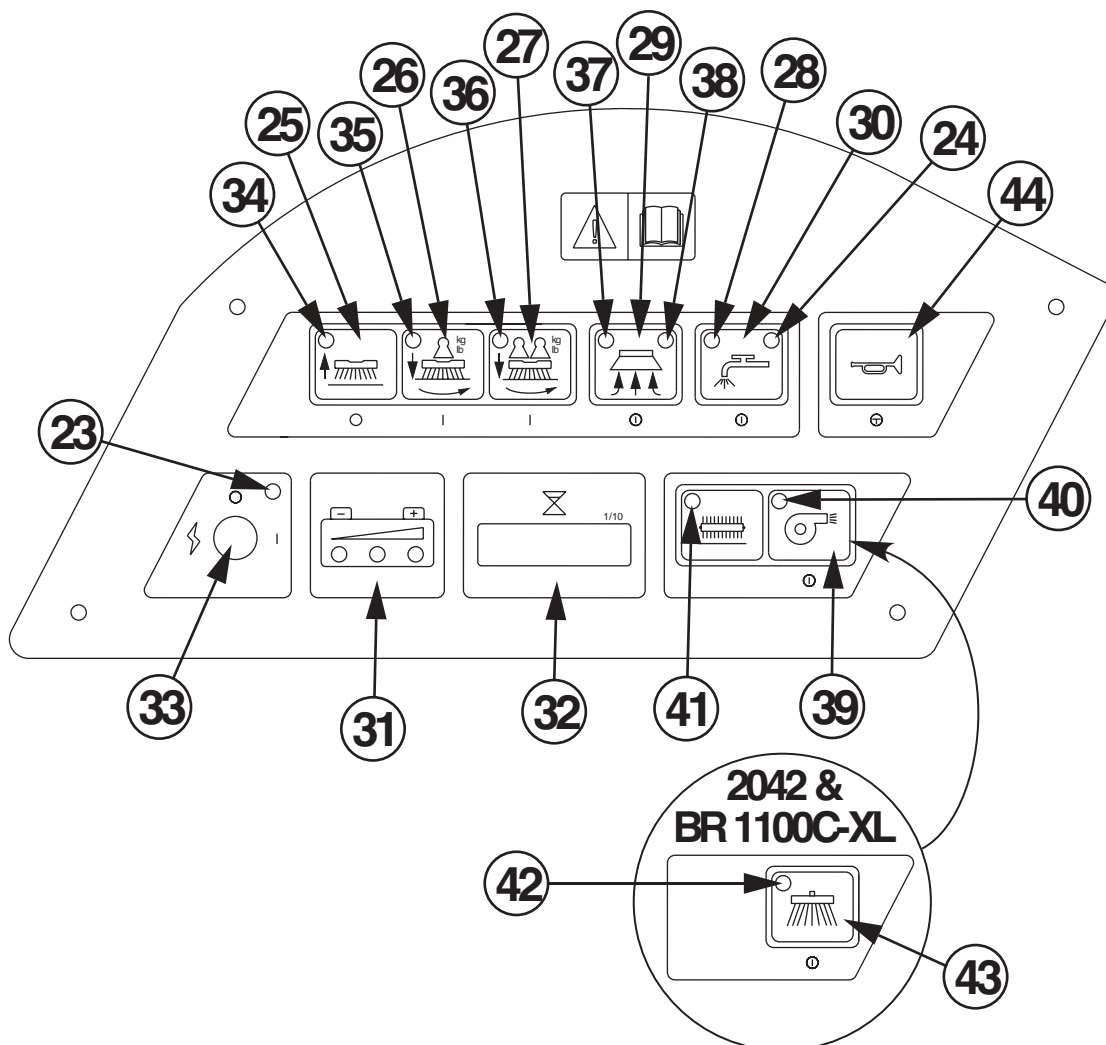
Horn Button (44) - Pressing this button will activate the horn.

Side Broom Wear Adjustment Lever (2042 / BR 1100C-XL only) (45) - Use this adjustment lever to periodically re-adjust the down limit of the side brooms as they wear. Loosening the lever, sliding it to the left and re-tightening it will cause the side brooms to drop closer to the floor.

KNOW YOUR MACHINE

CONTROL PANEL

- 23 Main Power Indicator
- 24 Solution System Fault Indicator
- 25 Scrub Off Button
- 26 Normal Scrub Button
- 27 Heavy Scrub Button
- 28 Solution System Indicator
- 29 Vacuum Button
- 30 Solution Button
- 31 Battery Condition Indicator
- 32 Hourmeter/Status Display
- 33 Master On/Off Key Switch
- 34 Scrub Mode Off Indicator
- 35 Normal Scrub Mode Indicator
- 36 Heavy Scrub Mode Indicator
- 37 Vacuum System Indicator
- 38 Vacuum System Fault Indicator
- 39 Presweep Dust Control Button (3800 / BR 1100 only - opt)
- 40 Presweep Dust Control Indicator (3800 / BR 1100 only - opt)
- 41 Presweep Power Indicator (3800 / BR 1100 only - opt)
- 42 Sweep System Power Indicator (2042 / BR 1100C-XL only)
- 43 Sweep System Control Button (2042 / BR 1100C-XL only)
- 44 Horn Button



KNOW YOUR MACHINE

DESCRIPTION OF INDICATORS ON THE CONTROL PANEL: (CONTINUED)

Main Power Indicator (23):

- This indicator will be GREEN when the key switch is ON.
- This indicator will flash RED if there is a system fault that requires turning the Master ON/OFF Key Switch (33) off to reset.
- This indicator will flash fault codes from the Curtis Speed Control if a fault exists. This will be accompanied by an "Err03" indication on the Hourmeter/Status Display (32).

Presweep Dust Control Indicator (40):

- This indicator will be GREEN when the dust control feature is ON.
- This indicator will be YELLOW when the dust control feature is enabled but not ON.
- This indicator will be OFF if the dust control feature is not enabled or unit has the optional side broom kit installed.

Presweep Power Indicator (41):

- This indicator will be GREEN when either the optional presweep or side broom kits are installed and turned ON.
- This indicator will be YELLOW when either the optional presweep or side broom kits are installed and enabled, but not ON (machine in neutral).
- This indicator will be flashing YELLOW when the optional side broom kit is installed, selected and turned ON, but the scrub system is OFF.
- This indicator will be OFF if the foot pedal on the optional presweep or side broom kits is UP.

Sweep System Power Indicator (2042 / BR 1100C-XL only) (42):

- This indicator will be GREEN when the sweep system is turned ON.
- This indicator will be YELLOW when the sweep system is enabled, but not ON (machine in neutral).
- This indicator will be OFF if the sweep system is turned off.

DESCRIPTION OF THE BATTERY CONDITION INDICATORS

The battery condition indicators will give an indication of the state of charge of the batteries. The battery condition monitor will retain the state-of-charge even if the key has been turned off. The state-of-charge indication is reset to full charge when the batteries have been recharged. It is also possible to choose between two different low voltage thresholds depending on whether maintenance free or standard batteries are being used (**have qualified service engineer perform this selection**). NOTE: The following percentages are based on useable battery capacity not total battery capacity. Therefore, 100% discharge = 80% of total battery capacity for standard wet cell batteries or 70% of total battery capacity for maintenance free batteries.

Green Indicator = full charge down to 50% discharge

Green & Yellow Indicator = 50% discharge down to 75% discharge

Yellow Indicator = 75% discharge down to 90% discharge

Yellow & Red Indicator = 90% discharge down to 95% discharge

Red Indicator = 95% discharge down to 99% discharge

Flashing Red Indicator = 100% discharge - scrub system will automatically shut down

***Important Note:** See the Main Control Board Special Program Options section in the Electrical System and follow the instructions for Selection of Low Voltage Cutout Threshold.

DESCRIPTION OF HOURMETER / STATUS DISPLAY

The 5-character display in the middle of the bottom row of the control panel is primarily used as a display for the hourmeter function. This display is also used to display the following information depending upon which mode the control is in:

- Error codes*
- Brush pressure adjustment settings for normal and heavy scrub mode (fixed and adjustable)*
- Display of control system default parameters*
- Recovery tank FULL indicator*

* NOTE: Have a qualified service engineer reference the Service Manual for explanations about the error code descriptions and scrub system control default parameter changes. A description of error codes can be found in the Electrical System.

Emergency Stop Switch / Battery Disconnect (12): This will remove all power from the machine.

SQUEEGEE SYSTEM

SQUEEGEE MAINTENANCE

If the squeegee leaves narrow streaks of water, the blades may be dirty or damaged. Remove the squeegee, rinse it under warm water and inspect the blades. Reverse or replace the blades if they are cut, torn, wavy or worn.

To Reverse or Replace the Rear Squeegee Wiping Blade...

- 1 See Figure 3. Raise the squeegee tool off the floor, then unsnap the Center Latch (I) on the squeegee tool.
- 2 Remove the Wing Nut (J) from each end of the squeegee, then remove the Tension Straps (K).
- 3 Slip the Rear Blade (L) off the alignment pins (shown in Figure 2).
- 4 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.
- 5 Install the blade, following the steps in reverse order and adjust the squeegee.

To Reverse or Replace the Front Squeegee Blade...

- 1 See Figure 3. Raise the squeegee tool off the floor, then loosen the (2) Thumb Nuts (M) on top of the squeegee and remove the squeegee tool from the mount.
- 2 Remove all the wing nuts that hold the Front Blade (N) in place (shown in Figure 2), then remove tension strap and blade.
- 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.

SQUEEGEE ADJUSTMENT

There are two major squeegee tool adjustments, height and angle. The recommended adjustment steps are to set the tool angle first, then adjust the blade height.

Adjusting the Squeegee Angle

Adjust the squeegee angle whenever a blade is reversed or replaced, or if the squeegee is not wiping the floor dry.

- 1 Park the machine on a flat, even surface and lower the squeegee. Then drive the machine forward enough to have the squeegee blades fold over to the rear as shown in Figure 4.
- 2 See Figure 3. Loosen the Lock Wing Nut (O) (hand tightened). This secures the squeegee mount angle from easily vibrating out of adjustment.
- 3 Turn the Adjustment Knob (P) to tilt the tool forward or backwards, until the rear squeegee wiping blade touches the floor evenly across its entire width.
- 4 Re-tighten by hand the Lock Wing Nut (O).

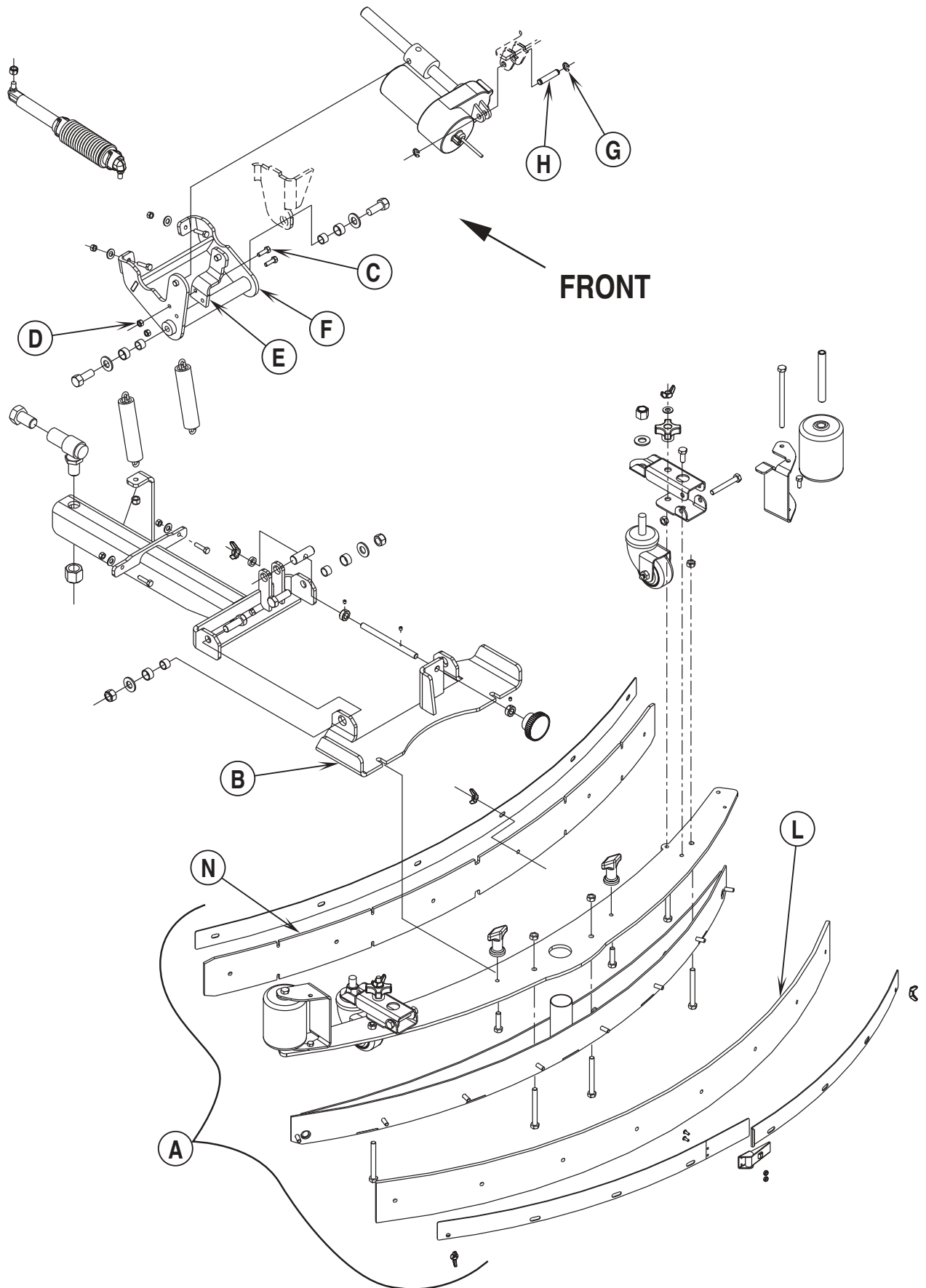
Adjusting the Squeegee Blade Height

Adjust the squeegee height whenever a blade is reversed or replaced, or if the squeegee is not wiping the floor dry. The squeegee blade height is easily adjustable at the caster wheels. To adjust...

- 1 Park the machine on a flat even surface and lower the squeegee. Then drive the machine forward enough to have the squeegee blades fold over to the rear as shown in Figure 4.
- 2 See Figure 3. Loosen both the lock adjustment Wing Nuts (Q) (need to be hand tightened only) located on the top of the caster mount bracket.
- 3 Rotate the Adjustment Knobs (R) CW (clockwise) to lift the squeegee and CCW (counter clockwise) to lower it. A starting point when replacing the blades is to adjust the caster-mounting bracket so it is level (parallel) to the top of the squeegee tool. Note: The Right and Left caster wheels must be adjusted equally to maintain level and even blade pressure.
- 4 Re-tighten the lock adjustment Wing Nuts (Q) and test for proper squeegee pick-up.

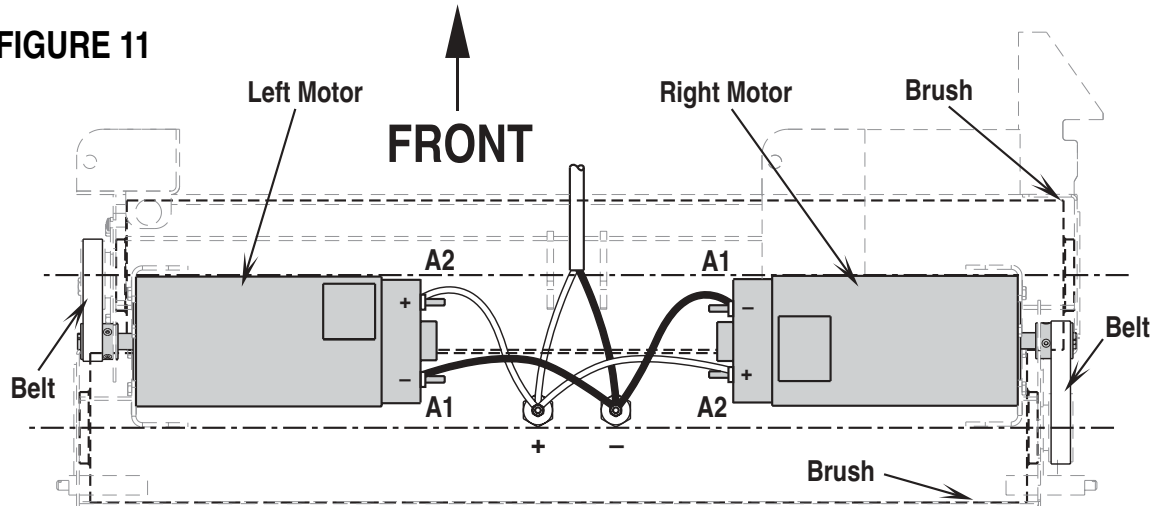
SQUEEGEE SYSTEM

FIGURE 2



SCRUB BRUSH SYSTEM

FIGURE 11



SCRUB BRUSH REMOVAL AND INSTALLATION (CYLINDRICAL)

- 1 Make sure the key switch is off and disconnect the battery pack before servicing.
- 2 To access the brushes, swing open both the side skirt assemblies. See Figure 10. Note: The skirts are held in place by Hairpins (N) on each side, remove the pins and swing the skirt assemblies out of the way.
- 3 Loosen the black knobs (one on each side) that secure the removable bearing idler support Plate (R) to the brush housing, then pull the plates down and out to remove. Grip the scrub brush and slide it from the housing end.
- 4 To install the brush slide it into the housing, lift slightly, push and turn until it seats into the drive end assembly.
- 5 Re-install the idler end plate assemblies, close the skirt assemblies and secure with the hairpins.

SIDE SKIRT MAINTENANCE & ADJUSTMENT (CYLINDRICAL)

General Overview: The side skirts function is to channel the wastewater to the rear pick-up squeegee, helping contain the water within the machine's cleaning path. During normal use the blades will wear in time. The operator will notice a small amount of water leaking out underneath the side skirts. The skirt height adjustment is automatic on this system using spring tension and movable linkage arms to control the blade pressure. The side skirt assemblies must move up and down freely for proper operation.

To replace the scrub system side skirts...

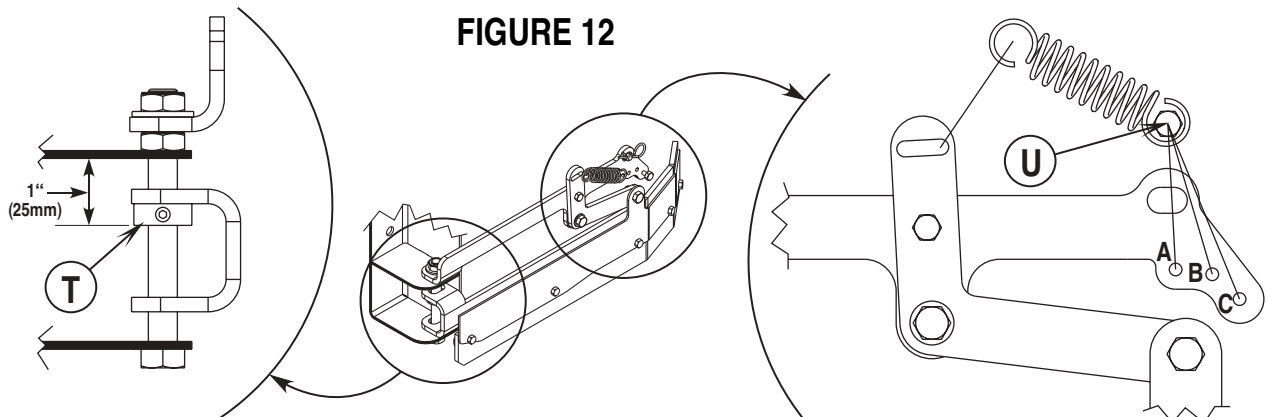
- See Figure 10. Remove the (2) Hairpins (N) and swing the skirt assemblies open. Remove the (S) Screws and nuts then remove the skirts and replace.

To adjust the scrub system side skirts...

Note: The side skirt blade assemblies have two minor adjustments, they are the individual front collar height and the rear blade pressure spring.

See Figure 12. The stop collar (T) is installed on the pivot hinge bolt to help control the front skirt mount bracket's travel when the scrub deck is lowered. It limits the front of the blade from folding (curling) under when scrubbing. Thus allowing the blade to hold its shape better, reduce blade damage and wear.

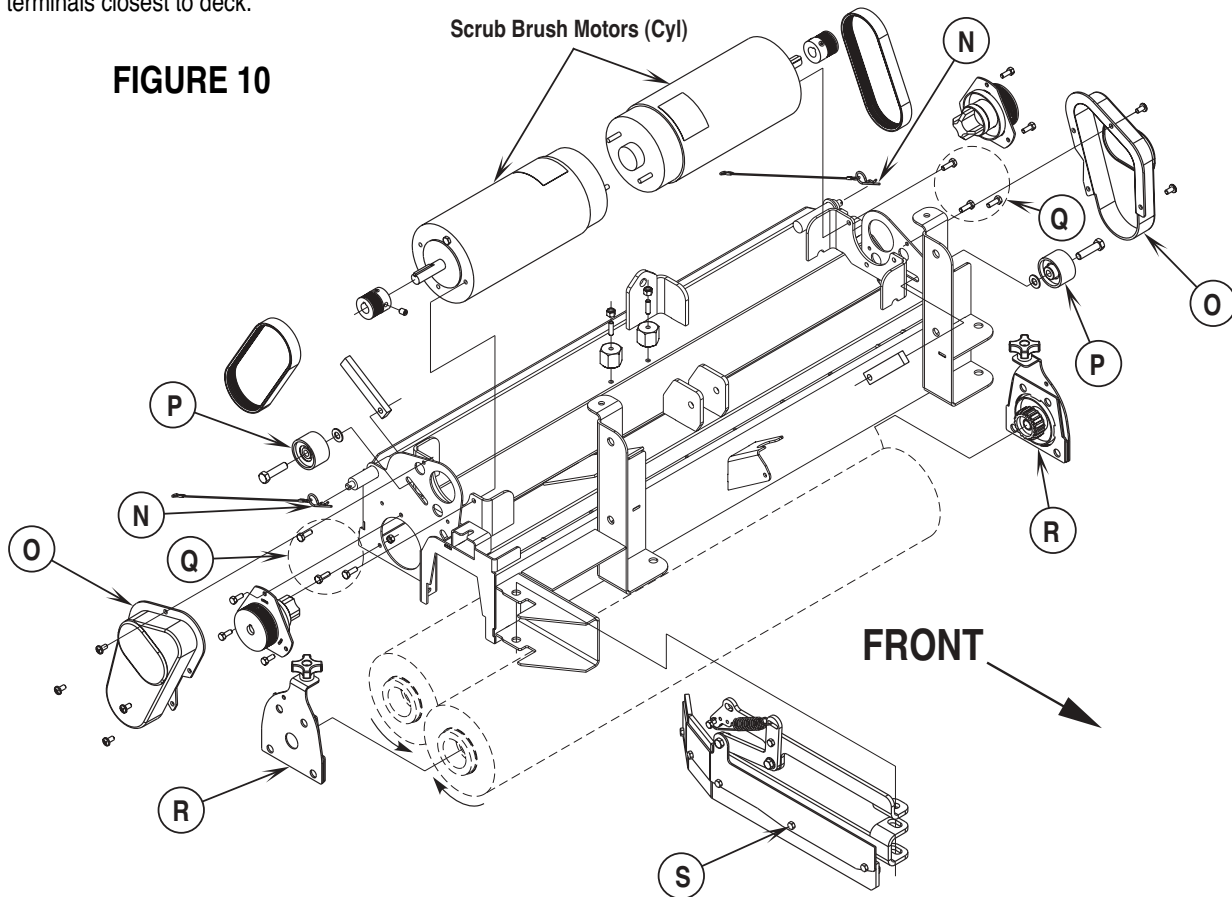
See Figure 12. A limited amount of adjustment for general blade wear and squeegee wiping performance can be made by reinstalling the spring attachment screw (U) into a different mount hole (A, B or C). This change will increase or decrease the spring force (pressure) pulling down on the rear edge of the skirt blade. Position "C" creates maximum down pressure on the blade and position "A" is minimum pressure.



SCRUB BRUSH SYSTEM

SCRUB BRUSH MOTOR(S) REMOVAL (CYLINDRICAL)

- 1 See Figure 10. First open both the left and right side brush housing doors, and then remove the Hairpin (N) from both the scrub deck skirt assemblies and swing them open.
- 2 Next remove the Belt Guards (O) (4 screws per side). With an operator in the driver's seat with the key switch ON and the normal scrub function selected press the drive pedal to start the scrub brushes and observe which brush motor needs to be removed.
- 3 Next loosen the scrub brush belt tension Hex screw in the center of the Belt Idler (P) (using a 5/8" wrench).
- 4 Remove the wiring at both the Pos. & Neg. brush motor terminal studs and note the correct wiring connections (for reinstallation). Then remove the (3) Screws (Q) and lift the motor out from the front or rear of the scrub deck.
- 5 Reassemble in reverse order and adjust the belt tension to 1/2-9/16 inches (13-14 mm) as shown in Figure 9. Note: Install motors with A2 terminals closest to deck.



SCRUB BRUSH BELT REPLACEMENT (CYLINDRICAL)

- 1 See Figure 10. Remove Hairpin (N) and swing open the scrub deck skirt assembly (right or left side) and remove the belt guard(s) (O) (4 screws each).
- 2 **Important Service Tip:** The left and right side drive belts are not the same lengths they must be ordered individually (P.N. 56410217, left side & P.N. 56410215, right side).
- 3 Loosen the scrub brush belt tension hardware on the Belt Idler Pulley (P) (using a 5/8" wrench). Pull the idler wheel away from the backside of the belt and roll the belt off both the motor and brush pulleys. Then inspect for wear and replace as needed.
- 4 Re-install the drive belt and tension the belt as shown in Figure 9. Then install the belt guard, reconnect the battery pack and test the scrub system for proper operation.

SCRUB BRUSH SYSTEM MAINTENANCE

The scrubbing system must be serviced at regular intervals to maintain good scrubbing performance. Follow the maintenance steps listed below.

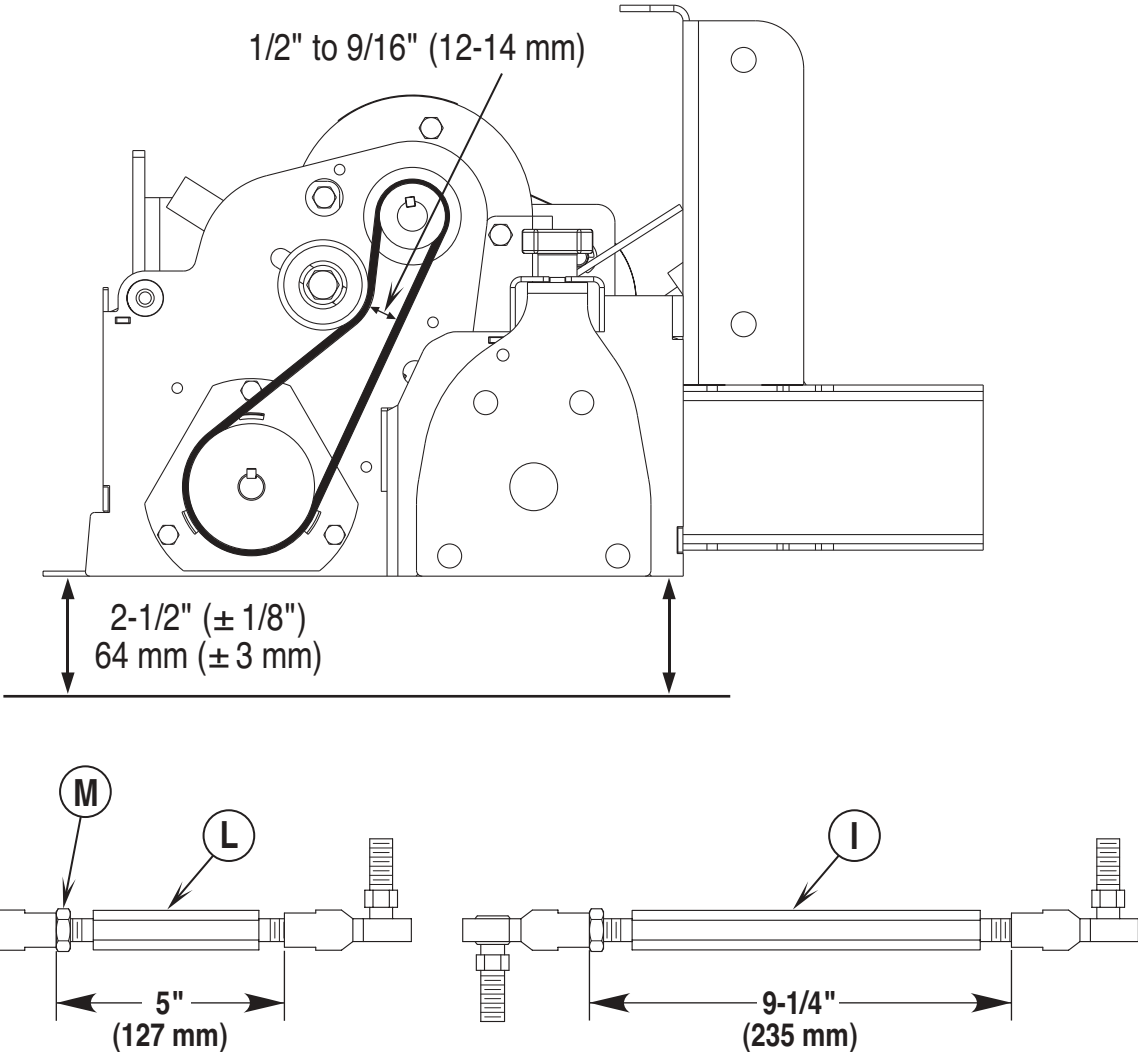
- 1 Rinse clean, built up debris from the debris hopper drain holes (daily).
- 2 Clean drain holes in the solution delivery trough on top of the scrub deck (weekly).
- 3 Clean built up dirt from the inside of the scrub brush housing (weekly).
- 4 Remove any string wrapped around the scrub brush, drive hub and idler hub (weekly).
- 5 Remove both the scrub brushes and rotate, turn end for end (weekly). See Scrub Brush Removal and Installation (Cyl) section.
- 6 Inspect the scrub brush bristles for wear, the brushes should be replaced when the bristle length is 1 inch (26 mm) or less (monthly).

SCRUB BRUSH SYSTEM

SCRUB BRUSH DECK LEVELING ADJUSTMENT (CYLINDRICAL)

- 1 See Figure 9. On a level floor surface put the scrub deck in the raised (stored) position and measure the distance from the floor to the bottom edge of the scrub deck at all Four Corners as shown.
- 2 The four measurements should be approximately 2-1/2 inches (64 mm). To adjust, loosen the Lock Nuts (M) on the (4) Connecting Rods (L) and turn the center section of the rod(s) to raise or lower (lengthen or shorten) the levelness of the brush deck. **Note:** The assembly length on the ball joint connecting rods are adjusted to 5 inches (127 mm) from ball joint to ball joint as shown in Figure 9.
- 3 Re-tighten the connecting rod lock nuts and lower the brush deck to the floor and check for an even brush pattern.

FIGURE 9

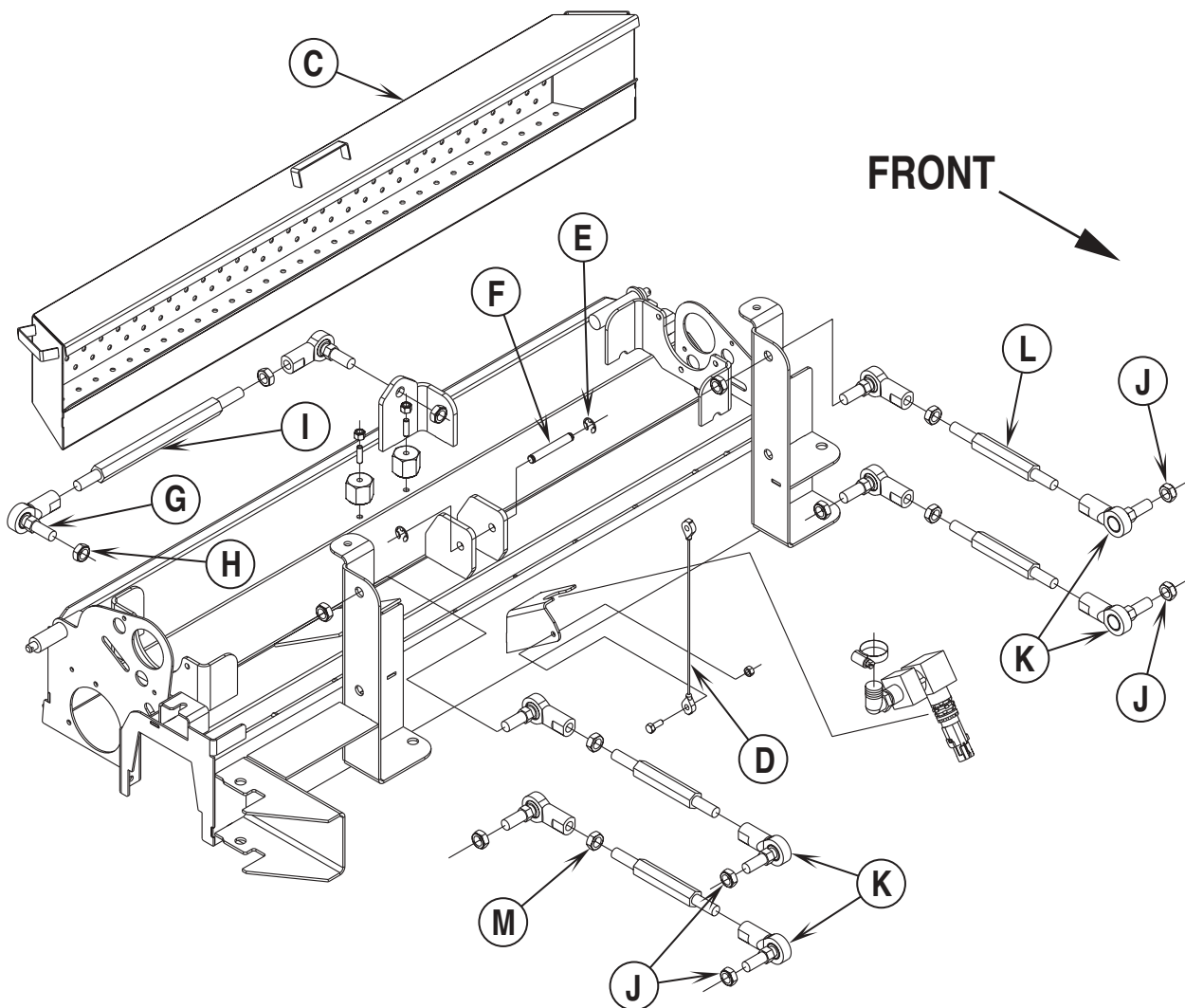


SCRUB BRUSH SYSTEM

SCRUB BRUSH DECK ASSEMBLY REMOVAL (CYLINDRICAL)

- 1 Lower the scrub deck with the cylindrical brushes installed. Note: Don't turn the key switch off until disconnecting the battery pack by pushing in the emergency disconnect knob (12). This procedure is done to prevent the scrub deck from automatically raising itself when the key is turned off. Turn the key switch Off.
- 2 Open both the left and right side brush housing doors and remove the Debris Hopper (C) (see Figure 8) from the machine.
- 3 Remove the nut and screw that secure the deck down limit Cable (D) at the deck mount bracket.
- 4 Remove the Retaining Ring (E) securing the lower lift motor mount Pin (F) and remove the pin from the deck mount.
- 5 Disconnect the brush lift motor wire harness at the motor.
- 6 Remove the mounting hardware, Screw (G) and Nut (H) then separate the Support Arm (I) from the machine's out board frame mounting bracket (right side of machine).
- 7 On both sides of the machine remove the (4) item (J) Hex Nuts from the front Ball Joint Ends (K), and then separate the deck support arms from the machine frame. **Note:** To access the top Hex Nuts (J) pop off the removable frame cover plugs using a screwdriver.
- 8 Cut any necessary wire ties that secure the wiring harnesses for the solution solenoid and scrub brush motors. Next remove the two main electrical wires (one black & one red) at the brush motor(s) terminal studs and then also unplug the wire connector for the solution solenoid valve.
- 9 Remove the solution feed hose at the solenoid valve and carefully slide the scrub deck assembly out from underneath the machine from either side.

FIGURE 8



SCRUB BRUSH SYSTEM

SCRUB BRUSH LIFT ACTUATOR REMOVAL (DISC & CYLINDRICAL)

Note: All new replacement actuator motors are not shipped with the lift nut pre-adjusted for any machine model applications.

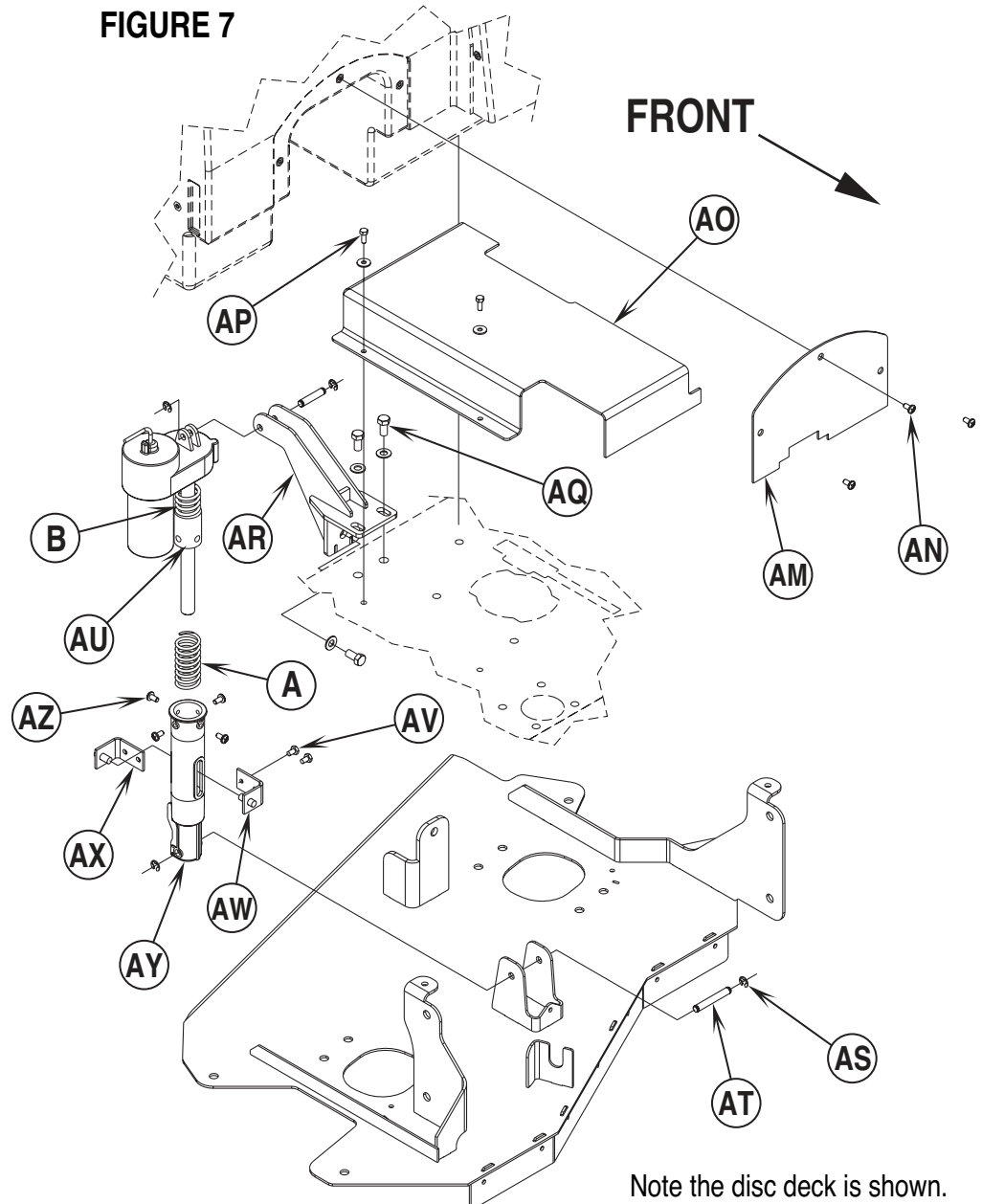
- 1 If possible lower the scrub deck with the scrub brushes installed. Don't turn the key switch off until disconnecting the battery pack by using the emergency disconnect (12). This procedure is done to prevent the scrub deck from automatically raising when the key is turned off.
- 2 See Figure 7. Remove actuator inspection cover (AM) secured with (3) item (AN) screws and then also remove the false floor plate (AO) Qty (2) screws item (AP).
- 3 From underneath the machine disconnect the actuator motor wiring connector at the motor.
- 4 If the brush lift actuator has failed in the up position it will be necessary to support the brush deck with wood blocking. Note: This is done to remove the weight from the deck so that the mounting pins can be removed.
- 5 Remove the (3) item (AQ) hex screws that secure the upper motor mount bracket (AR) (2 screws from the top and 1 from bottom front of chassis).

- 6 Remove the left side retainer ring (AS) and push the lower mount pin (AT) from the scrub deck mount bracket.
- 7 Maneuver (push and then pull up) the combined upper mount bracket and actuator motor assembly through the top frame and solution tank opening.

- 8 **IMPORTANT:** After removing the actuator motor and before replacing a new motor or drive nut the IN & OUT limit switches must be set (or checked) to their correct specifications (see the electrical section for the actuator drive nut adjustments).

- 9 To disassemble the drive nut (AU) from the actuator shaft, remove the (2) screws (AV) and separate both retainers (AW) & (AX) from the spring housing (AY).

- 10 Remove the (4) spring housing retainer screws (AZ) and slide the spring housing and (long) compression spring (A) from the actuator shaft. Then spin the drive nut off the shaft and remove the (short) compression spring (B). Note: See the Actuator Drive Nut Adjustment section in this manual to properly install a new drive nut.



Scrub Brush Lift Actuator Installation

- 11 After setting the correct brush lift actuator drive nut dimensions, follow in reverse the above removal steps to reassemble and reinstall.

Service Tip: Wrap a small amount of tape around the spring housing to prevent it from spinning out of adjustment.

Service Tip: Shown in the Electrical System is the actuator power cord adapter PN 56407502 and instructions for use. This tool can be used to help position (raise or lower) the drive nut housing for ease in the actuator mounting pin installations. An additional method to control the output to the pad/brush lift actuator for installation and removal is to read the instructions in the Service Test Mode section for the special output control of the Normal Scrub Switch (26) (See Electrical System for steps to enter the Service Test Mode).

SCRUB BRUSH SYSTEM

SCRUB BRUSH SIDE SKIRT REPLACEMENT (DISC)

- 1 See Figure 6. Loosen the (4) side skirt Retainer Knobs (**AB**) (2 per side) and pull the Skirt Assemblies (**AC**) off from the scrub deck.
- 2 Remove all the hardware that holds both the (short and long) blades and retainers to the skirt housing.
- 3 Each of the (2) long blades has 4 working edges and the (2) short blades have 2. Reinstall the blades to the skirt housing so a clean, undamaged edge points inside towards the scrub brushes. Replace the blades as a set if they are nicked, torn or worn beyond their ability to be adjusted.
- 4 Reinstall the skirt housing assemblies onto the machine and adjust the blade for proper contact to the floor when the brush deck is placed in the scrub position.

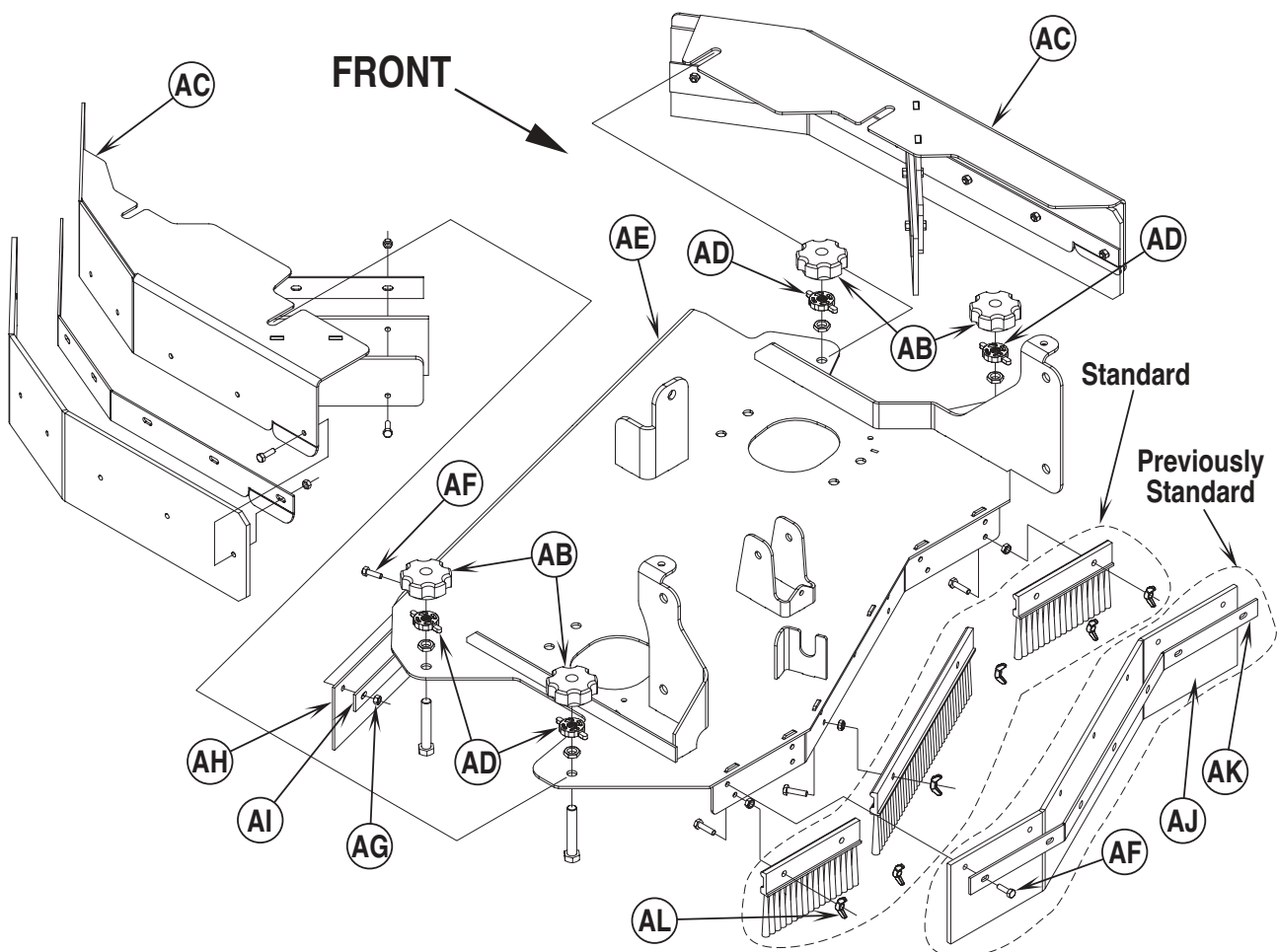
SIDE SKIRT HEIGHT ADJUSTMENT (DISC)

- 1 See Figure 6. The side skirt housing knob retainer screw studs have leveling Adjuster Collars (**AD**), that are to be raised or lowered to compensate for blade wear.
- 2 To adjust, remove the Skirt Assemblies (**AC**) from the Scrub Deck (**AE**) to access the Adjuster Collars (**AD**). Adjustment Tip: The skirts Retainer Knobs (**AB**) can be loosened with skirts left on and the Adjuster Collars (**AD**) rotated by reaching under the skirt housing.
- 3 Turn the Adjuster Collars (**AD**) (Up or Down) to where the blades just fold over enough when scrubbing that all the waste water is contained inside the skirting. Note: Make small adjustments to obtain good blade wiping. Do not lower the blades too much to where they fold over excessively and cause unneeded blade wear.

SCRUB BRUSH FRONT / REAR SKIRT REPLACEMENT (DISC)

- 1 Place the scrub deck in the UP position, then remove both the left and right side skirt assemblies from the machine.
- 2 See Figure 6. Remove the (13) (**AF**) Screws and (**AG**) Nuts from each front and rear skirt set. Separate the Skirts (**AH & AJ**) and Retainer Straps (**AI & AK**) from the scrub deck. If equipped with front bristle skirts, these can be removed without tools by removing the Wing Nuts (**AL**).
- 3 Replace with new blades when they are nicked, torn or worn beyond their ability to contain the brush solution within the skirting. Re-assemble in reverse order.

FIGURE 6



SCRUB BRUSH SYSTEM

FIGURE 4

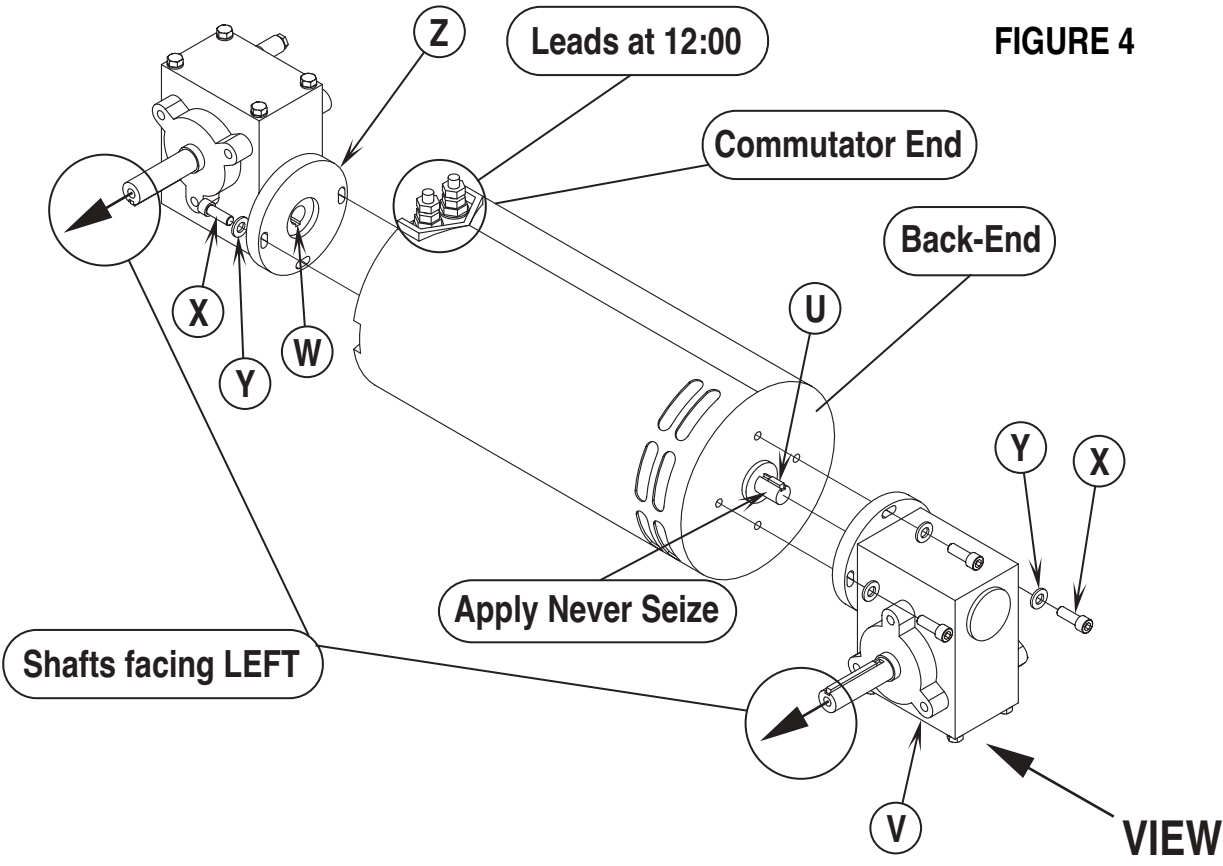
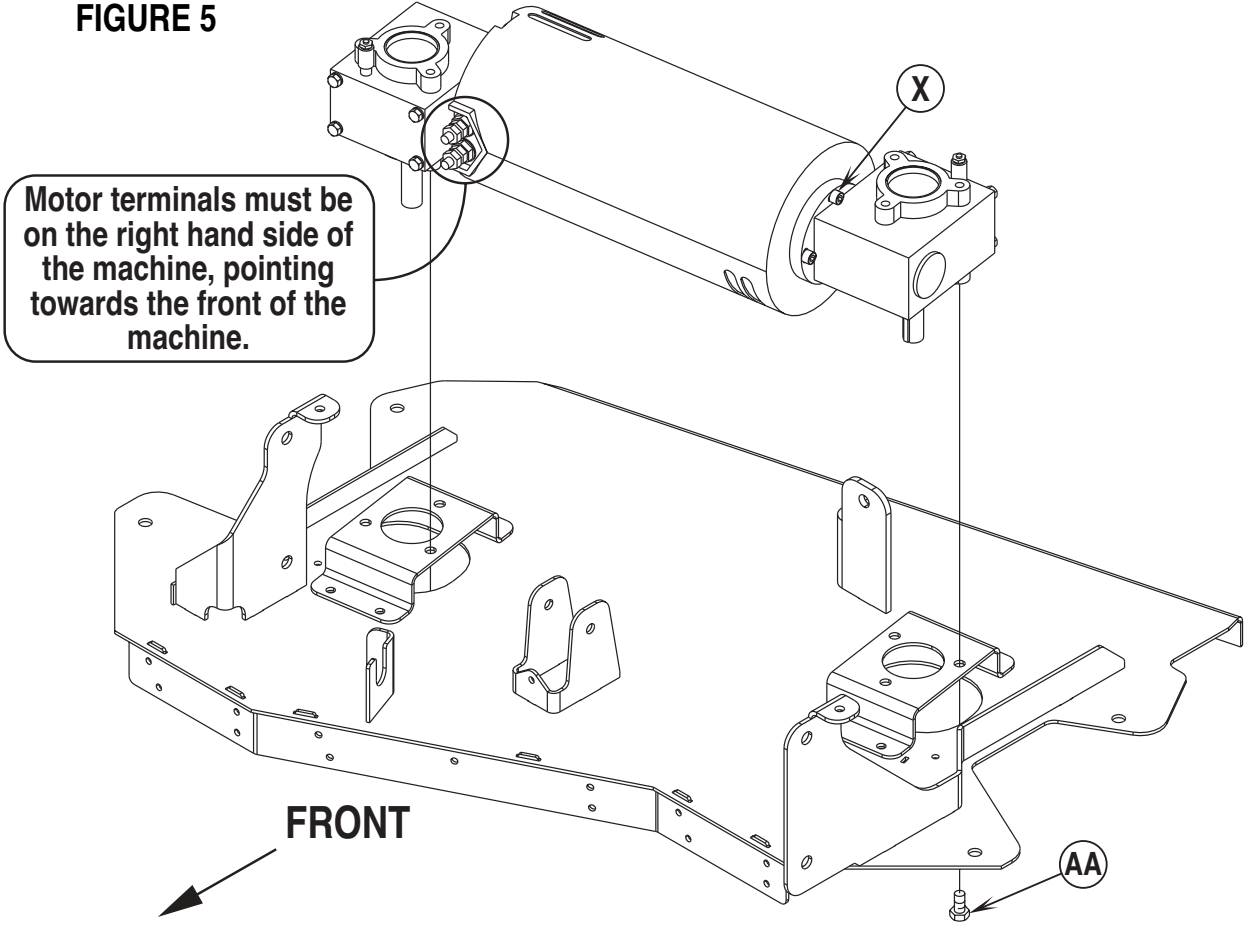


FIGURE 5



SCRUB BRUSH SYSTEM

SCRUB BRUSH GEAR BOX REPLACEMENT

If the need to replace a disc scrub drive gearbox should arise, please follow the re-assembly instructions below.

1 Installing the shaft keys-See Figure 4

Install (1) Shaft Key (U) into each end of motor shaft, you may need to use a hammer to complete this operation.

2 Applying Never Seize

Starting with the back-end of the motor. Apply some Never Seize onto the back-end shaft and key. The installation of Never Seize allows you to remove and replace the gearbox easily if the gearbox fails in the field.

3 Installing the Back-end Gearbox (V)

Visually line-up the Key (U) (installed into the motor shaft) with the keyway (W) on the inside of the gearbox. Slide the gearbox onto the shaft as far as it will go. If the gearbox does not slide on completely (flush with back-end bracket), **DO NOT** use a hammer to pound the gearbox on the rest of the way. Using a hammer will damage the shaft and bearings inside the gearbox. Carefully wiggle the gearbox back and forth while pushing the gearbox the rest of the way onto the motor.

4 Installing mounting screws

After the gearbox is completely flush with the back-end bracket of the motor, install 3 Screws (X) with lock Washers (Y) through the gearbox mounting flange and into the pre-drilled mounting holes in the back-end bracket. **Important:** Make sure that the gearbox shaft is pointing in the correct direction before installing the mounting screws. The gearbox shafts should both be pointing left, if viewing the motor from the back end and the lead terminals are at 12:00. Tighten screws as much as possible with your fingers, **DO NOT** tighten the bolts yet as the gearboxes still need to be lined up.

5 Installing the Comm.-end Gearbox (Z)

Repeat the above process for the comm.-end gearbox. **Remember:** Before installing the mounting screws into the comm.-bracket, make sure that the gearbox shaft is pointing in the correct direction. Both gearbox shafts should be pointing LEFT, if viewing the motor from the back-end with the lead terminals at 12:00. Also, remember to not tighten the mounting bolts yet.

6 Lining Up the gearboxes-See Figure 5

After you have made sure that the gearbox shafts are pointing in the correct direction and you have installed all 6 mounting screws (X) (3 in the back-end gearbox and 3 in the comm.- end gearbox), you must Line-up the gearboxes. Re-install the Gearbox/Motor Assembly onto the scrub deck as shown. Install and tighten the (6) Screws (AA) first and then tighten the (6) Screws (X).

SCRUB BRUSH SYSTEM

SCRUB BRUSH MOTOR REMOVAL (DISC)

- 1 Follow steps 1-10 of the Scrub Brush Deck Removal (Disc) section.
- 2 See Figure 3. Remove the scrub brushes from the Brush Holders (I).
- 3 Remove the (3) (J) Screws from each Thermoid Disk (flexible coupler) (K) and remove the Brush Holders (I) from both (L) Hubs. Note: Use a 13 mm socket wrench to remove Screws (J).
- 4 Remove all (8) of hardware items (M, N & O) that secure the Gear Case Mount Brackets (P) to the scrub deck plate.
- 5 Remove the Gearbox / Motor Assembly (Q) from the scrub deck plate by pulling the assembly straight up.
- 6 Remove the (6) socket head cap screws securing the gearboxes to the brush motor and separate.
- 7 Re-assemble in reverse order and test for proper operation. **Note:** The proper brush motor installation position is where the two cable mounting bolts (wiring connections) face the front and right side on the scrub deck platform.

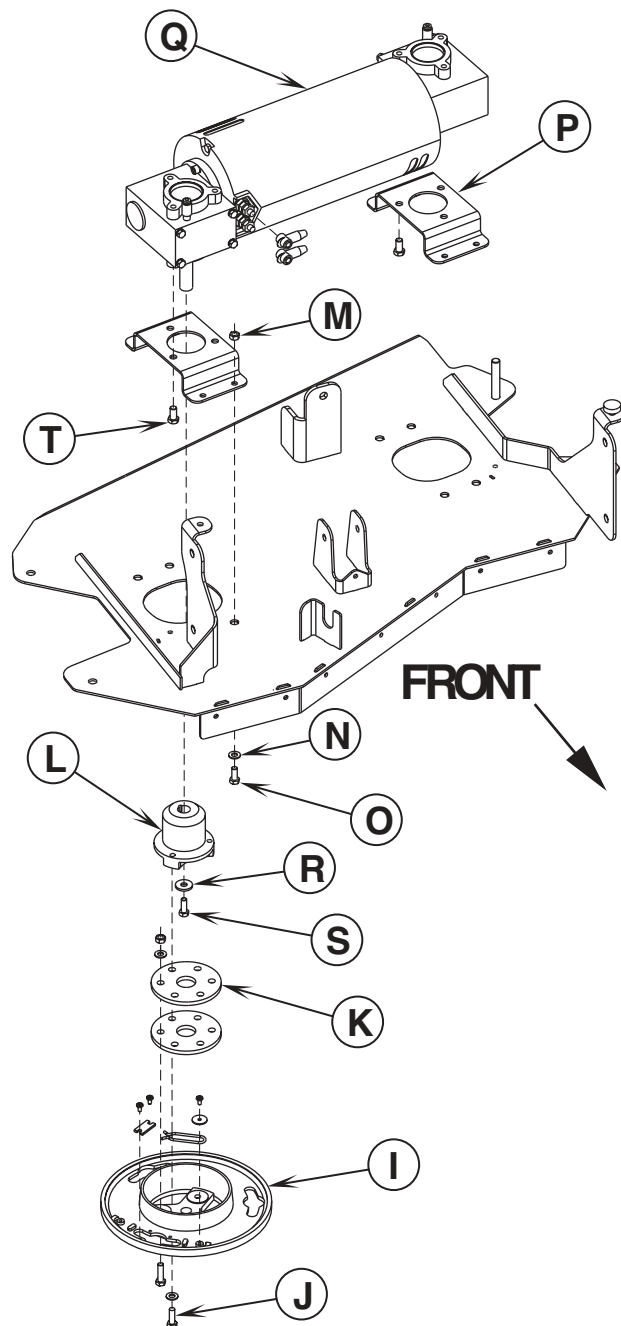
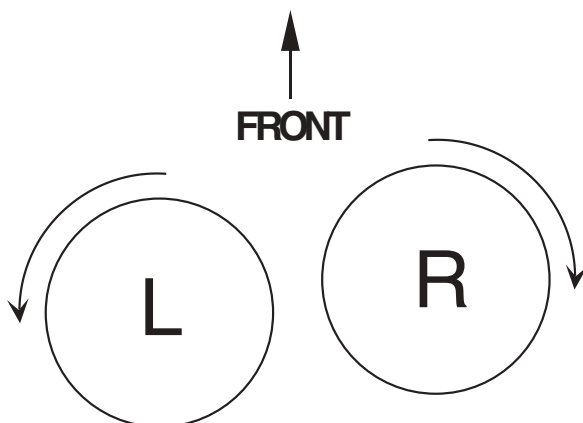
SCRUB BRUSH GEARBOX REMOVAL (DISC)

Follow steps 1-10 of the Scrub Brush Deck Removal (Disc) section and steps 1-6 of the Scrub Brush Motor Removal (Disc) section.

- 1 See Figure 3. Remove the hardware items (R & S) that secure the Hub (L) to the output shaft on each gearbox. Then pull the hub from the shaft and save the key.
- 2 Remove the (3) (T) Screws and separate the Mount Bracket (P) from the gearbox that needs replacement.
- 3 Remove the (3) socket head cap screws securing the gearbox that needs replacement and separate from the brush motor.
- 4 Re-assemble in reverse order and test for proper operation. **Note:** Apply a small amount of grease or "Never Seize" to the gear box output shaft when reinstalling the drive Hub(s) (L).

Note: The gearbox output shaft rotates the brush holders in the opposite direction of other Nilfisk-Advance auto scrubbers (see below).

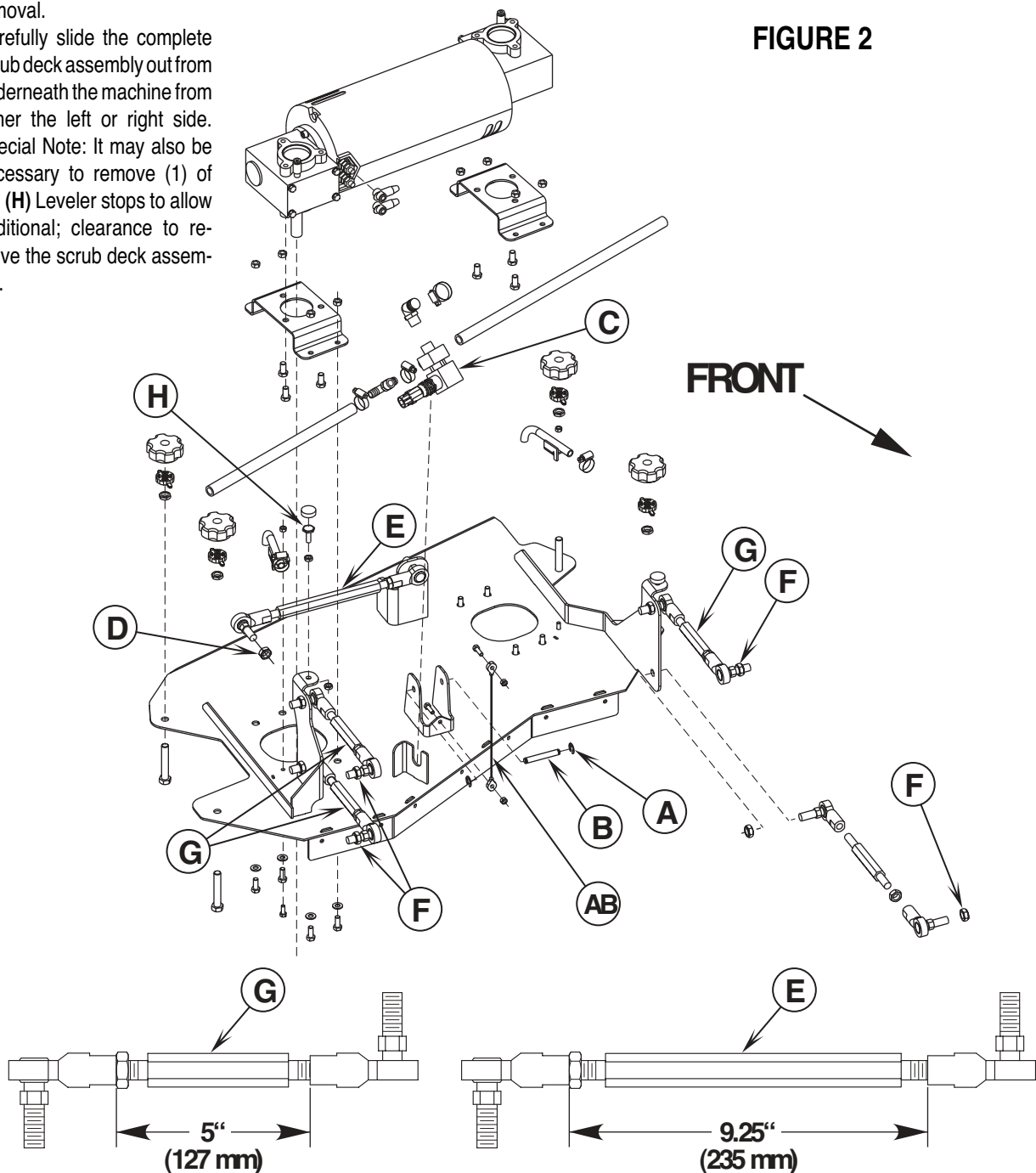
FIGURE 3



SCRUB BRUSH SYSTEM

SCRUB BRUSH DECK REMOVAL (DISC)

- 1 Open both the left and right side brush housing doors. Then remove both splash skirts and scrub brushes.
- 2 Place wood blocking (2 by 4) under both brush drive discs and lower the deck to the floor by pressing the normal scrub panel button. After brush deck is in the lowered position don't turn the key switch off until disconnecting the battery pack (push in the emergency disconnect (12)). This procedure is done to prevent the scrub deck from automatically raising when the key is turned off.
- 3 Turn master key to the OFF position.
- 4 See Figure 2. Remove either the top or bottom mounting hardware to disconnect the tethered Cable (AB). Then remove the Retainer Ring (A) from the lower actuator motor mount Pin (B). Next remove the pin from the deck mount bracket.
- 5 Remove the (2) brush motor wires at the motor terminals (POS. (+) red wire on top) and also unplug the wire connector to the water Solenoid Valve (C).
- 6 Remove the solution feed hose at the solenoid valve or solution filter housing.
- 7 Remove the (D) Hex Nut from the outside rear Support Bar (E) and pull the ball joint stud end from the frame bracket.
- 8 From the left and right side of the chassis remove the (4) front (F) Hex Nuts from the scrub deck Connecting Rods (G), then pull all rod ends from their mounting holes.
- 9 Remove the previously installed wood blocking from under the drive discs. Note: This must be done to allow needed clearance for deck removal.
- 10 Carefully slide the complete scrub deck assembly out from underneath the machine from either the left or right side. Special Note: It may also be necessary to remove (1) of the (H) Leveler stops to allow additional; clearance to remove the scrub deck assembly.

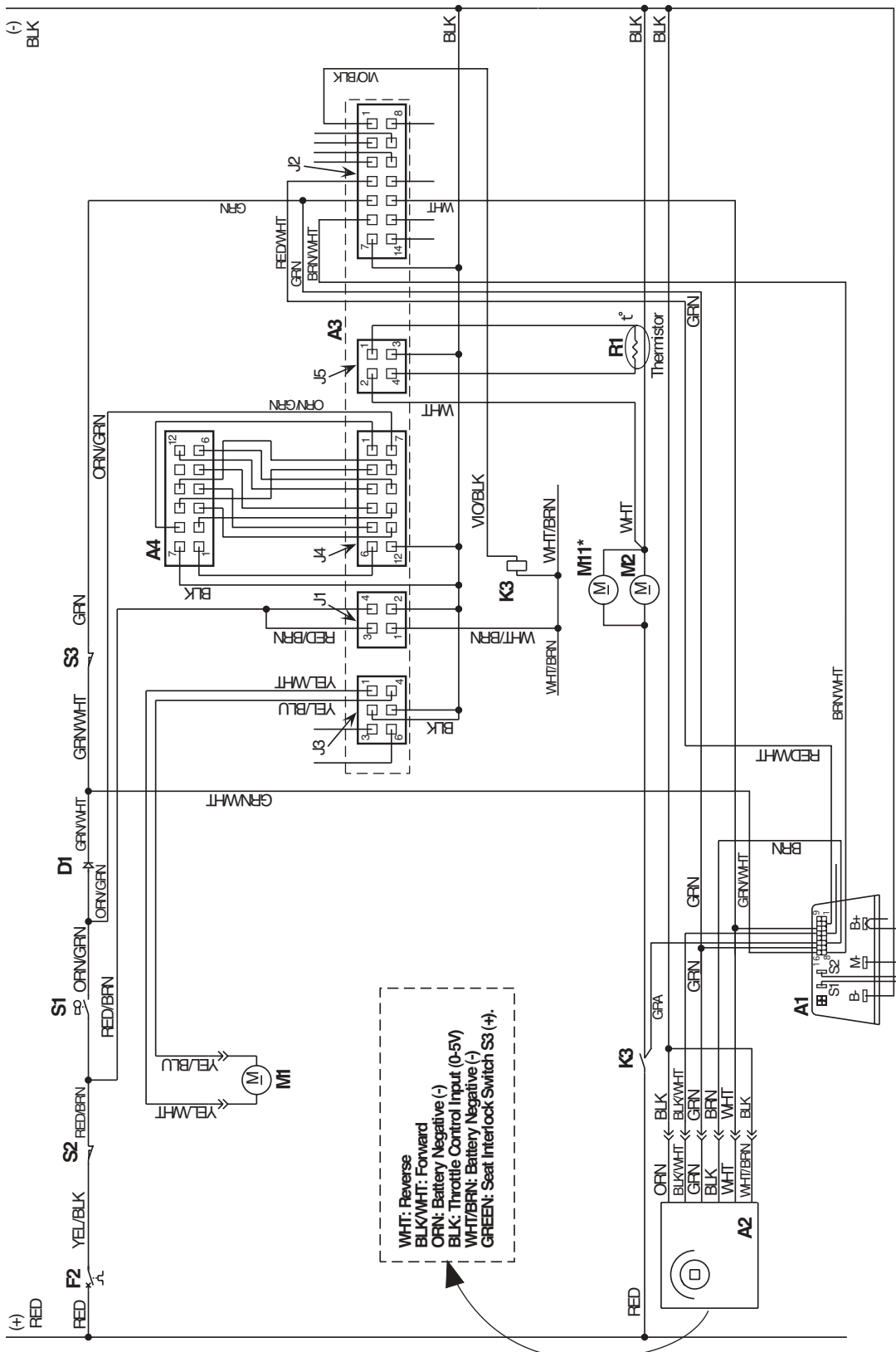


SCRUB BRUSH SYSTEM

SCRUB BRUSH SYSTEM TROUBLESHOOTING

On all models (disc & cylindrical) the scrub system's major electrical components are monitored by the main controller (A3) to detect any system function failures (error codes). The system components covered are the brush motor(s) (M2 & M11), brush solenoid (K3) and brush lift actuator motor (M1). Detected error codes from the main controller are displayed on the hour meter LED display as they occur. Note: Reference the Main Control Board Troubleshooting Guide in the Electrical System of this manual for specific fault descriptions and service repair actions.

FIGURE 1



SCRUB BRUSH SYSTEM

FUNCTIONAL OVERVIEW

• Disc Brush System Overview

See Figure 3. The machines Hydro-Retriever™ 3800 and BR 1100 (model #'s 56411000 & 56411002) use the disc type scrub system. A single 3HP 36V DC permanent magnet motor is connected at both ends with (2) 90-degree gearboxes that drive the two 20" disc (rotary) brushes.

• Cylindrical Brush System Overview

See Figure 8. The machine models Hydro-Retriever™ 3800C, BR 1100C (#'s 56410350 & 56410351) and models 2042, BR 1100C-XL (#'s 56410001 & 56410425) use two cylindrical brushes that counter rotate to sweep up light debris and scrub at the same time. Each scrub brush is powered on opposing ends by 1 HP permanent magnet motors attached to separate poly-V belt/pulley drives.

• General Brush Overview

On all models the scrub deck platform is raised & lowered automatically by a vertically mounted electric lift actuator motor. The operation of the machine's scrub functions are activated when the operator selects (presses) either the normal or heavy scrub (mode) panel buttons. The scrub pad or brush pressure ranges (normal & heavy) are independently programmable allowing the operator the choice to vary the scrubbing effort (pressure) while operating the machine. Note: See the Main Control Board Special Program Options section in this manual for more detailed operation and instructions to change scrub pressure settings.

See Figure 1. The machine's main scrub system input and output operating functions are regulated (managed) by the membrane switch display panel A4 and main control board A3. The major scrub system functions are...

• Scrub Brush Motor Run Function

To turn On (energize) the K3 brush motor solenoid either the normal or heavy scrub button (location A4 panel) must be pressed and the drive pedal moved off its neutral position triggering an output from the A2 electronic throttle. These two-operator functions deliver the required A3 control board and A1 speed control circuit inputs.

Detailed Explanation of the scrub motor function

A closed A4 membrane panel switch input (either normal or heavy) enables the A3 microprocessor automatic functions for the brush lift, **brush solenoid**, solution solenoid, vacuum solenoid and squeegee lift. The next step is the movement of the foot pedal for the needed A2 throttle output to the A1 speed controller, which causes either FWD or REV motor action. At the moment of A2 throttle input the A1 controller closes an internal coil driver and outputs a POS. 36V signal from pin #8 (wire color Brn/Wht) to the A3 J2 pin #6 connection. This input signal causes the controller to output a NEG. 36V signal from J2 pin #1 (wire Vio/Blk) that energizes the K3 brush motor solenoid coil pulling in the high current contactor making the brush motor(s) turn on (run).

• Scrub Brush Actuator Lift Motor Function

The control board outputs activate (raise and lower) the scrub-deck for installing, removing and controlling the scrub brushes' selected current load. The negative (-) drive motor wire is specially designed so that it has a known (specified) resistance value. As brush motor current passes through the negative wire that is, in effect, a low value resistor, a small voltage is developed across it which is proportional to the motor current. Any temperature change in this wire affects its resistance so the temperature is sensed by a thermistor (*) attached to the wire. This allows the controller to provide error correction for the temperature resistance changes. When the controller senses a current draw out of the desired range it automatically turns on the M1 actuator motor to raise or lower the scrub deck. This process is on going in maintaining the operator's selected scrub motor current load (PA #) to sustain the desired brush working pressure.

• Low Voltage Cut-Out Function

The purpose of the low voltage cutout function is to help prolong battery life. The main control board A3 is programmed to monitor the machine's battery pack voltage to prevent over discharging of the batteries. The brush motors, brush lift actuator and solution solenoid valve will turn OFF automatically and cease to function when the batteries are discharged to the selected cutout level. The cutout level is adjustable between two settings. The standard battery type (wet cell) is 31.5 volts (1.75 volts per cell) and maintenance free battery (gel) is 33 volts (1.83 volts per cell). Note: See the battery section for instruction in selecting (setting) the two different thresholds.

* Thermistor: A special semiconductor resistor whose resistance value varies with temperature.

Note: See the "Know Your Machine" section in this manual for a complete explanation for all scrub system operational modes.

SQUEEGEE SYSTEM

FIGURE 3

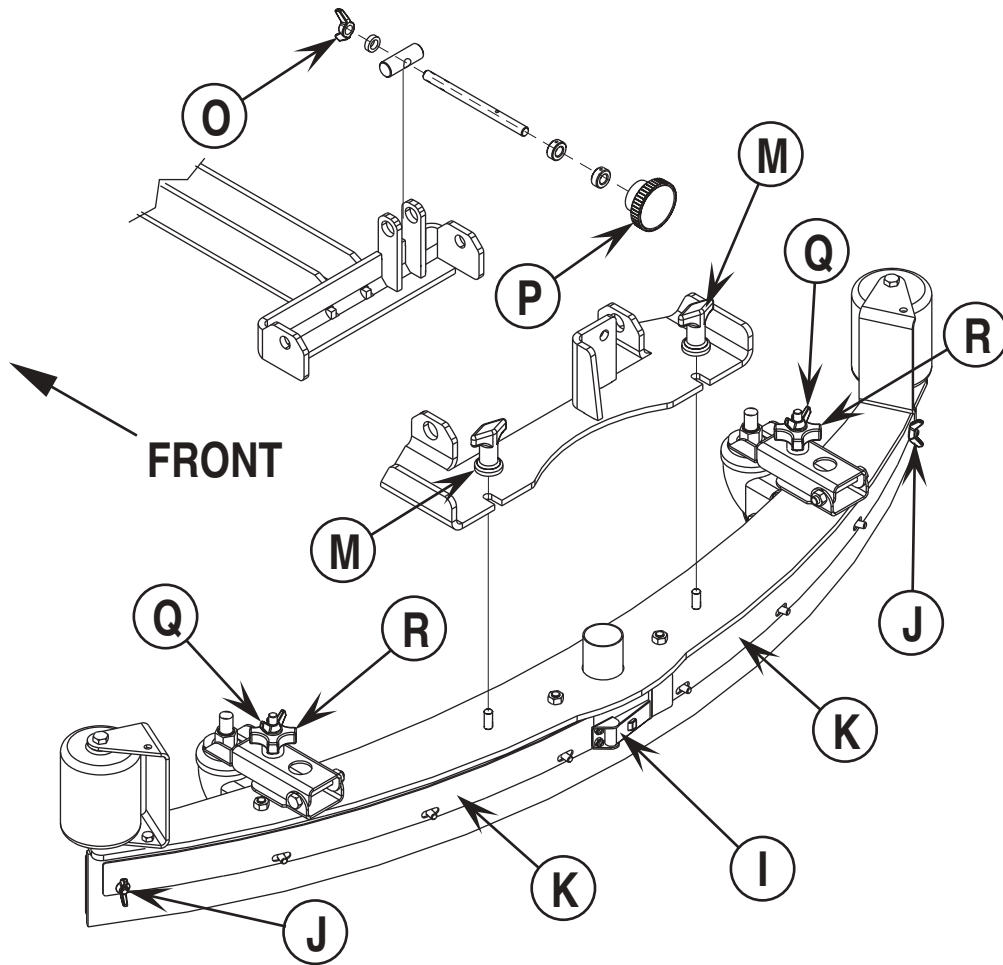


FIGURE 4

