



GLOBAL R3 Air

Service Manual

Mechanical Sweeper

Manual GS335173

January 2018





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GLOBAL PARTS AIR

Service Manual

Mechanical Sweeper

PART# GS335173





GLOBAL R3 Air Service Manual

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Introduction

The information contained in this manual will help you better understand the operation of the GLOBAL Mechanical sweeper. The Global MX3 Series sweeper represents the highest grade of craftsmanship and reliability that makes Global a world leader in sweeper technology. Careful attention to proper operating procedures will ensure efficient operation, maximum performance and total customer satisfaction.

How to Use This Manual

- Keep this manual in the cab buddy seat compartment as a permanent and convenient reference.
- Throughout this manual, you will find **WARNINGS**, **CAUTIONS**, and **NOTES**.
 - The **WARNINGS** reminds you to be especially careful to avoid possible personal injury.
 - The **CAUTIONS** are given to prevent you from making an error that could damage the sweeper or cause personal injury.
 - The **NOTES** are suggestions that will help you make full use of the sweeper.
- A thumb tabbed quick reference guide is located on the title page of manual to assist you in locating a desired function.
- Procedure titles and chapters are positioned in margins for easy reference while flipping through the manual.

Important Information

All information in this manual is based on the latest product information available at the time of printing. Due to improvements in design, performance and reliability, there may be minor discrepancies between actual vehicle and the contents of this manual. Global Environmental Products reserves the right to make changes at any time without notice and without incurring any obligation to make such changes to products manufactured previously. No liability can be accepted for any inaccuracies or omissions in this publication, although every endeavor is made to ensure that information contained in this manual is correct.

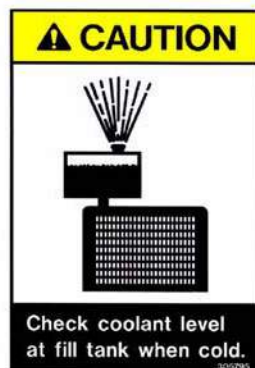
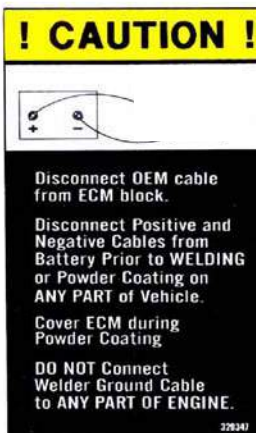
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Safety Decals

Safety must always be the operator's utmost concern and responsibility. The operator must read and understand this manual and all safety decals on the sweeper before operating the vehicle. Failure to follow these safety precautions could result in damage to the equipment and/or personal injury or death. Decals are designed and installed on the sweeper for your protection. They are placed at appropriate areas on the sweeper to be constant reminders of the ever-present dangers. KNOW and ADHERE to the information they provide.



PLEASE REFER TO ENGINE MAINTENANCE MANUAL FOR PROPER COOLANT AND OIL REQUIREMENTS

SAFETY INSTRUCTIONS

1. Before starting and operating this machine, read and thoroughly understand operators manual and additional warnings.
2. This unit must be operated with care due to tight turning radius and high center of gravity.
3. WEAR YOUR SEATBELT AT ALL TIMES.
4. Dump only on level surfaces away from power lines and building structures.
5. Do not drive unit with hopper raised.
6. Use approved method for servicing tires.

302944

ENGINE COOLANT NOTIFICATION

1. Engine cooling system is filled with a 50% Antifreeze to 50% Distilled Water mixture at time of manufacture.
2. A 50/50 mixture helps protect engine during NORMAL operating conditions.
3. If operating engine at EXTREME temperature conditions, consult manual and/or manufacture for coolant mixture recommendations.

313880

CAUTION

Do not Weld on Hopper. Inside of Hopper Polyurethane Coated.

320519

VEHICLE WARM UP PROCEDURE

IT IS RECOMMENDED THAT A SHORT WARM UP PERIOD BETWEEN 10 AND 15 MINUTES BE PART OF THE PRE-OPERATING PROCEDURES FOR THIS VEHICLE. THIS WARM UP PERIOD WILL ALLOW THE OIL IN THE HYDROSTATIC DRIVE SYSTEM TO REACH THE DESIRED TEMPERATURE AND CONSISTENCY FOR SAFE AND SMOOTH OPERATION.

320742

SPRAY BAR WATER FILTER

SERVICE DAILY

323312

ATTENTION

ALL WHEEL LUGNUTS ARE RIGHT HAND THREADS.

325919

Do not exceed 2200 RPM while sweeping

315732

Raise Step To Closed Position Before Driving

317712

WARNING

Turn off all sweeping functions before shutting engine off.

326429

CAUTION!

After starting engine, PAUSE momentarily before shifting.

325457

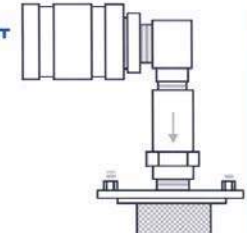
ATTENTION!

GREASE CAVITY DAILY.



325202

HYDRANT FILL



WATER FILL

Remove Strainer and Clean Weekly

P/N 324722

WATER PUMP MANUAL PURGE

CAUTION! REMOVE KEYS FROM IGNITION PRIOR TO PURGING.

LIFT and HOLD SWITCH UNTIL PUMPS HAVE EMPTIED.



325423



Safety Precautions

The safety precautions listed in this manual and on the sweeper are not all-inclusive. Anyone using service procedures, methods, or tools, whether or not recommended by Global Environmental Products, Inc. must satisfy himself thoroughly that neither personal safety nor vehicle safety will be jeopardized by the service methods or tools selected. Remember, your ability as a professional operator is critical to ensuring your safety and that of others around you.

Always follow local and state traffic laws. Drive defensively—the other driver may be wrong, but it is better to avoid collisions of any kind. Carefully study the following safety related operating suggestions.

1. **Always** fasten seat belts.
2. Always drive at a safe speed. **Slow down** for curves and downgrades.
3. Be extremely **careful** when maneuvering around parked cars.
4. **Never** make sudden starts, stops or turns.
5. Be very **careful** when backing up sweeper.
6. **Do not** use sweeper for towing.
7. **Never** operate sweeper with a known hydraulic leak. Repair leak immediately.
8. Check sweeper daily for hydraulic leaks.
9. **Avoid** sweeping near bystanders or in congested areas eliminating possible injury caused from sweeper brooms throwing debris.
10. If elevator becomes jammed, turn **off** elevator drive motor and **stop** engine before proceeding to clear debris.
11. **Do not** overload sweeper.
12. Whenever a mechanic, operator, inspector or any other person needs to perform work under a raised hopper, **stop** engine and **install both safety props**. **Do not** stand under raised hopper with engine running.
13. **Never** use a hydraulic cylinder or hydraulic mechanical mechanism to lift another object or part.
14. **Never** leave sweeper unattended with engine running and/or ignition key in vehicle.
15. Be certain sweeper is parked in a position allowing hopper to **clear** container before dumping hopper.
16. Be sure sweeper is parked on **level ground** and bystanders are **clear** before dumping hopper.
17. Stay **clear** of electrical power lines and other overhead obstructions to prevent injury or property damage when dumping hopper.
18. **Always** cover battery terminals during maintenance to prevent electrical short.
19. When operating at slow speed or whenever sweeper may cause traffic problems, operate beacon and rear flashers lights.
20. **Never** step on either gutter broom for any reason. Serious injury may result. Use provided step plates located on right front bumper and handle to enter cab.

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Safety Summary

The following safety measures are essential and must be observed when servicing, repairing, or maintaining the Global MX3 Series sweeper.

- JACK STANDS & CHOCKS** - Before jacking the vehicle, or releasing or adjusting the parking brake on a stationary sweeper, **always** chock the wheels. **Always** use safety (jack) stands when using hydraulic jacks or hoists to raise the vehicle. **Do not** rely on either the jack or the hoist to hold the load.
- SAFETY GLASSES** - Safety glasses **must** be worn when using tools such as hammers, chisels, pullers and punches. Always wear safety glasses when working on the hydraulic system.
- WELDING** - Wear welding gloves and goggles when welding or using an acetylene torch. Make sure that a metal shield separates the acetylene and oxygen bottles, both of which must be chained to a cart. **Do not** weld or heat areas near fuel tanks or fuel lines. Utilize proper shielding around hydraulic lines. **CAUTION: Disconnect battery terminals prior to welding.**
- WORK AREA** - Organize your work area and keep it clean. To prevent slips and falls, promptly wipe clean any oil spills. Keep all tools and parts off the floor. After servicing the sweeper, reinstall all safety devices, guards and shields. Before starting the engine or moving the sweeper, check to make sure that all tools and servicing equipment are removed from the engine area.
- CLOTHING & JEWELRY** - Wear close fitting clothing appropriate for the job. Use sturdy work shoes and rough-soled. Bare feet, sandals, or sneakers are **not** acceptable foot wear when adjusting and/or servicing the sweeper. **Do not** wear rings, wrist watches, neck chains, or loose-fitting clothing when working on the engine. Any of these items could catch on moving parts, causing serious injury.
- COMPRESSED AIR** - To avoid serious injury or death, **do not** apply compressed air to any part of the body or clothing. Use only approved air guns that do not exceed 30 psi (**207 kPa**). Always wear safety glasses or goggles. Use proper shield to protect everyone in the work area.
- PRESSURIZED FLUIDS** - Be extremely careful when dealing with fluids under pressure. Fluids under pressure can have enough pressure to penetrate the skin. These fluids can infect a minor cut or opening in the skin. If injured by escaping pressurized fluids, see a doctor at once. Serious infection or reaction can result without immediate medical treatment.

When opening the radiator cap, always remove the coolant pressure control cap slowly, and only when the coolant is at room temperature. A sudden release of pressure from a heated cooling system can result in possible personal injury from the expulsion of hot coolant.

Always use extreme caution while inspecting or working on the pressurized hydraulic systems. **Do not** attempt to look for hydraulic leaks without hand and eye protection. Oil can shoot from a pinhole in a fine jet at a velocity that can penetrate the skin and cause severe injury. **Never** attempt to block the oil flow with your hands or fingers.

Safety Summary

- ❑ **DIESEL FUEL** - Diesel fuel is highly flammable. Take extra precautions to avoid personal injury. **Do not** smoke when fueling the vehicle, or when servicing the engine or the fuel system. Store diesel fuel and other flammable fluids away from fire hazards.
- ❑ **HOT EXHAUST** - Engine produces extremely hot exhaust gases (*over 1200 degrees F*). To prevent the possibility of serious burns, always allow the engine and exhaust system to cool to ambient temperature before working on or servicing the engine or exhaust system. Engine exhaust fumes can cause sickness or death. **Do not** run engine in an enclosed area without exhaust pipe extension.
- ❑ **BATTERIES** - Electrical batteries give off highly explosive and flammable hydrogen gas when charging, and continue to do so for some time after receiving a steady charge. **Do not** smoke or allow an open flame or spark near the batteries - an explosion may result. Prevent battery explosions. Do not charge a frozen battery; it may explode. Warm battery to 16 degrees C (*60 degrees F*). Prevent acid burns. Avoid contact with sulfuric acid in battery electrolyte. Wear proper eye protection and wear rubber gloves when handling battery. Use voltmeter or hydrometer to check battery charge. To avoid the possibility of electrical shock, always remove the battery ground cable before working on the electrical system.
- ❑ **FIRE EXTINGUISHER** - Always keep a charged fire extinguisher within reach while working on or servicing the vehicle. Make sure the extinguisher is the correct type for the situation: a Type A extinguisher is for wood, paper, textiles and rubbish (*as might be found in the sweeper hopper*); a Type B extinguisher is for flammable liquids such as solvents; and a Type C extinguisher is for electrical equipment.
- ❑ **HOPPER & ELEVATOR SAFETY** - A combination of a hydraulic system and an elevatable, heavy hopper present several safety concerns. The following cautions must be taken to avoid personal injury or damage to equipment:
 1. **Do not** raise the hopper unless the sweeper is parked on firm, level ground.
 2. Before raising the hopper, make sure that the vehicle is clear of overhead electrical power lines or other obstructions such as trees.
 3. Make sure that bystanders are well clear of the sweeper before dumping.
 4. Before working beneath a raised hopper, **always** install the safety props on both hopper cylinder rods. The safety props rest on the top edge of the cylinder body, positioned around the cylinder rod to keep the hopper from falling in the event of a hydraulic failure. **Never** position yourself beneath the hopper while installing or removing the safety props.
 5. **Always** stay clear of the running elevator while making adjustments. The moving equipment can easily grab clothing and cause personal injury.



DETAILED



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Definition of Abbreviations

acc	accumulator	min	minimum
adh	adhesive	NC	normally closed
altntr	alternator	neg	negative
amp	ampere	NO	normally opened
appx	appendix	No.	number
a/r	as required	NPT	national pipe threads
assy	assembly	NS	not serviced
auto.	automatic	NSS	not serviced separately
aux	auxiliary	opt	optional
bat.	battery	OD	outside diameter
°C	Celsius	pg	page
CB	circuit breaker	pl	parts list
cc	cubic centimeter	pn	part number
cu ft	cubic foot	pos	positive
cu in.	cubic inch	rd	round
cu m	cubic meter	ref	reference
cyl	cylinder	reqd	required
dB	decibel	res	resistor
DGB	double gutter broom	rev	revision
dia	diameter	RH	right hand
diff	differential	SGB	single gutter broom
elec	electric	SN	serial number
°F	Fahrenheit	soc	socket
FS	Full Suspension	svce	service
ga	gauge	swp	sweeper
gal.	gallon	sym	symbol
GB	gutter broom	temp	temperature
hd	head	tol	tolerance
hp	horse power	trans	transmission
ht	heat treated	vac	vacuum
ID	inside diameter	vol	volume
ign	ignition	w/	with
LH	left hand	w/o	without
max	maximum	warr	warranty



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1

General Information Sweeper Functions

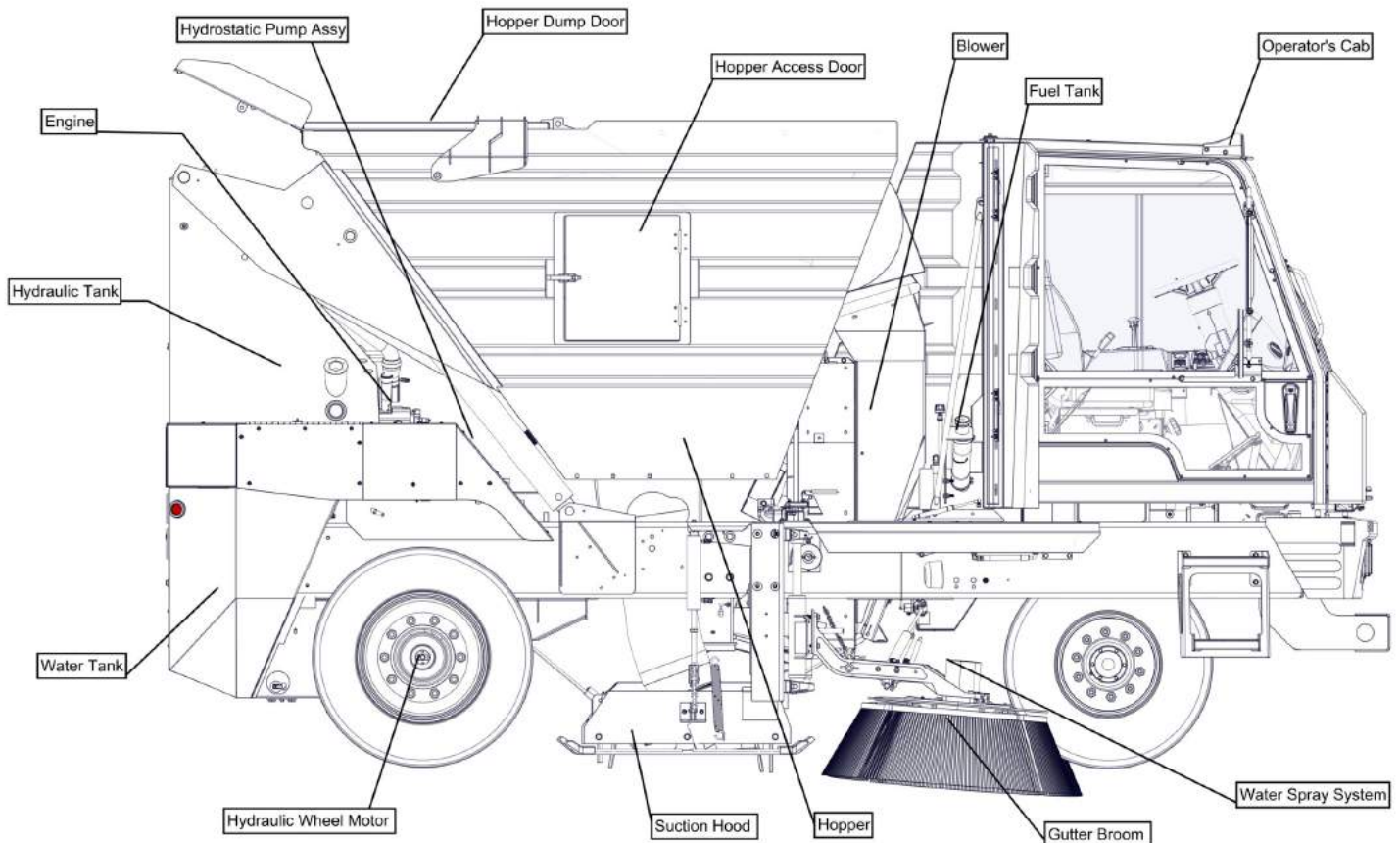


Fig. 1.1 – Major component locations on Global R3Air Street Sweeper.

SWEeper FUNCTIONS

The Global R3Air sweeper is a special purpose three-wheel vehicle built to clean streets, highways, parkways and any other large paved areas.

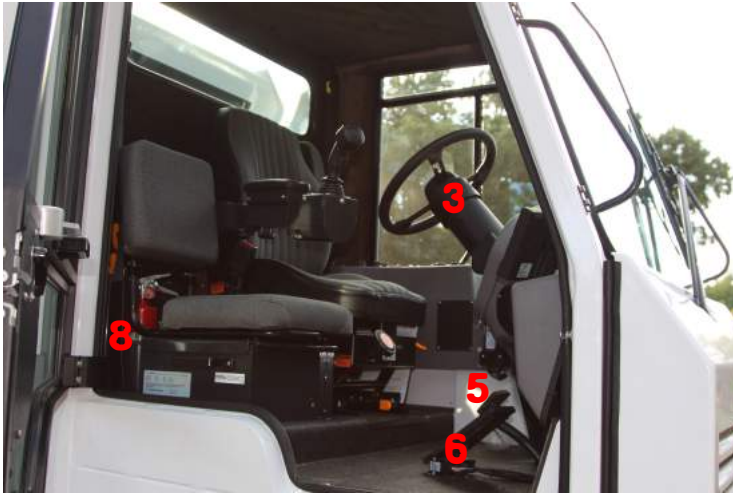
Many various options are available to suit each individual customer's needs. For example, the Global R3Air can be purchased with either a high dump hopper, designed for large containers, or with a low dump hopper. Many other extras can be installed on the machine ranging from various warning gauges to a beacon safety lights.

Engine — A standard Isuzu 172hp Final Tier 4 turbocharged inter-cooled diesel engine powers the R3Air. Def tank is included to meet the Tier 4 Final Emissions.

Hydrostatic Traction — A hydrostatic traction system is used on the Global R3Air in place of a standard automatic transmission (common on most conventional trucks); therefore, engine rpm's are separate from the mile-per-hour speed. This allows engine speed to be set at a high rpm to run sweeping operations while traveling at slow speeds.

Three major components make up the traction system: traction pump, bent axis hydraulic motor, and torque hubs. The traction pump consists of a single variable displacement hydrostatic pump accompanied with a fixed displacement charge pump. A variable displacement bent axis hydraulic motor enables sweeper to either shift in high range or low range which changes torque and mile-per-hour capabilities. Torque hubs are the last link in drive system. Each rear wheel is mounted to its own torque hub which is mounted to the frame. There is no rear axle.

General Information
Sweeper Functions



1. Shift Lever
2. Side Instrument Panel
3. Steering Wheel/Column
4. Front Instrument Panel
5. Brake Pedal
6. Speed Control Go-Pedal
7. Engine Throttle-Idle/Run
8. Water Shut Off Valves

Fig. 1.2 – Controls and indicators located in operators cab.

Auxiliary Hydraulic Drive (Blower) — The blower is driven by a fixed displacement auxiliary hydraulic drive pump. Overall rotation speed of the blower is controlled by engine rpm speed and is fully adjustable.

Auxiliary Hydraulic Drive and Control — A fixed displacement auxiliary drive pump provides hydraulic power to raise and lower brooms, dump and close hopper, open and close hopper door, drive gutter brooms and drive charge air cooler motor.

Separate hydraulic motors drive gutter brooms. Individual hydraulic cylinders adjust the height of right and left gutter brooms to suit specific sweeping conditions. Hydraulic cylinders also raise and lower suction hood. In addition, cylinders dump and lower hopper and hopper door.

Water Spray — A water spray system is designed to control dust created when sweeping. Water sprays in front of each gutter broom. An optional system sprays water in front of each side of the sweeper for extremely dusty

conditions. Also, an optional water flusher system will clean out hopper after dumping.

Water tanks are designed to be filled from a fire hydrant through a single filler hole and water fill strainer. A fire hydrant hose and tools needed to fill water tanks are in tool box above right rear wheel.

Cab Mounted Controls and Indicators — Operator controls and performance indicators are mounted in cab within easy reach and view of operator. A front instrument panel allows operator to monitor gauges and switches dedicated for driving operation. A side instrument panel allows operator to monitor gauges and switches dedicated for sweeping operation.

The throttle is a hand lever that controls engine rpm. The go-pedal (similar to a gas pedal in a conventional truck) controls sweeper speed and rpm simultaneously. A built-in hydraulic braking system activates when go-pedal is fully released. A standard mechanical brake pedal activates wheel brakes. Parking brake automatically engages when high/low/reverse gear shifter is in park.

General Information
Sweeper Functions

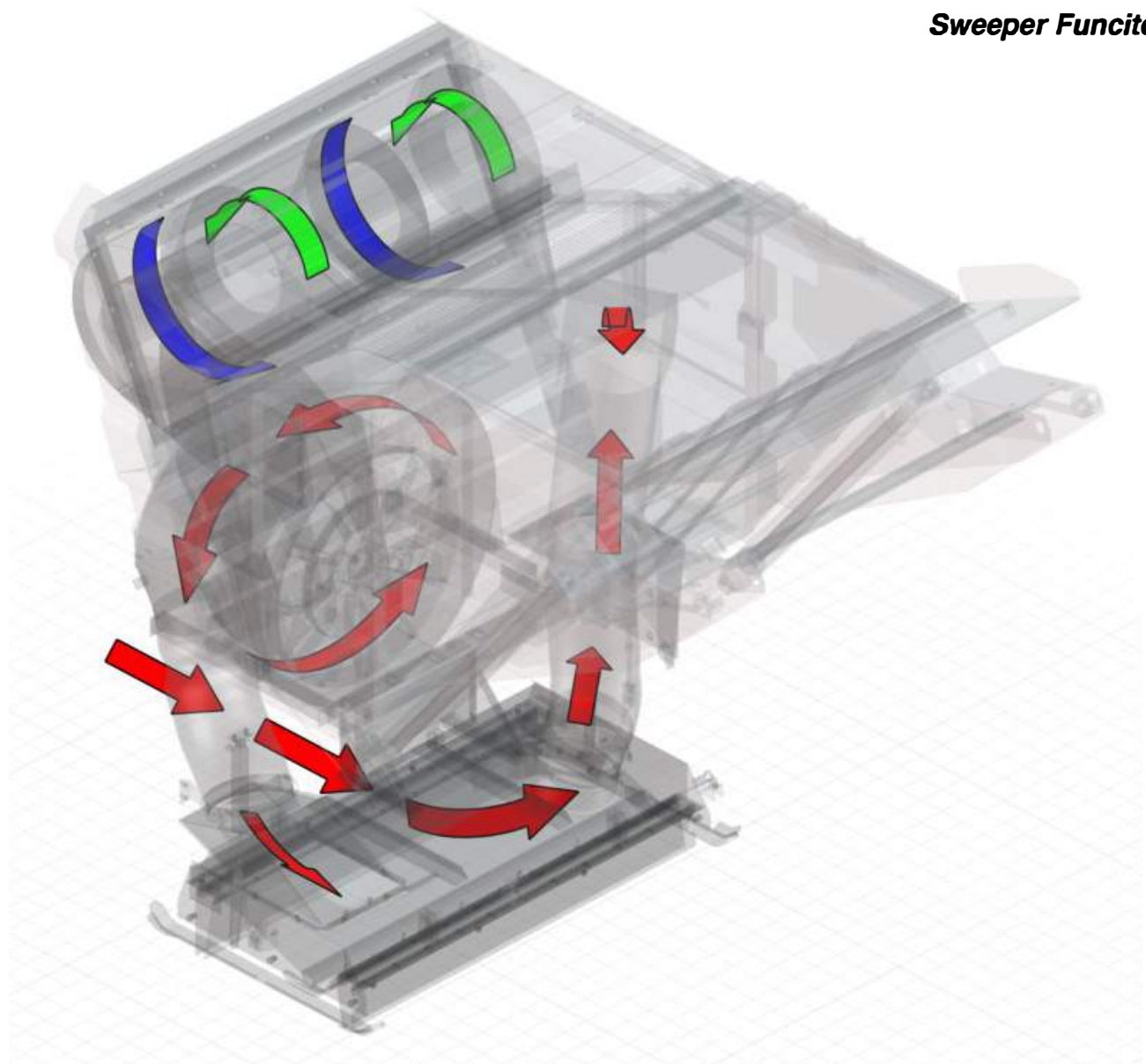


Fig. 1.3 – Flow of the recirculating air is powered by the blower through the pressure nozzle to loosen debris from the street. Then the debris travels up the suction tube, through the dust separator and into the hopper. Debris is removed from the air by the screens and dust separator before it returns to the blower.

Blower — The R3Air sweeping system uses air to perform sweeping and loading functions. The blower impeller is a hydraulically driven centrifugal type that creates negative pressure to load material into the hopper and positive pressure to lift debris off the street.

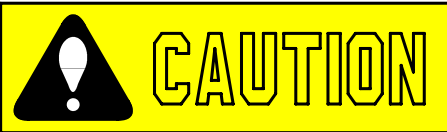
The adjustable vacuum regulator door is used to control the air pressure balance in the sweeping system. An open

regulator door decreases nozzle pressure and increases suction inside the hood.

Flow of the recirculating air is powered by the blower through the pressure nozzle to loosen debris from the street. Then the debris travels up the suction tube, through the dust separator and into the hopper. Debris is removed from the air by the screens and dust separator before it returns to the blower.

General Information
Cab Controls & Indicators

Table 1.1
Cab Mounted Controls and Indicators
(refer to Fig. 1.2)

Index No.	Description	Function/Indication
1.	Shift Lever	Allows selection of two forward speeds, reverse and park (similar to an automatic transmission shifter in a conventional truck).
	(a) HI Position	Selects high ratio of hydrostatic system. Sweeper travels forward at speeds up to up to 23 mph.
	(b) LO Position	Selects low ratio of hydrostatic system to provide greater torque to rear wheels. Sweeper travels forward at speeds up to 7 mph.
	(c) P Position	Position shift lever in park position to start engine. Emergency brake is automatically activated when shift lever is in park position. Allows sweeper to move in reverse.
		DO NOT shift into R position while sweeper is moving. Damage to hydrostatic traction system may result.
2	Side Instrument Panel	Allows operator to adjust and monitor sweeping operations. Refer to Fig. 1.4 and Table 1.3 for a detailed explanation of gauges and controls.
3.	Steering Wheel/Column	Besides performing standard turning applications, steering wheel tilts for operator comfort and easy access in and out of cab. Refer to Fig. 1.5 and Table 1.4 for detailed explanation of steering wheel/column functions.
4.	Front Instrument Panel	Allows operator to monitor driving and engine performance. Refer to Fig. 1.3 and Table 1.2 for detailed explanation of front instrument panel.
5.	Foot Brake Pedal	Foot brake pedal applies wheel brakes simultaneously when activated.
6.	Go-Pedal	Controls sweeper speed and engine rpm simultaneously (similar to a gas pedal in a conventional truck). Hydrostatic braking occurs when go-pedal is released.
7.	Engine RPM and BLOWER FAN SPEED SELECTOR	Used to adjust engine rpm and Blower Speed. Both are sent simultaneously. 1750 is Utilized for Light sweeping Debris such as leaves. 1875 is utilized to standard sweeping. 2000 RPM setting is for Heavy Sweeping such as sand. Fan Speed will adjust with Engine RPM Setting.

(continued)

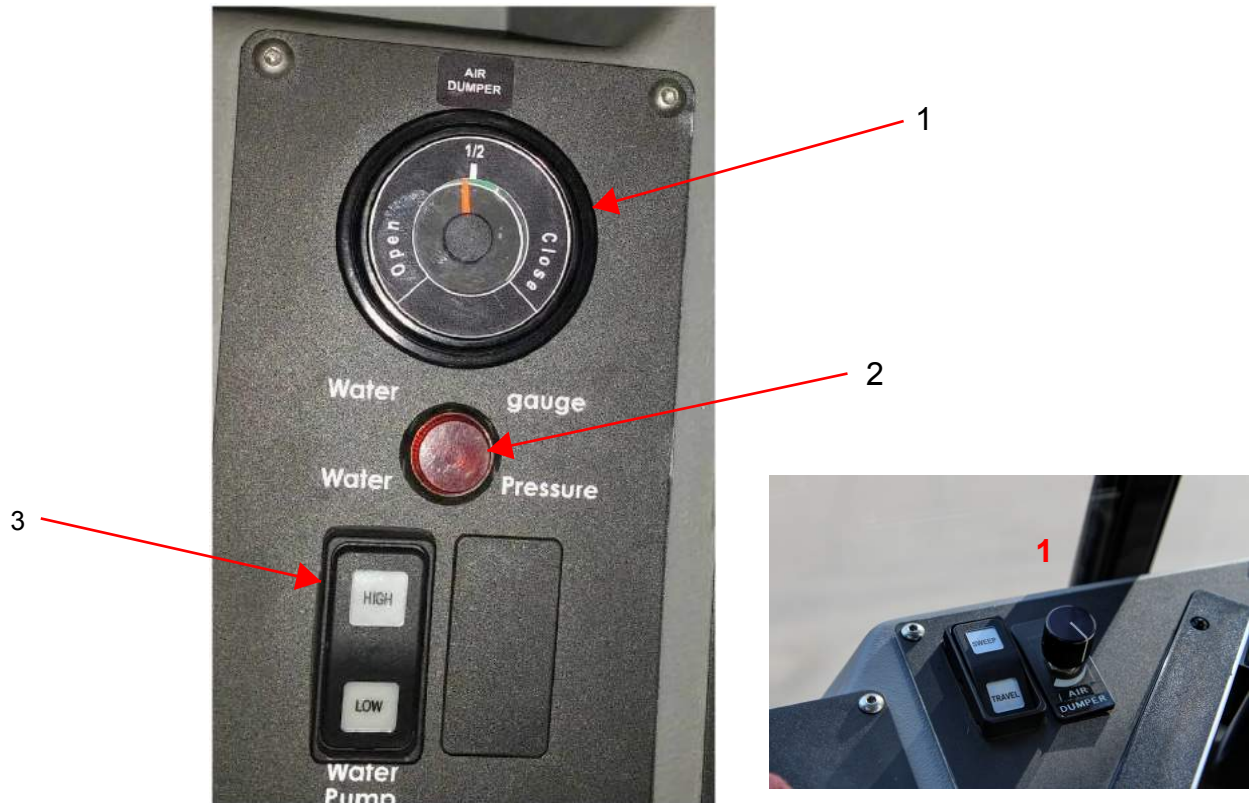
**General Information
Cab Controls & Indicators**

**Table 1.1 (continued)
Cab Mounted Controls and Indicators
(refer to Fig. 1.2)**

Index No.	Description	Function/Indication
8.	Water Valves	Valves control overall water flow to spray

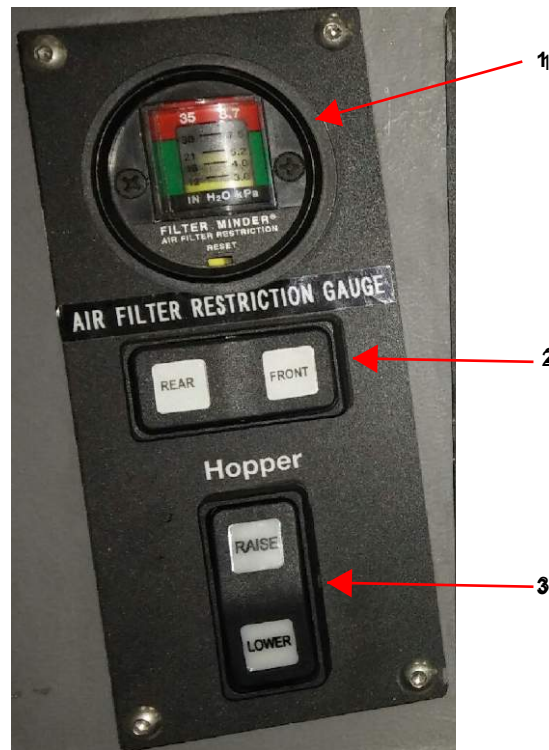
		<i>(not shown)</i>
9.	Fire Extinguisher (optl)	Located left of seat to enable access from inside cab or from outside through left window.
10.	Sun Visor	Sun Visors are located inside cab near top of front windshield. Visors independently rotate down and swing to the side helping to block sun reflections from all directions.

Notes



Rear Side Control Panel

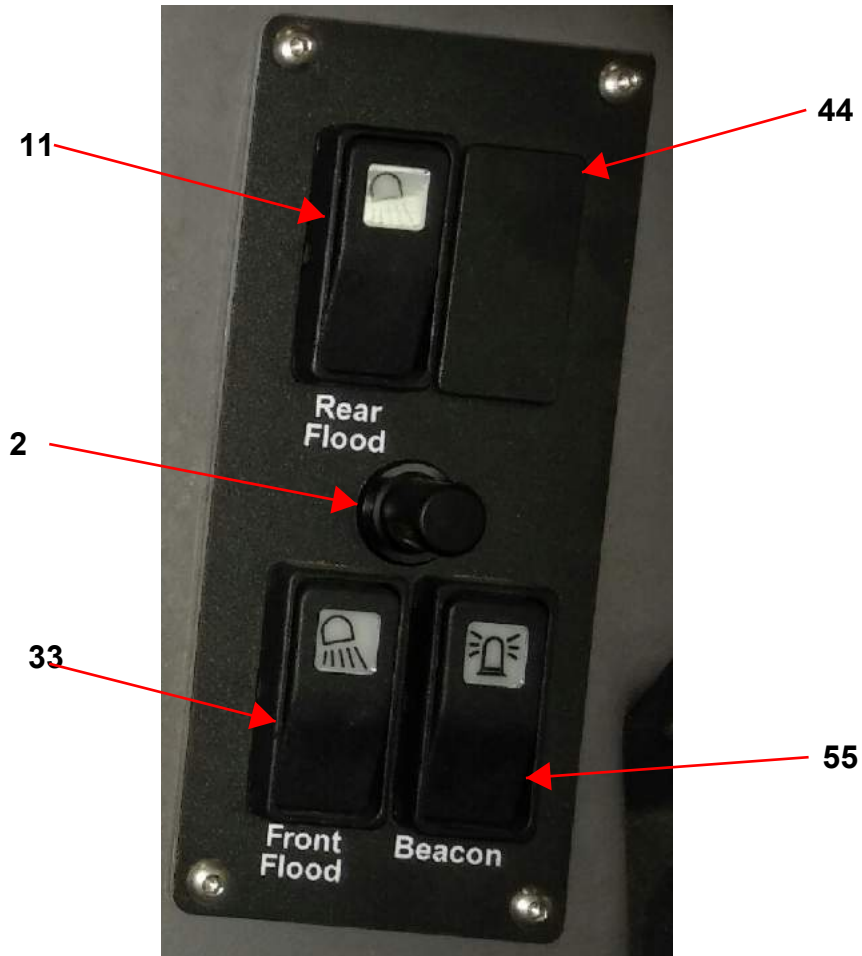
Index No.	Description	Function/Indication
1.	Vacuum Air Bleeder Gauge	Air Bleeder Valve allows for air to escape through the sweeper hood. With the Air Valve completed Open, the Air is exhausted allowing highest amount of suction while sweeping.
2.	Low Water Light	When Low Water Light is On (RED), the sweeping Water System is low on Water. Must hook up to Water Hydrant and Re-fill Water Tanks. Never sweeper without water as damage to Fan and Fan Housing may occur.
3.	Water PUmp Off/Low/High.	Turns on Sweeper Water System. Low means 3.5 GPM and High Means 7GPM.



-
1. Air Filter Restriction Gauge. 2
 2. Optional Remote Hopper Raise/Lower Switch
 3. Hopper raise/Lower Switch.
-

Hopper Control Panel

Index No.	Description	Function/Indication
1.	Air Filter Restriction Gauge.	Indicates the restriction of the air flow from the air filter to the engine, caused by the accumulation of dirt on the air filter. If the gauge indicator is in the red (above 30 In or 7.5 kPa) replace the air filter.
2.	External Hopper Function(option)	When Selected to Front, Hopper/Raise Lower Switch operates from within the Cab/ When Selector to REAR, Hopper Raise Lower Switch operates from Right, Rear Fender.
3.	Hopper raise/Lower Switch.	Raises hopper to dump position. Lower switch selection lowers hopper to sweeping and driving position.



-
1. Rear Flood Light On/Off Switch.
 2. Dash Illuminating light.
 3. Front Flood Light On/Off Switch.
 4. Additional Option for Switch
 5. Beacon light On/Off Switch.
-


Light Switch Option Control Panel

Index No.	Description	Function/Indication
1.	Rear Flood Light On/Off Switch.	Activates rear floodlights to illuminate rear.
2.	Illuminating light.	Illuminates dash panel.
3.	Front Flood Light On/Off Switch.	Activates front floodlights to illuminate front.
4.	Additional Slot for Optional Equipment	
5.	Beacon light On/Off Switch.	Activates Beacon light.



1. Auxiliary Shutdown Alarm (Option)
2. Not Used
3. Heat Temperature Control
4. Fan Switch
5. Air Circulation Control
6. AC ON/OFF Switch

Auxiliary Shutdown Alarm Option & Air Conditioner Control Panel

Index No.	Description	Function/Indication
1.	Aux. Shutdown Alarm (Opt.)	Audible alarm sounds when either the engine oil pressure is below 8 Psi, or the coolant temperature is above 238° F.
		If the ENGINE OIL PRESSURE goes below 8 Psi (55 kPa) or the ENGINE COOLANT TEMPERATURE rises above 238° F (114° C), the engine will shut down automatically .
2.	Not Used	N/A
3.	Heat Temperature Control	Selects desired hot temperature of cab air by directing hot water through heater.
4.	Fan Switch	Turns heater/air conditioner fan On or Off and selects desired fan speed (<i>Low, Medium, High</i>).
5.	Air Circulation Control	Selection controls fresh air or recirculating air.
6.	AC On/Off Switch	Turns On/Off Air Conditioner.

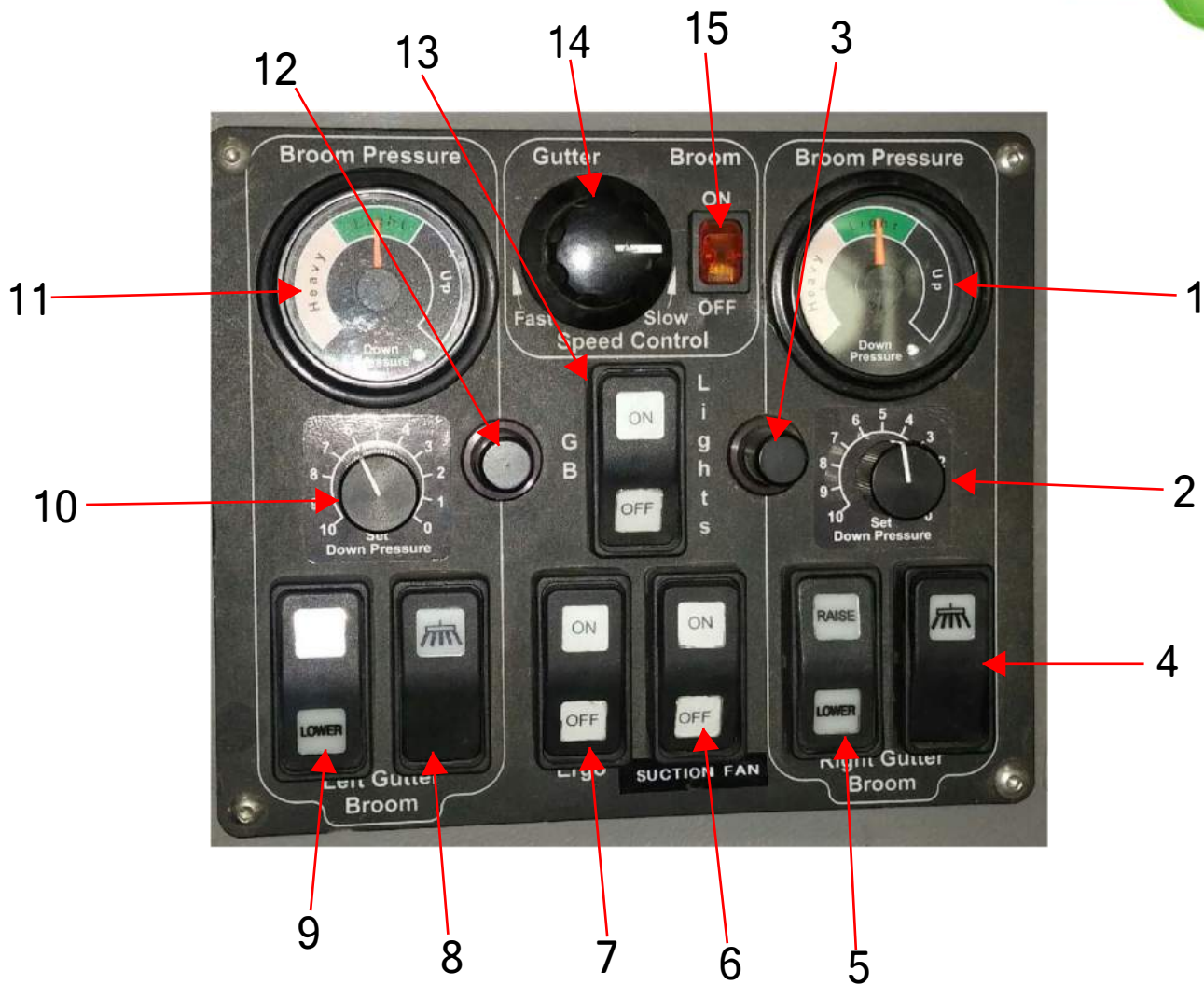





Table 1.6 Elevator/ Broom Control Panel

- 1- RH Gutter Broom Pressure Gauge.
- 2- RH Gutter Broom Pressure Adjustment.
- 3- Panel Illuminating lights
- 4- RH Gutter Broom Drive Switch.
- 5- RH Gutter Broom Raise/ Lower Switch.
- 6- Suction Fan On/Off Switch.
- 7- Ergo On/Off Switch.
- 8- LH Gutter Broom Drive Switch.
- 9- LH Gutter Broom Raise/ Lower Switch.
- 10- LH Gutter Broom Pressure Adjustment.
- 11- LH Gutter Broom Pressure Gauge.
- 12- Panel Illuminating lights.
- 13- Gutter Broom Lights.
- 14- Gutter Broom Speed control.
- 15- Gutter Broom Speed Control ON/OFF switch.

Control Panel

Index No.	Description	Function / Indication
1.	RH Gutter Broom Pressure Gauge	Indicates the down pressure of the right hand side gutter broom.
		DO NOT use the gutter broom as a step to climb onto the sweeper. Personal injury may occur.
2.	RH Gutter Broom Pressure Adjustment	Increases or decreases the right hand side gutter broom pressure.
3.	Dash Light	Illuminates switches and gauges.
4.	RH Gutter Broom Drive Switch	Drives the right hand gutter broom and turns on the flood-light.
		Stay clear of a rotating gutter broom. Personal injury may occur.
5.	RH Gutter Broom Raise/Lower Switch	Raises or lower the right hand gutter broom to the desired adjustment.
6.	Suction Fan Switch	First, Lowers the Pick Up Hood, then it Starts the Fan. <i>Must be In Sweep Mode to Proceed.</i>
7.	ERGO SWITCH On/Off Switch	Raises or lowers all selected present functions such as gutterbrooms. Will activate water pumps when selected.
8.	LH Gutter Broom Drive Switch	Drives the left hand gutter broom and turns on the flood-light.
		Stay clear of a rotating gutter broom. Personal injury may occur.
9.	LH Gutter Broom Raise/Lower Switch	Raises or lower the left hand gutter broom to the desired adjustment.
10.	LH Gutter Broom Pressure Adjustment	Increases or decreases the left hand side gutter broom pressure.
11.	LH Gutter Broom Pressure Gauge	Indicates the down pressure of the left hand side gutter broom.
12.	Dash Light	Illuminates switches and gauges.
13.	Gutter Broom Lights On/Off Switch	Illuminates Gutter broom lights.
14.	Gutter Broom Speed Control.	Controls the Gutter Broom rotational speed.
15.	Gutter Broom Speed Control On/Off Switch.	Activates Gutter Broom Speed control.



- 1. Def Tank Monitor and FAULT CODE READER
- 2. Fan Speed (RPM)



Index No.	Description	Function/Indication
1.	Def Tank Monitor.	Monitors Def Level & Temperature. <i>(If Engine Fault code DTC is present. Every 45 seconds it will show DTC for a few seconds and return to Def level & Def temperature screen).</i>
2.	Illuminating light.	Illuminates dash panel.

General Information
Notes

1. Turn Signal
2. Tilt Steering Wheel Lever
3. Horn Pad/Telescope
4. Hazard Warning Flasher



– Controls located on steering wheel and column

Table 1.4
Left Steering Column Controls
(refer to Fig. 1.5)

Index No.	Description	Function/Indication
1.	Turn Signal/High Beam (a) Turn Signal (b) Lane Change (c) High/Low Beam	Used for the following applications: Click lever forward to signal right turn. Click lever backward to indicate left turn. Green light will flash indicating turn signal. When turn is completed, lever automatically returns to neutral position and signal stops. Without clicking, hold lever part way forward or backward (first stop) until lane change is completed. With headlights on, click lever up toward operator. Lights change from low beam to high beam, or from high beam back to low beam. When high beams are on, the blue dash light illuminates.
2.	Tilt Steering Wheel	Pull lever up towards operator to adjust steering wheel to desired driving position.
3.	Horn Pad/Telescope	Press firmly on horn pad to activate horn. Rotate horn pad assembly to adjust telescope height of steering wheel.
4.		Push to cause right and left turn signal lights to flash during emergency stops or any time sweeper becomes a traffic hazard. <input type="checkbox"/>

CHAPTER 2

Operation

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2



2

Operation Preliminary Checks

PRELIMINARY CHECKS

1.	Engine Oil	✓
2.	Hydraulic Oil	✓
3.	Brake Fluid	✓
4.	Engine Coolant	✓
5.	Coolant and Oil Leaks	✓
6.	Radiator and Oil Cooler	✓
7.	Belts	✓
8.	Air Cleaner Service Indicator	✓
9.	Fuel Level	✓
10.	Tires	✓
11.	Lights	✓
12.	Water Spray Level	✓
13.	Service and Lubrication	✓

Perform preliminary maintenance checks on a daily basis. These checks aid in trouble-free operation by reducing wear and mechanical failure.

- 1. Engine Oil** — Check engine oil level. Remove dipstick, wipe clean and re-insert into engine. Then remove dipstick and check oil level by observing gradient lines. Oil level should indicate between *Add* and *Full* marks. If necessary, add oil by removing oil filler cap (refer to Engine Oil Viscosity, Chart 4.4). **Never over fill engine with oil.**

NOTE: When inserting, ensure that dipstick is fully seated by pushing it all the way down to get a proper oil level reading and prevent contamination from entering engine.

- 2. Hydraulic Oil** — Check oil in each hydraulic tank at sight gauges located on outside of hopper towers. With engine turned off add hydraulic oil as required (Mobil DTE 15).



Do not add hydraulic oil while engine and exhaust are hot.

- 3. Brake Fluid** — Check brake fluid level in master cylinder. Fluid level should indicate between *Add* and *Full* marks. If necessary, add fluid by removing filler cap (refer to Brake Fluid Type, Chart 4.4).
- 4. Engine Coolant** — Check engine coolant level at deaeration tank sight gauge. If liquid is not visible in sight gauge, wait for radiator to cool, remove filler cap and add coolant as required (refer to Engine Coolant Mixture, Chart 4.2).



Never remove deaeration tank cap or any radiator hose when engine coolant is hot.

Fig. 2.1 –

Engine coolant is filled through deaeration tank accessed from behind access door.

Check coolant level through deaeration tank sight gauge.



Fig. 2.1 –

Operation Starting Engine

5. **Coolant and Oil Leaks**— Visually check for engine coolant, hydraulic oil and engine oil leaks. Repair or replace parts, seals and hoses as required.



Do not attempt to check for hydraulic oil leaks without hand and eye protection. Oil under pressure can penetrate skin and cause severe injury.

6. **Radiator and Oil Cooler**— Inspect radiator and oil cooler for damage, leaking weldments and clogged fins. Repair all leaks and clean clogged fins. Check mounting screws for proper tightness.
7. **Belts**— Check all engine driven belts (commonly referred as fan belts) for wear and tension. Belts should reflect 1/2 inch free play when a force of 12 pounds is applied between pulleys. Adjust belt tension as required. Replace worn belts.
8. **Air Cleaner Service Indicator**— With engine running, check air cleaner service indicator located on inside of right hydraulic tank. Clean or replace air cleaner filter element before yellow indicator spool reaches red line. Reset indicator after servicing air cleaner.

NOTE: Frequent air cleaner and dust cap cleaning is necessary when sweeping under severe conditions.

9. **Fuel Level**— Turn ignition key to driving position and observe fuel gauge. Add fuel as required (refer to Diesel Fuel, Chart 4.1).
10. **Tires**— Check tires for correct inflation pressure and add air as required: Front=130 psi (*Goodyear 11R17.5*), Rear=115 psi (*Goodyear 11R22.5*). Perform inflation checks when tires are cool. Visually inspect tires for damage or wear and replace as required.
11. **Lights**— Pull headlight switch to first position. All running lights and panel lights should illuminate. Pull headlight switch to second position. Check that both high and low beam headlights also illuminate. Check beacon (option) and signal lights also. If lights do not operate properly, return headlight switch to off position and replace burned out bulbs and/or repair damaged wiring.
12. **Water Spray Level**— Check water spray level. Add water as required (refer to Fill Water Tank procedure in this chapter).



Fig. 2.2 – Air cleaner service indicator is mounted on inside wall Air Filter Canister or inside the cab.

13. **Service and Lubrication**— Perform all daily service and lubrication functions (refer to Daily Maintenance Procedures—Table 4.1 and Daily Maintenance Guide).

STARTING ENGINE

Enter cab from front–right side of sweeper. Step plates and a handle are provided. **Do not** step on right gutter broom to enter cab.



Never step on gutter broom, injury may result.

Normal start

Normal starting procedure will fire up engine in most conditions. If outside temperature measures below 40° F (5° C), refer to Cold Start procedure.

Operation Driving



Fig. 2.3 – Each hydraulic fluid tank is equipped with a filler cap and sight gauge.

1. Place shift lever in *Park*.
2. Push engine throttle approximately 1/4 from *Idle* toward *Run*.
3. Turn ignition key switch to start position.



Do not run starter motor more than 30 seconds at a time. Allow starter motor to cool at least 3 minutes between starting attempts to avoid heat damage to starter motor.

4. As soon as engine fires, release ignition key switch allowing it to automatically return to run position. Engine alarm will sound until oil pressure is 10 psi. If alarm continues, stop engine and check engine oil level. If engine oil is at proper level and alarm contin-

ues to sound when engine is running, notify a qualified mechanic to troubleshoot oil pressure and/or electrical system.

5. Engine oil pressure gauge should read 20 psi within 30 seconds. If oil pressure is low, immediately turn ignition key to *Off* position. Notify a qualified mechanic to determine and correct cause of low oil pressure.
6. Allow engine and hydraulic pumps to warm up for a few minutes before driving sweeper or performing any hydraulic operations.

Cold Start

Cold start option will aid in starting procedure when outside temperature measures below 40° F (5° C). Tune key to run position and pause until Wait Light is illuminated. Then proceed to use Cold Start push button switch when cranking engine. Follow normal start procedures.

NOTE: Use proper diesel fuel in cold weather (refer to Diesel Fuel, Chart 4.1).

DRIVING SWEEPER

Follow safety related operating suggestions discussed throughout manual. When sweeping public streets follow local and state highway laws.

Normal Driving

1. Adjust rear view mirrors, seat (refer to Table 2.1) and steering wheel (tilt and height) to suit individual operator comfort.
2. Fasten seat belt.
3. Start and warm up engine. Refer to Starting Engine procedure. Set engine throttle at 1500 rpm minimum.

NOTE: Gutter brooms, blower and suction hood should be off and in fully raised position for normal driving conditions.

4. Hold hopper switch in *Close* position making sure hopper is down. Transmission will not shift into a drive gear with hopper up (even slightly).

NOTE: Whenever sweeper is traveling at slow speeds, pull On beacon (option) and rear flasher switches as a safety precaution.

5. Position engine throttle to *Idle*. There are two forward speed settings available (refer to Table 1.1). Position shift lever in *High* to reach a maximum speed of 23 mph.

Operation Starting

**Table 2.1
Seat Adjustments**

For safety and operator comfort, drivers seat is fully adjustable: weight, height, fore and aft. Perform seat adjustments **prior** to driving sweeper. **Always wear your seat belt.**

- **Weight/Ride Adjustment**—With no weight on seat, set desired weight adjustment. Turn knob clockwise to stiffen bounce and counterclockwise to soften bounce.

***NOTE:** Weight/Ride adjustment can be made while sitting on seat but knob is hard to turn.*

- **Height Adjustment**—Height of seat is adjustable to four levels. To raise, pull lever and lift seat until it automatically engages in next highest position.

To lower seat, pull lever and let weight of operators body push seat down to next level.

***NOTE:** Always adjust Tether Belt after changing seat height.*

- **Fore and Aft Adjustment**—Pull up on seat fore and aft adjustment bar and slide seat to desired position. The operator must be able to comfortably reach all cab controls.

- **Arm Rests**—Armrests may be positioned up or down. In up setting, armrests are flush with seat backing.

- **Seat Belt Adjustment**—Seat belt is a common lift type release without a shoulder harness. Adjust belt by pulling extra strap material through buckle.

- **Tether Belt Adjustment**—Tether belt is a safety device which allows seat to travel up a maximum

distance. Adjust belt by pulling extra strap material through buckle.

***NOTE:** Adjust tether strap tight enough to eliminate chance of operator from hitting roof of cab during a rough ride.*



Do not shift into PARK while sweeper is in motion.

6. Step on go-pedal and hold foot steady. Observe speed recorded by speedometer located on front instrument panel.
7. When reducing vehicle speed, slowly remove pressure from go-pedal.



When go-pedal is fully released, hydraulic drive system automatically applies hydrostatic braking.

Wheel braking is applied by stepping on brake pedal.

Operation Parking

8. To drive in reverse, position shift lever in *Reverse* and step on go-pedal. When backing up sweeper, a warning alarm sounds and back-up lights illuminate cautioning bystanders to stay clear.

NOTE: In a safe area designed specifically for training, first time operators should practice driving, turning, acceleration, stopping and familiarizing themselves with the Global Street Sweeper.

PARKING SWEEPER

Only park sweeper in an area designated for large vehicles. Abide by all local and state highway laws. It is important to follow specific parking procedures which include lifting all brooms to their up position.

1. Bring vehicle to a complete stop in a safe parking area. Place shift lever in *Par* , automatically activating parking brake.
2. Gutter brooms, blower and suction hood should be off and in fully raised position while sweeper is parked.



Damage may occur to bristles if sweeper is parked with brooms down.

- a. Turn off gutter broom drive/light switches and turn off blower switch.
- b. Raise each gutter broom by holding switch in *Up* position until broom pressure gauge indicates fully raised.
- c. Raise suction hood by holding suction hood switch in *Up* position for approximately five seconds until relief valve activates.

3. Position engine throttle to *Idle* and wait 30 seconds. Turn ignition switch off and remove key.
4. Turn off all switches including headlights, floodlights, beacon and rear flashers. Shut water spray valve.
5. Always use provided steps plates to exit cab. **Do not** step on right gutter broom to exit cab.



Never step on gutter broom, injury may result.

SWEEPING

For most conditions the V3000 SP sweeps best when engine rpm is at 2100 and machine traveling 3 to 7 mph. Only experienced drivers should sweep streets and highways. Follow safety related operating suggestions discussed throughout manual. When sweeping public streets follow local and state highway laws.

Preliminary Procedures

1. Check suction hood and suction hood flaps at start of each operators work shift. Suction hood and flap adjustments are made in shop area by experienced mechanics (refer to Adjustments, Chap 3).
2. Adjust gutter broom pattern at sweeping site to suit specific sweeping conditions (refer to Adjustments, Chap 3).

NOTE: Careful attention to gutter broom pattern and arm angle will aid in maximum sweeping efficiency.

Fill Water Tank

Fill water tanks from a local fire hydrant. All tools required to fill tanks are supplied in right rear fender tool box.



Fig. 2.4 – Fire hydrant filler hose and related tools are located in right rear fender tool box.

Operation Sweeping

1. Close water system valves in cab.
2. Using fire hydrant tool provided, remove hydrant cap. Run water through hydrant flushing out dirt and other foreign objects. Do not fill sweeper water system with contaminated water.
3. With hydrant valve off, unroll filler hose from tool box and connect to hydrant.
4. Slowly open hydrant valve and fill water tank until it overflows.



Stand clear from hydrant hose when filling tanks. A high volume of water travels through hose under high pressure.

5. Slowly close hydrant valve.
6. Disconnect filler hose from hydrant and replace hydrant cap. Drain excess water out of hose. Stow filler hose and hydrant wrench in tool box.

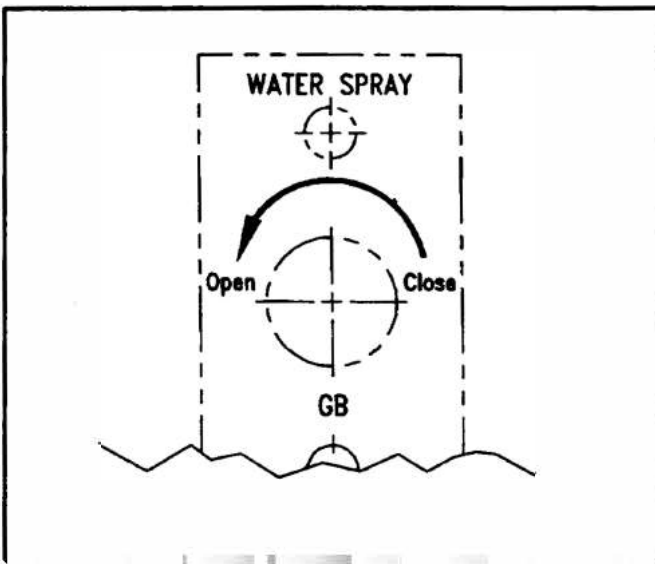


Fig. 2.5 – Water spray control valves for each gutter broom is located, inside the Cab, behind the jump seat. Turn valves counterclockwise to open and clockwise to close.

Standard Water Spray System

The application of water spray in appropriate areas of sweeping is important for efficient sweeper function and durability. Dampening of debris will actually minimized abrasive wear on componentry and improve performance.

Water spray requirements vary widely in direct relationship to sweeping speed, sweeping conditions, type of debris and volume of debris swept. Therefore, it is impractical to attempt to lay down firm direction for water spray volume to be utilized. The recommendations throughout this procedure can only be accurately determined by the sweeper operator when confronting actual sweeping conditions. Refer to the following procedure to help set water spray requirements.

1. Check water spray level. Fill water tanks if required.
2. Check water spray nozzle jets for obstruction. Clean, repair or replace clogged nozzles.
3. From inside cab, adjust standard variable flow valves to provide sufficient water required for dampening debris in front of gutter broom (refer to chart 2.2 for general recommendations).

Extremely Dusty Water Spray System

To enable the operator full adjustment of the water spray system, two additional valves control the flow of water to left and right fronts of the sweeper. These two valves are also located inside the cab.

Only open the extremely dusty water spray valves when required. During normal sweep conditions, close the extremely dusty water spray valves (refer to table 2.2). If too much water sprays in front of the sweeper during normal sweep conditions, mud cakes up and oozes out of the sweep system.

NOTE: When all four water spray valves are open, a tremendous amount of water is used causing the water tanks to empty rapidly.

Operation
Sweeping

Sweeping Procedures

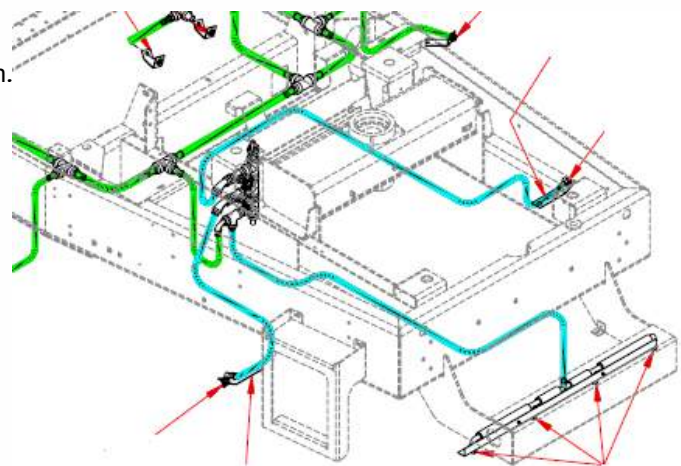
1. If using right gutter broom, open water spray valve, located behind the training seat.

NOTE: Turn off opposite gutter broom water spray valve, unless both brooms are being used.

2. If using left gutter broom, open water spray valve located behind the seat. Select Water to Low
3. Open water shut-off valves located in cab.
4. Select Sweep Mode and set Engine Speed to 1875rpm.
5. Select each gutter broom switch to **On**. Adjust pressure on gutter broom for specific sweeping conditions.
6. Select Suction Fan to ON.
7. TURN ON ERGO SWITCH.
8. Gutterbrooms shall lower along with the hood, fan will start automatically and RPM will adjust.

NOTE: When sweeper is operating at slow speeds in traffic, pull On beacon (option) and rear flasher switches.

9. Position engine throttle to appropriate engine speed for sweeping conditions (1875 rpm is recommended).
10. Press go-pedal for appropriate sweeper ground speed to suit sweeping conditions.



Avoid sweeping near bystanders or in congested areas. Debris thrown from sweeper brooms may cause injury.

Fig. 2.6 – Additional water spray valves are for extremely dusty sweep conditions. Individual shut-off valves are located in cab. Turn valves counterclock wise to open and cloc wise to close.

Table 2.2
Water Spray Settings

Water spray mist dampens debris as it is swept. Dampening of debris will actually minimize abrasive wear on componentry and improve performance. The following recommendations for water spray settings can only be accurately determined by the sweeper operator when confronting sweeping conditions.	
● Dust cloud created by sweep system.	Increase standard cab valve openings to enhance water flow to Gutter Broom spray nozzles.
● Extreme dust cloud created by sweep system.	Increase heavy duty cab valve openings to enhance water flow to left & right front spray nozzles.
● Mud cakes up and oozes out of sweep system.	Decrease cab valve openings to reduce water flow to spray nozzles.
● No evidence of dust cloud or muddy debris.	Adequate water flow to spray nozzles.

Operation

Dumping

NOTE: Observe all local and state traffic laws during sweeper operation. Follow good safety procedures (refer to Operating Safety Advice, Table 2.1).

11. Continuously observe gauges on front and side instrument panels. Stop sweeping if any sign of trouble is indicated.
12. Occasionally look in rear view mirror and observe sweeping area. If area is not being swept clean, sweeping system is not operating properly. Stop sweeper and determine problem.
13. Hopper full alarm (option) activates when hopper reaches full capacity. Stop sweeper and position shift lever to *Park* setting parking brake.
14. Close water shutoff valves.
15. Select Sweeper to TRAVEL MODE.
 - a. Select Ergo Switch to OFF.
 - b. All Functions will stop and will Raise Automatically.
 - c. Water System will stop working when selecting the ERGO Switch.
16. Throttle will go down to IDLE when in TRAVEL Mode

DUMPING

1. Park sweeper in position so hopper clears any overhead obstructions such as trees, buildings or power lines. If dumping into a container, truck or dumpster, make sure hopper lip clears.



Do not raise hopper unless sweeper is parked on firm, level ground.

Stay clear of electrical power lines and other overhead obstructions.

Be sure bystanders are clear from sweeper before dumping.

2. With engine running at Idle (Travel Mode) and shifter in *Park*, hold hopper switch in *Dump* position until hopper is fully raised. Alarm sounds while dumping. Observe hopper operation through cab rear window.
3. Once hopper is empty, hold hopper switch in *Close* position until hopper is in fully lowered.

TOWING SWEEPER

Do not tow sweeper without following instructions. Strict procedures must be performed before towing to alleviate further damage to inoperable sweeper.

Rear Towing



Do Not tow sweeper from rear. Serious damage may occur.

NOTE: An alternative to towing is, load sweeper onto a flat bed truck or trailer to be transported.

Front Towing



Chock wheels before preparing sweeper for towing.

First disengage rear wheel torque hubs, then release parking brake before towing R3Air.

1. Chock rear wheels.
2. Disengage left and right rear wheel torque hubs.
 - a. Remove two holes securing tow plate to center of torque hub.

NOTE: Tow plate is a 1/2" by 3" diameter part with a dimple sticking out from the center of one side.

- b. Turn tow plate over and install on torque hub with round dimple facing toward the middle of sweeper.

Operation
Towing

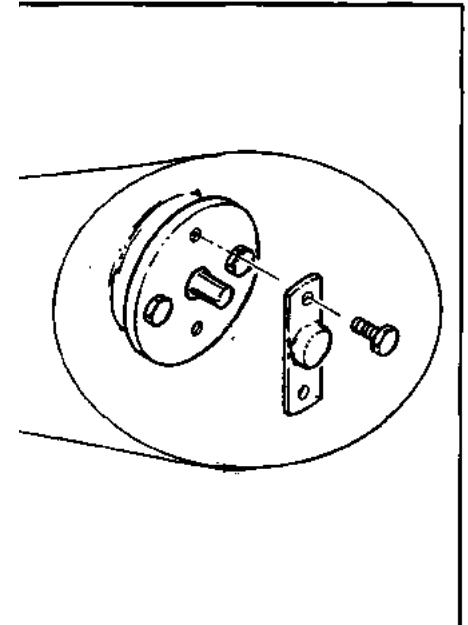


Fig. 2.7 – Each rear wheel torque hub must be disengaged before sweeper can be towed. Remove towing plate and remount with dimple facing inward disengaging torque hub.

- c. Install and tighten two bolts securing tow plate to torque hub. Dimple will force torque hub to disengage when bolts are tight.

NOTE: Rear wheel may need to be slightly rotated to properly engage torque hub plate.

3. Hitch front end of sweeper to towing vehicle (use rigid tow hitch).
4. Remove parking brake release hair pen from linkage screw. Remove gutter broom angle adjustment tool from storage chain.
5. Disengage parking brake by using gutter broom tool to mechanically screw parking brake turnbuckle counterclockwise (relative to brake canister) until spring is compressed.

NOTE: On old sweepers, pressurize actuator canister with air and remove clevis pin from large parking brake clevis and equalizer plate.

6. With front end of sweeper hitched to towing vehicle, raise front wheel off the ground.
7. Ensure rear wheels spin freely with torque hubs and parking brake disengaged.
8. Remove wheel chocks.

Chock wheels before unhitching sweeper from tow vehicle.

First engage parking brake, then engage rear wheel torque hubs towing Global R3AIR.



Do not tow sweeper over 20 mph. Use extreme caution.

Use proper tow-vehicle lighting. Observe local towing regulations.

Unhitch Sweeper From Towing Vehicle

Operation
Towing

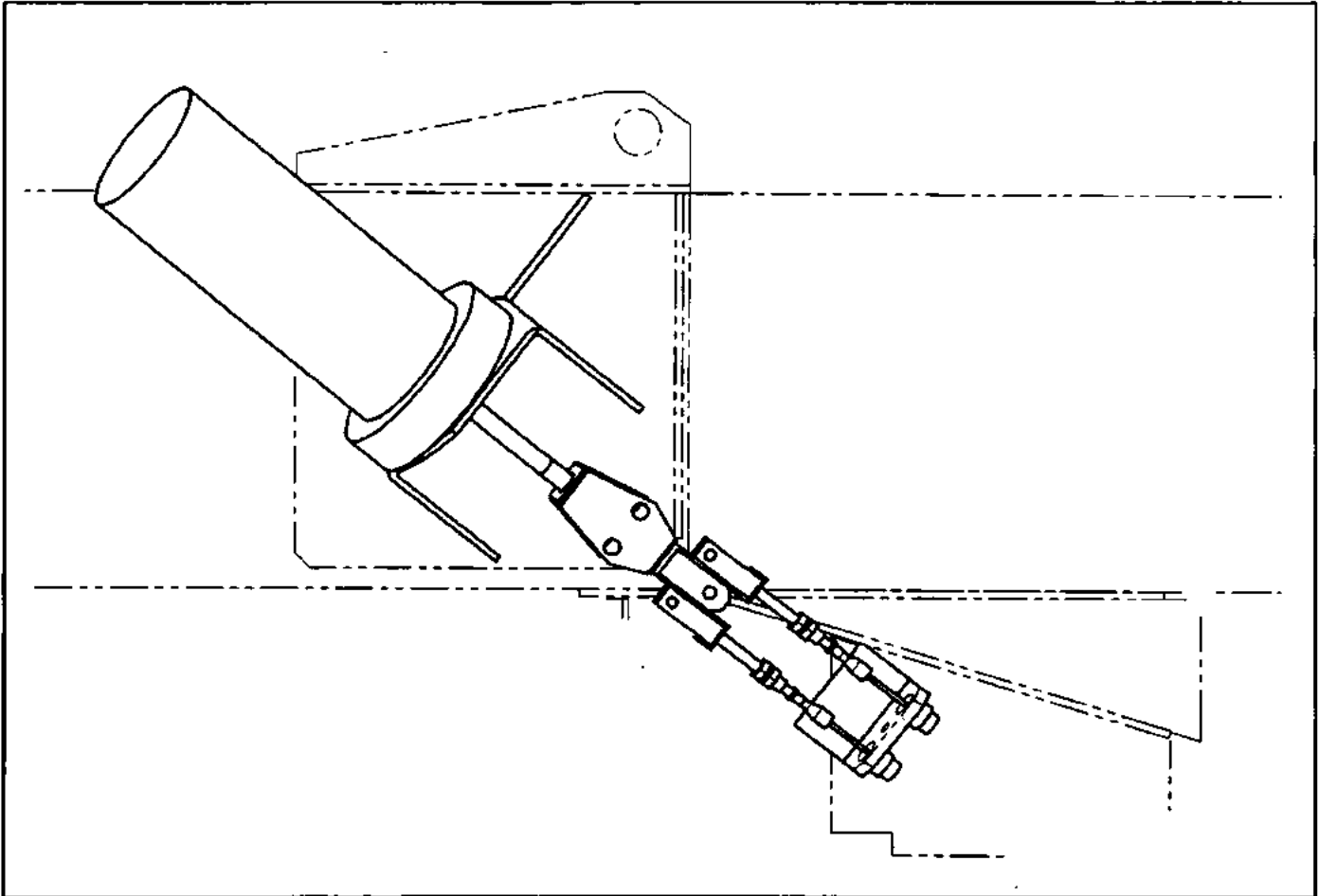


Fig. 2.8 – Disengage parking brake by mechanically screwing turnbuckle counterclockwise (relative to brake canister) until spring is compressed. Screw turnbuckle clockwise to engage parking brake.

1. Install wheel chocks after towing transportation is complete.
2. Engage parking brake by using gutter broom tool to mechanically screw parking brake turnbuckle clockwise (relative to brake canister) until spring is decompressed.
3. Replace parking brake release hair pen in linkage screw. Return gutter broom angle adjustment tool to its stow position.

NOTE: On old sweepers, pressurize actuator canister with air and replace clevis pin through large parking brake clevis and equalizer plate.

4. Check parking brakes for proper operation. If required, refer to Parking Brake Adjustment, chapter 3.

5. Lower sweeper to ground and unhitch from towing vehicle.
6. Engage left and right rear wheel torque hubs.
 - a. Remove two holes securing tow plate to center of torque hub. Torque hub will disengage.

NOTE: Tow plate is a 1/2" by 3" diameter part with a dimple sticking out from the center of one side.

- b. Turn tow plate over (it's original position) and install on torque hub with round dimple facing away from the middle of sweeper.
 - c. Install and tighten two bolts securing tow plate to torque hub.
7. Remove wheel chocks.

Operation
Operating Safety Advice

Table 2.3
Operating Safety Advice

Always follow local and state traffic laws. Drive defensively—the other driver may be wrong, but it is better to avoid collisions of any kind. Carefully study the following safety related operating suggestions.

1. **Always** fasten seat belts.
2. Always drive at a safe speed. **Slow down** for curves and downgrades.
3. Be extremely careful when pulling around parked cars.
4. **Never** make sudden starts, stops or turns.
5. Be very careful when backing up sweeper.
6. **Do not** use sweeper for towing.
7. **Never** operate sweeper with a known hydraulic leak. Repair leak immediately.
8. Check sweeper daily for hydraulic leaks.
9. Avoid sweeping near bystanders or in congested areas eliminating possible injury caused from sweeper brooms throwing debris.
10. If blower impeller becomes jammed, turn **off** blower drive motor and **stop** engine before proceeding to clear debris.
11. Whenever a mechanic, operator, inspector or any other person needs to perform work under a raised hopper, **stop** engine and **install both safety props**. **Do not** stand under raised hopper with engine running.
12. **Do not** overload sweeper.
13. Never use a hydraulic cylinder or hydraulic mechanical mechanism to lift another object or part.
14. **Never** leave sweeper unattended with engine running and/or ignition key in vehicle.
15. Be certain sweeper is parked in a position allowing hopper to **clear** container or truck before dumping hopper.
16. Be sure sweeper is parked on **level ground** and bystanders are **clear** before dumping hopper.
17. Stay **clear** of electrical power lines and other overhead obstructions to prevent injury or property damage when dumping hopper.
18. **Always** cover battery terminals during maintenance to prevent electrical short.
19. When operating at slow speed or whenever sweeper may cause traffic problems, operate beacon (option) and rear flashers lights.
20. **Never** step on suction hood for any reason. Serious injury may result. Use provided step plates and handle to enter cab.

Operation
Operating Safety Advice

CHAPTER 3

Adjustments

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3



3

Adjustments
Gutter Broom

GUTTER BROOM — ADJUSTMENTS

Properly adjusted gutter brooms are essential in sweeper performance. Each gutter broom requires two variable and one constant adjustment: broom angle in relation to street and curb, broom pressure and forward tilt. Broom angle and pressure require frequent readjusting caused by broom wear and sweeping conditions. Forward tilt adjustment is factory set and should remain correct indefinitely under normal sweeping conditions. All gutter broom adjustment procedures apply to both right and left sides.

Gutter Broom — Angle Adjustment

Angle adjustment is controlled by position of gutter broom arm in relation to the vertical bracket. A correctly adjusted gutter broom allows bristles to sweep at a 90 degree angle where street and curb meet (gutter broom plate is parallel to gutter).

1. Remove lock pin tool chained to vertical gutter broom assembly bracket.
2. Pry gutter broom pillow block bearing and arm to a new position. Secure assembly in new position with lock pin tool.

NOTE: Bolts holding gutter broom pillow block bearing to vertical bracket do not require any mechanical work when adjusting gutter broom angle. Gutter broom pillow block bearing is designed to pivot. Bolts should not be loosened or tightened while adjusting gutter broom angle.

3. Check for correct gutter broom angle. Repeat procedures 1 and 2 until correct broom angle is achieved.

NOTE: When sweeping conditions are severe such as a heavy overlay of asphalt on gutter or a high crown on street, increase gutter broom angle to transfer debris

away from curb. Gutter broom pattern should always overlap pickup broom pattern to avoid streaking.

Gutter Broom — Pressure Adjustment

Gutter broom pressure is altered using left and right gutter broom pressure adjustment switches in cab.

1. On level ground, select a dirty area to run broom pressure test. With all brooms off and raised, drive sweeper onto test site. Stop machine and place shift lever in *Park*.

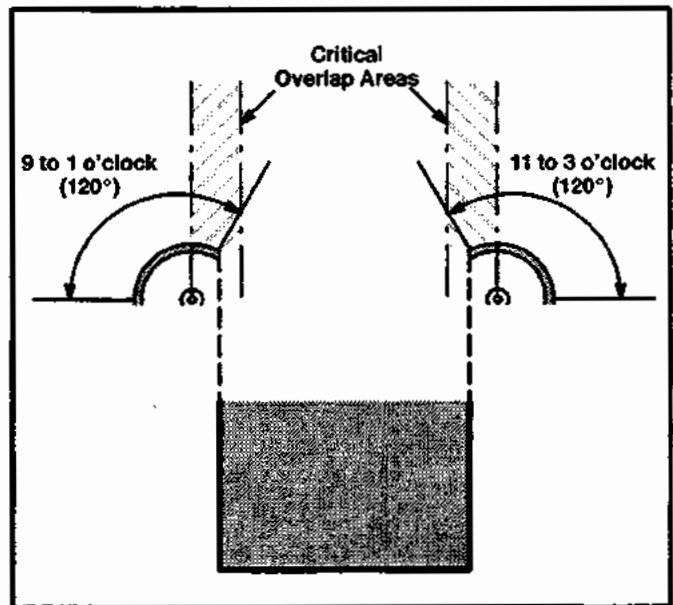


Fig. 3.1 – Broom overlap pattern is controlled by the gutter broom pressure adjustment. A correct gutter broom pressure pattern creates a 120° angle. Insufficient overlap results in streaking and poor sweeping.

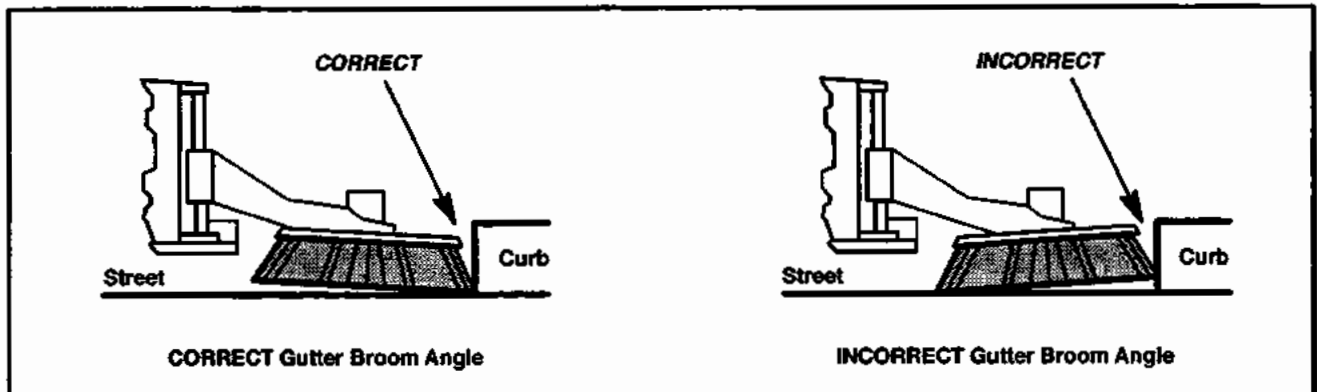
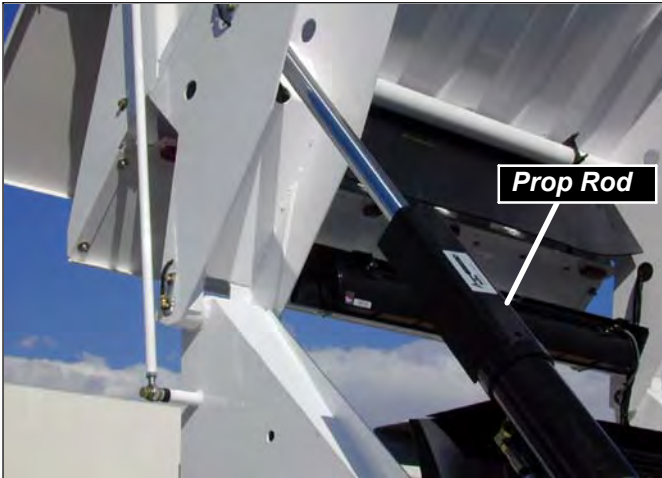


Fig. 3.2 – A correctly adjusted gutter broom angle allows bristles to sweep at a 90° angle where street and curb meet. Angle adjustment is controlled by position of gutter broom arm in relation to the vertical bracket.

Adjustments Suction Hood/Blower

2. Run engine at 1875 rpm and perform the following procedures.
 - a. Lower gutter brooms. Blower/Suction Hood should be off.
 - b. Turn *On* gutter broom drive switches and run for approximately 10 seconds.



Serious INJURY or DEATH may result if hopper cylinders fail.

INSTALL safety props when working on, around or under raised hopper.

Never position yourself under hopper while installing or removing safety props.

Fig. 3.3 – With hopper raised, use a ladder to climb up to hopper cylinder and install safety prop on hopper cylinder rod. Safety prop rests on top edge of cylinder body. Install safety props on both hopper cylinders.

- c.. Turn *Off* and raise gutter brooms. Drive sweeper forward a few feet. UTILIZE ERGO SWITCH
 - d. Lower suction hood. Gutter brooms should be off.
 - e. Turn *On* blower drive switch and run for approximately 10 seconds.
 - f. Turn *Off* and raise suction hood. Drive sweeper forward, clear of test site.
3. Place shift lever in *Park*, shut down sweeper and exit cab to examine patterns. Each gutter broom pattern is 120 degrees when properly adjusted. The critical area is where the gutter broom pattern overlaps the suction hood pattern.

NOTE: *Insufficient gutter broom/suction hood overlap results in streaking and poor sweeping performance.*

4. Adjust gutter brooms using the pressure gauge adjustment knobs in the operators cab.
 - a. If broom pattern is too light: broom is not scrubbing ground hard enough causing broom bounce and streaking.
 - b. If broom pattern is too heavy: broom is scrubbing ground too hard causing excessive wear.

NOTE: *Gutter broom is designed to return to pre-selected pressure adjustment each time lowered.*

5. Repeat procedures 1–3 after readjustments.

SUCTION HOOD/BLOWER ADJ

The blower and suction hood generate a vacuum flow of recirculating air which picks up debris and filters it into the hopper. Although suction hood and blower speed adjustments are not prone to change, they need to be checked at regular intervals.

Suction Hood Nozzle Flap Adjustment

Suction hood nozzle flap adjustment may be required due to damage caused by sweeping heavy debris. The nozzle flap backing strip can get bent out of tolerance.

1. Position sweeper on clean, level surface with front wheel pointing forward and rear wheels on ramps. Place shifter in *Park* and stop engine. Block wheels using wheel chocks.
2. Check the distance between suction hood nozzle flap and the nozzle opening. Nozzle flap is located about 1 foot forward from the back of the hood.

Adjustments

Suction Hood/Blower

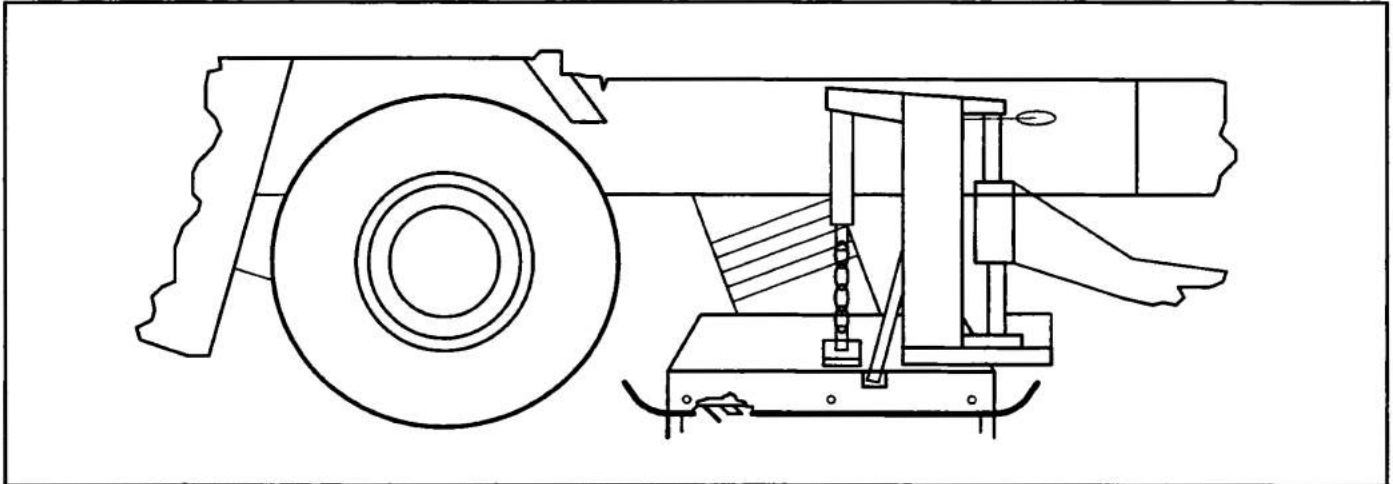


Fig. 3.4 – Suction hood nozzle flap is visible from under the hood. Suction hood standard flaps (sets of two) are located at each end of the hood which are visible from the side of sweeper.

NOTE: Suction hood nozzle flap is visible from under the hood. Do not get the suction hood nozzle flap confused with suction hood standard flaps (sets of two) located at each end of the hood which are visible from the side of sweeper.

- a. Bend nozzle flap backing strip to achieve 5/8" clearance.
3. Remove wheel chocks and wheel ramps.

Suction Hood Skate Adjustment

Suction hood Skate adjustment is required for misalignment, not for hood height.

1. Position sweeper on clean, level surface with front wheel pointing forward. Lower hood to sweeping position. Place shifter in *Park* and stop engine. Block wheels using wheel chocks.
2. Check left and right skate to ground seal. If skate to ground seal is good, proceed to step 6.
3. Raise hood a few inches off the ground.
4. Adjust right skate parallel to ground.
 - a. Loosen skate attachment bolts on both ends of suction hood.
 - b. Pivot skate from center bolt making it parallel to ground.
 - c. Tighten skate attachment bolts.
5. Adjust left skate parallel to ground with suction hood still a few inches off the ground.
 - a. Loosen skate attachment bolts on both ends of suction hood.

- b. Lower suction hood to ground. Skate will self adjust parallel to ground.
- c. Tighten skate attachment bolts.
6. Raise suction hood and remove wheel chocks.

Blower Speed Adjustment

Blower access requires hopper raised to dump position. Install safety props on cylinders (Fig. 3.9) whenever working under hopper.

Blower Speed is controlled electronically and various based on set RPM.



**Stay clear from running blower.
Personal injury may occur.**

Adjustments
Brakes

BRAKE ADJUSTMENTS

The R3AIR sweeper has internal, expanding drum brake assemblies on rear wheels. Rear brakes need to be manually centered when adjusted. Other areas that need adjusting are brake shoe wear, free play in brake pedal and parking brake linkage.

Rear Brake Adjustment

1. Position sweeper on clean, level surface with front wheels pointing forward. Place shifter in *Park* and stop engine. Block wheels using wheel chocks.
2. Disengage parking brake. Remove parking brake release hair pen from linkage screw. Using gutter broom angle adjustment tool, mechanically screw parking brake turnbuckle counterclockwise (relative to brake canister) until spring is compressed.



WARNING
Chock wheels before releasing parking brake.

NOTE: On old sweepers, pressurize actuator canister with air and remove clevis pin from large parking brake clevis and equalizer plate.

3. Remove rubber rectangle dust cover from brake backing plate exposing star-nut adjuster next to

large hex-centering bolt. Remove two round rubber dust cover plugs from gauge slots located forward and aft on outer rim of backing plate.

4. Loosen large hex-head centering bolt next to star-nut access hole using a 3/4 inch wrench.
5. With adjusting spoon, turn star-nut while sliding .015 feeler gauge (Snap-On FB326A) in forward slot between brake shoe and drum. Adjust star-nut (clockwise-tighten, counterclockwise-loosen) until gauge makes slight contact between brake shoe and drum.

Table 3.1
Brake Adjustment
Speciality Tools & Reference Chart

○	Torque Wrench	✓
○	Star-Nut Adjusting Spoon	✓
○	0.015 Feeler Gauge	✓
○	Rubber Hammer	✓
○	Wheel Chocks	✓
○	Rear Brake Shoe/ Drum Clearance	0.015
○	Parking Brake Free Play (disengaged)	1/8"
○	Brake Pedal Free Play (disengaged)	1/8"

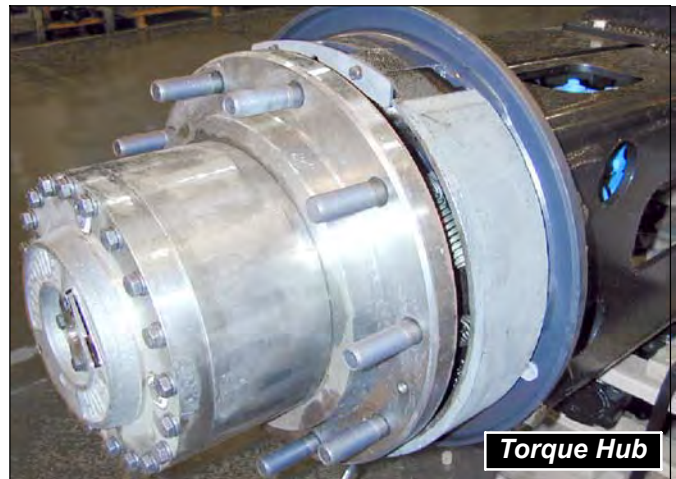
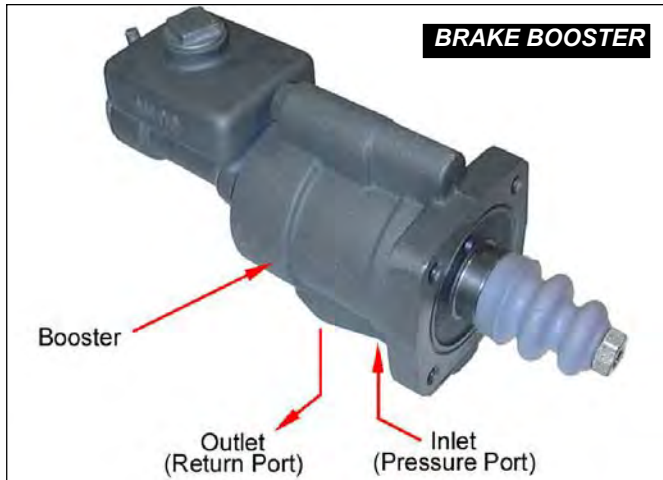


Fig. 3.5 – Rear brake feeler gauge adjusting holes are on the edge of backing plate. Star nut adjusting holes are next to the large centering bolt.

Adjustments
Brakes



Master Cylinder/Brake Booster Fig: 3.6

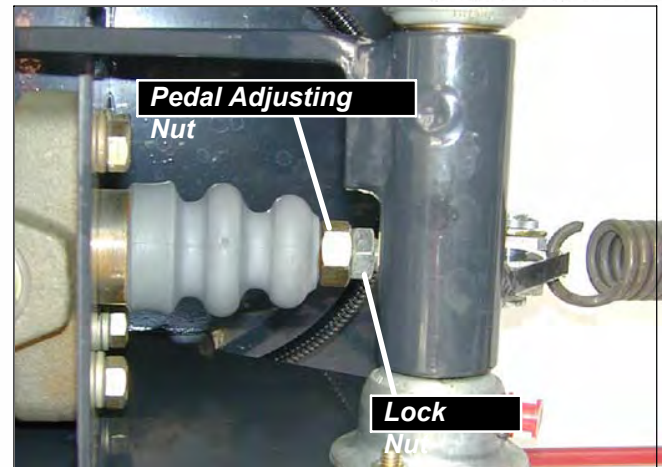


Fig. 3.6 –The hydraulically powered booster in conjunction with the master cylinder, provides a power assist for applying hydraulic brakes. The brake system is composed of the following:

6. Slide .015 feeler gauge in aft adjusting hole. If both brake shoes are equal distance from drum, go to step 8.
7. If brake shoes are not equal distance from drum, center shoes by lightly tapping large hex-head centering bolt with a rubber hammer. Slightly tighten centering bolt and repeat steps 5 and 6.
8. Once shoes are properly adjusted and centered, torque centering nut to 85 foot-pounds (115 Nm). Double check centering and brake shoe clearance.
9. Replace round rubber dust covers over gauge holes and rectangular dust cover over star-nut hole.
10. Repeat steps 3–9 for opposite wheel.
11. Engage parking brake. Using gutter broom angle adjustment tool, mechanically screw parking brake turnbuckle clockwise (relative to brake canister) until spring is decompressed. If required, refer to Parking Brake Adjustment procedure. Replace parking brake release hair pen in linkage screw. Return gutter broom angle adjustment tool to its stow position.

NOTE: On old sweepers, pressurize actuator canister with air and replace clevis pin through large parking brake clevis and equalizer plate.

12. Remove wheel chocks.

Brake Pedal Adjustment

1. Position sweeper on clean, level surface with front wheel pointing forward. Place shift lever in *Park* and stop engine. Block wheels using wheel chocks.
2. Measure free play in brake pedal where arm goes through floor inside operators cab. If free play is 1/8 inch, go to step 6.

3. On right side of sweeper between cab and fender, remove side panel (6 bolts) using 7/16 inch wrench gaining access to brake pedal and go-pedal linkage.
4. Loosen lock nut on both ends of long tubular linkage adjusting nut using a 3/4 inch open-end wrench. Take care not to damage any linkage parts while loosening lock nuts. Turn adjusting nut by hand to achieve 1/8 inch free play in brake pedal.
5. Tighten lock nuts and replace side panel.

Parking Brake Adjustment

1. Position sweeper on clean, level surface. Place shift lever in *Park*, stop engine and chock wheels.



Chock wheels before adjusting parking brake.

2. Start engine and place shifter into a forward gear.
3. At parking brake canister, measure free play in cable assembly where it connects to hydraulic parking brake actuator. If free play is 1/8 inch, go to step 6.
4. Remove parking brake release hair pen from linkage screw. Using gutter broom angle adjustment tool, mechanically screw parking brake turnbuckle achieving 1/8 inch free play. Relative to brake canister, counterclockwise achieves more free play and clockwise achieves less free play.
5. Replace parking brake release hair pen in linkage screw. Return gutter broom angle adjustment tool to its stow position.
6. Place gear shifter in *Park* and turn off engine.
7. Remove wheel chocks. □



Adjustments
Brakes

Notes

CHAPTER 4

Service & Lubrication

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4

Service & Lubrication
General Information

GENERAL INFORMATION

Service

To ensure good performance, dependability and safety, regular preventive maintenance is essential on the Global R3Air Isuzu sweeper. The following charts, figures and tables outline periodic maintenance for a sweeper subjected to average use. A vehicle that is extensively exposed to abusive conditions requires more frequent attention. Sweepers which spend a lot of time parked also require periodic maintenance. Rust, dirt and corrosion cause unnecessary damage if the vehicle is neglected. Following routine maintenance suggestions in this chapter will help avoid expensive repairs.




Lubrication

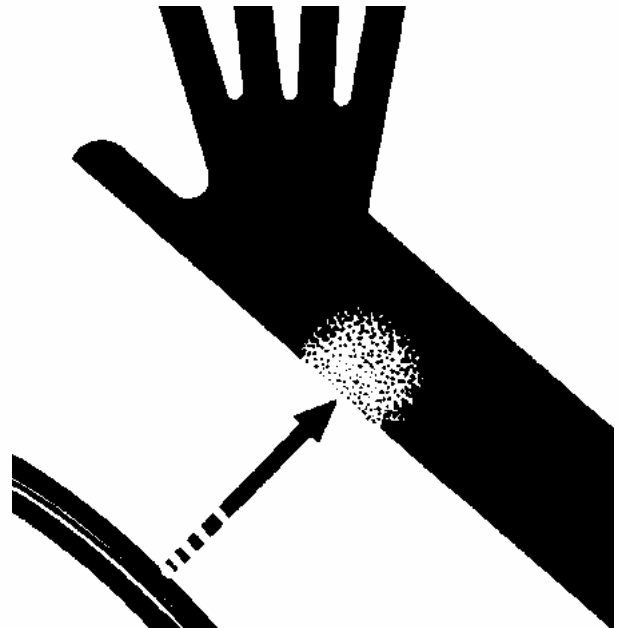
Strict adherence to a detailed lubrication schedule is as important as timely preventive maintenance. The recommended lubrication schedule in the following charts, figures and tables is based on average vehicle use under normal sweeping conditions in moderate weather and climate. Abnormal use such as sweeping in dusty, dirty conditions, or in extremely hot or cold climates, requires lubricants to be checked and changed more frequently than suggested in lubrication schedule.

Acids that form in engine and hydraulic oil during short-haul driving, or during operation in extremely cold climates, are injurious to moving parts and will wear out parts as quickly as dirty lubricants. Lack of lubrication on these items will make control operation difficult in addition to causing premature wear. However, lubricants should be used sparingly and wipe excess oil and grease away to prevent it from attracting dirt which will also accelerate wear.

Symbols

The following symbols are used throughout the Service & Lubrication chapter to help define procedures:

	Check Procedure
	Lubricate Procedure
	Service Procedure <ul style="list-style-type: none"> ● Change ● Clean ● Replace



Do not attempt to check for hydraulic oil leaks without hand and eye protection. Oil under pressure can penetrate skin and cause severe injury.

Do not attempt to block oil flow with hands or fingers.

Oil can shoot from a pinhole in a fine jet at a velocity sufficient to penetrate skin and cause serious injury.

Use extreme caution when inspecting hydraulic system for oil leaks.

Fig. 4.1 – Check for leaks prior to working on or near hydraulic system and always wear appropriate clothing and eye protection.

Service & Lubrication
General Information

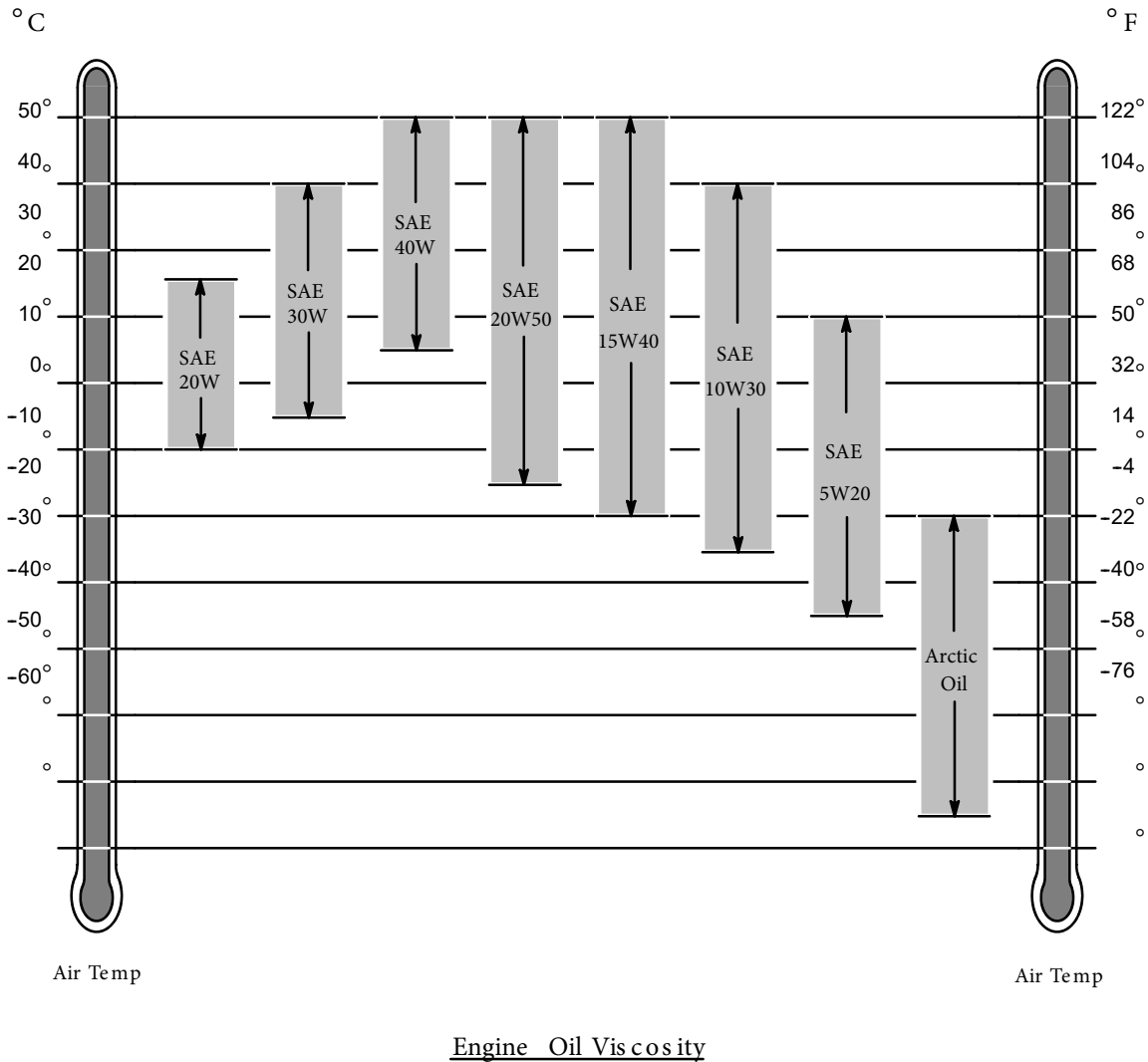





Chart 4.1 - Choose the proper engine oil viscosity based on expected air temperature range during sweeper operation. All oils used must meet API Service Classification SE or CD. SAE 5W20 and arctic oil viscosity grades meeting API Service Classification CC may be used, but oil and filter must be changed twice as often. A slight increase in oil consumption is expected when low viscosity oils are used; therefore, check oil level more frequently. An oil engine heater is required when ambient air temperature is less than 14° F (-10° C).

NOTE: REFER TO ENGINE MANUFACTURER SPECIFICATIONS AND RECOMMENDATIONS WHEN REPLACING/INSPECTING ENGINE FLUIDS.

Service & Lubrication
Daily Maintenance


Table 4.1
Daily Maintenance Procedures

No.	<u>Daily Procedure</u>	Daily Maint Guide Pg 4-15	Periodic Maint Guide Pg 4-17	Detail Ref Fig	Recommended Fluid/Lubricant
	Check:				
1.	Air cleaner dust cap. Clean as required. Do not clean safety element.	1	1	4.5	-
2.	Air cleaner hoses and connections. Repair or replace as required.	2	2	-	-
3.	Air cleaner service indicator with engine running. Clean main element before yellow indicator reaches 20 in. vacuum level.	3	3	4.5	-
4.	Engine coolant level at deaeration tank. Add coolant as required.	4	6	-	ref to Cht 4.4
5.	Engine coolant systems for leaks. Repair or replace as required.	5	7	-	-
6.	Engine oil level. Add oil as required.	6	8	-	ref to Cht 4.3
7.	Engine oil system for leaks. Repair or replace as required.	7	9	-	-
8.	Fan belt tension. Adjust as required.	8	10	-	-
9.	Fuel level on gauge in operators cab. Add fuel as required.	9	11	-	ref to Cht 4.2
10.	Hydraulic oil level in each tank by observing sight gauge. Engine must be warm. Add oil as required.	10	15	-	
 CAUTION		Filler breather cap is under slight pressure, about 5 psi. Open with caution.			
11.	Hydraulic oil system for leaks. Repair or replace as required.	11	16	4.1	-
12.	Tire pressure in all tires. Add air as required.	12	19	-	-
	Lubricate:	13	20.1	-	ref to Cht 4.1
13.	Blower bearings.				

Service & Lubrication

50-Hour Maintenance

Table 4.2
50-Hour Maintenance Procedures

No.	50-Hour Procedure	Periodic Maint Guide Pg 4-17	Detail Ref Fig	Recommended Fluid/Lubricant
1.	Perform all Daily maintenance procedures Table 4.1.	–	–	–
	Check:			
2.	Brake fluid level. Add fluid as required.	5	–	SAE Bk Fl DOT 3
3.	Hydraulic oil filter gauge, suction line. After engine is operating for 15 minutes, observe gauge on suction of hydraulic oil filter. If pointer exceeds 10 in. Hg at 2100 rpm's, replace hydraulic filter.	13	4.1 4.4	
4.	Hydraulic oil filter gauges, high pressure and filters. With hydraulic oil at operating temperature and engine at 2100 RPM observe the indicators on the filters. If indicating red replace filters.	14	4.1 4.4	
5.	Steering ball joints for wear. Replace as required.	17	4.3	–
6.	Steering spindle bearing for wear. Replace as required.	18	4.3	–
 CAUTION Always chock wheels before working on torque hubs or under any area of sweeper.				
7.	Torque hub oil level. Rotate wheel positioning tow plate perpendicular to ground. Check plugs will be at 3 o'clock and 0 o'clock (45°). Remove both upper and lower plugs. Fill torque hub through upper plug until oil drains from lower plug.	20	4.2	SAE Multpurp Gear Oil-EP 90W
	Lubricate:			
8.	Front wheel bearings.	22	–	ref to Cht 4.1
9.	Gutter broom lift bearings.	23	–	ref to Cht 4.1
10.	Hopper pivot bearings.	24	–	ref to Cht 4.1
11.	Hopper ram pivot bearing, lower.	25	–	ref to Cht 4.1
12.	Hopper ram pivot bearing, upper.	26	–	ref to Cht 4.1
13.	Steering ball joints.	27	4.3	ref to Cht 4.1
14.	Steering spindle bearing.	28	4.3	ref to Cht 4.1

(continued)

Service & Lubrication
50-Hour Maintenance

Table 4.3 (continued)
50-Hour Maintenance Procedures

No.	<u>50-Hour Procedure</u>	Periodic Maint Guide Pg 4-17	Detail Ref Fig	Recommended Fluid/Lubricant
15.	<p>Service-Change:</p> <p>Torque hub oil if sweeper is new or torque hub has been replaced or rebuilt. Thereafter, replace torque hub oil during 500-Hour periodic maintenance.</p>	29	4.2	SAE Multpurp Gear Oil-EP 90W
16.	<p>Service-Clean:</p> <p>Water strainer. Disconnect filler hose from elbow on top of water tank. Loosen lock nuts and remove thumb screws from flange gaining access to screen. Remove and clean strainer screen.</p>	34	-	-
<p>Take precautionary measures to keep all dirt, grime, dust and debris from contaminating hydraulic oil when working on hydraulic system. Contaminated oil may cause severe damage to hydraulic components.</p>				
17.	<p>Service-Replace:</p> <p>Hydraulic oil filters if sweeper is new or any components such as motors or pumps have been replaced. Thereafter, replace hydraulic oil filters during 500-Hour periodic maintenance.</p>	40	4.1 4.4	

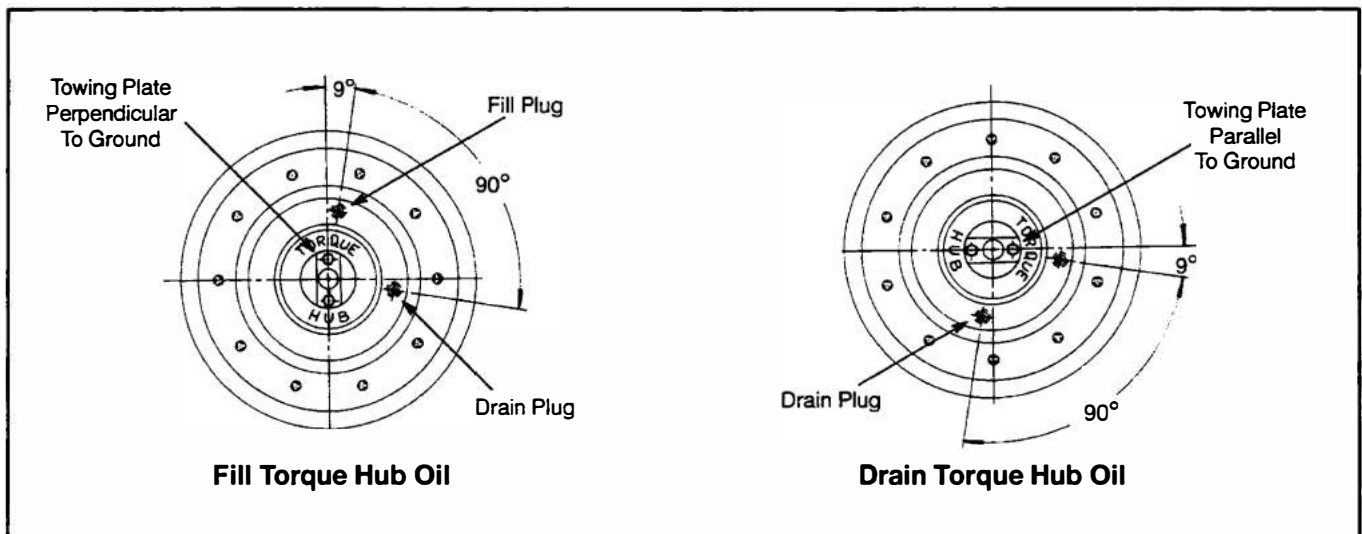


Fig. 4.2 – To fill torque hub, rotate wheel positioning tow plate perpendicular to ground. Check plugs are positioned at 3 o'clock or 9 o'clock. Fill torque hub through upper check plug until oil drains from lower check plug. To drain torque hub, rotate wheel positioning tow plate parallel to ground. Remove lower check plug at 6 o'clock to drain oil.

Service & Lubrication
50-Hour Maintenance

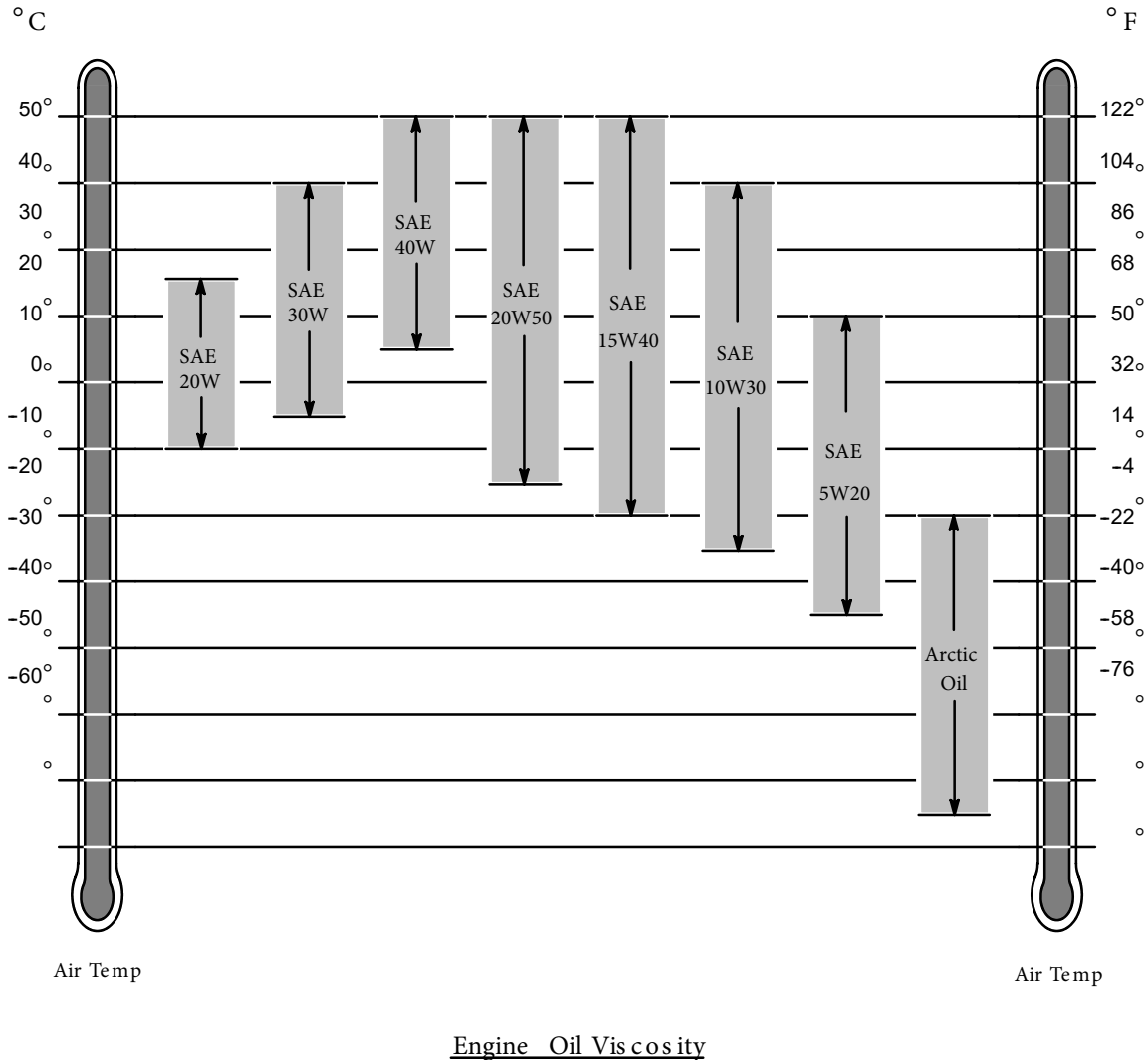
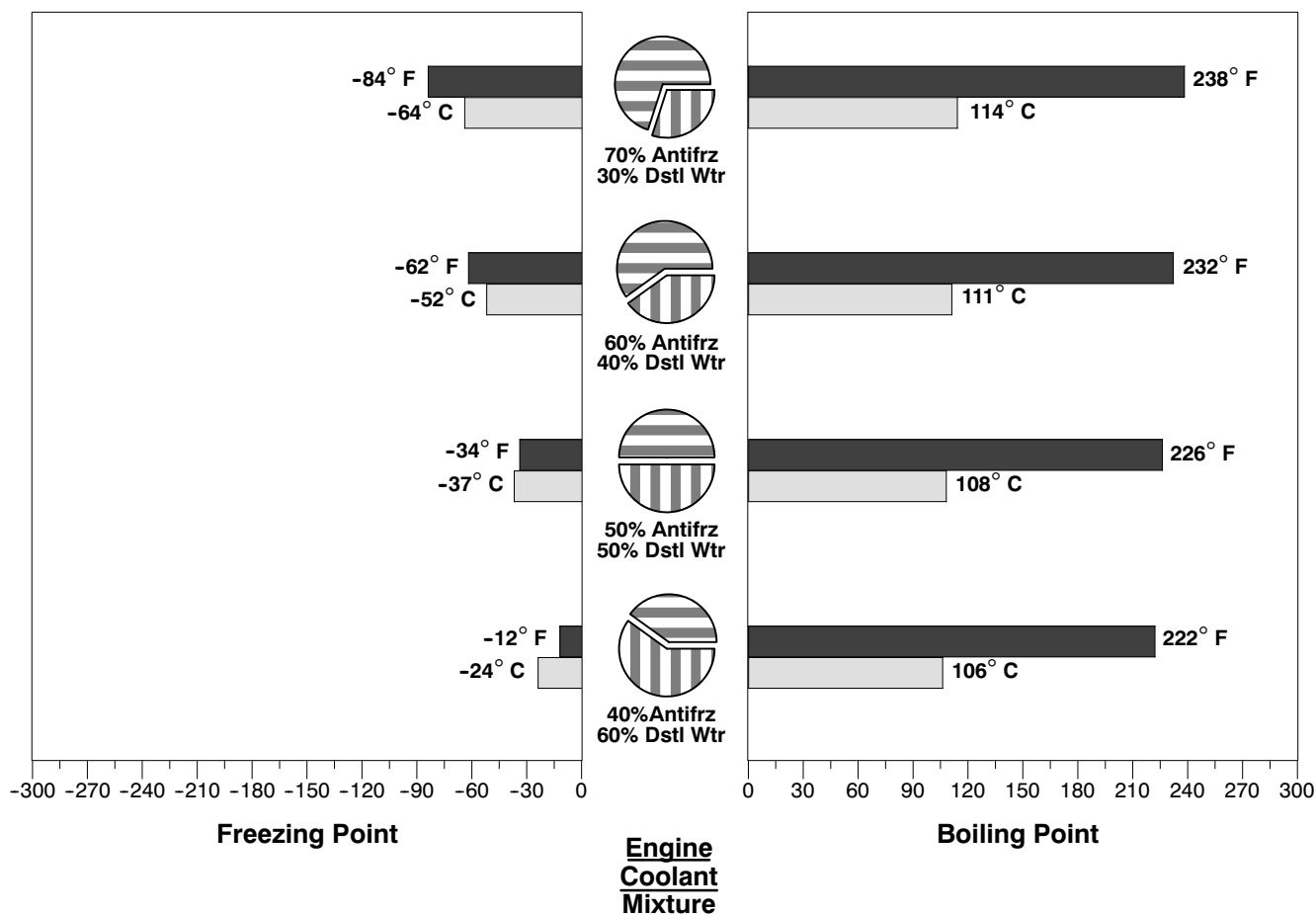


Chart 4.1 - Choose the proper engine oil viscosity based on expected air temperature range during sweeper operation. All oils used must meet API Service Classification SE or CD. SAE 5W20 and arctic oil viscosity grades meeting API Service Classification CC may be used, but oil and filter must be changed twice as often. A slight increase in oil consumption is expected when low viscosity oils are used; therefore, check oil level more frequently. An oil engine heater is required when ambient air temperature is less than 14° F (-10° C).

NOTE: REFER TO ENGINE MANUFACTURER SPECIFICATIONS AND RECOMMENDATIONS WHEN REPLACING/INSPECTING ENGINE FLUIDS.

Service & Lubrication 50-Hour Maintenance




Do not use methyl alcohol base anti-freeze. Do not use methoxy propanol antifreeze. Damage may occur to rubber seals on cylinder liners which are in contact with coolant.

NOTE: Some types of ethylene glycol antifreeze commonly available on the open market are intended for automotive use. These products are often labeled for use in aluminum engines and usually contain more than 0.1 percent anhydrous metasilicate. Use of this type of antifreeze can cause a gel-like deposit to form which reduces heat transfer and coolant flow. When wet, gel becomes the same color as coolant. When dry, gel is a white, powdery deposit. Check container label or consult with antifreeze supplier before using.

Chart 4.2 - Engine coolant mixture consist of a ethylene glycol type antifreeze and distilled water. The ethylene glycol type antifreeze cannot contain more than 0.1 percent anhydrous metasilicate and must meet General Motors Performance Specification GM1899M or be formulated to GM6038M. Antifreeze to distilled water coolant mixture is determined by required boiling and freezing points.

Service & Lubrication
100-Hour Maintenance

Table 4.3
100-Hour Maintenance Procedures

No.	100-Hour Procedure	Periodic Maint Guide Pg 4-17	Detail Ref Fig	Recommended Fluid/Lubricant
1.	Perform 50-Hour maintenance procedures 1 through 17 and 19 in Table 4.2.	–	–	–
	Check:			
2.	Hydraulic oil composition. Run engine for 15 minutes while operating several hydraulic components such as brooms or hopper dump. Turn engine off. Clean a convenient hydraulic fitting and draw sample of hydraulic oil into a sterile container. Test composition of oil. Change hydraulic oil if analysis indicates composition breakdown, excess dirt or deterioration.	12	–	
3.	Blower Impeller for wear. Replace as required.	4	–	–
	Service-Change:			
4.	Engine oil. Operate engine for 15 minutes before draining old oil. Do not run engine while changing oil.	30	–	ref to Cht 4.3
 CAUTION Shut engine off when changing either hydraulic or engine oil. Use caution when working around warm engine and exhaust parts.				
5.	Hydraulic oil. Check hydraulic oil composition every 250 hours and change as needed. Follow procedure 2 (above) to test oil composition.	32	–	ISO- 46
	Service-Replace:			
6.	Engine oil filter. After draining old oil from motor, change engine oil filter. Then fill motor with new oil.	37	–	ref to Cht 4.3

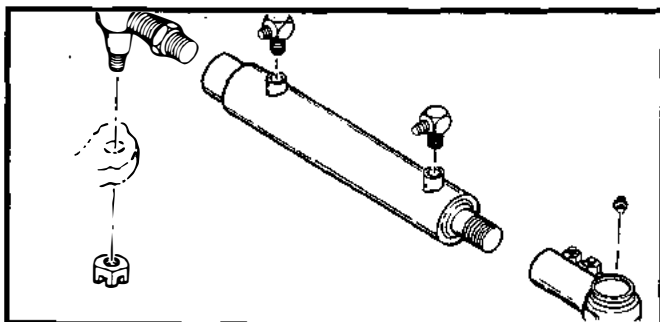
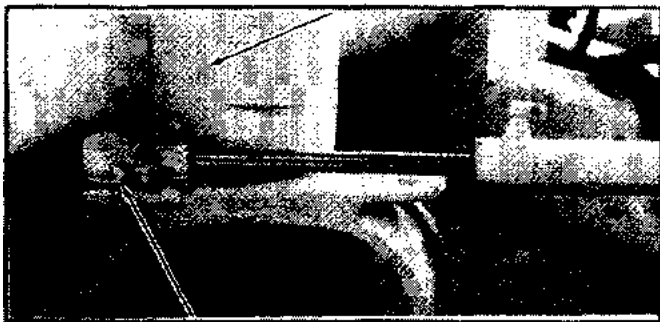


Fig. 4.3 – Steering Ball Joints and Spindle Bearing lube points are accessed from under the front of the sweeper. Lube points are located on top corner of frame and top of front fork.

**Service & Lubrication
250-Hour Maintenance**

**Table 4.4
250-Hour Maintenance Procedures**


No.	<u>250-Hour Procedure</u>	Periodic Maint Guide Pg 4-17	Detail Ref Fig	Recommended Fluid/Lubricant
1.	Perform 100-Hour maintenance procedures 1 through 3 and 5 in Table 4.3.	-	-	-
	Lubricate:			
2.	Door hinges and latches.	21	-	Light General Purpose Oil
	Service-Replace:			
3.	Air cleaner, primary element.	35	4.5	-
4.	Air cleaner, safety element. Change safety element when required or at least every third time primary element is replaced.	36	4.5	-
5.	Fuel filter, primary. Fill new filter with fuel before installing. Use fuel primer switch when starting engine for the first time after filter is installed. Longer engine cranking time may be required.	38	4.6	ref to Cht 4.2
<div style="display: flex; align-items: center; justify-content: center; gap: 20px;">  <div style="border: 2px solid black; padding: 5px; font-weight: bold; font-size: 1.5em;">CAUTION</div> <div style="text-align: left;"> <p>Do not run starter motor more than 30 seconds at a time. Allow starter motor to cool at least 3 minutes between starting attempts to avoid heat damage to starter motor.</p> </div> </div>				
6.	Fuel filter, secondary. Fill new filter with fuel before installing. Secondary fuel filter is located on engine block. Use fuel primer switch when starting engine for the first time after filter is installed. Longer engine cranking time may be required.	39	4.6	ref to Cht 4.2



Fig. 4.4 – Hydraulic suction and high pressure line filters are equipped with gauges which monitor flow performance. Suction filter and gauge is located on right side of engine compartment. High pressure line filter and gauge is located on left side of engine compartment. Check filter gauges with engine/hydraulic oil warm.

Service & Lubrication
250-Hour Maintenance

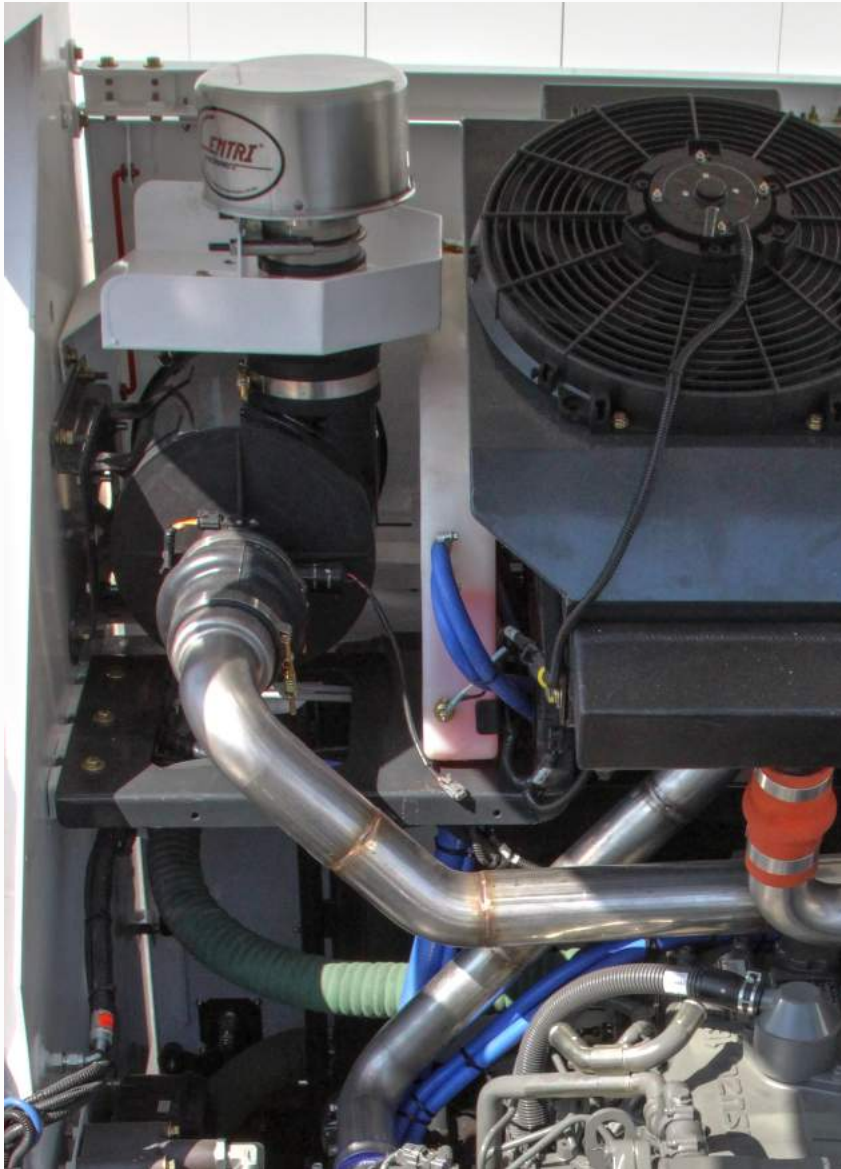


Fig. 4.5 – From behind the sweeper, check air cleaner service indicator daily. Clean air cleaner before vacuum level reaches 20 inches.



Fig. 4.6 – Primary fuel filter is mounted on inside wall of right hydraulic tank. When replacing, fill new filter with fuel before installing. Secondary fuel filter system is located on right side of engine block.

Service & Lubrication
500-Hour Maintenance

Table 4.5
500-Hour Maintenance Procedures

No.	<u>500-Hour Procedure</u>	Periodic Maint Guide Pg 4-17	Detail Ref Fig	Recommended Fluid/Lubricant
1.	Perform 250-Hour maintenance procedures 1 through 6 in Table 4.4.	-	-	-
<div style="background-color: yellow; padding: 5px; display: flex; align-items: center;"> CAUTION </div> <p style="text-align: center; margin-top: 5px;">Take precautionary measures to keep all dirt, grime, dust and debris from contaminating hydraulic oil when working on hydraulic system. Contaminated oil may cause severe damage to hydraulic components.</p>				
2.	<p>Service-Change:</p> <p>Front wheel bearings grease. Thoroughly clean old grease from bearings and associated parts before applying new grease.</p>	31	4.3	ref to Cht 4.1
3.	Hydraulic oil. Change when lab results indicate replacement is needed or if contaminated.	32	4.1	
<div style="background-color: yellow; padding: 5px; display: flex; align-items: center;"> CAUTION </div> <p style="text-align: center; margin-top: 5px;">Always chock wheels before working on differential or under any area of sweeper.</p>				
4.	<p>Torque hub oil. Rotate wheel positioning tow plate parallel to ground. One check plug will be at 6 o'clock (180°). Remove lower plug. Drain torque hub oil through lower plug. To fill torque hub with new oil, Rotate wheel positioning tow plate perpendicular to ground. Check plugs will be at 3 o'clock or 9 o'clock (45°). Remove both upper and lower plugs. Fill torque hub through upper plug until oil drains from lower plug.</p> <p>Service-Clean:</p>	29	4.2	SAE Multpurp Gear Oil-EP 90W
5.	<p>Service-Clean:</p> <p>Front wheel bearings. Thoroughly clean front wheel bearings and associated parts.</p>	33	-	Genl Purp Cing Solvent
6.	<p>Service-Replace:</p> <p>Hydraulic oil filters. After draining old oil from hydraulic tanks, change hydraulic suction line and return line filters. Then fill hydraulic tanks with new oil. <input type="checkbox"/></p>	40	4.1 4.4	



Service & Lubrication
500-Hour Maintenance

Notes

CHAPTER 5

Maintenance/Overhaul

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5

5

Maintenance & Overhaul General Information

GENERAL INFORMATION

Procedures for removal, installation, repair and overhaul of VV3000 sweeper is discussed throughout the following pages. Refer to the supplied Engine manual to perform any service, maintenance, overhaul or troubleshooting procedures on engine.

Throughout chapter 5, Front and Rear refer to front and rear of vehicle. Beware that the engine actually sits in the sweeper frame backwards (the flywheel is toward the front of the sweeper and the alternator, water pump and cooling fan are toward the rear of the sweeper). The front of any component is determined by the area which is towards the front of vehicle when assembled on the sweeper. Left and Right sides of the vehicle refer to the orientation of a person sitting in the drivers cab facing forward.

During disassembly and assembly remember that force is rarely needed. If parts are a tight fit, like a bearing in a case, there is usually a tool designed to do the job. Never use a screwdriver to pry apart parts with machined surfaces. You will mar the surfaces and end up with leaks after the parts are reassembled.

Most procedures are straight forward and accompanied by illustrations and/or photographs. If a more detailed parts description or assembly illustration is required, refer to the accompanying parts manual. Hydraulic and electrical schematics are located in chapter 6 of this manual.

Perform preventive maintenance and overhaul tasks when required to avoid additional expensive repairs resulting from damage caused by operating a malfunctioning sweeper. A good mechanical working sweeper increases reliability and improves long term overall performance.

**Table 5.1
Jacking Procedure**

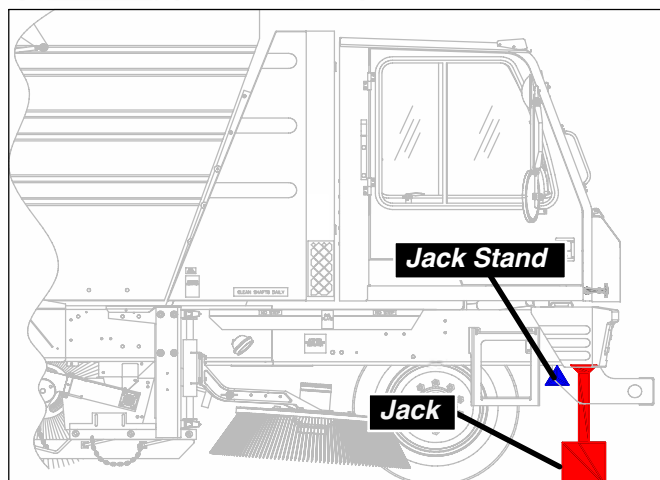


Fig: 2.15 A



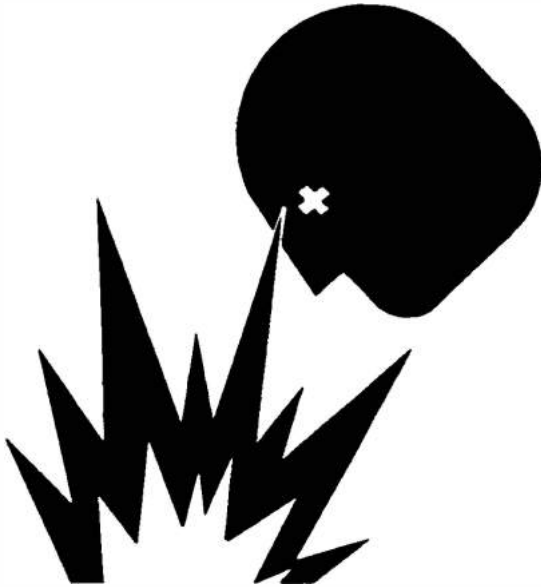
Equipment Required

- 5-ton hydraulic jack with an adjustable stroke of 9 in. min to 19 in. max.
- Wheel chocks
- Jackstands

Procedure

1. Position sweeper on level surface.
2. Place shift lever in "P," setting parking brake.
3. Stop engine.
4. Jacking front:
 - a. Chock rear wheels.
 - b. Place jack under front frame.
5. Jacking rear:
 - a. Chock opposite rear and front wheel.
 - b. Place jack under rear jack pad.
6. Place jackstands under vehicle. Do not trust a hydraulic jack to hold sweeper up by itself.

Maintenance & Overhaul
Wheels & Brakes



Always use an approved OSHA cage when working on or with a tire/wheel assembly. Split flange type rims and extremely high air pressure can cause personnel injury.

Attempting to work on a tire wheel assembly may result in a high air pressure explosion. Wearing safety glasses, ear plugs and working within an approved OSHA cage will help avoid serious injury.

Deflate tire prior to attempting to remove tire or any rim component.

Do not pound on rim or wheel components with steel hammers.

Fig. 5.1 – Use an approved OSHA cage when working on tire/wheel assemblies to prevent possible injury. Follow all safety procedures when working on or with inflated tires because of the extreme pressures involved.

WHEELS & BRAKES

**Tire/Wheel
–Overhaul**

1. Place tire/wheel assembly in an approved OSHA cage.



Always use an approved OSHA cage when working on or with tire/wheel assembly. Do not remove any rim or tire component with tire inflated. Rim assemblies are split flange type and tires are under high air pressure (Fig. 5.1).

2. Remove valve core to deflate tire. If air does not escape, check for a clogged valve stem.
3. Disassemble split flange rim and remove tire.
4. Check rim components for fatigue and cracks. Replace all cracked, worn, damaged or rusted components.



Do not pound on tire or wheel components with steel hammers. If necessary to tap on components, use rubber, lead, brass or plastic mallets.

5. Assemble split flange rim and tire.
6. Around tire bead, use approved vegetable oil soap solution for lubrication or an approved tire lubricant.
7. Seat tire bead by inflating the assembled tire to 130 psi for front and 110 psi for rear with valve stem core removed. Once bead is seated, deflate tire.

FRONT & REAR WHEELS

Front Wheel

– Removal/Installation

1. Position the sweeper on a hard level surface.
2. Set the parking brake, stop the engine, and jack the vehicle in accordance with the Jacking Procedures in Table 5.1.



To prevent death or accidental injury, always place jack–stands to support a raised vehicle.

3. Loosen the lug nuts.
4. With the front tire slightly off the ground, clean the area around the wheel and hub.
5. Remove the wheel lug nuts.
6. Remove the wheel assembly from the front hub.
7. Remove the tire from the wheel, and repair the tire as required, using standard procedures.
8. With the tire dismounted, inspect the wheel for signs of damage such as a rough area that might damage the mounted tire.
9. Using standard procedures, remount the tire to the wheel. Inflate the mounted tire to 115 psi.
10. Place the assembled wheel on the front hub, and install and hand tighten the lug nuts. Tighten the lug nuts in the numerical order shown in Fig: 5.4 A. Final torque specification of front wheel lug nuts is 400–420 ft lbs.
11. Remove the jack–stands and lower the sweeper to the ground.

12. Remove the jack and wheel chocks.

Rear Wheel

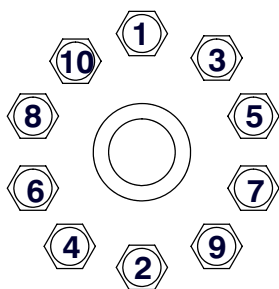
– Removal/Installation

1. Position the sweeper on a hard level surface.
2. Set the parking brake, stop the engine, and jack the vehicle in accordance with the Jacking Procedures in Table 5.1.

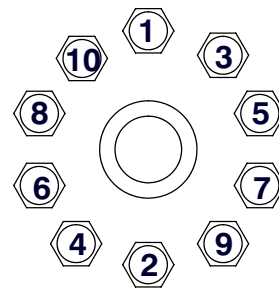


To prevent death or accidental injury, always place jack–stands to support a raised vehicle.

3. With the rear tire slightly off the ground, clean the area around the wheel and hub.
4. Remove the wheel lug nuts.
5. Remove the wheel assembly from the rear hub.
6. Remove the tire from the wheel, and repair the tire as required, using standard procedures.
7. With the tire dismounted, inspect the wheel for signs of damage such as a rough area that might damage the mounted tire.
8. Using standard procedures, remount the tire to the wheel. Inflate the mounted tire to 120 psi.
9. Place the assembled wheel on the rear hub, and install and hand tighten the lug nuts. Tighten the lug nuts in the numerical order shown in Fig: 5.4 A. Final torque specification of rear wheel lug nuts is 450–500 ft lbs.
10. Remove the jack–stands and lower the sweeper to the ground.
11. Remove the jack and wheel chocks.



**Front Lug Nut Torque
Pattern (400–420 ft lbs)**



**Rear Lug Nut Torque
Pattern (450–500 ft lbs)**

Fig: 5.4 A *Lug nut tightening sequence for replacing the front and rear wheels. Torque the first and second lug nuts to properly seat in the wheel recess before tightening down other lug nuts. Tighten in the sequence order shown.*

CHAPTER 5

Front Suspension – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Stop the engine.
4. Chock the rear wheels.
5. Clean the area around the front suspension assembly.
6. Disconnect the hydraulic cylinder (*Fig: 5.6 A: item 9*) from the front suspension assembly.
7. Remove the driver seat inside the operators cab to gain access to the floor panel underneath the driver seat.

8. Remove the floor panel.
9. From inside the operators cab, remove the front suspension assembly dust cap (2) .
10. Remove the lock nut, lock washer and the bearing cone (3, 4, 5) from the front suspension assembly.



WARNING
To prevent death or accidental injury, secure the front suspension assembly before raising the vehicle.

11. Using an overhead hoist, lift the front of the sweeper by connecting the overhead hoist to the front tow bar eyelids. The front suspension should slide out as the front of the sweeper is being raised.

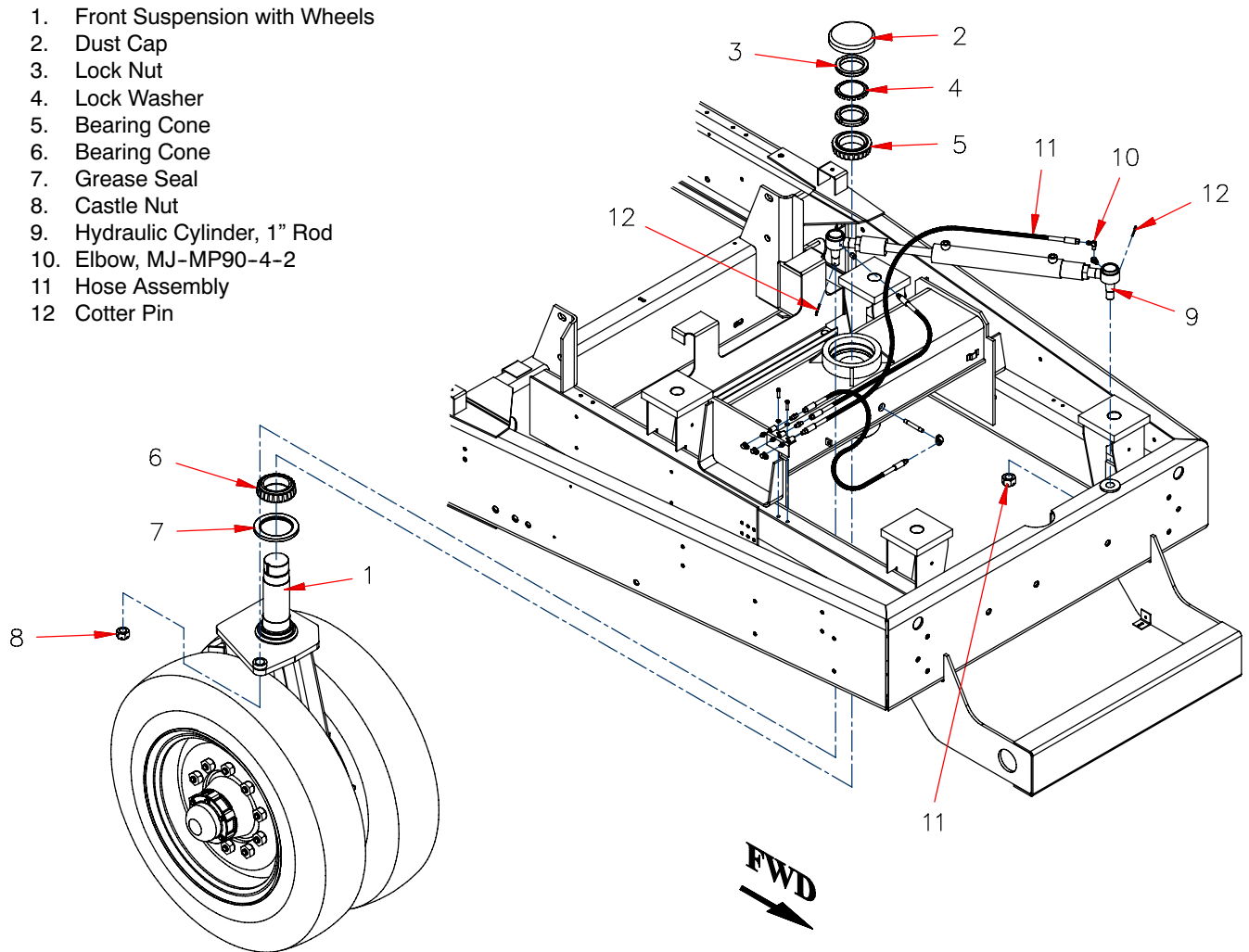
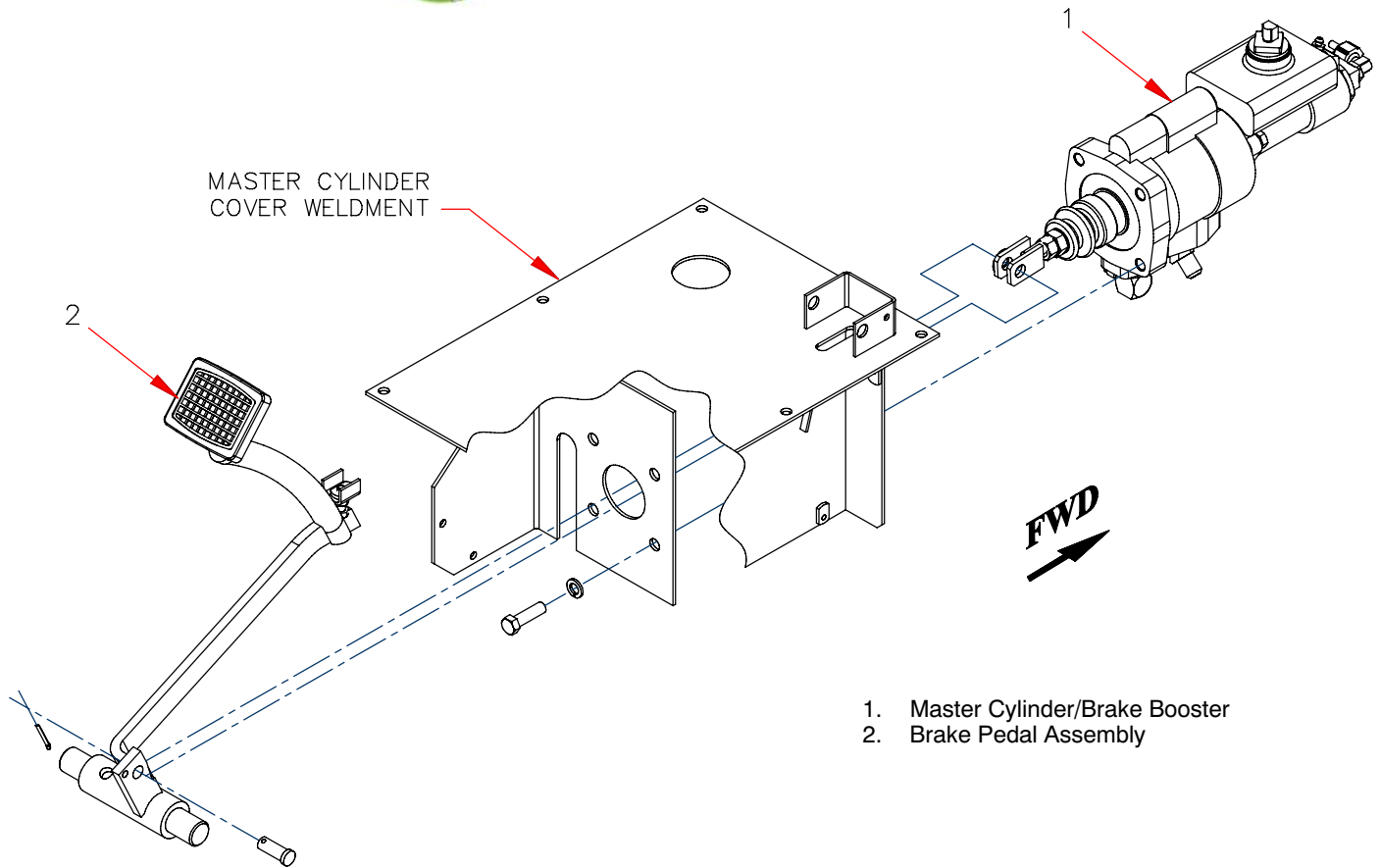


Fig: 5.6 A Front Suspension Removal/Installation



1. Master Cylinder/Brake Booster
2. Brake Pedal Assembly

Fig: 5.6 A Master Cylinder/Brake Booster Removal/Installation



WARNING

To prevent death or accidental injury, always place jack-stands to support a raised vehicle.

12. Remove the front suspension assembly.
13. Remove the bearing cone and the grease seal (Fig: 5.5 A: items 6, 7) from the front suspension assembly.
14. Install the front suspension assembly by reversing the steps.

**Master Cylinder/Brake Booster
– Removal/Installation**

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Stop the engine.
4. Chock the rear wheels.

5. Clean the area around the master cylinder/brake booster and the brake pedal.
6. Identify the hydraulic hoses connected to the master cylinder/brake booster.
NOTE: Before removing the hoses, provide a container to catch the excess hydraulic fluid from the master cylinder/brake booster.
7. Disconnect hydraulic hoses from the master cylinder.
8. Remove the cotter pin from the clevis pin which connects the master cylinder to the brake pedal assembly.
9. Disconnect the brake pedal assembly from the master cylinder.
10. Disconnect the master cylinder from the cover weldment by removing the four screws and washers which connect the master cylinder to the cover weldment.
11. Install the master cylinder/brake booster by reversing the steps.
12. Bleed the brakes.

NOTE: Before driving the sweeper, brake pedal adjustment should be done, refer to chapter 3 for the brake pedal adjustment procedure.

CHAPTER 5

1. Actuator- Parking Brake
2. Elbow- MB-MJX90-8
3. Nut- Jam, Plated, 5/8-18
4. Nut- Lock, Plated, 5/8-18
5. Washer- Lock, Split, Plated, 5/8
6. Washer- Flat, SAE, Plated, 5/8
7. Turn Buckle Weldment
8. Hairpin- 5/8 Dia.
9. Clevis Pin- 3/8 X 1 1/8
10. Cotter Pin- Plated, 1/8 X 1
11. Clevis Weldment, LH Thread
12. Equalizer Plate
13. Clevis Weldment
14. Clevis Pin- 5/16/X 1
15. Brake Cable- RH Wheel
16. Brake Cable- LH Wheel

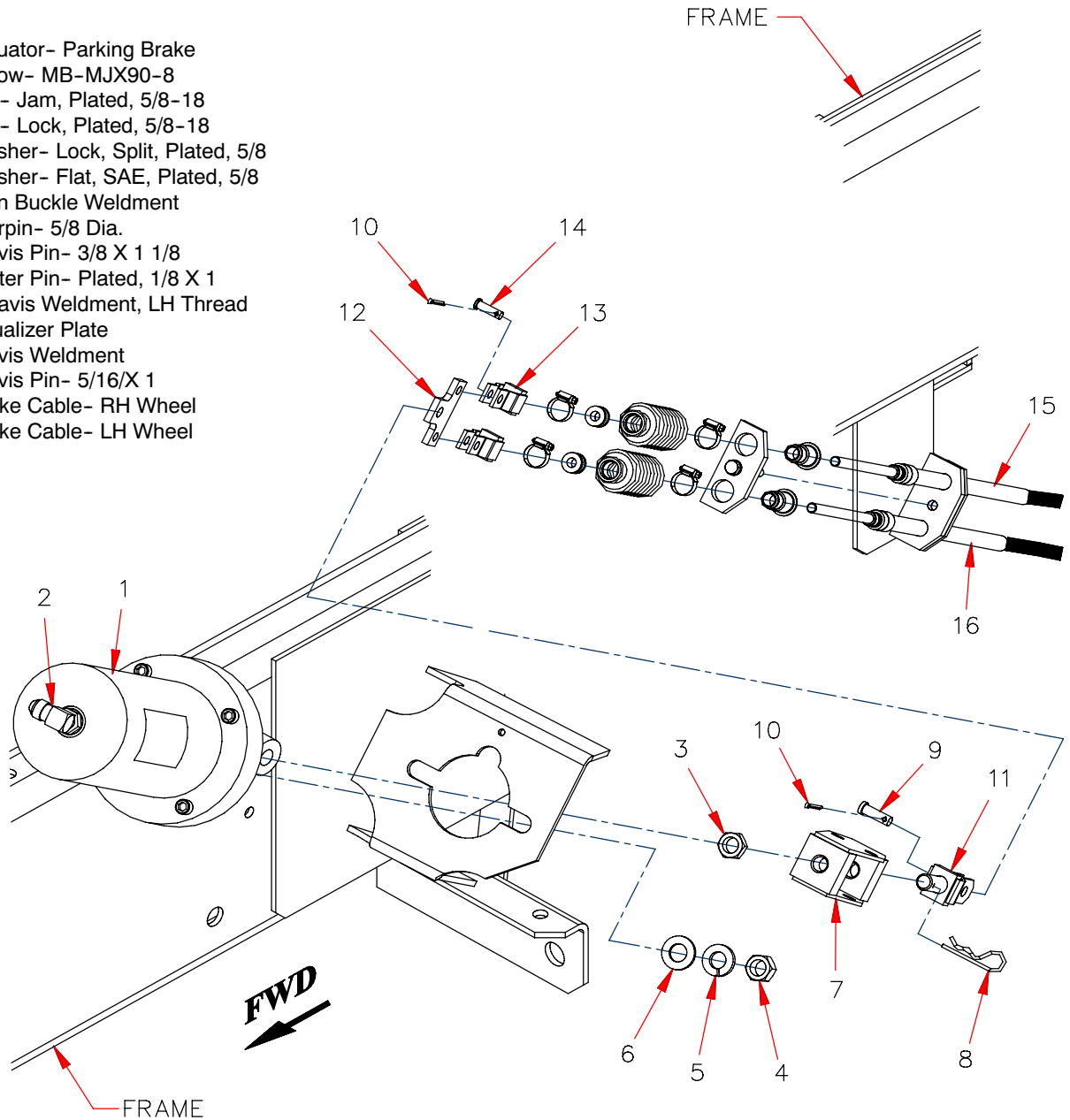


Fig: 5.7 A The Parking Brake Actuator is located in front of the left rear fender. Do not cut into, disassemble or torch the canister. The spring is under compressed force. The actuator canister must be replaced if a failure occurs.

**Parking Brake Actuator
- Removal/Installation**

1. Position sweeper on a level surface.
2. Chock the rear wheels.

3. Clean the area around the Parking Brake Actuator, cables and connecting hardware.
4. With an assistant in cab, have them start the sweeper, place shifter in the **Low (L)** position, releasing the parking brake, and engage the brake pedal.

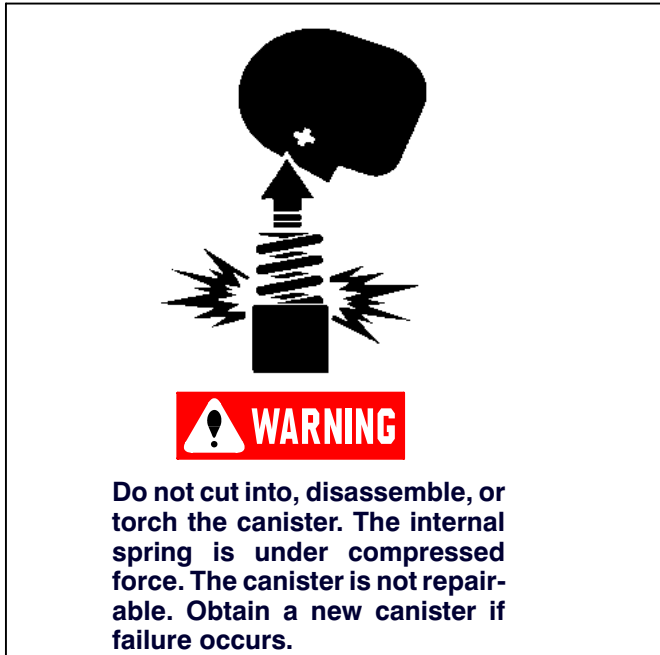


Fig: 5.8 A

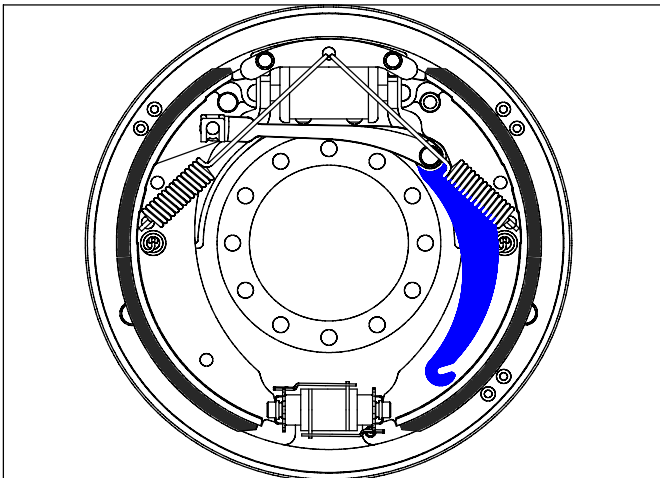


Fig: 5.8 B

5. Remove the parking brake release cotter pin and the clevis (Fig: 5.7A: 9 & 10) from the clevis weldment (11).
6. Loosen the locking nut (3). Using the gutter broom angle adjustment tool, mechanically unscrew the parking brake clevis weldment (7) turnbuckle and remove it from the actuator (1).
7. Turn off engine.
8. Disconnect the hydraulic hose from the elbow (2) on the front of the actuator. Plug the hose.

NOTE: Before removing the hydraulic hose, provide a container to catch the excess hydraulic fluid from the parking brake actuator.

9. Remove the nuts and flat washers securing the actuator to the frame. Remove the actuator (1).
10. Install the parking brake actuator by reversing the steps.



Hydraulic pressure is present with parking brake de-activated. Do not remove hydraulic hoses with shaft protruding out of canister.

Parking Brake Cable - Removal/Installation

1. Position sweeper on a level surface.
2. Chock the rear wheels.
3. Clean the area around the Parking Brake Actuator, cables and connecting hardware.
4. With an assistant in cab, have them start the sweeper, place shifter in the *Low (L)* position, releasing the parking brake, and engage the brake pedal.
5. Remove the parking brake release cotter pin and the clevis (Fig: 5.7A: 9 & 10) from the clevis weldment (11).
6. Loosen the locking nut (3). Using the gutter broom angle adjustment tool, mechanically unscrew the parking brake clevis weldment (7) turnbuckle and remove it from the actuator (1).
7. Turn off engine.
8. Jack the vehicle in accordance with the Jacking Procedures in Table 5.1.



To prevent death or accidental injury, always place jack – stands to support a raised vehicle.

9. Remove the rear wheel(s) (Refer to page 5.4 for wheel removal procedure).
10. Remove the cotter pins and clevis pins from the parking brake cable clevises (13).
11. Loosen the lock nuts on the cables. Unscrew the clevises from the cables.
12. Remove the nuts, lock washers, screws and clamps from the cable assemblies.
14. Remove the allen screws (3) which connect the drum to the torque hub assembly. Remove the drum.
15. Disconnect the parking brake cable from the brake arm (Fig: 5.8B).
16. Remove the brake cables (15 & 16).
17. Install the cables by reversing the steps.
18. Use the procedure in Chapter 3 to adjust the brake system.

Air Conditioner
– Evacuation by Vacuum Pump



DO NOT allow air conditioner refrigerant to escape into atmosphere.

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Clean the area around the air conditioner and connecting hardware.



Before connecting the manifold, close the gauge valves. Serious injury may occur if refrigerant touches your skin.

***NOTE:** The following procedures requires the use of a Refrigerant Recovery System or a manifold with three charging hoses, a compound gauge and pressure gauge.*

4. Remove the compression valve port caps and stem covers.
5. Connect the compound gauge to the compressor suction port with the hose. Connect the pressure gauge to the compressor discharge port with the hose.
6. Hook the hose to the vacuum pump.
7. Back out both compressor valve port stems completely and turn the valve stems two turns to a slightly open position.
8. Open the gauge valves and turn on the vacuum pump.
9. Operate the vacuum pump for 30 minutes. Close the gauge valves, stop the pump, and disconnect the hose from the vacuum pump.
10. The reading on the compound gauge should remain constant at 28 inches of vacuum. Let the system remain idle for 15 minutes.

***NOTE:** If the reading remains constant, the system is ready for charging. If the vacuum drops off, it is an indication of a leak. The leak must be located and sealed before charging.*



Should Refrigerant-134A contact your eye(s), do not rub the affected eye(s). Instead, splash with fresh clean cold water. Consult a doctor immediately.

HEATER/AIR CONDITIONER

***NOTE:** Only the EPA certified technicians may work with refrigerants.*

The air conditioning system consists of a condenser, a compressor, an evaporator, a receiver/dryer and an AC control panel.

Use manifold gauges, charging hoses and other air conditioning service tools when checking the refrigerant system. Use Refrigerant Recovery System or equivalent before removing or replacing any air conditioning parts.



Improper service methods may cause injury. Air Conditioning System to be serviced by qualified personnel only. Consult AC service manual.



The maximum operating charge is 4.0 lbs. of R-134A refrigerant.



Fig: 5.12 A

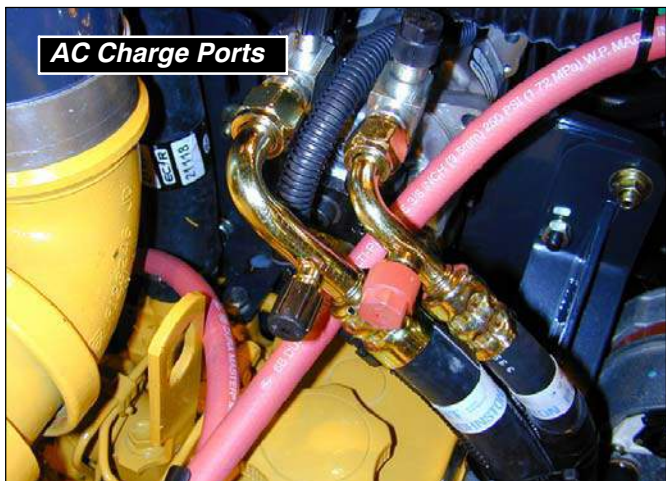


Fig: 5.12 B



Fig: 5.12 C

Air Conditioner

CHAPTER 5

– Charging or Adding Refrigerant

1. Position the sweeper on a level surface.
2. Place the shifter in the **Park (P)** position, setting the parking brake.
3. Clean the area around the air conditioner and connecting hardware.

NOTE: The following procedures requires the use of a Refrigerant Recovery System or a manifold with three charging hoses, a compound gauge and pressure gauge.



Before connecting the manifold, close the gauge valves. Serious injury may occur if escaping refrigerant touches your skin.

4. Remove the compression valve port caps and stem covers.
5. Connect the compound gauge to the compressor suction port with the hose. Connect the pressure gauge to the compressor discharge port with the hose.
6. Turn in the compressor discharge valve and suction valve port stems.
7. Bleed air from the hoses by slightly opening the shutoff valves slowly and individually for three seconds each. Then close each valve.
8. Install the valve on a refrigerant per the manufacturer's instructions and connect it to the center hose.
9. Open the valve at the refrigerant and bleed air from the center hose at the manifold. Retighten the center hose couplings.



The maximum operating charge is 4.0 lbs. of R-134A refrigerant.

10. Open both gauge valves. When the gauge readings are equal, close the pressure gauge valve. Check for leaks in the system.
11. When the refrigerant is empty, close the compound gauge valve. Close the refrigerant valve. Remove and discard the empty container. Attach another refrigerant. Open the refrigerant valve and the compound gauge valve.



The low pressure side suction gauge should not exceed 40 psi.

CHAPTER 5

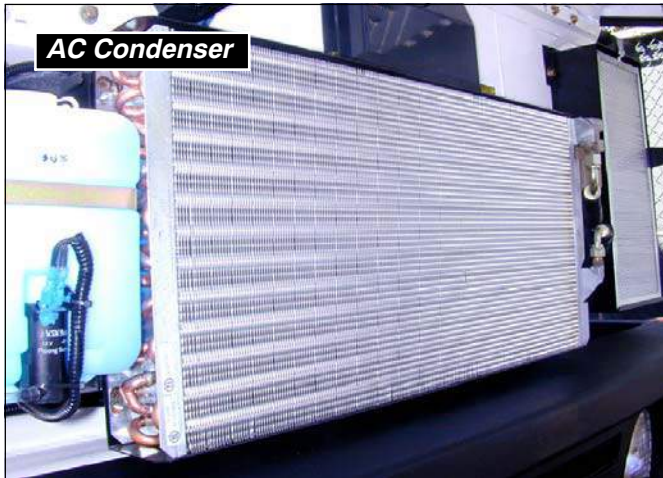


Fig: 5.13 A



Fig: 5.13 B

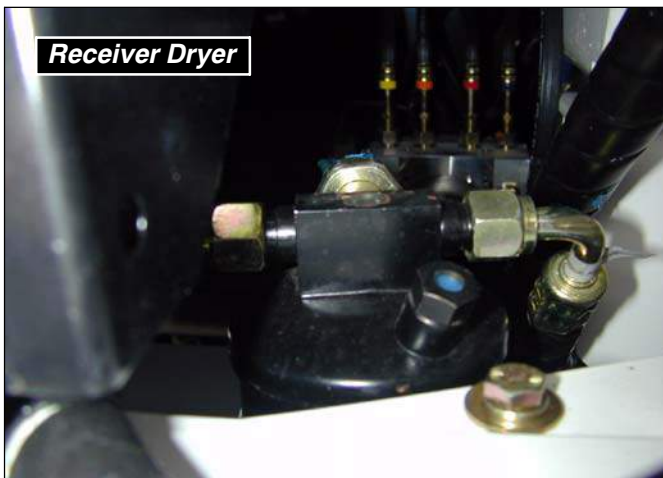


Fig: 5.13 C

12. Start the engine and set the throttle at fast idle. Position the fan switch to **On** and turn the cool switch to maximum.
13. Repeat step 8 until the sight glass on the receiver/dryer is clear and free of bubbles.
14. Close the compound gauge valve and the refrigerant valve. Slowly disconnect the center hose from the refrigerant.
15. Back out the compressor discharge valve port stem and open the pressure gauge shut off valve. Back out the compressor suction valve port stem.
16. Disconnect the hose from the refrigerant hose. Disconnect the hoses from the compressor valve port caps and stem covers.
17. In the A/C panel located in the operator's cab, position the fan switch to **Off** and stop the engine.

Air Conditioner

–Leak Detection



Avoid breathing the refrigerant fumes. They are toxic and may cause death or severe injury.

1. Leaks of refrigerant can be detected and located by using an electronic leak detection device with a sniffing tube tip for drawing air samples. If a leak is detected, the device will beep rapidly.
2. Explore the refrigerant system by passing the open end of the sniffing tube tip close to every joint.
3. If a leak is detected at a connection, tighten the fitting carefully. Recheck for leaks. If any leak is still apparent, discharge system and replace damaged components.

Air Conditioner Condenser

– Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the **Park (P)** position, setting the parking brake.
3. Raise the front grille.
4. Clean area around the air conditioner condenser and connecting hardware.
5. Discharge the air conditioner system (*refer to previous procedures*).



Serious injury may occur if the escaping refrigerant touches the skin.

6. Remove hoses from the condenser.
7. Unscrew bolts and nuts securing air conditioner condenser. Remove the condenser.
8. Install the condenser by reversing steps.
9. Evacuate and charge the air condition system (*refer to previous procedures*).

Air Conditioner Receiver Dryer – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Raise the front grille.
4. Clean area around the air conditioner receiver dryer and connecting hardware.
5. Discharge air conditioner system prior to removing components for service.



Serious injury may occur if the escaping refrigerant touches the skin.

6. Disconnect two hoses from the receiver/dryer.
7. Remove bolts, lock washers, and clamps securing the receiver dryer. Remove the receiver dryer.
8. Install receiver/dryer by reversing the steps.
9. Evacuate and charge the air condition system (*refer to previous procedures*).

Air Conditioner Evaporator – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Raise the left hand side cover.
4. Clean area around the air conditioner evaporator and connecting hardware.
5. Discharge air conditioner system prior to removing components for service.



Serious injury may occur if the escaping refrigerant touches the skin.



Fig: 5.14 A

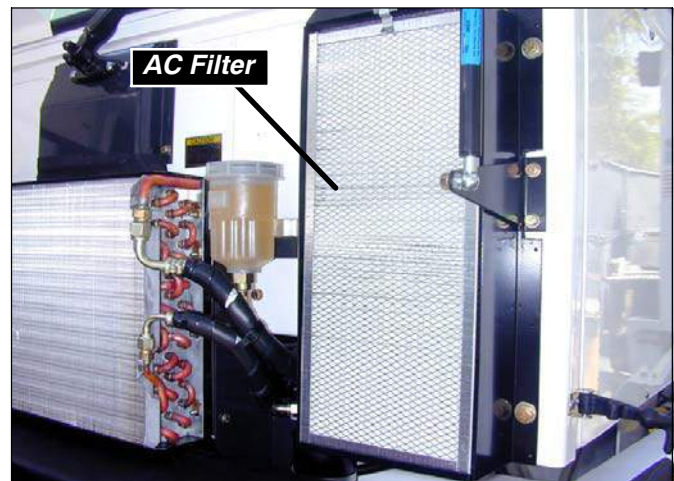


Fig: 5.14 B

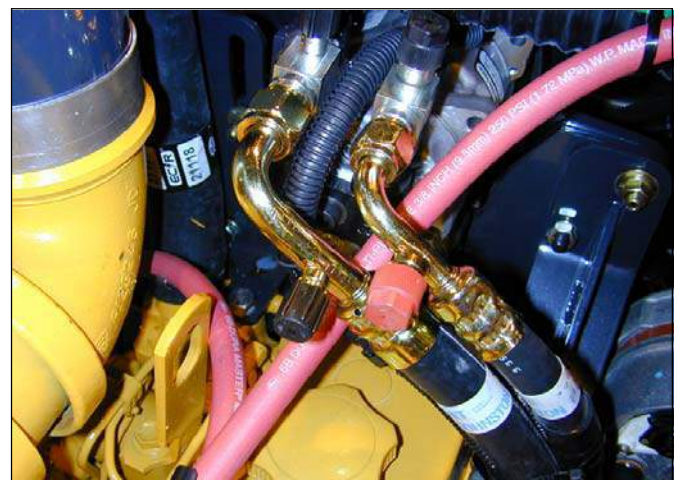


Fig: 5.14 C



CHAPTER 5

6. Disconnect electrical leads and remove hose clamps- from the evaporator.
7. Remove bolts, lock washers, and clamps securing the evaporator. Remove the evaporator.
8. Install evaporator by reversing the steps.
9. Evacuate and charge the air condition system (*refer to previous procedures*).

Air Conditioner Compressor –Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Working from the rear of the sweeper, swing out and latch the radiator.
4. Clean the area around the air conditioner compressor and connecting hardware.
5. Have the air conditioning system discharged (*refer to previous procedure*).

NOTE: Before removing components for service or before recharging refrigerant, always discharge the air conditioner system.

6. Disconnect the air conditioner hoses from the compressor.
7. Remove the electrical leads from the compressor.
8. Loosen the lock nut and turn the adjusting bolt to allow the compressor to slide toward the engine relieving V–belt tension.
10. Remove the V–belt from the compressor pulley.
11. Remove compressor bracket bolts & lock washers.
12. Remove the compressor.
13. Install the compressor by reversing the steps.
14. Use the following procedure to adjust the “V–belt” tension.
 - a. Tighten the bolts securing the compressor to the engine bracket.
 - b. With the lock nut loose, turn the adjusting bolt to move the compressor away from the engine in

creasing the belt tension.

NOTE: The properly–adjusted tension on the V–belts is a 1/2 inch deflection with a 12 pound force applied.

- c. Tighten the lock nut.
- d. Tighten the bolt and nut securing compressor to the bracket.
- e. Have the air conditioning system evacuated and recharged (*refer to the previous procedures*).

BLOWER GROUP

Blower Impeller –Removal/Installation

1. Position sweeper on a level surface under an overhead crane or hoist capable of lifting blower assembly.
2. Place shift lever in “P” position, setting parking brake.
3. Stop engine.

Maintenance & Overhaul Blower



Fig: 5.17 A



Serious INJURY or DEATH may result if hopper cylinders fail.

INSTALL safety props when working on, around or under raised hopper.

Never position yourself under hopper while installing or removing safety props.

Fig. 5.8 – With hopper raised, use a ladder to climb up to hopper cylinder and install safety prop on hopper cylinder rod. Safety prop rests on top edge of cylinder body. Install safety props on both hopper cylinders.

4. Clean area around blower impeller and connecting hardware.

5. Remove hydraulic hoses from blower motor (Fig. 5.9: 1). Drain fluid into a container.



Plug all hoses and open ports to prevent foreign matter from entering system.

note: Provide a container to catch excess hydraulic fluid from gutter broom motor prior to removing hoses.

6. Support blower drive motor with a overhead crane (or similar device).
7. Remove bolts and lock washers (2, 3) that support blower drive motor. Remove hydraulic motor.
8. Loosen bolts and washers (4, 5) holding impeller cover to blower scroll.
9. Remove top bolts to allow upper part of cover (6) to hang away from blower scroll (7).
10. Attach a lift chain to blower impeller cover.
11. With impeller assembly supported by an overhead crane (or similar device), remove remaining impeller cover bolts and washers.
12. Remove impeller assembly.

note: Shaft spline must slide out toward the rear of sweeper before impeller assembly can be pulled up.

13. Remove cotter pin, nut and washer (6, 9, 10) from end of blower shaft.
14. Place a puller plate (similar to figure 5.10) over end of shaft using two 1/2"–13 x 2 1/4" bolts. Tighten bolts evenly to pull impeller off shaft.

note: Threaded holes in impeller are a 1" depth.

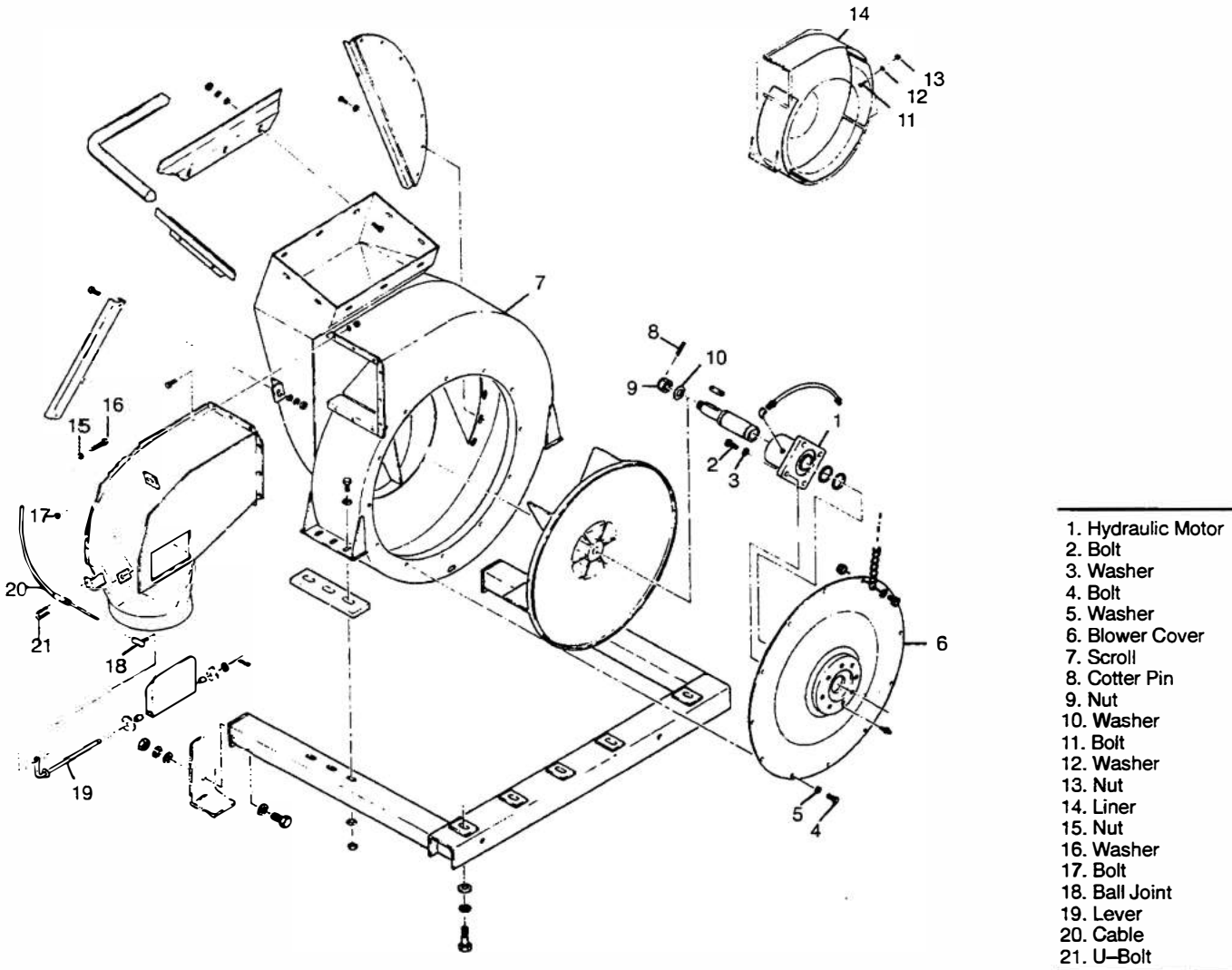
15. Install impeller by reversing steps.

note: Impeller must be pressed onto shaft with key aligned.

Blower Scroll Liner –Removal/Installation

1. Position sweeper on a level surface under an overhead crane or hoist capable of lifting blower assembly.
2. Place shift lever in "P" position, setting parking brake.

Maintenance & Overhaul
Blower



1. Hydraulic Motor
2. Bolt
3. Washer
4. Bolt
5. Washer
6. Blower Cover
7. Scroll
8. Cotter Pin
9. Nut
10. Washer
11. Bolt
12. Washer
13. Nut
14. Liner
15. Nut
16. Washer
17. Bolt
18. Ball Joint
19. Lever
20. Cable
21. U-Bolt

Fig. 5.9 – Blower Assembly is located behind operator cab. Blower removal/Installation requires two experienced mechanics and (usually) an overhead crane.

3. Raise hopper and install safety props (ref Fig 5.8).



INSTALL safety props. Serious INJURY or DEATH may result if hopper cylinders fail.

4. Stop engine.
5. Clean area around blower.

6. Remove blower impeller (refer to the preceding procedure).
7. Remove lock nuts, washers and bolts (Fig. 5.9: 11, 12, 13) from blower scroll (7).
8. Remove four rubber liner pieces (14).
9. Install scroll liners by reversing steps.

Blower Vacuum Regulator Cable
–Removal/Installation

1. Position sweeper on a level surface.
2. Place shift lever in "P" position, setting parking brake.
3. Raise hopper and install safety props (ref Fig 5.8).

Maintenance & Overhaul Blower

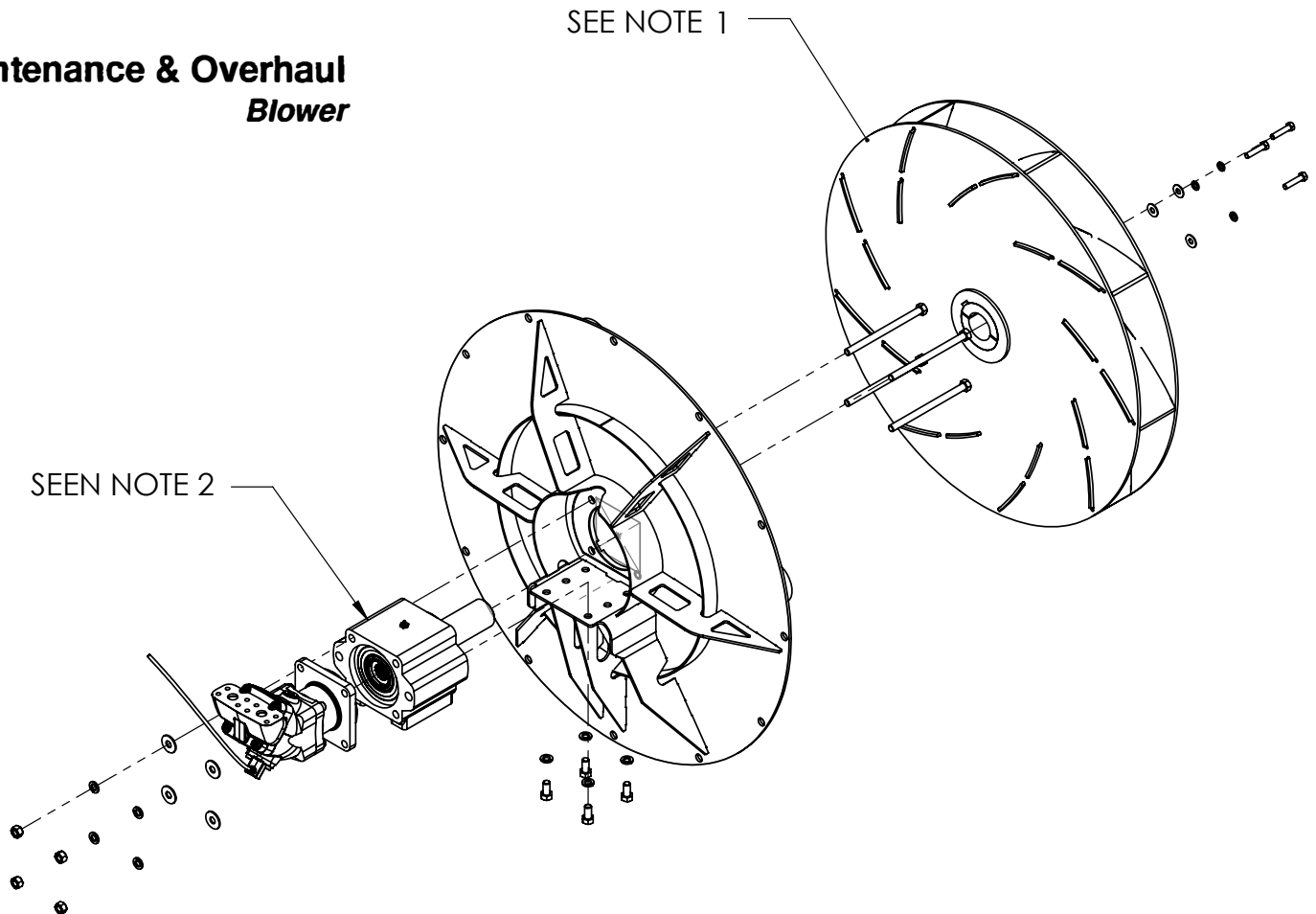


Fig. 5.10 – Blower Impeller puller is 6" x 2" x 1/2". Holes are 4" apart and .56" diameter. Do not force impeller off of shaft. Damage to both shaft and impeller could occur.



INSTALL safety props. Serious INJURY or DEATH may result if hopper cylinders fail.

4. Stop engine.
5. Clean area around blower.
6. Remove center body panel from left side of sweeper.
7. Remove nut and lock washer freeing ball joint (Fig. 5.9: 18) from vacuum regulator door arm.
8. Remove nuts, washers and u-bolts (15, 16, 17, 21) securing cable to side of blower. Remove cable (20) from the bracket.
9. Inside the cab, loosen retaining nut below cable handle and pull cable out of bracket.

10. Install cable by reversing steps.

note: Feed cable through access hole in floor of cab. Replace rubber grommet if necessary.

SUCTION HOOD GROUP

Proper operation of the sweeper requires air passages to remain open without leaks. It is important that all hoses and seals fit tight.

Blower & Suction Hose –Removal/Installation

1. Position sweeper on a level surface under an overhead crane or hoist capable of lifting blower assembly.
2. Place shift lever in "P" position, setting parking brake.
3. Raise hopper and install safety props (ref Fig 5.8).

FAN AND BEARING MAINTENANCE

NOTE: Water spray must be used to prevent premature wear. Fan and bearing should be replaced at same interval.

Recommend settings for fan are: 1875 Engine RPM which relates to 2450 fan RPM
Note 1 (33" centrifugal fan):

1. Fan can be run for **2150** cycles before replacement is needed.
2. Fan must be checked for wear and damage from foreign materials at every maintenance interval cycle.
3. Periodically inspect the shaft and wheel for dirt buildup, corrosion, and signs of excess stress or fatigue. Clean the components. If the wheel is removed for any reason, make sure that it is properly attached to the shaft before restarting the fan.
4. Check fan for dents and damage regularly
5. If any of the previous is evident, please contact manufacturer for proper maintenance procedure/instructions.
6. Trial "bump": after replacing the fan or doing maintenance do the follow

-turn on the power just long enough to start the assembly rotating.

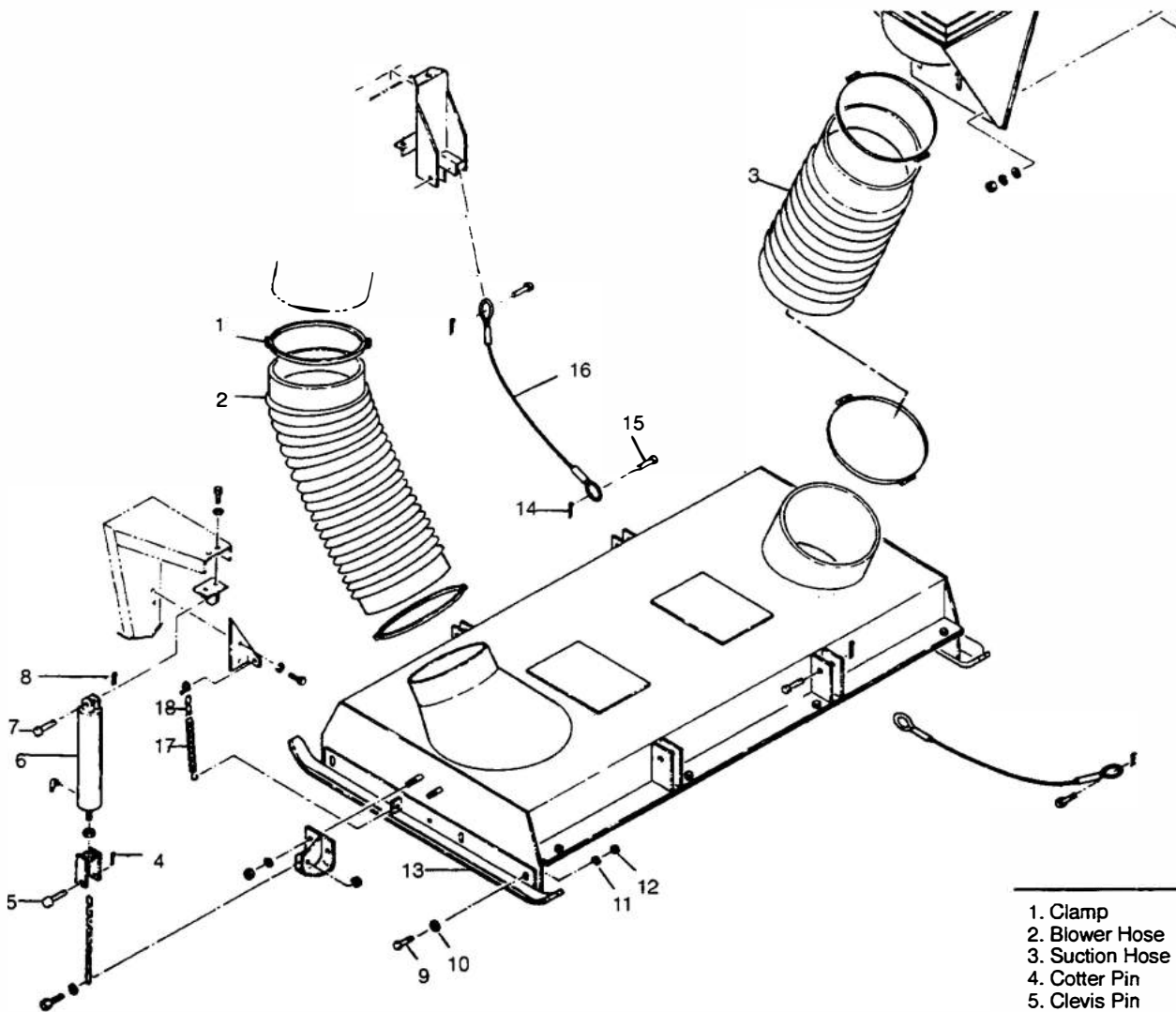
-check rotation for agreement with rotation arrow.

-listen for any unusual noise.

Note 2 (OHLA bearing):

1. Bearing is rated for 7,500 hours @ 2700 RPM.
 2. If increased vibration is noticed report to manufacturer.
 3. Added one hand pump of grease every year.
 4. Check all hardware for damage or loosening. Tighten or replace as necessary.
-

Maintenance & Overhaul
Suction Hood



1. Clamp
2. Blower Hose
3. Suction Hose
4. Cotter Pin
5. Clevis Pin
6. Lift Cylinder
7. Clevis Pin
8. Cotter Pin
9. Bolt
10. Washer
11. Washer
12. Nut
13. Skate
14. Cotter Pin
15. Clevis Pin
16. Cable
17. Spring
18. Chain

Fig. 5.11 – Suction Hood requires a tight seal with the ground and blower system and proper operation of the sweeper requires air passages to remain open without leaks.

Maintenance & Overhaul

Suction Hood



INSTALL safety props. Serious INJURY or DEATH may result if hopper cylinders fail.

4. Stop engine.
5. Clean area around suction hood.
6. Loosen clamps (Fig. 5–11: 1) on both ends of suction hose (2) (or blower hose (3)).
7. Lift bottom of hose off the hose flange on suction hood. Pull hose down behind hood and out from under sweeper.
8. Install suction hose (or blower hose) by reversing steps.

Hood Lift Cylinder

–Removal/Installation

1. Position sweeper on a level surface under an overhead crane or hoist capable of lifting blower assembly.
2. Place shift lever in "P" position, setting parking brake.
3. Raise hopper and install safety props (ref Fig 5.8).



INSTALL safety props. Serious INJURY or DEATH may result if hopper cylinders fail.

4. Stop engine.
5. Clean area around suction hood.
6. Remove cotter pin and clevis pin (Fig. 5–11: 4, 5) from cylinder clevis.
7. Remove hydraulic hoses from cylinder (6). Drain fluid into a container.



Plug all hoses and open ports to prevent foreign matter from entering system.

note: Provide a container to catch excess hydraulic fluid from gutter broom motor prior to removing hoses.

8. Remove cotter pin and clevis pin (7, 8) from clevis at the top of cylinder.
9. Remove suction hood cylinder (6).
10. Install cylinder by reversing steps.

Hood Skate

–Removal/Installation

1. Position sweeper on a level surface under an overhead crane or hoist capable of lifting blower assembly.
2. Place shift lever in "P" position, setting parking brake.
3. Raise suction hood.
4. Remove bolts, nuts and washers (Fig. 5–11: 9, 10, 11, 12) from skates.
5. Remove skates (13) from each end of suction hood.
6. Install new skates. Do not tighten bolts.
7. Start engine and lower hood to the down position.
8. With the top of hood parallel to the ground, adjust the skates to touch the ground.
9. Tighten skate attachment bolts (9, 12).

Suction Hood

–Removal/Installation

1. Position sweeper on a level surface under an overhead crane or hoist capable of lifting blower assembly.
2. Place shift lever in "P" position, setting parking brake.
3. Raise hopper and install safety props (ref Fig 5.8).



INSTALL safety props. Serious INJURY or DEATH may result if hopper cylinders fail.

4. Stop engine.
5. Clean area around suction hood.
6. Remove blower and suction hoses (Fig. 5–11: 2, 3) following a previous procedure.
7. Remove cotter pins and clevis pins (14, 15) to disconnect four hood cables (16).
8. Remove lift cylinder (6) following a previous procedure.
9. Remove spring (17) by taking shackle out of mount bracket.

Maintenance & Overhaul

Gutter Broom

note: Take note of spring mounting position in chain link (18). Install in same position.

10. Slide hood from under sweeper by pulling out the side and slightly rearward.
11. Install hood by reversing steps.

GUTTER BROOM GROUP

The right and left gutter brooms are similar in construction. Mounting each broom on its respective side of the sweeper requires minor changes. The following procedure covers only the right gutter broom.

Gutter Broom Hydraulic Motor – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Stop the engine.
4. Clean the area around the hydraulic motor and connecting hardware.
5. Remove the hex nut (*Fig: 5.24A: 1*) securing the gutter broom plate assembly and dish assembly to the hydraulic motor. Lower the assembly to the floor.
6. Disconnect the hydraulic hoses from the elbows. Remove the elbows and connectors from the hydraulic motor.

NOTE: Before removing the hoses, provide a container to catch the excess hydraulic fluid from the gutter broom motor.



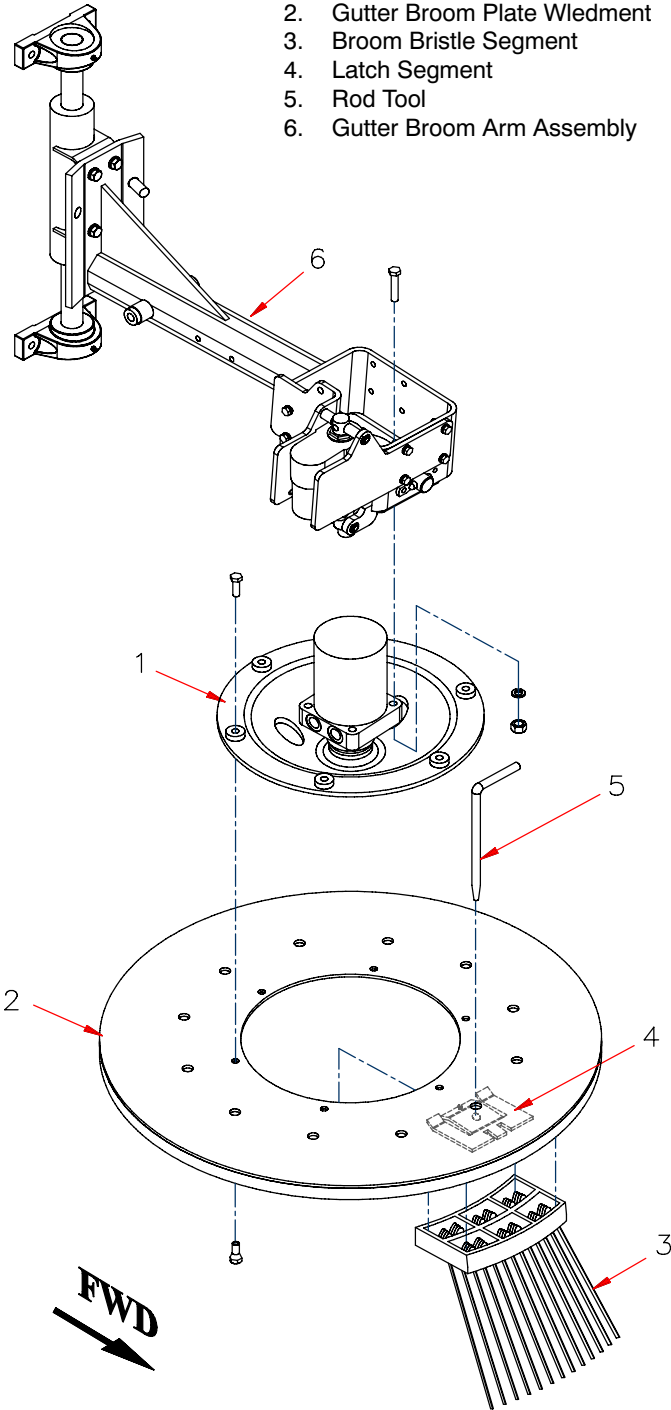
Plug all hoses and open ports to prevent foreign matter from entering hydraulic system.



The GB Motor will separate from the collar once free. Take care so that the GB motor does not fall on you.

7. Place protective plugs in the ports of the hydraulic motor and on the hoses to prevent dirt from entering the system.

1. Dish & Motor Assembly
2. Gutter Broom Plate Wledment
3. Broom Bristle Segment
4. Latch Segment
5. Rod Tool
6. Gutter Broom Arm Assembly



8. Remove the four hex nuts, lock washers, flat washers, and bolts securing the hydraulic motor to the gutter broom arm.
9. Remove the hydraulic motor and separate the dish assembly. Inspect the dish assembly for rust or damage. Replace the parts.
10. Install the gutter broom motor by reversing the steps.
11. Before installing the plate assembly and dish assembly, make sure the woodruff key is positioned in the gutter broom motor shaft. Install the motor shaft hex nut and torque from 300 to 310 foot-pounds.

Gutter Broom Plate & Brush Assembly – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the **Park (P)** position, setting the parking brake.
3. Raise the gutter broom.
4. Stop the engine.
5. Clean the area around the gutter broom and connecting hardware.
6. Using the rod tool (Fig: 5.24 A; 5), unlock the bristle segment (3) from the gutter broom plate.
7. Steam clean the gutter broom segment plate, removing all dirt and debris.
8. Remove the hex nut securing the gutter broom plate assembly, plate and mounting dish to the hydraulic motor. Lower the assembly to the floor making sure the shaft key stays in place.
9. Remove the six bolts securing the mounting dish to the plate.
10. Remove the mounting dish.

NOTE: Inspect the mounting dish threads for damage. Replace the mounting dish if damaged. Inspect the threads on the bolts for damage, and replace as necessary.

12. Install the gutter broom plate assembly by reversing the steps.

NOTE: Be careful to position the woodruff key in the gutter broom motor shaft before installing the plate assembly and mounting dish. Torque the motor shaft hex nut from 300 to 310 foot-pounds.

13. Re-adjust the gutter broom pressure.

Fig: 5.24 A Gutter Broom Plate/Brush Removal and Installation are basically the same on both sides.

CHAPTER 5

Gutter Broom Hydraulic Lift Cylinder – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Lower the gutter broom.
4. Stop the engine.
5. Remove the two bolts and lock washers securing the

- cover over the hydraulic lift cylinder. Remove the cover.
6. Clean the area around the hydraulic cylinder (*Fig: 5.25A: 1*) and the connecting hardware.
7. Disconnect the hydraulic hose assembly (*3*) from the elbow fitting (*4*).

NOTE: Before disconnecting the hydraulic hose, provide a container to catch the excess hydraulic fluid from the gutter broom hydraulic cylinder.

1. Hydraulic cylinder
2. Cylinder Cover
3. Cylinder Hose Assembly
4. Elbow- MB-MJ90-6
5. Braather Filter
6. Elbow- MB-MP90-6-4
7. Clevis Assembly
8. Cylinder Support Weldment
9. Cotter Pin- Plated

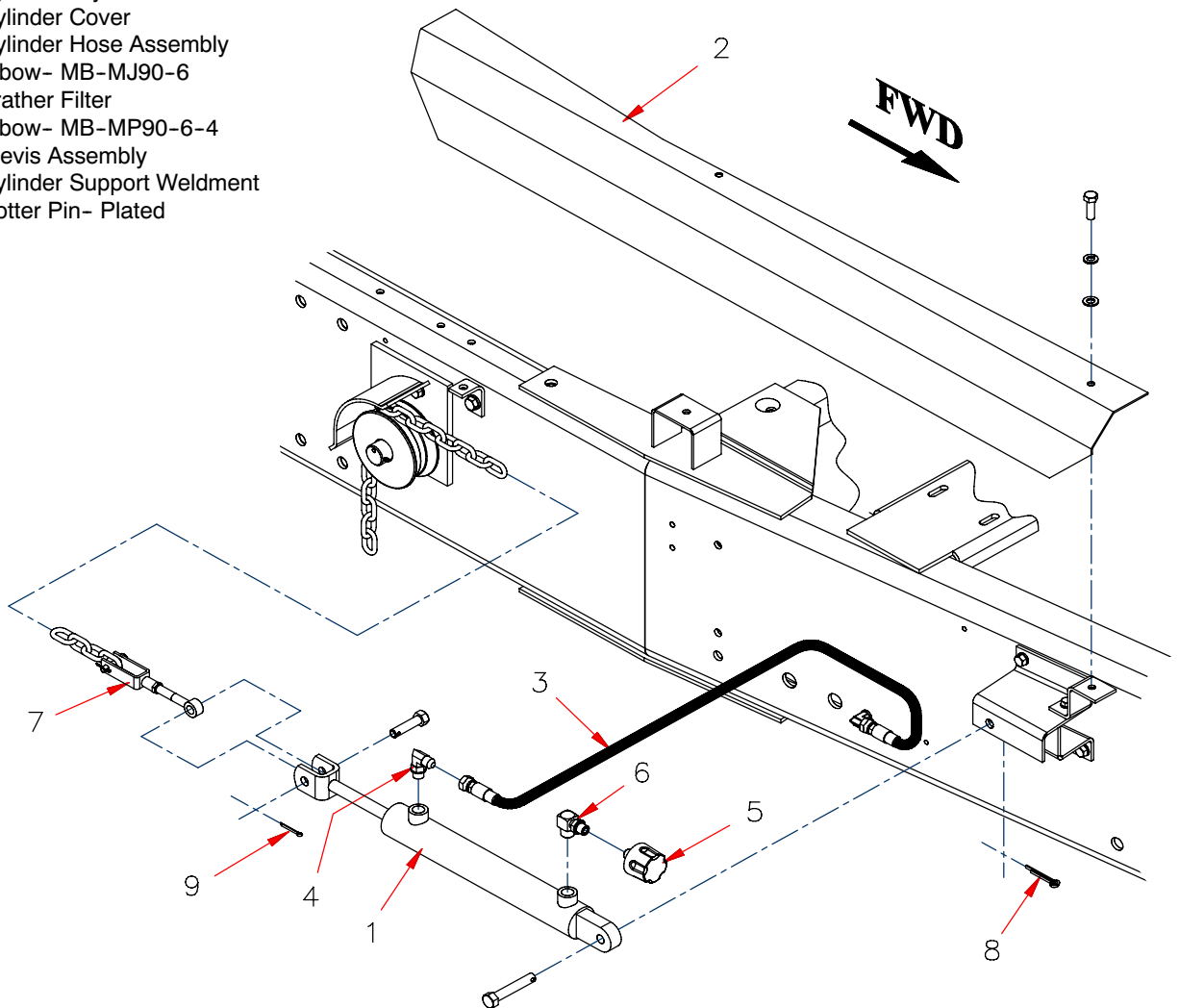


Fig: 5.25 A The Gutter Broom Lift Cylinder is located outside of the frame rail. A cable chain is connected to the cylinder and runs through a pulley down to the gutter broom arm.



Plug all hoses and open ports to prevent foreign matter from entering hydraulic system.

8. Remove the elbow fitting from the hydraulic cylinder.
9. Place protective plugs in the port of the hydraulic cylinder and on the hose to prevent dirt from entering the system.
10. Place a hydraulic jack under the gutter broom and raise just enough to release pressure off the cable.
11. Remove the cotter pin and clevis pin from the shaft end of the cylinder, freeing the cable and the shaft end of the lift cylinder.
12. Remove the cotter pin (9) and clevis pin from the body end of the cylinder securing it to the sweeper frame. Retain the two flat washers for re-installation.
13. Remove the hydraulic cylinder.
14. Remove the breather and elbow from the hydraulic cylinder.
15. Install the gutter broom lift cylinder by reversing these steps

Gutter Broom Arm Assembly – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Stop the engine.
4. Clean the area around the gutter broom and connecting hardware.
5. Remove the gutter broom motor and plate assembly (*refer to previous procedures*).
6. Disconnect the shock absorber from the arm assembly by removing the nut, flat washer, bushing, and bolt from clevis weldment (*Fig: 5.28A; 5*).

7. Remove the nut, flat washer and lower bearing from the clevis.
8. Remove the clevis and upper hardware.
9. Disconnect and remove tension spring (3).

NOTE: *When performing installation procedure close the spring loops after connecting the spring to the chain and frame.*

10. Remove the lock nuts, cap screws and washers attaching the shock absorber bracket and chain to the gutter broom arm.

NOTE: *Inspect the spring, chain and cable for damage. Replace as necessary.*

11. Place a hydraulic jack under the gutter broom and raise just enough to release the pressure off the lift chain.
12. Remove the nut, washer and bolt securing the lift chain bracket to the gutter broom arm.

NOTE: *Record the number of top spacers between the pillow blocks and the bracket weldment. A correct installation requires the same spacing.*

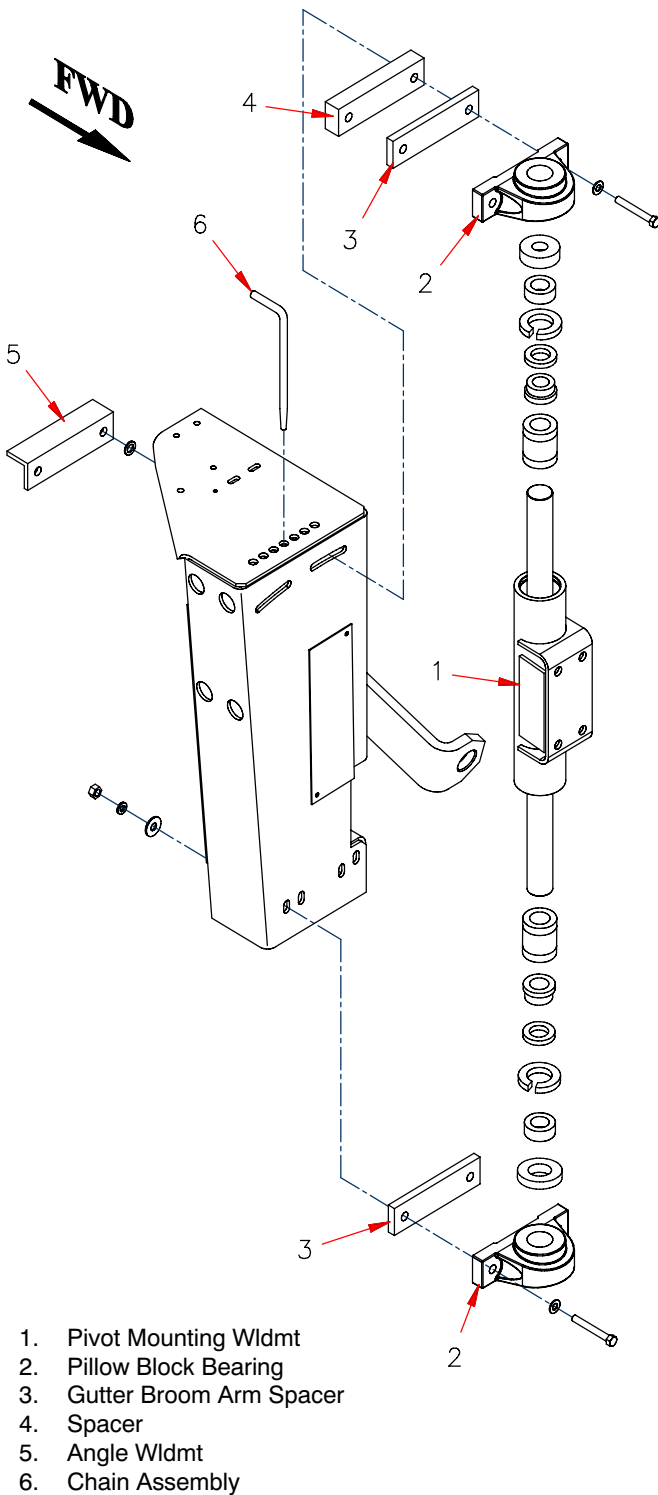
NOTE: *In disassembly, remove only the top pillow block bearing (so that the arm assembly is still supported).*

13. Remove the screws, washers and nuts securing the gutter broom arm to the lift shaft pivot assembly.
14. Remove the gutter broom arm assembly (1) from the the lift shaft pivot assembly.

NOTE: *Before installation of the arm assembly, check the fit of the shaft in the pillow block bearings. Inspect the shaft for scoring, rust, or other damage. Replace as necessary.*



The GB Arm will separate from the GB bracket weldment once free. Take extra precautions so that the GB arm does not fall on your feet.



NOTE: During each overhaul, always replace the bumpers, housing wipers and wiper rings. Install the bumpers against the bearing collars.

15. Install gutter broom arm assembly by reversing steps.
16. Grease pillow block bearing fittings after installation.



CAUTION
Plug all hoses and open ports to prevent foreign matter from entering hydraulic system.

Gutter Broom Shock Absorber – Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Lower the gutter broom.
4. Stop the engine.
5. Clean the area around the shock absorber and connecting hardware.
6. Remove the nut, flat washers, bushing, and bolt from both ends of the shock absorber, securing the absorber to the gutter broom arm and frame.
7. Remove the shock absorber .

NOTE: If either clevis requires replacement, go to step 8. Otherwise go to step 10.

8. Remove the nut, washer and lower bearing from the clevis.
9. Remove the clevis and separate the washer, sleeve, and upper bearing from the clevis shaft.
10. Before replacing the shock absorber, collapse the new shock and rotate it to the "R" setting until it clicks.
11. Partially extend the shock and rotate the ends until the eyes align with each clevis.
12. Proceed with shock absorber installation by reversing the above steps.

NOTE: Tighten the lock nuts securing the shock to each clevis just enough to allow free rotation.

Fig: 5.27 A Removal of the Gutter Broom Arm requires the use of a jack to hold up the assembly while the hydraulic cylinder tension is being released.

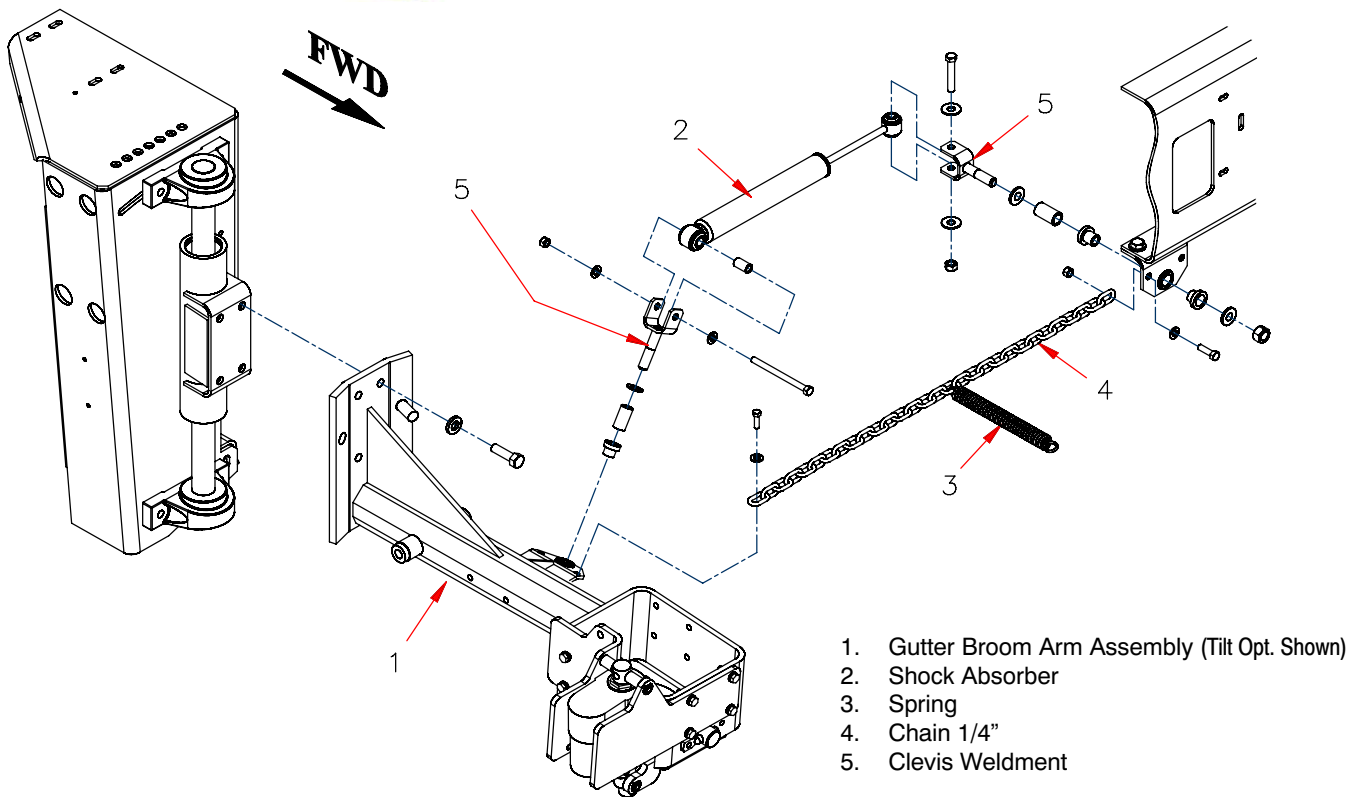


Fig: 5.28 A The gutter broom arm shock absorber mounts to the gutter broom arm and to the frame. A jack may be required when working on the gutter broom arm assembly to relieve the hydraulic cylinder tension.

ENGINE GROUP

The engine group section in this chapter provides instructions on the removal and installation of the engine external components. Refer to the John Deere Engine Troubleshooting and Repair Manual to repair and overhaul the engine.

Fuel Filters/Water Separator – Removal/Installation

The purpose of the fuel filters are to keep fuel clean, to filter any dirt particles that can cause wear on the fuel system, and to separate any water from the fuel. The primary fuel filter is mounted on the right side of the engine towards the front of the sweeper. The pre-filter is mounted on the wall inside RH hydraulic tower next to the engine.



The filter element should always be replaced with new one. Never try to clean the filter element.

1. Position the sweeper on a level surface.
2. Place the shifter in the **Park (P)** position, setting the parking brake.
3. Raise the hopper and install the safety props.
4. Stop the engine.
5. Clean area at the right front of engine and fuel filter.

NOTE: Before removing the fuel filter element, provide a container to catch the excess fuel.

6. Unscrew the fuel filter element from the filter head, located on the right hydraulic tower.
7. Remove fuel filter element and the gasket.

NOTE: Always replace the gasket when replacing a fuel filter element.

NOTE: The engine fuel system may require priming the first time the engine is started after working on the fuel system.

8. Replace fuel filter element and the gasket by reversing the steps.

BATTERY GROUP

The battery provides a source of energy for cranking the engine and acts a voltage stabilizer for the electrical system.

The battery is factory sealed. Water never needs to be added. A small amount of electrolyte may leak from the top of the battery if it is tipped at more than 45 degree angle. Evidence of electrolyte leakage on top of the battery does not necessarily mean that the battery is defective.

Battery- Warning



EXPLOSIVE GASES. Always shield eyes and face when working on or around batteries. Cigarettes, flames or sparks could cause the battery to explode.

Batteries contain poisonous sulfuric acid which can cause severe burns. Avoid contact with skin, eyes and clothing. In the event of accident flush with water and call a physician immediately.

Antidote-External:

Flush thoroughly with water.

Antidote-Internal:

Drink large quantities of water or milk. Follow with milk of magnesia, a beaten egg or vegetable oil.

Antidote-Eyes:

Flush eyes with water for 15 minutes. Accidental shorting across the battery terminals may result in lead splatter which can cause bodily injury and/or fire.



Do not tip the battery more than 45 degree angle when carrying or installing it.

NOTE: Keeping the batteries in a charged condition should protect it against freezing.

Battery - Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Stop the engine.
4. Open RH fender cover to gain access to the battery.
5. Remove plastic terminal cover. Disconnect the negative battery cable (*black*) from the battery negative terminal. Move the cables away from the terminals.
6. Disconnect the positive battery cable (*red*) from the battery positive terminal. Move the cables away from the terminals.
7. Remove the nuts and washers from the hold down assemblies.
8. Remove the hold down assemblies
9. Remove the battery.



The battery is extremely heavy. To prevent injury, always lift with your leg and arm muscles, not your back.

10. Install the battery by reversing the steps.

Battery-Replacement Precautions

When handling a battery, the following precautions should be observed:

1. Hydrogen gas is produced by the battery. A flame or spark near the battery may cause the gas to ignite.
2. Inspect the battery for physical damage and replace as required.
3. Battery fluid is highly acidic. Avoid spilling on clothing or other fabric. Any spilled should be flushed with water immediately.
4. To disconnect, remove negative cable from the negative terminal and positive cable from the positive terminal.
5. To connect or install make sure positive cable is connected to the positive terminal and negative cable is connected to the negative terminal.

CHAPTER 5

PLACEMENT FOR HOOKS
USED TO RAISE THE HOPPER
(4 PLACES)

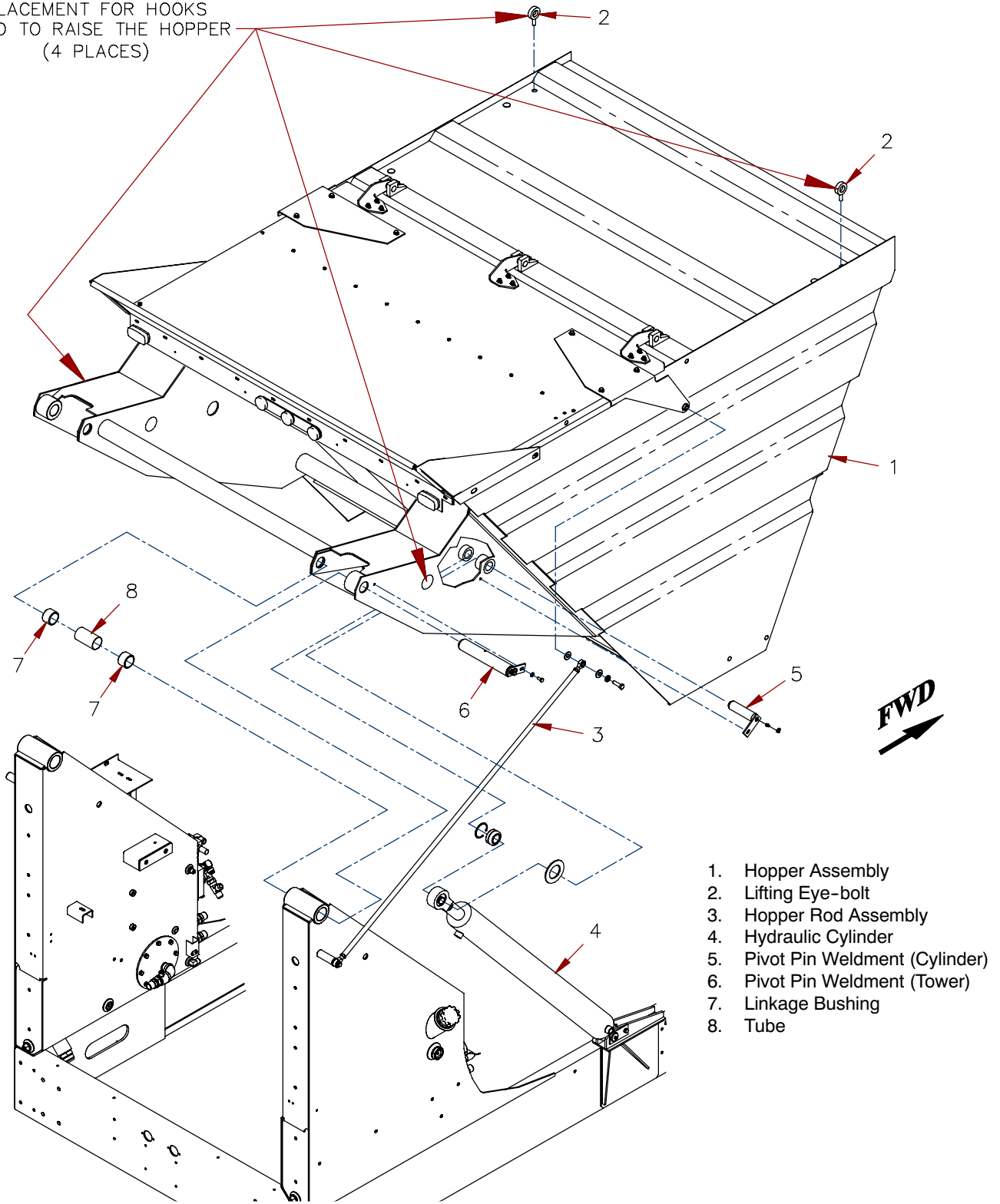


Fig: 5.37 A To remove the hopper, attach an overhead crane sling to each of the attaching point.



HOPPER GROUP

The removal and installation of the hopper requires a lifting equipment designed to lift the hopper safely as an assembly without causing personal injury or damage to the equipment.

Hopper - Removal/Installation

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Stop the engine.

NOTE: Before removing the hydraulic hoses, provide a container to catch the excess hydraulic fluid.

4. Remove the hydraulic hoses connected to the hopper door lift cylinder.
5. Provide a chain sling and hoist capable of lifting the hopper. Attach the sling to the lifting eye (1/2" standard) at each corner of the hopper, with a center pull crane (or hoist) configuration.
6. Remove the bolts, lock washers and hopper lift cylinder pins from each side of the hopper.



Do Not remove the lower lift cylinder pins from the frame.

7. Remove the bolts and lock washers that secure the hopper hinge pivot pin on each side of the hopper.
8. Raise the crane (or hoist) to lift the hopper from the sweeper.
9. Remove the bushing and spacer from each side of the hopper pivots.
10. Install the hopper by reversing the steps.

Raising the Hopper Without Engine Power (Option)

In order to raise the hopper without engine power, a remote hydraulic pump is required to actuate pressure necessary to lift the cylinder.

1. Position the sweeper on a level surface.
2. Place the shifter in the *Park (P)* position, setting the parking brake.
3. Remove remote high pressure and low pressure caps from auxiliary hopper lift ports.
4. Attach remote hydraulic hoses and a remote hydraulic pump to the ports.

NOTE: The female port (pressure) comes directly from the auxiliary pump. The male port (return) should dump into a hydraulic oil container or pump reservoir.

5. Start the remote hydraulic pump and raise the hopper.

NOTE: Pressure necessary to lift the cylinder will depend on the amount of debris inside the hopper.



INSTALL safety props. DEATH or serious INJURY may result if the hopper cylinders fail.

6. Install the safety props.
7. Remove the remote pump and related connections.
8. Replace the auxiliary port caps.
9. Check the hydraulic fluid level.



Maintenance & Overhaul Hopper

Hopper Screen

–Removal/Installation

1. Position sweeper on a level surface.
2. Place shift lever in "P" position, setting parking brake.
3. Stop engine.
4. Open hopper access door.

note: To open hopper door, it may be required to raise the hopper about a half of foot to release pressure.

5. From inside hopper, remove screen brackets.



Support clogged screens prior to removing brackets. The weight of debris may cause the screen to fall.

6. Remove screens by dropping the rear of screen about an inch and pulling the screen back.
7. Scrape dirt and debris from all mounting surfaces and screens.

8. Install screens by reversing steps.

Hopper Seal

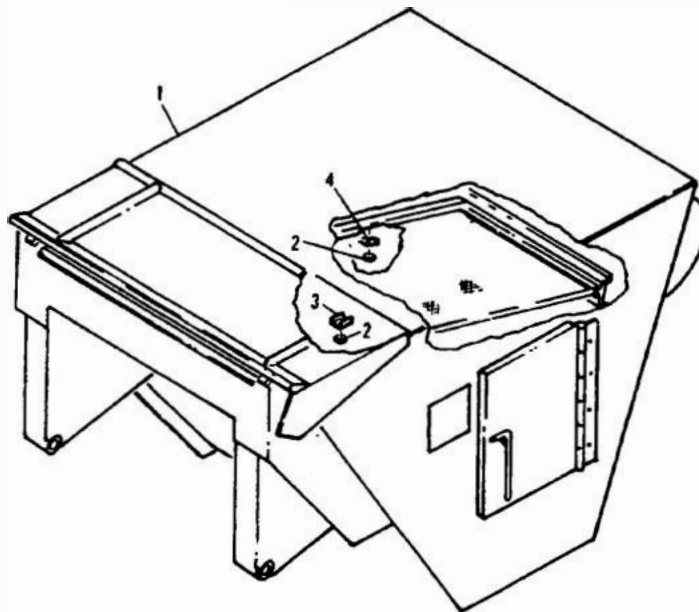
–Removal/Installation

1. Position sweeper on a level surface.
2. Place shift lever in "P" position, setting parking brake.
3. Raise hopper and install safety props (ref Fig 5.10).



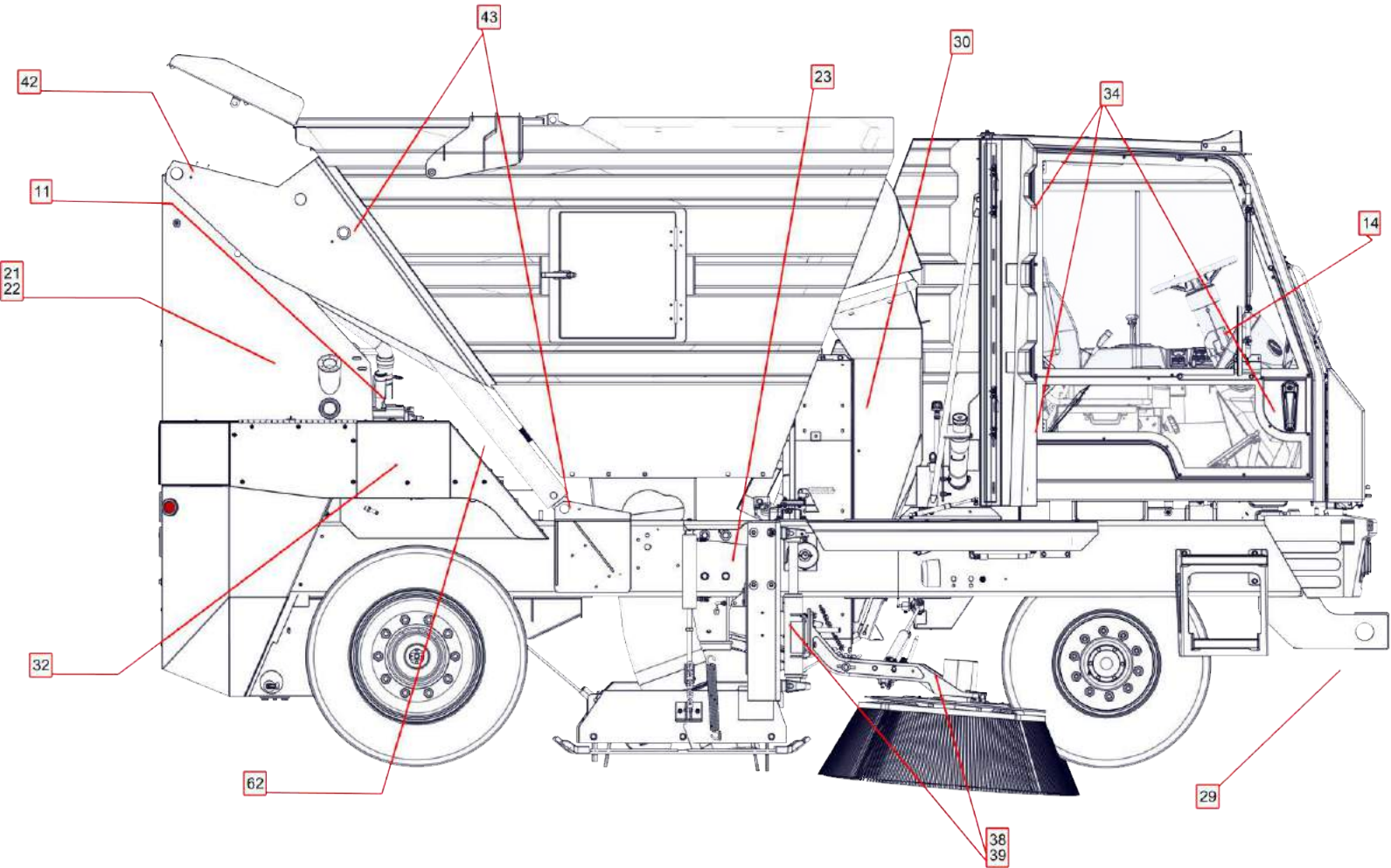
INSTALL safety props. Serious INJURY or DEATH may result if hopper cylinders fail.

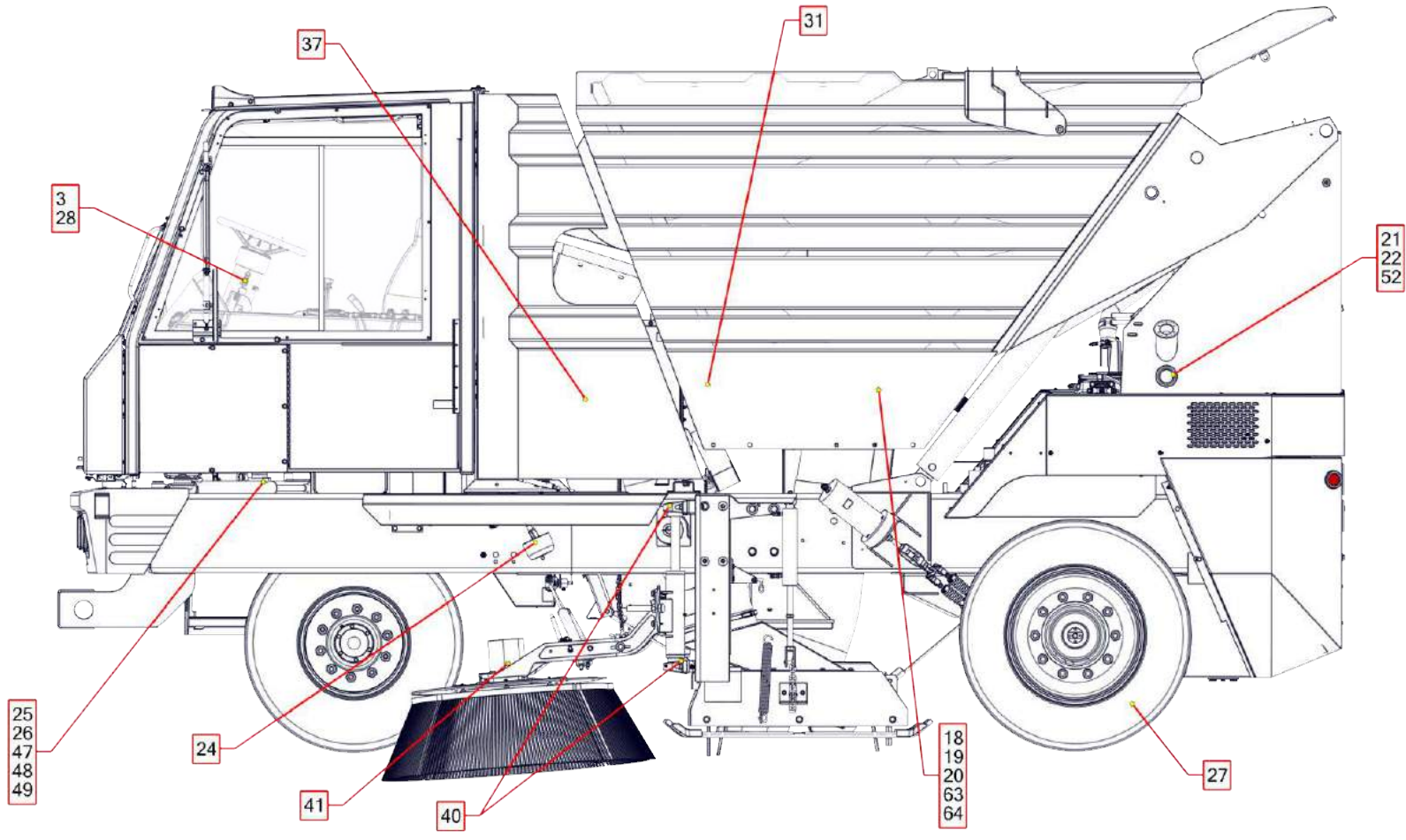
4. Stop engine.
5. Remove damaged seal by scraping material out of seal channel.
6. Thoroughly clean area in and around seal channel. Allow channel area to dry.
7. Apply contact cement to new seal and the bottom of seal channel.
8. Install seal into channel until adhesive surfaces on seal and channel contact firmly.
9. Allow time for contact cement to dry completely. □



1. Hopper
2. Nut
3. Bracket
4. Bolt





Fig. 5.20 – Hopper screens are located inside of hopper. Through the access door, you can get to the screens to work on. If the screens are clogged, beware that the debris may be heavy.







No.	Maintenance Operation	Service Interval				
		Daily	50 - Hour	100 - Hour	250 - Hour	500 - Hour
	Check: ✓					
1	Air Cleaner Filter	<input type="radio"/>				
2	Air Cleaner Hoses And Connections		<input type="radio"/>			
3	Air Cleaner Service Indicator	<input type="radio"/>				
4	Air Conditioner Filter		<input type="radio"/>			
5	Brake Fluid Level	<input type="radio"/>				
6	Radiator	<input type="radio"/>				
7	Coolant Level	<input type="radio"/>				
8	Cooling System - Deaeration Tank	<input type="radio"/>				
9	Coolant Leakage	<input type="radio"/>				
10	(Not Used)	N/A	N/A	N/A	N/A	N/A
11	Engine Oil Level	<input type="radio"/>				
12	Engine Oil Leakage	<input type="radio"/>				
13	Fan Belt Tension	<input type="radio"/>				
14	Fuel Level	<input type="radio"/>				
15	Exhaust System	<input type="radio"/>				
16	Oil Cooler (Inspect and Wash)	<input type="radio"/>				
17	Hydraulic Oil Composition					<input type="radio"/>
18	Hydraulic Oil Filter Gauge, Suction	<input type="radio"/>				
19	Hyd. Oil Filter Indicator, High Pressure	<input type="radio"/>				
20	Hydraulic Hoses - Visual Inspection	<input type="radio"/>				
21	Hydraulic Oil Level	<input type="radio"/>				
22	Hydraulic Oil Leakage	<input type="radio"/>				
23	Auto Lube (optional)	<input type="radio"/>				
24	Lights	<input type="radio"/>				
25	Steering Ball Joints		<input type="radio"/>			
26	Steering Spindle Bearing		<input type="radio"/>			
27	Tire Pressure	<input type="radio"/>				
28	Water Spray Level	<input type="radio"/>				
29	Water Spray Nozzles	<input type="radio"/>				
30	Check Blower Fan	<input type="radio"/>				
31	Removed					
32	Battery Corrosion			<input type="radio"/>		

No.	Maintenance Operation	Service Interval				
		Daily	50 - Hour	100 - Hour	250 - Hour	500 - Hour
	Lubricate: 					
33	Removed					
34	Door Hinge & Latch			○		
35	Removed					
36	Removed					
37	Removed					
38	Gutter Broom Shock Absorber		○			
39	Gutter Broom Lift Bearings	○				
40	Gutter Broom Swing Bearings		○			
41	Gutter Broom Motor/Dish Cavity	○				
42	Hopper Pivot Bearings		○			
43	Hopper Ram Bearings, Lower & Upper		○			
44	Removed					
45	Removed					
46	Removed					
47	Steering Ball Joints		○			
48	Steering Spindle Bearing		○			
49	Steering Spindle Input Shaft		○			
	Service - Change: 					
50	Engine Oil <i>(Follow JD Engine Manufacturer Recommendations)</i>				○	
51	Front Wheel Bearing Grease					○
52	Hydraulic Oil <i>(Analyze and Change if required)</i>					○
	Service - Clean: 					
53	Front Wheel Bearings					○
54	Fuel Filter, Primary, Water Separator				○	
55	Water Stariners (2 Places)	○				
56	Charge Air Cooler	○				
57	Radiator/Oil Cooler	○				
	Service - Replace: 					
58	Air Cleaner, Primary & Safety Elements				○	
59	Engine Oil Filter <i>(Refer to JD Engine Manual for recommendations)</i>				○	
60	Fuel Filter, Primary, Water Separator				○	
61	Fuel Filter, Secondary <i>(Refer to JD Engine Manual for recommendations)</i>				○	
62	Hydraulic Oil Filter, Suction				○	
63	Hydraulic Oil Filter, High Pressure				○	
64	Hydraulic Oil Filter, Water Separator				○	

Maintenance & Overhaul
Hopper

Notes



Maintenance & Overhaul
Hopper

Notes

CHAPTER

6

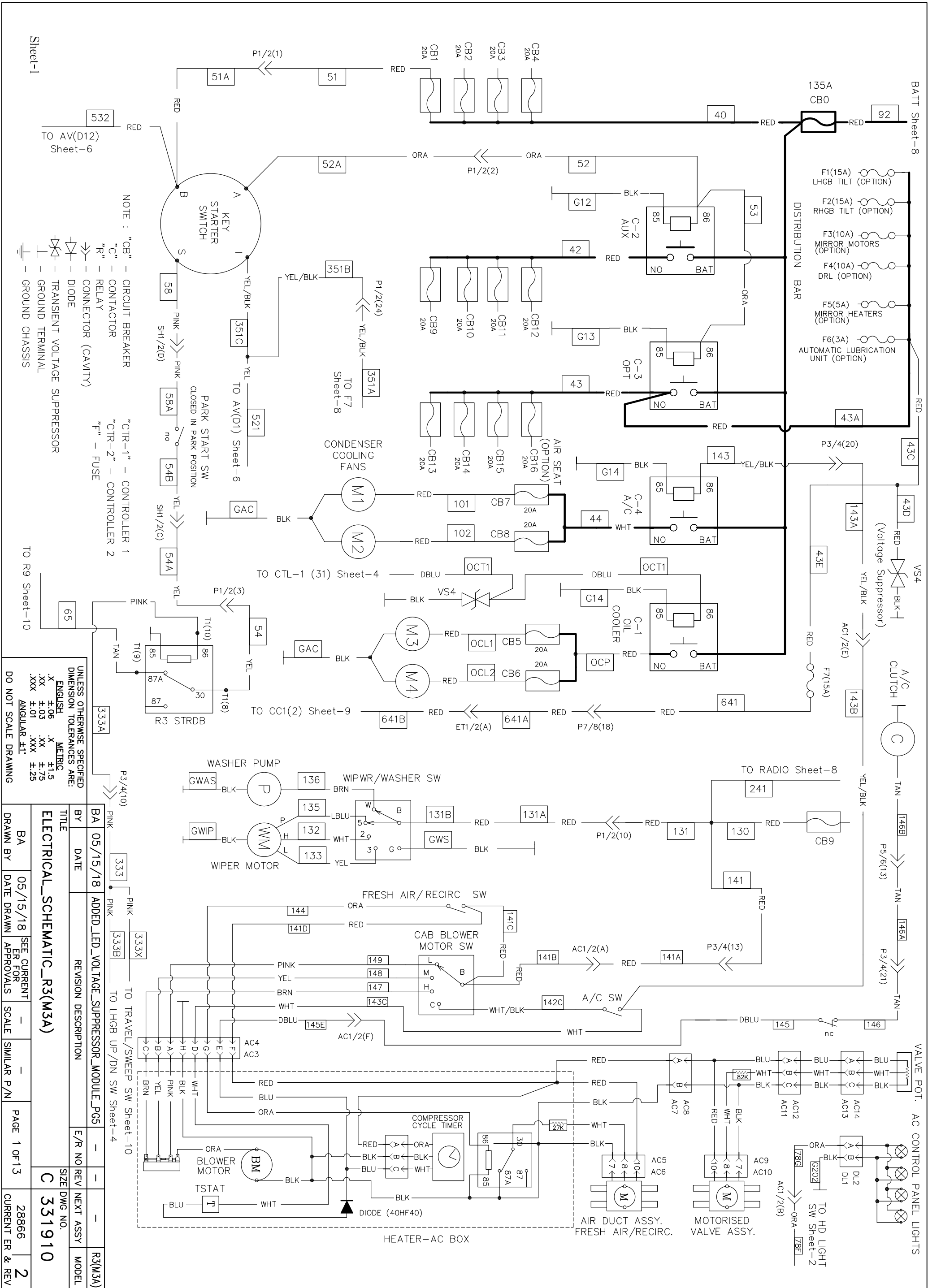
**Isuzu Engine
Troubleshooting Information
and Global R3Air
Schematics**

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Components	6-11



6

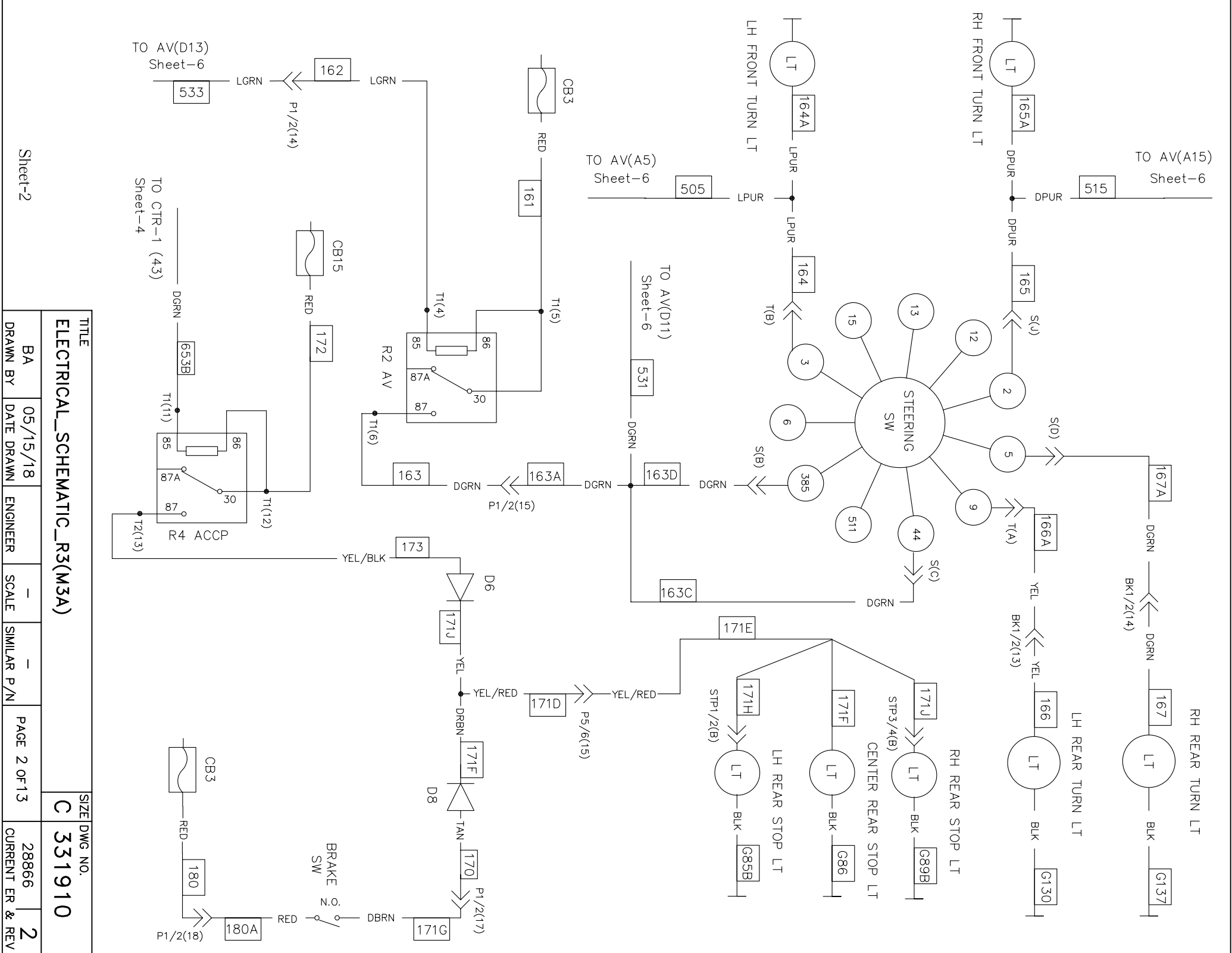
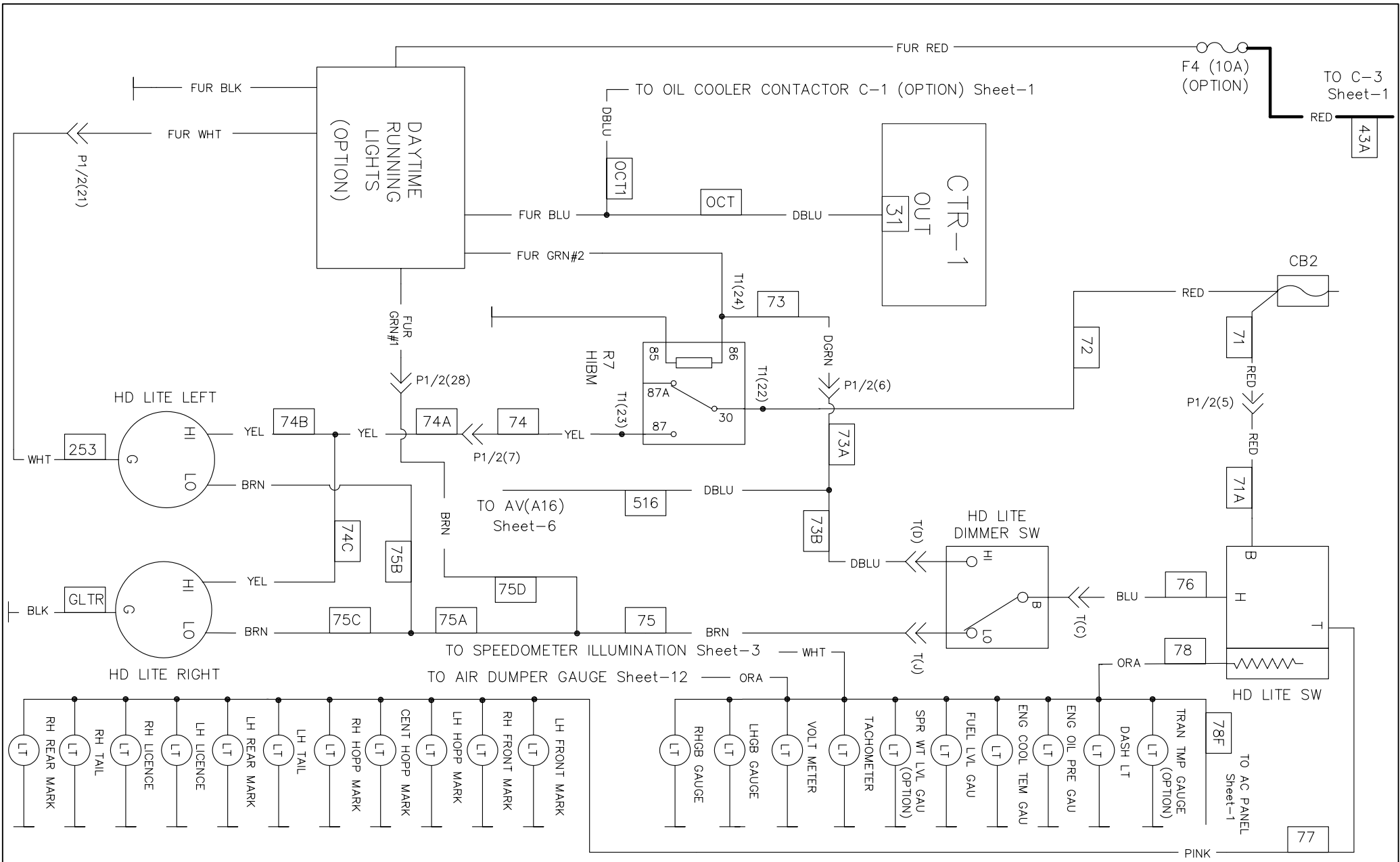


NOTE : "CB" - CIRCUIT BREAKER
 "C" - CONTACTOR
 "R" - RELAY
 "CON" - CONNECTOR (CAVITY)
 "D" - DIODE
 "TVS" - TRANSIENT VOLTAGE SUPPRESSOR
 "G" - GROUND TERMINAL
 "CH" - GROUND CHASSIS

"CTR-1" - CONTROLLER 1
 "CTR-2" - CONTROLLER 2
 "F" - FUSE

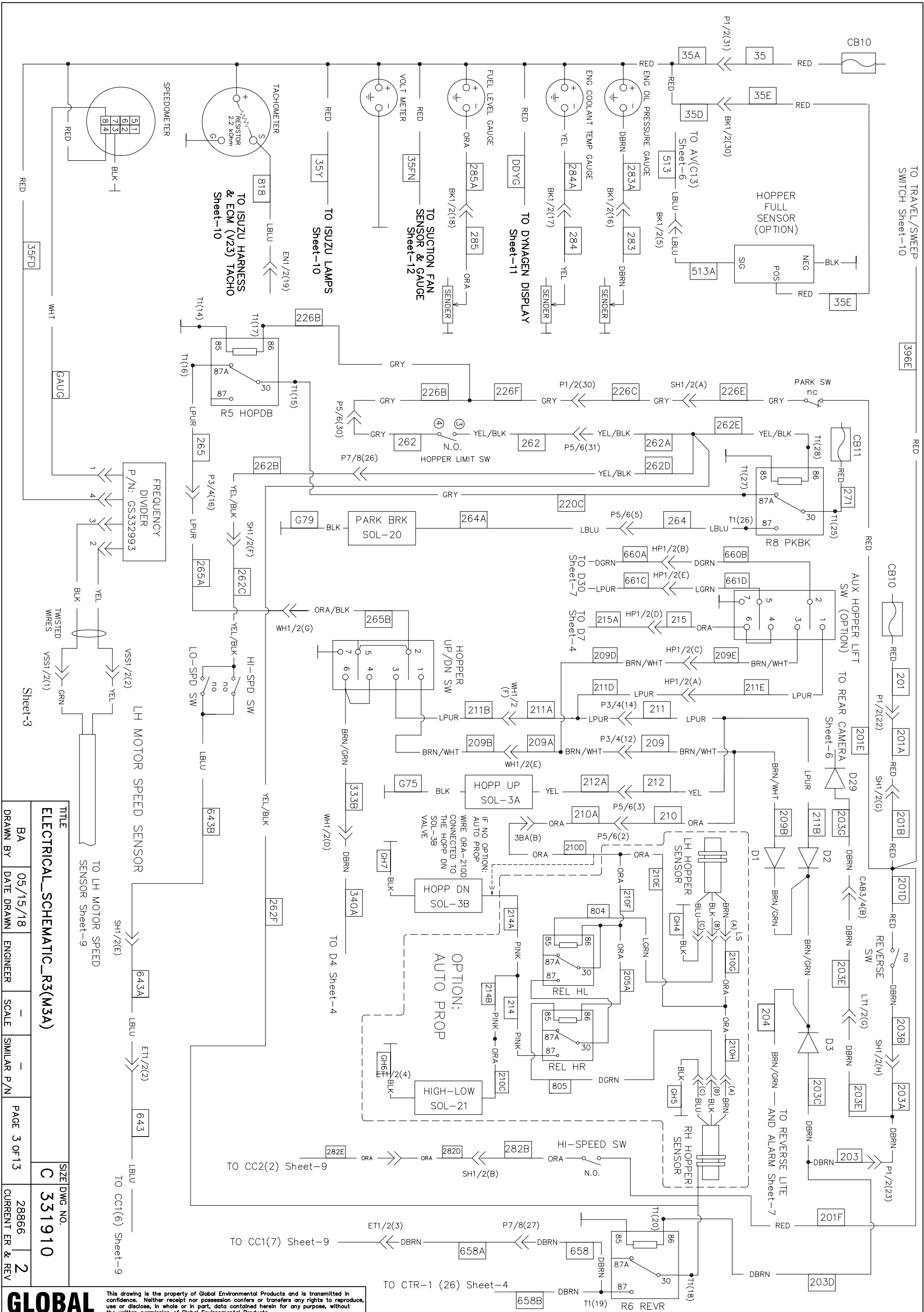
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 .XX ±.06 X ±1.5
 .XX ±.03 X ±.75
 .XXX ±.01 XXX ±.25
 ANGULAR ±.1°

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BY	DATE										
BA	05/15/18										
DATE DRAWN	APPROVALS										
SCALE	SIMILAR P/N										
PAGE 1 OF 13	CURRENT ER & REV										
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ELECTRICAL SCHEMATIC_R3(M3A)											
SIZE DWG NO. C 331910											



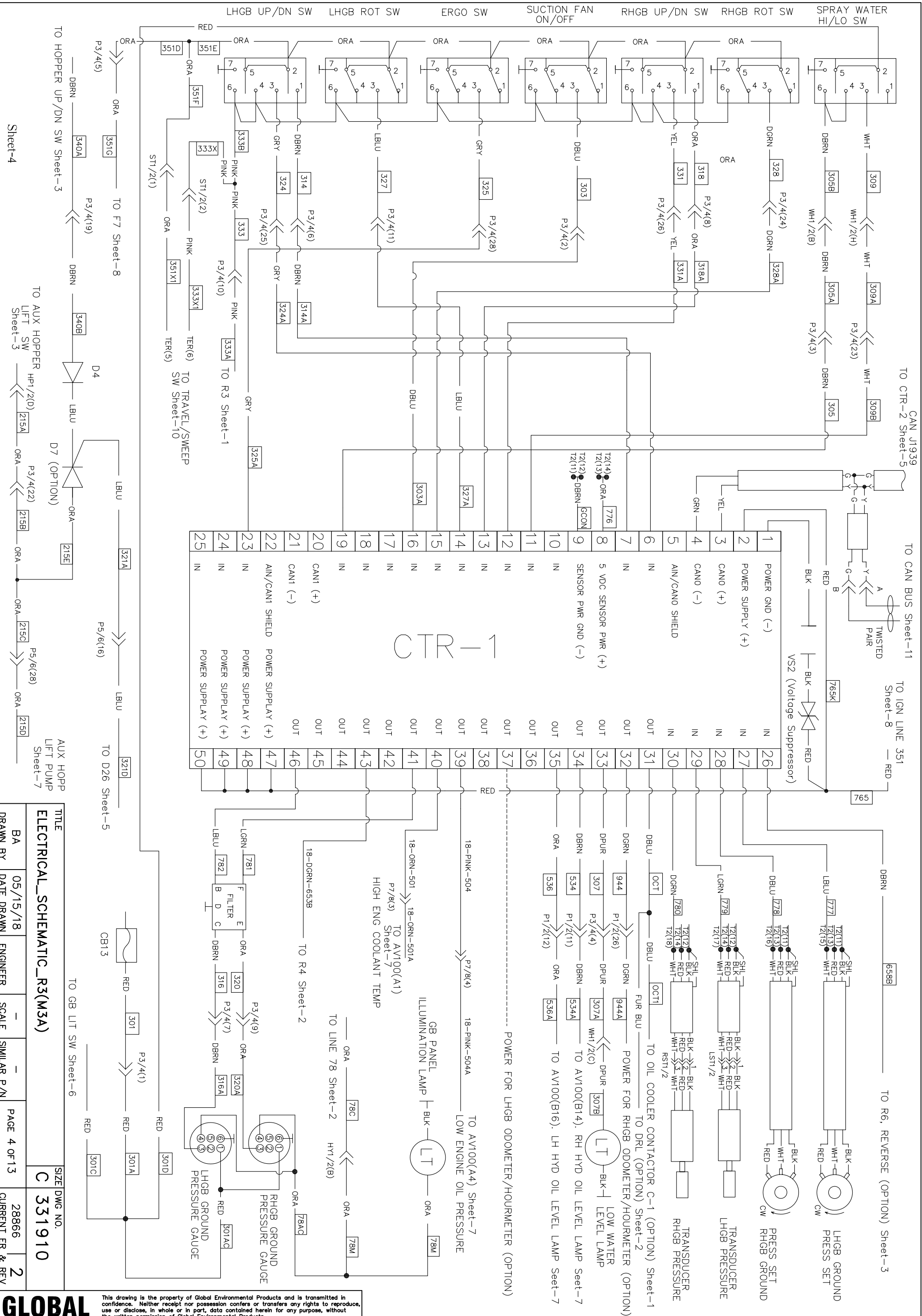
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28866	2	CURRENT ER	REV



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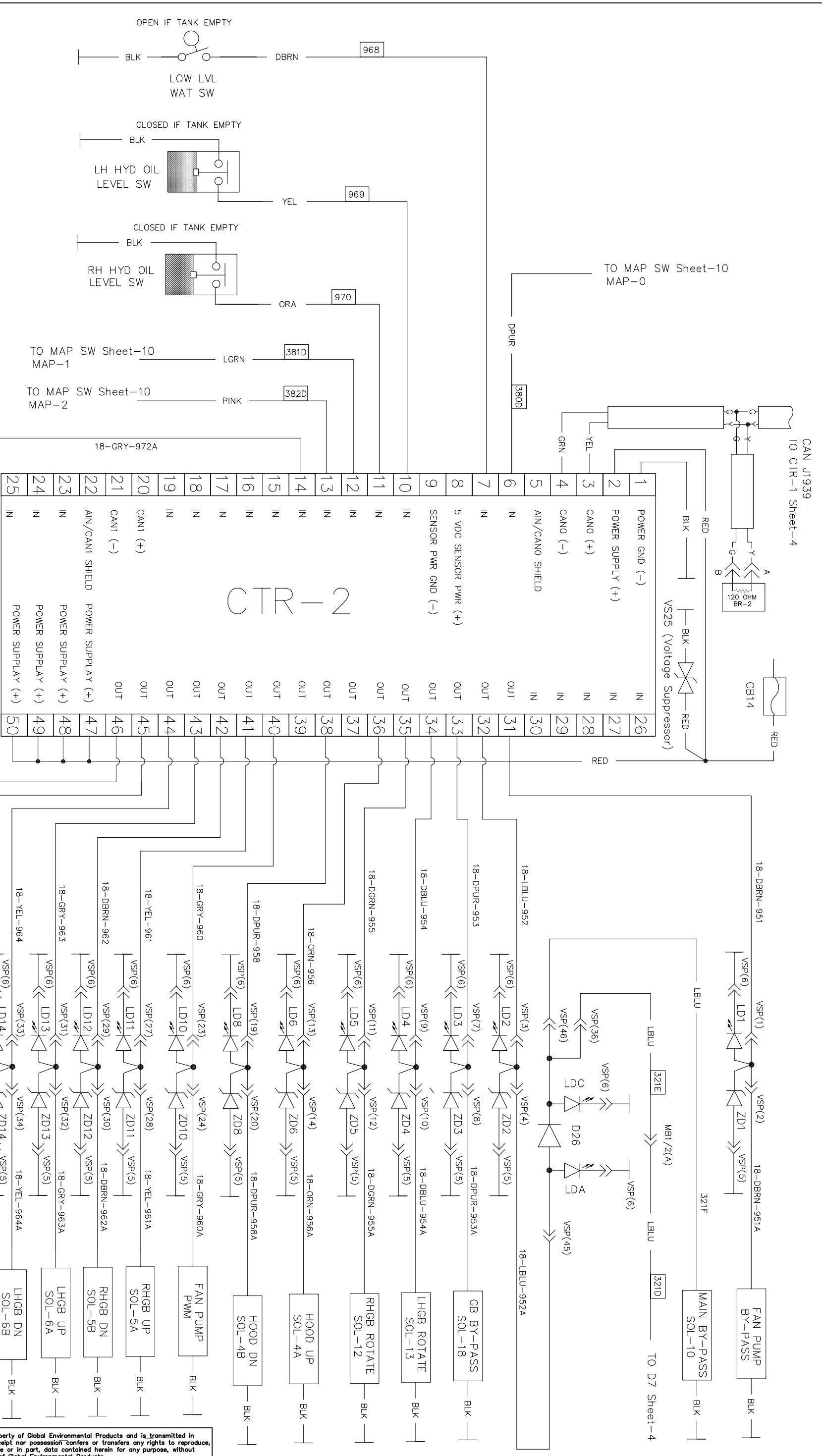
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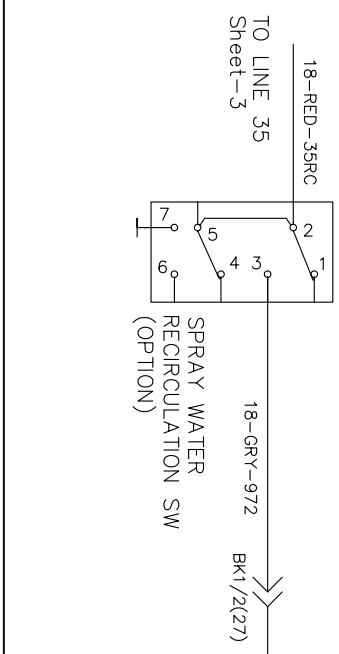


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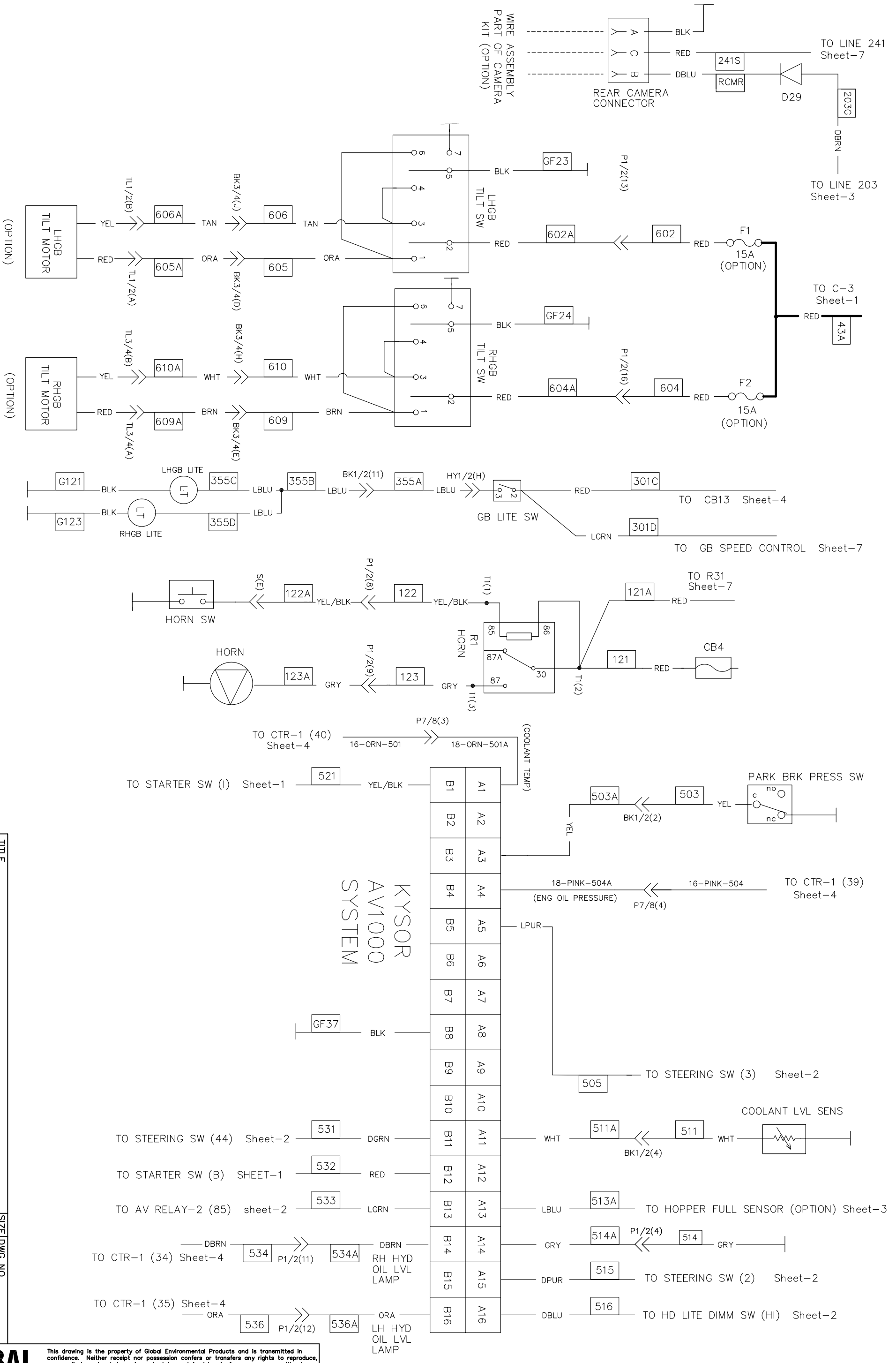


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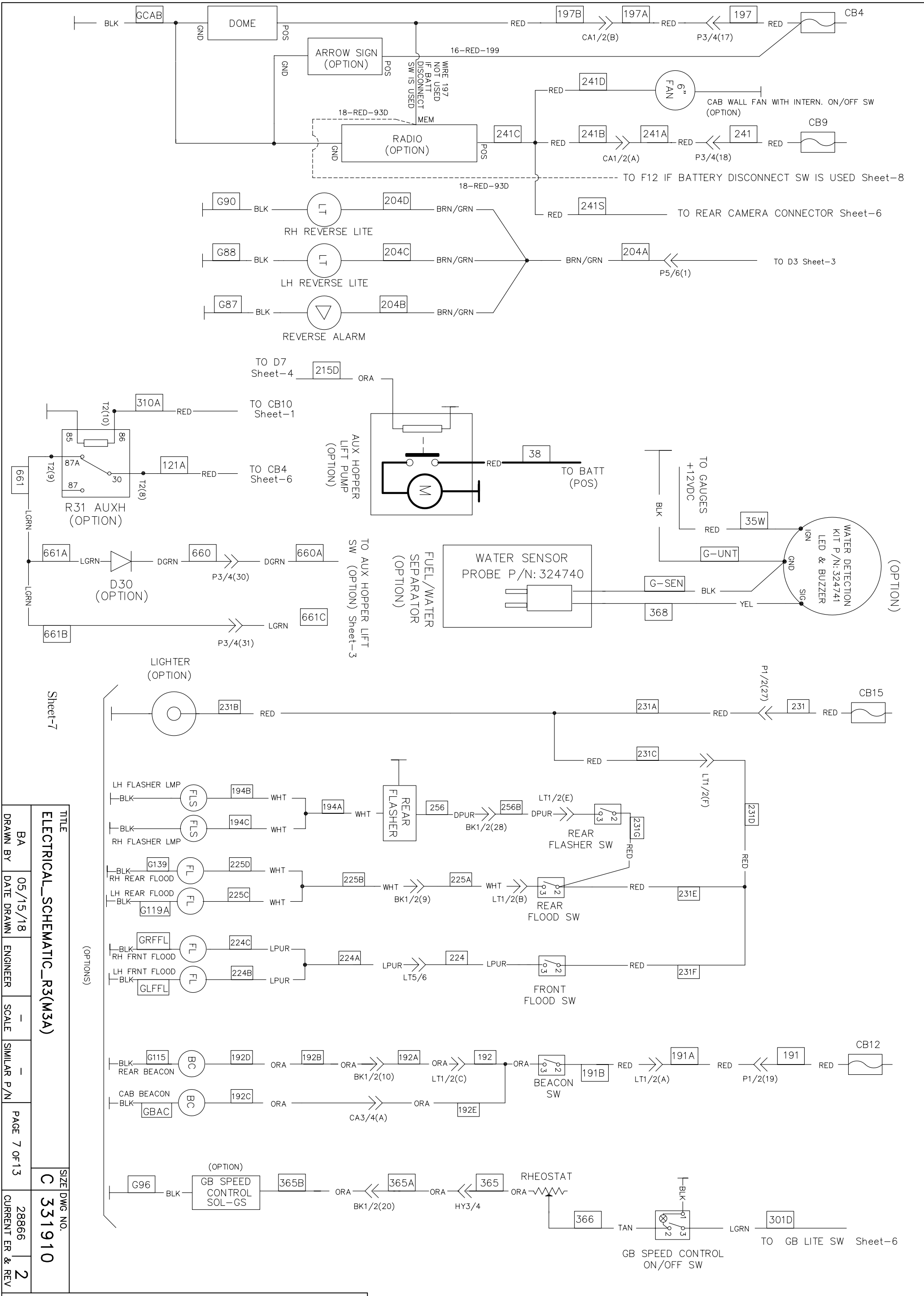
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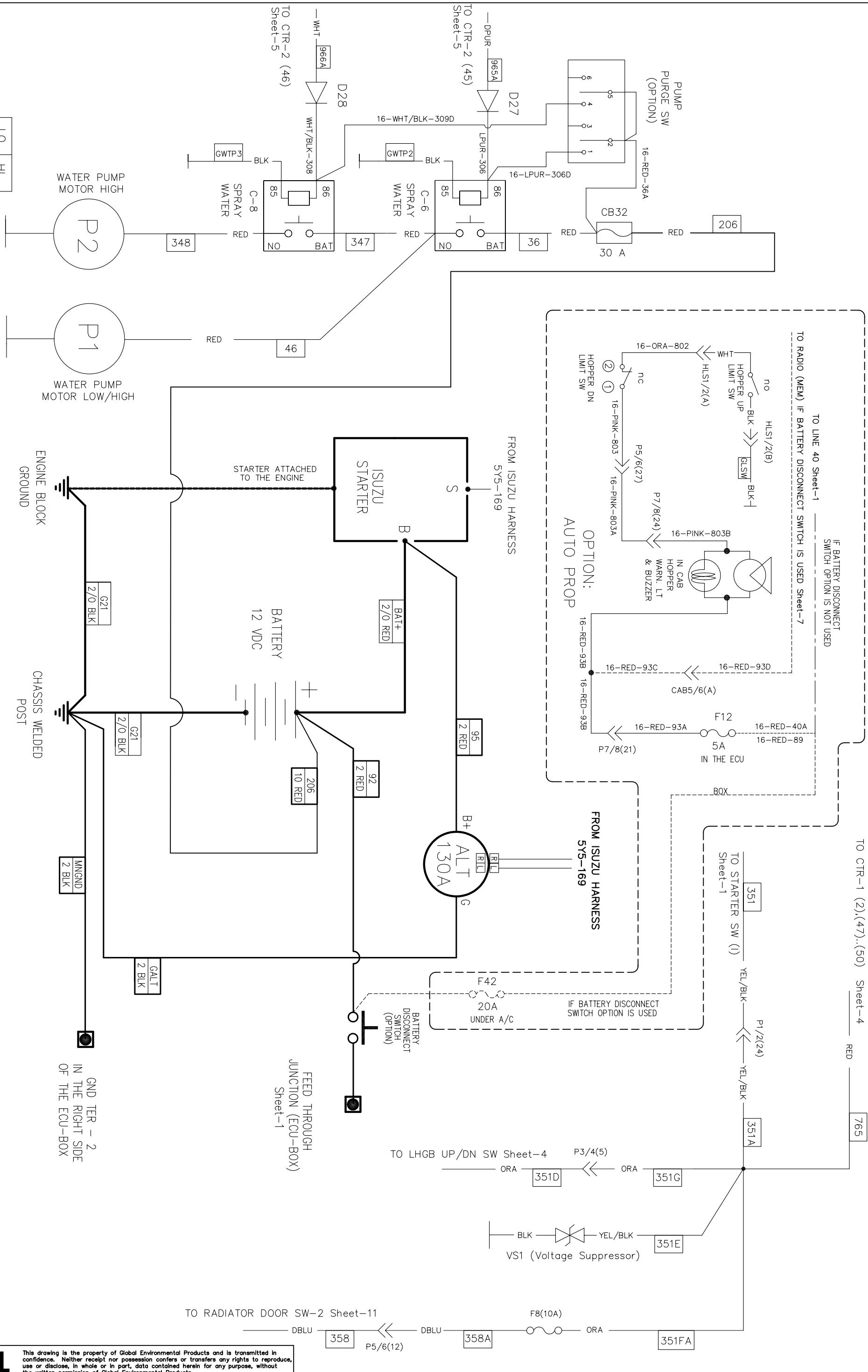
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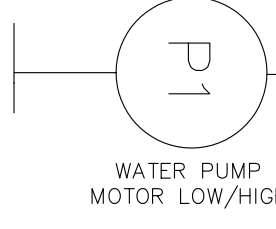
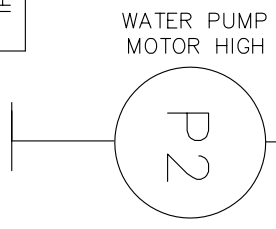
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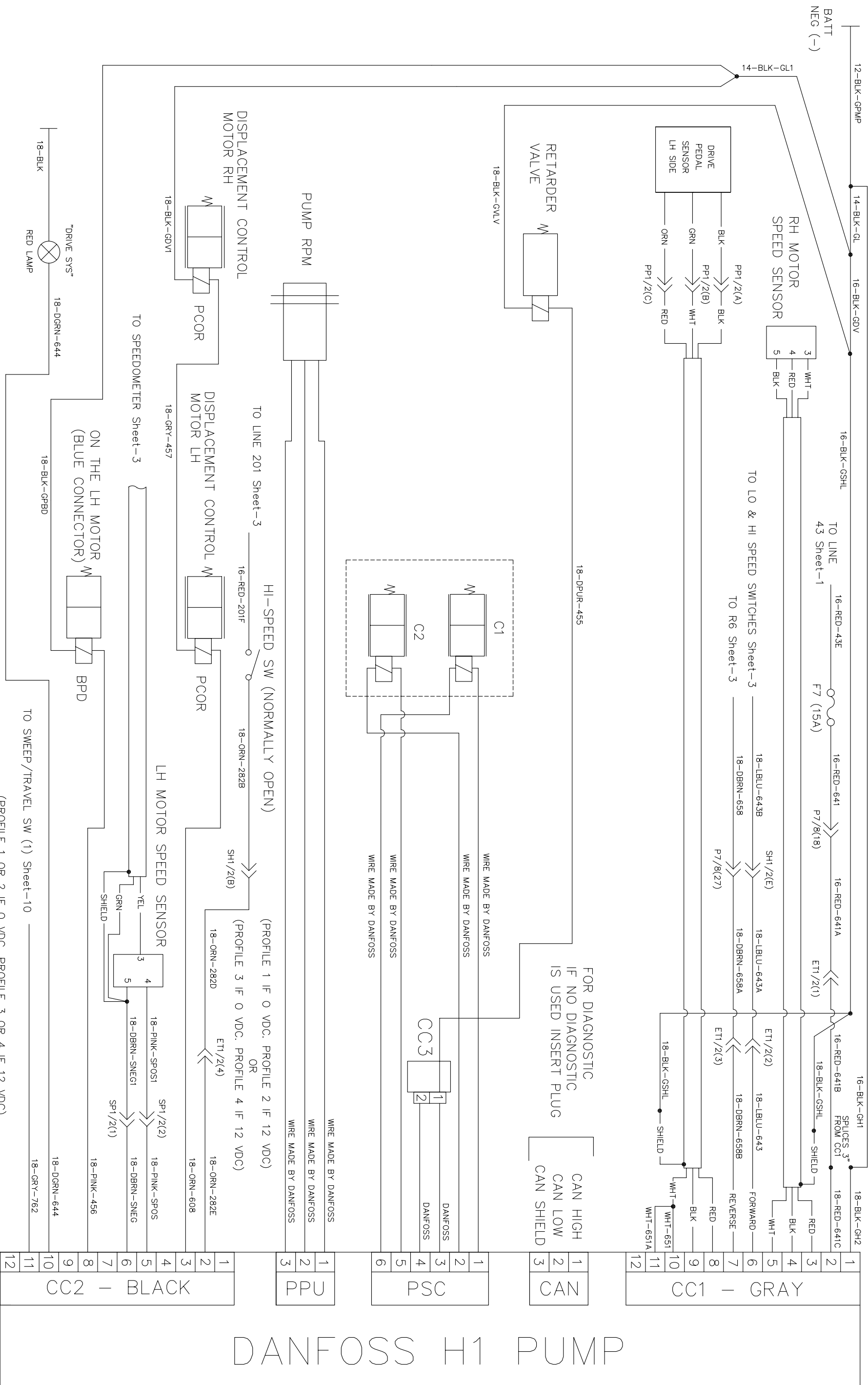
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P2	OFF	ON



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DANFOSS H1 PUMP

NOTE:

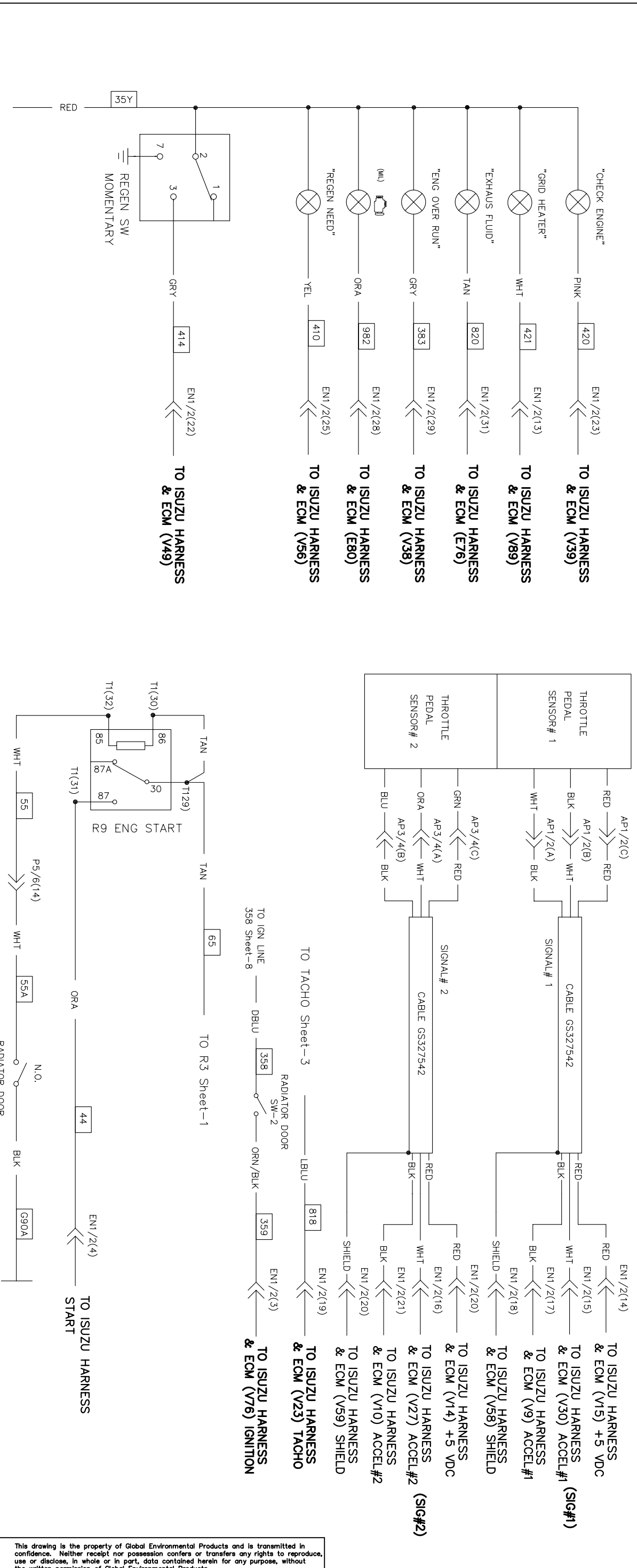
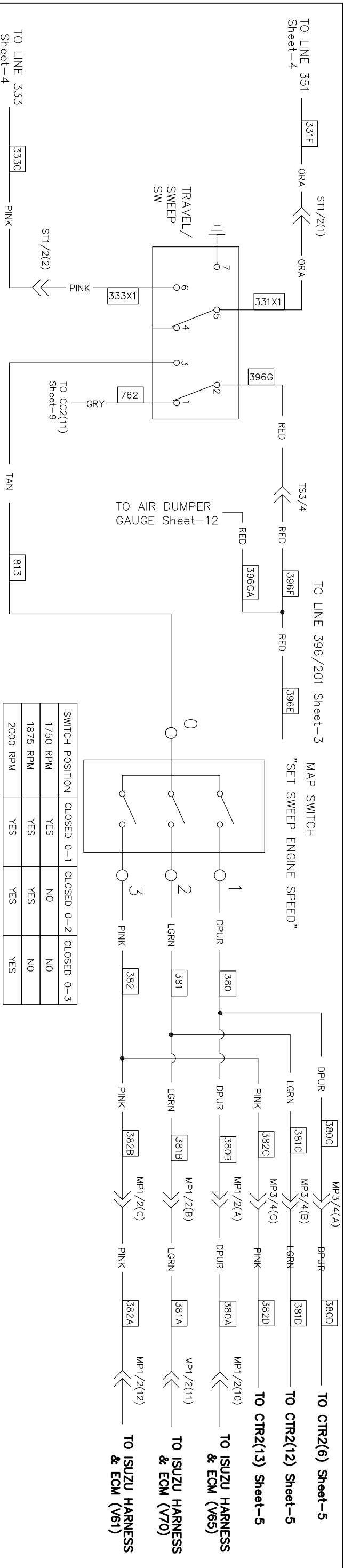
1. LH MEANS LEFT HAND DRIVER SIDE.
2. RH MEANS RIGHT HAND DRIVER SIDE.
3. CC1 CONNECTOR TYPE DTM. CONTACT SOCKETS ACCEPTING MAX AWG#18 WIRES.
3. WIRES AWG#16 USED TO HAVE LESS DROP OF VOLTAGE.
3. BEFORE CC1 WIRE GAUGE CHANGED TO AWG#18.
4. ALL GEP WIRES TYPE SXL OR GXL.

(PROFILE 1 OR 2 IF 0 VDC. PROFILE 3 OR 4 IF 12 VDC)
 (PROFILE 1 OR 2 - SWEEP (1 AND 2 LOW SPEED)
 PROFILE 3 OR 4 - TRAVEL (3 - LOW SPEED, 4 - HIGH SPEED))

Sheet-9

1	2	3	4	5	6	7	8	9	10	11	12	
CAN			CC1 - GRAY									
CAN			PSC									
CAN			PPU									
CAN			BLACK									
CAN			CC2 -									
CAN			CC3									
CAN			CAN HIGH									
CAN			CAN LOW									
CAN			CAN SHIELD									
CAN			CAN SHIELD									
CAN			CAN SHIELD									

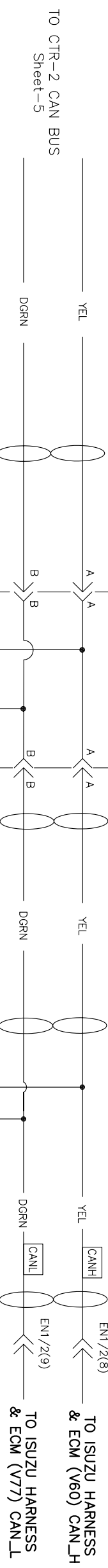
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BA DRAWN BY	05/15/18 DATE DRAWN	ENGINEER	SCALE	SIMILAR P/N	PAGE 9 OF 13	CURRENT ER & REV 2



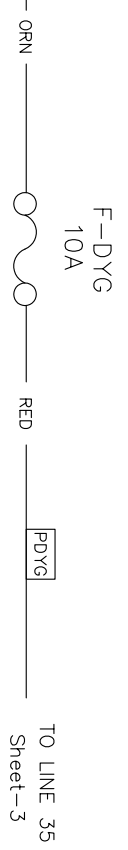
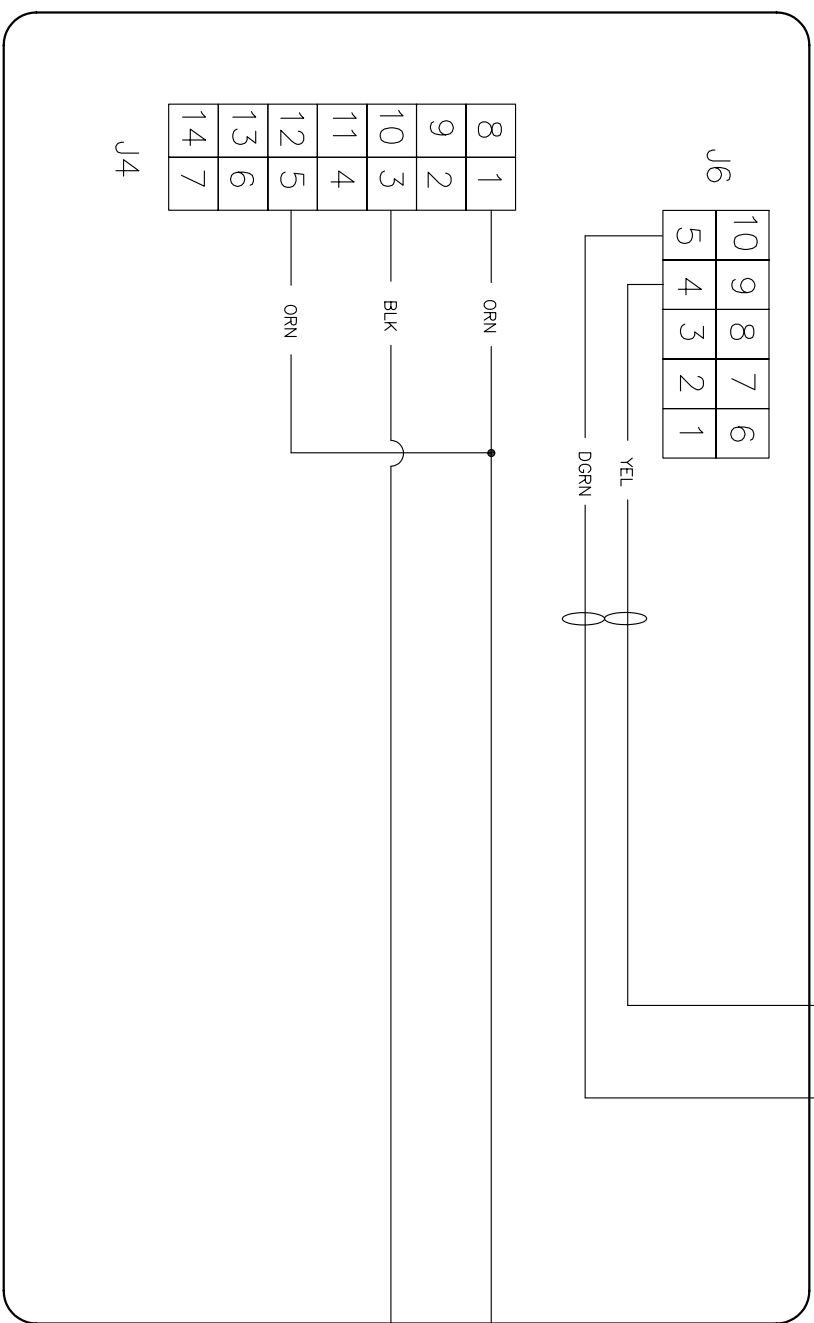
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BA	05/15/18	ENGINEER	SCALE
DRAWN BY	DATE DRAWN	ENGINEER	SCALE
PAGE 100F13		CURRENT ER & REV	
28866		2	

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P/N: GS329344
 RECEPTACLE "Y"
 CONNECTOR J1939

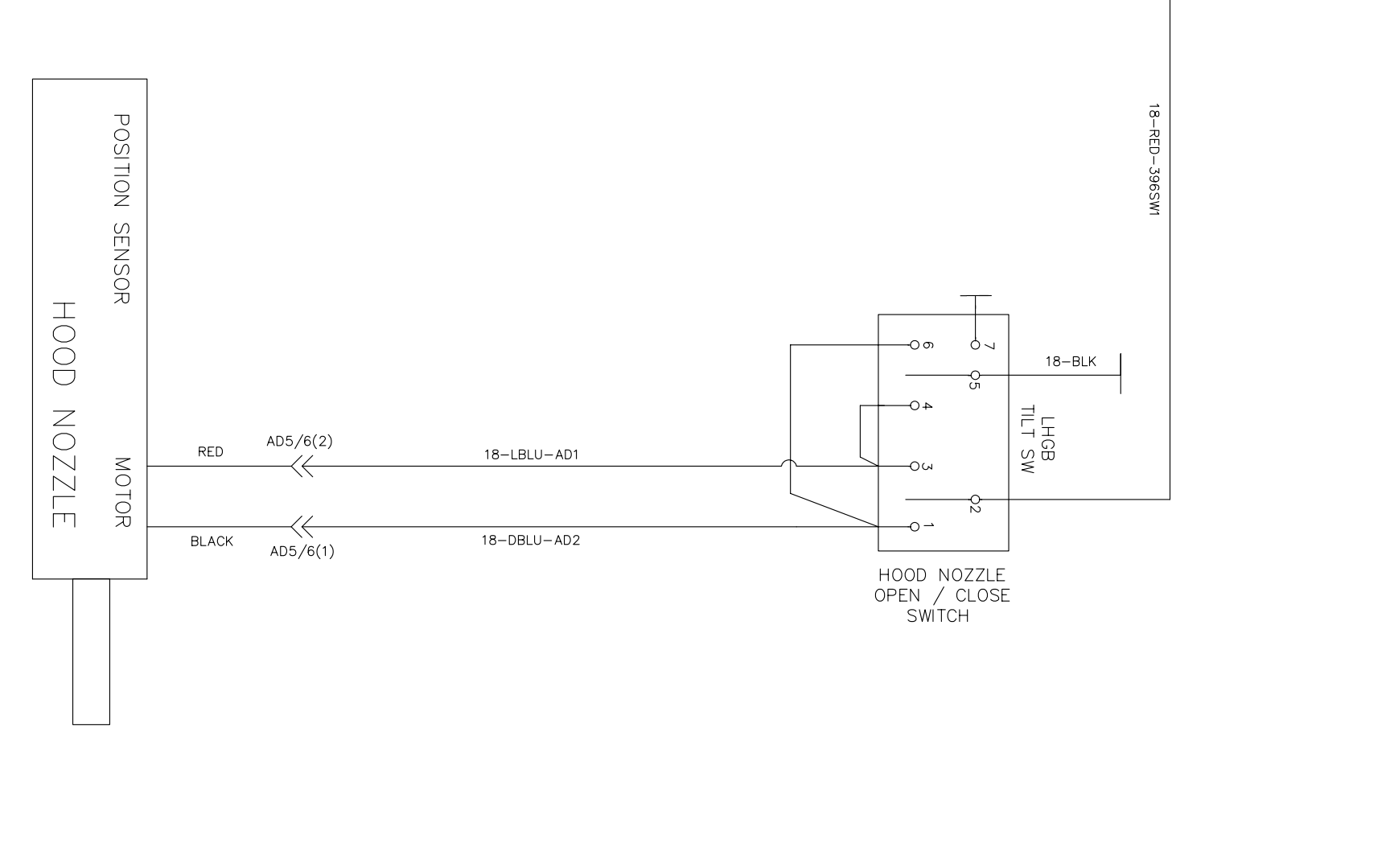
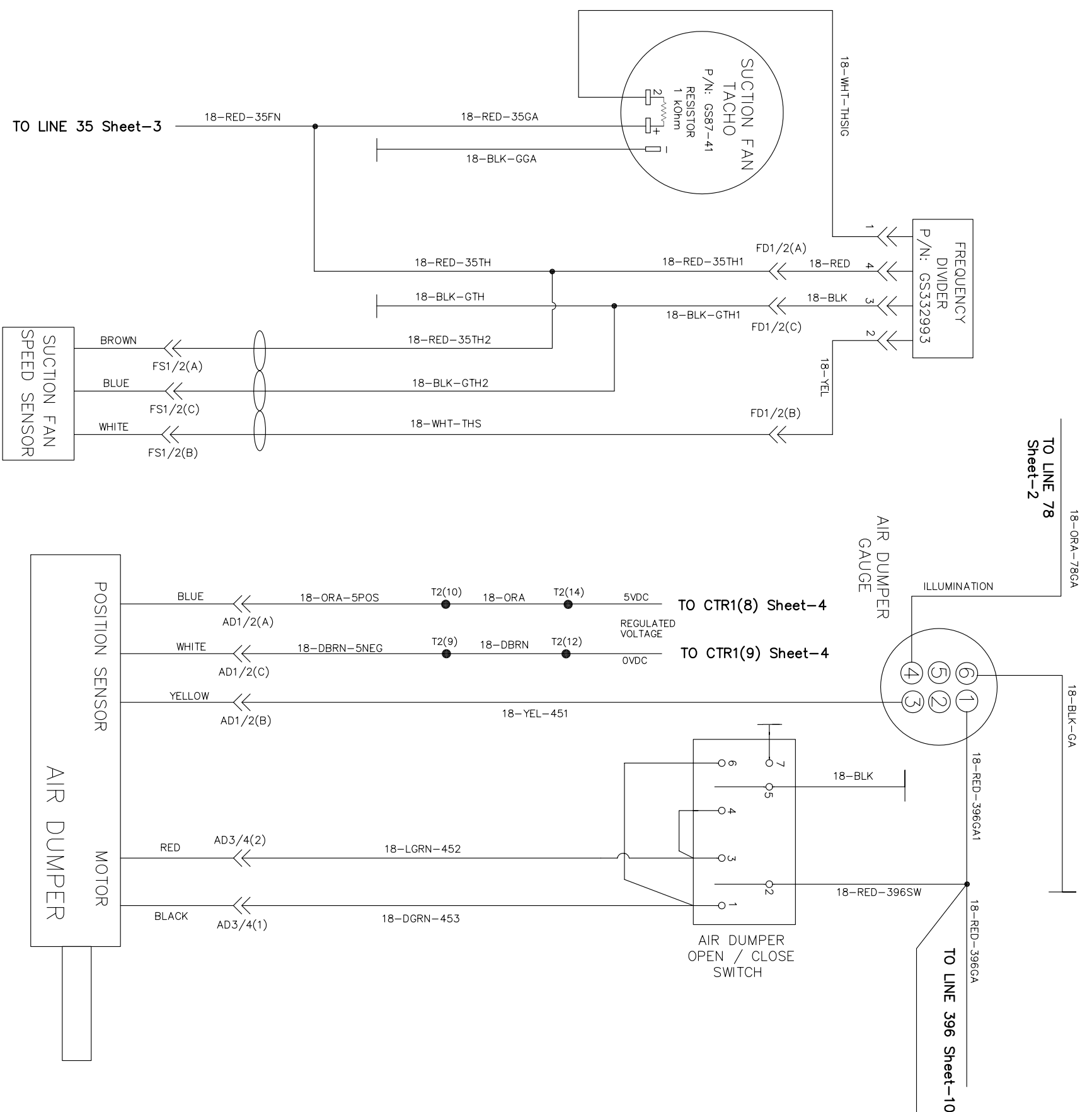


DYNAGEN DISPLAY



Sheet-11

TITLE		SIZE	
ELECTRICAL_SCHEMATIC_R3(M3A)		DWG NO.	
BA	05/15/18	C	331910
DRAWN BY	DATE DRAWN	CURRENT ER & REV	
ENGINEER	SCALE	2	
SIMILAR P/N	PAGE 11 OF 13		



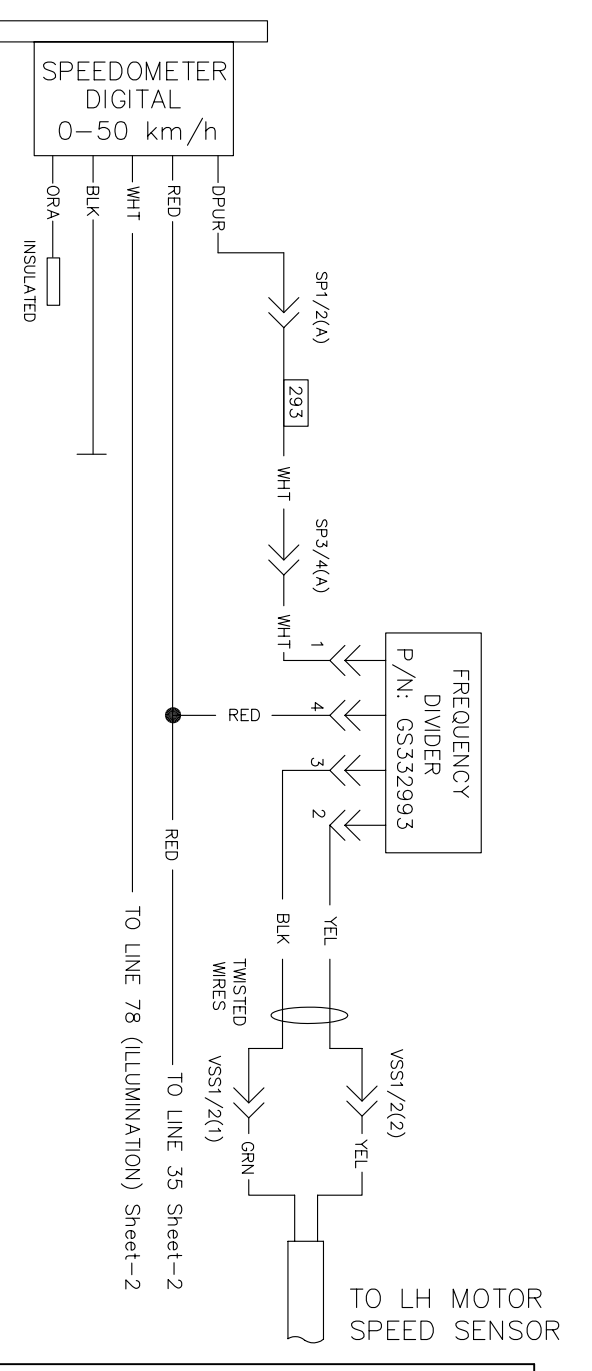
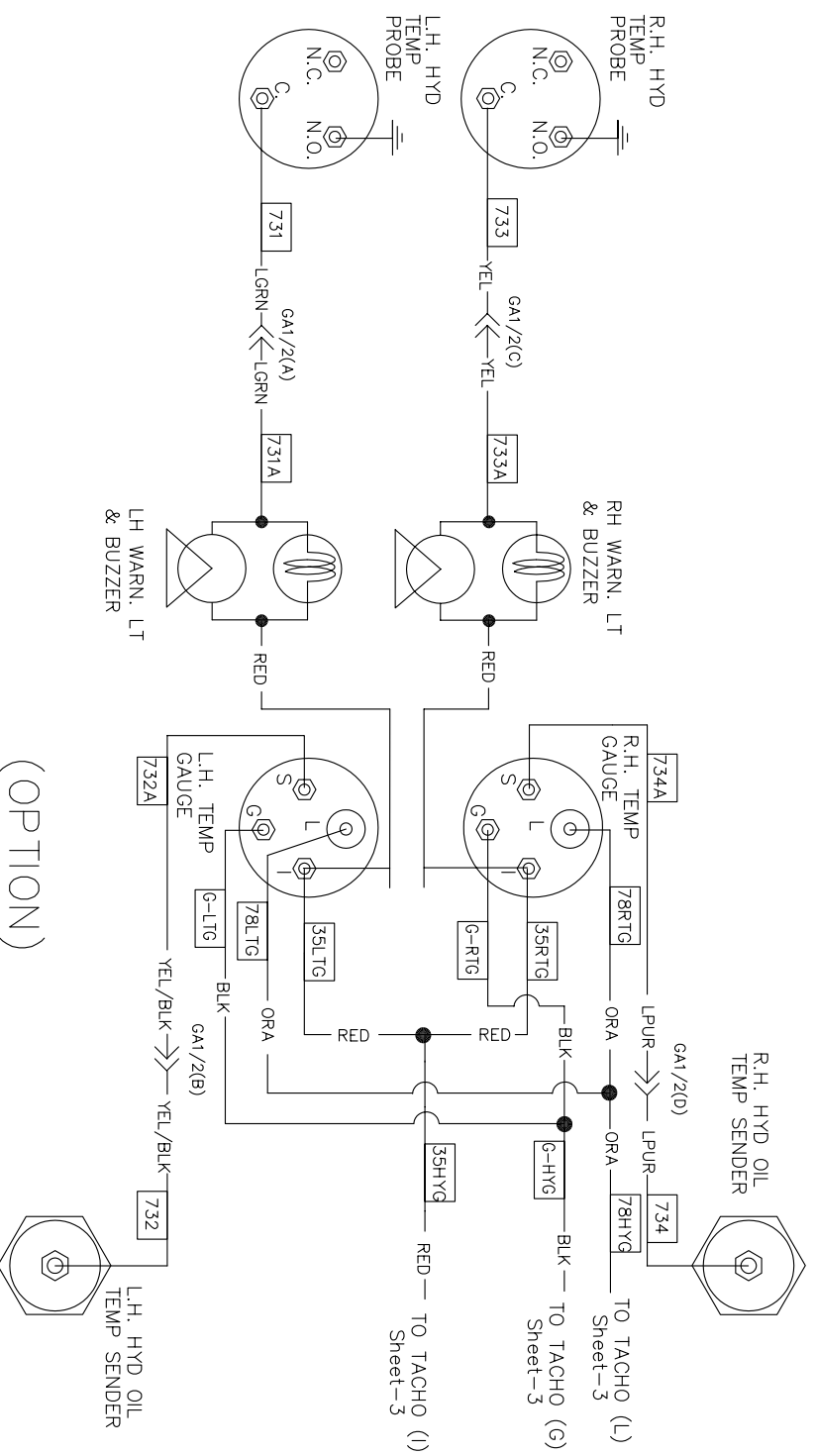
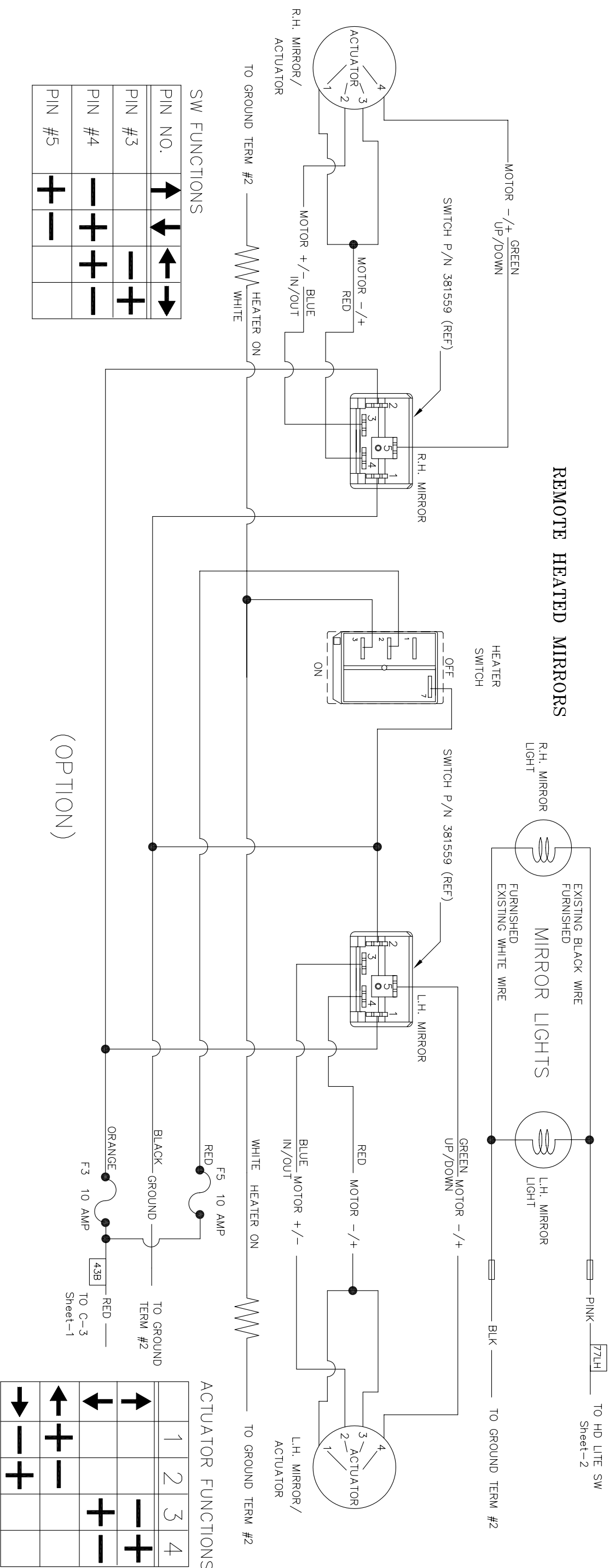
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BA	05/15/18	ENGINEER	SCALE	C	331910
DRAWN BY	DATE DRAWN	ENGINEER	SCALE	PAGE	12 OF 13
				CURRENT ER & REV	2

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TWISTED WIRES

Sheet-12

REMOTE HEATED MIRRORS



TITLE		SIZE	DWG NO.
ELECTRICAL SCHEMATIC_R3(M3A)		C	331910
BA	05/15/18	ENGINEER	SCALE
DRAWN BY	DATE DRAWN	ENGINEER	SCALE
			SIMILAR P/N
			PAGE 13 OF 13
			CURRENT ER & REV
			2



ISUZU MOTORS AMERICA, LLC

PowerTrain Division

46401 Commerce Center Drive
Plymouth, Michigan 48170

Phone: (734) 582-9470 **Fax:** (734) 455-7581 **www.isuzuengines.com**

Engines are the heart of Isuzu, an industry leader of over 20 million diesel engines worldwide.

The Isuzu Motors America, LLC, PowerTrain Division (ISZAPT) Engine Distribution Network consists of Distributors and Authorized Dealers. Each is an Isuzu diesel engine expert in its respective market. For service outlet referrals, please contact the Distributor listed in the state in which you are interested.

Contact information is continually updated and available on the www.isuzuengines.com website.

Market responsibilities are identified as follows:



Industrial Distributor

All off-highway industrial applications including marine applications.



Marine Distributor

All off-highway industrial applications including marine applications.



24 Hour Service



Industrial Full Service Dealer

All off-highway industrial applications.



Industrial OEM Dealer

The Dealer provides product support for Isuzu engines installed into a specific make of equipment. Please contact the local Isuzu Distributor to determine the appropriate Dealer for a specific make of equipment.



Marine Dealer

All commercial marine engine applications.

ISUZU MOTORS AMERICA, LLC

North American Engine Distributor Network

UNITED STATES

Company	Phone	Fax	Website
1. Mack Boring & Parts Co – NJ	908.964.0700	908.964.8475	www.mackboring.com
2. Penn Power Group	716.823.7242	716.823.2769	www.pennpowergroup.com
3. Blue Ridge Diesel Injection Co	540.389.7296	540.387.2792	www.blueridgediesel.com
4. M & L Engine LLC	985.857.8000	985.851.0006	www.mlengine.com
5. United Engines LLC – AR	501.562.5565	501.565.7754	www.unitedengines.com
6. United Engines LLC – OK	405.947.3321	405.947.3406	www.unitedengines.com
7. United Engines LLC – OK	918.627.8080	918.663.0467	www.unitedengines.com
8. UE Powertrain – United Engines LLC	806.762.0455	806.762.6246	www.uepowertrain.com
9. UE Powertrain – United Engines LLC	806.355.8228	806.358.1308	www.uepowertrain.com
10. Southwest Products Corp – AZ	602.269.3581	602.269.2306	www.southwestproducts.com
11. Southwest Products Corp – CA	562.424.0913	562.989.1622	www.southwestproducts.com
12. Valley Power Systems Inc – West Sacramento	916.372.5078	916.372.2721	www.valleypowersystem.com
13. Valley Power Systems Inc – Fresno	559.486.6900	559.442.6056	www.valleypowersystem.com
14. Hamilton Engine Sales Inc	503.288.6714	503.287.8289	www.hamiltonengines.com
15. UE Compression – United Engines LLC	307.577.8100	307.577.4091	www.unitedengines.com
16. UE Compression – United Engines LLC	303.297.8100	303.297.2765	www.unitedengines.com
17. Husker Power Products	402.463.1531	402.463.1313	www.huskerpowerproducts.com
18. Isuzu Diesel Midwest	701.282.7915	701.282.2472	www.isuzu-tk.com
19. Total Energy Systems LLC – Milwaukee	414.357.7900	414.357.6278	www.totalenergysystems.com
20. Total Energy Systems LLC – Green Bay	920.964.1400	920.964.1409	www.totalenergysystems.com
21. W.W.Williams Midwest Inc - Brunswick	330.225.7751	330.273.8110	www.wwwilliams.com
22. W.W.Williams Midwest Inc - Columbus	614.527.9400	614.527.1699	www.wwwilliams.com
23. W.W.Williams Midwest Inc - Toledo	419.837.5067	419.837.5229	www.wwwilliams.com
24. W.W.Williams Midwest Inc -Youngstown	330.534.1161	330.534.1529	www.wwwilliams.com
25. W.W.Williams Midwest Inc - Dearborn	313.584.6150	313.584.1444	www.wwwilliams.com
26. W.W.Williams Midwest Inc - Saginaw	989.753.4411	989.753.1620	www.wwwilliams.com
27. W.W.Williams Midwest Inc - Grand Rapids	616.878.7071	616.878.0659	www.wwwilliams.com

ISUZU MOTORS AMERICA, LLC

North American Engine Distributor Network

CANADA

Company	Phone	Fax	Website
1. ADF Diesel – Quebec City	418.681.0631	418.681.3686	www.adfdiesel.com
2. ADF Diesel – Saint-Stanislas	418.328.8713	418.328.3974	www.adfdiesel.com
3. ADF Diesel – Alma	418.668.5040	418.668.8141	www.adfdiesel.com
4. ADF Diesel – Candiac	450.659.1316	450.659.4432	www.adfdiesel.com
5. ADF Diesel – Sherbrooke	819.563.8880	819.563.8882	www.adfdiesel.com
6. ADF Diesel – Montreal	514.684.0440	514.684.2417	www.adfdiesel.com
7. ADF Diesel – Toronto	905.565.1110	905.565.1155	www.adfdiesel.com
8. Isuzu Diesel Mid Canada	204.694.1368	204.632.0929	
9. Westquip Diesel Sales - Acheson	780.960.5560	780.486.2676	www.westquip.ca
10. Westquip Diesel Sales - Calgary	403.261.0601	403.263.3702	www.westquip.ca
11. Klassen Diesel Sales LTD – Delta	604.940.6400	604.940.6500	www.klassenengine.com

International Distributor Network

A listing of Isuzu international locations is continually updated and can be found by accessing the distributor map located on www.isuzuengines.com.

Product Registration

Registering Isuzu engines for warranty purposes can easily be accomplished on the www.isuzuengines.com website. Registration provides the user with contact information for the respective distributor responsible for any updated maintenance. Registration also continues to keep the customer informed of any information related specifically to that particular product and allows for service support when needed.

ISUZU MOTORS AMERICA, LLC

Latin American Engine Distributor Network

LATIN AMERICA

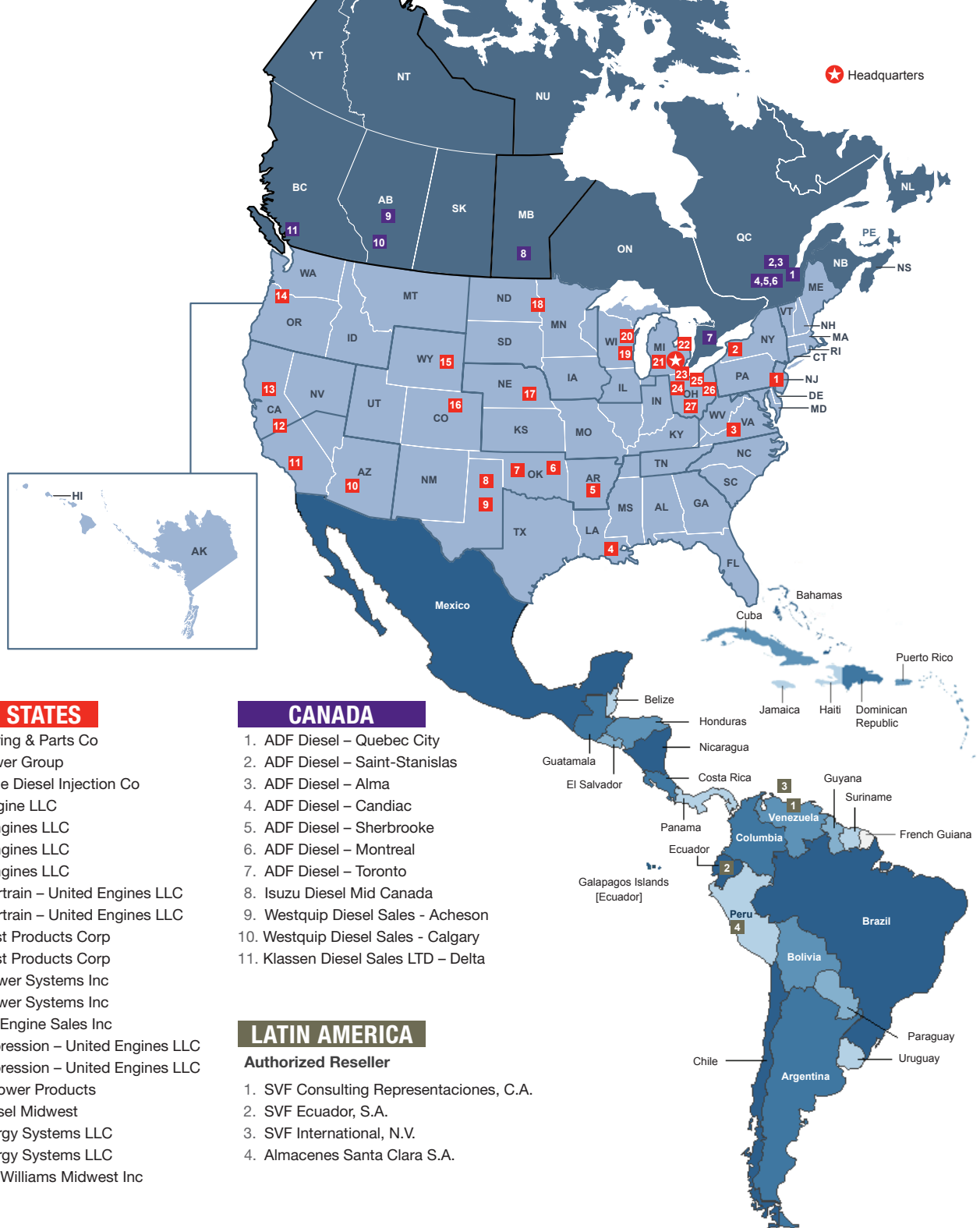
Company	Phone	Fax	Website
1. SVF Consulting Representaciones, C.A.	+58 212 975 34 11	+58 212 975 21 12	www.svf-consuting.com
2. SVF Ecuador, S.A.	+593 04 2287768	+593 04 2691258	www.svf-consuting.com
3. SVF International, N.V	+599 9 434 3605	+599 9 434 3533	www.svf-consuting.com
4. Almacenes Santa Clara S.A.	+419 326 4441	+419 326 4490	www.isuzuperu.com.pe

International Distributor Network

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Product Registration

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UNITED STATES

1. Mack Boring & Parts Co
2. Penn Power Group
3. Blue Ridge Diesel Injection Co
4. M & L Engine LLC
5. United Engines LLC
6. United Engines LLC
7. United Engines LLC
8. UE Powertrain – United Engines LLC
9. UE Powertrain – United Engines LLC
10. Southwest Products Corp
11. Southwest Products Corp
12. Valley Power Systems Inc
13. Valley Power Systems Inc
14. Hamilton Engine Sales Inc
15. UE Compression – United Engines LLC
16. UE Compression – United Engines LLC
17. Husker Power Products
18. Isuzu Diesel Midwest
19. Total Energy Systems LLC
20. Total Energy Systems LLC
- 21 - 27. W.W.Williams Midwest Inc

CANADA

1. ADF Diesel – Quebec City
2. ADF Diesel – Saint-Stanislas
3. ADF Diesel – Alma
4. ADF Diesel – Candiac
5. ADF Diesel – Sherbrooke
6. ADF Diesel – Montreal
7. ADF Diesel – Toronto
8. Isuzu Diesel Mid Canada
9. Westquip Diesel Sales - Acheson
10. Westquip Diesel Sales - Calgary
11. Klassen Diesel Sales LTD – Delta

LATIN AMERICA

Authorized Reseller

1. SVF Consulting Representaciones, C.A.
2. SVF Ecuador, S.A.
3. SVF International, N.V.
4. Almacenes Santa Clara S.A.

ECM故障診断仕様一覧 (ECM Trouble Diagnosis Specifications)

更新日: 2014/1/31
エンジン型式: F14 4H61X
仕向け先: MSZA
用途: General power

INDUCEMENT TYPE

TYPE A ... 4HzでFinal, 1分1時30minでFinal

TYPE B ... 100HzでFinal, 1分1時30minでFinal

U/O : UREA QUALITY (尿素品質異常) ... TYPE A

D/A : DOSING ACTIVITY (尿素噴射異常) ... TYPE A

TAMPERING ... TYPE A

EGR : EGR VALVE 故障 ... TYPE B

Table with 5 columns: O制限1, O制限2, O制限3, 回転制限1, 回転制限2, L-1制限

Table with 4 columns: 故障発生時処理, 故障発生時処理, 故障発生時処理, 故障発生時処理

Table with 10 columns: 故障コード / Failure code, 故障種類 Malfunction type, EMISSION, INDUCEMENT対象 Inducement target, DOM, INDUCEMENT分類 Inducement category, ENG保護 ENG protection, 診断実施条件①/ Diagnosis condition ①, 診断実施条件②/ Diagnosis condition ②, 故障判定条件/ Malfunction decision conditions, 故障判定時間/ Malfunction decision time, 演算周期/ Calculation cycle (msec), 診断継続/ Diagnosis continuation, チェックランプ/ Check engine lamp, CAN故障/ CAN malfunction, CAN通信/ CAN communication, エンジン制御/ Engine control, O制限/ O limit, 回転制限/ Rotation limit, レール圧制限/ Rail pressure limit, マルチストップ/ Multi stop, EGR, DPF, ターボ/ Turbo, ハーン/ Harn, その他/ Others, 故障回復時の動作 Operation at failure recovery

センサー系 Sensor system

Main diagnostic table with columns for code, DTC, CAN SPN-FMI, malfunction type, EPA, CARB, EU, U/G, D/A, TAMPERING, EGR, diagnosis conditions, decision time, cycle, lamp, CAN, engine control, limits, EGR, DPF, Turbo, Harn, others, and recovery actions.

ECM故障診断一覧/ECM Trouble Diagnosis Specifications

Table with 2 columns: Item and Value. Includes engine type (FT4 4HK1X), location (AZA), and application (General power).

INDUCEMENT TYPE

TYPE A...4H/1min, 10...10min/1min
TYPE B...100H/1min, 10...10min/1min
U/Q : LUREA QUALITY (尿素品質) ...TYPE A
D/A : DOSING ACTIVITY (尿素噴射量) ...TYPE A
TAMPING ...TYPE A
EGR : EGR VALVE 異常 ...TYPE B

Table with 5 columns: Item, 0制限, 1制限, 2制限, 3制限, 4制限, 5制限. Lists various engine parameters and their limits.

Table with 2 columns: Item and Value. Lists various engine parameters and their limits, including fuel injection and pressure.

Main diagnostic table with columns: DTC, CAN SPN-FMI, Malfunction type, EMISSION, INDUCEMENT 対象, DCM, INDUCEMENT 分類, 診断発生条件, 診断発生条件, 故障判定条件, 故障判定時間, 診断時間, 診断結果, CAN 通信, CAN 故障, 故障コード, エンジン制御状態, 故障発生時状態, 故障発生時状態, 故障発生時状態.

ECM故障診断仕様書/ECM Trouble Diagnostic Specifications

Table with 2 columns: Item and Value. Includes fields like 更新日 (2014/1/31), エンジン型式 (FT44HKLX), 仕向け先 (ISZA), 用途 (General power), and 試験.

INDUCEMENT TYPE

TYPE A...4hrでFinal, 10minでFinal
TYPE B...10hrでFinal, 10minでFinal
U/Q : UREA QUALITY (尿素品質) ...TYPE A
D/A : DOSING ACTIVITY (尿素噴射異常) ...TYPE A
TAMPERING ...TYPE A
EGR : EGR VALVE異常 ...TYPE B

Table with 6 columns: 0制限, 1制限, 2制限, 3制限, 4制限, 5制限. Includes values for RPM, Q limit, and engine speed.

Table with 2 columns: 0制限, 1制限, 2制限, 3制限, 4制限, 5制限. Includes values for fuel injection and engine stop.

Table with 15 columns: 故障コード, 故障種類, 法規対応, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件, 診断実施条件.

外部デバイス系 External device system

Main diagnostic table with 15 columns. Rows include VNT turbo malfunction, EGR valve control malfunction, EGR zero-point learning malfunction, Intake throttle control malfunction, SDV駆動系+ショート, SDV駆動系断線, GNDショート, 燃料ノズル#1駆動系断線, 燃料ノズル#2駆動系断線, 燃料ノズル#3駆動系断線, 燃料ノズル#4駆動系断線.

燃料系 Fuel system

Main diagnostic table with 15 columns. Rows include コモンレール圧力異常 (ポンプ過圧), プレッシャーリリーフオープン, コモンレール圧力低下 (ポンプ圧不足), コモンレール圧力低下 (ポンプ圧不足).

ECM故障診断一覧 (ECM Trouble Diagnosis Specifications)

Table with 2 columns: Item (e.g., エンジン型式, 仕向け先) and Value (e.g., FT4 4HK1X, BSZA).

INDUCEMENT TYPE

TYPE A...4HでFinal, 1L1-1時30minでFinal
TYPE B...100%でFinal, 9L2-1時30minでFinal
...D/A : DOSING ACTIVITY(尿素噴射異常)...TYPE A
...TAMPERING...TYPE A

Table with 6 columns: OBD1, OBD2, OBD3, OBD4, OBD5, OBD6. Rows include Fuel level, NOx/DPF level, SOx level, Engine speed level, Engine speed level, Common rail pressure limit.

Table with 2 columns: Item (e.g., 0制限なし, 1:0制限レベル1) and Value (e.g., 0制限なし, 1:0制限レベル1, 2:0制限レベル2).

Main diagnostic table header with columns: 故障コード / Failure code, 故障種類 / Malfunction type, 法規対応 / Corresponding regulations, 診断判定条件 / Malfunction decision conditions, 故障発生時点 / Malfunction occurrence time, etc.

Table listing diagnostic codes (e.g., 139, 611, 611) and their corresponding failure descriptions and conditions.

外部回路系 External circuit system

Table listing external circuit diagnostic codes (e.g., 416, 416, 35) and their failure descriptions.

内部回路系 Internal circuit system

Table listing internal circuit diagnostic codes (e.g., 34, 36, 36) and their failure descriptions.

ECM故障診断仕様一覧/ECM Trouble Diagnosis Specifications

Table with 2 columns: Item, Value. Includes engine model (FT4 4HK1X), location (ISZA), and application (General power).

INDUCEMENT TYPE

TYPE A・・・4Hで検出、1分間30minで検出
TYPE B・・・100Hで検出、1分間30minで検出
U/Q : UREA QUALITY(尿素品質)・・・TYPE A
D/A : DOSING ACTIVITY(尿素噴射異常)・・・TYPE A
TAMPERING・・・TYPE A
EGR : EGR VALVE異常・・・TYPE B

Table with 6 columns: Item, Value. Includes O2 sensor limits (Q limit level 1-5) and engine speed limit (1700, 1200, 600RPM).

Table with 2 columns: Item, Value. Includes engine speed limit (1700, 1200, 600RPM) and various engine control parameters.

Main diagnostic table with columns: DTC, CAN SPN-FMI, Malfunction type, EMISSION, INDUCEMENT対象, DOM, INDUCEMENT分類, ENG保護, 診断条件, 診断判定条件, 故障判定時間, 演算周期, 診断周期, 診断時間, 診断結果, エンジン制御状態, ハックバック制御, 故障回復. Contains detailed diagnostic data for various faults like 55 P06A6, 56 P06A7, etc.

SPN-FMI	P Code	Description
10001-13	P1404	EGR BLOC Zero Position EGR Position Fault
10001-2	P1404 P0409	EGR 1 closed position characteristic malfunction EGR 1 position sensor system malfunction EGR Sensor Circuit EGR Valve BLOC Position Circuit
10002-2	P0404	EGR 1 control system characteristic malfunction EGR Control Circuit Range/Performance EGR Valve Control Circuit
10003-2	P2146	Fuel Injector Group 1 Supply Voltage Circuit Fuel injector supply voltage system malfunction, group 1
10004-2	P2149	Injector Circuit Group 1 Fuel Injector Group 2 Supply Voltage Circuit Fuel injector supply voltage system malfunction, group 2
10005-1	Pl 261	Injector Circuit Group 2 Fuel injector supply voltage system malfunction, group 1
10005-2	P1261	Fuel Injector Group 1 Supply Voltage Circuit Injector Positive Voltage Control Circuit Group 1
10006-1	P1262	Fuel injector supply voltage system malfunction, group 2
10006-2	P1262	Fuel Injector Group 2 Supply Voltage Circuit Injector Positive Voltage Control Circuit Group 2
10007-2	P060A (blank)	Internal Control Module CPU IC Error SUB-CPU Error (blank)
10008-2	P060B	A/O Converter Error Control module AID conversion processor characteristic error
10009-2	P060C P0697	Internal Control Module A/D Processing Performance 5 Volt Reference 3 Circuit Sensor voltage system malfunction (Reference 3)
100-1	P06A8 P0521	Sensor Reference Voltage 3 Circuit Engine Oil Low Pressure Malfunction
10010-2	P06A9 P1655 P1655	Sensor Reference Voltage 4 Circuit 5 Volt Reference 4 Circuit Sensor voltage system malfunction (Reference 4)
10011-2	P06D5	Sensor Reference Voltage 5 Circuit
10012-2	P0560	12 Volt Circuit Error
10013-12	P1622	Control Module EEPROM Hardware Error
10013-2	P1621	Control Module EEPROM Error Control Module Long Term Memory Performance Control module EEPROMIHD EEPROM malfunction
10014-3	P041D	EGR Cooler Outlet 1 Temp Sensor Circuit High
10014-4	P041C	EGR Cooler Outlet 1 Temp Sensor Circuit Low
10020-2	P045B	EGR 2 Control Circuit Range/Performance
10021-13	P140C	EGR 2 Closed Position Performance
10021-2	P140B	EGR 2 Sensor Circuit

10022-2	P0638	Throttle Actuator Control Range/Performance
10022-3	P0123	Throttle Position Sensor Circuit High
10022-4	P0122	Throttle Position Sensor Circuit Low
10023-12	P0045	Turbocharger Boost Control VNT Error
10023-19	U0411	Lost CAN Communications With VNT Control Module
10023-2	U0110	Lost Communication With VNT System
10024-3	P042D	Catalyst Temperature Sensor Circuit High Sensor 2
	P042O	Exhaust Temperature Sensor 2 Circuit High Input
10024-4	P042C	Catalyst Temperature Sensor Circuit Low Sensor 2
		Exhaust Temperature Sensor 2 Circuit Low Input
10025-5	P1669	DPD Lamp Control Circuit
10029-0	P2458	Purge time Out Error
100-3	P0523	Engine Oil Pressure Sensor Circuit High Input
		Engine oil pressure sensor malfunction (high voltage)
10032-2	P0602	Control module program malfunction error
		Injector Tolerance-QR Code Error
		Internal Control Module QR Code Error
10033-2	P0604	Control module RAM malfunction random access memory error
		Internal Control Module RAM Error
		Internal Control Module Random Access Memory Error
10034-2	U2106	Lost CAN Communications With Wheel Loader Transmission Control System
100-4	P0522	Engine Oil Pressure Sensor Circuit Low Input
		Engine oil pressure sensor malfunction (low voltage)
10040-19	U0001	CAN Bus Error (ISO-CAN)
		ISO-CAN bus reset counter overrun
10041-2	U010E	Lost Communications With Dosing Control Module
10042-12	P2BAA	SCR System Error (Inducement, No Purge)
		SCR System Error (Inducement, No Purge)
10043-2	P204F	SCR System Error (No Inducement)
10044-1	P20C9	SCR System Error
10045-2	P160B	AD-IC Failure Error
	P160B	AD-IC malfunction
10046-2	P1606	SW-IC Internal failure
		SW-IC internal malfunction
	P1606	SW-ICI internal malfunction
10047-2	(blank)	(blank)
10048-2	(blank)	SW-ICI communication circuit malfunction
		(blank)
10049-2	(blank)	(blank)
10050-2	P06AF	Injector IC Failure
		Injector IC malfunction
		Torque Management System - Forced Engine Shutdown
10051-2	(blank)	Injector IC Communication Line Failure
		Injector IC communication malfunction
10051-3	P1077	Charge Air Cooler (CAC) Temperature Sensor 1 Circuit High Voltage
		Charge air cooler temperature sensor 1 malfunction (High voltage)
10051-4	P1076	Charge Air Cooler (CAC) Temperature Sensor 1 Circuit Low Voltage

10051-4	P1076	Charge air cooler temperature sensor 1 (Low voltage)
10052-2	(blank)	Injector IC Checksum Failure Injector IC checksum malfunction
10053-3	P0546	EGR Cooler Inlet 1Temp Sensor Circuit High
10053-4	P0545	EGR Cooler Inlet 1 Temp Sensor Circuit Low
10054-17	P2457	Exhaust Gas Recirculation (EGR) Cooling System Performance
10055-3	P0549	EGR Cooler Inlet 2 Temp Sensor Circuit High
10055-4	P0548	EGR Cooler Inlet 2 Temp Sensor Circuit Low
10078-12	P160C	AD-IC2 Failure Error
10082-2	(blank)	(blank)
10083-2	(blank)	(blank)
102-0	P0234	Turbocharger Overboost Condition
102-3	P0238	Turbo Charger Boost Sensor Circuit High Turbo Charger Boost Sensor Circuit High Input Turbocharger boost sensor circuit high input
102-4	P0237	Turbo Charger Boost Sensor Circuit Low Turbo Charger Boost Sensor Circuit Low Input Turbocharger boost sensor circuit low input
105-3	P1098	Compressor Outlet Temperature Sensor Circuit High
	P1113	Boost temperature sensor malfunction (high voltage)
105-4	P1097	Compressor Outlet Temperature Sensor Circuit Low
	PII 12	Boost temperature sensor malfunction (low voltage)
1077-2	P0606	Control module processor error CPU Error Record Internal Control Module CPU Error
1079-2	P0641	5 Volt Reference 1 Circuit Sensor voltage system malfunction (Reference 1)
	P06A6	Sensor Reference Voltage 1 Circuit
1080-2	P0651	5 Volt Reference 2 Circuit Sensor voltage system malfunction (Reference 2)
	P06A7	Sensor Reference Voltage 2 Circuit
108-3	P2229	Barometric Pressure Circuit High Input Barometric Pressure Sensor Circuit High Barometric pressure sensor system high input
108-4	P2228	Barometric Pressure Circuit Low Input Barometric Pressure Sensor Circuit Low Barometric pressure sensor system low input
110-0	P0217	Engine coolant high temperature malfunction Engine Coolant Over Temperature Condition Engine Over Heat Condition
110-3	P0118	Engine Coolant Temperature Circuit High Input Engine Coolant Temperature Sensor Circuit High Engine coolant temperature sensor system high input
110-4	P0117	Engine Coolant Temperature Circuit Low Input Engine Coolant Temperature Sensor Circuit Low
	POI 17	Engine coolant temperature sensor system low input
1131-3	P0098	Intake Air Temperature (IAT) Sensor 2 Circuit High Voltage
	P041C	EGR Gas Temperature Sensor Circuit Low Input IMT sensor system high input
1131-4	P0097	Intake Air Temperature (IAT) Sensor 2 Circuit Low Voltage

1131-4	P041D	IMT sensor system low input
	P041O	EGR Gas Temperature Sensor Circuit High Input
1239-1	P0093	Fuel Rail Pressure Too Low Fuel system leakage detection
	P1093	Fuel Rail Pressure Too Low
1239-17	P1093	Fuel Rail Pressure Low Ouring Power Enrichment Fuel rail pressure low pressure malfunction Fuel Rail Pressure Too Low
1239-31	P3093	Fuel Rail Pressure Too Low
132-3	P0103	Mass Air Flow Sensor Circuit High Input
132-4	P0102	Mass Air Flow Sensor Circuit Low Input
1347-12	P1062	Fuel Pressure Regulator 1 Solenoid Control Circuit
1347-3	P0092	Fuel Pressure Regulator Control Circuit High Fuel rail pressure regulator control system high input
1347-4	P0091	Fuel Pressure Regulator Control Circuit Low Fuel rail pressure regulator system low input
1348-12	P1063	Fuel Pressure Regulator 2 Solenoid Control Circuit
1348-3	P2296	Fuel Pressure Regulator 2 Control Circuit High
1348-4	P2295	Fuel Pressure Regulator 2 Control Circuit Low
1381-1	P2540	Fuel filter clogging malfunction (Second stage)
1381-17	P20DE	Fuel filter clogging malfunction (First stage)
1381-3	P1294	Fuel Filter Pressure Sensor Circuit High Voltage
	P20E0	Exhaust After-treatment Fuel Pressure Sensor Circuit High
	P1294	Fuel filter pressure sensor system high input
1381-4	P1293	Fuel filter pressure sensor system low input
	P1293	Fuel Filter Pressure Sensor Circuit Low Voltage
	P20DF	Exhaust After-treatment Fuel Pressure Sensor Circuit Low
1485-5	P0685	ECM main relay control system low input ECM Power Relay Control Circuit Open Main Relay Circuit Stuck Open
1485-6	P0687	ECM main relay control system high input ECM Power Relay Control Circuit High Main Relay Circuit Stuck Close
157-15	P0089	Fuel Pressure Regulator Performance Fuel rail pressure regulator control characteristic malfunction
157-3	P0193	Fuel Rail Pressure Sensor Circuit High Fuel Rail Pressure Sensor Circuit High Voltage Fuel rail pressure sensor system high input
157-4	P0192	Fuel Rail Pressure Sensor Circuit Low Fuel Rail Pressure Sensor Circuit Low Voltage Fuel rail pressure sensor system low input
158-3	P0563	System Voltage High System voltage high input
172-3	P0113	Intake Air Temperature Circuit High Input Intake Air Temperature Sensor Circuit High
	POI 13	Intake air temperature sensor system high input
172-4	P0112	Intake Air Temperature Circuit Low Input Intake Air Temperature Sensor Circuit Low
	POI 12	Intake air temperature sensor system low input
173-3	P0428	Catalyst Temperature Sensor Circuit High Sensor 1

173-4	P0427	Catalyst Temperature Sensor Circuit Low Sensor 1
174-3	P0183	Fuel Temperature Sensor Circuit High Fuel Temperature Sensor Circuit High Input Fuel temperature sensor system high input
174-4	P0182	Fuel Temperature Sensor Circuit Low Fuel Temperature Sensor Circuit Low Input Fuel temperature sensor system low input
190-0	P0219	Engine Overspeed Condition High engine speed malfunction
2791-2	P0401	EGR Flow Insufficient Detected
412-3	P040D	EGR Cooler Outlet 2 Temp Sensor Circuit High
412-4	P040C	EGR Cooler Outlet 2 Temp Sensor Circuit Low
4332-12	P207F	Urea Fluid Concentration Too Low
	P2BA7	Urea Fluid Quantity Too Low
5260-1	(blank)	Degraded EGR cooler 2 performance
5285-1	P1236	Charge Air Cooler Performance Failure
628-2	P0601	Control module memory check sum error Control Module Read Only Memory Internal Control Module Memory Check Sum Error
633-7	P0087	Fuel Rail Pressure Limiter Open Fuel rail system pressure low pressure malfunction Fuel Rail/System Pressure - Too Low
636-2	P0340	Camshaft Position Sensor Circuit CMP sensor system malfunction
636-7	P0016	Crankshaft Position - Camshaft Position Correlation Crankshaft Position - Camshaft Position Correlation Error
639-19	U0073	CAN bus malfunction (JI939) CAN bus reset counter overrun Control Module Communication Bus Off
639-2	U0101	Lost Communication With CAN Lost Communication with IEC TCM communication malfunction
651-5	P0201	Injector Circuit Cylinder 1 Injector Circuit Open - Cylinder 1 Injector system malfunction No. 1 cylinder
652-5	P0202	Injector Circuit Cylinder 2 Injector Circuit Open - Cylinder 2 Injector system malfunction No. 2 cylinder
653-5	P0203	Injector Circuit Cylinder 3 Injector Circuit Open - Cylinder 3 Injector system malfunction No. 3 cylinder
654-5	P0204	Injector Circuit Cylinder 4 Injector Circuit Open - Cylinder 4 Injector system malfunction No. 4 cylinder
655-5	P0205	Injector Circuit Open - Cylinder 5
656-5	P0206	Injector Circuit Open - Cylinder 6
676-5	P0380	Glow plug system malfunction Glow Relay Circuit Glow Relay Circuit Error
677-5	P0615	Starter Cut Relay Circuit Starter Relay Circuit Error Starter relay system malfunction

723-2	P0335	Crankshaft Position Sensor Circuit
		Crankshaft position sensor system malfunction
	P0336	Crankshaft position sensor system characteristic malfunction
723-8	P0336	Crankshaft Position Sensor Circuit Range/Performance
91-2	P2138	Pedal Position Sensor 1 - 2 Voltage Correlation
91-3	P2123	Pedal Position Sensor 1 Circuit High Input
	P2128	Pedal Position Sensor 2 Circuit High Input
91-4	P2122	Pedal Position Sensor 1 Circuit Low Input
	P2127	Pedal Position Sensor 2 Circuit Low Input
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Supplement

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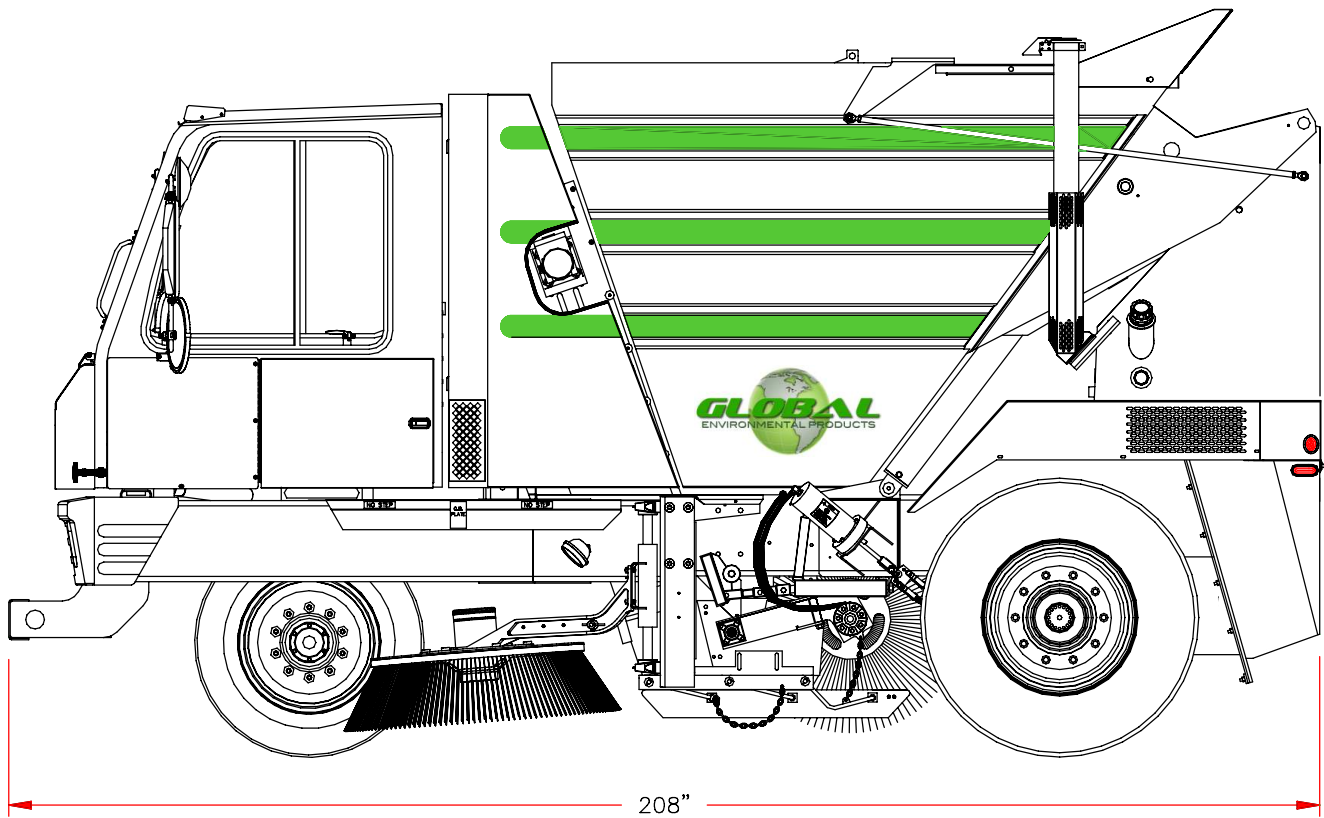
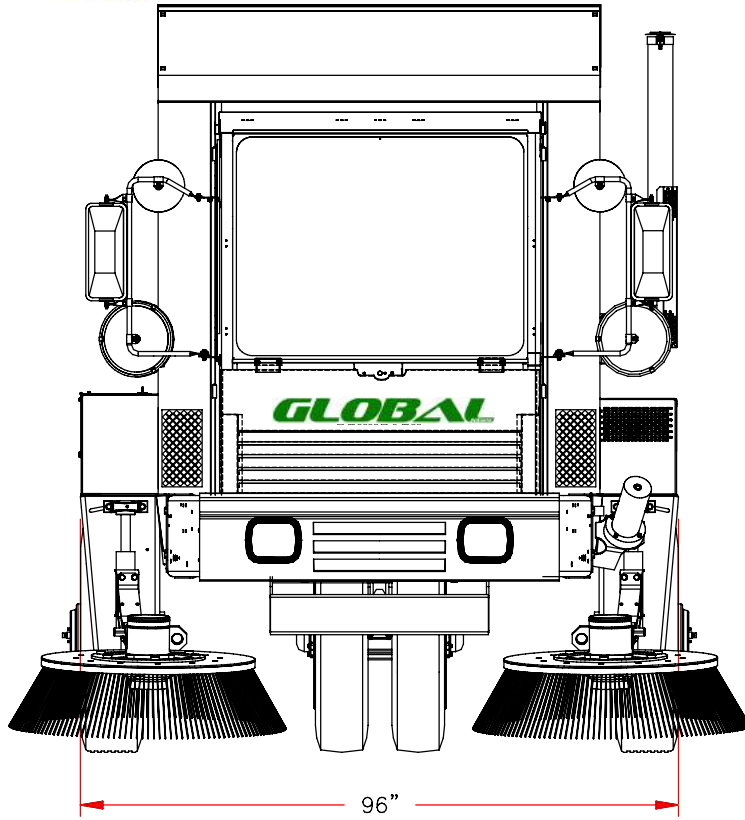


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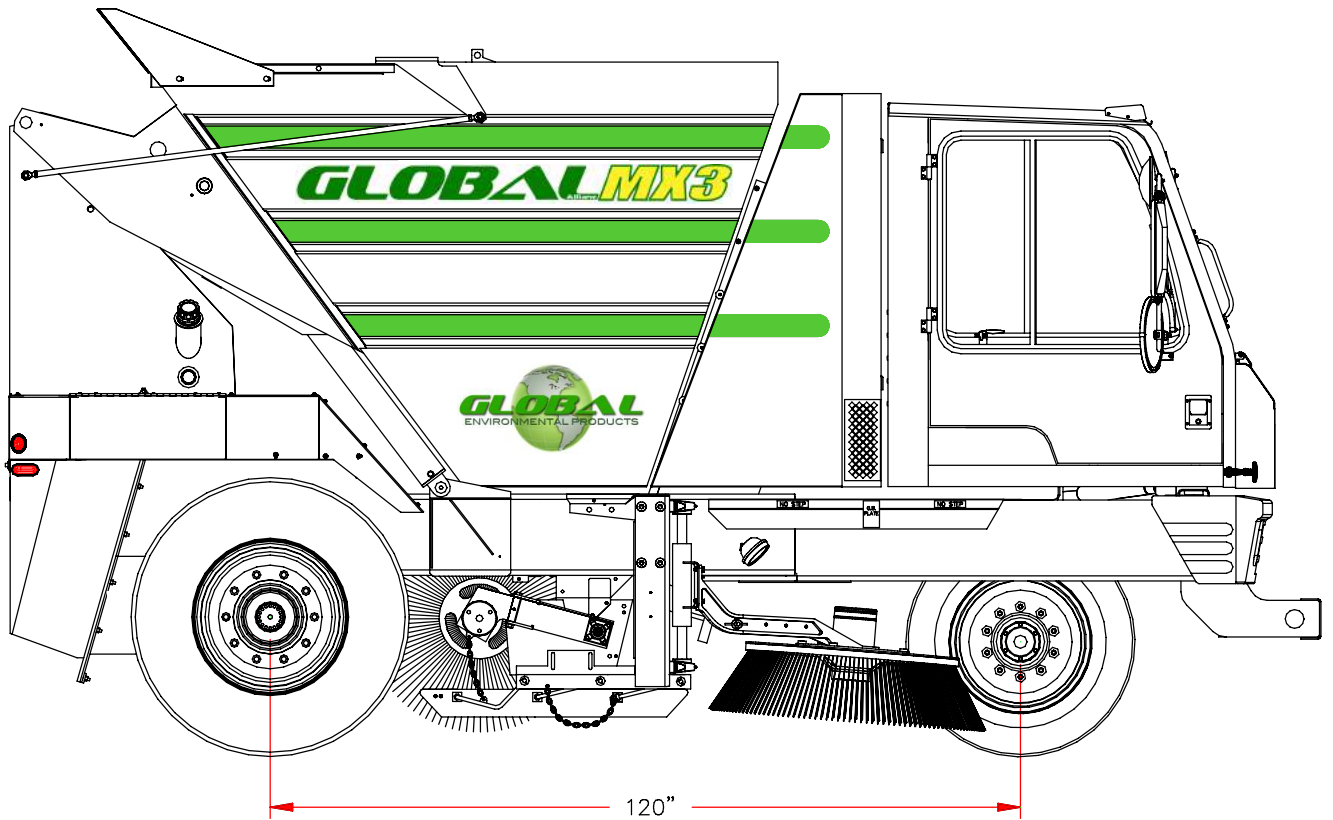
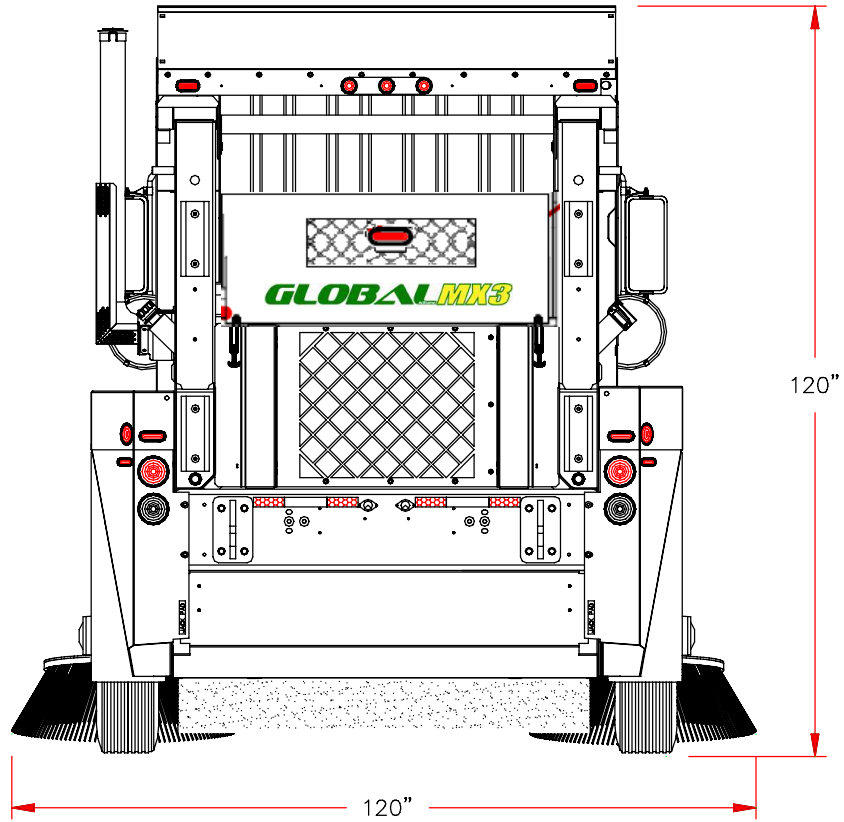
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Vehicle Configuration

Brakes

- Type - Hydraulic power boosted.
- Rear - 5 in. x 15 in. drum.

Chassis

- Frame-3 in. x 13 in. (76mm x 330mm) C-channel.
- Section Modules-16.63 in. (422 mm).
- Modular Body.
- Tow Hooks - Front and Rear.

Cab

- *Description* - Center forward mounted, single operator dust and weather sealed with filtered air intake. Integral ROPS structure with left and right side limb guards. All steel construction.
- Sound Suppression Interior - Utilizes padded insulation and isolated position to maintain 83 dBA OSHA recommended environment. Rubber mounted to frame.
- Windows - 4400 sq in. of tinted safety glass. Sliding windows left and right, configured for ultimate front visibility.
- Windshield Wiper - 2 speed with washer.
- Seat - Cloth covered, adjustable for height and weight. Spring suspended with shock absorber, seat belt and arm rests.
- Automotive Controls - Tilt telescopic steering Wheel and positive position shift quadrant.
- Mirrors - Dual west coast type and large dual parabolic.
- Heater - Fresh air heater/defroster pressurizer.

Electrical

- Alternator- 130 Amp with dust shield.
- Battery - Dual system 1800 CCA @ 0° F.
- Lights-Sealed beam headlights with high beam indicator, LED combination stop and tail lights, self canceling turn signals with two way hazard flasher, LED backup lights, gutter broom spotlights and illuminated license plate holder.
- Wire Harness "No Splice" harness with weather resistant connectors.
- Alarms-Electronic backup alarm, hopper warning alarm, vehicle movement lockout (prevents movement when hopper is raised) and horn.
- Lighting -Illuminated panels and dome light.

Engine

- Isuzu - 16 Valve Inline 4-cylinder Turbocharged diesel inter cooled, direct injection, Model 4HK1 Tier 4 Final

- Displacement - 317 cu in. (5.1 L).
- Horsepower-172 HP @2550 rpm (128 kW).
- Torque-380 ft lb@ 1600 rpm (515 N.m).
- Radiator-39 qt (37 L) capacity, swing away design.
- Air Cleaner- Dry single safety element with primary element.

Fuel System

- Description-30 gallons, vented w/plastic construction.

Instruments

- Gauges - Speedometer/odometer, tachometer, hour-meter, engine oil pressure, engine water temperature, voltmeter, fuel gauge and gutter broom position indicators.
- Indicators-Water spray, low engine oil, high engine water temperature, low hydraulic oil level alarm, air restriction and high beam.

Paint

- Body - White with accent blue striping and black matte cab.
- Frame and Fenders- White.

Steering

- Description-Heavy duty full power steering.

Sweeper Dimensions

- Wheel Base - 116 in. (2946 mm).
- Length-189 in. (4801 mm).
- Height-106 in. (2693 mm).
- Width-98 in. (2489 mm).
- Turning Radius- 12.5 ft (3810 mm).
- Weight, High Dump-15,860 lbs (7194 kg) w/duel gutter broom.

Tires and Wheels

- Front Tires (Dual) -11R x 17.5H 16 Ply.
- Front Rim -8.25 x 17.5.
- Rear Tire - 11A x 22.5G 14 Ply.
- Rear Rim - 8.25 x 22.5.

Traction Drive

- Description - Hydrostatic drive with two speed variable displacement wheel motors and an engine mounted variable displacement pump. The traction system provides constant blower speed independent of vehicle speed or direction.
- Range - Low (sweeping mode) 0-12 mph (19 km/h), High (travel mode) 0-25 mph (40 km/h).
- Controls - Automotive controls Including foot pedal and shift console. Infinitely variable speeds in sweeping and travel ranges.

Sweeping Configuration

Auxiliary Hydraulics

- *Description* - dual power parallel hydraulics utilizes separate direct mounted gear pump to provide high torque power to blower, gutter brooms and lift systems.

Blower

- Drive - Direct hydraulic.
- Construction - 33 in. diameter (838.2 mm) ASTM-A514S with 9 blades.
- Blower Housing - Lined with removable rubber inserts.
- Drive - Direct hydraulic.

Gutter Broom

- Diameter-47 in. (1194 mm).
- Segments-TufGrip disposable, 12 segmts. with 26in. (660 mm) steel wire.
- Speed- Variable.
- Drive - Direct high torque hydraulic.
- Lift - Hydraulic through accumulators.
- Impact Protection - Free floating vertically and horizontally.
- Overload Protection - Motor mounted relief caps.
- Adjustments - Simple "tool free" settings, in-cab controls for pressure and wear.

Hopper

- Capacity-5.8 cubic yards (4.4 cubic meters).
- Lift-12,000 lbs (5445 kg).
- Full Stainless Steel Hopper (Optional)
- Hopper Screens -Stainless Steel (Optional)

- Lift Method - Dual 4 in. (102 cm) hydraulic cylinders.
- Dump Height-144 in. (2869 mm) high dump standard.
- Dump Position -Behind rear wheels, similar to dump truck.
- Dump Control - Cab mounted single toggle switch.
- Safety Lockout - Hopper lift controls automatically prevent movement while dumping.
- Location - Center mounted behind cab.

Suction Hood

- Type- Recirculating.
- Hood Width - 72 in. (1829 mm) outside dimension.
- Vacuum & Pressure Hoses-12in. (305 mm) diameter.
- Suspension - Springs with forward and reverse tow cables.
- Skates - Adjustable long life carbide,
- Ground Clearance- 5 in. (127 mm) for transport.

Water Spray System

- Capacity- 230 gal (870 L).
- Construction - Molded Polyethylene.
- Location - Below frame for stability.
- Pumps - 2 Electrical diaphragm, 7.2 gal/min (42 U/min).
- Spray Nozzles - gutter brooms, suction hood, and inside dust separator and hopper.
- Controls - Variable flow valves in cab.
- Shutoff - Water pump switch in cab.
- Filter-100 mesh in-line type, cleanable.
- Fill Hose-15 ft (4.6m) hose stored in right rear fender box with hydrant coupling and wrench included.
- Flusher-Hopper and hydrant screen.

ADDITIONAL OPTIONS AVAILABLE:

ISO 9001:2008

- GUTTERBROOM SPEED CONTROL
- 100% STAINLESS STEEL HOPPER
- GUTTERBROOM SPEED CONTROL
- AIR RIDE SEAT
- HEATER POWER MIRRORS
- AM/FM/CD/AUX BLUETOOTH W/USB PORT
- ARROWSTICK (LED)
- DUAL OR SINGLE GUTTERBROOM TILT
- HOPPER WASH OUT SYSTEM

- ▶ *Reliable / Durable Equipment*
- ▶ *Innovative Engineering / Design*
- ▶ *Industry Leading Reputation*
- ▶ *Dedicated Customer Service*
- ▶ *Outstanding Sales Professionals*
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