

VIKING® RIDE-ON SCRAPER OPERATING & SERVICE MANUAL



CE



Read Manual Before Operating or
Servicing Machine

406572 RevB

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MANUFACTURER INFORMATION

CONTACT INFORMATION

Contact National Flooring Equipment (NFE) for customer support:

National Flooring Equipment, Inc.
9250 Xylon Avenue North
Minneapolis, MN 55445
Tel: (800) 245-0267
Fax: (800) 648-7124
nationalequipmentdirect.com
info@nationalequipment.com

SUPPORT MATERIALS

Scan the QR code below to access support materials for the Viking scraper.



SERIAL NUMBERS

When contacting NFE, always provide the serial number of the machine and the engine.

Machine Serial Number

The serial number label is located inside the cab above the windshield.



Engine Serial Number

The serial number plate is located on top of the engine.



SPECIFICATIONS

INTENDED USE

The Viking ride-on scraper is designed to scrape rubber overlay or other materials off bridge decks. The machine can also be used to scrape wood, tile and other materials off concrete surfaces if the underlying structure is capable of supporting the weight of the machine. The machine must not be used as a battering ram, for earth moving purposes or for lifting concrete or asphalt.

Operators should have average mechanical abilities and be trained by proper personnel. Trainees should have average mechanical abilities and be trained and supervised by proper personnel. Maintenance personnel should have above average mechanical abilities and be fully trained.

ALLOWED ENVIRONMENTAL CONDITIONS

The machine should be run in temperatures between 32°F-104°F (0°C-40°C) with relative humidity not above 95% to ensure correct operation.

MACHINE SPECIFICATIONS

Width	57.9"	147 cm
Length	122.5"	311 cm
Height	93.3"	237 cm
Weight	6000 lbs	2722 kg
Power	49.5 HP (36.9 kW) Kubota Turbo Diesel	
Fuel Capacity	18 gal	68 L
Alternator	90 amps, 12V	

SAFETY

SAFETY FIRST!

Look for the safety alert symbol. This symbol is used throughout the manual and on the labels of the machine to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read these instructions before you attempt to operate the machine.

 **DANGER**

Identifies an immediate hazard which, if not avoided, will result in death or serious injury.

 **WARNING**

Identifies a potential hazard which, if not avoided, could result in death or serious injury.

 **CAUTION**

Identifies a potential hazard which, if not avoided, could result in minor or moderate injury and/or could result in damage to equipment.

IMPORTANT:

Indicates equipment or property damage could result if instructions are not followed.

NOTE:

Gives helpful information.

Read and understand this safety section carefully before operating the machine.

BEFORE OPERATION

1. Carefully read and understand this manual before operating or performing maintenance on the machine. Keep the manual with the machine at all times. If your manual is lost or damaged, contact National Flooring Equipment (NFE) for a replacement.



2. Do not allow anyone to use this machine until they have been informed of the work to be done and they have read and understood this manual. Know your equipment and its limitations. Personnel must be properly trained before operating this machine.
3. Safety labels carry important information. Obey the danger, warning and caution labels attached to the machine. If unreadable or missing, contact NFE for a replacement.
4. Dress properly and wear adequate safety equipment. The operator and any other personnel in the work area must wear: eye protection, ear protection, safety shoes,

safety gloves, safety helmet, high visibility safety vest and dust mask. Do not wear loose clothing as it could get caught in moving parts and cause injury.

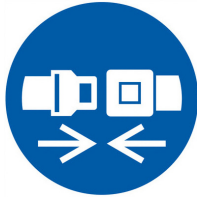


5. Scraping of concrete, asphalt and other materials can generate harmful dust which can cause serious injury or illness such as respiratory disease. The operator and any bystanders should always wear a safety mask.



6. The ROPS/FOPS cab is designed and tested to ISO 3471 and ISO 3449 standards regarding roll-over protection and falling object protection. Never modify the structural members of the cab as this may weaken the structure.

7. Always fasten the seat belt before starting the engine. Inspect regularly and replace if frayed or damaged.



8. Always perform the daily checks each day before operating the machine. See “DAILY CHECKS” section of the manual.
9. Make sure a fire extinguisher is installed before using the machine. The mounting bracket is located on the right side of the cab behind the operator’s seat.



10. The cab is equipped with an air pressurizer to reduce the amount of dust particles entering the cab. Always turn on the cab pressurizer before operating the machine.
11. The cab is equipped with a carbon monoxide detector. Periodically check the detector during operation to make sure it is indicating in the normal range.
12. Check the surrounding area before using the machine.
 - Be aware of protrusions (stud anchors, rebar, threaded rod, etc.), cracks and expansion joints.
 - Check for buried pipes and cables.
 - To avoid danger of electrocution, never operate the machine near power lines before confirming the power is off.
13. Check for hidden holes, obstacles, soft underground and overhangs. Do not enter soft ground.
14. Make sure blades and cutting heads are securely mounted. Use only NFE parts.
15. Do not operate the machine when tired, distracted, or under the influence of drugs, alcohol or any medication that may cause decreased control.
16. Before entering and exiting the cab, make sure the handles and step are dry, clean and free from oil and dust.

OPERATING THE MACHINE

1. Enter and exit the machine safely. Use the handles and step and keep yourself balanced. Do not grab or hold the joysticks or other controls. Do not jump on or off the machine, whether stationary or in motion.
2. Smoking is prohibited while inside the cab.



3. Always sit in the operator’s seat when starting the engine or operating the machine.
4. The machine is equipped with a safety circuit. The operator must be seated with the seat belt fastened, cab door closed, and emergency stop and front safety switches released before the hydraulic system can be enabled. If any of these conditions is not met, the safety circuit will disable the hydraulic system and the machine will be inoperative.
5. To avoid injury, always keep hands and body inside the ROPS/FOPS cab whenever operating the machine. Never try to operate the machine using controls from outside the cab while the machine is running.
6. Never allow passengers to ride on the machine. The operator must remain in the seat during operation.
7. Never remove or modify any of the safety features on the machine.
 - Carefully read the manual to understand the proper use of the safety features.
 - Make sure all safety features, including horn, backup alarm and camera, safety circuit, all exterior lights and protective guards are in good operating condition. Repair or replace any inoperative or missing safety features.
8. Always keep the exterior work lights on while operating the machine, no matter the time of day, to improve the visibility of the machine and decrease the possibility of accidents.

SAFETY

9. Beware of hot surfaces such as the exhaust pipe, blades, and hydraulic and engine components. Always wear safety gloves.



10. Beware of pinch point locations:

- Cab door has pinch points on latch and hinge sides.
- Engine hood has pinch points near handles.
- Tooling holder has pinch points at cutting head insertion locations.
- Front caster wheels have a tight fit at the rotation point near the frame.



11. Always make sure the dual lift is lowered to the ground before changing blades or performing maintenance on the machine.

- Never attempt to work on or under the dual lift if it is not properly supported.
- Failure in the hydraulics could cause the dual lift to drop.



12. Always check the surrounding area for any possible conditions that could create a dangerous situation.

- Make sure to read this manual to thoroughly understand the operating conditions and limitations of the machine.
- Operator should be aware of who is around them and their proximity. Never allow people to approach the vicinity of the machine while the machine is running.

- Keep children away from the machine and work area at all times.
- To prevent accidents and avoid damage, always use an external helper and have the helper check for clearances and other possible dangers that may be obstructed from view.
- Be aware of blind spots to the rear and always check behind you before backing up.

13. Watch where you are going at all times. Watch for and avoid obstacles. Remain alert for trees, wires and other obstructions.

14. Avoid driving the machine over any obstacles which could cause a loss of control.

15. Always operate the machine in slow drive mode when driving in congested or closed-in areas where there is a danger of hitting or running into something. Pay close attention to obstructions.

16. Pay attention when passing through tunnels or moving under high obstacles. Check height and width dimensions of the machine against those of the obstruction in order to avoid accident or injury from hitting the obstruction.

17. Use caution when operating the machine on inclines or uneven surfaces.

- The weight of the machine may become distributed differently if on an uneven surface. Too much of an angle could make the machine unsafe and cause it to roll over.
- To avoid injuries or accidents, always operate the machine at slow speed when going up or down an incline by using the slow drive mode. Traveling too fast down an incline can cause the operator to lose control of the machine.
- Avoid stopping suddenly on an incline, which can cause the machine to become unstable and roll over.

18. Take care when moving the machine in slippery or unstable conditions such as grass, fallen leaves, metal plates or ice, as it may skid out of control.

19. Never attempt to operate the machine on unstable surfaces such as road shoulders, deep trenches, cliffs, etc. Always check the area for conditions that could cause the ground to cave in. The machine could lose stability causing it to roll over.

20. Only operate the machine in well-ventilated areas to avoid carbon monoxide poisoning.

21. Avoid use in dangerous environments. Do not use in the presence of explosive atmospheres (gaseous fumes, dust or flammable materials). Remove materials or debris that may be ignited by sparks.

22. Do not block the machine's air flow. Blocking ventilation slots or air flow will result in damage to the machine. Leave space for air to flow freely during operation.
23. Never operate the machine without the cab door or engine hood installed. Always make sure the door and hood are latched before operation and that latches are working properly.
24. If abnormal noise or vibration occurs, turn off the machine immediately.
25. Do not force equipment. Equipment will perform best at the rate for which it was designed. Excessive force only causes operator fatigue, increased wear and reduced control.

AFTER OPERATION

Before leaving the machine:

1. Park the machine on level ground.
2. Remove tooling.
3. Lower dual lift to the ground.
4. Stop the engine.
5. Remove the key.
6. Turn the main power switch to the "OFF" position.

MAINTENANCE

1. Before performing maintenance on the machine, park the machine on level ground. Lower the dual lift to the ground. Stop the engine and remove the key. Turn off the main power switch unless needed for troubleshooting.
2. Always make sure the dual lift is lowered to the ground before performing any maintenance on the machine.
 - Never attempt to work on or under the dual lift if it is not properly supported.
 - The dual lift could drop if the hydraulic lines are loosened or disconnected.
 - Failure in the hydraulics could also cause the dual lift to drop.
3. Always make sure the engine is stopped before performing any maintenance or repairs.
 - Do not attempt to make adjustments while the machine is moving or while the engine is running even if stationary.
 - Always keep body clear of any moving parts and remove any loose clothing when working near moving parts to prevent possible injury.
 - Always stay clear of rotating fans, V-belts and other moving parts. Clothing, hands or other parts of the body can become caught in moving parts of the machine and cause personal injury or death.



4. Before performing maintenance, allow the machine to cool down sufficiently.
5. Dress properly and wear adequate safety equipment. All personnel in the work area must wear: eye protection, ear protection, safety shoes, safety gloves, safety helmet, high visibility safety vest and dust mask. Do not wear loose clothing as it could get caught in moving parts and cause injury.
6. Keep a first-aid box and fire extinguisher on hand at all times.

SAFETY

7. Always attach a “DO NOT OPERATE” tag whenever performing any kind of maintenance or repair.
8. Make sure you have the proper tools on hand. Do not use defective or damaged tools. Always use tools that are appropriate for the task to be done.
9. Be sure to use explosion-proof lighting when working on, inspecting or handling fuel, oil, coolant, battery fluid, etc. If explosion-proof lighting is not used and should break, it can ignite and cause fire, injury or death.
10. Make sure the work area is clear and safe. Be sure to work on a firm, level surface with adequate lighting. Work in a well-ventilated area if indoors. Make sure the area is free from any potentially dangerous conditions such as obstacles, slippery surfaces, etc.
11. Prohibit unauthorized persons from entering the work area to prevent injury caused by flying debris.
12. Make sure the machine is secured before beginning maintenance work.
 - Make sure the wheels are securely blocked off.
 - Never do any work under the machine or work on it while it is supported on jack-stands or other rigid support devices unless they are well secured and stable.
13. Securely support the machine with stands or suitable blocking before working underneath. For your safety, do not work under any hydraulically supported device. They can settle, suddenly drop or be accidentally lowered.
14. Be sure the machine is clean and free of debris.
 - Always remove debris from the machine and clean it before performing any maintenance or repair work.
 - Before using water to wash or clean the machine, stop the engine and make sure all electrical parts and devices are covered. Any water seepage into electrical wiring on the machine can cause a short circuit or malfunction of controls. Never wash the battery, sensors, connectors or cab with water or steam.
15. Hydraulic fluid under high pressure can penetrate the skin and may be harmful to your health if not treated immediately.
 - Leakages from pinholes can be totally invisible.
 - Never look for a leak when unit is under pressure.
 - Do not use hands for checking for leaks—always use a piece of wood or cardboard.

- Use eye protection.
- Should injuries occur with leaking hydraulic fluid, contact a doctor immediately. This fluid can cause gangrene or serious allergic reactions.



16. Most hydraulic fluids are flammable when exposed to the proper conditions. Leaking pressurized hydraulic fluids may develop a mist or fine spray that can flash or explode upon contact with a source of ignition. Precautions should be taken to eliminate all ignition sources from contact with escaping fluids resulting from hydraulic failures. Sources of ignition could be sparks, open flames, extremely high temperatures, etc.
17. To avoid fire, do not heat the hydraulic components (tanks, pipes, hoses, cylinders) before they have been drained and washed.
18. Do not open the radiator cap before the radiator has cooled down sufficiently. First loosen the cap to the first stop and allow the system enough time to release the remaining pressure. Then loosen the cap completely.
19. Take care when working around hot and pressurized components.
 - Always allow the engine to cool sufficiently before performing any maintenance, inspection or repairs.
 - Never touch any parts such as the engine, muffler, radiator, hydraulic lines, sliding parts, etc. as they may be very hot immediately after the machine has been running and can cause burning. Allow these parts to cool sufficiently before touching.
 - Always use care when removing the caps and plugs on the coolant, oil and hydraulic fluid as they are hot and pressurized and can cause burning and injury from spraying of hot fluid.



20. Make sure pressure from the hydraulic, fuel and coolant systems is sufficiently released before performing any maintenance or repairs. Oil and other fluids could be released when caps or filters are removed before the pressure has been stabilized in the hydraulic system.

- Gradually release internal pressure buildup by standing out of the line of any possible spray and slowly removing plugs or disconnecting hoses.

21. Smoking is prohibited while refueling or handling the battery. Keep sparks and fire away from the fuel tank and battery. Flammable gases escape from the battery, especially during charging.

22. Remove personal metal items when working with batteries.

- A battery can produce a short circuit current sufficient enough to weld metal objects, causing severe burns.
- Be careful not to drop metal tools on the battery, as a spark or short circuit could cause an explosion.

23. To avoid short-circuiting the battery, always disconnect the battery's ground cable (-) first and reconnect it last.

24. Be cautious when working with batteries. If electrolytic acid gets in the eyes, immediately flush out with cold, fresh water for at least 10 minutes and get medical help.

25. Use care when refueling the machine.

- Never smoke cigarettes or permit the use of fire while refueling or in the vicinity of refueling.
- Always make sure the engine is off and cool before removing the fuel cap to refuel the tank. Avoid getting fuel on any hot components.
- Keep control of the fuel filler nozzle while refueling.
- Never overfill the tank with fuel. Leave room for thermal expansion.
- Always remove any spilled fuel immediately.
- Always make sure the fuel tank cap is securely reinstalled. Replace the cap only with a manufacturer approved cap whenever it becomes damaged. Use of the wrong type of cap may not allow for proper venting, causing pressure in the tank to build up.
- Never use fuel to clean the machine.
- Always use the correct type of fuel for the machine and the temperature in which it is being operated.

26. Fire prevention

The machine has components that are at high temperatures under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcing or sparks. The following guidelines will help keep the machine running efficiently and keep the risk of fire to a minimum.

- Blow off accumulated debris near hot engine components such as the exhaust and muffler more frequently when working in severe conditions.
- Clean out accumulated flammable debris such as leaves, branches and any other combustible materials from inside the lower structures of the machine as well as from the engine area.
- Remove rags, tools, supplies, etc. from the machine after maintenance is completed.
- Inspect all fuel lines and hydraulic hoses for wear. Replace them immediately if they begin to leak.
- Check electrical wiring and connectors frequently for damage. Repair any wires that are loose or frayed before operating the machine. Clean and tighten all electrical connections as necessary.
- Inspect the exhaust system daily for any signs of leakage. Check for broken pipes and muffler, and also for loose or missing bolts, nuts and clamps. If any exhaust leaks or fractured parts are found, repairs must be completed prior to operation.
- Always keep a fire extinguisher on hand.



27. Hoses

- Leakage in any fuel, oil or hydraulic line can cause fire or explosion.
- Avoid any twisting, bending or hitting of the hoses that could cause damage to the line.
- Make sure any loose connections are secured properly before using the machine.

SAFETY

28. Do not permanently remove a guard or other safety device when performing maintenance on the machine.
29. Check for loose or damaged parts, misalignment, improper mounting, binding of moving parts, and any other conditions that may affect operation.
 - Retighten all loose parts. Replace damaged parts immediately. Use only NFE parts.
 - Do not use damaged equipment until repaired.
 - Use only NFE-approved or recommended parts and accessories. Using any that are not recommended may be hazardous.
30. Do not modify the machine without authorization from NFE.
31. Always carefully check the machine after performing any maintenance or repairs. Confirm that no fluids are leaking from any parts that had been serviced by carefully inspecting the parts. Remove all traces of oil, fuel, hydraulic fluid or cleaning fluids from the machine. Gradually speed up the engine from a low speed to higher speed to check operation.
32. Use proper cleaning agents. Ensure that all cleaning rags are fiber-free. Do not use any aggressive cleaning products.
33. Always secure the hood after closing it. Avoid opening the hood on an incline or in strong winds.
34. Waste material
 - Always make sure any material and waste products from the repair and maintenance of the machine are collected into proper containers using a funnel or other device. Dispose of waste material properly to avoid pollution and contamination of the environment.
 - Consult local regulations and codes when disposing of oil, fuel, coolant, hydraulic fluids, refrigerant, solvents, filters, batteries and any other potentially harmful and hazardous materials or substances.

SAFETY LABELS



Hot Surface



Sharp & Hot
Blades



Pinch Point



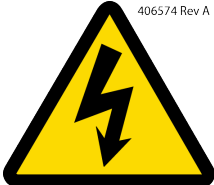
Keep Feet Clear



No Smoking



Fire Hazard



Electrical Hazard



Heavy Object



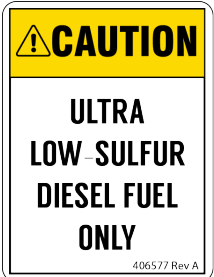
Inhalation Hazard



Carbon Monoxide



Lock Out



Ultra-Low Sulfur
Diesel Fuel

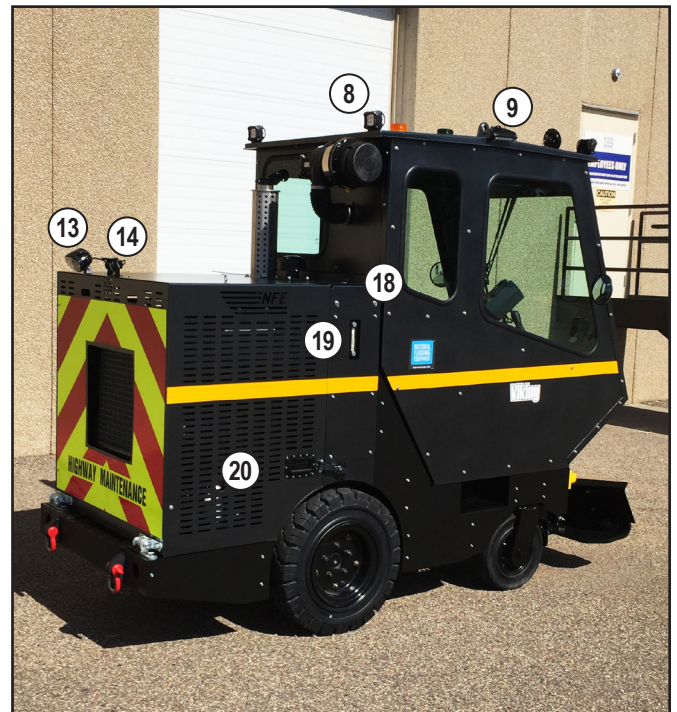
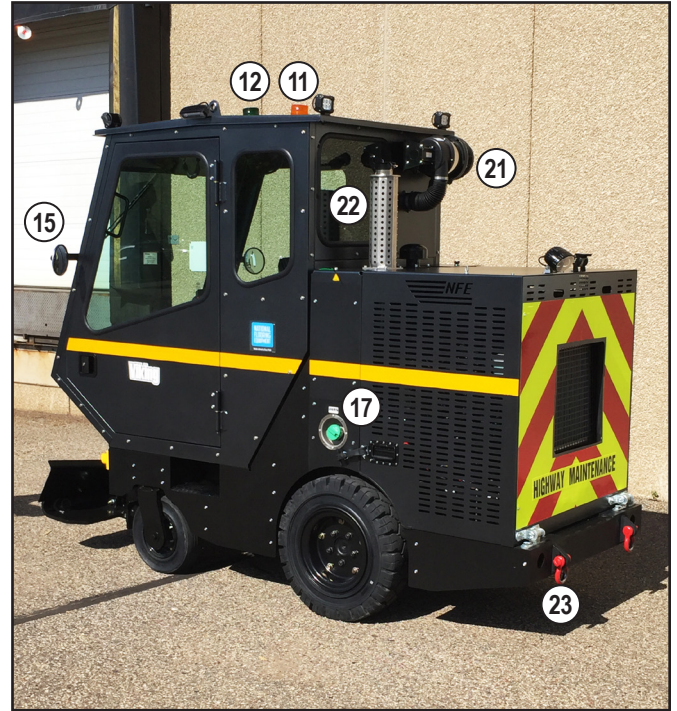


Safety Equipment & Read Manual



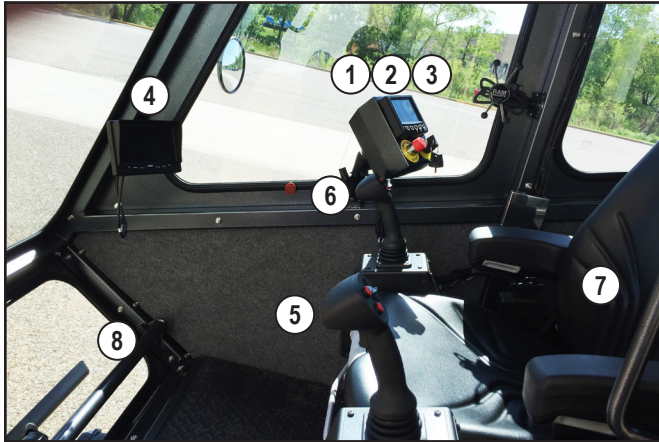
Hydraulic Enable Warning

MACHINE PARTS OVERVIEW



- | | | | |
|------------------------|---------------------------|--------------------------------|--------------------------------------|
| (1) Cab | (7) Front safety switch | (13) Blue zone safety light | (19) Hydraulic oil level gauge |
| (2) Front caster wheel | (8) Exterior work light | (14) Rear view camera | (20) Hydraulic filter pressure gauge |
| (3) Rear drive wheel | (9) Red zone safety light | (15) Side view mirror | (21) Cab pressurizer blower |
| (4) Tooling holder | (10) Horn | (16) Windshield wiper/washer | (22) Exhaust pipe |
| (5) Debris deflector | (11) Amber beacon | (17) Fuel tank cap | (23) Rear tie down |
| (6) Dual lift | (12) Green beacon | (18) Hydraulic tank cap access | |

OPERATING CONTROLS



- (1) Ignition switch
- (2) Emergency stop switch (E-Stop)
- (3) Engine control panel
- (4) Rear view camera monitor
- (5) Left joystick
 - Left drive wheel control
 - Dual lift tilt control
 - Fast drive mode
 - Slow drive mode
- (6) Right joystick
 - Right drive wheel control
 - Dual lift height control
 - Horn
- (7) Seat



- (8) Foot rest
- (9) Dome light
- (10) Night light
- (11) Defrost fan
- (12) Temperature control
- (13) Blower fan speed control
- (14) Air conditioning switch
- (15) Safety circuit indicator
- (16) Hydraulic enable switch
- (17) Exterior work lights switch
- (18) Cab pressurizer switch
- (19) CB5 circuit breaker—HVAC system, cab pressurizer
- (20) CB4 circuit breaker—Safety lights, night light, defrost fan, wiper/washer, HVAC control panel, rear view camera
- (21) CB3 circuit breaker—Work lights, dome light, horn
- (22) CB2 circuit breaker—12V accessory outlet
- (23) Wiper/washer switch
- (24) 12V accessory outlet



CONTROL DESCRIPTIONS

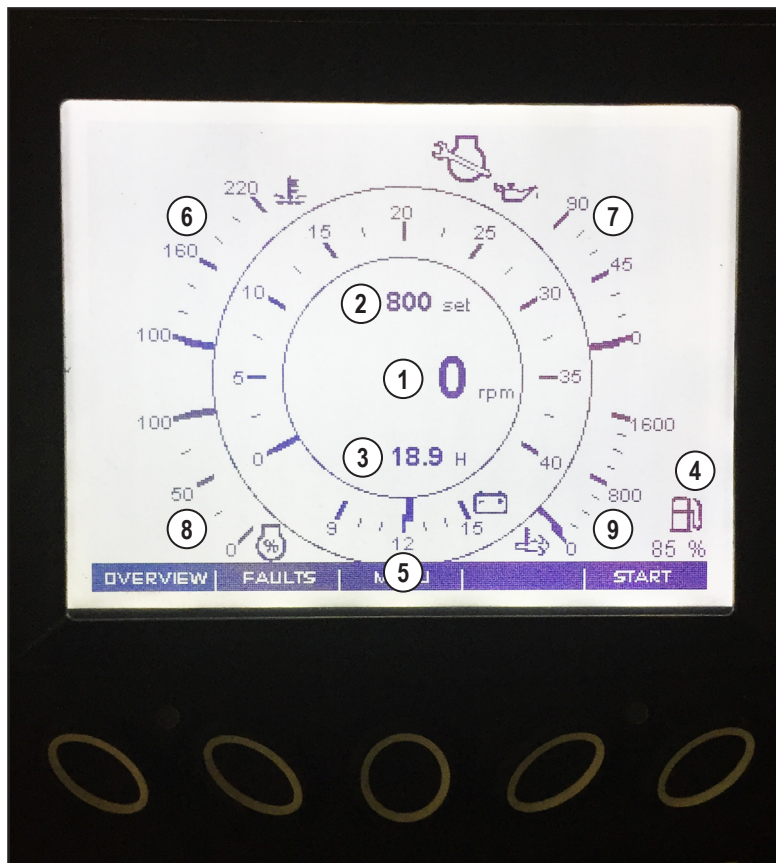
ENGINE CONTROL PANEL

The engine control panel turns on automatically with the key in the "ON" position and performs the following functions:

- Displays and monitors engine parameters
 - Engine RPM
 - Engine hours
 - Fuel level
 - Battery voltage
 - Coolant temperature
 - Oil pressure
 - Engine load

- Exhaust temperature
- Displays warning icons
- Displays service reminders
- Displays faults and popups
- Performs the engine start function
- Controls engine RPM
- Controls the engine regeneration process

Reference the "ENGINE OPERATION" section for more detailed information on the engine control panel and the display screens.



- (1) Engine RPM
- (2) Set RPM
- (3) Engine hours
- (4) Fuel level
- (5) Battery voltage

- (6) Coolant temperature
- (7) Oil pressure
- (8) Engine load
- (9) Exhaust temperature

CONTROL DESCRIPTIONS

POWER CONTROLS

■ Main Power Switch and Breaker

The main power switch enables electrical power to the entire machine and must be turned to the “ON” position to operate the machine.

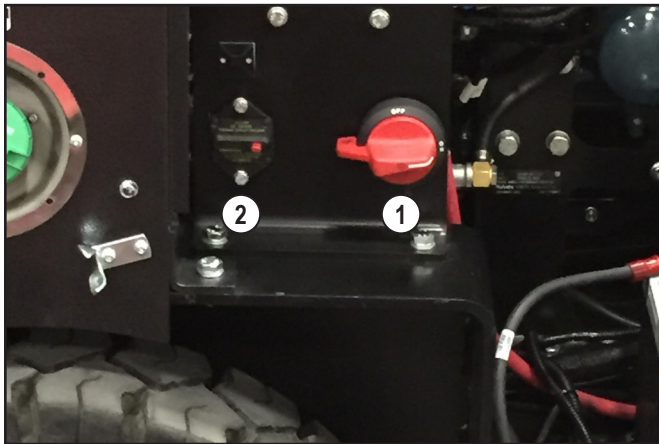
The switch should be turned to the “OFF” position for any of the following activities:

- Servicing
- Long storage
- Transporting or shipping

The main power switch and breaker are located under the engine hood.

◆ Main Breaker Reset Procedure

If the main breaker is tripped, the yellow trip indicator will be visible from the bottom of the breaker. To reset, push the yellow trip indicator back up into the bottom of the breaker.



(1) Main power switch
(2) Main breaker

■ Ignition Switch

• [OFF]

The key can only be inserted and removed while in the “OFF” position. Turn the key to the “OFF” position to shut off the engine.

• [ON]

Turn the key to the “ON” position to get the engine ready to start.



(1) Ignition switch
(2) Emergency stop switch

SAFETY CIRCUIT COMPONENTS

■ Emergency Stop Switch (E-Stop)

In case of emergency push the emergency stop switch to immediately shut down the engine and disable the hydraulic system.

◆ Reset Procedure

The emergency stop switch must be reset before the hydraulic system can be enabled and the engine can be restarted:

1. Twist the red button clockwise to release.
2. Cycle the ignition switch by turning the key to the “OFF” position and then back to the “ON” position.

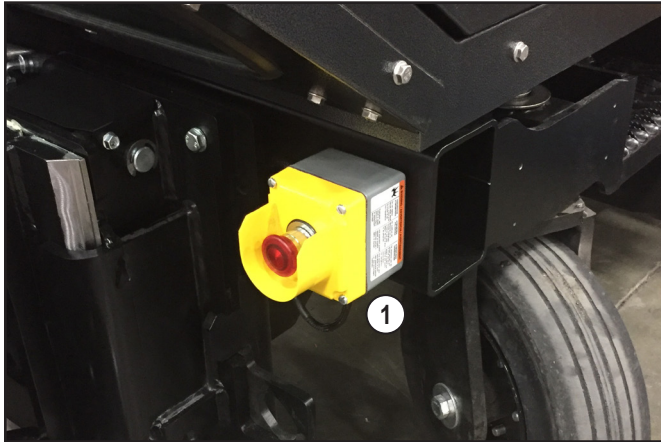
CONTROL DESCRIPTIONS

■ Front Safety Switches

The front safety switches allow the hydraulic system to be disabled from outside the cab. There are two safety switches, one on each side. Push the red button to disable the hydraulic system.

◆ Reset Procedure

The front safety switch must be released before the hydraulic system can be enabled. Twist the red button to release the switch.



(1) Front safety switch

■ Seat Switch

The seat switch detects if the operator is sitting on the seat. If the operator leaves the seat, the hydraulic system will be disabled.

■ Seat Belt Switch

The seat belt switch detects if the seat belt is fastened. If the seat belt is unfastened, the hydraulic system will be disabled.

■ Door Switch

The door switch detects if the cab door is closed. If the door is opened, the hydraulic system will be disabled.

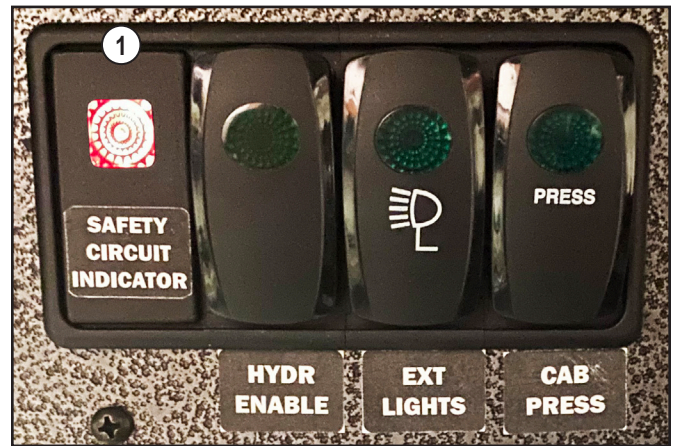
■ Safety Circuit Indicator

The safety circuit indicator will light up if any of the following actions occur:

- E-Stop is pushed.
- Front safety switch is pushed.
- Operator leaves the seat.
- Seat belt is unfastened.
- Cab door is opened.

NOTE:

- If the hydraulic system has been disabled, it must be enabled again before the system can be used by pushing the hydraulic enable switch.



(1) Safety circuit indicator lit up indicating the hydraulic system is disabled.

CONTROL DESCRIPTIONS

HYDRAULIC ENABLE SWITCH

! WARNING

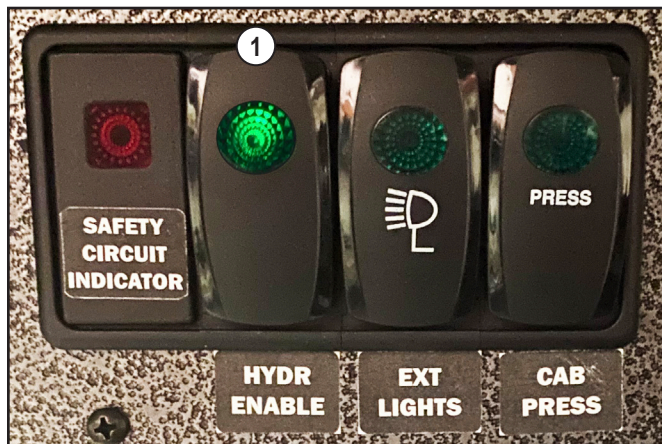
To avoid personal injury:

- The hydraulic enable switch must be “OFF” when starting the engine, otherwise unintended motion may occur.
- The engine must be running BEFORE enabling the hydraulic system.

To enable the hydraulic system so it is ready to use:

1. Ensure the ENGINE IS RUNNING.
2. Ensure the safety circuit indicator is not lit.
3. Push the hydraulic enable switch. The switch light will light up.

To turn off the hydraulic system, push the switch again. The switch light will go out.



- (1) Hydraulic enable switch “ON” indicating the hydraulic system is enabled.

BACKUP SAFETY DEVICES

■ Rear View Camera

The rear view camera gives the operator visibility behind the machine. Night vision technology allows the operator to see clearly in low light conditions. The camera turns on automatically with the key in the “ON” position and stays on continuously during machine operation.

■ Backup Alarm

The backup alarm sounds a loud audible alarm warning pedestrians the machine is moving in reverse.



- (1) Rear view camera monitor
(2) Rear view camera

CONTROL DESCRIPTIONS

JOYSTICK CONTROLS

■ Left Joystick

The left joystick performs the following functions:

◆ Left Drive Wheel Control

- Push the joystick forward to move the left drive wheel forward. The farther you push, the faster the wheel moves.
- Pull the joystick back to move the left drive wheel backward. The farther you pull, the faster the wheel moves.

◆ Dual Lift Tilt Control

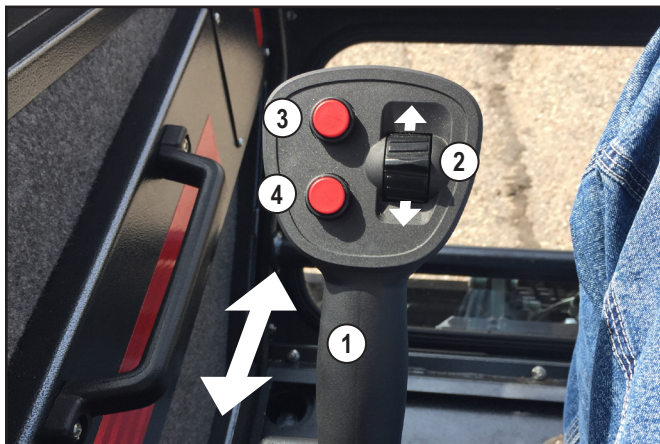
- Roll the dial upward to decrease tilt angle of blade.
- Roll the dial downward to increase tilt angle of blade.

◆ Fast Drive Mode

- Push this button to select the fast drive mode.

◆ Slow Drive Mode

- Push this button to select the slow drive mode.



- (1) Left drive wheel control
- (2) Dual lift tilt control
- (3) Fast drive mode button
- (4) Slow drive mode button

■ Right Joystick

The right joystick performs the following functions:

◆ Right Drive Wheel Control

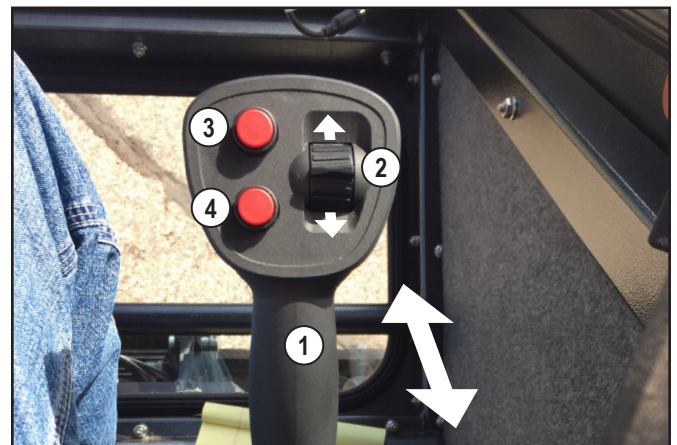
- Push the joystick forward to move the right drive wheel forward. The farther you push, the faster the wheel moves.
- Pull the joystick back to move the right drive wheel backward. The farther you pull, the faster the wheel moves.

◆ Dual Lift Height Control

- Roll the dial upward to raise blade.
- Roll the dial downward to lower blade.

◆ Horn

- Push this button to beep the horn.



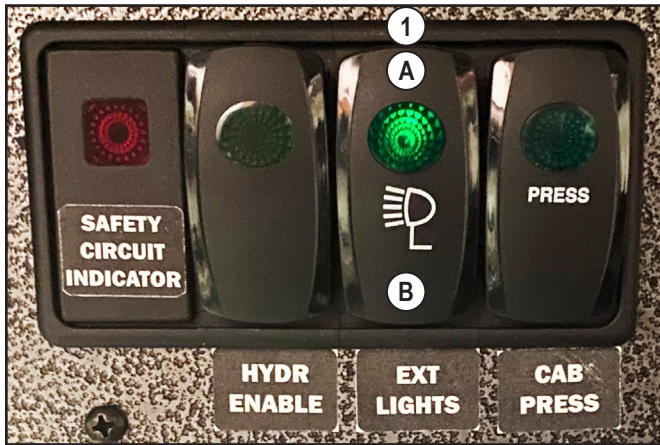
- (1) Right drive wheel control
- (2) Dual lift height control
- (3) Nonfunctional
- (4) Horn

CONTROL DESCRIPTIONS

EXTERIOR LIGHTS

■ Exterior Work Lights

The exterior work lights illuminate the work areas in the front and rear of the machine. Push the exterior work light switch "ON" to turn on the work lights. The switch light will light up. Push the switch "OFF" to turn off the lights. The switch light will go out.



- (1) Exterior work light switch in "ON" position (A) ON
(B) OFF

■ Red Zone Safety Lights

The red zone safety lights emit a red beam on the floor in the front and on the sides of the machine warning pedestrians to stay clear. These lights turn on automatically when the key is turned to the "ON" position.

■ Blue Zone Safety Light

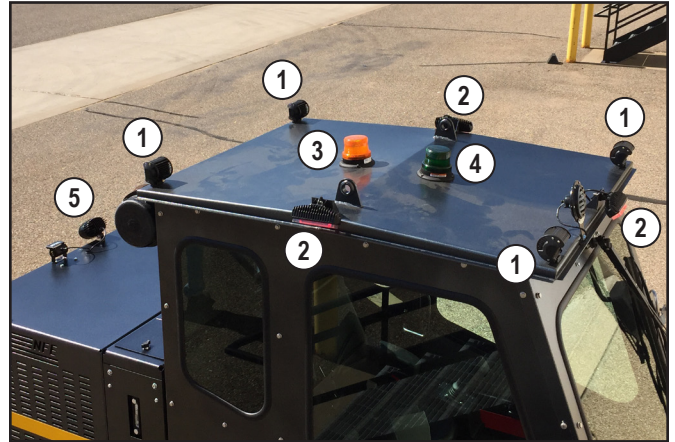
The blue zone safety light emits a blue spot on the floor in the rear of the machine alerting pedestrians to stay clear. This light turns on automatically when the key is turned to the "ON" position.

■ Amber Beacon

The flashing amber beacon indicates the key is turned to the "ON" position.

■ Green Beacon

The flashing green beacon indicates the key is turned to the "ON" position AND the operator is seated on the seat, the seat belt is fastened, the cab door is closed and the front safety switches are released.



- (1) Exterior work light
(2) Red zone safety light
(3) Amber beacon
(4) Green beacon
(5) Blue zone safety light

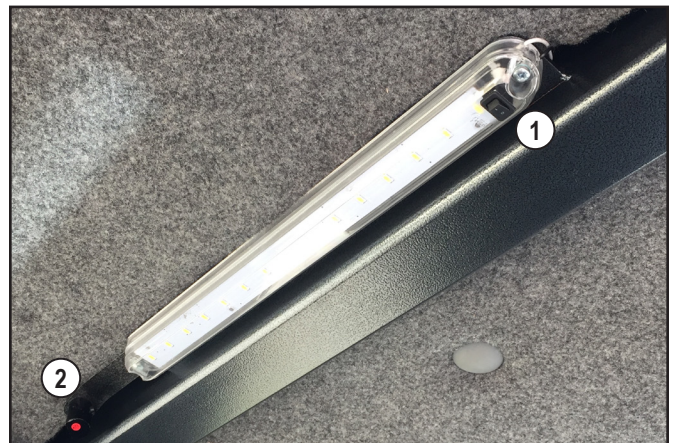
INTERIOR LIGHTS

■ Dome Light

Push the dome light switch to turn on the light.

■ Night Light

Push the night light switch to turn on the light.



- (1) Dome light switch
(2) Night light

CONTROL DESCRIPTIONS

CAB ENVIRONMENTAL CONTROLS

■ Temperature Control

Turn the temperature control knob to adjust the temperature inside the cab.

■ Blower Fan Speed Control

Turn the blower fan speed control knob to adjust the air flow through the air vents.

■ Air Conditioning Switch

Push the air conditioning switch (snowflake symbol) to turn on the air conditioning system and cool the cab. The indicator will light up indicating the air conditioning is turned on. The air conditioning switch is operative with the key in the "ON" position. Push the switch to turn off. The indicator will go out.

■ Defroster Switch

The defroster switch is nonfunctional.



- (1) Temperature control
- (2) Blower speed control
- (3) Air conditioning switch
- (4) Defroster switch—Nonfunctional

■ Air Vents

The air vents are located behind the operator's seat and under the seat.

■ Defrost Fan

The defrost fan provides additional air flow inside the cab and operates at low and high speeds. It is also used to defrost the windows. The control switch is located on the fan enclosure.

■ Cab Pressurizer Switch

Push the cab pressurizer switch "ON" to pressurize the cab. The switch light will light up. The cab pressurizer switch is operative with the key in the "ON" position. Push the switch "OFF" to turn off. The switch light will go out.



- (1) Air vents
- (2) Cab pressurizer switch in "ON" position
- (A) ON
- (B) OFF

CONTROL DESCRIPTIONS

CAB DOOR

■ Opening/Closing Door

⚠ CAUTION

To avoid personal injury:

- Keep hands and feet away from the area between cab door and cab frame. Otherwise the operator risks pinching or crushing injuries.
- Other persons should stay away when opening or closing the cab door.

◆ Outer Latch

Pull the outer latch to open the door from the outside.

- To secure the contents of the cab, the outer latch may be locked using the provided key.

◆ Inner Latch

Pull the inner latch to open the door from inside the cab.

NOTE:

- The door must be fully closed in order for the hydraulic system to be enabled.



(1) Outer door latch



(2) Inner door latch

EMERGENCY EXIT

The side window serves as an alternate exit should you become trapped inside the cab. The window must be removed in order to use it as an emergency exit.

1. Pull on the ring at the bottom of the window, removing the seal that holds the window in place.
2. When the seal is removed, push out the window and exit the cab.

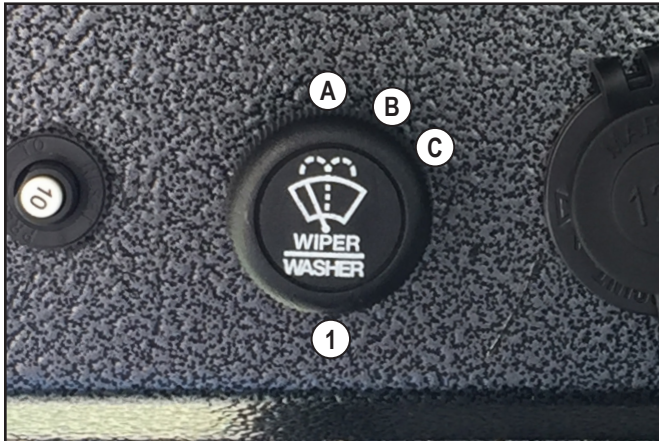


(1) Window pop-out ring

CONTROL DESCRIPTIONS

WINDSHIELD WIPER/WASHER

Turn the wiper/washer switch to position “B” to operate the wiper at slow speed, position “C” for fast speed. Push to dispense washer fluid. The wiper/washer switch is operative with the key in the “ON” position.



- (1) Wiper/washer switch
- (A) OFF
(B) Wiper–Slow speed
(C) Wiper–Fast speed

12 VOLT POWER OUTLET

The 12V socket can be used for recharging mobile phones and powering other small electronic devices.



- (1) 12V accessory charger

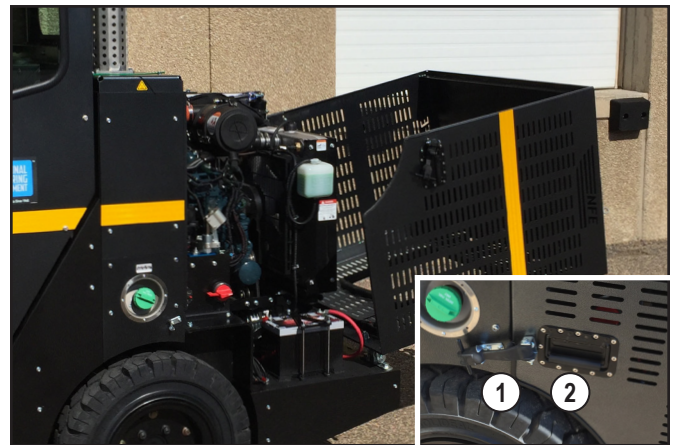
ENGINE HOOD

⚠ CAUTION

To avoid personal injury:

- Never open engine hood while engine is running.
- Do not touch exhaust pipe while it is hot. Severe burns could result.
- When opening and closing the engine hood, be careful not to get your hands pinched or other parts of your body caught.
- Hood is heavy. Use two people when opening and closing the hood.

1. Release latch on each side.
2. With one person on each side, grab handle and open hood slowly until hood is stopped by cable.



- (1) Latch
(2) Handle

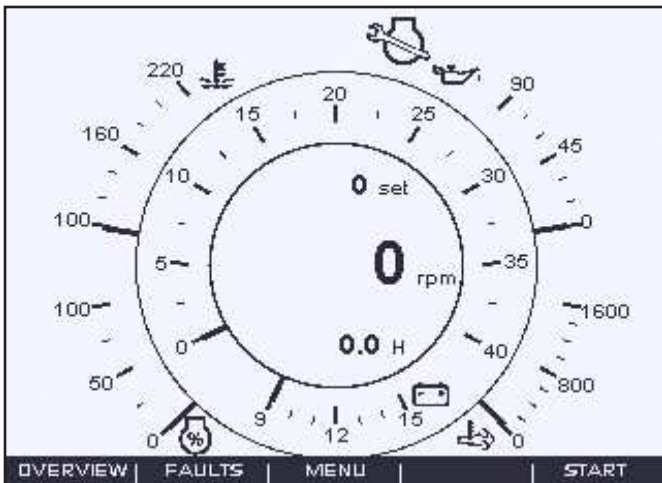
ENGINE OPERATION

DISPLAY SCREEN OVERVIEW

■ Main Gauge Screen

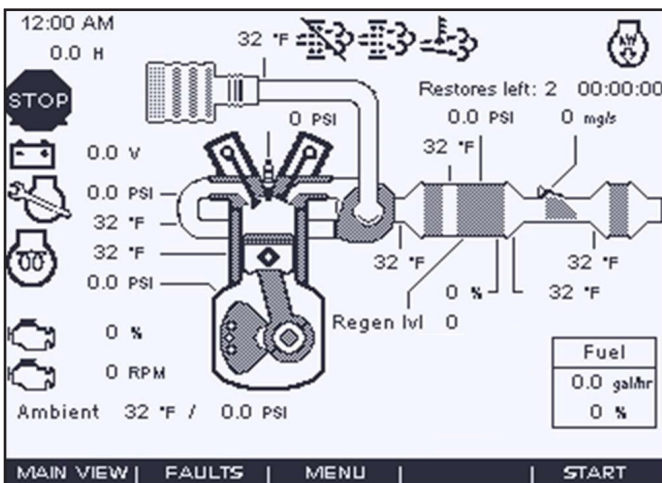
The main gauge screen displays engine RPM, engine hours, battery voltage, coolant temperature, oil pressure, engine load, exhaust temperature, fuel level and warning icons.

- The engine is started from this screen.
- Engine RPM is also controlled from this screen.



■ Overview Screen

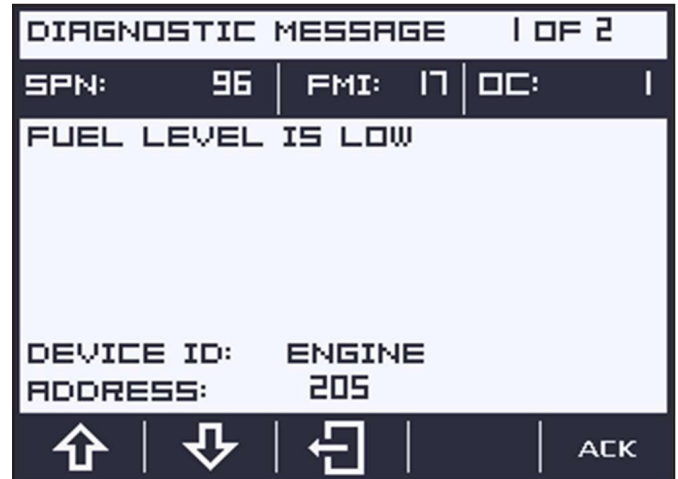
From the main gauge screen, push the “OVERVIEW” button to advance to the overview screen. This screen displays an image of the engine and aftertreatment system with temperature and pressure parameters.



■ Diagnostic Trouble Code (DTC) Popup Screen

This popup appears when a diagnostic trouble code (DTC) becomes active. If multiple DTC's are active, the operator can scroll through the list using the arrow keys.

The active and historical DTC's can also be checked at any time by pressing the “FAULTS” button on the main gauge and overview screens.











NOTE:

- Reference the engine control panel manual (shipped with the machine) for additional information.

ENGINE OPERATION

■ Display Screen Icons

The following icons appear on the main gauge screen and the overview screen.

ICON	DESCRIPTION
	Diesel Particulate Filter (DPF) Regeneration inhibited. The inhibition could be due to operator inhibition (not recommended) or failure to follow parked regeneration procedures.
	DPF regeneration required. Popups with instructions will appear when operator action is required. This icon will remain visible until the regeneration is completed.
	DPF system temperature too high.
	Service required. The list of serviceable items may be found under the main menu. The remaining time before service is required will also be listed.
	The stop icon appears when the Emergency Stop button is pressed or if a fault that stops the engine is active.
	The warning icon appears when a fault is active but it is one that does not immediately stop the engine.
	The wait to start icon appears when the engine is too cold to start immediately and the glow plugs are engaged. This process is governed by the ECU. When the wait to start icon disappears, the engine may be started normally.
	Low oil pressure icon.

STARTING THE ENGINE

! WARNING

To avoid personal injury:

- To avoid the danger of exhaust fume poisoning, do not operate the machine in a closed building without proper ventilation.

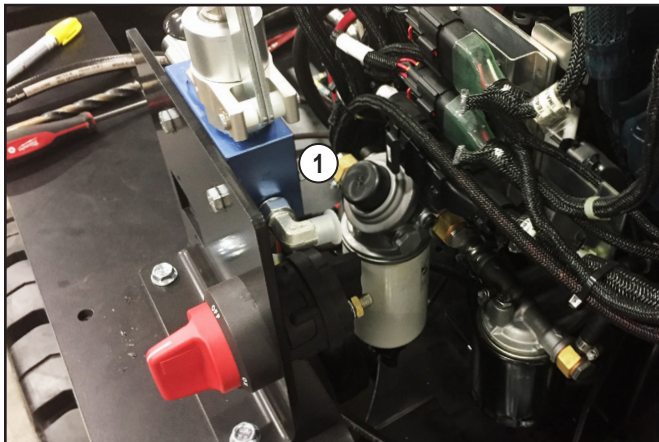
! WARNING

To avoid personal injury or death:

- The hydraulic enable switch must be “OFF” when starting the engine, otherwise unintended motion may occur.
- Before the starting the engine, make sure that no one is near the machine.

NOTE:

- Make sure the main power switch is turned to the “ON” position.
- Make sure the emergency stop switch is released.
- If fuel tank runs empty, fuel system must be primed before restarting the engine.



(1) Primer button

Start the engine as follows:

1. Turn key to the “ON” position.
2. Verify the hydraulic enable switch is “OFF”.
3. If the service reminder screen appears, notify the appropriate personnel. If you wish to proceed, push the “OKAY” button to advance to the main gauge screen.
 - The engine must be started from the main gauge screen.
4. Push the “START” button on the main gauge screen.
5. Check if all the warning lights on the engine control panel have gone out. If a warning light is still lit up, stop the engine and check for the cause.

CHECKS AFTER STARTING THE ENGINE

After starting the engine and allowing it to warm up, check the following points before starting operation:

- Low oil pressure icon has gone out
- Color of the exhaust is normal
- No fluid leaking from pipes or hoses

◆ **Should any of the following conditions occur, stop the engine immediately and contact NFE technical support.**

- Engine RPM changes suddenly
- Sudden unusual noises are heard
- Exhaust is black
- Low oil pressure icon lights up during operation

ENGINE OPERATION

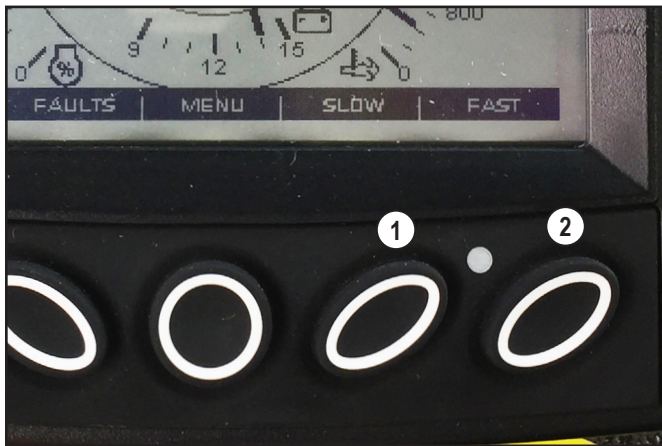
ADJUSTING ENGINE RPM

After the engine has started, the “START” button on the main gauge screen is replaced with speed control buttons.

- To adjust the engine RPM, push the “FAST” or “SLOW” buttons incrementally until the desired RPM is reached.
- Engine RPM should be adjusted to 2400 RPM for normal operation.

IMPORTANT:

- Do not exceed 2700 RPM.



- (1) “SLOW” button
(2) “FAST” button

STOPPING THE ENGINE

! WARNING

To avoid personal injury or death:

- Park the machine on level ground.

1. Slow engine RPM.
2. Turn the key to the “OFF” position.
 - The parking brakes are automatically engaged when the engine is shut off.

NOTE:

- Reference the engine control panel manual (shipped with the machine) for additional information.
- Reference the Kubota engine manual (shipped with the machine) for engine information.

REGENERATION

CAUTION

To avoid engine damage:

- Be sure to follow the display instructions and perform regeneration when prompted. Delaying regeneration can cause:
 - Engine output being derated
 - Engine damage
 - Service call
 - Engine warranty being voided

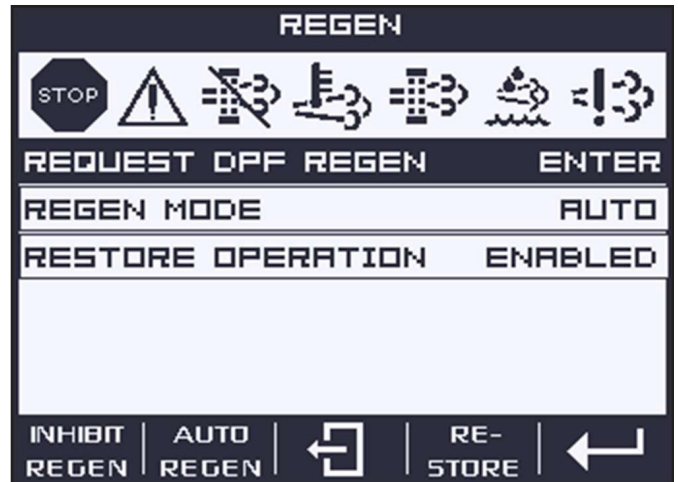
Regeneration (regen) is the process of burning off the accumulated soot from the diesel particulate filter (DPF).

The regen menu allows you to set the regen mode using the "INHIBIT REGEN" and "AUTO REGEN" buttons. Using the default auto regen mode is recommended to avoid damage to the engine due to inhibiting the aftertreatment system regeneration.

When regeneration is not completed, soot will continue to build up in the aftertreatment system. When soot levels become too high, the engine will stop running. At this point, the operator can restore limited engine function using the "RESTORE" button.

IMPORTANT:

- ONLY TWO RESTORES ARE ALLOWED!!
- Each restore period lasts 30 minutes.
- Using the "RESTORE" button allows you to:
 - Finish a job that is short in duration (less than 30 minutes)
 - Drive the machine to a place where regeneration can be performed
- After the second restore, the engine will not run correctly and a service call may be required.



Regen Menu

If auto regeneration is not selected, the operator can use the Request DPF Regen bar using the "ENTER" button to start this process manually. This brings you to the regen confirmation page. Push the "YES" button to begin the DPF regeneration process.



Regen Confirmation Page

NOTE:

- Reference the engine control panel manual (shipped with the machine) for additional information.

DAILY CHECKS

CAUTION

To avoid personal injury:

- Before performing daily checks on the machine, make sure the machine is parked on level ground. Stop the engine and remove the key from the ignition switch unless power is required for the specific check list item.

For your safety and to ensure the longevity of your machine, the following checks should be performed daily before machine operation.

DAILY CHECK LIST

CHECKS TO BE PERFORMED DAILY BEFORE BEGINNING OPERATION	SERVICE INTERVAL
	Daily
Verify safety circuit is working properly.	•
Verify horn and backup alarm are working properly.	•
Verify rear view camera is working properly.	•
Verify fire extinguisher is present (depending on local ordinances).	•
Verify carbon monoxide detector is indicating in the normal range.	•
Verify cab pressurizer is working properly.	•
Verify exterior lights are working properly.	•
Verify washer fluid level is sufficient.	•
Verify fuel level is sufficient.	•
Verify fuel cap is tight	•
Check dual lift for sufficient grease; verify deflector and shield are in place.	•
Check wheels for wear; verify lug nuts are in place.	•
Verify hydraulic oil level is sufficient.	•
Verify hydraulic oil cap is tight.	•
Verify engine oil level is in proper range.	•
Verify coolant level is in proper range.	•
Verify radiator, A/C condenser and hydraulic oil cooler fins are not clogged; check hoses for damage.	•
Inspect V-belts for wear.	•
Check battery condition; make sure main power switch in ON and breaker is not tripped.	•
Check engine electrical wiring for disconnections.	•
Check engine compartment, wheel motors and dual lift for fluid leaks.	•
Check for damaged, worn or loose components.	•
Check machine components for debris buildup.	•

CAUTION

To avoid personal injury:

- Before performing daily checks, make sure to stop the engine and remove the key unless power is required for the specific check list item.

SAFETY CIRCUIT

1. Make sure the front safety switches and E-Stop are released.
2. Sit in the operator's seat, fasten the seat belt and close the cab door.
3. Turn key to the "ON" position. Make sure the safety circuit indicator is not lit.
4. Unfasten the seat belt.
5. Make sure that the safety circuit indicator lights up, indicating the hydraulic system has been disabled.



- (1) Safety circuit indicator lit up indicating the hydraulic system is disabled.

HORN AND BACKUP ALARM

1. Make sure the front safety switches and E-Stop are released.
2. Sit in the operator's seat, fasten the seat belt and close the cab door.
3. Turn key to the "ON" position.
4. Push the horn button making sure the horn beeps.
5. Pull one of the joysticks backward making sure the back-up alarm sounds.

REAR VIEW CAMERA

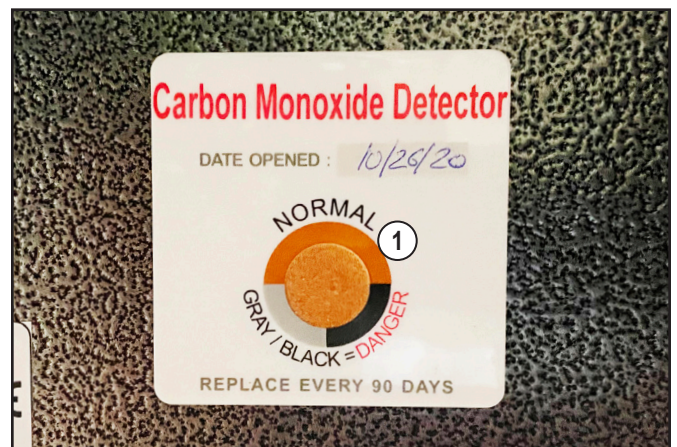
1. Turn key to the "ON" position.
2. Make sure that the rear view camera turns on.

FIRE EXTINGUISHER

If required by local ordinances, make sure fire extinguisher is mounted behind the operator's seat.

CARBON MONOXIDE DETECTOR

Make sure the carbon monoxide detector is indicating in the normal range. Detector will turn dark brown to gray/black when exposed to high levels of carbon monoxide which indicates a dangerous condition.



- (1) Detector indicating normal range.

CAB PRESSURIZER

1. Turn key to the "ON" position.
2. Push the cab pressurizer switch "ON". The switch light will light up. Make sure you can hear the pressurizer operating.

DAILY CHECKS

EXTERIOR LIGHTS

1. Make sure the front safety switches and E-Stop are released.
2. Turn key to the "ON" position.
3. Make sure that the red zone safety lights, blue zone safety light and amber beacon turn on.
4. Push the exterior work lights switch "ON". The switch light will light up. Make sure the exterior work lights turn on.
5. Sit in the operator's seat, fasten the seat belt and close the cab door. With the help of another person outside the cab, make sure the green beacon turns on.

WASHER FLUID

IMPORTANT:

- Make sure there is sufficient washer fluid in tank. Wiper/washer switch should not be pushed if the tank is empty as the motor may be damaged.



(1) Washer fluid tank

FUEL LEVEL

⚠ CAUTION

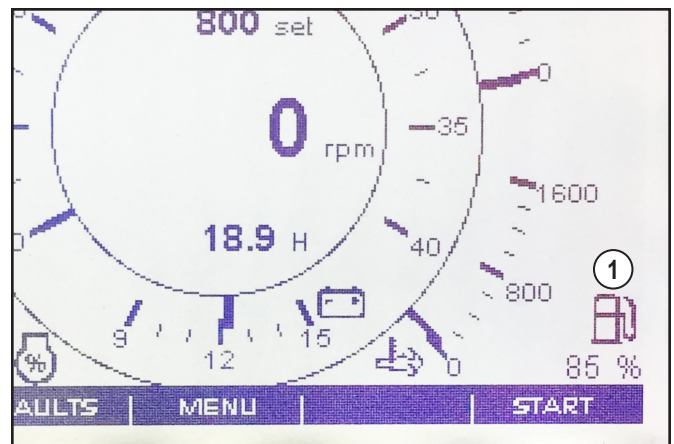
To avoid personal injury:

- Do not smoke while fueling.

IMPORTANT:

- Make sure that the fuel tank does not run empty. Otherwise the fuel system must be primed before restarting the engine.
- If the fuel level icon is near empty, add fuel as soon as possible. If the fuel tank is near empty and the machine runs on a slope, the engine may run out of fuel and stop operating.

1. Turn key to the "ON" position.
2. If the service reminder screen appears, notify the appropriate personnel. If you wish to proceed, push the "OKAY" button to advance to the main gauge screen.
3. Fuel level icon indicates the fuel level.
4. If necessary, open the fuel tank cap and fill with fuel.
 - Use only ultra-low sulfur diesel fuel.



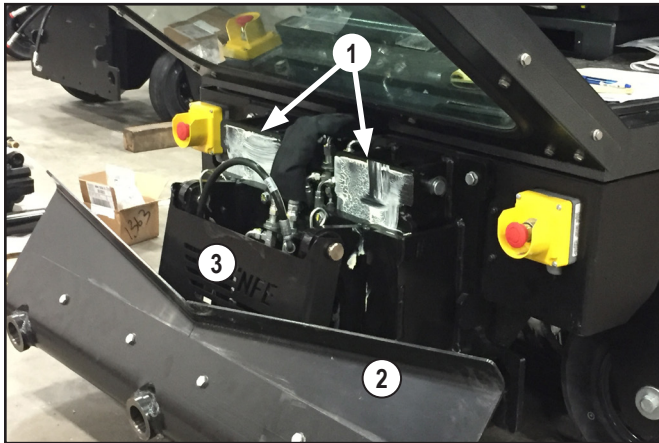
(1) Fuel level icon

FUEL CAP

Make sure fuel cap is in place and tight.

DUAL LIFT

1. Check dual lift to make sure grease is visible on the front and back of both guides. Add grease if needed. See “RECOMMENDED FLUIDS AND LUBRICANTS” section.
2. Make sure the debris deflector is in place.
3. Make sure the front shield is in place.



- (1) Dual lift guides
- (2) Debris deflector
- (3) Front shield

WHEELS

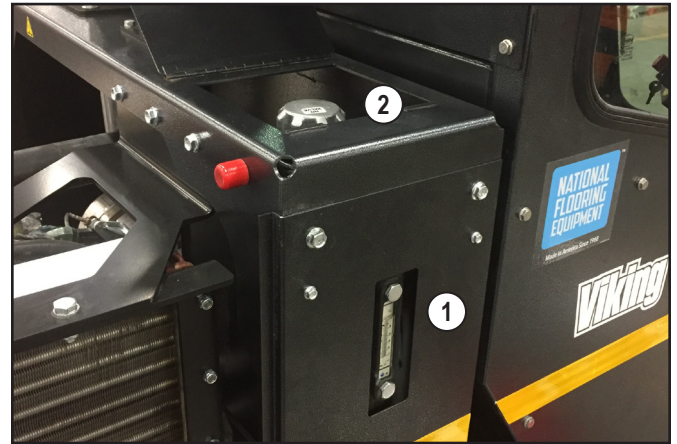
1. Check front caster wheels and rear drive wheels for wear.
2. Make sure lug nuts on rear wheels are in place.

HYDRAULIC OIL LEVEL

IMPORTANT:

- Before filling oil, wipe away all sand and dust from around the hydraulic oil port.
- The machine has been filled with hydraulic oil before delivery. Make sure to use an identical type of hydraulic oil. See “RECOMMENDED FLUIDS AND LUBRICANTS” section.

1. Machine must be on level ground.
2. Check the hydraulic oil level gauge to make sure the oil level is between the maximum and minimum fill lines.
3. If the oil level is too low, add new oil to the proper level through the hydraulic oil port.



- (1) Hydraulic oil level gauge
- (2) Hydraulic oil cap

HYDRAULIC OIL CAP

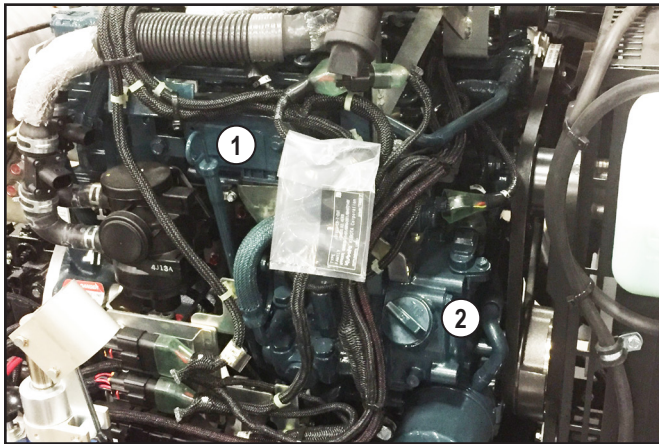
Make sure hydraulic oil cap is in place and tight.

DAILY CHECKS

ENGINE OIL LEVEL

IMPORTANT:

- After stopping the engine, wait 5 minutes, then check oil level. Machine must be on level ground.
 - Use engine oil with the correct viscosity according to the outside temperature.
1. To check the engine oil level, remove the dipstick, wipe it clean, replace it and then remove it again. Check to see that the oil level is between the two notches on the dipstick.
 2. If the oil level is too low, add new oil to the proper level through the engine oil filling port. See “RECOMMENDED FLUIDS AND LUBRICANTS” section.



- (1) Dipstick
(2) Engine oil filling port

COOLANT LEVEL

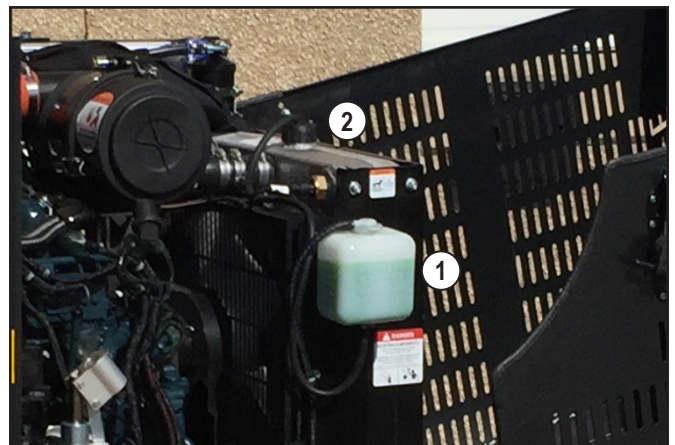
⚠ CAUTION

To avoid personal injury:

- Remove the radiator cap only if absolutely necessary.
- Do not open the radiator cap right after the engine has been stopped—serious burns can occur from contact with escaping hot coolant.

IMPORTANT:

- Machine must be on level ground.
 - Wait until the machine has cooled down before checking the coolant level in the recovery tank.
 - Do not fill the recovery tank over the “FULL” mark.
1. Make sure coolant level is between the “FULL” and “LOW” marks of the recovery tank.
 2. Add coolant in the proper mixing ratio if needed. See “RECOMMENDED FLUIDS AND LUBRICANTS” section.



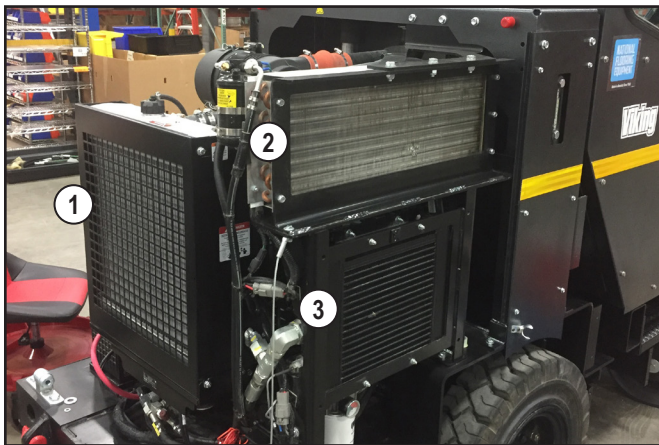
- (1) Recovery tank
(2) Radiator cap

RADIATOR, A/C CONDENSER AND HYDRAULIC OIL COOLER

IMPORTANT:

- Radiator, condenser and cooler fins must be clean to allow air to flow freely through the cooling elements to prevent engine from overheating.
- Take care not to damage the fins when cleaning.

1. Make sure fins are not clogged. Clean if needed.
2. Check hoses for wear or damage and replace if needed. Make sure hose clamps are tight.



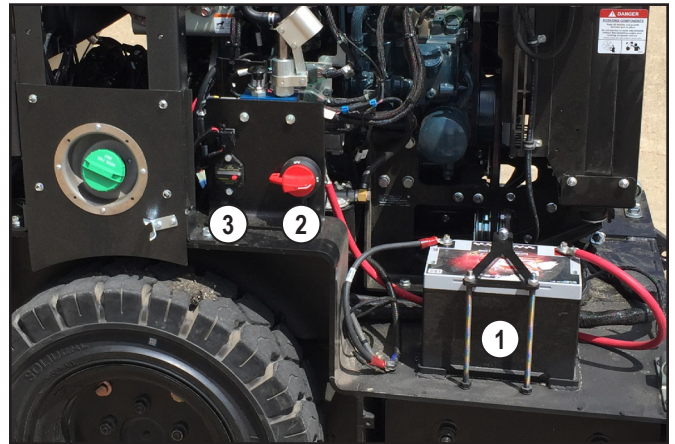
- (1) Radiator
- (2) A/C condenser
- (3) Hydraulic oil cooler

V-BELTS

Check the V-belts for cracks and wear. Reference the Kubota engine manual (shipped with the machine) for the V-belt adjusting procedure.

BATTERY, MAIN POWER SWITCH AND BREAKER

1. Check battery for any swelling, cracks or leaking.
2. Check for any signs of corrosion on the battery terminals and clean if needed.
3. Make sure the main power switch is turned to the “ON” position and that the breaker is not tripped.



- (1) Battery
- (2) Main power switch
- (3) Main breaker

ENGINE ELECTRICAL WIRING

Check the engine electrical wiring for disconnections, shorts, loose terminals or damage.

DAILY CHECKS

FLUID LEAKS

WARNING

To avoid personal injury or death:

- Leaking hydraulic fluid has enough pressure to penetrate the skin and cause serious injuries. Do not use hands for checking for leaks—always use a piece of wood or cardboard.
1. Check the engine compartment components and hoses for any signs of fuel leaks, oil leaks, hydraulic fluid leaks and coolant leaks.
 2. Check the wheel motors for any signs of hydraulic fluid leaks. Check for hydraulic fluid deposits on the inner sides of wheels.
 3. Check the dual lift components and hoses for any signs of hydraulic fluid leaks.

DAMAGED AND LOOSE COMPONENTS

Walk around the machine and check for any damage, wear, and loose components and fasteners.

DEBRIS BUILDUP ON MACHINE COMPONENTS

IMPORTANT:

- Do not wash the machine with the engine running.
- Do not allow water to enter the exhaust pipe or air intake, as engine damage could result. Engine air cleaner must be kept dry.

Check all machine components for buildup of dust, sand and debris. Clean if needed.

PREPARING FOR OPERATION

⚠ WARNING

To avoid personal injury:

- Use the handles and steps when entering and exiting the cab. Make sure the handles and steps are clean.

■ Adjusting the Operator's Seat

⚠ CAUTION

To avoid personal injury:

- Make sure that the seat is completely secured after each adjustment.

Reference the Grammar seat manual (shipped with the machine) for adjustment instructions.

NOTE:

- The operator must be seated on the seat in order for the hydraulic system to be enabled.



(1) Operator's seat

■ Seat Belt

⚠ WARNING

To avoid personal injury or death:

- Always fasten the seat belt securely before starting the engine.

◆ Fastening the Seat Belt

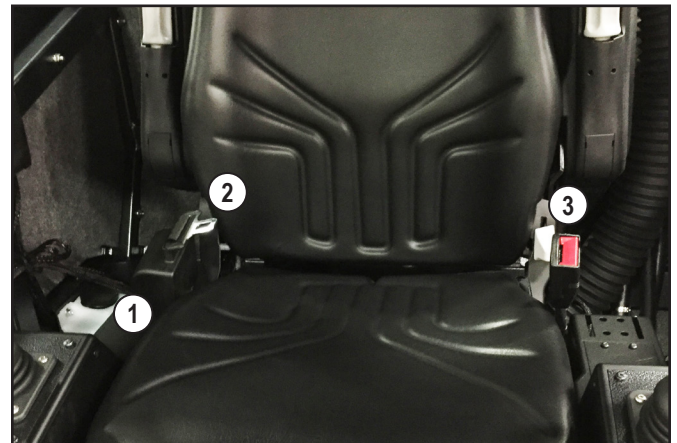
1. Pull the seat belt from the retractor on the right side of the seat.
2. Insert the buckle into the socket on the left side of the seat until it clicks.

NOTE:

- The seat belt must be fastened in order for the hydraulic system to be enabled.

◆ Releasing the Seat Belt

1. Press the red button of the socket to release the seat belt.
2. The seat belt will retract itself into the retractor on the right side of the seat.



(1) Retractor
(2) Buckle
(3) Socket

MACHINE OPERATION

ENABLING THE HYDRAULIC SYSTEM

WARNING

To avoid personal injury:

- The hydraulic enable switch must be “OFF” when starting the engine, otherwise unintended motion may occur.
- The engine must be running **BEFORE** enabling the hydraulic system.

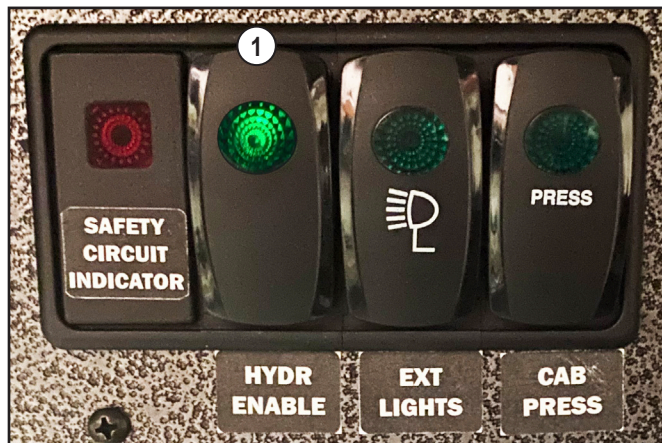
To enable the hydraulic system so it is ready to use:

1. Ensure the ENGINE IS RUNNING.
2. Ensure the safety circuit indicator is not lit.
3. Push the hydraulic enable switch. The switch light will light up.

To turn off the hydraulic system, push the switch again. The switch light will go out.

NOTE:

- If the hydraulic system has been disabled, it must be enabled again before the system can be used.



(1) Hydraulic enable switch “ON” indicating the hydraulic system is enabled.

DRIVING

WARNING

To avoid personal injury:

- Before you start the machine and before you move the machine, make sure that no one is underneath or close to the machine.

The joysticks are used to drive the machine by controlling the speed and turn direction of the drive wheels. The left joystick controls the left drive wheel, the right joystick controls the right drive wheel.

These are proportional controls, meaning the farther you push or pull the joystick, the faster the drive wheel moves. Move the joysticks slowly for even movement. Moving the joysticks quickly results in jerky, uneven movement.

■ Parked Position

- When both joysticks are in the neutral position the wheel motor brakes are engaged and the machine is parked.
- Always park the machine on firm, level ground.

■ Forward Travel

- To move forward, push both joysticks forward.

Left Joystick	Right Joystick
↑	↑

■ Backward Travel

- To move backward, pull both joysticks backward.

Left Joystick	Right Joystick
↓	↓

MACHINE OPERATION

■ Steering

- To steer or to make a gradual turn, slightly reduce pressure on the proper joystick. Steer to the left by reducing pressure on the left joystick, steer to the right by reducing pressure on the right joystick.

■ Zero Turns

◆ Zero Turn to the Right

- To make a zero turn to the right, pull the right joystick backward and push the left joystick forward.

Left Joystick	Right Joystick
↑	↓

◆ Zero Turn to the Left

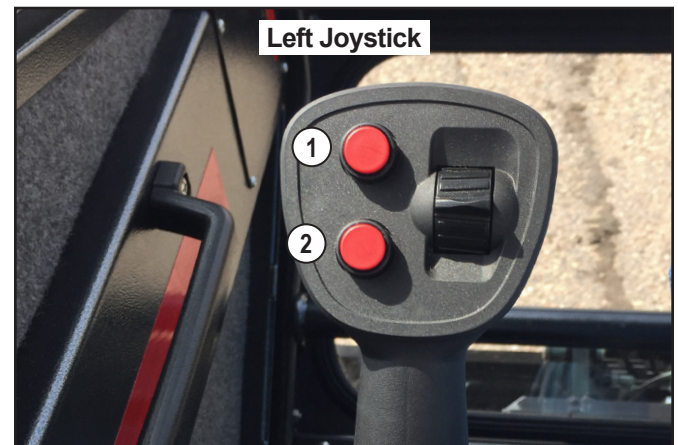
- To make a zero turn to the left, pull the left joystick backward and push the right joystick forward.

Left Joystick	Right Joystick
↓	↑

■ Drive Modes

Select the drive mode appropriate for the application. The drive mode buttons are located on the left joystick.

- Slow drive mode is typically used for driving the machine in tight quarters or on a ramp.
- Fast drive mode is typically used for scraping.



- (1) Fast drive mode button
- (2) Slow drive mode button

MACHINE OPERATION

BLADES AND CUTTING HEADS

■ Blade Selection

Selecting the right blade for the application is important. The following blades are recommended for use with the Viking.

NOTE:

- Job site conditions dictate the blade life.

PART#	DESCRIPTION
6271	Blade, Extra Heavy Duty, 3" x 6" x .250"
6273	Blade, Extra Heavy Duty, 3" x 11" x .250"
6290	Blade, Extra Heavy Duty, 3" x 6" x .187"
6291	Blade, Extra Heavy Duty, 3" x 8" x .187"
6292	Blade, Extra Heavy Duty, 3" x 12" x .187"
6295	Blade, Self-Scoring, 45°, 3 X 12 X .188", BU
6296	Blade, Self-Scoring, 45-45, 3 X 12 X .188", BU
6297	Blade, Self-Scoring, 45-45, 3 X 17.5 X .188", BU
6298	Blade, Extra Heavy Duty, 3 X 19 X .187"

■ Cutting Head Configurations

The tooling holder holds up to three cutting heads. Each cutting head swivels to keep the blade in contact with the ground during scraping. The number of cutting heads used depends on the application and can best be determined after some time experimenting on the job site.

- When beginning a new job, it is best to start out by using one cutting head in the center position of the tooling holder.
- When using one cutting head, the head must be mounted in the center position.
- If two cutting heads are used, the heads must be mounted in the outside positions.
- Depending on the surface material, three blades can sometimes be used if the surface is perfectly flat.
- Having additional cutting heads on site reduces downtime on the job. NFE recommends keeping at least six cutting heads on hand (in addition to those already on the machine) with the blades already installed. When the blade gets dull, remove the cutting head and replace it with another.

■ Changing Cutting Heads

⚠ WARNING

To avoid personal injury:

- Before changing cutting heads, always lower the dual lift to the ground. Hydraulic failure could cause the dual lift to drop causing injury.

⚠ WARNING

To avoid personal injury or death:

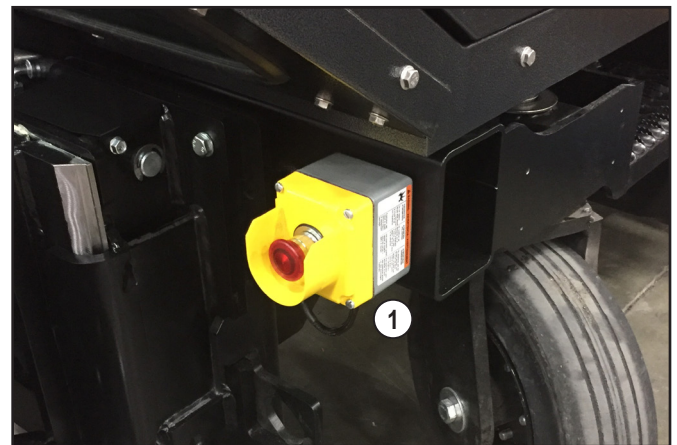
- Before changing cutting heads, be sure to disable the hydraulic system using one of the safety switches on the front of the machine.

⚠ WARNING

To avoid personal injury:

- Always wear safety gloves when handling cutting heads. Cutting heads get very hot while scraping. Blades are sharp.

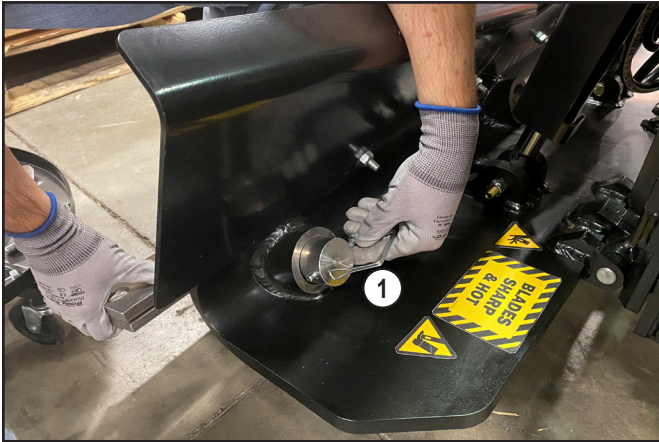
1. Lower the dual lift to the ground.
2. Push the red button on one of the front safety switches to disable the hydraulic system.



(1) Front safety switch

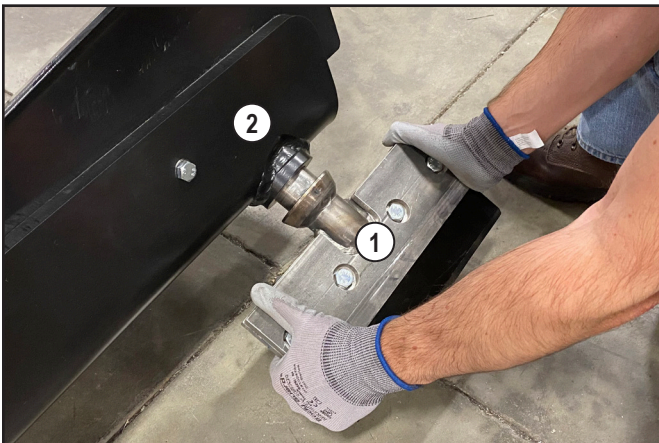
MACHINE OPERATION

3. Remove the locking pin from cutting head shaft.



(1) Locking pin

4. Remove the cutting head from the tooling holder.



(1) Cutting head
(2) Tooling holder

5. To reinstall the cutting head, reverse Steps 3 and 4.
6. When changeover is complete, release the front safety switch by twisting the red button.

■ Replacing Blades

⚠ WARNING

To avoid personal injury:

- Always wear safety gloves when handling blades. Blades are sharp and could be very hot.
- Remove cutting head from tooling holder and place on level ground before replacing blade.

1. Using a 19 mm socket, remove the bolts on the cutting head. Remove old blade.



2. Insert new blade into the cutting head to back of notch.
 - Insert straight blades with bevel side up.



(1) Notch

3. Tighten bolts firmly.

MACHINE OPERATION

SCRAPING

■ Adjusting the Dual Lift

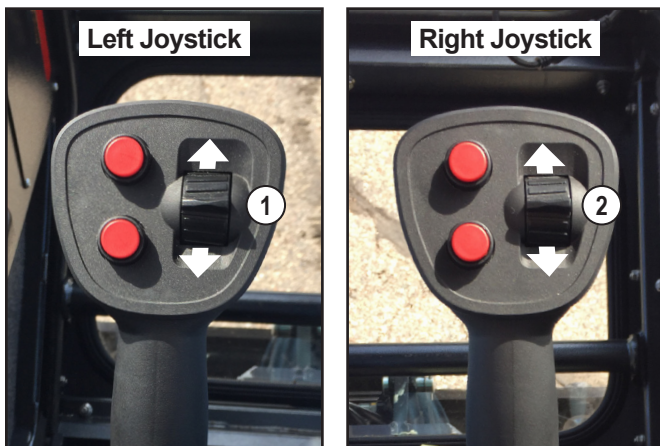
The dual lift allows the operator to find the optimal tilt angle of the blade for scraping. Tilt angle of the blade and blade height are adjusted independently by means of the dial controls on the joysticks:

◆ Dual Lift Tilt Control

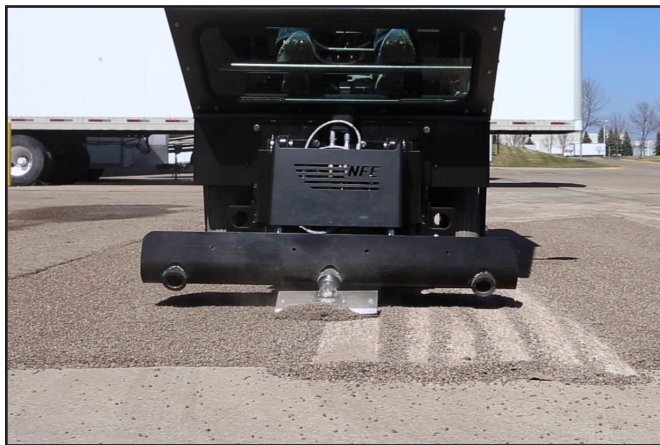
- Roll the dial upward to decrease tilt angle of blade, roll the dial downward to increase tilt angle of blade.

◆ Dual Lift Height Control

- Roll the dial upward to raise blade, roll the dial downward to lower blade.



- (1) Dual lift tilt control
(2) Dual lift height control



Machine scraping epoxy-covered concrete.

■ Scraping Tips

- For best removal rates and maximum blade pressure, front caster wheels should be off the ground.
- Too steep of a blade tilt angle will cause the front end of the machine to shudder, which can result in damage to the bridge deck and the structure itself. Blades will also wear quickly.



Decreased blade tilt angle and raised blade. Front caster wheels off ground.



Increased (steep) blade tilt angle and lowered blade. Front caster wheels high off ground.

MACHINE OPERATION

IMPORTANT INFORMATION ON MACHINE OPERATION

WARNING

To avoid personal injury or death:

- Know and understand the machine capabilities and operating conditions, and never exceed any of these conditions.
- Always move the machine at speeds that are appropriate for the conditions. Take particular care if you are moving through areas where the view may be obstructed.
- Whenever traveling over uneven ground, travel at low speed. Avoid any sudden movements with the machine such as accelerating, stopping or turning quickly.
- Never operate the machine in the vicinity of explosive gases. Always keep exhaust from machine away from any combustible material.

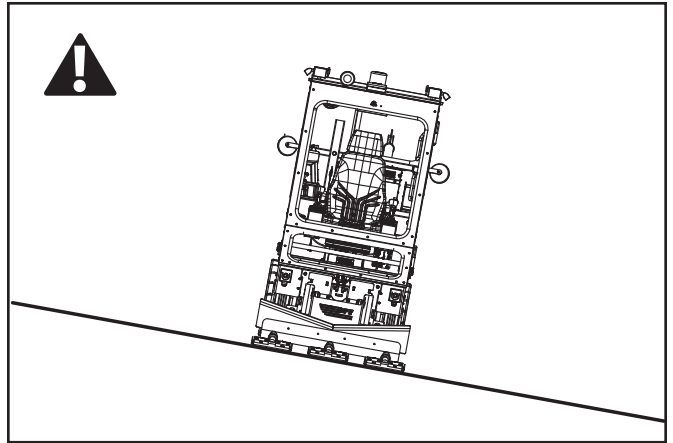
■ Parking or Traveling on Inclines

WARNING

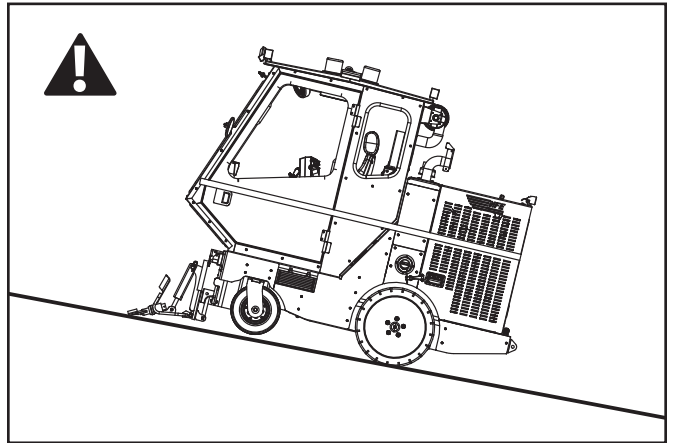
To avoid personal injury or death:

- Use caution when using machine on an incline as the machine can become unstable and roll over.
- It is best to park the machine on firm, level ground. If you must park the machine on an incline, make sure you block the wheels to prevent any movement.
- Use caution when operating the machine on inclines or uneven surfaces. The weight of the machine may become distributed differently if on an uneven surface. Too much of an angle could make the machine unsafe and cause it to roll over.

- To avoid injuries or accidents, always operate the machine at slow speed when going up or down an incline by using the slow drive mode. Traveling too fast down an incline can cause the operator to lose control of the machine.
- Avoid stopping suddenly on an incline, which can cause the machine to become unstable and roll over.



Use caution when operating sideways on inclines.



Use caution when operating up or down inclines.

MAINTENANCE SCHEDULE

CAUTION

To avoid personal injury:

- Before performing maintenance on the machine, make sure the machine is parked on level ground. Lower the dual lift to the ground. Stop the engine and remove the key from the ignition switch. Turn off the main power switch unless needed for troubleshooting.

To ensure the machine operates safely for a long time, perform regular maintenance according to the following schedules.

GENERAL MACHINE MAINTENANCE

MAINTENANCE TO BE PERFORMED	SERVICE INTERVAL				
	After initial 50 hrs	After initial 100 hrs	After initial 500 hrs	Every 200 hrs	Every 1000 hrs
Change engine oil and replace filter. See NOTE 1.	•				
Replace hydraulic oil filter.		•		•	
Change hydraulic oil.			•		•
Inspect cabin air filter. Clean or replace as needed.				•	
Inspect cab pressurizer air filter. Clean or replace as needed.				•	
Grease front caster wheels.					•
Grease cab door.					•
Lube door latch.					•

NOTE 1:

- Engine warranty will not be honored if the 50 hour service is not performed and documented.

IMPORTANT:

- Reference the “Kubota Engine Maintenance” section for the engine maintenance schedule.
- Reference the “DAILY CHECKS” section for daily checks to be performed.

MAINTENANCE SCHEDULE

KUBOTA ENGINE MAINTENANCE

IMPORTANT!

- Engine warranty will not be honored if the 50 hour service is not performed and documented.

Inspection item	Service interval											Reference page	
	Daily	Initial 50 hrs	Every 50 hrs	Every 250 hrs	Every 400 hrs	Every 500 hrs	Every 1000 hrs	Every 1500 hrs	Every 3000 hrs	Every 1 year	Every 2 years		
Checking engine oil level	○												3-5
Checking fuel level	○												3-6
Checking coolant level	○												3-6
Checking fan belt	○												3-7
Changing engine oil		○			○								3-7
Replacing oil filter cartridge		○			○								3-8
Checking fuel hoses and clamp bands			○										3-8
Checking and draining water separator (Type 1)			○										3-9
Cleaning of air cleaner element (replace the element after 6-times cleaning)				○									3-9
Adjusting fan belt tension				○									3-10
Checking radiator hose and clamp bands				○									3-10
Checking intake air line				○						○			3-11
Replacing fuel filter cartridge						○							3-12
Cleaning water separator (Type 1)						○							3-13
Cleaning fuel tank interior						○							—
Cleaning water jacket and radiator interior						○							3-13
Replacing fan belt						○					○		3-15
Replacing water separator filter (Type2)						○				○			3-13
Checking valve clearance							○						3-16
*1 Checking injector (with Diagmaster)								○					3-17
*1 Checking EGR cooler								○					3-18
*1 Replacing oil separator element								○					3-19
*1 Checking positive crankcase ventilation (PCV) valve								○					3-19
*1 Checking turbocharger									○				3-19
*1 *2 Cleaning DPF									○				3-20
*2 Checking EGR system (with Diagmaster)										○			3-24
Replacing air cleaner element										○			3-25
*1 Checking DPF differential pressure pipes and hoses										○			3-25
Checking EGR piping										○			3-26

(Continued)

MAINTENANCE SCHEDULE

Inspection item		Service interval										Reference page	
		Daily	Initial 50 hrs	Every 50 hrs	Every 250 hrs	Every 400 hrs	Every 500 hrs	Every 1000 hrs	Every 1500 hrs	Every 3000 hrs	Every 1 year		Every 2 years
	Checking exhaust manifold (crack, gas, leakage and mounting screw)										○		3-27
	Replacing oil separator rubber hose											○	3-27
*2	Replacing rubber hose of differential pressure sensor											○	3-28
	Replacing intake hose (after air flow sensor) and intercooler hose											○	3-28
	Replacing EGR cooler hose											○	3-28
	Replacing water hose											○	3-28
	Replacing lubricant hose											○	3-28
	Changing radiator coolant (L,L,C.)											○	3-28
	Replacing radiator hose and clamp bands											○	3-30
	Replacing fuel hose and clamps											○	3-31
	Replacing intake air line											○	3-31

NOTE

- When the battery is used for less than 100 hours in a year, check its electrolyte yearly (for refillable battery's only).
- The items above (*1 marked) are registered as emission related critical parts by KUBOTA in the U.S. EPA nonroad emission regulation.
As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.
Please see the warranty statement in detail.
- The items listed above other than *1 marked are not necessary to keep the emission-related warranty valid.
- *2: Only for D1803-E4, -TE4, V2403-E4, -TE4
- Failure to perform the maintenance will cause problems that will significantly degrade the engine performance.

IMPORTANT:

- The above schedule is taken directly from the Kubota engine manual. Scan the QR code to access the complete engine manual and other support materials for the Viking scraper.



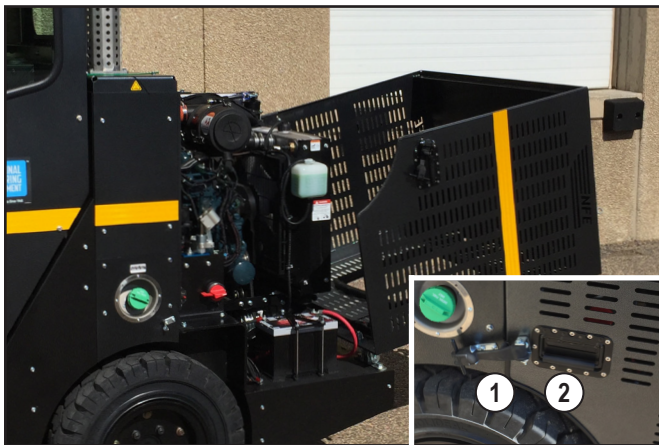
OPENING THE HOOD

⚠ CAUTION

To avoid personal injury:

- Never open engine hood while engine is running.
- Do not touch exhaust pipe while it is hot. Severe burns could result.
- When opening and closing the engine hood, be careful not to get your hands pinched or other parts of your body caught.
- Hood is heavy. Use two people when opening and closing the hood.

1. Release latch on each side.
2. With one person on each side, grab handle and open hood slowly until hood is stopped by cable.



- (1) Latch
(2) Handle

⚠ CAUTION

To avoid personal injury:

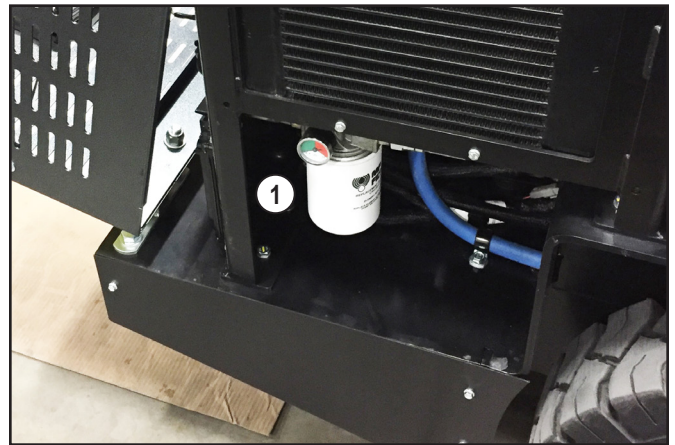
- Before performing maintenance on the machine, make sure the machine is parked on level ground. Lower the dual lift to the ground. Stop the engine and remove the key from the ignition switch. Turn off the main power switch unless needed for troubleshooting.

REPLACE HYDRAULIC OIL FILTER

SERVICE INTERVAL:

- After initial 100 hours
- Every 200 hours thereafter

1. Open the hood.
2. Remove the hydraulic oil filter using an oil filter wrench.
3. Oil the seal of the new filter lightly.
4. Install the new filter and tighten by hand.



- (1) Hydraulic oil filter

MAINTENANCE

CHANGE HYDRAULIC OIL

CAUTION

To avoid personal injury:

- Make sure to allow the hydraulic oil to cool before changing the oil.

SERVICE INTERVAL:

- After initial 500 hours
- Every 1000 hours thereafter

NOTE:

- The drain plug is located under the wheel well of the right rear drive wheel. Remove the wheel for better accessibility to the drain plug.

1. Machine must be on level ground.
2. Drain hydraulic oil by removing the drain plug. The machine contains 10 gal (38 L) of oil. Make sure the container size is adequate to catch the oil.
3. Replace the drain plug.
4. Remove the hydraulic oil cap.
5. Using a funnel, add hydraulic oil into the fill port. Tank capacity is 10 gal (38 L). See “RECOMMENDED FLUIDS AND LUBRICANTS” section.
6. Replace hydraulic oil cap.
7. Run the engine, drive the machine and operate the dual lift. Then stop the engine.
8. Check the hydraulic oil level gauge 20 minutes after filling to make sure the oil level is between the maximum and minimum fill lines. Add oil if needed.

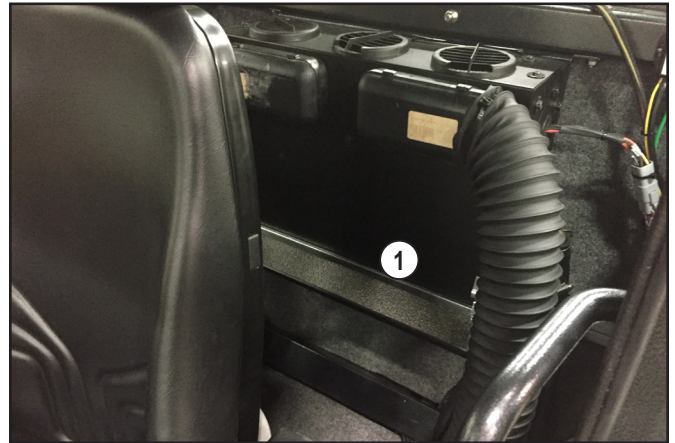


(1) Hydraulic oil drain plug

INSPECT CABIN AIR FILTER

SERVICE INTERVAL:

- Every 200 hours
1. Remove air filter and inspect.
 2. Clean or replace with new filter.

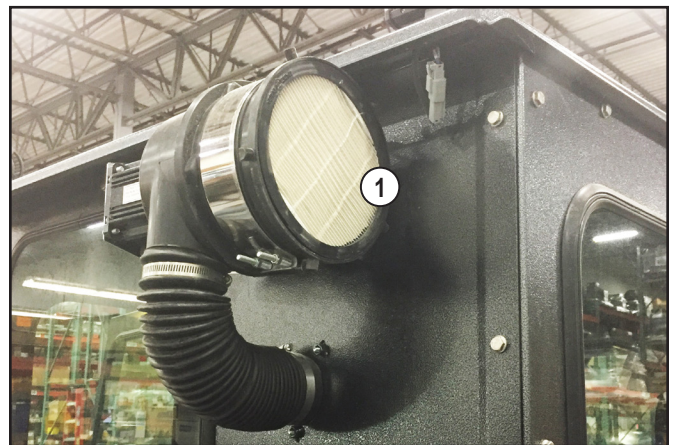


(1) Cabin air filter

INSPECT CAB PRESSURIZER AIR FILTER

SERVICE INTERVAL:

- Every 200 hours
1. Remove cab pressurizer end cap.
 2. Remove air filter and inspect.
 3. Clean or replace with new filter.



(1) Cab pressurizer air filter

GREASE FRONT CASTER WHEELS

⚠ CAUTION

To avoid personal injury:

- Be careful not to pinch your hands. The front caster wheels have a tight fit at the rotation point near the frame.

SERVICE INTERVAL:

- Every 1000 hours

Grease front caster wheels. See “RECOMMENDED FLUIDS AND LUBRICANTS” section.



(1) Grease fitting

⚠ CAUTION

To avoid personal injury:

- Be careful not to pinch your hands. The cab door has pinch points on the latch and hinge sides.

GREASE CAB DOOR HINGES

SERVICE INTERVAL:

- Every 1000 hours

Grease cab door hinges. See “RECOMMENDED FLUIDS AND LUBRICANTS” section.

LUBE CAB DOOR LATCH

SERVICE INTERVAL:

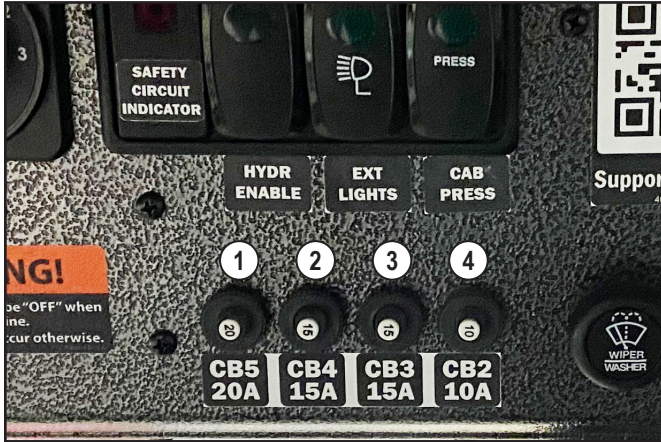
- Every 1000 hours

Lube door latch. See “RECOMMENDED FLUIDS AND LUBRICANTS” section.

MAINTENANCE

RESETTING CIRCUIT BREAKERS

The button will pop out if the breaker has been tripped. Push the button to reset.

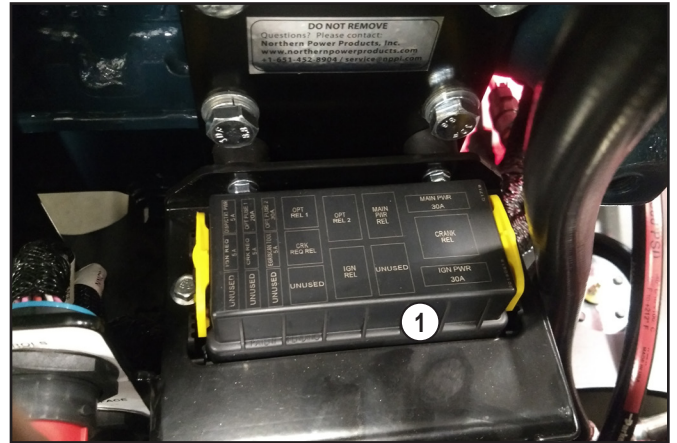


- (1) CB5 circuit breaker—HVAC system, cab pressurizer
- (2) CB4 circuit breaker—Safety lights, defrost fan, wiper/washer, HVAC control panel, rear view camera
- (3) CB3 circuit breaker—Work lights, dome light, night light, horn
- (4) CB2 circuit breaker—12V accessory outlet

FUSES

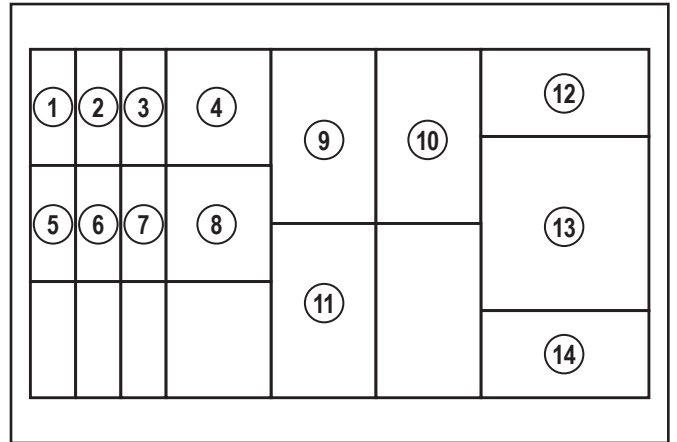
■ Replacing Fuses

1. Open the hood.
2. Remove the cover of the fuse box.
3. Replace the burnt-out fuse with a new fuse having the same capacity.



(1) Cover

■ Fuse Capacities



1	Control Power (5A)	8	CRK Req Relay
2	IGN Secondary PWR (20A)	9	Hyd Fan Control Relay
3	Hyd Fan (30A)	10	Main Power Relay
4	Secondary IGN Relay	11	IGN Relay
5	IGN Req (5A)	12	Main Power (30A)
6	CRK Req (5A)	13	CRK Relay
7	EGR/Scan Tool (5A)	14	IGN Power (30A)

REMOVING WEIGHTS

⚠ WARNING

To avoid personal injury:

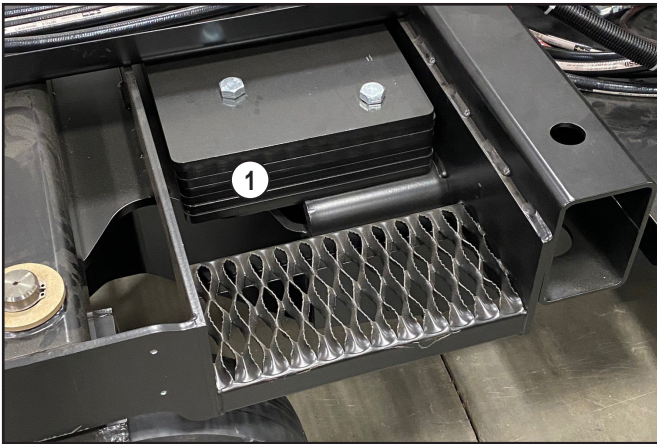
- Weights are very heavy and pose a crushing hazard. Use care when removing or reinstalling the weights.
- Make sure to properly secure the weights after reinstalling. Unsecured weights could fall off during operation causing injury.

NOTE:

- The machine is shipped with the weights installed. Front weights provide greater blade pressure, while the rear weights provide better traction for the rear drive wheels. For the majority of applications the weights should remain installed.

■ Front Weights

- 8 weights, 40 lbs (18 kg) each
1. Remove bolts, two per side.
 2. Push weights out opposite side, one by one.



(1) Front weights

Note: Some parts not shown for clarity.

■ Rear Weights

- 20 weights (10 weights per side), 13 lbs (6 kg) each
1. Remove left and right side panels.
 2. Remove nuts, two per side.
 3. Remove weights, one by one.



(1) Rear weights

Note: Some parts not shown for clarity.

TROUBLESHOOTING GUIDE

GENERAL MACHINE

PROBLEM	CAUSE	SOLUTION
Machine doesn't move. Dual lift doesn't respond.	Hydraulic enable switch has not been pushed.	<ul style="list-style-type: none"> • Push hydraulic enable switch (switch light will light up).
	Hydraulic system is disabled (safety circuit indicator is lit).	<ul style="list-style-type: none"> • Make sure E-stop and front safety switches are released, operator is seated, seat belt is fastened and cab door is closed. Then push hydraulic enable switch (switch light will light up).
Key is turned to "ON" position but nothing happens.	Main power switch is turned off.	<ul style="list-style-type: none"> • Turn power switch to "ON" position.
	Main breaker is tripped.	<ul style="list-style-type: none"> • Reset breaker.
Hydraulic oil temperature is too hot (yellow indicator on control panel is lit).	Continuous operation under full load.	<ul style="list-style-type: none"> • Reduce load.
	Hydraulic oil cooler fins are clogged.	<ul style="list-style-type: none"> • Clean fins.
	Hydraulic oil level is too low.	<ul style="list-style-type: none"> • Add hydraulic oil.
Hydraulic oil is very cloudy.	Water has entered the hydraulic tank.	<ul style="list-style-type: none"> • Drain and clean tank thoroughly. Change oil and repair tank if necessary.
	Oil is contaminated with dirt.	<ul style="list-style-type: none"> • Drain and clean tank thoroughly and change oil.
Machine has no power with engine running at 2400 rpm.	Multiple possible causes—Do not operate in this condition!	<ul style="list-style-type: none"> • Contact NFE customer support immediately.
Air conditioning isn't cooling the cab.	Air conditioning is turned off (indicator is not lit).	<ul style="list-style-type: none"> • Push the air conditioning switch (snowflake symbol) to turn on air conditioning. The indicator will light up.
	Temperature set incorrectly.	<ul style="list-style-type: none"> • Turn temperature control knob to "blue" zone.
	No air flow (blower is turned off)	<ul style="list-style-type: none"> • Turn blower speed control knob to position "1", "2" or "3".
Heater isn't heating the cab.	Air conditioning is turned on (indicator is lit).	<ul style="list-style-type: none"> • Push the air conditioning switch (snowflake symbol) to turn off air conditioning. The indicator will go out.
	Temperature set incorrectly.	<ul style="list-style-type: none"> • Turn temperature control knob to "red" zone.
	No air flow (blower is turned off)	<ul style="list-style-type: none"> • Turn blower speed control knob to position "1", "2" or "3".
Horn doesn't beep. Backup alarm doesn't sound.	Hydraulic system is disabled (safety circuit indicator is lit).	<ul style="list-style-type: none"> • Make sure E-stop and front safety switches are released, operator is seated, seat belt is fastened and cab door is closed (safety circuit indicator will go out).
Misc. electrical failures	Circuit breaker is tripped.	<ul style="list-style-type: none"> • Reset appropriate circuit breaker in cab.

TROUBLESHOOTING GUIDE

ENGINE

PROBLEM	CAUSE	SOLUTION
Starting difficulties	Fuel is too viscous.	<ul style="list-style-type: none"> • Check fuel tank and filter. • Remove impurities and water. • Replace filter if necessary. • Use appropriate fuel for the season.
	Oil viscosity is too high; the engine runs sluggishly in winter.	<ul style="list-style-type: none"> • Use appropriate oil for the season.
	Battery is almost dead.	<ul style="list-style-type: none"> • Recharge battery.
	Fuel system was not primed after running out of fuel.	<ul style="list-style-type: none"> • Prime fuel system.
Insufficient engine power	Low fuel level	<ul style="list-style-type: none"> • Check fuel and add if necessary.
	Clogged air filter	<ul style="list-style-type: none"> • Clean the air filter.
	Engine requires regeneration.	<ul style="list-style-type: none"> • Perform regeneration when prompted.
Engine stops suddenly.	E-stop is pushed.	<ul style="list-style-type: none"> • Release E-stop.
	Low fuel level	<ul style="list-style-type: none"> • Check fuel and add if necessary. • Prime the fuel system.
Abnormal exhaust gas color	Poor fuel	<ul style="list-style-type: none"> • Use high quality fuel.
	Too much engine oil	<ul style="list-style-type: none"> • Drain engine oil to proper level.
Coolant temperature is too hot.	Worn or damaged V-belt	<ul style="list-style-type: none"> • Adjust or replace.
	Coolant level too low	<ul style="list-style-type: none"> • Fill to proper level.
	Radiator fins are clogged.	<ul style="list-style-type: none"> • Clean.
	Defective radiator cap (evaporation)	<ul style="list-style-type: none"> • Replace cap.
	Continuous operation under full load	<ul style="list-style-type: none"> • Reduce load.
	Engine oil level is too low.	<ul style="list-style-type: none"> • Add engine oil to proper level.
	Poor fuel	<ul style="list-style-type: none"> • Use high quality fuel.

IMPORTANT:

- Scan the QR code to access the Kubota engine manual and other support materials for the Viking scraper.



LONG TERM STORAGE

CAUTION

To avoid personal injury:

- Do not clean the machine with the engine running.
- To avoid the danger of exhaust fume poisoning, do not operate the machine in a closed building without proper ventilation.
- Park the machine on level ground.
- Lower the dual lift to the ground.
- When storing, remove the key from the ignition switch to avoid unauthorized persons from operating the machine and getting injured. Turn off the main power switch.

STORING THE MACHINE FOR LONG PERIODS OF TIME

1. Clean the machine thoroughly.
2. Store the machine indoors.
3. Change the engine oil and grease the machine.
4. Grease the visible sections of the hydraulic cylinder rods.
5. Remove the battery and store indoors.

IMPORTANT:

- Do not wash the machine with the engine running.
- Do not allow water to enter the exhaust pipe or air intake, as engine damage could result. Engine air cleaner must be kept dry.

OPERATING THE MACHINE AFTER LONG STORAGE

1. Wipe the grease from hydraulic cylinder rods.
2. Start the engine, operate the dual lift and drive the machine under no load in order to circulate the hydraulic oil.
3. If the machine is stored for longer than one month, repeat steps 1 and 2 every month.

RECOMMENDED FLUIDS AND LUBRICANTS

IMPORTANT:

- Before delivery the hydraulic oil used was Chevron Rando HDZ 46.
- Use engine oil API classification CJ-4.

DESCRIPTION	APPLICATION	SPECIFICATION	QUANTITY
Engine Fuel	Above 14°F (-10°C)	Ultra-Low Sulfur Diesel Fuel No. 2-D S15	18 gal (68 L)
	Below 14°F (-10°C)	Ultra-Low Sulfur Diesel Fuel No. 1-D S15	
Engine Oil	Above 77°F (25°C)	SAE30, SAE10W-30 or SAE15W-40	1.8 gal (7.0 L)
	32°F - 77°F (0°C - 25°C)	SAE20, SAE10W-30 or SAE15W-40	
	Below 32°F (0°C)	SAE10W, SAE10W-30 or SAE15W-40	
Hydraulic Oil	All seasons	Chevron Rando HDZ 46 or compatible fluid from a name brand manufacturer	10 gal (38 L)
Coolant	Permanent type anti-freeze (see information below)		As required
Grease	Dual lift Cab door latch	Sta-Lube Super White Multi-Purpose Lithium Grease or equivalent	NA
Grease	Front caster wheels Cab door hinges	Talon General Purpose Lithium Grease or equivalent	NA

Anti-freeze

NOTE

- There are 2 types of anti-freeze available: use the permanent type (PT) for this engine.
- When you add anti-freeze for the first time, flush the water jacket and radiator interior with clean, soft water several times.
- The brand of the anti-freeze and the ambient temperature have an effect on the procedure to mix water and anti-freeze. Refer to the SAE J1034 standard, especially to the SAE J814c.
- Mix the anti-freeze with clean, soft water, and then fill into the radiator.

IMPORTANT

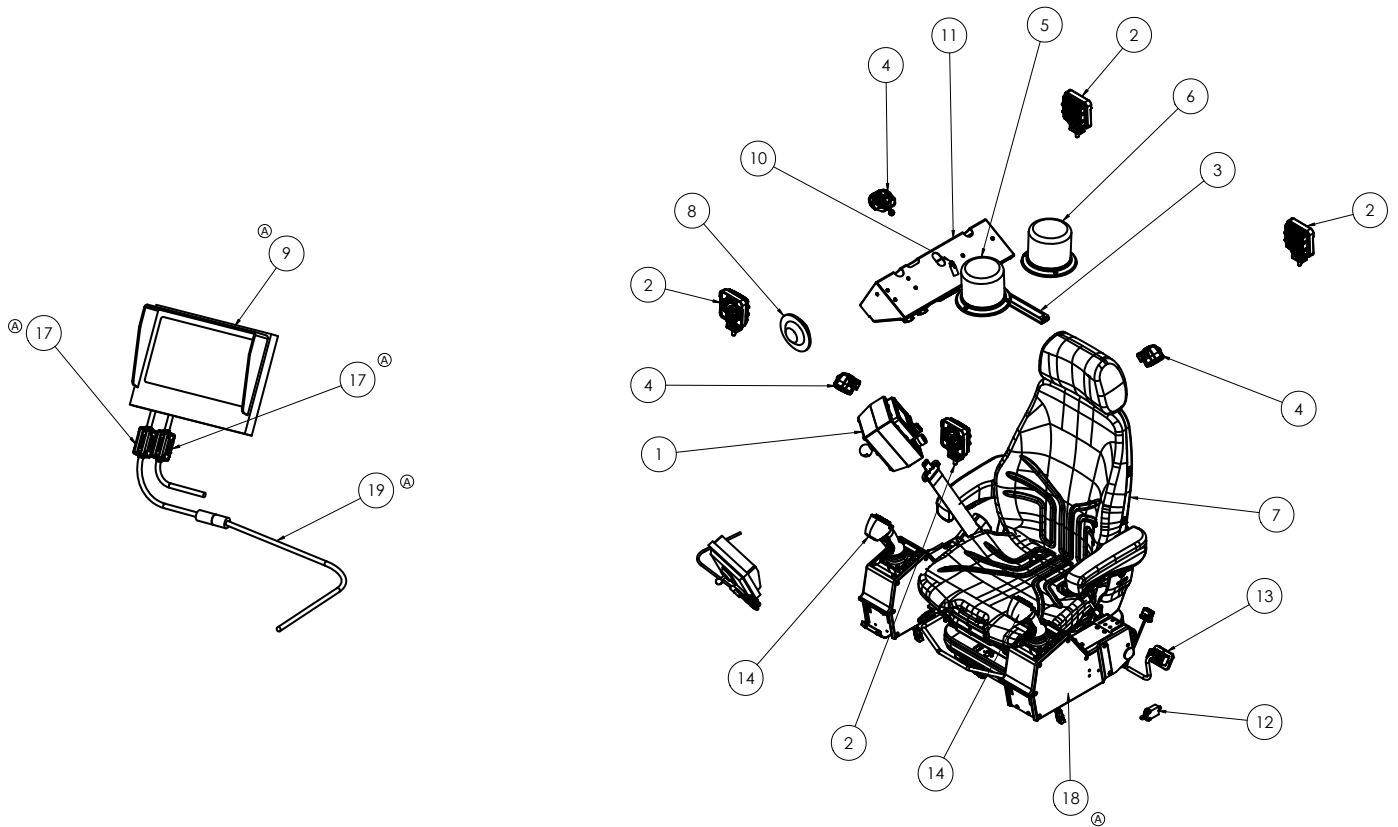
- Make sure that when you mix the anti-freeze and water, the ratio of anti-freeze is less than 50%.

Anti-freeze volume	Freezing point		Boiling point*	
	°C	°F	°C	°F
40%	-24	-11	106	223
50%	-37	-35	108	226

* At 1.01 × 100000 Pa (760 mmHg) pressure (atmospheric). Use a radiator pressure cap that lets the pressure collect in the cooling system to get a higher boiling point.

PARTS LISTS

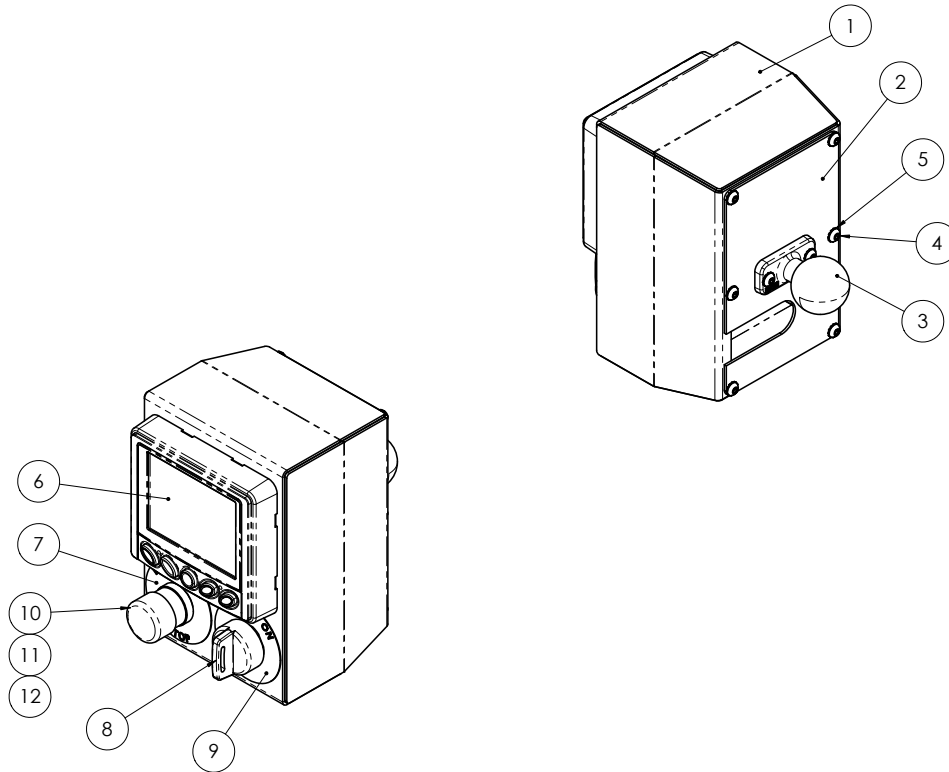
CAB—ELECTRICAL



Item No.	Part No.	Description	Qty.
1	405461	Assy Lower Control Box, Murphy	1
2	406558	Light, LED, Worklight, 1450 Lumens, 1.3A, 12-24VDC	4
3	405475	Light, Dome, White, LED, 12V, 13"x 3/4"	1
4	406567	Light, Boundary, Red LED, 1.1A, 12-80VDC	3
5	405478	Beacon, Green, Strobe, 12-48 VDC	1
6	405479	Beacon, Amber, Strobe, Class II, 12-48 VDC	1
7	405591	Seat, Grammer, W/ Joystick Mounts	1
8	405814	Horn, 12 Vdc, 4 Amp, 115 Db, 5" Dia	1
9	406565	Monitor, Back Up Camera, 7 inch, RLED, 12-60V, w/Mount	1
10	405961	Light, Post, Red, LED, w/ Switch	1
11	406140	Assy Console, M1	1
12	406145	Switch, Interlock, Limit, 1NO, 1NC	1
13	406233	Wiring Kit, Cab	1
13.1*	405656	Harness, Joysticks, Cab	1
13.2*	406452	Harness, Engine Controls, Cab	1
13.3*	406451	Harness, Safety Circuit, Cab	1
14	406367	Joystick, 1-Axis, Can-bus, 2-button, 1-Thumbwheel	2
15	406514	Switch, Operator Presence, Grammer MSG 85/722	1
16	406515	Switch, Seat Belt, Grammer MSG 85/722	1
17	406556	Ferrite, Snap, 321Ω, 4.5-6mm Cable OD	2
18	406555	Ferrite, Snap, 270Ω, 8.5-10.5mm Cable OD	2
19	406566	Cable, Back Up Camera, Coax, 26 ft	1

*Items 13.1-13.3 (not shown) are included as part of Item 13 and are also available individually.

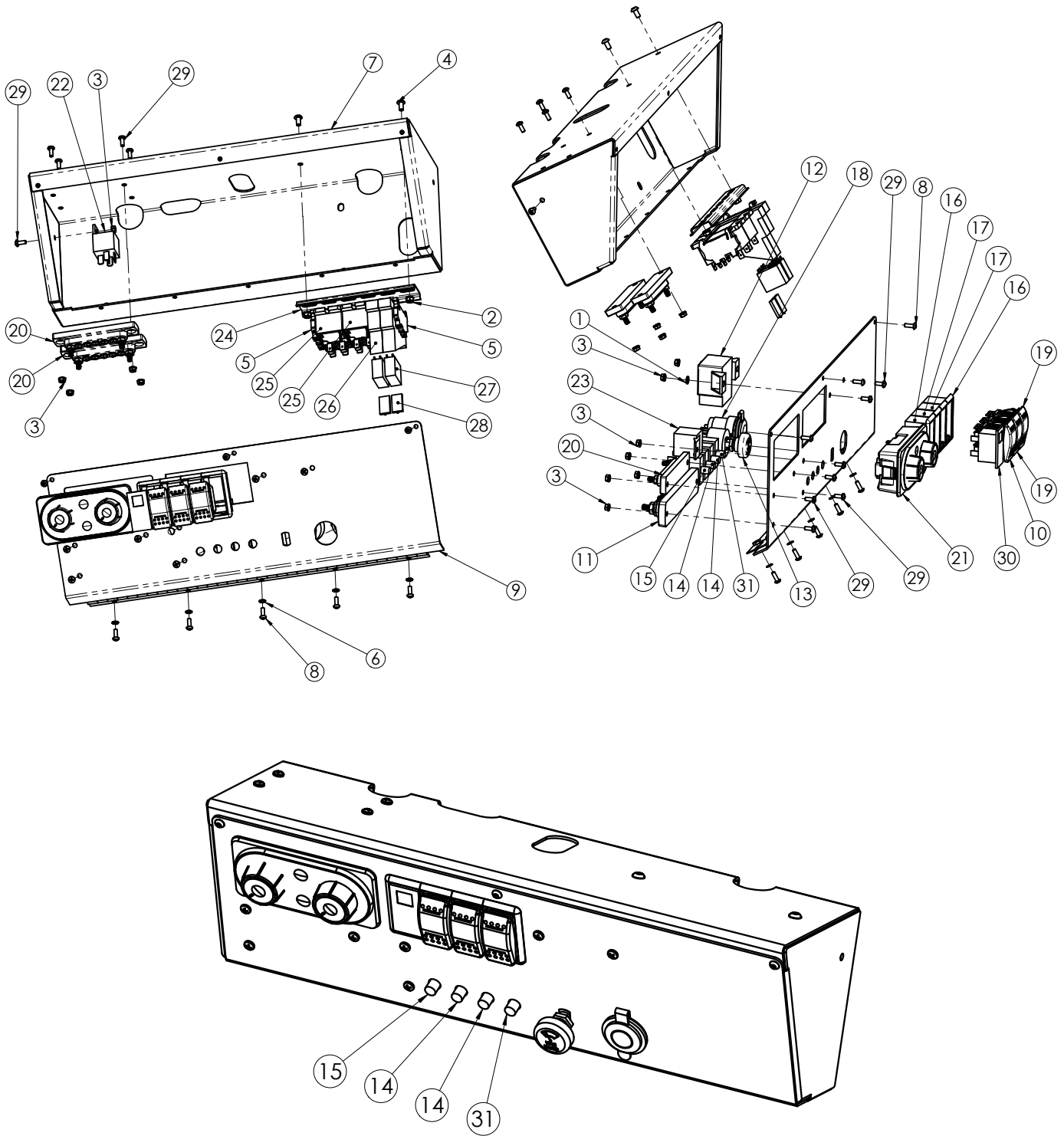
CAB—OPERATOR CONTROL BOX 405461



Item No.	Part No.	Description	Qty.
1	405836	BOX WELDMENT, MURPHY CONSOLE	1
2	405835	WELDMENT, ACCESS, MURPHY CONSOLE	1
3	405830	RAM BALL, 1.5" DIA, RECTANGULAR BASE	1
4	406004	Screw, BHSH, M5-0.8 X 14mm, Stainless	8
5	406005	Washer, Lock, Ext Tooth, M5, Clear Zinc	8
6	406402	Display, 3.8" Screen, 5 Push Buttons, Monochrome	1
7	405464	Decal, Yellow Ring, E-STOP	1
8	406400	Switch, Ignition, On/Off, w/ Key	1
9	405463	Decal, On-Off, Key Switch	1
10	72453	Switch, 22mm, E-Stop, ZB4 Series	1
11	72456	Collar, Mounting, 22mm, ZB4 Series	1
12	72452	Contact Block, NC, 10A, Spring Clamp, ZB4 Series	2

PARTS LISTS

CAB—CONSOLE 406140



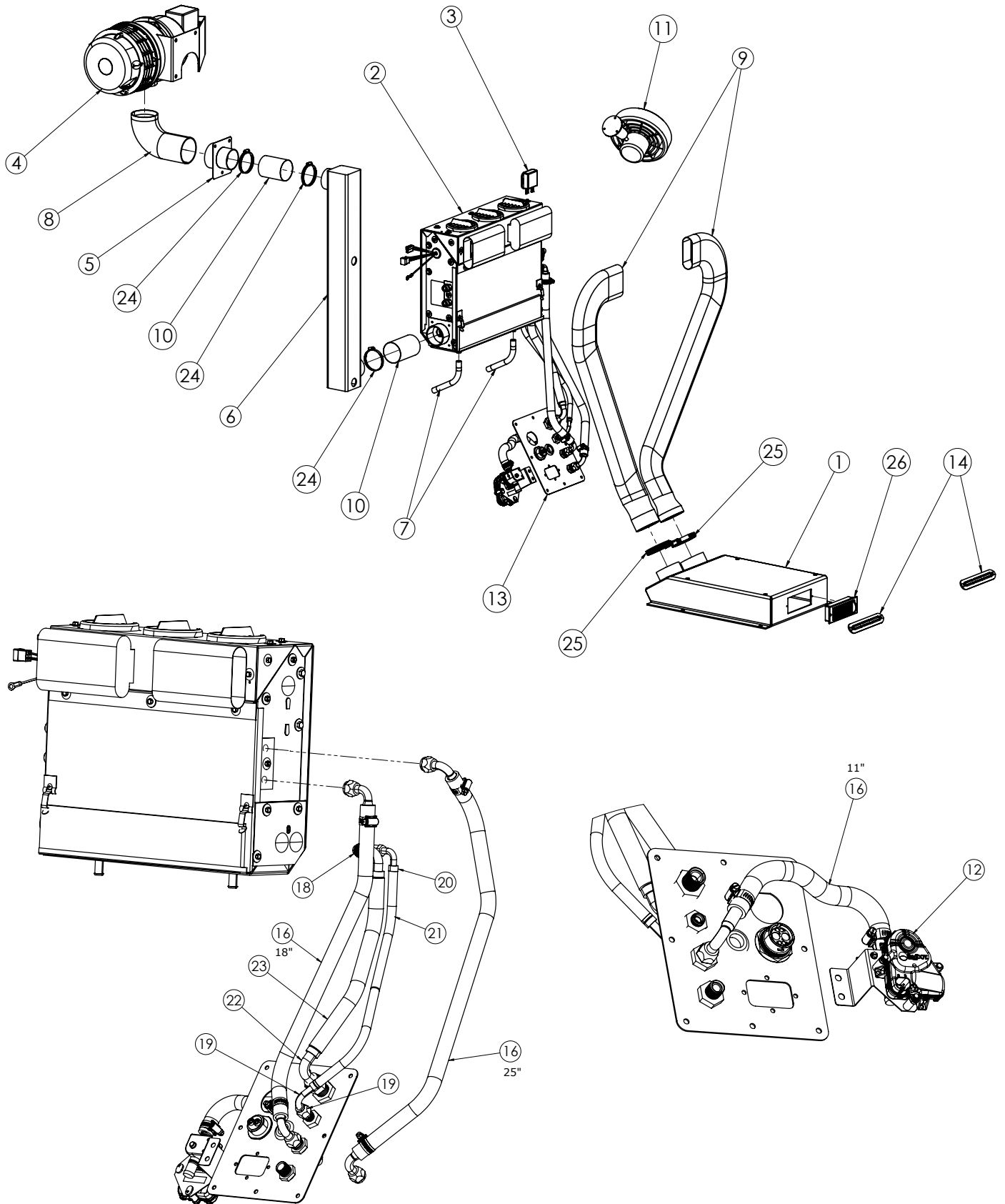
PARTS LISTS

CAB—CONSOLE 406140 (CONT'D)

Item No.	Part No.	Description	Qty.
1	401326	Washer, Flat, M4, Clear Zinc	2
2	402258	Nut, Keps, M5-0.8, Clear Zinc	2
3	403281	Nut, Keps, M4-0.7	12
4	404060	Screw, Button Head Cap, M5x0.8x10, Black Oxide	2
5	405783	End Stop, DIN Rail, 35mm, Slim	2
6	405206	Washer, External Tooth, M4, Clear Zinc	5
7	405952	WELDMENT, CONSOLE BOX	1
8	406002	Screw, BHCS, M4-0.7x16mm, Stainless	8
9	406139	WELDMENT, CONSOLE PANEL	1
10	406141	Switch, Rocker, MOM, SP, 20A, 12V, .25 Tabs	1
11	406142	Bus Bar, 150A, 48VDC, 6.1"x1.25"	1
12	406143	Relay, 75A, 12V Coil, SPST NO	1
13	406146	Switch, 2 Axis, Rotary, Wiper	1
14	406147	Circuit Breaker, 15A, Push Reset, Panel Mount, .25 Tab	2
15	406148	Circuit Breaker, 20A, Push Reset, Panel Mount, .25 Tab	1
16	406149	Bezel, End, Switch	2
17	406150	Bezel, Mid, Switch	2
18	406154	Receptacle, Accessory, 12V, 20A	1
19	406155	Switch, Rocker, On-Off, SP, 20A, 12V, .25 Tabs	2
20	406156	Bus Bar, 100A, 48VDC, 4.2"x0.9"	3
21	406173	Panel, Controller, HVAC	1
22	406383	Relay, Automotive, 12V Coil, SPDT, 30A, Sealed	1
23	406384	Relay, Automotive, 12V Coil, SPDT, 30A	1
24	406389	DIN Rail, 5.9"	1
25	406390	Relay, 12V Coil, DPDT, 30A, DIN Rail	2
26	406391	Socket, Relay, DIN Rail	2
27	406392	Relay, Safety, 12V Coil, DPDT, 8A	2
28	406393	LED Module, Red, Safety Relay	2
29	406396	Screw, Phillips Pan Head, M4-0.7x10, Black Oxide	12
30	406454	Indicator, Light, Red, 12V, VP Series	1
31	406368	Circuit Breaker, 10A, Push Reset, Panel Mount, .25 Tab	1

PARTS LISTS

CAB—HVAC



PARTS LISTS

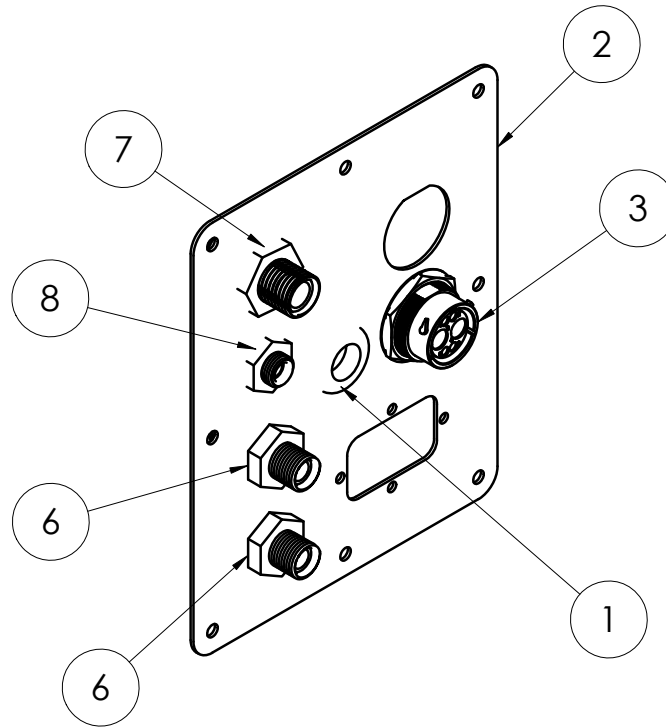
CAB—HVAC (CONT'D)

Item No.	Part No.	Description	Qty.
1	405449	Weldment, Pedestal, Seat	1
2	405480	RED DOT R-8500 HVAC UNIT	1
3	405578	CABAIRES APC UNIT	1
4	405579	CABAIRES-8 UNIT	1
5	405586	BULKHEAD ADAPTER, 3"-2" DUCT HOSE	1
6	405587	PRESSURE DUCT, ABS	1
7	405588	CONDENSATE DRAIN TUBE	13 in
8	405590	DUCT, FLEX, PRESSURE, OUTSIDE	1
9	405592	DEFROST SUPPLY DUCT	72 in
10	405593	HOSE, DUCT, AIR, 2.5"	7 in
11	406568	Fan, Cab, 2 Speed, 12VDC	1
12	405832	WATER VALVE, ELECTRIC W/HD BRKT	1
13	405951	Assy Bulkhead, Cab	1
14	405956	DEFROST LOUVER	2
15*	406189	5/8" HOSE BARB TO #8 O-RING FITTING, 90 DEGREE	5
16	406190	Hose, Heater, 5/8" ID	54 in
17*	406191	Clamp, Hose, 5/8" - 1 1/2", Worm Drive, SS	6
18	406192	FITTING, #10 MALE O-RING TO #12 AOC, 90 DEGREE	1
19	406193	FITTING, #6 FEMALE TO #6 AOC, 90 DEGREE	1
20	406194	FITTING, #6 MALE TO #6 AOC, 90 DEGREE	1
21	406195	Hose, Refrigerant, #6 AC Reduced Barrier	14 in
22	406196	FITTING, #10 FEMALE TO AOC, 90 DEGREE	1
23	406197	Hose, Refrigerant, #12 AOC TYPE	10 in
24	406198	HOSE CLAMP, 2.5" STAINLESS	3
25	406199	CLAMP, HOSE, 3.0" STAINLESS	2
26	406223	LOUVER, SEAT PEDESTAL	1

*Not shown

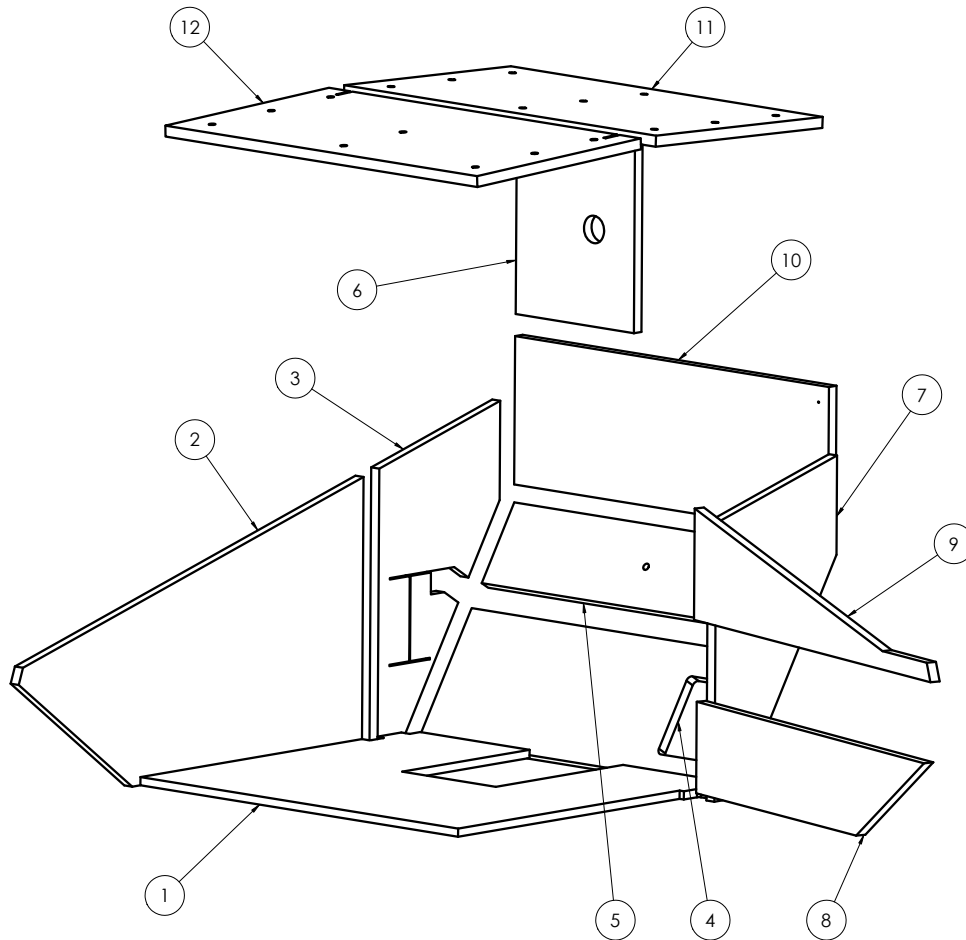
PARTS LISTS

CAB—BULKHEAD 405951



Item No.	Part No.	Description	Qty.
1	405468	GROMMET, BULKHEAD, 3/4" ID	1
2	405470	PLATE, BULKHEAD	1
3	406151	CONNECTOR, POWER	1
4	406152	Nut, Panel, Bayonet Coupling, Size 18	1
5	406153	Washer, Lock, Size 18, HDP Series	1
6	406178	FITTING, BULKHEAD, #8 MALE TO #8 MALE, 3/4"-16	2
7	406179	FITTING, STRAIGHT, BULKHEAD, #10 to #10 MALE	1
8	406180	FITTING, STRAIGHT, BULKHEAD, #6 Male TO #6 Male	1

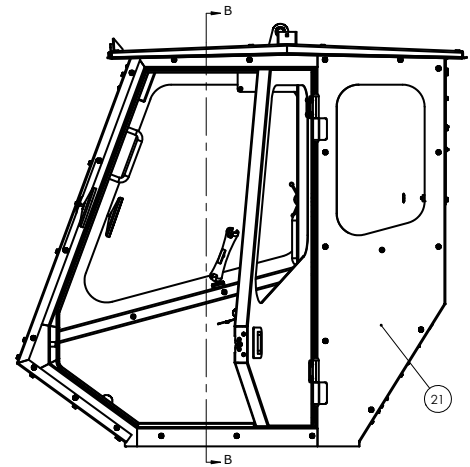
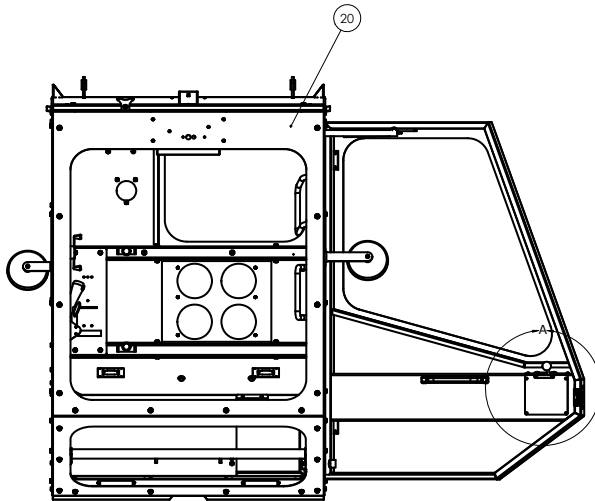
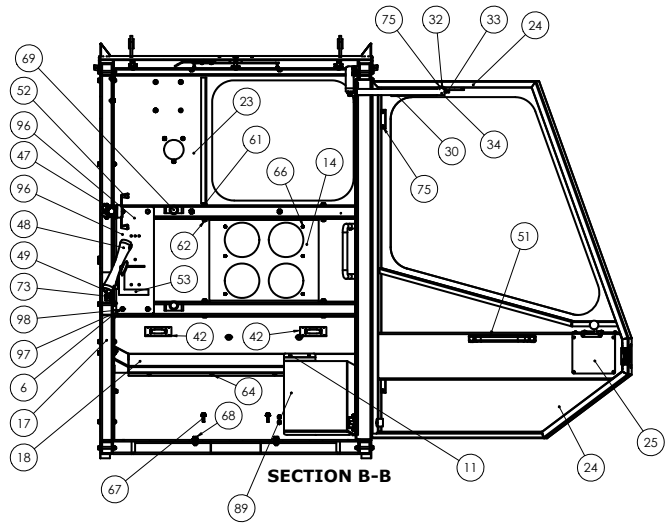
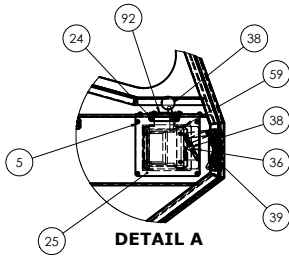
CAB—ACOUSTIC FOAM AND FLOORMAT



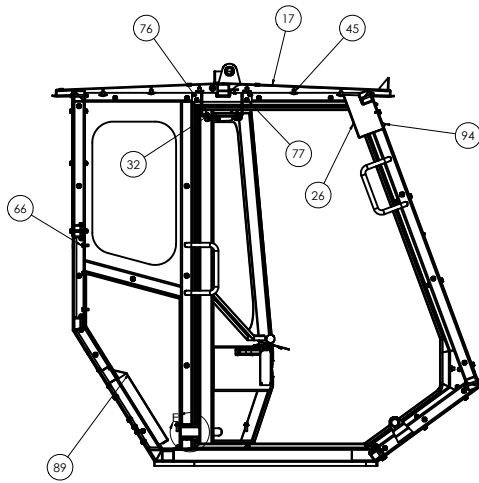
Item No.	Part No.	Description	Qty.
1	405596	FLOORMAT, CAB	1
2	405792	FOAM, ACOUSTIC, RH FRONT	1
3	405793	FOAM, ACOUSTIC, RH REAR	1
4	405794	FOAM, ACOUSTIC, REAR BOTTOM	1
5	405795	FOAM, ACOUSTIC, REAR, MID 1	1
6	405796	FOAM, REAR, TOP	1
7	405797	FOAM, ACOUSTIC, LH REAR	1
8	405798	FOAM, ACOUSTIC, DOOR BOTTOM	1
9	405799	FOAM, ACOUSTIC, DOOR UPPER	1
10	405802	FOAM, ACOUSTIC, REAR, MID 2	1
11	405821	FOAM, ACOUSTIC, ROOF, REAR	1
12	405822	FOAM, ACOUSTIC, FRONT	1

PARTS LISTS

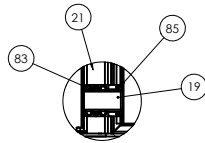
CAB—MECHANICAL



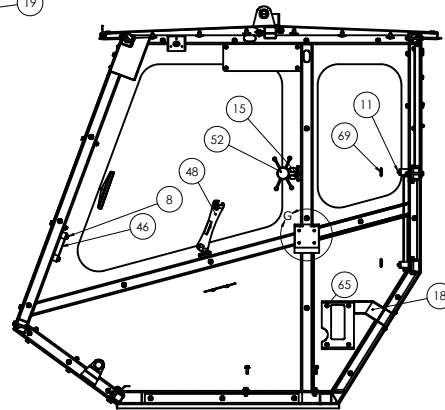
CAB—MECHANICAL (CONT'D)



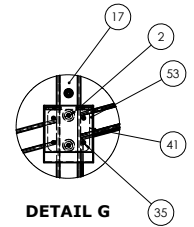
SECTION C-C



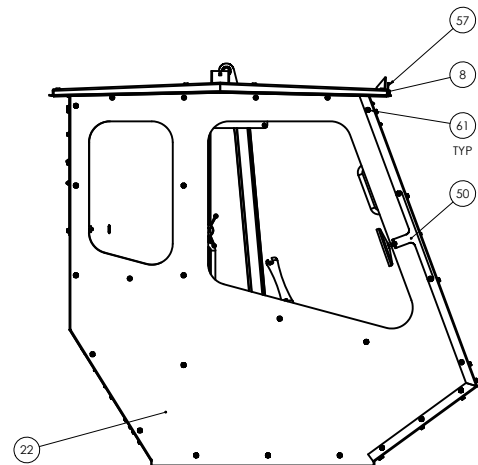
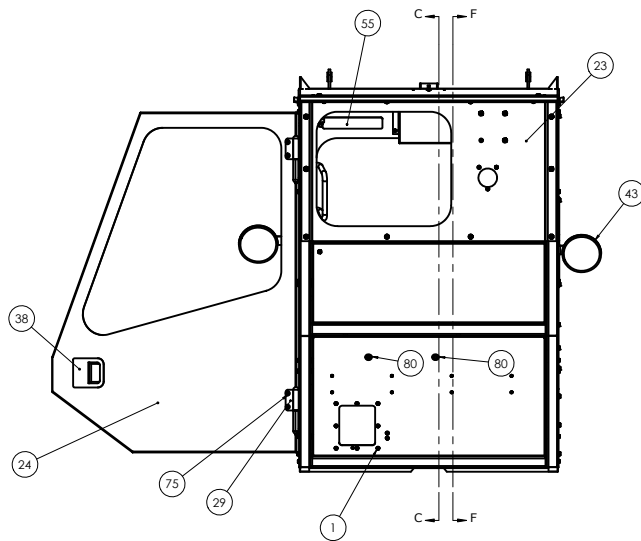
DETAIL E



SECTION F-F



DETAIL G



PARTS LISTS

CAB—MECHANICAL (CONT'D)

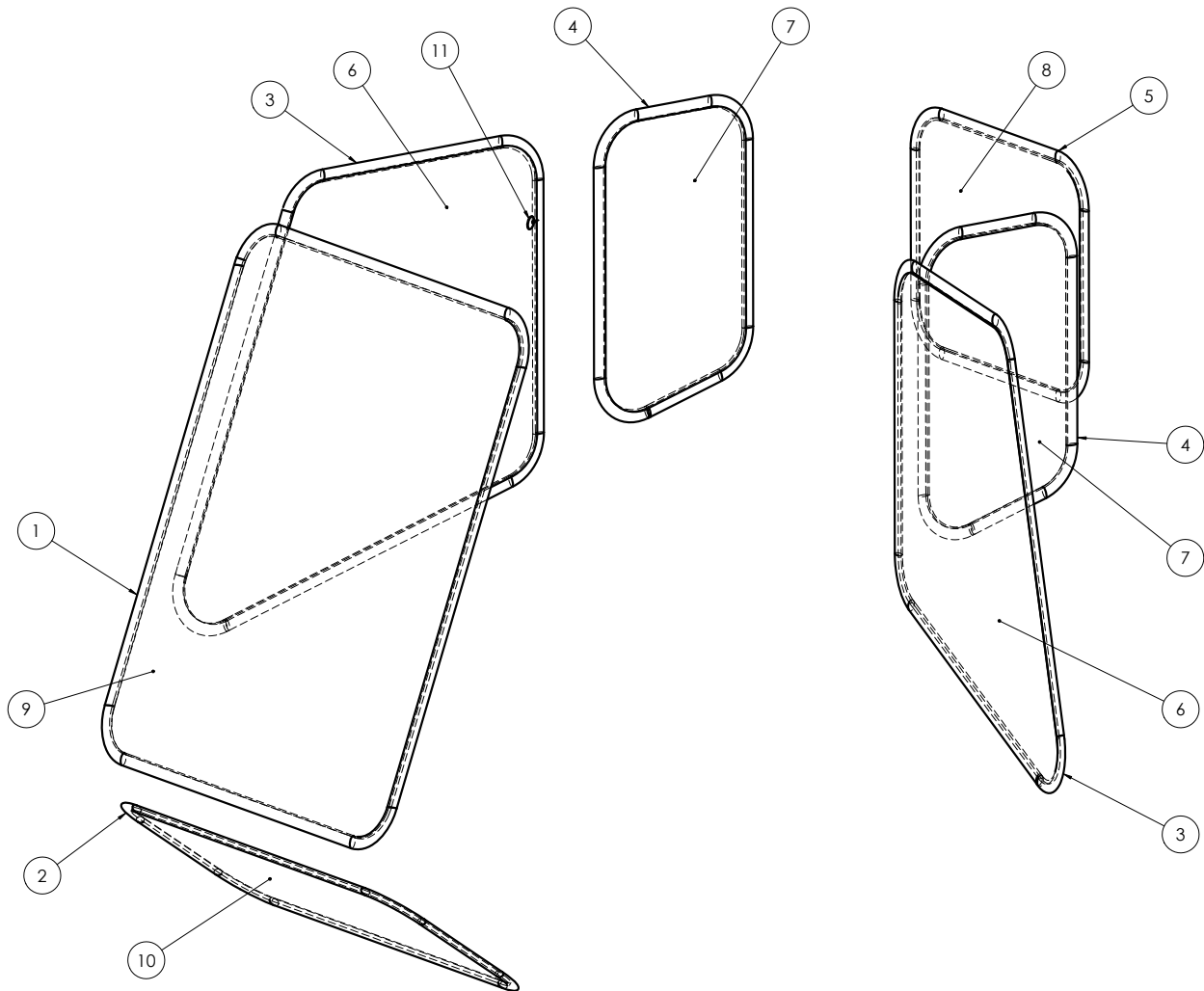
Item No.	Part No.	Description	Qty.
1	74636	M6-1.0 X 16MM LG SERRATED FLANGE BOLT, CZ	17
2	400342	M8-1.25 X 12 MM FH SCREW, ZN PLT	2
3	401326	Washer, Flat, M4, Clear Zinc	2
4	401327	Washer, Flat, M5, Clear Zinc	4
5	401331	Washer, Lock, M5, Clear Zinc	6
6	401332	Washer, Lock, M8, Clear Zinc	8
7	402258	Nut, Keps, M5-0.8, Clear Zinc	4
8	402447	Bolt, Wizlock, M8 x 1.25 x 16	6
9	403187	M3-0.5 X 12MM LG ZINC-PLATED ALLOY STEEL FLAT-HEAD CAP SCREW	12
10	403279	Screw, Button Head Cap, M5-0.8 x 12, Clear Zinc	6
11	405188	Screw, Button Head Cap, M4x0.7x12mm, Clear Zinc	11
12	405198	Nut, Flange, M8-1.25, Clear Zinc	1
13	405206	Washer, External Tooth, M4, Clear Zinc	11
14	405453	PLATE, FORMED, HVAC MTG	1
15	405465	RAM DIAMOND BASE 1"BALL	1
16	405482	COVER, MTG BOLT ACCESS	4
17	405483	CAB WELDMENT-MAIN	1
18	405537	WELDMENT, WIRE HIDE	1
19	405543	DOOR SWITCH COVER	1
20	405545	EROPS PANEL, FRONT	1
21	405553	PANEL, WELDMENT, EROPS, LH	1
22	405556	PANEL, WELDMENT, EROPS, RH	1
23	405559	REAR EROPS PANEL WELDMENT	1
24	405568	Weldment, Door	1
25	405570	COVER, LATCH	1
26	405574	COVER, WIPER MOTOR	1
27	405575	SWITCH MTG PLATE	1
28	405595	DOOR BULB SEAL	150"
29	405597	HINGE WELDMENT MALE, RH	2
30	405600	GAS SHOCK, DOOR	1
32	405601	BALL STUD, 8MM	2
33	405602	CHAIN, DOOR SNUB	16"
34	405603	CHAIN PROTECTOR SHEATH	14"
35	405605	M3-0.5 X 12MM LG STEEL, ZN PLT	4
36	405608	CONNECTING CLIPS PADDLE HANDLE	2
37	405609	CONNECTING LINK, ZINC PLATED	1
38	405610	HANDLE, PADDLE, LH	1
39	405611	LATCH, DOUBLE ROTARY	1
40	405804	DOOR SHOCK MTG WELDMENT	1
41	405811	PLATE, CUP HOLDER MTG	1
42	405812	PLATE & NUT ASSY, JOYSTICK ADAPTER	2
43	405816	MIRROR ASSY, 6" CONVEX	2
44	405817	TRIM EDGE, FORMED, FLOORMAT	1
45	405818	PUSH-ON BUTTONS, GRAY, #10 STUD	20
46	405823	PLATE, CAMERA MTG	1
47	405824	RAM ARM, 1.75" C-C 1.0" SOCKET	1
48	405829	RAM ARM, 8" LG, 1.5" SOCKET	1
49	405830	RAM BALL, 1.5" DIA, RECTANGULAR BASE	1
50	405834	MIRROR BRKT	1

CAB—MECHANICAL (CONT'D)

Item No.	Part No.	Description	Qty.
51	405837	DOOR PULL HANDLE & PLUGS	1
52	405838	CELLPHONE HOLDER	1
53	405841	CUP HOLDER, STAINLESS, FOLDING	1
54	405954	GROMMET	1
55	405957	ROPS PLACARD	1
56	405958	STRIKER BOLT	1
57	405959	BRKT, HORN	1
58	405960	SEAL, DOOR BOTTOM	28"
59	405962	BRKT, FORMED, PADDLE HANDLE	2
60	405963	BRKT, INTERIOR RED LED POST LIGHT MTG	1
61	405981	Screw, Hex Head, Flanged, M8-1.25 X 65 mm, Steel, Zinc	89
62	405982	Nut, Hex, Flanged, Serrated, M8-1.25, Steel, Zinc	89
63	405983	M8 X 1.25 HEX WELD NUTS W/ PROJECTIONS	4
64	405988	M4-0.7 X 10MM LG 18-8 STAINLESS STEEL ROUNDED HEAD SCREW	8
65	405989	M6-10 X 20 MM FLANGE HEAD STEEL, ZN SCREW	4
66	405994	Screw, Hex Head Cap, Flngd, 5/16"-18 x .75", Gr 5 Steel Serrated	6
67	405995	Screw, Hex Head Cap, Flanged, Serr, M8-1.25 X 25 mm, Zinc	5
68	405996	Screw, Hex Head Cap, Flnged, Serr, M10-1.5 X 25 mm, Steel, Zinc	4
69	405998	Plug, Round, 1 inch ID Hole, Plastic, Blk	2
70	405999	Grommet, 3/4" OD x 7/16" ID, Rubber, Blck	10
71	406000	Grommet, Round, 1" OD x 3/8" ID, Rubber, Blk	2
73	406004	Screw, BHSH, M5-0.8 X 14mm, Stainless	5
74	406005	Washer, Lock, Ext Tooth, M5, Clear Zinc	8
75	406011	Screw, Hex Head Cap, Flngd, Serr, M8-1.25 x 20mm, Steel, Zinc	5
76	406012	Nut, Hex, Flngd, Serr, 5/16"-18, Steel, Zinc	1
77	406014	Screw, SHCS, M8-1.25 x 16mm, Steel, Zinc	4
78	406015	Screw, Pan Head, Phillips, M4-0.7x16mm, Steel, Zinc	2
79	406016	Screw, Flat Head, Hex, M6-1.0x40mm, Steel, Zinc	4
80	406020	Grommet, 1 1/8" OD x 5/8" ID, Rubber, Blk	2
81	406022	Grommet, 5/8" OD x 3/8" ID, Rubber, Blk	5
82	406023	Nut, Hex, Flngd, Nyloc, 7/16"-14, Steel, Zinc	1
83	406024	Screw, Hex Head Cap, Flngd, M6-1.0x16mm, Steel, Zinc	4
84	406025	Screw, SHCS, M4 - 0.7 X 18mm, SS	2
85	406026	Screw, Pan Head, M4-0.7 x 6mm, Steel, Zinc	4
86	406027	Screw, Truss Head, Phillips, M8-1.25x25mm, Steel, Zinc	2
87	406176	M5-0.8 FLANGE BOLT X 16MM LG YZ	4
88	406177	M3-0.8 X 10 MM LG BHPH SCREW W- EXT TOOTH LOCK WASHER	4
89	406200	COVER, BULKHEAD FITTINGS	1
90	406201	GROMMET, 5/8" OD x 3/8" ID, EDPM	1
91	406214	Screw, Button Head Cap, M5-0.8x8mm, Steel, Clear Zinc	6
92	406224	SEAL, INSIDE DOOR HANDLE	1
93	406225	RETAINER, SEAL	1
94	406232	M5-0.8 X 12 MM LG 18-8 SS PHIL HEAD SCREW	4
95	406398	Bracket, Mirror, Left	1
96	405451	Plate, Mount, Fire Extinguisher	1
97	401803	Washer, Flat, M8, Clear Zinc	4
98	400041	Screw, Hex Head Cap, M8-1.25 x 12, Clear Zinc	4

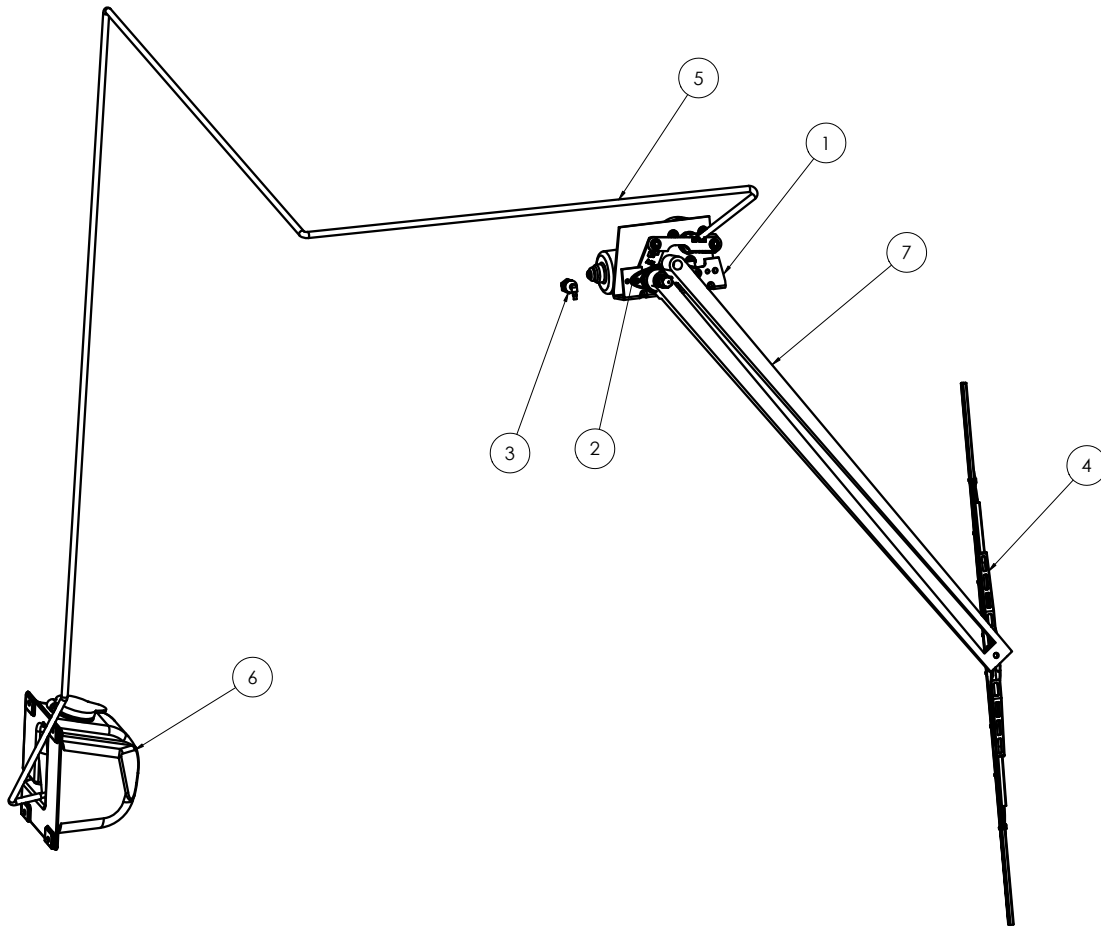
PARTS LISTS

CAB—WINDOWS



Item No.	Part No.	Description	Qty.	Inches Grommet Req'd
1	405462-1	WINDOW GROMMET-FRONT	1	158
2	405462-2	WINDOW GROMMET, FRONT LOWER	1	105
3	405462-3	GROMMET DOOR & SIDE WINDOW	2	120 ea
4	405462-4	GROMMET, OPERA WINDOW	2	72 ea
5	405462-5	GROMMET, REAR WINDOW	1	81
6	405580	SIDE WINDOW PANE	2	
7	405581	OPERA WINDOW PANE	2	
8	405582	REAR WINDOW PANE	1	
9	405583	WINDOW, FRONT, PANE	1	
10	405584	WINDOW, FRONT LOWER, PANE	1	
11	405955	KEYTAG, RIPCORD ESCAPE WINDOW	1	

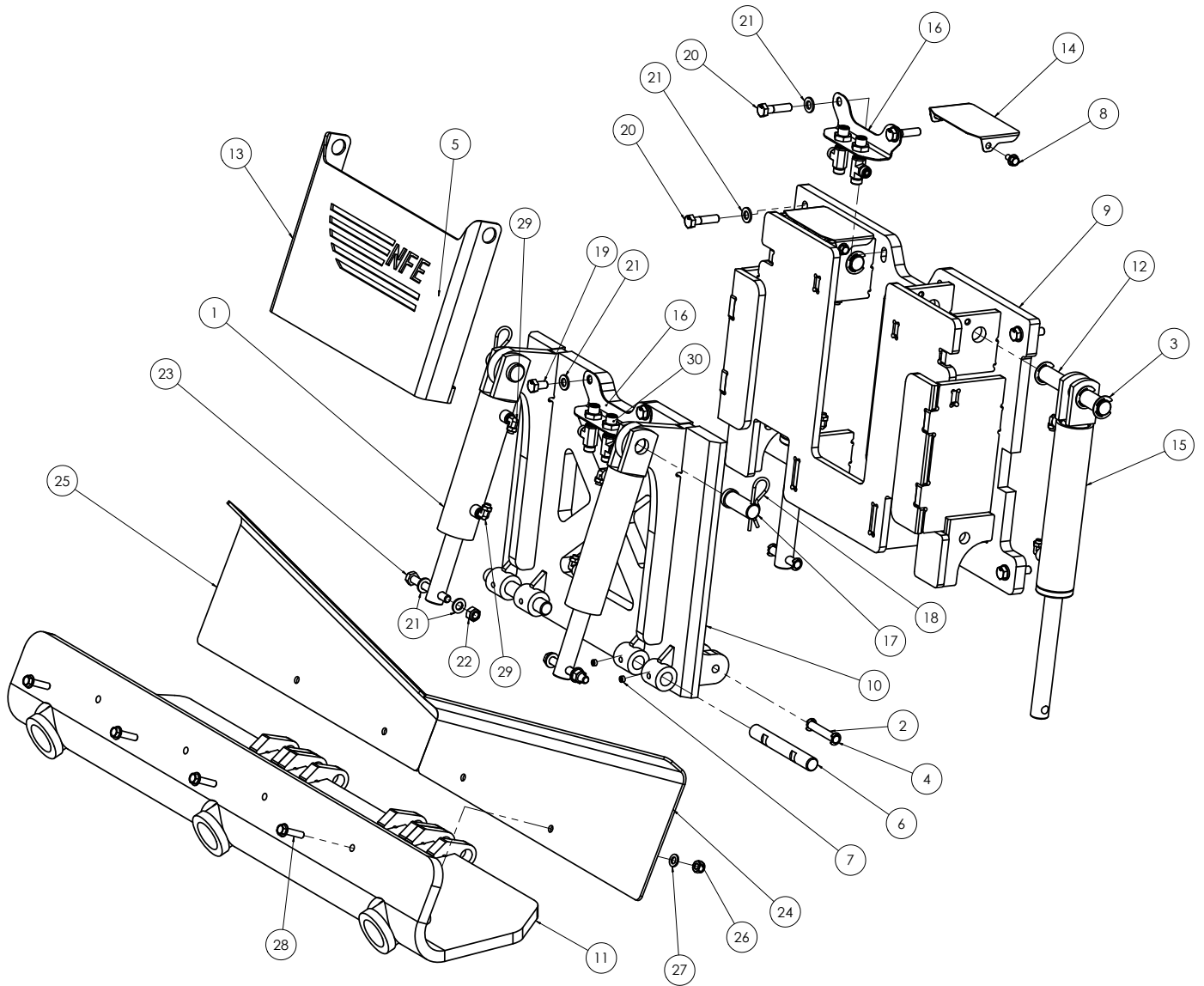
CAB—WIPER ASSEMBLY



Item No.	Part No.	Description	Qty.
1	406559	Motor, Wiper, Assembly, 12V, Dynamic Park, 68-72 Deg	1
2	406562	Adapter, Wiper, Pantograph, 1.75" O.C.	1
3	406563	Fitting, Wiper, Bulkhead, 90 Deg, 20mm Thread	1
4	406561	Blade, Wiper, 30", Framed	1
5	406202	WIPER WASHER SUPPLY HOSE	1
6	406221	WASHER & TANK ASSEMBLY	1
7	406560	Arm, Wiper, CD, 28" Panto, Wet, Saddle, Tapered Knurl, 1.75 Bridge	1

PARTS LISTS

DUAL LIFT



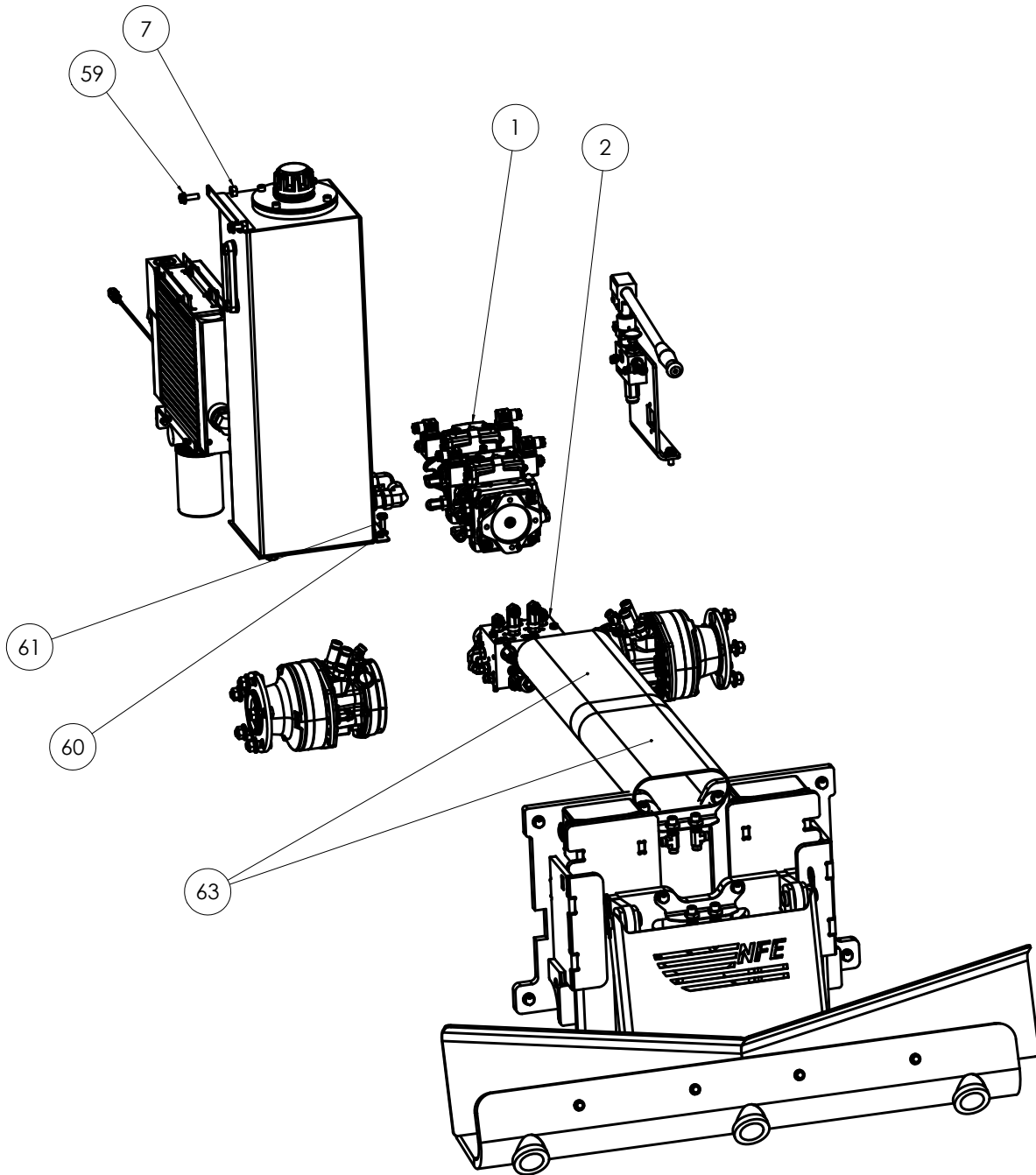
PARTS LISTS

DUAL LIFT (CONT'D)

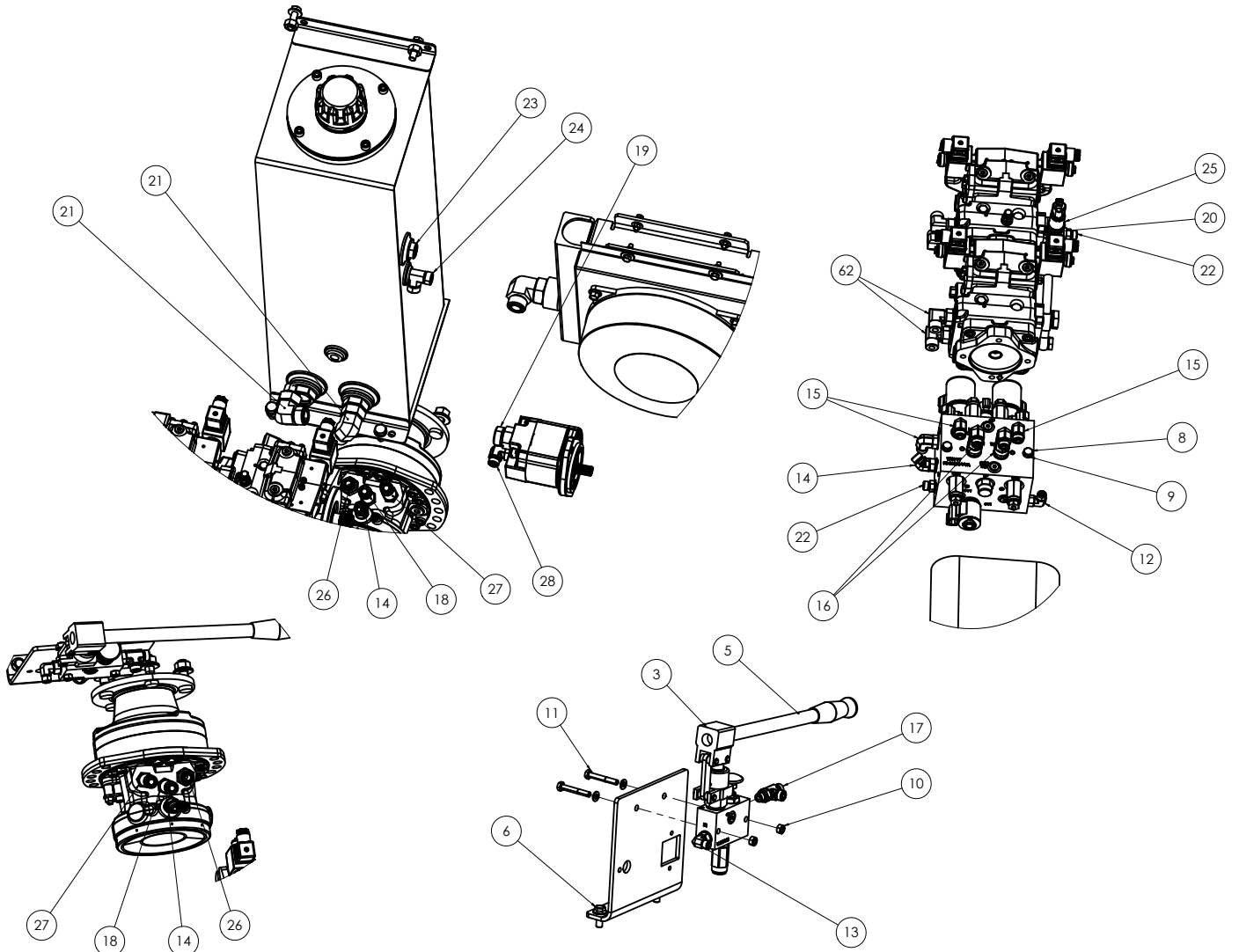
Item No.	Part No.	Description	Qty.
1	5110-250	Cylinder NN16	2
2	6500-31	Pin Lower Middle	2
3	80083	E-Clip, 1" shaft	8
4	80084	E-Clip, 1/2" shaft	4
5	400296	Gasket, EPDM Foam	2
6	401429	Pin, Lower Cutting Head Support	2
7	401876	Screw, Set, Cup Point, 3/8-24x1/4, Black Oxide	4
8	402447	Bolt, Wizlock, M8 x 1.25 x 16	4
9	405345	Weldment, Dual Lift, Housing	1
10	405351	Weldment, Dual Lift, Slide Plate	1
11	405353	Weldment, Dual Lift, Tooling Holder	1
12	405356	Pin, Lift Cylinder	2
13	405358	Shield, Cylinder	1
14	405359	Channel Cap, Dual Lift	2
15	405376	Cylinder, Hydraulic, 7.25, 2.0 x 15"	2
16	405660	Plate, Tee Fitting Mount	2
17	405688	Pin, Clevis, 1"x 2-1/2", Steel, Clear Zinc	2
18	405689	Pin, Clip, Hitch, .177" x 3-1/2", Clear Zinc	2
19	405690	Screw, Hex Head Cap, M12-1.75 x 22, Class 8.8, Clear Zinc	2
20	405691	Screw, Hex Head Cap, M12-1.75 x 50, Class 8.8, Clear Zinc	8
21	405692	Washer, Flat, M12, Yellow Zinc	14
22	405037	Nut, Hex, Nylon Insert, M12-1.75, Clear Zinc	2
23	406523	Screw, Hex Head Cap, M12-1.75 x 100, Class 10.9, Zinc	2
24	406291	Diverter, RH Front, Scraper, VIKING	1
25	406292	Diverter, LH Front, Scraper, VIKING	1
26	402240	Nut, Hex, Nylon Insert, M10-1.5, Heavy, Clear Zinc	4
27	74655	Washer, Flat, M10	4
28	403921	Bolt, Wizlock, M10 x 1.5 x 40	4
29	72801	Fitting, 90 Deg., 1/4"	8
30	405905	TEE -6 MALE SAE ORFS TO -6 MALE SAE ORFS BULKHEAD W/ LOCKNUT TO -6 MALE SAE ORFS	4

PARTS LISTS

HYDRAULICS



HYDRAULICS (CONT'D)



PARTS LISTS

HYDRAULICS (CONT'D)

Item No.	Part No.	Description	Qty.
1	405937	Pump, Hydrostatic, Tandem, 7.08cc	1
2	405850	Valve, Main, M1 Scraper	1
3	405851	Pump, Hand, Manual	1
4	405729	Bracket, Manual Pump	1
5	405852	Handle, Pump, 16"	1
6	74650	Bolt, Wizlock, M10-1.5 x 30mm, Class 8.8	2
7	401523	Nut, Hex, M12-1.75, Clear Zinc	2
8	405695	Screw, Hex Head Cap, M8-1.25 x 125, Class 10.9, Plain	2
9	405694	Washer, Flat, M8, Steel, Plain	4
10	74635	Nut, Hex, M8-1.25	2
11	405699	Screw, Hex Head Cap, M8-1.25 x 55, Class 8.8, Plain	2
12	405855	Adapter, Hydraulic, 90 deg, -4M ORFS, -4M ORB	1
13	405858	Adapter, Hydraulic, 90 deg, -4M ORFS, -6M ORB	1
14	5110-264	Adapter, Hydraulic, 45 deg, -6M ORFS, -6M ORB	3
15	72816	Adapter, Hydraulic, 90 deg, -6M ORFS, -6M ORB	3
16	405863	Adapter, Hydraulic, 90 deg, -6M ORFS, -6M ORB Long	2
17	405864	Adapter, Hydraulic, Tee, -6M ORFS, -6M ORB, -6M ORFS	1
18	406443	Adapter, Hydraulic, -8M ORFS Long, -8M ORB	2
19	405884	Adapter, Hydraulic, -12M ORFS, -12M ORB	2
20	405856	Adapter, Hydraulic, Tee, -4M ORB, -4F ORB, -4F ORB	1
21	405886	Adapter, Hydraulic, 90 deg, -12M ORFS, -12M ORB	2
22	405888	Adapter, Hydraulic, -4M ORFS, -4M ORB	2
23	405857	Adapter, Hydraulic, -10M ORB, -10M ORFS	1
24	405889	Adapter, Hydraulic, Tee, -8M ORFS, -8M ORB, -8M ORFS	1
25	405933	Pressure, Transducer, 500 PSI	1
26	406446	Adapter, Hydraulic, -8M ORFS, -10M ORB	2
27	406445	Adapter, Hydraulic, -8M ORFS Long, -10M ORB	2
28	5280-118	Adapter, Hydraulic, 90 Deg, -6M ORFS, -8M ORB	1
29	406409	Hose, Hydraulic, SAE-12 x 28", F/90F	1
30	406410	Hose, Hydraulic, SAE-12 x 13.5", F/45F	1
31	406411	Hose, Hydraulic, SAE-10 x 33.5", F/45F	1
32	406412	Hose, Hydraulic, SAE-12 x 20", F/45F	1
33	406413	Hose, Hydraulic, SAE-6 x 50.5", F/90F	1
34	406414	Hose, Hydraulic, SAE-8 x 29.25", 45F/90F	1
35	406415	Hose, Hydraulic, SAE-8 x 85.5", F/45F	1
36	406416	Hose, Hydraulic, SAE-12 x 51", F/45F	1
37	406417	Hose, Hydraulic, SAE-4 x 20", F/90F	1
38	406418	Hose, Hydraulic, SAE-4 x 61.5", F/90F	1
39	406419	Hose, Hydraulic, SAE-6 x 20.7", F/45F	1
40	406420	Hose, Hydraulic, SAE-6 x 75", 45F/90F	1
41	406421	Hose, Hydraulic, SAE-6 x 28", F/90F	1
42	406422	Hose, Hydraulic, SAE-6 x 46.5", F/90F	1
43	406423	Hose, Hydraulic, SAE-6 x 48", F/90F	1
44	406424	Hose, Hydraulic, SAE-6 x 55.75", F/F	1
45	406425	Hose, Hydraulic, SAE-6 x 57.5", F/F	1
46	406426	Hose, Hydraulic, SAE-4 x 17", F/90F	1
47	406427	Hose, Hydraulic, SAE-4 x 14", F/F	1
48	406428	Hose, Hydraulic, SAE-4 x 11", F/90F	1
49	406429	Hose, Hydraulic, SAE-4 x 20", F/90F	1
50	406430	Hose, Hydraulic, SAE-4 x 18", F/F	1

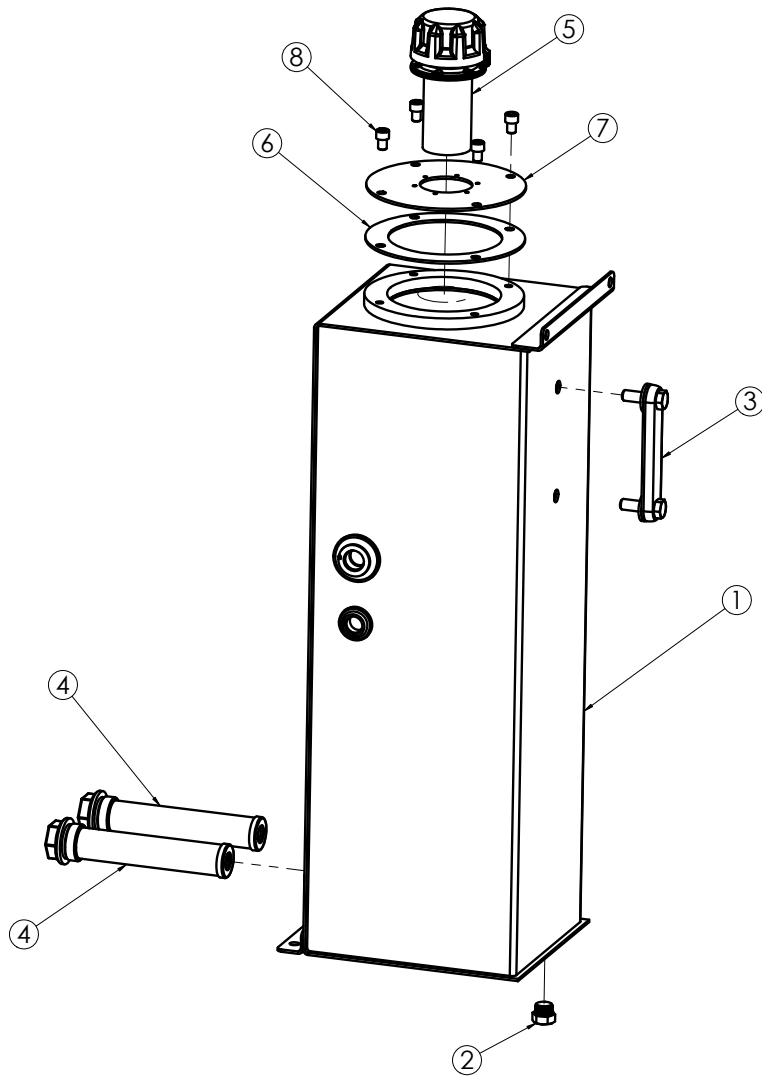
HYDRAULICS (CONT'D)

Item No.	Part No.	Description	Qty.
51	406431	Hose, Hydraulic, SAE-4 x 17.25", F/90F	1
52	406432	Hose, Hydraulic, SAE-4 x 41", F/F	1
53	406433	Hose, Hydraulic, SAE-4 x 21.75", F/90F	1
54	406434	Hose, Hydraulic, SAE-6 x 21", F/45F	1
55	406435	Hose, Hydraulic, SAE-6 x 17.25", F/45F	1
56	406436	Hose, Hydraulic, SAE-6 x 44.25", F/45F	1
57	406437	Hose, Hydraulic, SAE-6 x 46.5", F/45F	1
58	405666	Assy, Hydraulic Tank, M1	1
59	74651	Bolt, Wizlock, M10-1.5 x 30mm, Class 8.8	2
60	74655	Washer, Flat, M10	2
61	401534	Screw, Hex Head Cap, M10-1.5 x 25, Clear Zinc	2
62	6280-118	Fitting, 90 deg, -8 Male SAE ORFS to -8 Male SAE ORB	4
63	405197	Wrap, Nylon, Protective 19"	2

From Location	NFE Hose Part No.	To Location
RES1 - S1	406409	Tandem Pump - S
RES1 - S2	406410	P4 - In
F1 - out	406411	RES1 - R1
OC1 - out	406412	F1 - in
MFV1 - T1	406413	OC1 - in tee
RT Wheel M2 - 1	406414	RES1 - R2 tee
LT Wheel M1 - 1	406415	RES1 - R2 tee
Tandem Pump T2	406416	OC1 - in tee
Tandem Pump - G tee	406417	MFV1 - CP
MFV1 - PB	406418	P5 - IN
P5 - OUT tee	406419	LT Wheel M1 - X
P5 - OUT tee	406420	RT Wheel M2 - X
P4 - Out	406421	MFV1 - P1
MFV1 - LCP1	406422	CB1 - V1 TEE
MFV1 - LCR1	406423	CB2 - V2 TEE
MFV1 - TCP1	406424	CB3 - V1 TEE
MFV1 - TCR1	406425	CB4 - V2 TEE
CB1 - C1 tee	406426	LIFT CYL1 - P
CB1 - C1 tee	406427	LIFT CYL2 - P
CB2 - C2 tee	406428	LIFT CYL1 - R
CB2 - C2 tee	406429	LIFT CYL2 - R
CB3 - C1 tee	406430	TILT CYL1 - P
CB3 - C1 tee	406431	TILT CYL2 - P
CB4 - C2 tee	406432	TILT CYL1 - R
CB4 - C2 tee	406433	TILT CYL2 - R
Tandem Pump B-1	406434	RT Wheel M2 - L
Tandem Pump A-1	406435	RT Wheel M2 - R
Tandem Pump A-2	406436	LT Wheel M1 - L
Tandem Pump B-2	406437	LT Wheel M1 - R

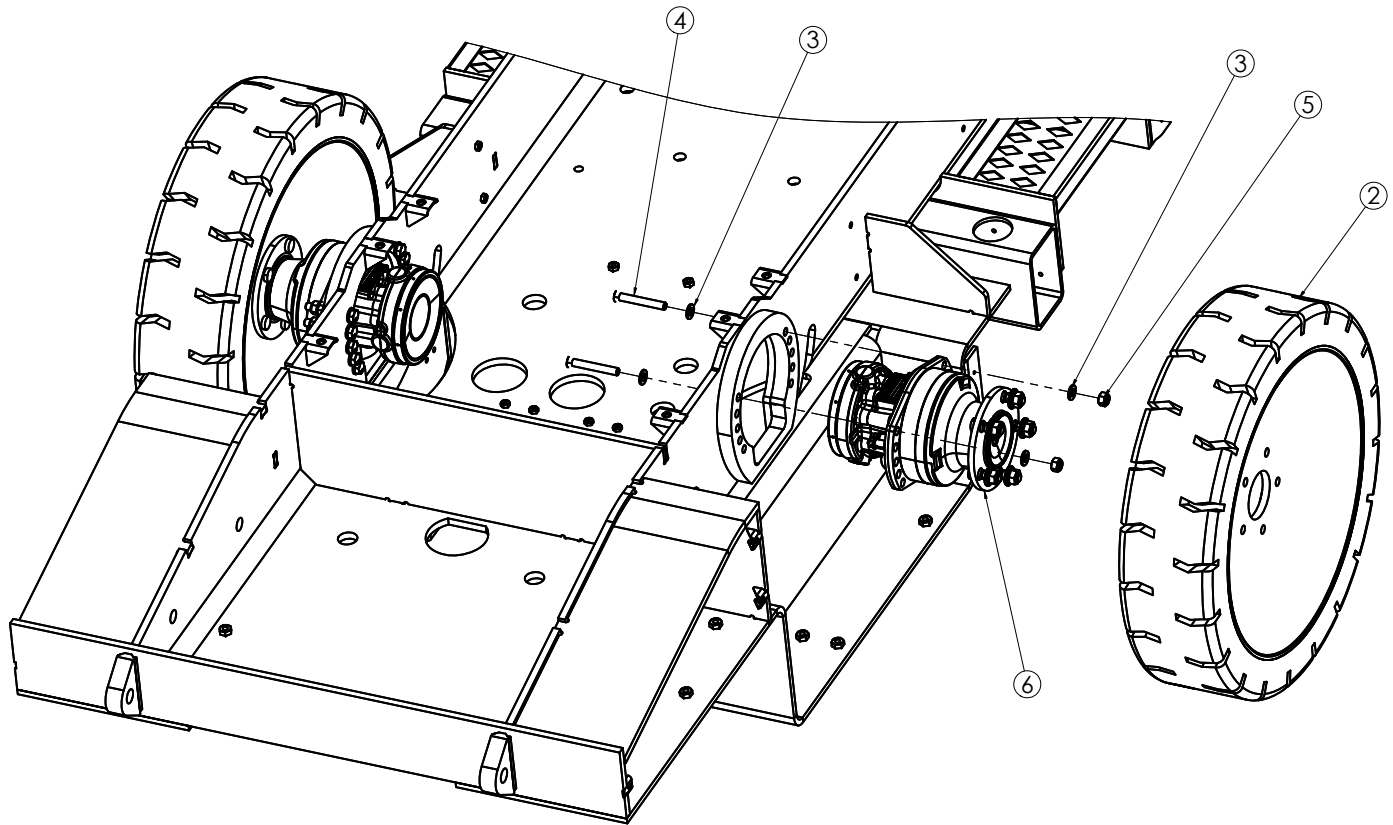
PARTS LISTS

HYDRAULIC TANK 405666



Item No.	Part No.	Description	Qty.
1	406516	Weldment, Res-10 Hydraulic Tank, PC, With Access Hole	1
2	406517	Plug, Hex Head, -8M ORB	1
3	406518	Sight/Temp Gauge, w/ Plastic Guard, M12x1.75 Threads	1
4	406519	Strainer, -20 x -12 ORB, 3 PSI Bypass, 100 Mesh	2
5	406520	Filler Breather, 10 micron, 4" Basket	1
6	406531	Gasket, Hydraulic Tank, M1	1
7	406551	Panel, Access, Hydraulic Tank	1
8	406552	Screw, Socket Head Cap, 3/8-16 x .5, Steel, Black Oxide	4

WHEEL AND WHEEL MOTORS

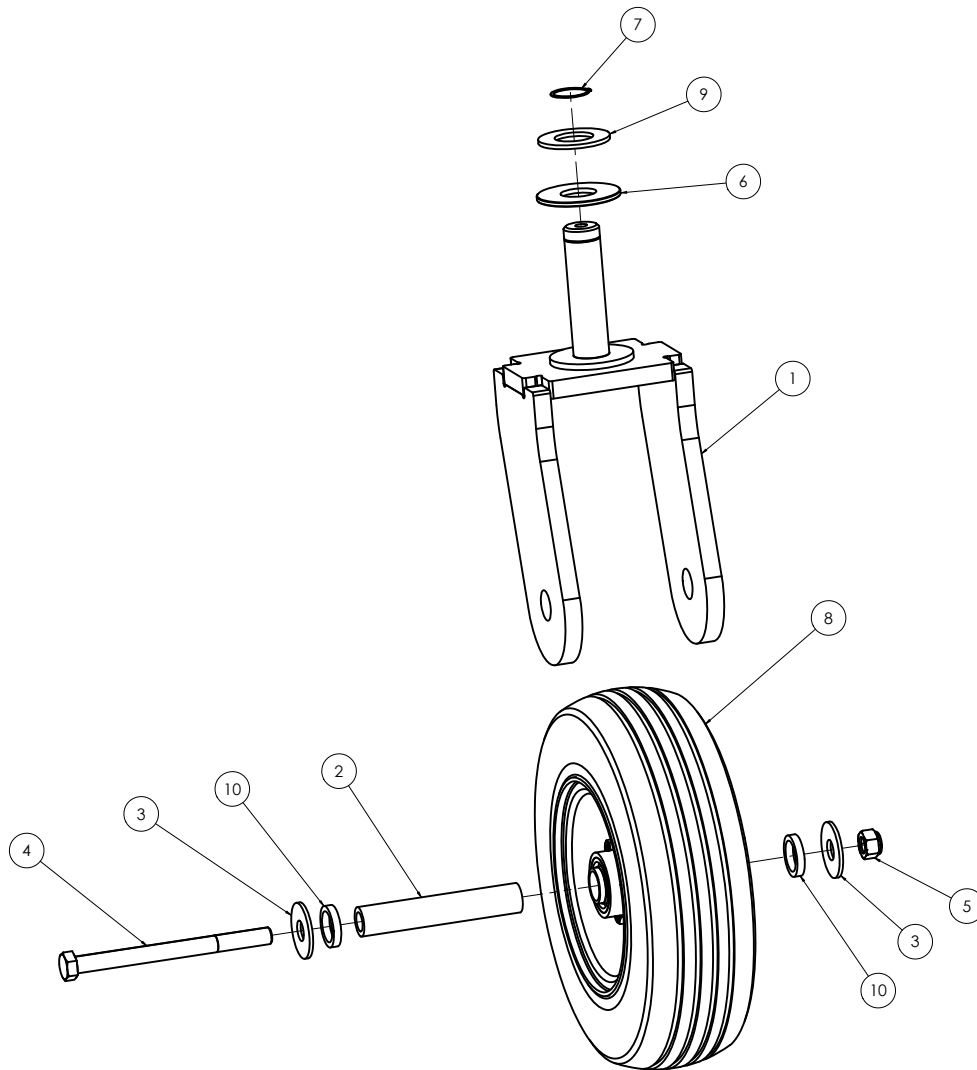


Item No.	Part No.	Description	Qty.
1*	405363	Assy Caster Wheel, M1	2
2	405670	Wheel Assembly, Rim & Tire, 25.7" OD x 6.5" Wide	2
3	405692	Washer, Flat, M12, Yellow Zinc	40
4	405859	Screw, Hex Head Cap, M12-1.75 x 80, Class 10.9, Yellow Zinc	20
5	405860	Nut, Nylon Lock, M12-1.75, Class 10, Clear Zinc	20
6	405904	Motor, Hydraulic Displacement, W Brake	2

*Not shown

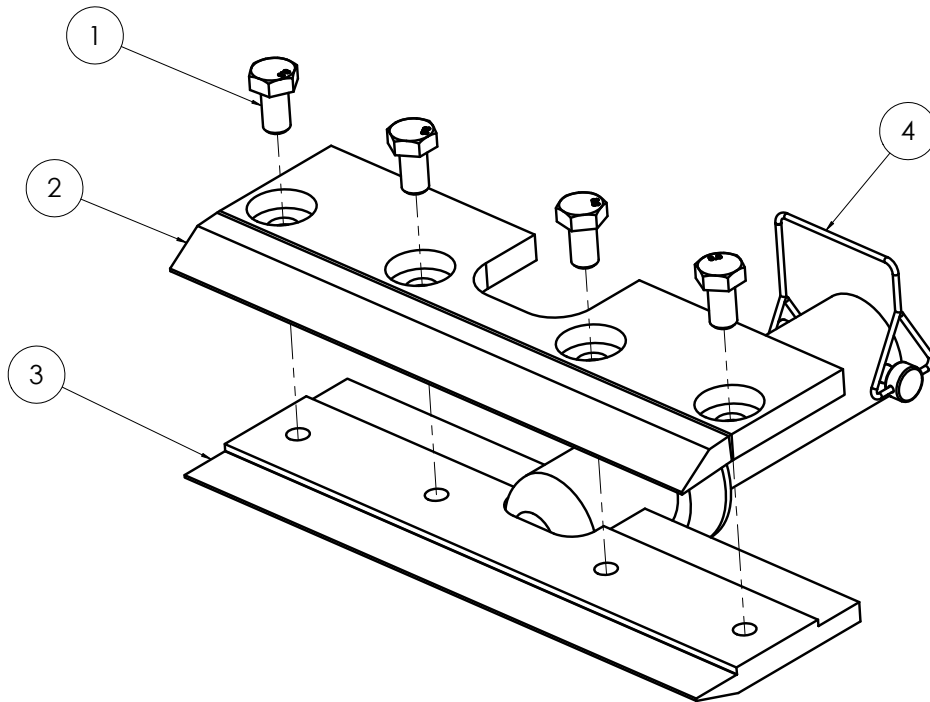
PARTS LISTS

CASTER WHEEL 405363



Item No.	Part No.	Description	Qty.
1	405364	Weldment, Caster Wheel Frame	1
2	405367	Shaft, Caster Wheel	1
3	405368	Washer, Fender, M20 x 60mm OD, Clear Zinc	2
4	405369	Hex Cap Screw, M18-2.5 x 220mm, Steel	1
5	405370	Nut, Nylon Lock, M18-2.5, Stainless Steel	1
6	405371	Washer, Thrust, 1-1/2" ID X 3-1/2" OD X 3/16" Thck	1
7	405373	Retaining Ring, 1.5", Stainless Steel	1
8	405375	Wheel, 16" Solid Pneumatic	1
9	405383	Washer, Flat, 1.5" x 3.0", Yellow Zinc	1
10	405846	Spacer, Caster Wheel	2

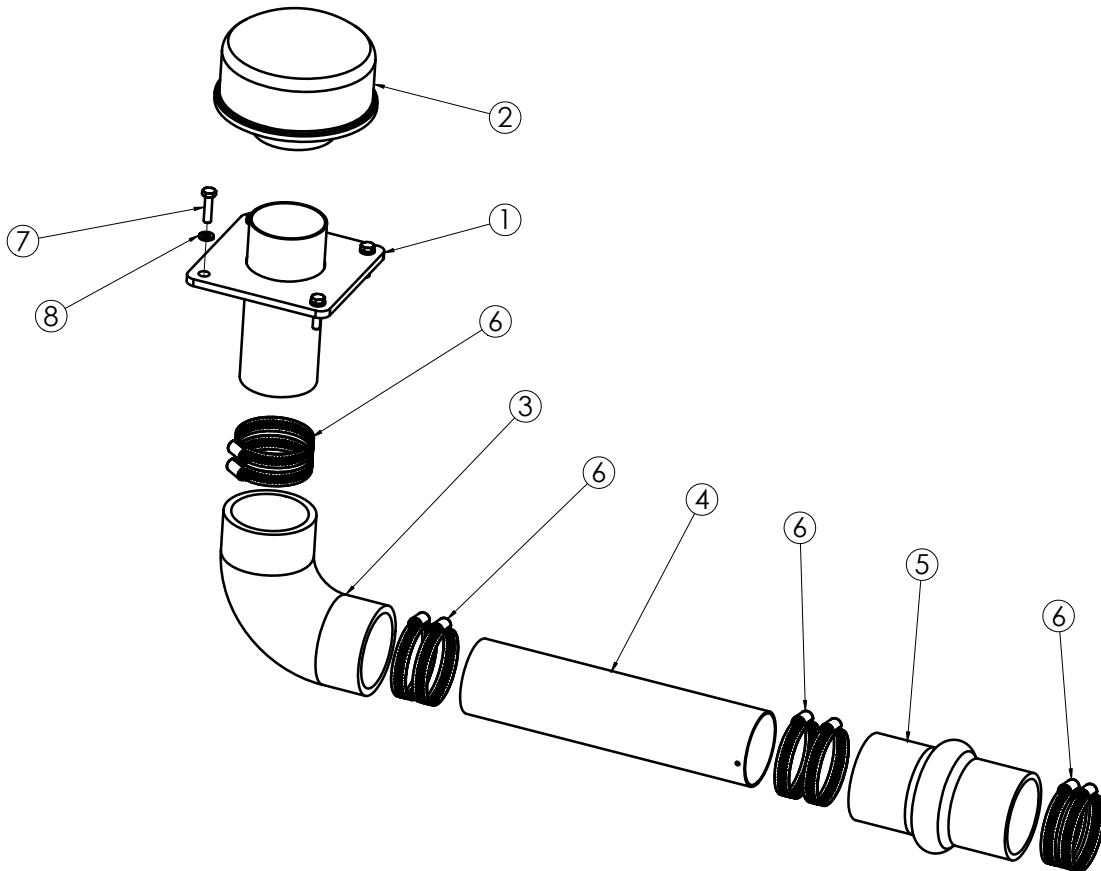
TOOL HOLDER 406388



Item No.	Part No.	Description	Qty.
1	405690	Screw, Hex Head Cap, M12-1.75 x 22, Class 8.8, Clear Zinc	4
2	405947	Holder, Upper, .094/.188 Blade, Swivel Head	1
3	405968	Cutting Head, 12" x 1.94" Shaft, Reversible	1
4	73330	5/16 X 2.0 Lock Pin	1

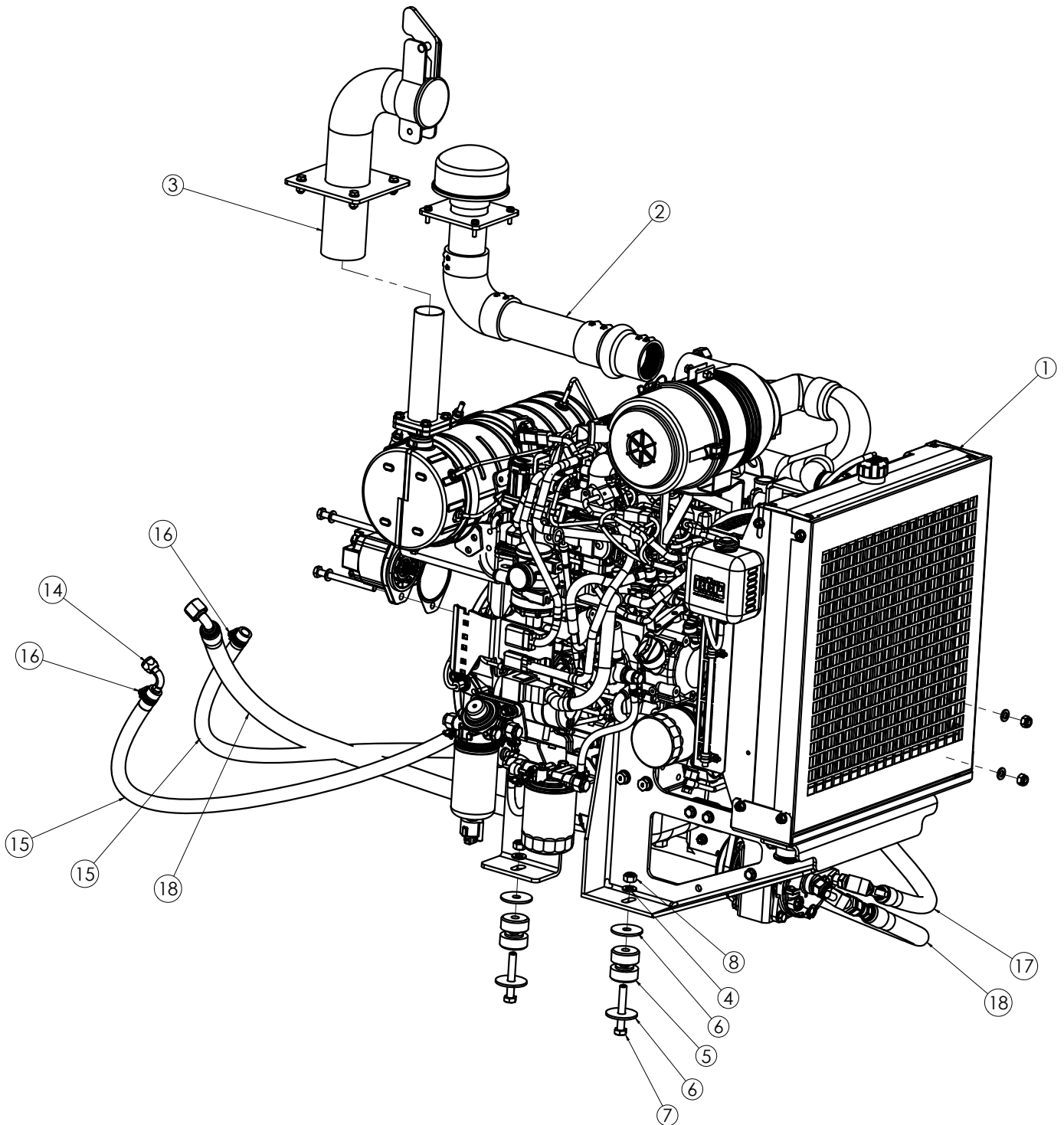
PARTS LISTS

ENGINE INTAKE 405390



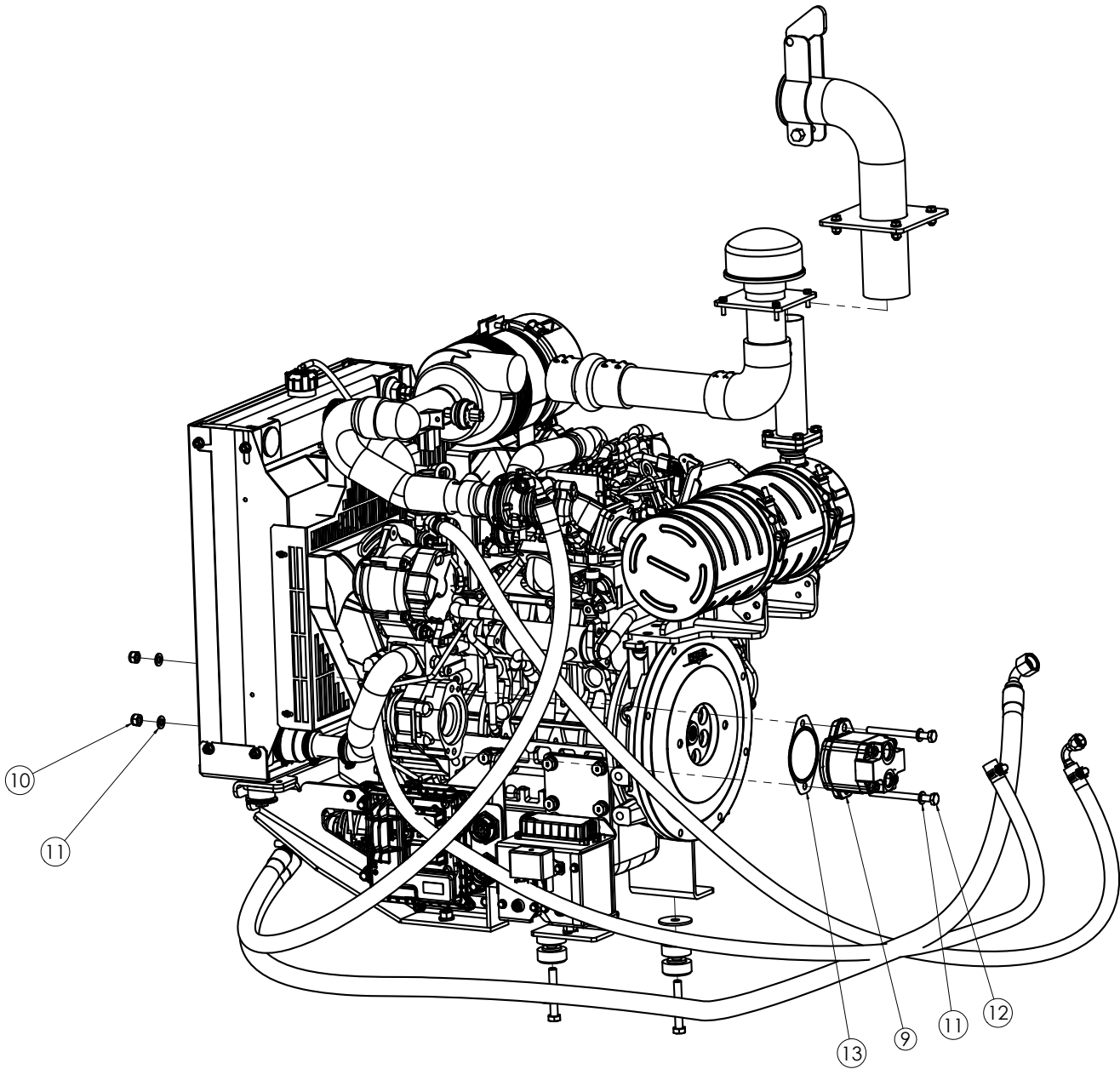
Item No.	Part No.	Description	Qty.
1	405365	Weldment, Intake, Engine, M1	1
2	405386	Hood, Inlet, 2.5" OD Pipe	1
3	405384	Elbow, 90-Deg, 2.5" ID, Rubber	1
4	405388	Tube, Extend, Intake, Engine	1
5	405385	Hose, Hump, 2.5" ID x 5.5" Lng, Nomex 4-Ply	1
6	405391	Clamp, Hose, 2-1/2" to 3-1/2", Stainless Steel	8
7	401660	Screw, Hex Head Cap, M6-1.0 x 25	4
8	405486	Washer, Flat, M6, Clear Zinc	4

ENGINE



PARTS LISTS

ENGINE (CONT'D)



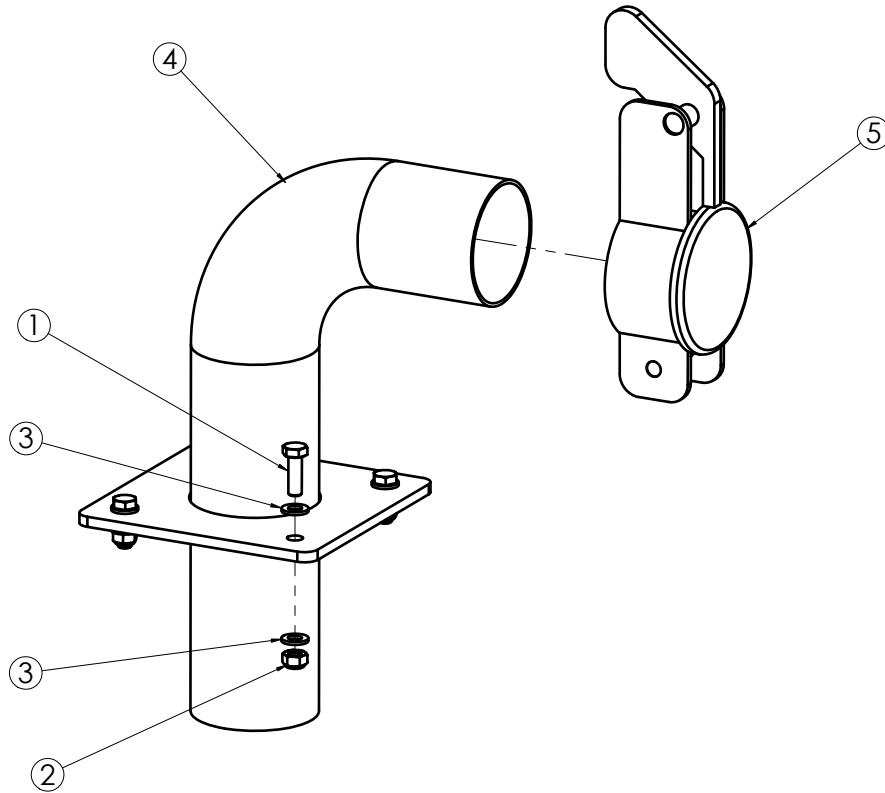
PARTS LISTS

ENGINE (CONT'D)

Item No.	Part No.	Description	Qty.
1	405292	Engine, Diesel, 50 HP, Water Cooled (Serial numbers VIKING-100000 through VIKING-100003 only)	1
	405530	Engine, Diesel, 50 HP, Water Cooled, Tier 4, Stage 5	1
2	405390	Assy Intake, Engine, M1 Scraper	1
3	405398	Assy Exhaust, Engine, M1 Scraper	1
4	405692	Washer, Flat, M12, Yellow Zinc	4
5	405844	Isolator, Engine, .53" ID	4
6	405845	Washer, 0.532" x 2.13" x .134", Engine Isolator	8
7	405859	Screw, Hex Head Cap, M12-1.75 x 80, Class 10.9, Yellow Zinc	4
8	405860	Nut, Nylon Lock, M12-1.75, Class 10, Clear Zinc	4
9	405938	Pump, Hydraulic, Splined, 5cc	1
10	402240	Nut, Hex, Nylon Insert, M10-1.5, Heavy, Clear Zinc	2
11	74655	Washer, Flat, M10	4
12	405408	M10-1.5 x 120mm Hex Cap Screw	2
13	406120	Gasket, Gear Pump	1
14	406189	5/8" HOSE BARB TO #8 O-RING FITTING, 90 DEGREE	1
15	406190	Hose, Heater, 5/8" ID	16 ft
16	406191	Clamp, Hose, 5/8" - 1 1/2", Worm Drive, SS	2
17	406538	Hose, A/C, Compressor to Condenser, Viking	1
18	406539	Hose, AC, Cab to Compressor, Viking	1

PARTS LISTS

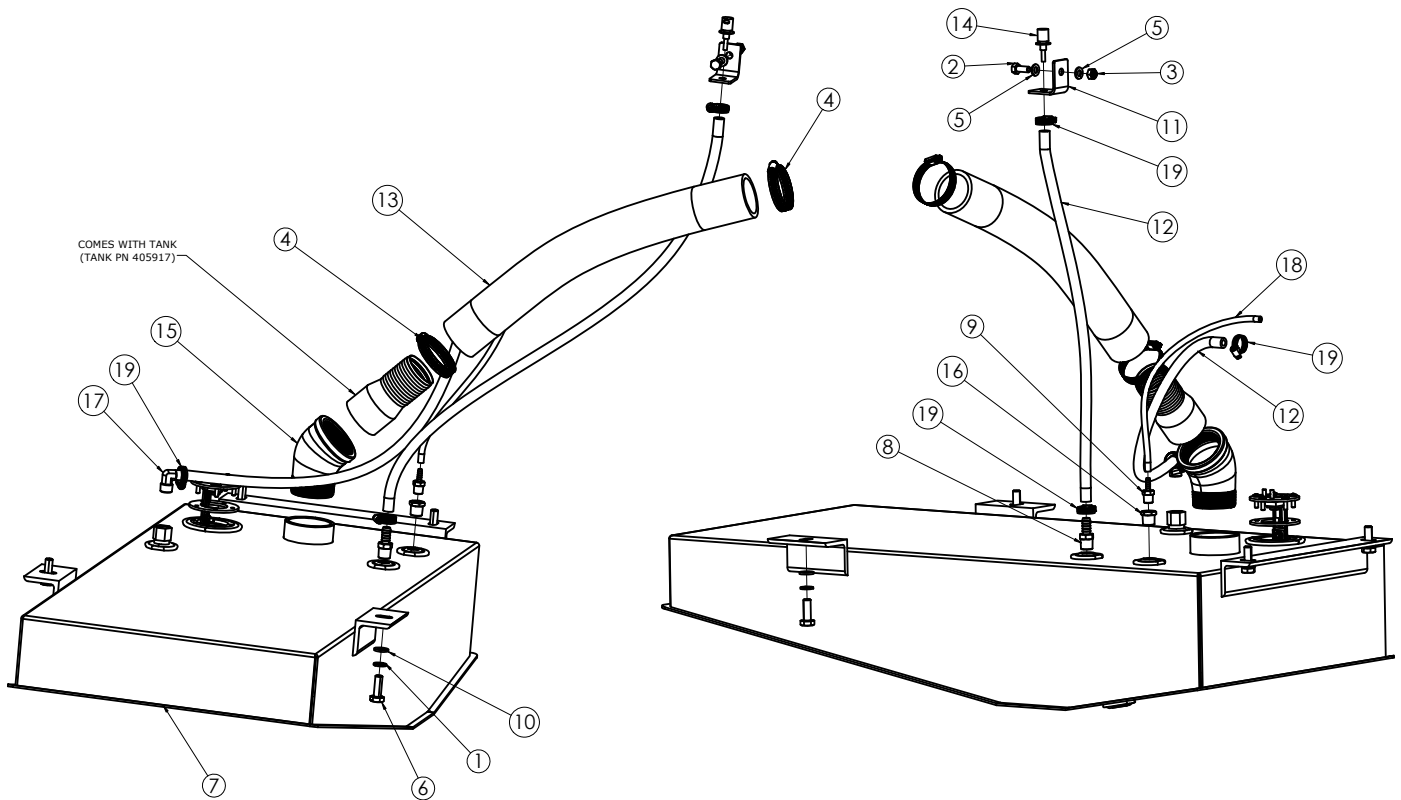
ENGINE EXHAUST 405398



Item No.	Part No.	Description	Qty.
1	74638	Bolt, Hex Head Cap Full Thread Zinc M8-1.25x25mm8.8	4
2	401509	Nut, Hex, Nylon Insert, M8-1.25, Clear Zinc	4
3	401803	Washer, Flat, M8, Clear Zinc	8
4	405407	Exhaust Weldment	1
5	406382	Cap, Rain, Exhaust, 3" OD, Gray	1

PARTS LISTS

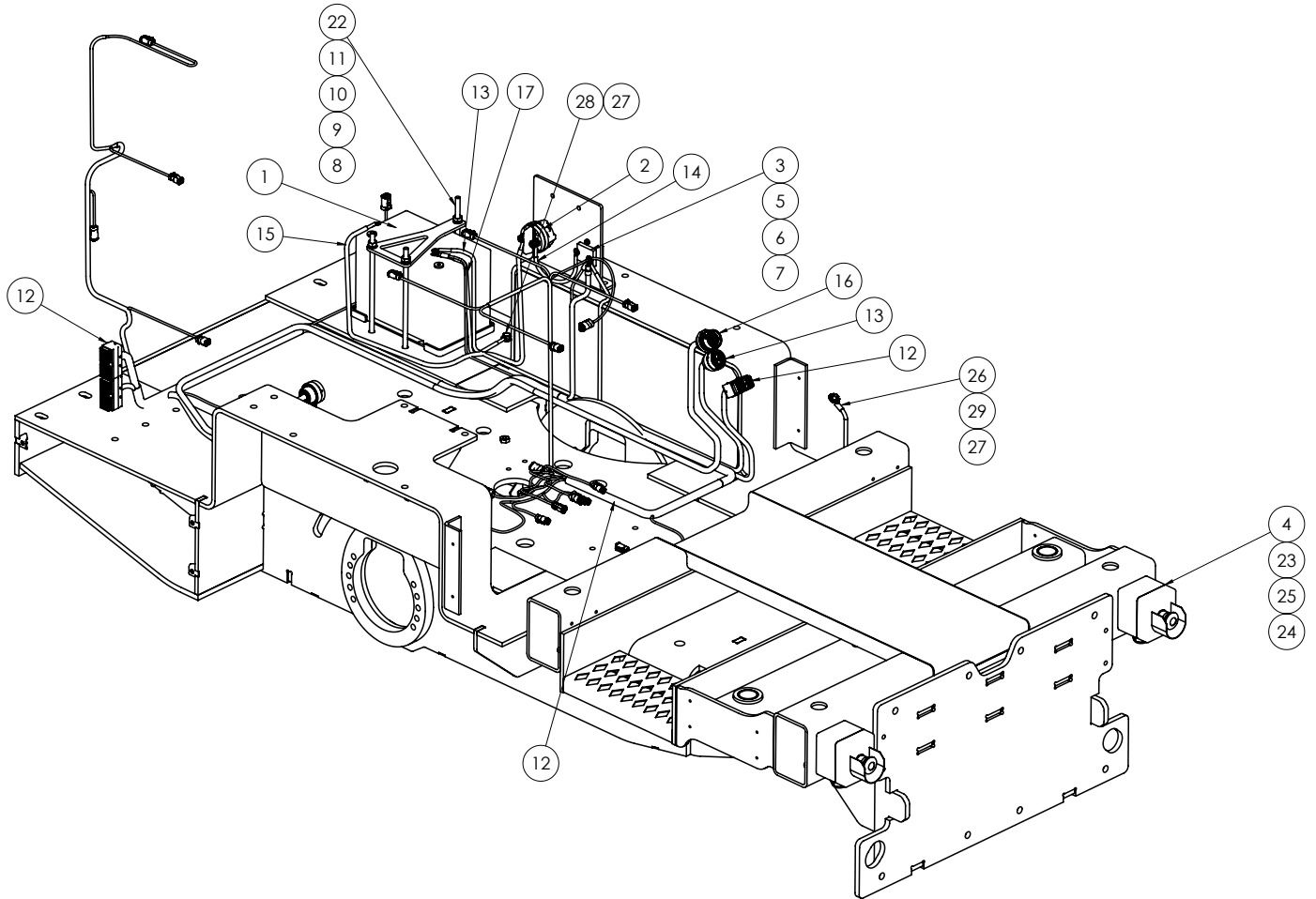
FUEL TANK



Item No.	Part No.	Description	Qty.
1	74657	Washer, Lock, M10	4
2	401315	Screw, Hex Head Cap, M8-1.25 x 20, Clear Zinc	1
3	401509	Nut, Hex, Nylon Insert, M8-1.25, Clear Zinc	1
4	405391	Clamp, Hose, 2-1/2" to 3-1/2", Stainless Steel	2
5	401803	Washer, Flat, M8, Clear Zinc	2
6	405405	Screw, Hex Head Cap, M10-1.5 x 30, Class 8.8, Yellow Zinc	4
7	405917	Fuel Tank, Diesel, 18 Gallon, w/ Sending Unit	1
8	405924	Fitting, Barbed, 3/8"NPT to 5/16" Hose, Brass	1
9	405925	Fitting, Barbed, 1/4"NPT to 3/16" Hose, Brass	1
10	74655	Washer, Flat, M10	4
11	405927	Mounting Bracket, Vent Hydraulic Fitting	1
12	405928	Fuel Line, 5/16" ID, 50 Psi, Bulk	6 ft
13	405929	Fuel Line, 2" ID, 75 psi Max, EPDM, Bulk	2 ft
14	405930	Vent, Gas Tank, 5/16" Hose Barb, Rollover Valve	1
15	406128	Fitting, Pipe, 2", 45-Elbow	1
16	406379	Fitting, Adapter, Bushing, 3/8" MNPT to 1/4" FNPT	1
17	406380	Fitting, Barbed, 90 Deg, 3/8 MNPT, 5/16 Hose, Brass	1
18	406381	Fuel Line, 3/16" ID, 50 Psi, Bulk	1
19	70605	Clamp, Hose, Worm Gear, 1/2	4

PARTS LISTS

ELECTRICAL ASSEMBLY

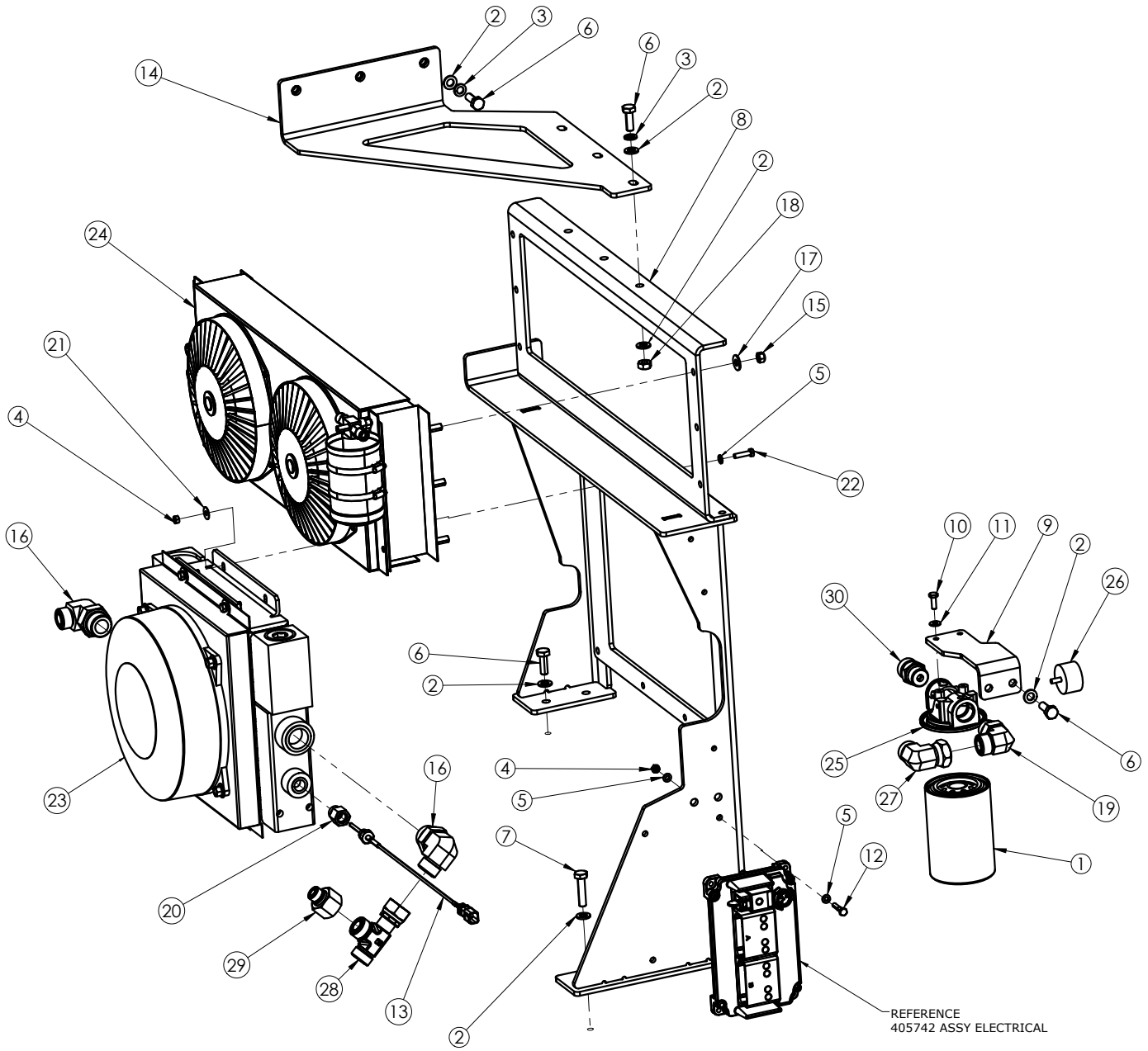


ELECTRICAL ASSEMBLY (CONT'D)

Item No.	Part No.	Description	Qty.
1	405934	Battery, 12V, 65AH, 825 CCA, 34AGM, M8/TP28	1
2	405657	Disconnect, SPST, 36V, 200A, Panel Mount	1
3	405658	Circuit Breaker, Type III, PTT, Panel Mount, 120A	1
4	406483	Assy, Front Switch	2
5	405700	Screw, Hex Head Cap, M6-1.0 x 30, Class 8.8, Clear Zinc	2
6	401306	Nut, Hex, M6-1.0, Clear Zinc	2
7	405486	Washer, Flat, M6, Clear Zinc	2
8	406283	Clamp, Bracket, Battery, Group 34/79	1
9	74655	Washer, Flat, M10	3
10	74657	Washer, Lock, M10	3
11	405266	Nut, Hex, M10x1.5, Clear Zinc	3
12	405651	Harness, Main Chassis	1
13	405652	Harness, Cab Power	1
14	405653	Cable, Disconnect to CB	1
15	405654	Cable, Battery to Disconnect	1
16	405733	Harness, Engine Extension	1
17	405734	Cable, Battery Ground, 1/0 Black	1
18	405745	Harness, Fuel Sender	1
19	406488	Harness, CCV Heater	1
20	406487	Assy, Cable, Engine Power	1
21	406486	Harness, Front Switches	1
22	406509	Rod, Threaded, M10-1.5x300, Steel, Zinc	3
23	406608	Screw, Socket Head Cap, M5-0.8x25, Clear Zinc	8
24	401327	Washer, Flat, M5, Clear Zinc	8
25	401517	Nut, Hex, Nylon Insert, M5-.80, Clear Zinc	8
26	406609	Assy, Grounding Strap, Cab	1
27	73210	Washer, Internal/External Lock 3/8	3
28	74650	Bolt, Wizlock, M10-1.5 x 25mm, Class 8.8	2
29	73306	Screw, Hex Head Cap, 5/16-18x1/2	1

PARTS LISTS

COOLER AND CONDENSER

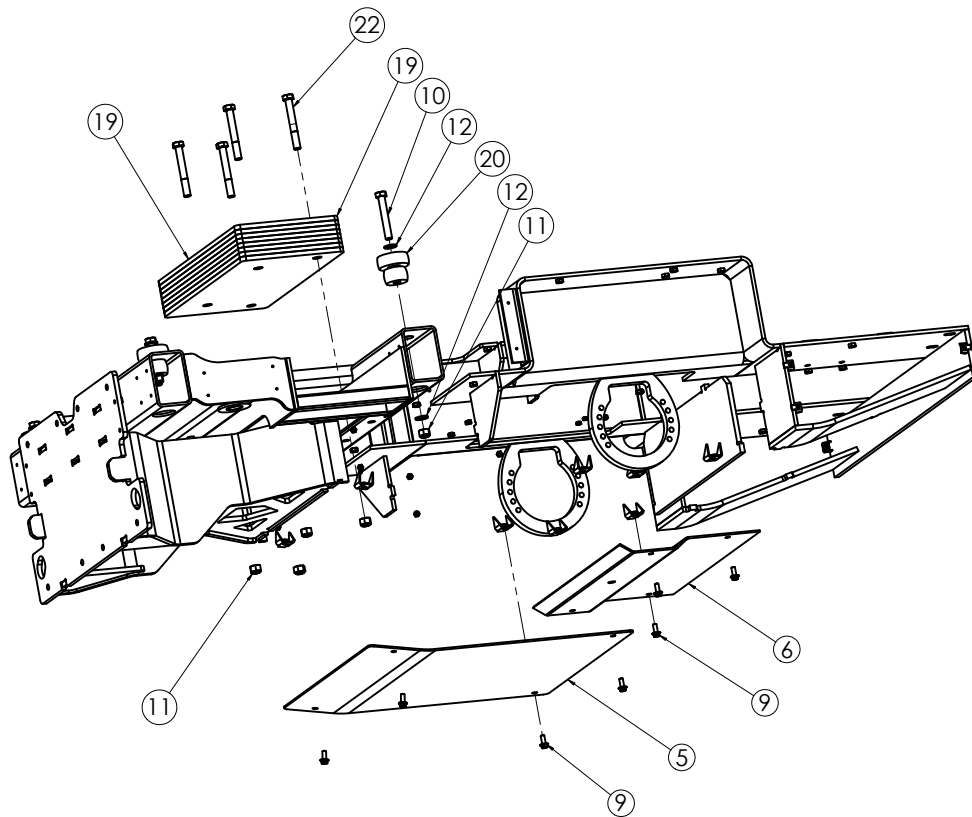
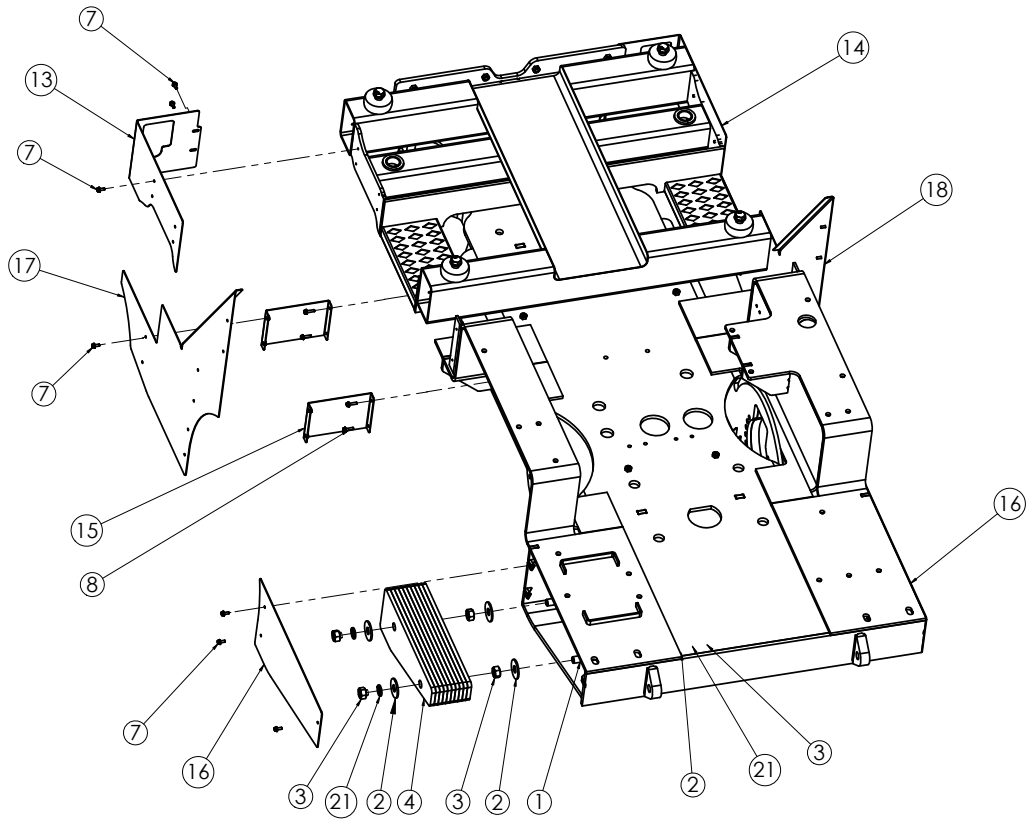


COOLER AND CONDENSER (CONT'D)

Item No.	Part No.	Description	Qty.
1	5700-65	Filter, Hydraulic	1
2	74655	Washer, Flat, M10	16
3	74657	Washer, Lock, M10	6
4	401306	Nut, M6-1.0	8
5	405486	Washer, Flat, M6, Clear Zinc	12
6	405405	Screw, Hex Head Cap, M10-1.5 x 30, Class 8.8, Yellow Zinc	12
7	405406	Screw, Hex Head Cap, M10-1.5 x 45, Class 8.8, Yellow Zinc	1
8	405673	Weldment, Structure, Cooler Mount	1
9	405682	Bracket, Filter Mount	1
10	73019	Screw, Hex Head Cap, 1/4-20x3/4	2
11	73091	WASHER, FLAT, ZINC, SAE 1/4	2
12	405700	Screw, Hex Head Cap, M6-1.0 x 30, Class 8.8, Clear Zinc	4
13	405736	Sensor, Temp, 9/16-18, Deutsch DTM	1
14	405743	Weldment, Bracket, Cooler Support	1
15	73322	Nut, Hex, Nylon Insert, 5/16-18	6
16	406440	Adapter, Hydraulic, 90 deg, -12M ORFS, -16M ORB	2
17	73302	Washer, Flat 5/16 USS	6
18	405266	Nut, Hex, M10x1.5, Clear Zinc	3
19	405886	Adapter, Hydraulic, 90 deg, -12M ORFS, -12M ORB	1
20	405887	Adapter, Hydraulic, -8M ORB, -6F ORB	1
21	401328	Washer, Flat, Fender, M6, Clear Zinc	4
22	401660	Screw, Hex Head Cap, M6-1.0 x 25	4
23	405911	Cooler, Hydraulic, Fan, 12V, 24A	1
24	405912	Condenser w/ Drier, Fans	1
25	405913	Housing, Filter, Clog Ind, 1.75 Bar, SAE 12 -11/16"-12, NBR	1
26	405915	Gauge, Pressure, Axial Mount, 1/8" NPT, 0-40 psi	1
27	405941	Adapter, Hydraulic, 90 deg, -12M ORFS, -12F ORFS	1
28	406441	Tee, Hydraulic, -12F ORFS Swivel, -12M ORFS, -12M ORFS	1
29	406442	Reducer, Hydraulic, -12F ORFS, -8M ORFS	1
30	406439	Valve, Check, Hydraulic, SAE-12, 5KSI	1

PARTS LISTS

WEIGHTS, SKIRT AND SKID PLATE

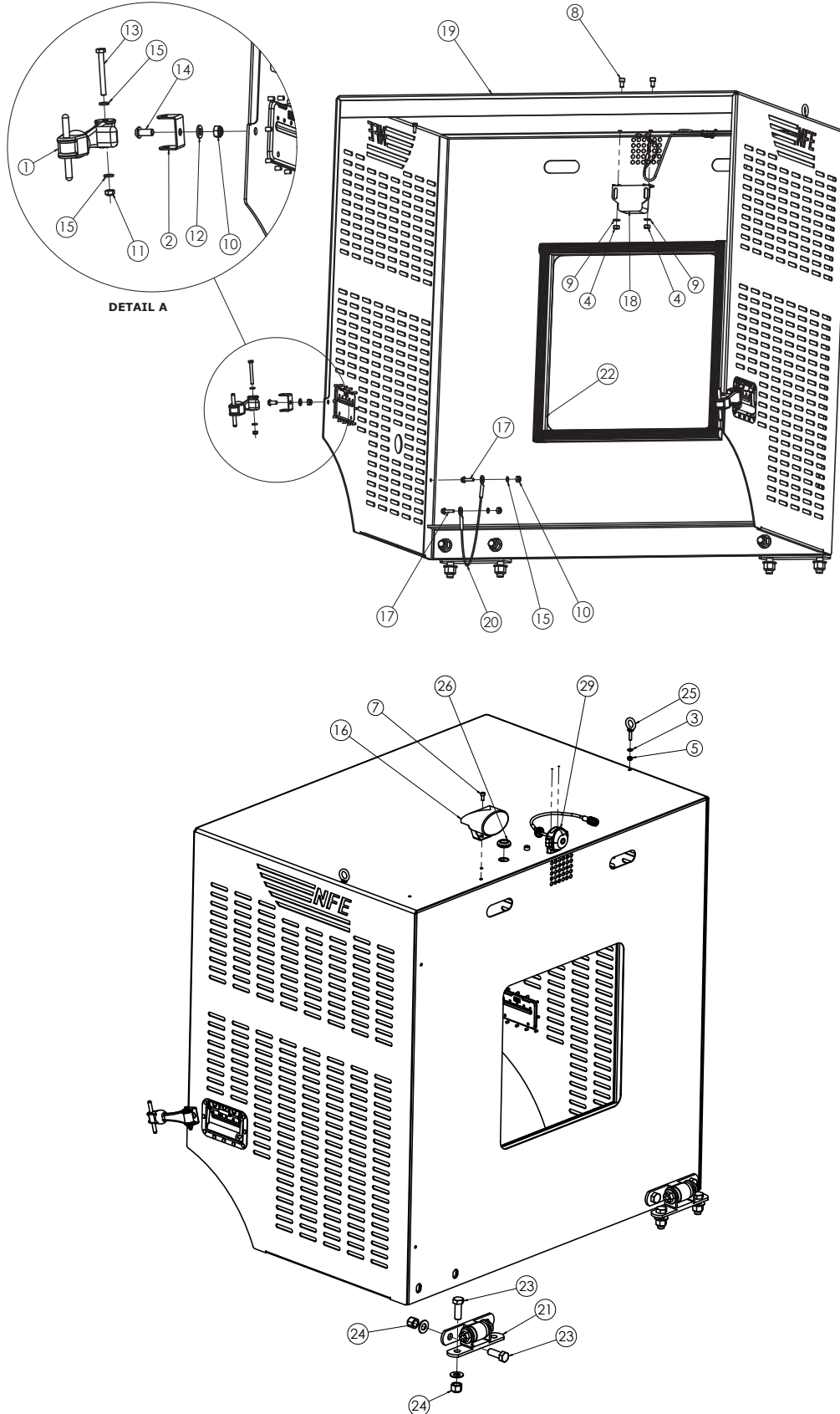


WEIGHTS, SKIRT AND SKID PLATE (CONT'D)

Item No.	Part No.	Description	Qty.
1	405377	Rod, Threaded, M20-2.5 x 300, Steel, Zinc	4
2	405368	Washer, Fender, M20 x 60mm OD, Clear Zinc	12
3	406506	Nut, Hex, M20-2.5, Steel, Zinc	12
4	405401	Ballast Weight, Rear	20
5	405663	Skid Plate, Front	1
6	405664	Skid Plate, Back	1
7	405667	Screw, Hex Flange, M6-1.0 x 16, Class 8.8, Plain	34
8	405668	Screw, Hex Flange, M6-1.0 x 25, Class 8.8, Plain	8
9	405669	Screw, Hex Flange, M10-1.5 x 25, Class 8.8, Yellow Zinc	8
10	405702	Screw, Hex Head Cap, M18-2.5 x 120, Class 8.8, Clear Zinc	4
11	405703	Nut, M18-2.5 DIN 985 Class 8	8
12	405704	Washer, Flat, M18, Clear Zinc	8
13	405724	Machine Enclosure, LH, Front	1
14	405725	Machine Enclosure, RH, Front	1
15	405727	Weldment, Enclosure Bracket	4
16	405728	Enclosure, Ballast	2
17	405738	Machine Enclosure, LH, Back	1
18	405739	Machine Enclosure, RH, Back	1
19	405740	Ballast Weight, Front, Large	8
20	405747	Isolator, .9" ID, 2-Piece, Neoprene	4
21	406507	Washer, Split Lock, M20, Steel, Zinc	8
22	406548	Screw, Hex Head Cap, M18-2.5 x 140, Class 8.8, Clear Zinc	4

PARTS LISTS

TILT ENCLOSURE



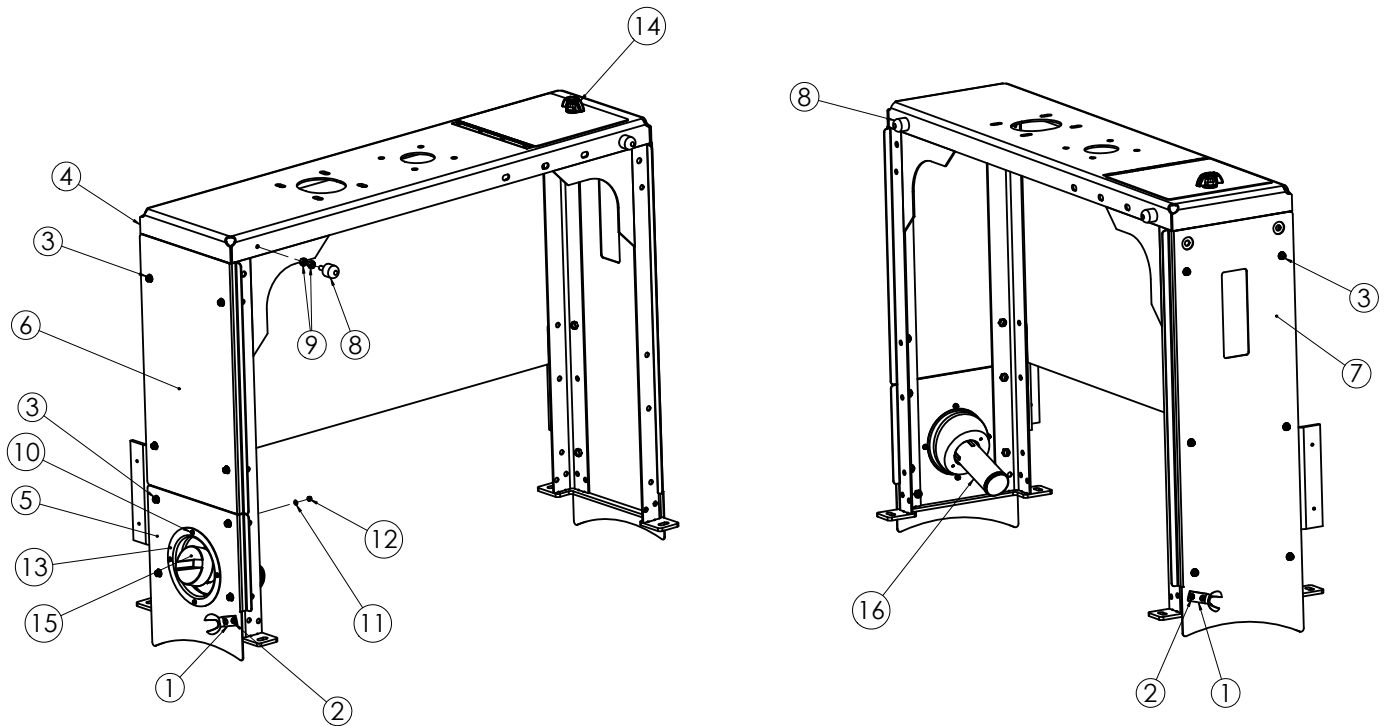
PARTS LISTS

TILT ENCLOSURE (CONT'D)

Item No.	Part No.	Description	Qty.
1	5200QL-31	Lever, Hood	2
2	5200QL-32	Bracket, Hood Lever	2
3	74619	Washer, Lock, M6	2
4	74635	Nut, Hex, M8-1.25	2
5	401306	Nut, Hex, M6-1.0, Clear Zinc	2
7	401322	Screw, HSHC, M6x1.0x14	1
8	401324	Screw, Socket Head Cap, M8-1.25x14, Stainless Steel	2
9	401329	Washer, Flat, M8, Stainless Steel	2
10	401509	Nut, Hex, Nylon Insert, M8-1.25, Clear Zinc	4
11	401516	Nut, Hex, Nylon Insert, M6-1.0, Clear Zinc	2
12	401803	Washer, Flat, M8, Clear Zinc	2
13	405260	Screw, Hex Head Cap, M6x1.0 x55, Partial Thrd, Clear Zinc	2
14	405261	Screw, Button Head Cap, M8x1.25 x 18, Clear Zinc	2
15	405486	Washer, Flat, M6, Clear Zinc	6
16	406522	Light, Safety, LED, Blue, 400 Lumens, 10-80 VDC	1
17	405668	Screw, Hex Flange, M6-1.0 x 25, Class 8.8, Plain	2
18	405685	Alarm, Backup, 12-24VDC, 97dB	1
19	405715	Enclosure, Engine Tilt	1
20	405843	Lanyard, Galvanized Steel	1
21	405853	Hinge, Heavy Duty Bolt-On, 7-1/2"	2
22	405869	Seal, D-shaped, 1.25" X 1.13", EPDM Rubber	6.5 ft
23	405870	Screw, Hex Head Cap, 5/8"-18 x 1-3/4", Grade 5, Clear Zinc	8
24	405873	Nut, Nylon Lock, 5/8"-18, Grade 8, Yellow Zinc	8
25	405874	Eyebolt, Lifting, 19mm Dia, M6-1.0 x 26, Galvanized	2
26	405906	Grommet, 11/16" ID, 1" OD, Buna-N Rubber	1
27	73531	Washer, Flat Zinc, SAE 5/8	8
28	405655	Harness, Enclosure, Rear	1
29	406564	Camera, Back Up, FAMOS 118 Deg, PAL, IR w/Mount	1

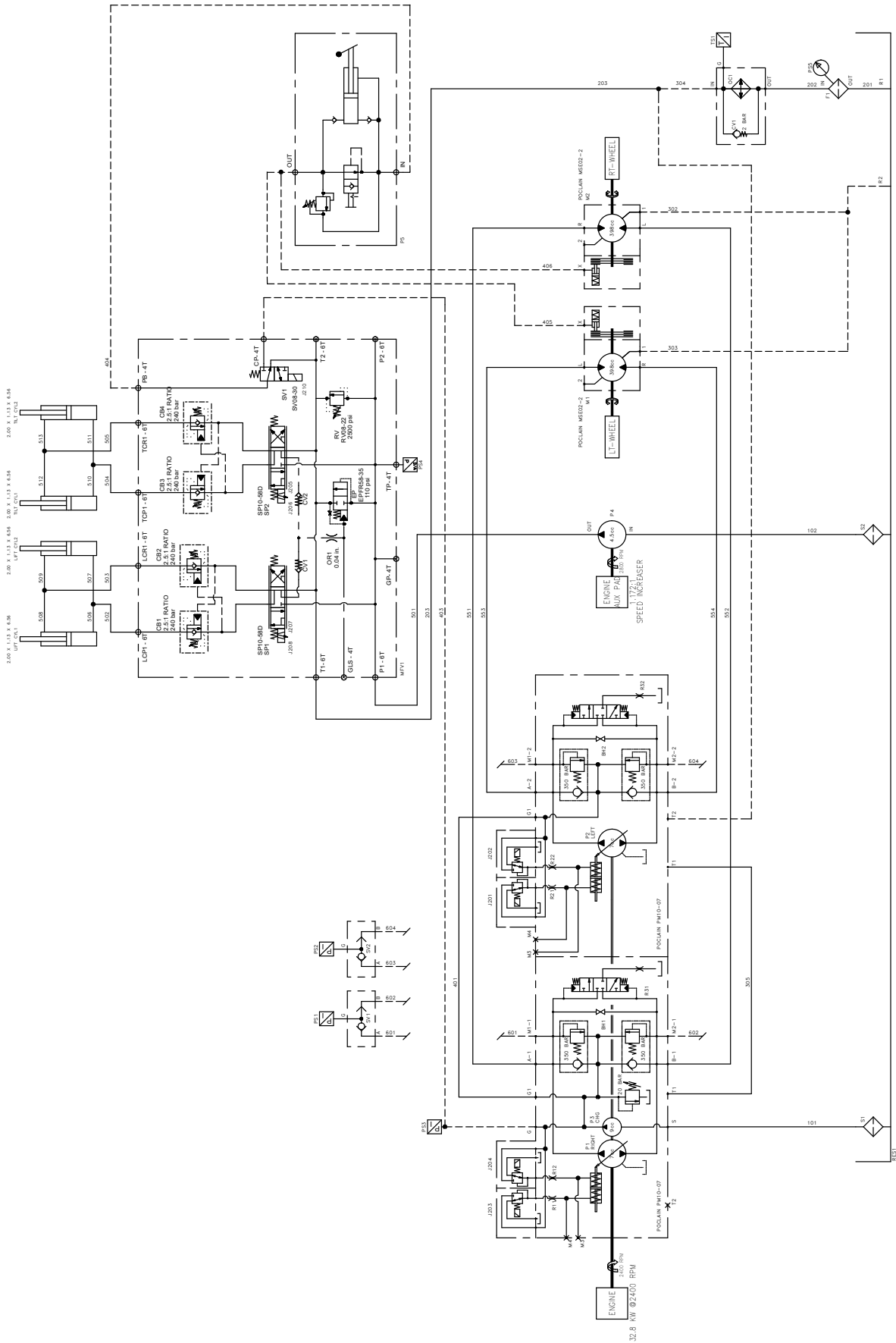
PARTS LISTS

REAR ENCLOSURE



Item No.	Part No.	Description	Qty.
1	5200QL-34	Bracket, Reverse Catch	2
2	405262	Screw, Button Head Cap, M6x1.0 x 16, Clear Zinc	4
3	405667	Screw, Hex Flange, M6-1.0 x 16, Class 8.8, Plain	14
4	405709	Enclosure, Stationary w/ Access Panel	1
5	405720	Enclosure, Left Hand, Fuel	1
6	405721	Enclosure, Left Hand, Stationary	1
7	405722	Enclosure, Right Hand, Stationary	1
8	405875	Bumper, 1" OD x 1"H, Threaded-Stud, 5/16"-18	2
9	405876	Nut, 5/16"-18, Clear Zinc	4
10	405879	Screw, Hex Head Cap, M4-0.7 x 12, Class 8.8, Plain	4
11	405880	Washer, Flat, M4, Yellow Zinc	4
12	405881	Nut, Nylon Lock, M4-0.7, Grade 8, Clear Zinc	4
13	405909	Protector, Fuel Filler Neck , 21 Degrees	1
14	405910	Handle, Cam Latch, Quarter Turn, Black	1
15	405931	Cap, Diesel, Standard Thread	1
16	405932	Filler Neck, 2" Universal Fuel (Diesel Engine)	1

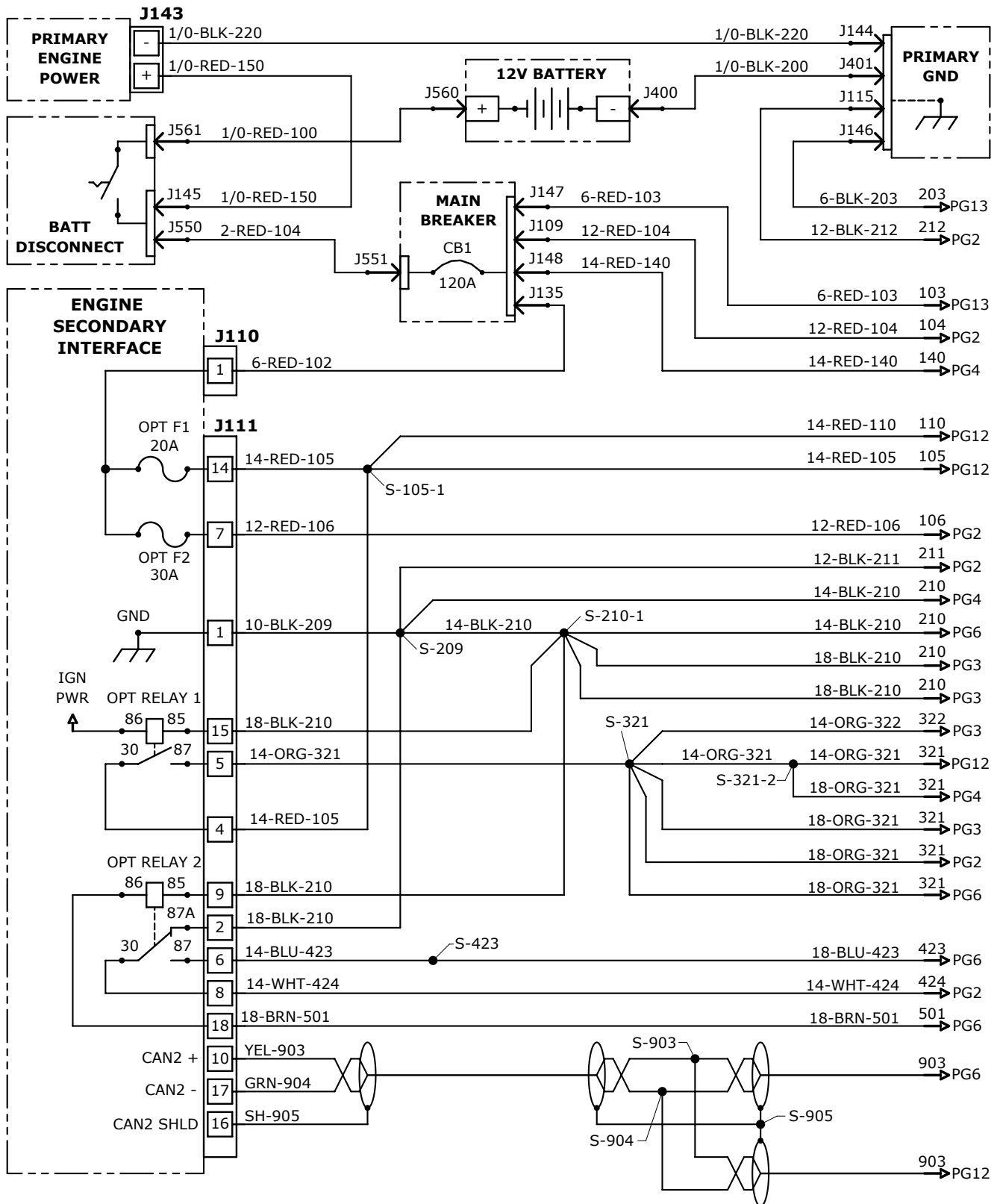
HYDRAULICS DIAGRAM



WIRING DIAGRAMS

**WD
PG 1**

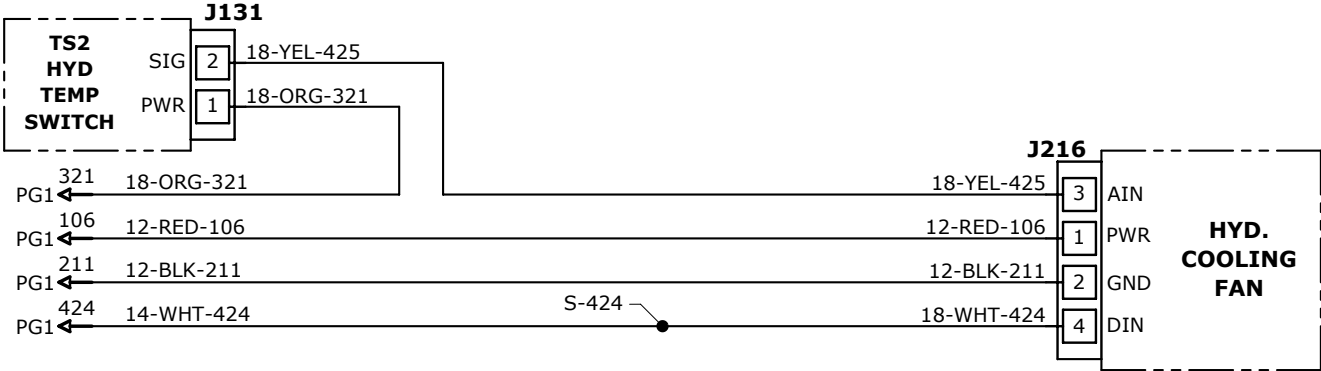
ENGINE INTERFACE & POWER DISTRIBUTION WIRING DIAGRAM (REFER TO KUBOTA DIAGRAMS FOR FURTHER ENGINE INFO)



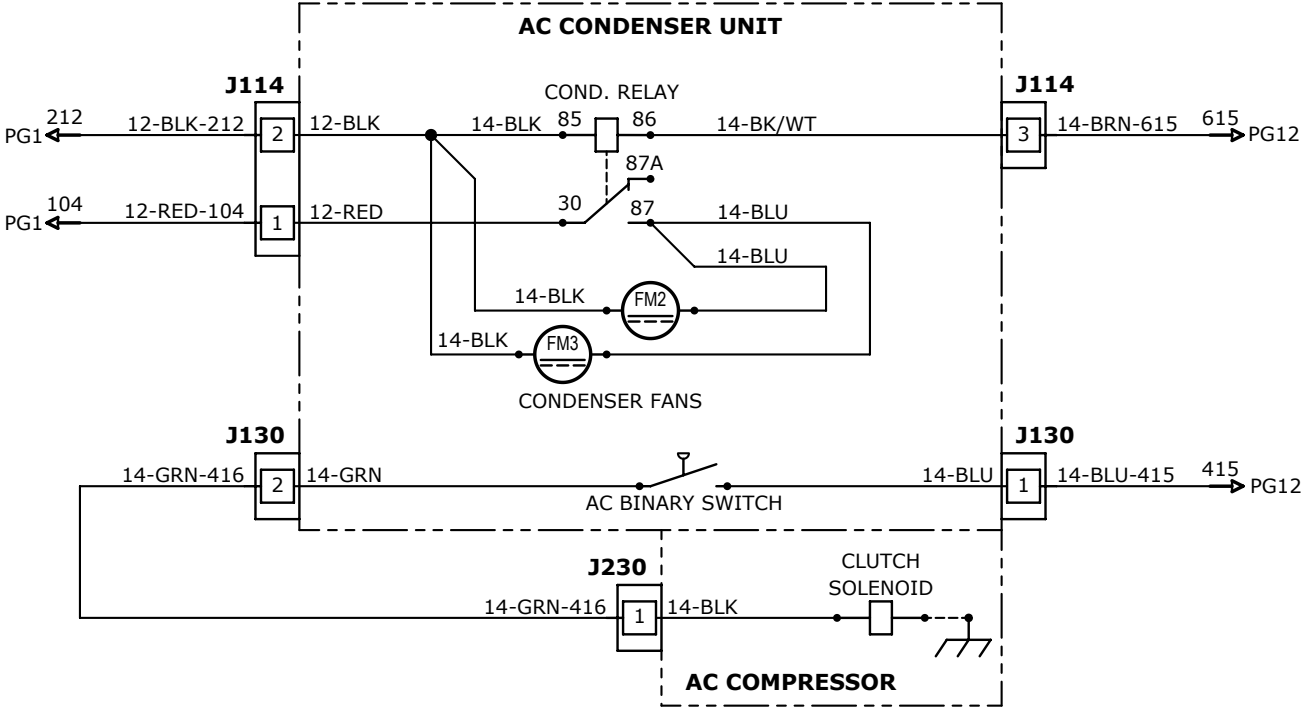
WIRING DIAGRAMS

HYDRAULIC COOLING FAN WIRING DIAGRAM

**WD
PG 2**



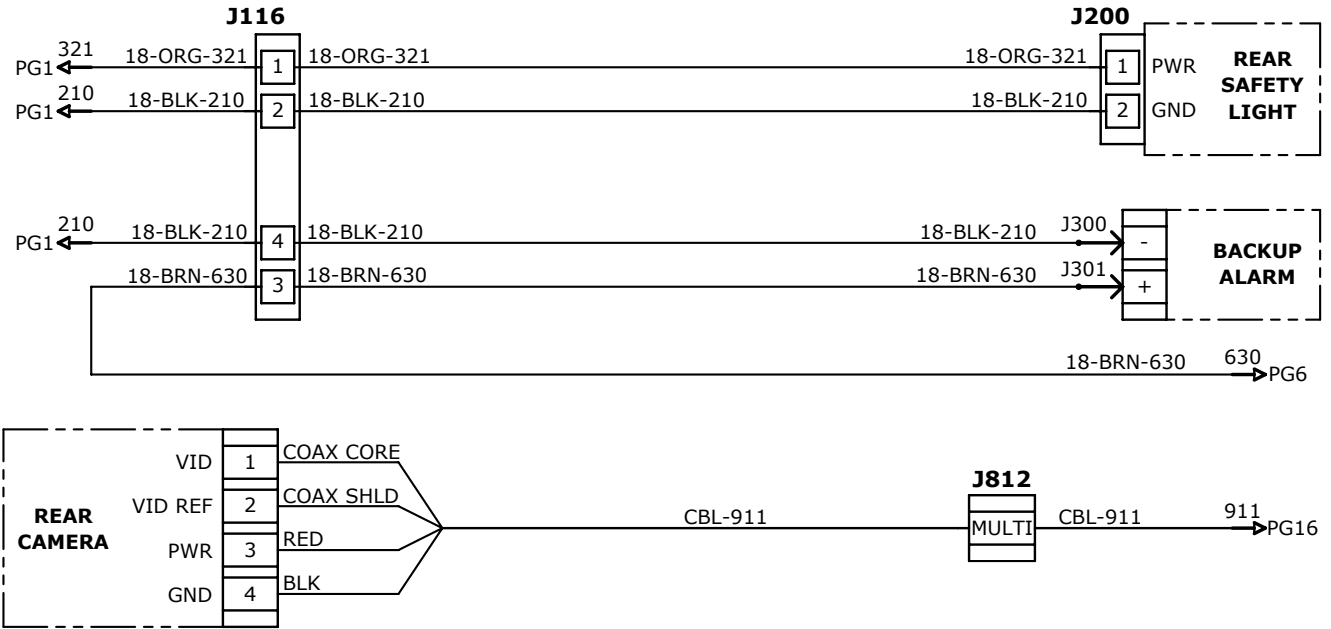
AC CONDENSER & COMPRESSOR WIRING DIAGRAM



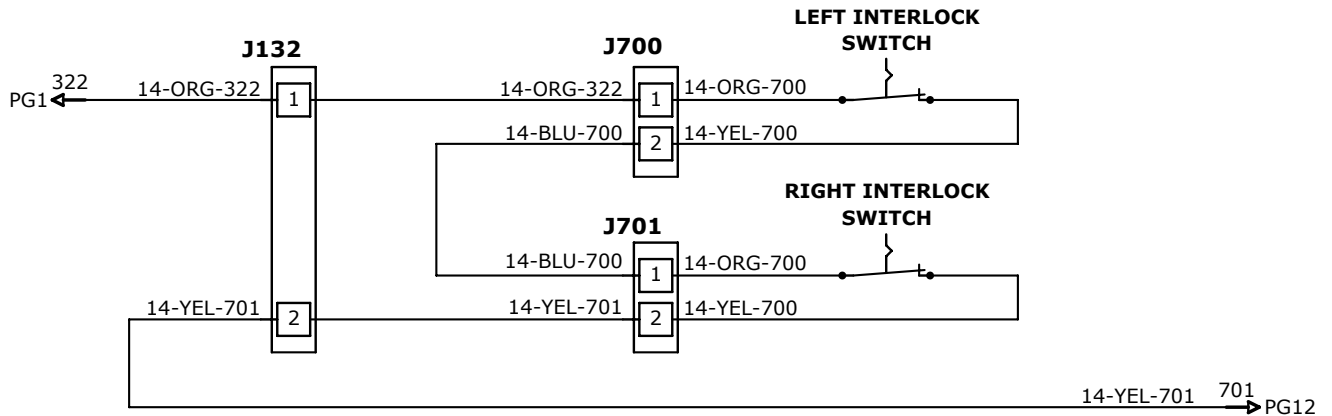
WIRING DIAGRAMS

**WD
PG 3**

REAR ENCLOSURE WIRING DIAGRAM



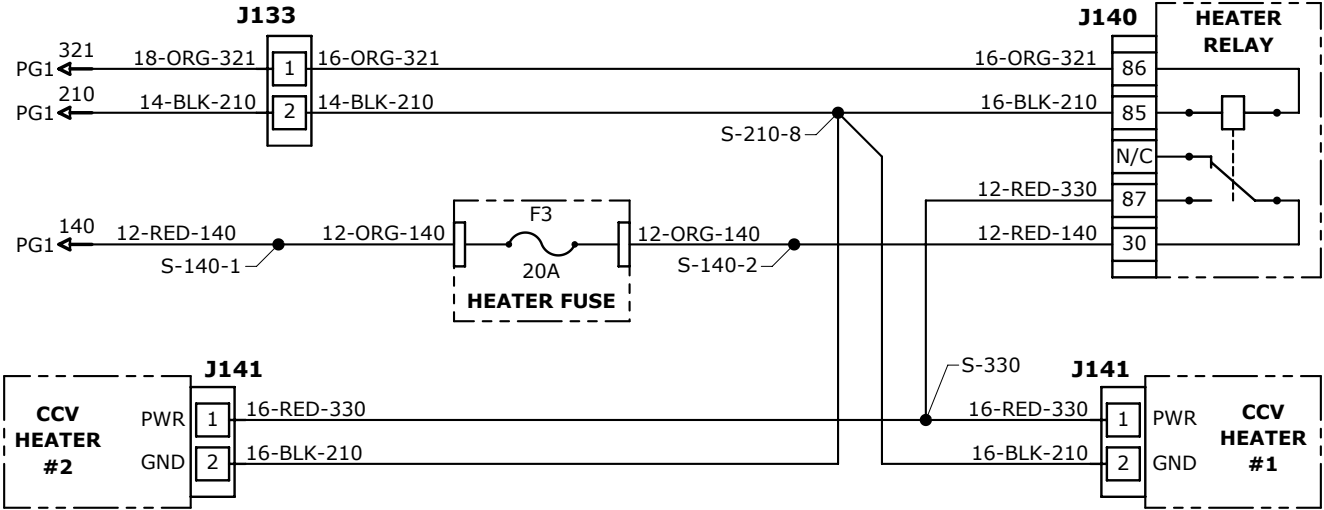
FRONT EXTERNAL SAFETY SWITCHES WIRING DIAGRAM



WIRING DIAGRAMS

CCV HEATER SYSTEM WIRING DIAGRAM

**WD
PG 4**



WIRING DIAGRAMS

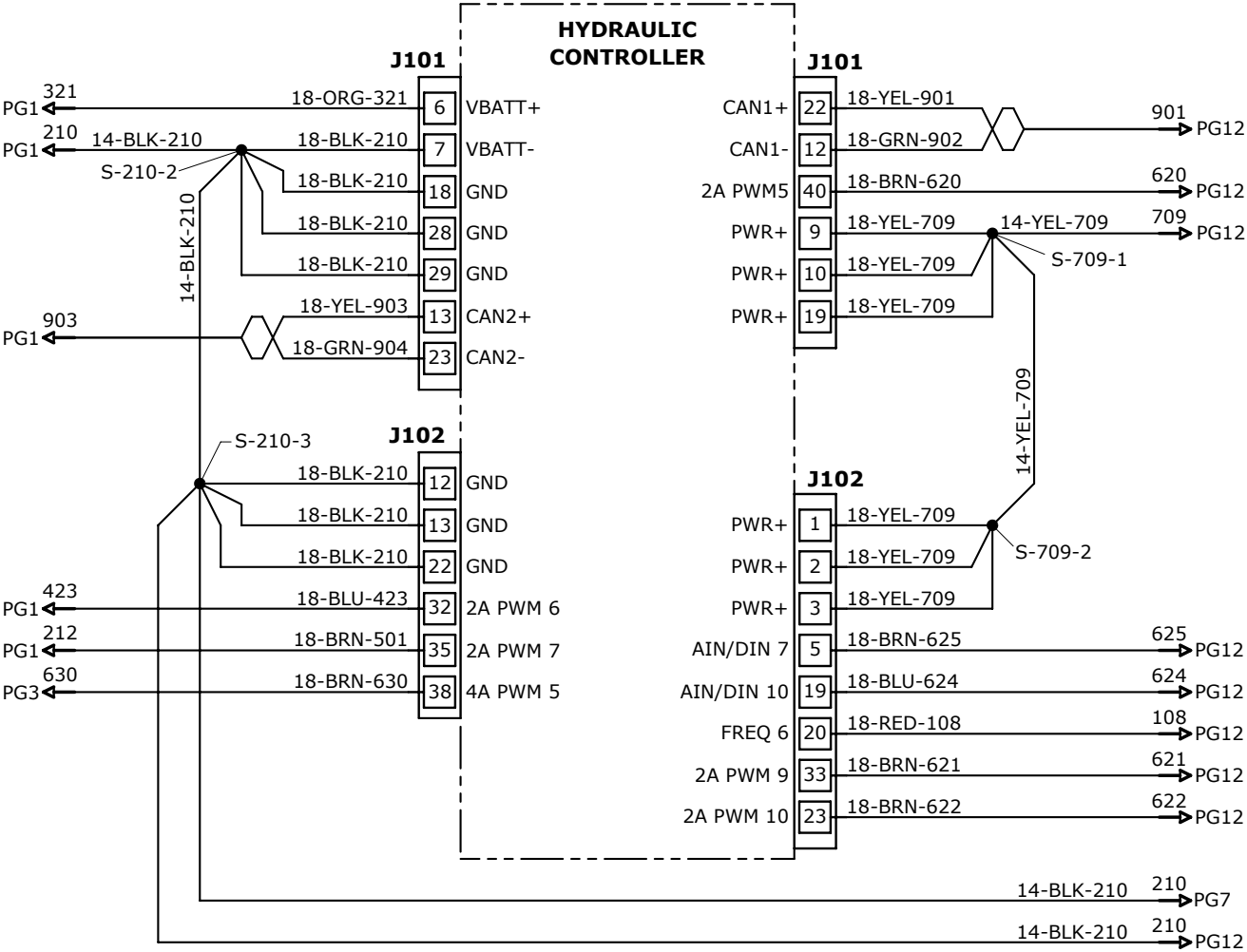
WD
PG 5

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FOR FUTURE USE

WIRING DIAGRAMS

HYDRAULIC CONTROLLER POWER & PERIPHERALS WIRING DIAGRAM

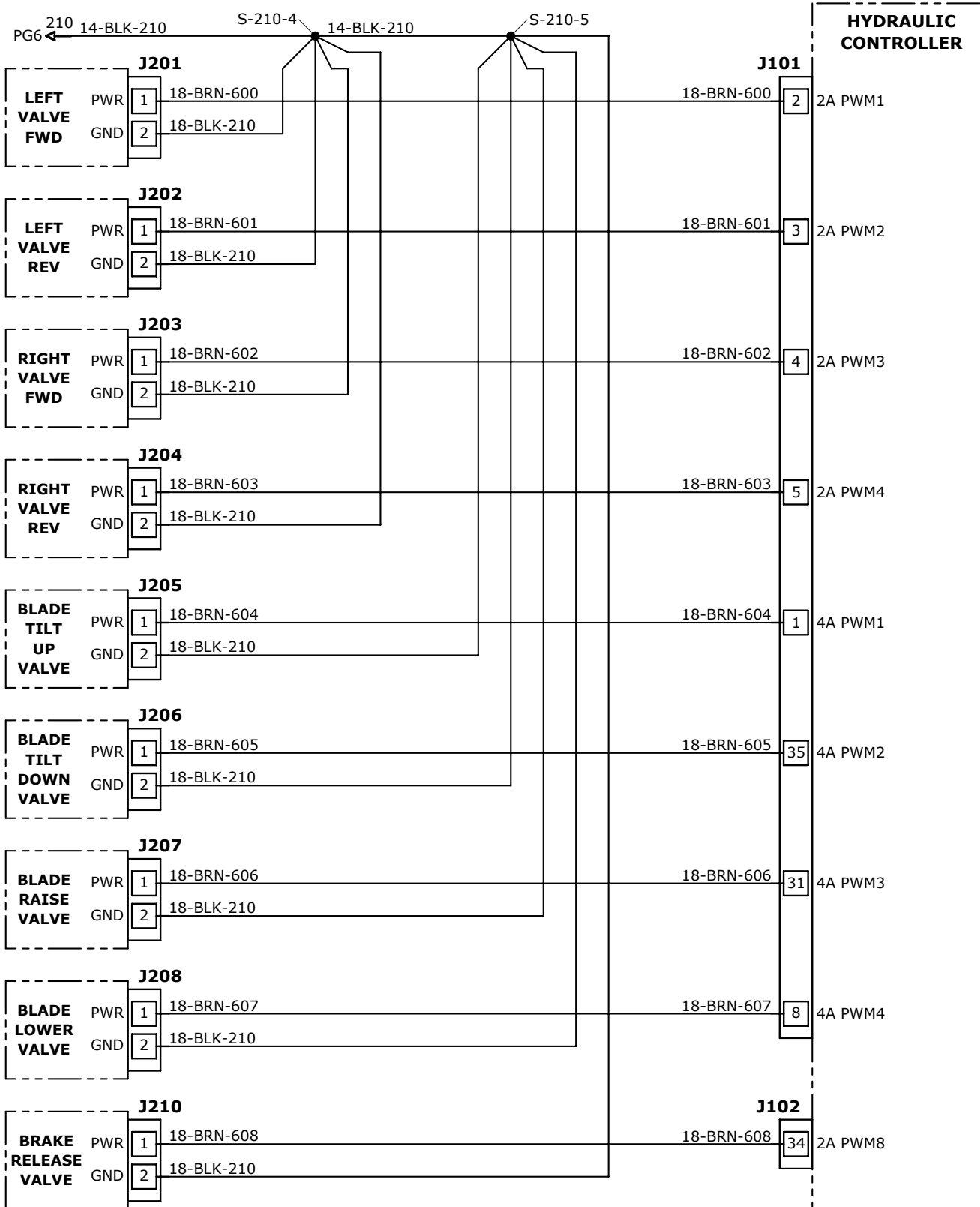
**WD
PG 6**



WIRING DIAGRAMS

**WD
PG 7**

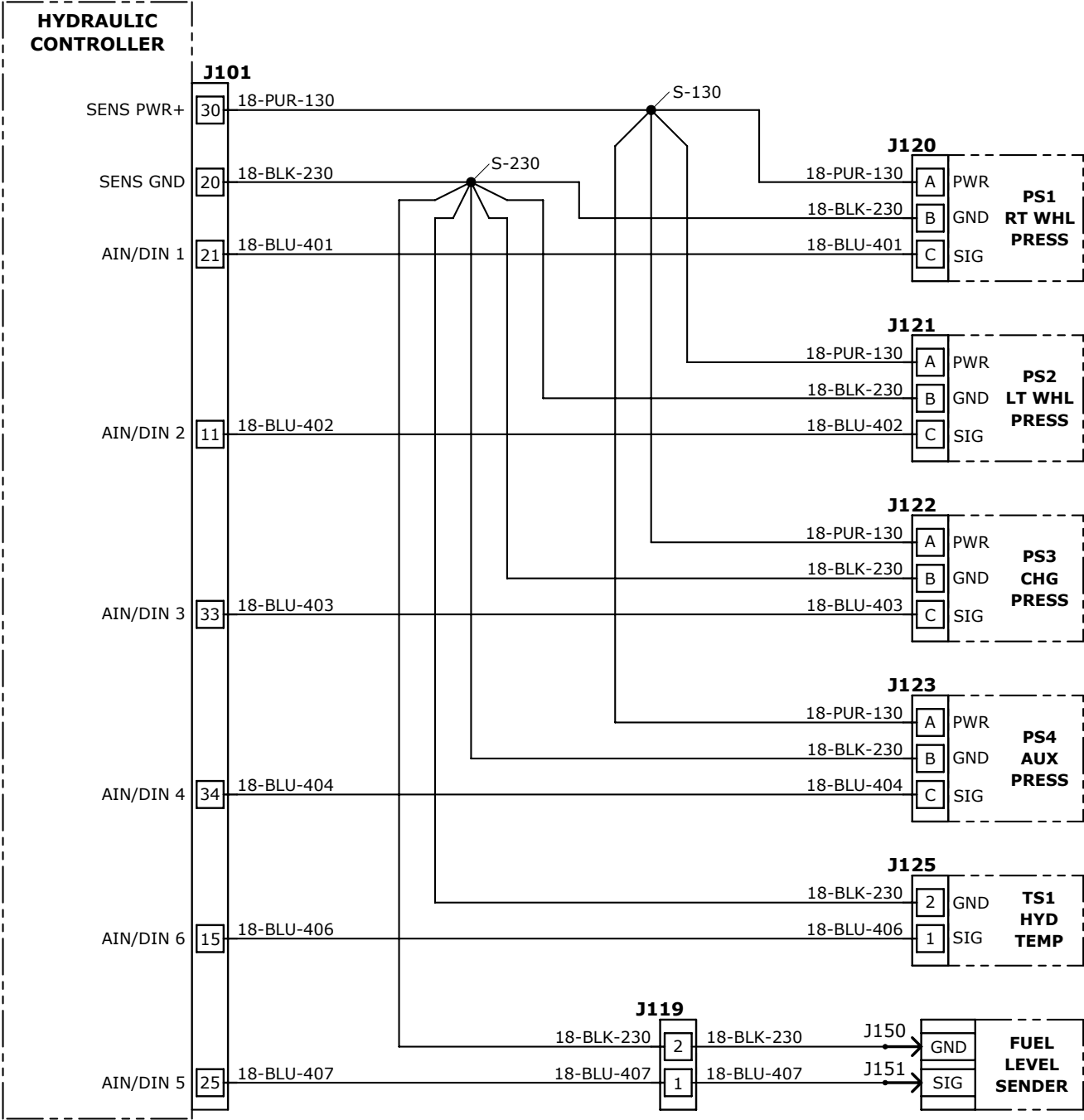
HYDRAULIC CONTROLLER SOLENOID VALVES WIRING DIAGRAM



WIRING DIAGRAMS

HYDRAULIC CONTROLLER SENSORS WIRING DIAGRAM

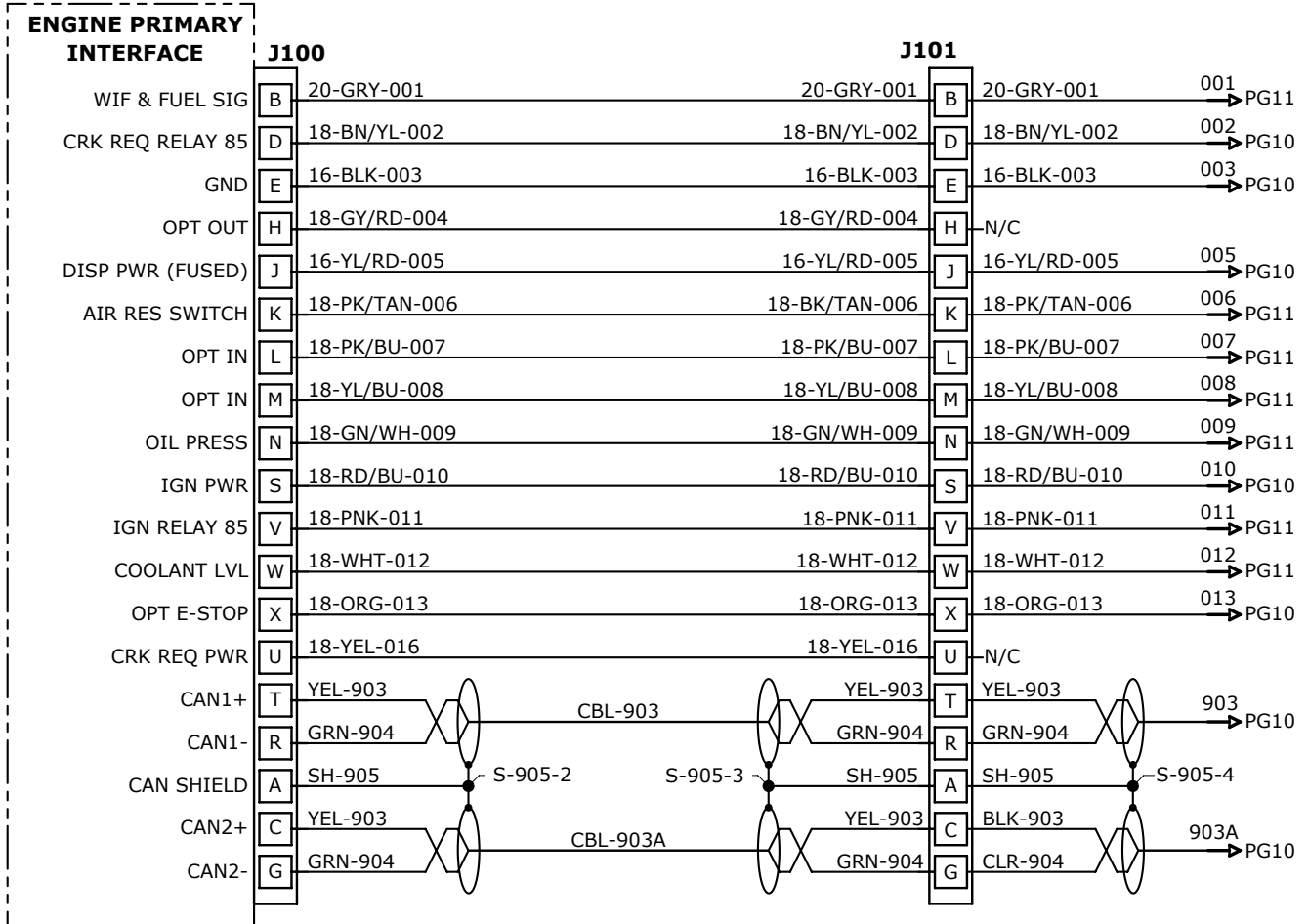
**WD
PG 8**



WIRING DIAGRAMS

**WD
PG 9**

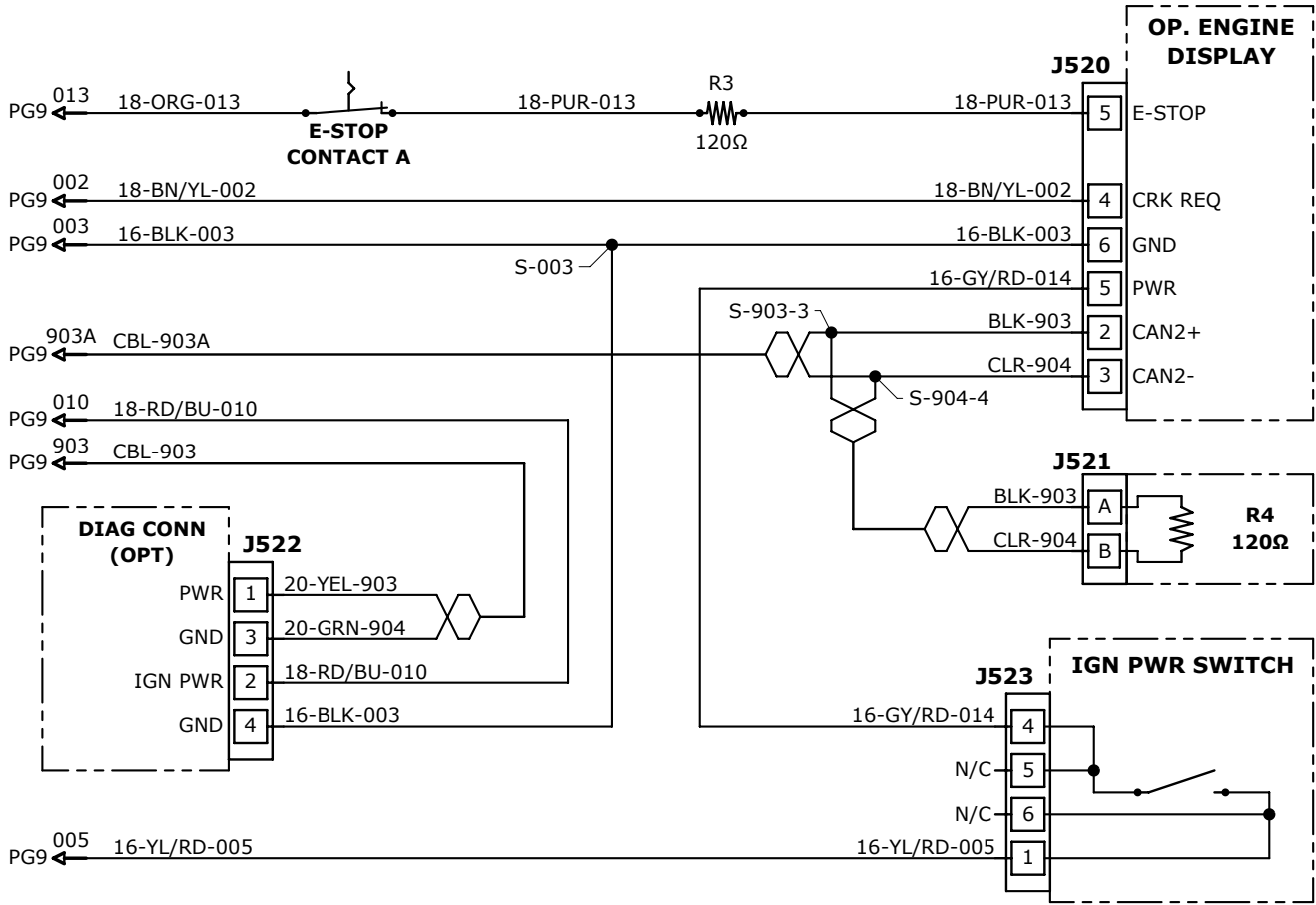
ENGINE CONTROLS INTERCONNECT WIRING DIAGRAM (REFER TO KUBOTA DIAGRAMS FOR FURTHER ENGINE INFO)



WIRING DIAGRAMS

CAB ENGINE CONTROLS WIRING DIAGRAM 1

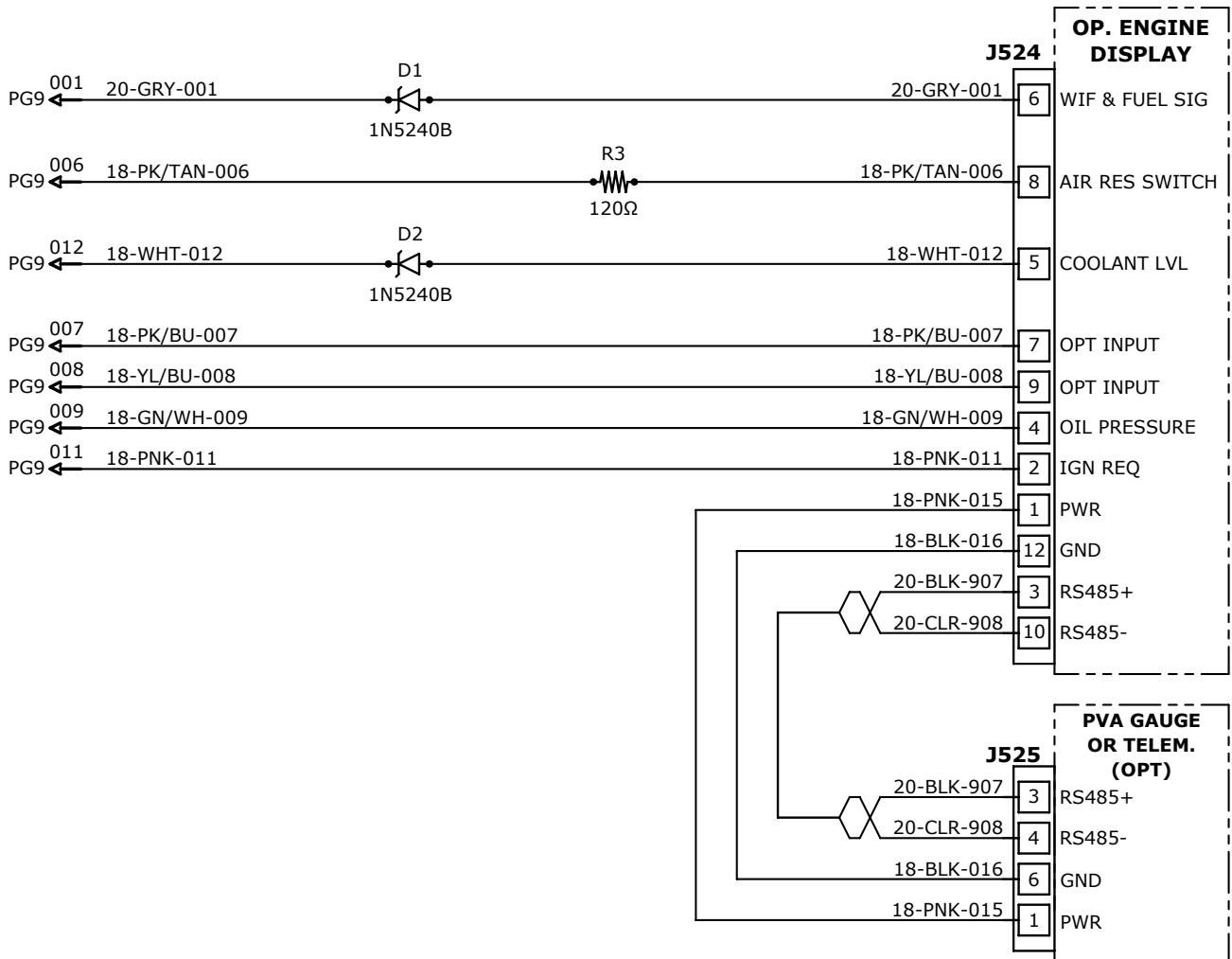
**WD
PG 10**



WIRING DIAGRAMS

**WD
PG 11**

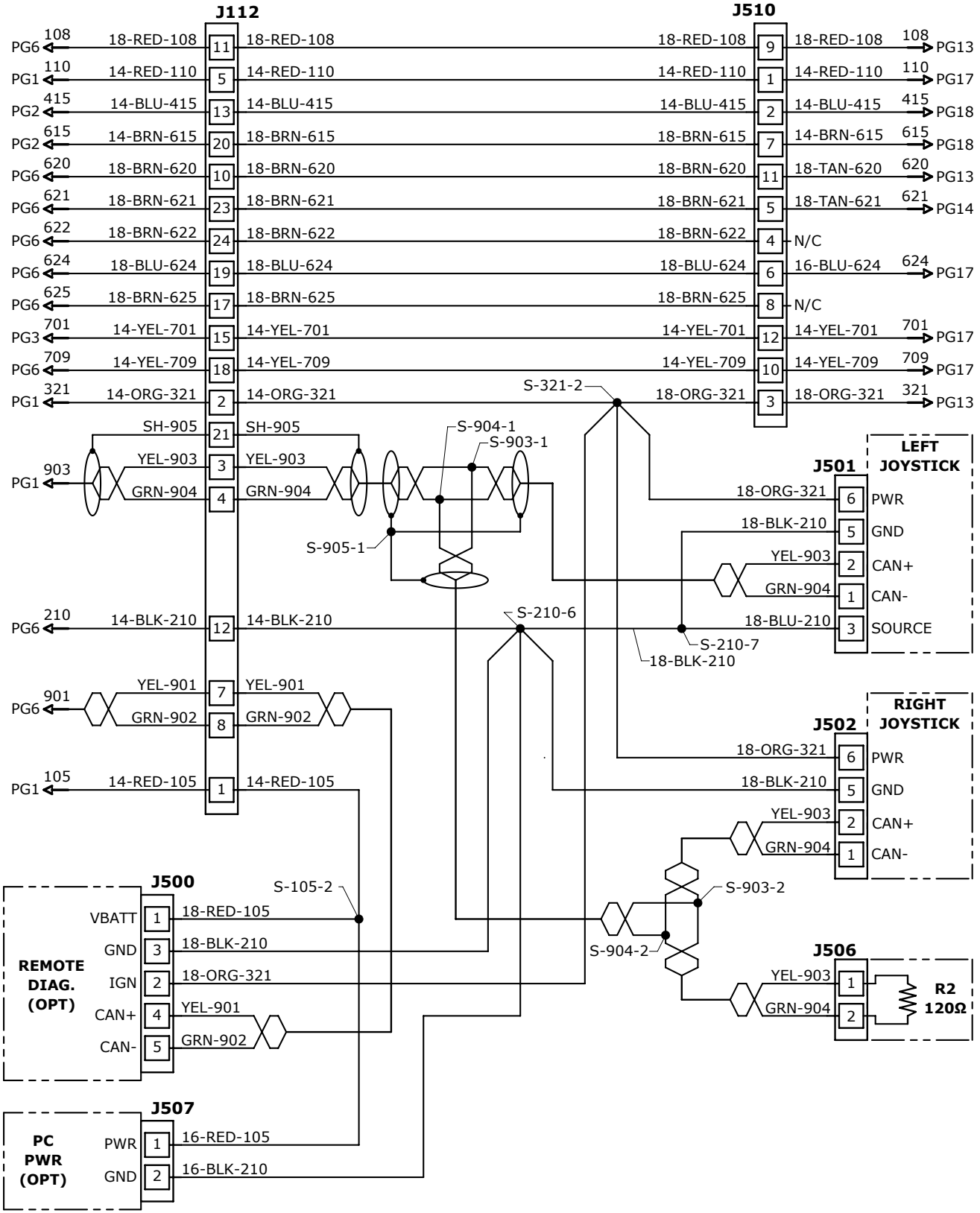
CAB ENGINE CONTROLS WIRING DIAGRAM 2



WIRING DIAGRAMS

CAB CONTROLS INTERCONNECT WIRING DIAGRAM

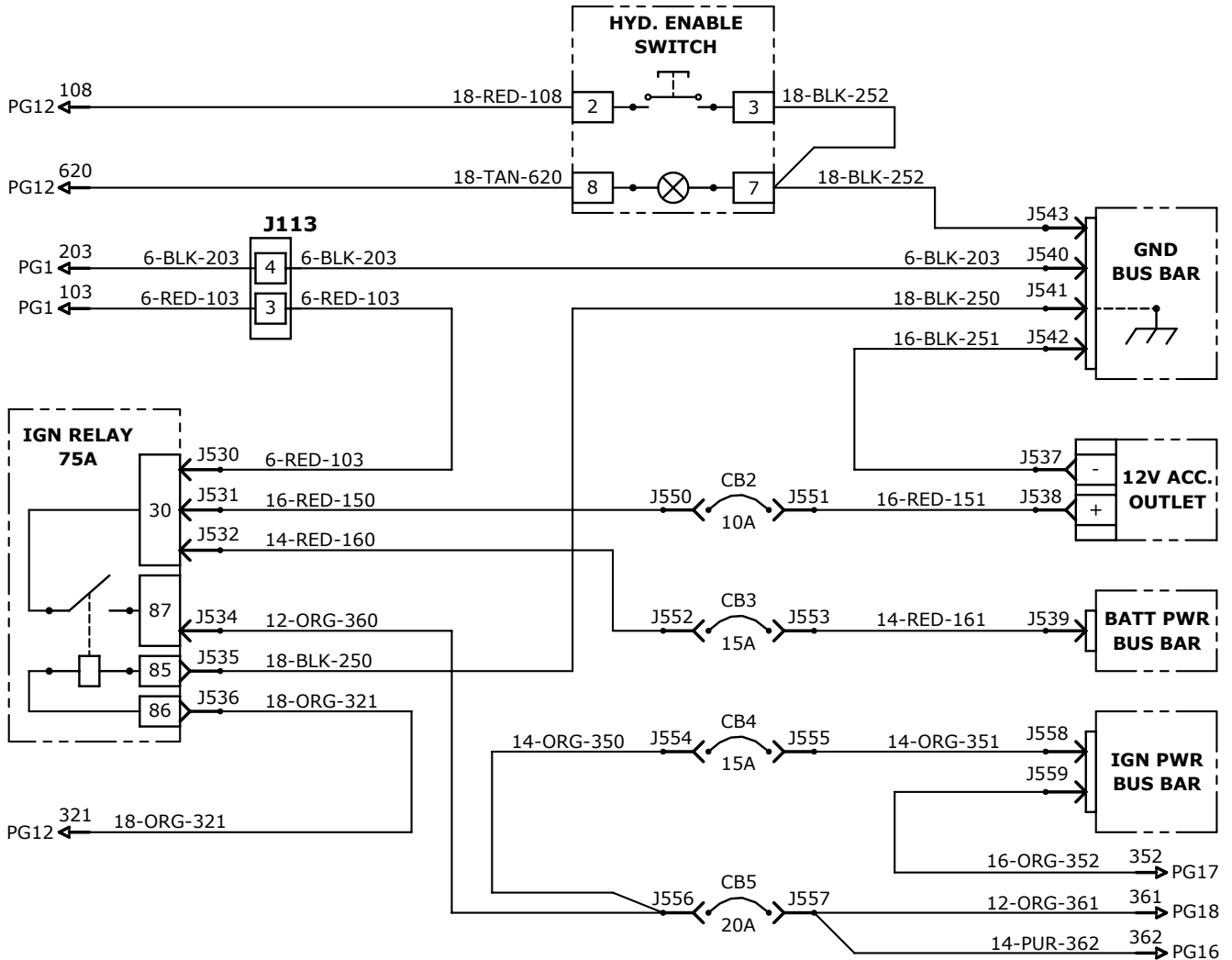
**WD
PG 12**



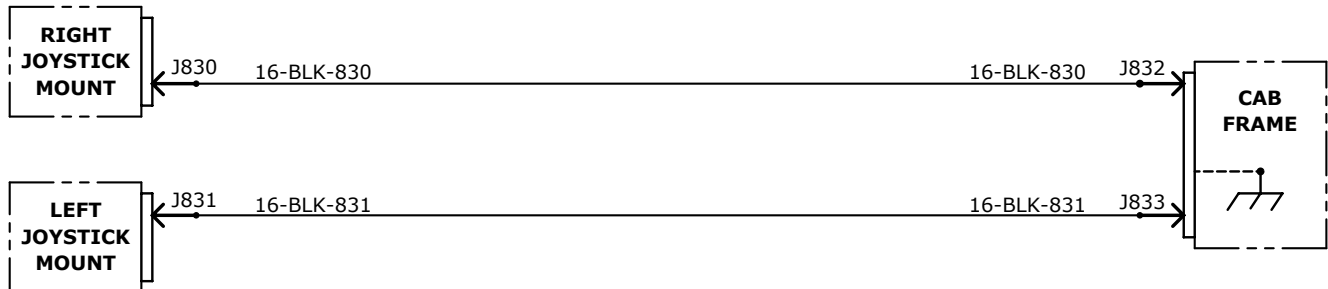
WIRING DIAGRAMS

**WD
PG 13**

CAB POWER DISTRIBUTION & HYDRAULIC ENABLE WIRING DIAGRAM



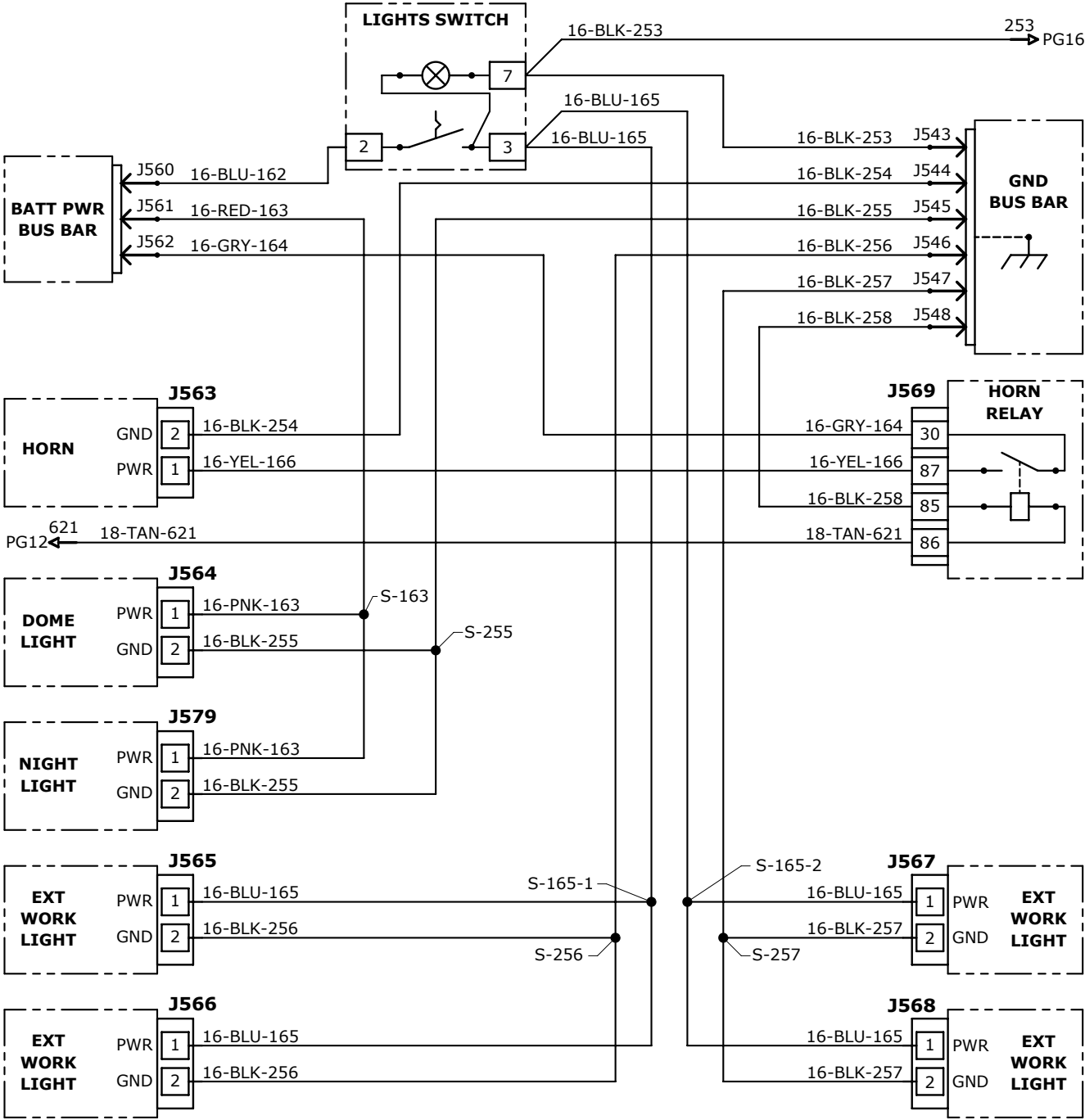
JOYSTICK/ARMREST GROUNDING WIRING DIAGRAM



WIRING DIAGRAMS

CAB BATTERY BUS SYSTEMS WIRING DIAGRAM

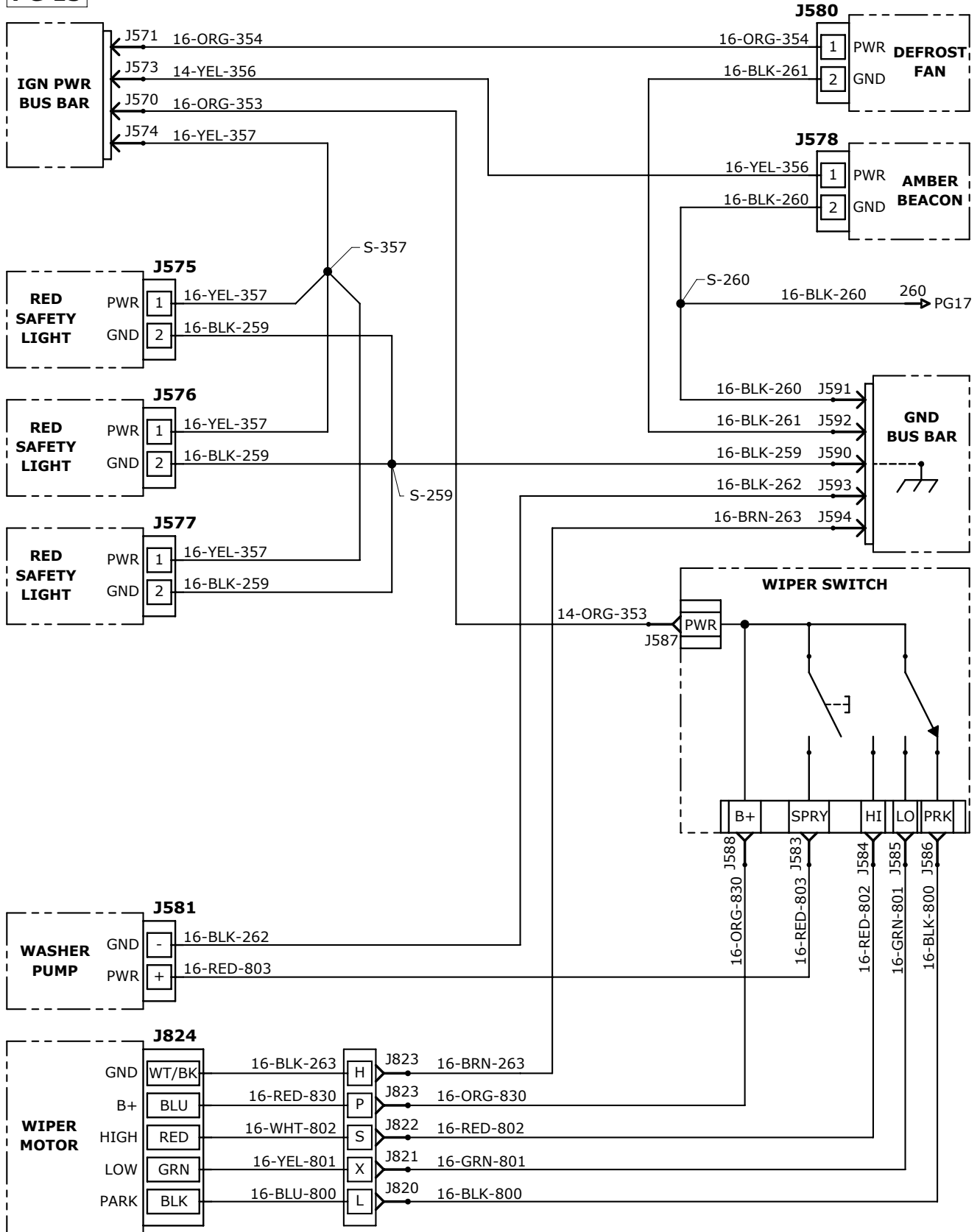
**WD
PG 14**



WIRING DIAGRAMS

**WD
PG 15**

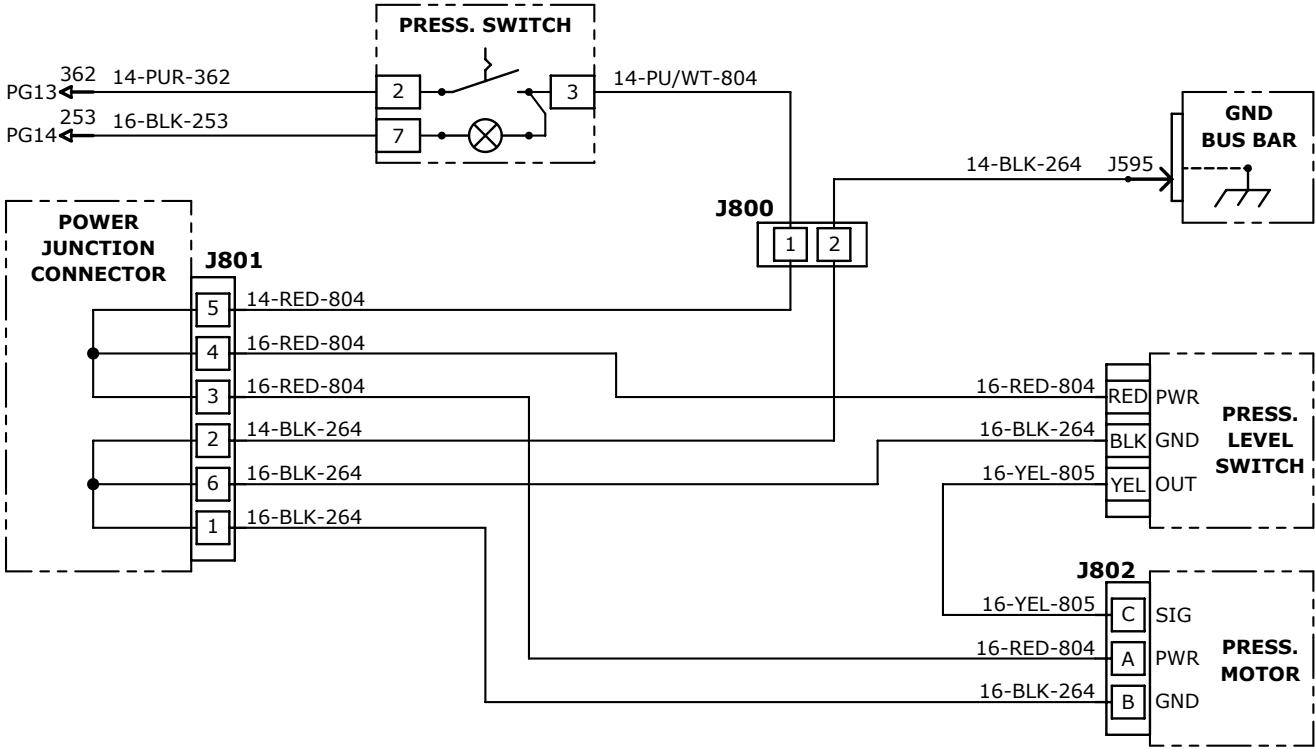
CAB IGNITION BUS SYSTEMS WIRING DIAGRAM



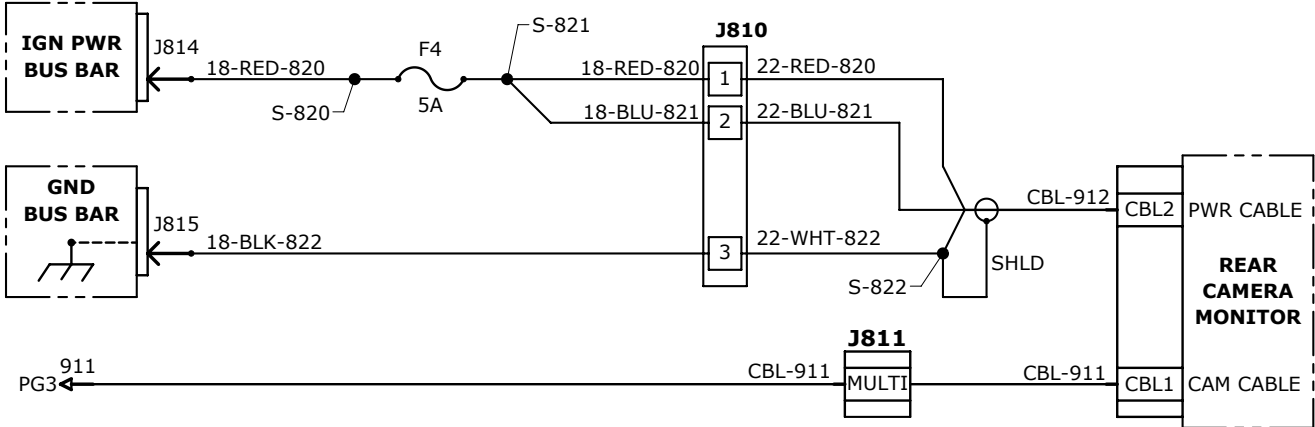
WIRING DIAGRAMS

CAB PRESSURIZER WIRING DIAGRAM

**WD
PG 16**

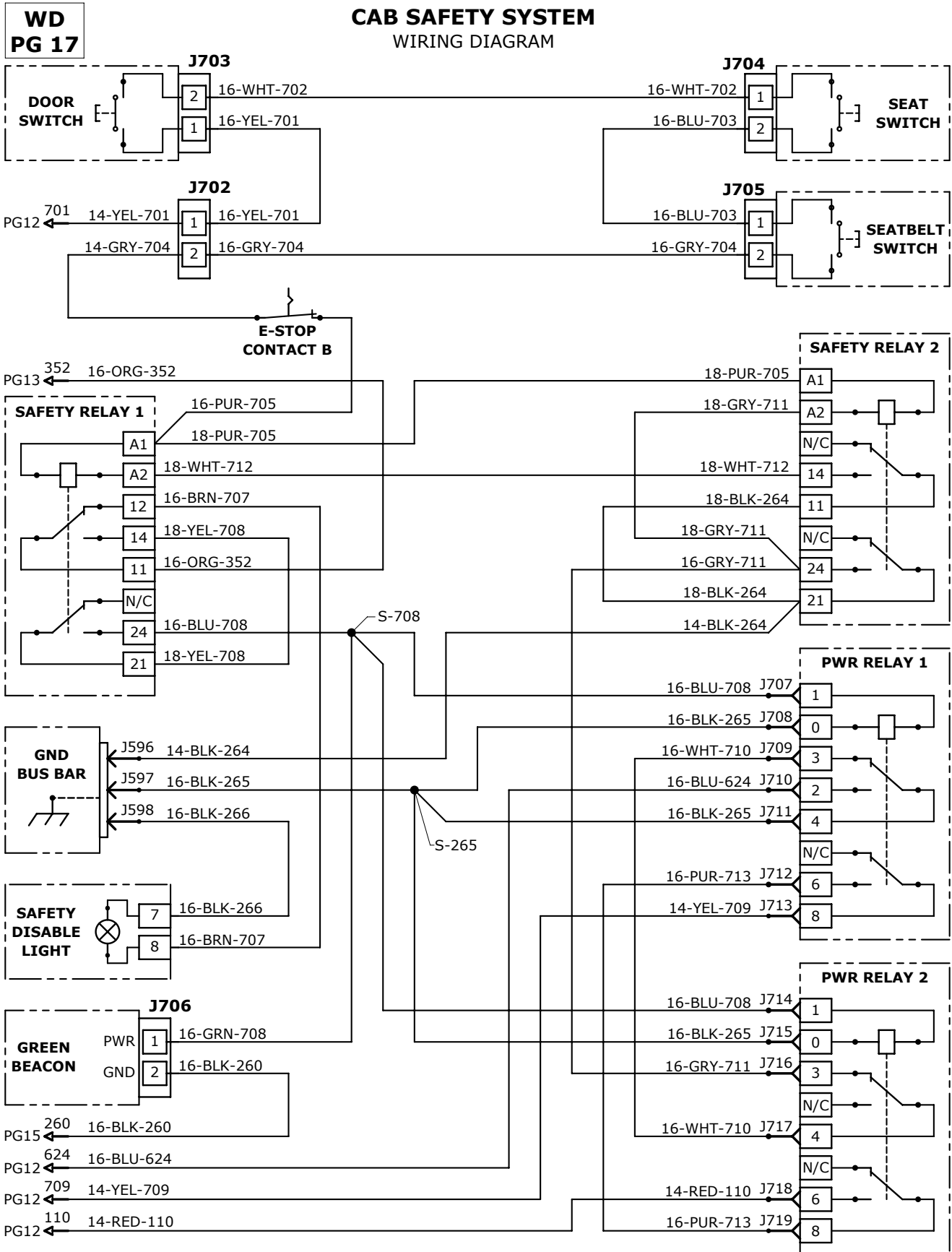


REAR VIEW DISPLAY WIRING DIAGRAM



WIRING DIAGRAMS

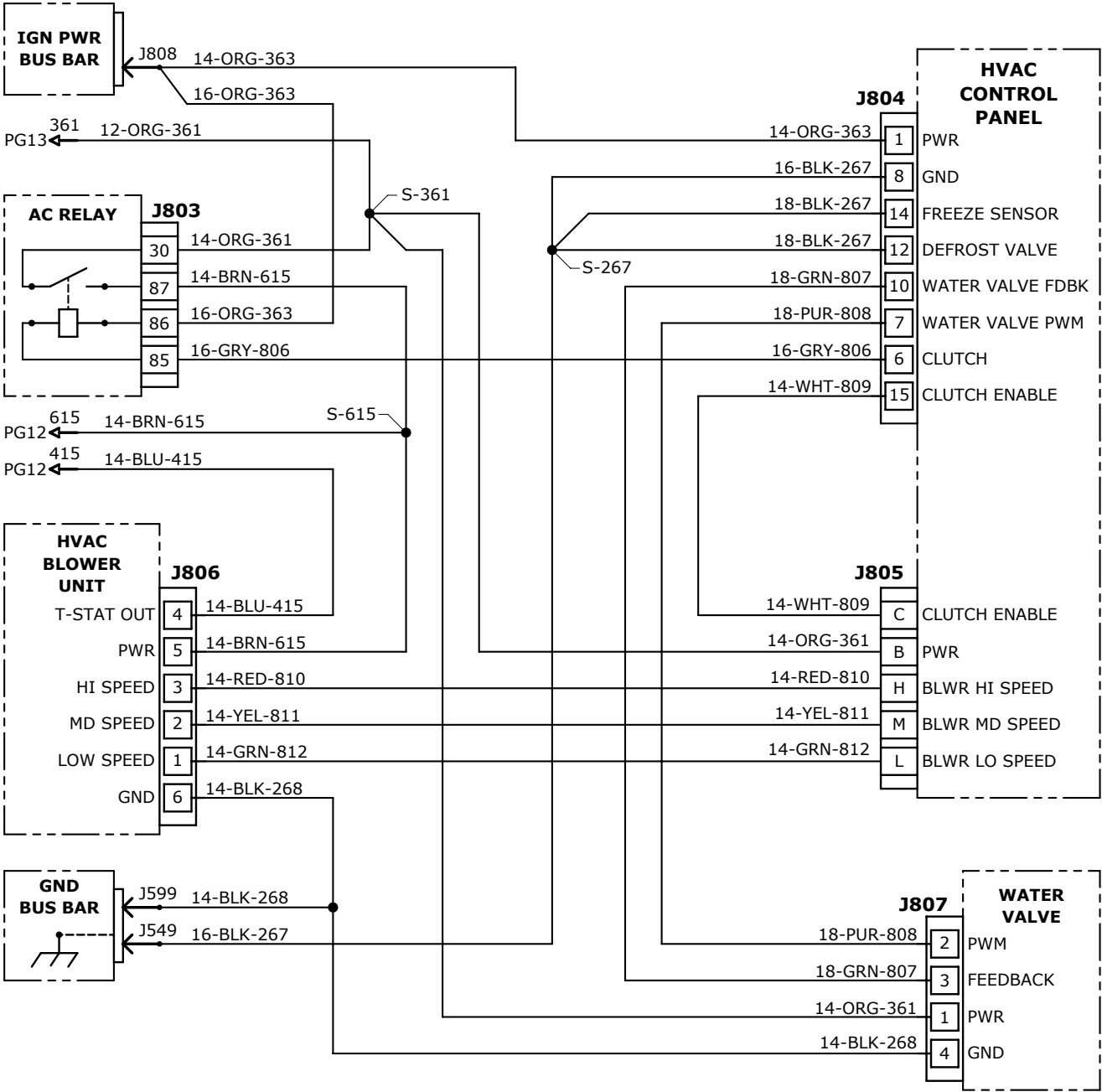
CAB SAFETY SYSTEM WIRING DIAGRAM



WIRING DIAGRAMS

CAB HVAC SYSTEM WIRING DIAGRAM

**WD
PG 18**



NFE WARRANTY

National Flooring Equipment Inc. (referred to as "The Company") warrants that each new unit manufactured by The Company to be free from defects in materials and workmanship in normal use and service for a period of twelve (12) months from date of shipment from The Company to the end user. If shipment to end user is from a Distributor, The Company may honor warranty for up to 15 months from initial shipment from the Company if the end user can provide documentation of receipt date. Accessories or equipment furnished and installed on the product by the Company but manufactured by others, including but not limited to: engines, motors, electrical components, transmissions etc., shall carry the accessory manufacturers own warranty. Battery warranties are prorated over the warranty period. Warranty does not cover glass breakage unless it occurs because of defects in material or workmanship. Customer is responsible for the inspection of equipment or parts upon delivery. **Freight damages are excluded from this warranty.**

The Company, at its determination of defect, will repair or replace any product or part deemed to be defective in material or workmanship within specified warranty time period. All product determinations and / or repairs will take place at The Company repair facility or at a certified warranty location designated by The Company. The Company will coordinate and be responsible for all freight expenses associated with valid warranty claims. Freight and shipping expenses associated with abuse or misuse will be back charged to the Distributor/Customer. The Company reserves the right to modify, alter or improve any part / parts without incurring any obligation to replace any part / parts previously sold without such modified, altered or improved part / parts. In no event shall the seller or manufacturer of the product be liable for special, incidental, or consequential damages, including loss of profits, whether or not caused by or resulting from the negligence of seller and / or the manufacturer of the product unless specifically provided herein. **This warranty shall not apply to any products or portions there of which have been subjected to abuse, misuse, improper installation or operation, lack of recommended maintenance, electrical failure or abnormal conditions, and to products which have been tampered with, altered, modified, repaired, reworked by anyone not approved or authorized by the Company or used in any manner inconsistent with the provisions of the above or any instructions or specifications provided with or for the product.** Any and all unauthorized onsite warranty work conducted by unauthorized personnel or any outside person(s), is not covered by The Company unless the work has been pre-authorized by a predetermined manufacturer representative. This warranty excludes wearable parts and/or consumables.

Defective or failed material or equipment shall be held at the purchaser's premises until authorization has been granted by The Company to return or dispose of defective products. Products returned to The Company for inspection must be returned with a manufacturer authorized Return Material Authorization (RMA), and must be packaged to The Company's specifications to avoid damage during shipment. Any unauthorized return of equipment will be declined at the dock by The Company. Any non-approved items returned with approved returned items are subject to rejection and will not be credited. Credit will be issued for material found to be defective upon The Company's inspection based on prices at time of purchase.

To obtain service contact National Flooring Equipment, Inc. toll free at 1-800-245-0267 for a repair authorization number. COD freight returns will not be accepted. Freight collect shipments will not be accepted. Warranty repairs must be accompanied by date of purchase receipt and a return/repair authorization number.

Return/Repair Authorization Number: _____

Machine Serial Number: _____

KUBOTA ENGINE WARRANTY



KUBOTA ENGINE AMERICA CORPORATION LIMITED WARRANTY ON INDUSTRIAL ENGINES AND REPLACEMENT PARTS EFFECTIVE JANUARY 1, 2009

OUR WARRANTY TO YOU

We warrant to you, the original purchaser, that all parts (except those referred to below) of your new Kubota industrial engine and replacement parts purchased from an Authorized Kubota Industrial Engine Distributor or OEM Distributor in the United States and Canada will be free from defects in materials or workmanship during the following periods.

1. Industrial Engines for 2 years or 2,000 hours, whichever occurs first.
2. Industrial Engines Major Component Warranty (MCW), 3 years or 3000 hours, whichever occurs first, parts only.

MCW covers cylinder block, cylinder head, crankshaft, camshaft, gears, pistons, rods, flywheel, flywheel housing, oil pump, pulleys, governor, intake manifold, oil pan, ignition distributor.

MCW does not cover rings, bearings, water pump, any electrical component, valve train components, accessory parts, seals, gaskets, carburetors, exhaust manifold, hoses, all fuel system components, muffler, any filters, radiator, fan, belts, thermostat, spark plugs, fuel transfer pumps.

3. Replacement parts for 1 year.

WHAT WE WILL DO

We will, at our option, repair or replace any part covered by this warranty which becomes defective, malfunctions or otherwise fails to conform with this warranty under normal use and service during the term of the warranty at no charge for parts or labor. (Parts only for MCW)

WHAT YOU MUST DO TO OBTAIN WARRANTY SERVICE

In order to obtain warranty repairs, you must deliver the product, together with proof of purchase, to an Authorized Kubota Industrial Engine Distributor or Dealer at your expense. The names and addresses of such Authorized Kubota Industrial Engine Distributors can be found on the internet at www.kubotaengine.com, by calling 1-800-532-9808 or by contacting:

Kubota Engine America Corporation
505 Schelter Road
Lincolnshire, IL 60069

WHAT THE WARRANTY DOES NOT COVER

This warranty **does not** cover:

1. Damage, malfunctions or failures resulting from accidents, abuse, misuse, modifications, alteration, improper servicing, or lack of performance of required maintenance service.
2. Normal maintenance services or replacement of maintenance items such as light bulbs, preheater plugs, indicator and resistant coils, filter elements, lubricants, oils, spark plugs, coolant, or belts.
3. Installation of replacement parts, unless originally installed by an Authorized Kubota Industrial Engine Distributor or Dealer.
4. Non-genuine Kubota parts.
5. Any engines damaged by use of ether or any starting aid, or greater than a 50/50% solution of antifreeze and water.
6. Injection nozzle wear or any engine damage caused by injection nozzle wear or sticking.
7. Damage caused by water entering the engine due to any cause.
8. Used Products.
9. Any damage caused by overheating that is not a direct result of a defect in materials or workmanship.
10. Any Engine not application reviewed.

APPLICATION REVIEW PROCESS: The Kubota Engine America (KEA) application review process is intended to assist the OEM with engine installation to optimize functionality/performance within the OEM's equipment in order to maintain durability, customer satisfaction, and reduce warranty failures and expenses. Kubota cannot anticipate all potential failures and issues that may occur with the engine or product in the field during an application review. Therefore, machine durability testing by the OEM either in a test facility and/or in the field is critical to further reduce the potential for field failures.

The amount of time spent by KEA on an application review is significantly less than the amount of time spent by the OEM's design engineers on the application. Because of this, the KEA application review is intended to identify issues that are within the scope of the application review testing performed and in some cases recommend possible solutions. The KEA application review should never take the place of proper design and testing of the finished product by the OEM.

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