



DuraPack® Python®

HIGH-PERFORMANCE AUTOMATED SIDE LOADER

SERVICE MANUAL

ISSUED FEBRUARY 2026


TP1DPPY-SM-0226




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 **WARNING:** Operating, servicing and maintaining equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your equipment in a well-ventilated area and wear gloves or wash your hands frequently when servicing your equipment. For more information go to www.P65Warnings.ca.gov.

 **WARNING:** Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

WARNING

IF INCORRECTLY USED, THIS EQUIPMENT CAN CAUSE SEVERE INJURY. THOSE WHO USE AND MAINTAIN THE EQUIPMENT SHOULD BE TRAINED IN ITS PROPER USE, WARNED OF ITS DANGERS, AND SHOULD READ AND FULLY UNDERSTAND THIS ENTIRE MANUAL BEFORE ATTEMPTING TO SET UP, OPERATE, ADJUST OR SERVICE THE EQUIPMENT. KEEP THIS MANUAL FOR FUTURE REFERENCE

PLEASE NOTE THAT THIS MANUAL IS APPLICABLE TO THE HEIL BODY ONLY. PLEASE CONSULT THE RESPECTIVE CHASSIS MANUAL FOR ANY AND ALL ISSUES OR QUESTIONS RELATED TO THE CHASSIS. HEIL CANNOT SPEAK FOR THE CHASSIS MAKER.

IMPORTANT SAFETY NOTICE

Proper service and repair are important to the safe, reliable operation of Heil Co.'s products. Service procedures recommended by Heil are described in this service manual and are effective for performing service operations. Some of these service operations may require the use of tools or blocking devices specially designed for the purpose. Special tools should be used when and as recommended. It is important to note that some warnings against the use of specific methods that can damage the product or render it unsafe are stated in the service manual. It is also important to understand these warnings are not exhaustive. Heil could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each method. Consequently, Heil has not undertaken any such broad evaluations. Accordingly, anyone who uses service procedures or tools which are not recommended by Heil must first satisfy himself thoroughly that neither his safety nor the product safety will be jeopardized by the method he selects.

Heil Environmental, as manufacturer of the equipment that is covered by this manual, is providing a product to the user who has acknowledged to have superior knowledge of the conditions of the use to which the product will be put. Heil Environmental relies upon the user's superior knowledge in specifying any changes or modifications including, but not limited to, the inclusion or non inclusion of options that are required by the user and the Heil product, and for the particular application of the user relative to the Heil product.

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SECTION 1

GENERAL INFORMATION

GENERAL INFORMATION

Introduction

The following sections are guides for maintenance and service of the Heil unit. The sections cover preventive maintenance, adjustment, and troubleshooting tips. Before performing maintenance, check the work area carefully to find all the hazards present and make sure all necessary safeguards or safety devices are used to protect all persons and equipment involved. In order to diagnose a problem quickly and effectively, a service person must be thoroughly familiar with the machine.

This section explains the system and its major components. Diagrams and schematics of the electrical and hydraulic systems are in the Service Manual Schematics section.

NOTICE

For CNG units, this Service Manual should be used in conjunction with any associated CNG System Manufacturer's Operation and Maintenance Manuals. Always read and understand all associated manuals alongside the Heil Parts and Service Manual and Heil Operation Manual before operating or servicing the unit. This manual does not contain and should not be relied upon to cover any CNG system specifics. You must consult the applicable CNG system manual as well as this Manual.



IMPORTANT!

Before starting any maintenance, study this section of the manual.

Read all hazard warnings and decals on the unit.

Clear the area of other persons before performing any maintenance.

Know and understand safe use of all controls.

It is your responsibility to understand and follow manufacturer's instructions on equipment and care.

Service/Parts Assistance

Assistance in troubleshooting, repair and service is available by contacting the authorized Heil Dealer in your area. Parts are available at your Heil Dealer or through Heil. Heil personnel are trained to provide prompt and professional assistance.

ALWAYS give the unit serial number in any correspondence relating to the equipment.

See the back cover of this manual for Heil contact information.

GENERAL INFORMATION

Recommended Spare Parts

PART #	DESCRIPTION	QTY
BODY & TAILGATE		
021-4494-001	TAILGATE SEAL	2
003-5142	BEARING, LOCK	2
022-4058	SEAL, SUMP DOOR	1
094-2834	PANEL, RUBBER, FOLLOWER, SIDE	2
113-7510-001	PLATE, CORNER CLOSURE	1
311-5837-010	PANEL, CONTROLLER	1
311-6621-001	RH HOPPER SIDE SHEET	1
311-6780-004	BRACKET HARNESS CONNECTORS	1
311-7054-006	MOUNT PLATE, BODY VALVE	1
311-7121-010	FENDER EXTENSION BAR, 28YD	2
311-7121-023	FENDER EXTENSION BAR, 23YD	2
311-7121-033	FENDER EXTENSION BAR, 33YD	2
LOADER & GRABBER ASSEMBLY		
093-3227	ASSEMBLY, DRIVE GEAR, GRABBER	1
062-0712-001	1-5/16" RUBBER ROLLER	2
062-0805	ASSEMBLY, GRABBER, ROLLER, 4"	2
019-1242	SPRING, 1" OD X 6"	3
014-1711	LINER, RUBBER, 90 GAL.	1
HYDRAULICS		
219-2433	PUMP & MANIFOLD ASSEMBLY	1
031-6650	PUMP MANIFOLD	1
219-2434	PUMP (TANDEM VANE)	1
253-2468	HYDRAULIC POWER UNIT	1
031-6705	MAIN BODY VALVE	1
031-6412	ARM VALVE	1
031-6227	REGEN EJECT VALVE	1
001-6993	CYLINDER, SERVICE HOIST, DA	1
001-7069	LIFT & REACH CYLINDER	2
001-7153	GRIPPER CYLINDER	1
003-4432	PIVOT BEARING	2
031-3310	RESTRICTOR CHECK VALVE	1
060-0417	CAP, FILLER, 4"	1
067-0630	GAUGE, SIGHT, THERMOMETER	1
075-0712	FILTER, BREATHER	1
075-0953-001	FILTER ELEMENT, RETURN LINE	1
031-5601	DISCONNECT, QUICK	1
031-6221	PORT RESTRICTION VALVE	1

GENERAL INFORMATION

PART #	DESCRIPTION	QTY
001-7185	TAILGATE RAISE CYLINDER	2
001-7311	TAILGATE LOCK CYLINDER (MONARCH)	2
001-7310	TAILGATE LOCK CYLINDER (UNITED HYDRAULICS)	2
001-7240	SERVICE HOIST CYLINDER (DOUBLE ACTING)	2
001-7235	SERVICE HOIST CYLINDER (SINGLE ACTING)	2
031-6693	TAILGATE VALVE (HAWE)	1
001-7327	PACKER CYLINDER - 23 YD (MAILHOT)	2
001-7340	PACKER CYLINDER - 23 YD (CUSTOM HOIST)	2
001-7341	PACKER CYLINDER - 23 YD (ROSENBOOM)	2
001-7314	PACKER CYLINDER - 28 YD (MAILHOT)	2
001-7338	PACKER CYLINDER - 28 YD (CUSTOM HOIST)	2
001-7339	PACKER CYLINDER - 28 YD (ROSENBOOM)	2
001-7274	PACKER CYLINDER - 33 YD (MAILHOT)	2
001-7158	PACKER CYLINDER - 33 YD (CUSTOM HOIST)	2
001-6906	PACKER CYLINDER - 33 YD (ROSENBOOM)	2
001-7153	GRABBER CYLINDER	2
001-7070	CYLINDER, Ø2.5 X 13	2
031-6613	IN-LINE CHECK VALVE	1
311-7050-014	RUBBER BELTING FOLLOWER	1

ELECTRICAL & CONTROLS

108-8790	DISPLAY	1
108-8789-005	CABLE, ETHERNET, 5M	2
254-4954	IFM CONTROLLER CR721S, HP / DPF ALL BODY)	1
254-4961	CONTROLLER, 60 I/O IFM CR711S (CAB)	1
063-0108	PROXIMITY SWITCH (SOURCING) 30MM	1
063-0109	PROXIMITY SWITCH (SOURCING) 30MM	1
063-0120	PRESSURE SWITCH	1
063-0121	SWITCH, PRESSURE, DEUTSCH CONN	1
063-0122	SWITCH, PROXIMITY 18MM	1
063-0141	ARC SENSOR, 100 DEG, CAN	1
063-0143-003	OIL LEVEL SENSOR, METAL HOUSING	1
063-0145	TRANSDUCER, HYD PRESSURE, SAE #6	1
063-0146	TEMPERATURE PROBE, RTD	1
063-0151	SENSOR MAGNET (TAILGATE CYLINDER SENSORS)	3
108-4797	BACK UP ALARM	1
108-7631-001	RED ILLUMINATED STOP SWITCH, VARIOUS	1
108-7631-002	NC CONTACT BLOCK	1

GENERAL INFORMATION

PART #	DESCRIPTION	QTY
108-7631-003	PUSH BUTTON BASE	1
108-7631-004	LED LIGHT MODULE	1
108-8503-06B	SOLENOID MANIFOLD 6 VALVE W/CONN VARIOUS UNITS	1
108-8734-002	AUDIBLE ALARM, J1939, VARIOUS PRODUCTS	1
115-1490-001	LIGHT, LED S/T/T, RED	2
115-1492-001	LIGHT, LED, TURN, AMBER	4
115-1494-001	LIGHT, LED, BACK-UP	2
115-1495-002	LIGHT, LED, 6 INCH OVAL, RED	1
115-1496-001	LIGHT, LED, MID BODY TURN, AMBER	2
115-1506-001	LIGHT, LED, MARKER, AMBER	2
115-1506-002	LIGHT, LED, MARKER, RED	7
115-1506-003	PLATE, DOT ADAPTER	2
115-1510-001	WORK LIGHT, NEAR FLOOD	1
115-1511-001	LIGHT, LED, AMBER SMART STROBE	4
115-1512-001	LIGHT, STROBE, 6 INCH OVAL, AMBER	2
115-1520	LED SCENE LIGHT, RIGID	2
115-1522-001	LIGHT, LICENSE PLATE, 12-24 VOLT	1
161-0652	3RD EYE SIDE VIEW CAMERA	1
161-0730	VISION CAM ANALOG STD, YOGA	1
161-0735	VIDEO BOX KIT	1
031-6260	PNEUMATIC JOYSTICK W/5 PUSH BUTTONS VARIOUS PRODUCTS	1
263-1907-018	HARNESS, AUX CONTROLS	1
263-1928-001	HARNESS, BODY FRONT, COMMON BODY	1
263-1928-002	HARNESS, BODY REAR, COMMON BODY	1
263-1928-003	HARNESS, MAIN CONTROLLER, COMMON BODY	1
263-1928-004	HARNESS, LIFT CONTROL PYTHON ASL COMMON BODY	1
263-1928-008	HARNESS, OIL TANK, COMMON BODY	1
263-1928-009	HARNESS, DISPLAY, COMMON BODY	1
263-1928-011	HARNESS, MAIN CONTROL PANEL, COMMON BODY	1
263-1928-012	HARNESS, PANEL SPLITTER, COMMON BODY	1
263-1928-013	HARNESS, SECONDARY CONTROL PANEL, COMMON BODY	1
263-1928-017	HARNESS, DPF BODY VALVE, COMMON BODY	1
263-1928-021	HARNESS, CAB TO BODY, MACK, PETE, AUTOCAR, BATTLE, COMMON BODY	1
263-1928-024	HARNESS, PO1 CAB AUTOCAR, COMMON BODY	1
263-1928-025	HARNESS, PO1 CHASSIS AUTOCAR, COMMON BODY	1
263-1928-026	HARNESS, FREIGHTLINER CAB TO BODY, ASL COMMON BODY	1

GENERAL INFORMATION

PART #	DESCRIPTION	QTY
263-1928-033	HARNESS, ECONIC CAB TO BODY, COMMON BODY	1
263-1928-050	HARNESS, BODY DOWN PROX OPTION, COMMON BODY	1
263-1928-051	HARNESS, JOYSTICK SPLITTER, COMMON BODY	1
263-1928-055	HARNESS, DPF HOPPER FRONT, COMMON BODY	1
263-1928-057	HARNESS, PTO EXTENSION, ASL COMMON BODY	1
263-1928-058	DEFUEL DETECT SMART FMM HARNESS, COMMON BODY	1
263-1928-059	EATON ROCKER SWITCH CAMERA TRIGGER	1
263-1928-065	HARNESS, IN CAB CONTROLS, ECONIC, COMMON BODY	1
263-1928-066	HARNESS, CAMERA SPLITTER	1
263-1928-067	HARNESS, CAMERA SPLITTER STD	1
263-1928-068	CARLING ROCKER SWITCH CAMERA TRIGGER	1
263-1928-069	HARNESS ,CAMERA 360, COMMON BODY	1
263-1928-072	HARNESS, REMOTE PTO ENABLE	1
263-1928-100	HARNESS, TAILGATE UPPER, COMMON BODY	1
263-1928-101	HARNESS, TAILGATE MIDDLE, 6 STROBES, BRAKE LT, REV FLOODS, CB	1
263-1928-102	HARNESS, TAILGATE MIDDLE, CAM FLOOD, BRAKE LT, COMMON BODY	1
263-1928-103	HARNESS, TAILGATE MIDDLE, 2 STROBES, COMMON BODY	1
263-1928-104	HARNESS, TAILGATE LOWER, COMMON BODY	1
263-0899-001	HARNESS,CAB-MOUNTED STROBES/FLOOD ALLIED/MACK RESI, HALF/PACK	1
263-1049-013	HARNESS, JOYSTICK SWITCH, DUAL CONTROL	1
263-1049-014	HARNESS, JOYSTICK CONSOLE DUAL CONTROL	1
263-1145-007	HARNESS, PROX SWITCH (40" RED)	1
263-1145-010	HARNESS, PROX SWITCH (300" YELLOW)	1
263-1733	HARNESS, LOW TORQUE PRESSURE SWITCH SHUT OFF EXTENSION,	1
108-8503-63B	SOLENOID MANIFOLD 3 VALVE W/CONN VARIOUS UNITS	1
108-8903-001	FLASHER LED MODULE, MACK, VARIOUS	1
031-6311	PNEUMATIC JOYSTICK W/5 PUSH BUTTONS WITH OPS	1
108-8789-010	CABLE, ETHERNET, 10M	1
108-8903-001	FLASHER MODULE FOR LED, MACK, VARIOUS	1

GENERAL INFORMATION

Electronic Parts Catalog (EPC)

The Parts Central EPC includes electronic versions of the Heil Parts Manuals, specific to a Customer’s truck configuration and options. After registering and logging in, the user can search by **Keyword(s) or Part Number** and/or **Heil Body Serial Number** to quickly identify a spare part or browse a custom parts catalog.

Note: This tool is for reference use only and the cart functionality is disabled. Please contact your local Heil Dealer for parts quoting and ordering.

Registration & Login

Register online to gain access: <https://epc.partscentral.com>. Upon registration, you will receive an email notification confirming registration. Within 24 hours, your registration will be approved and you can log in using the **login page**.

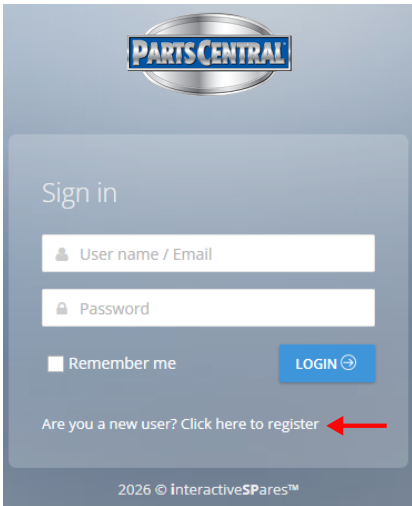


Figure 1.

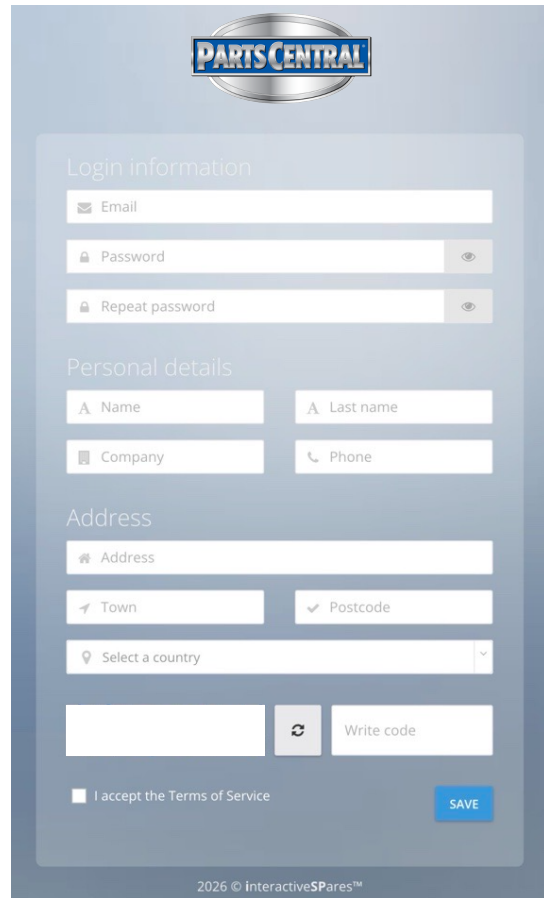


Figure 2.

GENERAL INFORMATION

Search by Part Keyword(s) or Part Number in Body Serial Number

After login, you will land on the User Dashboard. At the top right of the Dashboard, there will be two search fields:

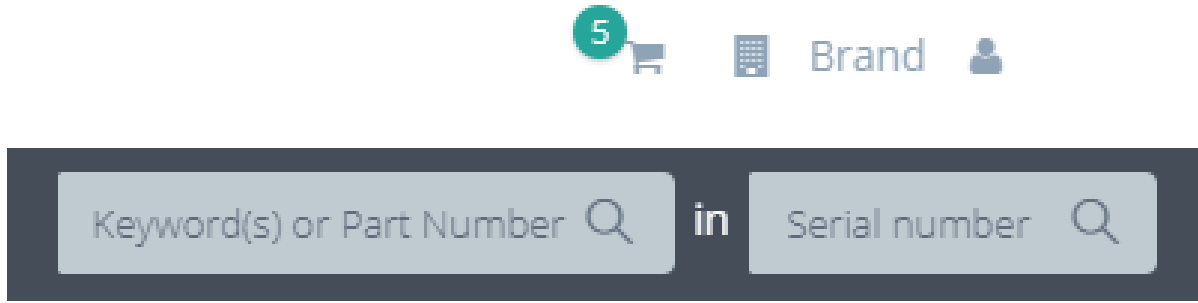


Figure 3.

You can search by **Keyword(s) or Part Number** within a specific Heil Body **Serial Number**. For example, if you are looking for a **proximity switch** for Body Serial Number **HPS4959991**, you can enter this information into these two fields and the search results will include all parts within the **HPS4959991** body that contain the keywords **proximity** and **switch** within their part descriptions.

From the search results list, you can select the right arrow icon to view the part within its associated assembly/kit, helping you identify the needed part. Alternatively, you can select the eye icon on the right to see part specifics (including any notes) and quickly add to cart (although this functionality is not yet turned on in the Parts Central EPC).

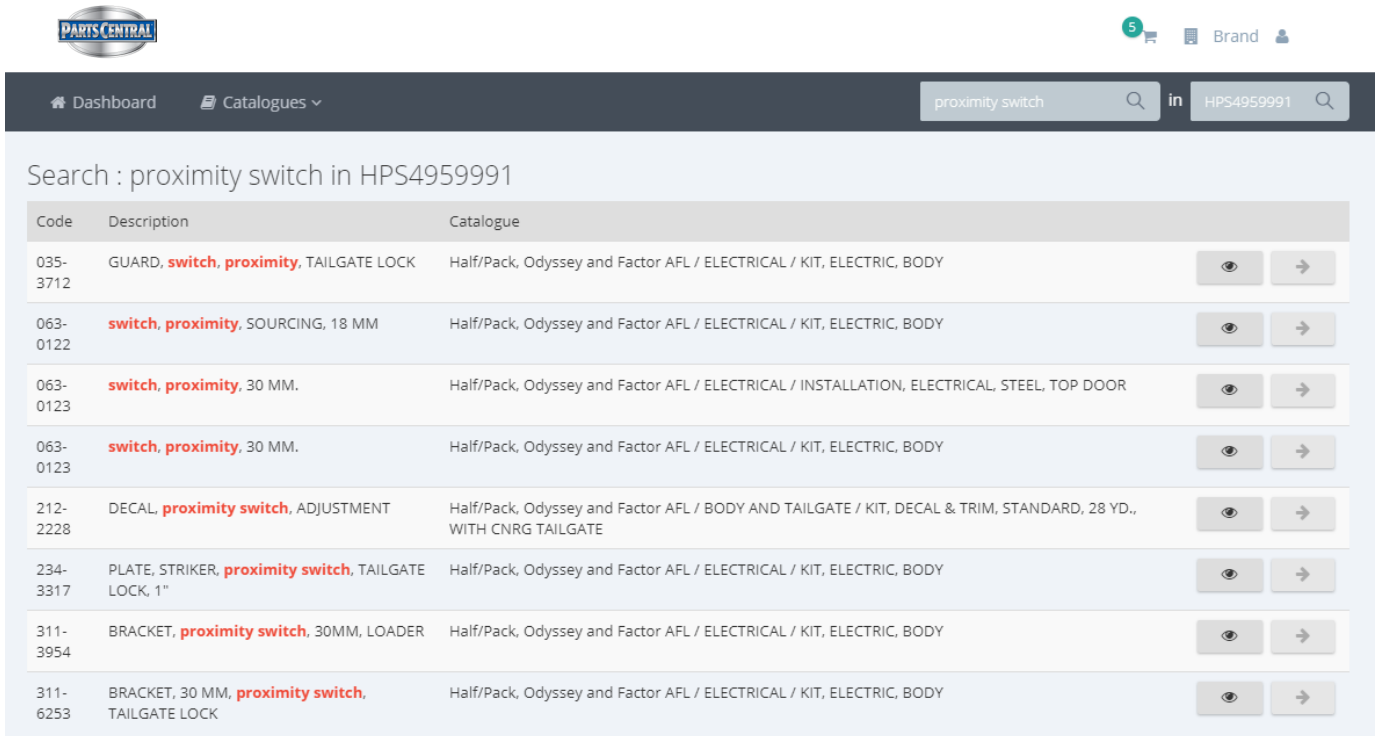


Figure 4.

GENERAL INFORMATION

Search by Body Serial Number

If you want to view an entire parts catalog for a particular Heil unit, you can search by only the Heil Body Serial Number, leaving the Keyword(s) / Part Number field blank. The search result will then be the Body Serial Number-specific parts catalog with familiar catalog sections that you can browse. You can navigate through the catalog using the section/topic menu in the left panel and then adjust an assembly/kit illustration size in the right panel with the mouse center scroll wheel. Additionally in the right panel, you can drag the image when holding down the left mouse button.

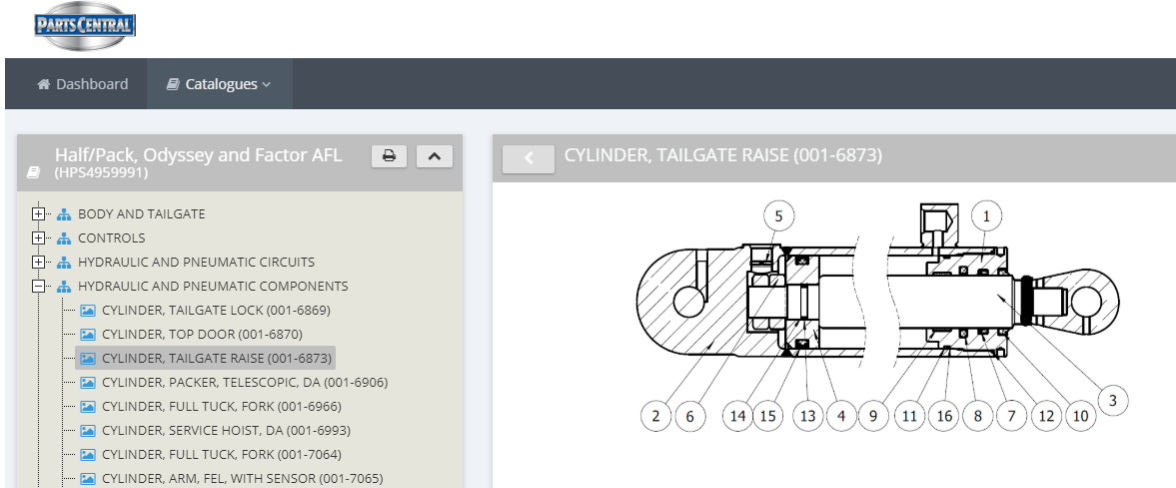


Figure 5.

For each assembly/kit, you can click on the interactive part callout reference numbers to highlight the corresponding part in the parts list, or you can click on a parts list line item to highlight its position on the illustration.

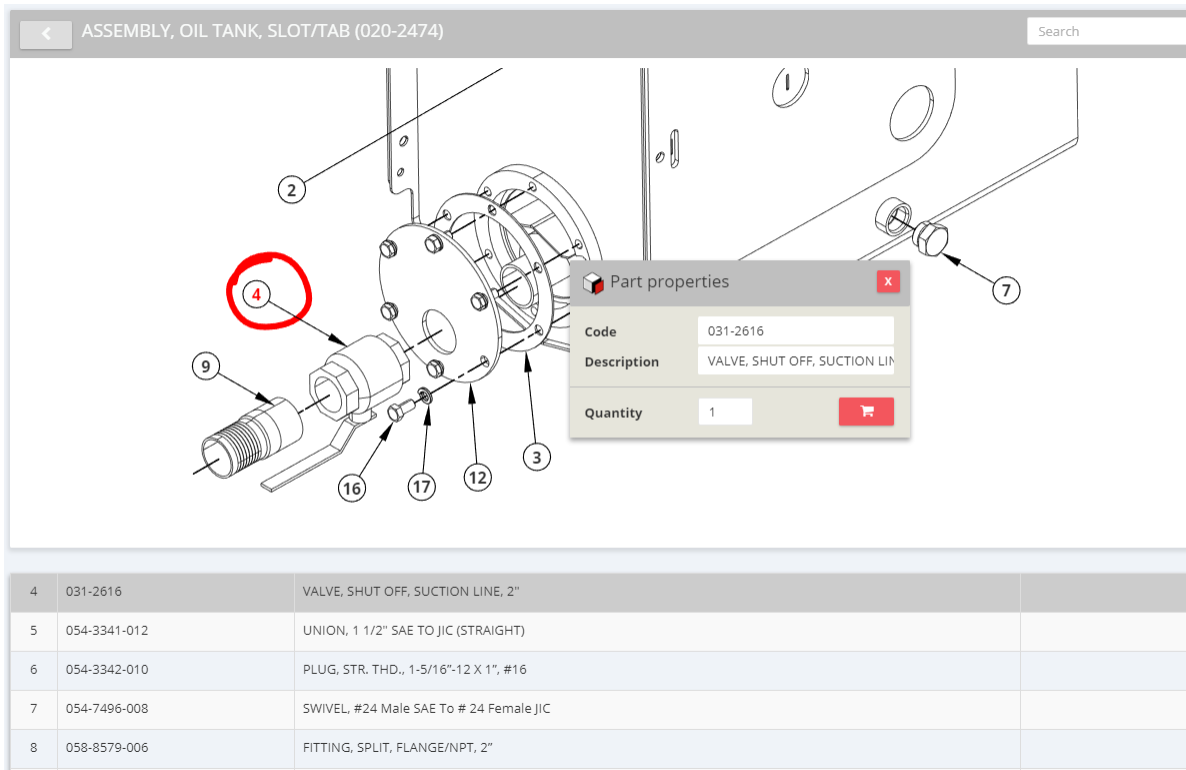


Figure 6.

GENERAL INFORMATION

Precautionary Statements

Listed below are the definitions for the various levels of hazards. It is important that the operators of this equipment and people who service units read and understand all warnings as they relate to this equipment operation.

- **DANGER** – indicates a hazardous situation, which if not avoided WILL result in SERIOUS INJURY or DEATH if you do not follow proper instructions.
- **WARNING** – indicates a hazardous situation, which if not avoided COULD result in SERIOUS INJURY or DEATH if you do not follow proper instructions.
- **CAUTION** – indicates a hazardous situation, which if not avoided COULD result in MINOR to MODERATE INJURY if you do not follow proper instructions.
- **NOTICE** – addresses practices not related to personal injury, such as property damage or damage to the equipment.

The following warnings are generally in the Operator's Manual for each specific unit, or are generic safety messages if an Operator's Manual does not have these safety messages. Other safety alert messages may be in other sections of the Service Manual or in an Operator's Manual. You must read and obey all safety alert messages in any manual produced by Heil to support your unit.

WARNING

Failure to follow all instructions and safety precautions in this manual or in other manufacturer's manuals and on the safety decals attached to the product could result in SERIOUS INJURY or DEATH to operators or bystanders and/or damage to property. Do not operate this vehicle before you read and understand the Operation Manual and the Service Manual for this unit, other applicable manufacturer's manuals and the safety decals on the product.

WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas. SERIOUS INJURY or DEATH can occur.

DANGER

Do not operate the unit or perform repair or maintenance procedures on the unit until you read and understand all of the instructions in this manual. Failure to do so will result in SERIOUS INJURY or DEATH to operators or bystanders.

DANGER

Make sure the unit is on firm, stable ground before you raise the body and clear the area of all unnecessary people. Do not prop a body unless it is on firm, stable ground. A unit not on firm, stable ground can roll when raising or propping the body. This will cause SERIOUS INJURY or DEATH to you, bystanders, or equipment.

DANGER

Always prop the tailgate when you leave it raised for maintenance, service or cleaning procedures. Always utilize the tailgate props according to specifications when propping the tailgate (see "**Tailgate Support Props**" on page 72). Never place any part of your body between the unit and the tailgate while propping or stowing the tailgate props. This area is extremely dangerous. SERIOUS INJURY or DEATH will occur if any part of your body is between the tailgate and the body if the tailgate suddenly closes.

DANGER

A tailgate in motion is dangerous. SERIOUS INJURY or DEATH will occur if a person is struck by a moving tailgate or becomes trapped between the tailgate and the body. Clear the area near the tailgate of all unnecessary people before you lower the tailgate. A safety spotter is recommended to make sure that no one enters the tailgate area while the tailgate is being closed.

GENERAL INFORMATION**⚠ DANGER**

The packer and crusher panels are dangerous. They will cause **SERIOUS INJURY** or **DEATH** if a person is inside the hopper. Make sure no one is inside the hopper before you begin a packer or crusher function. Put the unit in **“Lock-Out/Tag-Out Procedure”** on page 13 if it is necessary to enter the hopper area.

⚠ DANGER

Keep all parts of your body out from underneath the unit's body and away from the cylinders when raising or lowering the body. **SERIOUS INJURY** or **DEATH** will occur if the unit's body suddenly lowers and traps a part of your body.

⚠ DANGER

Do not raise a body that has refuse while you do maintenance or service procedures. Refuse in the body can make the unit unstable. Always unload refuse from the body before you raise it for maintenance or service procedures. Always use the body props when you raise the body for maintenance or service procedures.

⚠ DANGER

A full or partially full load of refuse is dangerous while you lower the body with inoperative controls. Refuse in the body can make the unit unstable and cause it to overturn. **SERIOUS INJURY** or **DEATH** will occur if the unit overturns due to instability caused by the loaded refuse. **REMOVE** the refuse before you block the body.

⚠ DANGER

Lifting equipment that does not have sufficient lifting capability is dangerous, equipment will fail and cause **SERIOUS INJURY** or **DEATH** to the operator or bystanders. Make sure the lifting equipment has sufficient lifting capability and clear **ALL** persons not involved with the procedure away from the area.

⚠ DANGER

The lifting equipment can fail. **SERIOUS INJURY** or **DEATH** will occur if the lifting equipment breaks and the body falls or the unit rolls over. Do not place your body or limbs between the unit's body and chassis while you remove the body supporting timbers. Be attentive and prepared to move quickly away from the unit in the event there is an equipment failure.

⚠ DANGER

Contact of the unit with overhead electric lines is dangerous. **SERIOUS INJURY** or **DEATH** will occur. Make sure there is adequate overhead clearance before you raise the container. If the unit does make contact with overhead electric lines do not touch any metal in the cab. Stay in the unit until help arrives.

⚠ WARNING

Make sure the unit is in the **“Lock-Out/Tag-Out Procedure”** on page 13 when you do **ANY** maintenance or service procedures, or when you go in the hopper, climb in or on the body or on equipment. Equipment can be operated when the unit is not in the Lock-Out/ Tag-Out. When the unit is not in the Lock-Out/Tag-Out, equipment operated while you do maintenance or service procedures, go in the hopper or climb in or on the body or on equipment can cause **SERIOUS INJURY** or **DEATH**.

⚠ WARNING

Moving equipment can be dangerous to bystanders. **SERIOUS INJURY** or **DEATH** can occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

GENERAL INFORMATION**⚠ WARNING**

Raising the body with the tailgate closed can damage the underride bumper. The under ride bumper can hit the ground when the tailgate is not fully raised before you raise the body. SERIOUS INJURY or DEATH can occur and also cause damage to the unit.

⚠ WARNING

Clear all people of the area before you lift a refuse container. Make sure the refuse is secure in the refuse container before you lift the container. Loose refuse can fall and cause SERIOUS INJURY or DEATH.

⚠ WARNING

The hydraulic fluid can be under pressure and can spray while you open the connection. Hydraulic fluid can cause damage to your eyes, hands or skin. Wear protective eye glasses, gloves and other clothing as necessary to protect you from the hydraulic fluid.

⚠ WARNING

A unit that needs service or repair can malfunction and create a dangerous condition. A part failure during operation can cause SERIOUS INJURY or DEATH to a person or damage to the unit. Repair or replace any failed or defective part immediately

⚠ WARNING

Improper ejecting of the refuse can cause the unit to tip or rollover. SERIOUS INJURY or DEATH can occur if the unit rolls or tips over.

⚠ WARNING

Isopropyl alcohol is flammable and is harmful to eyes and skin. Keep isopropyl alcohol away from heat or open sources of ignition. Refer to OSHA standards and seek immediate medical help.

⚠ WARNING

A container that is not locked to the container lift mechanism is dangerous. The container can fall off the container lift mechanism and cause SERIOUS INJURY or DEATH. Make sure you engage and lock the container latch bars before you lift the container.

⚠ WARNING

Grabbing a refuse container with too much pressure can damage the container. Pieces of the container can “fly” off the container and cause moderate or minor injury to a bystander. Use enough pressure with the grabber to raise the container with the lift arm and not damage the container.

NOTICE

Do not operate the unit or perform repair or maintenance procedures on the unit until you read and understand the instructions in this manual. Failure to do so can result in damage to the unit or other property. If you do not understand a procedure or instruction, tell the owner or the designated person immediately. Do not operate the unit if you do not understand all procedures and instructions in this manual. The owner or designated person can contact your Heil dealer or Heil for additional help. See the Operator’s Manual or Service Manual applicable to the unit for contact information.

NOTICE

Grabbing a refuse container with too much pressure can damage the container. The container can become unusable. Use enough pressure with the grabber to raise the container with the lift arm and not damage the container.

GENERAL INFORMATIONLock-Out/Tag-Out Procedure**⚠ DANGER**

This procedure **MUST** be followed before entering the unit's body or performing any maintenance, repair, or cleaning procedures on the unit.

⚠ WARNING

If you do not have functioning Lock-Out/Tag-Out equipment and/or are not an authorized employee, **STOP** and **DO NOT** initiate any service on the unit. Contact your supervisor immediately.

NOTICE

This Lock-Out/Tag-Out procedure represents Heil's minimum recommendation and should be used in conjunction with, and should not supersede additional or more stringent safety requirements specified by your company's policy. Please check with your supervisor to determine if your company has a specific Lock-Out/Tag-Out procedure. Contact your supervisor, Heil Technical Service, or reference OSHA Regulation 1910.147 if you have any questions about Lock-Out/Tag-Out.

Watch the Lock-Out/Tag-Out service shack video online at **Heil Service Shack**.

A. Put the unit in a Lock-Out/Tag-Out:

1. **BEFORE** you enter the unit's body
2. **BEFORE** you perform ANY maintenance, repair or cleaning procedures on the unit.

B. All stored energy must be removed and/or protected against, common sources found on Heil units (Including, but not limited to):

1. Hydraulics
2. Electrical
3. Gravity
4. Pneumatics
5. Mechanical

C. Examples of some basic equipment required:

1. Multi-hasp
2. Single-keyed red lock
3. Lockout tag



Figure 7.

GENERAL INFORMATION

Follow These Steps:

1. APPLY the brakes. MAKE SURE the brakes prevent the unit from moving and are functioning properly.
2. Chock all wheels.
3. SET the tailgate props when the tailgate is raised for any service, maintenance or cleaning.
4. SET the body props when the body is raised for any service, maintenance or cleaning.
5. BEFORE disconnecting main battery power, VERIFY all the following stored energy sources are depleted according to your company policy:
 - a. Hydraulic (Such as forks or grabber arm in stowed position)
 - b. Pneumatic (Such as tag axles).
 - c. Mechanical (Such as springs)
 - d. Gravity (Such as tailgate raised)
6. REMOVE the key from the ignition and store it in your pocket, or another secured location for your safety.
7. Disconnect the battery power by flipping the battery box disconnect switch to OFF.
 - a. VERIFY all electrical stored energy is depleted according to your company procedure.
8. INSERT the mufti-hasp into the disconnect switch.
9. ATTACH your red single-keyed Lock-Out/Tag-Out lock with your tag exposed and visible to the multi-hasp.
 - a. ALWAYS use individually assigned locks and tags when performing ANY service or maintenance with other authorized employees. Each employee MUST place their personally assigned tag and lock to the multi-hasp connected to the disconnect switch.
10. REMOVE your lock key and put it in your pocket for your safety.
 - a. ONLY the person who placed the lock and tag on the multi-hasp is authorized to remove it.
 - b. NEVER remove another employee's Lock-Out/Tag-Out equipment without approval from the authorized person responsible.
 - c. Shift or personnel changes: Off-going employees MUST provide all details pertaining to the unit's status to the oncoming employee(s). The oncoming employee(s) MUST perform the Lock-Out/Tag-Out procedure to verify all stored energy is removed from the unit BEFORE applying their Lock-Out/Tag-Out equipment.
11. BEFORE removing your Lock-Out/Tag-Out equipment to return the unit to service, follow these steps:
 - a. INSPECT the work area to ensure all nonessential items have been removed.
 - b. VERIFY all unit components are operationally intact.
 - c. ENSURE all employees are safely positioned or removed from the area.
 - d. NOTIFY all affected employees that the Lock-Out/Tag-Out devices are being removed.

GENERAL INFORMATION

Storing Refuse In The Body

DO NOT store refuse in the body. The different types of debris and corrosive elements usually collected can cause severe corrosion inside the body, decreasing the life of your body and impact unloading. Additionally, storing refuse in the body overnight can increase the risk of fire.

Maintenance/Lubrication Information

Before performing maintenance, check the work area carefully to find all the hazards present and make sure all safe guards or safety devices are in place to protect all persons and equipment involved.

Grease Lubricant Recommendation

Use a grease gun to apply **grade NLG1000 grease or equivalent**. Before engaging grease gun, clean the fitting. Always pump enough grease to purge the joint of contaminated grease and wipe off the excess. Lubricate a unit as shown on the lubrication decal on the unit and in the “**Body Lubrication Guide**” on page 80.

Oil Lubricant Recommendation

Use only non-detergent engine oil to lubricate all movable mechanical parts not furnished with grease fittings. Apply sufficient oil to give good lubrication, but do not bathe parts in oil. Always wipe off excess oil.

Hydraulic Oil Specifications

Hydraulic fluid is one of the most important components in a hydraulic system. It transmits power, provides lubrication, cooling function and has the following features:

- High viscosity index and long service life
- Outstanding cold temperature flow properties
- Fast water separation
- Excellent anti-wear performance
- Long term oxidation stability
- Superior rust and corrosion protection
- Exceptional shear stability / filter ability
- Excellent thermal and hydrolytic stability
- Anti-foam characteristics
- High performance of air release characteristics

Current Heil standard hydraulic oil is Shell Tellus S2 VX 32. Please see product TDS and MSDS for more detailed information. We strongly recommend to use it on Heil products to get best system performance and oil service life. The following oils can be used on Heil products, if Heil standard hydraulic oil (Shell Tellus S2 VX 32) is not available. System performance/oil service life may be compromised.

- Castrol Dual Range HV 32
- Chevron Rando HDZ 32
- Mobil DTE 10 Excel 32

GENERAL INFORMATION

Standard Torque Data For Nuts & Bolts

The following recommended torque data is a general guideline. Recommended torque, in foot pounds, for all Standard Application nuts and bolts provided in the following table.

NOTICE

Torque specifications on a drawing override torque values in the Standard Torque Data for Nuts and Bolts Table.

- All thread surfaces are clean and lubricated with SAE-30 engine oil. See notice above.
- Joints are rigid, that is no gaskets or compressible materials are used.
- When re-using nuts or bolts use minimum torque values.

STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE							
Bolt Size (D)	Nut Type (STD/ Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
1/4 0.25	STD	20	5	9	8	6	
			8	13	12	8	
		28	5	10	9	7	
			8	15	13	10	
	Lock	20	5				6
			8				8
		28	5				7
			8				10
5/16 .3125	STD	18	5	19	17	12	
			8	27	24	17	
		24	5	21	19	14	
			8	29	27	19	
	Lock	18	5				12
			8				17
		24	5				14
			8				19
3/8 .375	STD	16	5	33	30	22	
			8	47	42	31	
		24	5	38	34	25	
			8	54	48	35	
	Lock	16	5				22
			8				31
		24	5				25
			8				35

GENERAL INFORMATION

STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE								
Bolt Size (D)	Nut Type (STD/ Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)	
7/16 .4375	STD	14	5	53	48	35		
			8	76	68	49		
		20	5	60	54	39		
			8	84	76	55		
	Lock	14	5					35
			8					49
		20	5					39
			8					55
1/2 .500	STD	13	5	82	73	53		
			8	115	104	75		
		20	5	92	83	60		
			8	130	117	84		
	Lock	13	5					53
			8					75
		20	5					60
			8					84
9/16 .5625	STD	12	5	118	106	77		
			8	166	150	108		
		18	5	131	118	85		
			8	186	167	121		
	Lock	12	5					77
			8					108
		18	5					85
			8					121

GENERAL INFORMATION

STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE							
Bolt Size (D)	Nut Type (STD/ Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
5/8 .625	STD	11	5	162	146	106	
			8	230	207	149	
		18	5	184	166	120	
			8	260	234	169	
	Lock	11	5				106
			8				149
		18	5				120
			8				169
3/4 0.750	STD	10	5	288	260	188	
			8	408	367	265	
		16	5	322	290	209	
			8	455	409	295	
	Lock	10	5				188
			8				265
		16	5				209
			8				295
7/8 0.8750	STD	9	5	465	418	302	
			8	657	591	427	
		14	5	513	461	333	
			8	724	652	471	
	Lock	9	5				302
			8				427
		14	5				333
			8				471

GENERAL INFORMATION

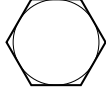
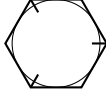
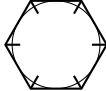
STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE							
Bolt Size (D)	Nut Type (STD/ Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
1 1.0000	STD	8	5	697	627	453	
			8	984	886	640	
		14	5	782	704	508	
			8	1105	994	718	
	Lock	8	5				453
			8				640
		14	5				508
			8				718
1-1/8 1.1250	STD	7	5	869	782	565	
			8	1395	1256	907	
		12	5	975	877	634	
			8	1564	1408	1017	
	Lock	7	5				565
			8				907
		12	5				634
			8				1017
1-1/4 1.2500	STD	7	5	1227	1104	797	
			8	1969	1772	1280	
		12	5	1358	1222	883	
			8	2179	1961	1417	
	Lock	7	5				797
			8				1280
		12	5				883
			8				1417

GENERAL INFORMATION

STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE							
Bolt Size (D)	Nut Type (STD/ Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
1-3/8 1.3750	STD	6	5	1608	1447	1045	
			8	2580	2322	1677	
		12	5	1830	1647	1190	
			8	2938	2644	1909	
	Lock	6	5				1045
			8				1677
		12	5				1190
			8				1909
1-1/2 1.5000	STD	6	5	2134	1921	1387	
			8	3425	3083	2226	
		12	5	2401	2161	1561	
			8	3854	3468	2505	
	Lock	6	5				1387
			8				2226
		12	5				1561
			8				2505

GENERAL INFORMATION

Bolt Type Identification Chart

IH Type	S.A.E. Grade	Description	Bolt Head Marking**
1	1 or 2	No radial lines. Low or medium carbon steel not heat treated. NOT USED, replace with same grade bolt.	
5	5	Three radial lines. Quenched and tempered medium carbon steel.	
8	8	Six radial lines. Quenched and tempered special carbon or alloy steel	

GENERAL INFORMATION

Torque For Hydraulic Tubes & Fittings

37 DEGREE FLARE (JIC) FITTINGS		
	SET WRENCH TO (DRY TORQUE CAN VARY +/- 10%)	
NOMINAL TUBE OD	TORQUE WRENCH SETTING	ALTERNATE TORQUE UNITS
1/8"	6.5 ft-lbs.	80 in-lbs.
3/16"	9 ft-lbs.	110 in-lbs.
1/4"	12.5 ft-lbs.	150 in-lbs.
5/16"	16.5 ft-lbs.	200 in-lbs.
3/8"	21 ft-lbs.	250 in-lbs.
1/2"	41 ft-lbs.	490 in-lbs.
5/8"	64 ft-lbs.	770 in-lbs.
3/4"	89 ft-lbs.	1070 in-lbs.
7/8"	105 ft-lbs.	1260 in-lbs.
1"	130 ft-lbs.	1560 in-lbs.
1-1/4"	142.5 ft-lbs.	1710 in-lbs.
1-1/2"	178.5 ft-lbs.	2140 in-lbs.
2"	250 ft-lbs.	3000 in-lbs.

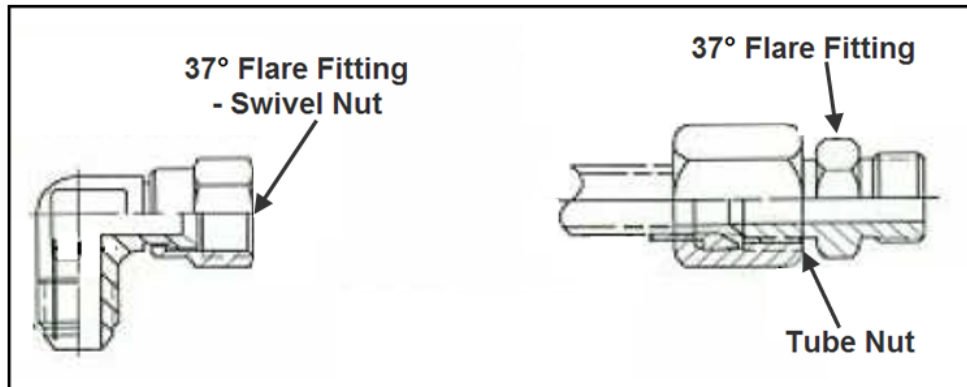


Figure 8.

GENERAL INFORMATION

FROM SAE J2593 TABLE 7		
BOSS (ORB)	(STEEL) SET WRENCH TO (DRY TORQUE +0%, -25%)	
NOMINAL TUBE OD	TORQUE WRENCH SETTING	ALTERNATE TORQUE UNITS
3/16"	9 ft-lbs.	110 in-lbs.
1/4"	16.5 ft-lbs.	200 in-lbs.
5/16"	21 ft-lbs.	250 in-lbs.
3/8"	29 ft-lbs.	350 in-lbs.
1/2"	64 ft-lbs.	770 in-lbs.
5/8"	89 ft-lbs.	1070 in-lbs.
3/4"	130 ft-lbs.	1560 in-lbs.
7/8"	178.5 ft-lbs.	2140 in-lbs.
1"	224 ft-lbs.	2690 in-lbs.
1-1/4"	250 ft-lbs.	3000 in-lbs.
1-1/2"	300 ft-lbs.	3600 in-lbs.

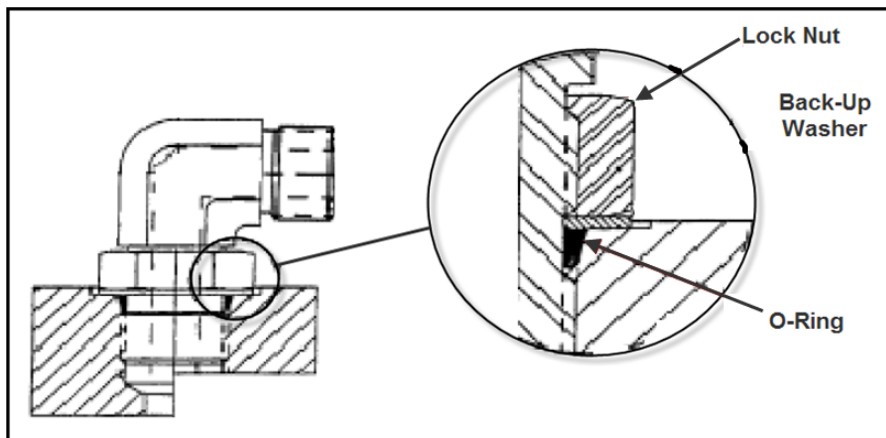


Figure 9.

GENERAL INFORMATION

SPLIT- FLANGE (HALF CLAMP) CONNECTORS (CODE 61)			
		SET WRENCH TO *DRY TORQUE*	
NOMINAL TUBE OD	BOLT SIZE	BOLT TORQUE [FT-LBS] *+/-4 FT-LBS	BOLT TORQUE [IN-LBS] *+/-50 IN-LBS
1/2"	5/16-18 x 1.25	17 ft-lbs.	200 in-lbs.
3/4"	3/8-16 x 1.25	25 ft-lbs.	300 in-lbs.
1"	3/8-16 x 1.25	32 ft-lbs.	380 in-lbs.
1-1/4"	7/16-14 x 1.50	41 ft-lbs.	490 in-lbs.
1-1/2"	1/2-13 x 1.50	53 ft-lbs.	640 in-lbs.
2"	1/2-13 x 1.50	61 ft-lbs.	730 in-lbs.
2-1/2"	1/2-13 x 1.75	86 ft-lbs.	1030 in-lbs.
3"	5/8-11 x 1.75	144 ft-lbs.	1730 in-lbs.
3-1/2"	5/8-11 x 2.00	125 ft-lbs.	1500 in-lbs.
4"	5/8-11 x 2.00	125 ft-lbs.	1500 in-lbs.
5"	5/8-11 x 2.25	125 ft-lbs.	1500 in-lbs.

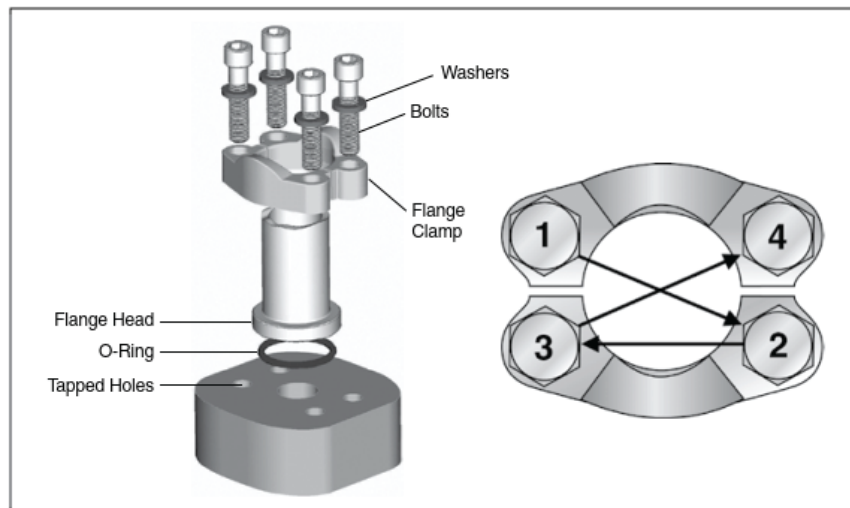


Figure 10.

GENERAL INFORMATION

Hydraulic Oil Warm-up Procedure

It is necessary to warm up the unit's hydraulic oil before you start your daily route operation or to check the oil level. The hydraulic oil is sufficiently warmed when the temperature is between 120° and 160°F.

⚠ WARNING

Moving parts on the unit are dangerous. Serious injury or death can occur if a person is struck by the equipment. Clear all people from the area before you operate the unit.

Follow the steps below to warm up the hydraulic oil.

1. START the TRUCK and let the engine idle.
2. APPLY the PARKING BRAKE and make sure it holds.
3. ENGAGE the HYDRAULIC PUMP for approximately five minutes.
4. MAKE SURE the AREA IS CLEAR of all unnecessary people BEFORE you operate the controls.
5. OPERATE the PACKER functions through ten (10) cycles while the engine idles. See the Operator's Manual applicable to this unit for operation instructions.
6. Make sure the oil temperature on the site gauge is between 120° and 160° F. If not, repeat step 5.
7. Check for fluid leaks. Repair if necessary.
8. The unit is now ready to go on route.

Battery Disconnect Switch

The battery box is typically located on the street side of the chassis frame near the front of the body, however it can be mounted at a different location on different chassis. Become familiar with the location of the battery box and battery disconnect switch on your unit.

1. You must turn the battery disconnect switch to the OFF position whenever the unit is shut off for any length of time – especially when the unit will be left unattended.
2. You must turn the battery disconnect switch to the ON position whenever you will use the unit.
3. You must check the position of the battery disconnect switch as part of the daily inspection.

NOTICE

Battery cables must be securely anchored and not rubbing other equipment. Cable insulation must be free of damage and abrasion. Inspect weekly.

NOTICE

Always disconnect the battery before welding on the chassis or body.

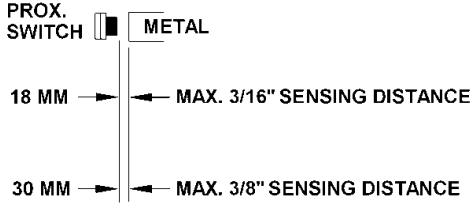
GENERAL INFORMATION

Proximity Switch Troubleshooting

When one or more of a unit's functions do not operate properly and there are proximity switches in the circuits of the unit for these functions, refer to the following table as a guide to find the problem(s).

NOTICE

Heil proximity switches have a Light Emitting Diode (LED) on the switch to indicate when the switch is sensing metal. Green indicates the switch is ON. Yellow indicates the switch senses metal. Some proximity switches only have the yellow light. The proximity switch can sometimes fail, and the LED indicator will remain operable. It is recommended to use the In-Cab display input screen to verify that the proximity switch is sending the proper on/off signal to the controller.

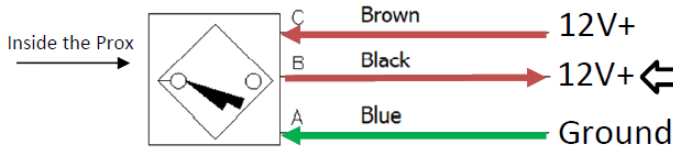
Proximity Switch Troubleshooting Table	
Probable Cause	Remedy
Loose or corroded electrical connections.	Replace the electrical connections.
Damaged Switch Cracked Ferrite core causing the fine internal wire to break. Cracked Ferrite core – but wire is not broken – the sensitivity of switch will increase which causes sensing distance to increase or switch work intermittently as the temperature changes.	DO NOT strike switch to make it work. DO NOT damage the switch when you adjust it. DO NOT adjust switch too close to the metal it is sensing.
Voltage spikes from truck chassis electrical system will break down the internal electronics of the proximity switch.	Make sure the power source from the chassis manufacturer is clean. The body electrical system is protected from voltage spikes.
Improper Sensing Range	Adjust proximity switches to sense metal as follows: 
If the controller input light stays on when a switch is unplugged (the signal wire is carrying +12V DC)	Check the proximity switch electrical circuits for the source of the problem.
If proximity switch LED light is NOT ON.	Check the in-line fuses (Side Loaders with IFM controllers). The in-line fuses are located in the cab. Unplug proximity switch. Check the power wire (terminal C) for +12 VDC with a multi-meter. Check ground signal with multi-meter for continuity to chassis ground. Check the signal wire for continuity to appropriate controller input terminal. If all three (3) wires are good, replace the proximity switch.

GENERAL INFORMATION

WIRING DIAGRAM

3-WIRE DC, PNP (SOURCING)

Normally open



3 Wire Prox

12v and Ground to power up the prox and the 3rd wire sends the 12v back to the controller when metal is detected on the face of the prox. This is called the input signal.

DIMENSIONS

All dimensions in mm unless otherwise specified
Drawing not to scale.

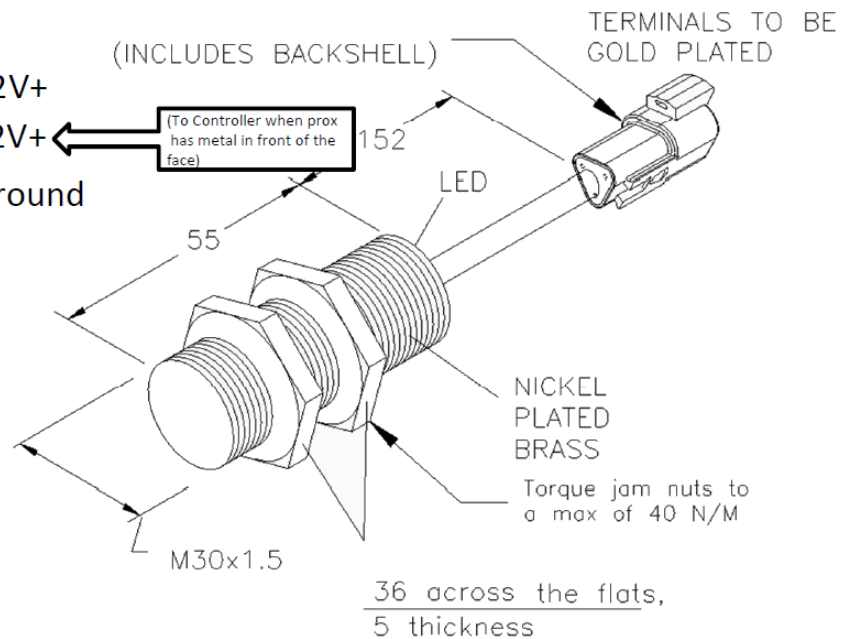


Figure 11.

Decals On The Unit

Make sure you can read all hazard and instruction decals. Clean decals if you cannot read the words.

Replace any decal that is damaged, missing, or not readable.

When you replace a part that has a decal, make sure a new decal is installed on the new part. See the applicable Operation Manual for a complete decal kit and individual decals. Order the decal kit and individual decals from your Heil Dealer or from Heil

Decal Care

It is important that the decals are properly cleaned to make sure that they are readable and do not come off the unit. Use the following steps to clean the decals.

A. General Guidelines

Following these guidelines helps the decals adhere longer.

- Wash the decals with a blend of mild car wash detergent and clean water
- Rinse with clean water
- Let the vehicle air-dry or dry with a micro-fiber cloth
- Do not allow fuels to stay in contact with the decal for an extended period of time. Remove the fuel contamination as quickly as possible
- Do not use carnauba-based wax over the decals
- Do not use a mechanical brush while washing the decals.

B. Pressure Washer Precautions

Pressure washing can cause damage to decals. It can cause the edges of the decals to lift and peel the decal away from the unit. Over time, the decal can fade, crack or chip away.

Use pressure washing only when other cleaning methods are not effective. If you use a pressure washer, use the following precautions.

GENERAL INFORMATION

- Spray nozzle opening: 40° wide pattern
- Spray angle: 65° from vehicle's body (do not use sharp angles – this can lift the decals from the unit)
- Distance of nozzle to decal: 38 cm minimum
- Water pressure: ≤ 5.5 MPa
- Length of time: not more than 30 sec.
- NEVER use a “turbo pressure nozzle”.

C. Remove Difficult Debris

When normal cleaning procedures do not remove difficult debris from the decals, try the following:

- Spot clean the decal with Isopropyl Alcohol and a micro-fiber cloth (rag)
- If these methods do not work on a problem area, call a Heil Dealer or Heil Customer Support.

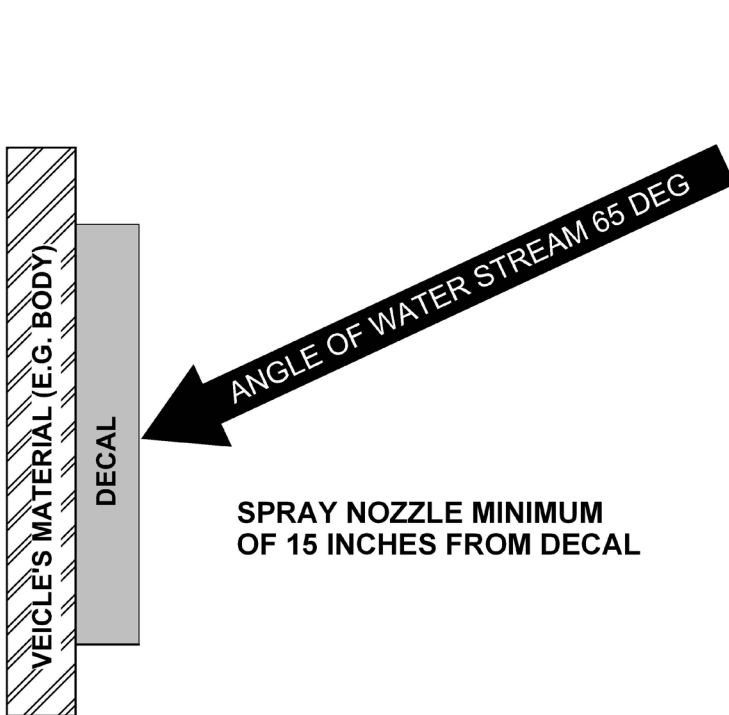


Figure 12. Recommended Technique

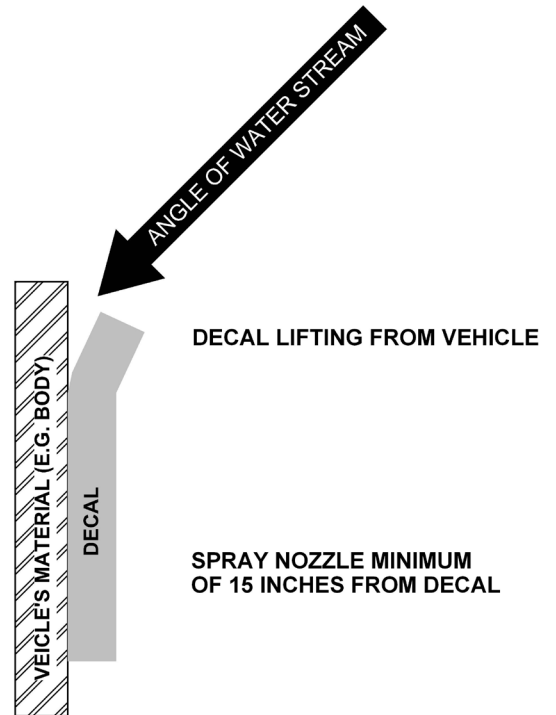




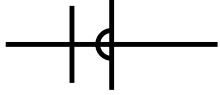




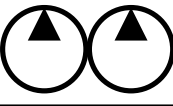

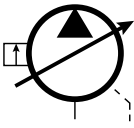
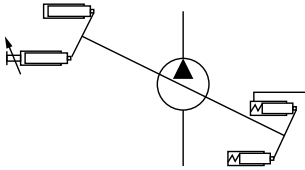





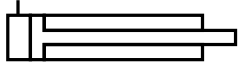
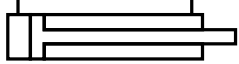
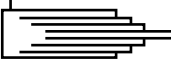

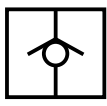
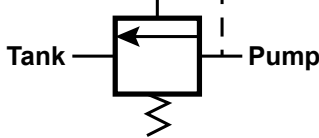
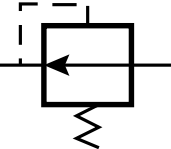
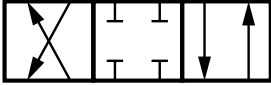
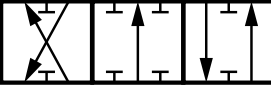

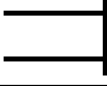
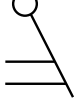



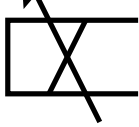
Figure 13. Incorrect Technique

GENERAL INFORMATION

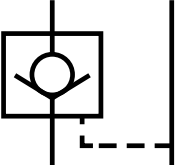
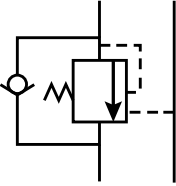
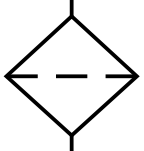
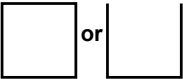
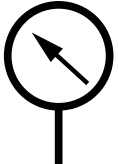
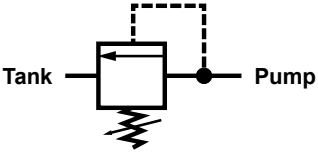


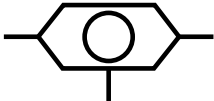
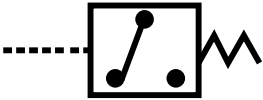

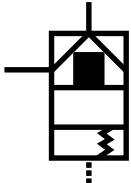
Hydraulic Symbols

	Fluid Lines
	Pilot Lines
	Component Enclosure
	Connection Of Lines
	No Connection Of Lines
	Plugged Port
	Indicates Direction Of Flow
	Fixed Displacement, Unidirectional Pump
	Fixed Displacement, Bi-directional Pump
	Fixed Displacement, Tandem Pump
	Variable Displacement Pump
	Variable Displacement, Pressure Compensated Pump
	Variable Displacement, Pressure Compensated Piston Pump
	Fixed Displacement, Unidirectional Motor
	Fixed Displacement, Bi-directional Motor
	Variable Displacement, Bi-directional Motor

GENERAL INFORMATION













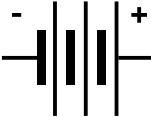

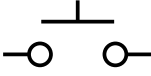
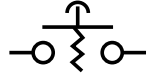



	Single Acting Rod Cylinder
	Double Acting Rod Cylinder
	Single Acting Telescopic Cylinder
	Double Acting Telescopic Cylinder
	Check Valve
	Pilot Operated Relief Valve
	Pressure Reducing Valve
	Three Position, Four Way Closed Center Valve Spool
	Three Position, Four Way Open Center Valve Spool
	Spring Actuator
	Manual Actuator
	Manual Handle Actuator
	Hydraulic Actuator
	Pneumatic Actuator
	Electric Solenoid Actuator
	Electro Proportional Actuator

GENERAL INFORMATION

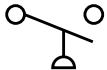
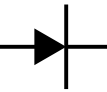
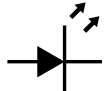

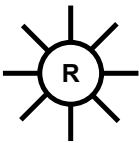
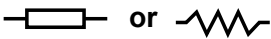
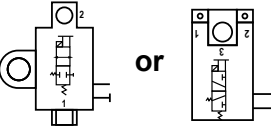
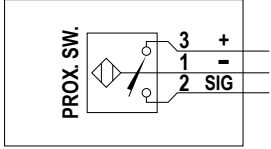
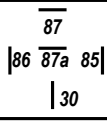
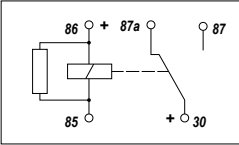
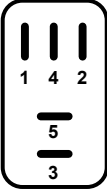
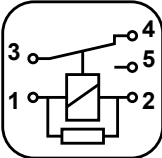
	<p>Pilot Operated Check Valve</p>
	<p>Counterbalance Valve</p>
	<p>Filter, Strainer, Screen</p>
	<p>Reservoir</p>
	<p>Pressure Gauge</p>
	<p>Adjustable Relief Valve</p>
	<p>Orifice (Flow Restrictor)</p>
	<p>Adjustable Orifice (Flow Restrictor)</p>
	<p>Shuttle Valve</p>
	<p>Pressure Switch</p>
	<p>Shut Off Valve</p>
	<p>Logic Valve</p>

GENERAL INFORMATION

Electrical Symbols

	<p>Alternating Current</p>
	<p>Direct Current</p>
	<p>Ammeter (Amp Meter)</p>
	<p>Volt Meter - Measures Voltage</p>
	<p>Watt Meter - Measures Electric Power</p>
	<p>Ohm Meter</p>
	<p>Wire</p>
	<p>Connected Wires</p>
	<p>Unconnected Wires</p>
	<p>Fuse</p>
	<p>Breaker</p>
	<p>Chassis Ground Or Ground</p>
	<p>Battery</p>
	<p>On/Off Switch</p>
	<p>Push to make switch/sometimes momentary</p>
	<p>Momentary Push Button</p>
	<p>Push To Break Switch</p>
	<p>Normally Open Limit Switch</p>
	<p>Normally Closed Limit Switch</p>

GENERAL INFORMATION

	<p>Pressure Switch</p>
	<p>Diode</p>
	<p>LED - Diode</p>
	<p>Lamp</p>
	<p>Indicator Light</p>
	<p>Resistor</p>
	<p>Solenoid Operated 3 Way Pneumatic Valve/MAC Valve</p>
	<p>Proximity Switch</p>
	<p>Relay Socket (General)</p>
	<p>Relay (General)</p>
	<p>Micro Relay Socket</p>
	<p>Micro Relay</p>

SECTION 2

PUMPS

PUMP

Tandem Vane Pump With Monoblock Separate Outlet Flow

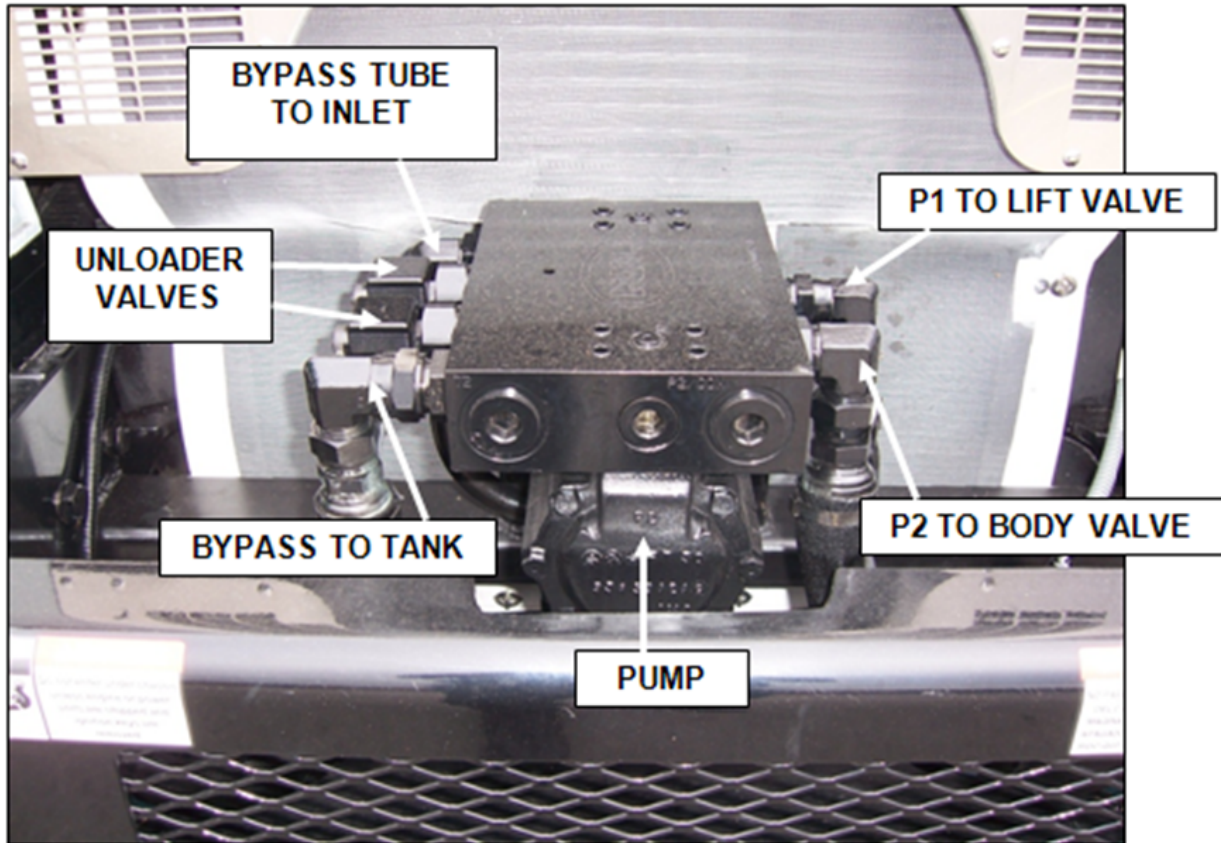


Figure 14. Tandem Vane Pump with Monoblock

In the Monoblock Operate-in-Gear-at-Idle hydraulic system, the pump section (pump 1) closest to the input shaft operates the lift and shuts OFF first. The pump section (pump 2) farthest from the input operates the packer and stays ON at higher RPMs.

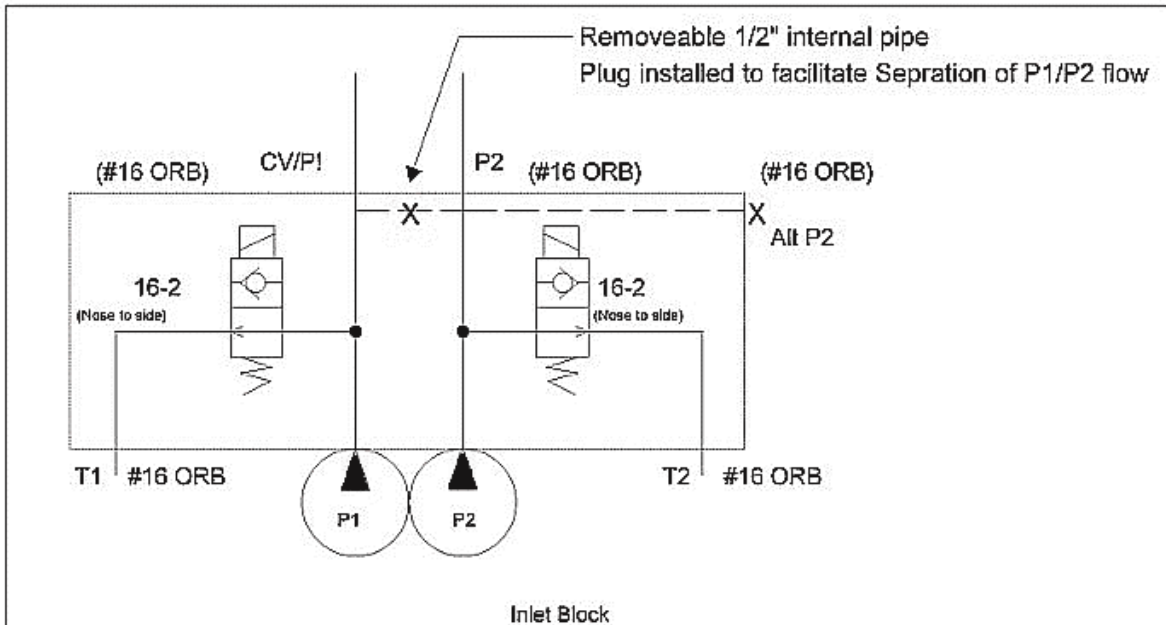


Figure 15. Isolated Flow

PUMP

Tandem Vane Pump O.I.G.A.I. Hydraulic System Troubleshooting

The Operate-in-Gear-at-Idle (OIGAI) system is designed to perform side-loading operations at standard idle speed. It consists of three major components: the monoblock, the tandem Vane pump, and the PTO.

On all systems, the loader is operated from P1, the front section (closest to the pump input shaft). P1 will also run the body function on some units. P2, the rear section (farthest from the input shaft), operates the body section or the packer only, depending on the units.

A. Major Components

P1 controls the lift and body functions, and P2 adds flow while running the packer. The P2 flow is combined with the P1 flow at the outlet of the lift valve.

B. Troubleshooting

Some symptoms of a problem in the pump circuit can be no operation or slow operation of the loader or packer system.

A malfunction of one pump's section will affect the truck's specific function. For example, the packer will work correctly but not the loader or vice versa. However, even though it is possible for both sections to fail, if both the body and lift do not function, problems might be electrical or the PTO.

There are four primary causes for the pump circuit not to operate properly:

1. Low or no voltage to the unloader valve coil
2. Malfunction in the manifold assembly
3. Internal problem with the pump
4. PTO slippage or not engaging

NOTICE

Perform the following test AFTER finding that there is insufficient OR no flow to the loader and/or body valves.

DPF Python: P1 (SV4) will be active at IDLE, and P2 (SV2) will only be active when the packer extend button is pressed.

DPF Python Pump Control Manifold	SV2 - P2 Pump Activation	SV4 - P1 Pump Activation
Arm Only	OFF	ON
Body	OFF	ON
Packer Function	ON	ON

1. With the system power on and the engine idling, test the voltage at the coils according to the activation charts above. It should read at least 10 VDC. If the proper voltage is present and the problem persists, proceed to step (2). If the voltage falls below 10VDC, check the electrical system for issues that could cause a drop or loss of voltage. Examples include a broken or shorted wire, a blown fuse, etc.
 - (a) If the voltage reads 0 V, make sure all conditions are met to activate the pump, such as the side door interlock switch, low oil level switch, RPM reading, etc.
2. Use an ohm meter to check the coil's resistance. If the measurement is less than 5 ohms or more than 20, then the coil is damaged. If so, replace it.
3. Eliminate all cartridge valves from the pump manifold circuit; unfortunately, there are not many options for forcing the fluid out of the pump on those manifolds.
 - (a) To test the P2 section of the pump, the drain hose from the manifold can be capped. This will force the oil out of P2 by overriding the solenoid valve and the relief valve.
 - (b) Then, for the P1 section, you need to replace the solenoid cartridge valve SV4 AND the relief with long cavity plugs, **031-6650-101**.
4. If the first three tests are not positive, refer to the **"PTO Troubleshooting" on page 40** for additional troubleshooting steps.
5. Restart the truck and test its functions. If the lift and packer functions are back to normal operation (with speed and pressure within specifications), replace or repair the necessary parts.

PUMP

Mount Pump Monoblock To Tandem Pump

Follow these steps when mounting a monoblock to the tandem pump.

1. Loosen the rear end cap bolts and front mounting cap bolts to allow slight movement between the P1, center pump, and P2 housings. This aligns the P1 and P2 pressure ports with the monoblock.
2. Mount the monoblock using the eight (8) cap screws with hi-collar lock washers and torque the cap screws.
NOTE: Make sure the o-rings stay in place.
3. Re-torque the bolts on the rear end cap and front mounting cap housings of the pump.
4. If either the unloader valve cartridge or the pilot valve cartridge (that screw into the unloader valve cartridge) is removed, it needs to be re-torqued. Re-torque the unloader cartridge to 110 ft. lbs. and the pilot cartridge (not shown) to 15 ft. lbs.

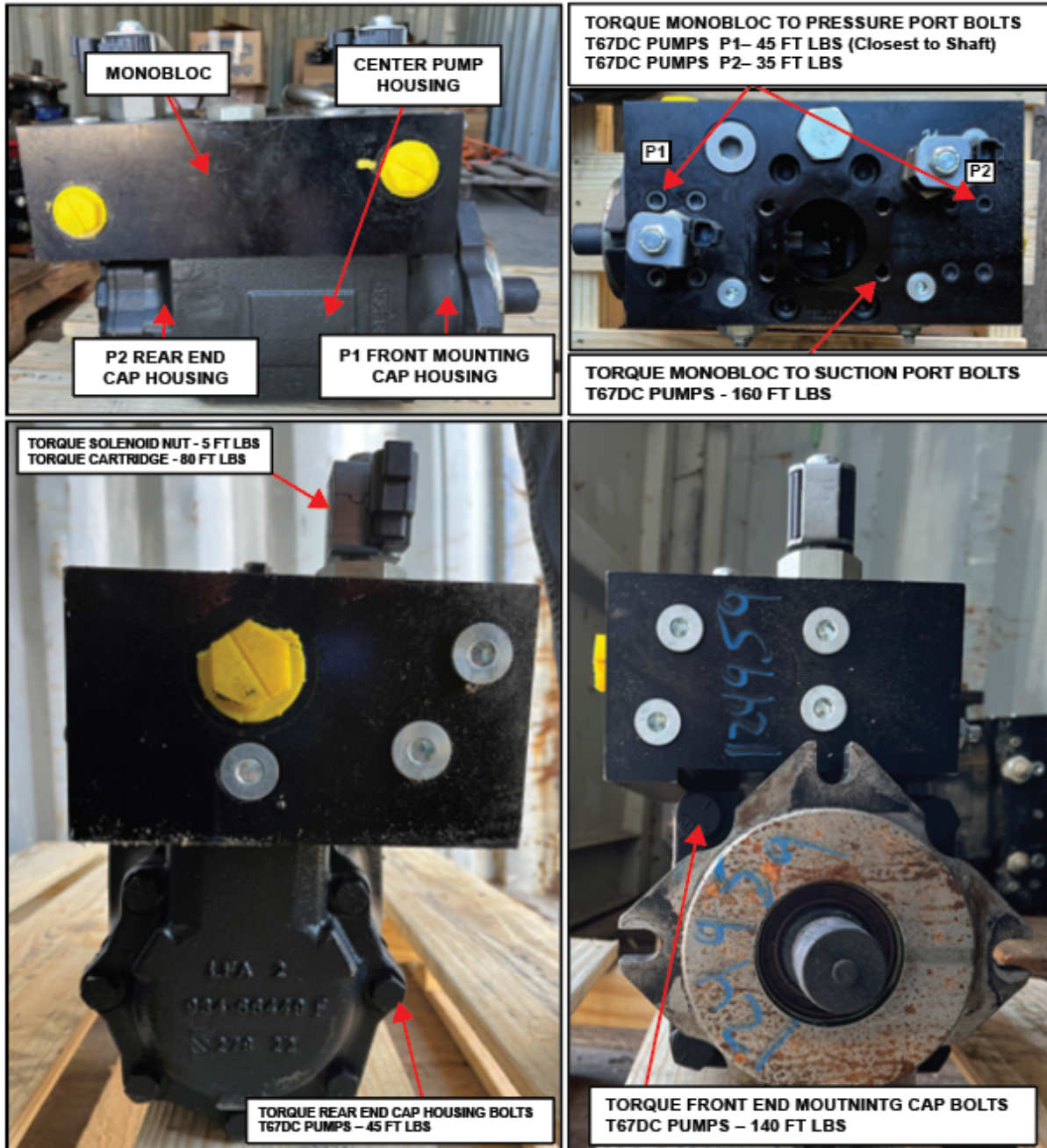


Figure 16.

PUMP

Power Take-Off Families

We use three different Power Take-Off (PTO) families to drive the hydraulic pumps at Heil.

A. Engine Driven PTO

Commonly called FEPTO. We use a crankshaft adapter then install a driveline and mount the pump in front of the engine.

B. Constant Drive Transmission Mount PTO

This PTO is driven by transmission interface gears and will provide power to the pump once the engine is running. They do not contain electrical, hydraulics, or a clutch.

C. Clutch Shift Transmission Mount PTO

This PTO is driven by transmission interface gear and will provide power to the pump once the engine is running, the PTO solenoid is activated with 12V, and it's internal clutch is engaged.

Pump Types

Constant Drive and Clutch Shift Transmission Mount PTO families can be found in three different pump types.

A. Direct Mount Pump

This is a very compact system and pump options are limited. The pump installed directly on the PTO flange has to be relatively small.

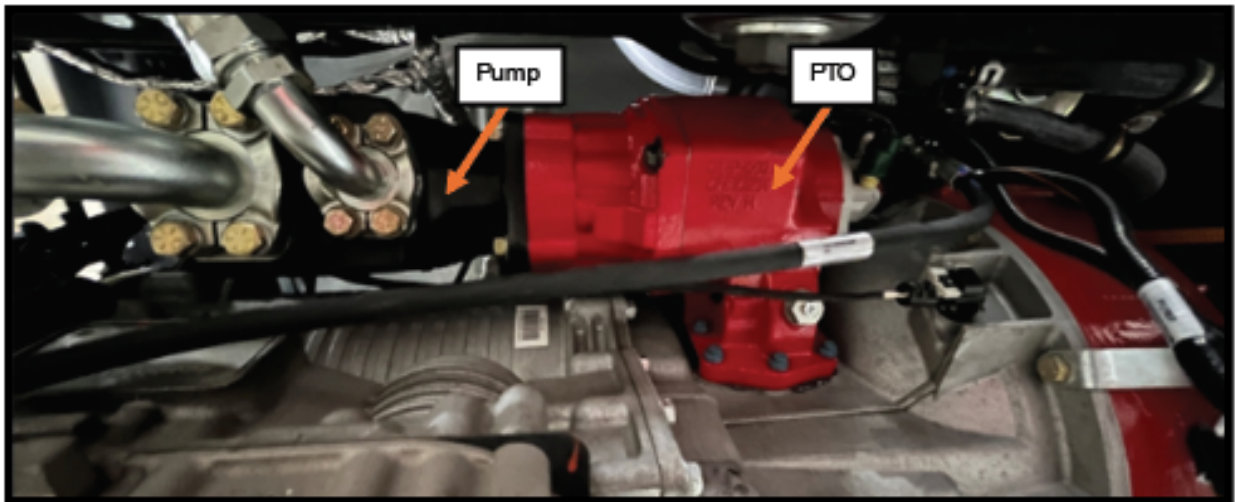


Figure 17. Direct Mount Pump

PUMP

B. Remote Mount Pump

This installation is more complex but offers greater flexibility and better pump options. The PTO and pump are not directly connected; instead, a driveline transfers power from the PTO to the pump that is remotely mounted with a separate bracket.

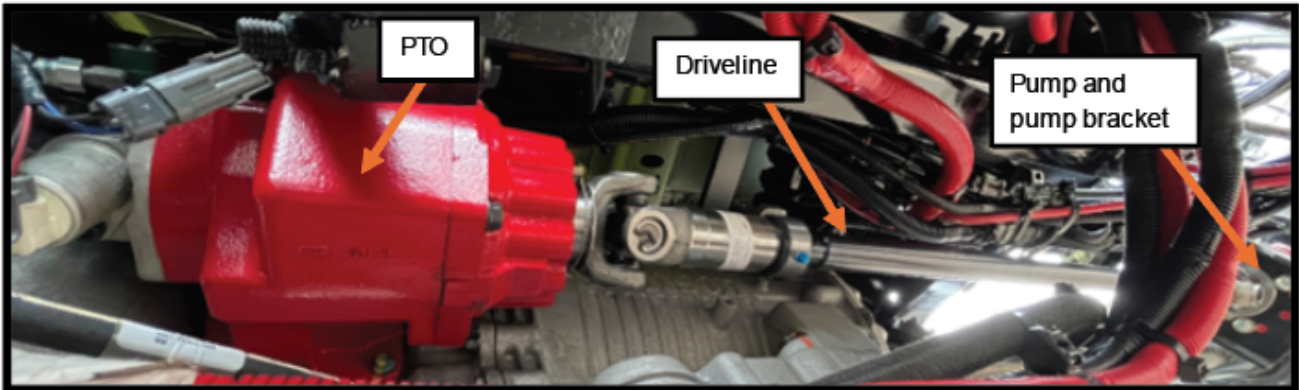


Figure 18. Remote Mount Pump

C. Extended Shaft PTO

This PTO integrates direct-mount and remote-mount pump capabilities. Its built-in driveshaft allows for mounting a pump further from the PTO unit, creating space for a larger pump and manifold system.

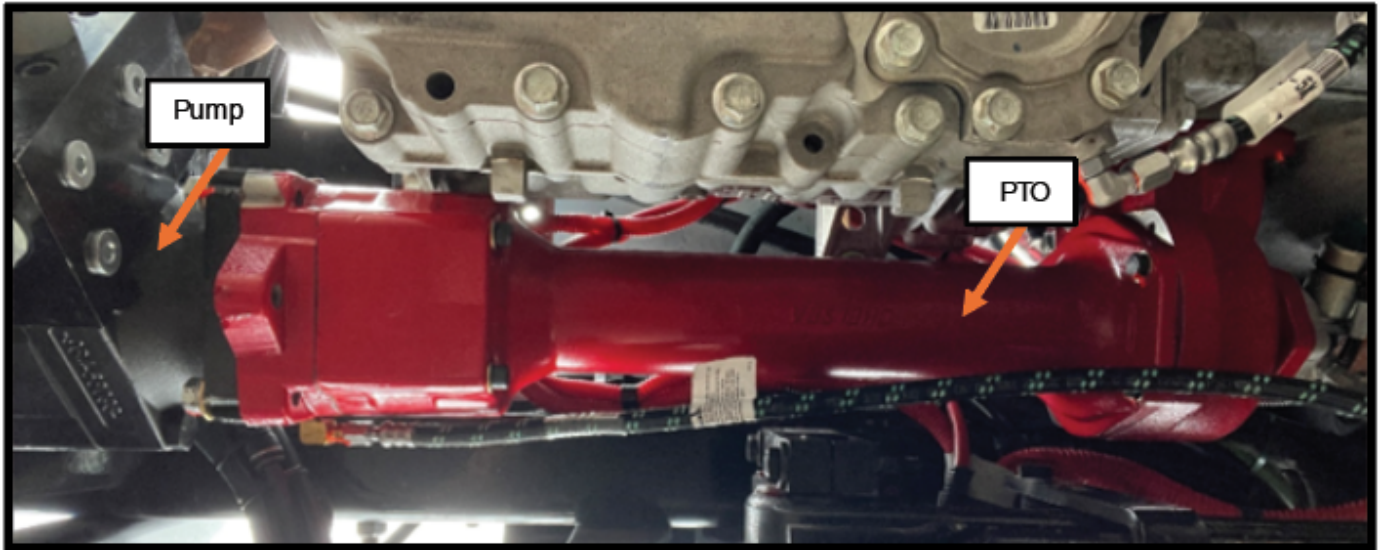


Figure 19. Extended Shaft PTO.

PUMP

PTO Troubleshooting

The following troubleshooting steps are used when the driveline is not equipped or not visible so outside testing must be performed to test if the pump is turning (ex., Clutch Shift Direct Mount or Extended Shaft). The Remote Mount Pump does not require a specific test because the driveline is visible from the outside.

A. Check Voltage at the PTO Solenoid

Heil units have a solenoid valve attached to the drive unit. Once this solenoid is activated, it provides transmission oil pressure to the piston and engages the PTO clutches (see “**Figure 20. PTO Pressure Switch**”).

1. Reading should be over 10V with the **PUMP SWITCH ON** and **ENGINE RUNNING**

NOTICE

On newer units, keep the solenoid connected and back-probe the connector. If the connector is undone, the controller will see an “Open Loop” condition (wire break) causing it to self-protect and shut-down the output.

B. Check Coil Resistance

Unplug the coil connector and measure resistance in Ohms.

1. Coil resistance should be 8 ohm +/- 20%

C. PTO Pressure Switch Function

Only complete the following check if a PTO pressure switch is installed on the assembly.

1. This is normally an open switch. Which means, when the transmission oil pressure reaches the pressure set-point (via the solenoid activation) it will close it's contact and allow it to send a signal to the controller
 - a. The PTO pressure switch is correctly activated when the blue wire switches to ground

NOTICE

On newer units, keep the switch connected and back-probe the connector. If the connector is disconnected, the controller will see an “Open Loop” condition when it is expecting signal feedback. Also, the in-cab display may show a warning when unplugging the switch.

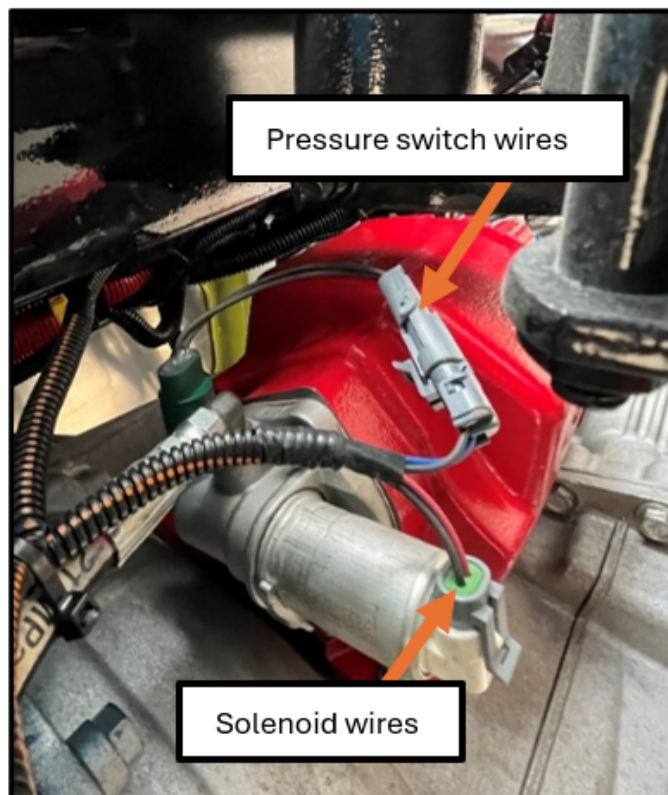


Figure 20. PTO Pressure Switch

PUMP

D. Transmission Pressure Check

This is a multi-step process and each step of the following process will guide you through the failure mode.

1. Install a 500 PSI pressure gauge to the feed line between the transmission port and the PTO.
 - a. Tee-in the so the PTO will not engage
 - b. Start the unit and let the engine run at idle
 - (1) Expected Pressure:
 - (a) Pump OFF = 170 - 230 PSI
 - (b) Pump ON = 220 - 300 PSI



Figure 21. Transmission Pressure Feed to PTO

2. If pressure is the same pump **OFF** vs pump **ON**, there may be a **missing wire** or **TCM not configured correctly**
3. If pressure difference is greater than **40 PSI**, there is an internal leak such as:
 - a. Solenoid valve bypassing to sump
 - b. Clutch piston seal bypassing to sump
4. If pressure with pump OFF is lower than specifications, it's possible:
 - a. the Solenoid valve is bypassing to sump
 - b. there is a Transmission pressure problem (if so, follow the next step)
 - (1) Install a pressure gauge directly on the transmission port.
 - (2) Check to see if the pressure is within the specifications provided above

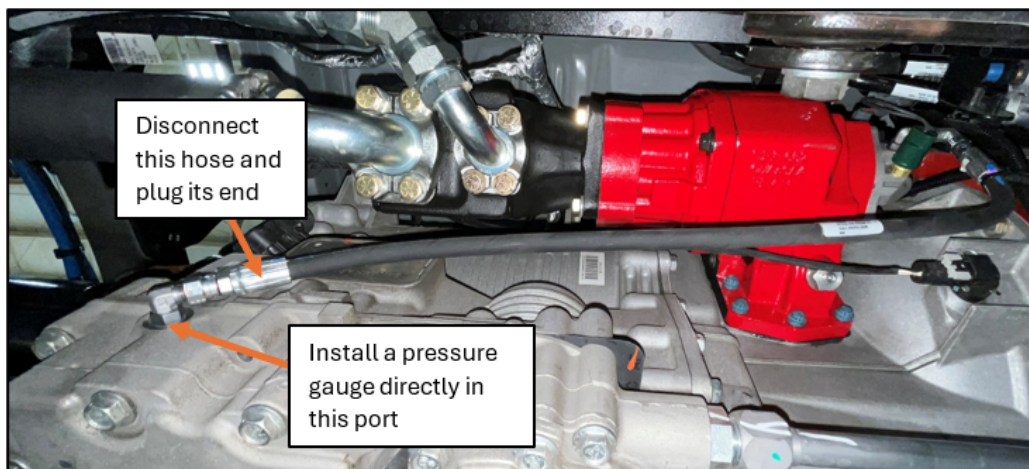


Figure 22. Transmission Pressure Measurement

PUMP

E. Clutch Slippage Test

Applies to the Chelsea 890 PTO **only**.

1. Only the Chelsea 890 PTO has the clutch housing separated from the drive unit.
2. Before testing, the unit **MUST** be completely cooled down to **room temperature**.
3. Using an infrared thermometer, measure the temperature by aiming the thermometer at the drive unit and clutch housing.
 - a. Take note of the reading and the exact location where the laser was pointing.
4. Start the truck, turn the pump ON and deadhead a hydraulic function for a minimum of **five minutes**.
5. Shutdown the engine then take the same measurements and note the results as described in line 3.
 - a. If the clutch housing is much hotter than the drive unit, most likely the PTO clutches are slipping.
 - (1) Clutch housing temperature will depend on the transmission temperature.
 - (2) Example, 10F on a 300F reading is not a concern, however, 10F on a 100F reading is a concern.

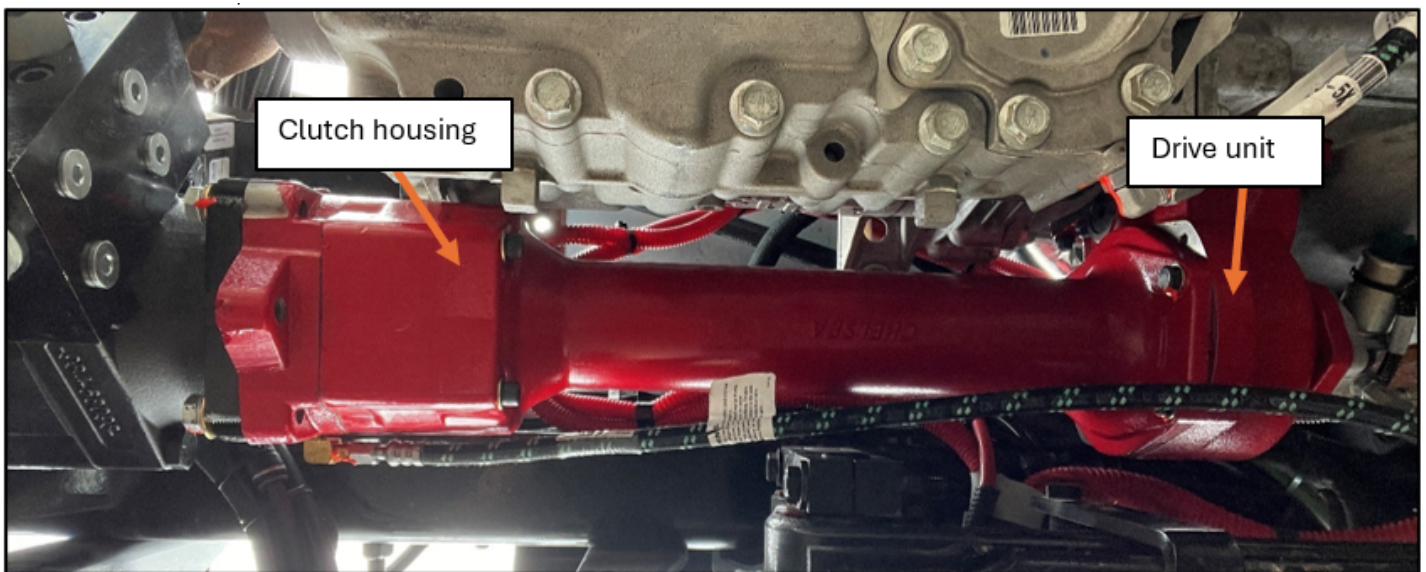


Figure 23. Clutch Slippage Test

SECTION 3

LIFT ARM

LIFT ARM

Nomenclature

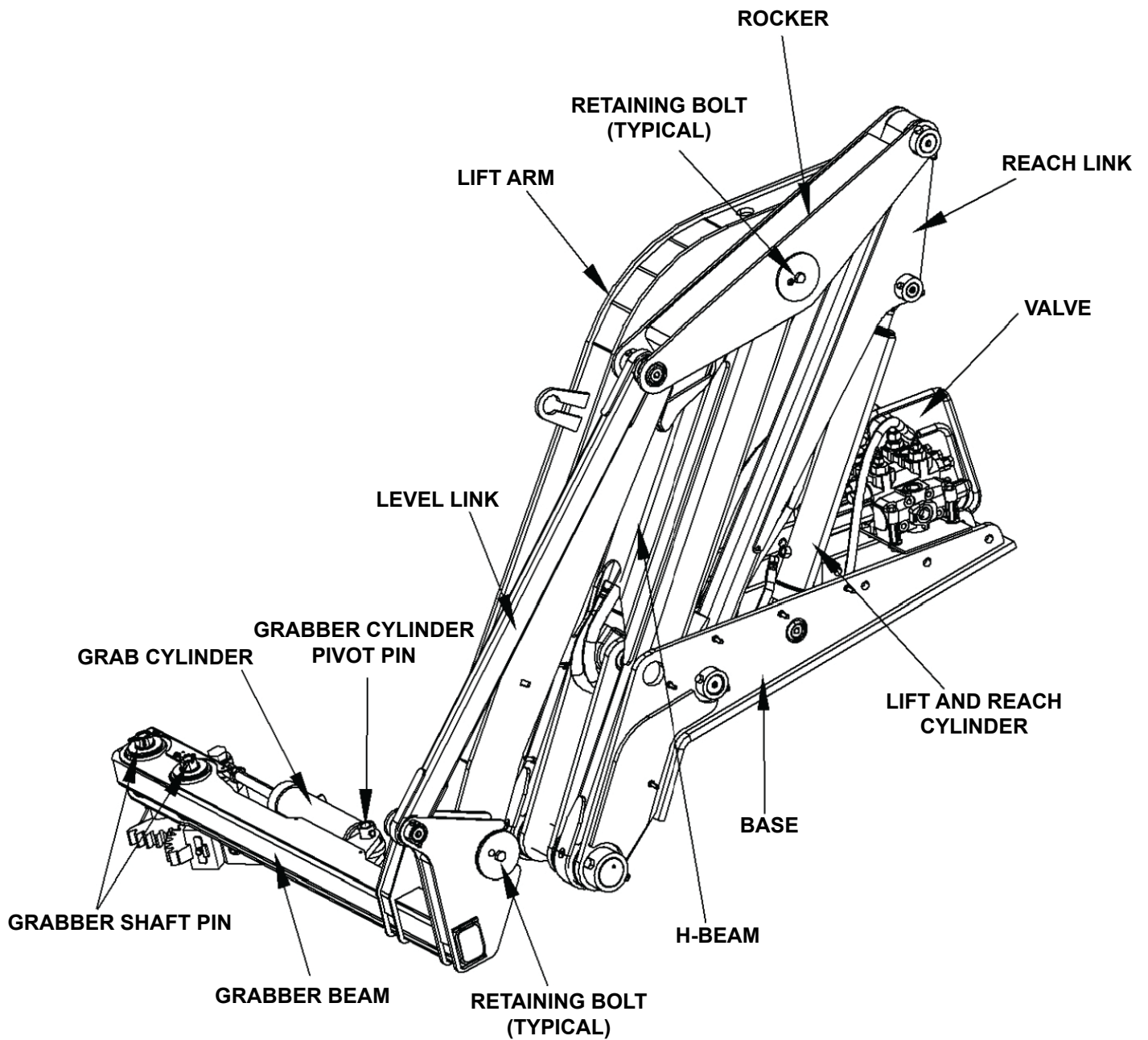


Figure 24.

LIFT ARM

Specifications

NOTICE

All pressures are +/- 100 PSI at operating temperature. See “Lift Control Valve Pressure Adjustments” on page 54 for valve adjustment procedures.

A. Hydraulic Cylinders	
Lift and Reach	3.1” Bore X 16” Stroke
Grab	3.1” Bore X 8” Stroke
Level	2.48” X 14.48” Stroke
B. Body	
Main Relief	2500 PSI
CNRG® Tailgate Raise	1500 PSI
C. Lift Valve	
Main Relief Valve Pressure	2300 PSI
Reach In/Out	2500/1250 PSI
Reach Relief In/Out	2500/1250 PSI
Arm Up/Down	2500/1250 PSI
Packer Pressure Switch	2200 PSI
D. Grabber	
Relief	1250/1250 PSI
E. Cycle Times	
Lift Cycle Time Standard Python	7 - 9 Seconds
Packer Cycle Time	12-16 Seconds
F. Lift Capacity (@700 RPM idle)	
Standard Python - At the Body	800 lbs
Standard Python - 6 Feet and Beyond	645 lbs
Hydraulic Pump	31 GPM @ 750 RPM @ 2500 PSI

LIFT ARM

Lift Arm Preventive Maintenance Chart

Maintenance performed on a regular schedule is preventive maintenance. Normal maintenance intervals are based on an 8-hour day and average operating conditions. Severe use or adverse conditions make it necessary to do this maintenance more frequently.

Watch the **Preventive Arm Lift Maintenance** video on the **Heil Service Shack**.

REF NO.	ACTIVITY	INTERVAL	SERVICE/CHECK
1	Grease Lift	(20 hrs)	See the Python Lift Lubrication Guide or the lubrication decal on the lift arm.
2	Check Pin Retaining Bolts – Tighten	Weekly (40 hrs)	Check for broken bolts. This may indicate bearing or pin damage. Replace the bolt and the bearing and pin retained by the bolt. Use anti-seize compound on any pins or bearings that are replaced.
3	Hydraulic Plumbing	Weekly (40 hrs)	Check for damage, worn, or leaking hoses, tubes or fittings. Replace as necessary. NOTE: Do not replace steel tubes with hoses.
4	Cycle Times (900 maximum RPM while operating lift)	Weekly (40 hrs)	Check lift operation. Normal engine RPMs should not exceed 900. The lift operates at approximately 7 – 8 second cycle time. Cycle times includes grab, lift, lower and release.
5	Check Mounts	Weekly (40 hrs)	Make sure chassis rail is undamaged. Make sure chassis bolts are present and tight. Check brackets for cracks. Make sure lift bolts are present and secure.
6	Check Lift Mount Base Bolts	Weekly (40 hrs)	Visually inspect mounting bolts for security and movement. Check the nuts and bolts to make sure the weld is secure. See Check Lift and Torque Mount Base Bolts for bolt replacement instructions.
7	Lift Stress or Weld Cracks	Weekly (40 hrs)	Check lift for any structural cracks or cracks in the areas of welds. Cracks must be ground out and repaired. If cracking continues replace the affected parts. See Lift and Weld Cracks Decision Tree in this section.
8	Grabber Assembly with Belt	Weekly (40 hrs)	Inspect belt condition for wear, cuts or damage. Replace if present.
9	Hoses	Weekly (40 hrs)	Check for tears, wear or holes and replace as necessary.
10	Fiber Guards	Weekly (40 hrs)	Check for tears or holes and replace as necessary.
11	Shaft Retainer Bolts	Monthly (200 hrs)	Make sure both pins are present and tight. If one pin fails, replace both pins. Make sure the collar key is present. If one fails.
12	Grabber Cylinder Pivot Bolt	Monthly (200 hrs)	Check for tightness.
13	Hydraulic Relief Valves	Twice Yearly (1000 hrs)	Check main relief and port reliefs for proper settings. For more information see Lift Control Valve Pressure Adjustments in this section.

LIFT ARM

Python Lift Lubrication Guide

Clean fittings before applying grease and always pump enough grease into joint to remove the old grease. Wipe off excess grease. Lubricate movable mechanical parts without fittings every 60 days with non-detergent engine oil.

NOTICE

If a grease zerk is missing or damaged, replace as necessary.

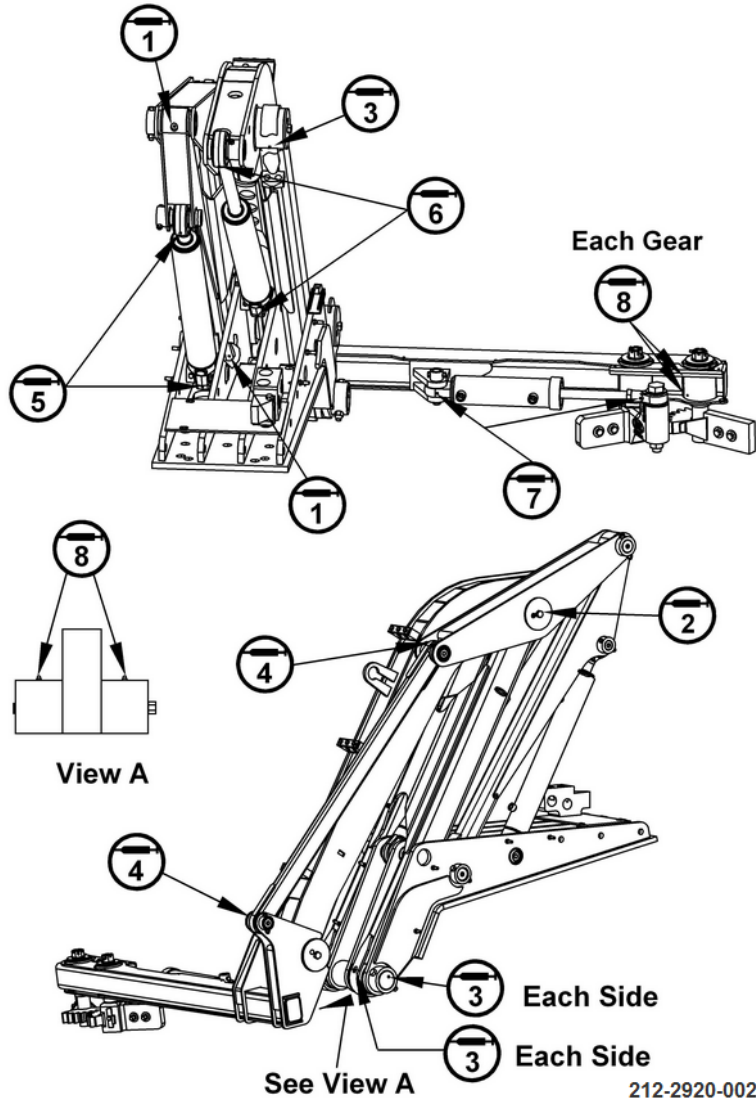


Figure 25. Python Lift Lubrication Guide

REF NO.	DESCRIPTION	QTY.	FREQUENCY
1	Reach Pivot Link	4	Every 20 Hours
2	Rocker Assembly	1	Every 20 Hours
3	H-Beam Assembly	6	Every 20 Hours
4	Level Link	2	Every 20 Hours
5	Reach Cylinder	2	Every 20 Hours
6	Lift Cylinder	2	Every 20 Hours
7	Grabber Cylinder	2	Every 20 Hours
8	Grabber Beam	4	Every 20 Hours

LIFT ARM

Check Lift And Torque Mount Base Bolts

When the Lift Base Mounting bolts weld is cracked, you must replace the bolts and nuts. The goal of this torque method is to achieve a 59,000lb clamp load consistently. A torque multiplier is not accurate enough at the values required. This method (torque/turn) is accurate and repeatable.

This method is required for field installation where proper torquing equipment may not be available. It also allows proper bolt torquing using standard wrenches and “cheater” bars.

A. Tools Required

Quantity	Tool
1	Torque wrench (1" and 5/8" sockets)
1	Combination wrench (1" and 5/8")
1	Welding equipment
1	Personal protective equipment

B. Parts Required

See Parts Manual for replacement parts.

C. Before Replacing Lift Mount Bolts

1. Visually inspect the lift mount bolts on both the street side and curb side. See the illustration for locations.
2. Make sure the bolts are secure and there is no movement.
3. Make sure welded bolts do not have cracks.
4. If any lift mount bolt is loose, cracked or broken, replace all bolts. Use only the parts specified. Lower grade parts are not acceptable.
5. After torquing, bolts and nuts cannot be reused. To install and torque bolts, complete section D below.

D. Replace Lift Mount Bolts

1. Make sure the threads on both the bolt and nut are dry (no lubrication) before installation.
2. Install bolt into lift base and lift mount brackets.
3. Thread nuts onto bolts and hand tighten.
4. Use a torque wrench with a combination wrench to tighten the nut to 100 ft-lbs., holding bolt-head and turning nut.
5. Mark nut, washer and lift base with a paint marker at a corner.
6. Count around 3-1/2 nut flats and mark the center of the nut, washer and lift base.

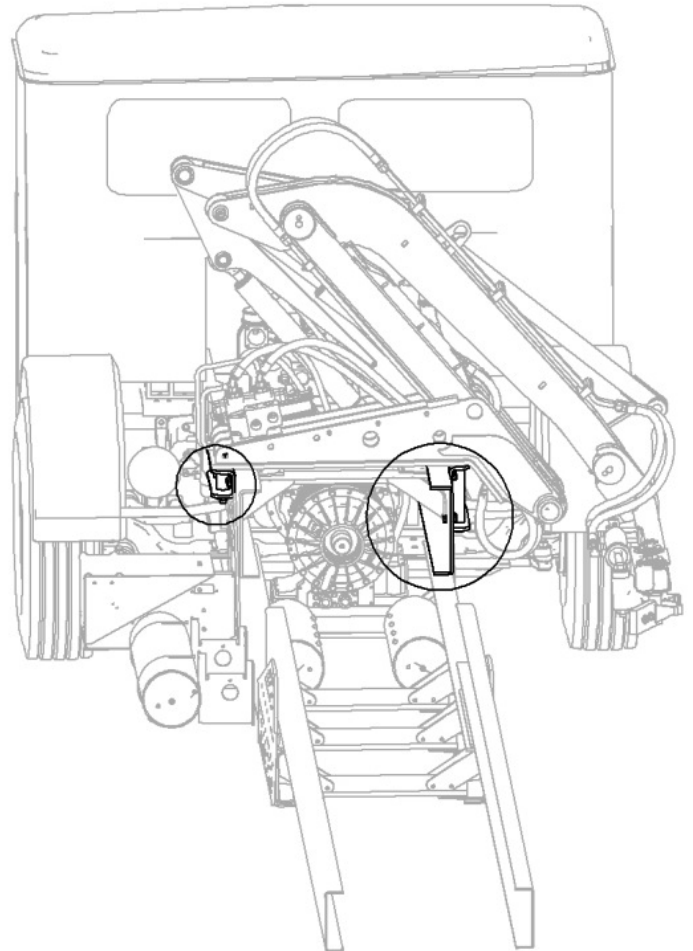


Figure 26. Lift Mount Base

LIFT ARM

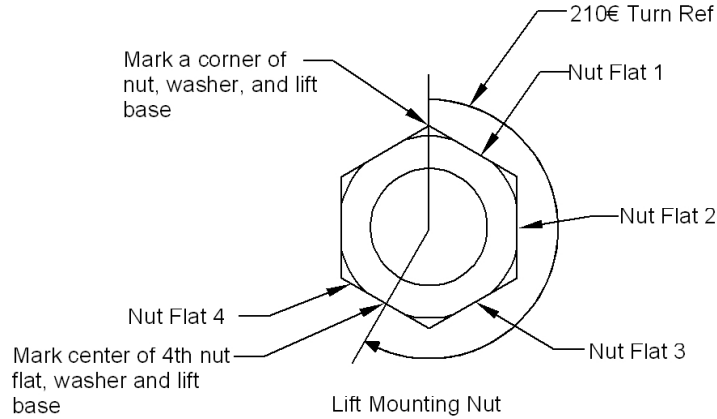


Figure 27. Lift Mount Bolt

7. Use a wrench and extension handle to turn the nut's marked corner to the second mark at the center of the fourth nut flat. It is critical that the head of the bolt is held in place and not allowed to rotate further. Brace the wrench handle as necessary.
8. Weld the nut to the bolt as specified. Welding the nut prevents the nut from loosening and prevents the bolt and nut from being reused.
9. Do not remove paint marks.

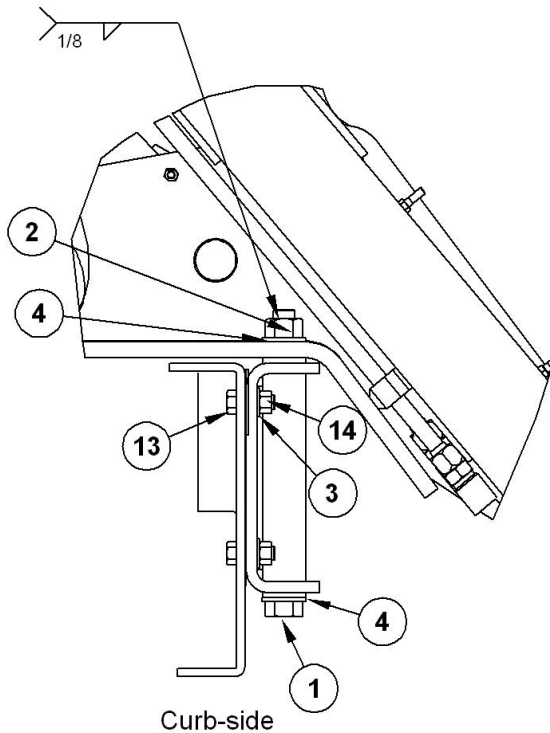


Figure 28. Lift Mount Bolt Location

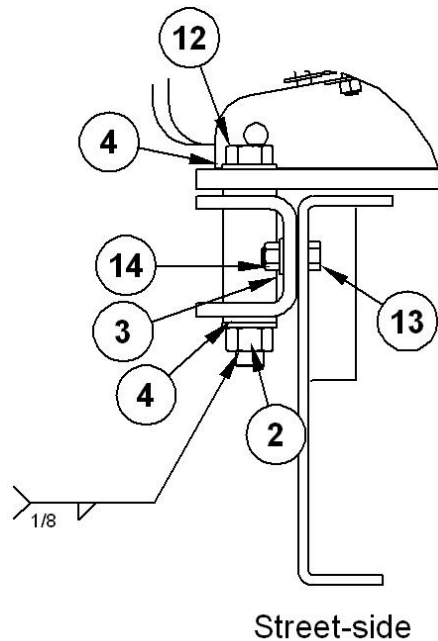


Figure 29. Lift Mount Bolt Location

LIFT ARMUniversal Belt And Tri-Cuff Grabber Adjustments

A. 60-90 Gallon Belt Grabbers

Adjust the grabber belt length so the distance between the roller on the inner arm and the outside roller is 30" (+/- 1"). See illustration below.

NOTICE

The grabber belt holes on the inside end of the belt are farther apart to make longer adjustments. The holes on the outside end of the belt are closer together to make shorter adjustments.

NOTICE

When the grabbers are used with the Python Lift, adjust the outer rollers so that they do not touch each other when the grabbers are completely closed. This distance should be at least 2" apart.

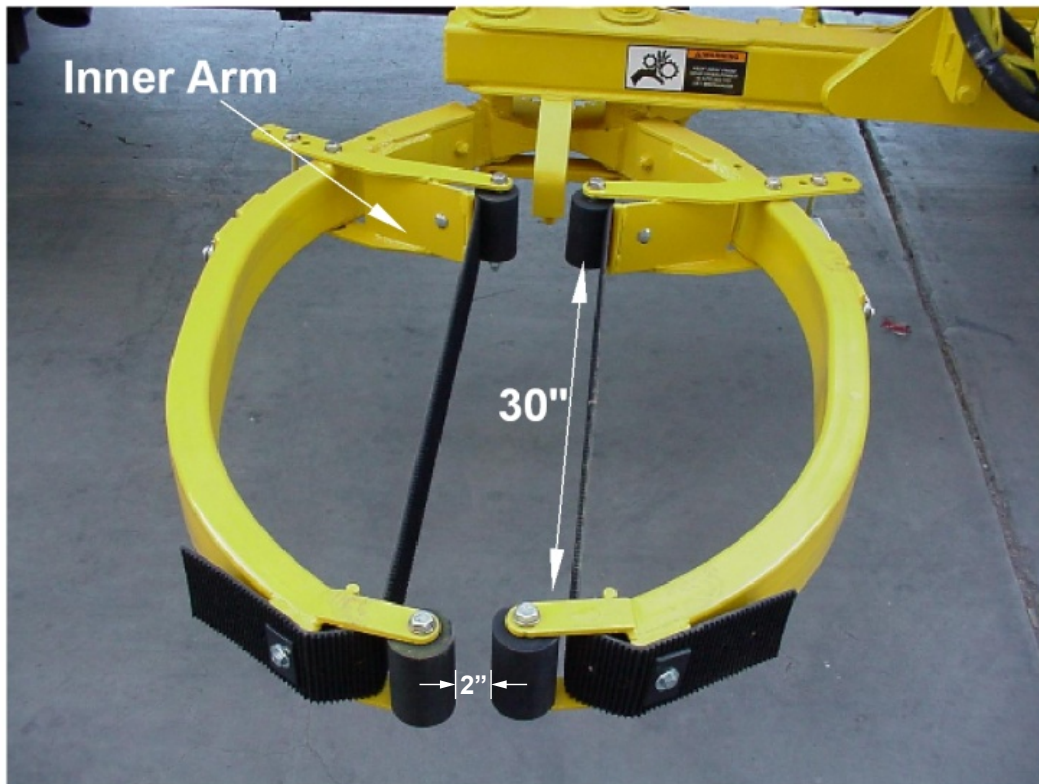


Figure 30. Gallon Belt Grabbers

LIFT ARM**B. 90-300 Gallon Belt Grabbers**

Adjust the grabber belt length so the distance between the inner arm and the outside roller is approximate 30" (+/- 1") to obtain a firm grip for smaller containers. The total overall length of the grabber belt must be set to obtain a firm grip for larger containers. See illustration below.

NOTICE

Do not adjust the total overall belt length too far as this may cause the grabber belt to touch or wear against the outer arm.

NOTICE

When used with the Python lift the grabbers should be adjusted so the outer rollers do not touch each other when the grabbers are completely closed. This distance should be at least 2" apart.

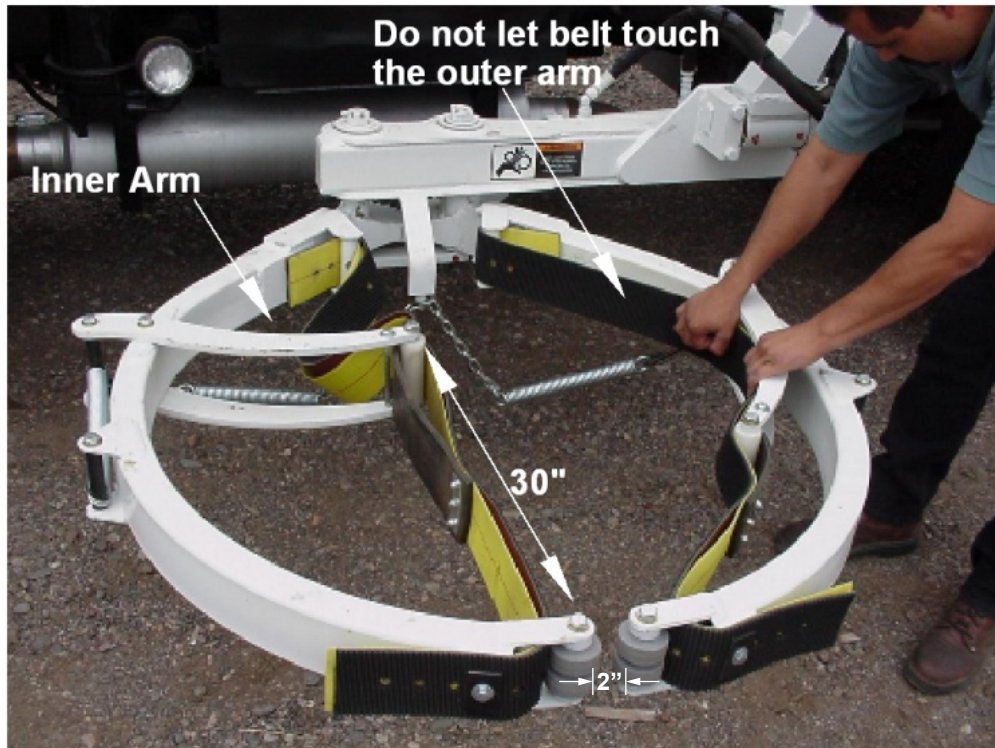


Figure 31. 90-300 Gallon Belt Grabbers

LIFT ARM

C. 30-110 Gallon Tri-Cuff Belt Grabbers

Adjust the grabber belt length so the distance between the roller on the inner arm and the outside roller is 30" (+/- 1"). See illustration below.

NOTICE

The grabber belt holes on the inside end of the belt are farther apart to make longer adjustments. The holes on the outside end of the belt are closer together to make shorter adjustments. The three bolts on the end of the grabbers will align once properly adjusted.

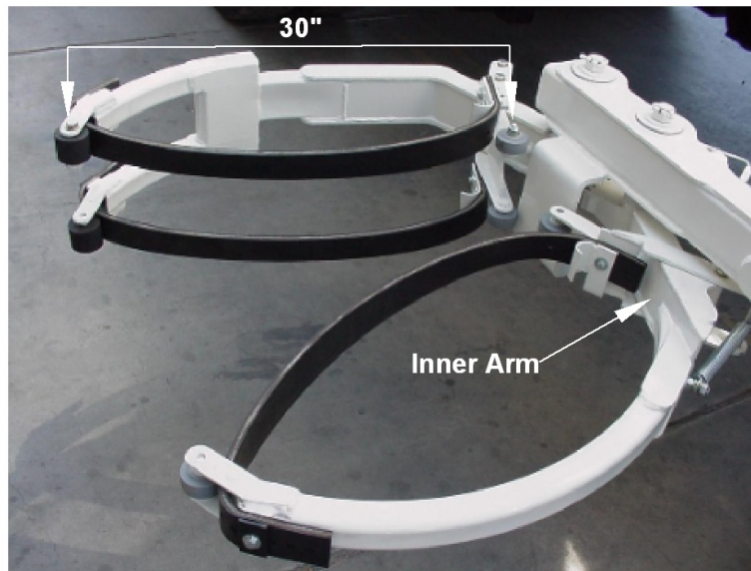


Figure 32. 30-110 Gallon Tri-Cuff Belt Grabbers



Figure 33. Tri-Cuff Bolt Alignment

LIFT ARM

Lift-Stowed And Grabbers Open Proximity Switches

Adjust the proximity switches to deactivate if grabber or arms are extended outside the width of the vehicle. You will need a 15/16" wrench. The grabbers open proximity switch should be adjusted so that it is activated when the grabbers are fully open. To make adjustments to the lift-stowed (lift-in) proximity switch, you will need a 7/16" wrench. The lift-stowed proximity switch should be adjusted so that it is activated when the lift arm is fully stowed or retracted. See the figure below.

Watch the **Preventive Arm Lift Maintenance** video on the **Heil Service Shack**.



Lift Arm Proximity Switches



Grabbers Open Proximity Switch



Lift-Stowed Proximity Switch

Figure 34. Lift Arm Proximity Switches

LIFT ARM

Lift Control Valve Pressure Adjustments

The lift control valve has adjustable hydraulic pressure settings that should be checked twice yearly (1000 hrs). All lift valve pressure adjustments are made with the engine running at idle. In general, hydraulic pressures are normally increased by turning the pressure adjusting screw clockwise. Follow the steps below to adjust the pressures on the Python lift arm.

Watch the **Preventive Arm Lift Maintenance** video on the **Heil Service Shack**.

Quantity	Tool
1	Personal protective equipment
1	Pressure gauge (0-5000)
1	1-1/2" Wrench
1	15/16" Wrench
1	7/16" Wrench
1	1/8" Wrench
1	1/2" Hex Wrench
1	Wire cutters
1	Slotted Screwdriver

⚠ WARNING

Moving equipment can be dangerous to bystanders. Serious injury or death can occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

⚠ WARNING

The hydraulic fluid is under pressure and may spray while you open the connection. Hydraulic fluid may cause damage to your eyes, hands or skin. Wear protective eye glasses, gloves and other clothing as necessary to protect you from the hydraulic fluid.

NOTICE

This procedure requires two properly trained technicians.

Before checking or adjusting the pressure settings, you will need to find a properly trained technician to help. When you are able to recruit some help, create hand signals to use while working together. Nonverbal communication will be key to keeping yourself and any bystanders safe while working with the Python lift arm.

The trained technician will operate the controls from inside the cab, while you will be working on the pressure settings from the street side.

To start checking the lift arm valve pressures, you will need to put the lift arm in manual mode.

A. To Place the Lift Arm In Manual Mode

1. Make sure the key switch is on.
2. The system power is on.
3. Then hold the grabber open and grabber close buttons at the same time, until the alarm stops sounding.

LIFT ARM

B. Checking and Making Adjustments

1. Connect a 0-5000 psi pressure gauge to the gauge port on the inlet of the valve.

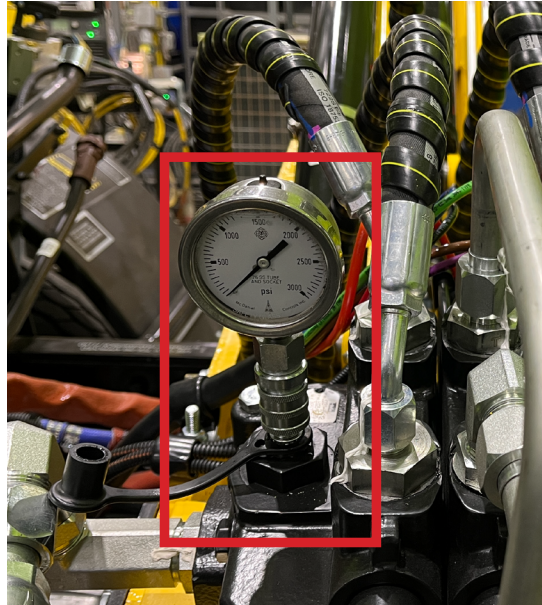


Figure 35. Inlet Section Pressure Gauge Port

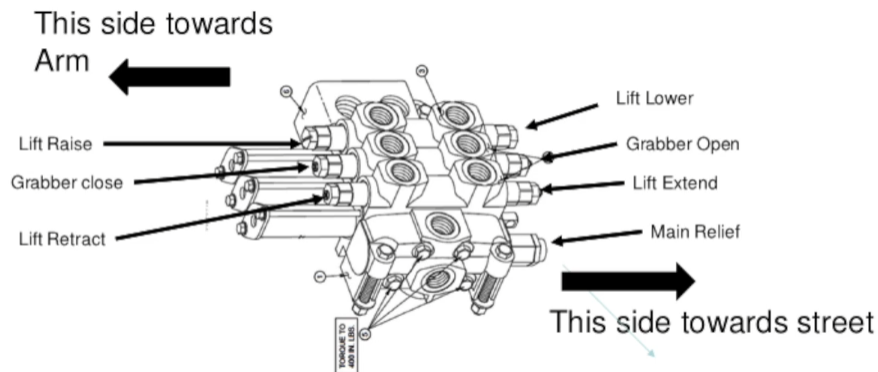


Figure 36. Seven Python Valve Pressure Settings

LIFT CONTROL VALVE RELIEF PRESSURE SETTINGS (PSI)			
LIFT MAIN RELIEF	LIFT UP (RAISE) / DOWN (LOWER)	GRABBER OPEN / CLOSE	LIFT IN (RETRACT) / OUT (EXTEND)
2300	2500 / 1250	1250 / 1250	2500 / 1250

2. To check the main relief on the lift valve, dead head any function that has a higher set point - like lift retract or lift raise, and hold that function while monitoring the pressure gauge. (Dead heading is when you extend or retract a cylinder to its maximum mechanical limit, and continue to maintain pressure for that circuit.)
3. To make adjustments to the main relief, you will first need to loosen the jam nut with a 1-1/2" wrench.
4. To make the adjustment you will need a 1/2" hex wrench, or a socket with ratchet.
5. To check the lift raise and lift retract port relief valves, you will need to raise the main relief one 1/2 turn clockwise so that it is high enough to allow you to see the 2500 psi.
6. Check all port reliefs by dead heading each function, one by one.
7. To make adjustments to the lift lower or lift raise port relief valves, you will need to loosen the jam nut with a 15/16" wrench. Then make the adjustment with a slotted socket bit, or a large slotted screwdriver.

LIFT ARM

8. To make pressure adjustments to the lift extend, lift retract, grabber open, or grabber close port relief valves; you will need to loosen the jam nuts with a 7/16" wrench. Then make the adjustments with a 1/8" wrench or socket with ratchet.
 9. After making pressure relief adjustments, you will need to bring the main relief setting back down to 2300 PSI. To do this, view your pressure gauge while dead heading lift retract. Lower the main relief until the gauge reads 2300 PSI, and then tighten the jam nut.
 10. After making pressure adjustments, make sure that all port relief valve jam nuts are tight. Then clean up your work area by removing the pressure gauge, replacing the dust cover over the gauge port, and wiping down the area.
- C. To Place the Lift Arm In Automated Mode
1. Toggle On/Off by holding grip and release buttons simultaneously five (5) seconds (until the in-cab alarm stops sounding).
 2. Closing grabbers will initiate Auto-Lift sequence. Must hold grabber closed button to continue cycle.
 3. Container will raise and retract automatically to the dump position.
 4. Operator manually replaces container to desired position on the ground
 5. Pressing and holding grabber open button will return lift to stowed position.
 6. See **Body Controller Hardware** for more information

Note: Toggle Auto Lift via the display by performing either step one (standard) or step two (optional).

1. From the ON-ROUTE screen (identified by the blue highlighted field), tap AUTO LIFT.



Figure 37. Standard Feature

2. Press the AUTO LIFT icon on the push button panel.

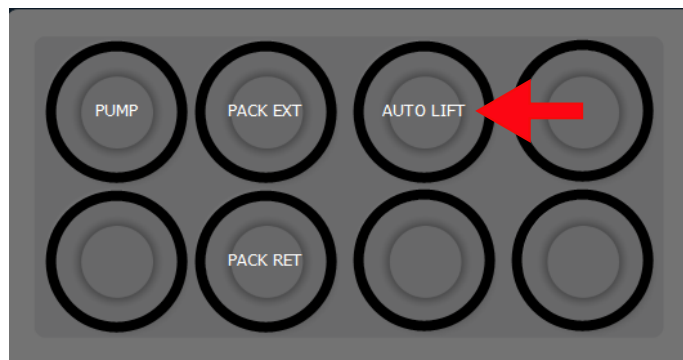


Figure 38. Optional Feature

LIFT ARM

Lift Control Valve

Some key areas are shown below on the standard lift control valve. The Python Lift uses a precision-machined parallel control valve that does not have interchangeable spools. Each spool is matched to the individual bore. See “**Lift Control Valve Pressure Adjustments**” on page 54.

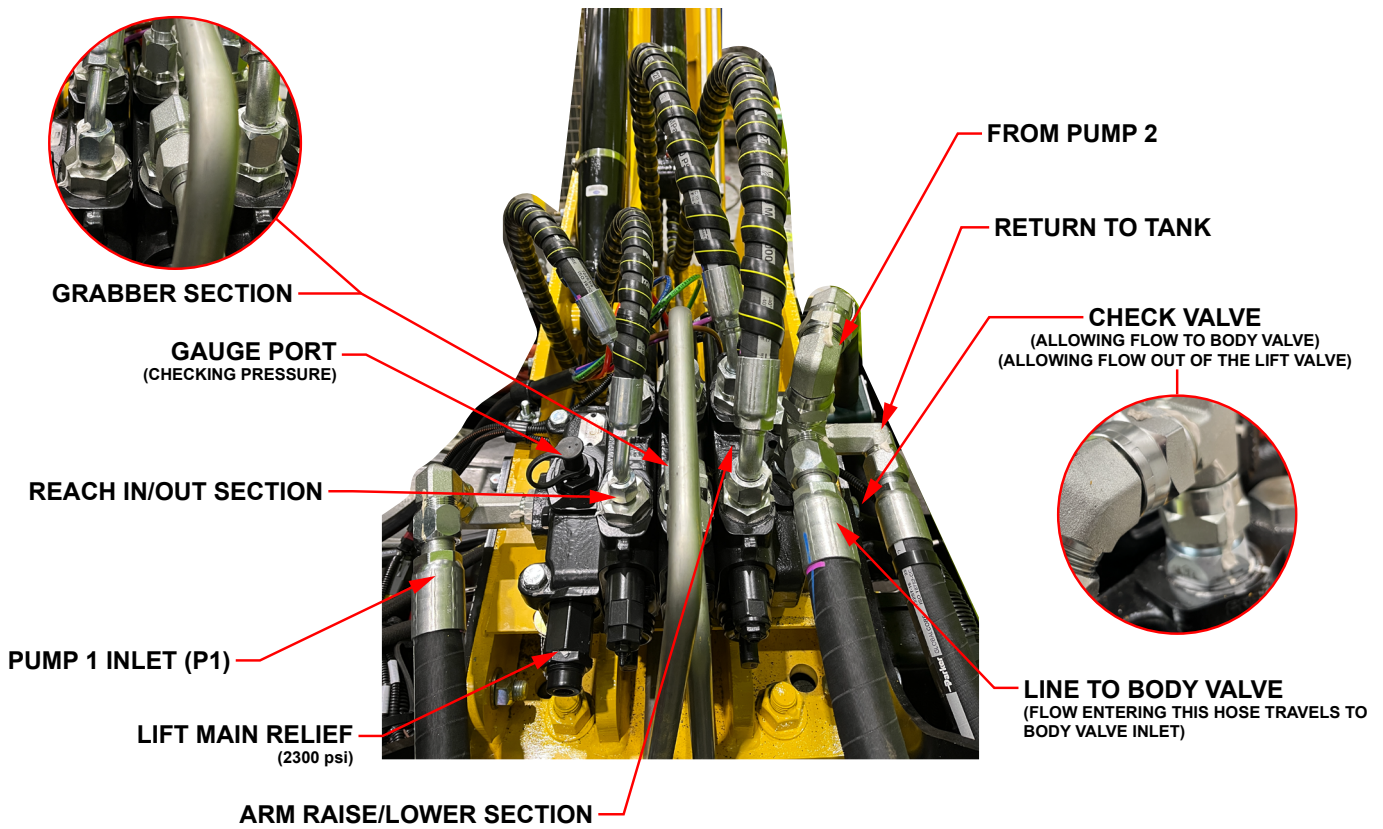
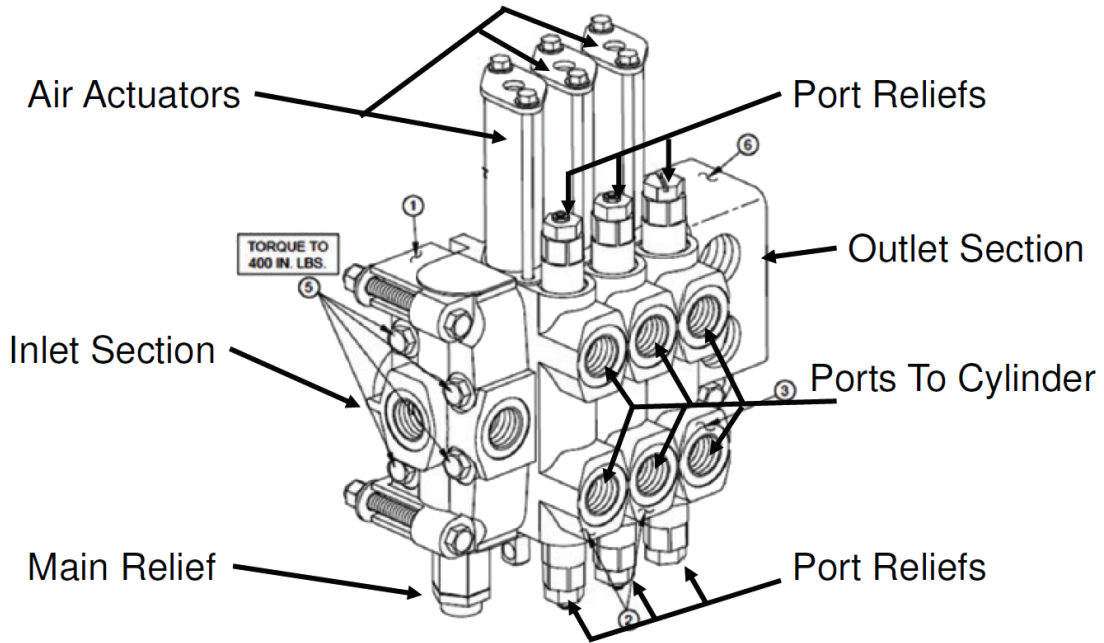


Figure 39. Python Lift Control Valve

LIFT ARM

Remove Grabber Beam Assembly

The grabber beam connects the grabber gears and grabbers to the lift arm. If the beam is damaged, you must replace the grabber beam. You need the following tools to replace the grabber beam.

A. Tools Required

Quantity	Tool
1	Personal protective equipment
1	Socket wrench (3/4" and 9/16")
1	Impact wrench (3/4", 15/16" and 9/16" sockets)
2	3/4" JIC plugs and caps for hydraulic fittings
1	1-1/4" wrench
1	1-1/8" wrench
1	10" C-clamp
1	1-1/2" steel rod
1	2lb hammer
	Plastic ties

B. Replace Grabber Arm

Replacing the grabber beam requires two people. To replace the beam, complete the following steps:

1. Use the 3/4" wrench and the impact wrench with the 3/4" socket to remove the bolts that connect the grabber arm to the grabber gear assembly.
2. Disconnect the grabber proximity switch cable. Use plastic ties to tie the cable out of the way.
3. Remove grabbers and set aside.
4. Use the impact wrench with the 15/16" socket to remove the retainer plate and the pin retaining bolt. **DO NOT** remove the pin yet. You will remove the pin in a later step.

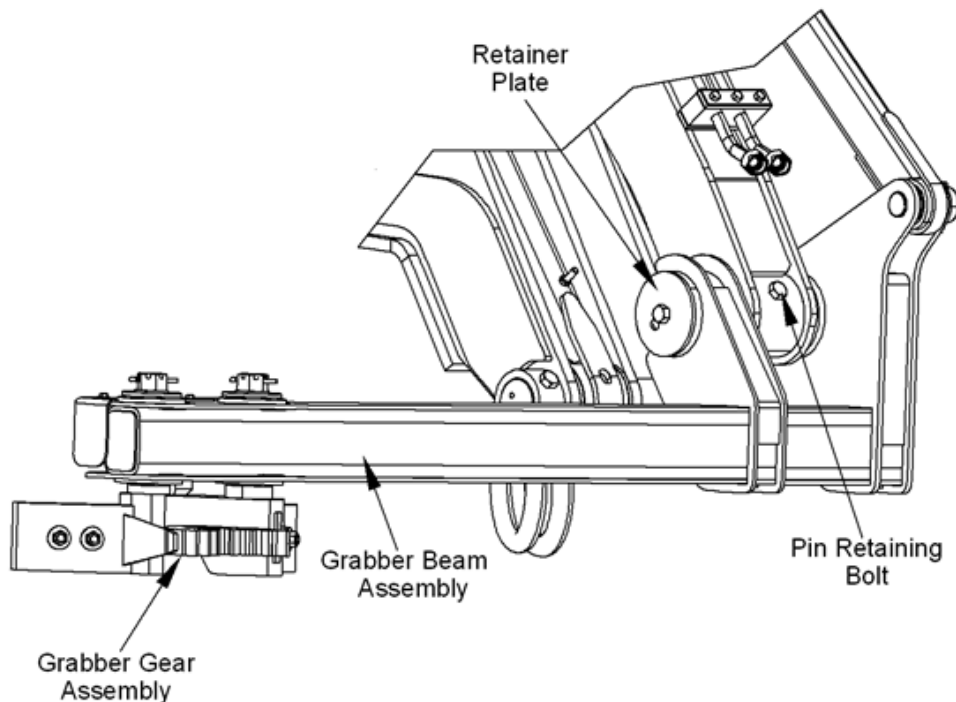
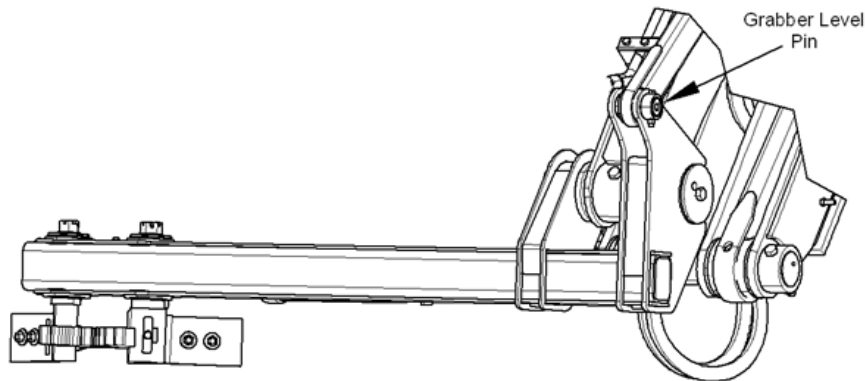


Figure 40. Grabber Beam and Gear Assemblies with Retainer Plate and Pin Retaining Bolt

LIFT ARM

5. To make the pin easier to remove, insert a different bolt with a washer into the bolt hole. Inserting this bolt makes it easier to remove the pin. DO NOT use the original bolt.
6. Use the 9/16" wrench and the impact wrench with the 9/16" socket to remove the level pin retaining bolt. DO NOT remove the pin.

**Figure 41. Grabber Level Pin Location**

7. Use the 1-1/4" and 1-1/8" wrenches to disconnect the two grabber cylinder hydraulic hoses.
8. Use the 3/4" plugs and caps to cap off the hydraulic fittings and hoses.
9. Use the plastic ties to tie the hydraulic hoses out of the way.
10. Support the grabber arm assembly and use the C-clamp to secure the arm assembly to the support. In the Figure below, the arm assembly is supported by a fork lift.

**Figure 42. Secured Grabber Arm**

11. Remove the grabber level pin.
12. Use the 1-1/2" steel rod and the 2 lb hammer to remove the grabber pin. Make sure the spacers in the bore do not fall out when you remove the grabber pin. Use plastic ties to hold the spacers in place. Make sure you lay aside the retainer plate from the opposite side when you remove the pin.
13. Slowly lower the grabber beam assembly.

NOTICE

Before re-installing pins, be sure to coat all pins with anti-seize compound.

14. To replace the arm, perform these steps in reverse.

LIFT ARM

Lift & Weld Cracks Decision Tree

Use this decision tree to help you decide whether to repair a crack or to replace the entire lift arm.

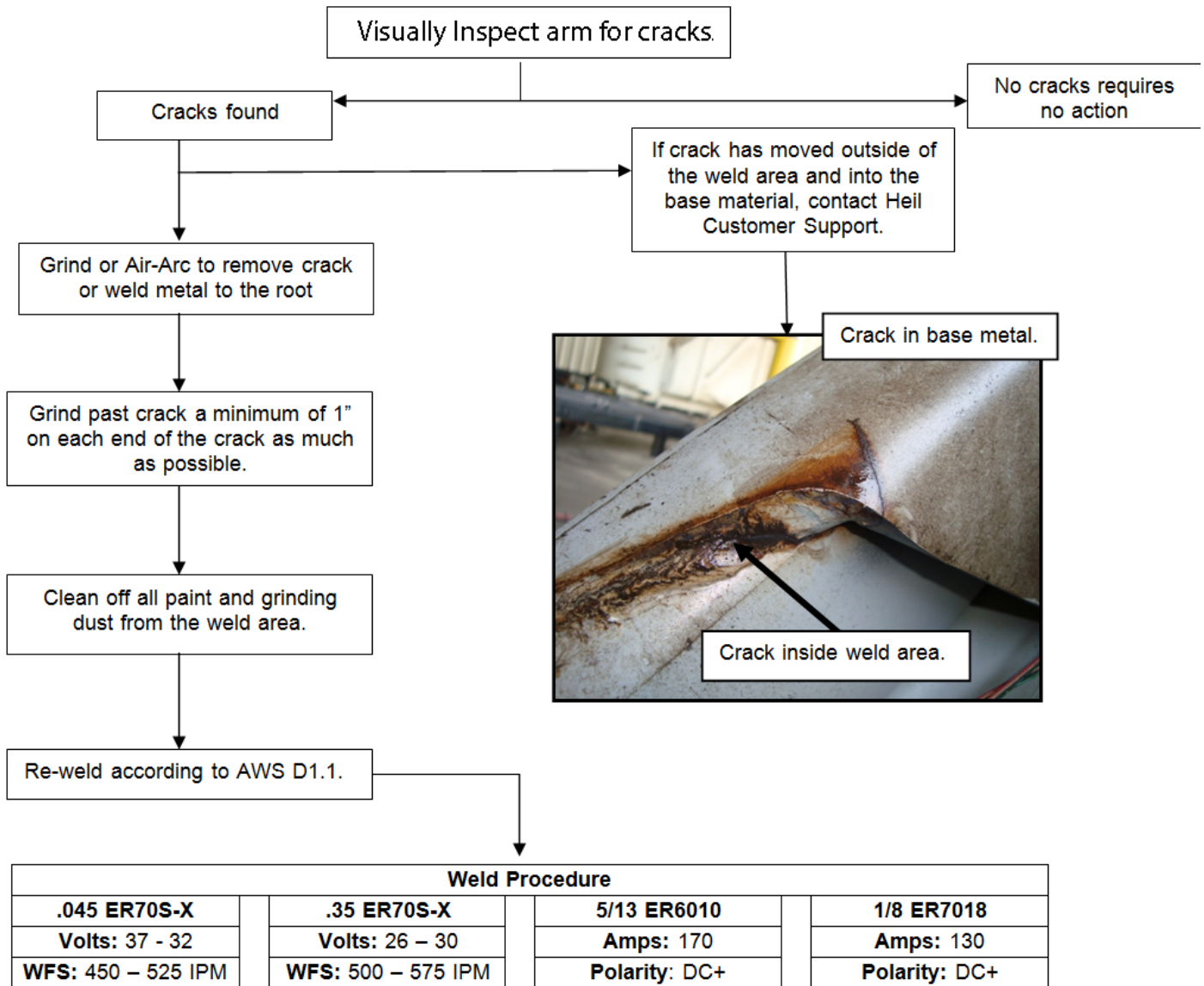


Figure 43.

Follow these welding requirements for repairing the lift arm.

1. All material shall be free from paint, soil, grease, dirt, and any other non-metal contamination.
2. Weld according to the Weld Procedure.
3. All welds shall be in conformance of AWS D1.1.
4. Inspection supervisor required.
5. Attach the ground lead as close as practical to the section where you are working. Disconnect the battery negative or ground cable from the battery.

SECTION 4

BODY & TAILGATE

BODY & TAILGATE

Body Nomenclature

Shown below are some of the features of the body.

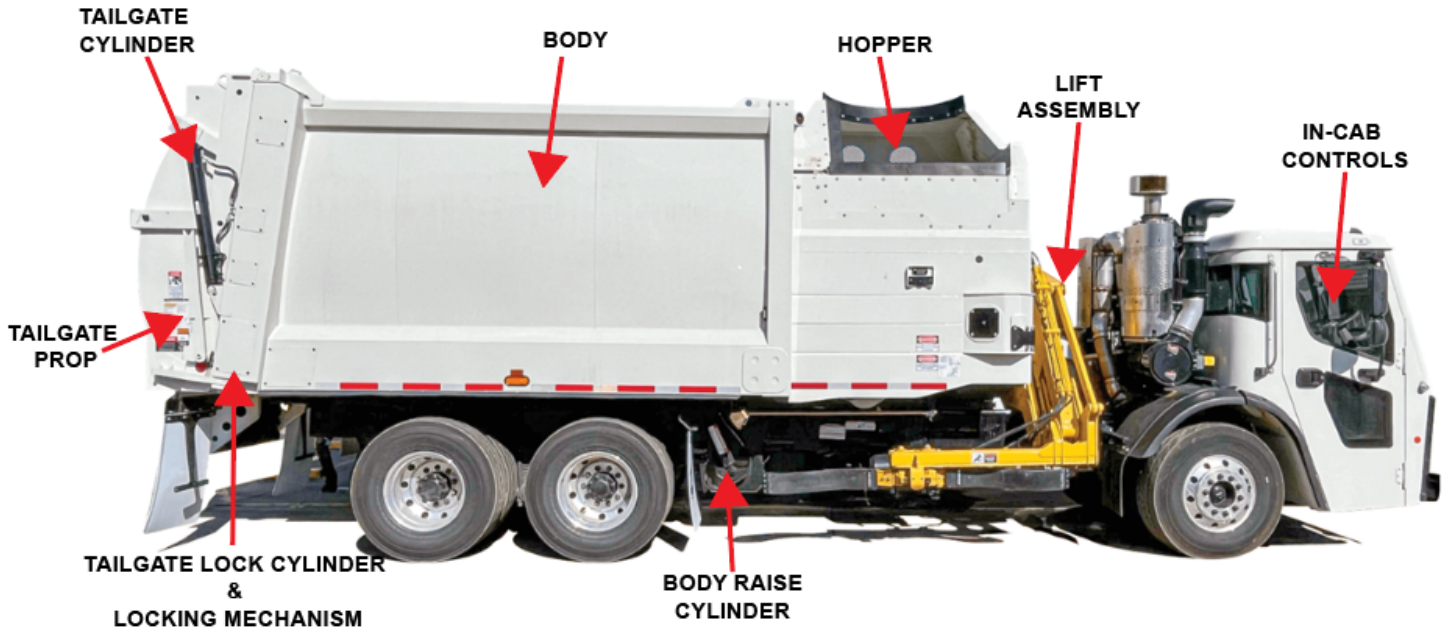


Figure 44.

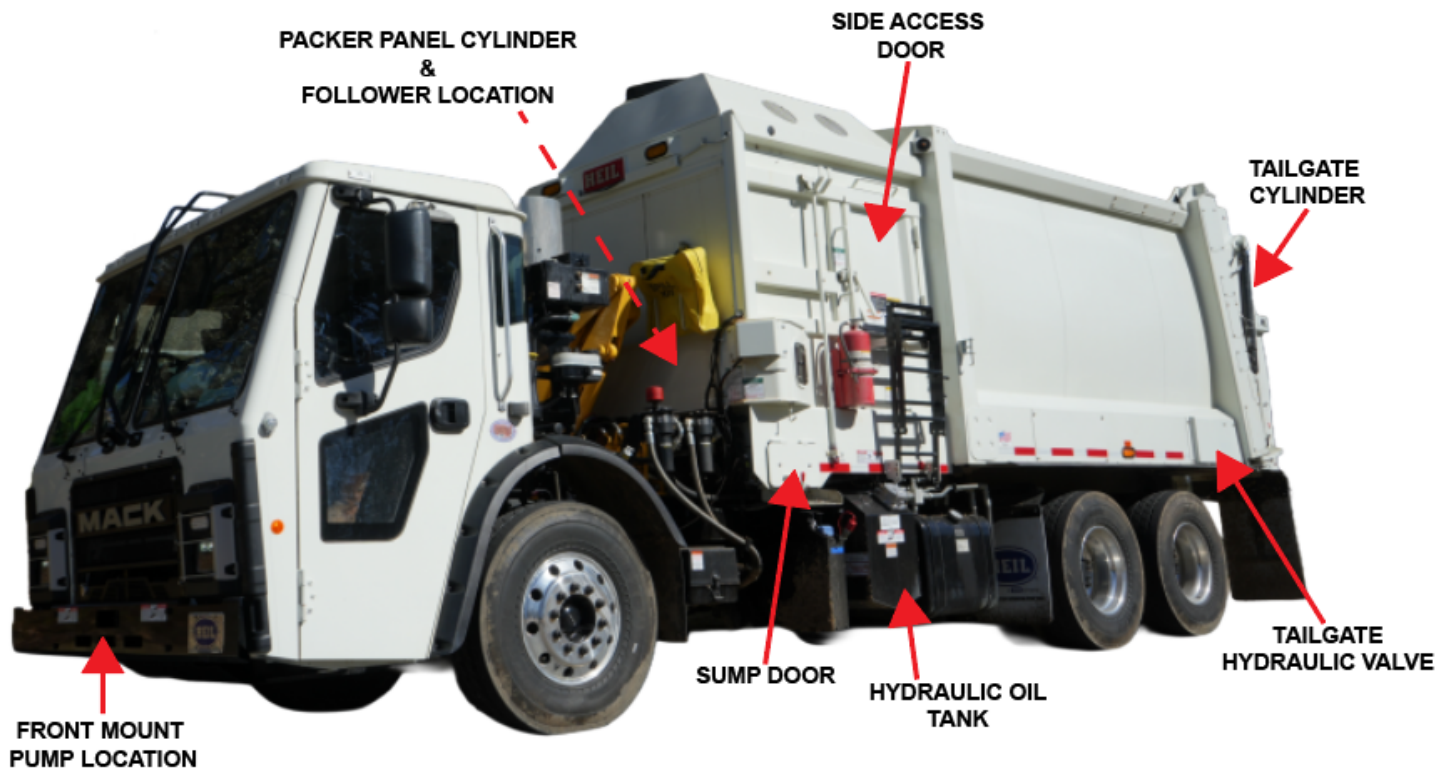


Figure 45.

BODY & TAILGATE

Propping The Body

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body for maintenance or repair procedures. Observe and obey the following DANGER and WARNING notices while you prop the body with the factory body props.

DANGER

Keep all parts of your body out from underneath the unit's body and away from the cylinders when raising or lowering the body. **SERIOUS INJURY** or **DEATH** will occur if the unit's body suddenly lowers and traps a part of your body.

DANGER

The unit may roll when you raise the body on unstable or uneven ground and cause **SERIOUS INJURY** or **DEATH** to you or bystanders. Do not prop the body while the unit is on unstable or uneven ground. Clear the area of all people not necessary for this procedure and set the unit on stable and even ground before you start this procedure.

WARNING

Interconnected body props are installed on the unit. Both props **MUST** be used.

WARNING

Never drive the unit with the body propped.

NOTICE

Empty body of all refuse before using body props.

Body Lifting Devices

We use three different body lifting devices: Service Hoist, Service Hoist Lite, and Serviceable Eject.

A. Service Hoist

This lift requires an on-board 12V power unit. Refer to “**Service Hoist Operation**” on **page 64** for the specific body propping procedure.

B. Service Hoist Lite

This lift requires an external hydraulic-powered unit to raise the body. Refer to “**Service Hoist Lite Operation**” on **page 67** for the specific body propping procedure.

C. Serviceable Eject

This lift requires overhead lifting devices to raise the body. Refer to “**Serviceable Eject Operation**” on **page 69** for the specific body propping procedure.

BODY & TAILGATE

Service Hoist Operation

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body for maintenance or repair procedures. Observe and obey the following DANGER and WARNING notices while you prop the body with the factory body props.

⚠ DANGER

Keep all parts of your body out from underneath the unit's body and away from the cylinders when raising or lowering the body. **SERIOUS INJURY** or **DEATH** will occur if the unit's body suddenly lowers and traps a part of your body.

⚠ DANGER

Do not prop the body while the unit is on unstable or uneven ground. The unit may roll when the body is raised on unstable or uneven ground, which could cause **SERIOUS INJURY** or **DEATH** to you and bystanders. Clear the area of all people not necessary for this procedure and set the unit on stable and even ground before propping the body.

⚠ DANGER

All cranes, chains and cables used **MUST** be of adequate lift rating.

⚠ WARNING

Never drive the unit with the body propped.

NOTICE

Empty body of all refuse before using body props.

The factory-supplied body props are located on both sides under the body and forward of the rear wheels. Refer to the figures and carefully follow the body propping procedures below.

✓ Follow these steps to raise the body:

1. Empty body of all refuse.
2. Make sure that body is on firm, level ground with the parking brake engaged and holding - chock the wheels.
3. **CLOSE** the manual override valve on the power unit – **PUSH** the knob **IN** and turn it **CLOCKWISE**.

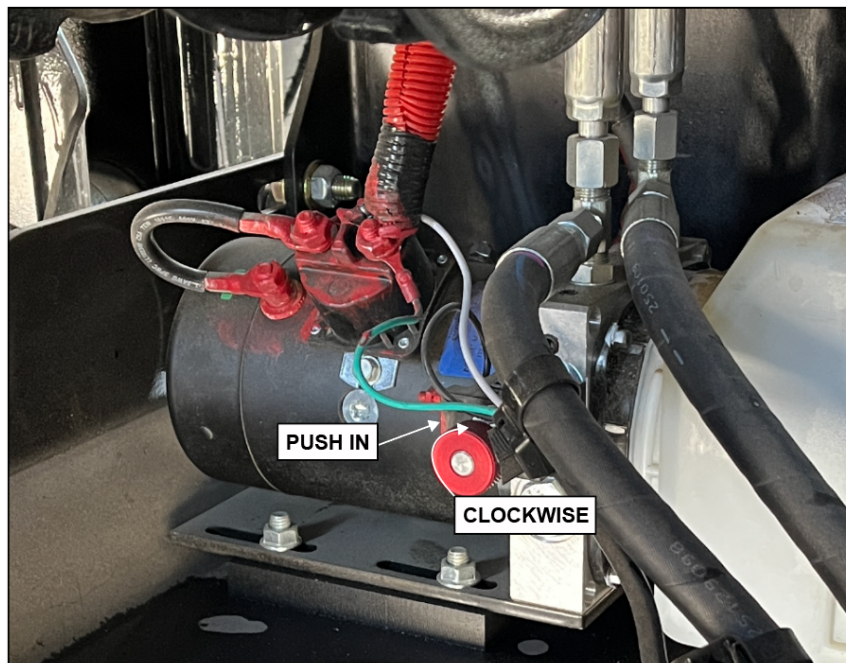


Figure 46.

BODY & TAILGATE

4. Lock-Out/Tag-Out the unit (see “Inspect Proximity Switches” on page 75).
5. Remove the bolts and springs from the chassis mounting brackets.



Figure 47. Removing Bolts and Springs from Chassis Mounting Brackets

6. If equipped with quick disconnects, uncouple prior to raising the body.
7. Disconnect all wire harnesses, hydraulic hoses, and air lines that would prevent the body from raising or be damaged by the body raising.
8. Observe and obey the DANGER labels for an elevated chassis.
9. PRESS and HOLD the UP button on the controller to RAISE the body.
10. RELEASE the UP button when the body is at the height required.



Figure 48. Service Hoist Controller

BODY & TAILGATE

11. Release the prop handles and LOWER the body props.

NOTICE

NEVER open the manual override valve while the body is elevated.



Figure 49.

12. PRESS the DOWN button on the controller to lower the body onto the lugs.



Figure 50.

13. Perform the maintenance or service procedures.

14. Once all maintenance and service procedures are complete - lower the body and store body props.

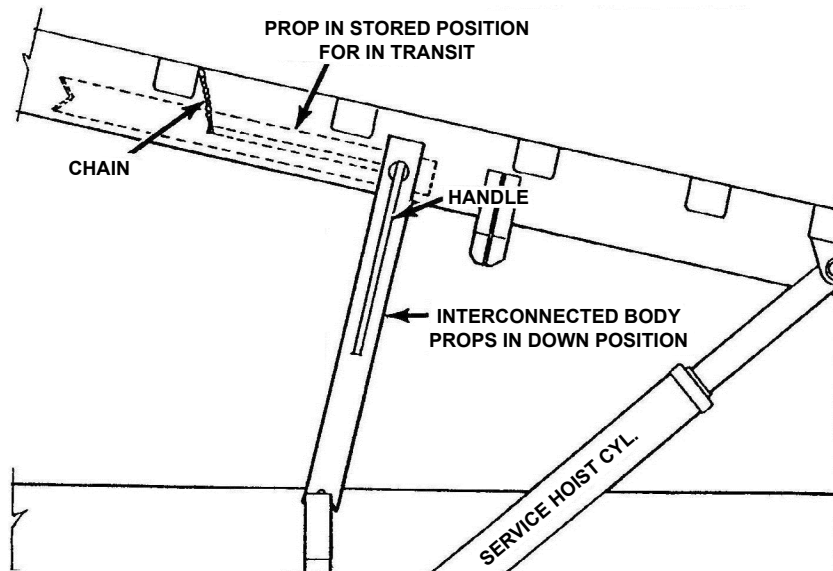


Figure 51. Factory Body Props

BODY & TAILGATE

15. OPEN the manual override valve on the power unit - PUSH the knob in and turn COUNTER-CLOCKWISE.

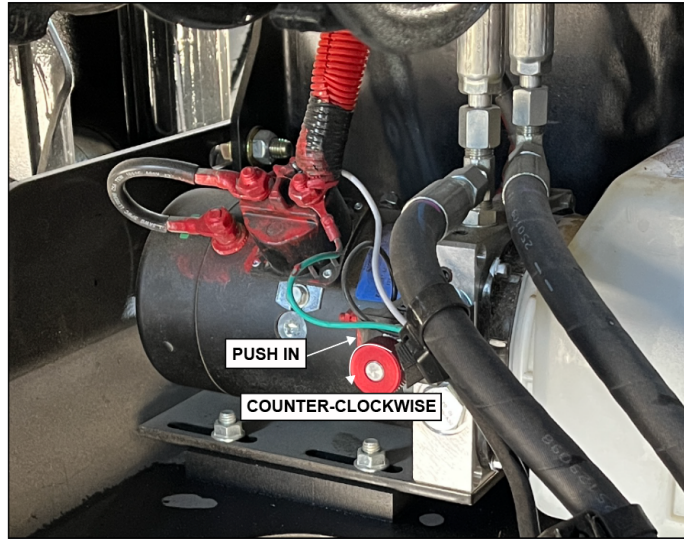


Figure 52.

16. MAKE SURE the manual override valve is open - PUSH the service hoist UP button on the controller. The body WILL NOT raise.
17. Reinstall the bolts and springs to the chassis mount brackets.

Service Hoist Lite Operation

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body for maintenance or repair procedures. Observe and obey the DANGER and WARNING notices below while you use a serviceable eject to raise the body.

⚠ DANGER

Keep all parts of your body out from underneath the unit's body and away from the cylinders when raising or lowering the body. **SERIOUS INJURY** or **DEATH** will occur if the unit's body suddenly lowers and traps a part of your body.

⚠ DANGER

Do not prop the body while the unit is on unstable or uneven ground. The unit may roll when the body is raised on unstable or uneven ground, which could cause **SERIOUS INJURY** or **DEATH** to you and bystanders. Clear the area of all people not necessary for this procedure and set the unit on stable and even ground before propping the body.

⚠ DANGER

All cranes, chains and cables used **MUST** be of adequate lift rating.

⚠ WARNING

Never drive the unit with the body propped.

NOTICE

Empty body of all refuse before using body props.

BODY & TAILGATE

The factory-supplied body props are located on both sides under the body and forward of the rear wheels. Refer to the figures and carefully follow the body propping procedures below.

☑ **Follow these steps to raise the body:**

1. Empty body of all refuse.
2. Make sure that body is on firm, level ground with the parking brake engaged and holding - chock the wheels.
3. Lock-Out/Tag-Out the unit.
4. Connect the remote hydraulic power unit to the quick coupler shown below.
 - a. ISO 7241-1 Series B 1/4" female connector required.

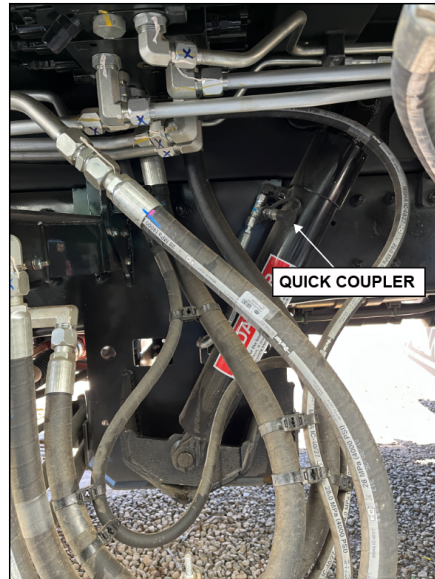


Figure 53.

5. Remove the bolts and springs from the chassis mounting brackets.



Figure 54. Removing Bolts and Springs from Chassis Mounting Brackets

6. Disconnect all wire harnesses, hydraulic hoses, and air lines that would prevent the body from raising or be damaged by the body raising.
7. Observe DANGER labels for elevated chassis and going under the chassis.
8. Raise the body and set props. Follow the instructions provided with your power unit for raising and lowering functions.
 - a. 1.25 gallons required to extend the cylinders @ 2500 PSI.

BODY & TAILGATE

9. Perform the maintenance or service procedures.
10. Once all maintenance and service procedures are complete - lower the body and store body props.

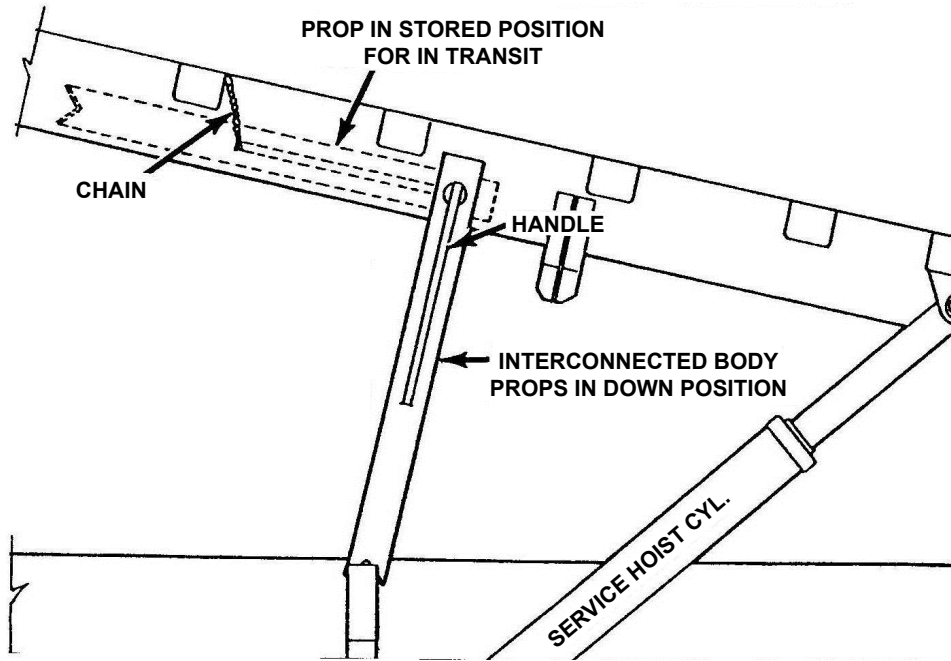


Figure 55. Factory Body Props

11. Reinstall the bolts and springs to the chassis mount brackets.
12. Disconnect the remote hydraulic power unit from the quick coupler and reinstall the dust cap to prevent premature failure of hydraulic system components.

Serviceable Eject Operation

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body for maintenance or repair procedures. Observe and obey the DANGER and WARNING notices below while you use a serviceable eject to raise the body.

⚠ DANGER

Keep all parts of your body out from underneath the unit's body and away from the cylinders when raising or lowering the body. **SERIOUS INJURY** or **DEATH** will occur if the unit's body suddenly lowers and traps a part of your body.

⚠ DANGER

Do not prop the body while the unit is on unstable or uneven ground. The unit may roll when the body is raised on unstable or uneven ground, which could cause **SERIOUS INJURY** or **DEATH** to you and bystanders. Clear the area of all people not necessary for this procedure and set the unit on stable and even ground before propping the body.

⚠ DANGER

All cranes, chains and cables used **MUST** be of adequate lift rating.

⚠ WARNING

Never drive the unit with the body propped.

NOTICE

Empty body of all refuse before using body props.

BODY & TAILGATE

The factory-supplied body props are located on both sides under the body and forward of the rear wheels. Carefully follow the body propping procedures below.

☑ **Follow these steps to raise the body:**

1. Empty body of all refuse.
2. Verify all tire pressures are correct.
3. Make sure that the body is on firm, level ground with the parking brake engaged and holding - chock the wheels.
4. Lock-Out/Tag-Out the unit.
5. Remove the bolts and springs from the chassis mounting brackets.



Figure 56. Removing Bolts and Springs from Chassis Mounting Brackets

6. Disconnect all wire harnesses, hydraulic hoses, and air lines that would prevent the body from raising or be damaged by the body raising.
7. Observe and obey the DANGER labels for an elevated chassis.
8. Connect a chain or cable sling with hooks from the front body chain hook lugs to an overhead crane, truck crane or other lifting device having adequate capacity to safely lift the body.
9. Using the lifting device, slowly lift the body in a controlled manner high enough to lower the factory body props.



Figure 57. Front Body Chain Hook Lugs

BODY & TAILGATE

10. RELEASE the prop handles and LOWER the body props.



Figure 58. Release and Lower Factory Body Props

11. Using the DOWN button on the control, slowly lower the body in a controlled manner until the body is resting on the prop stands.



Figure 59. Release and Lower Factory Body Props

12. Perform the maintenance or service procedures.

☑ Follow these steps to lower the body:

1. Observe and obey the DANGER labels for an elevated chassis.
2. Connect a chain or cable sling with hooks from the front body chain hook lugs to an overhead crane, truck crane or other lifting device having adequate capacity to safely lift the body.
3. Using the lifting device, slowly lift the body in a controlled manner high enough to raise (store) the factory body props.
4. Using the lifting device, slowly lower the body in a controlled manner until it is resting on the chassis frame.
5. With the body completely down and resting on the chassis, remove the cable or chain.
6. Reconnect all wire harnesses, hydraulic hoses, and air lines that were disconnected.
7. Install the bolts and springs to the chassis mounting brackets.

BODY & TAILGATE

Tailgate Support Props

Two support props are on the unit and must be used whenever the tailgate is opened for service or maintenance. Both props must be used.

⚠ DANGER

A tailgate in motion is dangerous. **SERIOUS INJURY** or **DEATH** may occur if a person is struck by a moving tailgate or becomes trapped between the tailgate and the body. Clear the area near the tailgate of all unnecessary people before you lower the tailgate.

⚠ CAUTION

Two props are installed on the unit. Both props must be used!

A. How To Use The Tailgate Props

1. Set unit on flat, stable ground, apply the parking brake, and chock the wheels.
2. Make sure the area around the tailgate is clear of all people.
3. **UNLOCK** the tailgate. Make sure the tailgate unlock flags are down (if equipped).
4. Use the tailgate raise lever or rocker switch in the cab (if equipped) and **RAISE** the tailgate enough to **RELEASE** and **ROTATE** the props so that you can **SECURE** each prop on its prop pin on each side of the tailgate.
5. **LOWER** the tailgate until you can **SECURE** each prop on its pin.
6. Turn **OFF** the engine and **REMOVE** the ignition key.
7. Put the unit in the Lock-Out/Tag-Out.

B. How To Store The Tailgate Props

1. When you finish using the props, take the unit out of the Lock-Out/Tag-Out, insert the ignition key and start the engine.
2. **RAISE** the tailgate enough so that you can **REMOVE** each prop bar from its pin, then **ROTATE** each prop so that you can **PUT** the props in the **STORED** position.
3. **SECURE** each prop with a pin.
4. **LOWER** the tailgate until it is completely **CLOSED**.
5. **LOCK** the tailgate.

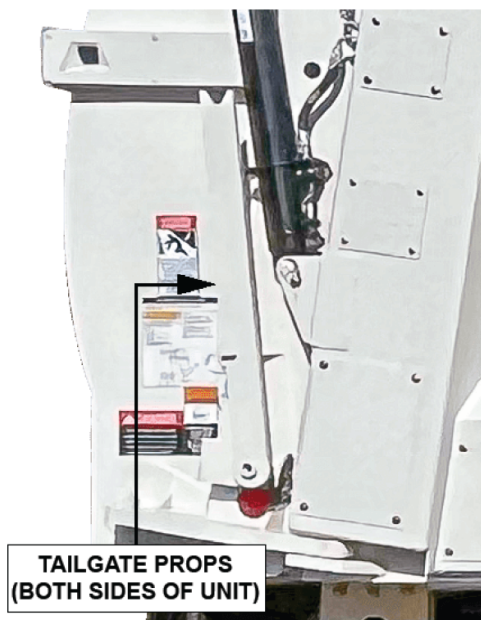


Figure 60.

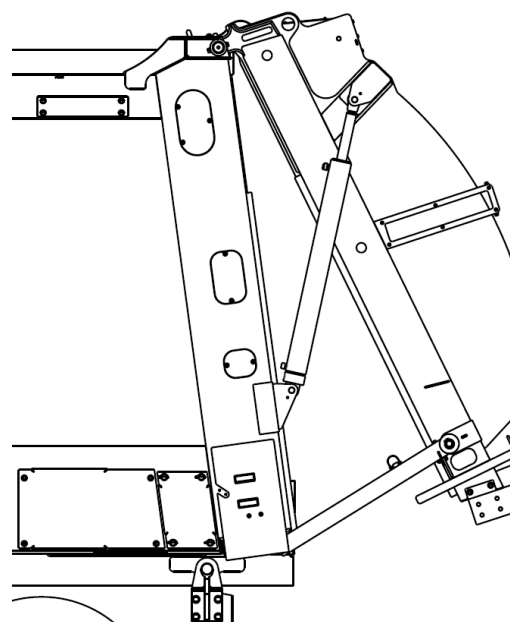


Figure 61.

BODY & TAILGATE

Side Access Doors

The hinged access door is located on the street side.

⚠ WARNINGS

Make sure the unit is in the “**Lock-Out/Tag-Out Procedure**” on **page 13** when you do maintenance or service procedures, when you go in the hopper, enter the side access doors, or climb on the body or equipment. Equipment can be operated when the unit is not in the Lock-Out/Tag-Out. When the unit is not in the Lock-Out/Tag-Out, equipment operated while you do maintenance or service procedures, enter the hopper or climb on the body or equipment can cause **SERIOUS INJURY** or **DEATH**.



Figure 62. Side Access Door

Body Sump Doors

Sump doors are located on the front corner of each side of the body. Open the doors when cleaning out the sump area. A cleaning tool is provided with each unit. Close the doors at all times except when cleaning. Cleaning should occur daily.



Figure 63. Body Sump Doors

BODY & TAILGATE

Main Control & Regenerative Valve

Note: The main control & regenerative valves are located street-side under the body.

Part -time regenerative valve during packer extend.

Full-time eject valve during packer retract.

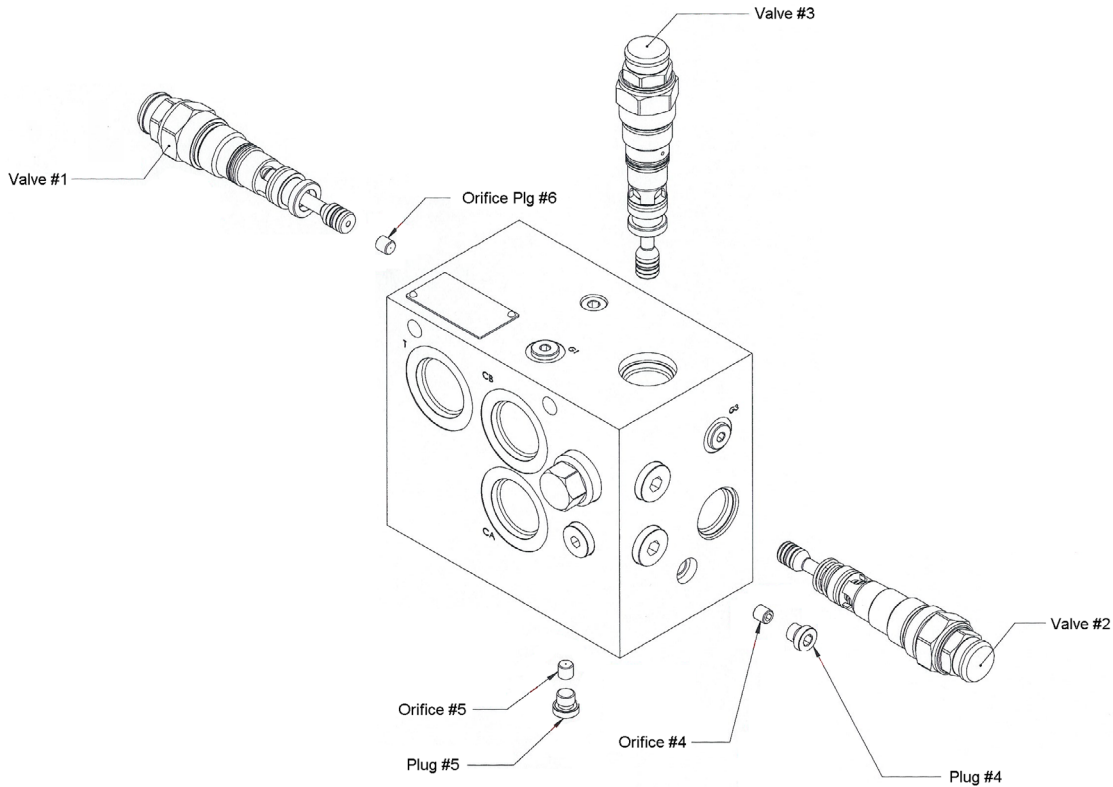


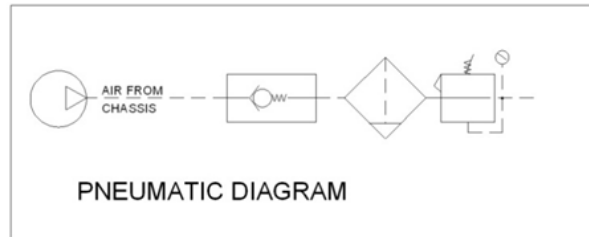
Figure 64. Regenerative Valve

Air Supply Regulator – Pneumatic Diagrams

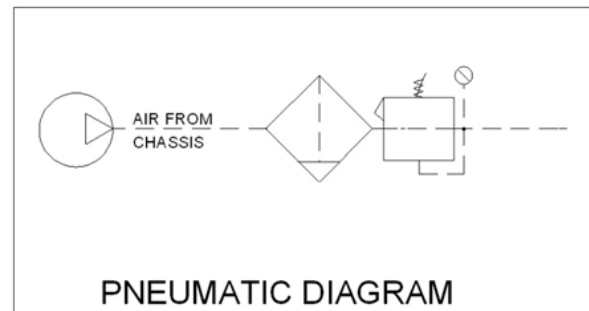
Air regulator adjustment knob set at 90 psi.
Lift knob to unlock, press knob to lock.



Air Filter Regulator



272-7464, 272-7464-001



272-7464-002, 272-7464-003, 272-7464-004

Figure 65. Air Supply Regulator

BODY & TAILGATE

Welding And Electronic Devices / Electrical Lubricants

WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas. SERIOUS INJURY or DEATH can occur.

Before welding on any unit with electronic devices like the mobile controller, electronic control units (ECUs), and proximity switches complete the following procedures.

- Disconnect all battery connections.
- Place welding ground as close as possible to the area that is being repaired.
- Disconnect the mobile controller and all other electronic control units (ECUs).
- If welding within 24 inches of a proximity switch, remove the switch from the unit.

NOTICE

Failure to follow these procedures may cause damage to the devices. The damage comes from the inability of the devices to withstand the amperage, open circuit voltage and magnetic flux a welder can produce.

Electrical Anti-Corrosion Lubricant

It is very important that all Packard connectors are properly lubricated. The following compounds, by brand name, or functional equivalents, are approved for use.

- Truck-Lite Corrosion Preventive Compound
- GB ox-gard, anti-oxidant compound
- Burndy Penetrox A electrical joint compound.

These lubricants may be obtained at an electrical supply store.

Repairing Cracked Weld Joints

Repair all cracked weld joints immediately after finding cracked weld joints. If you are unsure of the proper repair procedure, call Heil Technical Services at 866-310-4345.

Inspect Proximity Switches

See “**Proximity Switch Troubleshooting**” on page 26 for troubleshooting procedures.

SECTION 5

MAINTENANCE & ADJUSTMENT

MAINTENANCE & ADJUSTMENT

Body Daily Checklist

Make sure you perform a daily check of the unit. Refer to the applicable Operator's Manual for the Daily Checklist. Many checks in the Daily Checklist are maintenance related, such as checking tire pressures and hoses for wear and damage.

DAILY CHECKLIST MAINTENANCE ITEMS	
Item	Required Action
Low air pressure in tires	Inflate the tire to the correct air pressure given on the tire.
Worn tire	Replace when the wear is greater than allowed by law or before the tread is no longer visible.
Damaged tire	Replace immediately BEFORE going on route.
Hydraulic pump leaks	Determine the cause of the leak and repair immediately.
Damaged hydraulic pump	Repair or replace IMMEDIATELY.
Loose or missing hardware for the hydraulic pump	Tighten loose hardware. Replace missing hardware immediately.
Damaged decal or decal not readable	Replace decal immediately.
Low level of hydraulic oil	Fill the hydraulic oil tank immediately.
Worn or damaged hoses	Replace immediately.
Leaks at cylinders, hoses or fittings	Tighten loose connection.
Loose or missing hardware	Tighten loose connections. Replace missing hardware.
Worn fiber guards	Replace hoses/fittings as necessary. Install new fiber guard on new hoses.
Worn or damaged tailgate lock components	Replace worn or damaged components.
Loose or missing tailgate lock hardware	Tighten loose hardware. Replace missing hardware.
Damaged tailgate seal	Replace seal.
Body structure, lift arms, and/or attaching components have loose or missing hardware	Tighten loose hardware. Replace missing hardware.
Body structure, lift arms, and/or attaching components have cracked weld joints	Repair immediately.
Body mounting brackets have loose hardware, damaged hardware or cracked welds	Tighten loose hardware. Replace missing hardware. Repair cracked welds.
Hopper liner (when equipped)	Inspect welds. Repair cracked welds. Check for damage or excessive wear. Replace as necessary.
Operation	Operate All Functions to make sure all functions work correctly.

MAINTENANCE & ADJUSTMENT

Body Preventive Maintenance Chart

*HOURS OF OPERATION							
COMPONENT/SYSTEM	8	20	40	200	1000	2000	CHECK/SERVICE
Hydraulic System	<input checked="" type="checkbox"/>						Check oil level – add if necessary
			<input checked="" type="checkbox"/>				Check cylinders, pump, hoses, tubes, fittings, and adapters for leaks. Check hoses for cracks, crushes, and cover blisters. Repair or replace if necessary with genuine Heil parts. Any replacement hose should be the same size and pressure rating as listed on the original OEM hose.
			<input checked="" type="checkbox"/>				Check Control valve seals for leaks. Repair or replace if necessary.
					<input checked="" type="checkbox"/>		Replace filter(s) after first 30 days of operation, then every 6 months or 1000 hours of operation OR when filter bypass light is ON.
					<input checked="" type="checkbox"/>		Replace tank breather filter every time you replace filter element.
						<input checked="" type="checkbox"/>	Drain, flush, and refill. Change filter element(s). Change oil when oil sample shows to change oil.
Electrical, Battery Cables	<input checked="" type="checkbox"/>						Check for proper operation.
			<input checked="" type="checkbox"/>				Check battery cables from battery to starter for loose cables, rubbing or damage and abrasions to cables. Replace if necessary.
Operator Controls	<input checked="" type="checkbox"/>						
Front Mount Pump or Power Take-Off (PTO)			<input checked="" type="checkbox"/>				Check seals for leaks and operation. Replace if necessary
			<input checked="" type="checkbox"/>				Check drive line for smooth operation. Replace as necessary.
			<input checked="" type="checkbox"/>				Check set screws for tightness. Tighten as necessary.
			<input checked="" type="checkbox"/>				Make sure keys are in place. Replace if necessary.
				<input checked="" type="checkbox"/>			For greaseable PTOs (non-wet spline), remove the pump's bolt flange about 2 inches from the PTO and apply grease to female pilot of PTO pump flange. Failure to lubricate female pilot of PTO as given may cause damage to the pump shaft.
							Greasing is NOT required on wet spline PTOs such as the Chelsea 890/897 series.

MAINTENANCE & ADJUSTMENT

*HOURS OF OPERATION							CHECK/SERVICE
COMPONENT/SYSTEM	8	20	40	200	1000	2000	
Grease Fittings		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				Lubricate as shown on “ Body Lubrication Guide ” on page 80 and “ Python Lift Lubrication Guide ” on page 47.
Body Undercoating						<input checked="" type="checkbox"/>	Inspect body undercoating and repair as necessary.
Tailgate Seal Integrity	<input checked="" type="checkbox"/>						
Packer/Ejector Cylinder Preventive Maintenance	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			See “ Packer/Ejector Cylinders Preventive Maintenance ” on page 82.
Packer/Ejector Panel Bolt-in Cylinder Mount Bolts				<input checked="" type="checkbox"/>			Check for tightness. Bolt torques should be 192 Ft-Lbs. (lubricated threads)
PTO/Transmission Interface Inspection				<input checked="" type="checkbox"/>			Check the torque on the PTO mounting screws and tighten to the proper torque specification
* Daily = 8 hrs. or 20 hrs. Weekly = 40 hrs. Monthly = 200 hrs. 6 Months = 1000 hrs. Yearly = 2000 hrs.							

MAINTENANCE & ADJUSTMENT

Body Lubrication Guide

Clean fittings before applying grease and always pump enough grease into joint to remove the old grease. Wipe off excess grease. Lubricate movable mechanical parts without fittings every 60 days with non-detergent engine oil. Also see “Python Lift Lubrication Guide” on page 47.

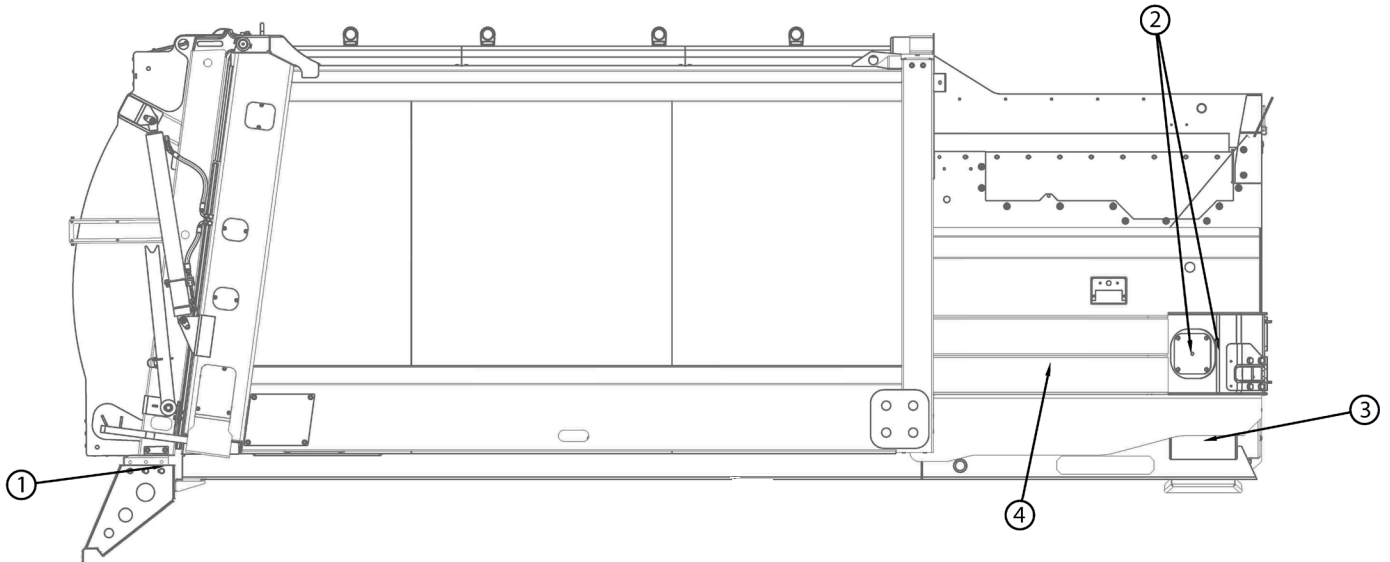


Figure 66.

REF No.	DESCRIPTION	QTY.	Frequency
1	Tailgate Lock Bearing	2	Weekly/Every 40 Hours
2	Packer Cylinders	2	Weekly/Every 40 Hours
3	Sump Hinge	1	Weekly/Every 40 Hours
4	Packer Panel Tracks	2	Weekly/Every 40 Hours

MAINTENANCE & ADJUSTMENT

PTO Inspection & Preventive Maintenance

Due to normal torsional vibrations of transmission mounted Power Take-Offs (PTOs), it is important that Service Technicians include the PTO/transmission interface in their standard inspection and maintenance schedules. If a PTO Inspection and Preventive Maintenance schedule is not followed, it is possible that the PTO mounting screws can come loose, resulting in transmission fluid leaks between the PTO and transmission and potential damage to the PTO or drive train.

A. Tools Required

The tools and materials necessary to perform the Inspection/Preventive Maintenance are shown in the table below.

Item	Part Number	Application
Personal Protective Equipment	Commercially available	Safety protection as required by employer
Wrench/Socket Set	Commercially available	To tighten PTO mounting 10mm 12 pt. head screws
Torque Wrench	Commercially available	To properly tighten PTO mounting screws
Marker	Commercially available	To make witness marks on the PTO mounting flange

B. PTO Mounting Screw

With the unit in Lock-Out/Tag-Out, use a 12.10 mm closed wrench and crowsfoot to perform the following steps: Note: PTO/Transmission Interface Inspection/Preventive Maintenance (MONTHLY/200 HOURS OF OPERATION)

1. Place the unit in Lock-Out/Tag-Out with the hydraulic pressure relieved.
2. Clear the work area around the unit of all unnecessary people and equipment.
3. Inspect for transmission fluid leaking from the PTO/transmission interface. Thoroughly clean around this area.
4. Using a torque wrench, check the PTO mounting screws. Note: If they are set less than 45 FT-LBS, tighten to 45 FT-LBS.
5. Using an oil-resistant marker, add a witness mark on each screw head and across the PTO mounting flange.
Note: This will help identify if the PTO mounting screws loosen over time during future inspections.



Figure 67. Witness Marks on PTO Mounting Screws and Flange

6. Take the unit out of Lock-Out/Tag-Out and operate unit functions.
7. Check for transmission fluid leaks around the PTO/transmission interface. If there are leaks, contact Technical Services.
8. If there are no transmission fluid leaks, return the unit to service.

MAINTENANCE & ADJUSTMENT

Packer/Ejector Cylinders Preventive Maintenance

It is critical to follow the guidelines of the “**Body Preventive Maintenance Chart**” on page 78 and “**Body Lubrication Guide**” on page 80 found in this section of this service manual and the Body Lubrication Guide decal on the unit. Failure to follow stated routine preventive maintenance can lead to premature cylinder failure that is not covered by your warranty.

⚠ WARNING

Make sure that the unit is in “**Lock-Out/Tag-Out Procedure**” on page 13 before you perform maintenance/service procedures, or when you enter or climb on the hopper/body/related assemblies. Equipment is operational when the unit is not in Lock-Out/Tag-Out. Equipment operated while you do maintenance or service procedures can cause **SERIOUS INJURY** or **DEATH** so also make sure to clear the area around the unit of all bystanders.

⚠ CAUTION

Failure to follow these instructions can result in damage to the Heil body, truck chassis or can cause personal injury!

HEIL PACKER/EJECTOR CYLINDERS PREVENTIVE MAINTENANCE CHART		
DAILY	WEEKLY	MONTHLY
<ul style="list-style-type: none"> • Clean behind the packer panel and pockets around spherical's. DO NOT damage cylinder rods by striking with any metal object (if applicable). • Visually inspect that lube lines (if equipped) are connected and not damaged or leaking. • Visually inspect packer tracks and hopper floor for excessive wear or damage. Repair or replace if necessary. 	<ul style="list-style-type: none"> • Grease Packer/ Ejector cylinder spherical bearings/ pins • Inspect packer/ ejector cylinder bearings/pins (both ends) for wear, rust or damage and replace if necessary. 	<p>Inspect the Packer/Ejector Panel start and stop travel positions and, if necessary, adjust the proximity switches for retract and extend settings. Refer to “Packer/Ejector Panel Adjustment” on page 89.</p>

Side Loading and Premature Cylinder Failure can be caused by:

- Inadequate greasing intervals.
 - causing increased friction at spherical bearings
 - potentially resulting in seizing of spherical bearings
- Packing into the second stage of a multistage cylinder.
- Binding of components caused by debris.



Figure 68.

MAINTENANCE & ADJUSTMENT

Pressure Adjustments

A. Unit Preparation

Follow these unit preparation steps prior to making any pressure adjustments listed in this section.

1. MAKE SURE area around unit is clear to enable arm operation.
2. MAKE SURE the unit is on flat, stable ground and apply the parking brake and chock the wheels.
3. Notify anyone in area that the arm will be operated during this procedure.
4. Make sure unit is full of hydraulic oil.
5. Make sure Hydraulic oil is at least 100 degrees F before beginning any pressure checks or adjustments.
 - a. If unit oil is not at desired temperature, engage the hydraulic pump.
 - b. Activate and hold the tailgate lock function for two minutes.
 - c. After two minutes release tailgate lock function and cycle the packer/ejector circuit to mix the hot oil.
 - d. Repeat steps (b) and (c) until oil is at desired temperature.
6. Connect a 5000 psi hydraulic gauge to the quick-disconnect located on the lift arm control valve.
7. Start the engine and engage the hydraulic pump.

⚠ WARNING

Moving equipment can be dangerous to bystanders. SERIOUS INJURY or DEATH can occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

⚠ WARNING

The hydraulic fluid may be under pressure and may spray while you open the connection. Hydraulic fluid may cause damage to your eyes, hands or skin. Wear protective eye glasses, gloves and other clothing as necessary to protect you from the hydraulic fluid.

NOTICE

This procedure requires two properly trained technicians, one to operate the controls from within the cab while the other will be working on the pressures settings from the street side of the unit.

NOTICE

The unit must remain in neutral during all pressure setting procedures.

B. Required Tools

These are the tools required to make pressure adjustments.

Quantity	Tool
1	Personal protective equipment
1	Pressure gauge (0-5000)
1	1-1/2" Wrench
1	15/16" Wrench
1	7/16" Wrench
1	1/8" Wrench
1	1/2" Hex Wrench
1	Wire cutters
1	Slotted Screwdriver

MAINTENANCE & ADJUSTMENT

C. Standard Pressures & Cycle Times

MODEL	LIFT MAIN RELIEF	LIFT UP / DOWN	GRABBER RELIEF OPEN / CLOSE	REACH RELIEF IN (RETRACT) / OUT (EXTEND)	BODY MAIN RELIEF	PACKER PRESSURE SWITCH	TAILGATE RAISE CNrG PORT RELIEF	LIFT CYCLE TIME	PACKER CYCLE TIME	
Eject	2300	2500 / 1250	1250 / 1250	2500 / 1250	2500	2200	1500 PSI	7 - 9 sec @ 28 GPM	12 -16 @ 27 GPM	
EOS SETTINGS		Lift Controls Disengage at 900 rpm - Lift Pump Disengage at 1050 RPM - Body Pump 1600 RPM								
NOTES:	1. Main Pressure settings have a tolerance range of +/- 50 p.s.i. and are to be set at operating speed - WI594									
	2. Port Relief Pressure settings have a tolerance range of +/- 100 p.s.i. and are to be set at operating speed - WI594									

D. Body Pump Pressure Switch

This switch is set at 2200 PSI. Make sure the orifice inside the snubber is clean and open so that fluid flow is not blocked. If you remove the snubber for cleaning, be sure to replace it to keep the pressure switch from failing. When setting the packer pressure, use a 5000 psi gauge and the tailgate lock function to adjust the pressure.

- Lower pressure - Turn set screw counter-clockwise.
- Raise pressure – Turn set screw clockwise.

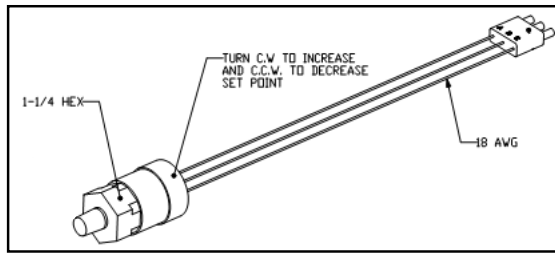


Figure 69. Packer Pressure Switch Adjustment

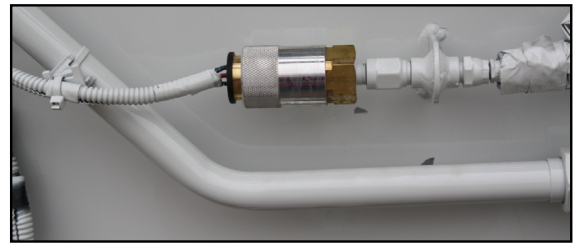


Figure 70. Packer Pressure Switch

1. With an empty body, raise the tailgate and extend the packer fully.
2. Lower the tailgate onto the tailgate props.
3. Attach a hydraulic pressure gauge rated 0-5000 psi to the gauge port on the body valve.
4. Lower the main relief pressure to 2200 psi by deadheading the packer extend circuit. A cylinder is considered *deadheaded* when the directional control valve is shifted, but the cylinder rod has reached the end of its stroke and can no longer move. In this condition, pump flow is diverted across the system's pressure relief valve. For this adjustment, hold the packer cylinder in the *extend* position after it reaches full extension. Maintain the deadheaded condition while reducing the main relief setting to 2200 psi.
5. Have a second person observe the input screen on the in-cab display and monitor "Packer Pressure Sw" while operating the controls.
6. Loosen the slotted set screw on the side of the pressure switch. While deadheading the packer extend circuit, adjust the switch by turning the screw both clockwise and counterclockwise. Have a teammate monitor the signal and notify you when it changes state (ON/OFF). Set the switch at the point where the signal toggles on and off with only minimal adjustment.
7. Using the same packer extend deadhead method, lock the slotted set screw, reset the main pressure to 2500 psi by deadheading packer extend and adjusting the relief to 2500psi, and then lock the jam nut.
8. Retract the packer fully, raise the tailgate just enough to lower the tailgate props, then lower and lock the tailgate.

NOTICE

It is very important to make pressure changes slowly. Quick changes can result in mistakes.

E. Verify Pressure Switch Setting

1. Install the 0-5000 PSI pressure gauge in the fitting on the inlet section.
2. Install a test harness between the pressure switch and the body harness.

MAINTENANCE & ADJUSTMENT

3. The hydraulic oil must be at or near operating temperature. If not, warm the oil.
4. Remove any dirt around the main relief valve.
5. Lower the main relief to 2000 psi +/- 10 psi using the tailgate lock function.
6. Disconnect the full extend packer proximity switch.
7. For Operate-In-Gear-At-Idle units, start the engine, leave it idling and place the transmission in neutral. Set the parking brake.
8. Deadhead the packer fully extended.
9. Slowly increase the main relief by small increments (1/16 – 1/8 turns). Pause for at least three (3) seconds between increments. Increase the main relief until the test light goes out.
10. Note the main relief pressure setting. This is the value of the pressure switch setting.
11. Return the main relief to 2500 psi.

F. Lift Control Valve - Refer to **“Lift Control Valve Pressure Adjustments”** on page 54.

G. Body Control Valve

Body Valve Pump 1

The following procedure will show pressure from Pump 1 only, having a power beyond system on the Python, the lift valve is daisy chained with the body valve. The lift main relief is normally set at 2300 PSI.

Following the procedure below will show 2300 PSI and turn the body valve relief valve adjustment screw will not change the pressure.

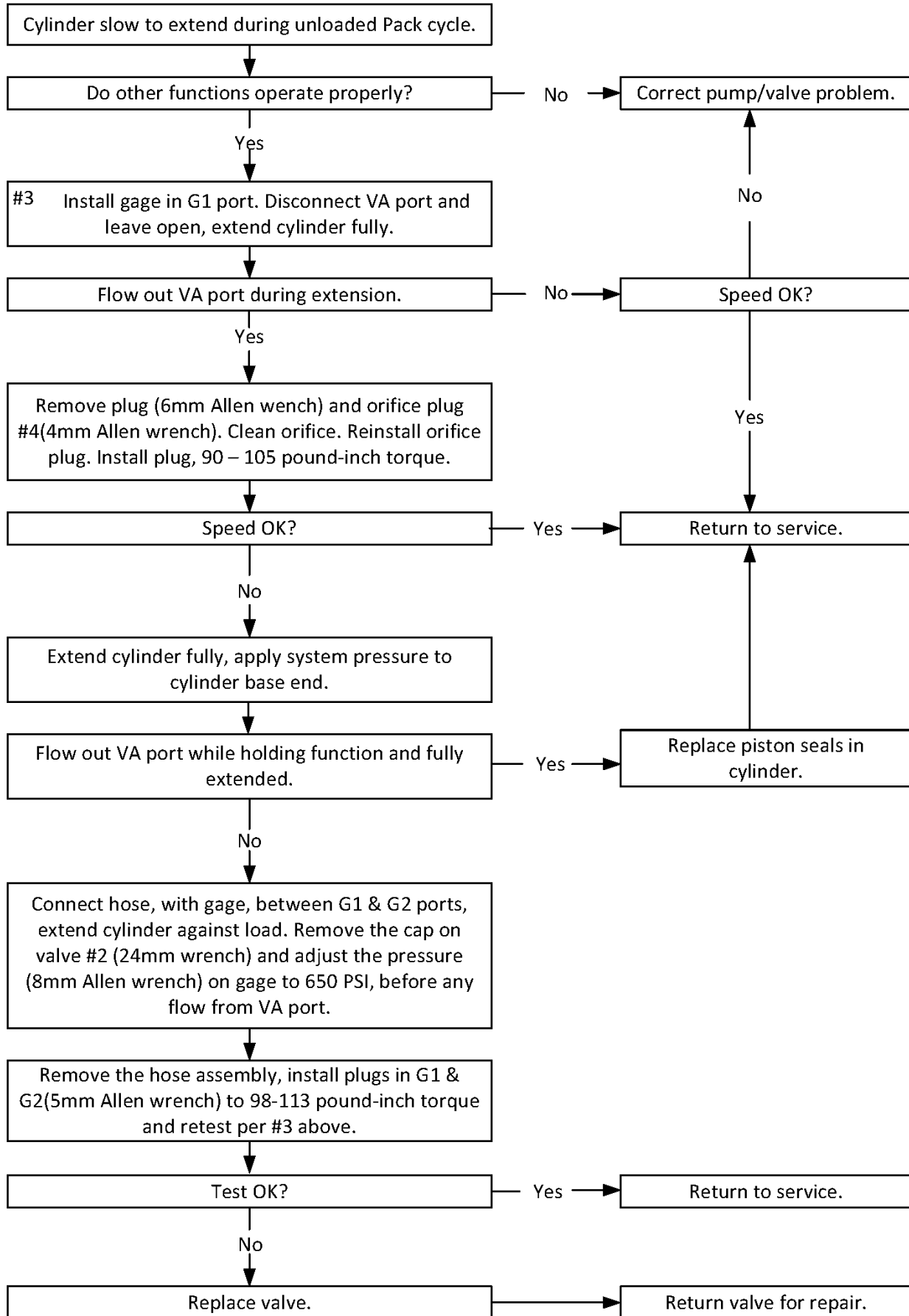
1. Install 5000 psi pressure gauge on body valve quick-disconnect.
2. Activate and hold tailgate lock air toggle.
3. Verify pressure on gauge reads 2500 psi.
4. If pressure reading is incorrect, using an open end wrench, remove caste nut on main relief.
5. Using allen wrench loosen jam nut on body main relief.
6. Using allen wrench on main relief adjusting screw, adjust main relief by turning “in” (clockwise) to increase pressure or “out” (counter-clockwise) to decrease pressure.
7. Using allen wrench tighten jam nut. When tightening jam nut, use allen wrench to hold adjusting screw to prevent adjustment screw from turning.
8. Using allen wrench replace and tighten caste nut.

Body Valve Pump 2

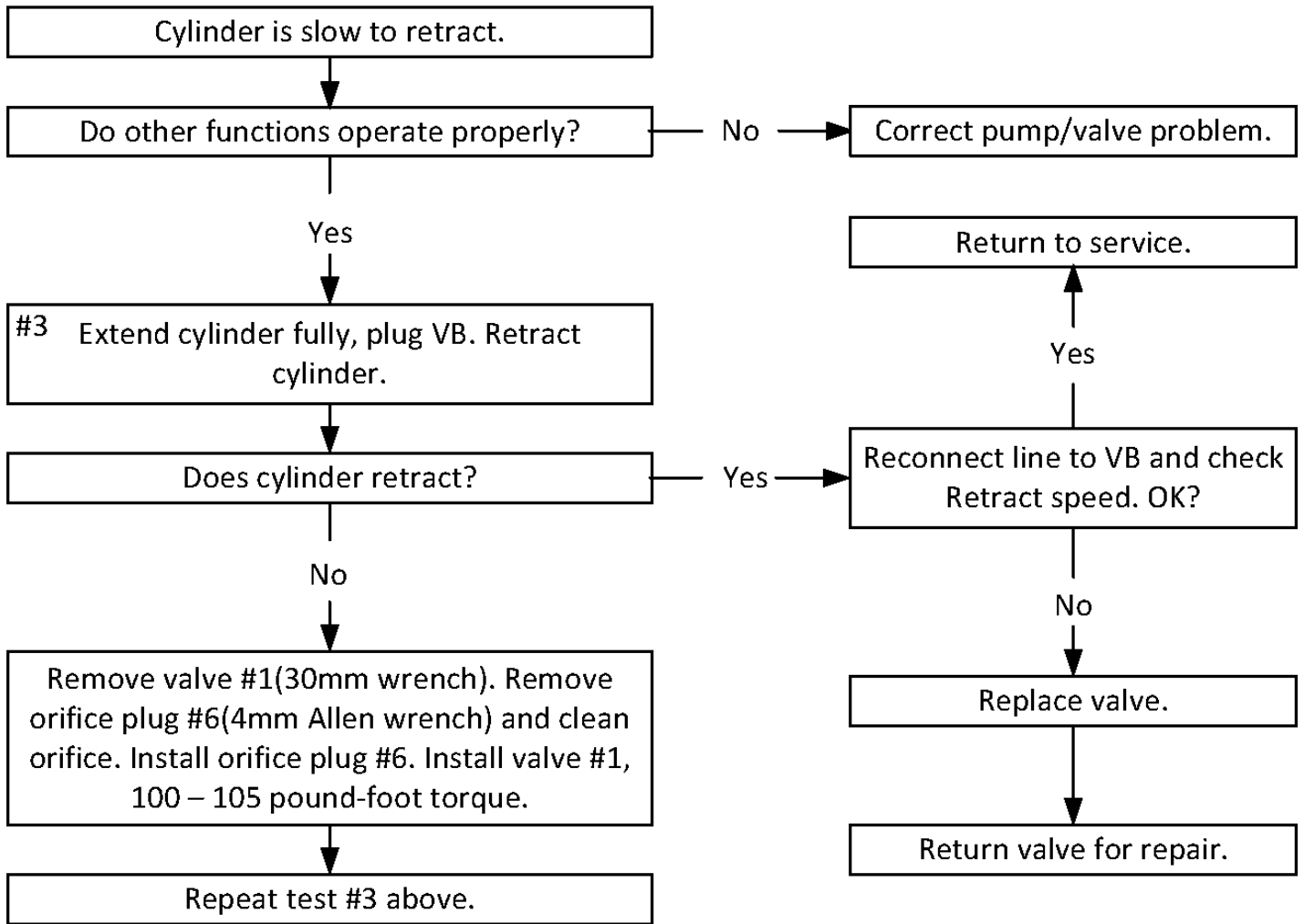
1. Install 5000 psi pressure gauge on body valve quick-disconnect.
2. Disconnect low torque pressure switch installed on the pump.
3. Unlock and slightly raise the tailgate
4. Activate packer extend until it reaches the end stroke and hold the function while a helper watch the gauge.
5. Verify pressure on gauge reads 2500 psi.
6. If pressure reading is incorrect, using an open end wrench, remove caste nut on main relief.
7. Using allen wrench loosen jam nut on body main relief.
8. Using allen wrench on main relief adjusting screw, adjust main relief by turning “in” (clockwise) to increase pressure or “out” (counter-clockwise) to decrease pressure.
9. Using allen wrench tighten jam nut. When tightening jam nut, use allen wrench to hold adjusting screw to prevent adjustment screw from turning.
10. Using allen wrench replace and tighten caste nut.
11. Return packer home. Lower and lock the tailgate.
12. Reconnect Low Torque pressure switch.
13. Remove pressure gauge.

MAINTENANCE & ADJUSTMENT

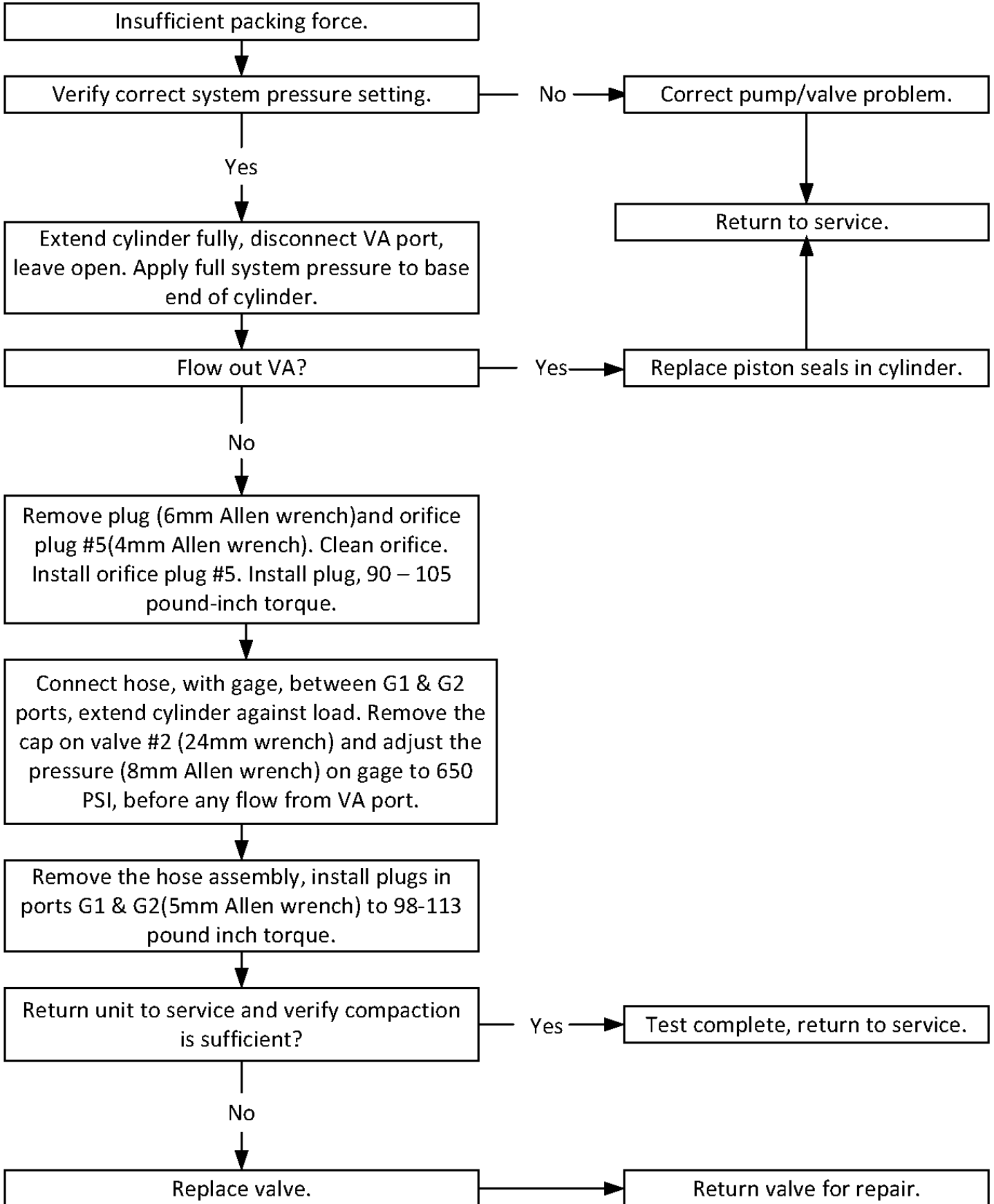
Regenerative Valve (031-6227) Troubleshooting Guide



MAINTENANCE & ADJUSTMENT



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MAINTENANCE & ADJUSTMENT

Packer/Ejector Panel Adjustment

Proper maintenance of the packer panel and ejector panel is important to the overall operation of the unit. Failure to maintain proper adjustment can affect payload and cause cylinder or structural damage.

A. Retract Stroke

Make this adjustment with the hydraulic system at operating temperature and the engine RPM held at a level to cause the packer panel to move at its fastest speed during retract. On some units, the fastest packer speed during retract occurs at engine idle.

1. Adjust the retract proximity switch so the packer panel retract function shuts off and the panel comes to rest two (2) inches away from the front head. (The outside proximity switch is located on the front head.) Do not let the packer panel contact the front head.
2. After the retract stroke is set, cycle the packer panel again. When the panel stops retracting, manually press the retract button and note the travel left between the packer panel and the front bulkhead. On some units the outside proximity switch must be disconnected before you manually press the retract button. If the travel is less than 2", repeat step (1).

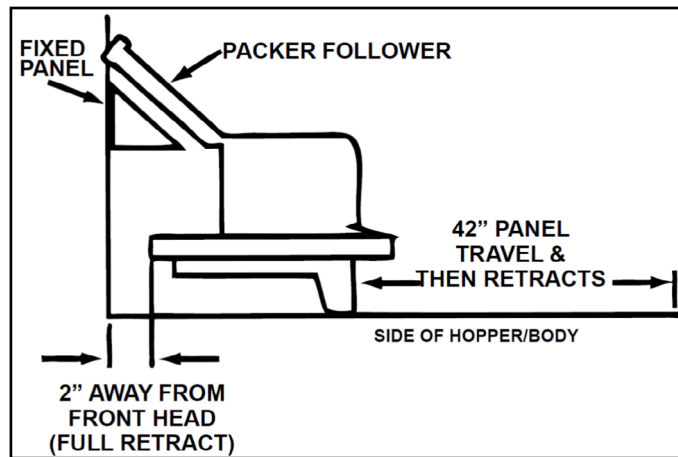


Figure 71. Packer Pressure Panel Adjustment

B. Extend Stroke

1. Extend the packer panel until the rollers on the packer follower panel stop and rest at the end of the fixed panel guides.
2. Adjust the full extend proximity switch (inside proximity switch located on the front head) so the retract portion of the autopack cycle starts just before the packer panel follower rollers leave the fixed panel guides.

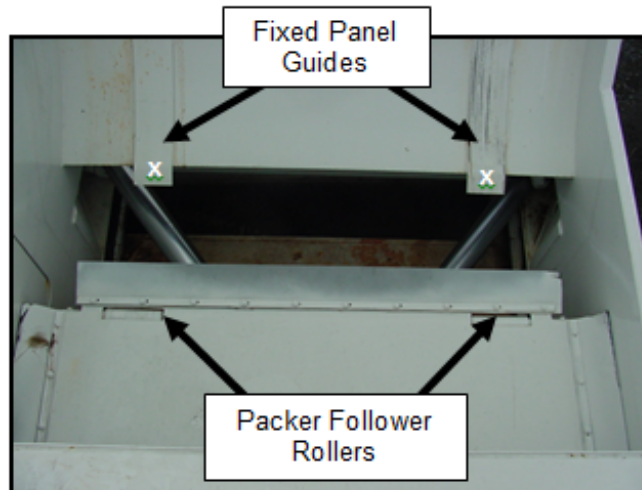


Figure 72. Packer Pressure Panel Adjustment

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Packer Position Sensor

The packer sensor is called an “ARC” Sensor and detects the position of the packer.

A. Functionality

1. As the packer moves, a striker attached to the rod eye of the curbside packer cylinder moves across the sensor, then sensor sends a signal back to the controller to show its position.

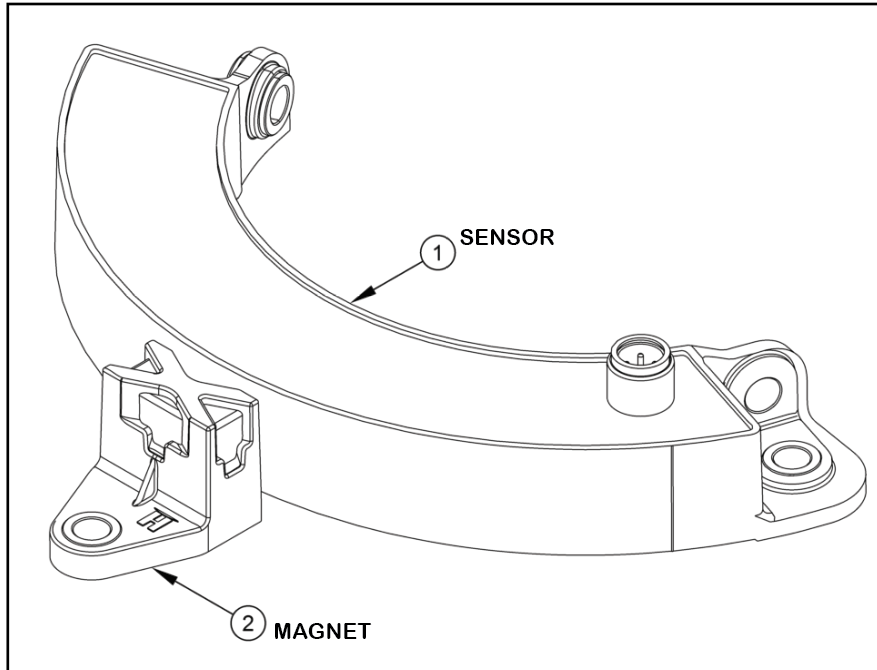


Figure 73. Arc Sensor

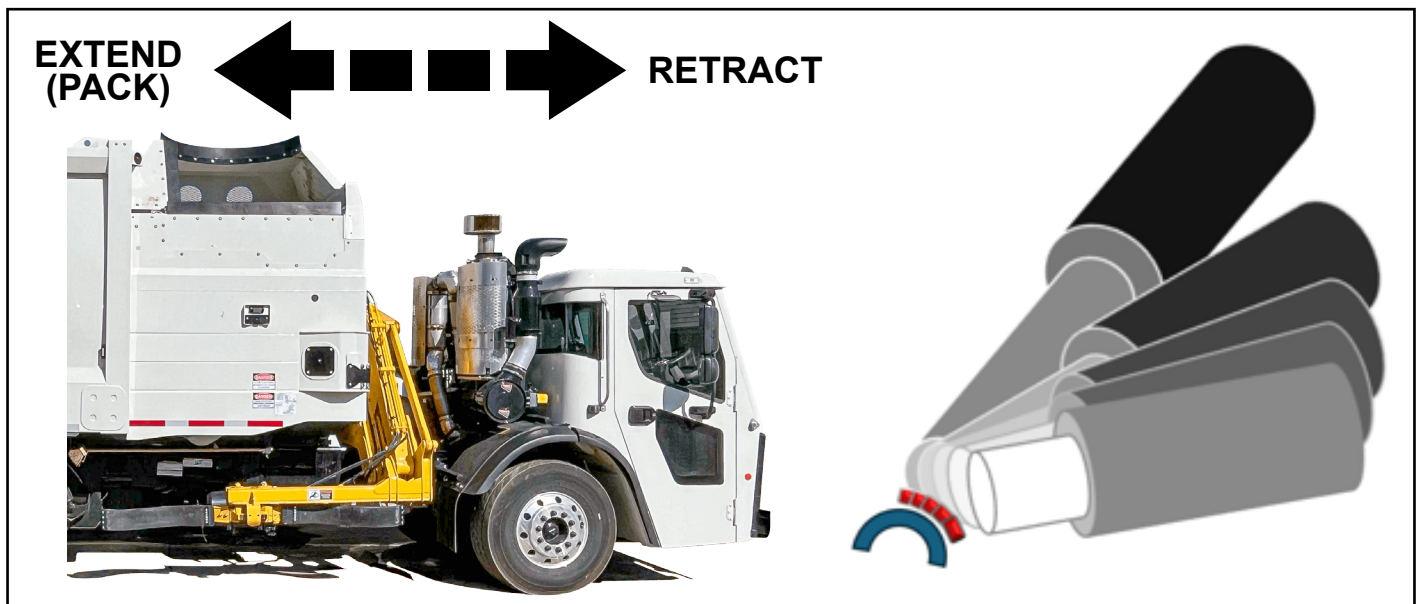


Figure 74.

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B. Troubleshooting

Use the following details to assist with troubleshooting the arc sensor.

1. Pin Positions: Heil uses pins 1, 2, and 3 ONLY.

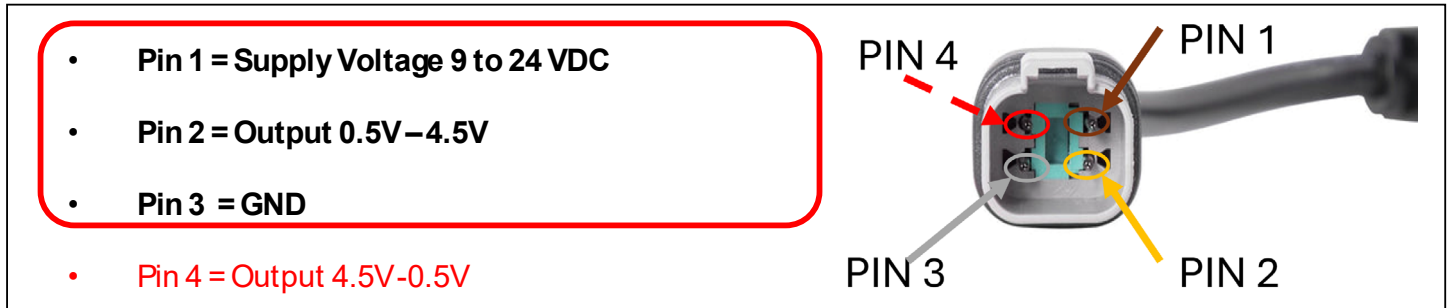


Figure 75. Arc Sensor Pin Locations

2. Voltage Readings:

- a. White wire - 0V ground
- b. Brown wire -
Between 10.5 VDC and 14.6 VDC
- c. Yellow wire:
Home position - around 3.5 VDC
Pack position - a little less than 2 VDC
Travel position - around 1.75 VDC
Full extend position - around 1 VDC

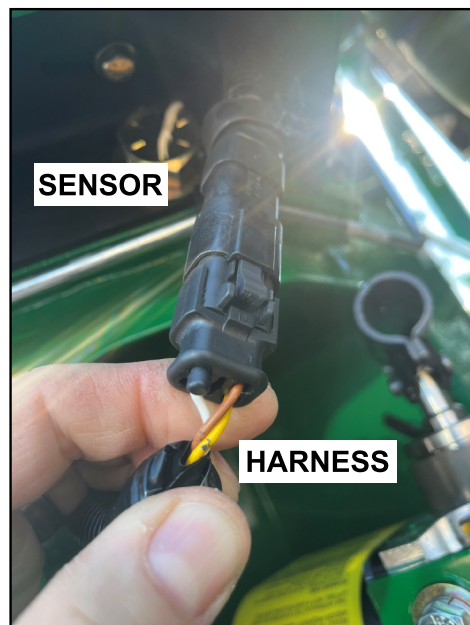


Figure 76. Arc Sensor Harness

3. Schematics:

Note: The schematic numbers shown in the images below can be used as a reference.

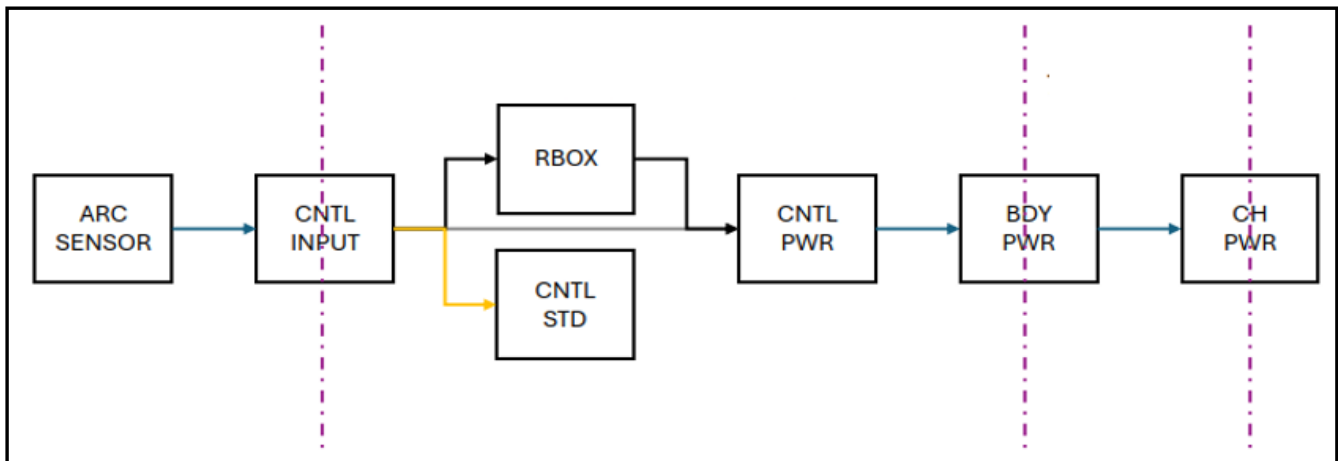


Figure 77. Basic Schematic

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C. Arc Sensor Calibration

Arc Sensor Calibration may be needed when the arc sensor for the packer is changed and needs to be calibrated.

Calibration should be performed annually ONLY by properly trained and authorized service personnel. This procedure requires a password to place the unit in calibration mode.

The password can be provided to authorized service personnel by contacting Heil Technical Services at 866-310-4345.

NOTICE

The arm and packer will move very slowly in calibration mode.

1. Press and hold Pack Retract icon to move packer to full retract position. Then press and hold set home position icon for 1 second. Then press next.

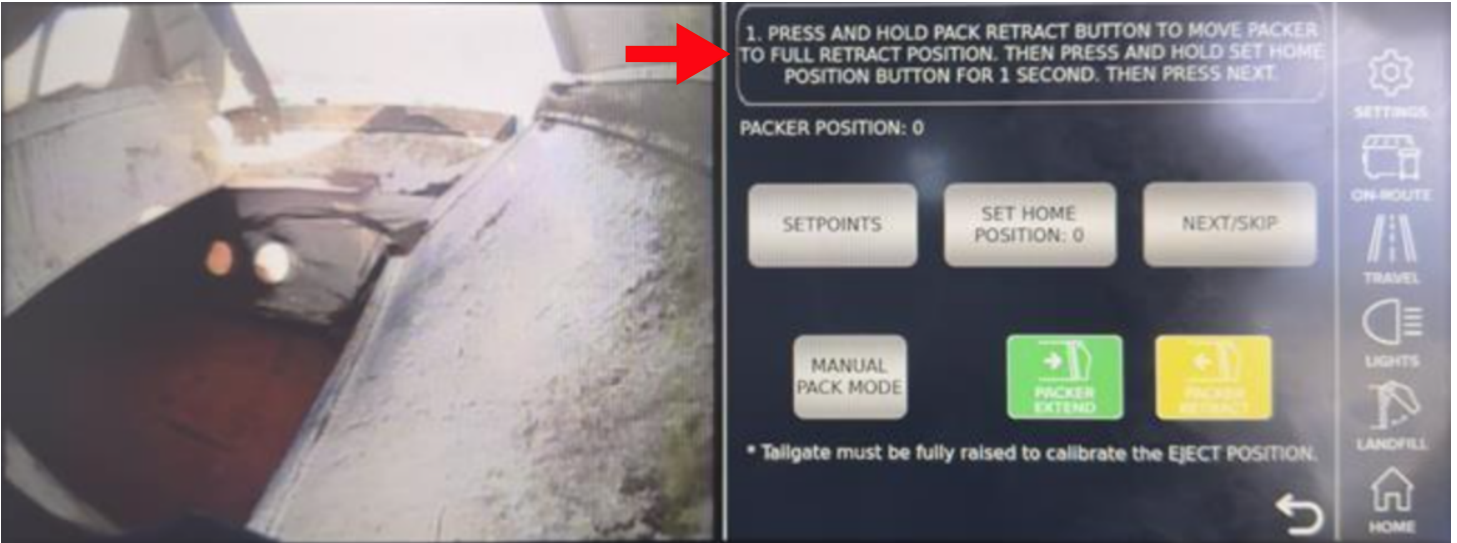


Figure 78.

2. Use Pack Extend and Retract buttons to move packer to desired pack position. Then Press & Hold set pack position button for 1 second. Then Press Next.

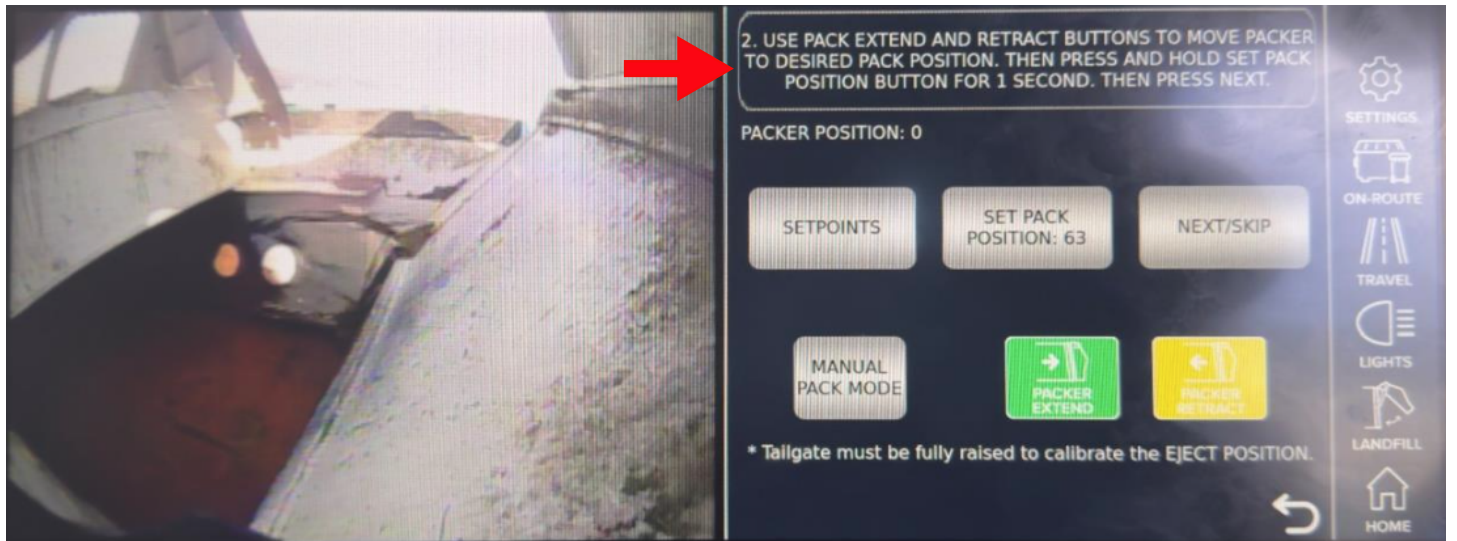


Figure 79.

MAINTENANCE & ADJUSTMENT

- Use Pack extend and retract button to move packer to desired travel position. Then press and hold set travel position button for 1 second. Then press next.

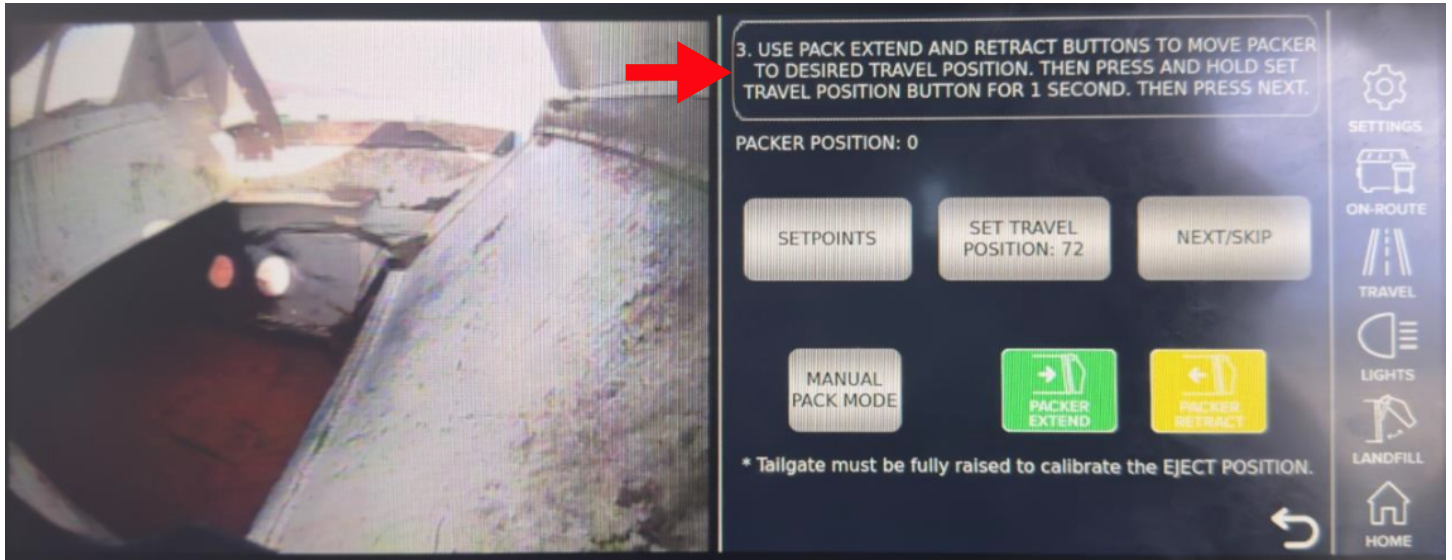


Figure 80.

- Press & hold pack extend button to move packer to full eject position. Then press and hold set eject position button for 1 second. Then Press Next.
- Calibration Complete! Move Packer to home position.

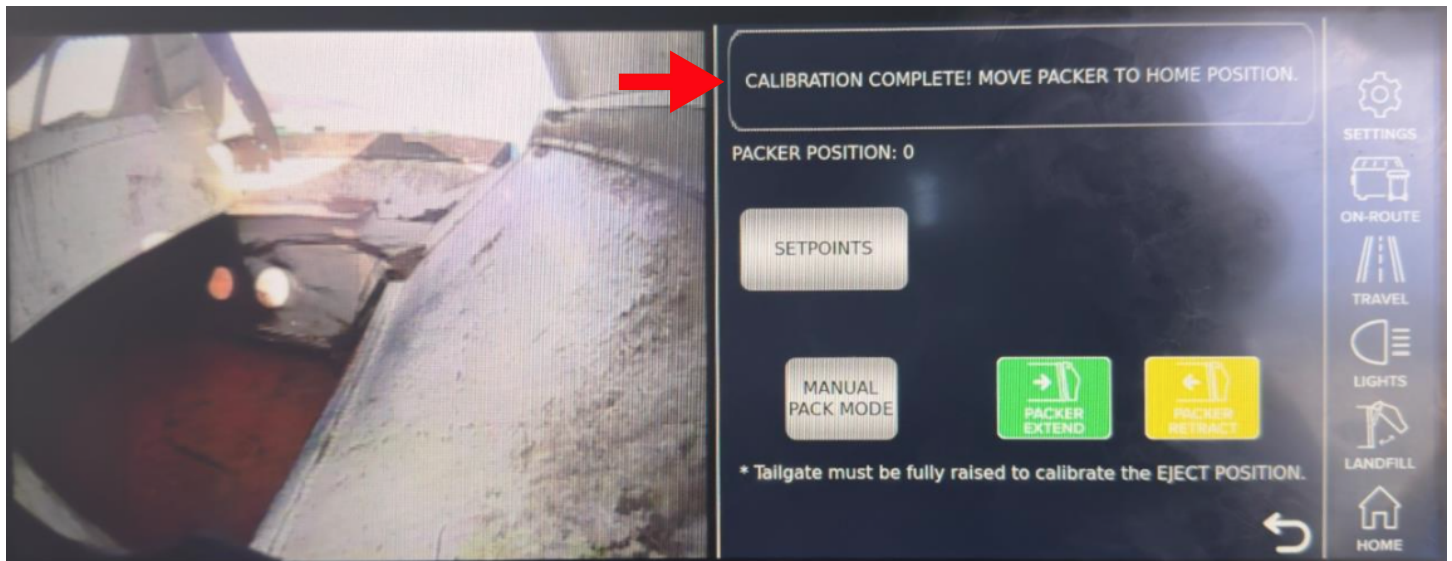


Figure 81.

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D. Arc Sensor Guidelines

When replacing the curbside pack/eject cylinder, the magnet bracket needs to be repositioned. The magnet must be reinstalled with the correct air gap.

Use the images below as reference for the proper location for each position.

Note: Once it is calibrated, no adjustment is needed until it fails. Then, the new sensor will need to be calibrated.



Figure 82. Magnet Holder Location on Cylinder Rod Eye

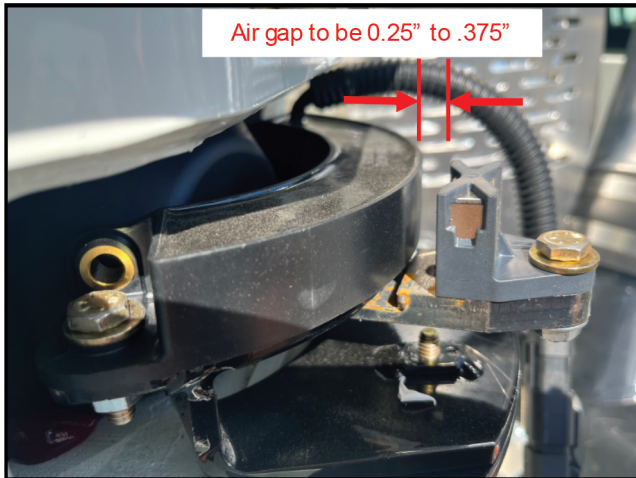


Figure 83. Air Gap Measurement



Figure 84. Home Position Retracted



Figure 85. Travel Position Extended



Figure 86. Eject Position Fully Extended

MAINTENANCE & ADJUSTMENT

Hydraulic Tank Nomenclature

The oil tank is mounted behind the chassis cab.

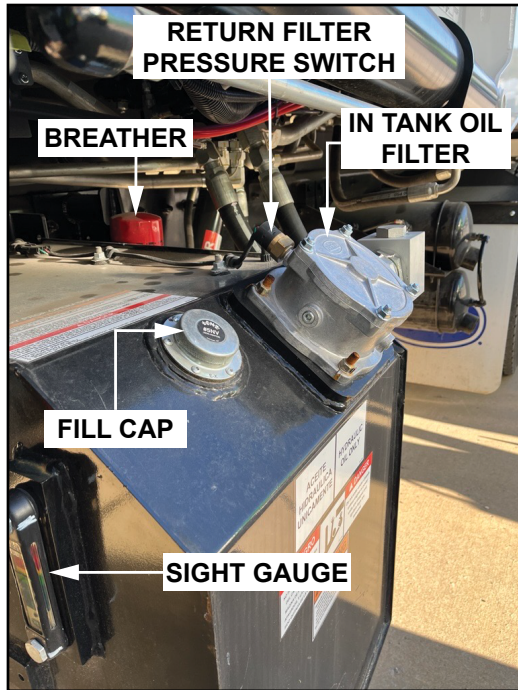


Figure 87.

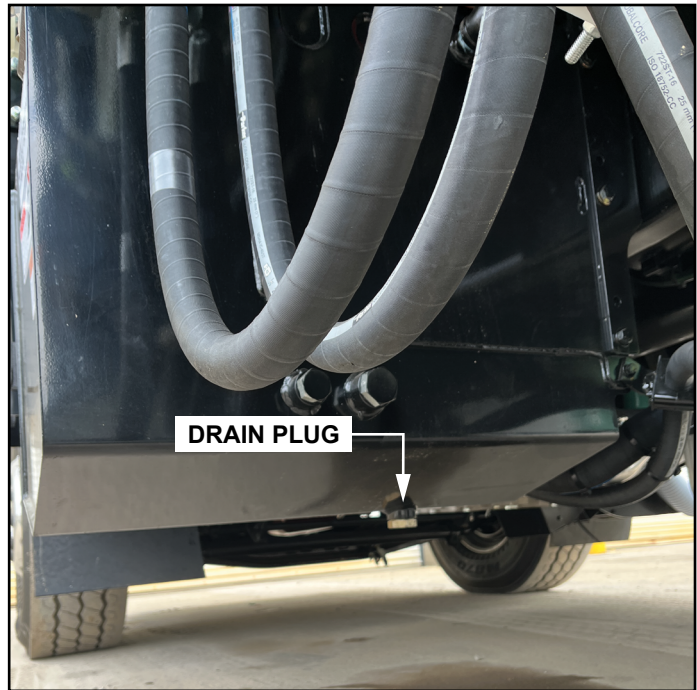


Figure 88.

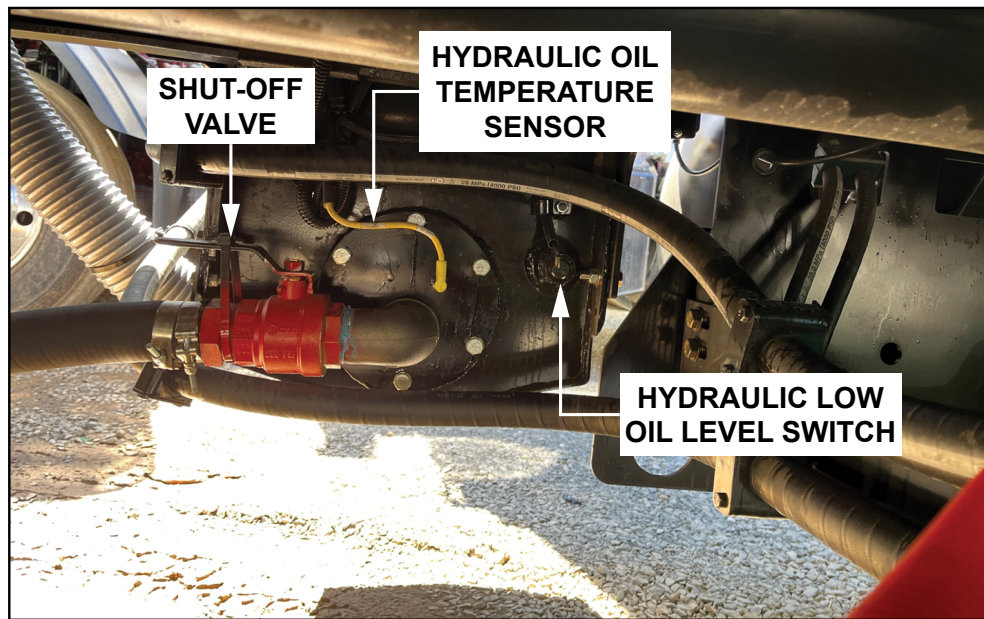


Figure 89.

Preparing The Unit To Check The Oil Level

Before checking the oil level or adding oil, make sure the unit is in the following position with all cylinders collapsed:

- Truck – on level ground
- Tailgate and Body – fully down and locked
- Packer Panel – in the in-transit position with all cylinders retracted
- Lift Arm (if equipped) – is fully retracted

The oil level in the tank must be kept between the low and full marks as indicated on the sight gauge.

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Check Oil Level

Check the hydraulic oil level (after warming up the oil) daily or every eight (8) hours, whichever comes first. All cylinders must be collapsed for an accurate oil level reading.

Important: Contamination is a hydraulic system's worst enemy. Do not let dirt enter the system. Use a clean rag to remove dirt or other contaminants around any system component before disconnecting or removing it. While filling the reservoir, filter the oil through a 200-mesh (or finer) screen. Never use a cloth to filter the oil.

When To Change Oil Filter Element

Change the filter more often under certain conditions, such as a highly dusty atmosphere or area. Use only Heil replacement filters. Purchase the filter element from your local Heil distributor.

Change the filter element when oil analysis shows the oil has expired.

Change Hydraulic Oil Filter Element

Watch the Service Shack Video online at **Heil Service Shack**.

Replace the hydraulic filter element after first 30 days of operation, then every 6 months or 1000 hours of operation OR when filter bypass light is ON. To change the hydraulic oil filter follow these steps:

1. Using a 1/2" wrench, remove the four (4) nuts from the filter cover located on the hydraulic oil tank.
2. Set the nuts aside for reuse and then remove the filter cover.
3. Remove the filter element with the by-pass assembly and responsibly discard as required.
4. Clean the housing with a clean, lint-free cloth.
5. Check the o-ring and gasket. Replace them if necessary.
6. Lubricate all o-rings and gaskets.
7. Install new element.
8. Reinstall cover with nuts. Torque nuts to 13 ft lbs.
9. Verify work completed. Refer to the "Filter Bypass Explanation & Reset Instructions" on page 97.

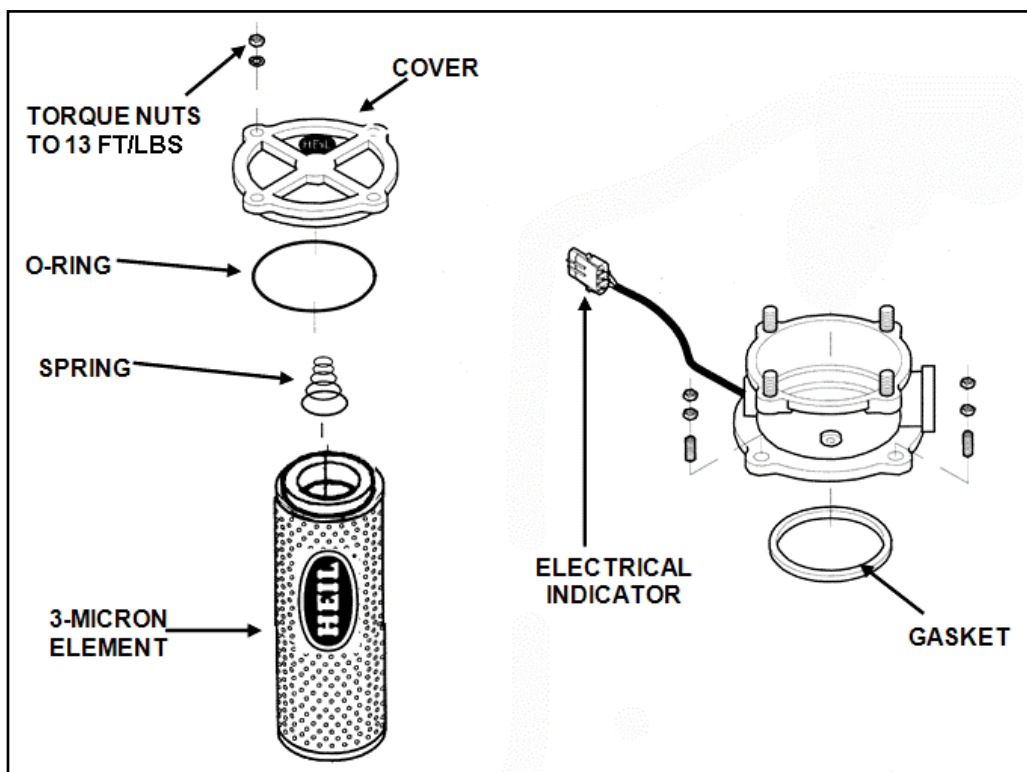


Figure 90.

MAINTENANCE & ADJUSTMENT

Filter Bypass Explanation & Reset Instructions

A. Understanding Filter Bypass:

A filter pressure switch is installed on the return filter housing and is wired normally closed when the ignition is ON. When the filter status is normal, the signal (input) to the controller remains ON.

If the pressure switch detects 30 psi of back pressure, it indicates that the filter is clogged and requires replacement (assuming no component malfunction). At 30 psi or greater, the switch opens the circuit, causing the controller input to be lost. This condition triggers a filter bypass warning.

When in this condition, the filter warning light blinks once for each hour in bypass. For example, after four hours, the light will blink four times, pause, and repeat. The blinking stops when the filter is changed.

NOTE: Usually, there is sufficient time to continue the route and complete the shift.

After 6 hours have passed, the system turns off the hydraulic pump. The operator must turn off the system power button, then turn it on again, and press the hydraulic pump ON button to regain hydraulic function. After every 3 minutes, this will continue to happen. At this point, the system will not reset automatically after a filter change. It will require a technician to change the filter and then reset the system.

B. Resetting the System:

NOTICE

The following three conditions **MUST** be met for the filter change warning to reset. Additionally, the filter warning will reset automatically after keeping the three conditions as described below for a total of 15 minutes.

1. The engine must be running.
2. Pump should be enabled in the controller.
3. The input for filter pressure switch must be on in the input screen of the display.

NOTE: In some cases, the chassis may automatically shut off the engine. The technician can restart the engine, turn the pump back on, and the system will continue the 15-minute count

NOTE: If a malfunction occurs—such as a failed pressure switch, broken input wire, or loss of ignition power to the pressure switch—the system will not reset because a required reset condition is missing. In this case, the system must be troubleshooted to identify and correct the issue. Once the issue is corrected, perform the reset procedure.

Drain & Clean The Hydraulic Oil Tank

Change the hydraulic oil according to the applicable service intervals.

Remember that almost all hydraulic system malfunctions can be traced to dirt in the fluid. When working with the hydraulic system, the hands, tools, working area and parts must be as clean as possible.

CAUTION

Wear proper eye protection when you are working on or around hydraulic lines or components. Wear proper eye protection and avoid contact with hydraulic oil if possible. Never check for oil leaks with your hands.

WARNING

Make sure the unit is in “**Lock-Out/Tag-Out Procedure**” on page 13 before performing maintenance, service procedures, entering the hopper, climbing on the body, or on equipment. Equipment can be operated when the unit is not in Lock-Out/Tag-Out. Operating equipment while conducting maintenance, entering the hopper, or climbing in or on the body can lead to **SERIOUS INJURY** or **DEATH** if the unit is not in Lock-Out/Tag-Out.

NOTICE

If your employer or company has a Lock-Out/Tag-Out procedure that is different from the following procedure, use your employer’s or company’s procedure. If your employer or company does not have a Lock-Out/Tag-Out procedure, refer to the “**Lock-Out/Tag-Out Procedure**” on page 13.

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To drain and clean the hydraulic oil tank, follow these steps:

1. Perform the Lock-Out/Tag-Out procedures. If you have any questions about the Lock-Out/Tag-Out procedure, please contact your supervisor or ESG Technical Service.
2. Disengage the pump, shut off the engine and remove the ignition key.
3. Remove the fill cap from the top of the tank.
4. Remove the drain plug from the bottom of the tank so that the oil drains into a container.
5. While fluid is draining from the tank, remove and replace the filter/breather assembly. Change the assembly every time the in-tank filter is replaced.
6. To drain the entire hydraulic system, disconnect all hoses at the adapter and drain the hoses into a container.
7. Remove and replace the in-tank filter as described in **“Change Hydraulic Oil Filter Element” on page 96**.
8. Remove the outlet flange and 100 mesh suction strainer to gain access to the tank inside.
9. Remove sediment from the tank bottom.
10. Install the outlet flange with a new gasket and the 100 mesh suction strainer into the tank.
11. Install the drain plug in the tank bottom.
12. Reconnect and tighten all hose connections that were disconnected.

NOTICE

Before filling the tank be sure the funnel is clean and 200 mesh (or finer) screen is used to strain the hydraulic oil.

13. Fill tank with recommended oil, checking the sight gauge as you fill. Refer to **“Hydraulic Oil Specifications” on page 15**.
14. Check the entire system to make sure all connections are tight and no leaks are found.
15. Start the truck’s engine and engage the pump.

WARNING

Moving equipment can be dangerous to bystanders. SERIOUS INJURY or DEATH can occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

16. Operate the packing panel through 10 cycles to be sure all air is out of the circuits.
17. Operate the automated container lift mechanism.
18. Operate tailgate – full up and full down.
19. With the packing panel in the retracted position and lift in the in-transit position, check tank oil level. If necessary, add recommended oil as described under **“Preparing The Unit To Check The Oil Level” on page 95**.

Purge The Hydraulic System

If a catastrophic hydraulic component failure occurs, the hydraulic system must be flushed entirely. Remove the in-tank filter assembly cover and inspect the return oil filter and magnets to identify a catastrophic component failure. If the return filter has metal debris or the magnets are full of shavings, perform a complete hydraulic system flush to prevent future failures due to oil contamination.

To purge the system, follow these steps:

1. Completely retract all cylinders to remove as much oil as possible, directing it into the hydraulic reservoir.
2. Completely drain the hydraulic reservoir and discard the in-tank filter.
3. Remove all debris from the filter magnet of the unit’s in-tank filter assembly.
4. Remove the hydraulic reservoir outlet flange and suction strainer.
5. Clean the hydraulic reservoir by removing all dirt and debris from the bottom of the tank. Rinse and clean the tank with a nonflammable cleaning solvent.
6. Remove, thoroughly clean, and reinstall the suction strainer, outlet flange, drain plug, system magnets, etc.
7. Reassemble the in-tank return filter assembly using a new OEM replacement filter

MAINTENANCE & ADJUSTMENT

8. Remove the suction line from the pump and thoroughly clean the entire length of the inside of the suction line from the pump to the connection at the hydraulic reservoir.
9. Replace the failed hydraulic component that has introduced the contamination into the system.

NOTICE

Before filling the tank be sure the funnel is clean and 200 mesh (or finer) screen is used to strain the hydraulic oil.

10. Fill the hydraulic reservoir with clean hydraulic oil
11. Make sure the suction line shut-off valve is in the on position. Secure the handle with a plastic zip tie to prevent the valve from closing due to vibration or being inadvertently closed.
12. Double-check the routing of all lines and verify that all fittings, flanges, and covers are properly installed and tight.
13. Start the vehicle and turn the pump on.
14. Run each hydraulic function at engine idle "only." Operate each hydraulic function through one complete cycle to flush any residual contaminated oil from hydraulic cylinders. A complete cycle consists of operating a cylinder to its full extended position and retracting it to the completely collapsed position.
15. After cycling the cylinders as described, remove the filter cover and inspect the filter magnets. If the magnets are covered with metal, replace the filter element, clean the magnets, and reinstall the filter cover.
16. Operate each hydraulic function through a complete cycle at least ten times at engine idle.
17. Remove the filter cover and inspect the magnets. If the magnets are clean, proceed to step 21. If the magnets are covered with metal, repeat steps 18 through 20.
18. At engine throttle, operate each hydraulic function (except the packer) through a complete cycle at least ten times. Operate the packer to the full eject position at engine throttle and back at engine idle.
19. Install a new OEM in-tank hydraulic filter and reinstall the filter cover.
20. Check the hydraulic system for leaks.
21. Run the unit for 40 hours and recheck the hydraulic filter and system magnets for debris. Service the hydraulic filter and magnets as needed.

NOTICE

Extra magnets may be placed inside the hydraulic reservoir to accelerate the removal of metal particles.

Tailgate Lubrication

See "**Grease Lubricant Recommendation**" on page 15 and "**Body Lubrication Guide**" on page 80.

Clean & Inspect The Tailgate Seal

WARNING

Make sure the tailgate props are engaged and locked before inspecting the tailgate seal. **SERIOUS INJURY or DEATH** can occur.

Daily, check the tailgate seal to make sure it mates properly with the body and inspect for possible wear, damage or leaking.

SECTION 6

IN-CAB DISPLAY

IN-CAB DISPLAY

In-Cab Main Control Panel

The In-Cab Main Control Panel varies by truck chassis model. See the following illustration for a typical example. Each panel is labeled to indicate its functions, so be sure to familiarize yourself with your unit's control panel.

Note: If the optional switch bank fails, use the in-cab display switchboard as a temporary solution.



Figure 91. Control Panel

WARNING

After the System Power switch is pressed and motion of components has appeared to stop, additional movement can occur.

1. SYSTEM POWER ON and OFF/STOP SWITCH (RED) - The switch must be ON and the side door closed for pack mechanism operation.
 - a. PULL for ON position.
 - b. PUSH for OFF/STOP position.

In-Cab Display

NOTICE

The packer panel can be stopped at any position by pushing switch to OFF/STOP position.

2. IN-CAB ALARM - Sounds when tailgate or body is opened or raised, the lift is extended, when switching between Auto and manual pack modes or auto and manual lift modes, when various other conditions occur, or a fault condition occurs. Refer to **"I/O Functions"** on page 101.
3. USB CHARGING PORT
4. SWITCH BANK (OPTIONAL) - Pump, pack extend., pack retract., and pump functions are located in the in-cab display.

IN-CAB DISPLAY

Boot-Up Screen

This image will appear on the display once it receives power.



Figure 92.

Customer Resource QR Code

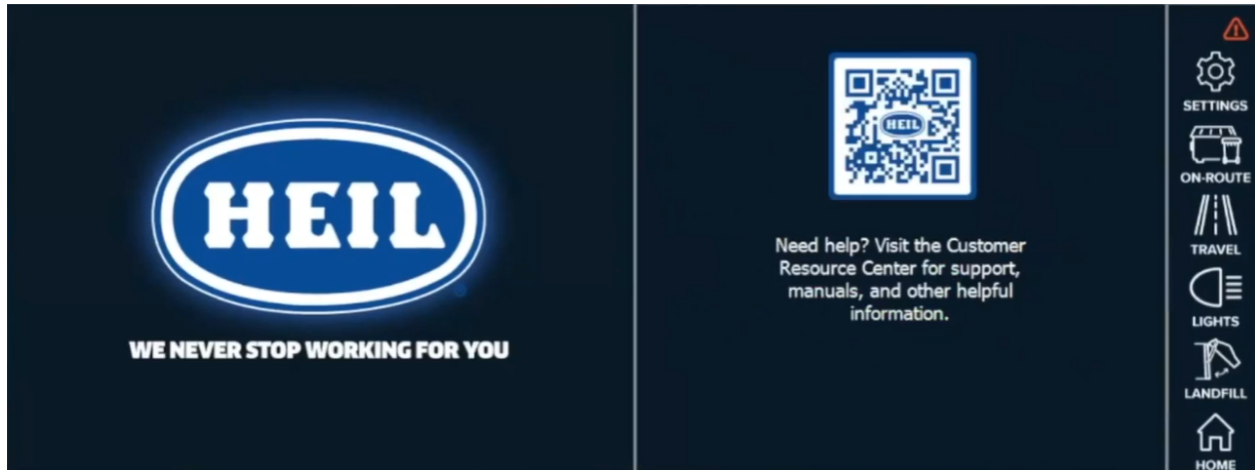


Figure 93.

Notice Page

Appears for ten seconds along with the telltale bulb check.

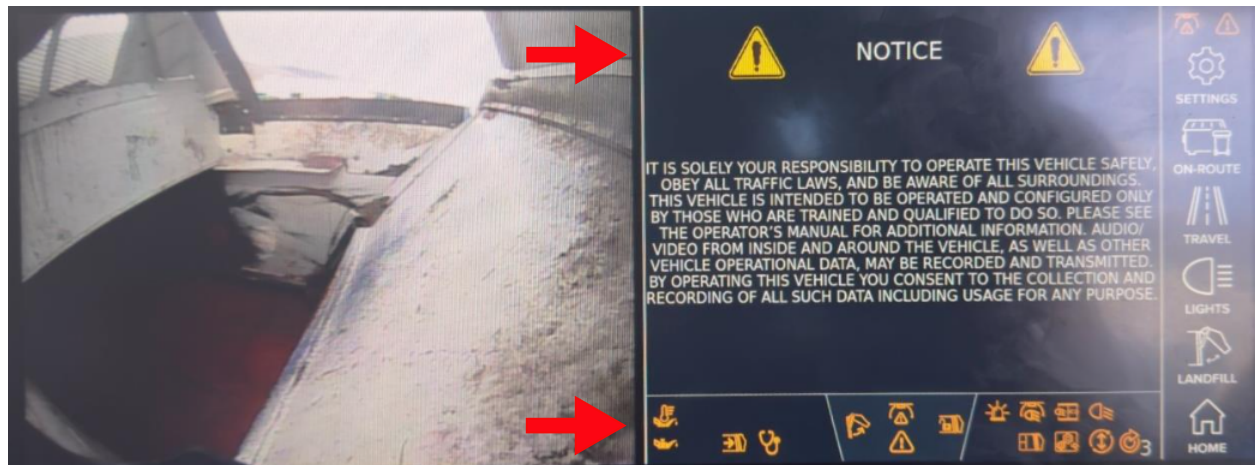


Figure 94.

IN-CAB DISPLAY

Telltale Banner

Telltales will be stacked, and the higher priority will be displayed.

Prio 3									
Prio 2									
Prio 1									
Prio 1									
Prio 2									
Prio 3									

Telltale Legend

A. Dimension & Tailgate Status














Icon	Definition	Activation Trigger / Action
	Tailgate Not Fully Closed	Tailgate is not sensed in the lowered position, lower tailgate before driving
	Tailgate Not Fully Locked (Flashing)	Tailgate not fully locked, lock tailgate before driving, flash above road speed limit
	Tailgate Unlocked (Solid)	Tailgate unlocked, lock tailgate before driving
	Out of Dimension	Above road speed limit, vehicle is not in the travel position, return arm, fully open grabbers, lower tailgate, close/lock any interlocked access doors
	Out of Dimension	Below road speed limit, vehicle is not in the travel position, return arm, fully open grabbers, lower tailgate, close/lock any interlocked access doors

B. Body Lighting - Body Status

Icon	Definition	Activation Trigger / Action
	Auxiliary Lighting On	Rear auxiliary backup lights are on
	Lift Lighting On	Lift lights are on
	Hopper Lighting On	Hopper lights are on
	Strobe Lighting On	Strobe lights are on
	Select-O-Pack Enabled	Select-O-Pack is enabled with Number of Packs showing to the left
	Hydraulic Pump Running	Hydraulic pump is on and running at its specified parameters
	Enable Hyd Pump	Flashing when the pump needs to be on but is not
	Auto Lift Enabled	Vehicle is in the travel position. Packer, Top Door
	In Travel Position	Vehicle is in the travel position
	Travel Position Sel.	Travel Position is selected but not in travel position

IN-CAB DISPLAY

C. Alarms & Health

Icon	Definition	Action
	Active Alarm	Critical error detected on the Body; immediate action should be taken to resolve the issue
	Active Warning	Noncritical error detected on the Body; should be checked when possible
	Logged In	Password login active
	Hydraulic Oil Error	Hydraulic oil level or pressure is out of specified range and should be checked immediately
	Hydraulic Oil Warning	Hydraulic oil level or pressure is approaching an out-of-specified range and should be checked when possible
	Hydraulic Oil Temperature Error	Hydraulic oil temperature is out of specified range and should be checked immediately
	Hydraulic Oil Temperature Warning	Hydraulic oil temperature is approaching an out-of-specified range and should be checked when possible
	Travel Position Selected	Packer Travel Position has been selected; next movement of the pack will move to the travel position and maintain that position
	Travel Position	Packer is in the travel position
	Packer/Ejector Malfunction	Critical error detected in the Packer or Ejector
	Packer/Ejector Warning	Warning of potential issues with the packer or ejector
	Pump ON	Pump is ON and pump button is BLUE on the display
	Pump Off (Flashing)	Pump is OFF but pump command is requested

IN-CAB DISPLAY

Body Health

The advanced diagnostics within the Heil control system enable the in-cab display to guide maintenance staff precisely to the root cause of the problem.

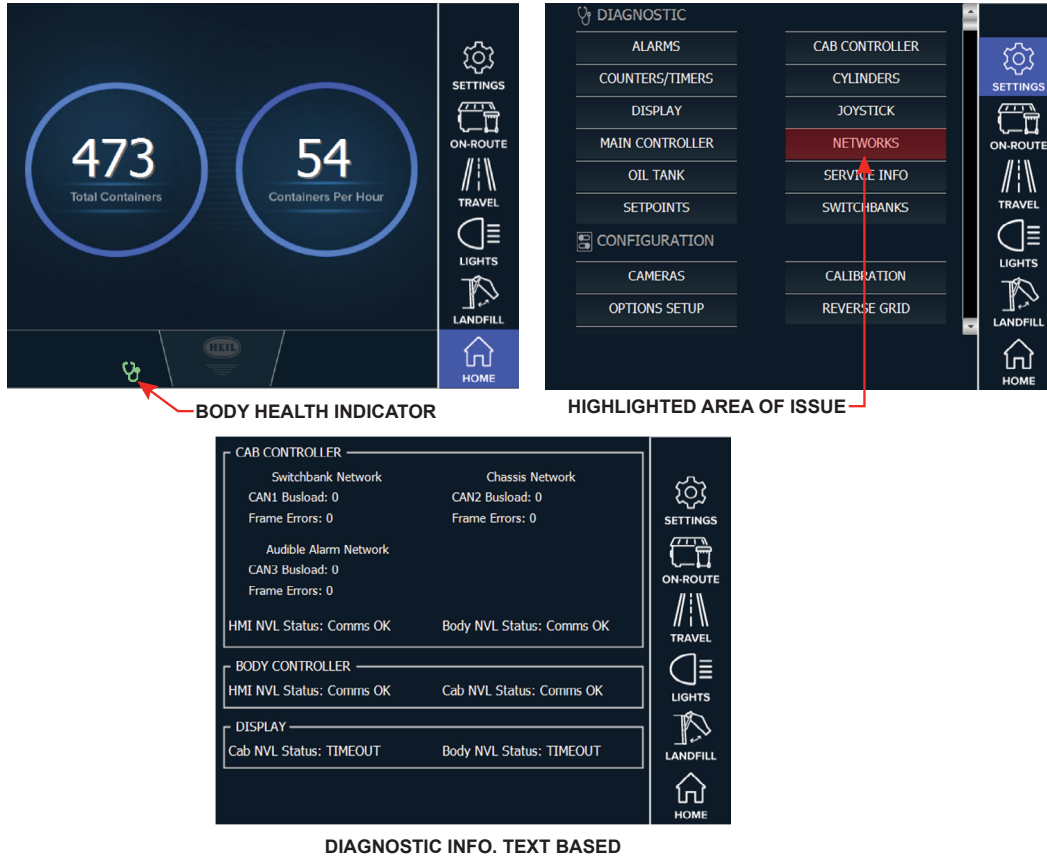


Figure 95.

Out Of Dimension / Tailgate Status

In addition to the audible alert, Telltales offer a visual warning indicating that the vehicle is not positioned to safely travel above the posted speed limit. This feature helps the operator recognize when the vehicle may be exceeding height or width restrictions.

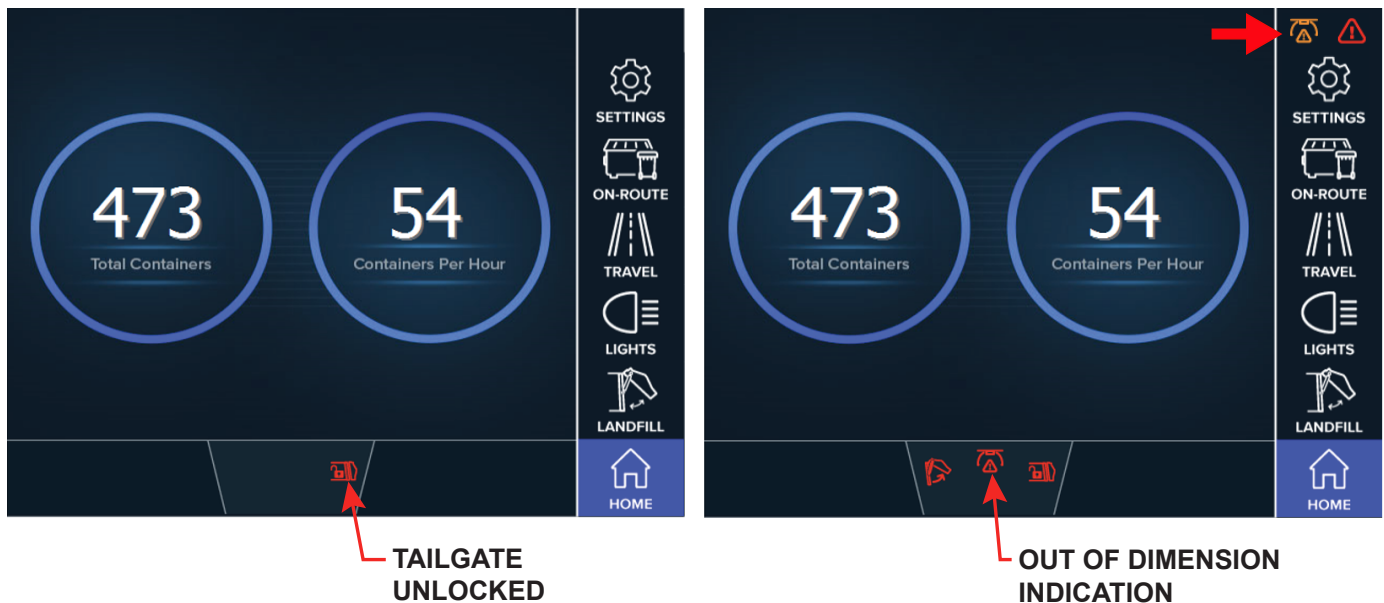


Figure 96.

IN-CAB DISPLAY

Notification Pop-Up

A notification pop-up will appear on home screen. There is an alarm pop-up (red header) and a warning pop-up (yellow header) both can be cleared with the return button, and the in-cab alarm will sound. The alarm message is also available in the settings sub-screen. Refer to the alarms and warnings list below for possible alarms.

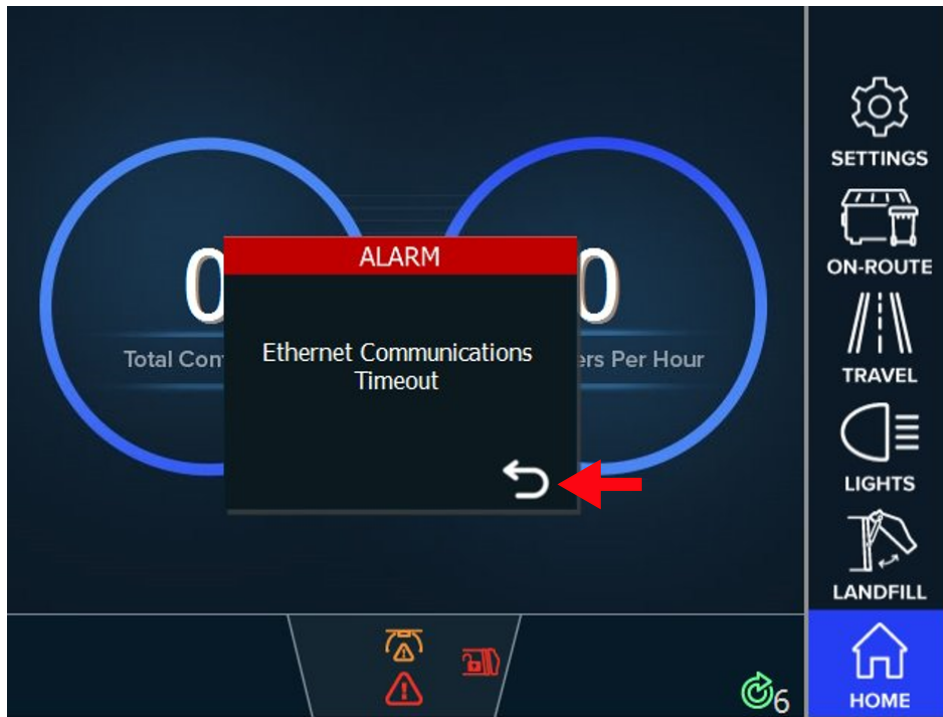


Figure 97.

Note: “Figure 110.” is for visual reference only.

Alarms & Warnings List		
Ethernet Communications Timeout	Hydraulic Oil Temp Low	Packer Position Sensor Failed Low
J1939 Network Health Not OK, Verify Network Integrity	Hydraulic Temp Over 180 for 5 Minutes	Packer Cycle Timeout: Exceeded Pressure Too Long
CNG Defuel Valve Open	Lift Extended	Rolling with Lift Extended
Side Door Open Pump Disabled	Side Door Open	Tailgate Open
Hydraulic Oil Temp Too High	Oil Temp Sensor Failed High	Tailgate Unlocked
Low Hydraulic Oil	Oil Temp Sensor Failed Low	Body Raised
Trans Temp High	Body Pressure Sensor Failed High	System Power Off
Filter Bypass Fault	Body Pressure Sensor Failed Low	Pump Off
Low Torque Fault	Packer Position Sensor Failed High	Camera Configuration Error
Hydraulic Oil Temp Too High. Pump Shutdown	Hydraulic Temp Over 210 for 3 Minutes	

IN-CAB DISPLAY

Home Screen

Note: If cameras are configured, they will appear on the left side of the display and can show up to four cameras at one time. If not configured the HEIL logo will appear.



Figure 98.

Settings Page

Here you can view active alarms and other details for the unit by tapping the corresponding icon. If an alarm occurs, it will be identified under the settings page. The icon will turn red when activated. Tap the red icon to view the alarm details.

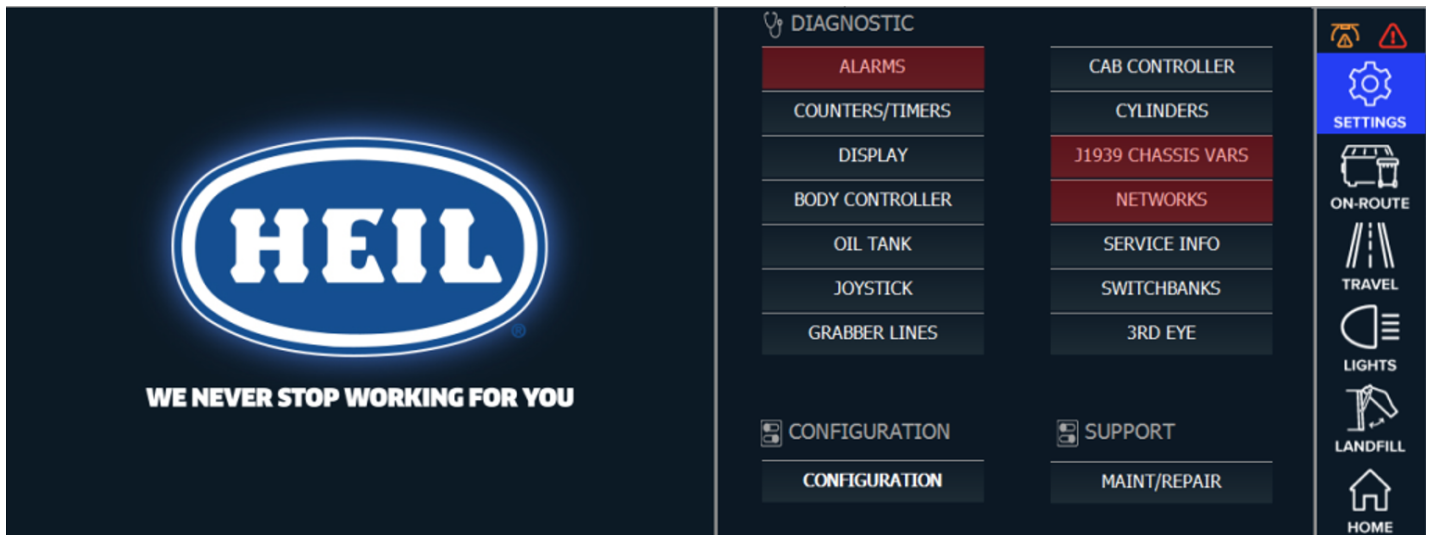


Figure 99.

IN-CAB DISPLAY

A. Alarms

Press the Clear Alarms icon to clear current alarms. Press the Back icon to return to the previous screen.

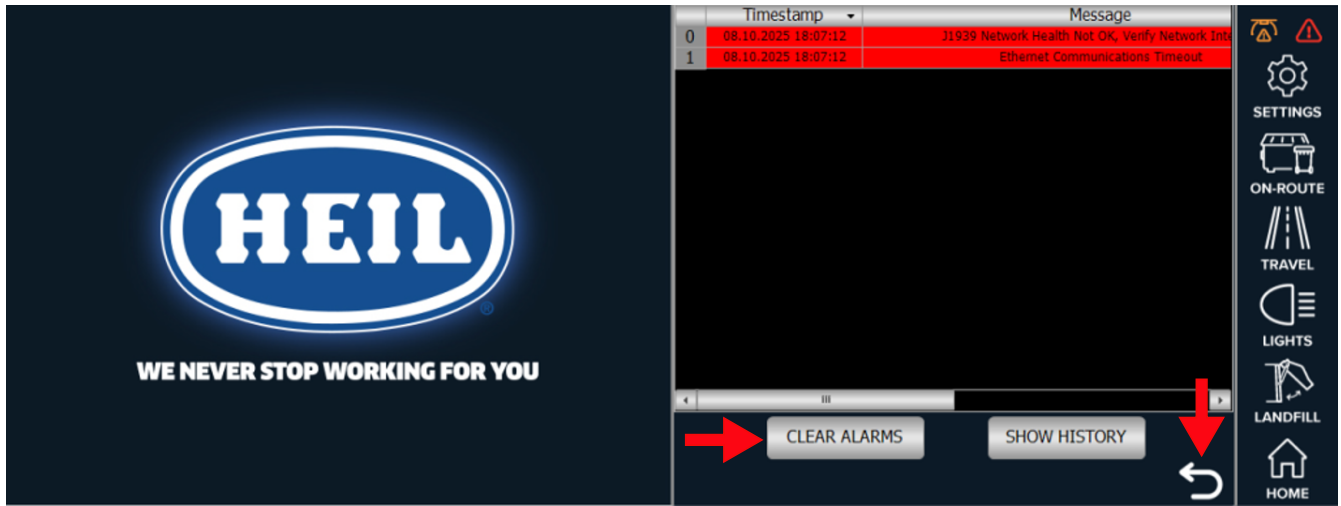


Figure 100.

B. Body Controller I/O PLC

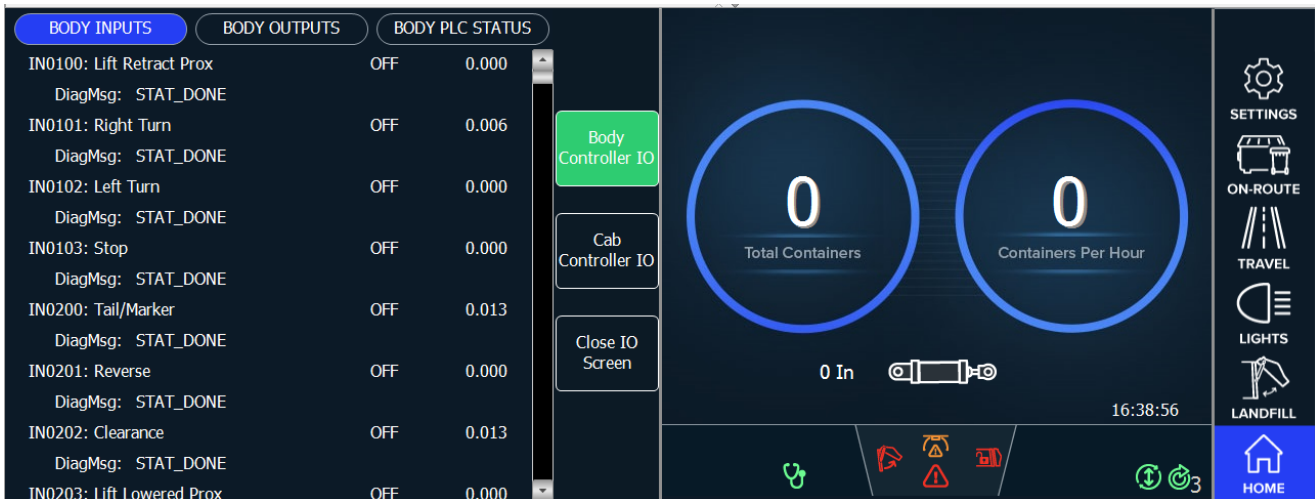


Figure 101.

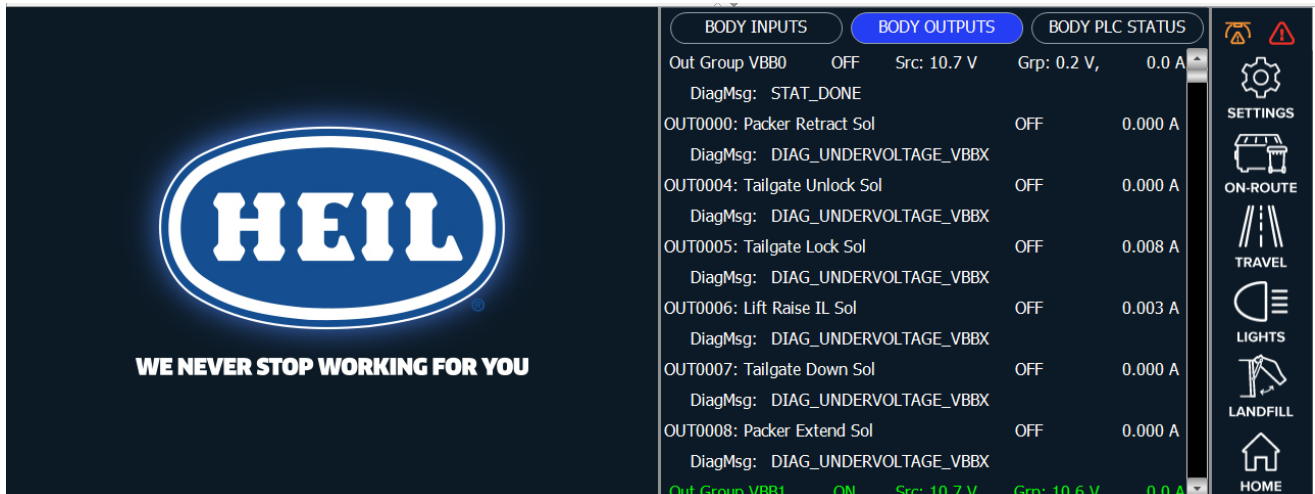


Figure 102.

IN-CAB DISPLAY

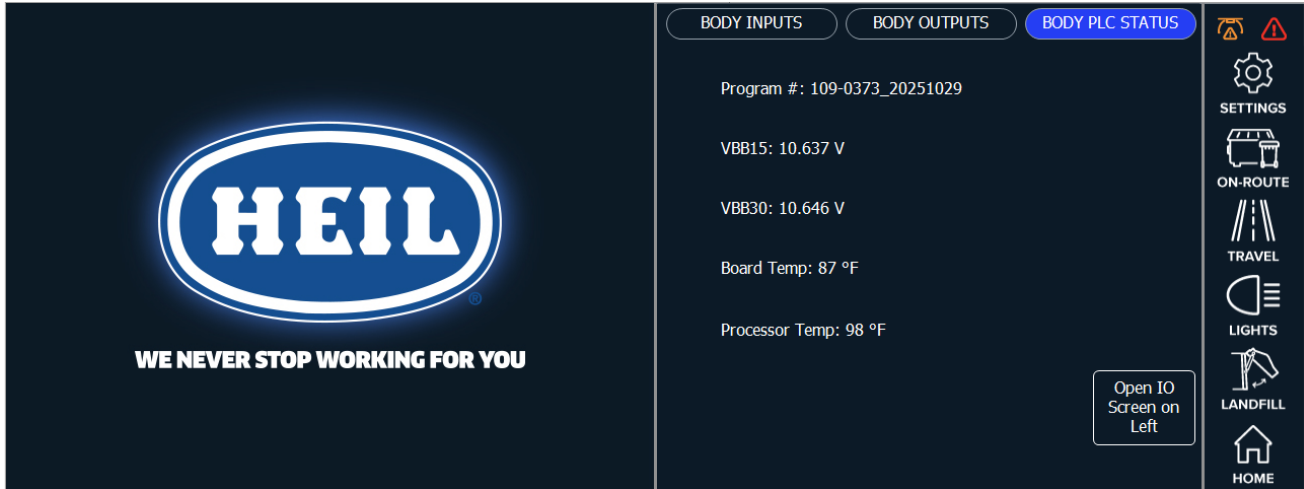


Figure 103.

C. Cab Controller I/O PLC

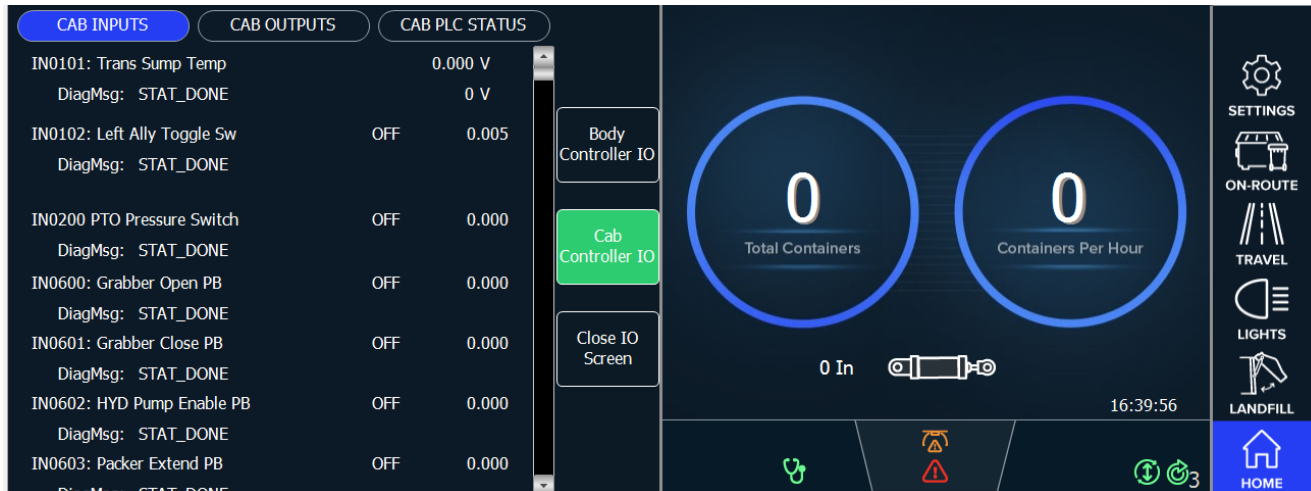


Figure 104.

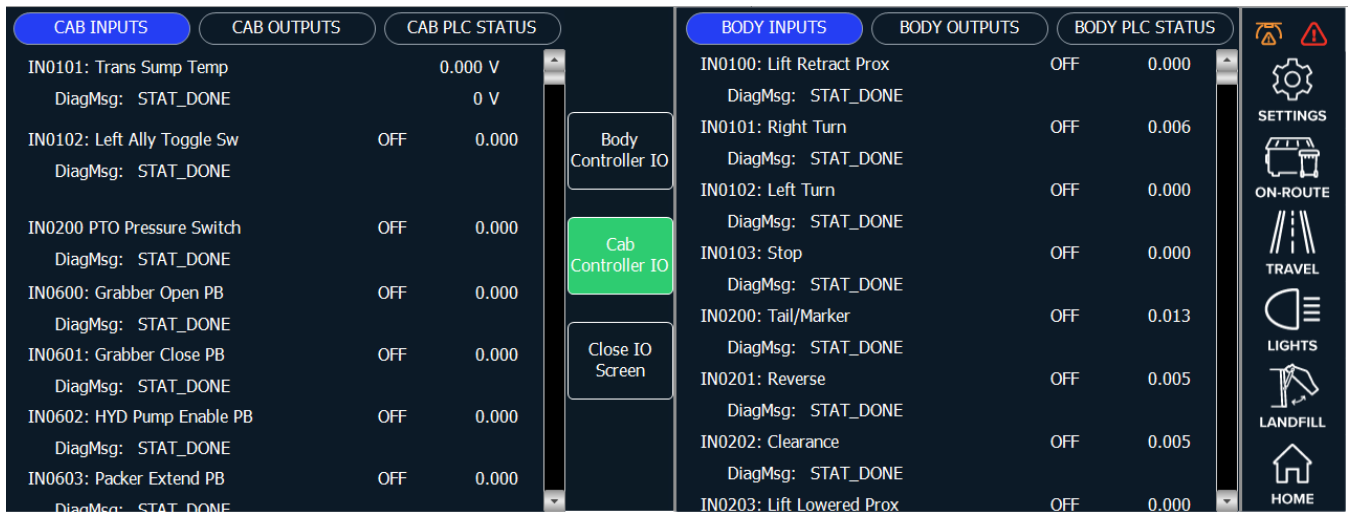


Figure 105.

IN-CAB DISPLAY

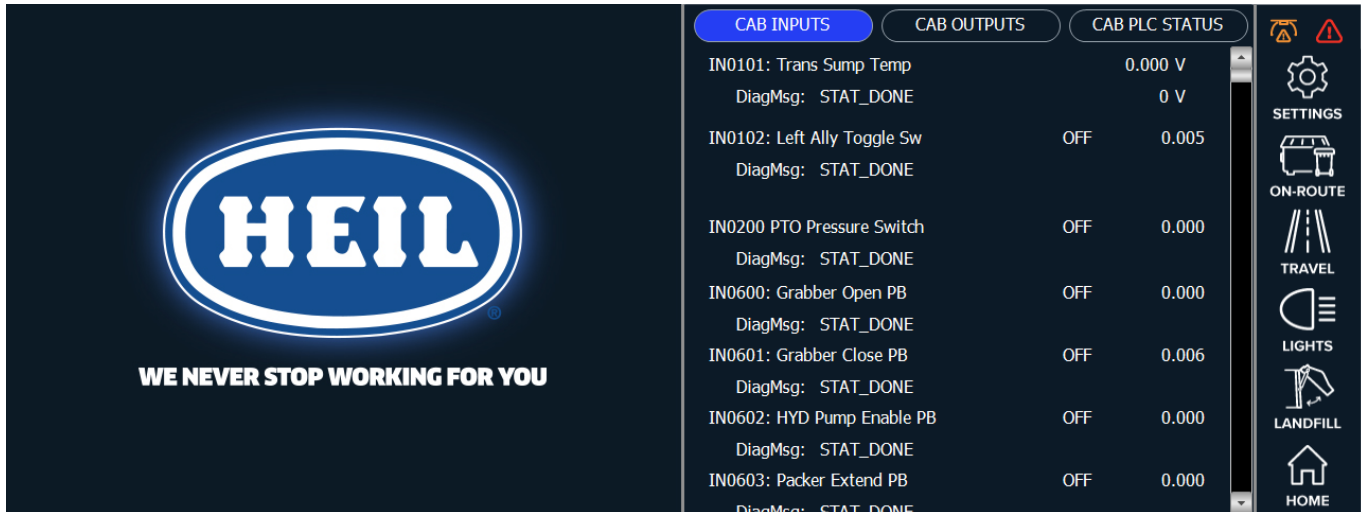


Figure 106.

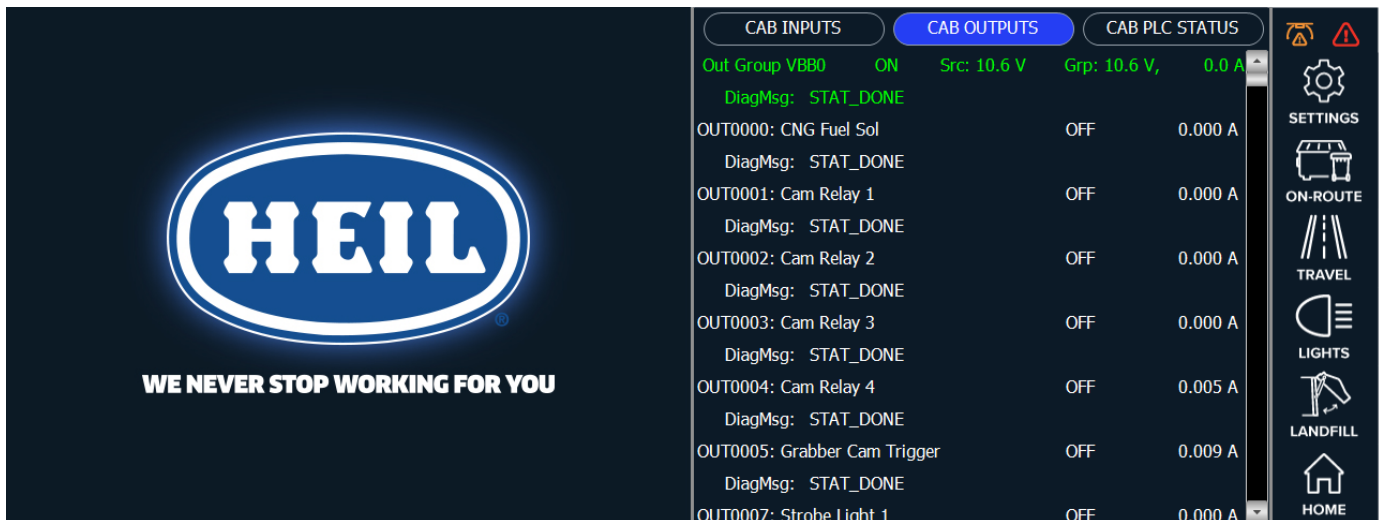


Figure 107.

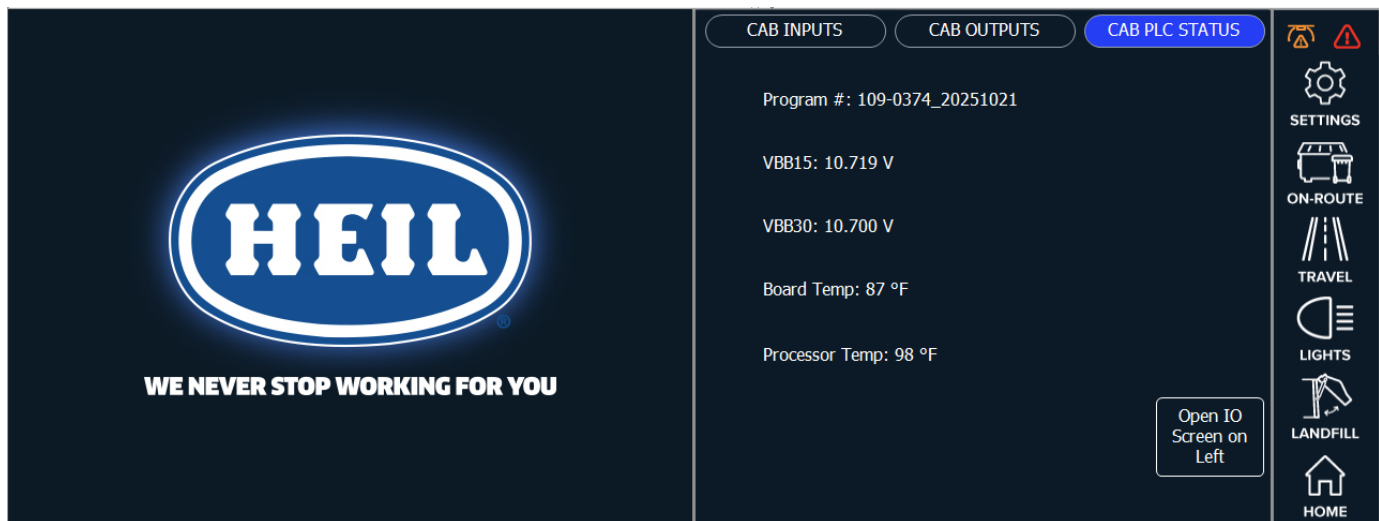


Figure 108.

IN-CAB DISPLAY

D. Counters & Timers

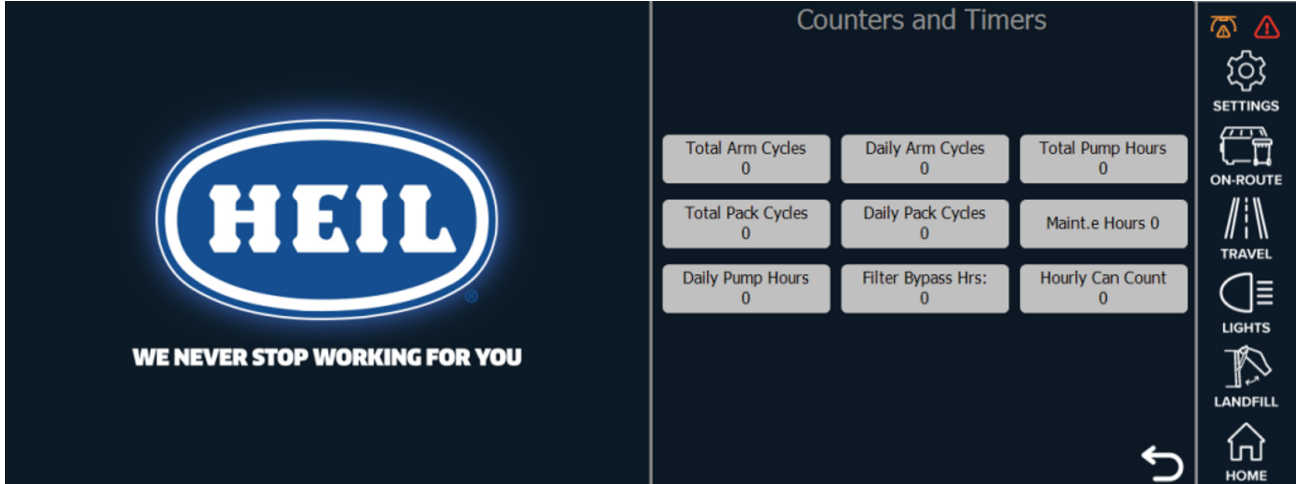


Figure 109.

E. Cylinders

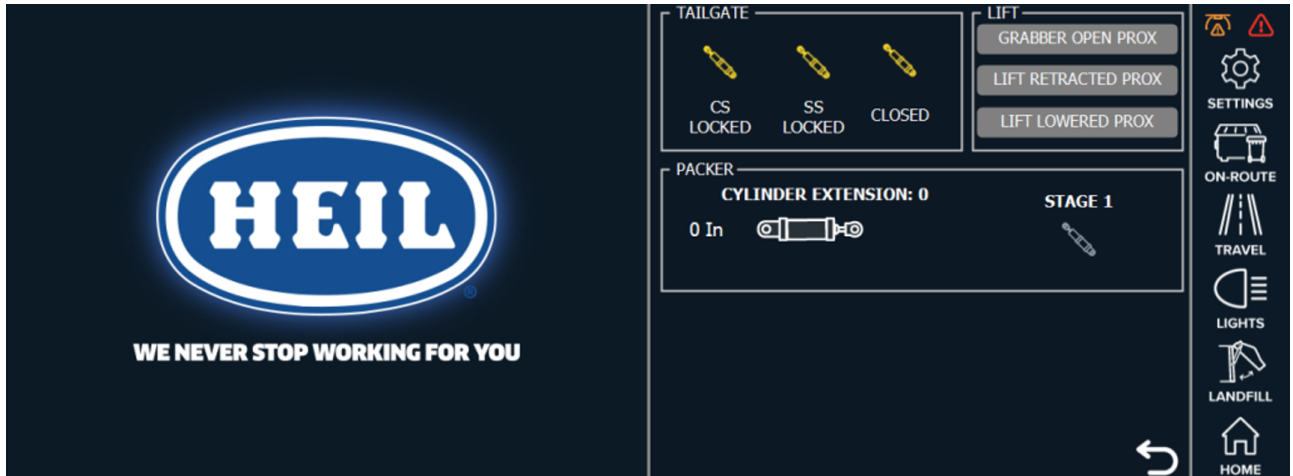


Figure 110.

F. Display

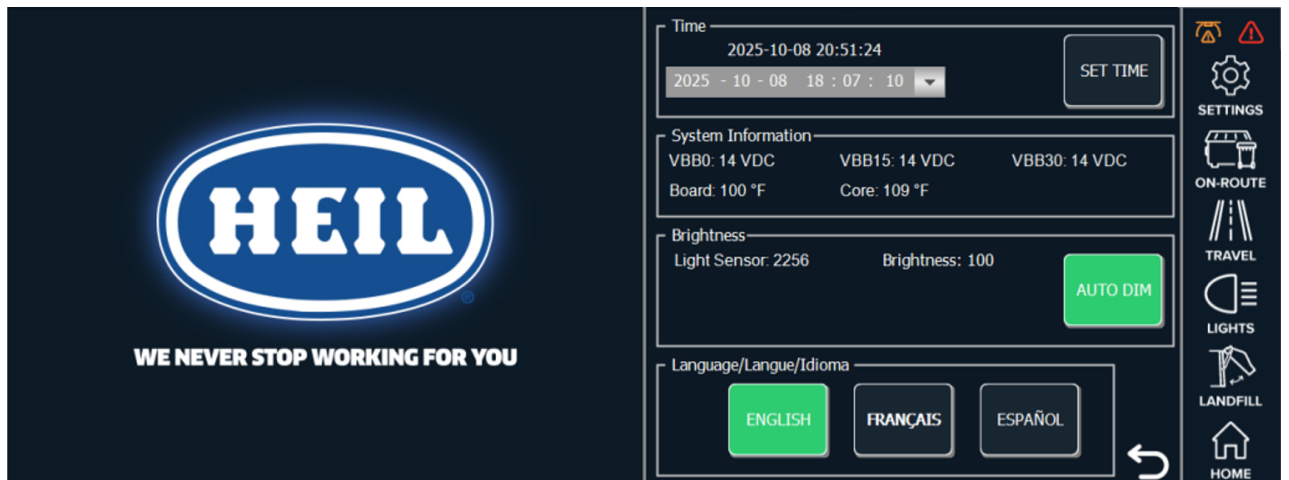


Figure 111.

IN-CAB DISPLAY

G. Chassis

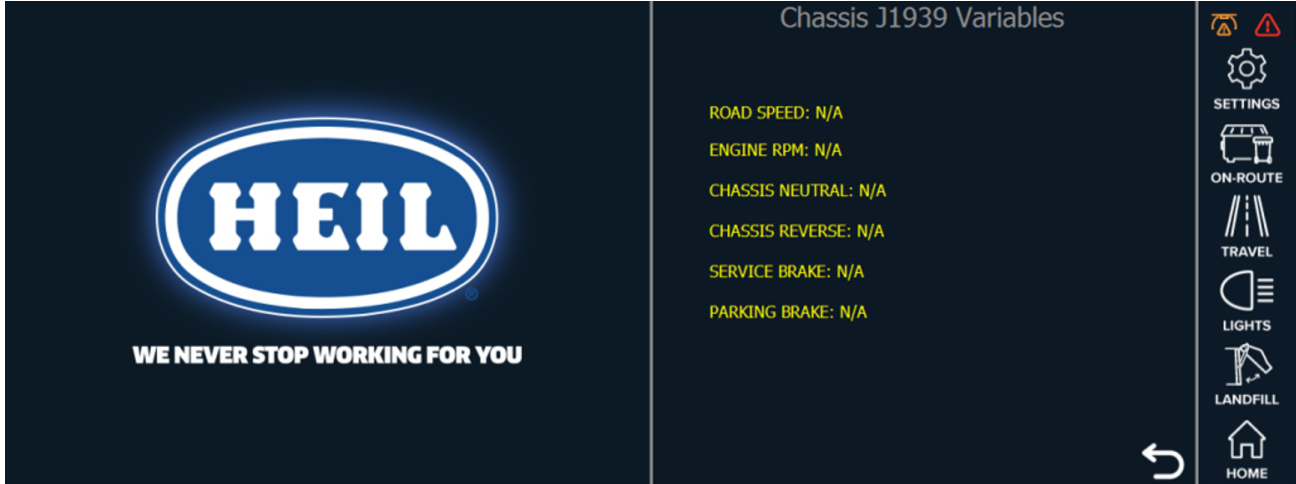


Figure 112.

H. Network

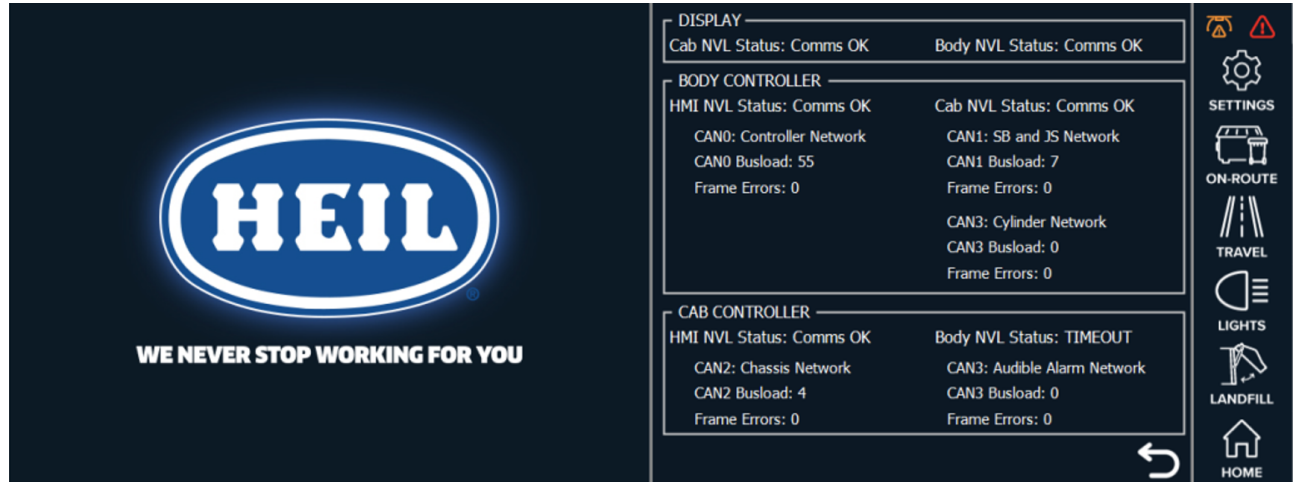


Figure 113.

I. Oil Tank

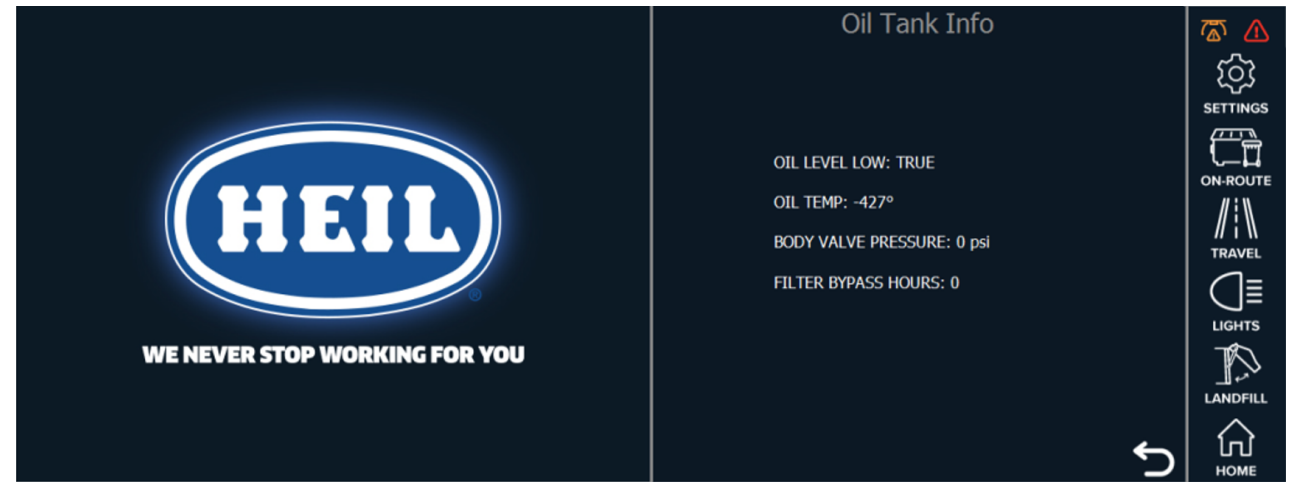


Figure 114.

IN-CAB DISPLAY

J. Joystick

Reference applicable operations manual for joystick override instructions.

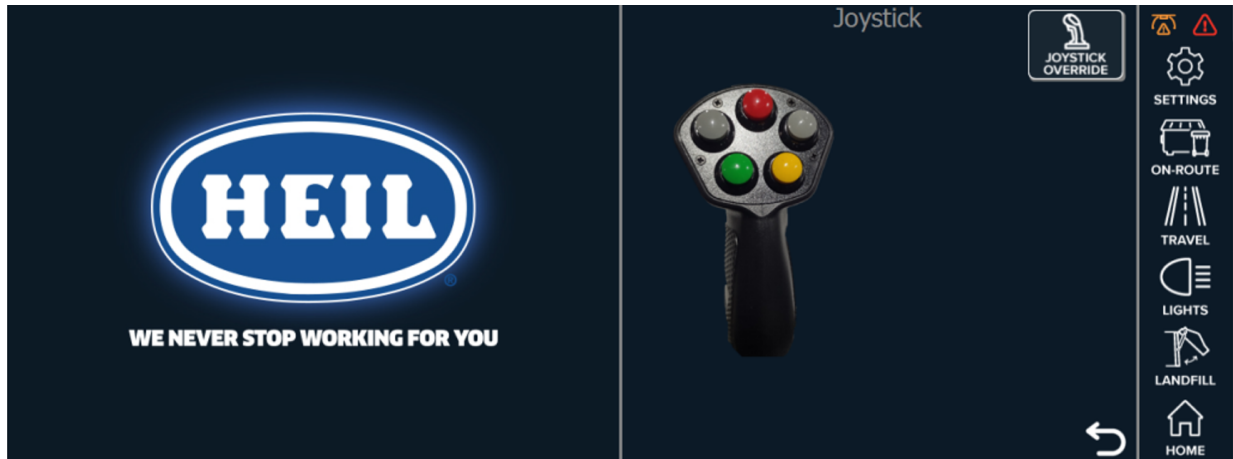


Figure 115.

K. Switch Bank Main

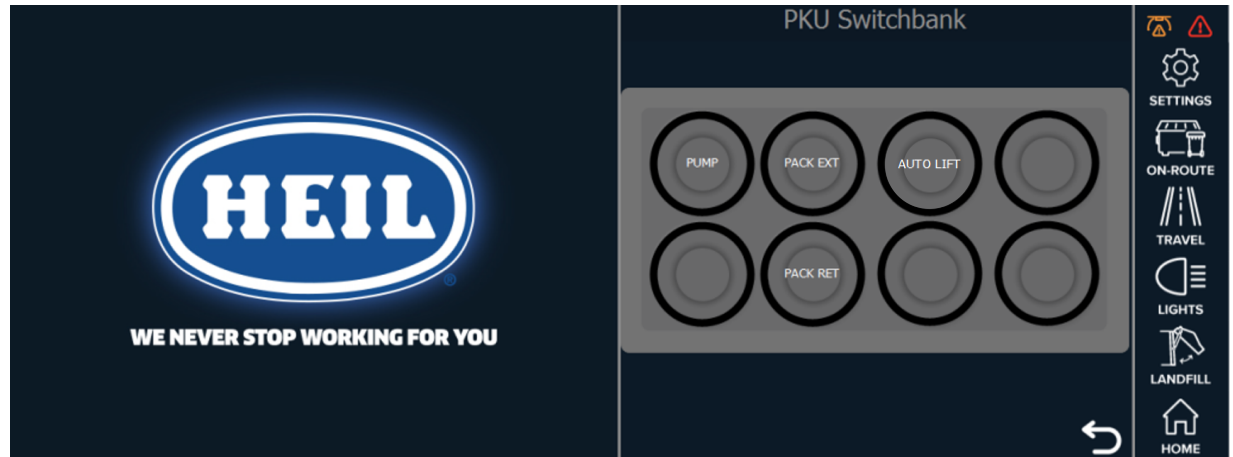


Figure 116.

L. Switch Bank Outside Controls

Note: This screen only appears when the customer has ordered the optional auxiliary outside-controls kit and the device is physically connected to the system.



Figure 117.

IN-CAB DISPLAY

M. Grabber Lines

Hold the reset button for five seconds to reset the position to zero.



Figure 118.

On Route Screen

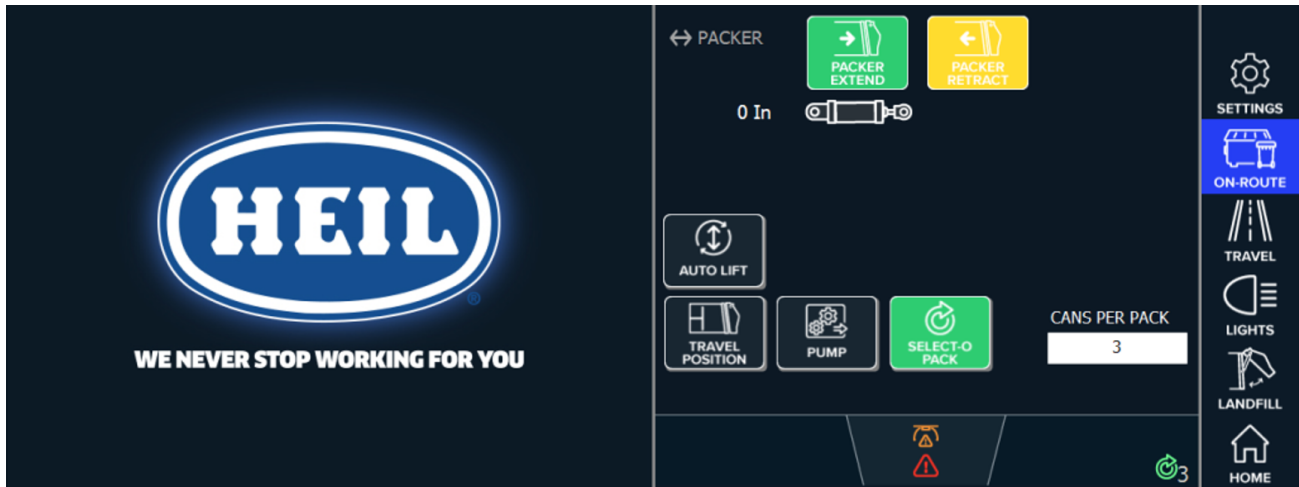


Figure 119.

Travel Screen

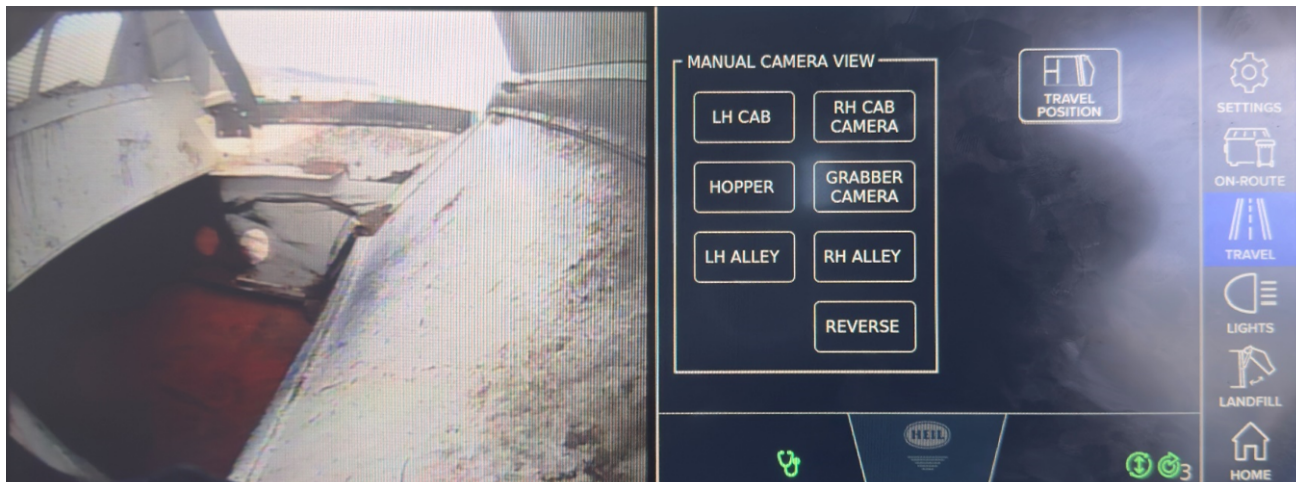


Figure 120.

IN-CAB DISPLAY

Lights

A. No active lights.

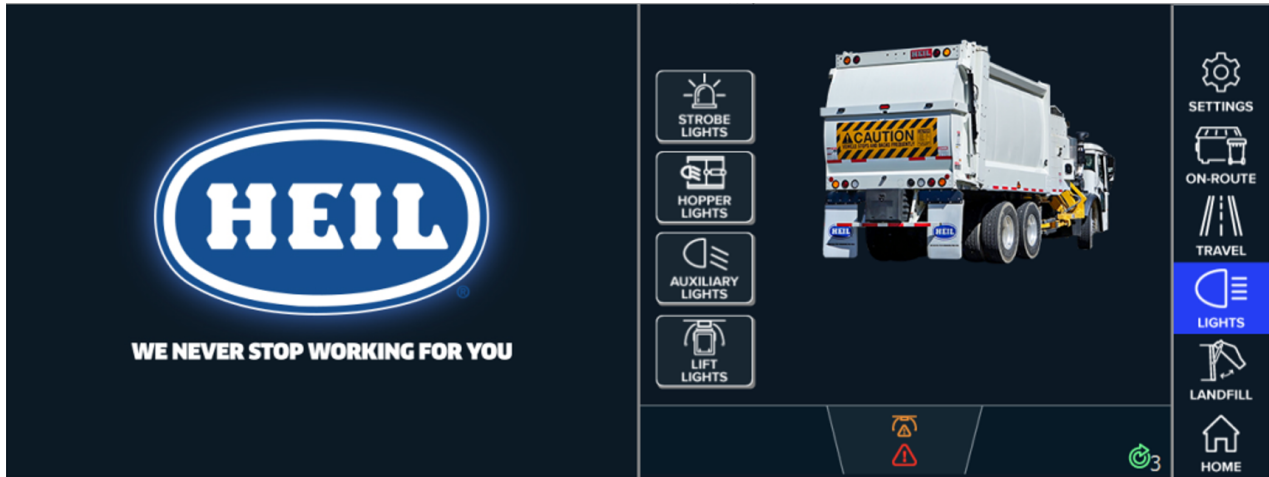


Figure 121.

B. Active lights are indicated by green icons and represented by the truck image displaying illuminated lights.



Figure 122.

Landfill Screen

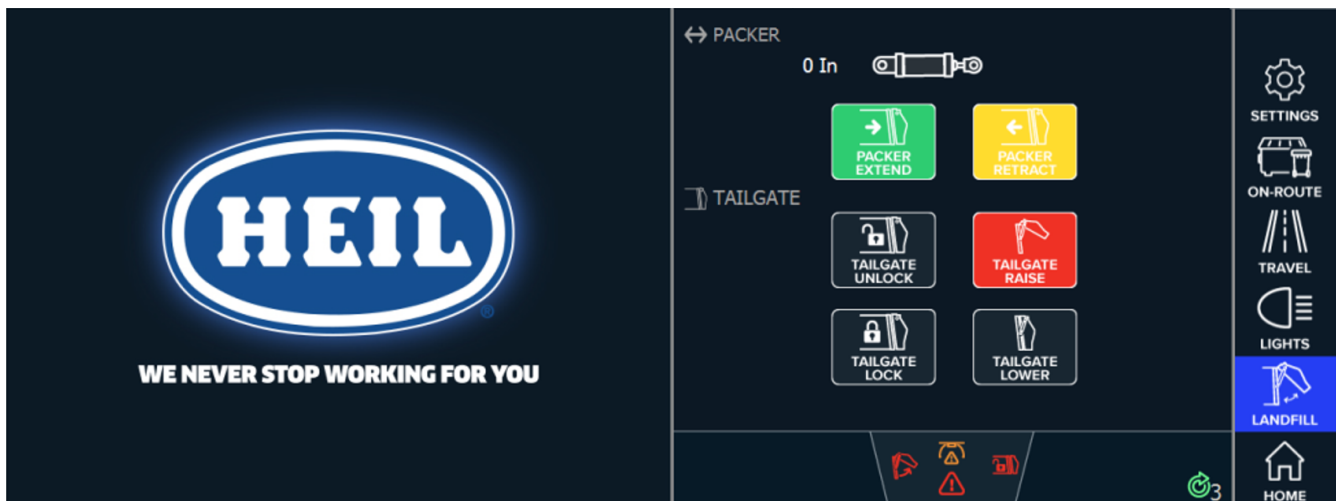


Figure 123.

IN-CAB DISPLAY

Configuration

Password required to enter.

A. Configuration

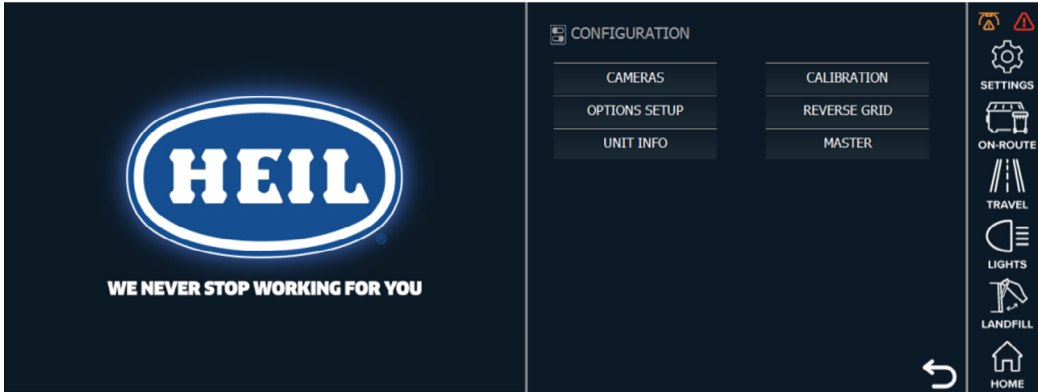


Figure 124.

B. Camera Settings

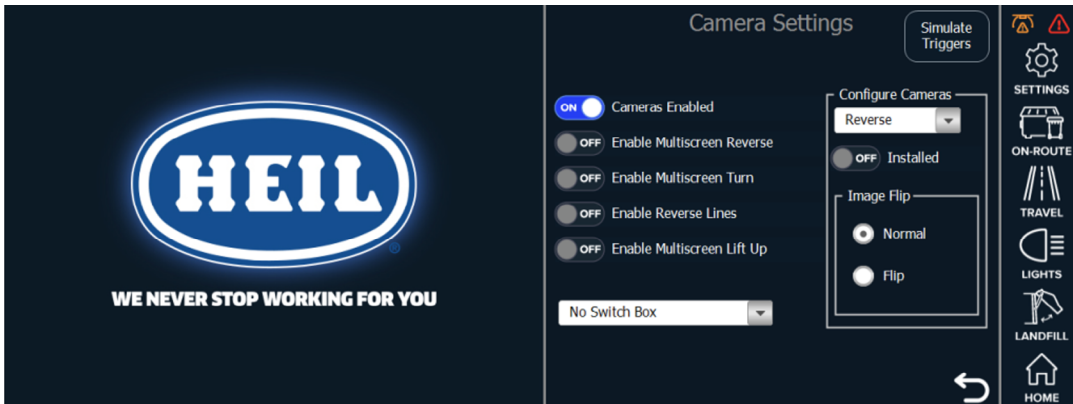


Figure 125.

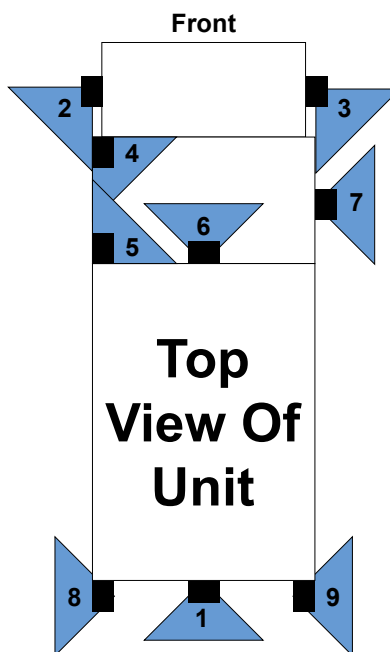


Figure 126.

IN-CAB DISPLAY

C. Option Setup

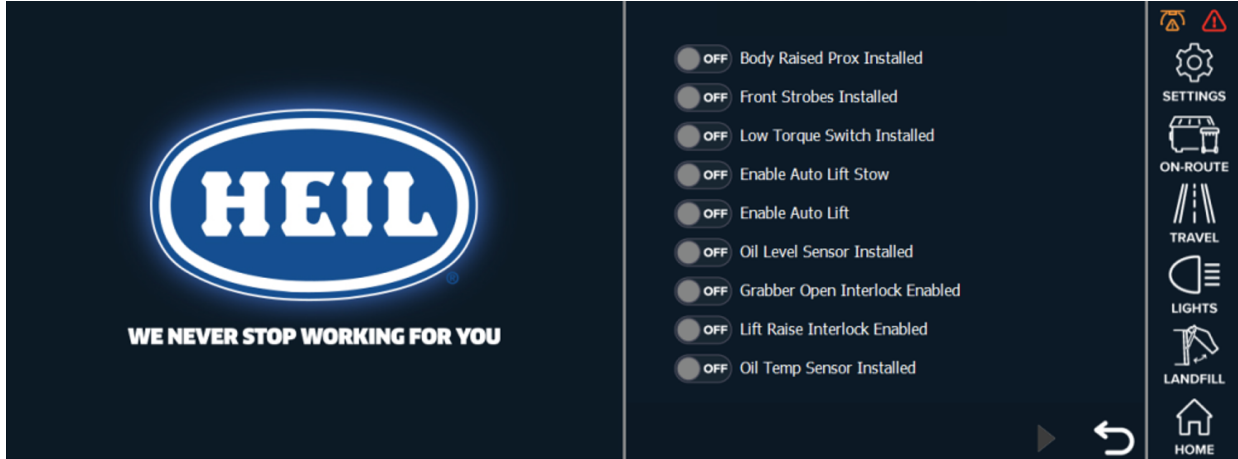


Figure 127.

D. Unit Information

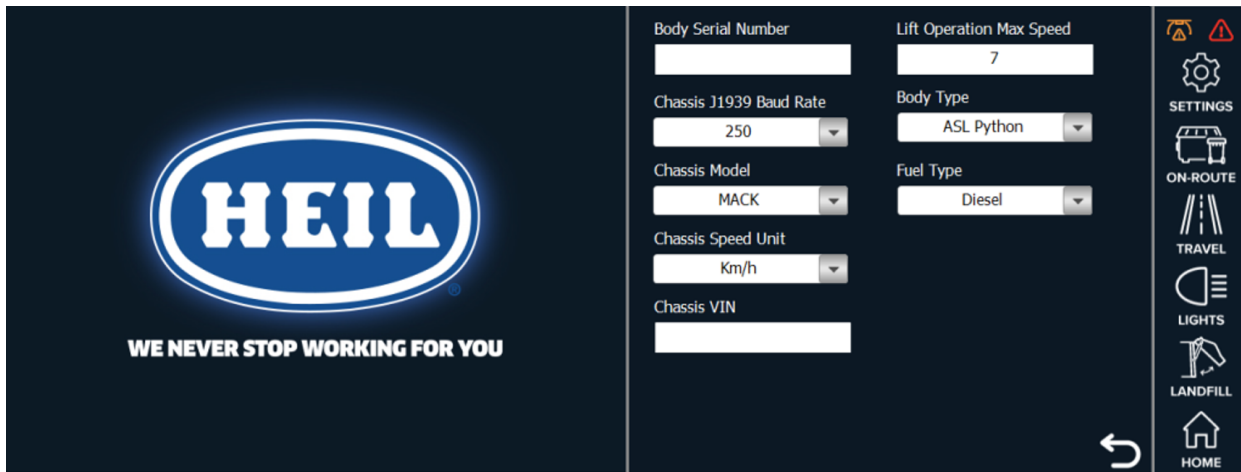


Figure 128.

E. Reverse Grid

Hold the reset button for five seconds to reset the position to zero.

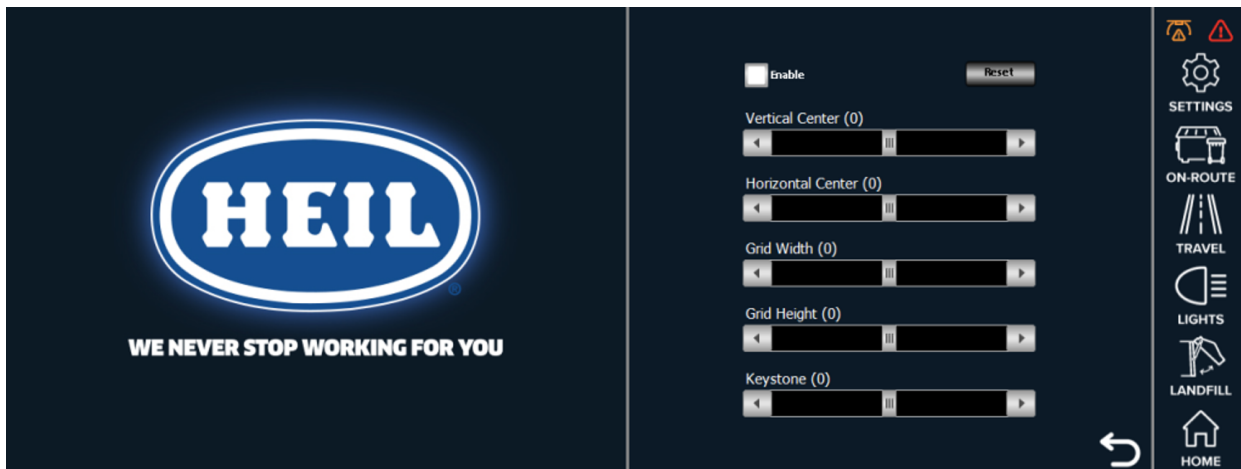


Figure 129.

SECTION 7

CONTROLLER HARDWARE

CONTROLLER HARDWARE

Mobile Controller Locations

The 124 I/O Mobile Controller is located midway within the street side of the body behind a steel cover.

The 37 I/O Mobile Controller is located in the cab (location varies by chassis):

1. Behind the seat (street side).
2. In the doghouse attached to the floor.
3. Behind the seat (curb side).



Figure 130. Mobile Controller Locations

CONTROLLER HARDWARE

Body Controller

32-bit CPU TriCore processor, 124 inputs/outputs, 4 CAN interfaces & Ethernet interfaces.

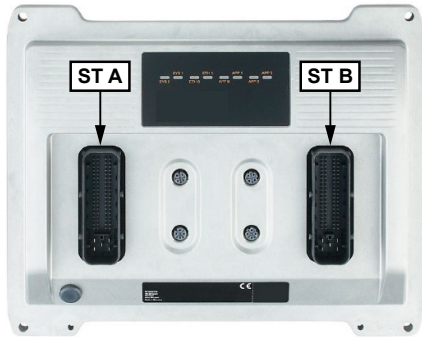


Figure 131. PN: 254-4954

NOTICE

There are no serviceable parts within the Mobile Controller housing. Do not open the Mobile Controller housing. Send the Mobile Controller to Heil Environmental for repair or programming.

The ST A and ST B are keyed specifically and not interchangeable.

Operating States System				
LED SYS0		LED SYS1		System State
Color	State	Color	State	
-	Off	-	Off	No Operating Voltage
Green	5 Hz	-	Off	No Operating system Loaded
Red	On	-	Off	Hardware Error (Fatal Error+)
Red	On	Red	On	System Error (Fatal Error)
Green/Yellow	2 Hz	Green/Yellow	2 Hz	Update

CONTROLLER HARDWARE

Operating States PLC/Application			
LED	Color	State	Description
SYS0	Green	On	No Application
		2 Hz	Run
	Red	10 Hz	Error Application (Serious Error)
	Yellow	2 Hz	Debug Run
		On	Debug Stop
	Blue	On	Sleep Mode
SYS1	Green	On	No Application
		2 Hz	Run
	Red	10 Hz	Error Application (Serious Error)
	Yellow	2 Hz	Debug Run
		On	Debug Stop
ETH0	Green	Flashing	Data Transmission Ethernet
		On	Ethernet Connection Ok, No Data Transfer
ETH1	Green	Flashing	Data Transmission Ethernet
		On	Ethernet Connection Ok, No Data Transfer
APP0 APP3	Red	On	Status Display of the Application, Freely Programmable
	Green	On	Status Display of the Application, Freely Programmable
	Blue	On	Status Display of the Application, Freely Programmable

CONTROLLER HARDWARE

Body Controller Connectors

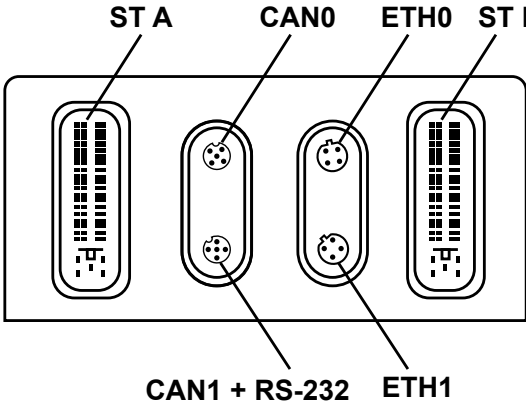
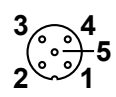
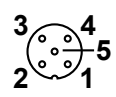
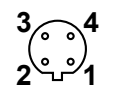
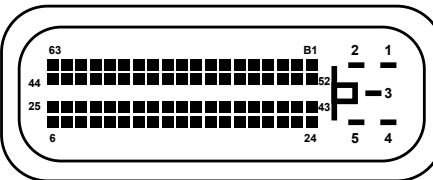
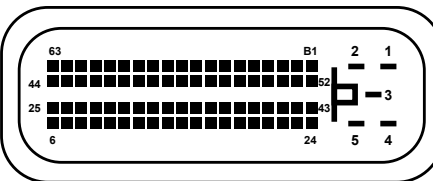
Connectors		
CAN0	M12 socket, 5 poles, A-coded 1: not used 2: not used 3: GND_COM 4: CAN0_H 5: CAN0_L	
CAN1 +RS-232	M12 socket, 5 poles, A-coded 1: RS-232_TxD 2: RS-232_RxD 3: GND_COM 4: CAN1_H 5: CAN1_L	
ETH0 / ETH1	M12 socket, 4 poles, D-coded 1: TxD+ 2: RxD+ 3: TxD- 4: RxD-	
ST A	AMP, 81 poles, A-coded 1-81: see wiring ST A	
ST B	AMP, 81 poles, B-coded 1-81: see wiring ST B	

Figure 132.

CONTROLLER HARDWARE

Cab Controller

32-bit CPU TriCore processor, 37 inputs/outputs, 4 CAN interfaces & Ethernet interfaces



Figure 133. PN: 254-4961

Operating States System				
LED SYS0		LED SYS1		System State
Color	State	Color	State	
-	Off	-	Off	No Operating Voltage
Green	5 Hz	-	Off	No Operating system Loaded
Red	On	-	Off	Hardware Error (Fatal Error+)
Red	On	Red	On	System Error (Fatal Error)
Green/Yellow	2 Hz	Green/Yellow	2 Hz	Update

Operating States PLC/Application				
LED	Color	State	Description	
SYS0	Green	On	Standard PLC	No Application
		2 Hz		Run
	Red	10 Hz		Error Application (Serious Error)
	Yellow	2 Hz		Debug Run
		On		Debug Stop
	Blue	On		Sleep Mode
SYS1	Green	On	Safe PLC	No Application
		2 Hz		Run
	Red	10 Hz		Error Application (Serious Error)
	Yellow	2 Hz		Debug Run
		On		Debug Stop
	ETH0	Green		Flashing
On	Ethernet Connection Ok, No Data Transfer			
ETH1	Green	Flashing	Data Transmission Ethernet	
		On	Ethernet Connection Ok, No Data Transfer	
APP0 APP3	Red	On	Status Display of the Application, Freely Programmable	
	Green	On	Status Display of the Application, Freely Programmable	
	Blue	On	Status Display of the Application, Freely Programmable	

CONTROLLER HARDWARE

Cab Controller Connectors

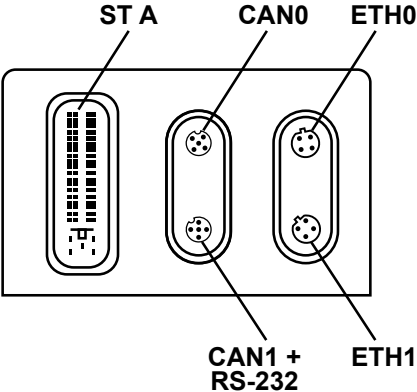



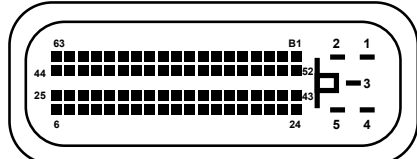
<p>Connectors</p>	
<p>CAN0</p>	<p>M12 socket, 5 poles, A-coded 1: not used 2: not used 3: GND_COM 4: CAN0_H 5: CAN0_L</p> 
<p>CAN1 +RS-232</p>	<p>M12 socket, 5 poles, A-coded 1: RS-232_TxD 2: RS-232_RxD 3: GND_COM 4: CAN1_H 5: CAN1_L</p> 
<p>ETH0 / ETH1</p>	<p>M12 socket, 4 poles, D-coded 1: TxD+ 2: RxD+ 3: TxD- 4: RxD-</p> 
<p>ST A</p>	<p>AMP, 81 poles, A-coded 1-81: see wiring ST A</p> 

Figure 134.

CONTROLLER HARDWARE

Mobile Controller Pin Number Diagram

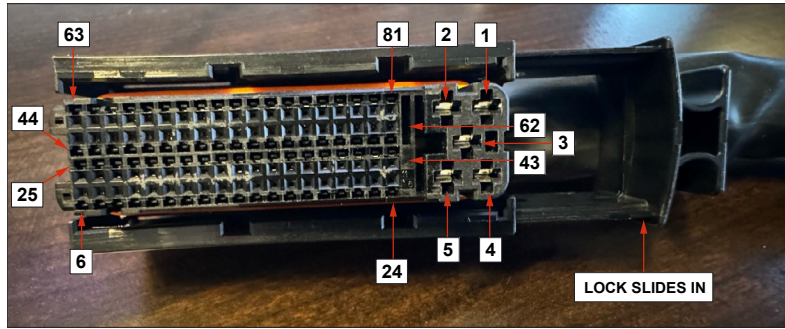


Figure 135. Heil Mobile Controller Female Pin Locations

Mobile Controller 81-Pin Cable Assembly

Refer to the following steps for assembly and connecting the mobile controller cable.

A. Cable Parts Identification

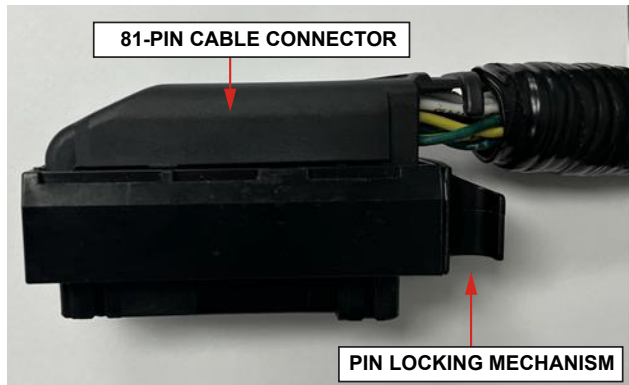


Figure 136.

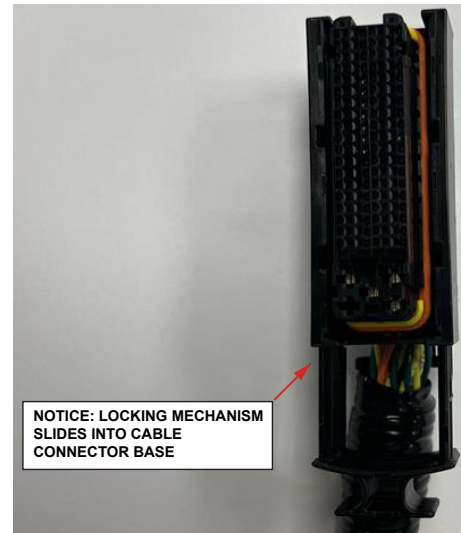


Figure 137.

B. Male and Female Controller Connector Close-Up View

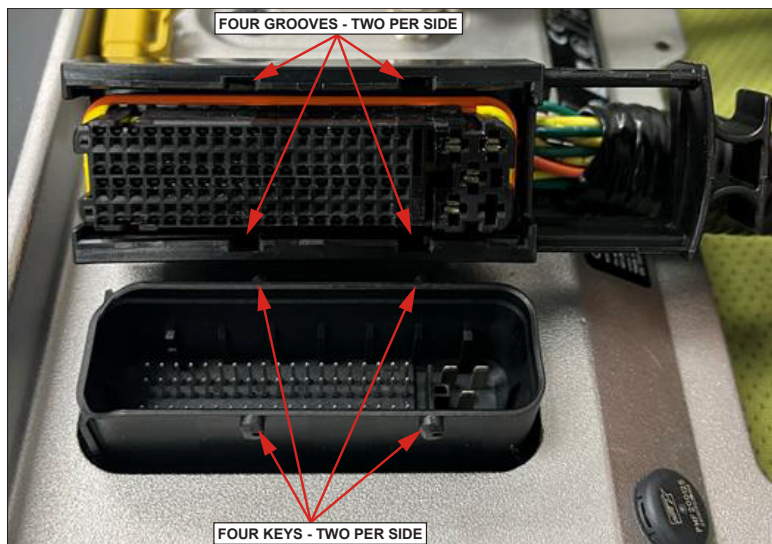


Figure 138. Connection Points

CONTROLLER HARDWARE

C. Connecting the 81-Pin Cable Connector

1. With the locking mechanism retracted, carefully align the keys and grooves then gently press down.

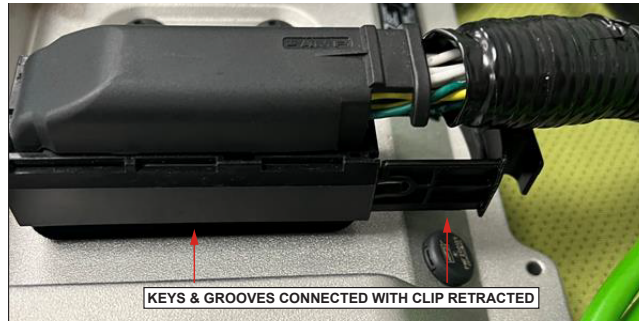


Figure 139.

2. Gently push the locking mechanism towards the base you hear a click and the connection is flush.



Figure 140.



Figure 141.

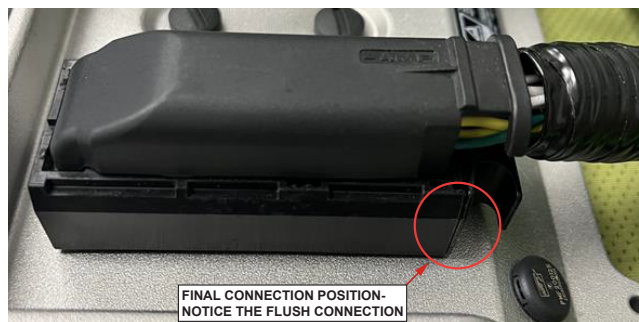


Figure 142.

3. Repeat steps to attach the second cable connector to the adjacent side of the controller.
4. To remove cable from controller, reverse above process.

CONTROLLER HARDWARE

Display Screen

64-bit Quad Core processor, 4 CAN interfaces, 2 Ethernet interfaces, 4 analogue video inputs 2 outputs / 2 inputs, 2 USB interfaces, program number 109-0375.



Figure 143. PN: 108-8790

Status LED	RGB LED, colors and states programmable by means of the application software		
Operating States (Factory Setting)	Paint	Status	Description
	-	off	no operating voltage
	green	5 Hz	loading operating system
	green	on	executing operating system
	green	1 Hz	shutting down operating system
	orange	5 Hz	loading recovery system
Service Inputs on Power Up	SERVICE0	SERVICE1	Description
	0	0	normal start
	1	0	Setup
	0	1	Recovery App

0 = GND

1 = VBB

Display Connector

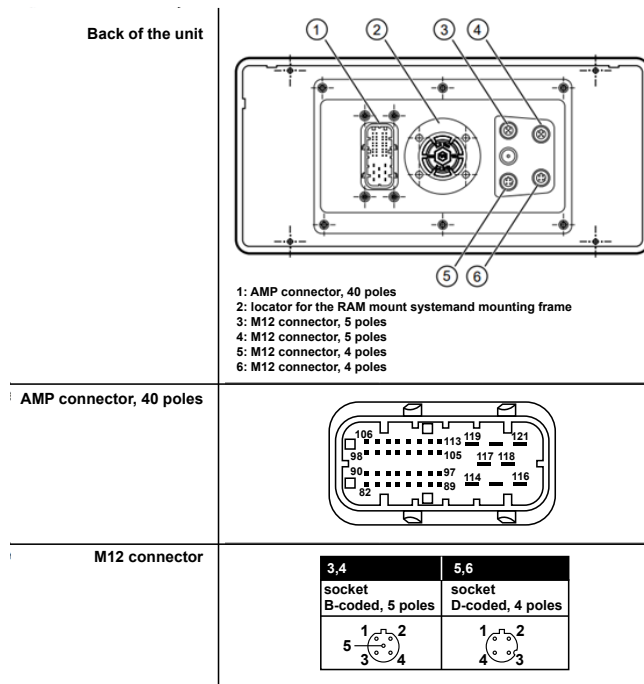


Figure 144.

CONTROLLER HARDWARE

Network Architecture

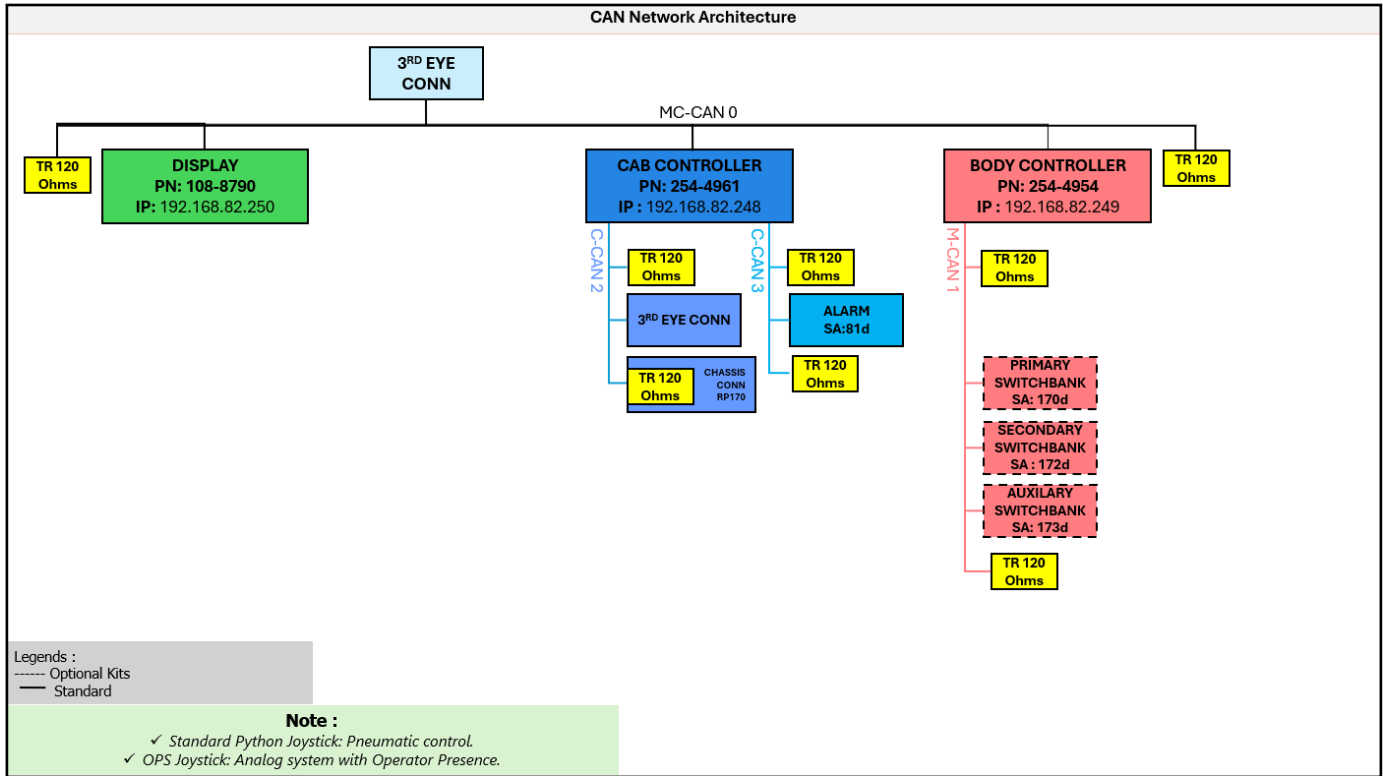


Figure 145.

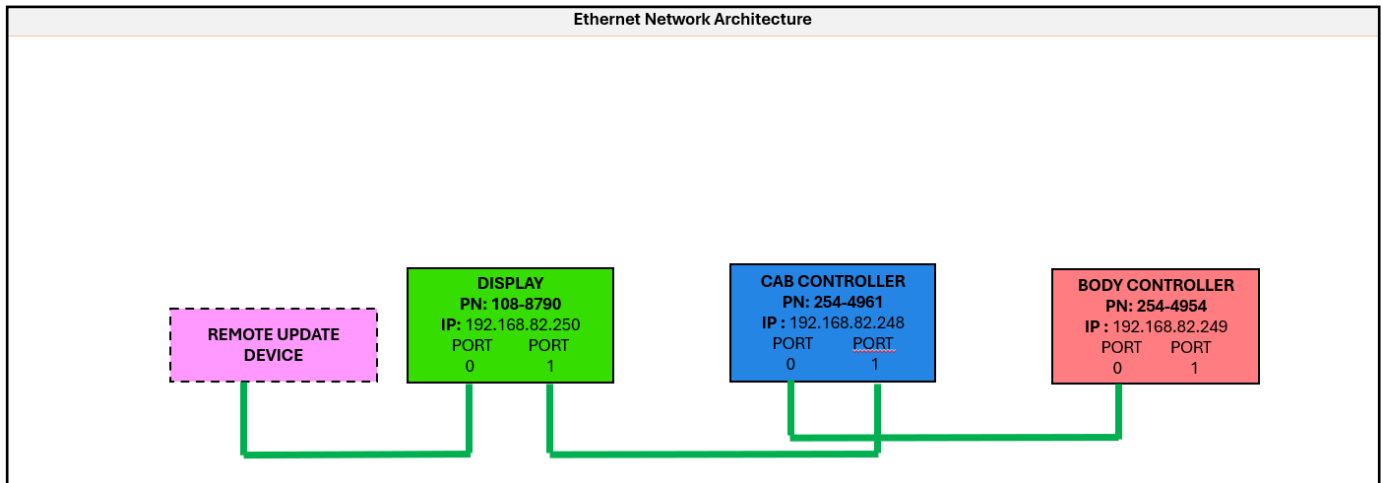


Figure 146.

SECTION 8

CONTROLLER SOFTWARE

CONTROLLER SOFTWARE

Main (Body) Controller

MAIN CONTROLLER INPUTS					
Program Number			109-0373		
Wire Label	Connector ID	Controller Pin #	DPF Signal	Configuration & Function	I/O Address
MC- CAN 0 L	ST A	48	Controller Network	CAN 0	
MC- CAN 0 H	ST A	49	Controller Network	CAN 0	
M - CAN 1 L	ST A	50	Joysticks/Switch banks	CAN 1	
M - CAN 1 H	ST A	51	Joysticks/Switch banks	CAN 1	
M - CAN 2 L	ST A	53		Chassis Network	
M- CAN 2 H	ST A	54		Chassis Network	
M- CAN 3 L	ST A	34	Arm Network	CAN 3	
M- CAN 3 H	ST A	35	Arm Network	CAN 3	
M- IN0000	ST A	25	Oil Tank Filter Psw	Digital Input, Active High	%IX2.0
M- IN0001	ST A	26	Oil Level	Digital Input, Active High	%IX34.0
M- IN0002	ST A	27	High Pressure Filter Body	Spare	
M- IN0003	ST A	28	High Pressure Filter Lift	Spare	
M- IN0100	ST A	63	Lift Retract Prox	Digital Input, Active High	%IX114.0
M- IN0101	ST A	64	R. Turn	Digital Input, Active High	%IX118.0
M- IN0102	ST A	65	L. Turn	Digital Input, Active High	%IX122.0
M- IN0103	ST A	66	Stop Brake	Digital Input, Active High	%IX126.0
M- IN0200	ST A	67	Tail	Digital Input, Active High	%IX130.0
M- IN0201	ST A	68	Reverse	Digital Input, Active High	%IX134.0
M- IN0202	ST A	69	Clear	Digital Input, Active High	%IX138.0
M- IN0203	ST A	70	Lift Lowered Prox	Digital Input, Active High	%IX142.0
M- IN0300	ST A	44			
M- IN0301	ST A	45			
M- IN0400	ST A	46	Side Door Prox	Digital Input, Active High	%IX154.0
M- IN0401	ST A	47			
M- IN0500	ST A	40			
M- IN0501	ST A	41	Grabber Pressure Switch	Digital Input, Active High	%IX194.0
M- IN0502	ST A	42			
M- IN0503	ST A	43			
M- IN0600	ST A	55	Grabber Open Prox	Digital Input, Active High	%IX274.0
M- IN0601	ST A	56			
M- IN0602	ST A	57	Top Door Open Prox	Digital Input, Active High	%IX282.0
M- IN0603	ST A	58			
M- IN0700	ST A	59			
M- IN0701	ST A	60	Packer Position Sensor	Analogue Input, Active High	%IW146
M- IN0702	ST A	61	Body Pump Pressure Sensor	Analogue Input, Active High	%IW148
M- IN0703	ST A	62	Lift Pump Pressure Sensor	Analogue Input, Active High	%IW150
M- IN0800	ST A	36			
M- IN0801	ST A	37			
M- IN0900	ST A	38	Body Down Prox	Digital Input, Active High	%IX314.0

CONTROLLER SOFTWARE

MAIN CONTROLLER INPUTS					
Program Number			109-0373		
Wire Label	Connector ID	Controller Pin #	DPF Signal	Configuration & Function	I/O Address
M- IN0901	ST A	39	Oil Tank Temp	Analogue Input, Active High	%IW158
M- IN1000	ST B	44	Spare In1000	Spare	
M- IN1001	ST B	45			
M- IN1002	ST B	46	Cng Defueling Valve Closed Prox	Digital Input, Active High	
M- IN1003	ST B	47			
M- IN1100	ST B	6			
M- IN1101	ST B	7			
M- IN1102	ST B	8			
M- IN1103	ST B	9	Tailgate Closed Prox	Digital Input, Active High	%IX446.0
M- IN1200	ST B	10			
M- IN1201	ST B	11			
M- IN1202	ST B	12			
M- IN1203	ST B	13			
M- IN1300	ST B	25			
M- IN1301	ST B	26			
M- IN1302	ST B	27			
M- IN1303	ST B	28			
M- IN1400	ST B	29			
M- IN1401	ST B	30			
M- IN1402	ST B	31			
M- IN1403	ST B	32			
M- IN1500	ST B	59			
M- IN1501	ST B	60			
M- IN1502	ST B	61			
M- IN1503	ST B	62			
M- IN1600	ST B	36	Tailgate Locked Prox Ss	Digital, BL	%IX610.0
M- IN1601	ST B	37	Tailgate Locked Prox Cs	Digital, BL	%IX614.0
M- IN1602	ST B	38	Spare In1602	Spare	
M- IN1603	ST B	39	Spare In1603	Spare	
M- IN1700	ST B	40			
M- IN1701	ST B	41			
M- IN1702	ST B	42			
M- IN1703	ST B	43			
M- IN1800	ST B	55			
M- IN1801	ST B	56			
M- IN1802	ST B	57			
M- IN1803	ST B	58			

CONTROLLER SOFTWARE

MAIN CONTROLLER OUTPUTS					
Program Number			109-0373		
Wire Label	Connector ID	Controller Pin #	DPF Signal	Configuration & Function	I/O Address
M- OUT0000	ST A	16	Packer Retract Sol	Digital Output, Active High	%QX2.0
M- OUT0001	ST A	17			
M- OUT0002	ST A	18			
M- OUT0003	ST A	19			
M- OUT0004	ST A	20	Tailgate Unlock Sol	Digital Output, Active High	%QX18.0
M- OUT0005	ST A	21	Tailgate Lock Sol	Digital Output, Active High	%QX22.0
M- OUT0006	ST A	22	Lift Raise Interlock Solenoid	Digital Output, Active High	%QX26.0
M- OUT0007	ST A	23	Tailgate Down Sol	Digital Output, Active High	%QX30.0
M- OUT0008	ST A	24	Packer Extend Sol	Digital Output, Active High	%QX34.0
M- OUT0100	ST A	6	Strobe Lt 1	Digital Output, Active High	%QX38.0
M- OUT0101	ST A	7	Strobe Lt 2	Digital Output, Active High	%QX42.0
M- OUT0102	ST A	8	Aux Backup Light	Digital Output, Active High	%QX46.0
M- OUT0103	ST A	9	Backup Alarm	Digital Output, Active High	%QX50.0
M- OUT0104	ST A	10	Hopper Flood Lights	Digital Output, Active High	%QX54.0
M- OUT0105	ST A	11	Lift Flood Lights	Digital Output, Active High	%QX58.0
M- OUT0106	ST A	12			
M- OUT0107	ST A	13	Spare Out0107	Spare	
M- OUT0108	ST A	14			
M- OUT0200	ST A	73	Lift Raise Solenoid	Digital Output, Active High	%QX74.0
M- OUT0201	ST A	74	Tailgate Up Sol	Digital Output, Active High	%QX78.0
M- OUT0202	ST A	75	Lift Retract Solenoid	Digital Output, Active High	%QX82.0
M- OUT0203	ST A	76	Hopper Cover Open	Digital Output, Active High	%QX86.0
M- OUT0204	ST A	77	Tailgate Flow Sol	Digital Output, Active High	%QX90.0
M- OUT0205	ST A	78			
M- OUT0206	ST A	79			
M- OUT0207	ST A	80			
M- OUT0208	ST A	81			
M- OUT3000	ST A	31			
M- OUT3001	ST A	32			
M- OUT0300	ST B	16	Spare Out0300	Spare	
M- OUT0301	ST B	17	Spare Out0301	Spare	
M- OUT0302	ST B	18			
M- OUT0303	ST B	19			
M- OUT0304	ST B	20			
M- OUT0305	ST B	21			
M- OUT0306	ST B	22			
M- OUT0307	ST B	23			
M- OUT0308	ST B	24			
M- OUT0400	ST B	63			
M- OUT0401	ST B	64			
M- OUT0402	ST B	65			

CONTROLLER SOFTWARE

MAIN CONTROLLER OUTPUTS					
Program Number			109-0373		
Wire Label	Connector ID	Controller Pin #	DPF Signal	Configuration & Function	I/O Address
M- OUT0403	ST B	66			
M- OUT0404	ST B	67			
M- OUT0405	ST B	68			
M- OUT0406	ST B	69			
M- OUT0407	ST B	70			
M- OUT0408	ST B	71			
M- OUT0500	ST B	73			
M- OUT0501	ST B	74			
M- OUT0502	ST B	75			
M- OUT0503	ST B	76			
M- OUT0504	ST B	77			
M- OUT0505	ST B	78			
M- OUT0506	ST B	79			
M- OUT0507	ST B	80			
M- OUT0508	ST B	81			
M- OUT3002	ST B	51			

CONTROLLER SOFTWARE

Cab Controller

CAB CONTROLLER INPUTS					
Program Number			109-0374		
Wire Label	Connector ID	Pin #	DPF Signal	Configuration & Function	I/O Address
MC- CAN 0 L	ST A	48	Controller Network	CAN 0	
MC- CAN 0 H	ST A	49	Controller Network	CAN 0	
C - CAN 1 L	ST A	50	Joysticks/Switch banks	CAN 1	
C - CAN 1 H	ST A	51	Joysticks/Switch banks	CAN 1	
C - CAN 2 L	ST A	53	Chassis/3rd Eye Network	Chassis Network	
C- CAN 2 H	ST A	54	Chassis/3rd Eye Network	Chassis Network	
C- CAN 3 L	ST A	34	Alarm Network	CAN 3	
C- CAN 3 H	ST A	35	Alarm Network	CAN 3	
C- IN0000	ST A	25	System Power	Digital Input, Active High	%IX2.0
C- IN0001	ST A	26	Chassis Neutral	Digital Input, Active High	%IX34.0
C- IN0002	ST A	27	Right Alley Toggle Switch	Digital Input, Active High	%IX58.0
C- IN0003	ST A	28	Spare	Spare	
C- IN0100	ST A	63			
C- IN0101	ST A	64	Trans Sump Temp	Analogue Input, Active Low	%IW58
C- IN0102	ST A	65	Left Alley Toggle Switch	Digital Input, Active High	%IX122.0
C- IN0103	ST A	66	Spare IN0103	Spare	
C- IN0200	ST A	67			
C- IN0201	ST A	68			
C- IN0202	ST A	69			
C- IN0203	ST A	70			
C- IN0300	ST A	44			
C- IN0301	ST A	45			
C- IN0400	ST A	46			
C- IN0401	ST A	47			
C- IN0500	ST A	40	Panel Select	Digital Input, Active High	%IX156.0
C- IN0501	ST A	41	Scale Alarm 1	Digital Input, Active High	%IX194.0
C- IN0502	ST A	42	Scale Alarm 2	Digital Input, Active High	%IX218.0
C- IN0503	ST A	43	Spare LTPS (Low Torque Press Switch)	Digital Input, Active High	%IX250.0
C- IN0600	ST A	55	Grabber Open Pb	Digital Input, Active High	%IX274.0
C- IN0601	ST A	56	Grabber Close Pb	Digital Input, Active High	%IX278.0
C- IN0602	ST A	57	Hyd Pump Enable Pb	Digital Input, Active High	%IX282.0
C- IN0603	ST A	58	Packer Extend Pb	Digital Input, Active High	%IX286.0
C- IN0700	ST A	59	Packer Retract Pb	Digital Input, Active High	%IX290.0
C- IN0701	ST A	60	Operator Presence Joystick Input	Digital Input, Active High	%IX294.0
C- IN0702	ST A	61			
C- IN0703	ST A	62			
C- IN0800	ST A	36			
C- IN0801	ST A	37			
C- IN0900	ST A	38			
C- IN0901	ST A	39			

CONTROLLER SOFTWARE

CAB CONTROLLER OUTPUTS					
Program Number			109-0374		
Wire Label	Connector ID	Pin Number	DPF Signal	Configuration & Function	IO Address
C- OUT0000	STA	16			
C- OUT0001	STA	17	Cam Relay 1	Digital Output, Active High	%QX6.0
C- OUT0002	STA	18	Cam Relay 2	Digital Output, Active High	%QX10.0
C- OUT0003	STA	19	Cam Relay 3	Digital Output, Active High	%QX14.0
C- OUT0004	STA	20	Cam Relay 4	Digital Output, Active High	%QX18.0
C- OUT0005	STA	21	360 Grabber Camera Trigger	Digital Output, Active High	%QX22.0
C- OUT0006	STA	22	Spare		
C- OUT0007	STA	23	Strobe Lt 1	Digital Output, Active High	%QX30.0
C- OUT0008	STA	24	Strobe Lt 2	Digital Output, Active High	%QX34.0
C- OUT0100	STA	6	Pump 1 Sol	Digital Output, Active High	%QX38.0
C- OUT0101	STA	7	Pump 2 Sol	Digital Output, Active High	%QX42.0
C- OUT0102	STA	8	Pto Sol	Digital Output, Active High	%QX46.0
C- OUT0103	STA	9	Throttle Advance	Digital Output, Active High	%QX50.0
C- OUT0104	STA	10			
C- OUT0105	STA	11			
C- OUT0106	STA	12	Spare Out0106		
C- OUT0107	STA	13			
C- OUT0108	STA	14			
C- OUT0200	STA	73	Lift Interlock Sol	Digital Output, Active High	%QX74.0
C- OUT0201	STA	74	Grabber Close Sol	Digital Output, Active High	%QX78.0
C- OUT0202	STA	75	Grabber Open Sol	Digital Output, Active High	%QX82.0
C- OUT0203	STA	76	Lift Extend Sol	Digital Output, Active High	%QX86.0
C- OUT0204	STA	77	Lift Lower Sol	Digital Output, Active High	%QX90.0
C- OUT0205	STA	78			
C- OUT0206	STA	79			
C- OUT0207	STA	80			
C- OUT0208	STA	81			
C- OUT3000	STA	31			
C- OUT3001	STA	32			

CONTROLLER SOFTWARE

I/O Functions

A. Body Controller Inputs

1. OIL TANK FILTER PSW (IN0000-PIN25)

Function: This circuit monitors the “ON/OFF” status of the filter pressure switch. The input is “OFF” when the filter is in bypass.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Pressure Switch	OIL TANK FILTER PSW	Activated	IN0000	“ON”

Activation Logic

The input is “OFF” when the filter is in bypass mode, indicating:

- The filter may be clogged or unable to maintain pressure.
- Hydraulic fluid is bypassing the filter, which could compromise system cleanliness.

Control Intent

This input helps:

- Detect filter health issues and trigger maintenance alerts.
- Protect hydraulic components by ensuring fluid is properly filtered.
- Enable diagnostics for system performance and reliability.

In-Cab Display Alarm: “Filter Bypass Fault” (Critical Alarm)

This alarm is triggered by the oil tank filter pressure switch circuit that monitors the condition of the hydraulic filter.

Activation Conditions:

- The pressure switch feedback signal is not “ON”, indicating bypass pressure.
- This condition is monitored only when both the lift pump solenoid and packer pump solenoid are “ON”.
- The condition must persist for more than 10 seconds to activate the alarm.

Alarm Behavior:

- Activates the buzzer to alert the operator.
- Displays a warning on the In-cab display indicating a potential filter bypass condition, which may suggest improper flow or a system fault.

2. OIL LEVEL (IN0001-PIN26)

Function: This circuit monitors the status of the oil level switch in the hydraulic tank. The switch is “ON” when the hydraulic oil level is good.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Level Switch	OIL LEVEL	Activated	IN0001	“ON”

Activation Logic:

- The input is “ON” when the hydraulic oil level is sufficient (i.e., within acceptable operating range).
- The input is “OFF” when the oil level is low, indicating a potential issue or need for maintenance.

Control Intent

This input supports:

- System health monitoring to prevent damage due to low oil levels.
- Interlock enforcement to disable hydraulic operations if oil level is critically low.
- Maintenance alerts for timely refilling or inspection.

CONTROLLER SOFTWARE

In-Cab Display Alarm: “Hydraulic Oil Low” (Critical Alarm)

This alarm is triggered when the hydraulic oil level input circuit detects no feedback from the level switch for more than 3 seconds.

Activation Conditions:

- The monitoring circuit is active only when the “Configure Hydraulic Oil Indication” setting is enabled.

Alarm Behavior:

- Activate the buzzer to alert the operator.
- Shuts down the hydraulic pump and its operations to prevent damage or unsafe conditions.

3. LIFT RETRACTED PROXIMITY (IN0100-PIN63)

Function: This circuit monitors the “ON/OFF” status of the lift retracted switch. This input is “ON” when the lift is in the stowed position.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity	LIFT RETRACTED	Activated	IN0100	“ON”

Function Description:

- This circuit monitors the status of the lift retracted proximity switch.
- When the lift is fully retracted, the proximity switch is activated, and the input at IN0100 goes “ON”.

This signal is used to:

- Confirm the lift is safely stowed.
- Enable or disable other operations based on lift position.
- Trigger automation sequences or safety interlocks.

In-Cab Display Alarm: “Lift Extended”

This alarm is triggered when the lift retracted proximity input circuit detects either of the following conditions:

- The lift retracted proximity switch is not activated “OFF”, OR
- The grabber fully open sensor (IN600) is not “ON”.

When this alarm is active:

- The buzzer is enabled to alert the operator.
- An “Out of Dimension” telltale will appear if the vehicle speed exceeds 7 MPH.

4. RIGHT TURN (IN0101-PIN64)

Function: This circuit monitors the right turn signal from chassis. This input is “ON” when the right turn indication turned “ON”.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Chassis-RP170	RIGHT TURN	Activated	IN0101	“ON”

Function Description:

- This circuit monitors the right turn signal from the chassis.
- When the right turn indicator is activated, the input at IN0101 goes “ON”.

This signal can be used to:

- Trigger indicator lights.

CONTROLLER SOFTWARE

5. LEFT TURN (IN0102-PIN65)

Function: This circuit monitors the left turn signal from chassis. This input is “ON” when the left turn indication turned “ON”.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Chassis-RP170	LEFT TURN	Activated	IN0102	ON

Function Description:

- This circuit monitors the left turn signal from the chassis.
- When the left turn indicator is activated, the input at IN0102 goes “ON”.

This signal can be used to:

- Trigger indicator lights

6. STOP BRAKE (IN0103-PIN66)

Function: This circuit monitors the “ON/OFF” status of the chassis service brake. This input will be “ON” when the service brakes are applied.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Chassis-RP170 OR CAN -2	SERVICE BRAKE OR STOP BRAKE	Activated	IN0103	ON

Function Description:

- This circuit monitors the status of the chassis service brake.
- When the brake is applied, the input at IN0103 goes “ON”.

This signal is used to:

- Trigger brake lights.
- Activate safety interlocks.

7. TAILS (IN0200-PIN67)

Function: This circuit monitors the “ON/OFF” status of the tail signal.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Chassis-RP170	TAIL	Activated	IN0200	“ON”

Function Description:

- This circuit monitors the “ON/OFF” status of the tail signal.

The signal is “ON” when the taillights or tail-related function is active, it is used for:

- Lighting control.
- Status indication.
- Safety or visibility features.

Operational Insight.

Tied into vehicle or equipment lighting systems.

CONTROLLER SOFTWARE

8. REVERSE (IN0201-PIN68)

Function: This circuit monitors the “ON/OFF” status of the reverse signal. This input will be “ON” when the truck is in reverse gear.

This “ON” signal enables the strobe and auxiliary lights.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Chassis-RP170 OR CAN-2	REVERSE	Activated	IN0201	“ON”

Function Description:

- The input is “ON” when the truck is shifted into reverse gear.

When “ON”, it activates the strobe and auxiliary lights, likely for:

- Safety visibility.
- Operator awareness.
- Compliance with operational standards.

9. CLEAR (IN0202-PIN69)

Function: NA

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Chassis-RP170	CLEAR	Activated	IN0202	ON

10. PROXIMITY LIFT LOWERED (IN0203-PIN70)

Function: This circuit monitors the “ON/OFF” status of the lift lowered proximity switch.

This signal is “ON” when the lift arm is in the lowered position.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity	PROXIMITY LIFT LOWERED	Activated	IN0203	ON

Function Description

- This circuit monitors the “ON/OFF” status of the proximity switch that detects when the lift arm is in the lowered position.
- The signal is “ON” when the lift arm is fully lowered.

Operational Insight

This input is likely used for:

- Sequencing: Ensuring the lift is in position before initiating other operations.
- Safety Interlocks: Preventing movement or actuation of other components unless the lift is lowered.
- Automation Logic: Triggering the next step in a process once the lift is confirmed to be down.

11. SIDE DOOR PROXIMITY (IN0400-PIN46)

Function: This circuit monitors the “ON/OFF” status of the side door proximity switch. The side door should always be in the closed position (“ON”). If the side door is open, the hydraulic pump and packer will be turned “OFF”. The side door is opened only for servicing/ maintenance purposes.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity Switch	SIDE DOOR PROXIMITY	Activated	IN0400	ON

CONTROLLER SOFTWARE

Activation Logic

- The input is “ON” when the side door is closed.
- The input is “OFF” when the side door is open.

System behavior on door open.

If the side door is open:

- Hydraulic pump is turned “OFF”.
- Packer operations are turned “OFF”.

This is a safety interlock, as the side door is only meant to be opened for servicing or maintenance.

Control Intent

This input ensures:

- Safe operation by disabling critical hydraulic functions when the service door is open.
- Prevents accidental activation during maintenance.

In-Cab Display Alarm: “Side Door Open”

This alarm is triggered when the side door proximity sensor feedback is not active while the hydraulic pump is in the enabled state.

Alarm Behavior:

- Activates the cab alarm buzzer to alert the operator.
- Automatically disables the hydraulic pump to prevent unsafe operation.

Reset Conditions:

The alarm will remain active until:

- (1) The side door is properly closed, and the proximity sensor feedback is received.
- (2) The system power is reset.

This mechanism ensures operational safety by preventing hydraulic functions when the side door is open or not properly secured.

12. PYTHON GRABBER PRESSURE SWITCH (IN0501-PIN41)

Function: This circuit monitors the “ON/OFF” status of the grabber closed pressure switch. This input is “ON” when the pressure in the grabber cylinder reaches the set point.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Pressure Switch	PYTHON GRABBER PRESSURE SWITCH	Activated	IN0501	ON

Activation Logic

- The input is “ON” when the pressure in the grabber cylinder reaches the configured set-point.
- This confirms that the grabber has fully closed, and sufficient pressure has been achieved

Control Intent

This input is used to:

- Verify successful grabber closure
- Potentially trigger subsequent operations (e.g., auto lift sequence in coordination mode)
- Serve as a feedback signal for system diagnostics and control logic.

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13. GRABBER FULL OPEN (IN0600-PIN55)

Function: This circuit monitors the “ON/OFF” status of the grabber open proximity switch. This input is “ON” when the grabber is fully open (i.e. release the can).

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity	GRABBER FULL OPEN	Activated	IN0600	ON

Function Description

- This circuit monitors the status of the grabber open proximity switch.
- The input is “ON” when the grabber is fully open, indicating that it has released the can.
- When the switch is “OFF”, the grabber is either partially open or closed.

Operational Insight

This input is typically used for:

- Interlocks to prevent further motion until the grabber is fully open.
- Sequencing logic in automation (e.g., allowing the next CAN to load).
- Safety checks to ensure the grabber is not obstructed.

In-Cab Display Alarm: “Rolling with Lift Extended”

Trigger Conditions

This alarm is activated when road speed > 0 MPH and sensor feedback is NOT “ON” for one or more of the following:

- Lift Retraction - IN0100 (Lift retracted proximity sensor) is feedback is NOT “ON”.
- Grabber Position - Grabber Fully open proximity sensor feedback is NOT “ON”.

Alarm Behavior

When the above conditions are met:

- Warning indicator is activated
- Buzzer is triggered
- “Rolling with Lift Extended” alarm is displayed

Purpose

This logic ensures that the system alerts the operator when:

- The lift is not properly retracted
- The grabber is in an unsafe open state
- Sensor feedback is missing or incorrect

This helps prevent unsafe rolling operations.

14. TOP DOOR OPEN PROXIMITY (IN0602-PIN57)

Function: Monitor top door open/close position

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity	TOP DOOR OPEN	Activated	IN0602	ON

CONTROLLER SOFTWARE

15. PACKER POSITION SENSOR (IN0701-PIN60)

Function: This circuit monitors the continuous voltage feedback from ARC sensor. From this sensor feedback will measure the packer position.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Arc Sensor	PACKER POSITION SENSOR	Activated	IN0701	Analog

Input Type: Analog

Voltage Output:0.5 to 4.5V

In-Cab Display Alarm Descriptions for ARC Sensor (IN0701)

The system monitors the ARC sensor feedback voltage to ensure it remains within the expected analog range of 0.5V to 4.5V. Two warning messages are triggered based on deviations from this range:

- a. "Packer Position Sensor Raw Value Too High"
 - Trigger Condition: Sensor voltage exceeds 4.6V continuously for 10 seconds.
 - System State: Warning is enabled only when the system power switch is ON.
 - Implication: Indicates a potential fault or abnormality in the sensor or signal conditioning.
- b. "Packer Position sensor Raw Value Too Low"
 - Trigger condition: Sensor voltage drops below 0.4V for more than 10 seconds.
 - System state: Warning is enabled only when the system power is "ON".
 - Implication: May suggest sensor disconnection, failure, or signal degradation

16. BODY PUMP PRESSURE SENSOR (IN0702-PIN61)

Function: This circuit monitors the continues voltage feedback from the body/ packer pressure transducer. The packer pressure transducer(s) will compare with set point 2200 PSI, and the "ON" timer is a programmed time delay of 10 sec which delays the response to the activation packer pressure SW flag input. This input is used to turn "ON/OFF" the packer.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Pressure Transducer	BODY PUMP PRESSURE SENSOR	Activated	IN0702	Analog

This input is used to retract the packer automatically when the body packs out.

Input Type: Analog

Voltage Output:0.5V to 4.5V, which typically corresponds to a pressure range.

Circuit Function Overview

- Purpose: Monitors the continuous analog voltage feedback from the body/packer pressure transducer.
- Set point: 2200 PSI — this is the threshold used to determine whether the packer should be activated or retracted.
- "ON" timer delay: 10 seconds — introduces a delay before the Packer Pressure SW Flag input is activated, preventing premature triggering due to transient pressure spikes.
- Input Type: Analog — the system reads a continuous voltage signal rather than a discrete on/off signal.

Operational Logic

- (1) Monitoring:
 - (a) The sensor continuously reads the pressure via voltage feedback.
 - (b) The system compares this voltage to the equivalent of 2200 PSI.

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(2) Activation Logic:

- (a) If the pressure exceeds 2200 PSI and remains above for 7 seconds, the packer pressure SW flag is triggered.
- (b) This flag controls the packer actuation — either turning it “ON” or “OFF”.

(3) Automatic Retraction:

- (a) If the body “packs out” (i.e., pressure drops or packing is complete), the system uses this input to automatically retract the packer.

Interpretation Notes

- The 7-second delay is a form of debouncing or hysteresis, ensuring the system responds only to sustained pressure changes.
- The analog input allows fine-grained monitoring, which is crucial for pressure-sensitive operations like hydraulic packing.
- The retraction logic helps prevent over-packing or damage by responding to pressure drop-off.

In-Cab Display Alarm Descriptions – Pressure Sensor (IN0702)

The system monitors the body pressure sensor’s feedback voltage to ensure it stays within the expected analog range of 0.5V to 4.5V. If the voltage deviates from this range, the system triggers warning messages and activates the buzzer to alert the operator.

Body Pressure Sensor Raw Value Too High

- **Trigger Condition:**
Voltage exceeds 4.6V continuously for 10 seconds.
- **System State:**
Warning and buzzer are active only when the system power switch is ON.
- **Implication:**
Indicates a potential fault or abnormality in the sensor or its signal conditioning circuitry.
- **Operator Alert:**
Buzzer is activated to signal the warning condition.

Body Pressure Sensor Raw Value Too Low

- **Trigger Condition:**
Voltage drops below 0.4V for more than 10 seconds.
- **System State:**
Warning and buzzer are active only when the system power switch is ON.
- **Implication:**
May suggest sensor disconnection, failure, or signal degradation.
- **Operator Alert:**
Buzzer is activated to signal the warning condition.

In-Cab Display Alarm: “Packer Cycle Timeout: Exceeded Pressure Too Long”

- **Trigger Condition:**
The body pressure sensor reads ≥ 2200 PSI continuously for more than 7 seconds during the packing cycle.
- **System State:**
Alarm is enabled only during the packing operation.
- **Implication:**
Indicates that the packing pressure has exceeded safe operational limits for too long, which may lead to mechanical stress or system inefficiency.
- **Operator Alert:**
Buzzer is activated immediately upon alarm trigger to notify the operator.
- **Automatic Response:**
The system initiates automatic retract operation to relieve pressure and protect the equipment.

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17. LIFT PUMP PRESSURE SENSOR (IN0703-PIN62)

Function: NA

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Pressure Transducer	LIFT PUMP PRESSURE SENSOR	Activated	IN0703	Analog

18. BODY DOWN PROXIMITY (IN0900-PIN38)

Function: This circuit monitors the “ON/OFF” status of the body down proximity switch. The input is “ON” when the body is lowered, as detected by the proximity switch.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity Switch	BODY DOWN PROXIMITY	Activated	IN0900	ON

Control Intent

This input is typically used to:

- Verify body position before enabling certain hydraulic or mechanical operations
- Serve as an interlock condition for functions like packer activation, tailgate movement, or lift operations

19. OIL TANK TEMP (IN0901-PIN39)

Function: This circuit monitors the hydraulic oil temp sensor. This is an analog resistive temperature sensor. The temperature range for the sensor is -40 to 302 Degree F.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Resistive type	OIL TANK TEMP	Activated	IN0901	Analog

Activation Logic

- The sensor provides a continuous analog signal corresponding to the oil temperature

The system reads this input to:

- Monitor operational safety
- Trigger warnings or shutdowns if temperature exceeds safe limits
- Adjust system behavior based on temperature conditions (e.g., flow rates, pressure limits)

Control Intent

This input supports:

- Preventive diagnostics for hydraulic system health
- Thermal protection for components
- Real-time monitoring for performance optimization

In-Cab Display Alarms & Warnings: Oil Temperature Monitoring

This Circuit monitors hydraulic oil temperature and triggers warnings or alarms based on the following conditions:

Warnings

- (1) Hydraulic Oil Temp Low
 - Triggered when oil temperature < 50°F for more than 5 minutes.
- (2) Hydraulic oil temp over 180 for 5 Minutes
 - Triggered when oil temperature > 180°F for more than 5 minutes.
- (3) Hydraulic oil temp over 210 for 3 minutes
 - Triggered when oil temperature > 210°F for more than 3 minutes.

CONTROLLER SOFTWARE

- (4) Oil Temp too high – pump shutdown in 60 seconds
 - Triggered when oil temperature > 210°F for more than 3 minutes.
 - Hydraulic pump is automatically shut down to prevent damage.
- (5) Filter bypass sensor fault
 - Triggered with loss of filter pressure switch when the hydraulic pumps are “OFF”

Critical Alarm filter

Hydraulic Oil Temp Too High

- Triggered when oil temperature > 220°F for more than 2 minutes.
- This is a fault alarm requiring immediate attention.

Alarm Logic Summary

Fault Alarm is triggered at extreme conditions:

- Low temperature < 50°F
- High temperature > 220°F

NOTE: Warnings begin from 180°F and escalate based on severity and duration

In-Cab Display Alarm Conditions for Oil Temperature Sensor:

- High Raw Value Warning:
The warning “Oil Temp Sensor Raw Value Too High” is triggered when the oil tank temperature sensor reads a raw value greater than 3000 continuously for 10 seconds.
- Low Raw Value Warning:
The warning “Oil Temp Sensor Raw Value Too Low” is triggered when the oil tank temperature sensor reads a raw value less than 500 continuously for 10 seconds

20. TAILGATE CLOSED PROX (IN1103-PIN09)

Function: This circuit monitors the “ON/OFF” status of the tailgate closed proximity switch. The input is “ON” when the tailgate is closed. Packer cylinder (Auto/Manual mode) is activated based on the status of this input.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity Switch	TAILGATE CLOSED PROX	Activated	IN1103	ON

Activation Logic

- The input is “ON” when the tailgate is fully closed, as detected by the proximity switch

System Dependency

The packer cylinder (in both auto and manual modes) is activated based on the status of this input

- If the tailgate is not closed, auto packer operations are typically inhibited for safety

Control Intent

This input ensures:

- Safe operation of the packer system by verifying tailgate closure
- Interlock enforcement to prevent packer activation when the tailgate is open

In-Cab Display Alarm: “Tailgate Open”

This warning is triggered when the Tailgate Closed Proximity feedback is not active (NOT ON). The system expects this circuit to be “ON” when the tailgate is securely closed. If the circuit fails to activate, the in-cab display interprets the tailgate as open and issues this warning.

CONTROLLER SOFTWARE

21. TAILGATE LOCKED PROX SS (IN1600-PIN36)

Function: This circuit monitors the “ON/OFF” status of the tailgate cylinder Lock proximity switch on the street side (SS). The input is “ON” when the tailgate lock cylinder on street side (SS) is closed (i.e., locked position confirmed by proximity detection).

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity Switch	TAILGATE LOCKED PROX SS	Activated	IN1600	ON

Control Intent

This input is used to:

- Verify tailgate lock status for safety and operational interlocks
- Ensure both sides (street side and curb side) are locked before enabling tailgate operations

22. TAILGATE LOCKED PROX CS (IN1601-PIN37)

Function: This circuit monitors the “ON/OFF” status of the tailgate cylinder lock proximity switch. The input is “ON” when the tailgate lock cylinder on curb side (CS) is closed (i.e., locked position confirmed by proximity detection).

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Proximity Switch	TAILGATE LOCKED PROX CS	Activated	IN1601	ON

Control Intent

This input is used to:

- Verify tailgate lock status for safety and operational interlocks
- Enable or restrict tailgate-related functions based on lock confirmation

In-Cab Display Alarm: “Tailgate Unlocked”

Tailgate locked proximity curb side (IN 1601) and street side proximity (IN1600) sensors enable this warning when these proximity s are not in “ON” condition

B. Body Controller Outputs

1. PACKER RETRACT SOL (OUT0000-PIN16)

Function: This output function controls the packer retract solenoid and has two modes of operation: auto and manual.

Auto Mode Operation

The packer retract solenoid activates only after the packer extend operation has occurred, and one or more of the following conditions are met:

- Set pack position is reached
- Body valve pressure exceeds 2200 PSI
- Packer extend solenoid has been “ON” for more than 30 seconds

Additionally:

- Auto pack latch conditions must be satisfied before retract can proceed.

Manual mode operation

- The operator must continuously press the Packer retract pushbutton to keep the solenoid active.
- Auto pack latch conditions are “NOT” required in manual mode.

Safety & Control Logic

This dual-mode logic ensures:

- Automated safety checks in auto mode to prevent premature retraction.
- Direct operator control in manual mode for flexibility during maintenance or troubleshooting

CONTROLLER SOFTWARE

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Pack Position AND Configure Packer travel POS is Disabled.	Activated	Memory Flag	ON
OR					
B	-	Body Valve pressure>2200PSI	Activated	Memory Flag	ON
OR					
C	-	Extender SOL "ON" > 30Sec	Activated	Memory Flag	ON
AND					
D	AND	Auto Pack Latch (See below NOTE 1)	Activated	Memory Flag	ON
OR					
E	-	Packer Retract PB (If PTO_HOC is Enabled) OR Switch Bank Input OR In-Cab Display Selection - Retract OR Yellow Button -Joystick	Activated	IN0700	ON
AND					
F	AND	Hydraulic Pump Enable	Activated	Memory Flag	ON
AND					
G	AND	Packer Extend PB (If PTO_HOC is Enabled) OR Switch Bank Input OR In-Cab Display Selection - Extend OR Red Button -Joystick	Deactivated	IN0603(CAB)	OFF

Conditions: (((A OR B OR C) AND D) OR E) AND F AND NOT G will activate the PACKER RETRACT SOL output.

NOTE 1: Condition A – This Memory Flag monitors Auto pack Latch conditions, switches “ON” when TG is in Closed Condition, & Trucks Road Speed should be less than 25MPH, & Engine RPM between 1500 to 3000. (1500<Engine RPM<3000)

2. TAILGATE UNLOCK SOL (OUT0004-PIN20)

Function: This output function controls the Tailgate Unlock Circuit.

Activation Conditions

The tailgate can be unlocked via the in-cab display only when:

- Truck is in PTO (Power Take-Off) mode
- Road speed is below 5 MPH

Safety & Control Intent

This logic ensures:

- Safe unlocking during low-speed or stationary operations
- Prevents accidental unlocking while the vehicle is in motion

CONTROLLER SOFTWARE

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Road Speed OK (< 5MPH)	Activated	Memory Flag	ON
B	AND	TG Unlock (In-Cab Display)	Activated	Memory Flag	ON
C	AND	PTO ON	Activated	Memory Flag	ON

Conditions: A AND B AND C will activate the TAILGATE UNLOCK SOL output.

3. TAILGATE LOCK SOL (OUT0005-PIN21)

Function: This output function controls the Tailgate lock Circuit.

Activation Conditions

The tailgate can be locked via the in-cab display only when:

- Truck is in PTO (Power Take-Off) mode
- Road speed is below 5 MPH

Safety & Control Intent

This logic ensures:

- Controlled locking during low-speed or stationary operations
- Prevents unintended locking while the vehicle is in motion

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Road Speed OK (< 5MPH)	Activated	Memory Flag	ON
B	AND	TG lock (In-Cab Display)	Activated	Memory Flag	ON
	OR	Oil Warm Active	Activated	Memory Flag	ON
AND					
C	AND	PTO ON	Activated	Memory Flag	ON

Conditions: A AND B AND C will activate the TAILGATE LOCK SOL output

4. LIFT RAISE LOCK (OUT0006-PIN22)

Function: This output function controls the lift raise lock function for the Python auto-lift. The standard Python lift has two modes for lift operation, auto-lift mode and manual mode. to toggle the control between the two modes, press Coord PB in switch bank (optional feature).

Applies if configure lift raise lock option is enabled.

Lift raise lock is a safety check function to hold the lift operations when below necessary conditions

Function Purpose

The lift raise lock is a safety interlock that prevents lift operations unless specific conditions are met. It applies only if the "Configure Lift Raise Lock Option" is enabled.

CONTROLLER SOFTWARE

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Configure Lift Raise Lock Enable	Activated	Memory Flag	ON
B	AND	Manual Pack mode	Deactivated	Memory Flag	OFF
C	AND	Lift Lowered Proximity	Deactivated	IN0203	OFF
AND					
D	AND	Actual Packer Position> Set Packer Position	Activated	Memory Flag	ON
D1.	OR	Grabber close Pressure Switch	Deactivated	IN0501	OFF
D2.	OR	Hopper Coven Open Proximity- (Applies if Option Hopper Cover Installed is Enabled)	Deactivated	Memory Flag	OFF

Conditions: A AND NOT B AND NOT C AND (D OR NOT D1 OR NOT D2) will activate the LIFT RAISE LOCK output.

5. TAILGATE DOWN SOL (OUT0007-PIN23)

Function: This output function controls the Tailgate DOWN Circuit.

Activation Conditions

The tailgate can be moved DOWN (closed) via the in-cab display only when:

- Truck is in PTO (Power Take-Off) mode
- Road speed is below 5 MPH

Safety & Control Intent

This logic ensures:

- Safe tailgate closing during stationary or slow-moving operations
- Prevents unintended closing while the truck is in motion

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Road Speed OK (< 5MPH)	Activated	Memory Flag	ON
B	AND	TG Down (In-Cab Display)	Activated	Memory Flag	ON
	OR	Oil Warm Active	Activated	Memory Flag	ON
C	AND	PTO ON	Activated	Memory Flag	ON
D	AND	TAILGATE LOCKED PROX SS	Deactivated	IN1600-Main	OFF
E	AND	TAILGATE LOCKED PROX CS	Deactivated	IN1601-Main	OFF
F	AND	Packer Full Extended	Deactivated	Memory Flag	OFF

Conditions: A AND B AND C AND NOT D AND NOT E AND NOT F will activate the TAILGATE DOWN SOL output

6. PACKER EXTEND SOL (OUT0008-PIN24)

Function: This function output controls the packer extend circuit and has two modes of operation: auto and manual.

Auto Mode Operation

The Packer Extend Solenoid can be activated in two ways:

(1) In-Cab Display-Based Trigger

- (a) When the number of cans per pack reaches the set value, the system automatically activates the solenoid.

(2) Pushbutton Trigger

- (a) Operator presses the Extend Pushbutton once
- (b) If all Auto Pack Latch conditions are met, this starts the auto operation and activates the solenoid.

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NOTE: Auto operation is only allowed when the Tailgate (TG) is closed.

Manual Mode Operation

- Operator must continuously press the Packer Extend Pushbutton to keep the solenoid active.
- Manual mode is not restricted by tailgate position — it works even if the TG is open.

Safety & Control Intent

This logic ensures:

- Automated packing based on operational thresholds
- Manual override for flexibility and troubleshooting
- Tailgate interlock for safe auto operation

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Auto Pack Latch (See below NOTE 1)	Activated	Memory Flag	ON
B	AND	Packer Extend SOL	Activated	OUT0008	ON
OR					
C	-	Select Auto Pack Start (See Above Point-1)	Activated	Memory Flag	ON
D	AND	Packer Travel Position (See below NOTE 2) (Applies Only if configure Packer travel position is enabled)	Deactivated	Memory Flag	OFF
OR					
E	-	Packer Extend PB (If PTO_HOC is Enabled) OR Switch Bank Input OR In-Cab Display Selection – Extend OR Red Button -Joystick	Activated	IN0603(CAB)	ON
AND					
F	AND	Packer Position > (Calibrated Packer Position, If Configure Packer Travel Position is Disabled) OR (Calibrated Travel Position, if Configure Packer Travel Position is Enabled)	Deactivated	Memory Flag	OFF
AND					
G	AND	Packer Retract	Deactivated	Memory Flag	OFF
H	AND	Body Valve pressure>2200PSI	Deactivated	Memory Flag	OFF
I	AND	Packer Retract PB OR Switch Bank Input OR In-Cab Display Selection – Retract OR Yellow Button -Joystick	Deactivated	IN0700(CAB)	OFF
J	AND	Extender SOL “ON” > 30Sec	Deactivated	Memory Flag	OFF
K	AND	Hydraulic Pump Enable	Activated	Memory Flag	ON

Conditions: (A AND B) OR (C AND D) OR E) AND (F) AND (G) AND NOT (H) AND NOT (I) AND NOT (J) AND (K) will activate the PACKER EXTEND SOL output.

NOTE 1: Condition A – This Memory Flag monitors Auto pack Latch conditions, switches “ON” when TG is in Closed Condition, & Trucks Road Speed should be less than 25MPH, & 1500<Engine RPM<3000

NOTE 2: Condition D – This Memory Flag monitors and Switches “ON” when Packer Position is equal to set Travel Position.

Coordination Mode (Coord Mode): Is enabled when Auto lift operation required and can be enabled from in-cab display or from switch bank (optional feature).

CONTROLLER SOFTWARE

7. FRONT STROBE LIGHTS (OUT0100-PIN06) & REAR STROBE LIGHTS (OUT0101-PIN07)

Function: These outputs' function controls the Front & Rear Strobe Lights.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Strobe Lights	Activated	Memory Flag-In-Cab Display	ON
A1.	OR	Pump Enabled	Activated	Memory Flag	ON
A2.	OR	Reverse	Activated	Memory Flag	ON
B	AND	Turn Signal-OFF timer (1.5 Sec)	Deactivated	Memory Flag	OFF

Conditions: (A OR A1 OR A2) AND NOT B will activate the Front and Rear Strobe lights output.

NOTE: Strobe lights shall not be enabled while turn signals are active. Once the turn signals are turned off, and a delay of 1.5 seconds has elapsed, strobe lights may be activated. Ref: Lighting Controls in in-cab display Screen

8. AUX BACKUP LIGHT (OUT0102-PIN08)

Function: The output Function controls Auxiliary Lights Output.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Auxiliary Lights PB	Activated	Memory Flag-In-Cab Display	ON
A1.	OR	Reverse	Activated	Memory Flag	ON

Conditions: (A OR A1) will activate the Auxiliary lights output.

Ref: Lighting Controls in in-cab display Screen

9. BACKUP ALARM (OUT0103-PIN09)

Function: The output Function controls Backup ALARM Output.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	TG Open (See below NOTE 1)	Activated	Memory Flag	ON
A1.	OR	TG Unlock (See below NOTE 2)	Activated	Memory Flag	ON

Conditions: (A OR A1) will activate the Backup Alarm output.

NOTE 1: The TG Open Indication Flag monitors the tailgate status and is activated when the TG Closed Proximity Sensor (IN1103) is "OFF".

NOTE 2: The TG Unlock Flag is triggered when either the TG Lock Proximity SS (IN1600) OR TG Lock Proximity CS (IN1601) is not ON.

Backup Alarm: This Alarm Triggers to indicate that TG is Unlocked OR TG is opening.

The Backup Alarm activates even when the truck is in reverse gear. This function is controlled via a hardwired connection from the chassis, independent of Controller logic.

10. HOPPER LIGHT (OUT0104-PIN10)

Function: The output function controls hopper lights output.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Auxiliary Lights PB	Activated	Memory Flag-In-Cab Display	ON

Conditions: A, will activate the Hopper Light output

CONTROLLER SOFTWARE

11. LIFT LIGHT (OUT0105-PIN11)

Function: The output function controls the lift lights output.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Lift Light	Activated	Memory Flag	ON
B	-	Auto Lift Light	Activated	OUT0105	ON

Conditions: A, will activate the Lift Light output.

Ref: Lighting Controls in in-cab display Screen

NOTE: The lift light can be activated manually via the in-cab display lift light push button. Alternatively, the auto lift light function will activate automatically when the vehicle’s road speed falls below the configured maximum ground speed (typically less than 7 MPH) and ambient light conditions meet the required threshold.

NOTE: The in-cab display screen provides both manual control and status indication. The auto lift light feature enhances safety and visibility during low-speed operations in dim environments.

Activation conditions

The lift light output can be activated under two conditions:

Condition A – Manual Activation:

- Source: in-cab display lift light icon.
- Logic: Operator manually presses the button on the in-cab display screen.
- Status: Memory flag = “ON”

Condition B – Automatic activation.

Logic: System automatically turns on the lift light when:

- Vehicle road speed is below the configured threshold (typically < 7 MPH).
- Ambient light conditions meet the required low-light threshold.

12. LIFT RAISE SOLENOID (OUT0200-PIN73)

Function: This function output controls the packer extend circuit and has two modes of operation: auto and manual. The lift mode is toggled by pressing the coordination pushbutton (Coord PB) located in the in-cab display or the switch bank (optional feature).

Auto-Lift Mode

- In auto-lift mode, the lift sequence is managed automatically based on system logic and coordination timing.

Manual-Lift Mode

- In manual mode, the operator has direct control over lift actions, including raising the lift manually.

Control Intent

This setup provides:

- Automated operation for efficiency and consistency
- Manual override for flexibility and troubleshooting
- Clear mode switching via a dedicated pushbutton

CONTROLLER SOFTWARE

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Configure Coord Dump Enable (Enables co-ordination dump option)	Activated	Memory Flag	ON
B	AND	Coord Dump Mode (Enabled by Coord Mode PB)	Activated	Memory Flag	ON
C	AND	Grabber Open -PB	Deactivated	Memory Flag	OFF
D	AND	Grabber Close -PB	Activated	Memory Flag	ON
E	AND	Max JS Operation (Conditions for lift enable)	Activated	Memory Flag	ON
F	AND	Gripper Closed (1.74 Sec after Gripper Close PB Press If Coord Mode Enabled)	Activated	Memory Flag	ON

Conditions: A AND B AND NOT C AND D AND E AND F will activate the Lift Raise SOL output. This Condition also enables the Lift Retract SOL

Manual Mode: Arm-Lift Raise SOL is activated manually via the joystick by moving it in the Y+ direction. This action enables the arm to lift.

NOTE: Pneumatically controlled joysticks are used to operate the arm’s lift/lower and retract/extend functions.

Auto Mode: Arm-Lift Raise SOL is activated in Auto mode by pressing Grabber Close PB. This action enables the arm to retract and Raise Simultaneously.

13. TAILGATE UP (RAISE) SOL (OUT0201-PIN74)

Function: This output function controls the Tailgate UP Circuit.

Activation Conditions

The tailgate can be moved UP (opened) via the in-cab display only when:

- Truck is in PTO (Power Take-Off) mode
- Road speed is below 5 MPH

Safety & Control Intent

This logic ensures:

- Safe tailgate operation during stationary or slow-moving conditions

Prevents accidental opening while the truck is in motion

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Road Speed OK (< 5MPH)	Activated	Memory Flag	ON
B	AND	TG UP (In-Cab Display)	Activated	Memory Flag	ON
C	AND	TG Unlock (In-Cab Display)	Deactivated	Memory Flag	ON
D	AND	TAILGATE LOCKED PROX SS	Deactivated	IN1600-Main	OFF
E	AND	TAILGATE LOCKED PROX CS	Deactivated	IN1601-Main	OFF
F	AND	PTO ON	Activated	Memory Flag	ON

Conditions: A AND B AND C AND NOT D AND NOT E AND F will activate the TAILGATE UP SOL output.

Lift Stow: Configuration Lift Stow “ON” Allows the Gripper Open and Arm lift Retract on the Fly.

CONTROLLER SOFTWARE

14. LIFT RETRACT SOLENOID (OUT0202-PIN75)

Function: This output function controls the Lift Retract function for the Python Auto-Lift. The standard Python lift has two modes for Lift operation, Auto-Lift mode and Manual mode. To toggle the control between the two modes, press Coord PB in switch bank (optional feature).

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Configure Coord Dump Enable (Enables co-ordination dump option)	Activated	Memory Flag	ON
B	AND	Coord Dump Mode (Enabled by Coord Mode PB)	Activated	Memory Flag	ON
C	AND	Grabber Open -PB	Deactivated	Memory Flag	OFF
D	AND	Grabber Close -PB	Activated	Memory Flag	ON
E	AND	Max JS Operation (Conditions for lift enable)	Activated	Memory Flag	ON
F	AND	Gripper Closed (1.74 Sec after Gripper Close PB Press If Coord Mode Enabled)	Activated	Memory Flag	ON
OR					
A1.	-	Configure Lift Stow Enable	Activated	Memory Flag	ON
B1.	AND	Coord Dump Mode (Enabled by Coord Mode PB)	Activated	Memory Flag	ON
C1.	AND	Grabber Open -PB	Activated	Memory Flag	ON
D1.	AND	Grabber Close -PB	Deactivated	Memory Flag	OFF
E1.	AND	Lift Stow "ON" timer – 400ms OR Grabber full Open Proximity	Activated	Memory Flag OR IN0600	ON

Conditions-1: A AND B AND NOT C AND D AND E AND F will activate the lift retract SOL output. This condition enables lift retract SOL along with lift raise SOL, both lift raise and retract enabled simultaneously for auto lift operation, OR Conditions-2: A1 AND B1 AND C1 AND NOT D1 AND E1 will activate the lift retract sol output. This condition enables grabber open SOL and then lift retract SOL output for stow operation.

Manual Mode: Arm-lift retract SOL is activated manually via the joystick by moving it in the **X- direction**. This action enables the arm to retract.

NOTE: Pneumatically controlled joysticks are used to operate the arm’s **lift/lower (Y Axis)** and **retract/extend (X axis)** functions.

Auto Mode:

Condition1- Arm-lift retract SOL is activated in auto mode by pressing grabber close PB. This action enables the arm to retract and Lift Raise Simultaneously.

Condition-2: Arm-lift retract SOL is activated in auto mode by pressing grabber open PB. The arm retract SOL activates after 400ms grabber open PB press OR grabber full open proximity ON.

15. TAILGATE FLOW SOL (OUT0204-PIN77)

Function Purpose: Enables air flow required for tailgate operations.

Activation Logic

The tailgate flow solenoid is activated in conjunction with any of the following outputs:

- Tailgate UP/Down Solenoids.
- Tailgate Lock/Unlock Solenoids.

Control Intent

- Acts as a gatekeeper for pneumatic flow, ensuring air is only supplied when a tailgate operation is requested.

CONTROLLER SOFTWARE

Prevents unintended tailgate movement by requiring dual conditions:

- A specific tailgate action (UP, DOWN, LOCK, UNLOCK).
- Flow solenoid activation.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	TG UP SOL	Activated	OUT0201	ON
B	OR	TG DOWN SOL	Activated	OUT0007	ON
C	OR	TG LOCK SOL	Activated	OUT0005	ON
D	OR	TG UNLOCK SOL	Activated	OUT0004	ON

Conditions: A OR B OR C OR D will activate the TAILGATE FLOW SOL output.

C. Cab Controller Inputs.

1. SYSTEM POWER (IN0000-PIN25)

Function: This circuit monitors the “ON/OFF” status of the system power switch (“mushroom button”). This “mushroom button” should be in “UP” position for the system to be operative. If “Depressed” system power will be turned “OFF”.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Mushroom Head EMG PB	SYSTEM POWER	Activated	IN0000	ON

Activation Logic

- When the mushroom button is in the “UP” position, the system power Input is “ON”, and the system is operational.
- When the button is depressed, the system power input is “OFF”, and the system power is disabled.

Control Intent

This input acts as a master safety and power control, ensuring:

- Immediate shutdown capability in case of emergency or maintenance
- Operator-controlled system enablement for safe startup

2. CHASSIS NEUTRAL (IN0001-PIN26)

Function: This circuit monitors the “ON/OFF” transmission neutral circuit. This input is enabled “ON” when the engine transmission is shifted into neutral.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
CHASSIS SIGNAL	CHASSIS NEUTRAL	Activated	IN0001	ON

Control Intent

This input is typically used to:

- Validate interlocks for hydraulic or PTO operations.
- Ensure safe system behavior by confirming the vehicle is not in gear during certain functions.

3. LOW TORQUE PRESSURE SWITCH (IN0503-PIN43)

Function: It monitors the “ON/OFF” status of the low torque pressure switch. This pressure switch monitors the pressure on hydraulic pump1. The input is on when pressure reaches the pressure switch set-point.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
PRESSURE SWITCH	LOW TORQUE PRESSURE SWITCH	Activated	IN0503	ON

CONTROLLER SOFTWARE

NOTE: This input is monitored only when configure low torque limit option is enabled.

Activation Logic

- The input is “ON” when the hydraulic pressure reaches the pressure switch set-point.
- The input is monitored only if the configure low torque limit option is enabled.

Control Intent

This logic ensures:

- Pressure-based monitoring for hydraulic performance.
- Selective activation based on configuration, allowing flexibility across different unit setups.

In-Cab Display Alarm: “Low Torque Fault”

The pressure switch IN0503 monitors the hydraulic pressure on pump 1. When the pressure reaches the switch’s set-point, the input signal is activated. If the hydraulic pump is not enabled, the system triggers a “Low Torque Fault” warning and activates the buzzer.

4. SCALE ALARM 1 (IN0501-PIN41)

Function: NA

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
-	SCALE ALARM 1	Activated	IN0501	ON

5. SCALE ALARM 2 (IN0502-PIN42)

Function: NA

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
-	SCALE ALARM 2	Activated	IN0502	ON

6. GRABBER OPEN PB (IN0600-PIN55)

Function: This circuit monitors the “ON/OFF” status of the grabber open button. When this button is pressed, the grabber open input will be “ON”, and enables grabber open sol based on interlocks (provided all interlocks are satisfied).

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Joystick PB (Left/Right Gray PB)	GRABBER OPEN PB	Activated	IN0600	ON

Activation Sources

The grabber open command can be triggered from:

- Joystick pushbutton — input: IN0600 (OR)
- In-cab display — via CAN signal (OR)
- Switch bank (optional feature) — via CAN signal

Interlock Logic

The grabber open solenoid will only activate if:

- The grabber open input is “ON”.
- All required interlocks are satisfied (e.g., system readiness, manual mode active)

Control Intent

This logic ensures:

- Flexible operator control from multiple interfaces
- Safe and intentional activation of the grabber open function

CONTROLLER SOFTWARE

7. GRABBER CLOSE PB (IN0601-PIN56)

Function: This circuit monitors the “ON/OFF” status of the grabber close button. When this button is pressed, the grabber close input will be “ON” and enables grabber close SOL based on Interlocks (provided all interlocks are satisfied).

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Joystick PB (Left/Right Gray PB)	GRABBER CLOSE PB	Activated	IN0601	ON

Activation Sources

The grabber close command can be triggered from:

- Joystick pushbutton — Input: IN0601
- In-cab display — via CAN signal
- Switch bank (optional feature) — via CAN signal

Interlock Logic

The grabber close solenoid will only activate if:

- The grabber close input is ON
- All required interlocks are met (e.g., coordination mode, system readiness)

Control Intent

This logic ensures:

- Flexible operator control from multiple interfaces
- Safe and coordinated activation of the grabber close function

8. HYD PUMP ENABLE PB (IN0602-PIN57)

Function: This circuit monitors the “ON/OFF” status of the hydraulic pump enable push button. This input will activate the PTO SOL based on interlocks (provided all interlocks are satisfied).

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Joystick PB (RED PB)	HYD PUMP ENABLE PB	Activated	IN0602	ON

Activation Sources

The pump command can be triggered from any of the following:

- Joystick pushbutton — Input: IN0602
- In-cab display — via CAN signal
- Switch bank (optional feature) — via CAN signal

Interlock Logic

The PTO solenoid will only activate if:

- The hydraulic pump enable input is ON
- All system interlocks are satisfied (e.g., vehicle state, safety conditions)

Control Intent

This logic ensures:

- Flexible control from multiple operator interfaces
- Safe activation of hydraulic systems through interlock validation

CONTROLLER SOFTWARE

9. PACKER EXTEND PB (IN0603-PIN58)

Function: This circuit monitors the “ON/OFF” status of the packer extend button. When this button is pressed, the packer extend input is “ON”. When the button is released, the input returns to “OFF”.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Joystick PB (GREEN PB)	PACKER EXTEND PB	Activated	IN0603	ON

Control Intent

This input is used to:

- Manually control the packer extend solenoid in manual mode.
- Initiate Auto Mode if all required conditions (e.g., Auto Pack Latch, TG closed) are met.

10. PACKER RETRACT PB (IN0700-PIN59)

Function: This circuit monitors the “ON/OFF” status of the packer retract button. When this button is pressed, the packer retract input is “ON”. When this button is released, the packer retract input is “OFF”.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
Joystick PB (YELLOW PB)	PACKER RETRACT PB	Activated	IN0700	ON

Control Intent

This input is typically used to:

- Manually control the packer retract solenoid in manual mode
- Provide real-time feedback to the control system for operator actions

11. OPERATOR PRESENCE JOYSTICK INPUT (IN0701-PIN60)

Function: This circuit monitors the “ON/OFF” status of the operator presence inputs when the appropriate joystick is selected. This input confirms that the operator is actively gripping the joystick, which is required for the lift pump to activate.

Function Logic:

Input Device	Function or Component	Status	I/O Address	Status
JOYSTICK	OPERATOR PRESENCE JOYSTICK INPUT	Activated	IN0701	ON

Activation Logic

When the appropriate joystick is selected:

- The system monitors whether the operator presence input is “ON” (i.e., operator is actively engaging the joystick)
- If the input is “OFF”, operations may be disabled or paused for safety

Control Intent

This logic ensures:

- Operator engagement verification before allowing hydraulic or lift operations.
- Safety interlock to prevent unintended activation when the operator is not present or actively controlling the system.

CONTROLLER SOFTWARE

D. CAB Controller Outputs

1. PUMP-1 SOL-Lift Pump (OUT0100-PIN06)

Function: This output function controls the lift pump solenoid and activates 500ms after the PTO solenoid is engaged OR PTO pressure SW “ON” feedback. It also activates during packer extend operation.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Pump “ON” delay (500ms) OR PTO Pressure SW	Activated	Memory Flag	ON
B	AND	Lift Enable SOL-1 (See below NOTE 1)	Activated	Memory Flag	ON
B1.	OR	Packer Extend SOL	Activated	OUT0008	ON
C	AND	HOC in Range -1	Activated	Memory Flag	ON

Conditions: A AND (B OR B1) AND C will activate the PUMP-1 SOL Lift Pump output.

NOTE 1: The lift enable memory flag is activated when the road speed is below 5 MPH, the engine RPM for lift operation is less than 1050, and either the chassis is in neutral, or the service brake is engaged

NOTE 2: HOC in range -1 memory flag is activated when the road speed is below 25Mph, and engine RPM is less than 1050 RPM & once SOL output is activated engine speed should not be greater than 1350 Rpm.

2. PUMP-2 SOL- Packer Pump (OUT0101-PIN07)

Function: The output function controls the packer pump solenoid. It activates 500 milliseconds after the PTO solenoid is engaged, or when the PTO pressure switch feedback is “ON” & packer operations if either the extend solenoid or retract solenoid is “ON”, additionally, the function is triggered when the tailgate flow request solenoid is “ON”.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Pump “ON” delay (500ms) OR PTO Pressure SW	Activated	Memory Flag	ON
B	AND	Packer Pump “OFF” Time Delay=1 Sec (see NOTE 1 below)	Activated	Memory Flag	ON
C	AND	HOC in Range -2 (see NOTE 1 below)	Activated	Memory Flag	ON

Conditions: A AND B AND C will activate the PUMP-2 SOL Packer Pump output.

NOTE 1: The packer pump solenoid switches “OFF” one second after packer operations or tailgate operations are deactivated

NOTE 2: HOC in range -2 memory flag is activated when the road is below 25 MPH, and engine RPM is less than 1550 RPM & once SOL output is activated engine speed should not be greater than 3000 RPM.

3. PTO SOL (OUT0102-PIN08)

Function: This output function controls the PTO Enable solenoid, which is activated by the Pump Enable push button.

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Enable Pump PB	Activated	Memory Flag	ON
B	AND	Engine RPM < 1500 OR PTO SOL output	Activated	Memory Flag	ON
C	AND	Road Speed <= 25MPH	Activated	IN0203	ON
D	AND	Engine RPM < 3000	Activated	Memory Flag	ON

Conditions: A AND B AND C AND D will activate the PTO SOL output.

NOTE: To enable PTO SOL the engine RPM should be less than 1500 and once after enabled should not be greater than 3000RPM, & truck speed should be less than 25Mph.

CONTROLLER SOFTWARE

4. LIFT INTERLOCK SOL- (JS Air Supply) (OUT0200-PIN073)

Function: The output function controls air supply to the joystick for controlling lift arm operations. It activates in conjunction with PTO SOL-OUT0102 when external (auxiliary) controls are disabled

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	PTO SOL AND NOT Auxiliary Controls	Activated	OUT0102 -CAB	ON

Conditions: A will activate the LIFT INTERLOCK SOL output

Lift Stow: Configuration lift stow “ON” allows the gripper open and arm lift retract on the fly.

5. GRABBER CLOSE SOL (OUT0201-PIN74)

Function Overview

- Output Name: Grabber Close Solenoid
- Purpose: Controls the Grabber Close Circuit
- Lift Modes Supported: Auto Lift and Manual Mode

Activation Logic

- The grabber close solenoid is activated when the grabber close pushbutton is pressed.

Coordination Mode Behavior

If Coordination Mode is enabled:

- Pressing the grabber close pushbutton starts the gripper close timer
- This timer automatically initiates the auto lift sequence

Control Intent

This logic ensures:

- Manual control over grabber closing
- Automated lift initiation when coordination mode is active, streamlining operations

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Max JS Operation (Conditions for lift enable)	Activated	Memory Flag	ON
B	AND	Grabber Close Request (see the note below)	Activated	Memory Flag	ON
C	AND	Grabber Open - PB	Deactivated	Memory Flag	OFF

Conditions: A AND B AND NOT C will activate the Grabber Close SOL output.

NOTE: Grabber close request can be activated from joystick LH button white/grey OR from the in-cab display virtual joystick screen, OR from auxiliary control switch bank (optional feature).

Grabber will be closed after pressing close PB as per above note, when road speed is below 7Mph & hydraulic pump should be in enable condition.

6. LIFT EXTEND SOLENOID: OUT0203(CAB)-PIN76.

Manual: Arm-Lift extend SOL is activated manually via the joystick by moving it in the X+ direction. This action enables the arm to lift extend.

NOTE: This SOL has not been handled via the controller in as a standard option. Pneumatically controlled joysticks are used to operate the arm’s lift extend functions. If option auxiliary switch bank is enabled, then lift extend PB will enable the lift extend solenoid via CAB controller OUT0203(CAB)-PIN76.

CONTROLLER SOFTWARE

7. GRABBER OPEN SOL (OUT0202-PIN75)

Function Overview

- Purpose: controls the grabber open circuit

Operational Mode

- The grabber open solenoid operates only in manual mode.
- Lift Operates in two modes: auto-lift and manual.

Auto Mode Restriction

- This solenoid is not activated during auto lift operations
- Manual control is required for grabber opening

Conditions necessary to activate the circuit:

Condition	Logic	Function or Component	Status	I/O Address	Status
A	-	Grabber Open Request (see below note)	Activated	Memory Flag	ON
B	AND	Lift Lowered Proximity (Considered if Configure open interlock is enabled)	Activated	IN0203	ON

Conditions: A AND B will activate the Grabber Open SOL output

NOTE: Grabber open request can be activated from joystick RH button white/grey OR from in-cab display virtual joystick screen, OR from auxiliary control switch bank

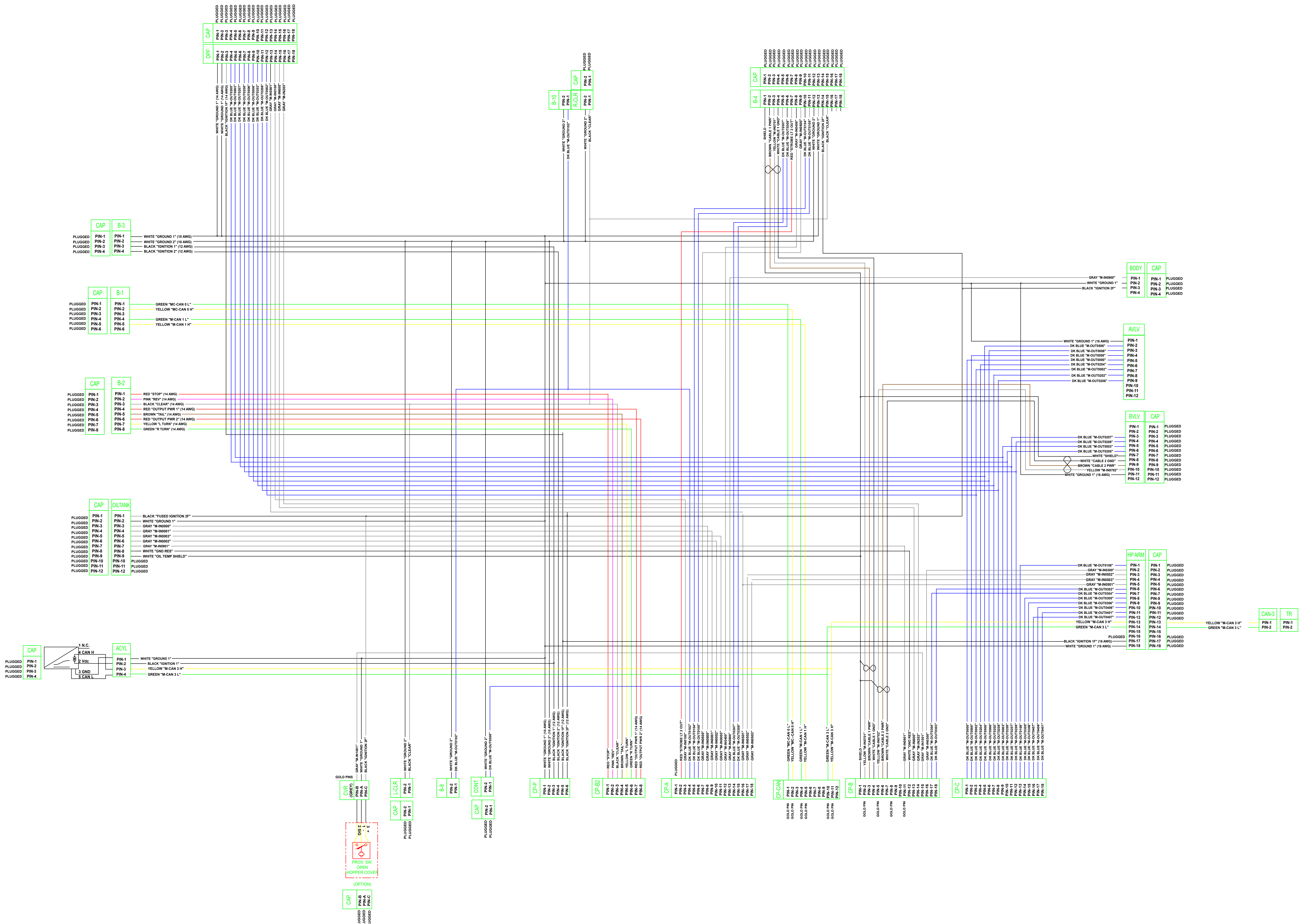
8. LIFT LOWER SOLENOID: OUT0204(CAB)-PIN77.

Manual: Arm-Lift lower SOL is activated manually via the joystick by moving it in the Y- direction. This action enables the arm to lift lower.

NOTE: This SOL has not been handled via the controller in as a standard option. Pneumatically controlled joysticks are used to operate the arm’s Lift lower functions. If Option auxiliary switch bank is enabled, then lift lower PB will enable the lift lowered solenoid via cab controller OUT0204(CAB)-PIN77.

SECTION 9

ELECTRICAL SCHEMATICS



Component	Pin	Wire Description
CAP	PIN-1	WHITE "GROUND 1" (14 AWG)
	PIN-2	BLACK "GROUND 1" (14 AWG)
	PIN-3	DK BLUE "M-OUT001"
	PIN-4	DK BLUE "M-OUT002"
	PIN-5	DK BLUE "M-OUT003"
	PIN-6	DK BLUE "M-OUT004"
	PIN-7	DK BLUE "M-OUT005"
	PIN-8	DK BLUE "M-OUT006"
	PIN-9	DK BLUE "M-OUT007"
	PIN-10	DK BLUE "M-OUT008"
	PIN-11	DK BLUE "M-OUT009"
	PIN-12	DK BLUE "M-OUT010"
	PIN-13	DK BLUE "M-OUT011"
	PIN-14	DK BLUE "M-OUT012"
	PIN-15	DK BLUE "M-OUT013"
	PIN-16	DK BLUE "M-OUT014"
	PIN-17	DK BLUE "M-OUT015"
	PIN-18	DK BLUE "M-OUT016"

Component	Pin	Wire Description
B-10	PIN-1	WHITE "GROUND 1" (14 AWG)
	PIN-2	BLACK "GROUND 2" (12 AWG)

Component	Pin	Wire Description
R-CLR	PIN-1	WHITE "GROUND 1" (14 AWG)
	PIN-2	BLACK "CLEAR"

Component	Pin	Wire Description
B-4	PIN-1	BROWN "CABLE 1 PWR"
	PIN-2	YELLOW "M-INT01"
	PIN-3	DK BLUE "M-OUT001"
	PIN-4	DK BLUE "M-OUT002"
	PIN-5	DK BLUE "M-OUT003"
	PIN-6	DK BLUE "M-OUT004"
	PIN-7	DK BLUE "M-OUT005"
	PIN-8	DK BLUE "M-OUT006"
	PIN-9	DK BLUE "M-OUT007"
	PIN-10	DK BLUE "M-OUT008"
	PIN-11	DK BLUE "M-OUT009"
	PIN-12	DK BLUE "M-OUT010"
	PIN-13	DK BLUE "M-OUT011"
	PIN-14	DK BLUE "M-OUT012"
	PIN-15	DK BLUE "M-OUT013"
	PIN-16	DK BLUE "M-OUT014"
	PIN-17	DK BLUE "M-OUT015"
	PIN-18	DK BLUE "M-OUT016"

Component	Pin	Wire Description
CAP	PIN-1	WHITE "GROUND 1" (10 AWG)
	PIN-2	WHITE "GROUND 2" (10 AWG)
	PIN-3	BLACK "IGNITION 1" (12 AWG)
	PIN-4	BLACK "IGNITION 2" (12 AWG)

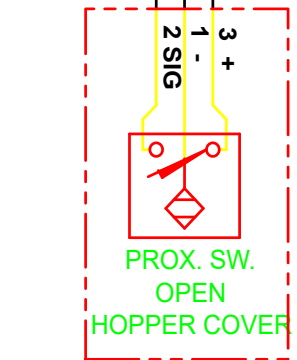
Component	Pin	Wire Description
B-1	PIN-1	GREEN "M-CAN 0 L"
	PIN-2	YELLOW "M-CAN 0 H"
	PIN-3	GREEN "M-CAN 1 L"
	PIN-4	YELLOW "M-CAN 1 H"
	PIN-5	GREEN "M-CAN 2 L"
	PIN-6	YELLOW "M-CAN 2 H"

Component	Pin	Wire Description
B-2	PIN-1	RED "STOP" (14 AWG)
	PIN-2	PINK "REV" (14 AWG)
	PIN-3	BLACK "CLEAR" (14 AWG)
	PIN-4	RED "OUTPUT PWR 1" (14 AWG)
	PIN-5	BROWN "TAL" (14 AWG)
	PIN-6	RED "OUTPUT PWR 2" (14 AWG)
	PIN-7	YELLOW "L TURN" (14 AWG)
	PIN-8	GREEN "R TURN" (14 AWG)

Component	Pin	Wire Description
OILTANK	PIN-1	BLACK "USED IGNITION 2"
	PIN-2	WHITE "GROUND 1"
	PIN-3	GRAY "M-IN000"
	PIN-4	GRAY "M-IN001"
	PIN-5	GRAY "M-IN002"
	PIN-6	GRAY "M-IN003"
	PIN-7	GRAY "M-IN004"
	PIN-8	GRAY "M-IN005"
	PIN-9	WHITE "OIL TEMP SHIELD"
	PIN-10	YELLOW "L TURN" (14 AWG)
	PIN-11	PLUGGED
	PIN-12	PLUGGED

Component	Pin	Wire Description
ACYL	PIN-1	WHITE "GROUND 1"
	PIN-2	BLACK "IGNITION 1"
	PIN-3	YELLOW "M-CAN 3 H"
	PIN-4	GREEN "M-CAN 3 L"

Component	Pin	Wire Description
C-VR	PIN-8	GRAY "M-IN001"
	PIN-9	BLACK "IGNITION 2"
	PIN-10	BLACK "IGNITION 2"



Component	Pin	Wire Description
CAP	PIN-8	GRAY "M-IN001"
	PIN-9	BLACK "IGNITION 2"
	PIN-10	BLACK "IGNITION 2"

Component	Pin	Wire Description
CP-P	PIN-1	WHITE "GROUND 1" (10 AWG)
	PIN-2	WHITE "GROUND 2" (10 AWG)
	PIN-3	BLACK "IGNITION 1" (12 AWG)
	PIN-4	BLACK "IGNITION 2" (12 AWG)
	PIN-5	BLACK "IGNITION 2" (12 AWG)
	PIN-6	BLACK "IGNITION 2" (12 AWG)

Component	Pin	Wire Description
CP-BZ	PIN-1	RED "STOP"
	PIN-2	PINK "REV"
	PIN-3	BLACK "CLEAR"
	PIN-4	YELLOW "L TURN"
	PIN-5	GREEN "R TURN"
	PIN-6	RED "OUTPUT PWR 1" (14 AWG)
	PIN-7	RED "OUTPUT PWR 2" (14 AWG)
	PIN-8	RED "OUTPUT PWR 2" (14 AWG)

Component	Pin	Wire Description
CP-A	PIN-1	PLUGGED
	PIN-2	GRAY "M-IN001"
	PIN-3	GRAY "M-IN002"
	PIN-4	DK BLUE "M-OUT016"
	PIN-5	DK BLUE "M-OUT017"
	PIN-6	DK BLUE "M-OUT018"
	PIN-7	DK BLUE "M-OUT019"
	PIN-8	DK BLUE "M-OUT020"
	PIN-9	DK BLUE "M-OUT021"
	PIN-10	DK BLUE "M-OUT022"
	PIN-11	DK BLUE "M-OUT023"
	PIN-12	DK BLUE "M-OUT024"
	PIN-13	DK BLUE "M-OUT025"
	PIN-14	DK BLUE "M-OUT026"
	PIN-15	DK BLUE "M-OUT027"
	PIN-16	DK BLUE "M-OUT028"
	PIN-17	DK BLUE "M-OUT029"
	PIN-18	DK BLUE "M-OUT030"

Component	Pin	Wire Description
CP-CAN	PIN-1	GREEN "M-CAN 0 L"
	PIN-2	YELLOW "M-CAN 0 H"
	PIN-3	GREEN "M-CAN 1 L"
	PIN-4	YELLOW "M-CAN 1 H"
	PIN-5	GREEN "M-CAN 2 L"
	PIN-6	YELLOW "M-CAN 2 H"
	PIN-7	GREEN "M-CAN 3 L"
	PIN-8	YELLOW "M-CAN 3 H"
	PIN-9	GREEN "M-CAN 3 L"
	PIN-10	YELLOW "M-CAN 3 H"
	PIN-11	GREEN "M-CAN 3 L"
	PIN-12	YELLOW "M-CAN 3 H"

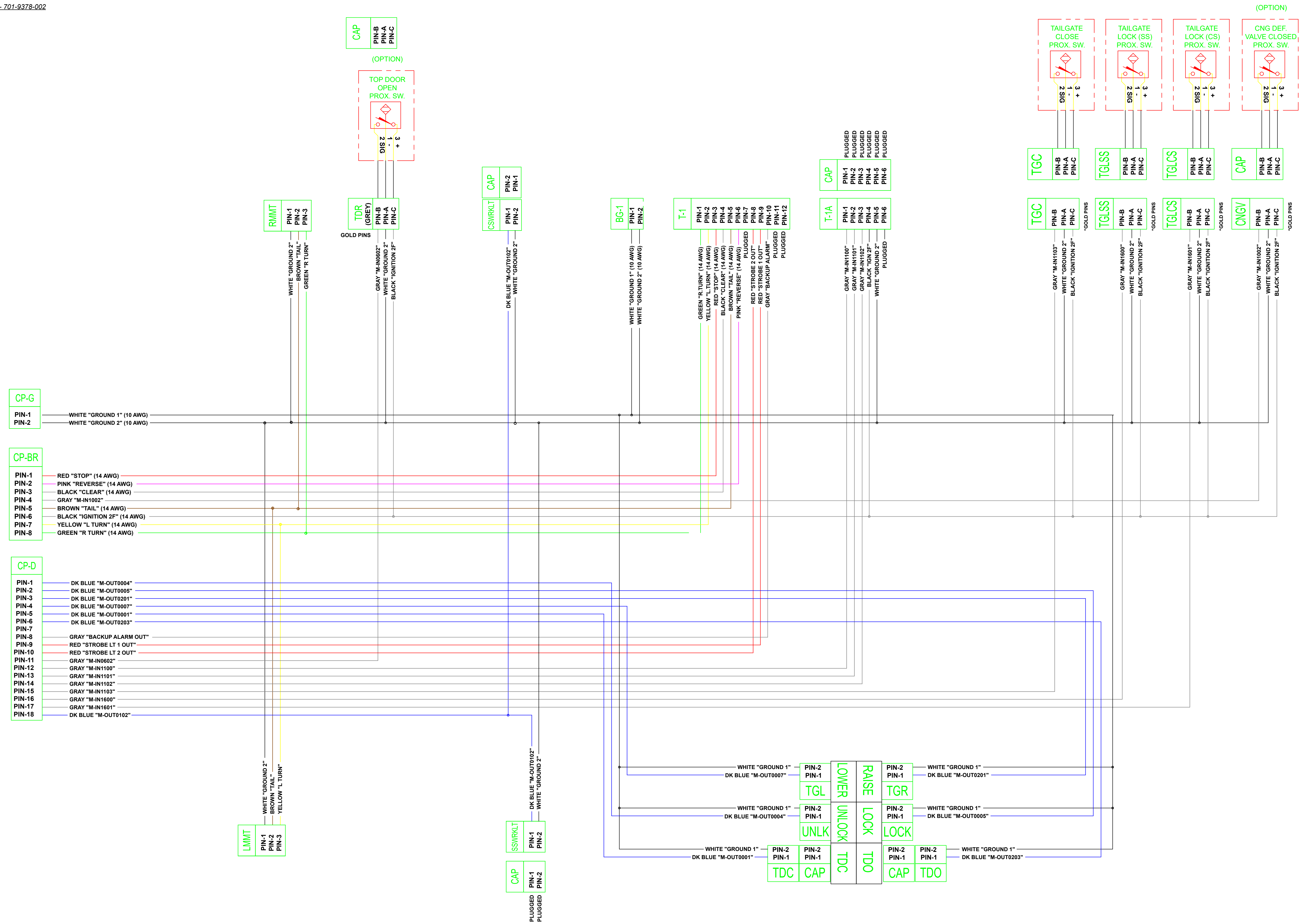
Component	Pin	Wire Description
CP-B	PIN-1	SHIELD
	PIN-2	YELLOW "M-INT01"
	PIN-3	WHITE "CABLE 1 PWR"
	PIN-4	WHITE "CABLE 1 PWR"
	PIN-5	YELLOW "M-INT01"
	PIN-6	WHITE "CABLE 2 PWR"
	PIN-7	WHITE "CABLE 2 PWR"
	PIN-8	WHITE "CABLE 2 PWR"
	PIN-9	WHITE "CABLE 2 PWR"
	PIN-10	GRAY "M-IN001"
	PIN-11	WHITE "OIL TEMP"
	PIN-12	WHITE "OIL TEMP"
	PIN-13	GRAY "M-IN001"
	PIN-14	GRAY "M-IN001"
	PIN-15	GRAY "M-IN001"
	PIN-16	DK BLUE "M-OUT016"
	PIN-17	DK BLUE "M-OUT017"
	PIN-18	DK BLUE "M-OUT018"

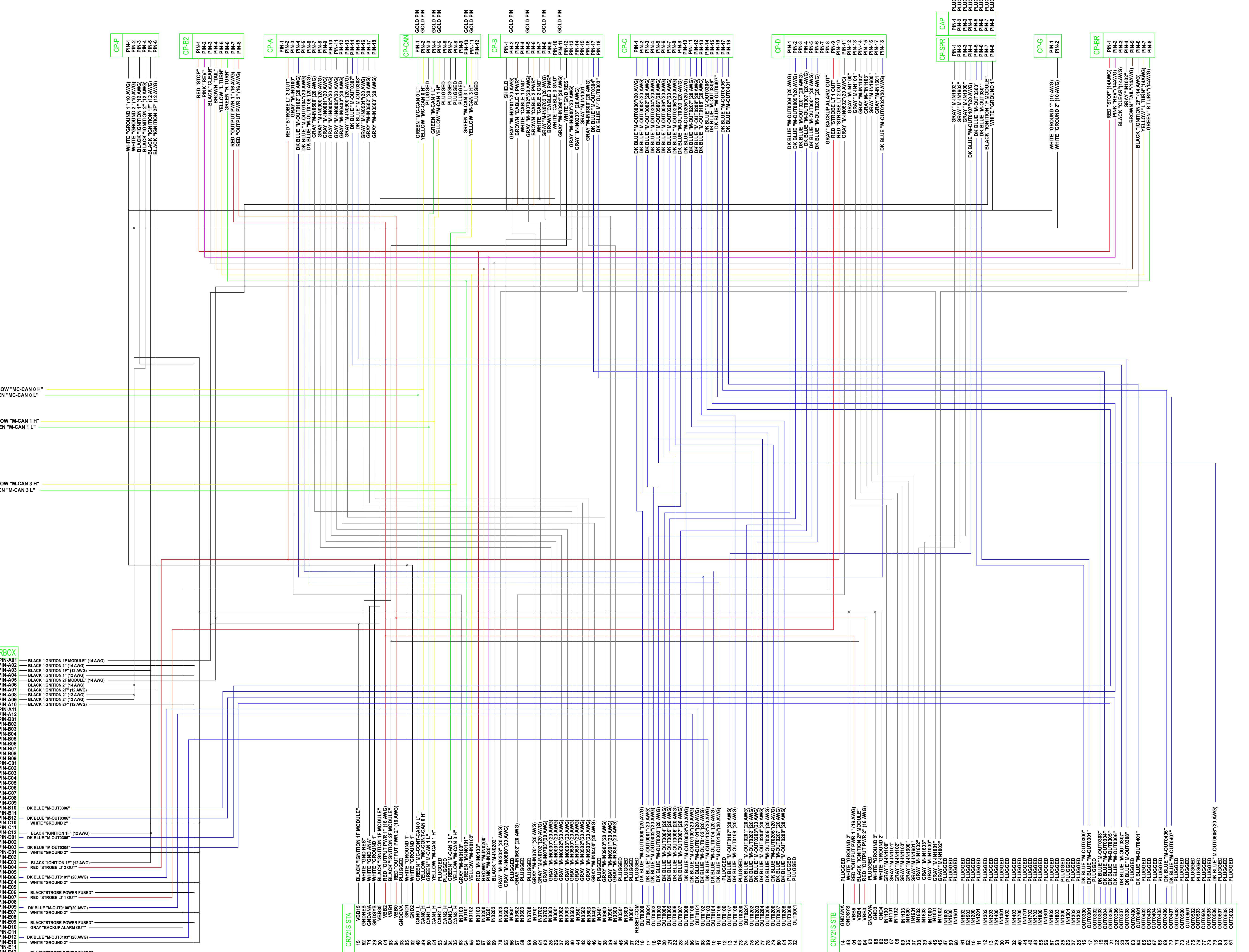
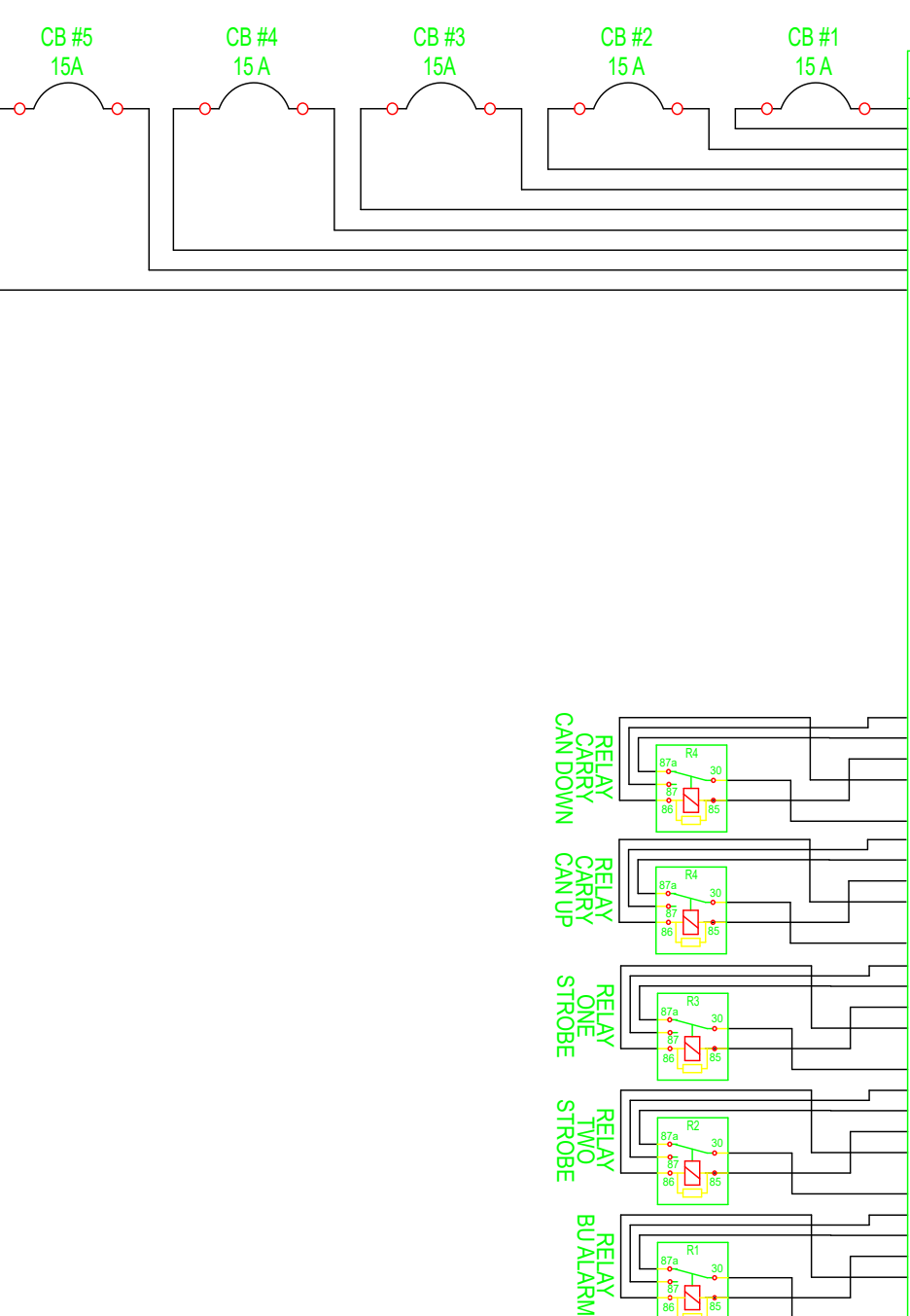
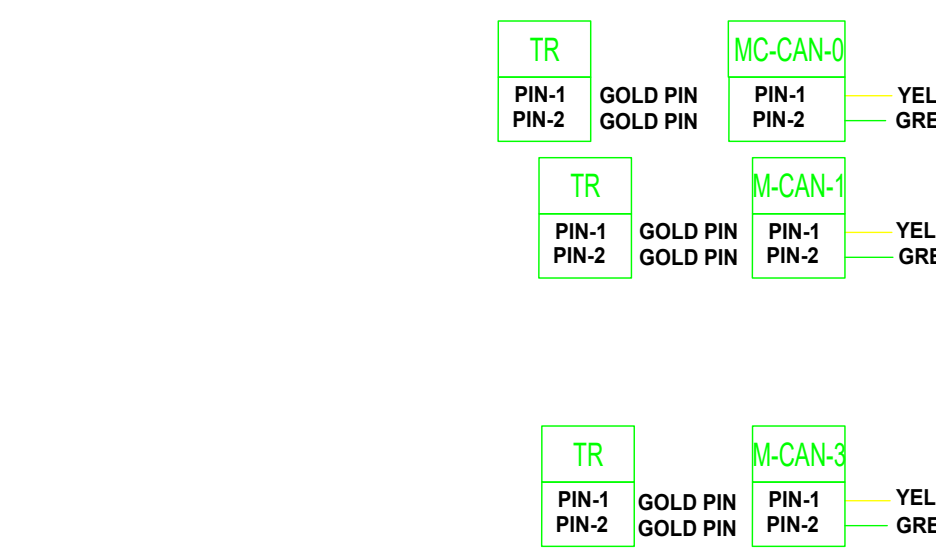
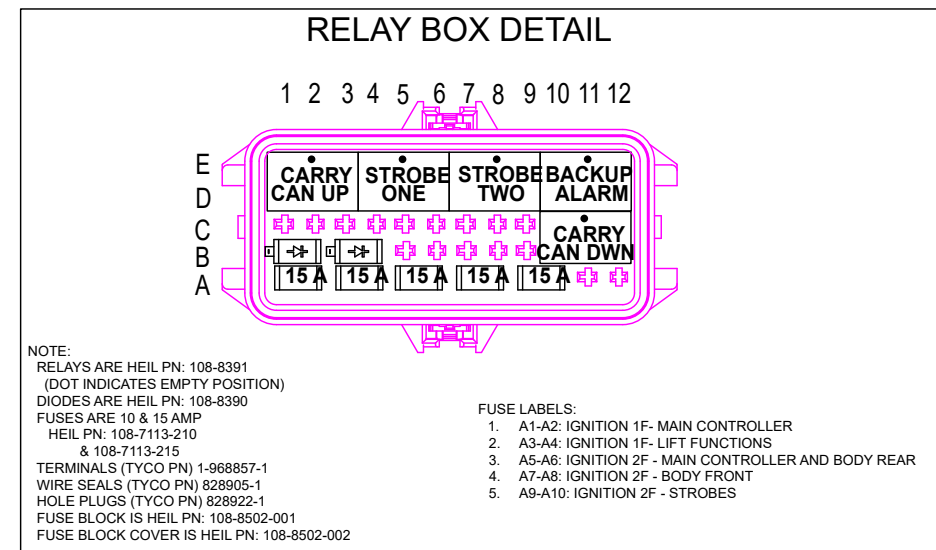
Component	Pin	Wire Description
CP-C	PIN-1	DK BLUE "M-OUT001"
	PIN-2	DK BLUE "M-OUT002"
	PIN-3	DK BLUE "M-OUT003"
	PIN-4	DK BLUE "M-OUT004"
	PIN-5	DK BLUE "M-OUT005"
	PIN-6	DK BLUE "M-OUT006"
	PIN-7	DK BLUE "M-OUT007"
	PIN-8	DK BLUE "M-OUT008"
	PIN-9	DK BLUE "M-OUT009"
	PIN-10	DK BLUE "M-OUT010"
	PIN-11	DK BLUE "M-OUT011"
	PIN-12	DK BLUE "M-OUT012"
	PIN-13	DK BLUE "M-OUT013"
	PIN-14	DK BLUE "M-OUT014"
	PIN-15	DK BLUE "M-OUT015"
	PIN-16	DK BLUE "M-OUT016"
	PIN-17	DK BLUE "M-OUT017"
	PIN-18	DK BLUE "M-OUT018"

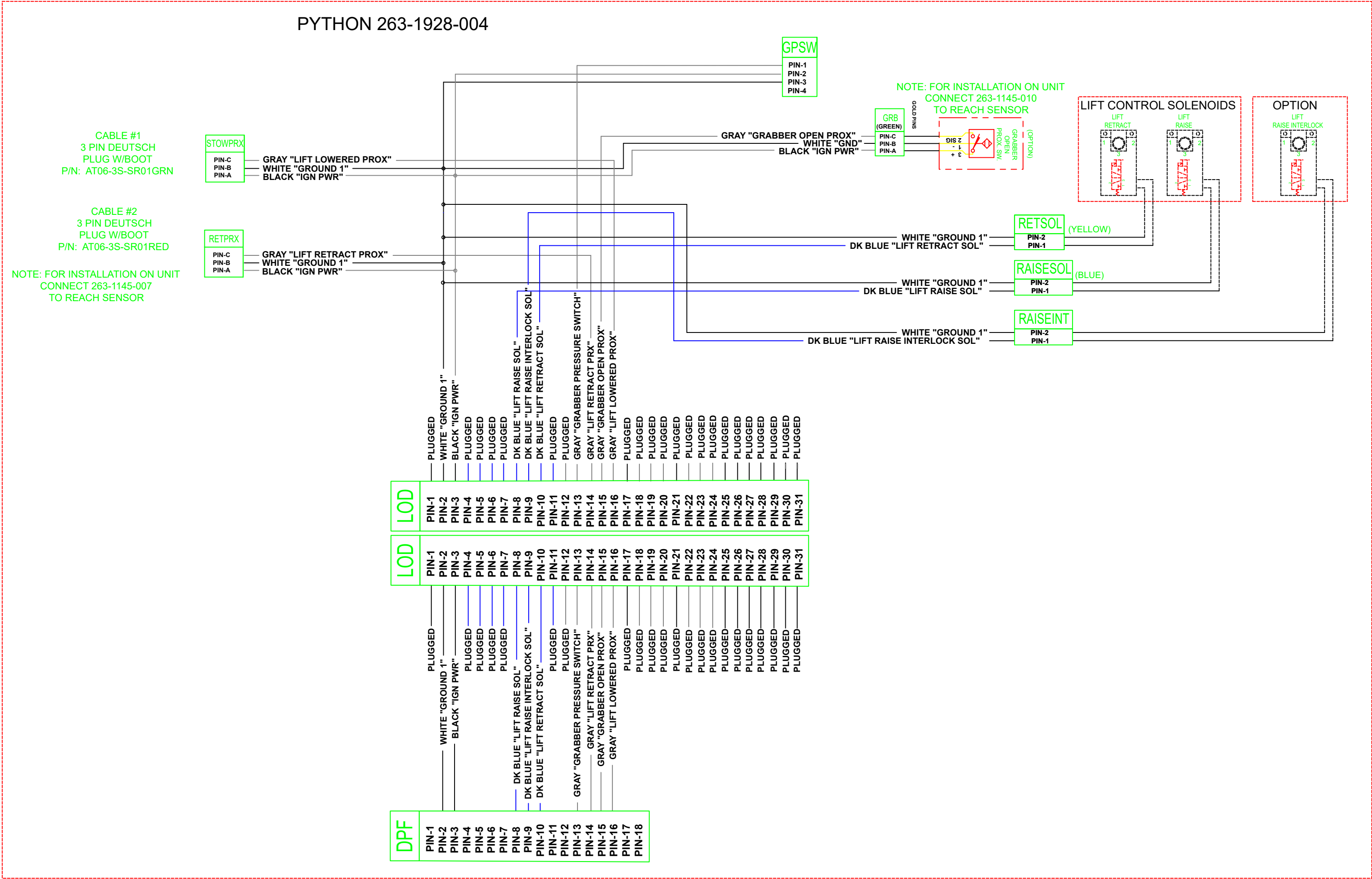
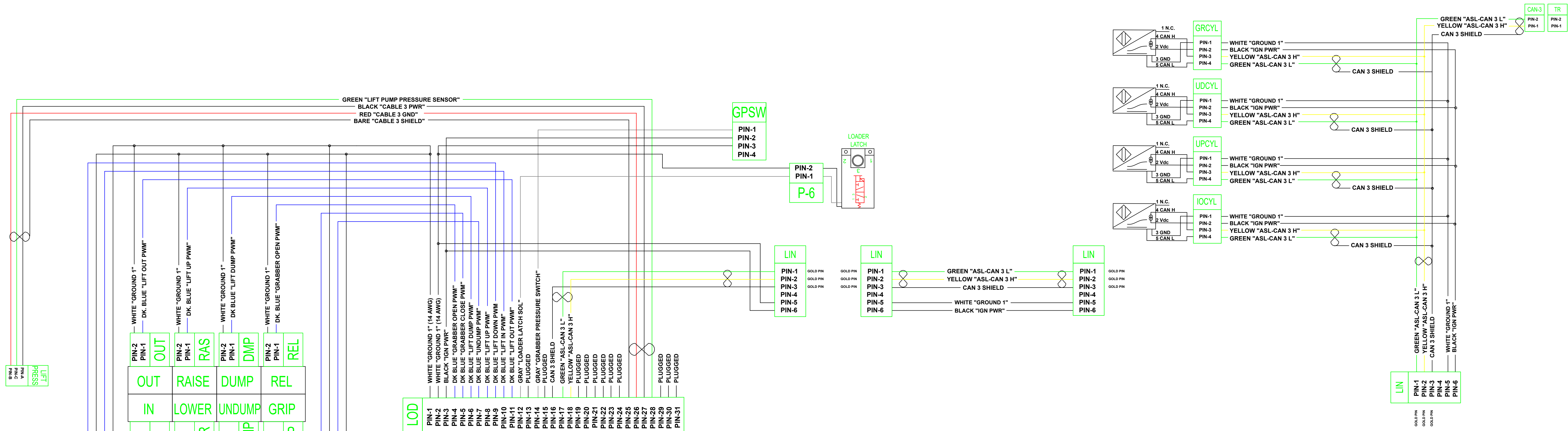
Component	Pin	Wire Description
HP ARM	PIN-1	DR BLUE "M-OUT016"
	PIN-2	GRAY "M-IN000"
	PIN-3	GRAY "M-IN001"
	PIN-4	GRAY "M-IN002"
	PIN-5	GRAY "M-IN003"
	PIN-6	GRAY "M-IN004"
	PIN-7	GRAY "M-IN005"
	PIN-8	DK BLUE "M-OUT001"
	PIN-9	DK BLUE "M-OUT002"
	PIN-10	DK BLUE "M-OUT003"
	PIN-11	DK BLUE "M-OUT004"
	PIN-12	DK BLUE "M-OUT005"
	PIN-13	DK BLUE "M-OUT006"
	PIN-14	DK BLUE "M-OUT007"
	PIN-15	DK BLUE "M-OUT008"
	PIN-16	DK BLUE "M-OUT009"
	PIN-17	DK BLUE "M-OUT010"
	PIN-18	DK BLUE "M-OUT011"

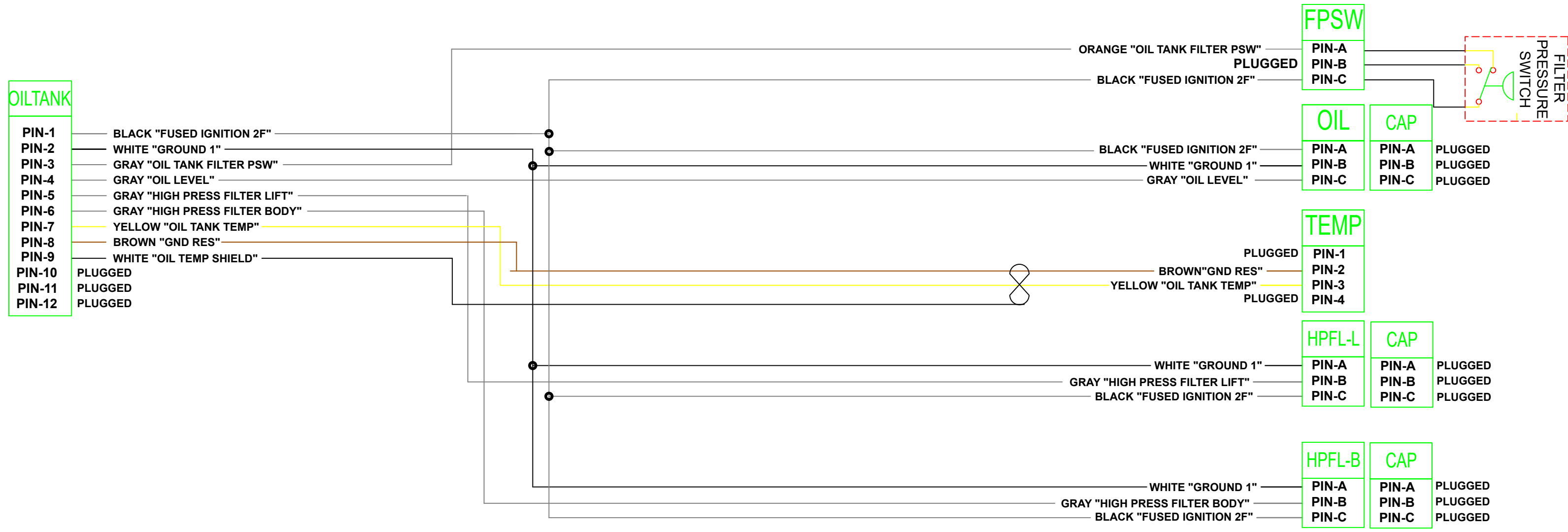
Component	Pin	Wire Description
CAN-3	PIN-1	YELLOW "M-CAN 3 H"
	PIN-2	GREEN "M-CAN 3 L"

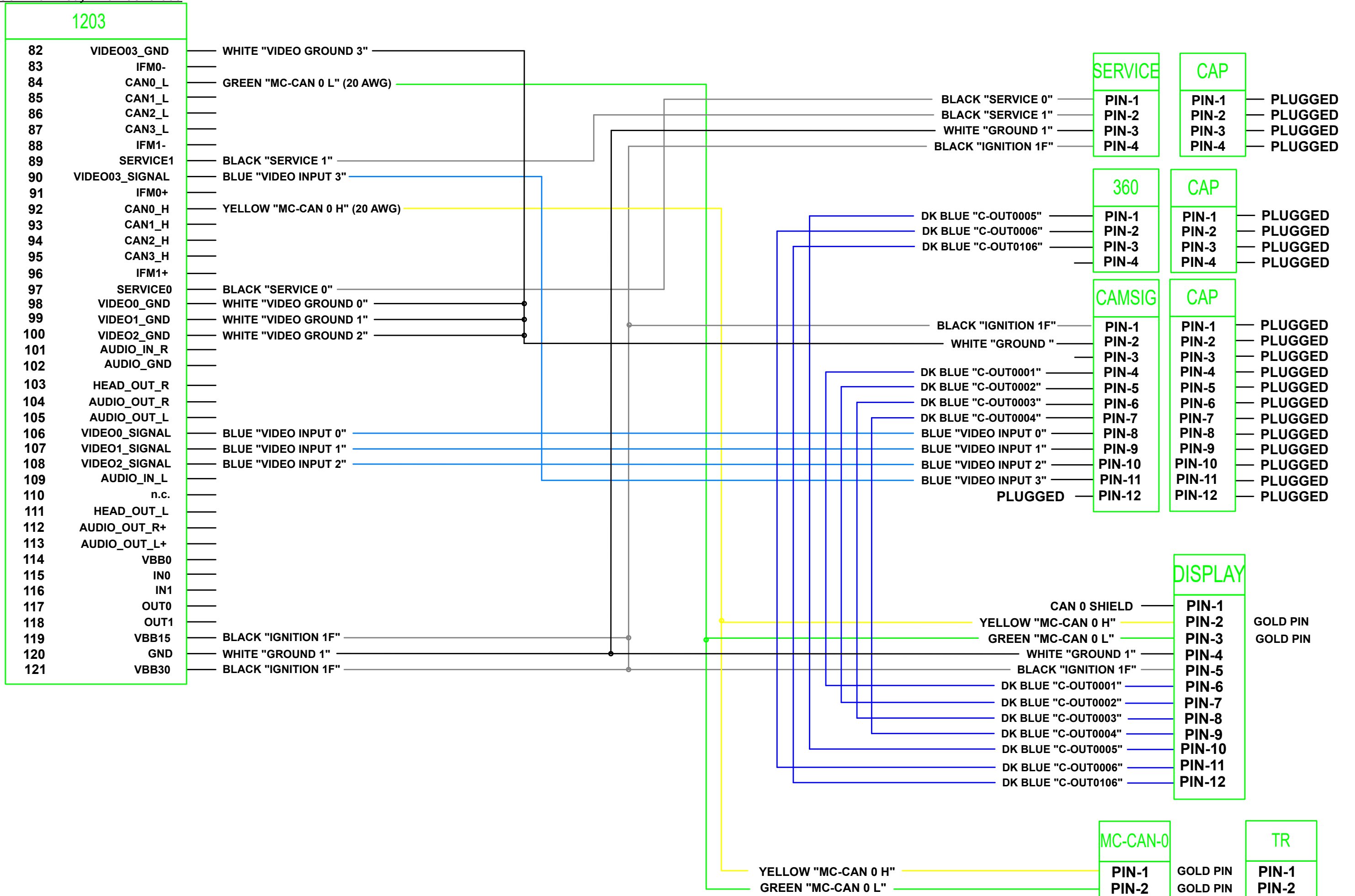
Component	Pin	Wire Description
TR	PIN-1	YELLOW "M-CAN 3 H"
	PIN-2	GREEN "M-CAN 3 L"

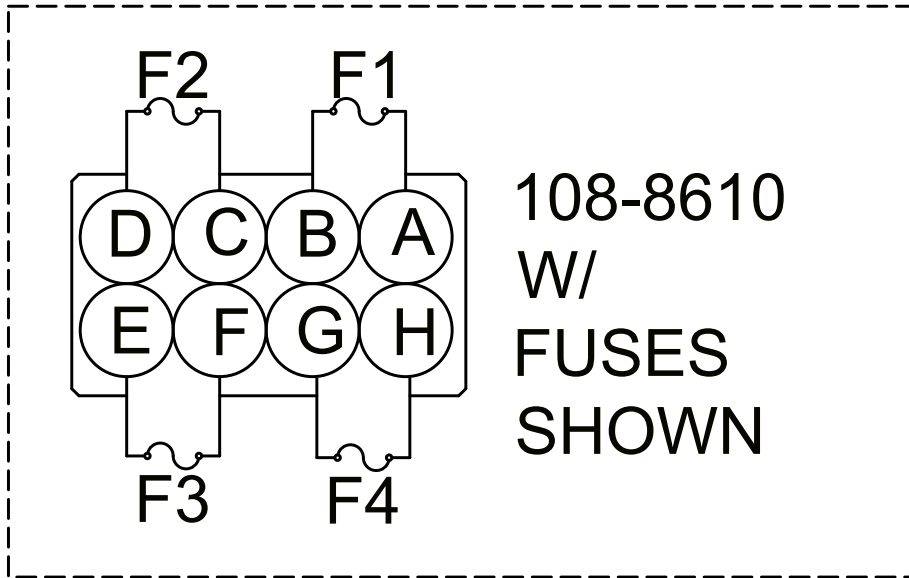






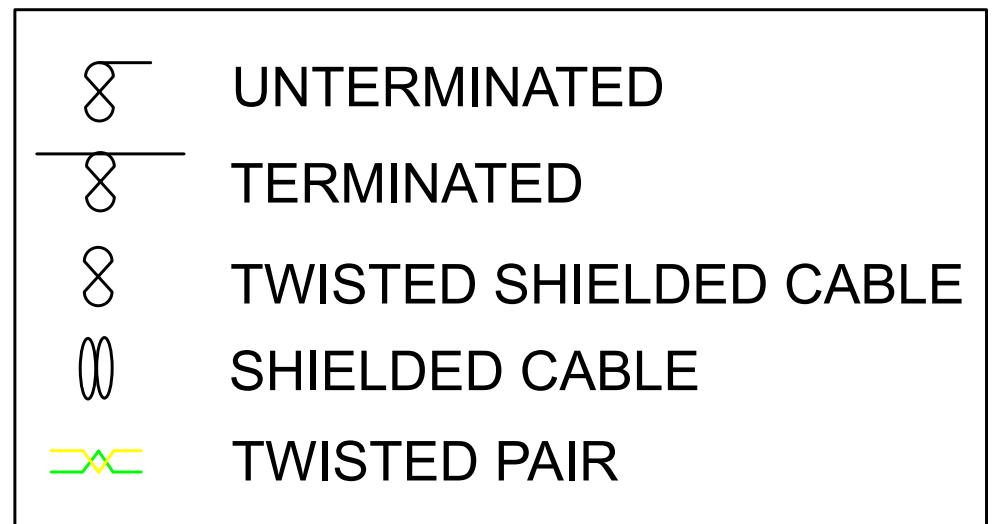
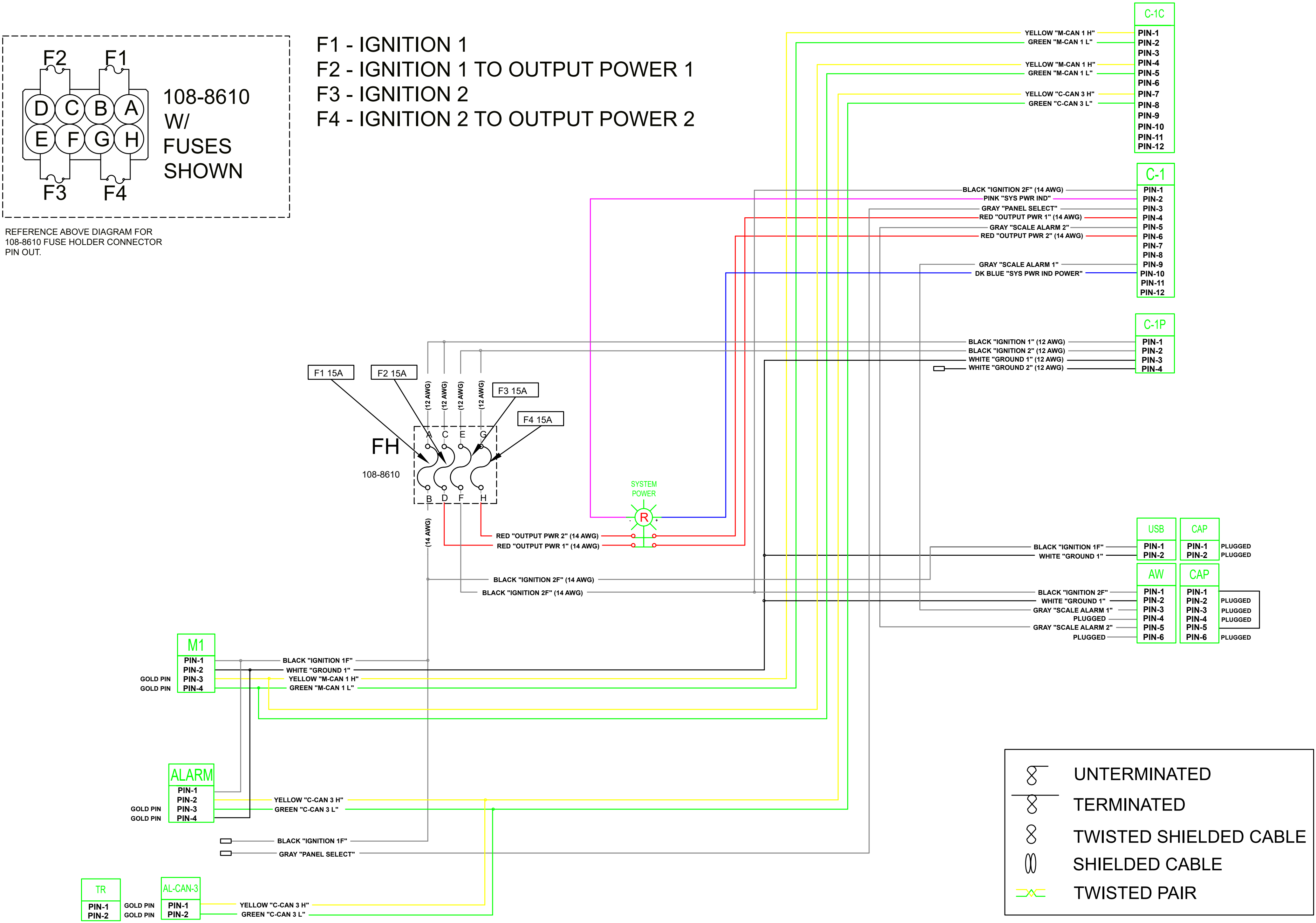


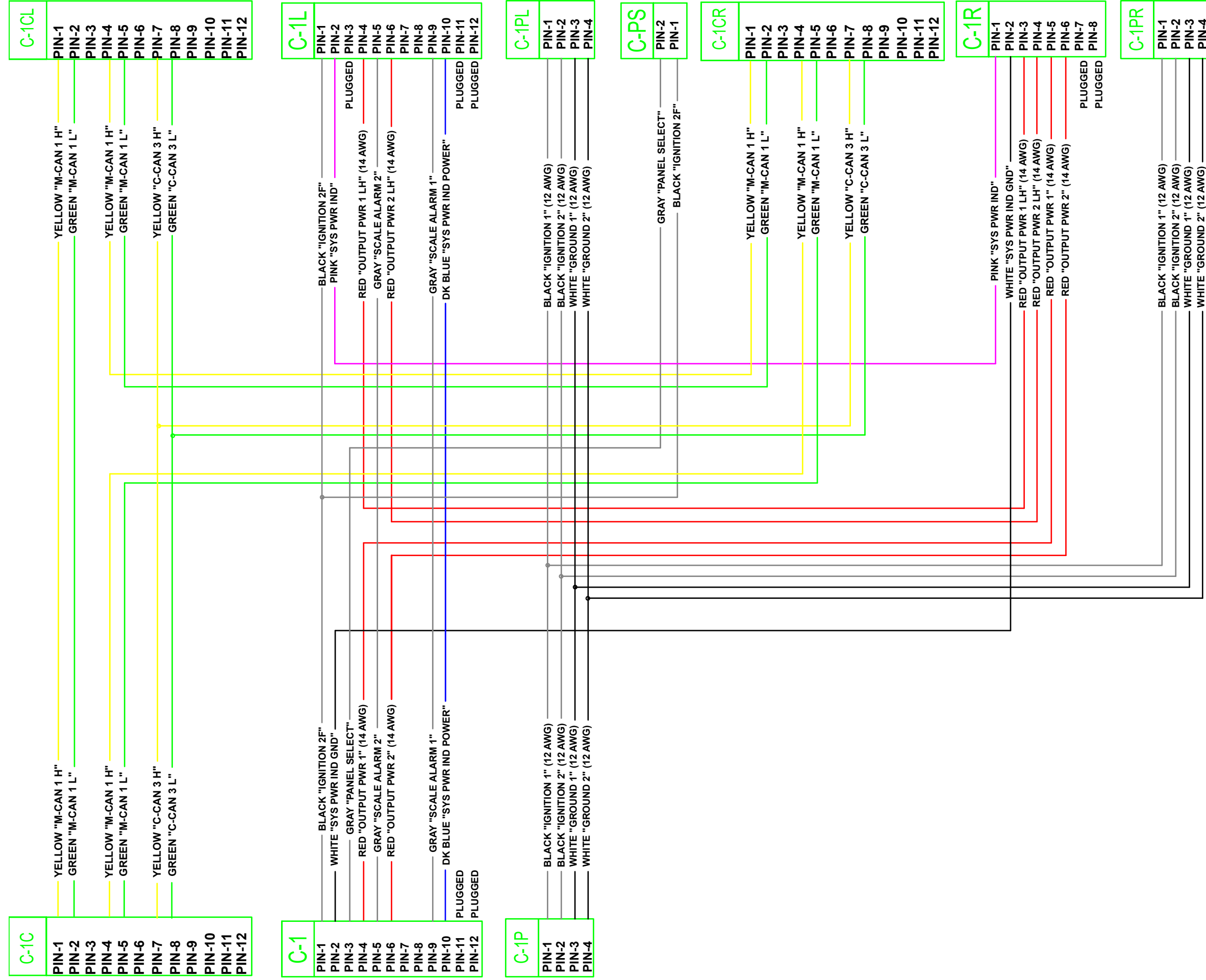


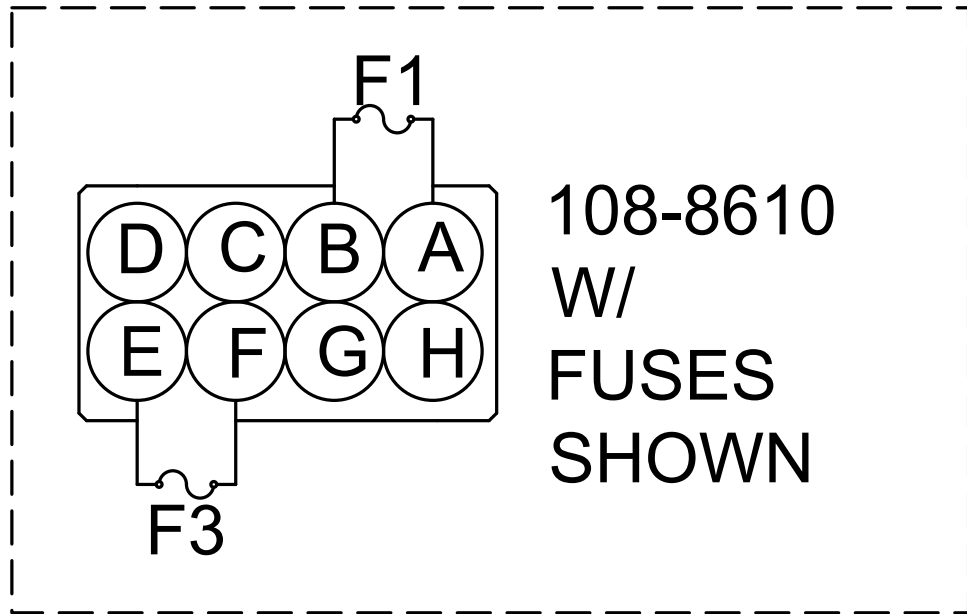


REFERENCE ABOVE DIAGRAM FOR
108-8610 FUSE HOLDER CONNECTOR
PIN OUT.

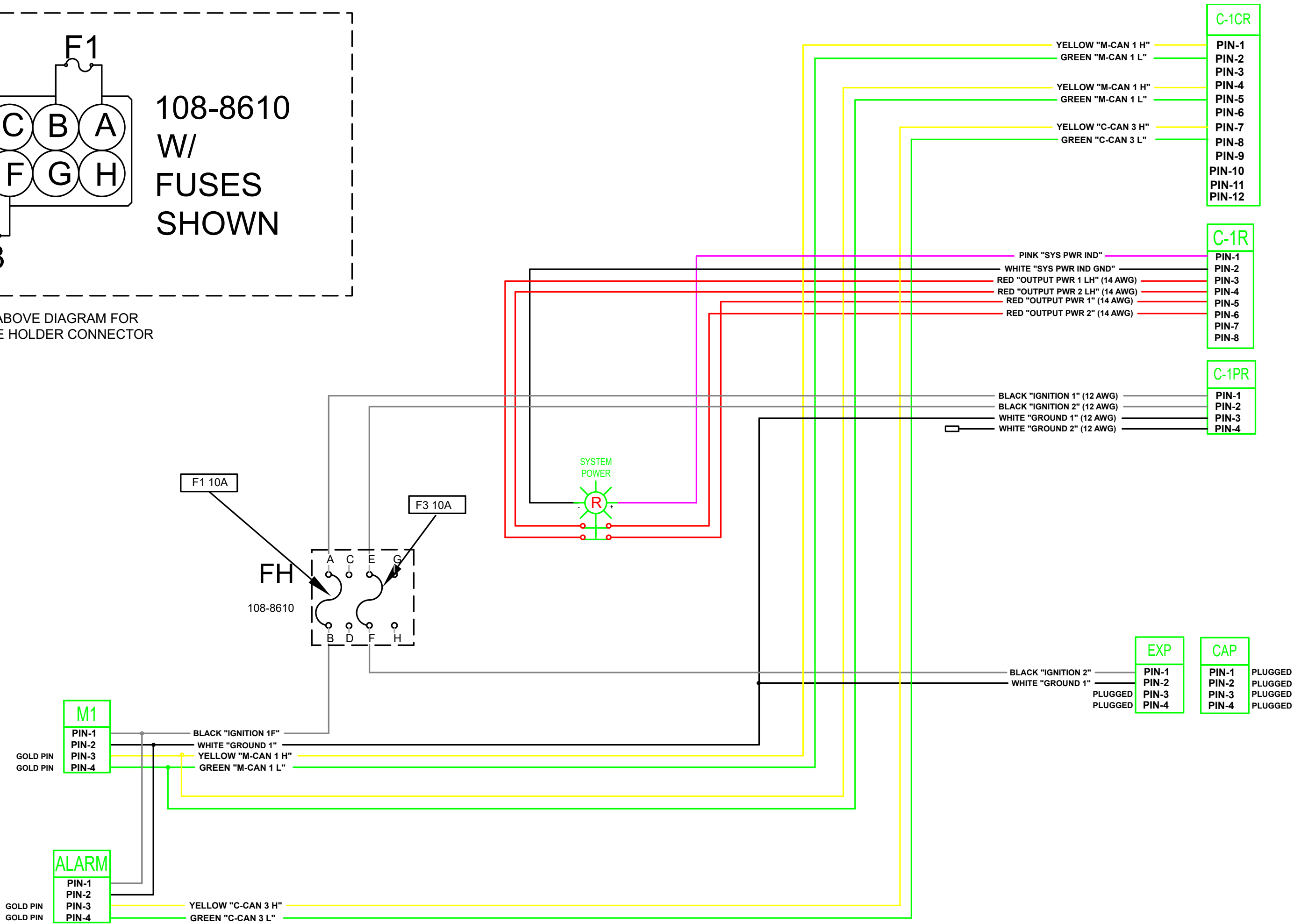
- F1 - IGNITION 1
- F2 - IGNITION 1 TO OUTPUT POWER 1
- F3 - IGNITION 2
- F4 - IGNITION 2 TO OUTPUT POWER 2







REFERENCE ABOVE DIAGRAM FOR 108-8610 FUSE HOLDER CONNECTOR PIN OUT.

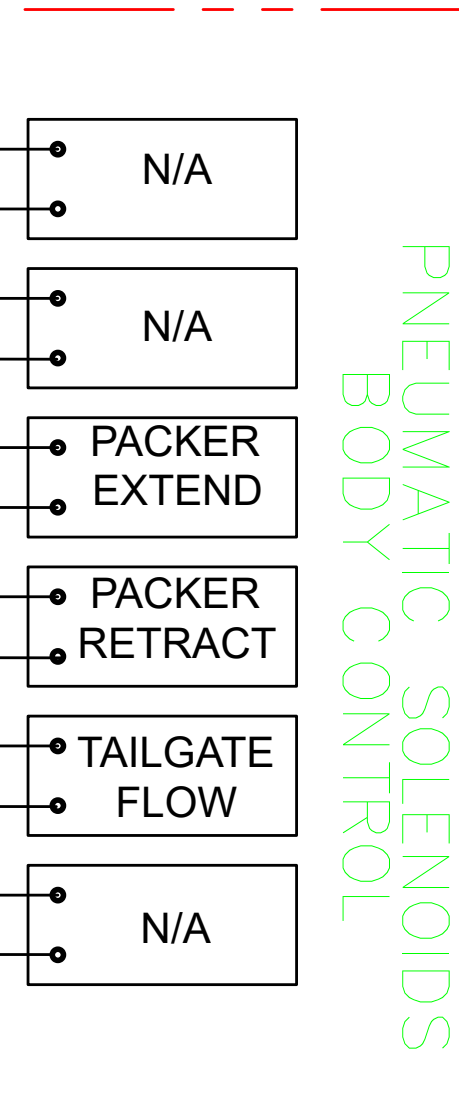


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AVLV	BV SOL
PIN-1	PIN-1
PIN-2	PIN-2
PIN-3	PIN-3
PIN-4	PIN-4
PIN-5	PIN-5
PIN-6	PIN-6
PIN-7	PIN-7
PIN-8	PIN-8
PIN-9	PIN-9
PIN-10	PIN-10
PIN-11	PIN-11
PIN-12	PIN-12

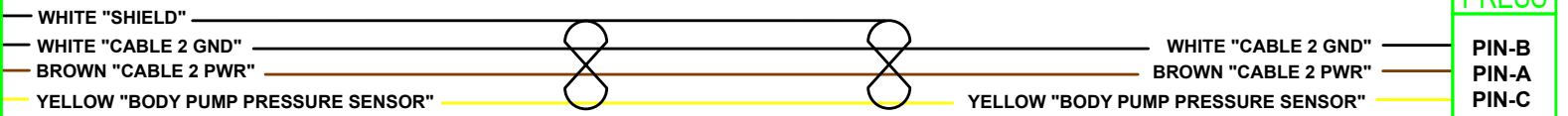
PLUGGED
PLUGGED
PLUGGED
PLUGGED

CONNECT
PNEUMATIC
SOLENOID BANK
CALLED OUT IN
CONTROLS KIT TO
CONNECTOR "AVLV"

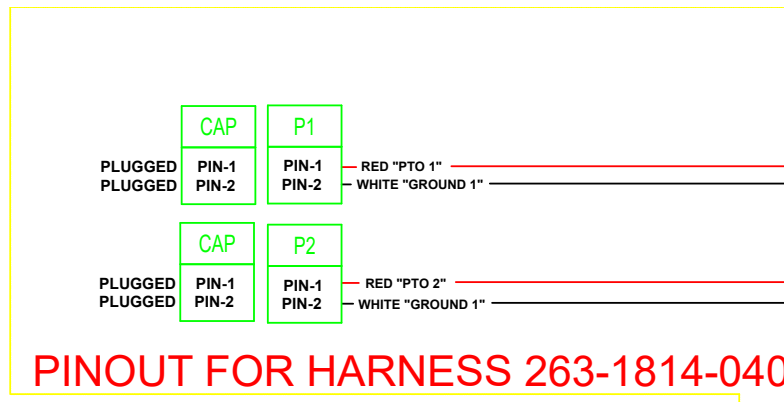


PNEUMATIC SOLENOIDS
BODY CONTROL

BVLV
PIN-1
PIN-2
PIN-3
PIN-4
PIN-5
PIN-6
PIN-7
PIN-8
PIN-9
PIN-10
PIN-11
PIN-12



BDY PRESS
PIN-B
PIN-A
PIN-C



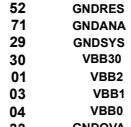
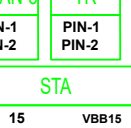
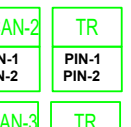
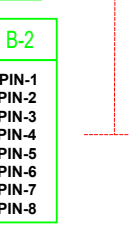
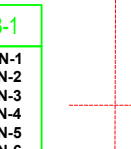
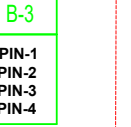
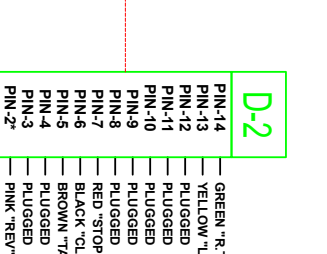
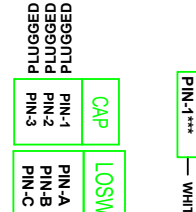
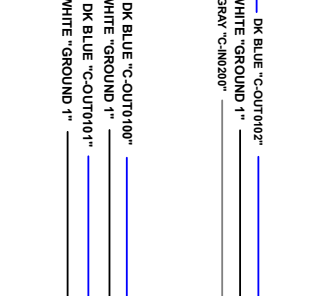
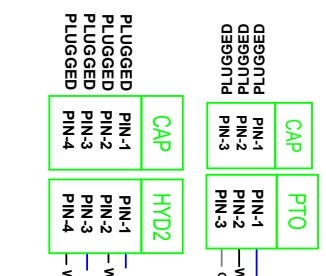
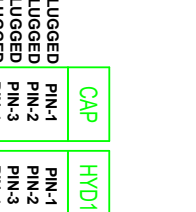
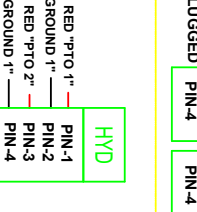
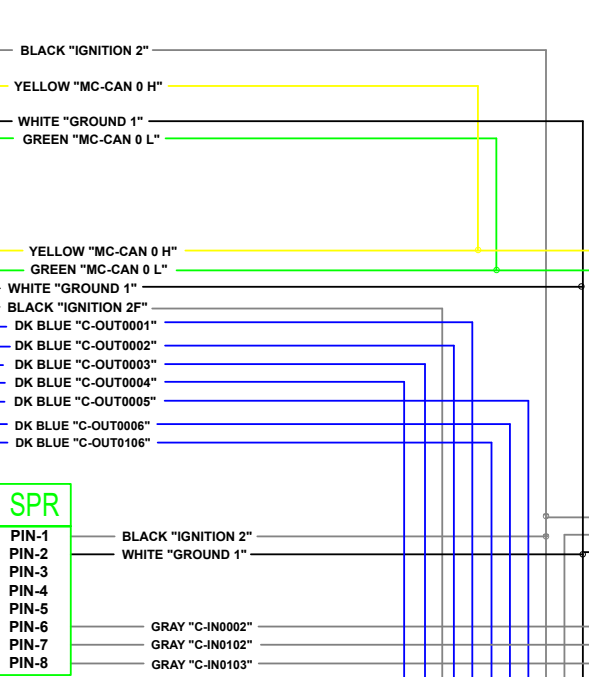
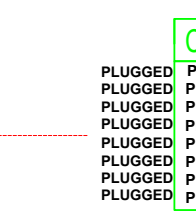
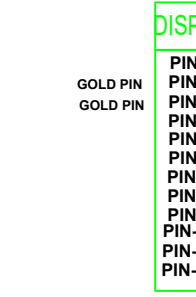
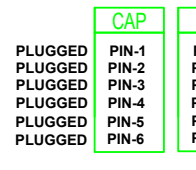
TO FRONT MOUNT HYDRAULIC PUMP

TO HOT SHIFT PTO AND MOUNT HYDRAULIC PUMP

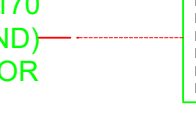
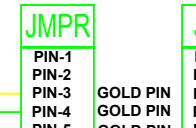
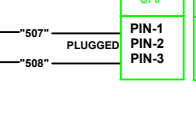
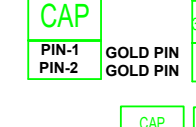
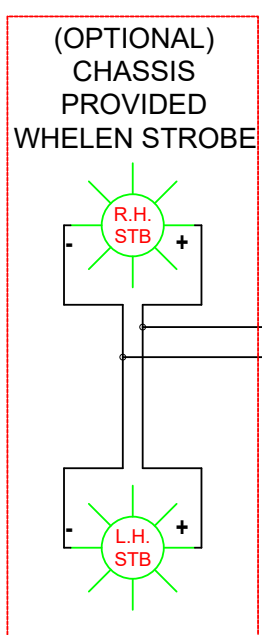
TO CHASSIS RP170 (EXTERIOR LIGHTING) CONNECTOR

TO BODY HARNESS

NO CONNECTION

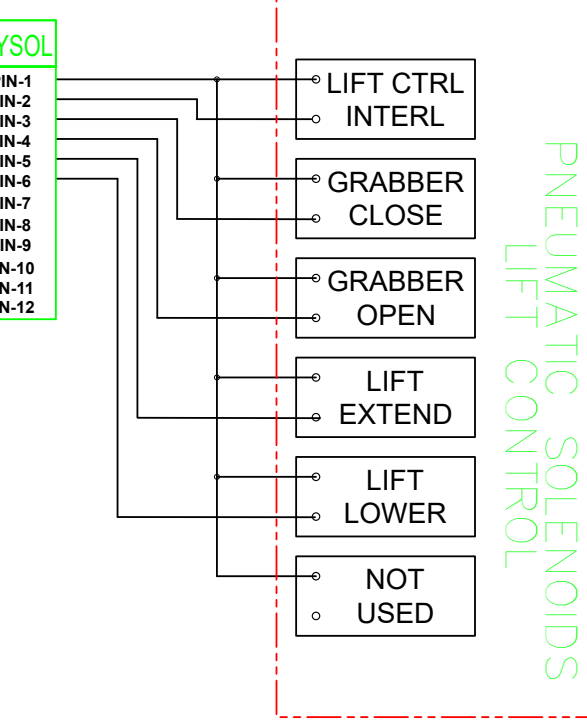
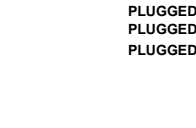
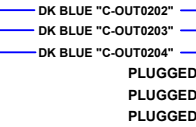
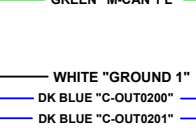
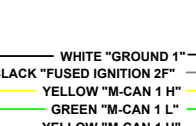
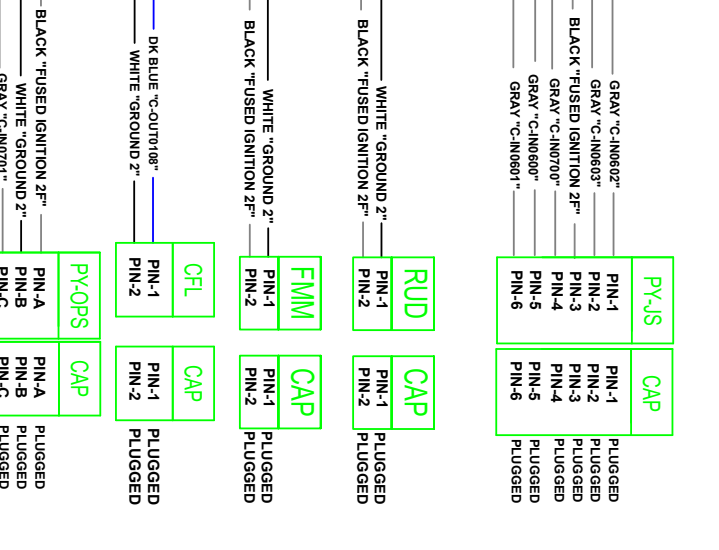
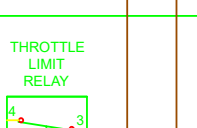
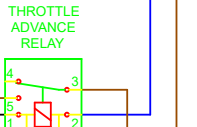
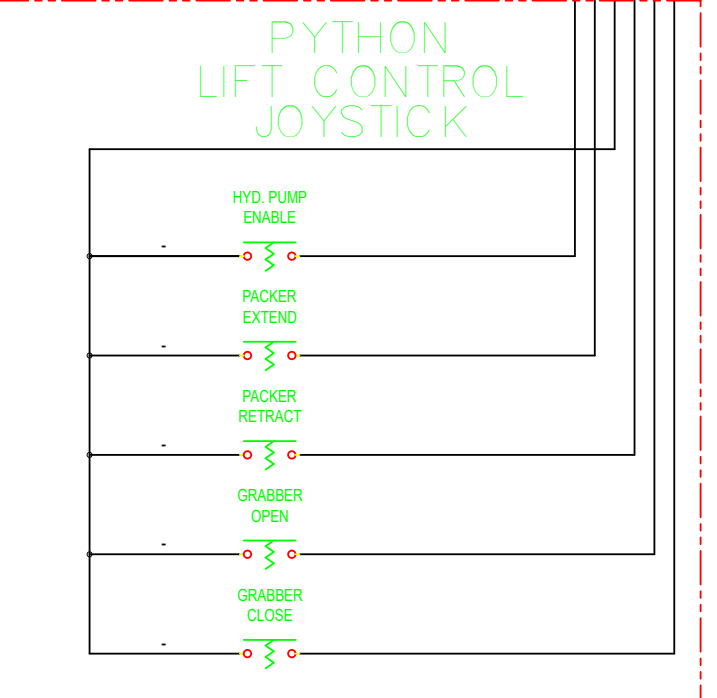


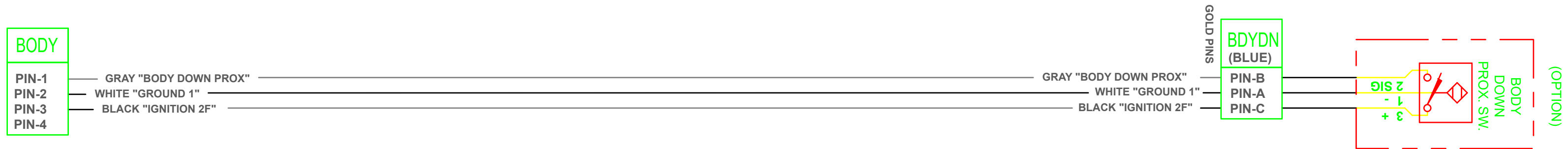
IN CAB CONTROL PANEL REFERENCE CAB CONTROL KIT REF. SALES ORDER

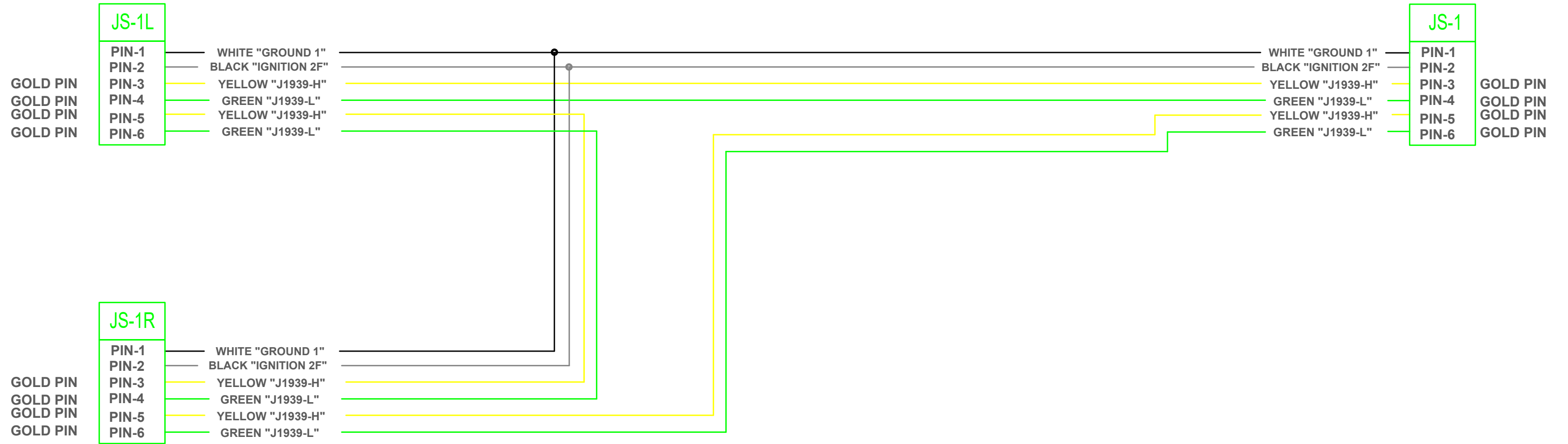


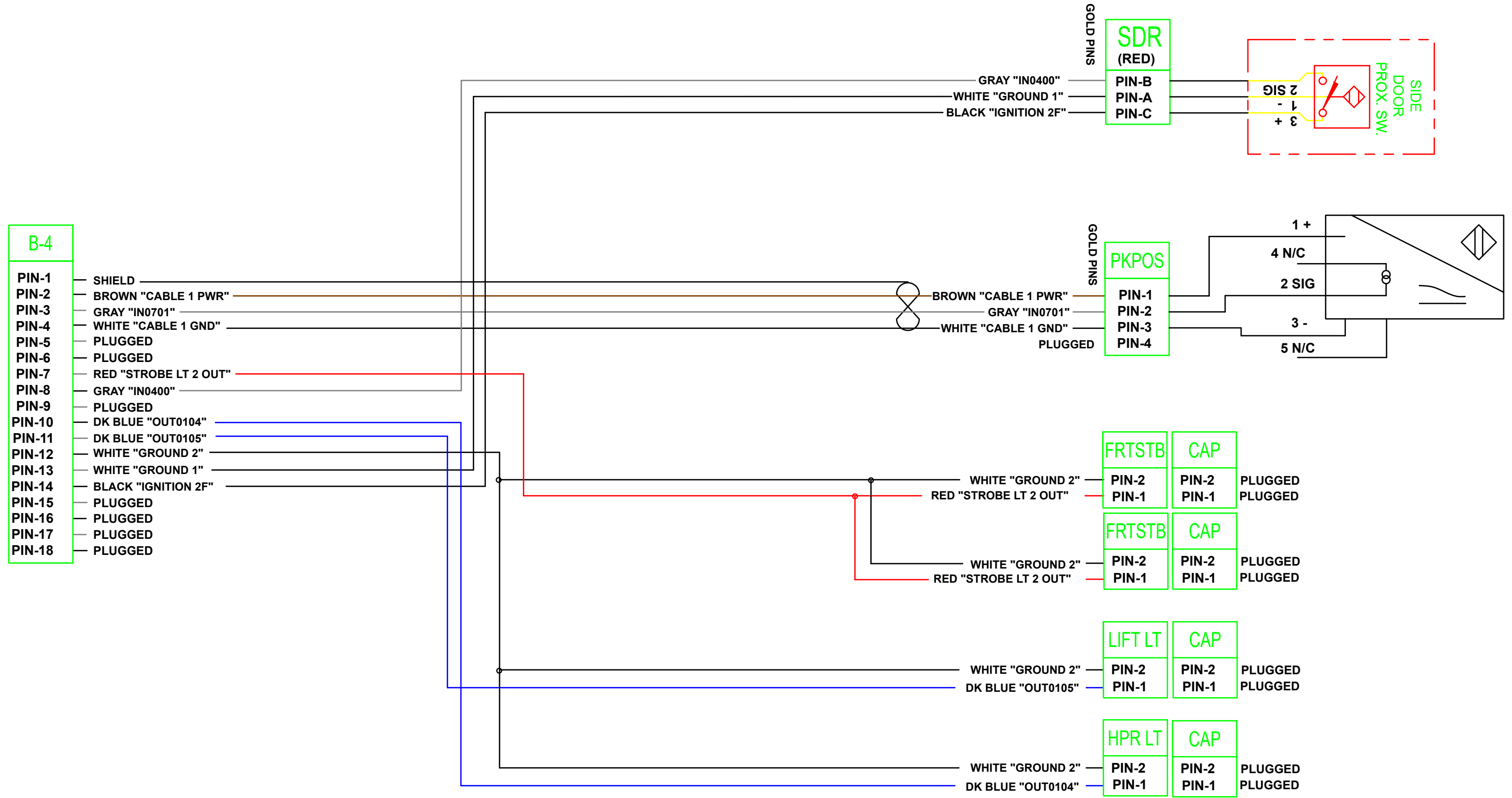
TO CHASSIS RP170 (POWER AND GROUND) CONNECTOR

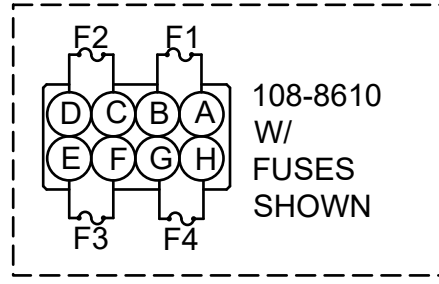
TO CHASSIS RP170 (POWERTRAIN) CONNECTOR



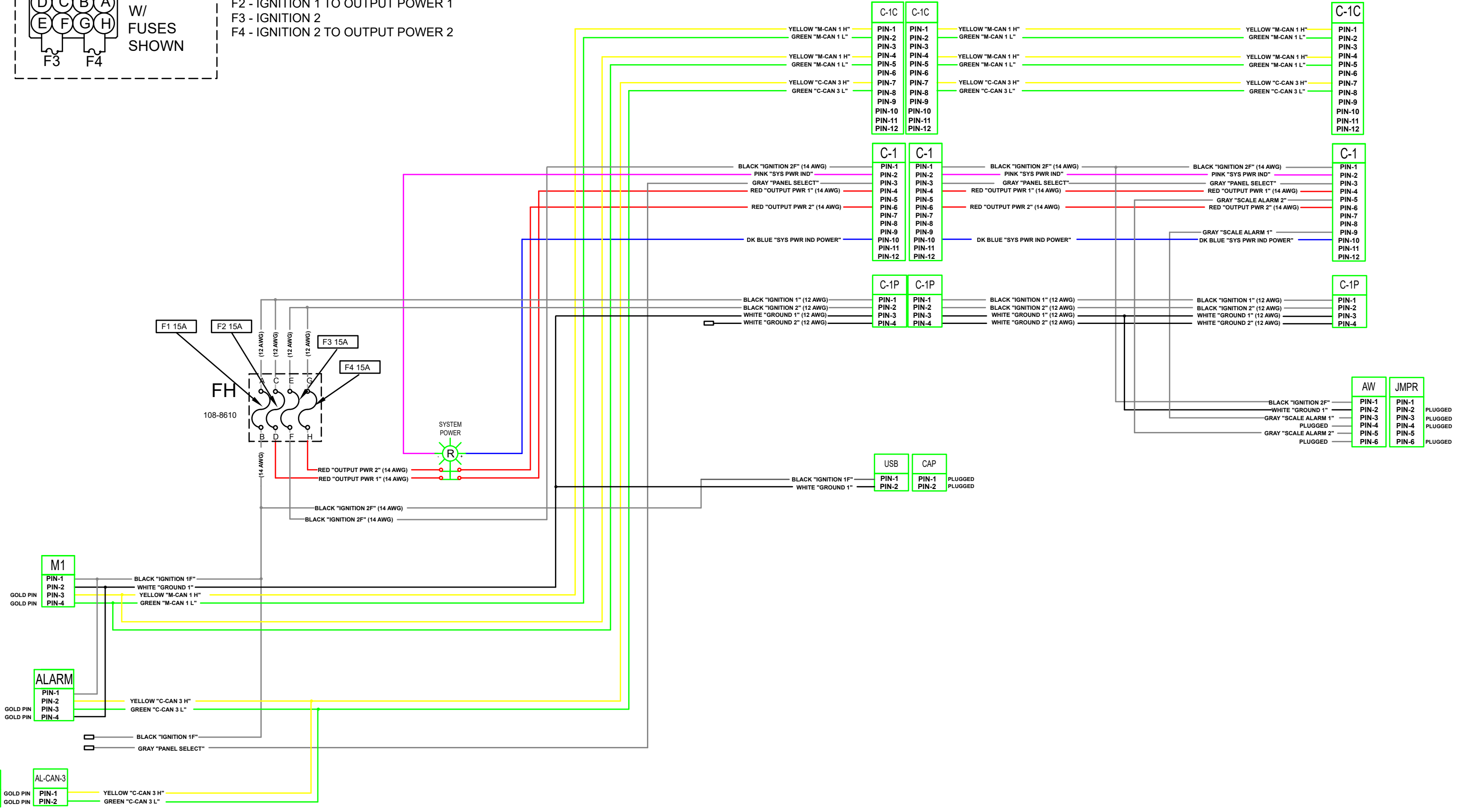








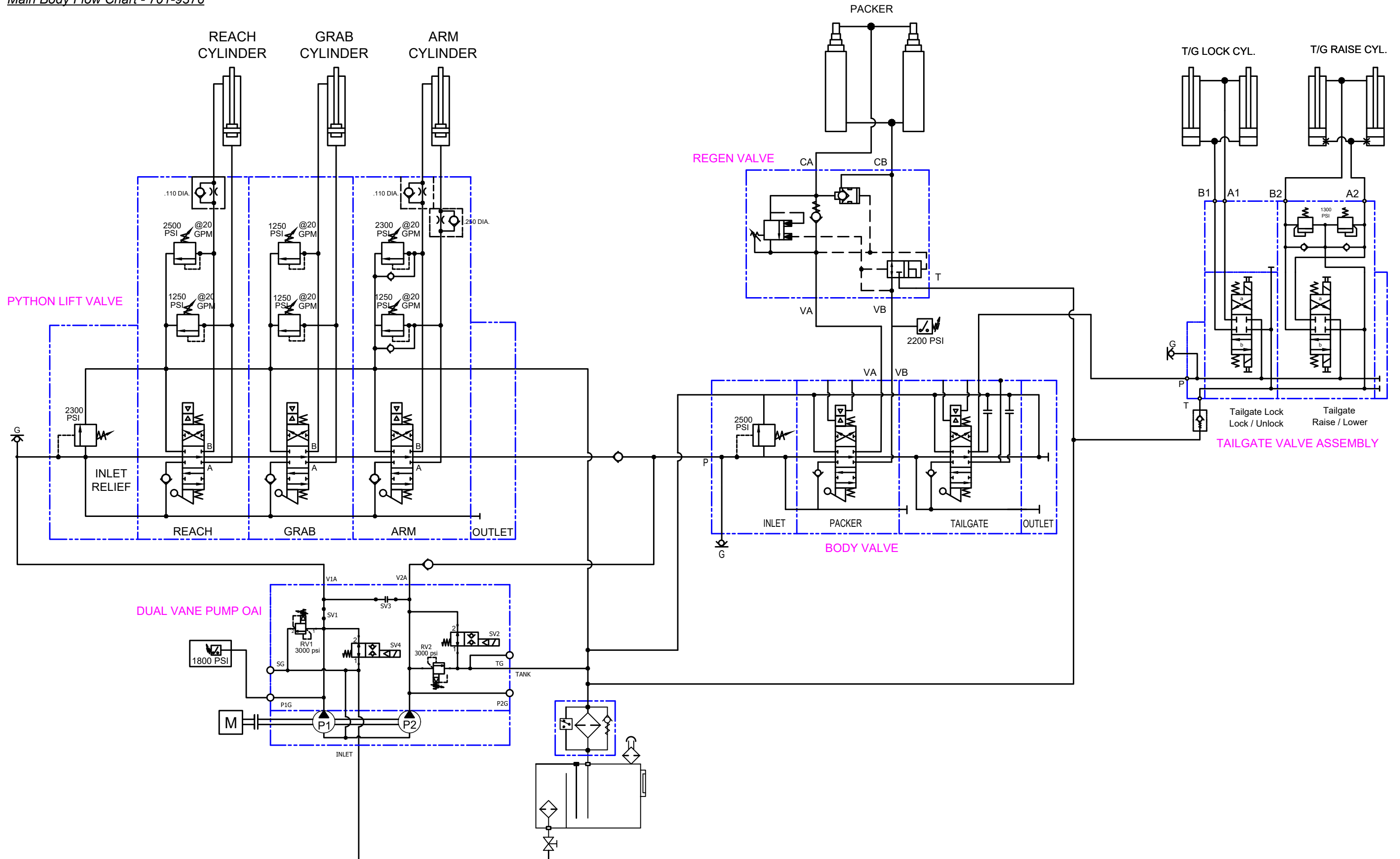
F1 - IGNITION 1
 F2 - IGNITION 1 TO OUTPUT POWER 1
 F3 - IGNITION 2
 F4 - IGNITION 2 TO OUTPUT POWER 2



SECTION 10

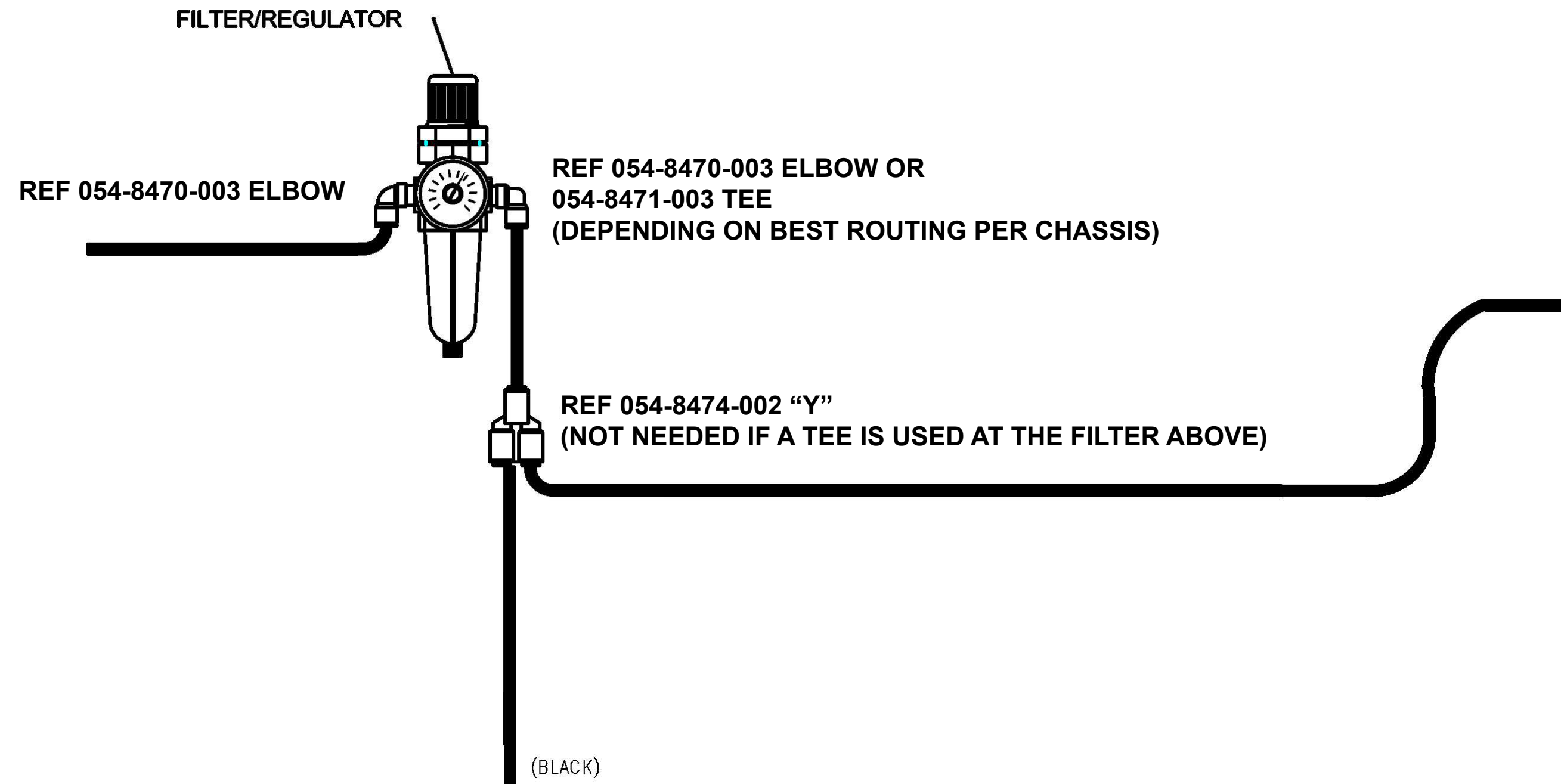
HYDRAULIC SCHEMATICS

Main Body Flow Chart - 701-9376

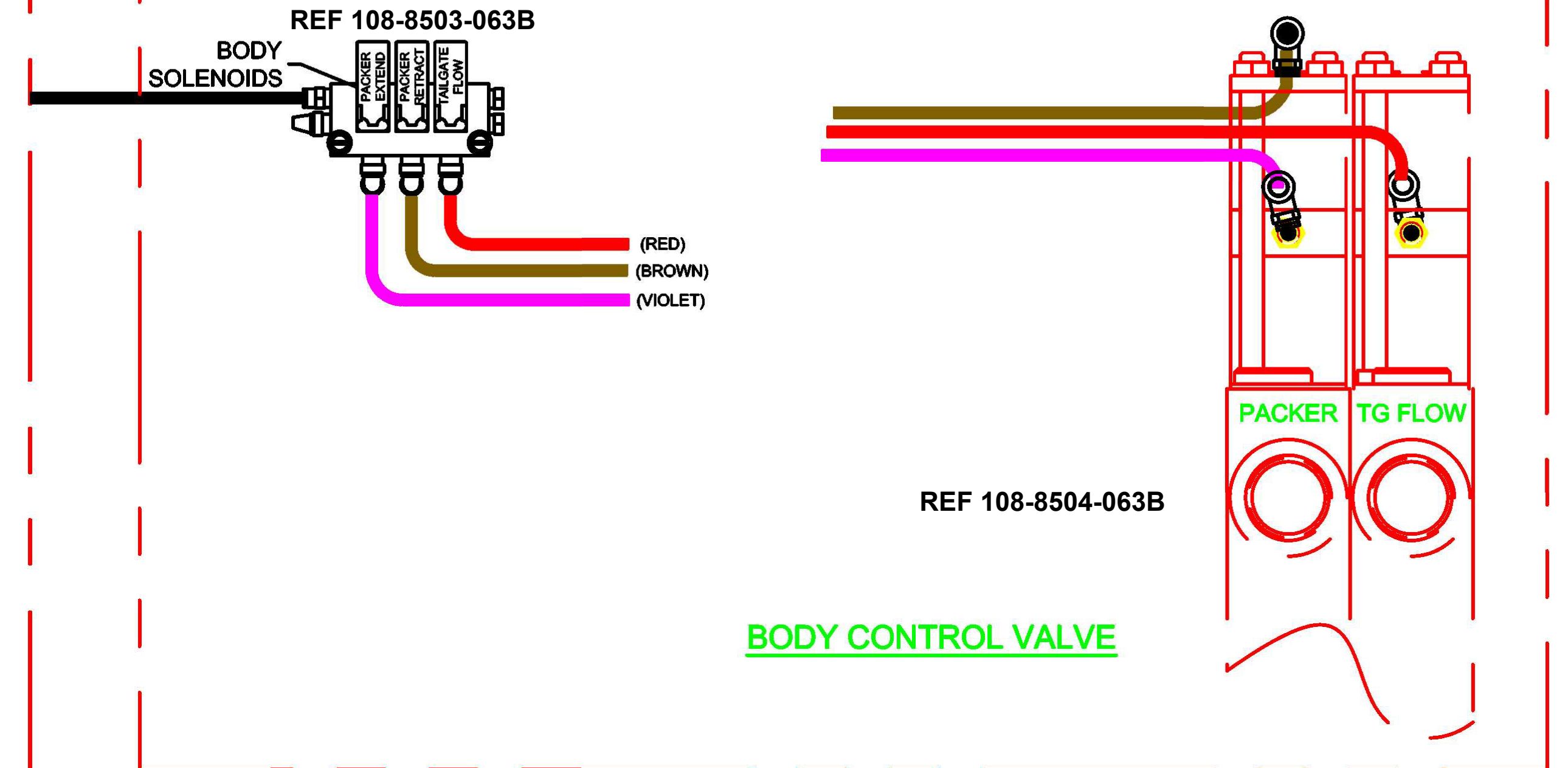


SECTION 11

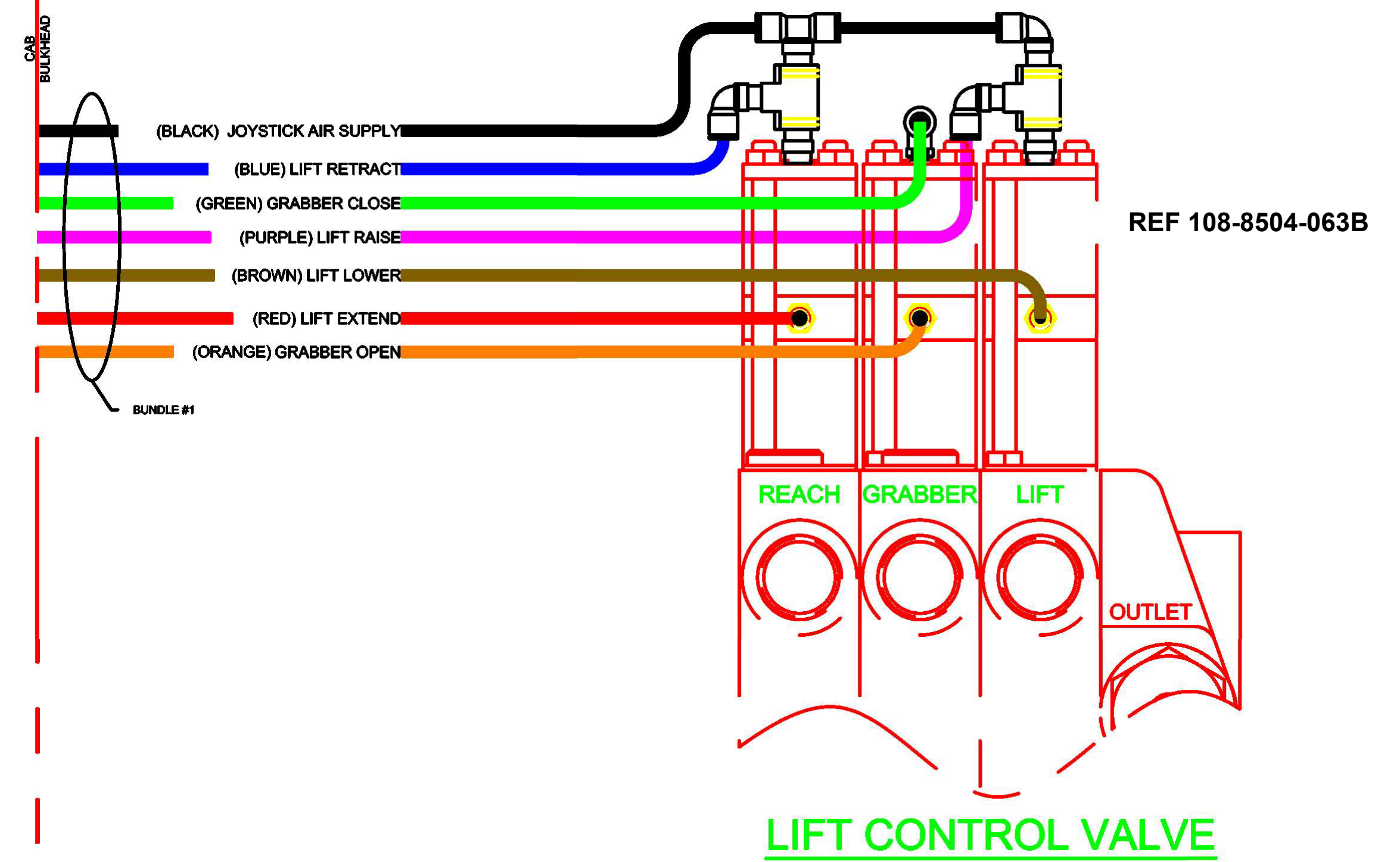
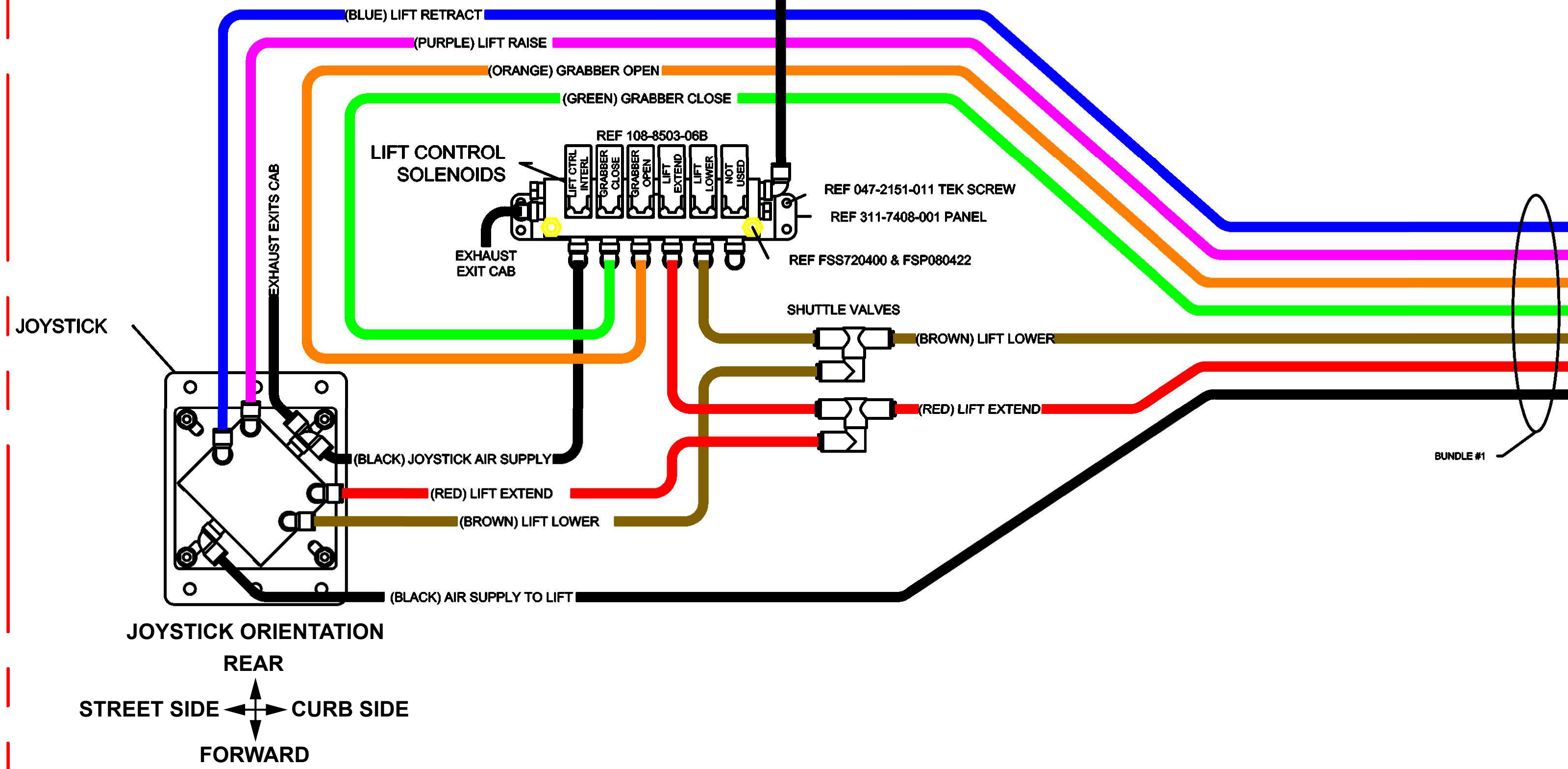
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PNEUMATIC DIAGRAM BODY CONTROLS



PNEUMATIC DIAGRAM LIFT CONTROLS



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HEIL ENVIRONMENTAL WARRANTY STATEMENT

The Heil Co. d/b/a Heil Environmental ("Heil") warrants its solid waste collection equipment to be free from defects in material and workmanship under normal use for a period of one (1) year or 2000 hours of operation (whichever comes first) from the date of equipment In-Service or during the period of coverage offered by an extended warranty program, when proper service and maintenance as described in Heil Service Bulletins and Parts & Service Manuals are performed. The standard or extended equipment warranty is not transferable except for sales demonstration units.

This warranty is expressly limited to the repair or replacement of any component or part thereof, of any such refuse or recycling collection body manufactured by Heil that is proven to Heil's satisfaction to have been defective in material or workmanship. Such components or parts shall be repaired or replaced at Heil's option without cost to the standard purchaser for parts and labor provided such unit is returned to an authorized Heil Distributor for replacement or repair. The repair or replacement must be made during the standard or extended warranty coverage period. Before any warranty can be allowed on new equipment, a validated warranty registration form must be on file with Heil's Customer Service Department within sixty (60) days of the equipment's In-Service date. Wear items are excluded from warranty coverage.

All OEM service parts sold by Heil have a six (6) month warranty from the date of purchase. Aftermarket parts purchased from Heil are supported by a 90-day warranty. The parts warranty covers parts only, providing that factory inspection reveals a defect in material or workmanship. Labor, troubleshooting, equipment downtime, etc. is not covered under the parts warranty policy.

HEIL MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. HEIL DOES NOT ASSUME ANY LIABILITY OR ACCEPT CLAIMS FOR LOSS OF PROFITS, PRODUCT DOWN TIME OR ANY OTHER DIRECT, INCIDENTAL OR INDIRECT CONSEQUENTIAL LOSSES, COSTS, DAMAGES OR DELAYS.

Any improper use, operation beyond rated equipment or component capacity, substitution of parts that are not Heil-approved, or any alteration or repair by others in such a manner as in Heil's sole judgment affect the product operation or integrity shall void the warranty.

Other than the extension of the standard warranty period purchased under a supplemental Heil Extended Warranty Program, no employee or representative is authorized to modify this warranty in any way nor shall any other warranties be granted. No dealersupplied warranty program is endorsed or supported by Heil.

Heil retains the right to modify its factory warranty program prospectively at any time.

The statements included herein is merely a summary of the full Limited Warranty provided by Heil. Please see the full limited warranty as outlined at <https://www.heil.com/warranty/> under Heil Warranty Policies and Procedures.



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www.heil.com

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(866-275-4345)

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