

USER MANUAL



Nautica 4M

SSI North America 5399

Rollover Wash System



Rev.:
FT-01-15

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Recommended Spare Parts Kit

NS Wash Systems understands that for vehicle wash operators, downtime just isn't an option. Critical to the successful operation of an efficient wash facility is having the right replacement parts on hand to ensure continuous operation, month after month, year after year. NS offers a full-line of Uptime Kits that contain the most frequently required replacement parts based on our extensive experience accumulated over the last fifty years. The BENEFITS of Uptime Kits include:

- Continuous/ Non-Stop operation of your wash system
- Decreased time-to-repair
- Elimination of costly expedited shipping/labor fees and delays caused by inventory shortages or longer lead times
- Increased profitability

NS parts are manufactured to exacting standards and are considered the highest quality in the vehicle wash marketplace. We always recommend that you use Genuine NS parts to ensure the efficiency, longevity, and profitability of your operation.

Part Number	Description	Related to	Qty
200-7037	1¼" Bore, #1610 Taper Lock Bushing	Gantry Drive Assembly	1
200-7038	1" Bore, #16-10 Taper Lock Bushing	Elevator Lift Drive	1
210-1301	½ HP Brake Motor, 1800 rpm, TEFC. 208/230/460V or 575V (Specify when ordering), 3 Ph, 60 Hz	Gantry Drive Assembly	1
210-1302	¾ HP Brake Motor, 1800 RPM, TEFC, 208/230/460V/3-PH / 60 Wash Down Duty	Elevator Lift Drive	1
210-1778	1-1/2 HP Motor, 230V, 1800 RPM, 56C Wash Down Duty.	Side Brush	1
210-2110	2 HP Motor, 230V, 1800 RPM, 56C	Top Brush	1
235-2139	Reducer, 15:1 (LH)	Top Brush	1
235-2140	15:1 Reducer (R.H.) for the Left Side Brush	Side Brush	1
235-2149	60:1 Speed Reducer	Elevator Lift Drive	1
300-1033	Backup Current Relay (PR-4A)	Relay	1
400-0075	3/8" Anti-Siphon Valve for Blue & White Pump #520-2006	Chemical Injection	1
400-0079	1/4" Anti-Siphon Valve for Blue & White Pump #520-2006	Chemical Injection	1
440-1190	1½"x5" Air Cylinder Double Stroke 250 PSI	Pneumatic System	2
570-0004	1/4" 2 Station Stacked Solenoid Valve	Pneumatic System	1
610-1015	1" 4-Bolt Flange Bearing	Side Brush	6
610-1124	1¼" Bore 4-Bolt, Flange Bearing	Gantry Drive Assembly	2
610-1125	1-1/2" Bearing Block	Top Brush	1
630-1294	Brush Pelt, Type-C, Half Density, 1400mm	Top Brush	4
630-1295	Brush Pelt, Type-C, Full Density, 1400mm	Top Brush	10
630-1295	Brush Pelt, Half Density, 1100mm	Side Brush	26
630-1296	Brush Pelt, Full Density, 1100mm	Side Brush	6
670-1151	#50 Chain x 5' Long	Gantry Drive Assembly	10'
670-1152	Chain #40 – 3040 riveted @100ft	Elevator Lift Drive	100'
670-3042	#50 Chain Connector (Master) Link	Gantry Drive Assembly	2
670-3043	Connecting Link #40	Elevator Lift Drive	4
770-1106	Sprocket, TLB 420	Elevator Lift Drive	1
770-1107	Sprocket TLB 516	Gantry Drive Assembly	1
770-1108	Sprocket, Idler #HN40A18X5/8	Elevator Lift Drive	2
790-1025	Idler Wheel / Shaft Weldment	Gantry Drive Assembly	2
790-1029	Drive Wheel / Shaft Weldment	Gantry Drive Assembly	2
900-5034	Top Brush Shaft (Specify 134.5" or 145.5" when ordering)	Top Brush	1
950-0020	Promixity Switch Sensor, M30 Long, Cable, 15 mm², SCR Make Switching	AC Proximity Switch	1
950-0025	Promixity Switch Sensor, M18 Long, Cable, 8 mm², SCR Make Switching	AC Proximity Switch	1

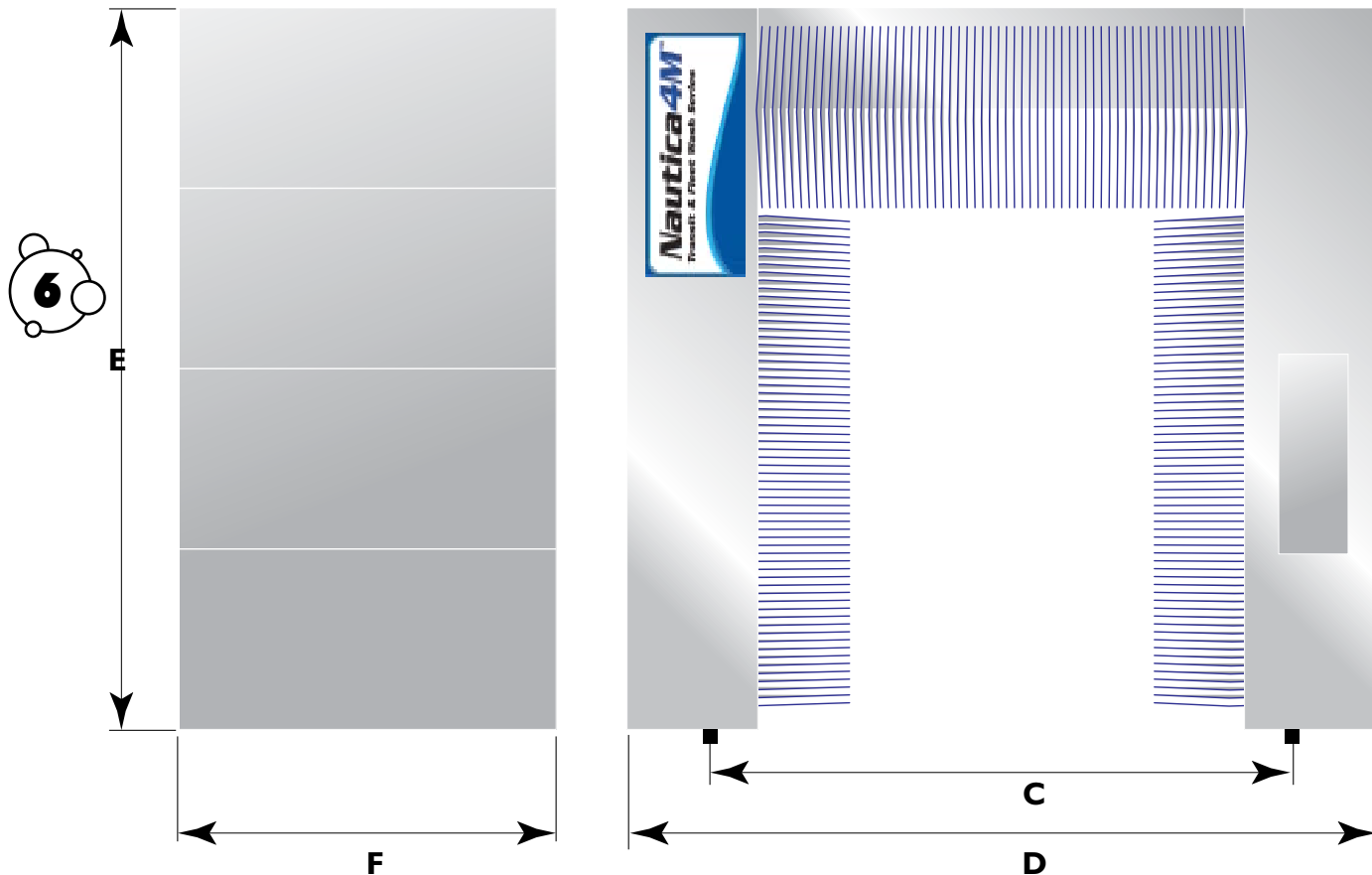


to Order Please Call: (800) 782-1582 press 3 for Parts

Operation Technical Data

Specifications

Item	Description	Model	Model
		4M-12' 5399A	4M-14' 5399B
A.	Maximum Vehicle Width	10'	10'
B.	Maximum Vehicle Height	12'	14'
C.	Distance Between Tracks	12'7-3/4"	12'7-3/4"
D.	Machine Width	15'-7"	15'-7"
E.	Machine Height	14'4"	16'4"
F.	Machine Length	7'6"	7'6"



Minimum Wash bay Dimensions

Height 16' 18'
Width 17' 17'
Longest Vehicle to be washed +16'

Rollover Utility Connections/ Consumption

Water ->A

"1" line, 40 to 60 psi, 30 US gpm; consumption approximately 60 to 80 US gallons per wash.
1" Female NPT thread shut off valve to be provided by the customer at the utility connection point.

Air ->B

"3/8 line, 85 to 100 psi, 1-2 CFM; consumption approximately 2 to 3 cubic feet per wash.
1/2" Female NPT thread shut off valve to be provided by the customer at the utility connection point.

Electricity ->C

208/230V, 3 phase, 60 Hz, 30 AMP, preferred.

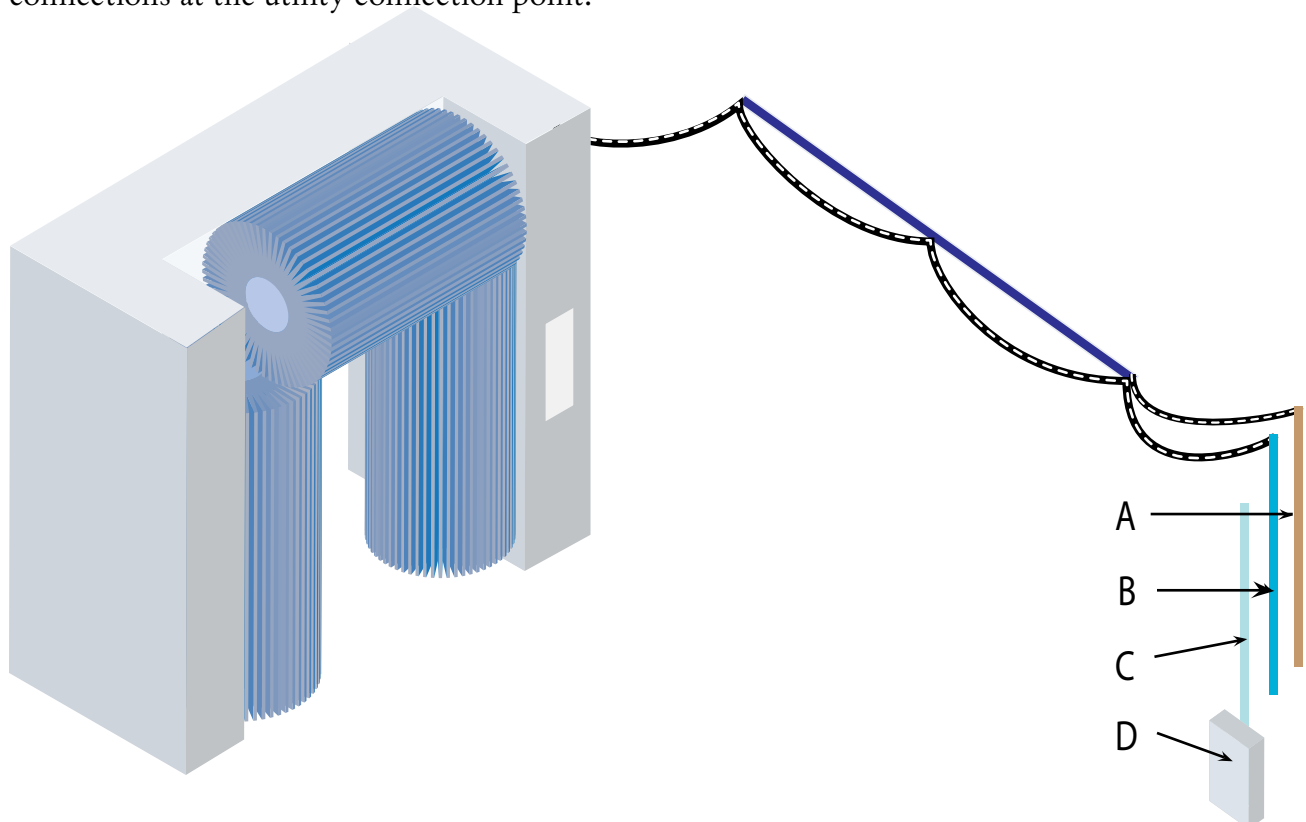
460/480V, 3 phase, 60 Hz, 15 AMP, optional.

575/600V, 3 phase 60 Hz, 15 AMP, optional.

Consumption: Approximately .08 KWh per wash. Customer to provide fused disconnect switch, that conforms to the local electrical codes, at the utility connection point.

Disconnect/Gate Valves ->D

Ball or other type disconnect valves may be mounted for floor access, with junction box and connections at the utility connection point.



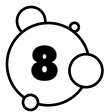
Testing Procedures

Before performing each test procedure, use the joystick on the remote control panel to move the Gantry back to its final stop position and raise the top brush to the top limit.

THE ELEVATOR MOTOR TEST:

- Turn the unit's MAIN POWER switch ON.
- Turn the unit's POWER selector switch ON. (The POWER ON pilot light, the light bulb inside the unit's panel and the programmable controller's lights will ALL light).
- Press the unit's START WASH button. THE TOP BRUSH SHOULD GO DOWN; if the top brush does not go down, LOCK THE MAIN POWER "OFF" and with the unit's control panel door. Reverse any two leads to the elevator motor (M-2) at the terminal strip in the bottom of the panel.
- As the top brush is lowering, take an Ammeter and measure the electrical load of the elevator motor inside the electrical panel.
- Press the STOP button. This should STOP ALL movement.

THE GANTRY DRIVE MOTOR TEST:



- Turn the unit's MAIN POWER switch ON.
- Turn the unit's TOP BRUSH & SIDE BRUSH selector switches to the OFF position (if applicable)
- Press the unit's START WASH button. THE GANTRY SHOULD MOVE TOWARD THE ENTRANCE DOOR; if the gantry moves in the wrong direction. LOCK THE MAIN POWER "OFF" and open the unit's control panel door. Reverse any two leads to BOTH DRIVE MOTORS (M-3 & M-3) at the terminal strip in the bottom of the panel.
- Press the unit's START WASH button. The gantry should move down track, toward the wash bay's entrance. With no test vehicle present, the gantry SHOULD TOP AND REVERSE AUTOMATICALLY AFTER MOVING DOWN TRACK FOR 20 SECONDS. Allow the gantry to move back to the starting position.
- While the unit is in motion, use an Ammeter and measure the Load of the two drive motors from the inside of the unit's electrical panel.
- At the same time have someone measure the speed of the gantry by timing the length of travel.
- Press the STOP button. This should STOP ALL movement.

NOTE: While the gantry under test is in motion, observe it for smoothness of running on the tracks and proper coiling of the overhead cables and hoses. Make any necessary adjustments.

THE SIDE BRUSH TEST:

- Turn the unit's MAIN POWER switch ON.
- Turn the unit's TOP BRUSH selector switch to the OFF position. (If applicable.)
- Turn the unit's SIDE BRUSH selector switch to the ON position. (If applicable.)
- Press the unit's START WASH button. The side brushes should start to rotate against the unit's movement and extend (See figures 8-A)
- While the side brushes are rotating use an Ammeter to measure the motor load; at the same time, have someone measure the speed of each brush's rotation by timing the rotations.
- Press the STOP button. This should STOP ALL movement.

NOTE: Up to this point in testing, the unit's top brush motor HAS NOT been running

THE TOP BRUSH TEST & SETTING THE CURRENT RELAYS:

- Turn the unit's MAIN POWER switch ON.
- Turn the unit's TOP BRUSH selector switch to the ON position. (If applicable)
- Press the unit's START WASH button. The top brush should begin to rotate COUNTER-CLOCKWISE, when viewed from the left side. If not then LOCK THE MAIN POWER "OFF". Reverse any two leads to the top brush motor (M-1) at the terminal strip in the bottom of the panel. The top brush should start to lower three (3) seconds after it begins to rotate. (See figures 8-A).
- While the top brush is rotating, use an Ammeter to measure the motor load; at the same time, have someone measure the speed of each brush's rotation by timing the rotations.
- Press the STOP button. This should STOP ALL movement.
- See Section 2.4.4 of this manual for instructions on how to adjust the current relays.



THE DETERGENT PUMPS TEST:

1. **Fill the detergent storage tank with the proper detergent.**
2. **When the detergent storage tank is full.**
 - Fill the pump's suction line and case with detergent.
 - Check to see, that the pump's motor voltage (on the pump's nameplate) MATCHES THE SITE POWER SUPPLY.
 - Have a companion go to the RECLAIM panel and briefly turn the pump's selector switch to the HAND position, then back to the OFF position, and note the direction the pump motor turns. Check to see that it IS TURNING THE PROPER DIRECTION AS PER THE PUMP'S ROTATION ARROW. If it is then go to the next step. If the pump motor is not turning in the proper direction. With the **reclaim panel's power off** have the field electrician change any two wires to the brush water pump's motor at the pump motor starter overload relay in the reclaim panel.
 - Open gate valve on discharge side of pump and turn the selector switch to HAND
 - Turn the valve OFF when the return line is full of detergent.
3. **IF the detergent pump's motor does not start:**
 - Check to see if the detergent pump's circuit breaker is off or its overload relay (OL-11) is tripped.
 - Check the RECLAIM Panel's disconnect switch and circuit breaker.
 - Check the level of the Detergent storage tanks. If it IS LOW, the tank's low level float switch will prevent the pump from running.
 - A pressure drop should be noticed between two gauges.

Main and Operator Panels

THE MAIN ELECTRICAL PANEL

Main Power ON/OFF Switch

ON: Main power is supplied to all motors and the control circuit transformer.

OFF: Main power is not supplied to the unit's motors and control circuit transformer. Warning: This switch does not turn off the power in the cable between the unit and the customer supplied fused disconnect switch. This switch does not turn off the main voltage inside the panel, cable or to the motors.

Power ON/OFF Selector Switch

ON: Control circuit power (120 VAC) is supplied to the control circuits and the programmable controller.

OFF: Control circuit power is not supplied to the control circuits and programmable controller. Warning: This switch does not turn off the main voltage inside the panel, cable or the motors.

Power ON light:

Green indicator light lit when the main power disconnect and power selector switches are both on.



Safety Cutout Push Button:

A guarded white lighted push button. This button lights, whenever the safety system needs to be reset, as when the chain tension proximity switch or the fourth control power relay (PR-4) has been tripped. This button must be pushed, before the unit will operate again.

Stop Push Button:

A raised red mushroom shaped button. When pushed shuts down all wash unit functions. Warning: this switch does not turn off the main voltage inside the panel, cable or the motors.

Counter:

A non-resettable device, used to count how many times the wash unit has cycled.

THE OPERATOR ELECTRICAL PANEL

These switches do not turn off the main voltage inside the main panel, cable or the motors. The cables between the main control panel and this panel are live until the main panel's power selection switch is turned off.

1. The operator electrical panel can be positioned on either side of the gantry during installation.
2. A wall mounted or remote control panel can be provided as an option.

Power ON light:

Green indicator light lit when the main power disconnect when power switches are both on.

Stop Push Button:

A raised red mushroom shaped button. When pushed shuts down all wash unit functions.

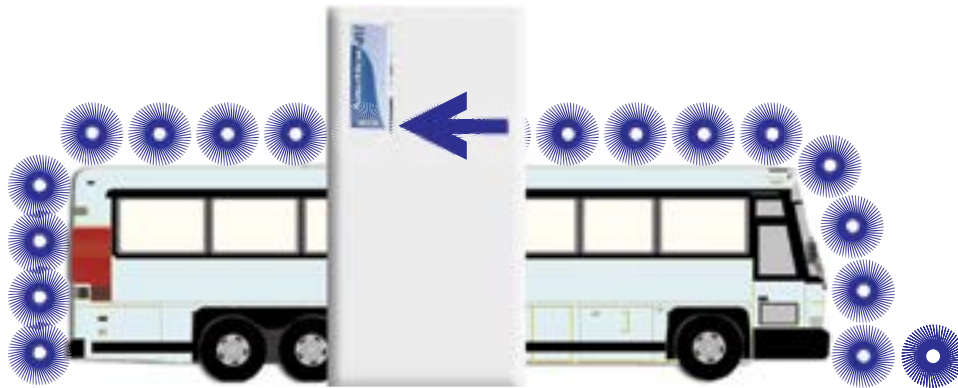
Joy-stick:

TOP BRUSH UP: Raises the top brush up to clear an obstruction.

TOP BRUSH DOWN: Lowers the top brush down, after the brush has cleared an obstruction.

MOVEMENT FORWARD: Causes the gantry to move forward to clear an obstruction.

MOVEMENT REVERSE: Causes the gantry to reverse direction to clear an obstruction.

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Start Wash Push Button:

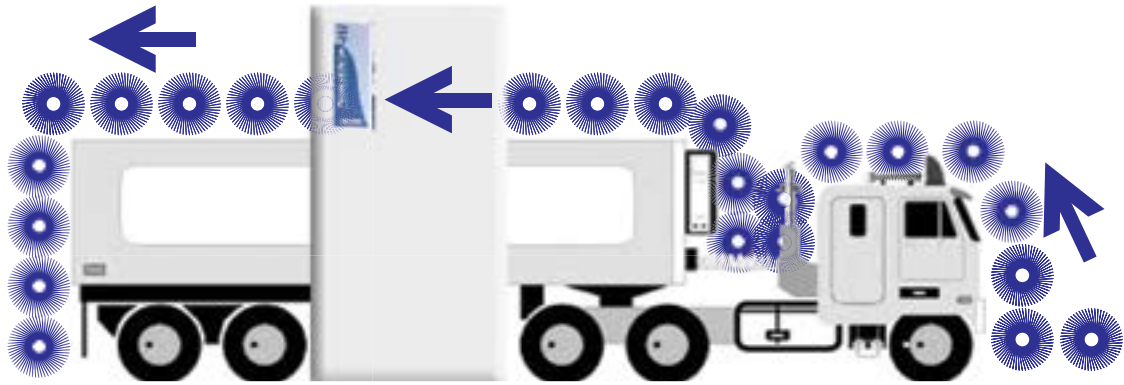
A green flush mounted button. Starts the machine's automatic wash and rinse cycles. This button is used to restart the machine, if it is stopped during the wash cycle. Shown below is the path the top brush follows when the start wash button has been pushed for both a bus and a truck.

Start Rinse Push Button:

A green flush mounted button. Starts the machine's automatic rinse cycle. This button is used to restart the machine if it is stopped during the rinse cycle. Depending on the program, the top brush will follow either of the two paths when the "start rinse" button is pushed.

Side Brushes Retract Push Button:

A black flush mounted button. When pushed and held down, it causes the side brushes to retract away from the vehicle's sides to clear mirrors, antennas, etc.

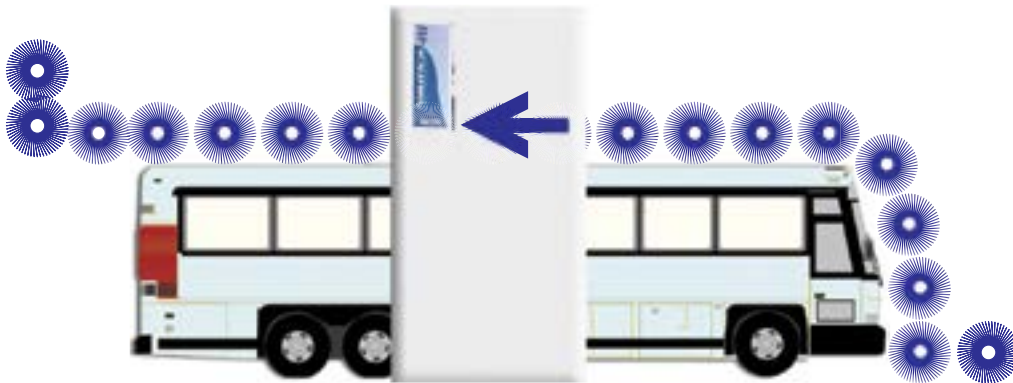


The side brushes continue to rotate, the gantry movement and water spray do not stop while this function is being used. The side brushes return to their extended positions, when this button is released.

Rear Wash Assist Push Button:

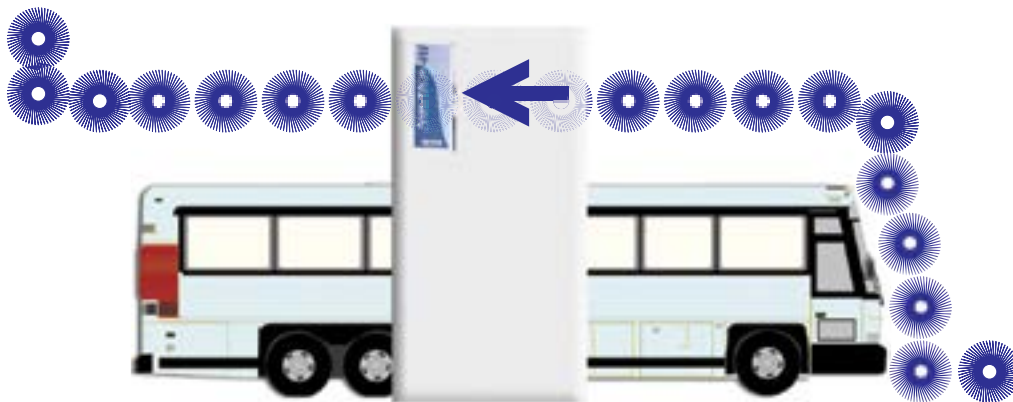
A black flush mounted button. When pushed, during the first pass (Wash cycle) of the washer, and while the top brush is still traveling across the vehicle's top surface, causes the top brush to hug the vehicle's rear contours as it lowers. If the brush pressure becomes too great (as in the case of large contours) the gantry will move the top brush away from the vehicle's rear contour until the brush pressure returns to normal at which point the gantry will stop and the top brush will begin to lower again to finish washing the vehicle's rear surfaces.

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Movement Stop Push Button:

A black flush mounted button when pushed causes the gantry travel to stop. However, the brushes continue to rotate and the water continues to spray.



Car/ Truck/ Transport Vehicle Selector Switch (optional illuminated push button):

CAR:

Position, activates the first and second strokes of both side brush arm air cylinders to swing the side brushes closer to the center of the machine, allowing them to wash smaller size vehicles. The machine follows the small vehicle program shown below.

BUS/TRUCK:

Position, only activates the first stroke of the side brush arm air cylinders, allowing them to wash larger size vehicles. The machine will automatically wash over a tractor and jump the gap between the tractor and trailer without contacting the 5th wheel or air brake and electrical lines. The height at which this jump occurs can be adjusted by moving the position of the top brush lower-truck proximity switch on its mounting track at the rear of the gantry.

TANDEM (Optional):

Same as transport, with adjustable proximity switch to stop lowering of the top brush between tandem trailers.

TRACTOR (Optional):

Forces unit to stop wash cycle early and return on rinse mode using a timer.

TRAILER (Optional):

Same proximity switch as TRACTOR TRAILER setting stops the top brush from lowering before it comes into contact with electrical and air brake lines.

STACKS (Optional):

Timed for the Top Brush to ride around the tops of the stacks. NOTE: The horizontal distance from the front bumper of the truck to the stacks must be supplied by the customer.

TAILGATE (Optional):

Adjustable proximity switch stops lowering of the top brush at the rear of the truck before becoming entangled in the framework or folded hydraulic rear-load lift 'tailgate'.

Water OFF/ON Selector Switch:

ON: The unit's water solenoid valve is allowed to activate as required.

OFF: The unit's water solenoid valve is prevented from activating. Water is not allowed to flow to the spray nozzles. Caution: the water pressure in the supply hose is still present. Lock off the customer supplied shut off valve before working in the supply hose.

Top Brush OFF/ON Selector Switch:

ON: The top brush operates normally.

OFF: The top brush does not rotate and remains in its fully retracted position at the top of the wash unit. This gives the option of using or not using the top brush.

Side Brushes ON/OFF Selector Switch:

ON: The side brushes operate normally.

OFF: The side brushes do not rotate and remain in their retracted positions. This gives the option of using or not using the side brushes.

Top Brush Return Level/Normal/Return Up Selector Switch:

RETURN LEVEL: The top brush follows the vehicle's contours during the washing pass then rises to its upper position and remains there during the rinsing pass.

NORMAL: The top brush follows the vehicle's contour during the washing pass, then just before the rinsing pass rises to its upper position and remains there during the rinsing pass.

RETURN UP: The top brush follows the vehicle's contours during the washing pass, then just before the rinsing pass raises to its upper position and remains there during the rinsing pass.

Optional Auto Start ON/OFF Selector Switch:

ON: The wash system starts automatically when a vehicle breaks the electric eye's beam.

OFF: The wash system does not start automatically when a vehicle breaks the electric eye's beam.



Wash Chemical Pump ON/OFF Selector Switch:

ON: Allows the wash chemical pump to run and discharge chemical during the wash cycle.

OFF: Prevents the wash chemical pump from running during the wash cycle.

Rinse Chemical Pump ON/OFF Selector Switch:

ON: Allows the wash chemical pump to run and discharge chemical during the wash cycle.

OFF: Prevents the rinse chemical pump from running during the rinse cycle.

Parts Description

Gantry and Brushes

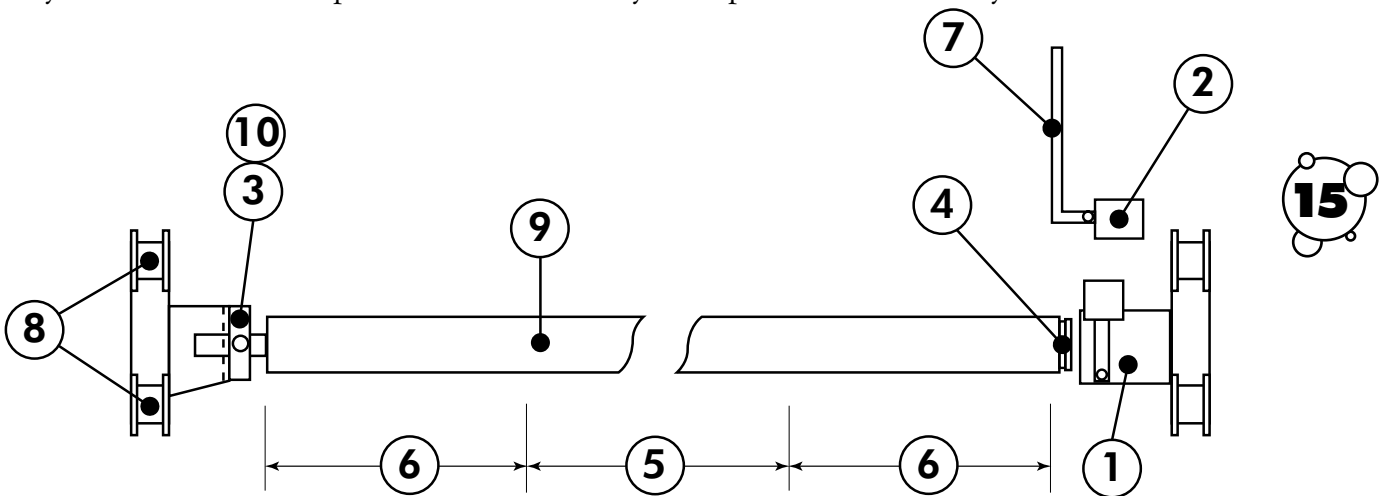
THE TOP BRUSH

The top brush in the figure below is driven by a 2 H.P., 1800 RPM electric motor (see item #2 in the parts list) & gear reducer (see item #1 in the parts list) combination. The motor is linked to the gear reducer's shaft by a taper lock bushing (see item #4 in the parts list).

The top brush is raised and lowered by a ¾ H.P., 1800 RPM elevator brake motor. This action is controlled by current relays (PR-1 to PR-4). See section 2.4.4 for details on the current relays.

The Standard Tapered Top Brush

The quantity of spares listed reflects the total number required to replace the top brush parts that are subject to wear. The item numbers shown in the parts list on the next page refers to the diagram shown below. These items are rarely replaced; however they are kept in stock or can be easily manufactured. The parts can be ordered by their part number directly.



Item	Qty.	Part Number	Description
	1	630-1333	Complete Top Brush: 630-1295(Qty 10), 630-1294(Qty 4) 900-5034 (qty 1)
1	1	235-2139	Reducer, 15:1 (LH)
2	1	210-2110	Motor, 2 HP, 230V, 1800 RPM, 56C
3	1	610-1125	Bearing Block, 1-1/2"
4	1	700-3003	Taper lock bushing hub, Q1 x 1-1/4
5	10	630-1295	Middle Brush, Type-C, Full density. 1400mm
6	4	630-1294	End Brush, Type-C, half density. 1400mm
7	3	670-3051	Plastic Track E-chain
8	16	970-1034	Top brush sledge wheel, UHWM
8A	8	970-1033	Wheel Sledge UHWM
8B	8	970-1032	Wheel Sledge Bushing steel
9	1	900-5034	Top Brush Shaft; (134.5" old style or 145.5" std.)

THE SIDE BRUSHES

The side brushes are pictured. They are each driven by a 1.5 HP 1800 RPM, electric motor and Peerless Winsmith gear reducer. The side brush shaft is linked to the gear reducer's shaft by a taper lock bushing.

The side brushes are mounted in four (4) bolt flange bearings on the arm frames. The movement of the side brush frames toward and away from the vehicle's sides is powered by dual stroke air cylinders (see section 2.3)

The quantity of spares listed reflects the total number required to replace the top brush parts that are subject to wear. All brush segments are identical and interchangeable. At least one item should be kept in stock or each interchangeable part. These items are rarely replaced; however they are kept in stock or can be easily manufactured. The parts can be ordered by their part number directly.

The side brushes of the model 4M-12/5399A (12') rollover washer differs only slightly from the 4M-14/5399B (14') rollover washer. Other than the number required, all brush segments are identical and interchangeable. The quantity of spares listed reflects the total number required to replace the brush segments of one brush unit that are subject to wear.

After the wash unit has been running a while you may find that some brush segments wear faster than others. Once these are determined, more of that type can be stocked. This is a long delivery time item, therefore on of each should be stocked for both the right hand and left hand brushes. The left hand unit is identical and interchangeable with the top brush gear reducer. When need arises the stocked part can be put in service, while the old unit is either replaced or repaired.

The stocking of one side brush motor is recommended so that the stocked one can be used while the existing motor is under repair or replacement. The motors are rarely replaced; however they are readily available directly from part sales.

NOTES:

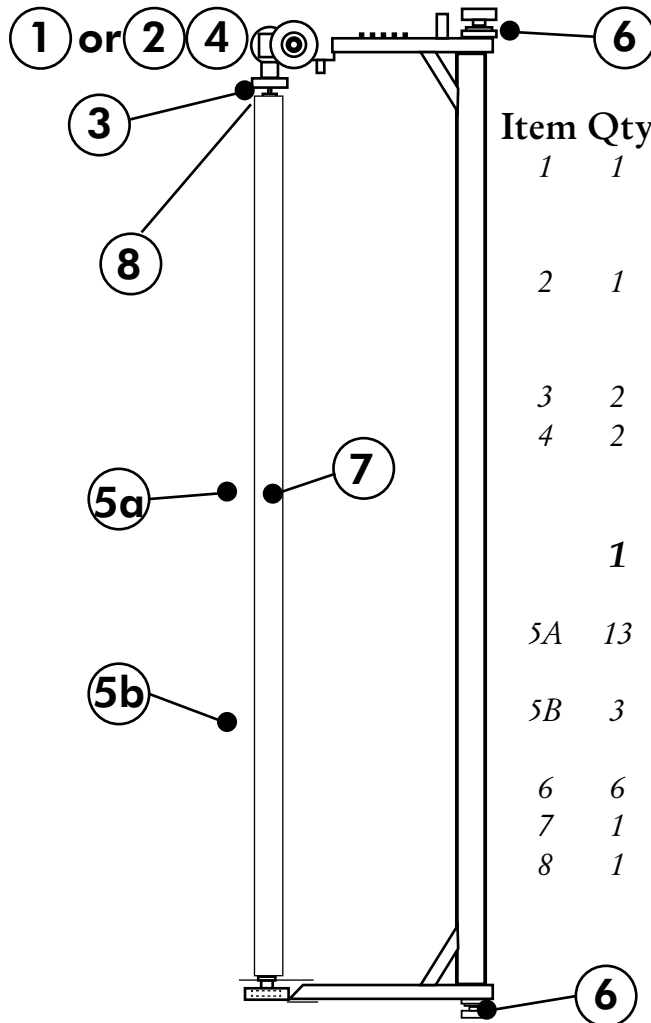
- *ONLY the left side brush has been shown in the figure on the next page. All parts are identical and interchangeable on the side brushes except for the item # 2, i.e. the gear reducer. For the right brush, the gear reducer with left hand motor to shaft orientation is used while the left brush uses the gear reducer with right hand motor to shaft orientation. Thus in the figure, item # 1 or 2 will be applicable depending on the relevant brush (left or right). See the parts lists on pages 17 & 18.*
-
- *The side brush shaft for the 12' rollover is different from the 14' rollover. Thus item #7 or 8 will be applicable depending upon the relevant machine. (12' or 14') respectfully. See the parts list on pages 17 & 18*

The Standard Tapered Side Brush

12' Clearance ROLLOVER:

The rotating side brushes have two different sections of brush segments:

- Thirteen rows, composed of 13 segments 1100mm, half density pelts per brush and
- Three rows composed of 3 bottom segments 1100mm full density pelts per brush.



Item	Qty	Part#	Description
1	1	235-2140	Speed reducer 15:1 (R.H.) for the left side brush (looking from the vehicle entry to exit direction)
2	1	235-2139	Speed reducer 15:1 (L.H.) for the right side brush (looking from the vehicle entry to exit direction)
3	2	700-3003	Bushing hub, Q1 x 1-1/4
4	2	210-1778	Motor, 1-1/2 HP, 230V, 1800 RPM, 56C wash down duty.
1 630-1334 Complete Brush 12'			
5A	13	630-1295	Top section Brush, Half Density, 1100mm
5B	3	630-1296	Bottom Section Brush Full Density 1100mm
6	6	610-1015	"Bearing, 4-bolt flange, 1"
7	1	900-5032	Side brush shaft for 12' rollover
8	1	153-1406	Gibkey 1/4" x 2"

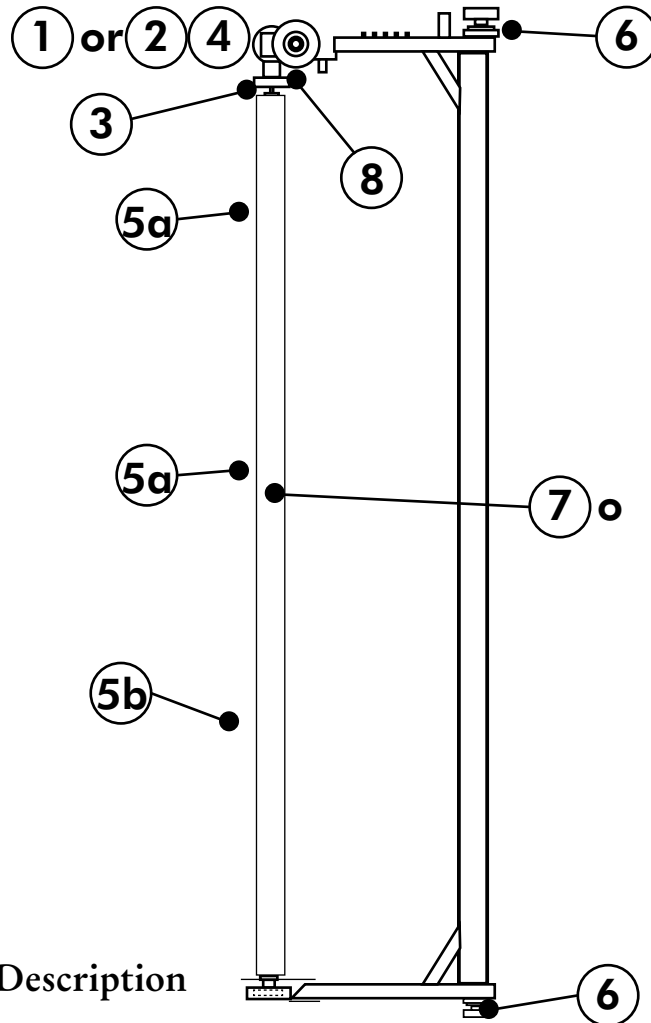
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The Optional Long Bristle Brush (For Truck)

14' Clearance ROLLOVER:

The rotating side brushes have two different sections of brush segments:

- Sixteen rows, composed of 16 segments 1100mm, half density pelts per brush and
- Three rows composed of 3 bottom segments 1100mm full density pelts per brush.



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Item	Qty	Part#	Description
1	1	235-2140	Speed Reducer 15:1 (R.H.) for the left side brush (looking from the vehicle entry to exit direction)
2	1	235-2139	Speed Reducer 15:1 (L.H.) for the right side brush (looking from the vehicle entry to exit direction)
3	2	700-3003	Bushing hub, Q1 x 1-1/4
4	2	210-1778	Motor, 1 1/2 HP, 230V, 1800 RPM, 56C washdown duty
	1	630-1335	Complete Brush 14'
5A	16	630-1295	Top Section Brush, Half Density, 1100mm
5B	3	630-1296	Bottom Section Brush Full Density, 1100mm
6	6	610-1015	Bearing, 4-bolt flange, 1"
7	1	900-1532	Side brush shaft for 14' Rollover
8	1	153-1406	Gibkey 1/4"x 2"

THE BRUSH SEGMENT INSTALLATION INSTRUCTIONS

Each brush assembly consists of a number of short $7\frac{3}{4}$ " long segments, riveted to a hollow brush shaft with three (3) rivets in each segments.

Each Brush Segment is installed as follows:

- i. *Starting at the bottom end of the brush shaft (top brush starts at the center then works to both ends), wrap on of the brush segments (proper for that position) around the shaft, overlapping the three rivet holes.*
- ii. *Mark the hole positions on the brush shaft.*
- iii. *Remove the brush segment and set it aside*
- iv. *Drill the three rivet holes (diameter to suit the rivet being used)*
- v. *Re-wrap the brush segment around the shaft, matching the holes in the segment with the holes in the shaft*
- vi. *Rivet the segment to the shaft (3 places)*
- vii. *Repeat steps b to f until all of the brush segments are attached.*

The Brush Shaft can be re-built by:

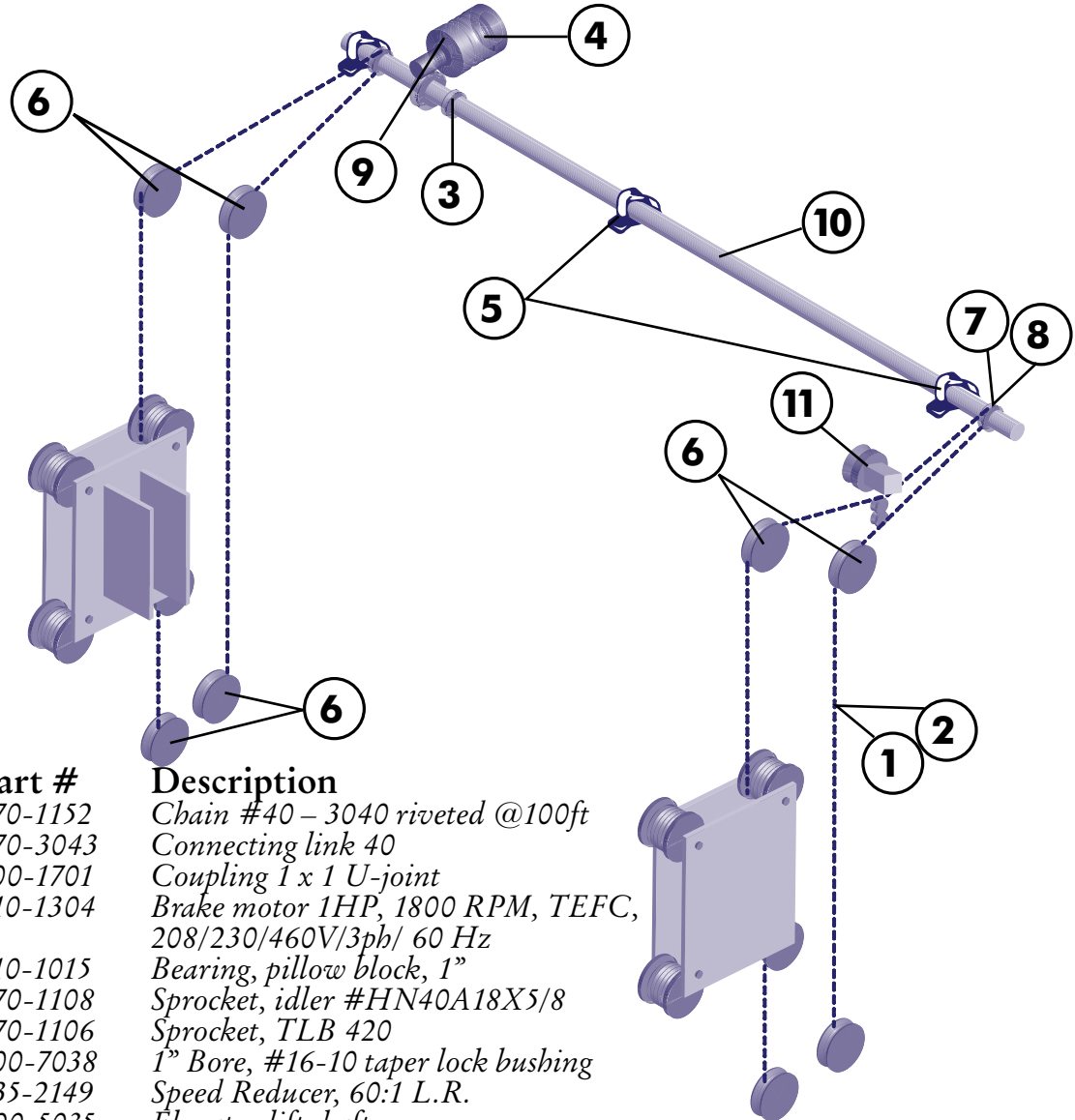
- viii. *Ordering the proper amount and type of brush segments to suit the brush shaft being worked on. Ordering the proper quantity and size of rivets to attach the new segments.*
- ix. *Starting at the bottom (or the top brush's center) drill out all of the old rivets holding the worn brush segments to the shaft*
- x. *Clean the brush shaft then repaint (re-flame coat) with some type of corrosion resistant paint*
- xi. *Wrap a new segment around the brush shaft in its proper position, matching the holes in the segment with the holes in the shaft.*
- xii. *Rivet the brush segment in place (3 rivets per segment)*
- xiii. *Repeat steps c to f until all of the new segments are attached.*

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NOTE: *It may be necessary to use the next size larger diameter rivets or to drill new holes for some of the segments, if the existing holes are damaged.*

THE ELEVATOR LIFT DRIVE ASSEMBLY

The elevator lift drive is designed to raise and lower the top brush assembly. The drive consists of a 1 HP brake type electric motor coupled to a 60:1 ratio gear reducer. The gear reducer simultaneously turns two shafts, which are connected to the lift chain sprockets (one on each side of the wash unit). The raise and lower signals are provided by the programmable controller acting on a combination of its program and feed back from the four current relays (PR-1 to PR-4)



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Item	Qty.	Part #	Description
1	70	670-1152	Chain #40 – 3040 riveted @100ft
2	8	670-3043	Connecting link 40
3	1	700-1701	Coupling 1 x 1 U-joint
4	1	210-1304	Brake motor 1HP, 1800 RPM, TEFC, 208/230/460V/3ph/ 60 Hz
5	3	610-1015	Bearing, pillow block, 1"
6	10	770-1108	Sprocket, idler #HN40A18X5/8
7	2	770-1106	Sprocket, TLB 420
8	2	200-7038	1" Bore, #16-10 taper lock bushing
9	1	235-2149	Speed Reducer, 60:1 L.R.
10	1	900-5035	Elevator lift shaft
11	1	202-1002-C	Chain tension assembly

The gear reducer listed is not interchangeable with the two gantry drive gear reducers. Therefore, at least one of these long delivery time items should be stocked. When the need arises it can be put in service while the old unit is either replaced or repaired.

The #40 chain listed is sold by the foot. **IT is recommended that you stock at least 50 feet of chain for replacement purposes.** This will allow you to completely change the lift chain in one side of the unit, usually the top brush drive side). However, not all of the chain goes over the various sprockets and wears. IT is also recommended that you stock several master links, as they can be used repair broken lift chain or use up short lengths of chain. These parts are used in daily production and should be available in stock.

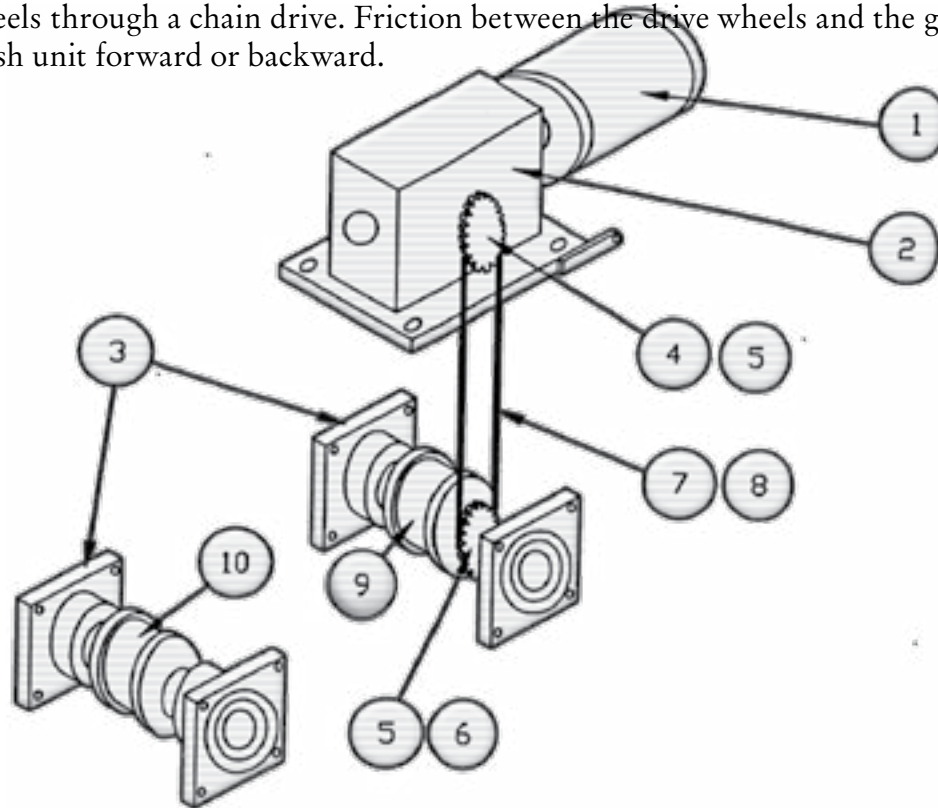
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Rev.:FT•0115

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THE GANTRY DRIVE ASSEMBLY

There are two identical gantry drive assemblies on in each gantry leg. Each drive consists of a ½ hp break type of electric motor coupled to a 60:1 ratio gear reducer. The gear reducer in turn drives the drive wheels through a chain drive. Friction between the drive wheels and the guide track moves the wash unit forward or backward.



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Item	Qty.	Part #	Description
1	1	210-1301	Brake Motor ½ hp, 1800 rpm, TEFC. 208/230/460V or 575V (Specify w/ordering), 3 Ph, 60 Hz
2	1	235-2149	Speed Reducer 60:1 L.R. (specify when ordering)
3	4	610-1124	1¼" Bore 4-Bolt, Flange Bearing
4	1	200-7038	1" Bore, # 1610 Taper Lock Bushing
5	2	770-1107	Sprocket TLB 516
6	1	200-7037	1¼" Bore, #1610 Taper Lock Bushing
7	1	670-1151	#50 Chain x 5' Long
8	2	670-3042	#50 Chain Connector (Master) Link
9	1	790-1029	Drive Wheel / Shaft Weldment
10	1	790-1025	Idler Wheel / Shaft Weldment

The gear reducer listed above is interchangeable with the elevator lift drive gear reducer, therefore at least one of these items should be stocked. Then when the need arises it can be put into service while the old unit is either replaced or repaired.

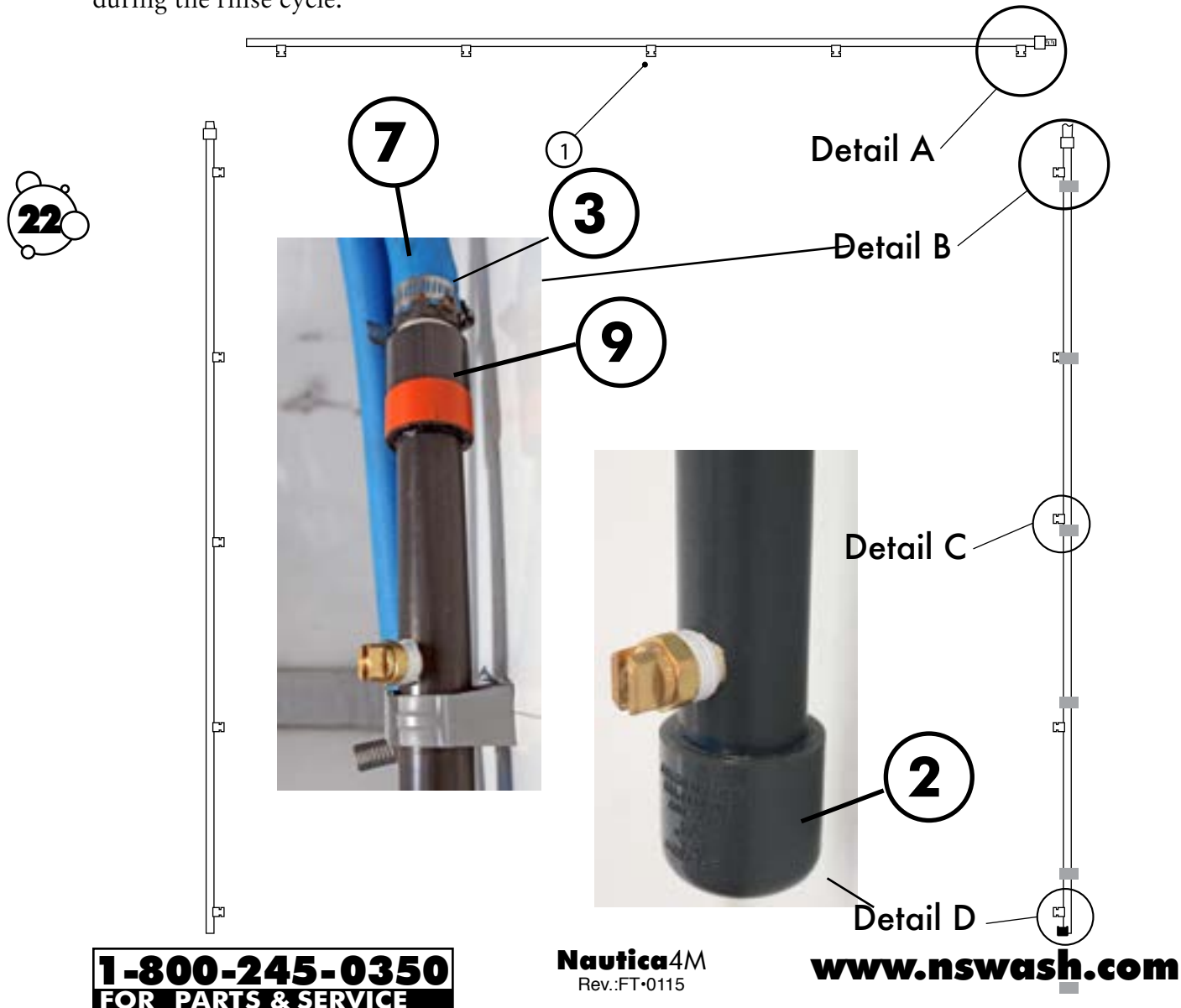
The quantity of spares required listed is for one gantry drive assembly. The #50 chain is sold by the foot. *IT is recommended that you stock at least 10 feet of chain for replacement purposes.* This will allow you to replace both drive chains at once. It is also recommend that you stock several master links, as they can be used to repair a broken drive chain or use up short lengths of chain. These parts are used in daily production and should be available from stock.

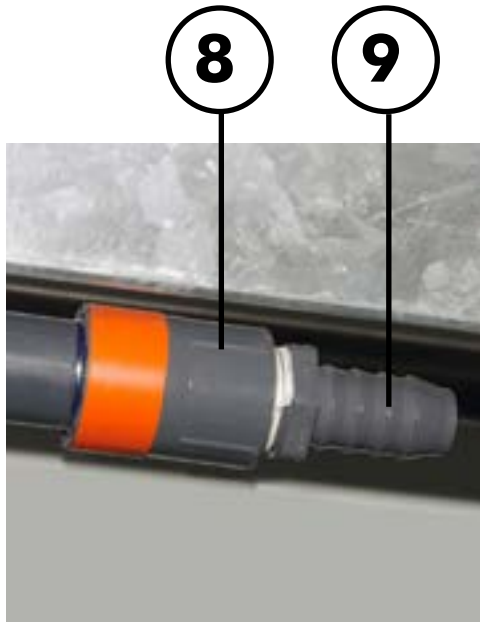
Plumbing System

THE PLUMBING SUPPLY

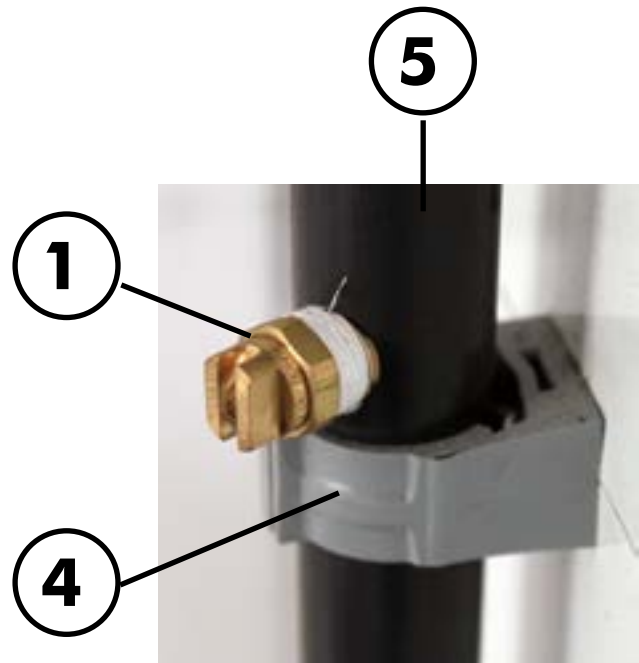
The plumbing system which consists of two spray arches as shown below. All lines are fed by a 1" water hose, connected to the customer supplied water source. During the wash cycle both arches spray soap and water. During the rinse cycle both arches spray water and can be combined with an optional wax.

The flow of the water from the hose to the unit's spray nozzles is controlled by the water solenoid valve. The amount of soap and wax added to the water flow is controlled by the chemical injection pump(s). The soap concentrate is poured into the soap tank mounted on the gantry. A 3/8" polytube, equipped with a check valve acting as a foot valve, leads from the soap tank to a chemical injection pump. The wash injection pump runs during the wash cycle to inject soap into the water flowing to the spray nozzles and does not run during the rinse cycle. Optionally, a second identical pump and supply tank can be added to the system, to add wax to the water during the rinse cycle.





Detail A



Detail C

If the wax option is not used then there is only one pump, chemical injection fitting tank and check valve (foot valve). The items listed refer to those shown in the figure above and the previous page (only the 12' model piping is shown). When this piping is installed on the 12' model there are a total of 32 nozzles used. This is four less nozzles than on the 14' model which has a pipe with 10'6" length. When this piping is installed on the 12' model, this pipe is 9' long and is fitted with one less nozzle. The top crossover spray pipes are identical for both units. The 12' model is shipped with 100' of 1" rubber hose not 120' unless longer hose is ordered by the customer when the wash unit is manufactured. As these parts are used in our daily production, we should either have them in stock or can manufacture them very quickly.

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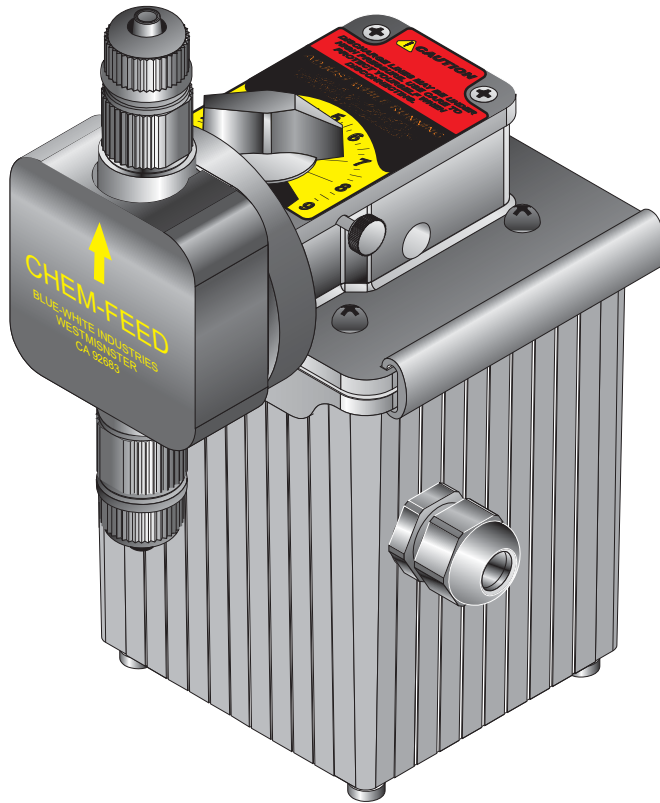
Item	14' Req.	12' Req.	Part #	Description
1	36	32	510-0053	Nozzle 1/4" 6508 Brass TPLUM 5871
2	4	4	150-2100	3/4" PVC Pipe Cap 5606-512
3	12	12	450-1053	#24 Hose Clamp
4	16	16	320-1221	Hanger, Pipe, 3/4" Efcor Plated
5	6	-		Side & Top Spray Pipes 3/4" PVC Pipe x 10'6" Long
6	-	6		Side & Top Spray Pipe, 3/4" PVC Pipe x 9'-0" Long
7	1	1		3/4" Rubber Hose x 23'-0" Long.
8	8	8	420-1441	Coupling 3/4" PVC
9	8	8	500-1065	3/4" PVC Hosebarb

THE CHEMICAL INJECTION PUMPS

The chemical injection pump is hard wired to the electrical control panel, not through a receptacle / grounded plug as shown in the pump's literature. When the wax option is purchased a second identical pump, tank, piping, injection point, control relay and selector switch are added. Both pumps are identical, and therefore the literature provided is applicable to both.

The main panel is equipped with a control relay (one per pump) and the operator panel is equipped with an OFF / ON selector switch (one per pump) to give the ability to turn the pump OFF when desired.

The chemical injection pump part # is **520-2006** is a Diaphragm Injector. This pump is powered by 120 V. /1/60.



NS# 520-2006

CHEMICAL INJECTION PUMP

Model C-1500N

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Chemical Injection Pump

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1.0 Introduction

Thank you for purchasing the 520-2006 positive displacement metering pump. The 520-2006 is designed to inject chemicals into piping systems. All models are equipped with a top mounted mechanical flow rate adjustment knob. Optional on/off cycling timers are available.

The pump has been tested by NSF International for use with 12-½% Sodium Hypochlorite.

CAUTION: This pump has been evaluated by ETL Intertek Testing Services for use with water only. The factory performance tests the pump with water only.



2.0 Specifications

Maximum Working Pressure	125 psig / 8.6 bar*
Maximum Fluid Temperature	130° F / 54° C
Output Accuracy	+/- 10% of maximum (water @ 70° F, 0 psig, and 5' suction lift)
Ambient Temperature Range	14 to 110° F / -10 to 43° C
Enclosure	NEMA 3R (IP 23) acceptable for outdoor use
Duty Cycle	Continuous
Maximum Viscosity	1,000 Centipoise
Maximum Suction Lift	up to 10 ft. water
Power Requirements	115V60Hz 45 Watts 220V50Hz 45 Watts 230V60Hz 45 Watts 24V60Hz 45 Watts
Dimensions	9-1/16" high x 4-1/2" wide x 5-3/4" deep
Weight	7 lb.

520-2006 Features

3.0 520-2006 Features

- Double-ball ceramic check valves.
- PVDF (Kynar) valve assemblies.
- Viton o-rings.
- High outlet pressure capability of 125 PSIG.*
- Easy access, top mounted mechanical feed rate adjustment.
- Ball bearing supported motor drive shaft.
- Permanently lubricated ball bearing motor.
- 20:1 adjustment turn down ratio.
- Acceptable for outdoor use. (NEMA 3R; IP23)
- Corrosion resistant Valox housing.
- Easy servicing.
- Includes suction tube foot valve & strainer, suction tube weight, suction tubing, discharge tubing and injection fitting with internal back-flow check valve and mounting hardware.* Most models.

4.0 How To Install the 520-2006

 **CAUTION** Proper eye and skin protection must be worn when installing and servicing the pump.

***Note:** All diagrams are strictly for guideline purposes only. Always consult an expert before installing the 520-2006 into specialized systems. The 520-2006 should be serviced by qualified persons only.*



4.1 Mounting Location

Choose an area located near the chemical supply tank, chemical injection point and electrical supply. Although the pump is designed to withstand outdoor conditions, a cool, dry, well ventilated location is recommended. Install the pump where it can be easily serviced.

- Mount the pump to a secure surface or wall using the enclosed hardware. Wall mount to a solid surface only. Mounting to drywall with anchors is not recommended.
- Keep the outlet (discharge) tubing as short as possible. Longer tubing increases the back pressure at the pump tube.
- Do not mount the pump directly over your chemical container. Chemical fumes may damage the unit. Mount the pump off to the side or at a lower level than the chemical container.
- Mounting the pump lower than the chemical container will gravity feed the chemical into the pump. This “flooded suction” installation can reduce the time required to prime the pump. Install a shut-off valve, pinch clamp or other means to halt the gravity feed to the pump during servicing.
- Your solution tank should be sturdy. Keep the tank covered to reduce fumes.
- Be sure your installation does not constitute a cross connection with the drinking water supply. Check your local plumbing codes.

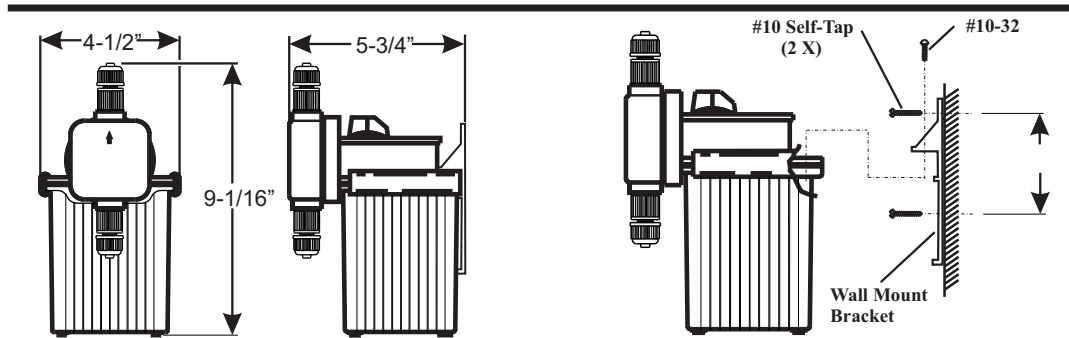


FIG. 4.0 DIMENSIONAL DRAWING

FIG. 4.1 INJECTOR WALL MOUNTING



CAUTION

To prevent chemical overdosing, a flow switch is recommended on the circulation system to automatically stop chemical feed when there is no return flow to the swimming pool or spa.



WARNING

Risk of chemical overdose. Be certain the pump does not overdose chemical during backwash and periods of no flow in the circulation system.

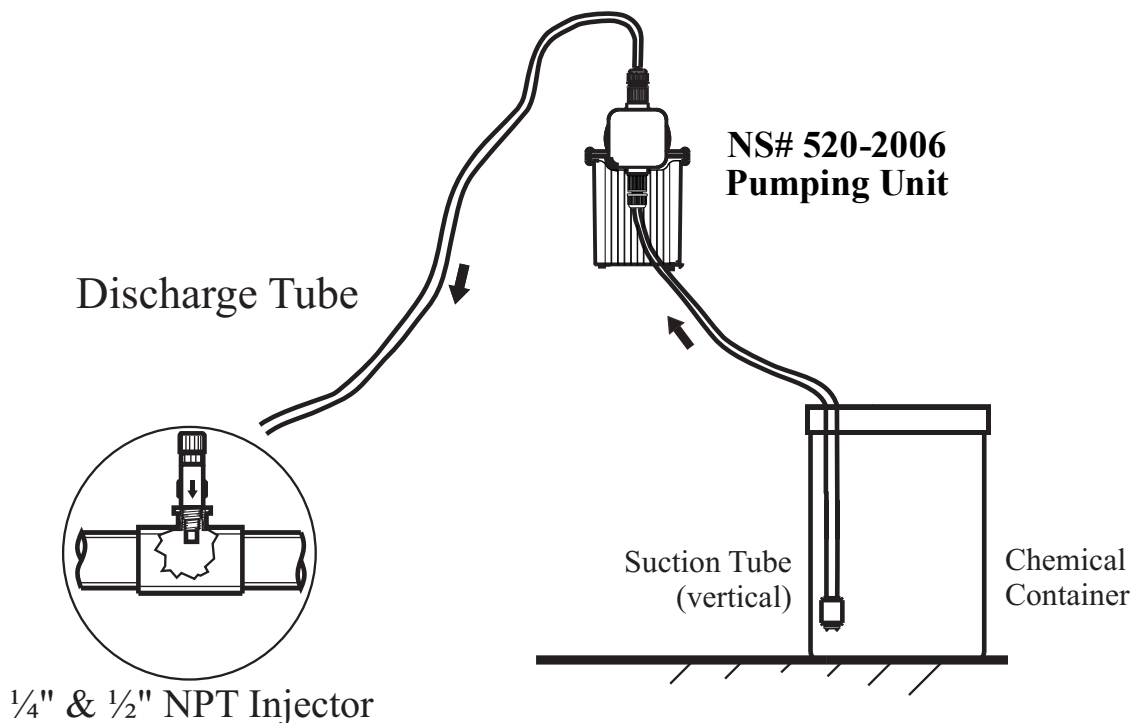


FIG. 4.3 TYPICAL INSTALLATION

Electrical Connections

4.2 Electrical Connections

4.2.1 Input Power Connections



WARNING



Risk of electric shock. Be certain to connect the pump to the proper supply voltage. Using the incorrect voltage will damage the pump and may result in injury. The voltage requirement is printed on the pump serial label.

Note: When in doubt regarding your electrical installation, contact a licensed electrician.

The 520-2006 is supplied with either a ground wire conductor and a grounding type attachment plug (power cord) or a junction box for field wiring.

POWER CORD MODELS -To reduce the risk of electric shock, be certain that the power cord is connected only to a properly grounded, grounding type receptacle.

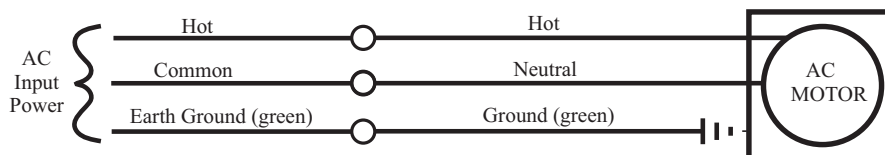
JUNCTION BOX MODELS -To reduce the risk of electric shock, be certain that a grounding conductor is connected to the green grounding conductor located in the junction box.

MOTOR LEADWIRES

INPUT VOLTAGE	HOT LEADWIRE	NEUTRAL LEADWIRE	GROUND LEADWIRE
115V 60Hz	BLACK or YELLOW *	BLUE	GREEN
220V 50Hz	BLUE or YELLOW *	BROWN	GREEN
230V 60Hz	BLACK or YELLOW *	RED	GREEN
24V 60Hz	BLUE *	WHITE	GREEN

* Yellow leadwire : thermally protected motor
 Black or Blue leadwire: standard impedance protected motor

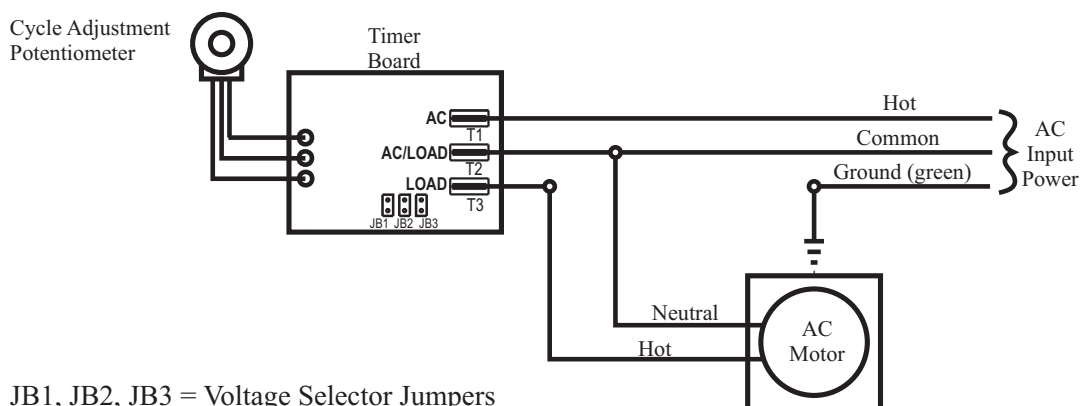
FIG. 4.4 WIRING DIAGRAM - STANDARD MODELS



CAUTION

To prevent chemical overdosing, disconnecting power to the circulation system must also disconnect power to the pump.

Wiring Diagram



JB1, JB2, JB3 = Voltage Selector Jumpers

Jumpers Configuration

Install JB2 & JB3, (JB1 left open) = 24 V AC input

Install JB1 & JB3, (JB2 left open) = 115 V AC input (factory Setting)

Remove all jumpers (JB1, JB2, & JB3 left open) = 220V, 230 V AC input

FIG. 4.5 WIRING DIAGRAM - FIXED TIMERS

4.3 How To Install the Tubing and Fittings



CAUTION Proper eye and skin protection must be worn when installing and servicing the pump.

4.3.1 Inlet Tubing - Locate the inlet fitting of the pump head, see fig 4.6. Remove the tube nut. Push the clear PVC suction tubing onto the compression barb of the fitting. Use the tube nut to secure the tube. Hand tighten only.

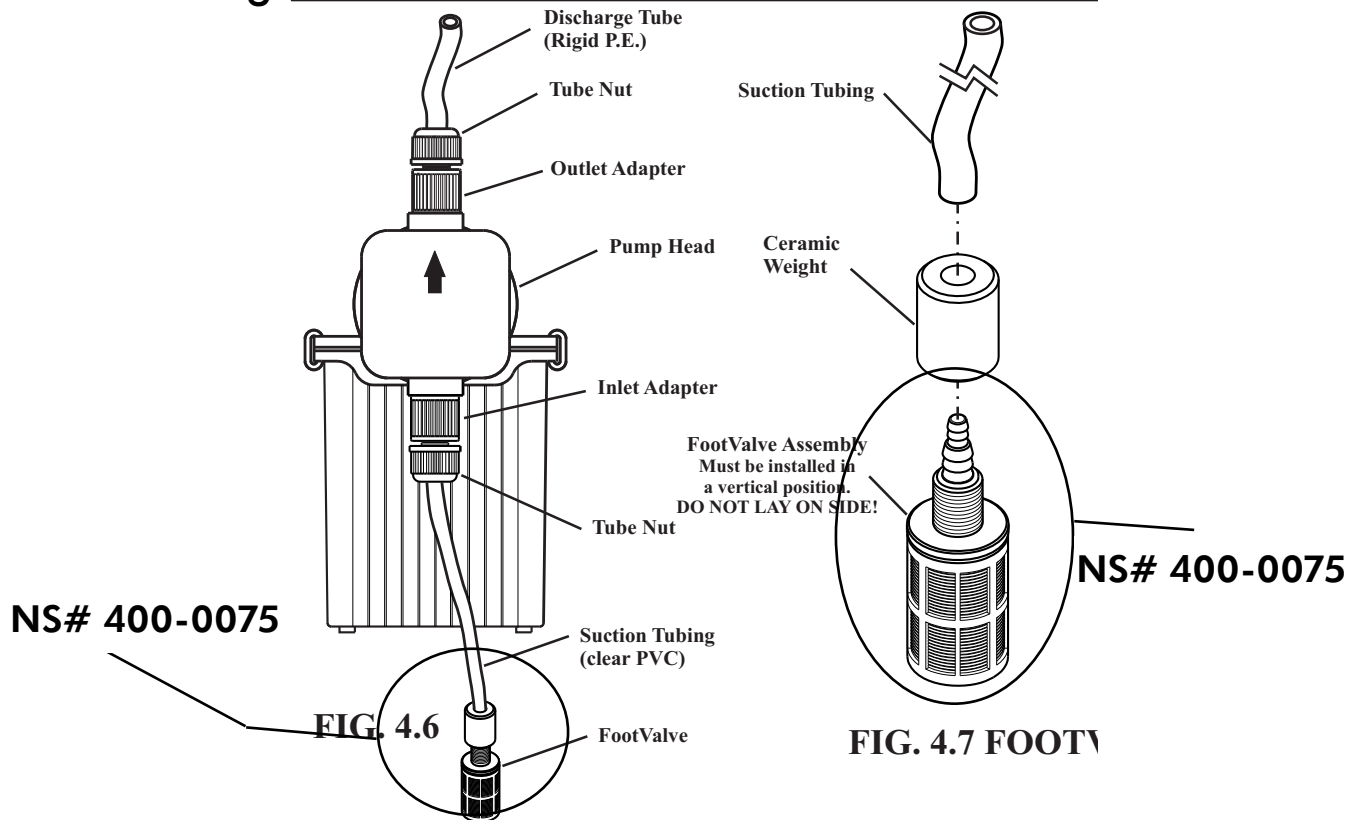
4.3.2 Footvalve/Strainer - Trim the inlet end of the suction tubing so that the strainer will rest in a vertical position, approximately one inch from the bottom of the solution tank. This will prevent sediment from clogging the strainer. Loss of prime may occur if the footvalve is permitted to lay on the bottom of the solution tank in a horizontal position. Slip the ceramic weight over the end of the suction tube. Press the footvalve/strainer into the end of the tube. Secure the ceramic weight to the strainer. Drop the strainer into the solution tank.

4.3.3 Outlet Tubing - Locate the outlet fitting of the pump head, see fig 4.6. Remove the tube nut. Push the opaque outlet (discharge) tubing onto the compression barb of the fitting. Use the tube nut to secure the tube. Hand tighten only.

Trim the other end of the outlet tube leaving only enough slack to connect it to the Injection/Check valve Fitting (see below). Increasing the length of the outlet tube increases the back pressure at the pump head, particularly when pumping viscous fluids.

Keep the inlet and outlet tubes as short as possible.

Valve Fitting Installation



4.3.4 Injection/Check Valve Fitting Installation - The Injection/Check valve fitting is designed to install directly into either 1/4" or 1/2" female pipe threads.

Install the Injection/Check valve directly into the tee fitting. Do not install the fitting into a pipe stud and then into the tee. The solution must inject directly into the flow stream.

Use Teflon thread sealing tape on the pipe threads. Push the opaque outlet (discharge) tubing onto the compression barb of the Injection/Check valve fitting. Use the tube nut to secure the tube. Hand tighten only.

Injection/Check valve fitting will require periodic cleaning, especially when injecting fluids that calcify such as sodium hypochlorite. These lime deposits and other build ups can clog the fitting increasing the back pressure and interfering with the check valve operation. See section 6.0.

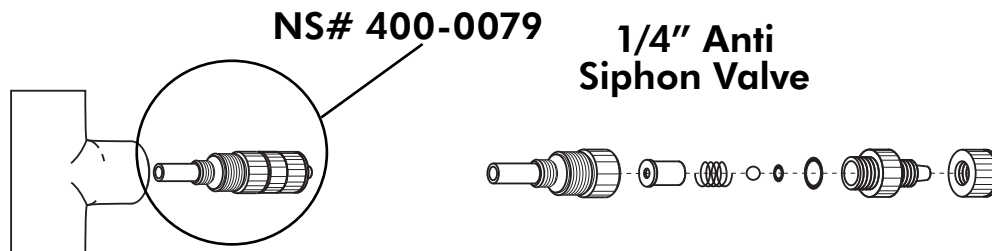


FIG. 4.8
INJECTION/CHECK VALVE

How to Operate the 520-2006

5.0 How To Operate The 520-2006

5.1 Adjusting the Pump Output- Standard models (fig. 5.1) - The 520-2006 flow rate can be adjusted within a range of 5% -100% of maximum output (20:1 turndown ration) by means of a mechanical, cam type mechanism. The mechanism adjusts the pump's stroke length to an infinite number of settings within the flow range. Because the pump's output is reduced by increasing the pressure of the system being injected into, the amount of suction lift, and the viscosity of the fluid being injected, the pump must be over-sized to allow for these factors. Sizing the pump to allow adjustment within the midrange is preferred to maintain accuracy. Consult the factory for individual pump model output curve data.

To adjust the pump's output:

1. With the pump running, loosen the set screw.
2. Turn the adjustment knob to the desired setting.
3. Re-tighten the set screw.

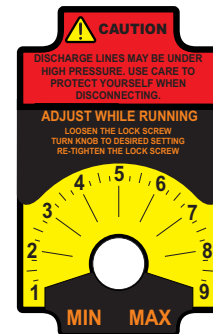


FIG. 5.1

5.2 Adjusting the Pump Output - DELUXE Models (fig. 5.2)

In addition to the cam type mechanism adjustment (section 5.1), the pump output of the 520-2006 deluxe unit equipped with an optional electronic cycle timer board can also be fine tuned by adjusting the timer adjustment knob. The total-time cycle is factory preset and is not user adjustable. The on-time cycle is adjustable from 5% to 100% of the total cycle time. Example: If the total-time cycle is 5 seconds and the on-time cycle is adjusted for 20 percent, the pump will run for 1 second and turn off for 4 seconds (5 second total cycle). This cycle is repeated until either the cycle time is changed or the input power is disconnected from the pump.

Note: When the input power is disconnected from the 520-2006, the unit will maintain the last adjusted settings. When power is restored to the pump, the 520-2006 will begin to pump using the last time cycle setting.

To adjust the On-Time :

Turn the timer adjustment knob located on the junction box cover.

Clockwise increases the time on.

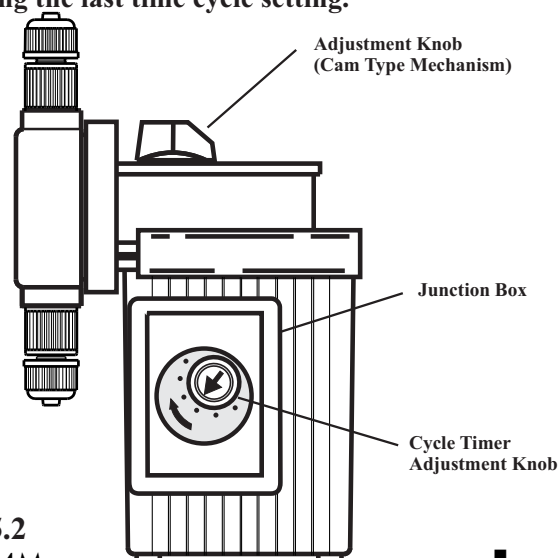


FIG. 5.2

Nautica4M
Rev.:FT-0115

How to Clean the 520-2006

5.3 Measuring the Pump's Output - Volumetric Test.

This volumetric test will take into account individual installation factors such as line pressure, fluid viscosity, suction lift, etc. This test is the most accurate for measuring the injector's output in an individual installation.

1. Be sure the Injection Fitting and Footvalve/Strainer is clean and working properly.
2. With the injector installed under normal operating conditions, place the Footvalve/Strainer in a large graduated cylinder.
3. Fill the graduated cylinder with the solution to be injected and run the injector until all air is removed from the suction line and the solution enters the discharge tubing.
4. Refill the graduated cylinder, if necessary, and with the Footvalve completely submerged in the solution, note the amount of solution in the graduated cylinder.
5. Run the injector for a measured amount of time and note the amount of fluid injected. A longer testing time will produce more accurate results.

6.0 How to Maintain the C-1500N



520-2006
Proper eye and skin protection must be worn when installing and servicing the pump.

6.1 Routine Inspection and Maintenance

The C-1500N requires very little maintenance. However, the pump and all accessories could be checked regularly. This is especially important when pumping chemicals. Inspect all components for signs of leaking, swelling, cracking, discoloration or corrosion. Replace worn or damaged components immediately. Cracking, crazing, discoloration and the like during the first week of operation are signs of severe chemical attack. If this occurs, immediately remove the chemical from the pump. Determine which parts are being attacked and replace them with parts that have been manufactured using more suitable materials. The manufacturer does not assume responsibility for damage to the pump that has been caused by chemical attack.

6.2 How to Clean the C-1500N

520-2006

The C-1500N will require occasional cleaning, especially the Injection fitting, the Footvalve/Strainer, and the pump head valves. The frequency will depend on the type and severity of service..

- ☑ When changing the diaphragm, the pump head chamber and pump head cover should be wiped free of any dirt and debris.
- ☑ Periodically clean the injection/check valve assembly, especially when injecting fluids that calcify such as sodium hypochlorite. These lime deposits and other build ups can clog the fitting, increase the back pressure and interfere with the check valve operation. See section 4.3.4. Fig. 4.8.
- ☑ Periodically clean the suction strainer. Fig.4.7
- ☑ Periodically inspect the air vents located under the motor compartment and under the pump head. Clean if necessary.



Pilot Piston Valve

Normally closed

Application: Water, air, light oil, noncorrosive and nonexplosive liquids.

Operation: The stem and plunger assembly open the port.

This releases the pressure on the top of the piston, which moves upward and opens the main valve port.

All pilot piston valves have stainless steel seats.

Valves rated 200F/93C fluid, 120F/49C ambient

Model No: 570-1128A 1" Solenoid Valve, 120v

Body: Brass

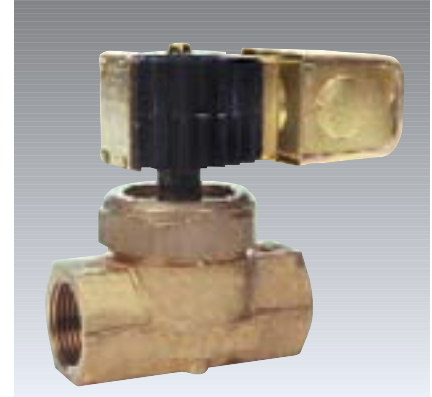
Seal: Teflon

Pressure: max: 150 psi min 3 psi

Pipe Size: 1N.P.T.

Office: 3/4

CV Flow-Factor: ... 8.0



NS#570-1128A

Water Spray Nozzle:

- Flat spray pattern distributes the liquid as a flat- or sheet-type spray.
- Small- to medium-sized drops.
- Uniform distribution over a wide range of flow rates and pressures.
- Spray angles available from 0° (solid stream) to 110° at 40 psi (2.8 bar).
- Specially tapered spray pattern is ideal for use in manifold and header applications.
- High impact solid stream provides highest impact per unit area.
- Unobstructed flow passages minimize clogging.



NS# 510-0053



Below 1 gpm (3.9 l/min) at

40 psi (2.8 bar)

1/8" to 1/4" NPT or BSPT (M)

Spray Angle at 40psi	Nozzle Type/							Equiv. Orifice Dia. (in.)	Capacity (gallons per minute)														Spray Angle °			
	H-VV		H-VVL		H-DT																					
	1/8	1/4	1/8	1/4	1/8	1/4																				
65°	●	●	●	●	●	●	8	0.071	0.28	0.4	0.57	0.69	0.8	0.98	1.1	1.3	1.8	2.2	2.8	55	65	71	74			

Pneumatic System

PNEUMATIC OPERATION

The movement of the side brushes is powered by compressed air. The figure (on the next page) shows the pneumatic layout.

The compressed air supply is filtered, pressure regulated, and lubricated before entering the system. The pneumatic solenoid valves are energized and de-energized to allow the inflow or outflow of exhaust to and from the air cylinders. These valves operate at the appropriate times through electrical impulses from the programmable controller.

Each side brush's movement is controlled by a two stroke air cylinder. One stroke extends the brushes (for regular size vehicles); the second stroke extends the brushes further (for smaller vehicles). Flow control valves ensure uniform motion of the brushes.

Do not put brake or automatic transmission fluids into the air link lubricator's reservoir. These type fluids will destroy the seals in the pneumatic solenoid valves and cylinders. The two manifolds mounted pneumatic solenoid valves each control one stroke of both air cylinders. These valves are plug in units and can be serviced without disturbing the other valve or piping / tubing as they attach directly to the manifold, not the piping / tubing. As both pneumatic solenoid valves are identical and interchangeable, this valve can be used to replace either valve in service.

34 One of these valves should be stocked if the need for replacement arises. It is the internal passages of the manifold that determine what each solenoid controls, not the solenoid valve itself. The items listed as spare parts are used in our daily production. There should be some in stock or you can be able to manufacture them upon request.

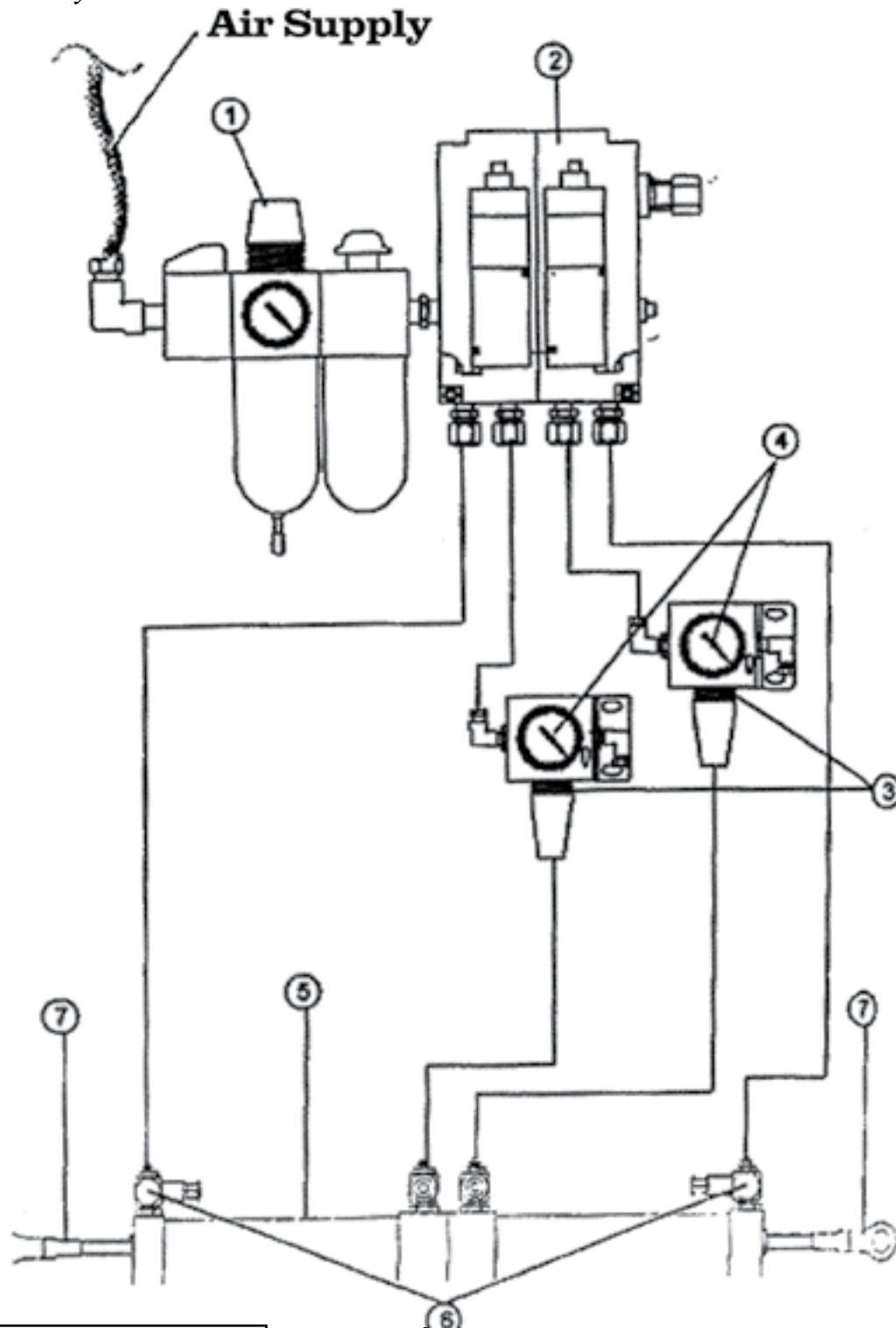
Item	Reqd.	Size	Part No.	Description
1	1	3/8"	460-0082	FIL/REG/LUB C/W Auto Drain & Shut Off
2	1	1/4"	570-0004	2 Stations Stacked Mark 8 4-Way Solenoid Valve
3	2	3/8"	465-1906	Regulator #R20R-03GL
4	2	1/8"	470-1211	Gauge (0-60)
5	2	1 1/2"x5"	440-1190	Air Cylinder Double Stroke 250 PSI
6	4	1/8" P x 1/4" T	465-1623	Flow Control Valve
7	2	1/2"	610-1405	Cylinder Rod End Bearing

THE AIR FILTER / LUBRICATOR / REGULATOR ASSEMBLY

When the compressed air enters the system, it is first filtered to remove contaminants such as abrasive solids and moisture which could damage equipment downstream. The air pressure is then regulated before the air is delivered to the lubricator. At this point, the suction created by the air flow draws a small amount of oil "log" into the air stream.

Be sure to use the right type of oil in the fog lubricator. Do not use brake or automatic transmission fluids. These fluids will destroy all seals in both the pneumatic solenoid valves and air cylinders. For the recommended oil to use, see page 69.

Note: This assembly is made-up of various modules. Each module can be replaced separately. We can supply either a complete assembly as show or its various parts if requested by the customer.



DIRECT SOLENOID ACTUATED VALVES

How to Order



Valves **082 SA 4 15 K 0 000 30**

Valve Series & Port Size

081* = 1/8
082 = 1/4
*Valve Unit Only

Valve Type

SA = Single Direct Solenoid, Spring Return w/Flush Non-locking Override
SS = Double Direct Solenoid w/Flush Non-locking Override

Function

4 = 2 Position 4-Way (5/2)
5 = 3 Position 4-Way (5/3), Open Center, Dual Pressure
6 = 3 Position 4-Way (5/3), Blocked Center
0 = Manifold Block, w/o Valve
P = Manifold Block, w/ Blank Station Plate

Mounting

00 = Valve Unit, w/o Mounting
01 = Valve Unit, Speed Control, w/o Mounting
02 = Valve Unit w/Long Screws for use w/ Speed Control or Regulator, w/o Mounting
15 = Manifold Block, Side & Bottom Cylinder Ports
16 = Manifold Block, Auxiliary Inlet, Side & Bottom Cylinder Ports
18 = Manifold Block, Alternate Outlet, Auxiliary Inlet, Side & Bottom Cylinder Ports
1B = Manifold Block, Alternate Outlet, Side & Bottom Cylinder Ports
25 = Manifold Block, Side & Bottom Cylinder Ports, Speed Control
31 = Plug-in Base, Common Exhaust, Side Cylinder Ports
32 = Plug-in Base, Common Exhaust, Side & Bottom Cylinder Ports
35 = Plug-in Base, Common Exhaust, Side Cylinder Ports, Speed Control
36 = Plug-in Base, Common Exhaust, Side & Bottom Cylinder Ports, Speed Control
3A = Plug-in Base, Individual Exhaust, Side Cylinder Ports
3B = Plug-in Base, Individual Exhaust, Side & Bottom Cylinder Ports
3C = Plug-in Base, Individual Exhaust, Side Cylinder Ports, Speed Control
3D = Plug-in Base, Individual Exhaust, Side & Bottom Cylinder Ports, Speed Control

Voltage

00 = Manifold Block, w/o Valve
20 = 24 VAC, 50-60 Hz
30 = 110-120 VAC, 50-60 Hz
40 = 220-240 VAC, 50-60 Hz
60 = 12 VDC
61 = 24 VDC

Options

000 = No Options
11B = Flush Locking Manual Override
11Y = Extended Non-Locking Manual Override
11Z = Extended Locking Manual Override
12A = Viton Seals on Sleeve Assembly
12B = Lubricant Free Assembly
13A = 4 Foot Leads
15W = 5-Pin Straight Mini Connector in Mounting;
Pin 1=A+(14+), 2=A-(14-), 3=Gnd, 4=B+(12+), 5=B-(12-)
16T = Adds Bottom P (1) Port to Mounting
17N = Surge Suppression (DC Only)
19M = Terminal Block in Mounting
46T = Zinc Plated Solenoid Armature (AC Only)
47J = 5-Pin Straight Mini Connector in Mounting;
Pin 1=B+(12+), 2=A-(14-), 3=Gnd, 4=A+(14+), 5=B-(12-)
56Y = 4 Pin Straight Micro Connector in Mounting;
Pin 1=Not Used, 2=12+(B+), 3=Com, 4=14+(A+)

Combination Options

41W = (11B) Flush Locking Manual Override & (17N) Surge Suppression (DC Only)
48S = (11B) Flush Locking Manual Override & (19M) Terminal Block in Mounting
26K = (11B) Flush Locking Manual Override & (46T) Zinc Plated Solenoid Armature (AC Only)
46Z = (11Z) Extended Locking Manual Override & (17N) Surge Suppression (DC Only)
26C = (11Z) Extended Locking Manual Override & (19M) Terminal Block in Mounting
48Q = (11Z) Extended Locking Manual Override & (46T) Zinc Plated Solenoid Armature (AC Only)
46P = (17N) Surge Suppression (DC Only) & (19M) Terminal Block in Mounting
54D = (19M) Terminal Block in Mounting & (46T) Zinc Plated Solenoid Armature (AC Only)

Port Type

0 = NPTF Pressure Ports w/ NPTF Conduit Ports or Valve Unit w/o Mounting
G = ISO228/1-G Pressure Ports w/ ISO Metric - 1.5mm Pitch Conduit Ports

Wiring Option

K = Plug-in, w/ Light, VAC
M = Plug-in, w/ Light, VDC
2 = DIN Plug-in Solenoid, VAC
4 = DIN Plug-in Solenoid, VDC
0 = Mounting Only w/ Electrical Receptacle
B = Mounting Only w/o Electrical Receptacle



Regulators

082 RS 1 15 J 0 000 00

Valve Series & Port Size

081* = 1/8
082 = 1/4

*Regulator Unit Only

Regulator Type

RS = Single Pressure to Port P (1)
RD = Dual Pressure to Ports EB (3) & EA (5)
RC = Dual Pressure w/Non-relieving Checks
RQ = Dual Pressure w/Relieving Checks
RE = External Jumper Plate, Dual Pressure
RT = 2 Pressure Selector

Pressure Range

1 = 10-130 PSIG (0.7-9 Bar)
3 = 3-30 PSIG (0.2-2 Bar)
4 = 5-60 PSIG (0.3-4.1 Bar)

Mounting

00 = Regulator Unit Only
15 = Manifold Block w/Side and Bottom Cylinder Ports
16 = Auxiliary Inlet
18 = Alternate Outlet, Auxiliary Inlet
1B = Alternate Outlet
25 = 15 w/Speed Control (RS only)
31 = Plug-in Base, Side Ports, Common Exhaust
32 = 31 w/Bottom Ports
35 = 31 w/Speed Control (RS only)
36 = 35 w/Bottom Ports (RS only)
3A = Individual Base, Side Ports, Individual Exhaust
3B = 3A w/Bottom Ports
3C = 3A w/Speed Control (RS only)
3D = 3C w/Bottom Ports (RS only)

Wiring Option

O = Non Plug-In
J = Plug-in Receptacle Assembly
U = Long receptacle for use w/ speed control, 5-wire.

Port Type

0 = NPTF Pressure Ports w/ NPTF Conduit Ports or Valve Unit w/o Mounting
G = ISO228/1-G Pressure Ports w/ ISO Metric - 1.5mm Pitch Conduit Ports

Voltage

00 = Not Applicable

Options

Single Options

000 = No Options
12H = Regulator Less Gauge
13A = 4 Foot Leads
15W = 5-Pin Straight Mini Connector in Mounting; Pin 1=A+, 2=A-, 3=Gnd, 4=B+, 5=B-
19M = Terminal Block in Mounting
16N = Jumper for Supply Pressure to Valve, A (14) End
16P = Jumper for Supply Pressure to Valve, B (12) End
16T = Adds Bottom P (1) Port to Mounting
16W = Fitting(s) for Top Facing Gauge
16Y = Regulator Less Gauge and Fittings
17A = Plugged Regulator Gauge Port
47J = 5-Pin Straight Mini Connector in Mounting; Pin 1=B+(12+), 2=A-(14-), 3=Gnd, 4=A+(14+), 5=B-(12-)
56Y = 4 Pin Straight Micro Connector in Mounting; Pin 1=Not Used, 2=12(B+), 3=Com, 4=14(A+)

Combination Options

27J = (12H) Regulator Less Gauge & (16N) Jumper for Supply Pressure to Valve, A (14) End
27K = (12H) Regulator Less Gauge & (16P) Jumper for Supply Pressure to Valve, B (12) End
27M = (16P) Jumper for Supply Pressure to Valve, B (12) End & (16W) Fitting(s) for Top Facing Gauge
27P = (16N) Jumper for Supply Pressure to Valve, A (14) End & (16W) Fitting(s) for Top Facing Gauge
27Q = (12H) Regulator Less Gauge & (16W) Fitting(s) for Top Facing Gauge
45E = (16N) Jumper for Supply Pressure to Valve, A (14) End & (16Y) Regulator Less Gauge and Fittings
46F = (16W) Fitting(s) for Top Facing Gauge & (19M) Terminal Block in Mounting
48D = (16P) Jumper for Supply Pressure to Valve, B (12) End & (19M) Terminal Block in Mounting
48G = (16N) Jumper for Supply Pressure to Valve, A (14) End & (19M) Terminal Block in Mounting
54A = (16P) Jumper for Supply Pressure to Valve, B (12) End & (16Y) Regulator Less Gauge and Fittings
58Z = (12H) Regulator Less Gauge & (19M) Terminal Block in Mounting
67P = (16Y) Regulator Less Gauge and Fittings & (19M) Terminal Block in Mounting



Example order

List in order, left to right, facing cylinder ports

Assembly kit	AKOHF00003NSTD
Station 1	081SA415K000030
Station 2	082SA425K000030
Station 3	082SS415K000030
Station 4	082SS415K000030
Station 5	081SA400K000030
	082RS115J000000
Station 6	081SA415K000030
	ASSEMBLED

Example order w/multiple valve lines

List in order, left to right, facing cylinder ports

Assembly kit	AKOHDJB00XNSTD
Station 1	082SA415K000030
Station 2	082SA415K011Z30
Station 3	082SS425K000030
Station 4	081BA400K000030
	082RD415J000000
Station 5	153SS415K000030
Station 6	153SA425K000030
	ASSEMBLED

How to Order continued

Manifold Assembly

AK 0 H F 0000 3 N STD

Electrical/Electronics

Type & Location

0 = Standard
V = For Fieldbus Electronics,
See Electronics section for ordering information

Valve Series

H = Mark 8 Series

Number of Valve Stations

A = 1 E = 5 I = 9 M = 13
B = 2 F = 6 J = 10 N = 14
C = 3 G = 7 K = 11 O = 15
D = 4 H = 8 L = 12 P = 16

Valve Series & Number of Valve Stations

Second Valve

0 = No Second Valve Series
J = Mark 15

Number of Stations of Second Valve Series

0 = None
A = 1 E = 5 I = 9 M = 13
B = 2 F = 6 J = 10 N = 14
C = 3 G = 7 K = 11 O = 15
D = 4 H = 8 L = 12 P = 16

Third Valve

0 = No Second Valve Series
H = Mark 8
M = Mark 55 Compact

Number of Stations of Third Valve Series

0 = None
A = 1 E = 5 I = 9 M = 13
B = 2 F = 6 J = 10 N = 14
C = 3 G = 7 K = 11 O = 15
D = 4 H = 8 L = 12 P = 16

Options

STD = Standard
A05 = All Stations Wired for Double Solenoid Valves ('AKV...' only)

Port Type

N = NPTF Pressure Ports w/
NPTF Conduit Ports
G = ISO228/1-G Pressure
Ports w/ ISO Metric - 1.5mm
Pitch Conduit Ports

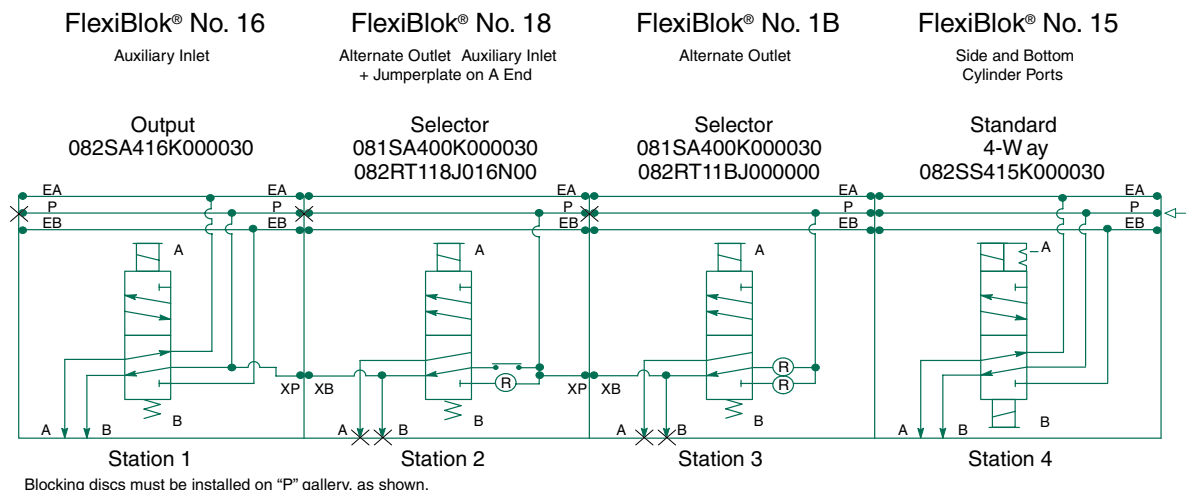
End Plate Port Size

3 = 3/8
X = Two or More Valve Series
in One Manifold



Flexiblok Diagrams

Sample diagram with regulators 3-pressure selector Flexiblok with output valve and separate 4 way (1/4 NPTF).



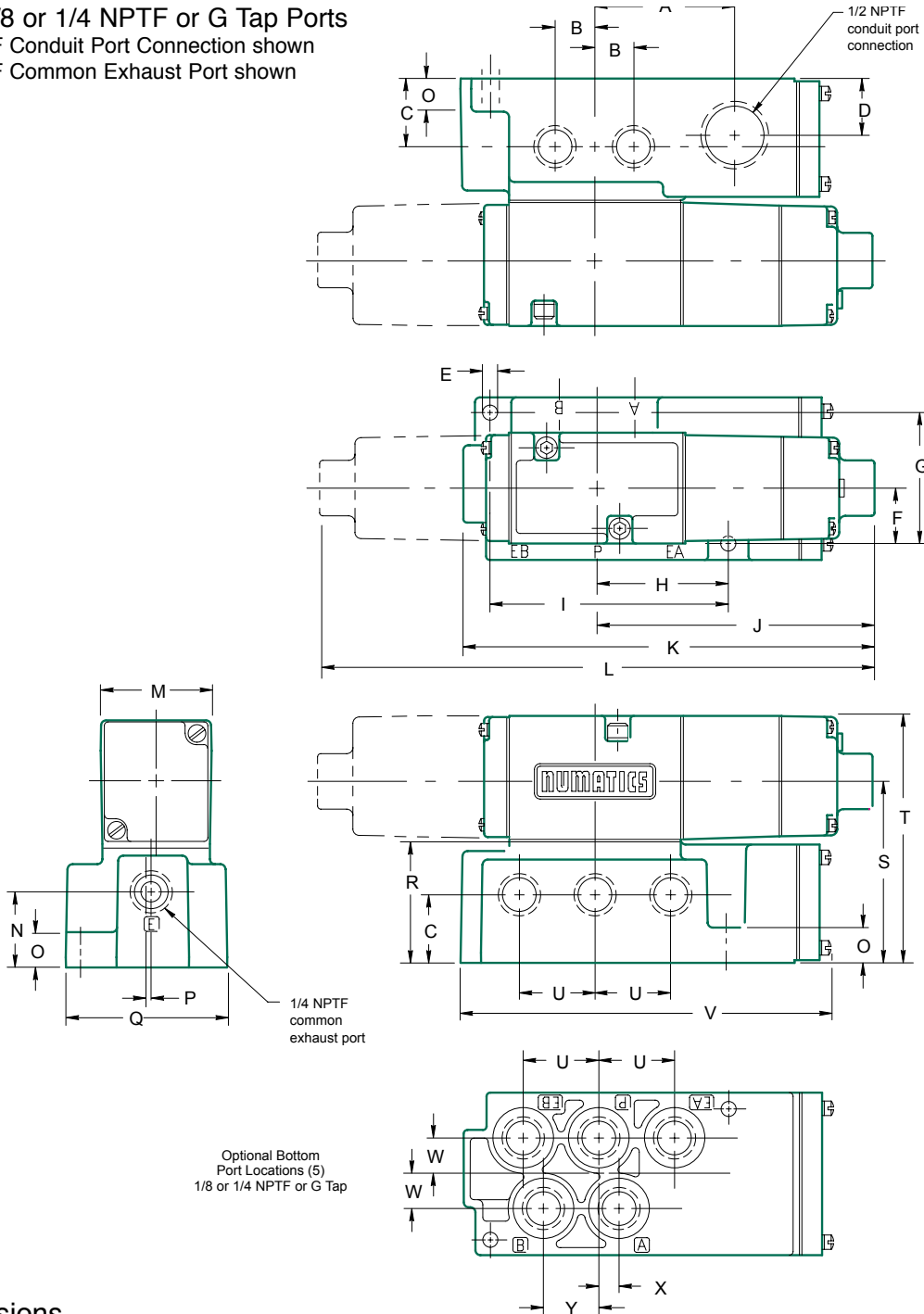
1-800-245-0350
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Nautica4M
Rev.:FT•0115

www.nswash.com

Valve on Individual Base

Base 1/8 or 1/4 NPTF or G Tap Ports
 1/2 NPTF Conduit Port Connection
 1/4 NPTF Common Exhaust Port shown



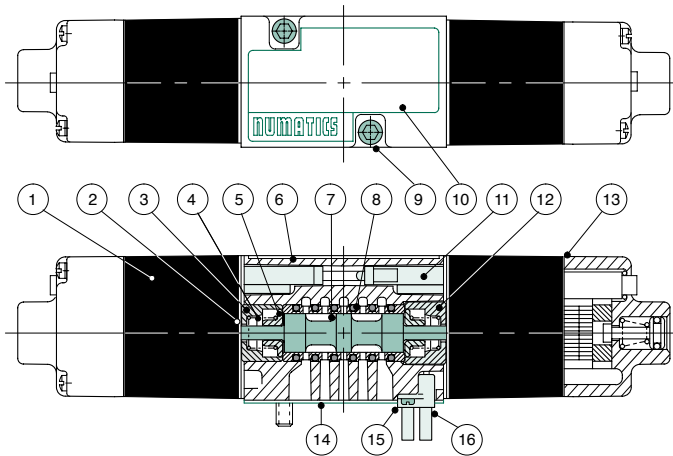
Dimensions

top dimensions = inches and bottom dimensions (in parenthesis) = millimeters

A	B	C	D	E	F	G	H	I	J (AC)	J (DC)	K (AC)	K (DC)	L (AC)	L (DC)	M	N	O	P
1.75 (44.5)	0.47 (11.9)	0.84 (21.3)	0.69 (17.5)	0.20 (5.1)	0.69 (17.5)	1.63 (41.4)	1.63 (41.4)	2.94 (74.7)	3.44 (87.4)	4.13 (104.9)	5.07 (128.8)	5.75 (146.1)	6.89 (175.0)	8.26 (209.8)	1.37 (34.8)	0.94 (23.9)	0.44 (11.2)	0.06 (1.5)
Q	R	S	T	U	V	W	X	Y										
2.00 (50.8)	1.50 (38.1)	2.23 (56.6)	3.03 (77.0)	0.94 (23.9)	4.57 (116.1)	0.45 (11.4)	0.25 (6.4)	0.69 (17.5)										

Service Kits and Parts

Kit No. MK8-K3 (For Models 081SS5, 082SS5)

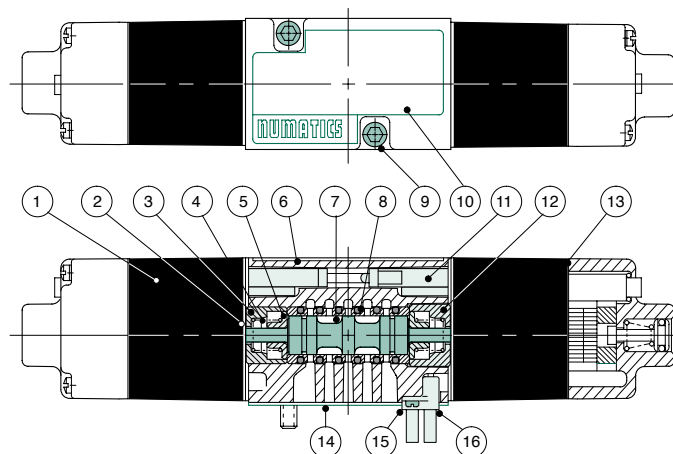


Parts List

DET. NO.	NO. REQ'D	PART NAME	PART NO.
1	2	Solenoid Assembly	See p.18
2 *	2	Gasket solenoid/valve	113-276
3 *	1	Spacer	116-307
4 *	2	Spring	115-221
5 *	2	Spring Retainer	116-309
6	1	Valve Body (not sold separately)	
7	1	Sleeve Assembly w/seals	209-265
8 *	6	Seals	126-202
9	2	Screw	127-211
10	1	Nameplate	122-936
11	2	Receptacle Housing	125-331
12 *	1	Spacer	116-308
13 *	2	Gasket solenoid/end cap	113-277
14 *	1	Gasket valve/base	113-278
15	1	Screw	127-318
16	1	5-Wire Plug Assembly	230-268

40

Kit No. MK8-K3 (For Models 081SS6, 082SS6)



Parts List

DET. NO.	NO. REQ'D	PART NAME	PART NO.
1	2	Solenoid Assembly	See p.18
2 *	2	Gasket solenoid/valve	113-276
3 *	1	Spacer	116-307
4 *	2	Spring	115-221
5 *	2	Spring Retainer	116-309
6	1	Valve Body (not sold separately)	
7	1	Sleeve Assembly w/seals	209-266
8 *	6	Seals	126-202
9	2	Screw	127-211
10	1	Nameplate	122-936
11	2	Receptacle Housing	125-331
12 *	1	Spacer	116-308
13 *	2	Gasket solenoid/end cap	113-277
14 *	1	Gasket valve/base	113-278
15	1	Screw	127-318
16	1	5-Wire Plug Assembly	230-268

*Indicates parts included in service kit. Spool and sleeve assemblies sold as precision matched set; spools are not interchangeable; and assemblies include (6) #126-202 seals.

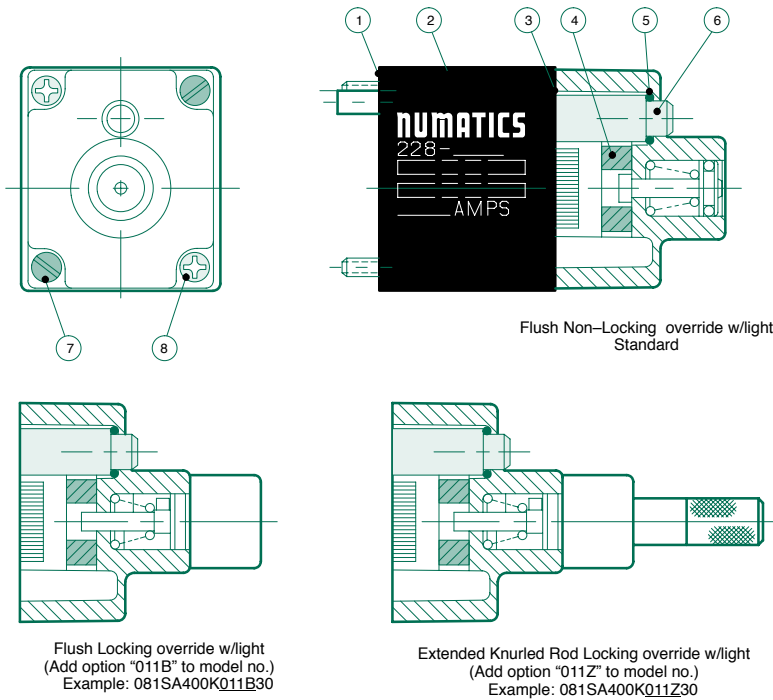
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Solenoid Capsule Assemblies

OVERRIDE TYPE	VALVE FUNCTION	PLUG-IN	AC		VOLTAGE		DC		LIGHT OPTION		DC
			100-115/50 110-120/60	200-230/50 220-240-60	24/50-60	12VDC	24VDC	100-130V	200-260V	8-13VDC	14-24VDC
Flush Non-Locking	2 Position	Std. w/light	237-415	237-416	237-423	226-591	226-592	204-252	204-253	204-304	204-305
	2 Position	DIN no light	237-427	237-428	237-429	226-628	226-629	N/A	N/A	N/A	N/A
	3 Position	Std. w/light	237-417	237-418	237-424	226-595	226-596	204-254	204-255	204-308	204-309
	3 Position	DIN no light	237-430	237-431	237-432	226-632	226-633	N/A	N/A	N/A	N/A
Flush Locking	2 Position	Std. w/light	237-451	237-452	237-453	226-611	226-612	204-272	204-273	204-290	204-291
Ext. Knurled Rod Locking	2 Position	Std. w/light	237-454	237-455	237-456	226-619	226-620	204-270	204-271	204-298	204-299
Solenoid Only less end cap; screws & gaskets not included			End Cap Only - No Light								
			Std. Plug-In	228-703	228-704	228-705	225-284	225-285	Flush non-locking std. plug 2 position Flush non-locking std. plug 3 position		204-250 204-251
			DIN Plug-In	228-675	228-676	228-677	225-238	225-239	Flush locking std. plug 2 position Extended knurled rod locking std. 2 position		204-269 204-268



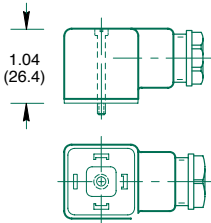
Parts List

DET. NO.	NO. REQ'D	PART NAME	PART NO.
1	1	Gasket solenoid/valve	113-276
2	1	Solenoid Capsule Assembly	See chart above
3	1	Gasket end cap/solenoid	113-277
4	1	Bumper: Black for 2 position Red for 3 position	114-138 114-139
5	1	O-Ring Seal	126-144
6	1	Light Assembly: 100-115/50 110-120/60 200-230/50 220-240/60 12VDC 24VDC	230-235 230-235 230-236 230-236 230-283 230-284
7	2	Solenoid Screws AC Solenoid Screws DC	127-314 127-316
8	2	End Cap Screws	127-315

41

Plug Assemblies

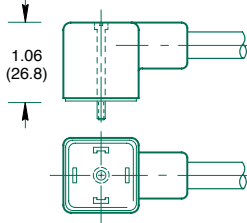
Per DIN Spec. No. 43650
Accepts cable dia. .310 - .410



PART NAME	PART NO.
Gray (A) Plug Ass'y	230-369
Black (B) Plug Ass'y	230-370
Plug w/24VDC Light	230-371
Plug w/110VAC Light	230-372
Plug w/220VAC Light	230-373

Superstructure Plug with Cord

Per DIN Spec. No. 43650
For plug-in solenoids wiring options 2 & 4, order cord separately.



PART NAME	PART NO.
Plug with 4' Cord	230-213
Plug with 6' Cord	230-215

dimensions = inches
(in parenthesis = mm)

1-800-245-0350
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Standard Electrical Schematic

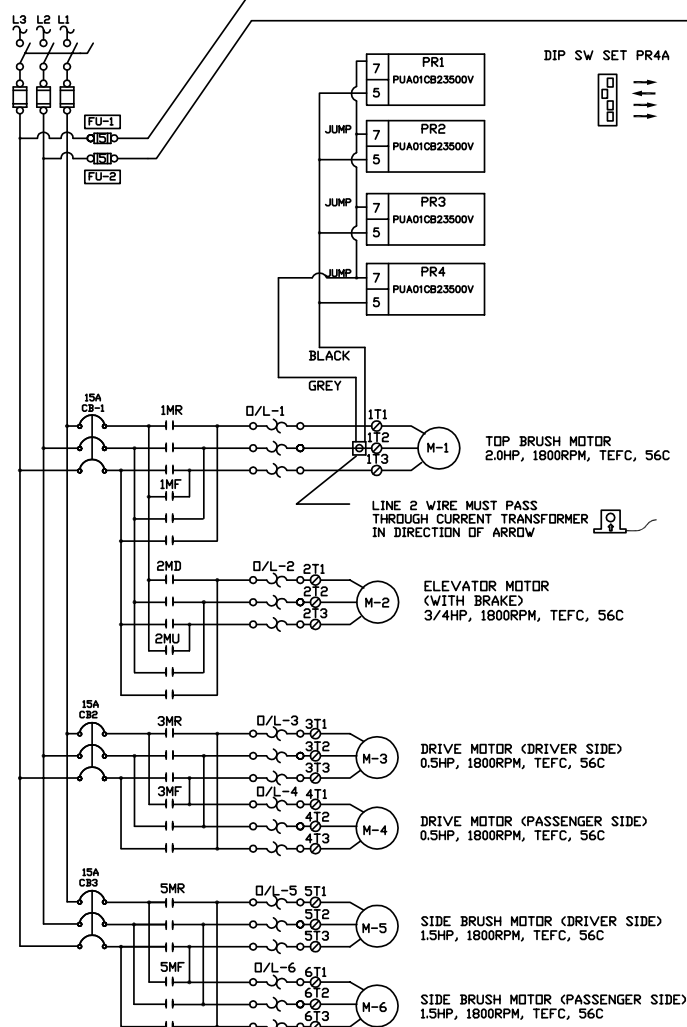
REVISIONS

2

UPDATED SCHEMATIC TO 205 SERIES

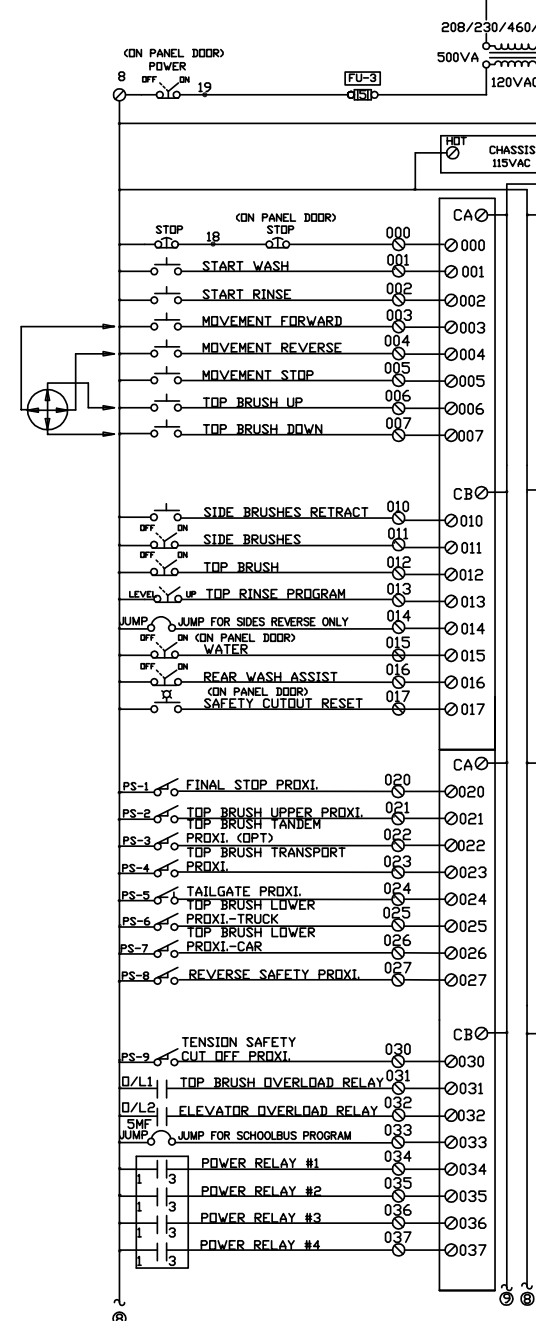
7/8/13

REVISIONS

 208/230 VAC 3PH/60HZ, 40AMP SERVICE
 460 VAC 3PH/60HZ, 20AMP SERVICE


MOTOR INFORMATION

MOTOR AMP DRAW	208 VAC	230 VAC	460 VAC	
M1-TOP BRUSH	7.8	6.8	3.4	
M2-ELEVATOR MOTOR	3.7	3.2	1.6	
M3,4-DRIVE MOTOR	2.5	2.2	1.1	
M5,6-SIDE BRUSH MOTOR	6.9	6.0	3.0	


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NS CORP. PART NO.: CP-4MNAUTICA-208-4-CAR/BUS

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 INGLEWOOD, CALIFORNIA 90301

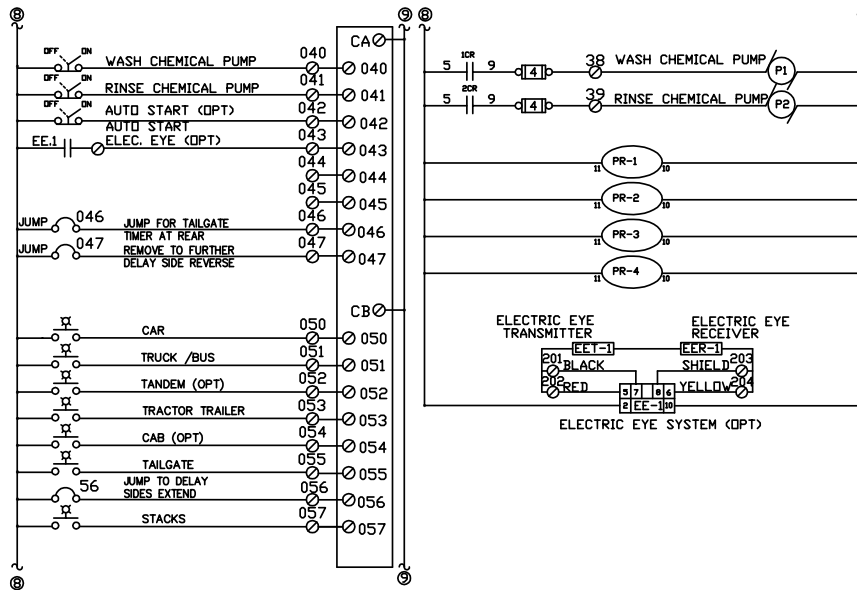
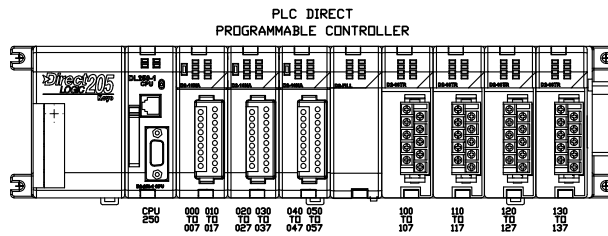
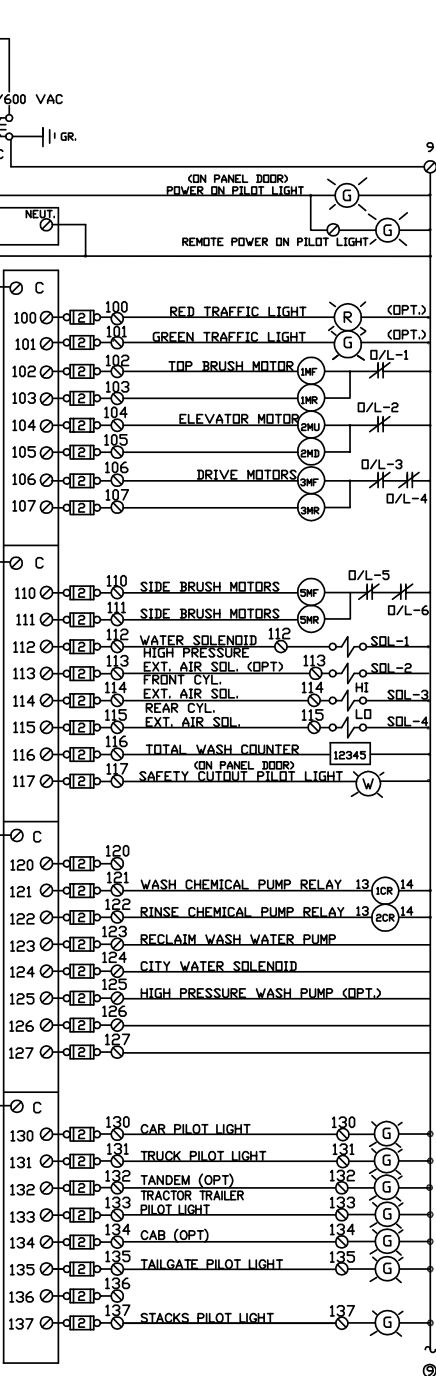
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 FAX: (310) 673-0276

web site: www.nswash.com

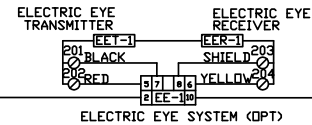
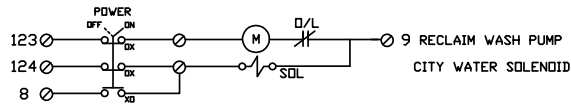
e-mail: info@nswash.com

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WHEN RECLAIM USED-TYPICAL



43

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DR. BY XX
DATE XX/XX/XX

CHK. BY XX
DATE XX/XX/XX

APP. BY XX
DATE XX/XX/XX

SCHEMATICS

SHEET 1

1-800-245-0350
FOR PARTS & SERVICE

Nautica4M
Rev.:FT-0115

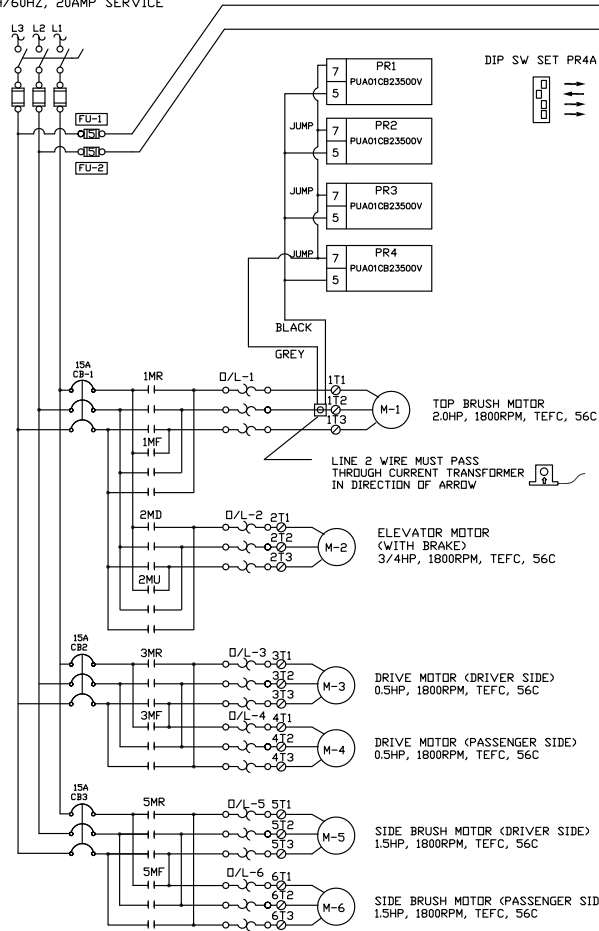
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Original (obsolete) Electrical Schematic

REVISIONS

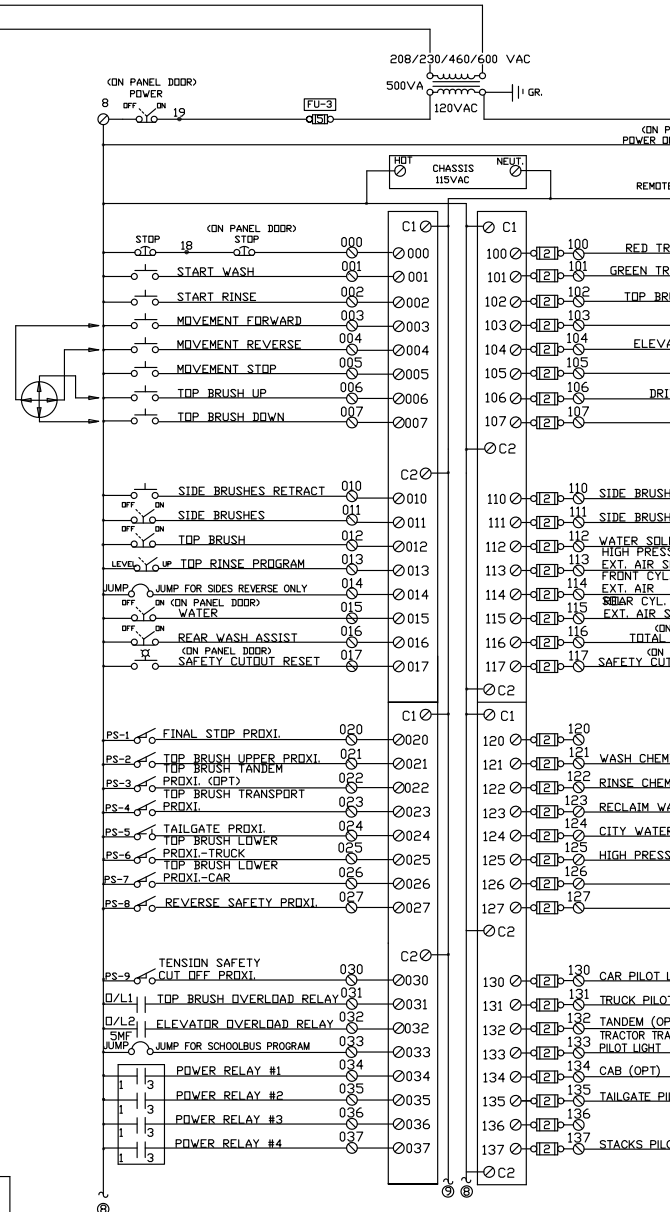
REVISIONS

208/230 VAC 3PH/60HZ, 40AMP SERVICE
 460 VAC 3PH/60HZ, 20AMP SERVICE



MOTOR INFORMATION

MOTOR AMP DRAW	208 VAC	230 VAC	460 VAC
M1-TOP BRUSH	7.8	6.8	3.4
M2-ELEVATOR MOTOR	3.7	3.2	1.6
M3,4-DRIVE MOTOR	2.5	2.2	1.1
M5,6-SIDE BRUSH MOTOR	6.9	6.0	3.0



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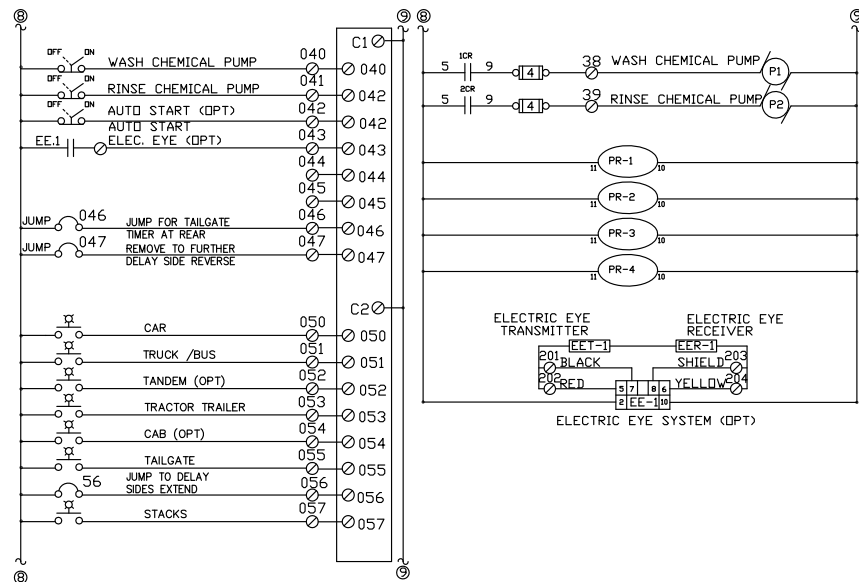
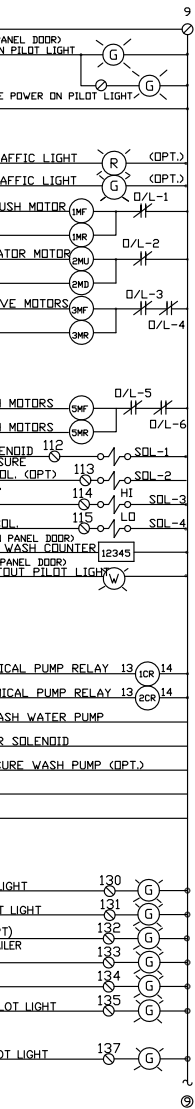
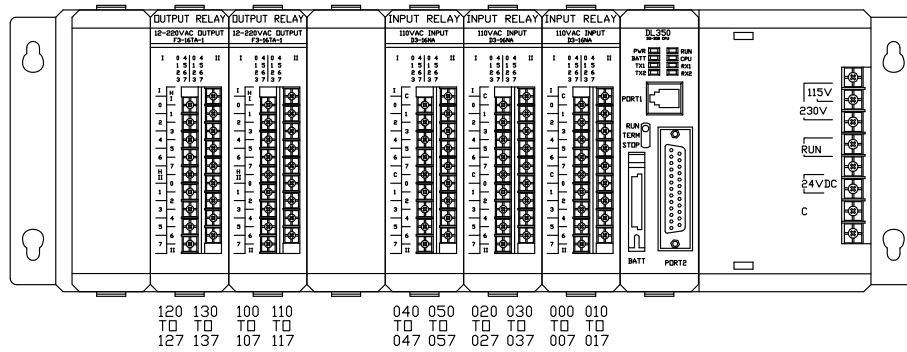
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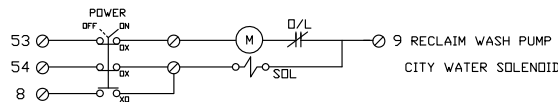
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PLC DIRECT
PROGRAMMABLE CONTROLLER



WHEN RECLAIM USED-TYPICAL



Manufactured by
NS CORP Corporation

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SCHEMATICS

SHEET

1 OF 1

Electrical System

THE ELECTRIC MOTORS

All motors on the rollover washer are controlled by automatic motor starters located in the main electrical panel.

When ordering replacement motors, give the motor's H.P., RPM, and voltage. We must know the voltage you intend to supply the elevator and drive brake motors, so that the proper voltage brake coil can be installed in any replacement brake motor. Before installing the motor, make sure its internal connections are wired to match the supply voltage. Failure to do so can result in motor and or wiring damage.

Top Brush Motor: NS#210-2110

- 2 H.P., 1800 RPM, TEFC
- Powers the rotation of the top brush.

Elevator "Brake" Motor: NS#210-1304

- 3/4 HP, 1800 RPM, TEFC
- Powers the raising and lowering of the top brush



L.H. & R.H. Drive "Brake" Motors: NS#210-1301

- 1/2 HP, 1800 RPM, TEFC
- Powers the forward and reverse movement of the gantry

L.H. & R.H. Side Brush Motors: NS#210-1778

- 1.5HP, 1800 RPM, TEFC
- Powers the rotation of the side brushes

THE PROXIMITY SWITCHES AND THEIR FUNCTIONS

The rollover unit is equipped with seven proximity switches. Six are located at various points in the right gantry leg (PSI-PS6). The seventh proximity switch is located near the top in the left gantry leg (PS7). Each proximity switch is connected to the programmable controller which is activated when the switch is tripped by some form of metal coming near it. All of these switches are 30 mm Inductive Proximity Sensors with normally open contacts by Carlo Gavazzi.

PS-1 Final Stop Switch:

Tripped by a track cam when the gantry completes rear to front travel. This proximity sensor stops all the functions except the elevator motor which is controlled by PS-2, PS-3, PS-5 and PS-6.

PS-2 Top Brush Upper Switch:

Tripped by the top brush sledge, when the top brush reaches a specific height. Prevents further lifting of the top brush. (I.e. stops the elevator motor).

PS-3 Top Brush Lower-Car Switch:

Tripped by the top brush sledge, when the top brush lowers to car bumper level. Prevents further lowering of the top brush; causes the gantry to begin moving forward on wash cycle

PS-4 Reverse Safety Switch:

Tripped by a track cam, when the gantry completes front to rear travel. Causes the gantry to reverse motion: Top brush to reverse rotation.

PS-5 Top Brush Lower-Truck Switch:

Tripped by the top brush sledge, when the top brush lowers to truck bumper level. Prevents further lowering of the top brush; causes the gantry to begin moving forward on wash cycle.

PS-6 Top Brush Lower-Mid Way Switch:

Tripped by the top brush sledge, when the top brush lowers to truck mid level, as it does between tractors and trailers. Prevents further lowering of the top brush to stop the top brush from getting tangled with the trailer's wire brake and electrical lines; causes the gantry to begin moving forward on wash cycle.

PS-7 Tension Safety Cut Off Switch:

Tripped by the top brush lift chain tension, when the tension moves out of its normal position as the lift chain gets too tight, as when the top brush is caught under a vehicle's bumper. This prevents the top brush from rising, until the brush is lowered, reducing tension on the lift chains, allowing the chain tension to return to its normal position.

NOTE: Proximity switches PS-1 to PS-6 are identical and interchangeable. At least one should be stocked for replacement purposes. The chain tension proximity switch PS-7 is not interchangeable, so you need to also stock on of these switches.

Types EI, AC, M12, M18, M30



- Thermoplastic polyester housing, cylind.
- Diameter: M12, M18, M30
- Sensing distance: 2 to 15 mm
- Power supply: 20 to 250 VAC
- Output: SCR, make or break switching
- Protection: Overvoltage
- LED-indication for output ON
- Long or short housing
- 2 m cable or M12 plug (double keyed)

Product Description

AC proximity switches constructed in rugged thermoplastic polyester housings. Sizes available are M12, M18 and M30. Length of housing is selectable with 30 mm

thread or 50 mm thread. Bright LED ring utilizing a yellow LED clearly gives indication of output status. Protection rating IP 67 ensures environmental compatibility.

Ordering Key

EI 1202 TBOPL-6

Type _____
Housing diameter (mm) _____
Rated operating dist. (mm) _____
Output type _____
Housing material _____
Body style _____
Plug _____

Type Selection AC Types, Cable and M12 Plug

Housing diameter	Body style	Connection	Rated operating dist. (S _n)	Ordering no. SCR Make switching	Ordering no. SCR Break switching
M12	Long	Cable	2 mm ¹⁾	EI 1202 TBOPL	EI 1202 TBCPL
M12	Long	Plug	2 mm ¹⁾	EI 1202 TBOPL-6	EI 1202 TBCPL-6
M12	Long	Cable	4 mm ²⁾	EI 1204 TBOPL	EI 1204 TBCPL
M12	Long	Plug	4 mm ²⁾	EI 1204 TBOPL-6	EI 1204 TBCPL-6
M18	Short	Cable	5 mm ¹⁾	EI 1805 TBOPS	EI 1805 TBCPS
M18	Short	Plug	5 mm ¹⁾	EI 1805 TBOPS-6	EI 1805 TBCPS-6
M18	Long	Cable	5 mm ¹⁾	EI 1805 TBOPL	EI 1805 TBCPL
M18	Long	Plug	5 mm ¹⁾	EI 1805 TBOPL-6	EI 1805 TBCPL-6
M18	Short	Cable	8 mm ²⁾	EI 1808 TBOPS	EI 1808 TBCPS
M18	Long	Cable	8 mm ²⁾	EI 1808 TBOPL	EI 1808 TBCPL
M30	Short	Cable	10 mm ¹⁾	EI 3010 TBOPS	EI 3010 TBCPS
M30	Short	Plug	10 mm ¹⁾	EI 3010 TBOPS-6	EI 3010 TBCPS-6
M30	Long	Cable	10 mm ¹⁾	EI 3010 TBOPL	EI 3010 TBCPL
M30	Long	Plug	10 mm ¹⁾	EI 3010 TBOPL-6	EI 3010 TBCPL-6
M30	Short	Cable	15 mm ²⁾	EI 3015 TBOPS	EI 3015 TBCPS
M30	Long	Cable	15 mm ²⁾	EI 3015 TBOPL	EI 3015 TBCPL

NS#
950-0025

NS#
950-0020

Short = 30 mm thread
Long = 50 mm thread
Make switching = Normally Open (NO)
Break switching = Normally Closed (NC)

¹⁾ For flush mounting in metal
²⁾ For non-flush mounting in metal

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THE OVERLOAD RELAYS / CIRCUIT BREAKERS

There are seven overload relay / circuit breakers, one connected to each motor starter. Two are used for each reversible motor to protect the motor while it is rotating in forward or reverse. If a motor draws too much current, (I.e. is jammed, stalling, etc.) then the connected overload relay / circuit breaker switches off all three phases automatically. These devices can be and must be locked off when working on the motor both the forward and reverse devices must be locked off in the case of reversing motors.

THE MOTOR LOAD SENSING SYSTEM

The motor load sensing system consists of four current relays and a current transformer. The current transformer measures the motor current and the current relays provide a feedback system to control the movement of the top brush as follows:

PR-1:

This current relay monitors the load on the top brush motor by comparing the phase angle between voltage (as read by the power relay, which is connected in parallel to the motor) and current (as measured by the current transformer), which increases or decreases as the brush pushes heavily or lightly into the vehicle. When the top brush motor's current exceeds PR-1's pre set level (indicator light ON), the top brush motor's current runs below PR-1's pre-set level (indicator light OFF), the gantry unit will stop moving and lower the top brush to look for the vehicle. If the top brush motor's current becomes very high (I.e. the top brush is pushing into the windshield), PR-2 will come into effect.

If the top brush is at the rear of the vehicle, it will lower to bumper level, stop and reverse rotation for the rinsing run.

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PR-2 & PR-3:

These current relays are used interchangeably depending on program selection.

PR-2

Preset for Cars: When the top brush motor's current exceeds PR-2's pre-set level (indicator light ON), the gantry drive stops and the top brush raises. If the motor's current draw continues to increase (i.e. the top brush is not rising quickly enough), then PR-4 comes into effect.

PR-3

Preset for Trucks: When the top brush motor's current exceeds PR-3's pre-set level (indicator light ON), the gantry drive stops and the top brush raises. If the motor's current draw continues to increase (i.e. the top brush is not rising quickly enough), then PR-4 comes into effect.

PR-4:

When PR-4's pre-set level is exceeded (indicator light ON), the gantry travel reverses. When the top brush motor's current lowers to an acceptable level (indicator light OFF), the top brush goes up, and the gantry wheel drive resumes (i.e. the top brush has risen enough not to push so hard into the vehicle).

PR-4A:

PR-4A is an over current relay to be used as a fail safe backup to PR-4 when current is high but the phase angle difference is minimal. When PR-4A's pre-set level is exceeded (indicator light ON), the gantry travel reverses. When the top brush motor's current lowers to an acceptable level (indicator light OFF), the top brush goes up, and the gantry wheel drive resumes (i.e. the top brush has risen enough not to push so hard into the vehicle)

Note:

If the current relays ever fail, the top brush current will rise to a point where an overload device (O / L-1) will trip, stopping the entire unit.

As the setting of the current relays is done with the main power on, and the panel's door open, the above steps illustrated should only be performed by a qualified electrician. When the door is opened, some of the power carrying parts will be exposed. Only non-power carrying parts, such as the overload handles, and the power relay control knobs, should be touched.



Component

Part Number

CURRENT RELAY (PR1 TO PR-4)	300-1033
CURRENT TRANSFORMER, MI20, 220v	260-3008
CURRENT TRANSFORMER, MI5, 460v/480v	260-3009

Monitoring Relays AC Over Current Type PUA01

CARLO GAVAZZI


PUA01

- AC/DC over voltage monitoring relay
- Selection of measuring range by DIP-switches
- Measuring ranges: 2 to 20 VAC/DC, 5 to 50 VAC/DC, 20 to 200 VAC/DC, 50 to 500 VAC/DC, 0.4 to 4 V_p AC
- Adjustable voltage limit on relative scale
- Adjustable hysteresis
- Programmable latching at set level
- Output: 8 A SPDT relay normally de-energized
- For mounting on DIN-rail in accordance with DIN/EN 50 022 (DUA01) or plug-in module (PUA01)
- 22.5 mm Euronorm housing (DUA01) or 36 mm plug-in module (PUA01)
- LED indication for relay and power supply ON
- Galvanically separated power supply

Product Description

DUA01 and PUA01 are precise AC/DC over voltage monitoring relays. They can also be used as 1-phase or 3-phase over current monitoring relays when connected with MI or MP current

transformers. Owing to the built-in latch function, the ON-position of the relay output can be maintained. The red LED indicates the alarm status.

Ordering Key

DUA 01 C B23 500V

Housing _____
 Function _____
 Type _____
 Item number _____
 Output _____
 Power supply _____
 Range _____

Type Selection

Mounting	Output	Supply: 24 to 48 VAC/DC	Supply: 115/230 VAC
DIN-rail	SPDT	DUA 01 C D48 500V	DUA 01 C B23 500V
Plug-in	SPDT	PUA 01 C D48 500V	PUA 01 C B23 500V

Input Specifications

Input (voltage level) DUA01 PUA01	Terminals Y1, Y2 Terminals 5, 7	
Measuring ranges Direct Selectable by DIP-switches 2 to 20 VAC/DC 5 to 50 VAC/DC 20 to 200 VAC/DC 50 to 500 VAC/DC 0.4 to 4 V _p AC Max. voltage for 1 s MI and MP CT ranges 1-ph.: 3-ph.: MI 5 MP 3005 MI 20 MP 3020 MI 100 MP 3100 MI 500 MP 3500	Int. resist.	Max. volt.
	> 500 kΩ	600 V
	> 500 kΩ	600 V
	> 500 kΩ	600 V
	> 500 kΩ	600 V
	> 500 kΩ	600 V
	> 500 kΩ	1000 V
	AAC rms	Max. curr.
	0.5 to 5 A	20 AAC
	2 to 20 A	50 AAC
	10 to 100 A	250 AAC
	50 to 500 A	750 AAC
Note: The input voltage cannot raise over 300 VAC/DC with respect to ground (PUA01 only)		
Contact input DUA01 PUA01 Disabled Enabled Latch disable	Terminals Z1, Y1 Terminals 8, 9 > 10 kΩ < 500 Ω > 500 ms	

Output Specifications

Output Rated insulation voltage	SPDT relay 250 VAC
Contact ratings (AgSnO ₂) Resistive loads AC 1 DC 12 Small inductive loads AC 15 DC 13	μ 8 A @ 250 VAC 5 A @ 24 VDC 2.5 A @ 250 VAC 2.5 A @ 24 VDC
Mechanical life	≥ 30 x 10 ⁶ operations
Electrical life	≥ 10 ⁵ operations (at 8 A, 250 V, cos φ = 1)
Operating frequency	≤ 7200 operations/h
Dielectric strength Dielectric voltage Rated impulse withstand volt.	≥ 2 kVAC (rms) 4 kV (1.2/50 μs)

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Supply Specifications

Power supply		Overvoltage cat. III (IEC 60664, IEC 60038)
Rated operational voltage through terminals: A1, A2 or A3, A2 (DUA01) 2, 10 or 11, 10 (PUA01)		
D48:	24 to 48 VAC/DC \pm 15%	
B23:	45 to 65 Hz, insulated 115/230 VAC \pm 15% 45 to 65 Hz, insulated	
Dielectric voltage		DC supply AC supply
Supply to input		2 kV 4 kV
Supply to output		4 kV 4 kV
Input to output		4 kV 4 kV
Rated operational power		
AC		4 VA
DC		2 W

General Specifications

Reaction time		
Alarm ON delay	< 100 ms (voltage rising from -20% to +20% set value)	
Alarm OFF delay	< 300 ms (voltage decreasing from +20% to -20% set value)	

General Specifications (cont.)

Accuracy		(15 min warm-up time)
Temperature drift		\pm 1000 ppm/ $^{\circ}$ C
Repeatability		\pm 0.5% on full-scale
Indication for		
Power supply ON		LED, green
Output relay ON		LED, red
Environment		(EN 60529)
Degree of protection		IP 20
Pollution degree		3 (DUA01), 2 (PUA01)
Operating temperature		-20 to 60 $^{\circ}$ C, R.H. < 95%
Storage temperature		-30 to 80 $^{\circ}$ C, R.H. < 95%
Housing		
Dimensions	DUA01	22.5 x 80 x 99.5 mm
	PUA01	36 x 80 x 94 mm
Material		PA66 or Noryl
Weight		Approx. 150 g
Screw terminals		
Tightening torque		Max. 0.5 Nm acc. to IEC 60947
Product standard		EN 60255-6
Approvals		UL, CSA
CE Marking		L.V. Directive 2006/95/EC EMC Directive 2004/108/EC
EMC		
Immunity		According to EN 60255-26 According to EN 61000-6-2 According to EN 60255-26 According to EN 61000-6-3
Emissions		



Mode of Operation

DUA01 and PUA01 monitor both AC and DC over voltage. When connected with MI or MP current transformer (using the 0.4 - 4 V_p range) they can monitor 1-phase or 3-phase AC currents up to 500 A.

Example 1

(connection between terminals Z1, Y1 or 8, 9 - latch function enabled)
The relay operates and latches in operating position when the measured value exceeds the set level. Provided that the voltage has dropped min. 4% below the set point (see hysteresis), the relay releases when the interconnection between terminals Z1, Y1 or 8, 9 is interrupted or the power supply is interrupted as well.

Example 2 (MI CT)

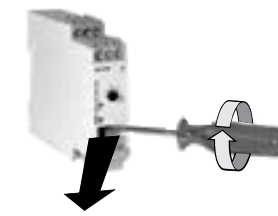
(no connection between terminals Z1, Y1 or 8, 9)
The relay operates when the current flowing through the CT exceeds the set level. It releases when the current drops min. 4% below the set level (see hysteresis) or when power supply is interrupted.

Example 3 (MP CT)

(no connection between terminals Z1, Y1 or 8, 9 - latch function disabled)
The relay operates when the maximum current flowing through the CT exceeds the set level. It releases when the maximum current drops min. 4% below the set level (see hysteresis) or when power supply is interrupted.

Range - Level Setting

Adjust the measuring range setting the DIP switches 1 to 4 as shown below.
To access the DIP switches open the grey plastic cover using a screwdriver as shown below.



Measuring range	
0	OFF ON OFF OFF 0.4 to 4 V_p
1	ON OFF OFF OFF 2 to 20 VAC/DC
2	OFF OFF OFF OFF 5 to 50 VAC/DC
3	ON OFF ON OFF 20 to 200 VAC/DC
4	ON OFF OFF ON 50 to 500 VAC/DC

Centre knob:

Setting of voltage on relative scale: from 10 to 110% of the full-scale value.

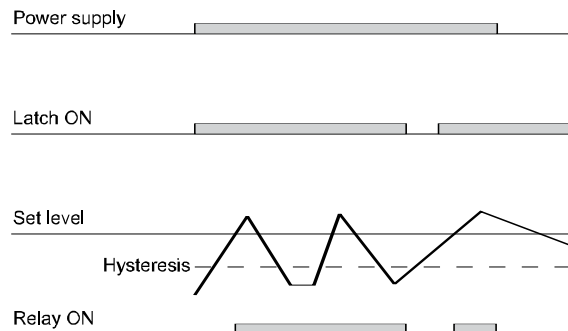
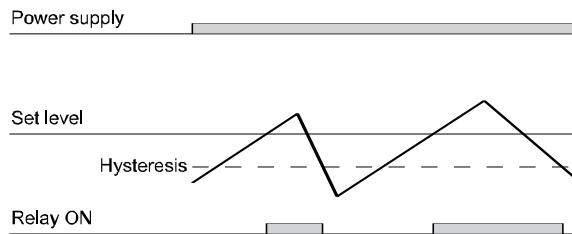
Hysteresis:

Approx. 4% of set value, it can be extended by inserting a resistor between terminals Z1, Y1 or 8, 9.

Approx. resistor values:

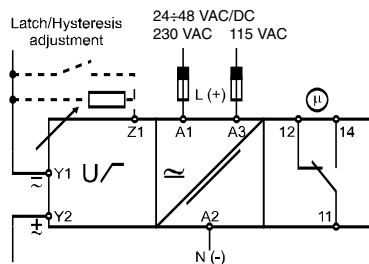
10%:	180 k Ω
25%:	47 k Ω
50%:	22 k Ω
75%:	15 k Ω
Latch:	< 500 Ω

Operation Diagrams

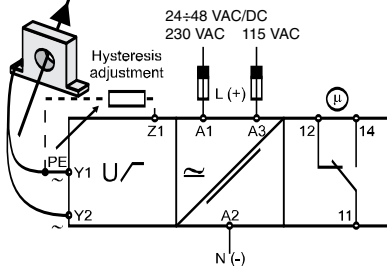


Wiring Diagrams

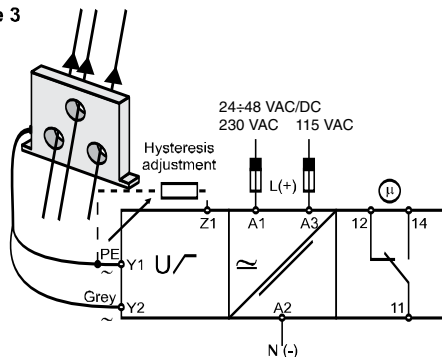
Example 1



Example 2

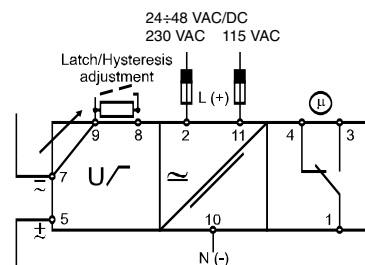


Example 3

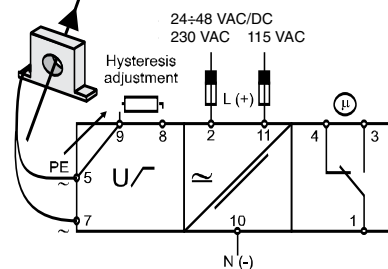


DUA01

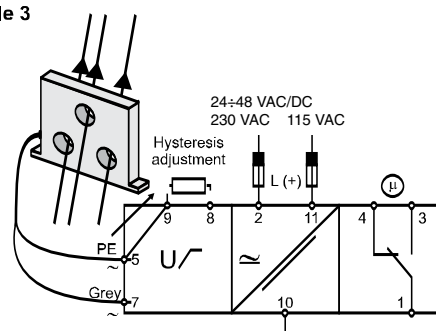
Example 1



Example 2



Example 3



PUA01

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The programmable controller is located in the top part of the electrical panel and controls all functions on the roll over vehicle washer system. It consists of several modules: inputs, outputs, and a central processing unit (CPU).

The necessary control and time delays in the cycle of the machine are already programmed into an EPROM chip inside the CPU. This proprietary program can only be changed by replacing the chip as described later on in this manual. If required, our programming department can burn-in (program) a new chip. You will be notified of any cost for this service at the time of order. You are also responsible for shipping costs to get the new chip to you. Applicable state taxes are extra.

Component	Part Number
-----------	-------------

<i>PLC INPUT MODULES</i>	<i>PLC-059</i>
<i>PLC OUTPUT MODULES</i>	<i>PLC-060</i>
<i>PLU CPU PROCESSOR</i>	<i>PLC-015</i>

THE MOTOR CONTROLS

There are seven overload relays / circuit breakers, one connected to each motor starter. Two are used for reversible motor to protect the motor while it is rotating in forward or reverse. If a motor draws too much current (i.e. is jammed, stalling etc.) then the connected overload relay/circuit breaker switches off all three phases automatically. These devices can be and must be locked off when working on the motor the forward and reverse devices must be locked off in the case of reversing motors.



ROLLOVER WASH SYSTEM OVERLOAD PROTECTION FUSES

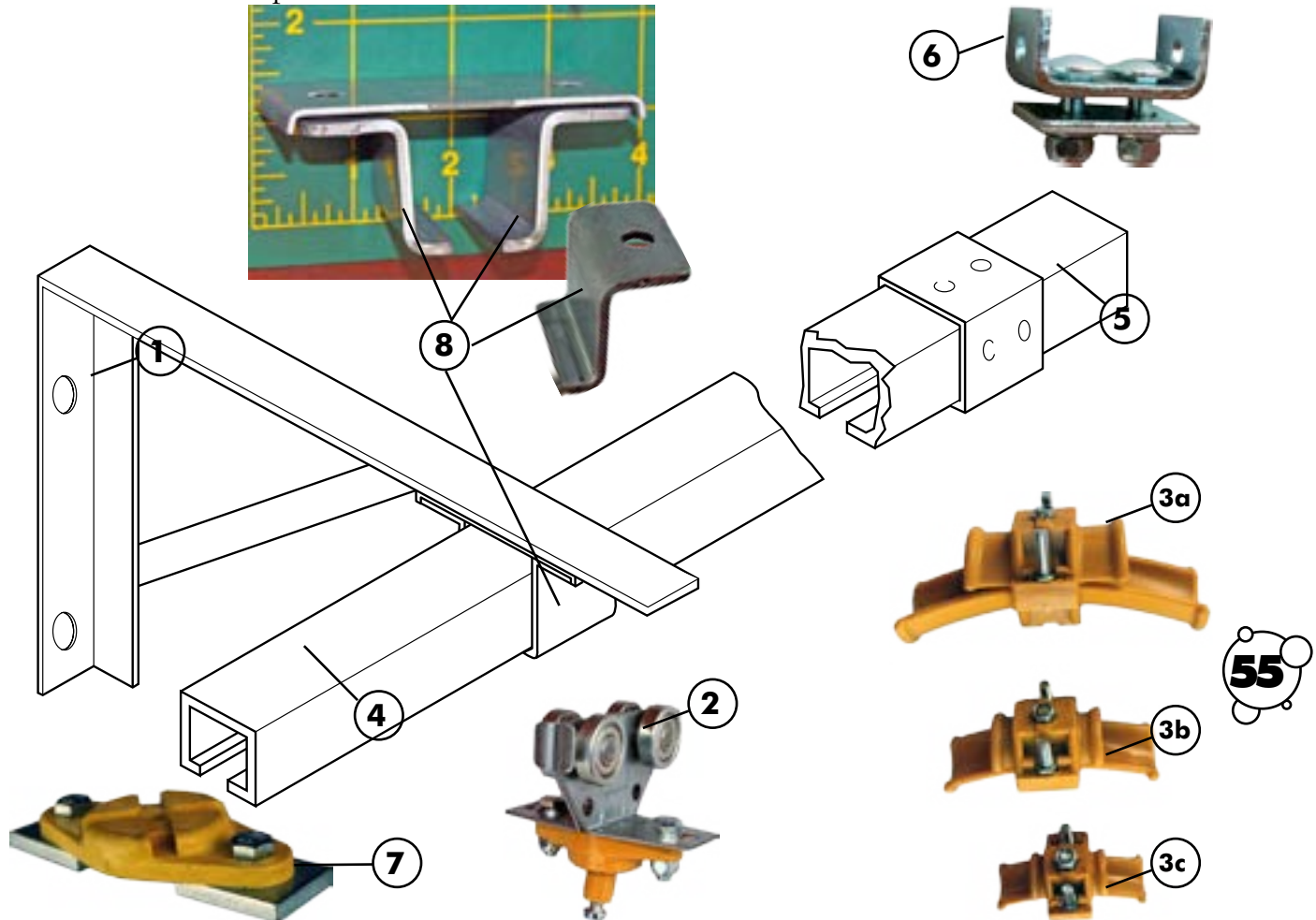
The fuses are installed between interconnections of the various wash system components. In the case there is excessive power in the rollover wash panel due to a main power supply surge or a short circuit in the panel components or various other reasons, the fuses will blow out thus protecting the more expensive components from damage. The fuses are inexpensive and readily available.

Fuse	Qty	Part Number	Function
30 Amps	3	360-1125	<i>Located inside the single phase fusible disconnect switch that controls the power to the wash electrical panel.</i>
5 Amps	3	360-0037	<i>Connected between the secondary winding of the transformer and the panel components.</i>
2 Amps	32	360-0086	<i>Connected between the PLC output module terminals and the various field devices</i>

Festoon System

PARTS LAYOUT

The festoon system is the wall mounted rail that a series of trolleys run in. The trolley cars support the air, water and electrical utility lines from the customer supplied air, water, and electrical connection points to the rollover vehicle washer.



Item	Required	Part Number	Description
1	7	900-2784	Mounting Bracket
2	5	001-2010	Intermediate Cars for Festoon Cable
3a	7	001-2012	Cable Clip 36 mm
3b	7	001-2011	Cable Clip 25 mm
3c	7	001-2013	Cable Clip 16 mm
4	3	001-2006	18' C-rail Track
5	2	001-2014	C-rail Joint Bracket
6	2	001-2008	End Stop
7	1	001-2009	End Clamp
8	7	001-2007	C-Rail Hanger Bracket 10' long

The items listed refer to those shown in figure above. The trolley rail, rail connector, wall bracket, rail mounting clamp and end stop are very rarely replaced. However, parts are replaced for a number of reasons; therefore their part numbers are listed.

The quantity of spares required listed is the quantity needed to replace one trolley car and its cable/pipe clamps. As these parts are used in our daily production, we should either have them in stock or can get them very quickly.

Preventive Maintenance

This section contains information regarding the normal day to day maintenance, normally performed by on site maintenance personnel. Along with the parts description / spare parts recommendations contained in section two (2) and the troubleshooting guide contained in section 4, most routine tasks can be done WITHOUT CALLING-IN AN OUTSIDE SERVICE CONTRACTOR.

Caution Note

1. Read all of section three (3) before making any adjustments.
2. Make sure that the all gantry unit's "main power" switches are "locked off" before doing any service work on the washer, or reclaim system.
3. Do not put automatic transmission or brake type fluids into the gantry compressed air system lubricators. These type fluids will destroy; all seals in the gantry's pneumatic solenoid valves and air cylinders (see section 3.6.2 For the recommended lubricant to use).
4. Brush life can be affected by many factors (i.e. How much soap used, fleet condition, air pressure, etc.)
5. The brush segments must be replaced when they have worn down past the following lengths:
6. Top brush 12-1/2 inches or 25 inches diameter
7. Side brush 10 inches or 20 inches diameter

Warning Note

1. Lock off and tag both the gantry unit being serviced, and the MCC panel main power disconnect switches, before doing any work on the gantry and or reclamation system equipment.
2. Lock off and tag the MCC panel main power disconnect switch, before working on the festooning system cables.
3. Keep away from moving equipment.

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NOTE: These checklists are intended to be reproduced and used by the maintenance people to record the various daily maintenance procedures as they are done.

We reserve the right to request copies of these maintenance lists to verify compliance with the maintenance section of our warranty.

Daily checklist is intended to check all washing equipment's performance everyday.

Watch the last two- (2) trains of the day being washed. Take steps to correct any malfunctions before the start of the next day's washes.

The weekly checklist should be done after the daily checklist has been done.

The monthly checklist is intended as an end of the month evaluation on the performance of the washing equipment. Take necessary steps to correct any problems.

The semi-annual checklist should be done as overall system checklist.

These checklists are very easy to do, but they are also very important for the safe and trouble free operation of the wash plant.

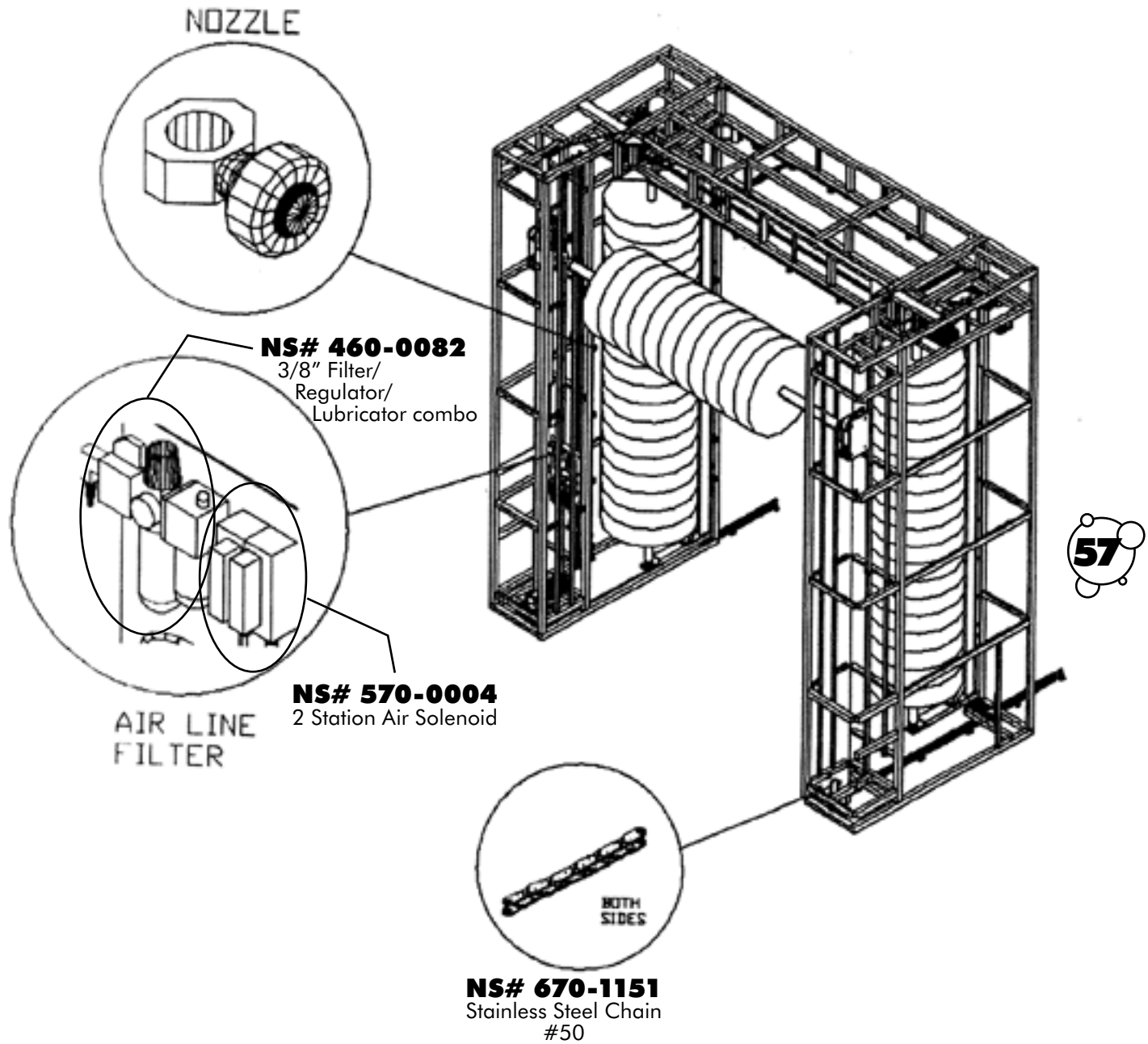
The following steps should be done in order.

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DAILY MAINTENANCE SCHEDULE



DAILY

Maintenance Schedule

Month/Week

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

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1	Check to see that all brushes turn						
2	Check to see that the top brushes and side brushes are following the trains contours						
3	Did you lock off both main power switches of the gantry being serviced and the MCC panel?						
4	Check ALL brushes and the drive tracks for foreign objects						
5	Check and fill the air line lubricator						
6	Turn off air panel's main air valve and drain ALL moisture/debris from the air panel's airline filter						
7	Turn the air panel's main air valve back on and make sure that the various air pressure gauge readings are correct see page 79						
8	Check and grease both drive chains see page 84						
9	Check for water/oil/air leaks repair as needed						
10	Check the level of the detergent tank When it drops down to about half full notify the proper person that detergent is required.						
11	Check the spray nozzles for debris & remove & clean when necessary						
12	Check for any loose nuts and bolts and tighten as needed.						
13	Check the sludge carts and empty as required.						
14	Check the waste oil holding tank and empty as required						
15	Turn the MCC Panel's main power back ON						
16	Check for any unusual noise/vibration coming from any of the wash equipment and pumps.						
17	Check the pH level of the neutralization pit and make sure the reading of the pH monitoring panel is correct.						
18	Make sure all the electrical panel's main power are switched ON						

Before performing any electrical work on the system lock out the system by turning the main disconnect switch located on the front of the appropriate panel to the "off" position.

Completed By:

Comments:



WEEKLY

Maintenance Schedule

Month

WEEK of WEEK of WEEK of WEEK of

1	Did you lock off both and tag the main power switches of the gantry being serviced and the MCC panel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Check for any oil leaks from the motor gearboxes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Check the side brush air cylinders and adjust if necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Check the amount of detergent being pumped by the detergent pump and adjust as needed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Clean the floor of the wash area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Check and grease the top brush lift chains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Check the drain trench and the settling pits for sludge build up and empty and clean as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Check the reclaim pump's foot valve's strainer if fitted and clean as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Check the metering pumps dosing rate and tightness. If diaphragm is damaged, remove and replace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Grease all the bearings on each gantry. Do not over lubricate. Wipe off any excess grease. See page 84 for recommended grease type	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Turn the MCC panel's main disconnect switch back on	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Test the operation of all switches on the MCC panel door	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Test the operation of all level switches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Check the operation of all switches on the gantry unit's main panel and the gantry booth's control panel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Make sure all the gantry's electrical panel's main power are switched on	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

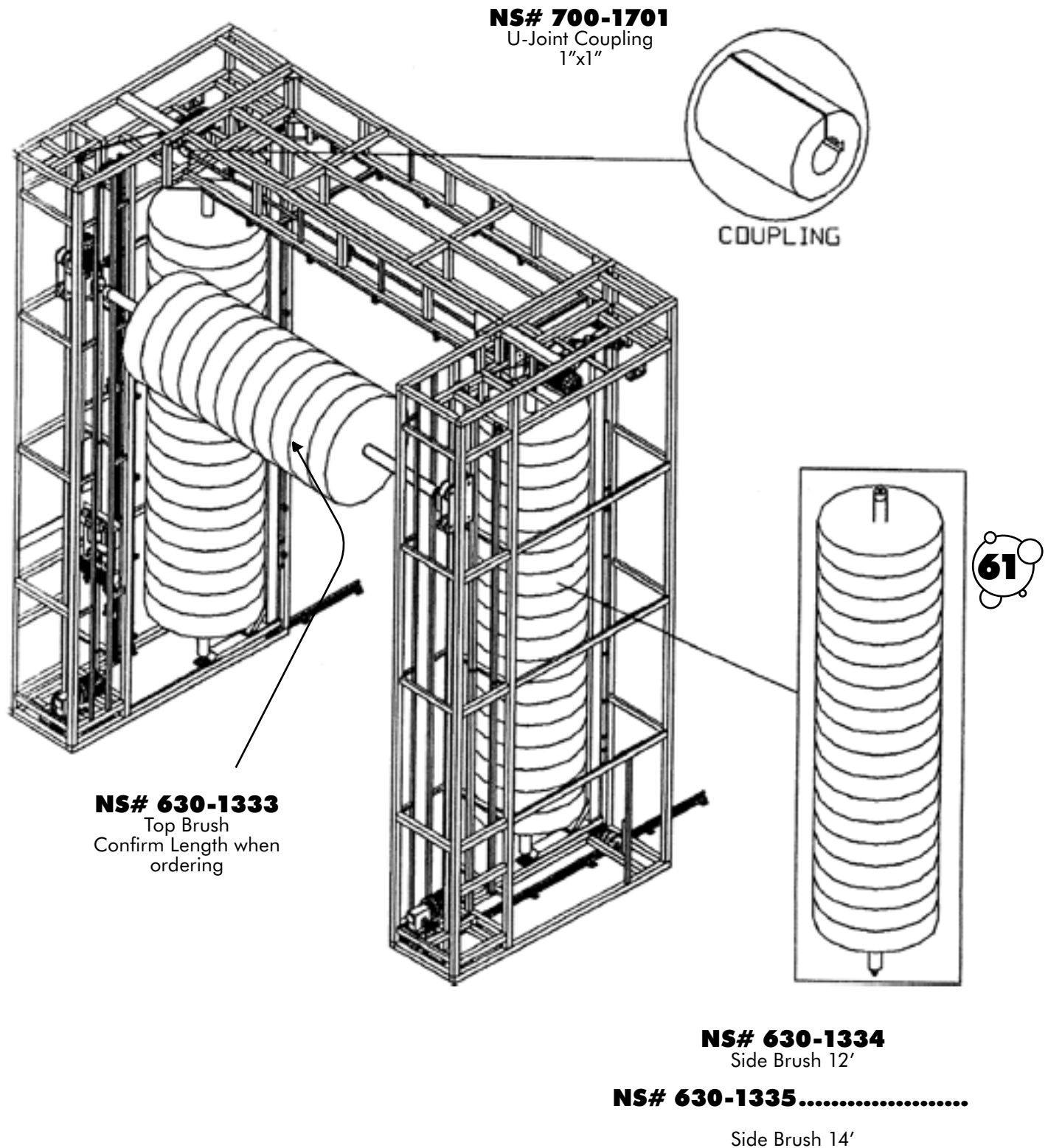
60

- Before performing any electrical work on the system lock out the system by turning the main disconnect switch located on the front of the appropriate panel to the "off" position.

Completed By:

Comments:

MONTHLY MAINTENANCE SCHEDULE



MONTHLY

Maintenance Schedule

YEAR

Month of

62

1	Did you lock off and tag both the main power switches of the gantry being serviced and the MCC panel?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	Check the performance and length of the brush filaments as indicated on pages ¹³ , ¹⁴ and ¹⁵ . If they are below the minimum limit, replace.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	Check the operation of the top brushes lifting motor's brake and adjust, if necessary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	Check and tighten all bolts in the floor, i.e. drive rails	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	Check the condition of all the coupling and coupling inserts and replace when they are worn out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	Clean the drain trench	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	Open the detergent pump gear reducer's upper plug and check the level of oil. If necessary, add oil up to just below the lower threads of the upper plug, and replace the plug. See page ⁸⁴ for the recommended oil to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

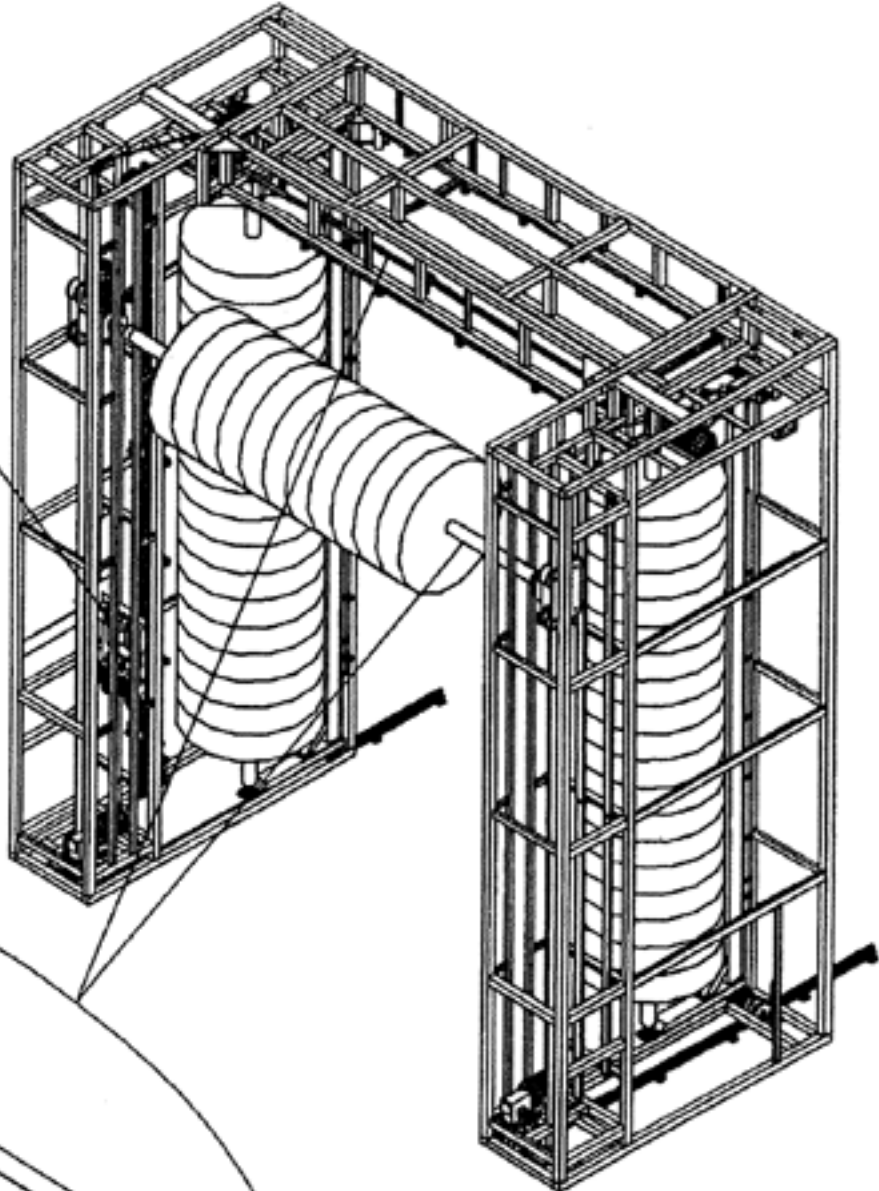
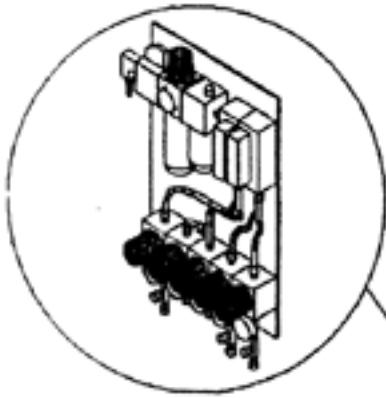
Before performing any electrical work on the system lock out the system by turning the main disconnect switch located on the front of the appropriate panel to the "off" position.

Completed By:

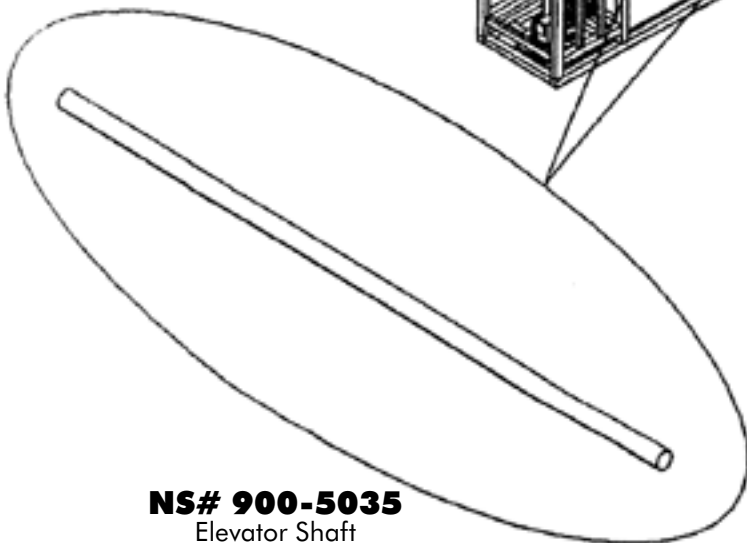
Comments:

SEMI-ANNUAL MAINTENANCE SCHEDULE

AIR PANEL



63



NS# 900-5035
Elevator Shaft

Semi-Annual

Maintenance Schedule

YEAR

1st 2nd

64

1	Did you lock off both and tag the main power switches of the gantry being serviced and the reclamation system?	<input type="checkbox"/>	<input type="checkbox"/>
2	Dump the detergent mixture tank; clean and refill	<input type="checkbox"/>	<input type="checkbox"/>
3	Check the top brush shaft and lift system couplings	<input type="checkbox"/>	<input type="checkbox"/>
4	Check and clean the gantry electrical panel and all limit switches	<input type="checkbox"/>	<input type="checkbox"/>
5	Clean all water pipes by flushing water out the bottom nozzle at the end of each pipe	<input type="checkbox"/>	<input type="checkbox"/>
6	Clean all air lines by blowing air through them	<input type="checkbox"/>	<input type="checkbox"/>
7	Clean the drain trench well, settling pit, reclaim pit and reclaim water tank	<input type="checkbox"/>	<input type="checkbox"/>
8	Check and tighten all bolts and nuts in the washer	<input type="checkbox"/>	<input type="checkbox"/>

Completed By:

- Before performing any electrical work on the system lock out the system by turning the main disconnect switch located on the front of the appropriate panel to the "off" position.

Comments:

Gantry Air Panel Maintenance & Adjustment

Referring to the Air Panel Layout (page 33) you will see that there are two (2) Pneumatic solenoid valves. The first solenoid valve controls the pistons of the two side brush air cylinders. BOTH cylinders are in parallel, THEREFORE BOTH BRUSH ARMS MOVE IN AND OUT AT THE SAME TIME. Each of the two air cylinders retract port, is fitted with a flow control valve, for cylinder movement speed regulation. The second solenoid valve is closed when energized and open when the power is shut off. Only one port of this valve is used to drive the air lift system which consist of an air motor and cylinder.

ADJUSTMENT:

1. Adjustment of the main air pressure: Approximately 15-25 PSI
 - *Check the air pressure to the main pressure regulator's gauge.*
 - *Pull up on the regulator knob and turn it Clockwise to increase/Counter Clockwise to decrease the air pressure output.*
 - *Push down the knob to lock it.*
2. Adjustments of the air pressure:

	RANGE
• <i>Brush Cylinder air pressure</i>	15 – 25 PSI



Note: Adjust The Brush Air Pressure Regulator Only When Washing Vehicles.

3. Manual operation of the pneumatic solenoid valves:
 - *SOL-3 Side Brush Cylinder Extend Air Solenoid*
 - *Push IN the button (located at the bottom of the solenoid #3) BOTH of the brush arm cylinders (connected to that valve) should extend. Releasing the button should cause both of the extended air cylinders to retract.*
4. Air line lubricator
 - *Turn the adjusting knob (located at the top of the fog lubricator) Clockwise to increase/Counter Clockwise to decrease, the oil flow into the air stream.*

MAINTENANCE:

1. Fill the fog lubricator:

CAUTION:

NOTE DO NOT USE AUTOMATIC TRANSMISSION OR BRAKE FLUID

See Lubrication Section (p.84) for the recommended lubricant.

2. Clean the automatic air line filter

- *Turn OFF the panel's compressed air valve.*
- *Remove guard by rotating it over reservoir glass.*
- *Separate the auto drain part, from the reservoir glass.*
- *Clean the reservoir glass, and auto-drain in soapy water.*
- *Dry them then put them back.*
- *Turn the compressed air back ON.*

3. Clean the solenoid Valves

- *Turn OFF the panel's compressed air valve.*
- *Remove the two – (2) screws at the bottom of the solenoid*
- *Separate the body, and end parts.*
- *Pull the shaft (spool) out.*
- *Clean the shaft, end part, and body in soapy water*
- *Dry them and, put them back in the same order.*
- *Turn the compressed air back ON.*



Gantry Brush Maintenance & Adjustment

ADJUSTMENT & MAINTENANCE

1. The speed of a brush arm (extending and retracting):

- *Adjust airflow control valves (near the air cylinder) to the proper opening.*
- *Adjust the air pressure at the air panel. (see page 33)*

2. Cleaning of the brush filaments:

- *Spray kerosene (or other approved solvent) over the dirty part of the brushes; wait approximately five (5) minutes*
- *Use a broom to brush the dirty material out*
- *Rinse any extra solvent away by starting the washer.*

3. Cleaning of the air lines to the air cylinders:

- *Turn the compressed air OFF at the air panel*
- *Loosen the air line connectors at both ends of the air cylinder.*
- *Extend / retract the brush arm (by hand) several times to clean the airlines*
- *Tighten the air line connectors again.*
- *Turn the compressed air back ON.*

4. Cleaning of the water spray nozzles

- *Lock off and tag the gantry unit's main power.*
- *Disassemble the nozzle, swivel, and check valve.*
- *Spray them, with high-pressure air.*
- *Re-assemble.*
- *Turn the main power back ON.*



Gantry Electrical Panel Maintenance & Adjustment

Warning Notes

- i. *Do not open the gantry's electrical panel's door, without the approval of proper authorization.*
- ii. *Lock-off the MCC panel's main disconnect switch powering the gantry units. Failure to do so leaves the power cable to the gantry unit "live" turning "off" the gantry system's main switch to open this door does not turn off this voltage. IT must be turned off at the MCC panel, before this panel and its cables are safe. Failure to do so can result in serious injury to whoever opens this panel thinking; "I turned off the main power switch, therefore it is safe to work on the panel, or its cables".*
- iii. *Lock off the MCC panel disconnect switch. The MCC panel supplies control voltage (110 v) to various terminals in the gantry electrical panels. Basically, there is no indication of its presence. Failure to do so can result in serious injury to whoever opens this panel thinking; "I turned off the main power switch, therefore it is safe to work on the panel, or its cables".*
- iv. *Do not work on the electrical panel with the power "ON".*

MAINTENANCE:



1. Tripped overload relay:
 - a) Push the **BLUE** button down on any that have the **GREEN** colored trip indicator popping up.
 - b) If the overload relay, **TRIPS OFF IMMEDIATELY**, then check the motor, and its wiring, **TO FIND OUT WHY. FIND AND CORRECT ANY FAULTS BEFORE, TRYING TO REST, THE OVERLOAD RELAY AGAIN.**
2. Changing the fuses:
 - a) **USE A FUSE PULLER, NOT YOUR BARE HAND,** to pull the burned fuse out.
 - b) **REPLACE WITH A NEW FUSE OF EXACTLY THE SAME TYPE AND SIZE.**

Notes:

*There is an easy way to find an electrical problem in the washer. The programmable controller has small **RED LED –LIGHTS** to indicate the operation of every electrical device in the washer and the control panel. The electrical blueprint inside the panel's door will indicate what device is hooked up, to which terminal of the inputs and outputs.*

*When a device is being supplied voltage a led will light. If the device **IS NOT** working and the **LED IS LIT**, then the problem is usually with the **DEVICE ITSELF**. Check for voltage at the I/O device's terminals. **IF the LED IS LIT**, voltage should be present.*

MCC Panel Maintenance & Adjustment:

Warning Notes

Do not open the reclaim electrical panel's door without approval or proper authorization.

Lock off the building disconnect switch powering the gantry units. Failure to do so leaves the power cables to the gantry units "live". The gantry electrical panels and cables provide control power (110 v.) To some terminals and devices in the reclaim panel. Never open the reclamation panel's door without first looking-off building power to the gantry unit's main power switches.

Do not work on electrical panel with the power "on".

MAINTENANCE:

Tripped overload relay:

- *Push the reset button down on any that have the trip indicator popping up.*
- *If the overload relay trips off immediately check the motor and its wiring to find out why. Find and correct any faults before trying to reset the overload relay again.*

Changing the fuses:

- *Use a fuse puller, not your bare hands, to pull the burned fuse out.*
- *Replace with a new fuse of exactly the same type of size.*



Caution Note

1. *Do not fill any of the gear reducer reservoirs above their indicated fill level. Over filling can cause damage.*
 2. *Most lubrication should be done at the end of the workday, to prevent rust from forming while the equipment sits idle.*
 3. *Do not use automatic transmission or brake fluid. These types of fluids will destroy all seals in the air cylinders and pneumatic solenoid valves.*
- Wipe off any excess grease from where it could, and before it does, foul the brushes.*

Lubrication:

The conditions in which the equipment must operate (excessive moisture, dirt, etc.) require that special care be taken to ensure proper lubrication.

The following recommendations are designed to prevent costly downtime and repairs.

All of the gear reducers should be checked regularly, for both oil level, and contamination by water or other foreign matter. Even where the old level remains constant the old oil should be drained and refilled to schedule. See caution note #1 above.

The airline lubricator should add one drop of oil for every four (4) times any of the pneumatic solenoid valves cycles. To regulate, activate one of the pneumatic solenoid valves manually, while observing the passage of oil in the lubricator's bowl. Refill if low. See caution note # 3 above.



RECOMMENDED LUBRICANTS FOR MECHANICAL SYSTEMS

Low speed bearing grease of the molybdenum disulphide family such as:

- *Texaco Molytex grease Chevron Dura-Lith EP2*
- *Shell Alvania EP2 Gulf Fulflex Moly Grease*
- *Imperial Molub – Alloy No. 362 Pennzoil Ttm No. 302*
- *Marathon 529 Maralube Moly Standard (Ohio) Bearing Guard*
- *Mobil Mobilgrease Special W/Moly Atlantic Richfield Ep Moly Grease*

Gantry gear reducers require a heavy duty worm gear oil:

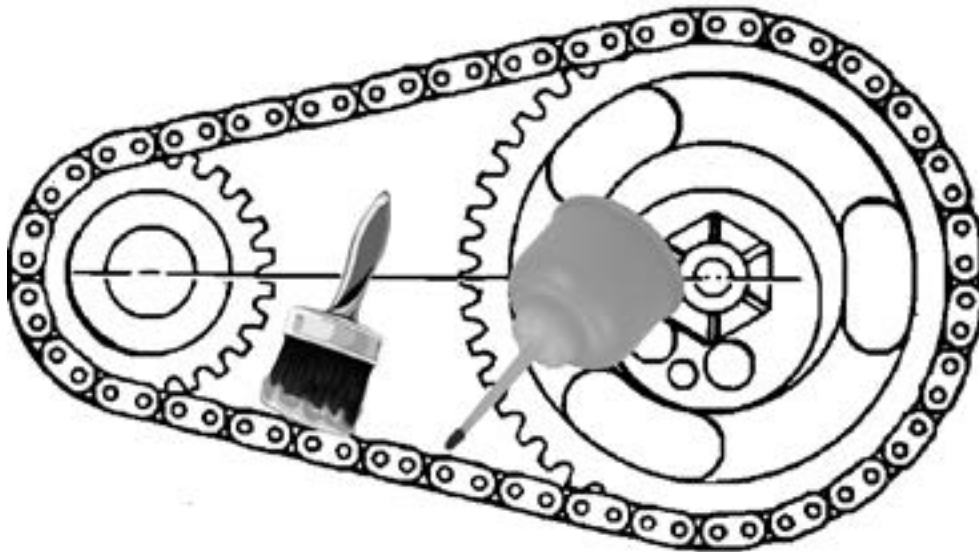
- *230 Ssu @ 100 degrees f.*
- *142 Ssu @210 degrees f.*
- *Sae140, AGMA 7EP*
- *Shell Spriax H.D. 140 Chevron Gear Compound 140*
- *Marathon 598 Worm Gear Compound Mobil Moilube C 140*
- *Imperial Molub – Alloy No. 140 Pennzoil Maxol EP No. 4*
- *Gulf EP Lubricant 95 Texaco Rando Oil HD 150*
- *Atlantic Richfield Pennant NLS155/S 100 Standard (Ohio) Gearep 140*

Warning Note

Lubrication, and or other maintenance, should be only done with the equipment locked "off" and tagged: "Men Working on Equipment, Do Not Start".

Recommended Top Brush Chain Lubrication

<i>Ambient Temperature</i>	$-10^{\circ}\sim 0^{\circ}\text{C}$	$0^{\circ}\sim 40^{\circ}\text{C}$	$40^{\circ}\sim 50^{\circ}\text{C}$	$50^{\circ}\sim 60^{\circ}\text{C}$
<i>Chain No.</i>				
<i>RS50 or Smaller</i>	<i>SAE 10</i>	<i>SAE 20</i>	<i>SAE 30</i>	<i>SAE 40</i>

How To Lubricate A Chain:**Application**

Oils is applied with an oil filler or brush on the slack side of the chain.

Oils should be applied at a fixed interval, generally about every 8 hours, or as often as necessary to prevent the bearing areas from becoming dry.

RECOMMENDED LUBRICANTS FOR PNEUMATIC SYSTEMS

The satisfactory operation of the airline lubricators, and effective lubrication, depend on the proper selection of the lubrication oils. Preferably most should have good corrosion and oxidation properties. Listed below, are just some of the oils that have been tested by C.A. Norgren Ltd.

Your regular lubricant dealer should be able to give you guidance, where doubt exists as to which to use. Some compound oils such as those containing graphite, are not suitable for use in micro-fog lubricators. Also, certain specialized lubricants, particularly synthetic ones, may contain compounds "which are not compatible" with the transparent lubricator bowls, and seals in the filter / regulator / lubricator system and the air cylinders. Before using such lubricants, consult the equipment manufacturer: C.A. Norgren Ltd., Watts Fluid Power, ARO Ltd., Parker-Hannifin Ltd., or your local lubricant supplier for compatible lubricant.

*****Note** The actual equipment manufacturer is the best one to consult, as to which lubricant to use in their product.***

The pneumatic system oils listed below are those listed in the ARO Systems Component Catalog # A-8156-T for the lubrication of air tools, air cylinders and pneumatic solenoid valves. Recommended viscosity – 100 to 200 S.S.U.



Request ARO System's catalog #4424 for listings of oils at other viscosity.

American Industrial Oil # 15 Citgo Sentry # 15 Gulf Stainless Machine
Amoist Oil # 18 Citgo Extra Duty Mobile Velocite Oil # 10
Champion Inhibited Turbine & Endurance Oil # 600 Mobil Velocite Oil # 12
Hydraulic Oil Light Esstic #42 Mobile DTE Oil Light
Chevron EP Machine Oil #9 Gulf Harmony #41 Mobil DTE # 24
Chevron Oc Turbine Oil #9 Gulf Harmony #44 Quaker State Quadrolube # 75
Citgo Pacemaker # 10 Gulf Harmony #47 Shell Tellus Oil # 21
Citgo Pacemaker #15 Gulf Harmony #43 Aw Shell Tellus Oil # 23
Citgo Pacemaker #XD-15 Gulf Harmony #48 Aw Shell Tellus Oil # 25

Troubleshooting

If a valve is closed (turned off) find out why. It might be because the equipment is being serviced. If this is the case, then the valve should have been locked closed (if possible) and tagged. “Men working on equipment. Do not open this valve. Do not remove this tag.” Only the person that locked off and tagged the valve should unlock it, remove their tag and open / adjust the valve to its proper setting.

If the wall mounted (customer supplied) building power supply to the washer, washer main power switch and any of the selector switches are turned off or to a position other than the switch’s normal position. Find out why. It might be because the equipment is being serviced. If this is the case, then the switch should have been locked off or in the new setting (if possible) and tagged. “Men working on equipment. Do not turn on this switch or change its settings. Do not remove this tag” Only the person that locked off and tagged the switch should unlock it, remove their tag and turn on or change the switch to its proper setting.

As the rollover may have optional equipment controlled by it and attached to it by cable always lock off and tag the rollover’s main power switch before doing any work on the equipment. Always check bare terminals with a meter to see if they are live before touching them with your hand.

Always lock off and tag the wall mount disconnect switch before on the main power cable between it and the rollover unit, otherwise it will be “live”.



Plumbing System

1. No water to washer.

- A) Check the main gate valve. Is it closed? When authorized, open the valve.
- B) Check the buildings supply line. Is its valve closed? When authorized, open the valve.
- C) Check to see if the washer’s main power and power switches are both turned ON, and the programmable logic controller’s (PLC) indicating lights are lit. When authorized, turn the switches ON.
- D) Check the PLC’s output fuse to the water solenoid valve (SOL-1). IS it blown? Find out why the fuse burnt out before replacing it with a new identically rated fuse.
- E) Check the water solenoid valve (SOL-1). Clean or Repair or Replace as needed.
- F) Check the spray nozzles. Are they clogged? Clean or replace the nozzles as needed
- G) Check for leaks and kinks in all hoses.

2. No water during the Wash or rinse cycle

- A) Check the main gate valve. Is it closed? When authorized, open the valve.
- B) Check the buildings supply line. Is its valve closed? When authorized, open the valve.
- C) Check to see if the washer’s main power and POWER selector switches are both turned ON and the programmable logic controller’s indicating lights are lit. When authorized, turn both switches on.

D) Check the PLC output that powers the water solenoid valve (SOL-1). And the PLC's output fuse. IS the output active or supplying power to the valve's coil? Is the fuse blown? Find out why the fuse burnt out before replacing it with a new, identically rated fuse. Replace the output module as needed.

E) Check the water solenoid valve (SOL-1.) Clean, repair, or replace if needed.

F) Check the spray nozzles. Are they clogged? Clean or replace the nozzles are needed.

G) Check for leaks and kinks in all hoses.

H) Check to see if the operator panel's water OFF/ON selector switch is turned ON. When authorized, turn on the switch.

3. The water does not stop.

A) Check the water solenoid valve (SOL-1). Is the water solenoid valve stuck open? Clean or repair the valve as needed.

B) Check the control wiring. Has it shorted so that the valve's coil is continually powered? Is the PLC output that powers the valve's coil active when it should not be or are its relay contacts stuck closed? Replace the output module or replace or repair the wiring as required.

4. Inappropriate soap quantities.

A) Check the chemical injection pump. Is it turned ON? When authorized, turn the pump cycle or the rinse water on or adjust its output.

B) Check the level in the chemical supply tank(s) during the rinse cycle. Refill the tank with the proper chemical.

C) Check for lead or kinks in the chemical supply tubing

D) Check for water pressure (min. 40 PSI.) Increase if needed

E) Check the PLC output that activates the control that powers the chemical pumps and its fuse. Is the PLC output active or supplying power to the control relay's coil? Is the fuse blown? Find out why the fuse burnt out, before replacing it when a new identically rated fuse. Replace the output module as needed.

F) Check to see if the control relay that powers the chemical pumps has failed with its contacts open. Replace the control relay, if needed.

5. The pre-rinse water doesn't get pre-rinse chemical during the pre-rinse cycle.

The wash water doesn't get soap during wash cycle.

The rinse water doesn't get rinse agent during the final rinse cycle.

A) Check the chemical injection pump. Is it turned ON? When authorized, turn the pump ON or adjust its output.

B) Check the level in the chemical supply tank(s). Refill the tank with the proper chemical if necessary.

C) Check for leak or kinks in the chemical supply rinse cycle tubing.

D) Check the water pressure (min. 40 PSI) increase if needed.

E) Check the PLC output that activates the control that powers the chemical pumps and its fuse. Is the PLC output active or supplying power to the control relay's coil? Is the fuse blown?



Find out why the fuse burnt out, before replacing it with a new identically rated fuse. Replace the output module as needed,

6. *The rinse water gets soap during the rinse cycle*

A) Check to see if the wash chemical pump is running. Check to see if the control relay that powers the pump has failed with its contacts closed. Replace the control relay, if needed.

7. *The water spray is not uniform.*

A) Clean the spray nozzles, replace if necessary.

Compressed Air System

1. *The washer does not get compressed air.*

A) Check the building air compressor and its gate valve. Is it running? Is the valve open? When authorized, turn the compressor ON or open the valve.

B) Check the main air valve in the washer's air panel. Is it open? When authorized, open the valve.

2. *There is a large air loss*

A) check for blown or cut hose, leaks at the fittings, etc. Once located, shut off the air and fix it.

3. *The side brushes do not extend or retract*

A) Check for obstacles on floor. Remove any found.

B) Check the air cylinder or rod end bearings. Repair or replace worn items as required.

C) Check the air solenoid valves manually

D) Check the flow control valves. Are they closed? When authorized, adjust the air flow to suit.

E) Check the LEDs on the PLC output modules. Are they Lit? Are the LEDs blown? Find out what caused the fuse to burn out before replacing it with a new identically rated fuse. Repair or replace the solenoid valve as required.



4. *The side brushes move Too fast or too slow.*

A) When authorized, adjust the flow control valves to suit.

5. *The side brushes pressure against the vehicle's side surfaces is too heavy/light*

A) When authorized, adjust the brush extend air side pressure.

Recommended Air pressure is:

"High" 40 – 50 PSI.

"Low" 10 – 15 PSI.

B) Check the brush filaments. Replace them if they are worn down to 10" Lg.

Electrical System

1. The washer does not start

A) Check to see that both the main power switch and power selector switch are “ON”. When authorized turn the switches ON.

B) Check to see if the building’s main power supply is turned “ON”. When authorized, turn the switch ON.

C) Check the stop button. (on some models the STOP button has to be pulled out, after it is pushed in, before the washer will run.)

D) Check all circuit breakers or overload relays. Are any tripped? Find out what caused the device to trip before resetting the device.

E) Check to make sure that the WASH START button has been pushed. When authorized, push the button.

F) Check to make sure the vehicle is on the optional automatic floor treadle.

G) Check the programmable controller’s fuse and battery. IF the fuse is burnt out, find out the cause before replacing it with a new identically rated fuse. See the section on how to replace the CPU’s battery.

2. The washer does not stop

A) Check all proximity switches. Are the metal objects that trip them broken out of position or jammed? Fix as required. Replace the proximity switch if needed.



3. The side brush(es) do not rotate

A) Check the SIDE BRUSHES selector switch. Is it turned OFF? When authorized, turn the switch ON.

B) Check the side brush’s circuit breaker or overload relay. Are they tripped OFF? Find out what caused the device to trip before resetting the device.

C) Check the PLC’s outputs for the side brushes and their output fuses. If a fuse is burnt out, find out why before replacing the fuse with an identically rated replacement. Replace any output module not supplying voltage to its output terminals, when it should be.

D) Check the operation of the side brush motor starters. When the starter’s coil is getting voltage, does it activate the starter’s contacts? Is the starter’s coil burnt out? Replace or repair the starter’s coil or contacts or the entire starter as required.

E) Check the side brush electric motors, reducers, and couplings. Repair or replace worn or damaged items as needed.

4. The top brush does not rotate

A) Check the TOP BRUSH selector switch. Is it turned OFF? When authorized, turn the switch ON.

B) Check the top brush’s circuit breaker or overload relay. Are they tripped OFF? Find out what caused the device to trip before resetting the device.

C) Check the PLC’s outputs for the side brushes and their output fuses. If a fuse is burnt out, find out why before replacing the fuse with an identically rated replacement. Replace any output module not supplying voltage to its output terminals, when it should be.

D) Check the operation of the motor starters. When the starter's coil is getting voltage, does it activate the starter's contact? If the starter's coil burnt out? Replace or repair the starter's coil or contacts or the entire starter as required.

E) Check the top brush electric motors, reducers, and couplings. Repair or replace worn or damaged items as needed.

5. The top brush spinner boom does not move up or down

A) Check the PLC's outputs for the appropriate elevator motor and its output fuses. If a fuse is burnt out, find out why before replacing the fuse with a identically rated replacement. Replace any output module not supplying voltage to its output terminals, when it should be.

B) Check the operation of the elevator motor starters and their mechanical interlock. When the starter's coil is getting voltage, does it activate the starter's contacts? Is the starter's coil burnt out? Is the mechanical interlock activating? Replace or repair the starters coil, contacts, and mechanical interlock or the entire starter as required.

C) Check the elevator motor circuit breaker or overload relay. Are they tripped OFF? Find out what caused the device to trip before resetting the device.

D) Check the brake in the elevator motor. The brake mechanism may need to be adjusted or replaced.

E) Check the elevator electric motors or reducer couplings. Repair or replace worn items as needed.

F) Check both lifting chains and sprockets. Has the lift chain jumped off its drive sprocket? Repair or replace damaged items as need.

G) (APPLIES TO TOP BRUSH ONLY) Check the chain tensioner. Has it moved out of its normal position tripping the tension safety proximity switch (PS-7). Adjust the chain's tension to allow the tensioner to return to its normal position.

H) Check the sledge wheels. Are they binding? Do the plastic wheels need to be greased or replaced? Lubricate, adjust, or replace as required.

I) (APPLIES TO TOP BRUSH ONLY) Check the selector switch. Is it turned OFF? When authorized, turn the switch ON. When not running, the top brush should stay in its upper position.

J) Check to see if the joystick is stuck in any of its modes. Unstick, repair, or replace the joystick as required.

K) Check the operation of the first power relay (PR-1). Adjust the power relay as described chapter three of its manual.



6. Top brush pressure against the vehicle is too heavy or light

A) Adjust the current relays (PR-1 to PR-4) as described in chapter 3 of this manual

B) Check the length of the brush filaments. Replace them, if they are shorter than 12-1/2" long measured from the brush shaft's center.

7. The washer does not travel

A) Check to see if the vehicle is too high or the top brush is caught on some part of the vehicle. If possible use the joy stick to raise the top brush. Turn the top brush selector switch OFF. Remove the vehicle from the wash bay.

B) Check for obstructions on the tracks. Clean the tracks as required.

C) Check to see if all four of the gantry wheels are on tracks. Replace the gantry wheels on the tracks as required.

D) Check all proximity switches. Are the metal objects that trip them broken, out of position or jammed? Fix as required. Replace the gantry wheels on the tracks as required.

E) Check the PLC's outputs for the gantry drive motor starters and their output fuses. If a fuse is burnt out, find out why before replacing the fuse with an identically rated replacement. Replace any output module with an identically rated replacement. Replace any output module not supplying voltage to its output terminals, when it should be.

F) Check the operation of the gantry drive motor starters and their mechanical interlock. When the starter's coil is getting voltage, does it activate the starter's contacts? Is the starter's coil burnt out? Is the mechanical interlock preventing the proper motor starter from activating? Replace or repair from starter's coil, contacts, and mechanical interlock.

G) Check the brake in the gantry drive motors. Adjust or replace the brake mechanism.

H) Check both gantry drive chains and their sprockets. Has the drive chain jumped off its drive sprocket? Repair or replace damaged items as needed.

I) Check to see if the joystick is stuck in any of its modes. Unstick the joystick. Repair or replace if unable to do so.

J) Check the drive motor circuit breakers or overload relays. Are they tripped OFF? Find out what caused the device to trip before resetting the device.

8. The washer turns back too early

A) check for obstacles on the floor, which may trip the reverse proximity switch.



9. The optional traffic light remains red

A) Check to see that the washer is in its home position (i.e. In its initial starting position

B) Check to see if the top brush is in its upper position.

10. The option traffic Lights do not work

A) Check to see that both the main power switch and power selector switch are "ON".

B) Check the traffic light's bulbs and replace if necessary.

C) Check the PLC's outputs for the optional traffic lights and their output fuses. If a fuse is burnt out, find out why before replacing the fuse with an identically rated replacement. Replace any output module not supplying voltage to its output terminals when it should be.

11. The washer burns main fuses continuously

A) Check the current drawn by all motors. (All three phases) Repair or replace any motor whose current draw is excessive. Also check the motor driver for binging, etc. Repair the device as needed.

B) Check the main power supply cable. Are all conductors supplying power to the rollover? Replace the cable if required.

C) Check the building's power supply. Has single phasing occurred? Find the cause and fix it. Check all of the motors to make sure that they were not damaged if single phasing has occurred. Repair or replace the motors as needed.

12. One of the PLC output terminal block fuses blows continuously

A) Check the corresponding device's LEDS. If the LED is lit, and the device is not getting power, then its fuse may be blown. Check for power on both sides of the fuse. IF the fuse is blown, find the cause at the device and or wiring before replacing it with new identically rated fuse.

13. The washer's control circuit fuse burns out continuously

- A) Check all proximity switches. Replace defective switches or wiring if needed.
- B) Check all water solenoid valves. Clean, repair, or replace the valves or their parts as required.
- C) Check the control circuit transformer.
- D) Check all control panel wiring and the control cable. Replace defective wiring and control cables as required.
- E) Check the current drawn by the wash chemical pump and optional rinse chemical pump. Repair pump if needed.

14. One of the washer's motor circuit breakers or overload relays trips

- A) Check the motor, reducer, or coupling.
- B) Check the motor cables.
- C) Check the operation of the circuit breakers or overload relays. Is the overload setting correct? Adjust the current draw to the proper value or replace the overload relay with an overload relay of the required current draw range.
- D) Check the actual amperage being drawn (all three legs) and compare it to the motor's name plate. Reset the valve of the overload. Replace or repair any motor whose actual current draw is excessive.



15. One of the motors turns in the wrong direction

- A) Check the motor wiring at the motor starter, in the electrical panel.
- B) Reverse the connection of any two (2) of the three phase. Remark the wires changed to agree with the motor starter markings (T1, T2 & T3, etc.) depending on which wires were changed.

Comprehensive Parts List

PART#	DESCRIPTION
001-2007	C-RAIL HANGER BRACKET
001-2010	CABLE CARS
001-2011	CABLE CLIP 25MM
001-2012	CABLE CLIP 36MM
001-2013	CABLE CLIP 16MM
001-2014	C-RAIL JOINT BRACKET
135-1406	GIB KEY 1/4"X2"
200-1909	2" CLAMP PVC
200-1910	3" CLAMP PVC
200-7037	1-1/4" TAPER LOCK 1610
200-7038	1" TAPER LOCK 1610
202-1002	CHAIN TENSIONER
210-1301	1/2HP MOTOR BRAKE 3PH
210-1304	1HP MOTOR BRAKE 3PH
210-1778	1-1/2HP MOTOR 3PH
210-2110	2HP MOTOR 3PH
235-2139	15:1 REDUCER 926 LEFT
235-2140	15:1 REDUCER 926 RIGHT
235-2149	60:1 REDUCER 920
330-0001	SO CABLE 16/4
330-0009	SO CABLE 16/3
330-0014	SO CABLE 10/4
330-0016	SO CABLE 16/16
330-0020	SO CABLE 14/4
350-1050	1/2" CORD CONNECTOR
350-1050	3/8" CORD CONNECTOR
350-1051	1/2" CORD CONNECTOR
350-1054	1/2" BELL BOX 5 HOLE
350-1056	BELL BOX COVER
350-1066	3/4" CORD CONNECTOR
350-1073	1/2" BELL BOX ROUND 5 HOLE
350-1074	BELL BOX COVER ROUND
400-1628	3/4" SEALING RING
400-1629	1/2" SEALING RING
405-1450	BUSHING 1"X1/2" GALV
430-1335	POLY ELBOW 3/8"X3/8"
430-1336	POLY ELBOW 1/8"X1/4"
440-1190	5" AIR CYLINDER DOUBLE STROKE
460-0082	3/8" FILTER/REGULATOR/ LUBRICATOR COMBO
465-1601	POLY FITTING STRAIGHT 1/4"X1/4"
465-1623	FLOW CONTROL VALVE 1/8"X1/4"
465-1904	POLY ELBOW DOUBLE HEAD 1/8"X1/4"
465-1906	1/4" REGULATOR
470-1211	1/8" GAUGE NPT 0-60PSI
475-1800	3/4" HOSE BLUE
475-2200	1" HOSE BLUE
475-2602	3/8" HOSE BLUE

475-3198	1/4" POLY TUBING
475-3209	3/8" POLY TUBING BLUE
475-3211	POLY ELBOW 1/4"X1/4"
500-1315	NIPPLE 3/8"X2" GALV
515-2004	1/4" PLUG GALV
520-1128A	1" SOLENOID VALVE 120V
520-2006	BLUE & WHITE PUMP 10.6 OZ 120V
570-0004	2 STATION SOLENOID VALVE
610-1015	1" 4 BOLT FLANGE BEARING
610-1115	1" PILLOW BLOCK BEARING
610-1124	1-1/4" 4 BOLT FLANGE BEARING
610-1405	1/2" ROD END BEARING
630-1294	1400MM HALF DENSITY PELT
630-1295	1400MM FULL DENSITY PELT
630-1296	1100MM FULL DENSITY PELT
630-1297	1100MM HALF DENSITY PELT
670-1151	CHAIN #50
670-1152	CHAIN #40
670-3042	CHAIN LINK #50
670-3043	CHAIN LINK #40
700-3003	BUSHING Q 1"X1-1/4"
770-1106	420 TLB SPROCKET
770-1107	516 TLB SPROCKET
770-1108	5/8" IDLER SPROCKET
820-1218	CAP SCREW 1/2"X1-1/4"
820-1415	CAP SCREW 3/8"X1-1/4"
820-1420	CAP SCREW 3/8"X1-1/2"
820-1520	CAP SCREW 1/2"X1-1/2"
820-1525	CAP SCREW 1/2"X1-3/4"
820-1531	CAP SCREW 1/2"X2-1/4"
820-1545	CAP SCREW 1/2"X3-1/4"
820-1760	CAP SCREW 5/8"X4-1/2"
820-3059	CAP SCREW 5/8"X5-1/2"
840-1989	3/8" LOCK NUT
840-2000	1/2" LOCK NUT
840-2100	5/8" LOCK NUT
840-2408	1/2" LOCKING RING
840-2410	3/4" LOCKING RING
870-1300	3/8" WASHER
870-1302	5/8" WASHER
870-1350	3/8" LOCK WASHER
870-1400	1/2" WASHER
870-1401	1/2" FLAT WASHER
870-1450	1/2" LOCK NUT
900-5032	SIDE BRUSH SHAFT
900-5035	TOP BRUSH SHAFT
950-0020	PROXIMITY SENSOR E13015TB0PL
950-0025	PROXIMITY SENSOR E11808TB0PL

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PLUMBING	
405-1190	BUSHING 1/2"X1/4" GALV
420-1420	COUPLING 1/2" GALV
430-1440	ELBOW 1/2" GALV
465-1620	POLY FITTING 1/4"X3/8"
500-1058	BARB KC 1/2"X3/8"
500-1403	NIPPLE 1/2"X3" GALV
SPRAY ARCH	
150-2100	3/4" PIPE PVC
415-1505	3/4" CAP SLIP PVC
420-1441	3/4" COUPLING SXT PVC
450-1053	1" HOSE CLAMP
510-0053	1/4" NOZZLE 6508 BRASS
WATER MANIFOLD	
320-1038	LB BOX 1/2
320-1038C	LB BOX COVER
320-1038G	LB BOX GASKET
350-1050	3/8" CORD CONNECTOR
400-1629	1/2" SEALING RING
430-1613	ELBOW 1"X3/4" GALV
450-1053	1" HOSE CLAMP
500-1065	3/4" HOSE BARB KC
500-1069	1" KC HOSE BARB
500-1400	1/2" NIPPLE GALV
500-1500	3/4" CLOSE NIPPLE GALV
500-1507	NIPPLE 3/4"X2" GALV
500-1516	NIPPLE 3/4"X4" GALV
500-1518	NIPPLE 3/4"X7" GALV
500-1600	1" CLOSE NIPPLE GALV
550-1518	3/4" TEE GALV
570-1128	1" SOLENOID VALVE 120V
570-1205	3/4" CHECK VALVE

4M ELECTRICAL PANEL PANEL	
200-0099	11 PIN BASE, RELAY SOCKET
200-1283	TERMINAL BLOCK 3 POLE
200-1284	TERMINAL BLOCK 10 POLE
200-1304-1	DISCONNECT HANDLE
200-1307	MAIN DISCONNECT SWITCH SHAFT
240-1101	AMBER PUSH BUTTON CAP
240-1102	GREEN PUSH BUTTON CAP
240-1103	ILLUMINATED PUSH BUTTON
240-1104	JOY STICK
240-1105	UNIVERSAL PUSH BUTTON
240-1106	SWITCH CONTACT 9001-KA2
240-1107	2-WAY SELECTOR SWITCH 9001-KS11B
240-1108	PILOT LIGHT LENS CAP
240-1109	PILOT LIGHT GREEN
240-1110	SWITCH CONTACT 9001-KA3
240-1111	RED STOP MUSHROOM BUTTON
240-2813	DISCONNECT SWITCH 600V-30AMP
260-1022	REVERSING CONTACTOR
260-1197	CIRCUIT BREAKER (MGN61364) 15A, 480/277V
260-3008	CURRENT TRANSFORMER MI20
260-3012	TRANSFORMER 1PH, 500VA 208/230/460V-115V
280-1259	RELAY 10A 120VAC, DPDT, 8-PIN
300-0010	OVERLOAD RELAY (LR2K0314)
300-0013	OVERLOAD RELAY (LR2K0310)
300-1033	RELAY CURRENT CARLO GAVAZZI
300-1035	OVERLOAD RELAY 575V, 11.5A
300-1035	OVERLOAD RELAY 575V, 11.5A
300-1124	RELAY BASE FOR DPDT, 8-PIN
360-0006	COUNTER 115V, 6-DIGIT
360-0032-1	DISTRUBUTION BLOCK COVER 3POLE
360-0037	FUSE 5A CCMR5
360-0086	FUSE 2AMP 120 VOLT GMA-2-R
360-1119	FUSE HOLDER CHCC1D FOR CCMR FUSE
360-1122	FUSE HOLDER FOR GMA FUSE
360-1125	FUSE 30A, DUAL TIME
840-3026	GROUNDING BAR ASSEMBLY
PLC-052	FILLER MODULE CHASSIS D-2
PLC-059	INPUT MODULE D2-16NA
PLC-060	OUTPUT MODULE D-208TR
PLC-061	9 SLOT CHASSIS D2-09B
PLC-062	CPU-D2-250



Standard Manufacturer's Limited Warranty

Government and rental divisions

EXPRESSED WARRANTY: N/S Corporation's manufactured vehicle wash equipment is guaranteed for one (1) year commencing the first day following installation, or thirty (30) days from the original invoice date, whichever ever occurs first. Equipment not manufactured by N/S Corporation and electrical parts are guaranteed for ninety (90) days. The equipment is guaranteed against manufacturing defects on material and workmanship, which develop in the service for which it was designed, provided that the equipment is installed and used in accordance with all applicable instructions and limitations as issued by N/S Corporation.

Pursuant to the above expressed warranty, N/S Corporation at its sole discretion, will repair goods or replace defective materials, free of charge excluding labor, provided that such goods or materials are returned as specified by N/S Corporation.

N/S Corporation does not warrant: (1) transportation, installation, adjustment, or other expenses which may arise in connection with such equipment or parts; (2) site related/operation based problems; (3) damage due to accident; (4) damage due to misuse, negligence, or overloading; (5) lack of proper maintenance; or (6) maintenance items, including but not limited to lubricating grease/oils, filters, cloth, materials, bearings, rollers, etc. nor any items therein which show signs of neglect; (7) damage due to non-N/S equipment or unauthorized personnel. Repairs and service provided by unauthorized N/S personnel voids warranty.

LIMITED LIABILITY: N/S Corporation shall not be liable (1) for any incidental, special, consequential, or exemplary damages; (2) for commercial loss; (3) for inconvenience; or (4) for any service not expressly provided for herein related to or arising from the vehicle wash equipment. N/S Corporation makes no further warranties and no implied warranties of merchantability or fitness for a specific purpose.

All terms and conditions apply unless otherwise specified in the contract. This warranty given in lieu of all other expressed warranties on the part of the Manufacturer, Distributors, or Dealers. No Dealer or Distributor (nor any agent, representative or employee thereof) is authorized to extend or enlarge this warranty.

If there are any questions regarding these procedures or you need additional assistance, please contact our **Director of Customer Service at (310) 330-1250**.

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F: CS-008 Revision Date: 9/26/13

Warranty Procedures

1 Before commencing any warranty work, the N/S Customer Service Department must be contacted and advised that a problem was encountered, which location, and an estimate must be given for any labor cost. The Customer Service Department will then advise the customer as to what action is to be taken.

2 If replacement parts are required, the Customer Service Department will advise the customer where the needed parts can be obtained.

3 All of parts supplied under warranty will be shipped via UPS ground by N/S Corporation. If a more expeditious means are requested, the customers will incur the extra charges.

4 Returned Good Authorization (RGA) will be issued by the N/S Customer Service Department at the time that credit for the replacement parts is requested. All parts returned under an RGA number must be returned within 20 days, freight prepaid and the RGA number must be plainly visible on the outside of the packaging.

5 No Credit will be issued for motors or reducers that do not have the original name plates affixed.

6 If there are any questions regarding the clarification of these procedures, this may be directed to the N/S Director of Customer Service at (800) 782-1582.

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