HALF/PACK®

INCLUDING STANDARD AND SIERRA

SERVICE MANUAL

ISSUED MAY 2025

TP1HP-SM-0525

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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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HALF/PACK
NOTES

SECTION 1
GENERAL INFORMATION

HALF/PACK
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.

HALF/PACK
General Information

RECOMMENDED SPARE PARTS		
PART NO.	**DESCRIPTION**	**QTY**
BODY AND TAILGATE ASSEMBLIES		
003-5142	BEARING, LOCK	2
022-3509	SEAL, TAILGATE	1
022-4065	SEAL, SUMP DOOR	1
019-1242	SPRING, 2.00” OD X 3.50”	4
014-2112	PAD, ARM STOP	2
003-4013	BEARING, ARM, SAE	2
003-5142	TAILGATE LOCK BUSHING	2
HYDRAULICS		
001-7164	CYLINDER W/O SENSOR PORT, FORK	1
001-7141	CYLINDER WITHOUT SENSOR, CAN FORK, GEN 3	1
001-7316	FEL ARM CYL, W/ SCRAPER & CUSHION 2024	1
001-7057	CYLINDER, ARM, CUSHIONED, FEL	1
001-7234	CYLINDER, TOP DOOR	1
001-7185	CYLINDER, TAILGATE RAISE	2
001-7181	CYLINDER, T/G LOCK, W/ SENSOR	2
001-7158	CYLINDER, PACKER, DA TELESCOPIC, 28 YARD	2
001-7157	CYLINDER, PACKER, DA TELESCOPIC, 23 YARD	2
001-7273	CYLINDER, PACKER/EJECTOR TELESCOPIC, 23 YARD	2
001-7274	CYLINDER, PACKER/EJECTOR TELESCOPIC, 28 YARD	2
001-7275	CYLINDER, PACKER/EJECTOR TELESCOPIC, 32 YARD	2
031-6444	ASSEMBLY, VALVE	1
031-6553	VALVE, TAILGATE	1
063-0145	TRANSDUCER, 3000 PSI PRESSURE	1
063-0146	SENSOR, TEMP	1
063-0151	MAGNETIC SENSOR	2
075-0896	STRAINER, SUCTION, 100 MESH	1
075-0578	STRAINER, SUCTION	1
075-0959-001	STRAINER, SUCTION, 100 MESH, 3" (IF EQUIPPED)	1
075-0953	FILTER, RETURN LINE	1

RECOMMENDED SPARE PARTS		
PART NO.	**DESCRIPTION**	**QTY**
075-0712	FILTER, BREATHER	1
ELECTRICAL		
063-0122	SWITCH, PROXIMITY, 18 MM	1
063-0123	SWITCH, PROXIMITY, 30 MM	1
063-0141	SENSOR, CAN ARC	1
063-0151	SENSOR, MAGNETIC	4
108-8458	RELAY, POWER MODULE	1

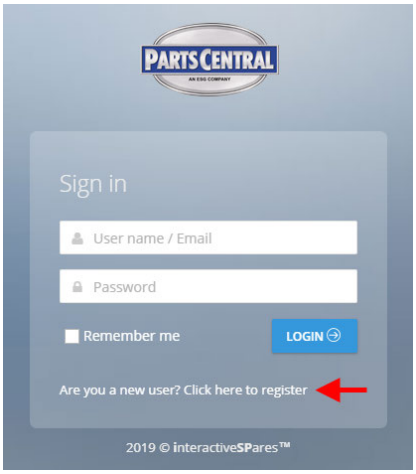
ELECTRONIC PARTS CATALOG (EPC)

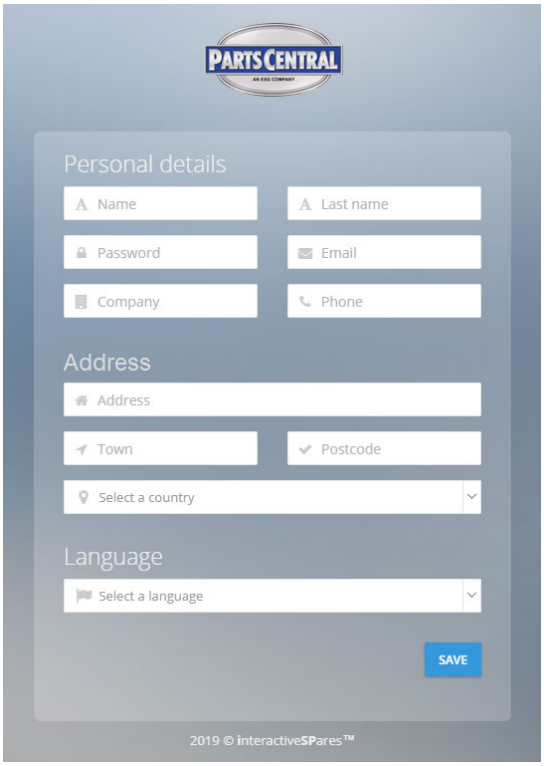
The Parts Central EPC includes electronic versions of the Heil Parts Manuals, specific to a Customer's truck configuration and options. After registering and logging in, the user can search by **Keyword(s) or Part Number** and/or **Heil Body Serial Number** to quickly identify a spare part or browse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

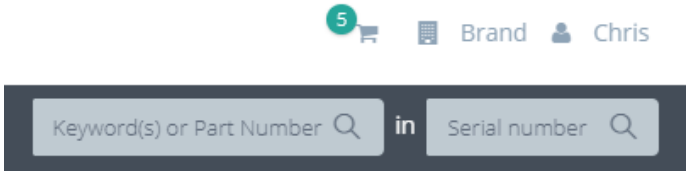




HALF/PACK
General Information

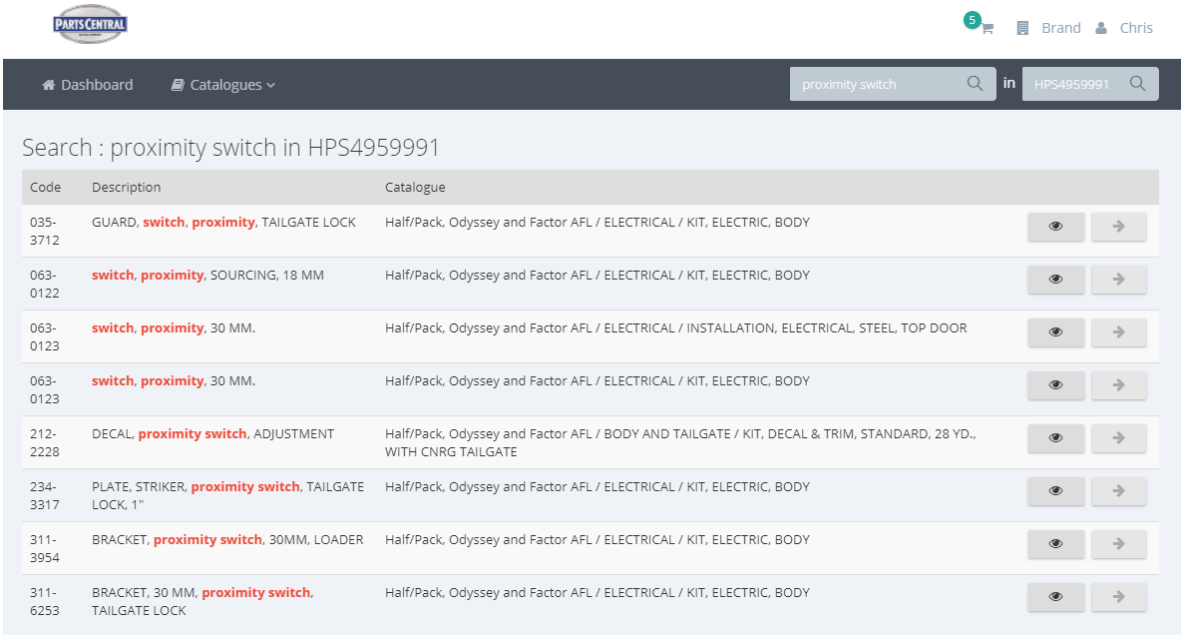
Search by Part Keyword(s) or Part Number in Body Serial Number

After login, you will land on the User Dashboard. At the top right of the Dashboard, there will be two search fields, as shown in the image below.



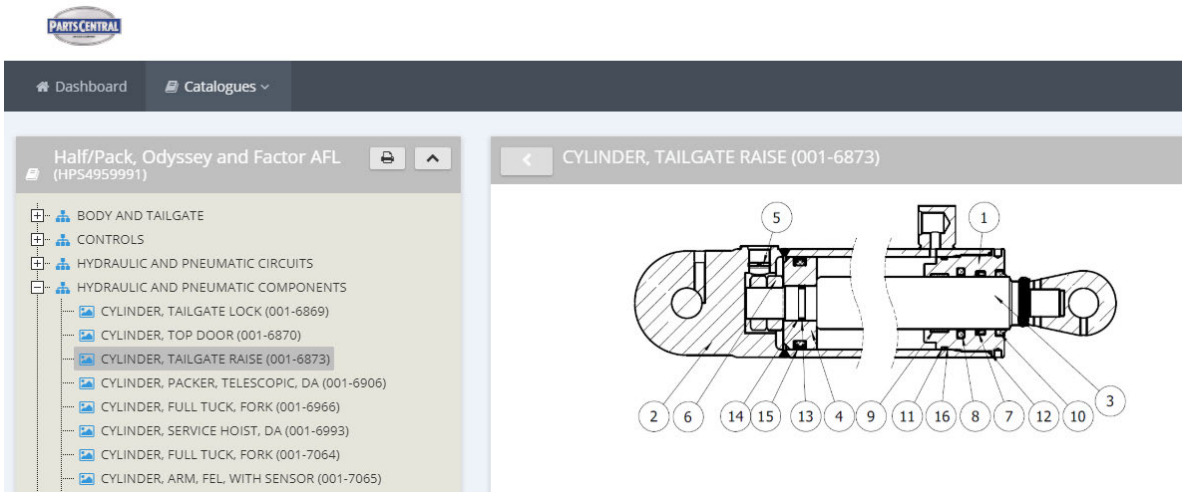
You can search by **Keyword(s) or Part Number** within a specific Heil Body **Serial Number**. For example, if you are looking for a **proximity switch** for Body Serial Number **HPS4959991**, you can enter this information into these two fields and the search results will include all parts within the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

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).

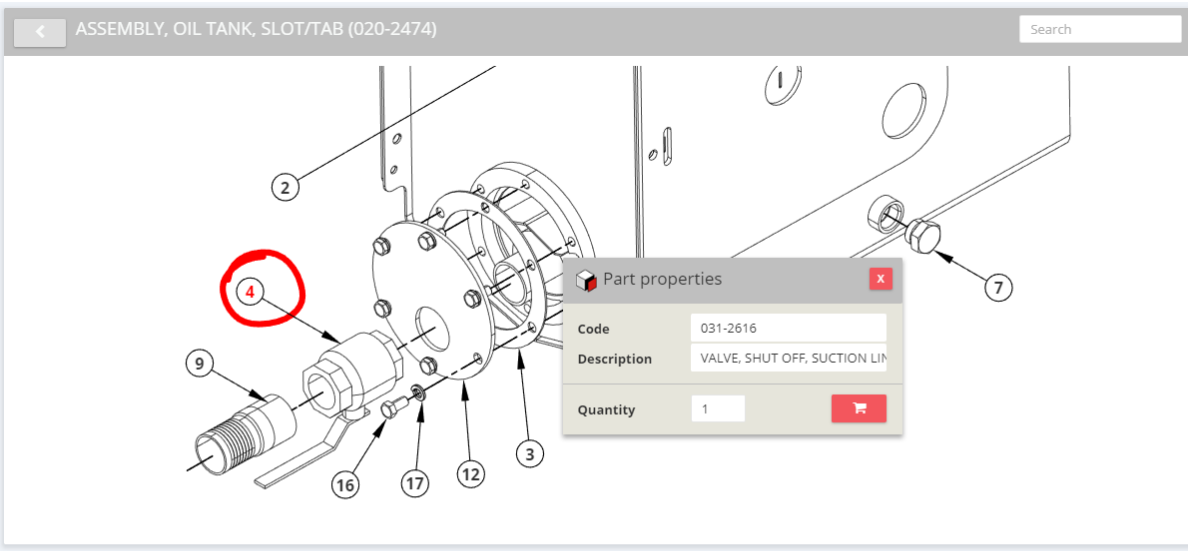


Search by Body Serial Number

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. See the image below.



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. See the image below.



4	031-2616	VALVE, SHUT OFF, SUCTION LINE, 2"	
5	054-3341-012	UNION, 1 1/2" SAE TO JIC (STRAIGHT)	
6	054-3342-010	PLUG, STR. THD., 1-5/16"-12 X 1", #16	
7	054-7496-008	SWIVEL, #24 Male SAE To # 24 Female JIC	
8	058-8579-006	FITTING, SPLIT, FLANGE/NPT, 2"	

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 DEATH or SERIOUS INJURY if you do not follow proper instructions.
- **WARNING** – indicates a hazardous situation, which if not avoided COULD result in DEATH OR SERIOUS INJURY 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, in the Service Manual, 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, the Parts Service Manual for this unit, other applicable manufacturer's manuals and the safety decals on the product. Each operator of this unit must read and understand all directions in this manual before they first operate this vehicle. Keep this manual in the cab for new operators and to remind all operators about safe use.

⚠ WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

⚠ 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 can result in death or serious injury 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 can cause death or serious injury to you or bystanders.

⚠ DANGER

Always prop the tailgate when you leave it raised for maintenance, service or cleaning procedures. Any part of your body between the unit's body and the tailgate while you prop the tailgate or when the tailgate is propped is dangerous. Death or serious injury can 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 can 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.

⚠ DANGER

The packer and crusher panels are dangerous. They can cause death or serious injury 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 Lockout/Tagout mode 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 can 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 can fail and cause death or serious injury 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 can 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. Death or serious injury can 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 Lockout/Tagout mode 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 Lockout/Tagout mode. When the unit is not in the Lockout/Tagout mode, 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 death or serious injury.

⚠ WARNING

Moving equipment can be dangerous to bystanders. Death or serious injury 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.

HALF/PACK
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. Death or serious injury 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 death or serious injury.

⚠ 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 death or serious injury to a person or damage to the unit. Repair or replace any failed or defective part immediately

⚠ WARNING

Improper dumping of the refuse can cause the unit to tip or rollover. Death or serious injury can occur if the unit rolls or tips over. Empty as much refuse as you can with the packer panel before you raise the body.

⚠ WARNING

Do not move the unit forward or backwards excessively fast (lurch) to dump the refuse load. Excessively fast movements with the body raised can make the body unstable and tip or roll the unit over. This can result in death or serious injury to the operator and damage the unit. Use only sufficient movement to loosen the load so that it will leave the body.

⚠ WARNING

Isopropyl alcohol is flammable and is harmful to eyes and skin. Keep isopropyl alcohol away from heat or open sources of ignition. Flush eyes and skin with water for 15 minutes after contact. 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 death or serious injury. 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 move the unit forward or backwards excessively fast (lurch) to dump the refuse load. Excessively fast movements with the body raised puts a very high load on the body raise cylinders and could damage one or both cylinders and make the body unstable unable to lower. Inspect the cylinders after you dump each load and replace if necessary.

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 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.

NOTICE

The following lockout/tagout procedure represents Heil's minimum recommendation and should be used in conjunction with and should not supersede additional or more stringent safety requirements called out by your company policy. Please check with your supervisor to determine if your company has a specific lockout/tagout procedure. Contact your supervisor, Heil Technical Service, or reference *OSHA Regulation 1910.147* if you have any questions about Lockout/Tagout procedures.

LOCKOUT/TAGOUT 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 Lockout/Tagout gear and/or are not an authorized employee, STOP and DO NOT initiate any service on the unit. Contact your supervisor immediately.

NOTICE

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

Watch the Service Shack Video online at **www.Heil.com/Heil-Service-Shack** by selecting **Lockout/Tagout**.

A. Put the unit in a Lockout/Tagout mode:

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, see Figure 1:

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

Figure 1. Examples of Lockout/Tagout Gear.

LOCKOUT/TAGOUT PROCEDURE (CONTINUED)

Follow These Steps:

1. APPLY the brakes. MAKE SURE the brakes do not let the unit move and they work 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. Mechnaical (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 multi-hasp into the disconnect switch.
9. ATTACH your red single-keyed Lockout/Tagout 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 Lockout/Tagout gear 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 Lockout/Tagout procedure to verify all stored energy is removed from the unit BEFORE applying their Lockout/Tagout gear.
11. BEFORE removing your Lockout/Tagout gear 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 Lockout/Tagout devices are being removed.

STORING REFUSE IN THE BODY

Heil does not recommend storing refuse in the body overnight. 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.

WINCH GEAR OIL

When the unit has a winch option, check the level of the winch's gear oil every 40 hours of operation. Fill as needed with AGMA Grade 5 EP (90wt.) for an 8,000 lb. winch and AGMA Grade 7 EP (140 wt.) for a 12,000 lb. winch.

GREASE LUBRICANT RECOMMENDATION

Use a grease gun. 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** paragraph of this section.

Use grade NLG1000 grease or equivalent.

OIL LUBRICANT RECOMMENDATION

Use only non-detergent engine oil to lubricate all moveable 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

COLD WEATHER WARMUP PROCEDURE

When ambient air temperature is cold (below 0 degrees F), it is necessary to warm up the unit's hydraulic oil before you start your daily route operation, check the oil level, or adjust hydraulic pressure settings. 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 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

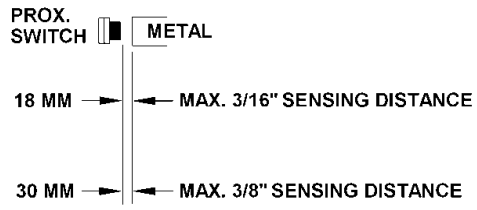
Always disconnect the battery before welding on the chassis or body.

PROXIMITY SWITCH TROUBLESHOOTING

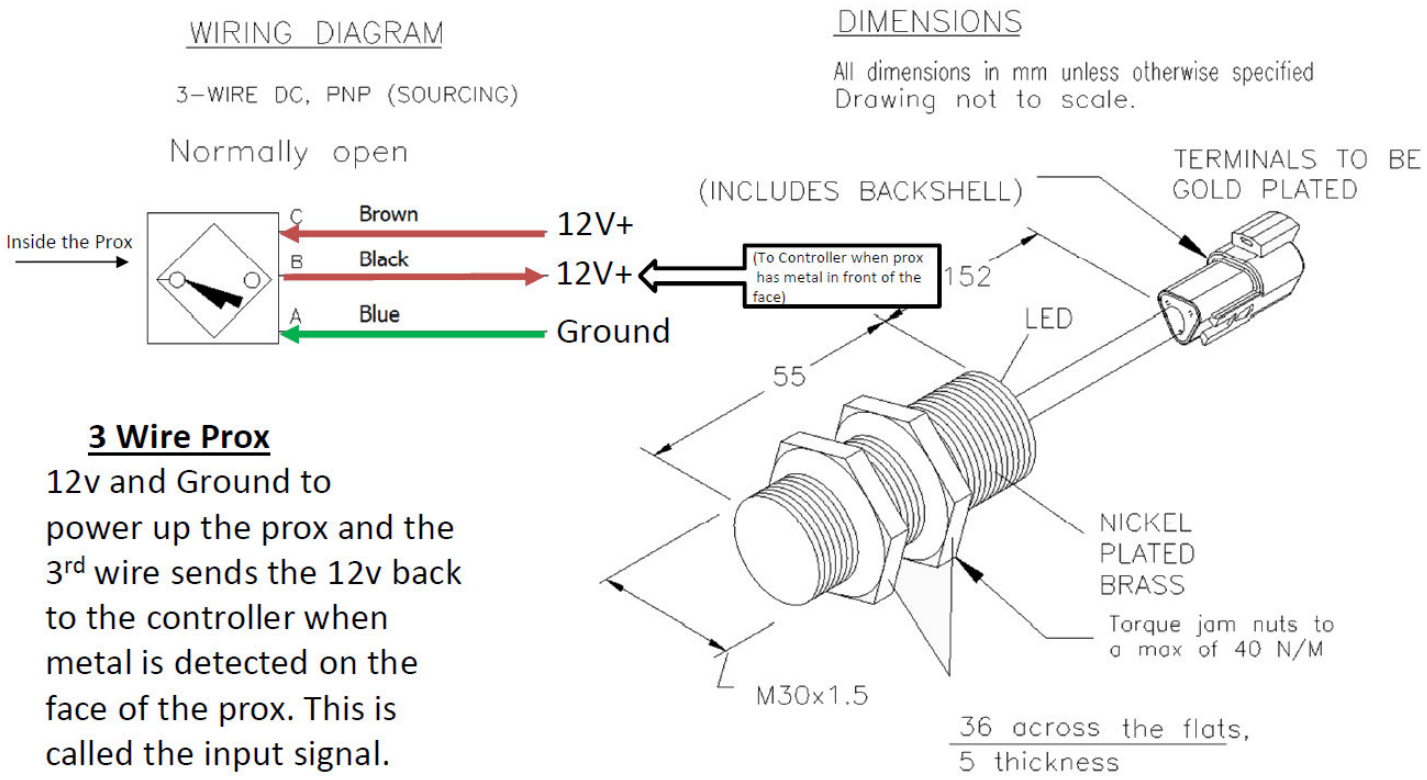
When one or more of a unit's functions do not operate properly and there are proximity switches in the circuits of the unit for these functions, refer to the following table as a guide to find the problem(s).

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.

Proximity Switch Troubleshooting Table	
Probable Cause	Remedy
Loose or corroded electrical connections.	Replace the electrical connections.
Damaged Switch A. Cracked Ferrite core causing the fine internal wire to break. B. 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.	1. Make sure the power source from the chassis manufacturer is clean. 2. 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.	1. Check the fuse relay block (Half/Packs with IFM controllers). The fuse/relay box is located in the cab. Or Check the in-line fuses (Side Loaders with IFM controllers). The in-line fuses are located in the cab. 2. Unplug proximity switch. 3. Check the power wire (terminal C) for +12 VDC with a multi-meter. 4. Check ground signal with multi-meter for continuity to chassis ground. 5. Check the signal wire for continuity to appropriate controller input terminal. See Service Manual. 6. If all three (3) wires are good, replace the proximity switch.

PROXIMITY SWITCH TROUBLESHOOTING (CONTINUED)



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.

DECALS ON THE UNIT

Make sure you can read all hazard and instruction decals. Clean decals if you cannot read the words. See, Decal Care, for directions on cleaning decals.

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 Parts and Service 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.

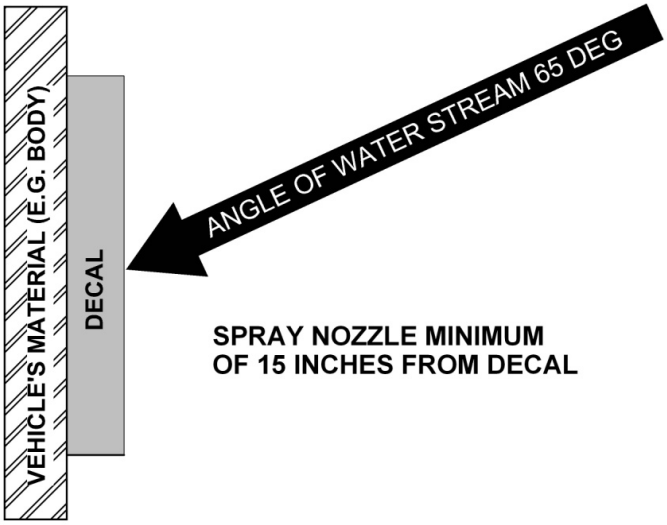
- Spray nozzle opening: 40° wide pattern
- Spray angle: 65° from vehicle's body (do not use sharp angles – this can lift the decals from the unit)
- Distance of nozzle to decal: 38 cm minimum
- Water pressure: <= 5.5 MPa
- Length of time: not more than 30 sec.
- NEVER use a "turbo pressure nozzle".

C. Remove Difficult Debris

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

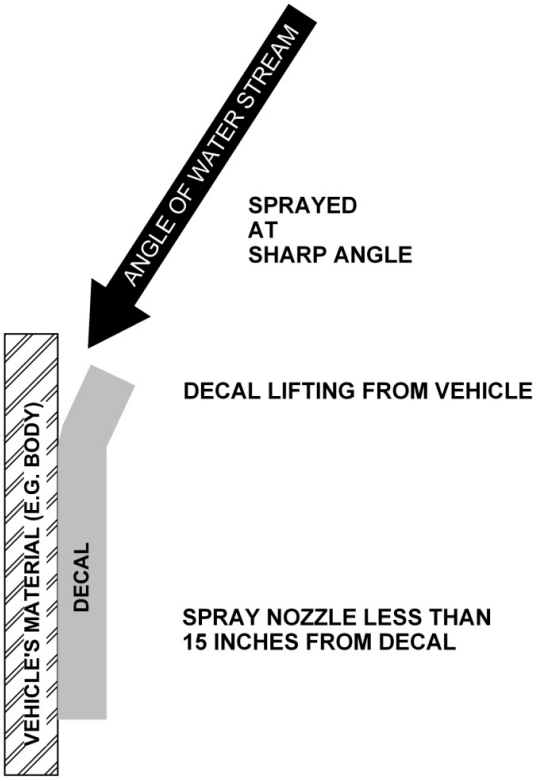
- Spot clean the decal with Isopropyl Alcohol and a micro-fiber cloth (rag)
- If these methods do not work on a problem area, call a Heil Dealer or Heil Customer Support.

DECAL CARE (CONTINUED)



RECOMMENDED TECHNIQUE

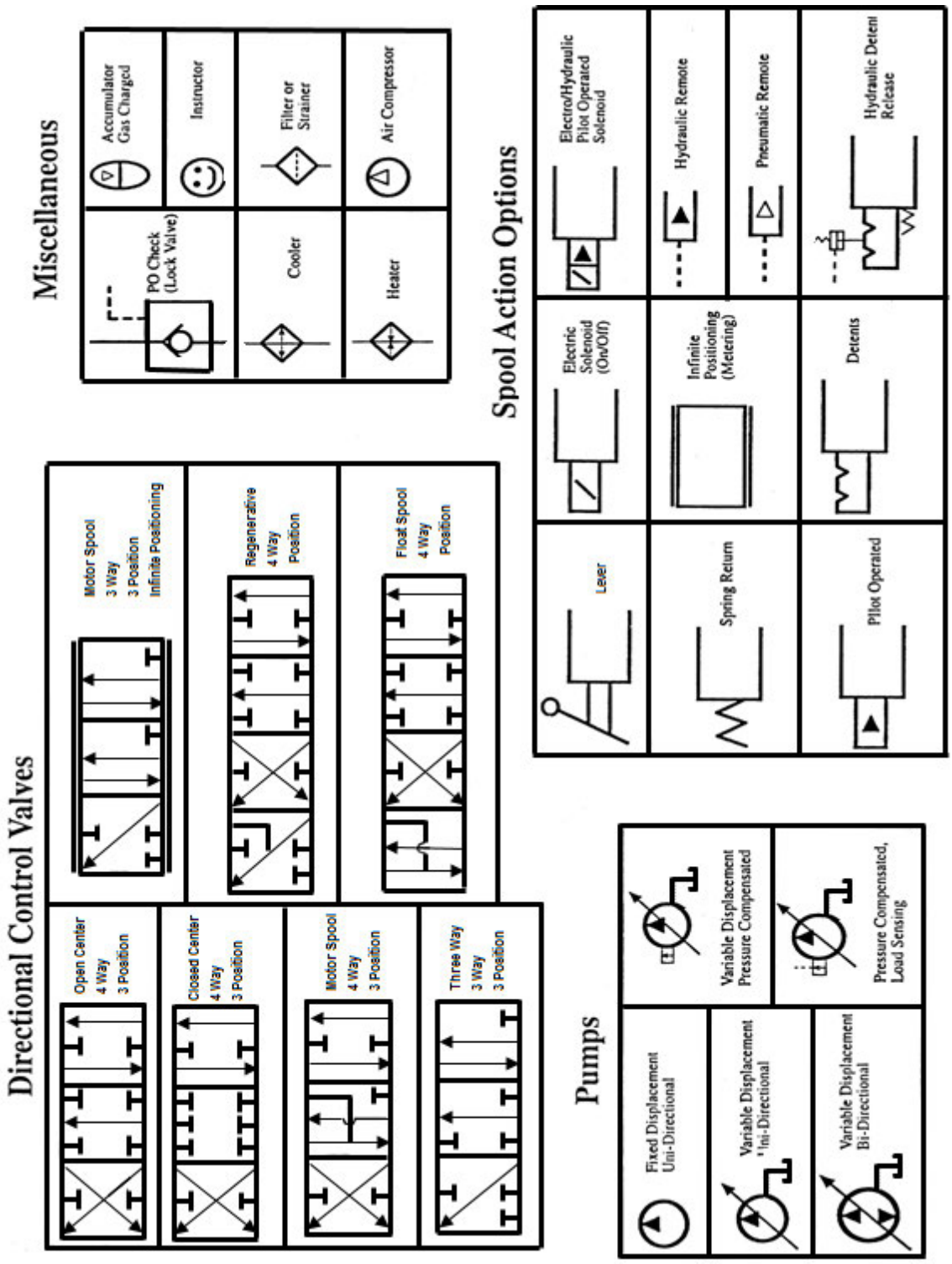
Figure 2. Recommended Technique



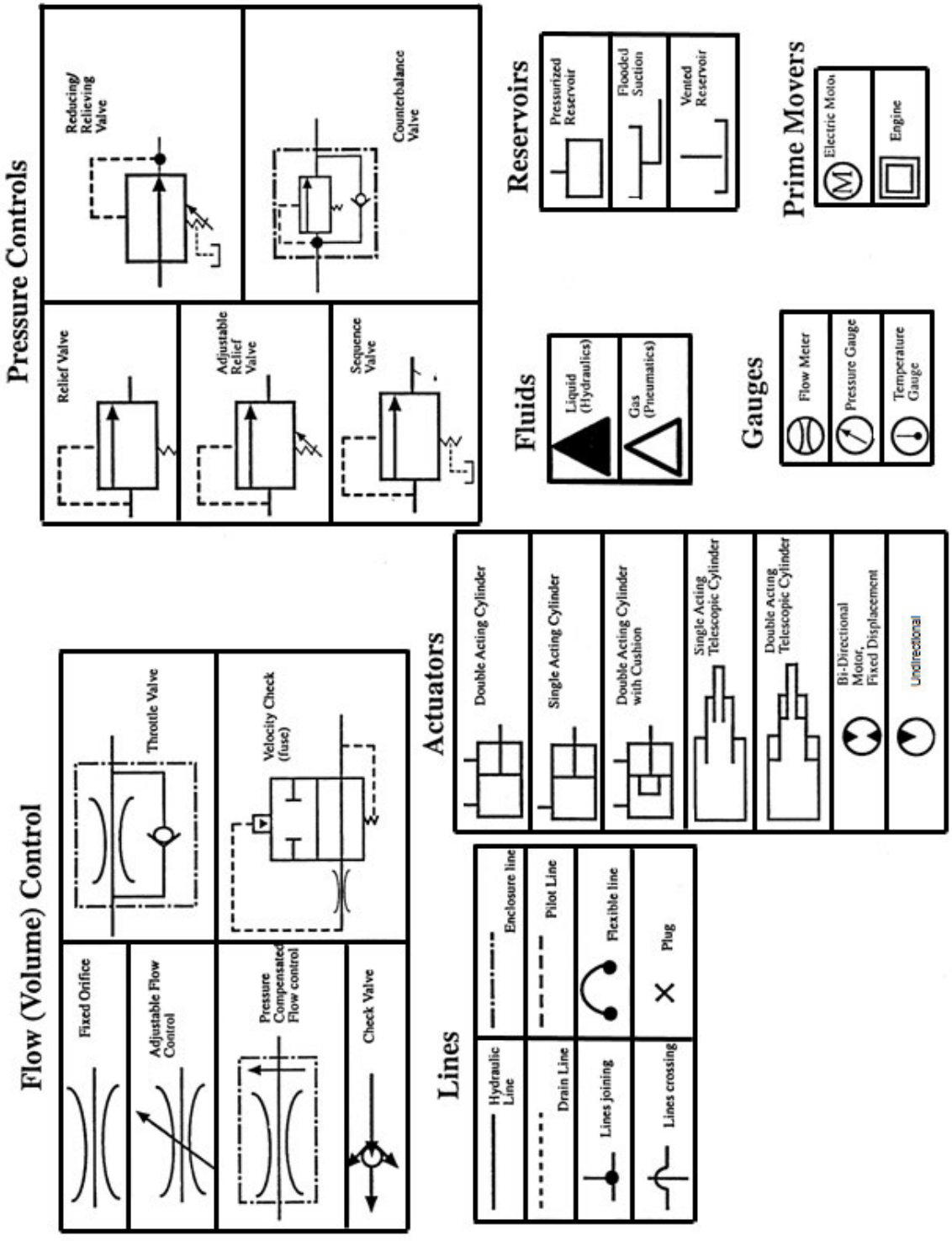
INCORRECT TECHNIQUE

Figure 3. Incorrect Technique

HYDRAULIC SYMBOLS

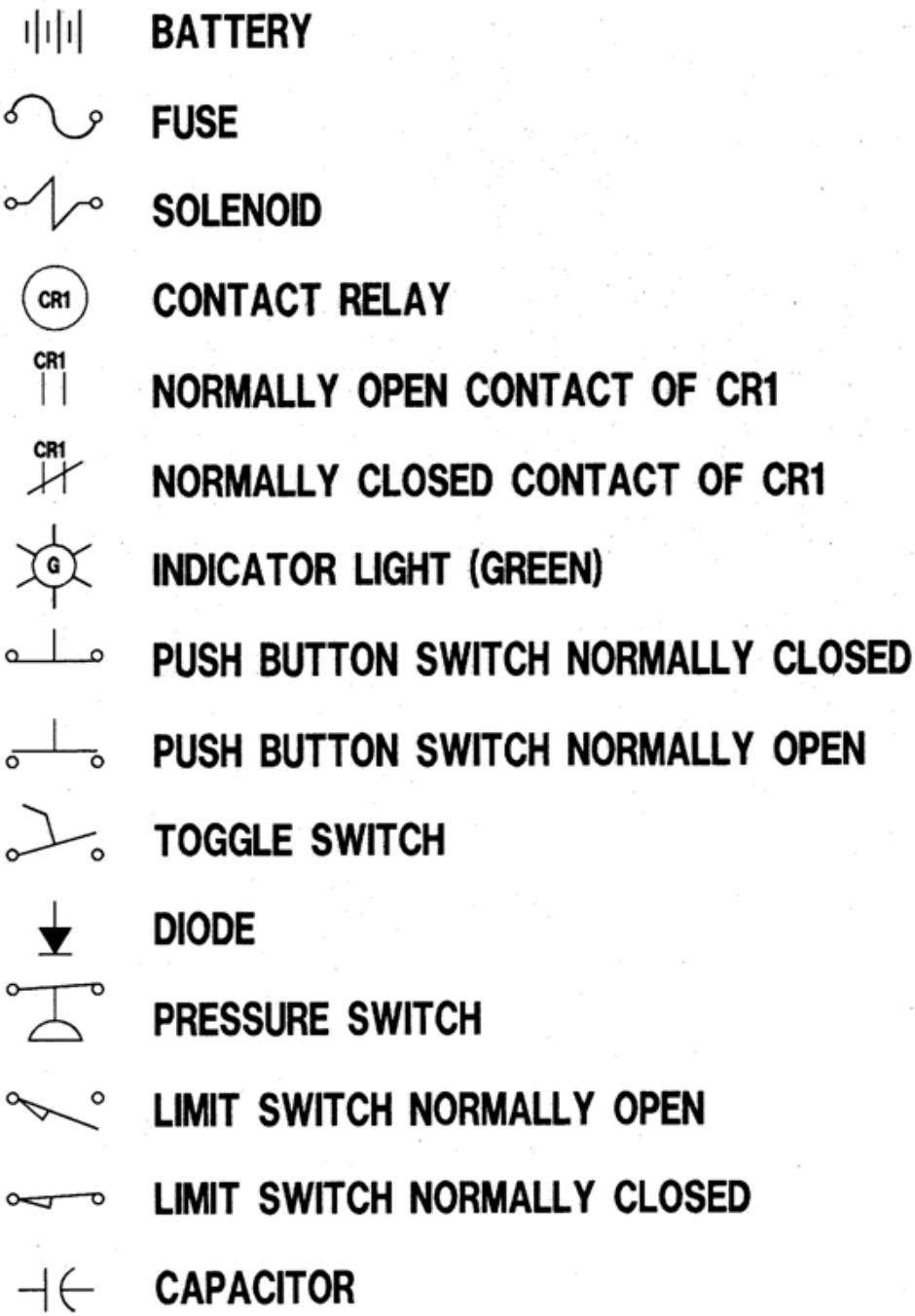


HYDRAULIC SYMBOLS (CONTINUED)



ELECTRICAL SYMBOLS

SYMBOL DEFINITIONS



SECTION 2
PUMP

PUMP INSPECTION

Important Inspection Tasks

- Check pressure fluid level in tank.
- Check cleanliness/condition of the hydraulic fluid.

NOTICE

A check of the hydraulic fluid can be regarded only as a rough indicator for the fluid condition (milky/black appearance, gumming, sludge at the tank bottom, or smell of burnt oil).

- Check filter clogging indicators/difference pressure switches (when apparent) while system is in operation.
- Check persistent fluid temperature while system is in operation (usually <140 degrees F, maximum 176 degrees F).
- Check operation pressure levels and operation speeds.
- Check for external leaks.
- Check tubes and hoses for proper mounting and indications of rubbing.

NOTICE

Damaged tubes and hoses should be replaced immediately!

- Check visually the hydraulic accumulators.
- Check visually all electrical connections of motor, solenoids, sensors, and pressure switches.

PUMP MAINTENANCE

Important Inspection Tasks

Hydraulic Fluid

The service life of hydraulic fluids is highly dependent on the operation temperature and the conditions. The maximum operation temperature usually is 80°C, an increase of 10°C will reduce the service life by 50%.

NOTICE

Different kinds of pressure fluids should not be mixed as this might cause sludge or gumming. It is recommended to flush the system prior to any change of the fluid type and to contact the fluid manufacturer.

- The fluid should be drained while the system is warm. Used oil should be disposed professionally.
- Heavily aged or contaminated fluid can't be improved by simply adding fresh fluid.
- The hydraulic fluid has to be filled-in via the system filter or via a mobile filtration system. The absolute filter rating for this initial filtration must be at least as high as the rating of the system filter.
- Fluid samples have to taken and tested for contamination kind, size, and level with the results being documented.

PUMP MAINTENANCE (CONTINUED)

⚠ CAUTION

The complete hydraulic system has to be depressurized prior to any works at accumulators. No soldering, welding, or machining is allowed at hydraulic accumulators! Incompetent handling may cause severe accidents!

- Check the setting of system and control pressure.
- Any pressure re-adjustments should be documented, as this may be a sign of wear.
- When repeated readjustment of the pressure valve becomes necessary to achieve the specified setting, it indicates wear of the pressure valve.
- Check the tubes and hoses for external leaks.

NOTICE

It is most important that the system is completely depressurized prior to removal of fittings, hoses or other components. Leaks at joints sealed via soft-iron rings, O-rings or other contoured seals cannot be solved by simply re-tightening of the joint (observe the perm. torque) as the seal material has hardened or is otherwise damaged. Seals should always be replaced and not reused.

- Check the function of control and monitoring devices (pressure gauges and pressure switches).

PUMP REPAIR

Important Inspection Tasks

A. Troubleshooting

- A successful troubleshooting of hydraulic systems requires a detailed knowledge about the hydraulic system and understanding of the layout, operation, and ensemble acting of the individual components. All documentation required should be at hand. Understanding usually requires the ability to read hydraulic and electrical circuit plans.
- Suited test devices include a temperature gauge, pressure gauge, multimeter, stop watch, and rev. counter.

B. Repair

NOTICE

Minor repairs should only be undertaken by qualified personnel. Major repairs and overhauls should only be undertaken by the manufacturer.

- Cleanliness is mandatory when working on hydraulic systems! This is especially true with systems with an Axial Pumps. All surfaces where joints are to be separated should be cleaned prior to disassembly. All ports should be plugged to prevent contaminants to enter an open system.
- Defective devices should not be repaired on site because the tools and cleanliness required for professional repairs is not present. It is better to replace only the complete unit or at least sub-assemblies, which can be tested individually, on site. This way standstill periods and fluid losses are minimized as well as repairs are made more easily.
- It is important to take into account whether the malfunction of the repaired component may have caused malfunction of other components, for example by migrating debris or even fragments within the hydraulic system.
- After repair of the component, one should look for and solve the basic cause for this malfunction, for example unsuitable filtration level, elapsed preventive service maintenance.

SINGLE VANE PUMP WITH CONTROL MANIFOLD

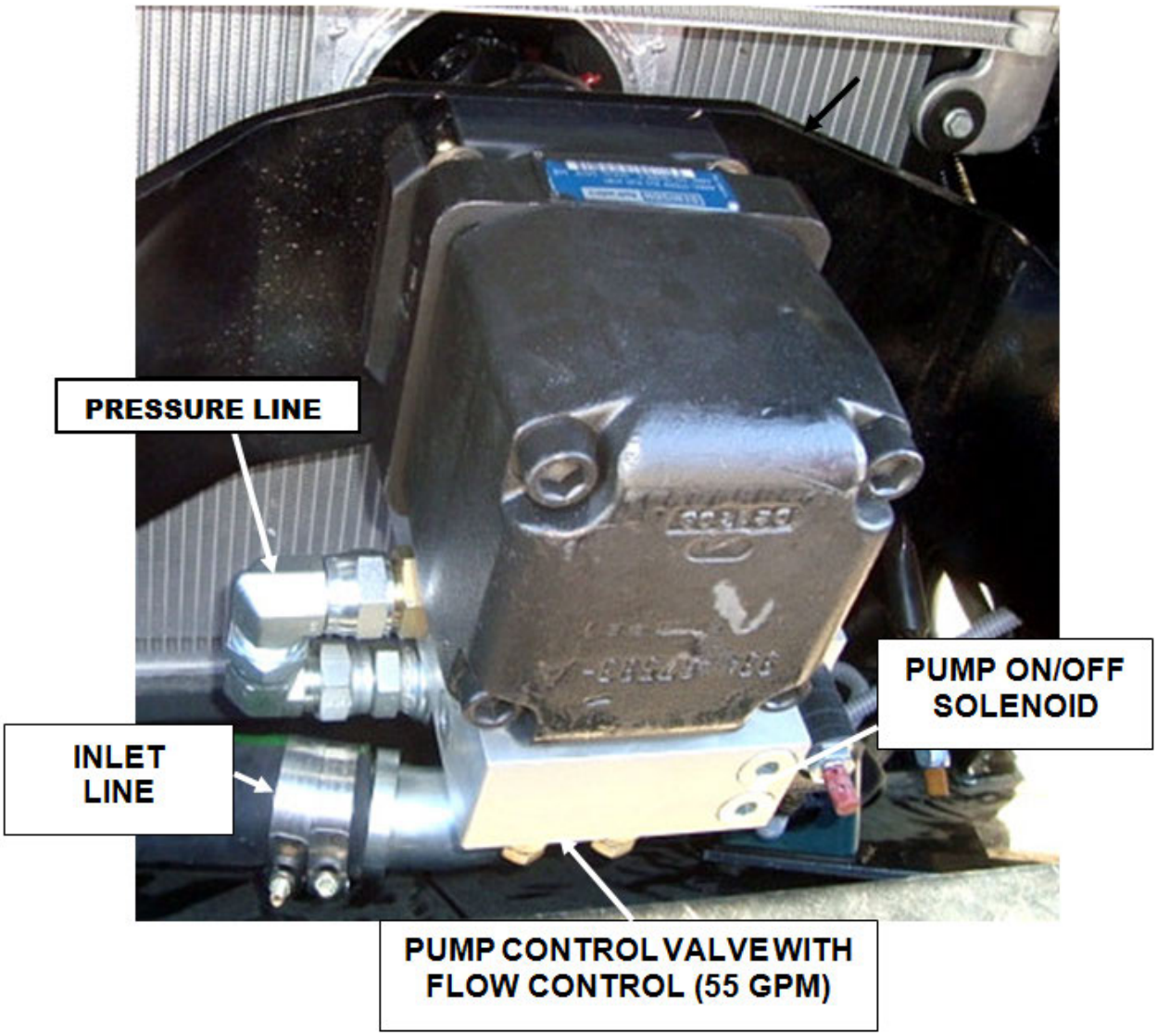


Figure 4.

The single vane pump control valve is designed to limit the flow to 55 GPM. Excess flow is re-circulated to the inlet.

- The pump on/off valve must have power to turn the pump on
- When the pump solenoid is in the off mode, oil is allowed to circulate back to the inlet
- The maximum pump speed is controlled by the Mobile Controller.

TROUBLESHOOTING PUMP 219-2303-003 WITH 031-6427 MANIFOLD

The pump control valve is designed to easily allow testing the pump and the pump control valve functions on the vehicle.

1. Hydraulic functions do not operate.
   - When pump should be on, verify there is at least 10 volts at the pump coil.
   - If 10 or more volts are present proceed to step 2.
   - If not, determine if the controller programming is at fault or a wire is broken.
2. When pump should be on, pull red knurled knob on the end of the solenoid valve. (Figure below)
   - Does the system work now?
   - If so replace the coil
   - If not proceed to step 3

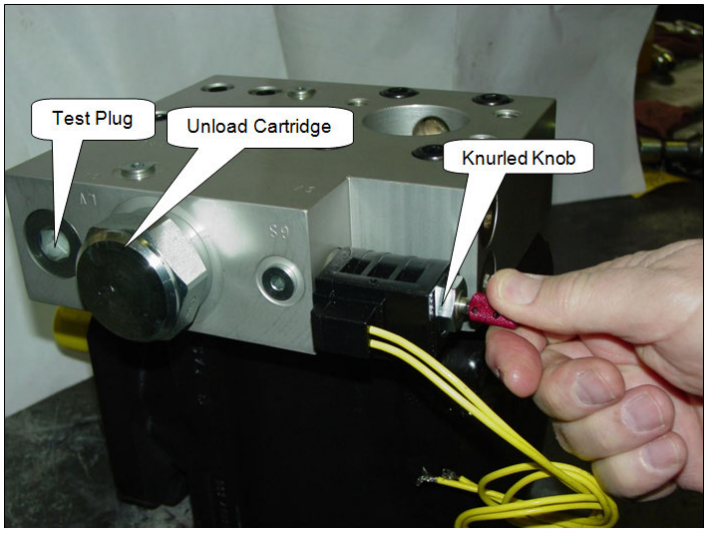


Figure 5.

3. Remove the unloading cartridge. (Figure below) Temporarily set aside in a clean location.

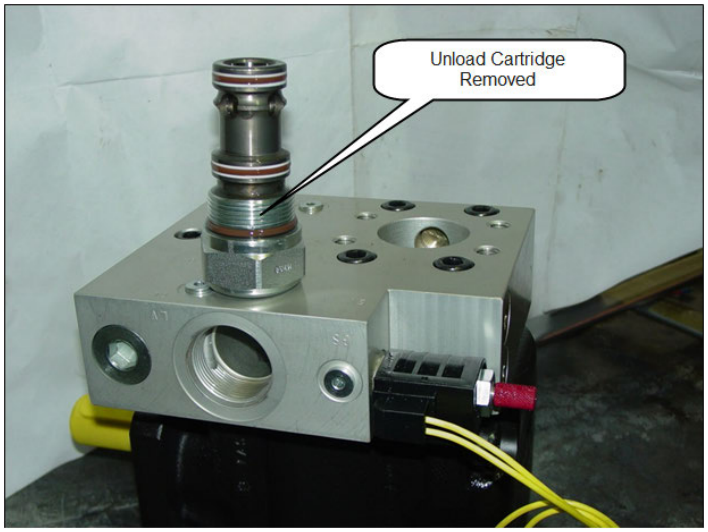


Figure 6.

TROUBLESHOOT PUMP 219-2303-003 WITH 031-6427 MANIFOLD (CONTINUED)

4. Remove test plug located in the side of the pump control valve. (Figure below)
5. Insert plug in the port where the unload cartridge was removed. There is a thread for it at the bottom of the cavity.

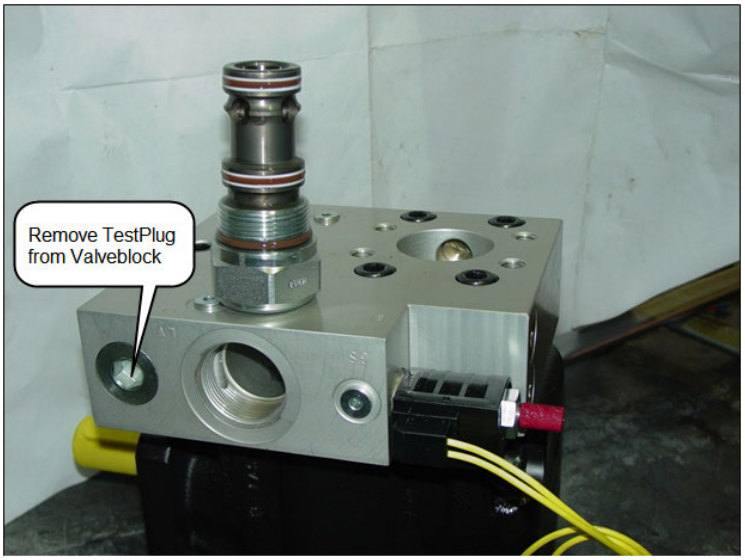


Figure 7.

6. Reinsert the unload cartridge. (Figure below)

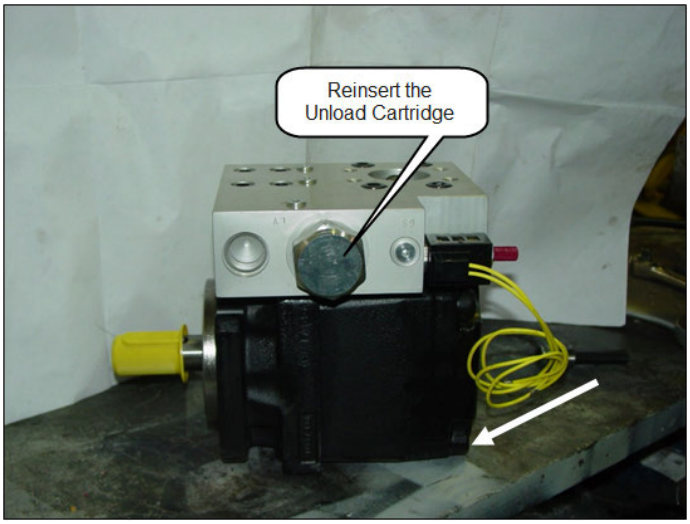


Figure 8.

TROUBLESHOOT PUMP 219-2303-003 WITH 031-6427 MANIFOLD (CONTINUED)

7. Start the truck and test all functions.
   - If the system now works correctly the problem is in the pump control valve.
   - If the system still does not function correctly the pump cartridge need to be replaced.
8. Remove the unload cartridge. Temporarily set aside in a clean location.
9. Remove the test plug and replace it in the side of the pump control valve.
10. Reinstall the unload cartridge.

NOTICE

Always remove the test plug before running the truck on routes to prevent hydraulic system failure.

SINGLE PUMP REPAIR PROCEDURES

Heil has upgraded many products to a high pressure vane pump. Although ratings vary, these pumps are generally rated for higher pressure and higher duty cycles than similar size gear pumps. Because of the design of a vane pump, it is generally not necessary to replace the entire pump. The pump cartridge contains all of the wear items in a vane pump. Replacing the cartridge provides the same performance as replacing the entire pump. Use the following procedures to field repair and inspect a Heil single vane pump. The procedure was performed on an Autocar chassis and can be used on other chassis. These instructions show complete tear down of the pump assembly. They can be used to replace a failed pump cartridge or failed pump shut-off valve.

NOTICE

Before making adjustments, Lockout/Tagout the unit using your company's policy. If one is not available, at a minimum follow the Lockout/Tagout procedure 14 provided in this service manual.

1. Test the cartridge for damage by flow testing the pump before disassembling.

Required tools to replace the pump:	
Quantity	**Tool**
1	1 1/2 inch open end boxed end wrench
1	3/4 inch open end boxed end wrench
1	Wire cutters (Dikes)
1	1/2 inch drive ratchet
1	14mm 1/2 inch drive hex head socket
1	3/8 inch hex head wrench
1	5/32 inch hex head wrench
1	Torque wrench capable of producing 150 ft. lbs.

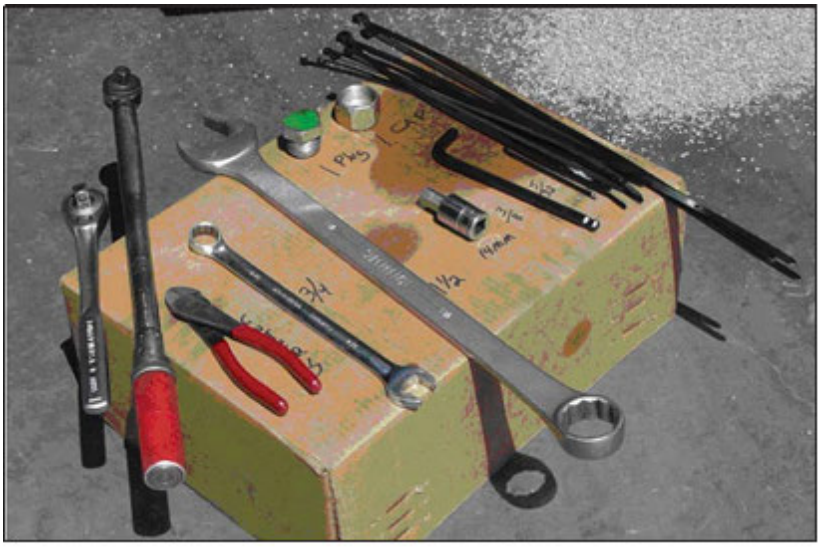


Figure 9. Tools Required

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

2. Remove the zip tie from the oil shut-off valve on the hydraulic oil tank.

Figure 10.

3. Turn the shut-off valve to the OFF position.

Figure 11.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

4. Remove the grill from the chassis. The number of bolts for the grill varies with chassis brand.

Figure 12.

5. Cut the zip tie around the electrical wiring that controls the pump shut-off valve solenoid.

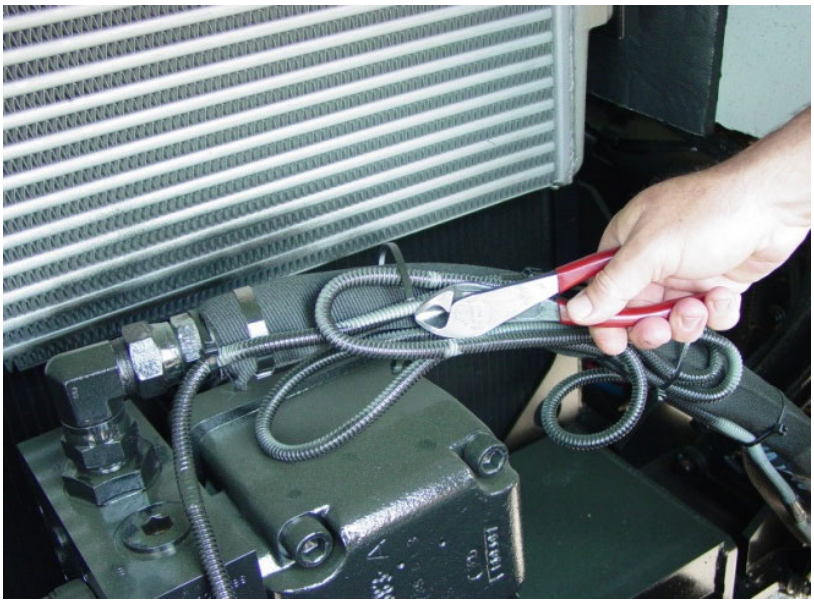


Figure 13.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

6. Disconnect the electrical wiring—the two-way Packard plug—that controls the pump shut-off valve solenoid.

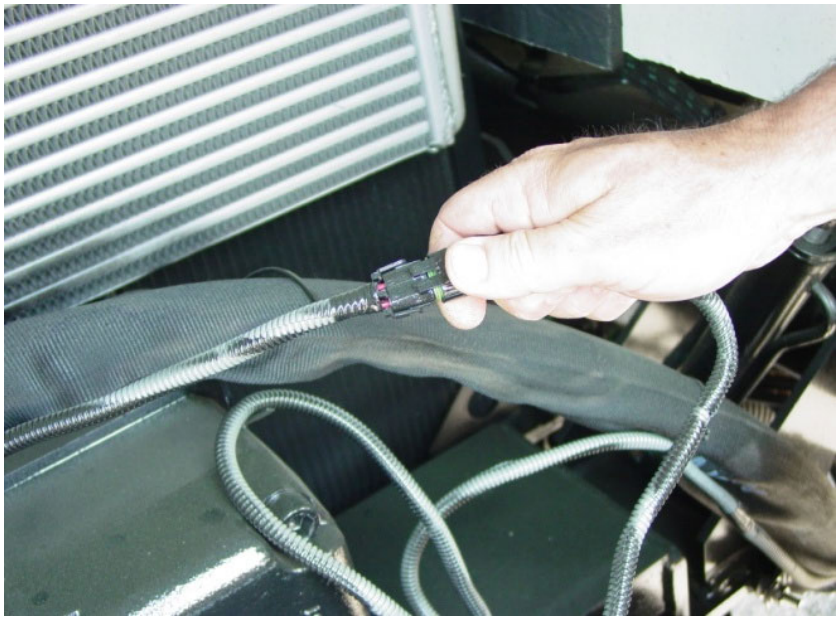


Figure 14.

7. Remove the one-inch hydraulic pressure hose.

Figure 15.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

8. Remove the four suction line flange bolts.

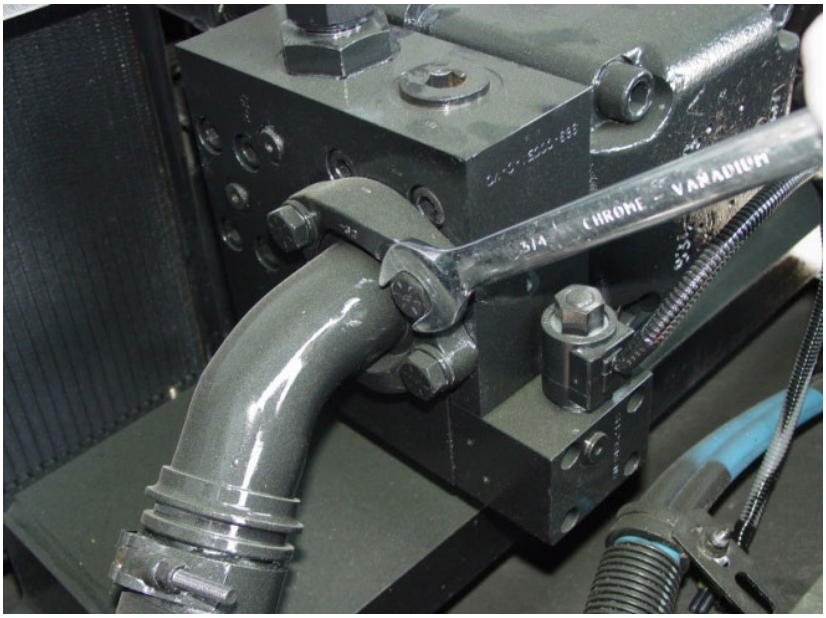


Figure 16.

9. Remove the eight bolts connecting the manifold to the pump. There are four small bolts and four large bolts.

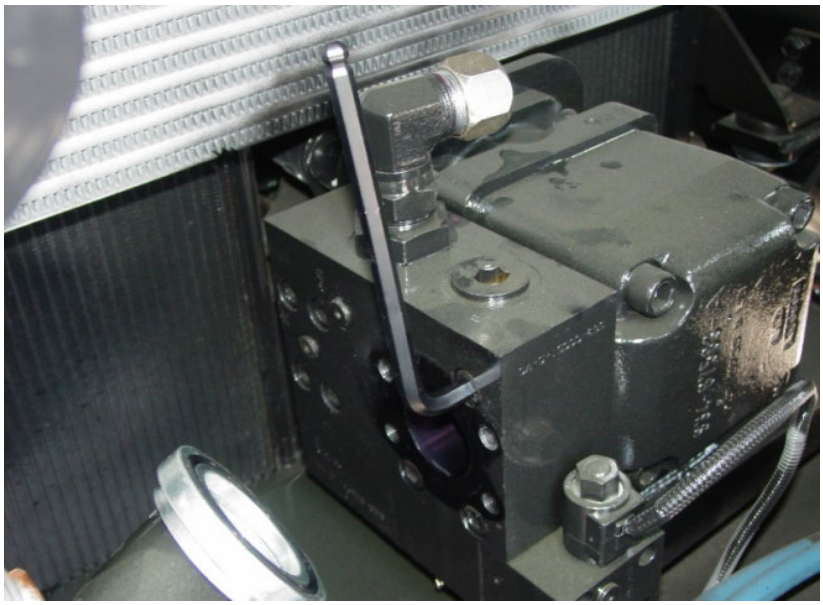


Figure 17.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

10. Carefully, remove the manifold from the pump.

Figure 18.

11. Remove the four pump housing connection bolts.

Figure 19.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

12. Carefully remove the pump case housing.

Figure 20.

13. Remove the pump cartridge by pulling it toward you. The fit might be tight.

Figure 21.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

14. Inspect the pump shaft, splines, and bearings for wear and damage. Check for the following:
    - Sheared or worn shaft splines
    - Broken bearing

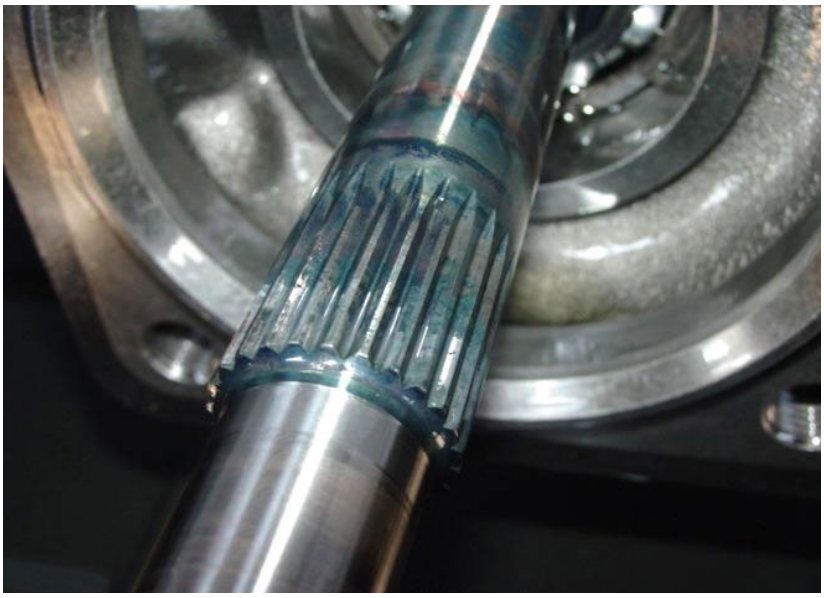


Figure 22.

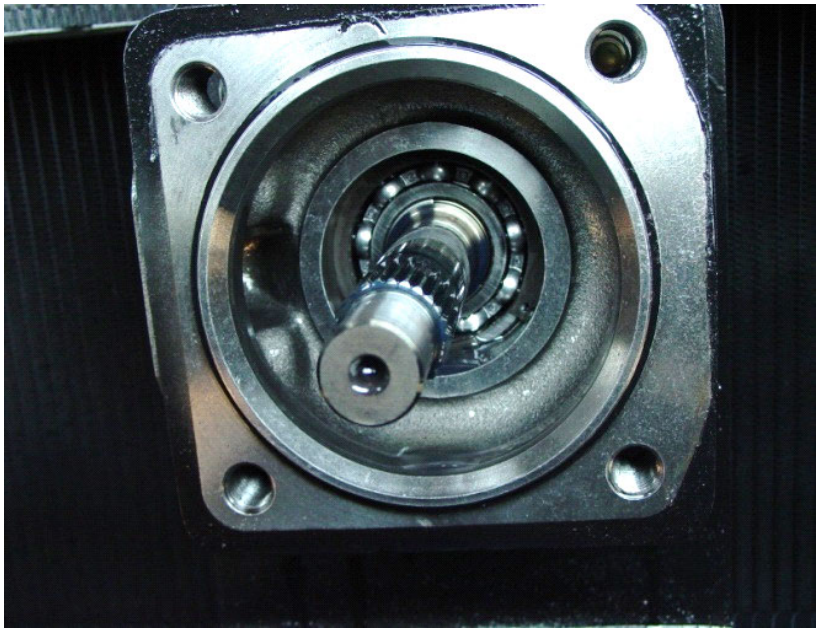


Figure 23.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

15. Inspect the brass bushing on the pump cartridge for wear and damage.

Figure 24.

16. Check the outer housing O-ring for wear or damage such as nicks, fraying, or cuts.
    a. Replace the o-ring if it is damaged.

Figure 25.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

17. Reinstall the pump cartridge back on the pump shaft.

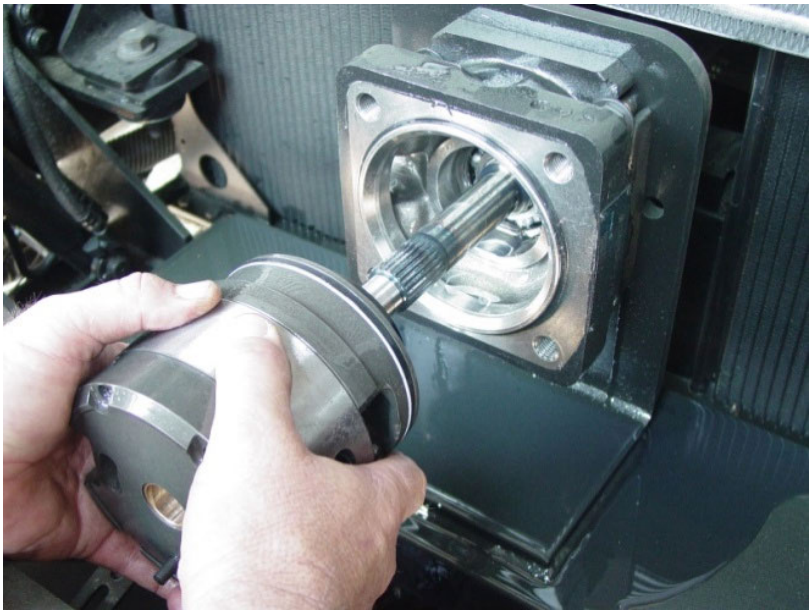


Figure 26.

18. Install the outer pump housing and finger-tighten the four pump housing bolts.

Figure 27.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

19. Tighten the four outer housing bolts to 138 ft. lbs.

Figure 28.

20. Install the new pump manifold using the new bolts included with the new valve.

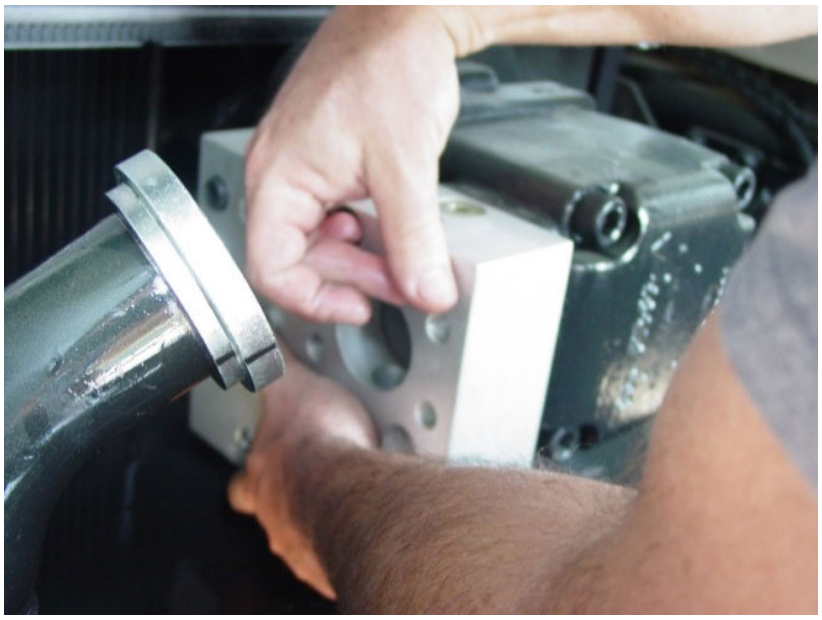


Figure 29.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

21. Tighten the eight pump manifold bolts as follows:
    - Four small back bolts – 60 ft lb
    - Four large front bolts – 92 ft lb

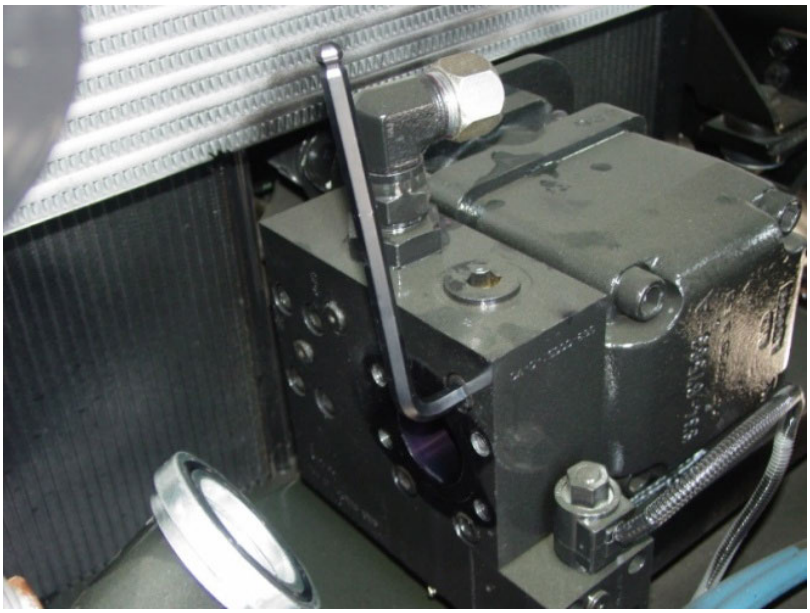


Figure 30.

22. Install the suction line flange to the pump manifold and tighten the four bolts on the flange.

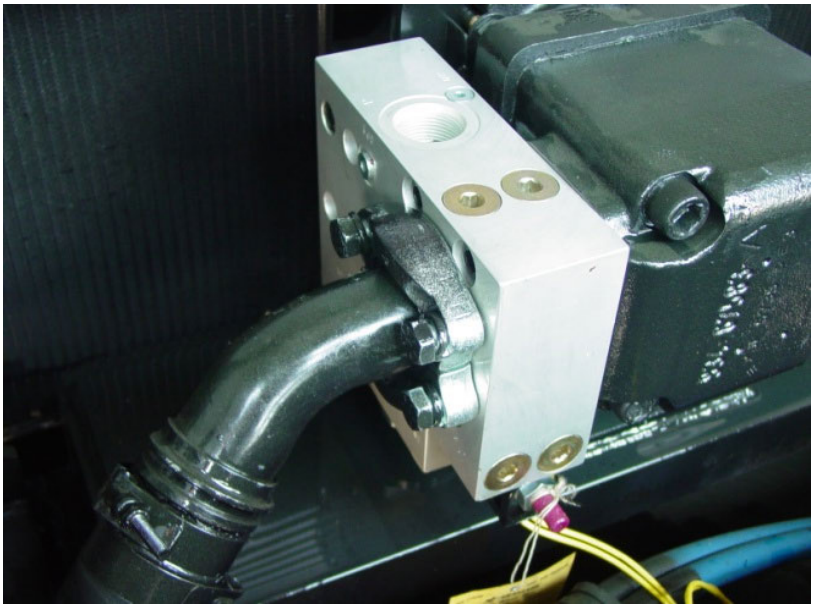


Figure 31.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

23. Install one straight connector, 054-3341-10, to the **P Port** on the manifold.

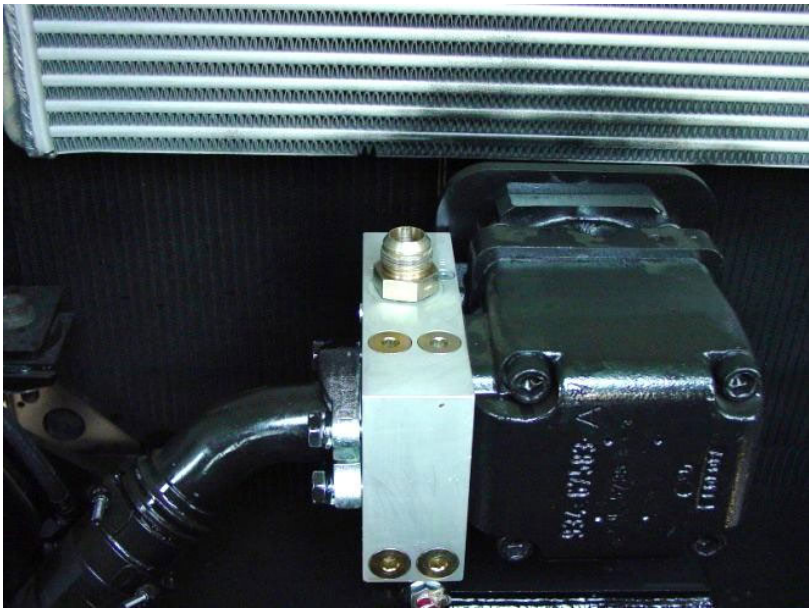


Figure 32.

24. Install one 90 degree elbow, 054-2988-10, on the straight connector.

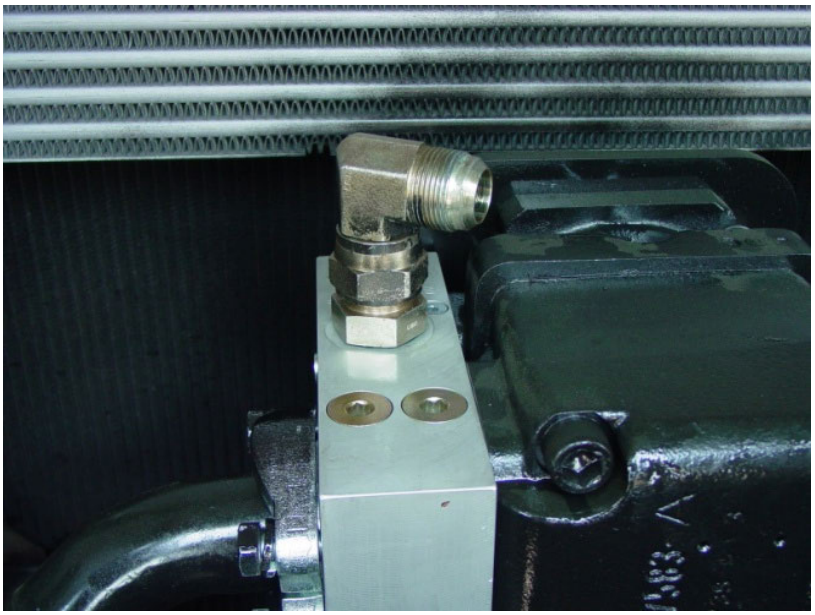


Figure 33.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

25. Connect the one inch hydraulic pressure hose to the 90 degree elbow.

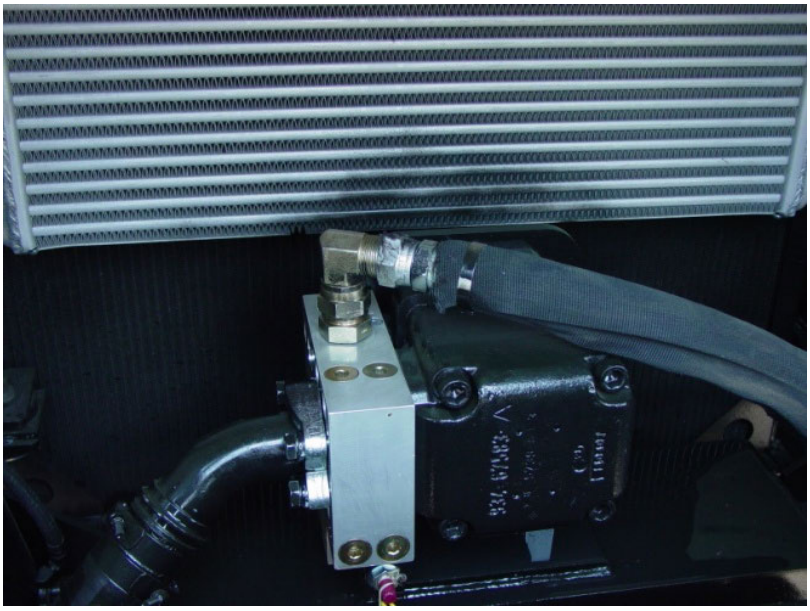


Figure 34.

26. Install the following two-way Deutsch connector to the two wires coming from the solenoid on the new manifold:

- 1 ea – Two-way female connection
- 2 ea – Female terminal (18-20AWG)
- 2 ea – Cable seal (16-14 GA)

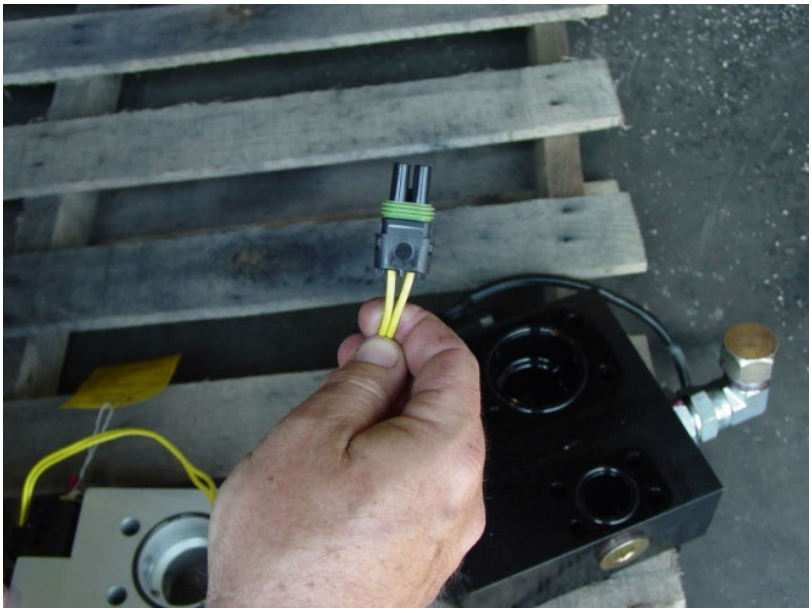


Figure 35.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

27. Connect the new Deutsch connector to the original, matching Deutsch connector. Secure the excess wiring harness for the solenoid to the hydraulic pressure line with a zip tie.

Figure 36.

28. Attach the grill to the chassis.

Figure 37.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

29. On the hydraulic oil pump, move the shut-off valve to the OPEN position and secure the valve with appropriate zip tie.

Figure 38.

Figure 39.

TANDEM O.I.G.A.I. PUMP

Tandem Pump Design

Note: This design is still available, however it is not frequently installed. See image below.

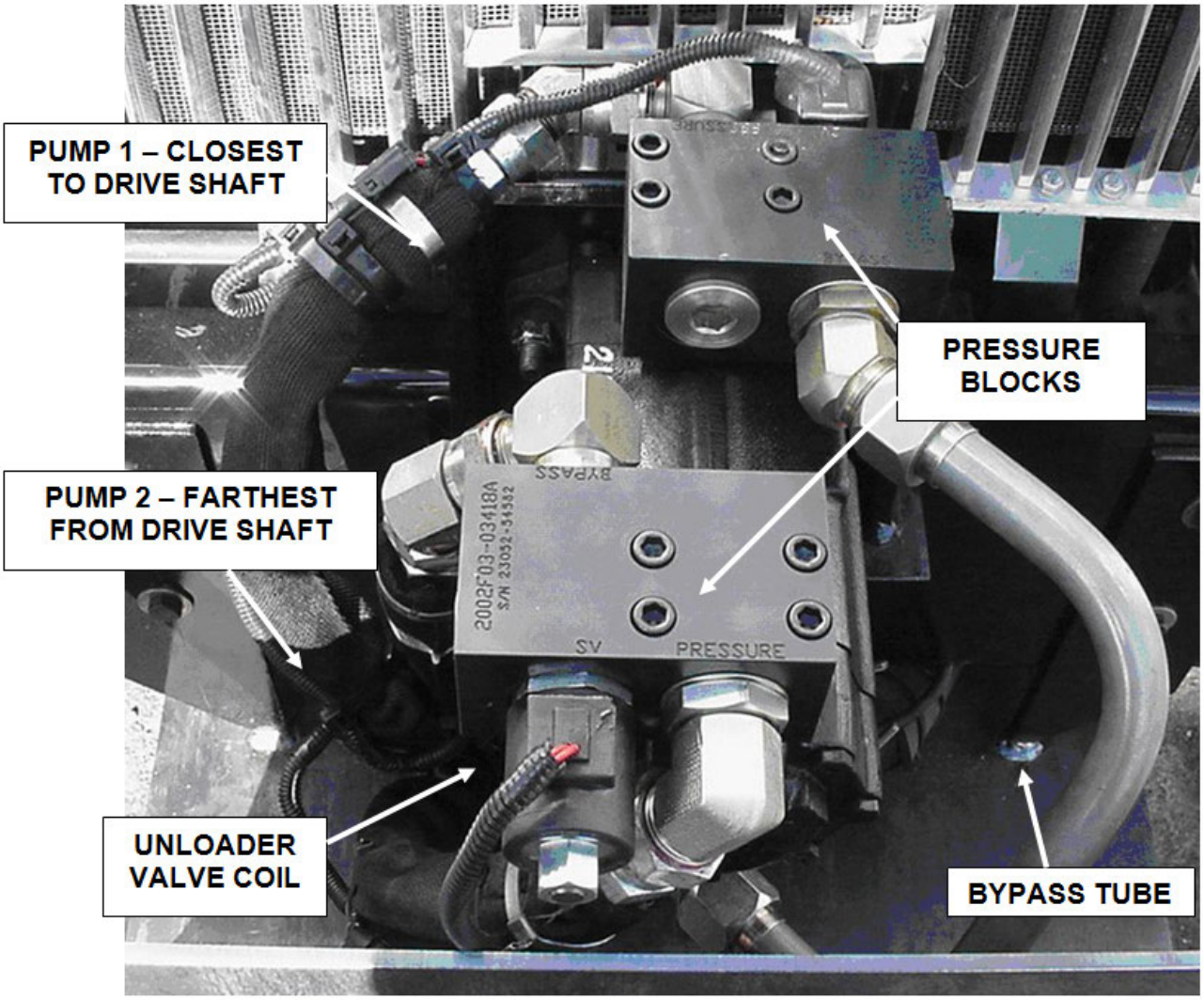


Figure 40. Tandem O.I.G.A.I. Pump

Tandem Pump Design (CONTINUED)

In this application, the flow from Pump 1 (the section closest to the shaft) and Pump 2 (the section furthest from the shaft) is combined using in-line check valves. Pump 2 will cut off when the pressure reaches a predetermined set point and/or when the RPM reaches the preset speed.

Note: The option will vary based on the vendor pump logic. See figures below.

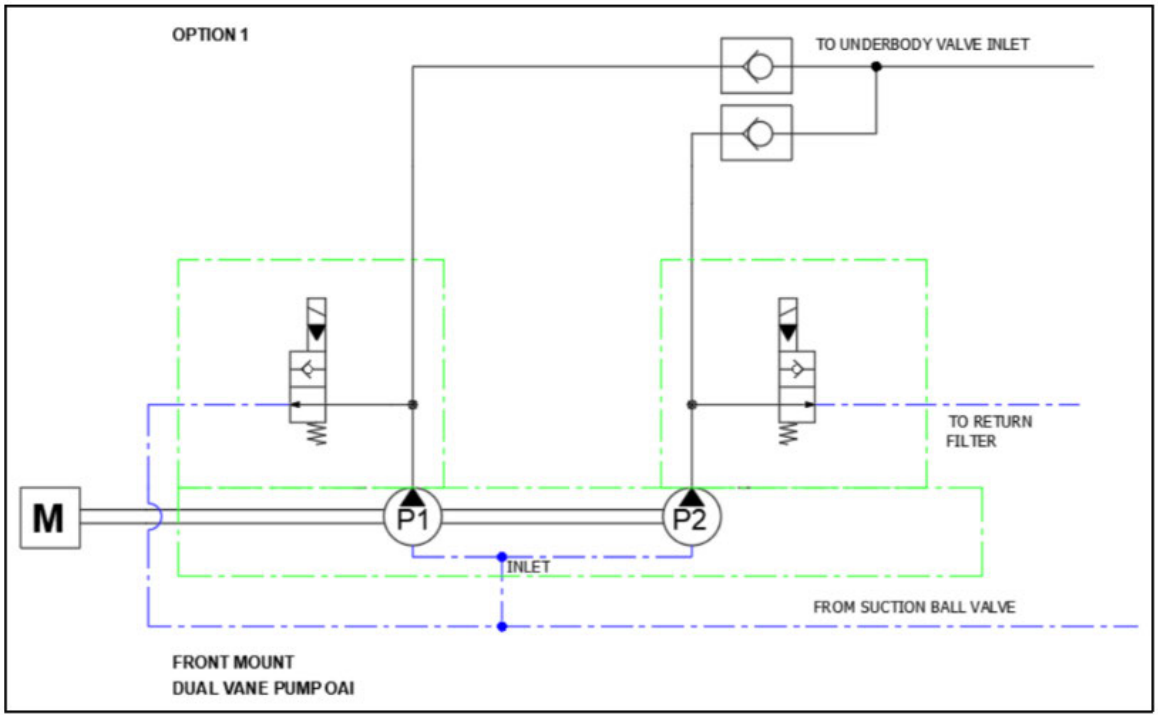


Figure 41. Option One.

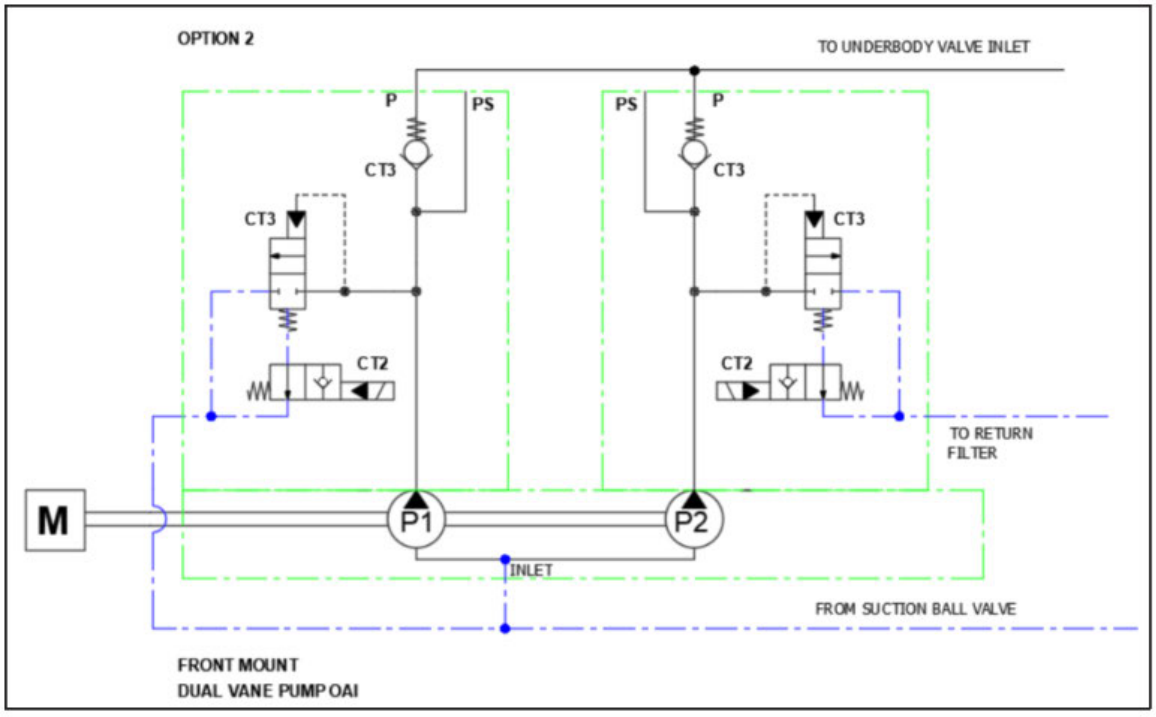


Figure 42. Option Two.

TANDEM VANE PUMP FRONT LOADER O.A.I. OPERATION

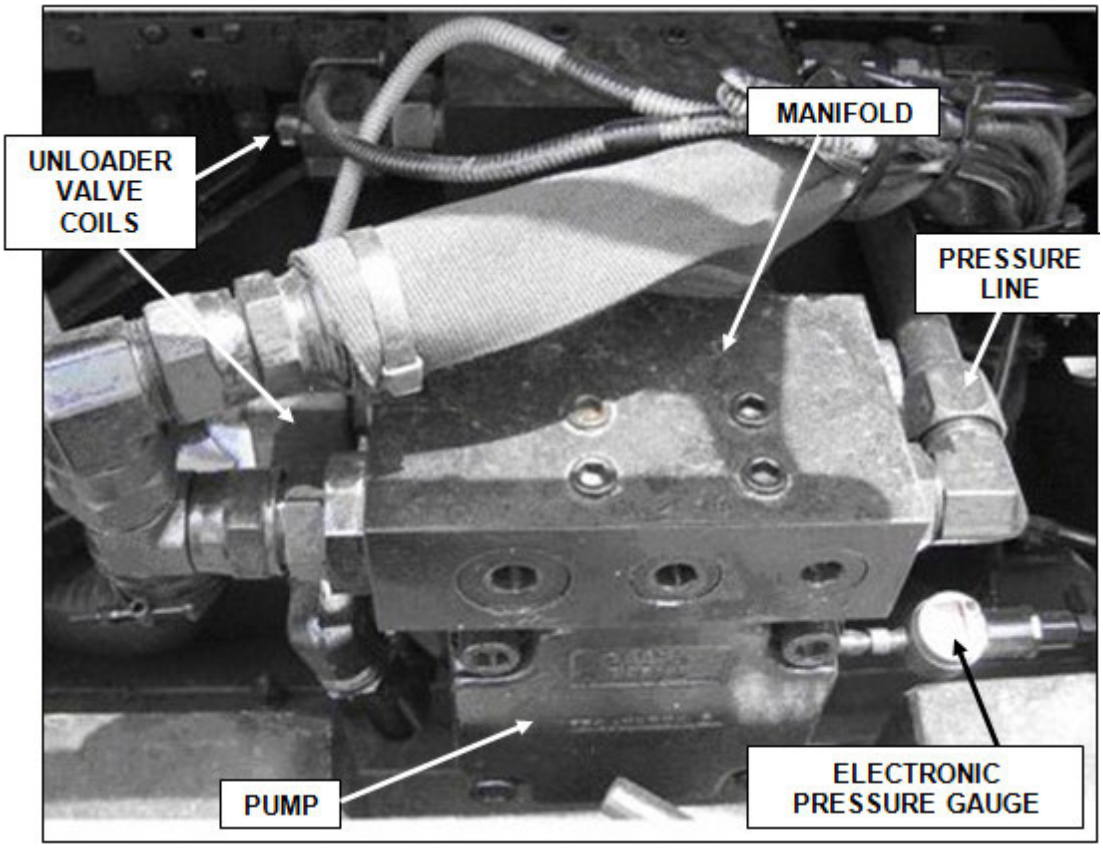
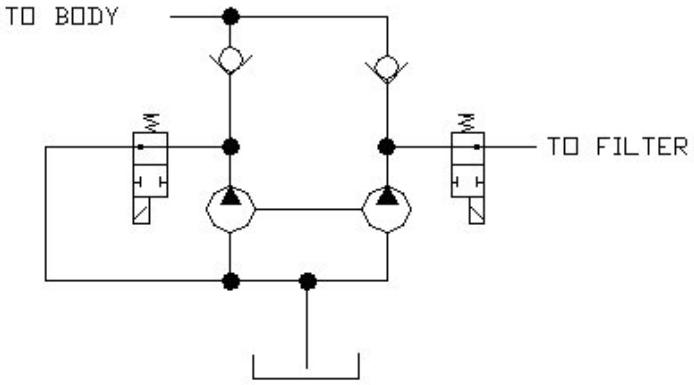


Figure 43.



The tandem pump with the pressure manifolds combines the flow of oil from both pumping sections to get normal cycle times for the packer and body functions at engine idle.

The pumping section closest to the pump input shaft (P1) shuts off first during higher RPMs. The pumping section farthest from the pump input shaft (P2) stays on longer during higher engine RPMs. The packer cycle time for units using this pump is fastest during engine idle up to 1050 RPM.

The separate pressure block manifolds contain two unloader valve and coil assemblies used to activate each respective pumping section and control the flow of oil directed to the hydraulic system.

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 is 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. See "Direct Mount Pump" image.

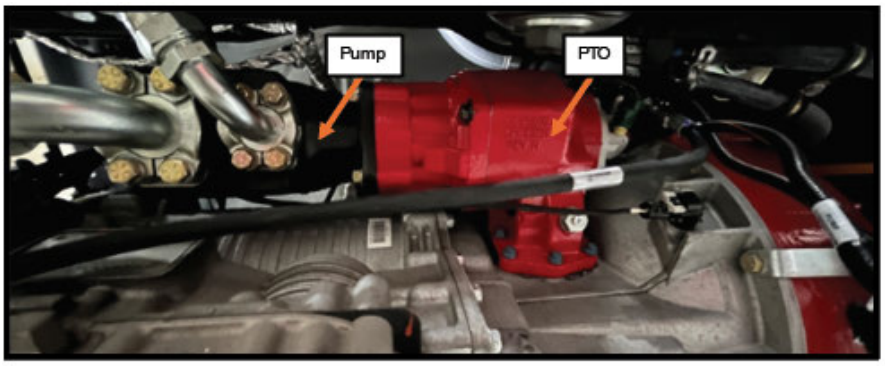


Figure 44. Direct Mount Pump.

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. See "Remote Mount Pump" image.

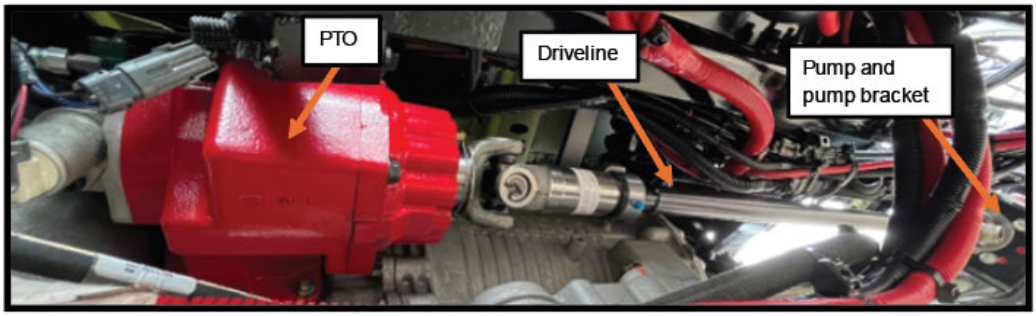


Figure 45. Remote Mount Pump.

PUMP TYPES (CONTINUED)

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 46. Extended Shaft PTO.

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 "PTO Pressure Switch" image.

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. See "PTO Pressure Switch" image.

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. See "PTO Pressure Switch" image.

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 and "Open Loop" condition when it is expecting signal feedback. Also, the in-cab display may show a warning when unplugging the switch.

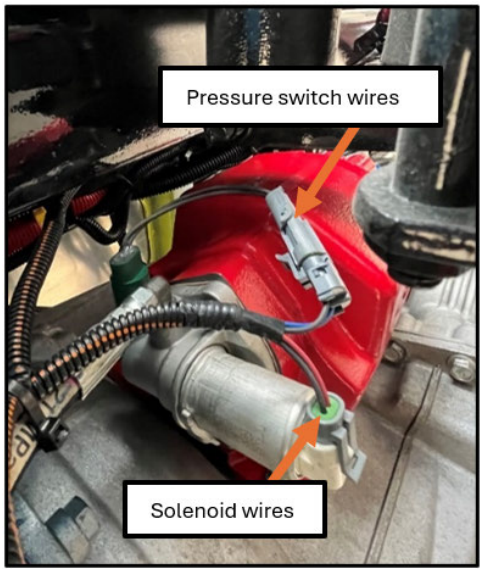


Figure 47. PTO Pressure Switch.

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. See "Transmission Pressure Feed to PTO" image.
   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

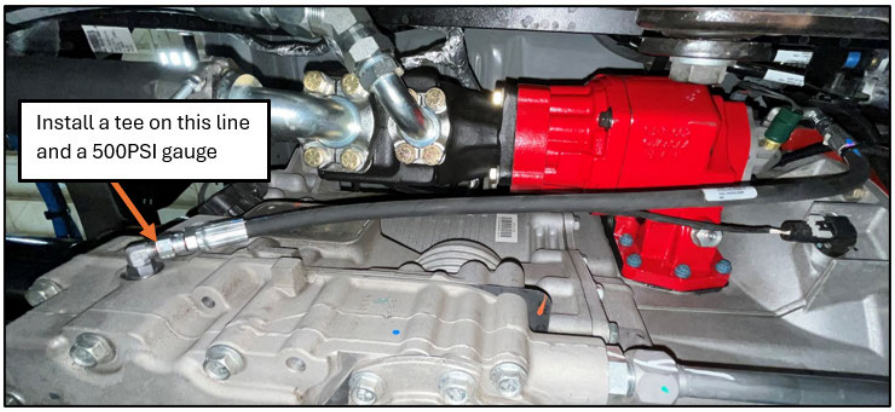


Figure 48. Transmission Pressure Feed to PTO.

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. See "Transmission Pressure Measurement" image.
      (2) Check to see if the pressure is within the specifications provided above

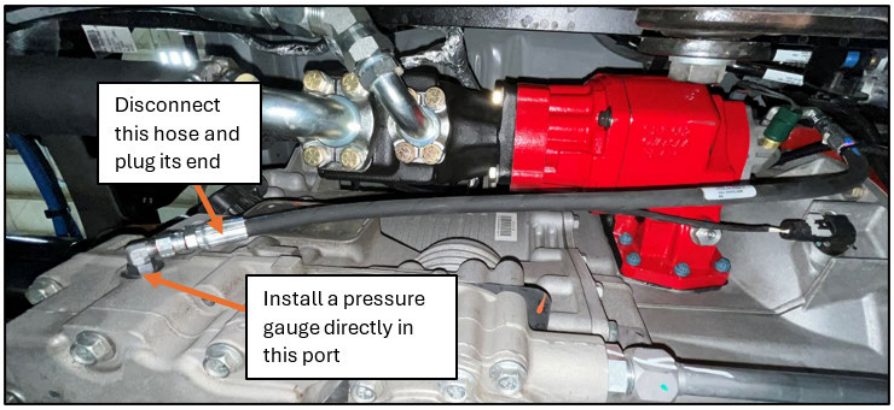


Figure 49. Transmission Pressure Measurement.

E. Clutch Slippage Test

Applies to the Chelsea 890 PTO **only.** See "Clutch Slippage Test" image.

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** (For Odyssey models, deadhead the tailgate lock)
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

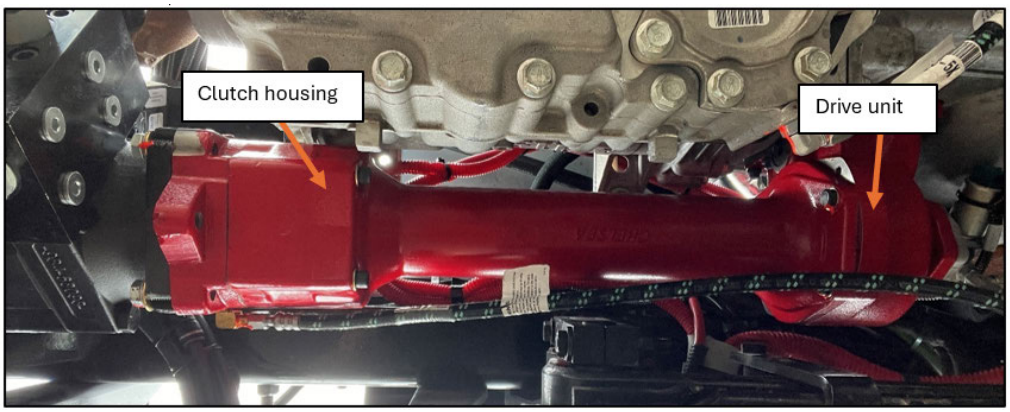


Figure 50. Clutch Slippage Test.

HALF/PACK
NOTES

SECTION 3
BODY AND TAILGATE

BODY NOMENCLATURE

The figure below shows the major components and their typical locations on the unit.

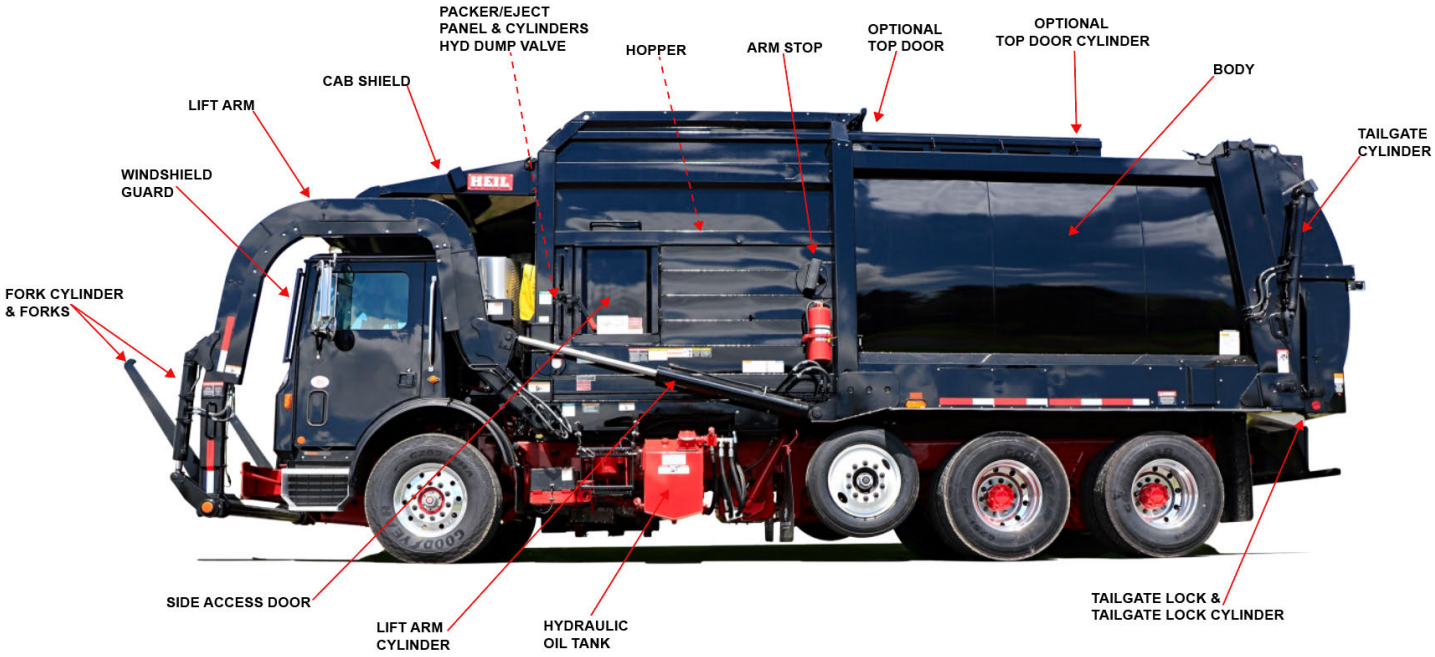


Figure 51. Body Nomenclature

TAILGATE NOMENCLATURE

The figure below shows the major tailgate components and their locations on the unit.

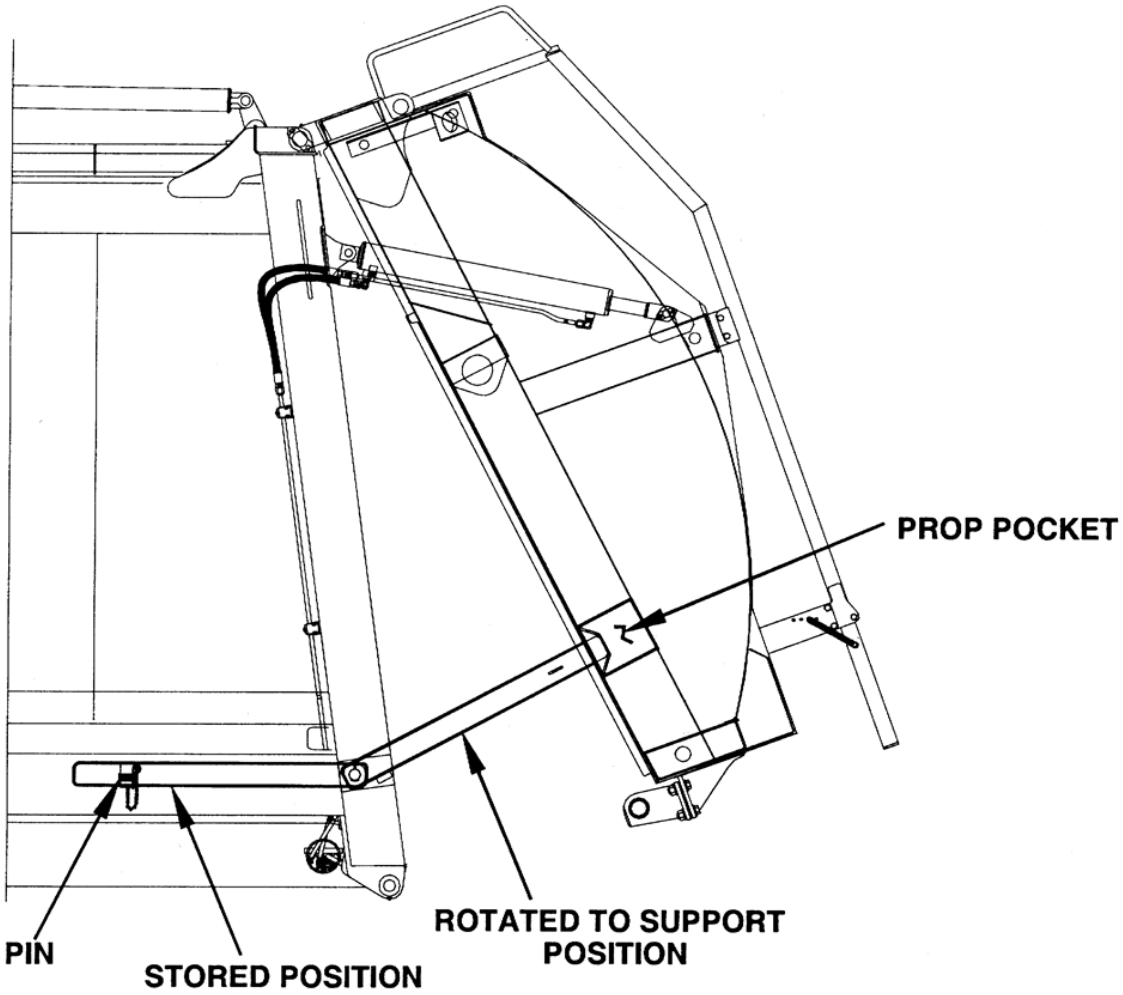


Figure 52. Tailgate Nomenclature

PROPPING THE BODY

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body up when you clean the inside of the body or 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 Service Lift.

A. Service Hoist

This lift requires an on-board 12v power unit. Refer to Service Hoist Operation 61 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 64 for the specific body propping procedure.

C. Service Lift

This lift requires overhead lifting devices to raise the body. Refer to Service Lift Operation 66 for the specific body propping procedure.

SERVICE HOIST OPERATION

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body up when you clean the inside of the body, perform maintenance or repair procedures. Observe and obey the DANGER and WARNING notices below while you use a service lift to raise the body.

⚠ DANGER

Keep all parts of your body 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 the body of all refuse before raising the body.

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.

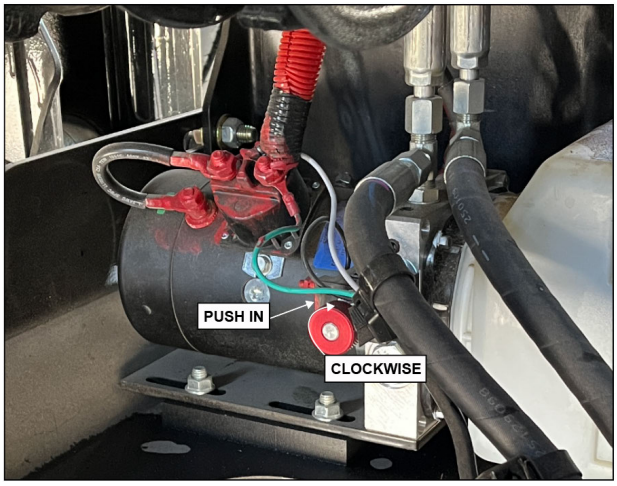


Figure 53.

SERVICE HOIST OPERATION (CONTINUED)

4. Lockout/Tagout 14 the unit.
5. Remove the bolts and springs from the chassis mounting brackets.

Figure 54. 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 55. Body Raise Controller

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

NOTICE

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

Figure 56.

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

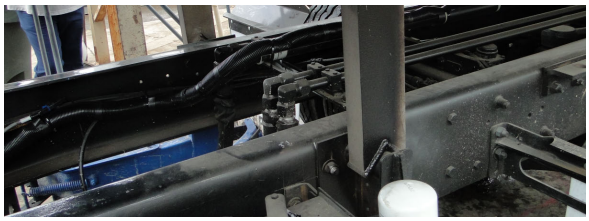


Figure 57.

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

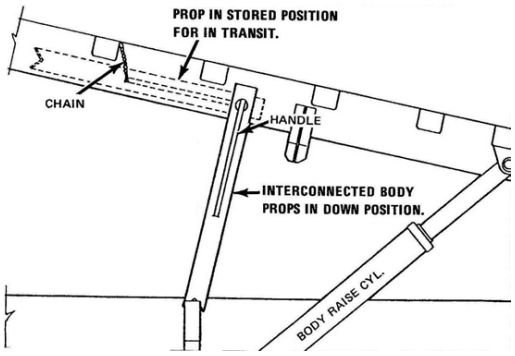


Figure 58. Factory Body Props

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

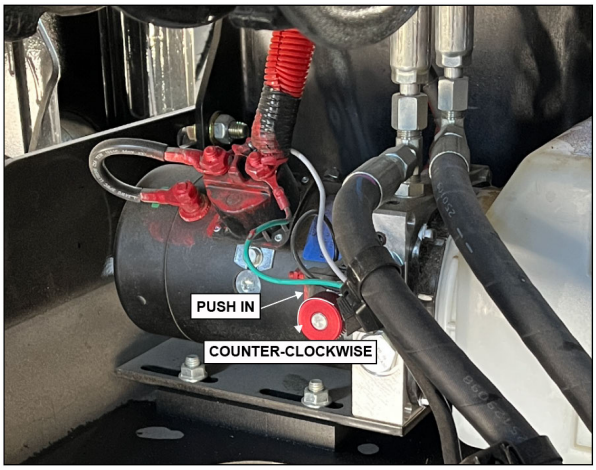


Figure 59.

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 up when you clean the inside of the body, perform maintenance or repair procedures. Observe and obey the DANGER and WARNING notices below while you use a service lift to raise the body.

⚠ DANGER

Keep all parts of your body 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 the body of all refuse before raising the body.

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. Make sure that body is on firm, level ground with the parking brake engaged and holding - chock the wheels.
3. Lockout/Tagout 14 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.

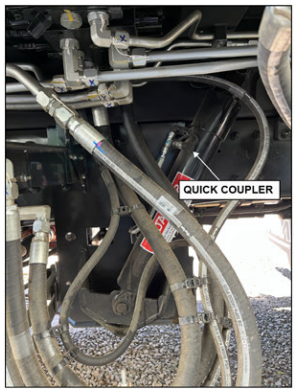


Figure 60.

SERVICE HOIST LITE OPERATION (CONTINUED)

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

Figure 61. 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.
9. Perform the maintenance or service procedures.
10. Once all maintenance and service procedures are complete - lower the body and store body props.

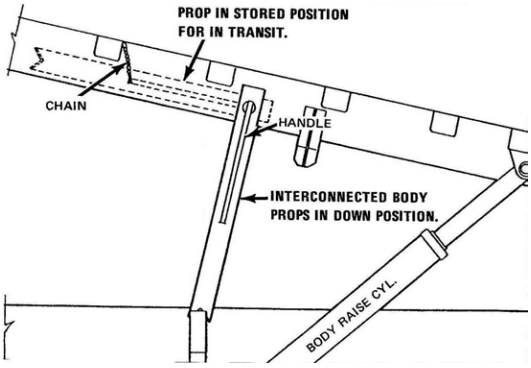


Figure 62. Factory Body Props

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.

SERVICE LIFT OPERATION

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body up when you clean the inside of the body, perform maintenance or repair procedures. Observe and obey the DANGER and WARNING notices below while you use a service lift to raise the body.

⚠ DANGER

Keep all parts of your body 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 the body of all refuse before raising the body.

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. **Lockout/Tagout** 14 the unit.
5. Remove the bolts and springs from the chassis mounting brackets. See the figure below.

Figure 63. Removing Bolts and Springs from Chassis Mounting Brackets

SERVICE LIFT OPERATION (CONTINUED)

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. See the figure below.

64. Front Body Chain Hook Lugs

10. RELEASE the prop handles and LOWER the body props. See the figure below.

Figure 65. Release and Lower Factory Body Props

SERVICE LIFT OPERATION (CONTINUED)

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. See the figure below.

66. 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.

TAILGATE SUPPORT PROPS

⚠ 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 support props are on the unit and BOTH must be used whenever the tailgate is open for service or maintenance!

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** 14 mode.

B. How to Store the Tailgate Props

1. When you finish using the props, take the unit out of the Lock-Out/Tag-Out mode, 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.

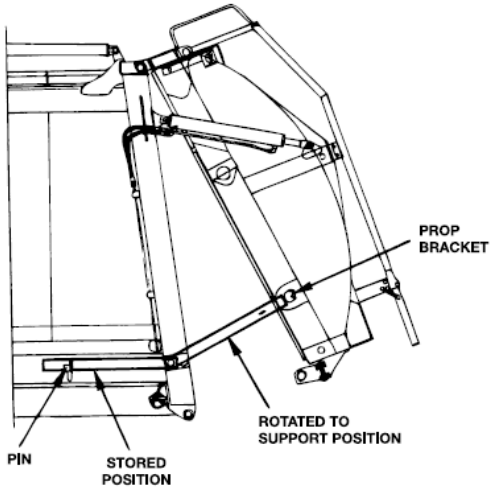


Figure 67. Tailgate Support Props

SIDE ACCESS DOOR

A hinged access door is located on the street side of the unit and provides access to the body area for clean-out purposes. Never enter the door unless the truck engine is stopped, the ignition key is removed, and the unit is in **Lockout/Tagout mode** [14]. See the figure below.

⚠ WARNING

Make sure the unit is in Lockout/Tagout mode 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 Lockout/Tagout mode. 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 Lockout/Tagout mode.

Figure 68.

SIDE ACCESS DOOR PROXIMITY SWITCH

One 18mm sourcing or sinking proximity switch located by the side access door. This switch is adjusted properly when the sensing gap between switch and target is 1/8”. See the figure below.

NOTICE

Side door must be closed and latched prior to adjustment of the side door proximity switch.

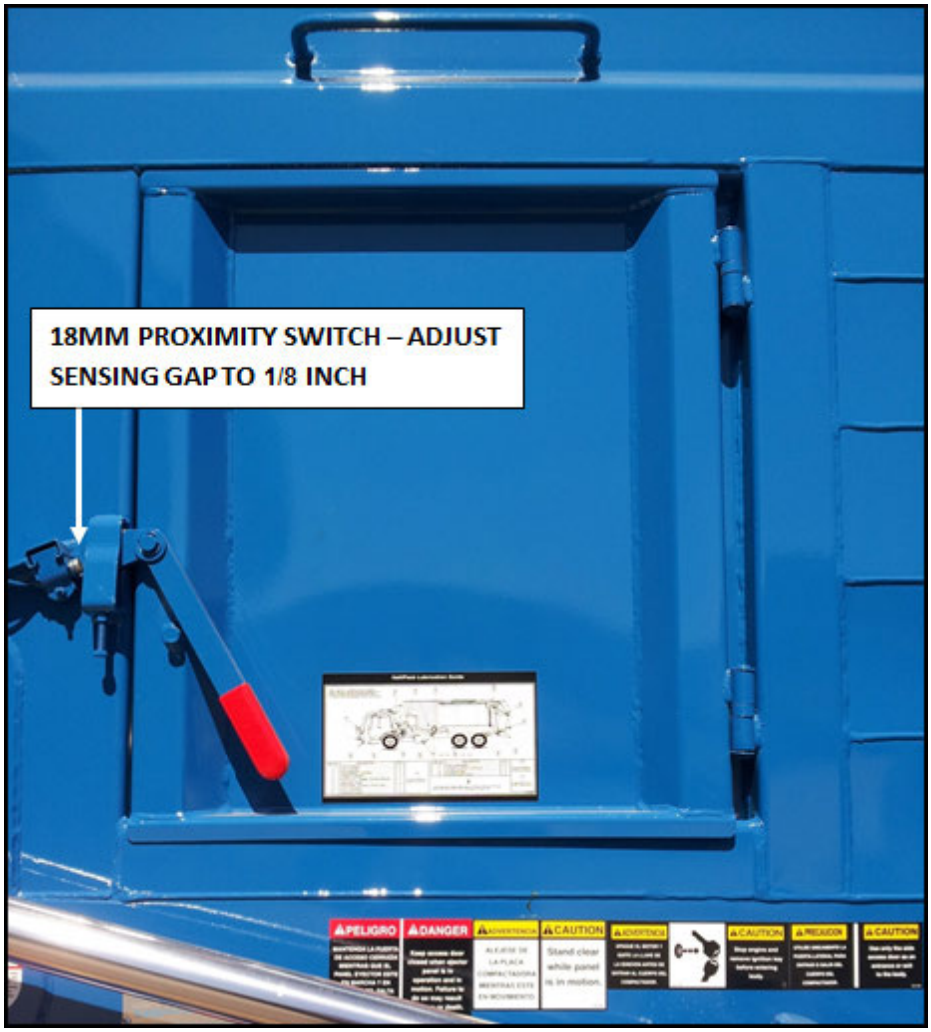
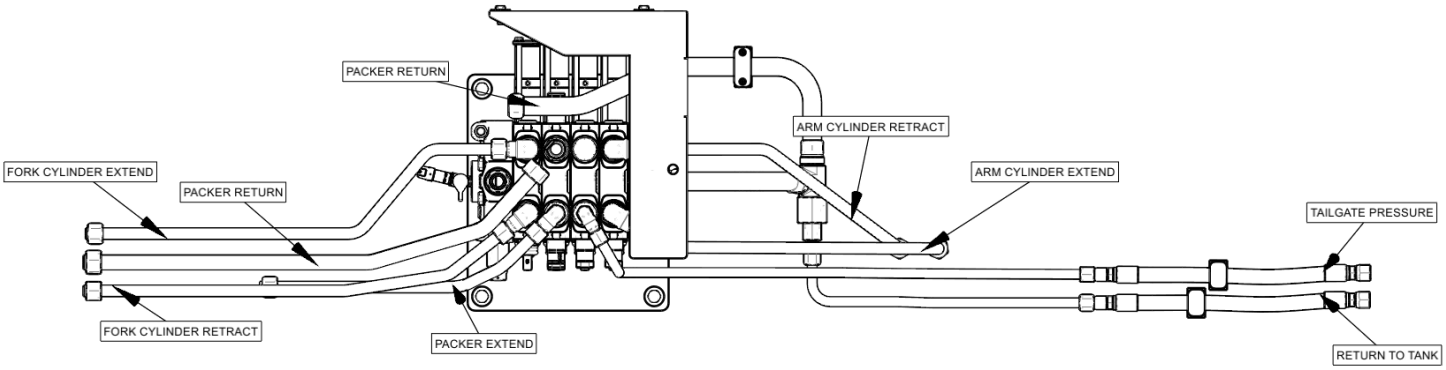


Figure 69. Side Door Proximity Switch

BODY VALVE FUNCTIONS



DUMP VALVE MANIFOLD

What is referred to as a dump valve is technically, in hydraulic terminology, a “Pilot-to-Open check valve. " In the case of the Heil dump valve manifold, it is a very efficient assembly that includes two low-restriction PO check valves. The purpose of the dump valve manifold is to allow a large volume of fluid contained in the pack/eject cylinder to quickly return to the tank.

A. Nomenclature

Use the images below to identify the major component locations.

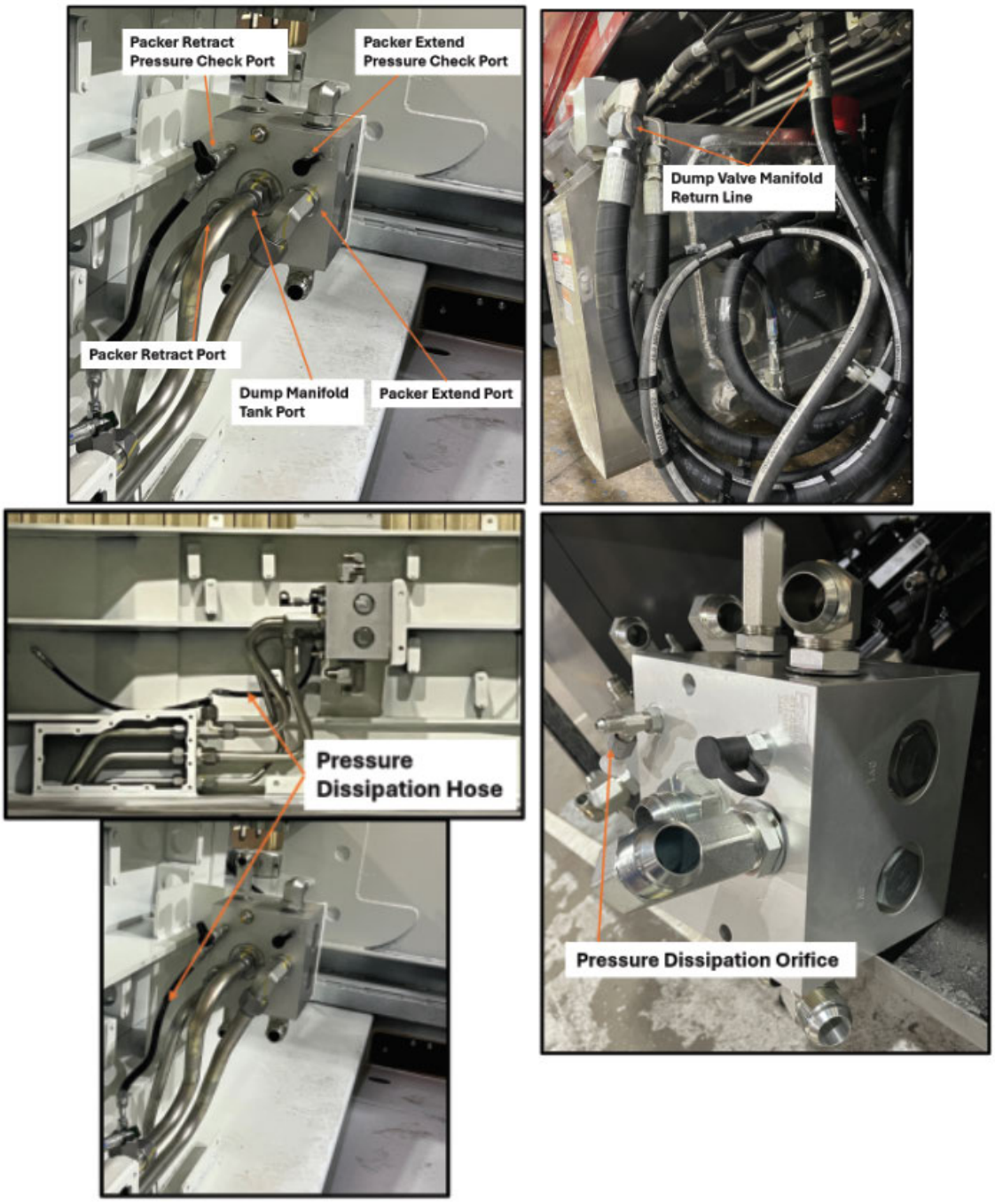


Figure 70. Dump Valve Nomenclature

DUMP VALVE MANIFOLD (CONTINUED)

B. Functionality

While the cylinders are retracting, the dump valve opens a parallel path to the tank. This feature is necessary for a telescopic pack/eject cylinder due to the large volume contained in the bore side of the cylinder compared to the smaller volume of the rod side. Heil uses a manifold that reduces the need for multiple hydraulic connectors. A pressure dissipation orifice (item 7 in the schematics below) is used to prevent hydraulic shocks.

1. Extend Cycle:

To extend pack/eject cylinders, the main underbody valve spool moves to the proper position and sends pump pressure to the cylinders' extend ports. This spool position also diverts the oil from the cylinders' retract ports to the tank.

Reference the schematic below.

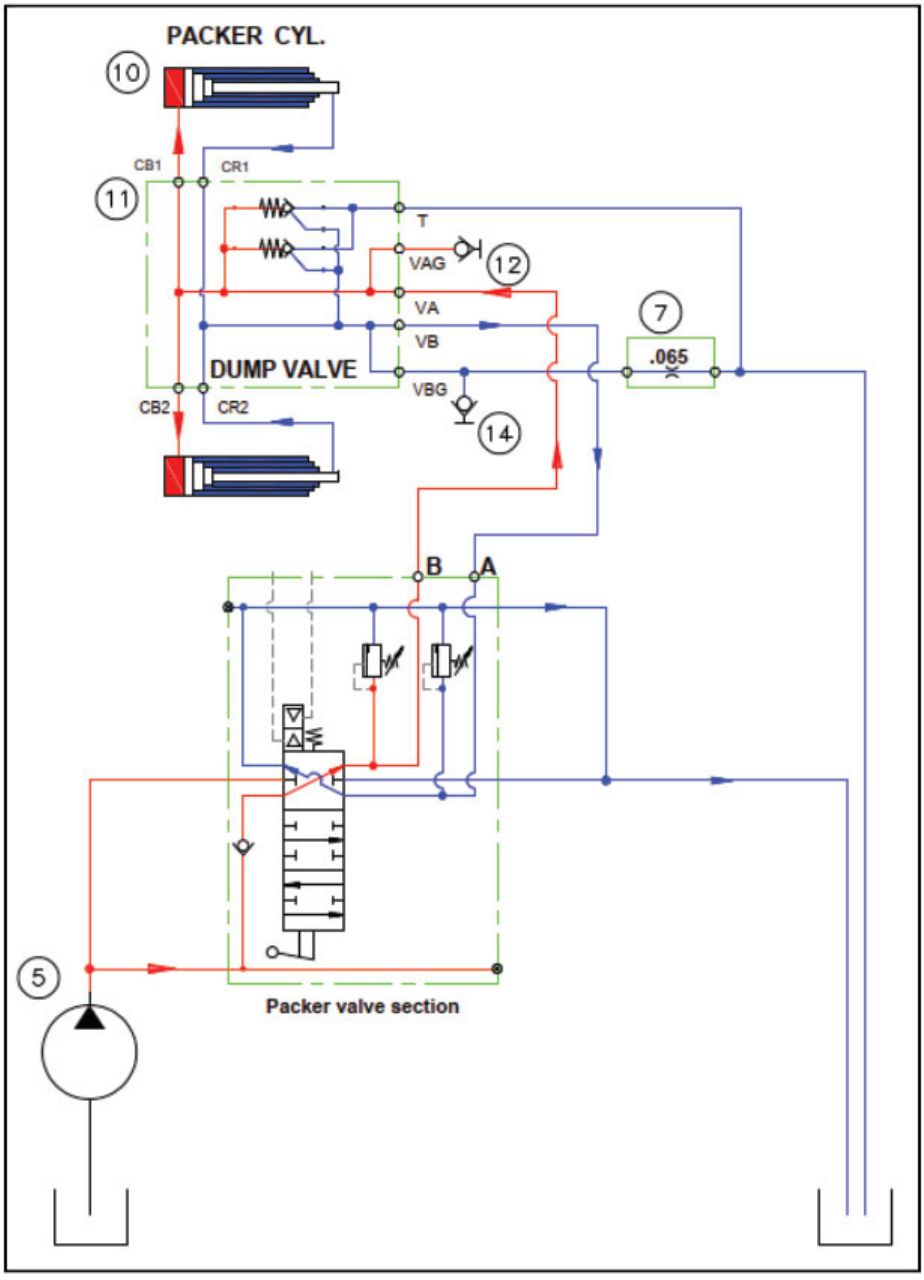


Figure 71. Extending Packer Cylinder

DUMP VALVE MANIFOLD (CONTINUED)

2. Retract Cycle:

To retract pack/eject cylinders, the main underbody valve spool moves to the correct position and sends pump pressure to the retract ports of the cylinders. This spool position also diverts the oil from the extend port of the cylinders to the tank. The high pressure applied to the retract ports pilots opens the dump valve, enabling a second path for the oil from the extend port of the cylinders to reach the tan

Reference the schematic below.

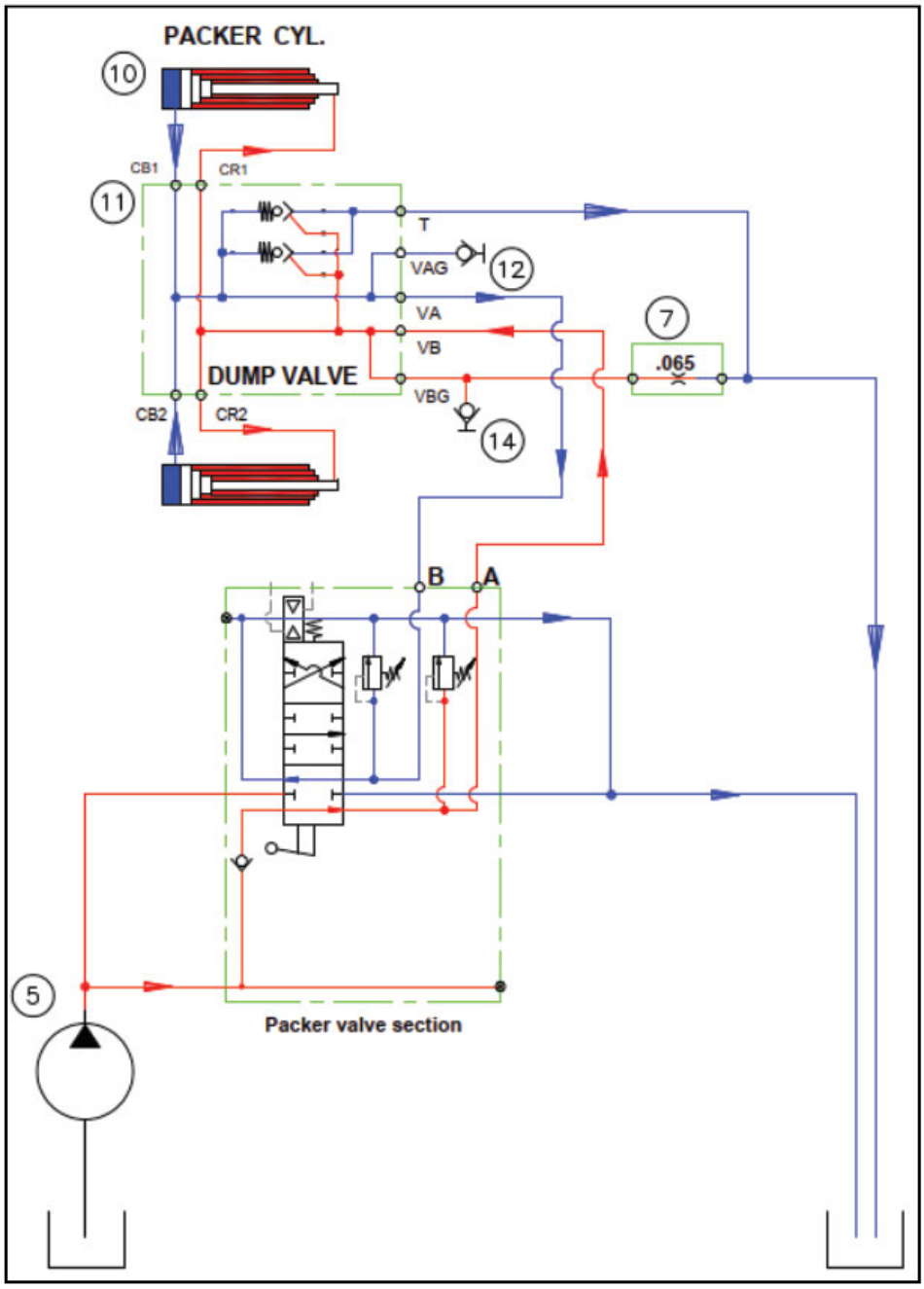


Figure 72. Retracting Packer Cylinder

DUMP VALVE MANIFOLD (CONTINUED)

C. Diagnostic

Those failure modes can be associated with other component/circuit malfunctions, such as cylinder bypass, incorrect body valve spool position, etc.

The most frequent and, importantly, mostly exclusive failure mode is contamination. Contamination can cause the spools in the manifold to get stuck in the open or closed position. Because of the redundancy of the PO check valve in this manifold, troubleshooting is made a little more challenging. This means that only one of both spools/cartridges can be defective. This would lead to incorrect diagnostics using a pressure gauge.

Common symptoms include:

- Slower than usual retract and higher retract pressure
- Slow to extend packer
- Low payload
- Packer drifting out

1. Slower than usual retract and higher retract pressure:

In this failed condition, the dump valve is stuck in the closed position.

a. **Test 1** - Cap the return line and plug or cap the tank side of the connection. If there is no change in retract pressure and speed, both spools may be stuck

b. **Test 2 -** Remove the return line and put it directly to the tank via the filler cap. Plug or cap the tank side of the connection. Extend the packer about halfway. Retract the packer while watching for fluid coming out of the dump valve manifold. There should be a lot of oil coming through this line. BE CAREFUL when doing this.

2. Slower than usual extend and/or low payload:

In this failed condition, the dump valve is stuck in the open position.

a. **Test 3 -** Cap the return line and plug or cap the tank side of the connection. The packer should speed up on extend and be slightly slower on retract.

b. **Test 4 -** Remove the return line and connect it directly to the tank via the filler cap. Plug or cap the tank side of the connection. Extend the packer all the way to the back. Deadhead the packer extend while watching for fluid coming out of the dump valve manifold tank line. There should be a lot of oil coming through this line. BE CAREFUL when doing this.

3. Packer drifting out:

In this failed condition, the dump valve is stuck in the open position, or the pressure dissipation orifice is missing/incorrect. Please note that in most cases of a packer drifting out, the most common failure is cylinder bypass 91.

a. **Test 3 and 4** must be performed first.

b. **Test 5 -** Remove the pressure dissipation hose and cap both open connections. Re-test to see if drifting still happens.

SUMP DOORS

A sump with a door is located on both sides of the front head of the unit. The sump area may be cleaned out by opening the door and using the sump tool.

Doors should be closed at all times except when cleaning out. See the figure below.

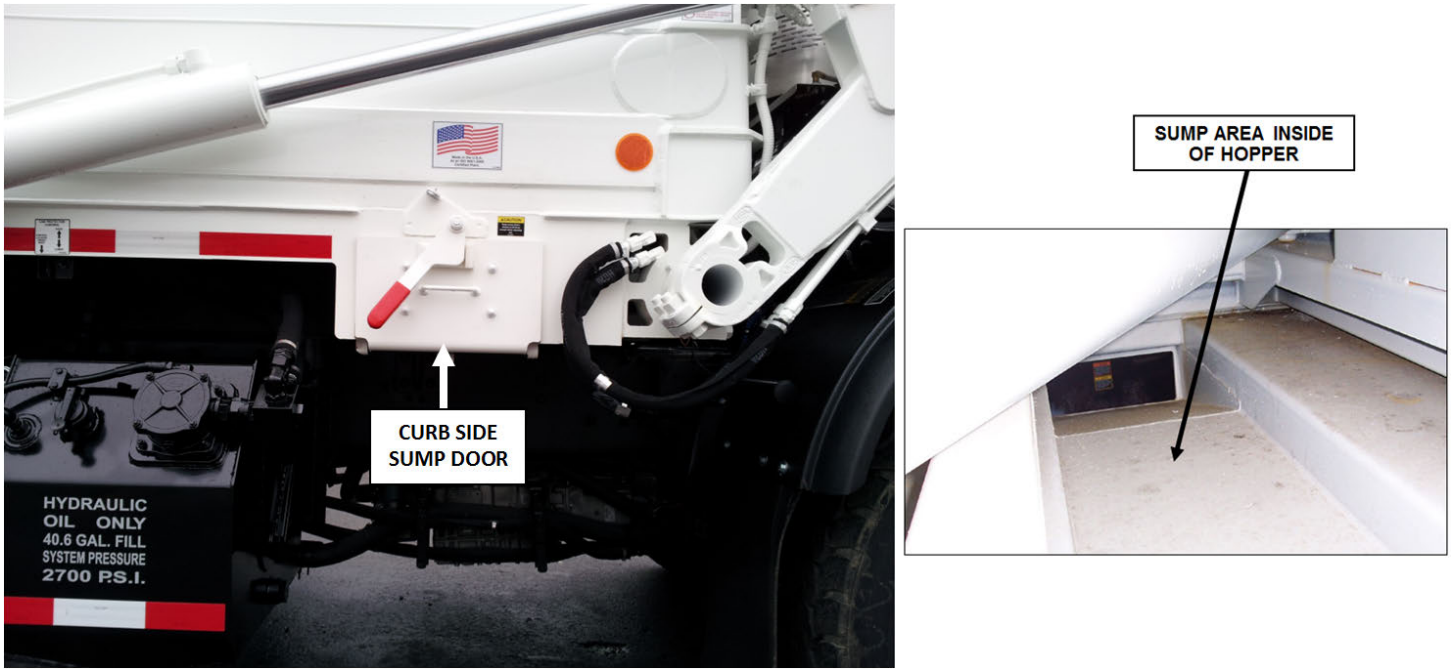


Figure 73. Sump Door and Internal Area

INSTRUCTIONS FOR BODY STRUCTURAL INSPECTION

Use the instructions that follow and perform the inspections necessary and any repairs due to damage to the body.

A. Prepare the Unit for Inspection of Cracks

1. Before performing the inspections, you must set up the unit.
2. Clear the area around the unit of all unnecessary people and equipment.
3. Start the engine and let the hydraulic oil warm up to at least 100° F. Monitor the temperature sight gauge for the temperature of the hydraulic oil. When the unit is in a cold-weather climate and the ambient air temperature is below 0° F, follow the procedures in the **Cold Weather Warm-Up Procedure** 98.

⚠ DANGER

A tailgate in motion is dangerous. Serious injury or death can 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.

⚠ DANGER

Always prop the tailgate when you must leave it raised for maintenance, service, or cleaning procedures. Placing any part of your body between the unit's body and the tailgate at any time, including while you prop the tailgate or when the tailgate is propped, is dangerous. Serious injury or death can occur if any part of your body is between the tailgate and the body if the tailgate suddenly closes.

4. After the hydraulic oil is warm, MOVE the TAILGATE LOCK/UNLOCK switch to the UNLOCK position.
5. MOVE the TAILGATE RAISE/LOWER switch to the RAISE position and RAISE the tailgate sufficiently to use the tailgate props.
6. SET the tailgate props.

⚠ DANGER

Make sure no one is in the hopper and body before you operate the packer. Serious injury or death can occur if a person is in the hopper or body while the packer moves. Make sure there is no equipment in the hopper and body. Equipment in the hopper or body can damage the unit when the packer moves.

7. Make sure the packer is in the fully RETRACTED position. If it is not, PRESS the PACKER RETRACT button and fully RETRACT the PACKER.
8. Turn the engine OFF.
9. After you set up the unit, you must put the unit in a Lockout/Tagout mode.

B. Lockout/Tagout

Put the unit in Lockout/Tagout condition. See the Lockout/Tagout 14 section for specific details.

NOTICE

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

INSTRUCTIONS FOR BODY STRUCTURAL INSPECTION (CONTINUED)

C. Body Inspections

1. Thoroughly clean the inside and outside of the body before you inspect the unit for cracks.
2. Inspect for cracks in the metal of the unit as shown in the following illustrations. (The red dots indicate the inspection points.) Check both sides of the body.
   a. For Point 1, check inside of body where the Packer track meets front hopper head.
   b. For Points 2 and 3, check underneath the body:
      (1) For Point 2, check the top edge of cross shaft lug attachment to floor sheet
      (2) For Point 3, check the longmember to front subframe crossmember corner.
   c. For Points 4 and 5, check:
      (1) For Point 4, check the lower joint at which the three bolsters shown meet
      (2) For Point 5, check around the boss for the pin to attach the arm cylinder.
   d. For Point 6, check the upper joint at which the three bolsters shown meet.
   e. For Point 7, check the body side at the center of the body and the bend in the body side sheet.
   f. For Point 8, check the end of the bolster on the body side.
   g. For Point 9, with the tailgate open, check the back surface of the rear body bolster.
   h. For Point 10, check the body roof sheet in the corner. See the figure below.

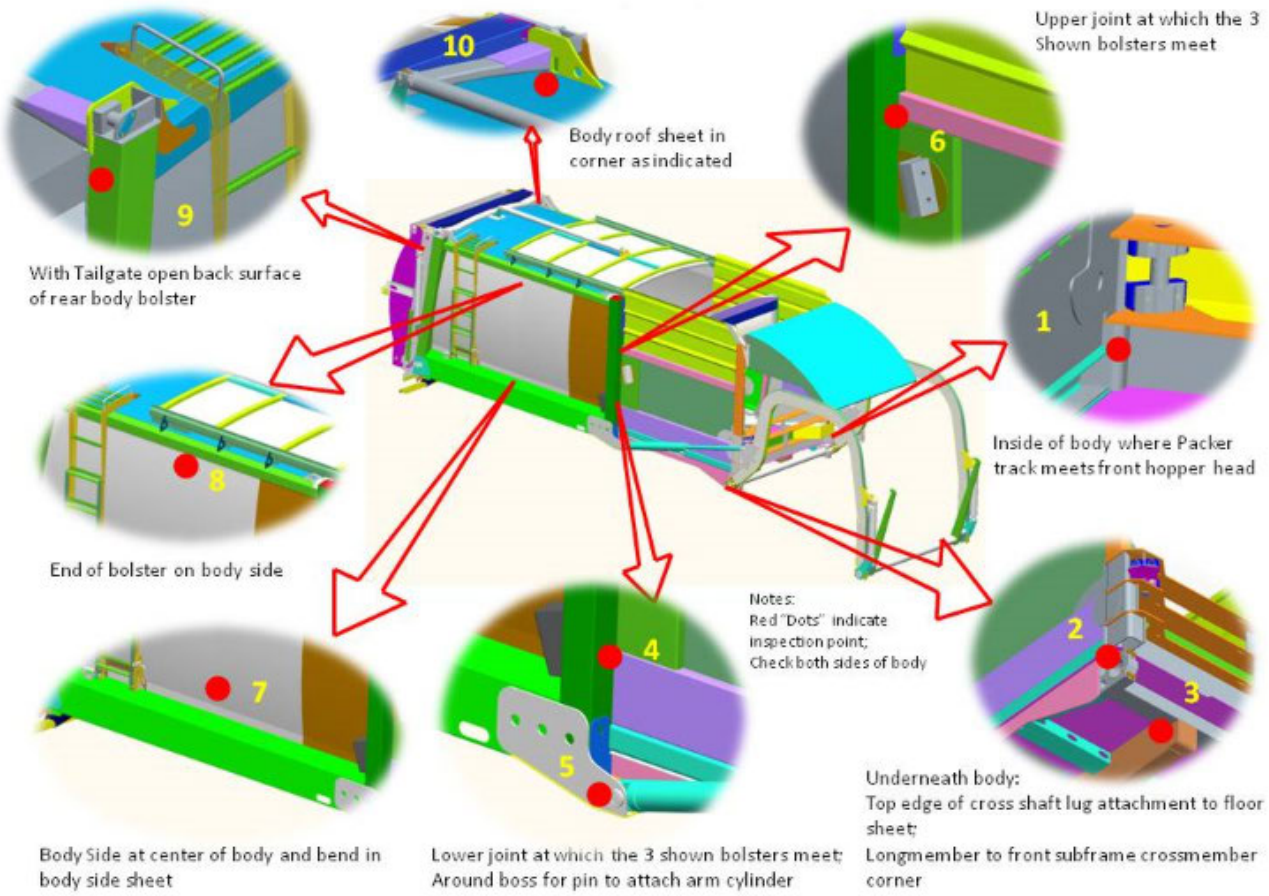


Figure 74. Front Loader Body Inspection Check Points

INSTRUCTIONS FOR BODY STRUCTURAL INSPECTION (CONTINUED)

3. If cracks are visible, contact your Heil dealer or Heil for recommended countermeasures. Continued operation of a vehicle with cracks can lead to detrimental damage to the structure that may or may not be repairable.
4. If consistent over-packing is suspected, do the following.
   (a) Inspect for cracks in the metal of the body as given above on a monthly (200 hours) basis.
   (b) Give additional operator training on proper allowable payloads.
   (c) Recalibrate the HOPS.
   (d) Confirm proper pressure settings in the body. Refer to Paragraph A.
5. If no metals cracks are found, keep the unit in the Lock-Out/Tag-Out mode and go to Paragraph 4.

WELDING AND ELECTRONIC DEVICES / ELECTRICAL LUBRICANTS

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

⚠ WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas. See Service Manual Section 1.

- Disconnect all battery connections.
- Place welding ground as close as possible to the area that is being repaired.
- Disconnect the Mobile Controller.
- 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.

SECTION 4
MAINTENANCE AND ADJUSTMENT

BODY DAILY CHECKLIST

Make sure you perform a daily check of the unit. Refer to the 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.
Air regulator	90 PSI, typically located street side in the cab behind the seat
Operation	Operate All Functions to make sure all functions work correctly.

BODY PREVENTIVE MAINTENANCE CHART

Preventive maintenance must be performed to ensure the safe and reliable operation of your unit. Use the chart below as a guideline for when essential items should checked and serviced. Severe use or adverse conditions may require more frequent maintenance.

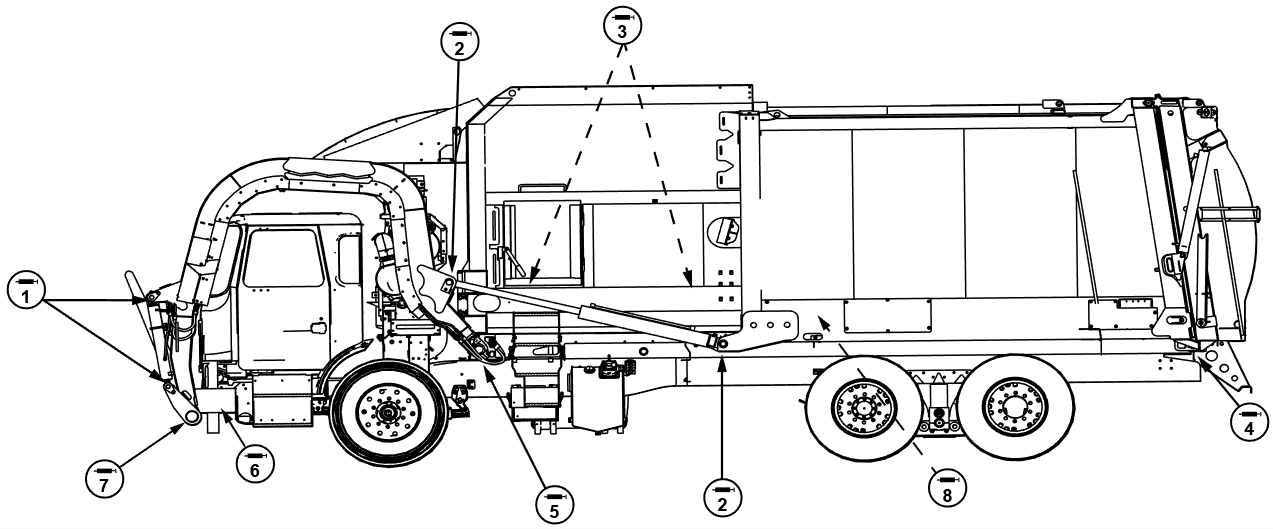
BODY PREVENTIVE MAINTENANCE CHART						
*HOURS OF OPERATION						
COMPONENT/SYSTEM	**8**	**40**	**200**	**1000**	**2000**	**CHECK/SERVICE**
Hydraulic System	☑					Check oil level – add if necessary
		☑				Check cylinders, pump, hoses, tubes, fittings, and adapters for leaks. Check hoses for cracks, crushes, 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.
		☑				Check Control valve seals for leaks. Repair or replace if necessary.
				☑		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.
				☑		Replace tank breather filter every time you replace filter element.
					☑	Drain, flush, and refill. Change filter element(s). Change oil when oil sample shows to change oil.
	When the hydraulic oil analysis shows the oil has expired					Drain, flush, and refill the hydraulic oil. Change filter element.
Electrical, Battery Cables	☑					Check for proper operation.
		☑				Check battery cables from battery to starter for loose cables, rubbing or damage and abrasions to cables. Replace if necessary.
Operator Controls	☑					
Front Mount Pump or Power Take-Off (PTO)		☑				Check seals for leaks and operation. Replace if necessary
		☑				Check drive line for smooth operation. Replace as necessary.
		☑				Check set screws for tightness. Tighten as necessary.
		☑				Make sure keys are in place. Replace if necessary.
			☑			For greaseable PTO's (non-wet spline),

BODY PREVENTIVE MAINTENANCE CHART						
*HOURS OF OPERATION						
COMPONENT/SYSTEM	**8**	**40**	**200**	**1000**	**2000**	**CHECK/SERVICE**
						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 PTO's such as the Chelsea 890/897 series.
Grease Fittings		☑				Lubricate as shown on **Body Lubrication Decal** 85.
Body Undercoating					☑	Inspect body undercoating and repair as necessary.
Fork Bearing Block Bolts			☑			Each of the four fork bearing block bolt torques should be 460 Ft-Lbs.
Tailgate Seal Integrity	☑					
Packer/Ejector Cylinder Preventive Maintenance	☑	☑	☑			See **Packer/Ejector Cylinder Preventive Maintenance.** 86
Packer/Ejector Panel Bolt-in Cylinder Mount Bolts			☑			Check for tightness. Bolt torques should be 192 Ft-Lbs. (lubricated threads)
PTO/Transmission Interface Inspection			☑			Check the torque on the PTO mounting screws and tighten to the proper torque specification
* Daily = 8 hrs. Weekly = 40 hrs. Monthly = 200 hrs. 6 Months = 1000 hrs. Yearly = 2000 hrs.						

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 moveable mechanical parts without fittings every 60 days with non-detergent engine oil.

HALF/PACK® BODY LUBRICATION GUIDE



REF NO.	DESCRIPTION	QTY.	FREQUENCY	REF NO.	DESCRIPTION	QTY.	FREQUENCY
1	FORK CYLINDERS	4	WEEKLY/EVERY 40 HOURS	5	ARM CROSS SHAFT	4	WEEKLY/EVERY 40 HOURS
2	ARM CYLINDERS	4	WEEKLY/EVERY 40 HOURS	6	PUMP DRIVE SHAFT	2	WEEKLY/EVERY 40 HOURS
3	PACKER/EJECTOR CYLINDERS	4	WEEKLY/EVERY 40 HOURS	7	FORK CROSS SHAFT	2	WEEKLY/EVERY 40 HOURS
4	SHUR-LOCK TAILGATE CYLINDER BRACKET	2	WEEKLY/EVERY 40 HOURS	8	PACKER PANEL TRACKS	2	MONTHLY/EVERY 200 HOURS

Use No. 1 pressure gun grease. Clean fittings before applying grease and always pump enough grease to remove old grease. Wipe off excess.

Lubricate moveable mechanical parts without fittings every 60 days with non-detergent engine oil.

212-3406

Figure 75. Half/Pack Lubrication Guide, PN 212-3406

PACKER/EJECTOR CYLINDERS PREVENTIVE MAINTENANCE

It is critical to follow the guidelines of the **Body Preventive Maintenance Chart** and **Body Lubrication Guide** found in this section of the 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 the unit is in Lockout/Tagout mode 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 Lockout/Tagout mode. 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 Lockout/Tagout mode.

⚠ 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
• Using a plastic shovel, clean behind the packer panel and pockets around sphericals. DO NOT damage cylinder rods by striking with any metal object. • 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.	• Grease Packer/ Ejector cylinder spherical bearings/ pins • Inspect packer/ ejector cylinder bearings/pins (both ends) for wear, rust or damage and replace if necessary.	Perform the operational “Checks and Inspections” found in the Operation Manual. If unit recalibration is required, refer to Arc Sensor Calibration 168 in Service Manual.

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 (see figure to right)

PACKER/EJECTOR PANEL ADJUSTMENT

Follow this procedure and refer to the figure below to adjust the Packer/Ejector for Autopack units.

NOTICE

Failure to maintain proper adjustment may affect payloads and/or cause structural damage to the unit.

Packer/Ejector Panel adjustment may be needed when the arc sensor for the packer is changed or is needed to be re-calibrated. Calibration should be performed ONLY by authorized service personnel. See **Arc Sensor Calibration** 168 for more information.

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. See image below.

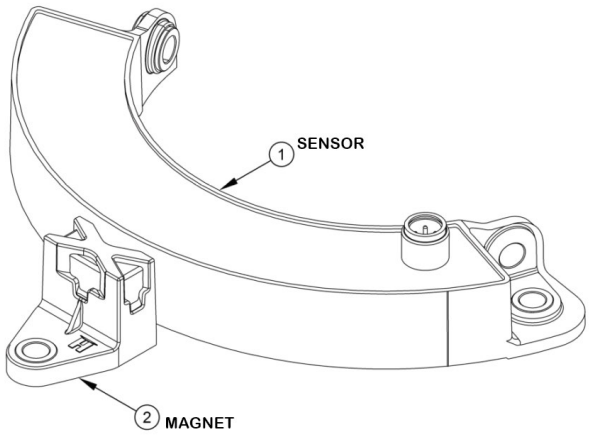


Figure 76. Arc Sensor

2. The input displays the packer position. When fully retracted, the packer will be around 355 - 325. At its packing position, it will be around 200 - 180 and will decrease as the packer ejects the load.

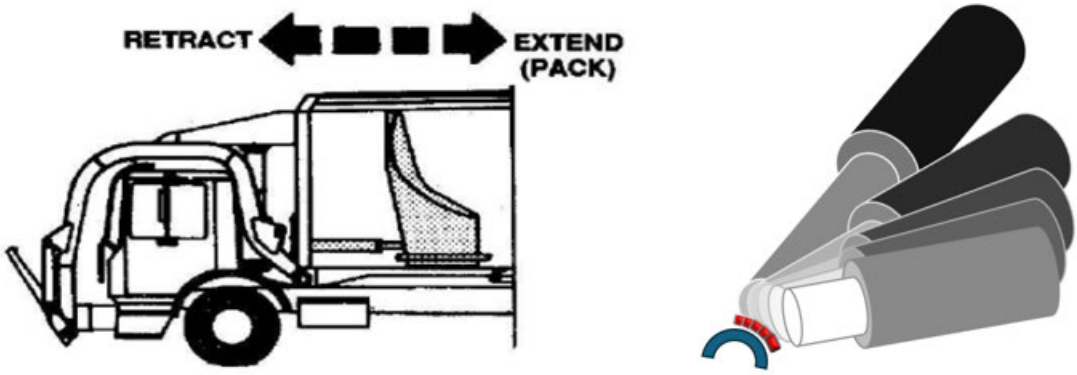


Figure 77.

B. Troubleshooting

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

1. Pin Positions: Heil uses pins 1, 2, and 3 ONLY. See image below for more details.

- **Pin 1 = Supply Voltage 9 to 24 VDC**
- **Pin 2 = Output 0.5V – 4.5V**
- **Pin 3 = GND**
- Pin 4 = Output 4.5V -0.5V

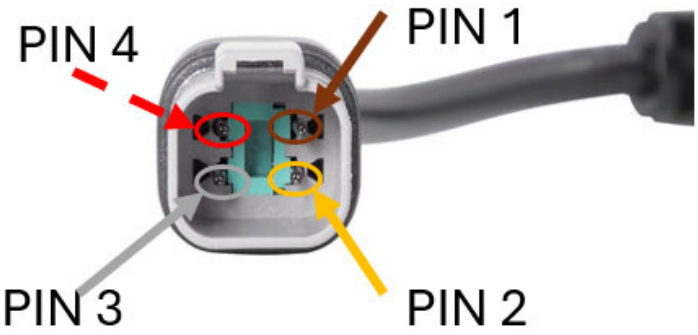


Figure 78. Arc Sensor Pin Locations

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

   d. Expected readings on the display:

   Home position at the front head - 340 - 360

   Pack position - 195

   Travel position - 180

   Full extend position - 105

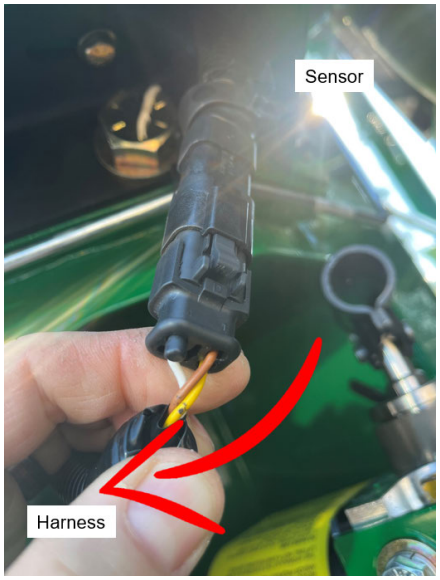


Figure 79. Arc Sensor Harness

PACKER POSITION SENSOR (CONTINUED)

3. Schematics:

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

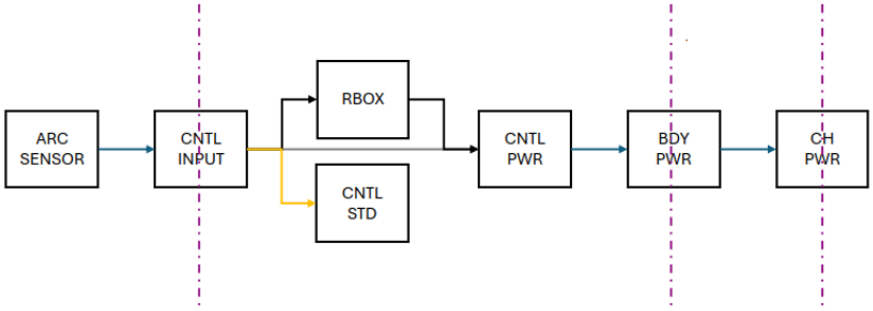


Figure 80. Basic Schematic

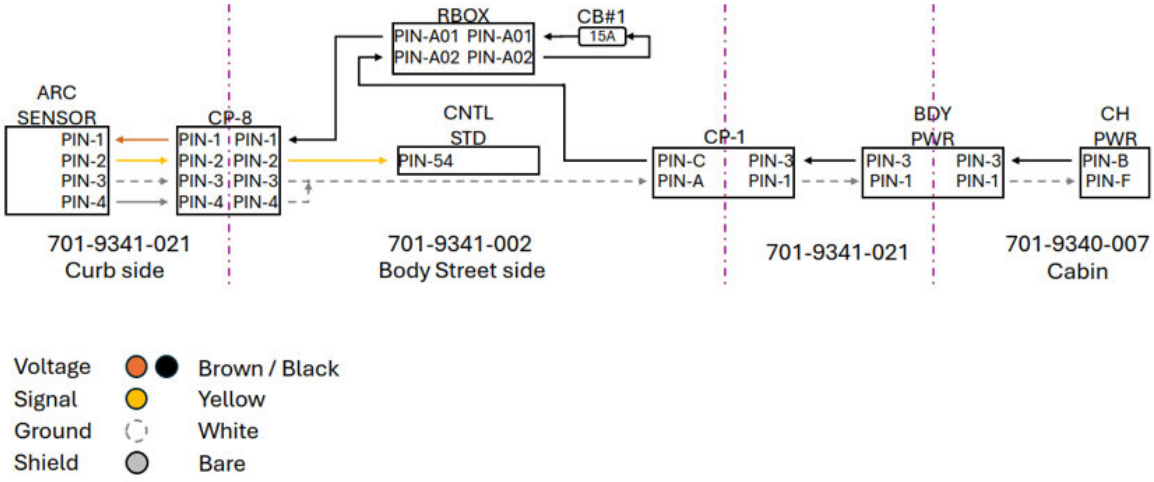


Figure 81. Pre-2021 HalfPack

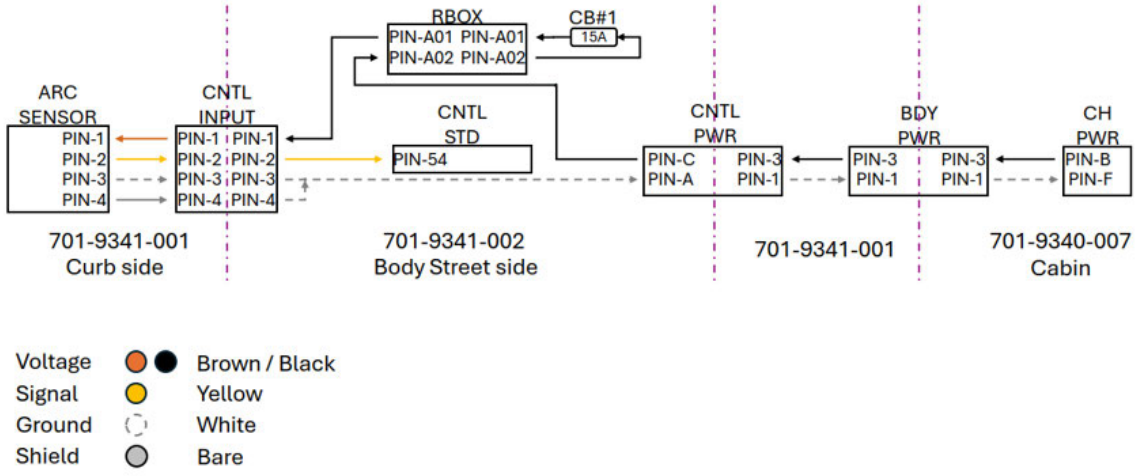


Figure 82. Post-2021 HalfPack

PACKER POSITION SENSOR (CONTINUED)

C. 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 83. Magnet Holder Location on Cylinder Rod Eye

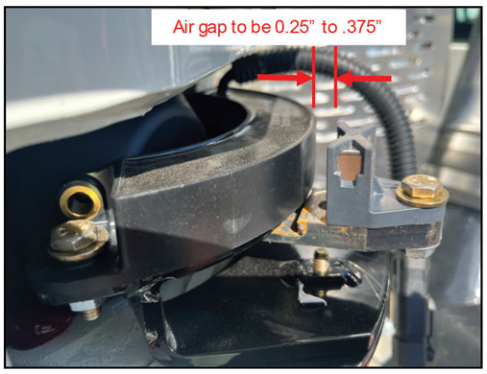


Figure 84. Air Gap Measurement

Figure 85. Home Position/Retracted

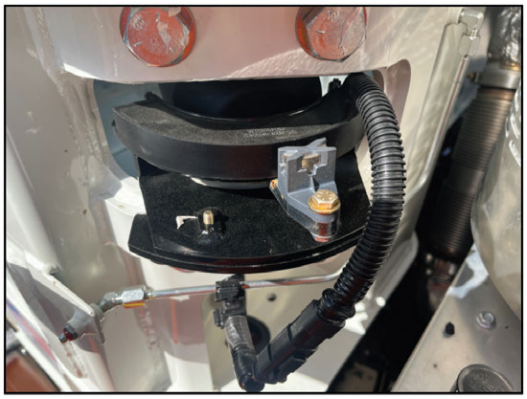


Figure 86. Travel Position/Extended

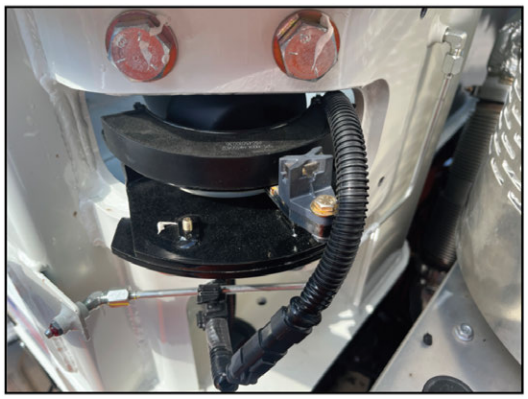


Figure 87. Eject Position/Fully Extended

CYLINDER BYPASS

Bypassing occurs when the hydraulic oil “bypasses” the seals on the piston to the other side of the cylinder when pressurized, causing the hydraulic function to slow down and/or have erratic functionality. See figure below.

Note: "A" = Retract and "B" = Extend

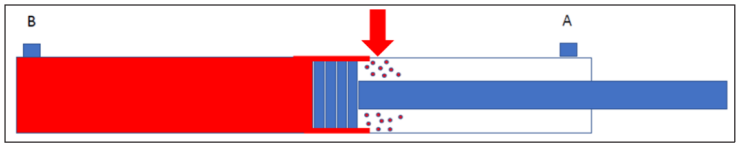


Figure 88. Pressurized Oil Bypassing the Piston Inside the Cylinder

In some cases, cylinder bypass is unavoidable due to years of wear or failure of an internal hydraulic part. However, there are several ways to prevent this from happening:

- Contain leaks
- Keep the oil clean when opening the system to fill or inspect
- Prevent side loading
- Maintain proper system pressures
- Follow the **Body Preventative Maintenance Chart** 83 provided in this manual

STANDARD BYPASS TEST

Carefully follow the troubleshooting steps below.

NOTICE

For units equipped with in-cylinder sensors, the controller may partially close the control valve once the cylinder reaches its fully extended or retracted position. This action reduces the flow to the cylinder and can result in an inaccurate result for the bypass test. As a best practice, apply direct power (12V or air) to the appropriate valve actuator for effective troubleshooting.

⚠ CAUTION

Make sure the area is clear of all unnecessary people and equipment before performing the bypass tests.

A. Troubleshooting Cylinder Bypass in the Extend Position

1. Fully extend the cylinder.
2. Remove the hose or tube from the cylinder port "A"
   a. Ensure the hose or tube is properly secured and stored in a clean area, away from potential sources of contamination that could be introduced to the system.
3. Pressurize port "B" or "deadhead" the cylinder
   a. The pressure used should be the pressure that is set in the hydraulic circuit for this cylinder.

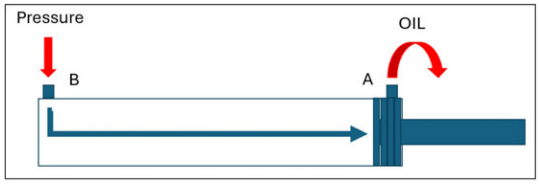


Figure 89.

Note: If more than 8 oz per minute exits out of port "A," this cylinder is experiencing cylinder bypass.

4. Repeat steps 1-3 in reverse to test for bypass in the other direction.

B. Troubleshooting Cylinder Bypass in the Retract Position

1. Fully retract the cylinder
2. Remove the hose or tube from cylinder port "B"
   a. Make sure the hose or tube is properly secured and stored in a clean area, away from potential sources of contamination that could be introduced to the system.
3. Pressurize port "A" or "deadhead" the cylinder
   a. The pressure used should be the pressure set in the hydraulic circuit for this cylinder.

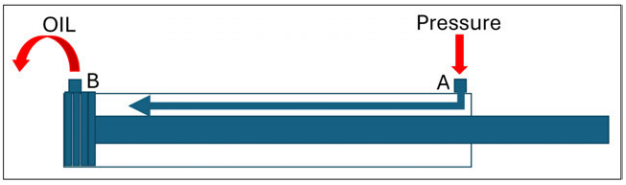


Figure 90.

Note: If more than 8 oz per minute exits out of port "B," this cylinder is experiencing cylinder bypass.

4. If more than 8 oz of hydraulic oil bypasses the piston - rebuild or replace the cylinder to restore full functionality.

ARM CYLINDER BYPASS TEST

If the standard bypass test does not result in failure and the cylinders continue to show signs of bypassing, perform the following troubleshooting test.

Additionally, this test can be used to determine:

- The cylinder bypassing
- Valve internal leakage problem
- Spool positioning problem

NOTICE

A lifting device, such as a forklift or crane, is required for this test.

1. Raise the arm to the top height of the windshield and rest it on the lifting device.
2. Perform **Lockout/Tagout** 14
3. Remove BOTH hoses on the ROD side of the arm cylinders and CAP one cylinder with a stell cap.
4. Remove BOTH hoses on the BORE side on BOTH cylinders - cap the hose, NOT the cylinder.
5. Leave BOTH cylinder bores open to the atmosphere
6. Remove the lifting device and watch for the arms to go down
7. If it goes down, the CAPPED cylinder is bypassing
8. Repeat steps 1-6 on the other side - it is possible to have two cylinders bypassing

CYLINDER SENSORS

Half/Pack uses high-pressure proximity sensors (Part Number 063-0151) inside the tailgate lock cylinders (QTY 2), tailgate raise cylinder (QTY 1), and top door cylinder (QTY 1).

A. Proximity Switch Adjustment

All Proximity Switch Adjustments, for safety reasons, must be made with any container removed (if equipped) and disconnected from the unit/truck. Unit should be on level ground. Clear the area around the unit of all unnecessary people and equipment. It is strongly recommended that the truck be quarantined from other units and uninvolved personnel outside the shop area when adjusting the Proximity Switches on the unit. The person making adjustment must know how to safely operate the unit and fully understand the adjustment he/she is making. The use of a spotter may be needed when cycling the arms and forks.

Commercial and Residential

- Arms Up Proximity Switch
- Lift Below Transit Proximity Switch

Residential Only

- Forks Roll Proximity Switch
- Forks Level Proximity Switch
- Arms Down Proximity Switch
- Autolift
- Forks Clear Proximity Switch

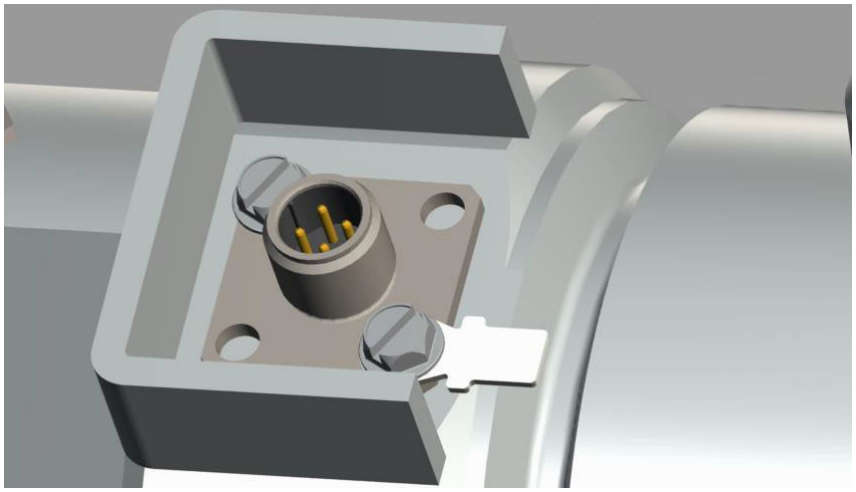
MTS SENSOR CONNECTOR REPLACEMENT (BOLTED FLANGE DESIGN)

A. Required Equipment:

- Soldering iron and solder
- Heat-shrink tubing suitable for 20AWG wire, cut into 1/2” lengths
- Replacement connector kit (Heil Part Number 001-7064-105)
- Heat gun
- Wire cutter/stripper
- Flat-head screwdriver, Phillips screwdriver, 1/16” hex key, or 1/4” nut driver (depending on the fastener used to connect the flange body to the cylinder)

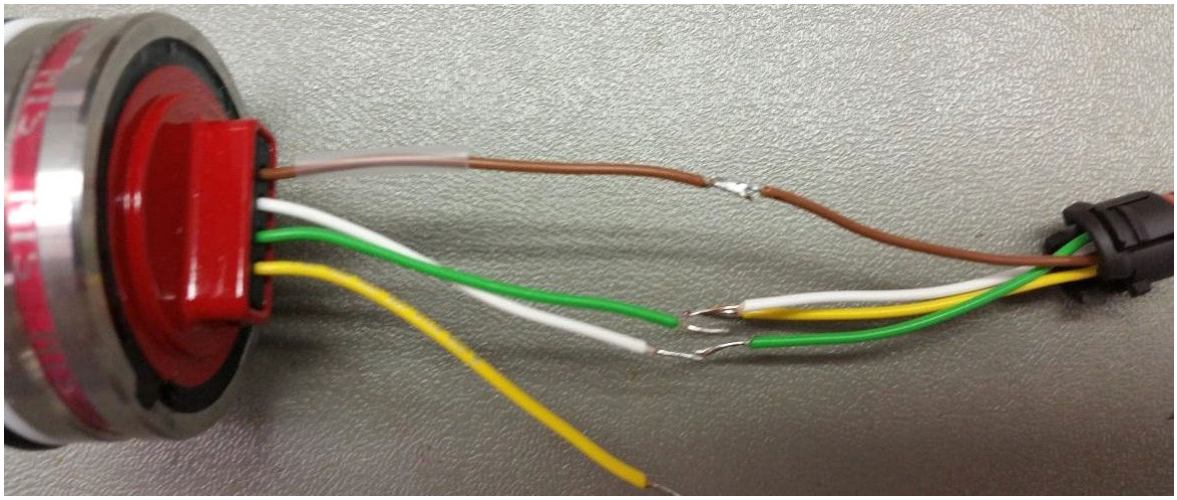
B. Procedure:

1. Remove the fasteners that are connecting the flange body to the cylinder (there may be 2 or 4 fasteners, and they may be one of several different types, depending on the cylinder).

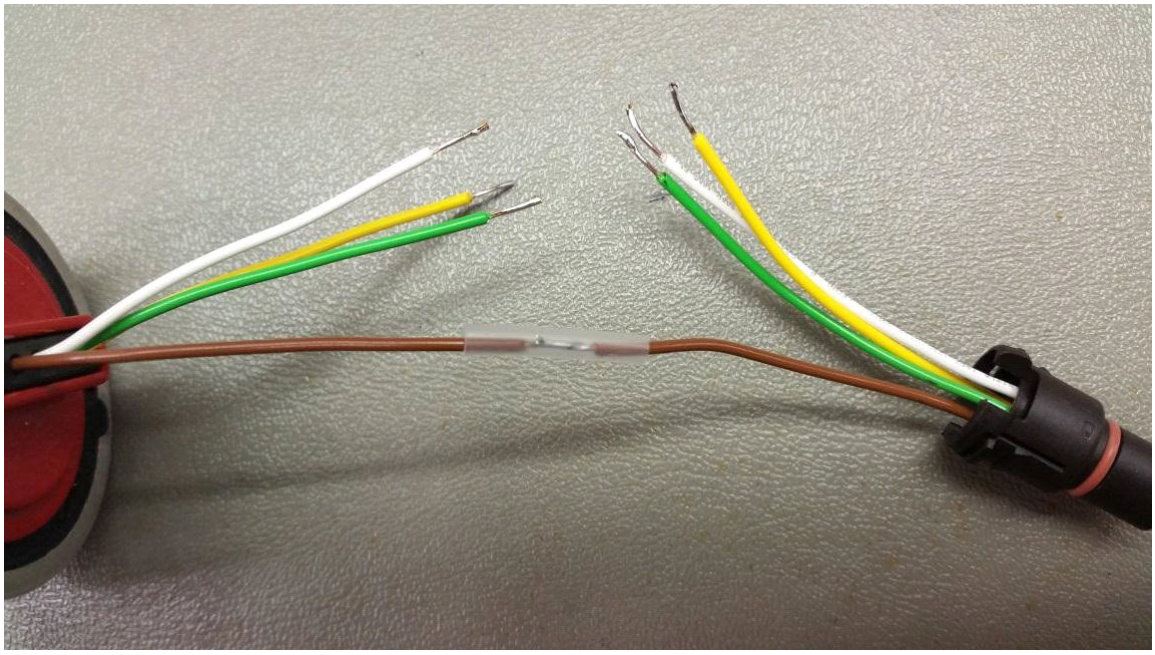


2. With the fasteners removed, pull the flange and connector body away from the cylinder.
3. Separate the metal flange from the black connector core by squeezing the black tabs at the bottom of the connector core, and pulling the two components apart.
4. Inspect the wires, connector pins, and black connector core for damage. If there is no damage to these components, then only the metal flange needs to be replaced. Take note of the orientation of the connector key relative to the flange bolt pattern.
5. Proceed to step 17 if only the metal flange needs to be replaced.
6. Measure the total visible wire length from where the wires exit the cylinder body to the back of the black connector core.
7. Cut the wires at approximately half of the total visible length.
8. Cut the wires on the replacement connector included in the repair kit at the same length.
9. Strip approximately 1/4” of insulation from the ends of each wire.
10. Tin the bare wire ends.
11. Slide a piece of heat-shrink tubing over one of the brown wire.
12. Lay the tinned ends of the brown wires adjacent to each other.
13. Apply solder to the joint.

MTS SENSOR CONNECTOR REPLACEMENT (BOLTED FLANGE DESIGN) (CONTINUED)



14. Slide the heat-shrink tubing over the solder joint so that the joint is in the middle of the tubing.



15. Shrink the tubing into place with a heat gun.
16. Repeat steps 11-15 for the yellow, white and green wires.
17. Install the new metal flange included with the repair kit onto the black connector core. Make sure that the connector key is oriented relative to the bolt pattern the same as it was before the replacement. The flange should snap into place. After the flange is snapped into place, hold onto the flange and gently pull on the wires to make sure the assembly does not come apart.
18. Carefully feed the wires back into the cylinder body until the metal flange makes contact with the cylinder.
19. Align the flange holes with the threaded holes in the cylinder, and re-install the fasteners. Take care not to over-tighten the fasteners.
20. Connect the sensor to the controller and verify proper operation.

PAINTING CYLINDERS WITH IN-CYLINDER SENSORS

Powder coating or electrostatic painting of cylinders uses a high voltage electrostatic charge that can damage the electronics of in-cylinder mounted displacement sensors. Heil recommends using standard painting procedures rather than powder coating for cylinders with in-cylinder sensors.

IN-CYLINDER HIGH-PRESSURE PROXIMITY SWITCH REPLACEMENT

Heil Half/Pack units use high-pressure In-Cylinder Proximity Sensors (Part Number 063-0151) to communicate piston positioning of the tailgate lock cylinders (QTY 2), tailgate raise cylinder (QTY 1), and top door cylinder (QTY 1) to the Mobile Controller. Only properly trained and authorized service personnel should attempt any type of hydraulic system work.

⚠ CAUTION

DO NOT operate cylinder with high-pressure proximity switch removed. The sensor port is wet port (hydraulic pressurized port). The unit must be in Lockout/Tagout Mode BEFORE you remove the high-pressure proximity switch.

1. Position the cylinder so that the cylinder piston is aligned with the sensor port. This position is fully collapsed on Tailgate Raise and Top Door cylinders and fully extended on Tailgate Lock cylinders. See the figures below.
2. Place the unit in **Lockout/Tagout Mode** 14.
3. Remove faulty sensor. Replace with new sensor (Part Number 063-0151) by gently turning the new sensor into the port clockwise until it makes contact with the cylinder piston, then turn counterclockwise 1/2 turn and tighten the jam nut to lock the sensor in place. For confirmation of a successful installation, make sure at least two threads of the sensor are protruding out of the lock nut.
4. Take the unit out of **Lockout/Tagout Mode** 14.

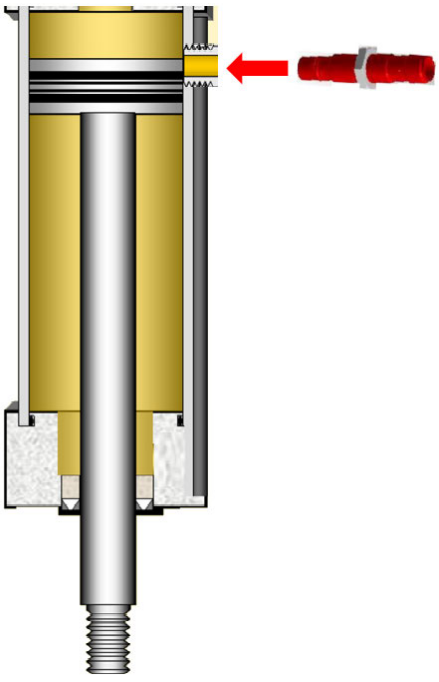


Figure 91. Tailgate Raise or Top Door Cylinder Fully Collapsed

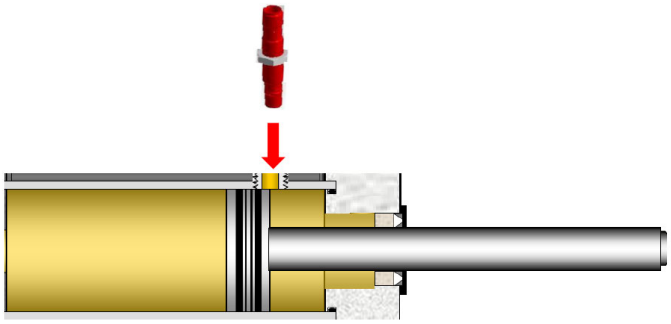


Figure 92. Tailgate Lock Cylinder Fully Extended

IN-CYLINDER HIGH-PRESSURE PROXIMITY SWITCH TROUBLESHOOTING

Wire colors in the figure below represent the Heil harness side of connections.

1. Make sure the 12 V supply is good at Pin-C.
2. Make sure the ground is good at Pin-A.
3. When the cylinder piston is in front of the proximity sensor, you should see 12 V at Pin-B. When the piston is not in front of the proximity sensor, there should be 0v on Pin-B.

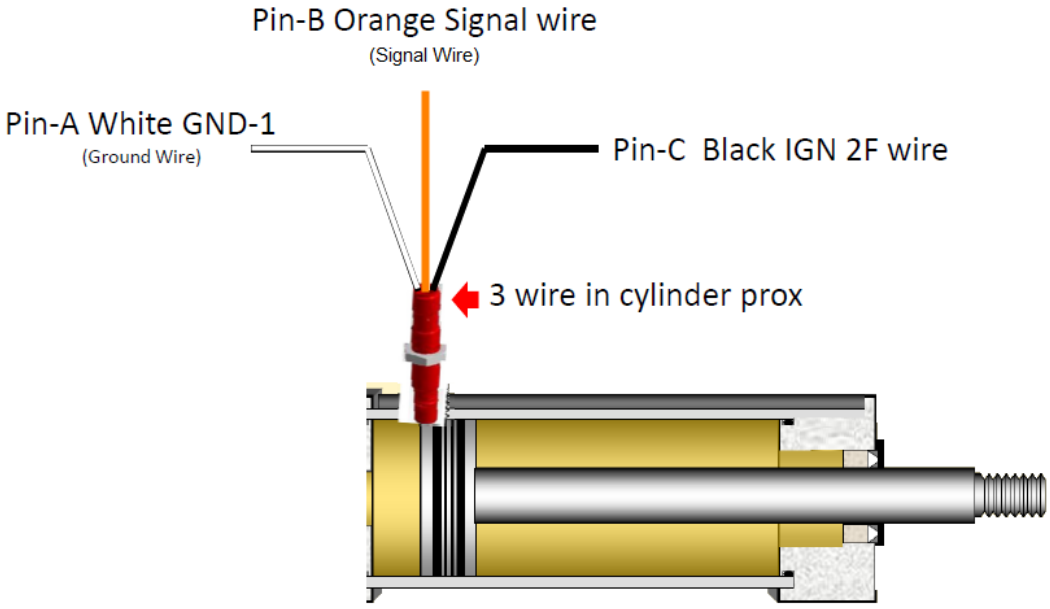


Figure 93. Wire Colors Above Represent Heil Harness Side of Connections

COLD WEATHER WARM-UP PROCEDURE

When ambient air temperature is cold (below 0 degrees F), 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 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.

HYDRAULIC TANK REAR COMPONENTS

A. Hydraulic Oil Temperature Sensor

See image below for the location of this sensor.

B. Hydraulic Low Oil Level Switch

See image below for the location of this switch.

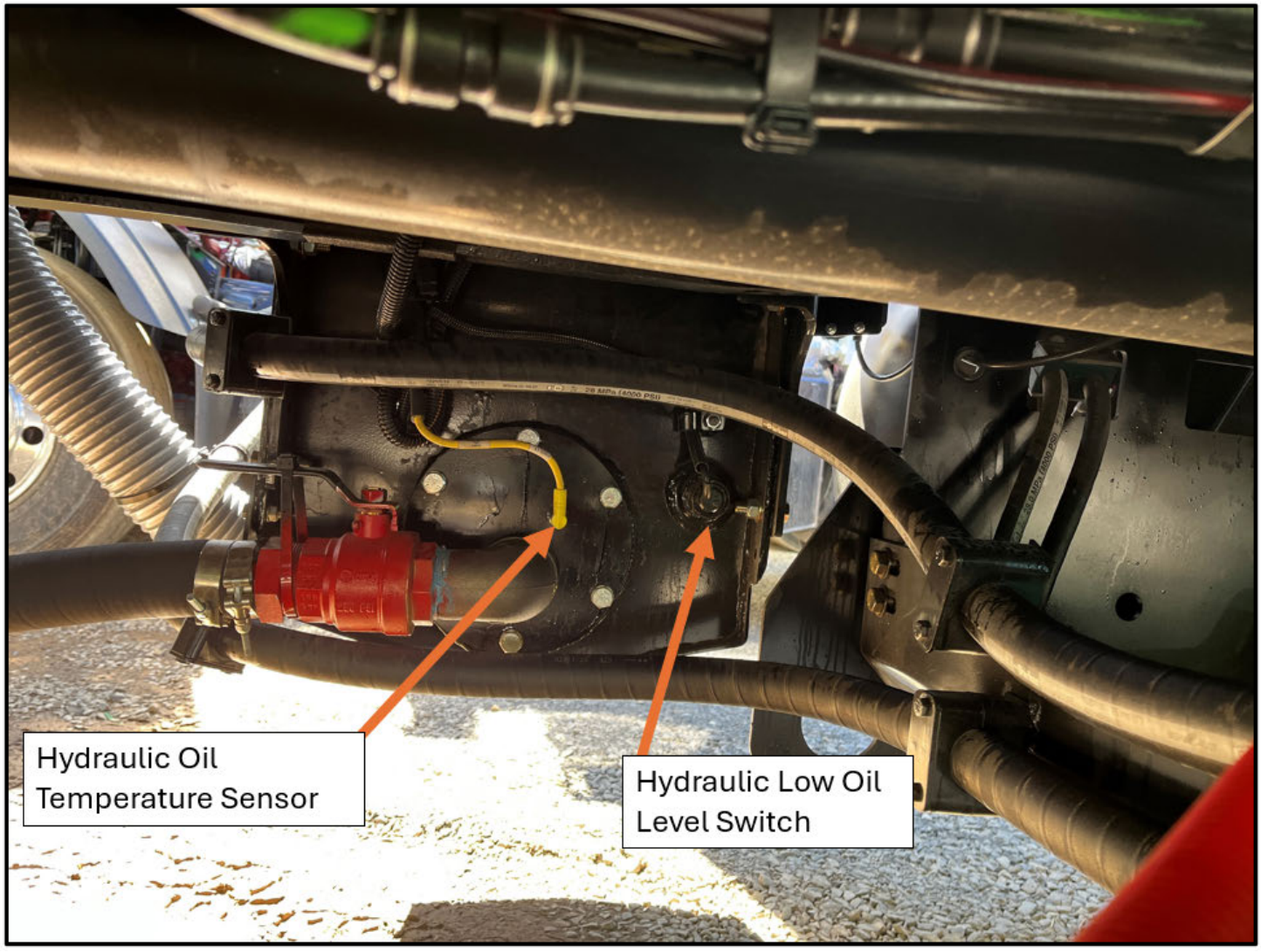


Figure 94.

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 – at the front of the body
- Forks – fully tucked
- Lift Arms – fully raised

The oil tank is mounted behind the chassis cab. The oil level in the standard tank must be kept between the low and full marks as indicated on the sight gauge. See the figure below.

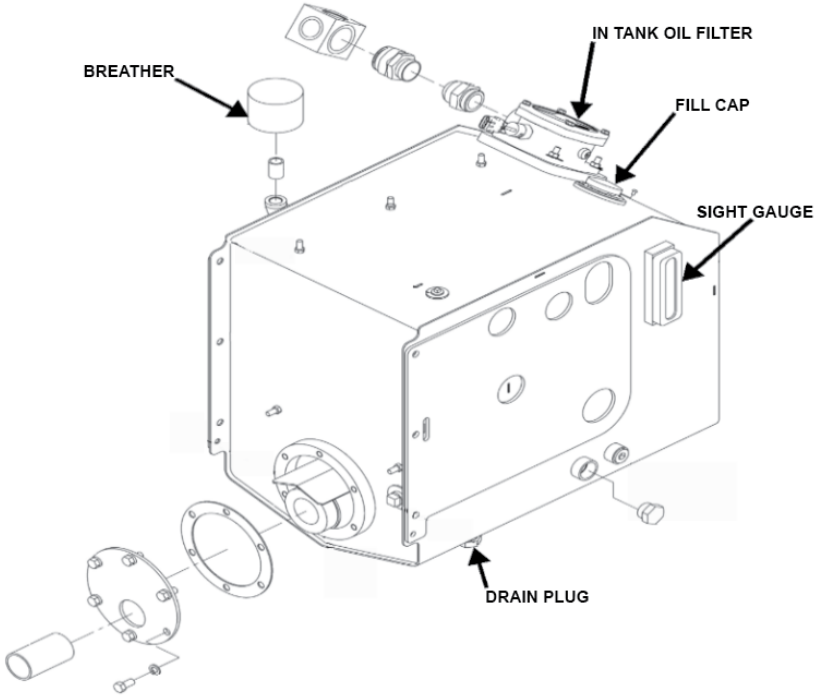


Figure 95. Hydraulic Oil Tank and Sight Gauge

CHECK OIL LEVEL

Check the hydraulic oil level (after warning up the oil) daily or every eight (8) hours, whichever comes first. Fill as necessary.

Important: Contamination is a hydraulic system's worst enemy. Do not let dirt enter the system. Use a clean rag and remove dirt or other contamination around any system component before you disconnect or remove it. While you fill 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 an extremely dusty atmosphere or area. Use only Heil replacement filters. Purchase the filter element from your local Heil distributor.

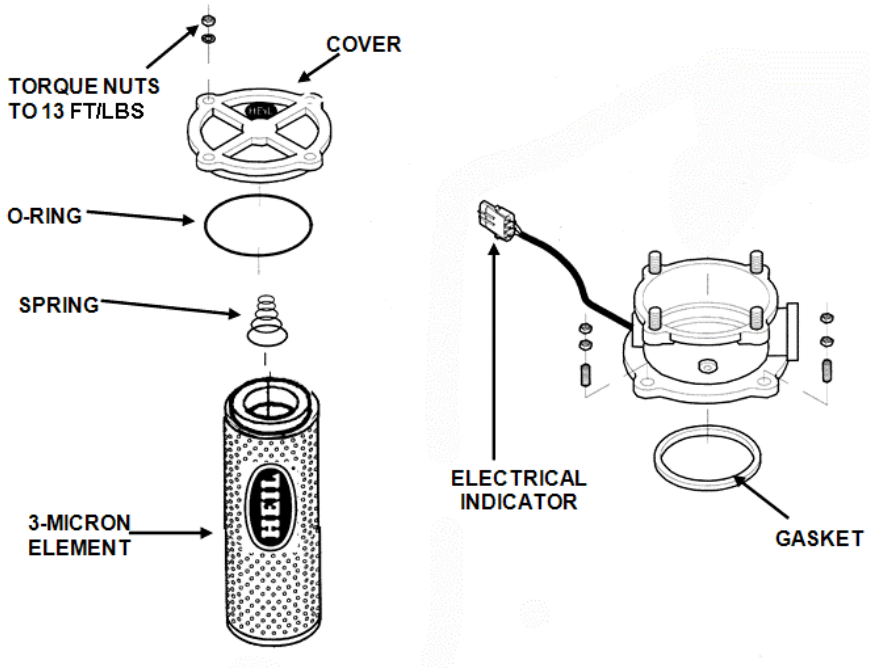
Change the filter element when oil analysis shows the oil has expired.

CHANGE HYDRAULIC OIL FILTER ELEMENT

Watch the Service Shack Video online at **www.Heil.com/Heil-Service-Shack** and selecting **Changing Filters**. Reference the image below.

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, refer to the figure below and 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 Reset** procedure.



FILTER BYPASS RESET

A. Correct the fault condition by changing the return filter, replacing the pressure switch, or repairing the harness.

1. If the unit is equipped with a display, navigate through the display and search for “filter pressure switch input” under the service screen. This input must be active before going to the next step.

B. Follow the instructions below to reset the warning:

1. With the engine running and the pump ON, the warning will reset in 15 minutes.
2. If the pump turns OFF before 15 minutes, cycle the key switch, start the engine, and turn the pump ON.

3. Maintain those conditions for a total of 15 minutes.

C. The pump may shut down several times. If this happens, keep repeating step B until the warning resets.

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 controller must receive the filter pressure switch input continuously
2. The controller reads the engine RPM, and the engine must be running at idle
3. Pump should be enabled in the controller

DRAIN AND 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 Lockout/Tagout mode 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 Lockout/Tagout mode. 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 Lockout/Tagout mode.

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, use the procedure that follows.

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

1. Perform the **Lockout/Tagout procedures** 14. If you have any questions about the Lockout/Tagout 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**.
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.

DRAIN AND CLEAN THE HYDRAULIC OIL TANK (CONTINUED)

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** 16.
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. Operate body raise (dump units) – full up and full down.
20. 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 **Check Oil Level** 100.

PTO INSPECTION AND 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 table below.

Table. Tools and Materials

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

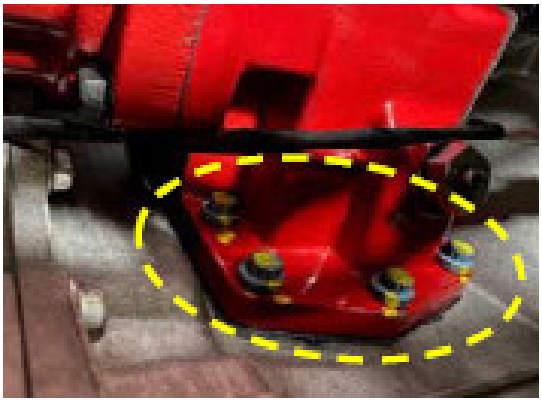
With the unit it Lockout/Tagout mode, use a 12.10 mm closed wrench and crowsfoot to perform the following steps:

Note: PTO/Transmission Interface Inspection/Preventive Maintenance (MONTHLY/200 HOURS OF OPERATION)

1. Place the unit in Lockout/Tagout 14 mode 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. See figure below.



Witness Marks on PTO Mounting Screws and Flange

6. Take the unit out of Lockout/Tagout mode 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.

PRESSURE ADJUSTMENT PROCEDURES

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, fork, and tailgate operation.
2. Place wheel chocks on both sides of driver side rear wheel.
3. Make sure parking brake is set.
4. Notify anyone in area that the arms, forks, and tailgate will be operated during this procedure
5. Make sure unit is full of hydraulic oil.
6. Make sure hydraulic oil is above 100 degrees F before beginning any pressure checks or adjustments. Refer to **Cold Weather Warmup Procedure** 98.

B. Required Tools

These are the tools required to make pressure adjustments.

Quantity	Tool
1	Personal Protective Equipment (PPE)
1	1.5" Wrench
1	1/2" Allen Wrench
1	0-5000 PSI hydraulic pressure gauge

C. Streetwise Hydraulics™ Valve Locations

The hydraulic control valves are located on the street side of the body. The main body valve that controls the packer, arms and forks is located beneath the body and behind a steel cover as seen in the left figure below, at the arrow location. The tailgate valve that controls the tailgate lock/unlock, tailgate open/close, and top door open/close hydraulic circuits is located behind a steel cover as seen in the right figure below.

Figure 96. Main Body Valve with Cover

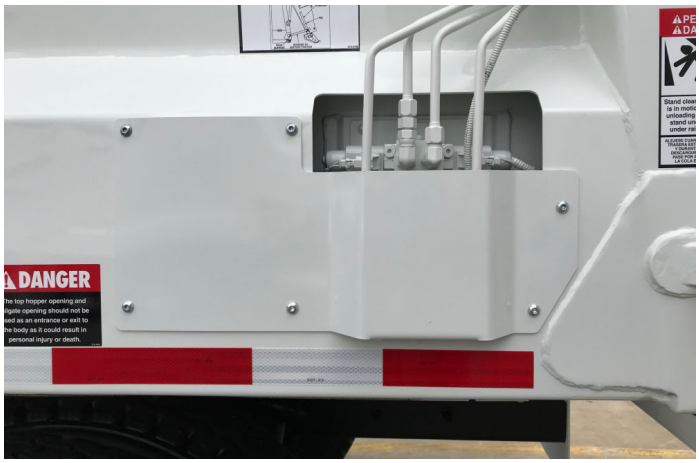


Figure 97. Tailgate Valve with Cover

PRESSURE ADJUSTMENT PROCEDURES (CONTINUED)

D. Main Pressure Adjustment Process

1. Complete steps 1-6 in paragraph A, Unit Preparation before proceeding to the next steps
2. Install the hydraulic pressure gauge on the main pressure port
3. Locate the underbody valve and the main relief
4. Remove the lock wire
5. Loosen the jam nut using the 1.5" wrench
6. Start the unit, turn on the pump, and deadhead the packer retract function
7. Watch the pressure gauge while holding the function, note the pressure, and release the function
8. Turn the pressure adjustment using the 0.5" Allen Wrench

Note: Clockwise increases pressure and counterclockwise decreases pressure

9. Repeat steps 7 and 8 until the pressure reaches the required value
10. Tighten the jam nut using a 1.5" wrench, while holding the pressure setting screw using the 1/2" Allen Wrench

E. Pressures and Cycle Times

			Commercial Half Pack	
			Diesel	**CNG**
HYDRAULIC PRESSURE	**UNDERBODY VALVE**	**MAIN RELIEF @1200 ENGINE RPM**	2500 PSI	2500 PSI
		PACKER EXTEND	STANDARD: 2650 PSI SIERRA: 2000 PSI	STANDARD: 2650 PSI SIERRA: 2000 PSI
		PACKER RETRACT	2650 PSI	2650 PSI
		ARMS UP	NO CIRCUIT RELIEF	NO CIRCUIT RELIEF
		ARMS DOWN 8000# ARMS	1250 PSI	1250 PSI
		FORKS UP	NO CIRCUIT RELIEF	NO CIRCUIT RELIEF
		FORKS DOWN	NO CIRCUIT RELIEF	NO CIRCUIT RELIEF
		AUXILIARY SECTION-TAILGATE VALVE SUPPLY	2000 PSI	2000 PSI
		AUXILIARY SECTION-OPTION VALVE SUPPLY - SEE NOTE 3	2500 PSI	2500 PSI
	TAILGATE VALVE	**TOP DOOR CLOSE**	750 PSI	750 PSI
		TOP DOOR OPEN	500 PSI	500 PSI
		TAILGATE OPEN	1300 PSI	1300 PSI
		TAILGATE CLOSE	1300 PSI	1300 PSI

HALF/PACK

Maintenance and Adjustment

			Commercial Half Pack	
			Diesel	**CNG**
		TAILGATE UNLOCK	2000 PSI	2000 PSI
		TAILGATE LOCK	2000 PSI	2000 PSI
FUNCTION CYCLE TIMES		**AUTOPACK CYCLE TIME @ 25 GPM**	20-23 sec	20-23 sec
		ARM ONLY CYCLE TIME - 8000# ARMS @ 25 GPM	17-19 sec @ ENGINE IDLE	18-21 sec @ ENGINE IDLE
		STANDARD TAILGATE AND CNRG® TAILGATE	RAISE 14-25 sec LOWER 14-17 sec	RAISE 14-25 sec LOWER 14-17 sec
		TOP DOOR CYCLE TIME	CLOSE 12-18 sec OPEN 26-32 sec	CLOSE 12-18 sec OPEN 26-32 sec

NOTES:	1: Main Pressure settings have a tolerance range of +/- 50 p.s.i. and are to be set at operating speed.
	2: Options include: Commercial Gripper, Adjustable Forks, Hydraulic Cab Shield
	3: Throttle Advance set to 1200 rpm
	4: Unless noted, all pressures are good for Standard and Sierra.
	5: Cycle Times based on 700 RPM at idle except Autopack @ 1200 RPM

F. Contact Heil Technical Services at 866-310-4345 for help with pressure adjustments.

CLAMP-ON ARM BOLTS MAINTENANCE

Check clamp-on arm bolts for tightness monthly. See the figure below.

NOTICE

Do not use an impact wrench as thread damage might occur.

NOTICE

If bolts are removed, the bolts MUST be replaced. Contact your local Heil Dealer or Parts Central for parts.

Torque as follows:

1. Lubricate threads with anti-seize compound.
2. Torque the lock nut to 600 ft. lbs. using a torque wrench.

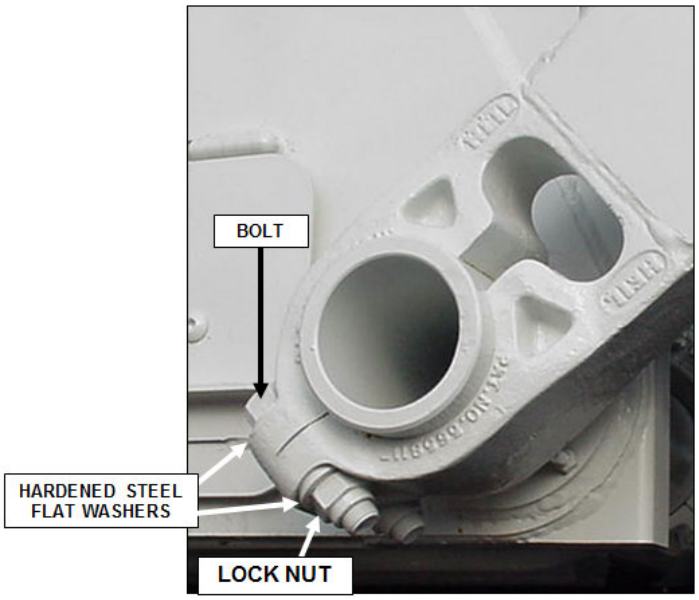


Figure 98. Clamp-on Arm Bolts Maintenance

BEARING BLOCKS MAINTENANCE

Half/Packs have the option of having 3 or 4 bearing blocks for the arm cross shaft. It is very important to keep the mounting bolts torqued to 200 ft. lbs. using a torque wrench (lubricated threads). See the figure below.

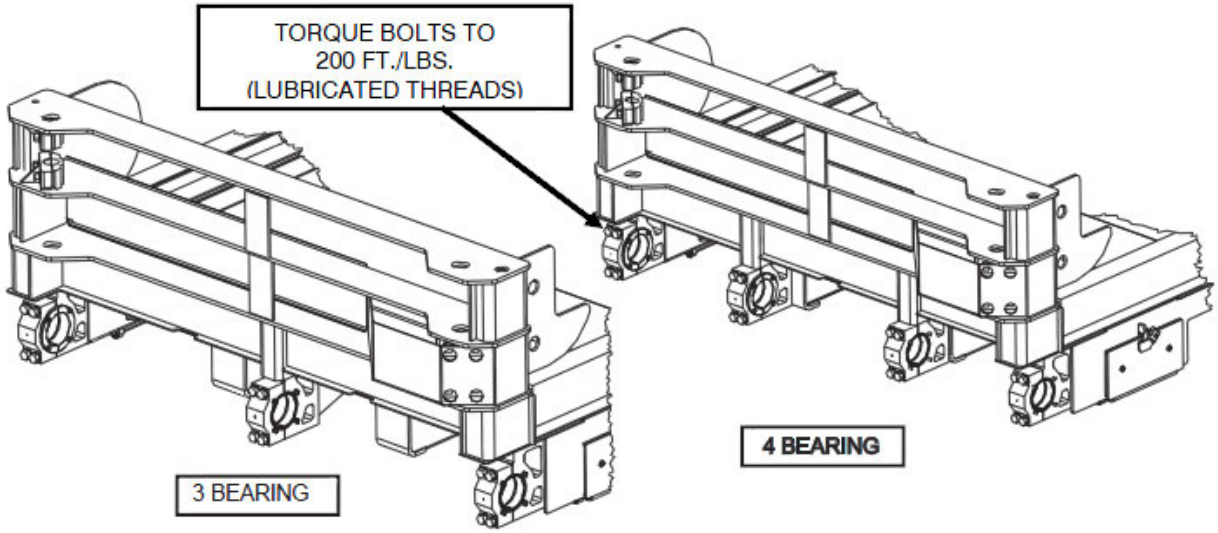


Figure 99. Optional Bearing Blocks Maintenance

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** 18 for recommended procedures for inspecting proximity switches.

CLEAN AND INSPECT THE TAILGATE SEAL

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

SECTION 5
BODY CONTROLLER HARDWARE

MOBILE CONTROLLER AND MODULE (NODE) LOCATIONS

The 80 I/O Mobile Controller is located midway within the street side of the body behind a steel cover.

The 32 I/O Mobile Controller Module has two locations:

1. In the cab, behind the driver seat.
2. In the tailgate, at the upper light bracket.

See the image below for the locations of each controller.

Figure 100. Mobile Controller Locations

MOBILE CONTROLLER PROGRAMMING

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.

MOBILE CONTROLLER PIN NUMBER DIAGRAM

Refer to the figure below for the Heil Mobile Controller male pin locations. Controller pin numbers are located on the black plastic for pin numbers 1 and 19 (top row left to top row right), 20 and 37 (middle row left to middle row right), and 38 and 55 (bottom row left and bottom row right).

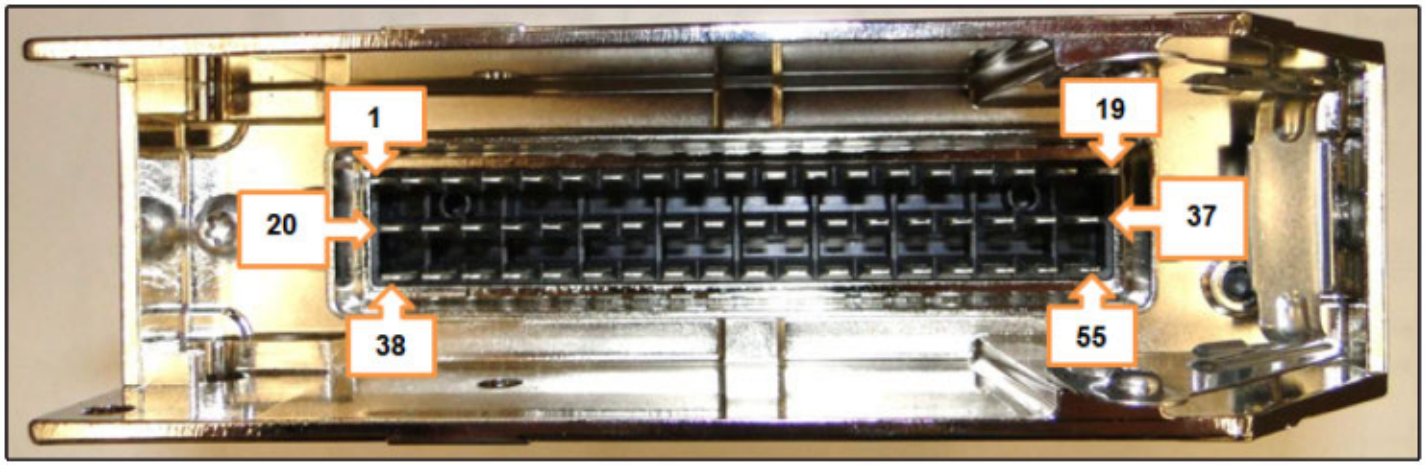


Figure 101. 80 I/O Controller Pin Number Locations (Same for Both Controller Sides)

MOBILE CONTROLLER 55-POLE CABLE ASSEMBLY

Follow these steps to assemble the Mobile Controller Cable.

A. Cable and Controller Parts Identification

See the figure below to identify the 55-Pole Cable Connector parts.

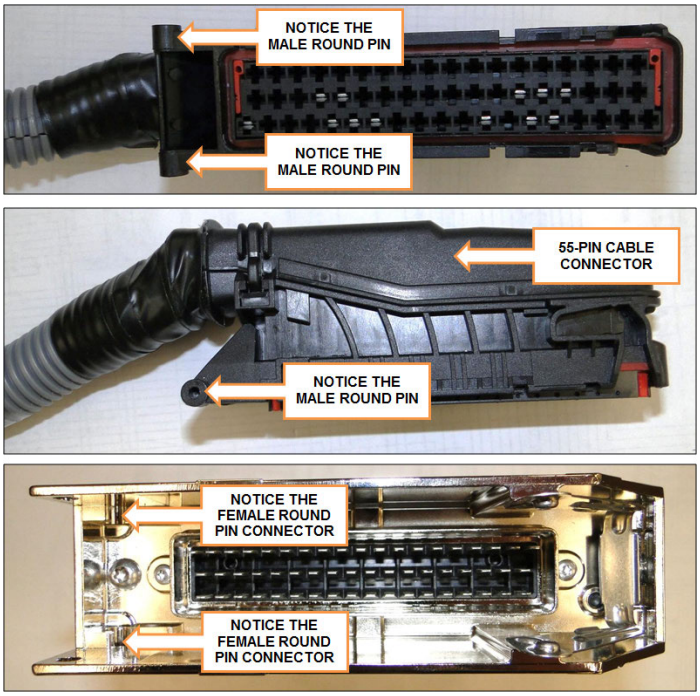


Figure 102. Cable Controller Plastic Male Hinge Pins and Controller Female Slot Connectors

B. Female Controller Connector Close-Up View

See the figure below to identify the controller female connector.

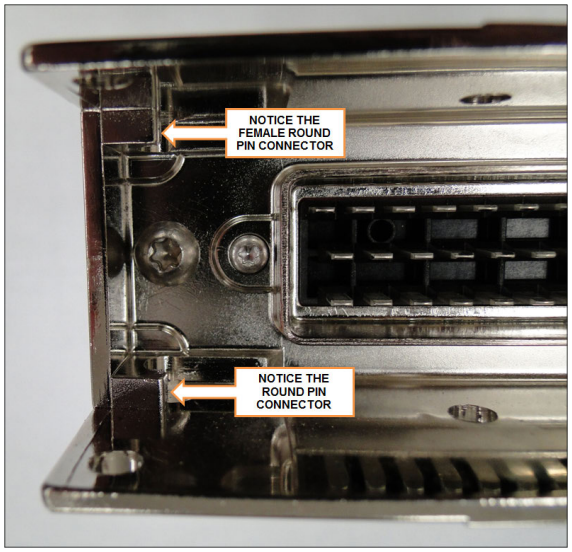


Figure 103. Female Controller Connector Slots

MOBILE CONTROLLER 55-POLE CABLE ASSEMBLY (CONTINUED)

C. Connecting the 55-Pole Cable Connector

Refer to the figure below and then slide cable male connectors into controller female connectors.

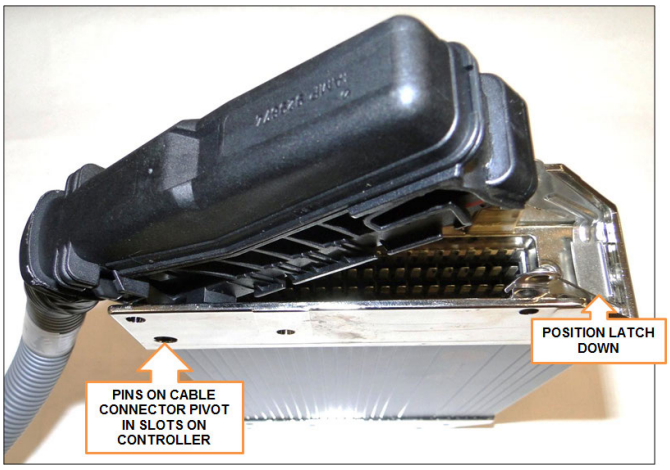


Figure 104. Cable Connector Pivoting on Controller

D. Pivot Cable Connector and Latch

1. While keeping left side of cable connector seated, carefully pivot cable connector until flush with controller. See the figure below.

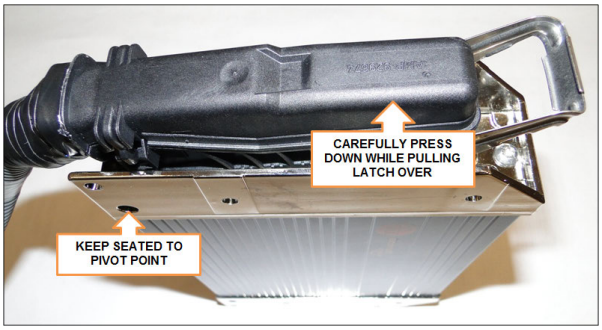


Figure 105. Slowly Press Down While Keeping Left Cable Connector Pivot Point in Place

2. Latch cable to controller until latch is secure and flush with rear of cable connector. See the figure below.

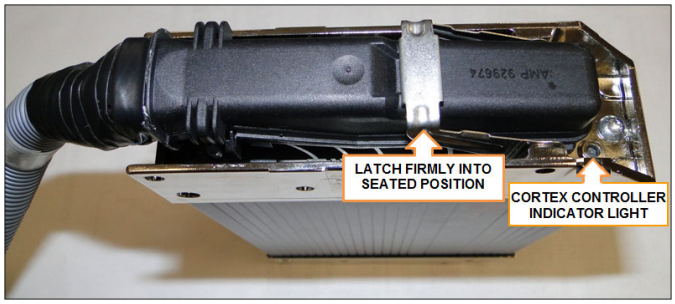


Figure 106. Latch Controller to Cable Connector

3. Repeat steps 1 through 5 to attach the second cable connector to the reverse side of the controller.
4. To remove cable from controller, reverse above process.

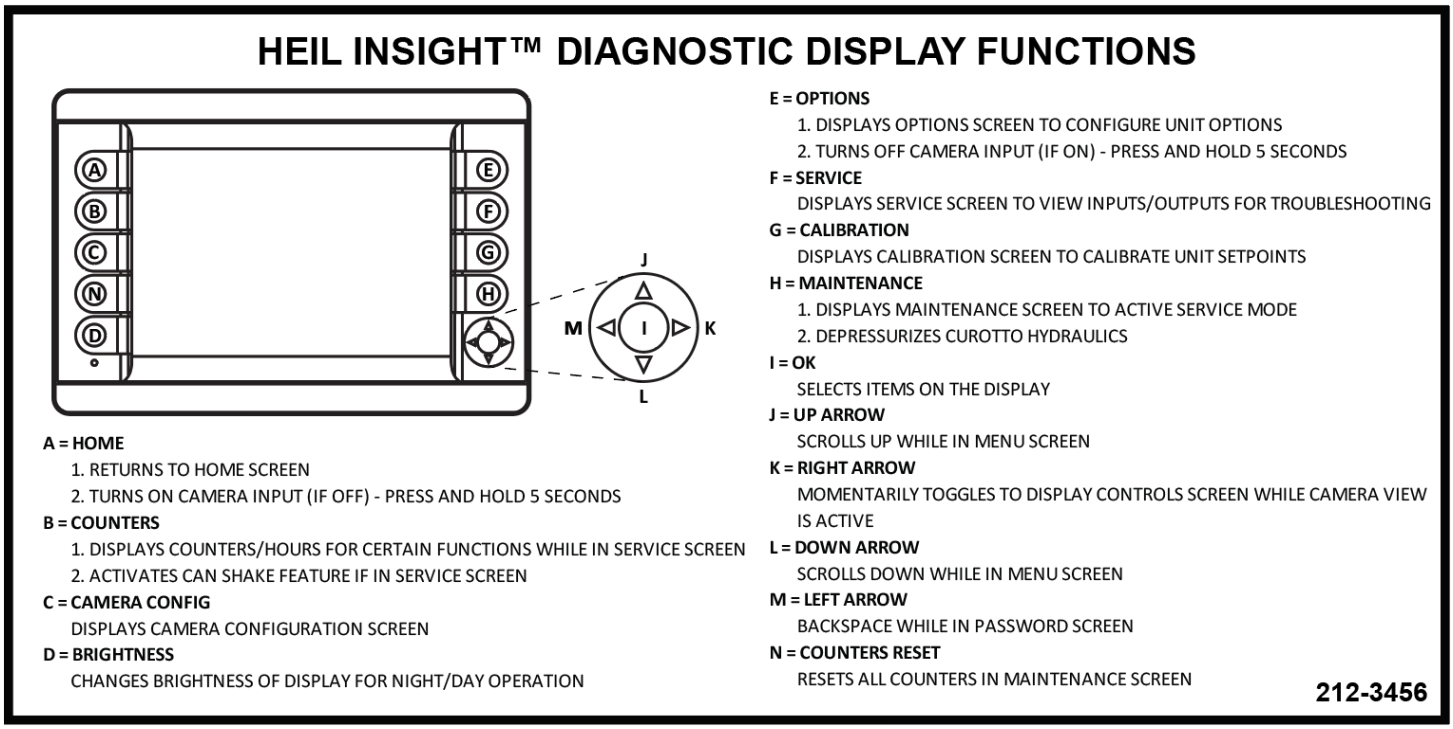
INSIGHT™ DIAGNOSTIC DISPLAY

The Half/Pack comes standard with a 7" InSight Diagnostic Display or optionally with a 12" InSight Diagnostic Display. Contact Heil for re-programming of the display.

The Heil InSight Diagnostic Display is the information center for the operator and troubleshooting tool for the service mechanic. The next few pages cover basic functionality. For additional information, see Commercial Half/Pack Mobile Controller Program 109-0396 172 in the Body Controller Software 171 the Body Controller Software section of this manual.

For the operator, it shows operation warnings and explains why the system may prevent a function so the operator can correct and operate in a safe and productive manner. For the service technician, it displays information regarding sensor failures, and with proper training, can be used to test sensors and other inputs and output functions.

Note: To toggle from Camera Mode to Home Screen: Hold right top button for 5 seconds. To toggle from Home Screen to Camera Mode: Hold left top button for 5 seconds (or power cycle truck ignition). While in Camera Mode, you can temporarily view any message on the display by holding down the right arrow on the display. See **Camera System** 163.



Heil InSight™ Diagnostic Display Functions Decal, Located in the Cab

INSIGHT™ 7 INCH DISPLAY

This display consists of nine back-lit function keys, analogue video input, and a InSight™ (Graphic) display terminal as shown below:

Figure 107.

A. Operating Elements

1. Function keys:
    a. There are nine backlit, freely programmable function keys available in INSIGHT. The primary use of the function keys is to allow transitions between operation screens. They also change to password protection keys when a password-protected screen is activated (for example, left side keys top to bottom “1 – 2 – 3 – 4 ” and right side keys top to bottom “5 – 6 – 7 - 8”).
2. Directional arrows (Up/down/right/left):
    a. The four directional arrows can be used to move the cursor (up, down, right, left). This feature facilitates cursor positioning within the Input, Output, Maintenance, or Options screens.
3. "OK" push button:
    a. When a specific input/output bit is selected using the directional arrows, the OK push button can be used to turn that particular bit on or off. Once a bit is turned on or off, its color will change from gray to green or vice versa, and this is displayed on the InSight terminal.
4. InSight Display
    a. This is used to display the status of the Input/Output, Engine Run Speed, Temperature, Auto/Manual mode, etc. It can be programmed to graphically represent a process and can also be used to change the set points for analog values.

INSIGHT™ 12 INCH DISPLAY

Consists of 13 back-lit function keys, analogue video input, and an InSight (Graphic) display terminal as shown below.

Figure 108.

A. Operating Elements

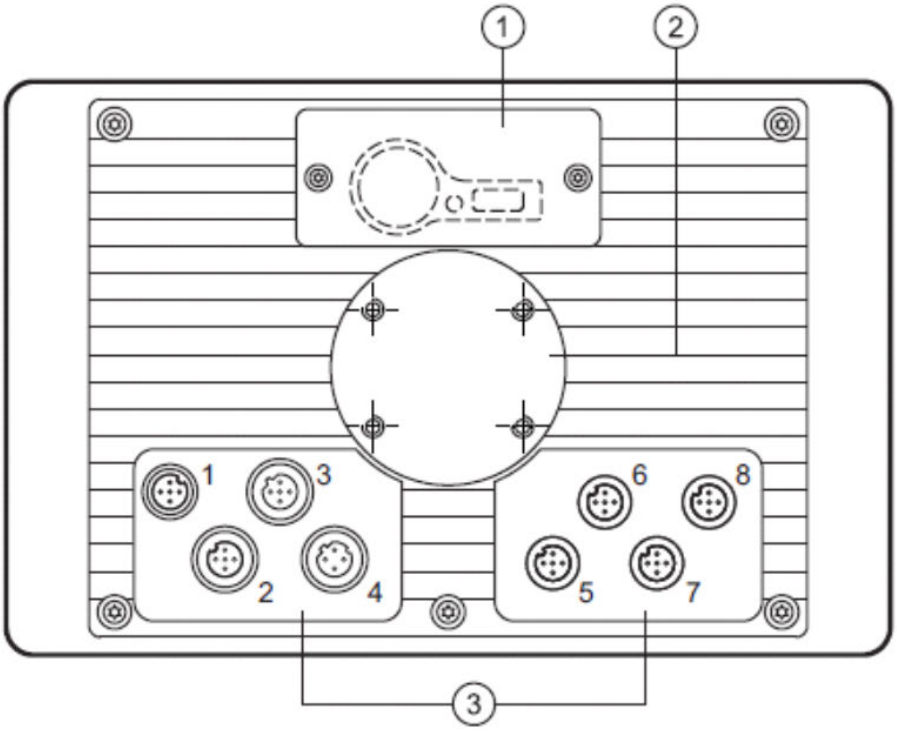
1. Function keys:
    a. There are 13 backlit, freely programmable function keys available in InSight. The primary use of the function keys is to allow transitions between operation screens. They also change to password protection keys when a password-protected screen is activated (for example, left side keys top to bottom “1 – 2 – 3 – 4 ” and right side keys top to bottom “5 – 6 – 7 - 8”).
2. Directional arrows (Up/down/right/left):
    a. The four directional arrows can be used to move the cursor (up, down, right, left). This feature facilitates cursor positioning within the Input, Output, Maintenance, or Options screens.
3. "OK" push button:
    a. When a specific input/output bit is selected using the directional arrows, the OK push button can be used to turn that particular bit on or off. Once a bit is turned on or off, its color will change from gray to green or vice versa, and this is displayed on the InSight terminal.
4. InSight Display
    a. This is used to display the status of the Input/Output, Engine Run Speed, Temperature, Auto/Manual mode, etc. It can be programmed to graphically represent a process and can also be used to change the set points for analog values.

DISPLAY OPERATING STATES

Color	Status	Description
-	Permanently Off	No Operating Voltage
Green	5 Hz	Boot Process Application
	2 Hz	Application Running (RUN) or Set-Up Running
	Permanently On	Application has Stopped (STOP) or No Project Available
Red	2 Hz	Application is Running with an Error (RUN with Error)
	Permanently On	System Error (Fatal Error), Device is in Reset (e.g. Internal Voltage Error)
Red/Orange	2 Hz Color Change	Over Temperature/Under Temperature, Device is in Reset Until Temperature Reaches Normal Range.
Orange	5 Hz	Boot Process System Recovery/Update
	2 Hz	System Recovery/Update Running
	Briefly On	System Reset

REAR PANEL HOUSING CONNECTION

The images below provide wiring details of the interface cable for the InSight 7" and 12" display units.



1: Service cover for USB connection, battery and watchdog reset
2: Locator for RAM® mount system and mounting frame
3: M12 connector (fig. shows max. number of connectors)

Figure 109.

REAR PANEL HOUSING CONNECTION (CONTINUED)

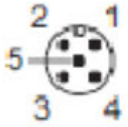
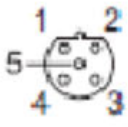
1	2, 5, 6, 7, 8	3	4
Connector A-coded, 5 poles	Socket A-coded, 5 poles	Socket B-coded, 5 poles	Socket D-coded, 4 poles
			

Figure 110.

(1) Supply, input/output	
1	10...32 V DC (clamp 30) (IN)
2	IN
3	GND (clamp 31) (IN)
4	OUT
5	10...32 V DC (clamp 15) (IN)

(2) CAN1	
1	Shield
2	VBB_c (OUT)
3	CAN1_GND (OUT)
4	CAN1_H
5	CAN1_L

(3) USB	
1	+5 V DC
2	-Data
3	+Data
4	ID
5	GND

(4) Ethernet	
1	TxD+
2	RxD+
3	TxD-
4	RxD-
	Housing = screen

(5) CAN2	
1	Shield
2	VBB_c (OUT)
3	CAN2_GND (OUT)
4	CAN2_H
5	CAN2_L

(6) CAN3/4	
1	CAN3_H
2	CAN3_L
3	CAN3/4_GND (OUT)
4	CAN4_H
5	CAN4_L

(7) Analogue video input	
1	Shield
2	GND (video 2)
3	GND (video 1)
4	FBAS1 (video 1)
5	FBAS2 (video 2)

(8) N/A	
1	
2	
3	
4	
5	

Figure 111.

INTERFACE DETAILS

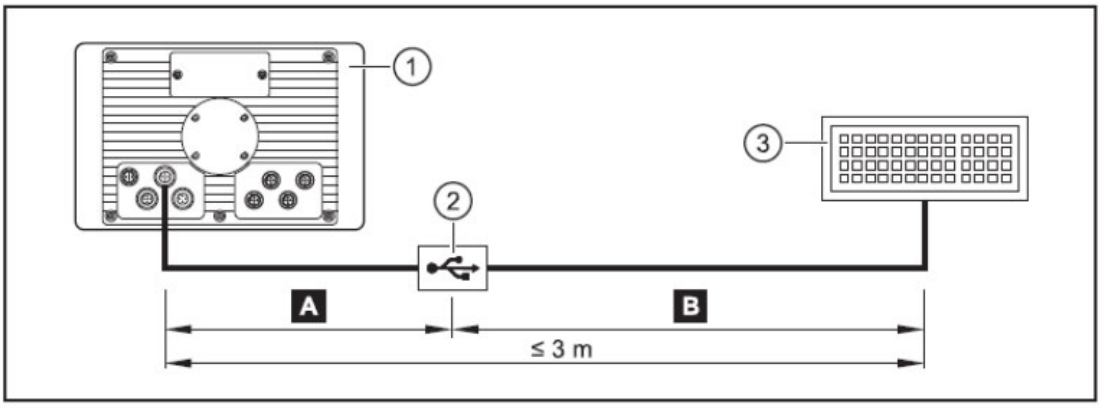
1. Ethernet Interface: Use a Shielded CAT5 cable (Shielded Twisted Pair - STP) for connection with maximum length of 25 mts.

2. Ethernet Camera: The device supports Ethernet cameras.

3. USB Interface: The USB interfaces are used for temporary connection of an external keyboard, mouse or a USB memory stick during servicing or maintenance. The USB device is connected to the display unit using a M12 connector.

NOTICE

They are not intended for actual operation (Remove the USB device after use).



USB connection via M12 connector

1: Dialogue module
2: USB connector, for example in the control panel or in the dashboard
3: USB keyboard, mouse or memory stick

A Permanent connection: Dialogue module – USB connector

- ► Use prewired cable.
  (e.g. art. no. EC2099, M12 connector, B-coded on USB socket, type A, watertight, cable length 1.5 m, wires twisted and screened)
- ► Use only cables with twisted and screened wires for individual wiring. Keep length "A" as short as possible and position the USB connector in immediate vicinity to the dialogue module. The length "A" considerably influences the quality of the USB data transmission.

B Temporary connection: USB connector – USB device

- ► Use a connection cable with the designation "Full Speed/High Speed" (= USB connection cable with twisted and screened cores).
- ► Do not make a connection using several USB connection cables.
- ► Remove connection cable after the programming or service works.

Figure 112.

INTERLOCK FUNCTIONALITY

The following details are in commercial mode.

A. Curb-Side Control

⚠ WARNING

The operator can roll the forks to Full Tuck with or without a can present. If a can is present and the operator rolls the forks too far, damage or injury to the cab, cab protector, can, and operator may occur.

- No Curotto controls are available
- All standard commercial control interlocks
- No fork interlock
- No auto-lift available

B. Street-Side Control

⚠ WARNING

The operator can roll the forks to Full Tuck with or without a can present. If a can is present and the operator rolls the forks too far, damage or injury to the cab, cab protector, can, and operator may occur.

- No Curotto controls are available
- All standard commercial control interlocks
- No fork interlock
- No auto-lift available

DIAGNOSTIC MESSAGES AND ALARMS

A digital multimeter is always the best tool for testing the voltage at an input or output terminal. Incandescent test lights cannot be used to test inputs from certain electronic input devices because the amperage required to illuminate an incandescent tester may exceed the device's maximum output. If using a test light, it must be an LED-type tester.

A. Pulse Width Modulation (PWM)

PWM controls the amount of power supplied to electrical devices. The main advantage of PWM is that the power loss in the switching devices is very low. The average value of voltage (and current) fed to the load is regulated by turning the switch between the supply and load ON and OFF at a rapid pace. The longer the switch is ON compared to the OFF periods, the higher the power supplied to the load. Refer to the figure below for PWM waveforms:

1. Voltage can be measured for a PWM signal by using the following equation:

   Voltage_Multimeter = (12V * T_High + 0V * T_Low) / PWM_Period

   Where PWM_Period = T_High + T_Low (Seconds)

Example: T_Low = Test Bulb OFF Time

T_High = Test Bulb ON Time

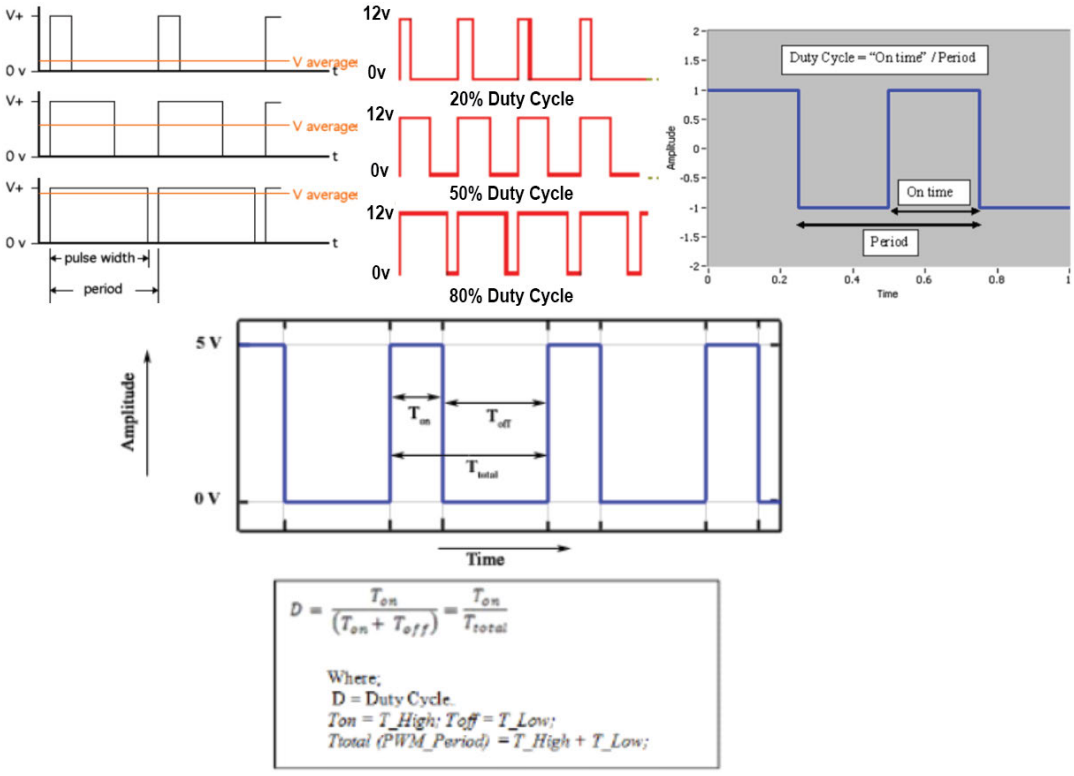


Figure 113. PWM Output Signal Waveforms

B. Monitoring Input Status

With an input ON, the corresponding input field (which includes description and address) located in the InSight display will also be ON. Refer to section Inputs/Outputs 124 for more details about diagnostic display options and the InSight display tool.

C. Monitoring Output Status

With an output ON, the corresponding Output field (including description and address) in the InSight display will also be ON. Refer to section Inputs/Outputs 124 for more details about diagnostic display options and the InSight display tool.

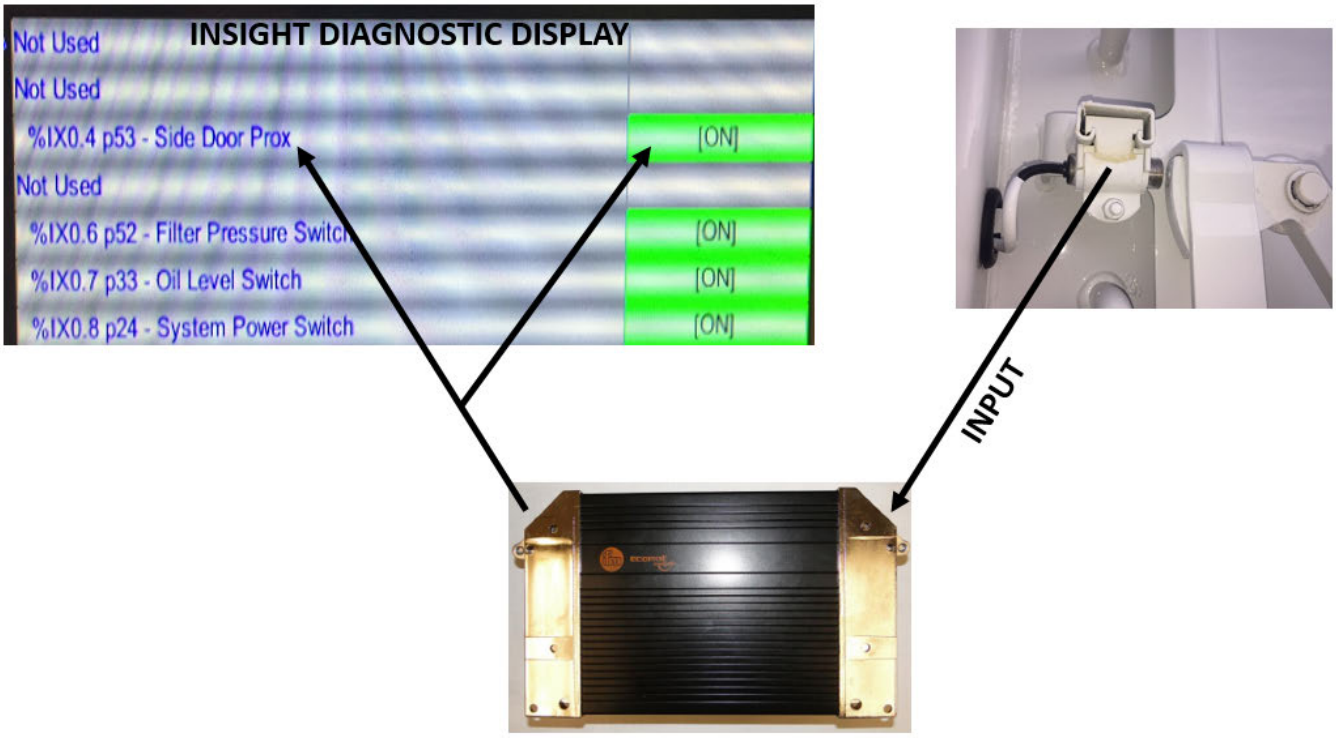
INPUTS / OUTPUTS

A. Inputs

Inputs are signals the controller receives from sensors or switches. Examples being: Prox switch signals, fork cylinder sensors, arm cylinder sensors, packer position sensor, pump on/off push button, system power button, packer extend or retract push buttons and so on. Any switch or sensor that sends signals to the controller are called INPUTS. All inputs can be viewed on the Mobile Controller InSight Diagnostic Display. These screens will show the state of all inputs. Once you are on an input screen, you may need to scroll down to see all inputs on that screen.

Example Input:

Side Door Proximity Switch is CLOSED: the signal from the Side Door Proximity Switch will travel to the Mobile Controller. When this happens, the InSight Diagnostic Display will show the Input to be ON. See the figure below.



INPUTS / OUTPUTS (CONTINUED)

B. Outputs

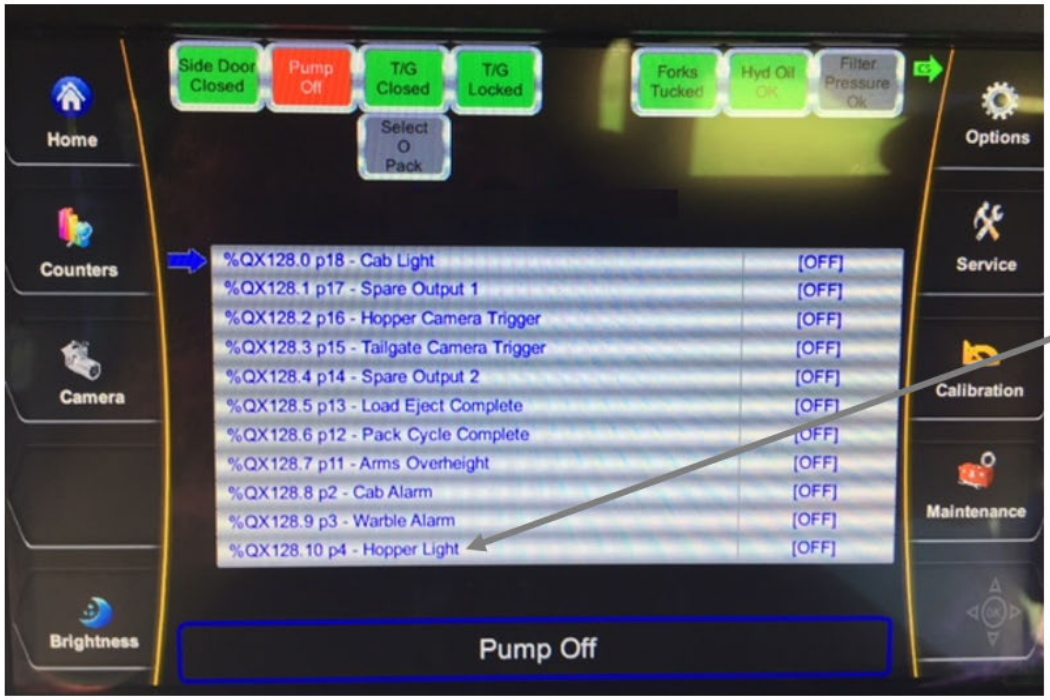
Outputs are signals sent out of the Mobile Controller to turn something ON or to make something happen. Any signal that is sent out of the controller is an output. Output examples are: Signals sent to valve coils that move a valve spool or to turn on a light. See the figure below.

Example Output:

Hopper Lights are ON: Turning the HOPPER LIGHT switch ON sends an Input signal from the switch to the controller and the controller sends an output signal to the light to turn the light ON.

Output examples:

- Coils/Solenoids
- Lights
- Mac Valves that control pneumatics to the body valve
- Tailgate Valve Coils/SOL
- Screen readouts



DIAGNOSTIC DISPLAY MESSAGES

When a fault is set, the In-Cab alarm will sound, and a diagnostic message will be displayed showing the status of the respective input/output on the InSight display unit.

TOP-DOOR OPEN AND AUTO-PACK INTERLOCK

If the top door is not fully open while the top door configuration bit is ON, and PB packer EXT or auto pack is enabled, this alarm will be activated. See figure below for the InSight display illustration.

Figure 114.

A. Indication:

1. Top-door open light ON
2. Top-door configuration bit is ON
3. Packer extend push button pressed
4. Travel position switch ON

B. Disabled functions

Packer

C. Fault Reset

Open the top door completely. Check the top door and the packer extend proximity sensor. Select the O-Pack switch for proper operation.

AUTO LIFT ENABLED AND OVERWEIGHT ALARM ACTIVE

If the auto lift enable switch is turned ON from either the street side or the curb side of the dual control panel for Bank-2 Switch-6 and Bank-4 Switch-6, and Scale Alarm-2 is activated due to overweight, or PTO-1 or PTO-2 pump is ON, the diagnostic message will be displayed in the Insight display. See figure below for the InSight display illustration.

Figure 115.

A. Indications:

1. Scale alarm-2 ON due to overweight
2. PTO-1 and PTO-2 pump active signal ON

B. Disabled functions

Arms up interlock and forks raise interlock

C. Fault Reset

Check the auto-lift enable switch and verify the overweight condition for proper operation

CAB PROTECTOR DOWN WITH ARMS LOWERED INTERLOCK AND ARMS ACTIVE, AND ARMS UP INTERLOCK

The arms are lowered when the top door is not fully open, the arm position angle exceeds the fork roll position value (765), the arms up position is less than (910), the Packer/ Cab protector switch is disabled, the fork position is greater than the feather up range (710), the arms up PWM value is less than (800), the cab protector down configuration bit is ON, the top door configuration bit is ON, and the residential configuration bit is ON. A diagnostic message will be displayed on the InSight display, as shown in the image below.

Figure 116.

A. Indication:

1. Top-door open light ON
2. Residential configuration bit is ON
3. Top-door configuration bit is ON
4. Cab protector down configuration bit is ON

B. Disabled functions

Forks will not lower

C. Fault Reset

Open the top door completely. Check the top door, cab protector down proximity, lift below transit proximity, forks' position, and arms' position for proper operation

CAB PROTECTOR DOWN WITH FORKS UNTUCKED AND ARMS LOWERED; DOCKED INTERLOCK

The arms will be lowered when the top door is not fully open, the forks untucked position is ‘113’, and the arm angle position is less than ‘110’. The diagnostic message will appear on the InSight display as shown below.

Figure 117.

A. Indication:

1. Top-door open light ON
2. Residential configuration bit is ON
3. Top-door configuration bit is ON
4. Cab protector down configuration bit is ON

B. Disabled functions

Forks will not lower

C. Fault Reset

Open the top door completely. Check the top door, cab protector down proximity, lift below transit proximity, forks' position, and arms' position for proper operation.

TOP DOOR OPEN AND ARMS LOWERED INTERLOCK

If the arms have been lowered when the top door is not fully closed, or if the arm position angle is greater than the fork roll position value (765), and the fork position is greater than the feather up range (710), and both the top door configuration bit and residential configuration bit are ON, the diagnostic message will be displayed in the InSight display as shown below.

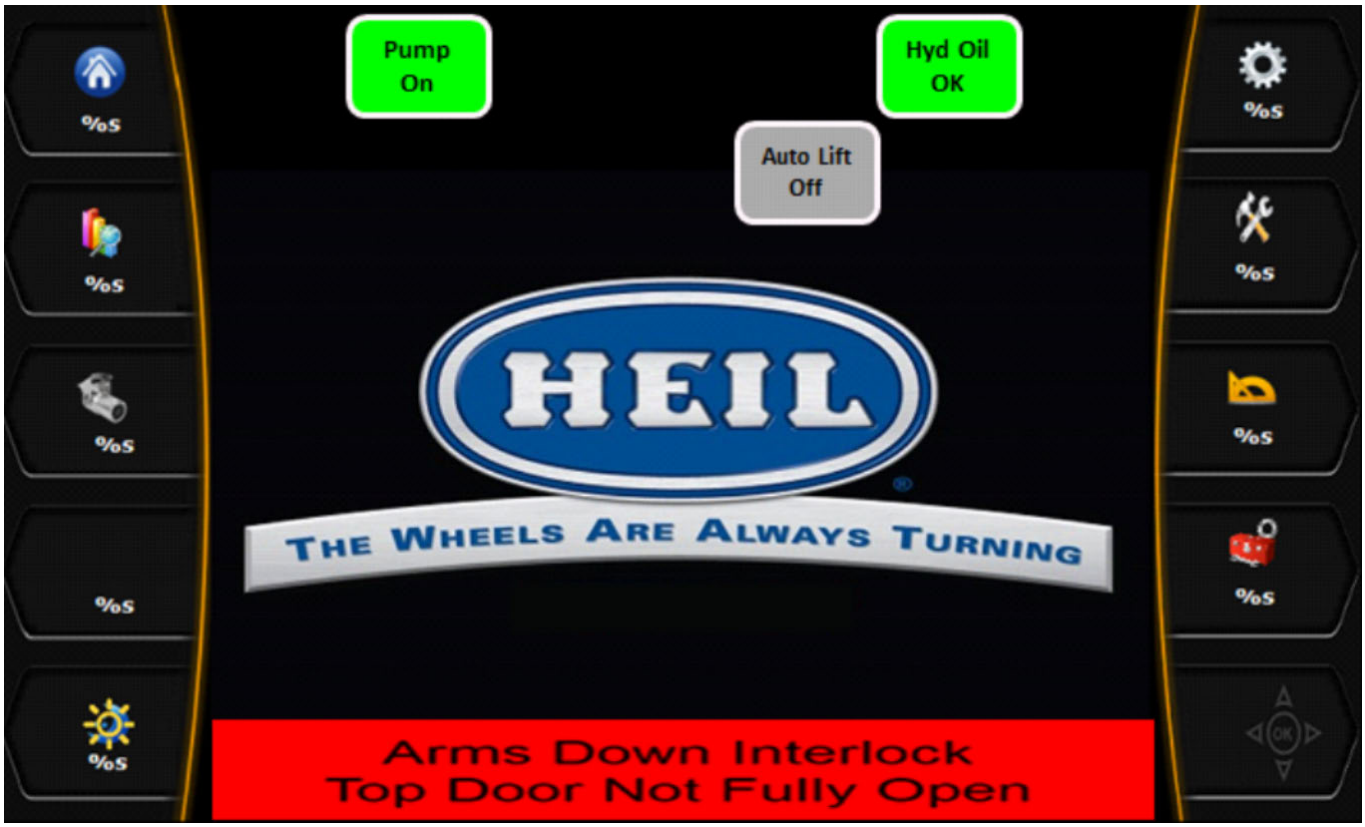


Figure 118.

A. Indication:

1. Top-door open light ON
2. Residential configuration bit is ON
3. Top-door configuration bit is ON

B. Disabled functions

Forks will not lower

C. Fault Reset

Open the top door completely. Check the top door, lift below transit proximity, forks' position, and arms' position for proper operation.

CAB PROTECTOR RAISED AND ARMS LOWERED INTERLOCK

The arms lower when the arm position angle exceeds the fork roll position value (765), the packer/cab protector switch is enabled, the fork position exceeds the feather up range (710), the cab protector down configuration bit is ON, and the residential configuration bit is ON; then the diagnostic message will be displayed on the InSight display as shown below.

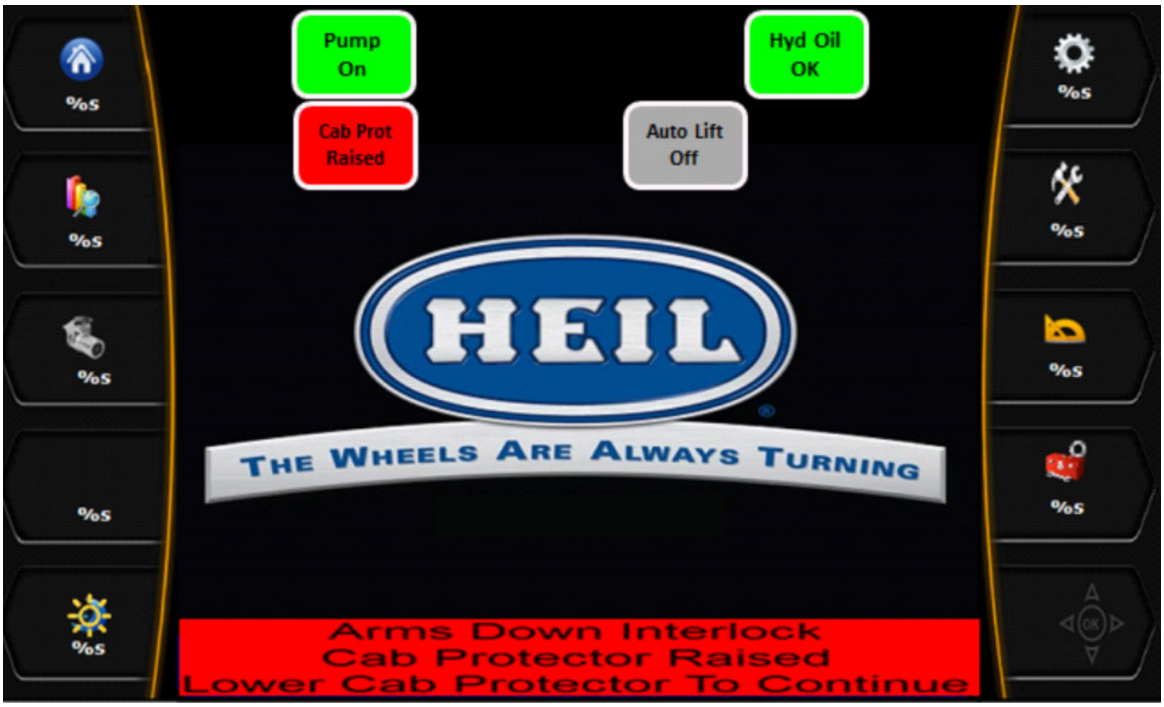


Figure 119.

A. Indication:

1. Top-door open light ON
2. Residential configuration bit is ON
3. Cab protector up configuration bit is ON

B. Disabled functions

Forks will not lower

C. Fault Reset

Open the top door completely. Check the cab protector down proximity, lift below transit proximity, forks' position, and arms' position for proper operation.

TRAVEL POSITION NOT ALLOWED; INTERLOCK ACTIVE

If the auto lift enable switch is turned ON from either the street side or the curb side of the dual control panel, and the travel position switch is activated while the packer extend/retract push button has been pressed or the packer extend/retract auxiliary controls are activated, then the diagnostic message will be displayed in the InSight display as shown below.

Figure 120.

A. Indication:

1. Packer retract push button pressed
2. Packer extend push button pressed
3. Travel position switch ON
4. Auto-lift enable switch ON

B. Disabled functions

None

C. Fault Reset

Turn OFF the auto-lift enable switch and travel position switch. Turn OFF the packer extend/retract auxiliary controls to manually move the packer.

TAILGATE CLOSED WHILE EJECTING

If the packer has reached the fully extended proximity switch while the tailgate is closed for at least 2 seconds, the diagnostic message will appear on the InSight display as shown below.

Figure 121.

A. Indication

Packer is fully extended and tailgate closed inputs are illuminated

B. Disabled functions

None

C. Fault Reset

Manually retract the packer or open the tailgate.

PACKER RETRACT PRESSED WHILE RETRACTED

If the packer is fully retracted but the packer return push button is still pressed, or the packer retract auxiliary controls have been activated, then the diagnostic message will appear on the InSight display as shown below.

Figure 122.

A. Indication

The packer was manually returned, and the retract button was not released.

B. Disabled functions

None

C. Fault Reset

Release the packer retract button and packer retract auxiliary controls, or check that the packer return proximity switch is properly positioned.

AUTO-PACK TIMED OUT (STANDARD EQUIPMENT)

The Mobile Controller has a timer to monitor the packer extend and retract operations. If the packer extend time exceeds 35 seconds before the extend prox. switch is activated, this beep code will activate. In auto-pack, the packer will automatically retract. Packer extend may time out when the body is full or when operated at engine idle (low hydraulic pump flow), as shown in the image below.

Figure 123.

A. Indications

The InSight display will display a diagnostic message. Packer extend prox. is not activated 35 seconds after the start of the extend cycle.

B. Disabled functions

Packer extend

C. Fault Reset

Check the packer extend prox. switch for proper operation and adjustment. Operate the packer above engine idle.

ARMS RAISED INTERLOCK ACTIVE

If the arms are raised when the top door is not fully open, the packer is not fully retracted, the packer/cab protector switch is not enabled, Scale Alarm-2 is enabled due to overweight, or PTO-1 or PTO-2 pump is ON, the diagnostic message will be displayed on the Insight display, as shown in the image below.

Figure 124.

A. Indication:

1. Arms over height light ON
2. Top door open light ON
3. Scale Alarm-2 ON due to overweight
4. PTO-1 and PTO-2 pump active signal ON

B. Disabled functions

Forks will not raise above the windshield.

C. Fault Reset

Open the top door fully. Restart the packer panel. Check the top door and packer retract prox. switches for proper operation.

PACKER EXTEND INTERLOCK ACTIVE

If the packer extend push button is pressed or the packer extend auxiliary controls are activated while the arms are raised and the packer/over-height over-ride switch is not enabled, the diagnostic message will appear on the InSight display.

Figure 125.

A. Indication:

1. Arms are raised
2. Packer extend push button pressed
3. Packer override switch OFF

B. Disabled functions

Packer will not extend.

C. Fault Reset

Lower the arms until the “Arms Raised” light goes out. Turn OFF the packer extend auxiliary controls. Turn the packer/over-height over-ride switch ON to manually move the packer.

PACKER EXTEND PB WITH SYSTEM POWER OFF

If the packer extend push button is pressed or the packer extend auxiliary controls are enabled while the system power is turned OFF, the diagnostic message will appear on the InSight display.

Figure 126.

A. Indication:

1. System Power input is not illuminated
2. Packer does not move

B. Disabled functions

PTO-1 pump, and PTO-2 pump.

C. Fault Reset

Turn the system power ON before utilizing the packer push buttons.

SIDE DOOR OPEN

If the side door is opened during a packing operation, the pump enable switch is turned ON, or the auxiliary control for packer extend/retract is enabled while the side door is open, the diagnostic message will appear on the InSight display as shown below.

Figure 127.

A. Indication:

1. Pump turns OFF unexpectedly.
2. Packer does not pack.
3. Pump will not turn ON.

B. Disabled Functions

Pump and all packer functions.

C. Fault Reset

Close the side door or repair faulty side door proximity switch.

PACKER EXTEND PB HELD WHEN FULLY EXTENDED

If the packer extend PB was pressed (or was being pressed) or the packer auxiliary controls were activated after the packer-extended proximity switch is turned ON, this information will appear on the InSight display, as shown below.

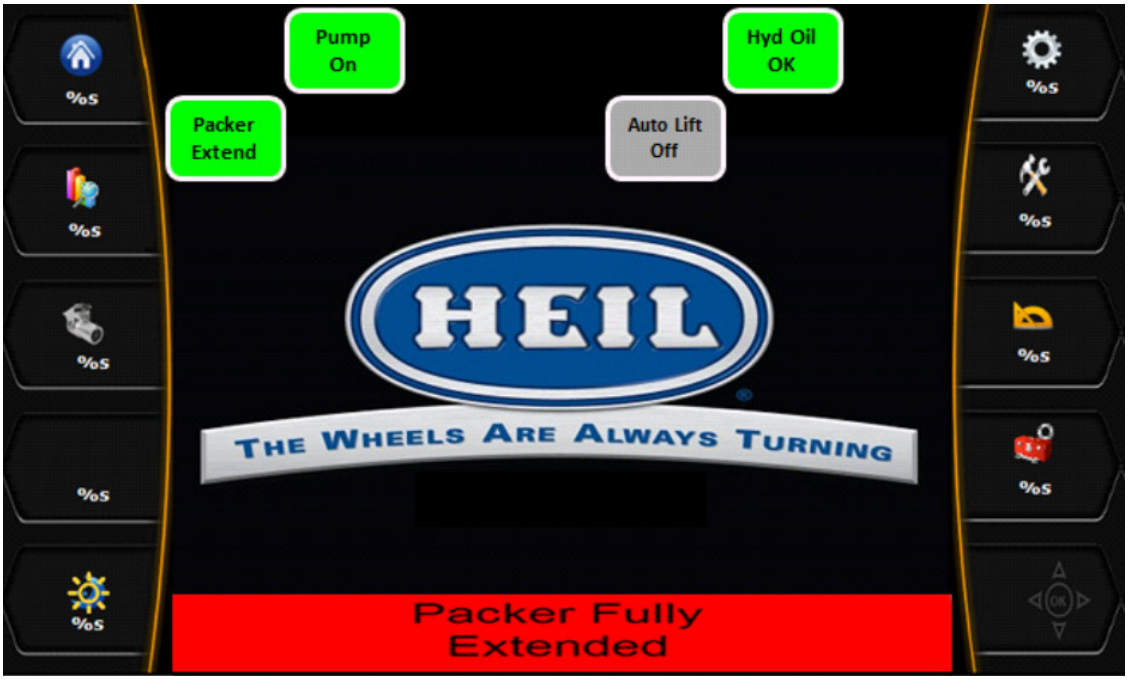


Figure 128.

A. Indication

The diagnostic message will be displayed in the InSight display.

B. Disabled Functions

None

C. Fault Reset

Release the packer extend push button or turn OFF the auxiliary controls.

PACKER RETRACT TIMED OUT (STANDARD EQUIPMENT)

The Heil Controller features a timer that monitors packer extend and packer retract operations. If the packer extend time exceeds 35 seconds before the extend proximity switch is activated, this beep code will be triggered. The packer retract may time out if the packer cannot fully retract due to the accumulation of material behind the packer panel as shown in the image below.

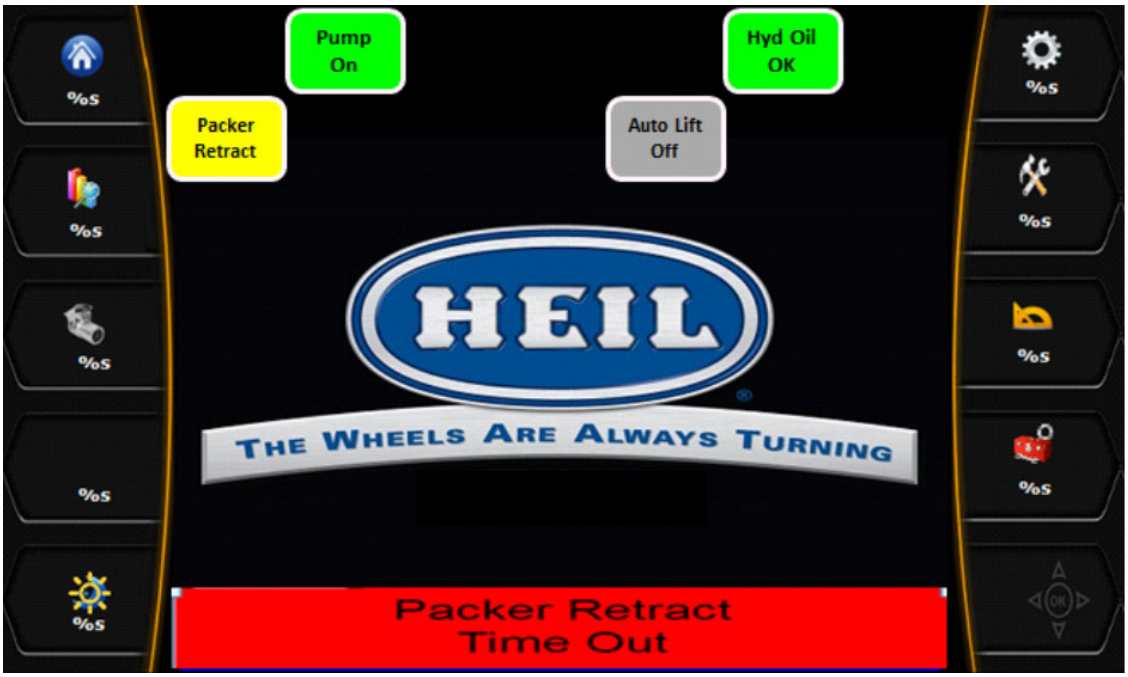


Figure 129.

A. Indication

The diagnostic message will appear on the InSight display if the packer retract prox switch is not activated 35 seconds after the retract cycle starts.

B. Disabled Functions

Packer retract

C. Fault Reset

Check the packer retract prox switch for proper operation and adjustment. Remove accumulated material from behind the packer panel.

PACKER RETRACT AND EXTEND PRESSED SIMULTANEOUSLY (STANDARD EQUIPMENT)

If the packer retract and extend push buttons are pressed simultaneously, the diagnostic message will appear on the InSight display as shown below.

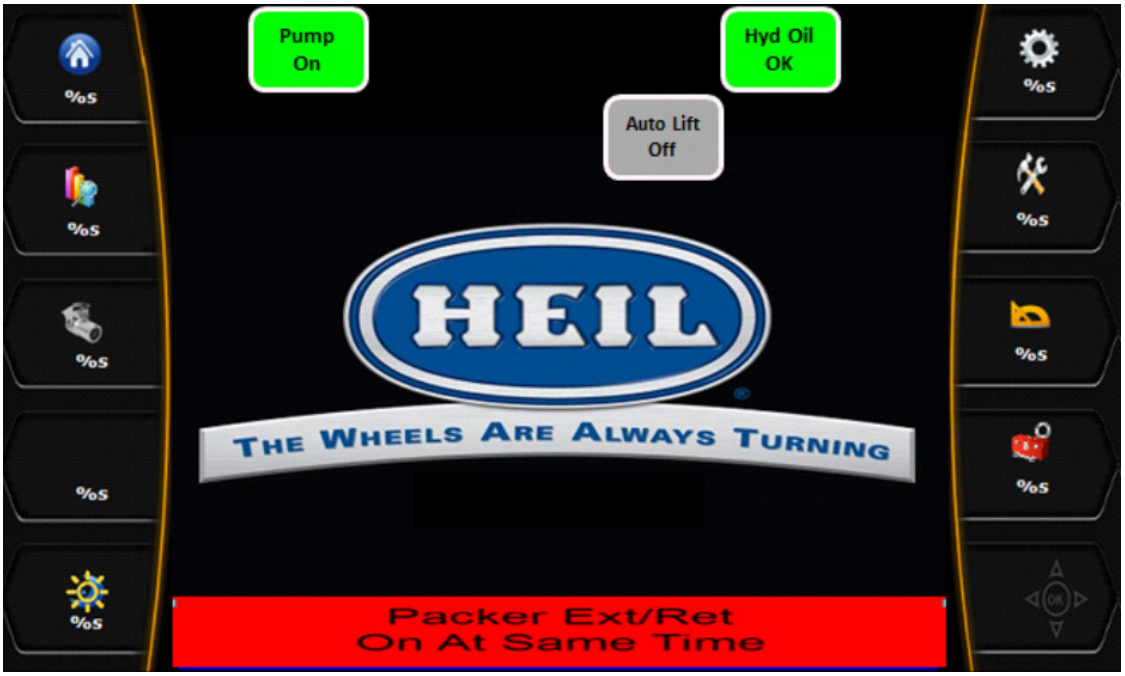


Figure 130.

A. Indication

The packer does not move.

B. Disabled Functions

Packer will not move.

C. Fault Reset

Determine why the packer extend and retract buttons are active at the same time.

PACKER EXTEND WITH PUMP OFF (STANDARD EQUIPMENT)

If the packer extend push button was pressed without the pump being ON, the diagnostic message will appear on the InSight display as shown below.

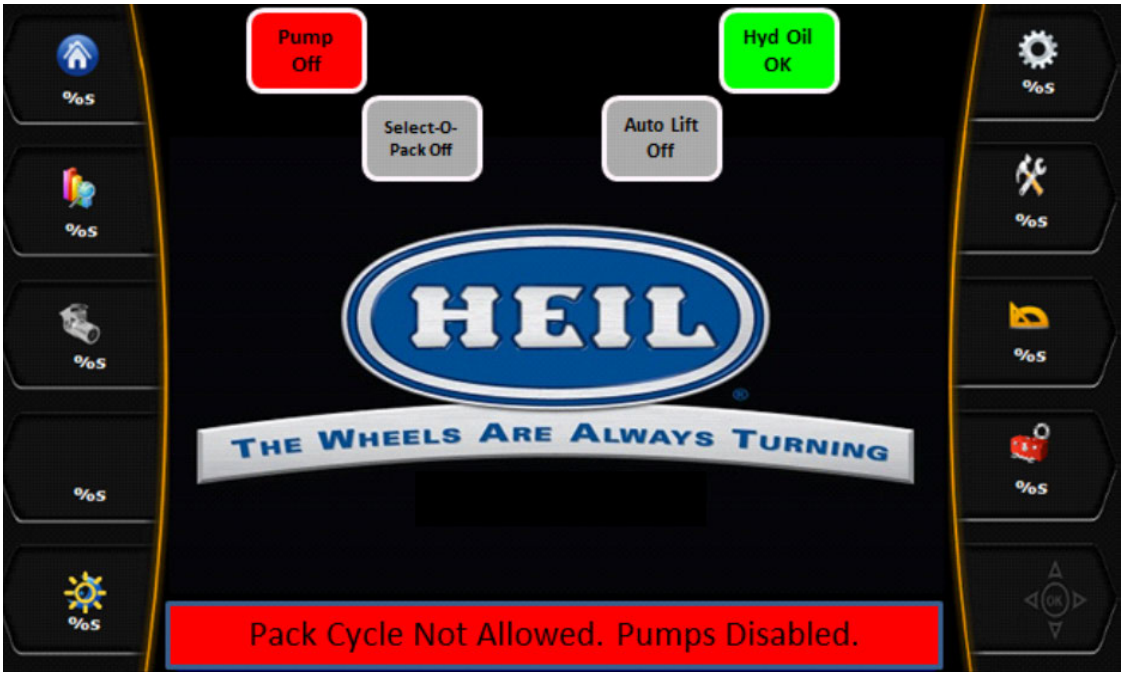


Figure 131.

A. Indication

The packer does not move

B. Disabled Functions

Packer extend

C. Fault Reset

Turn the pump ON

HYDRAULIC FILTER IN BYPASS (STANDARD EQUIPMENT)

If the hydraulic filter has been in bypass for more than 11 hours, then the diagnostic message will appear on the InSight display as shown below.

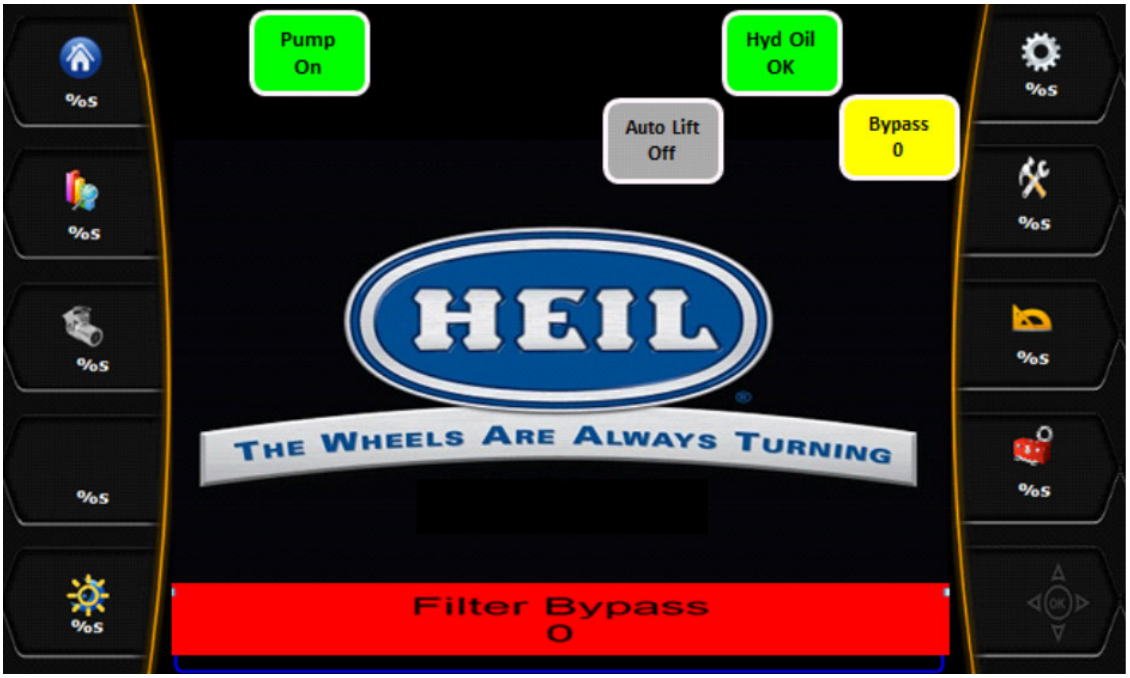


Figure 132.

A. Indication

The pump will only work for three minutes

B. Disabled Functions

Pump

C. Fault Reset

Replace the hydraulic oil filter

ARMS RAISED INTERLOCK AND OVERWEIGHT ALARM ACTIVE (STANDARD EQUIPMENT)

If the arms have been raised when the top door is not fully open; or the packer is not fully retracted; and the packer/cab protector switch is not enabled, or Scale Alarm-2 is enabled due to overweight; or PTO-1 or PTO-2 pump is ON, then the diagnostic message will appear on the InSight display as shown below.

Figure 133.

A. Indication:

1. Arms Overheight light ON.
2. Top Door Open light ON.
3. Scale Alarm-2 ON due to Overweight.
4. PTO-1 and PTO-2 pump Active signal ON.

B. Disabled Functions

Forks will not raise above the windshield.

C. Fault Reset

Fully open the top door. Restart the packer panel. Check the top door, the packer retract prox. switches, and the auto-lift enable switch for proper operation. Verify the overweight condition for correct functioning.

TOP DOOR OPEN AND ARMS RAISED INTERLOCK (STANDARD EQUIPMENT)

If the arms are raised when the top door is not fully open, or the packer is not fully retracted, and the packer/cab protector switch has not been enabled, or Scale Alarm-2 is enabled due to overweight, and the auto-lift switch is disabled, or PTO-1 or PTO-2 pump is ON and the top door open configuration bit is ON, then the diagnostic message will appear on the InSight display as shown below.

Figure 134.

A. Indication:

1. Arms over-height light ON.
2. Top door open light ON.
3. Scale Alarm-2 ON due to overweight.
4. PTO-1 and PTO-2 pump active signal ON.
5. Top door open configuration bit is ON.

B. Disabled Functions:

Forks will not raise above the windshield.

C. Fault Reset:

Open the top door fully. Restart the packer panel. Check top door and packer retract prox. switches and auto-lift enable switch for proper operation.

CAB PROTECTOR RAISED AND ARMS RAISED INTERLOCK (STANDARD EQUIPMENT)

If the arms have been raised when the packer is not fully retracted and the packer/cab protector switch has been enabled/ Scale Alarm-2 is enabled due to over-weight and the auto-lift switch is disabled/packer extend or packer retract bit is ON/ PTO-1 or PTO-2 pump is ON, then the diagnostic message will appear on the InSight display as shown below.

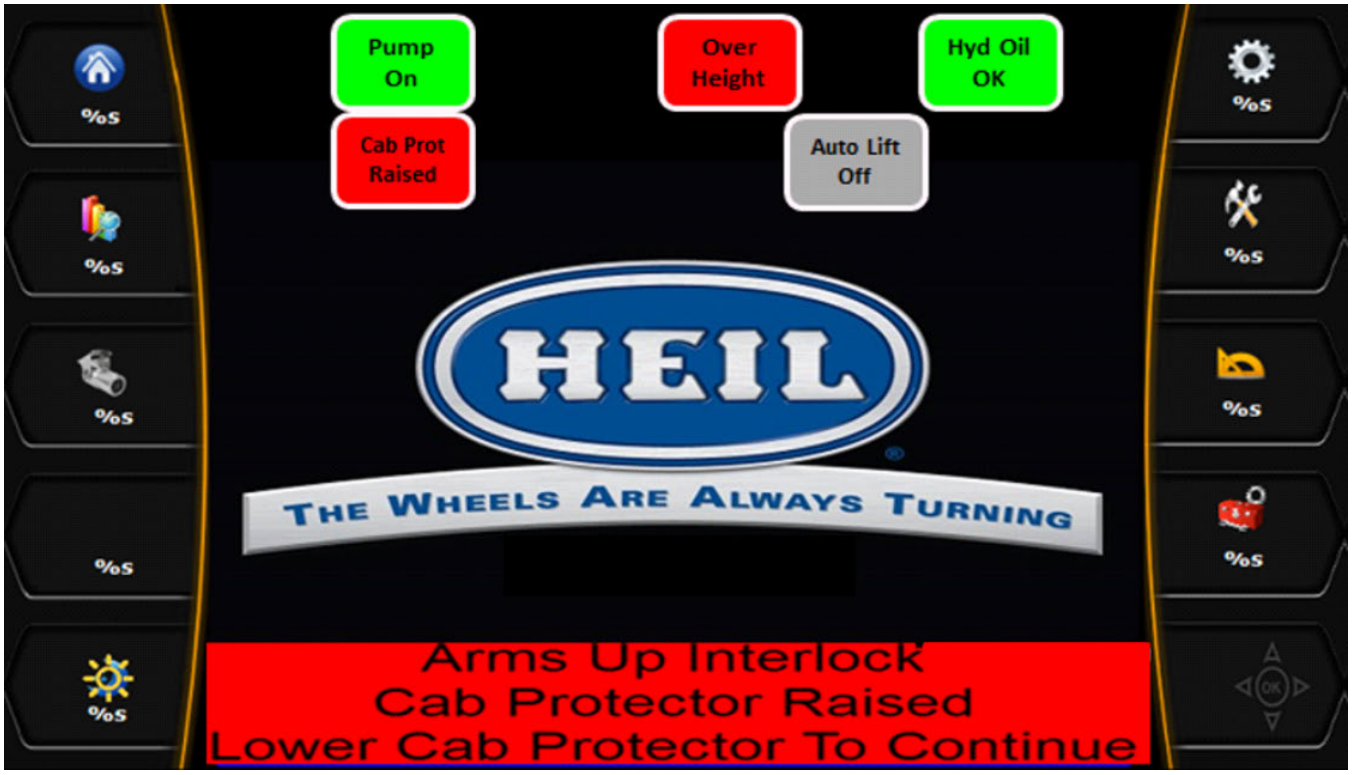


Figure 135.

A. Indication

1. Top Door Open light ON.
2. Arms Overheight light ON.
3. Scale Alarm-2 ON due to Overweight.
4. PTO-1 and PTO-2 pump Active signal ON.
5. Cab Protector Up Configuration bit is ON

B. Disabled Functions

Forks will not raise above windshield.

C. Fault Reset

Open the top door fully. Restart packer panel. Check Packer Retract prox. Switches, Cab protector down prox. Switches and Auto Lift Enable switch for proper operation.

PACKER SENSOR FAULT (STANDARD EQUIPMENT)

The packer position value is less than 100 during the packing operation. The diagnostic message will appear on the InSight display as shown below.

Note: Refer to Standard Side Body Controller Input Functions - I02-PIN054 Packer Position for more details

Figure 136.

A. Indication:

1. Packer Sensor faulty.
2. B. Sensor failure ON.

B. Disabled Functions

Packer and fork functions.

C. Fault Reset

Check for a faulty sensor or sensor mounting position, calibrate the faulty sensor, and check the packer cylinder for proper operation.

ARMS RAISED INTERLOCK WITH FORKS UNTUCK AND ARMS RAISED DOCKED INTERLOCK (STANDARD EQUIPMENT)

If the arms are raised when the top door is not fully open or the packer is not fully retracted, and the forks untuck position is ‘113’ while the arm angle position exceeds ‘450’, the diagnostic message will appear in the InSight display as shown below.

Figure 137.

A. Indication:

1. Arms over-height light ON.
2. Top door open light ON.
3. PTO-1 and PTO-2 pump active signal ON.

B. Disabled Functions

Forks will not raise above the windshield.

C. Fault Reset

Open the top door completely. Restart the packer panel. Check the top door and packer retract prox. switches for proper operation.

SIDE DOOR INTERLOCK FAULT (STANDARD EQUIPMENT)

If the side door opens with either pump enabled, the diagnostic message will appear on the InSight display as shown below.

Figure 138.

A. Indication:

1. Pump turns OFF unexpectedly
2. Packer does not pack
3. Pump will not turn ON

B. Disabled Functions

Pumps

C. Fault Reset

Close the side door or repair the faulty side door proximity switch.

LOW OIL LEVEL FAULT (STANDARD EQUIPMENT)

If the hydraulic oil level drops below a safe operating level during operation, the diagnostic message will appear on the InSight display as shown below.

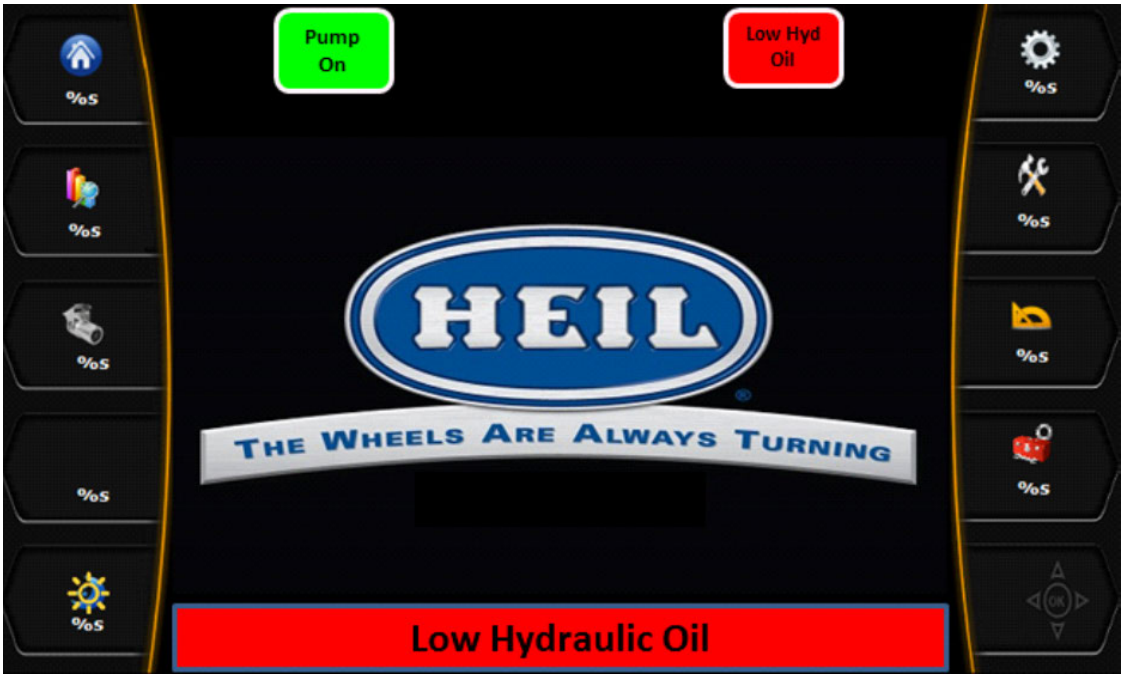


Figure 139.

A. Indication

Low Hydraulic Oil Level

B. Disabled Functions

Hydraulic Pump

C. Fault Reset

Refill the hydraulic oil in tank

OIL OVER TEMPERATURE SHUTDOWN FAULT (STANDARD EQUIPMENT)

If the hydraulic oil temperature exceeds 190º F, this indicates a fault because the oil temperature must remain within the specified limit (less than 190º F) for the system to function correctly. If these conditions occur, a diagnostic message will appear on the InSight display as shown below.

Figure 140.

A. Indication

Hydraulic oil over temperature shutdown

B. Disabled Functions

Hydraulic pump

C. Fault Reset

Reduce the temperature before operation.

HIGH TEMPERATURE FAULT (STANDARD EQUIPMENT)

If the hydraulic oil temperature exceeds 180º F, the diagnostic message will appear on the InSight display as shown below.

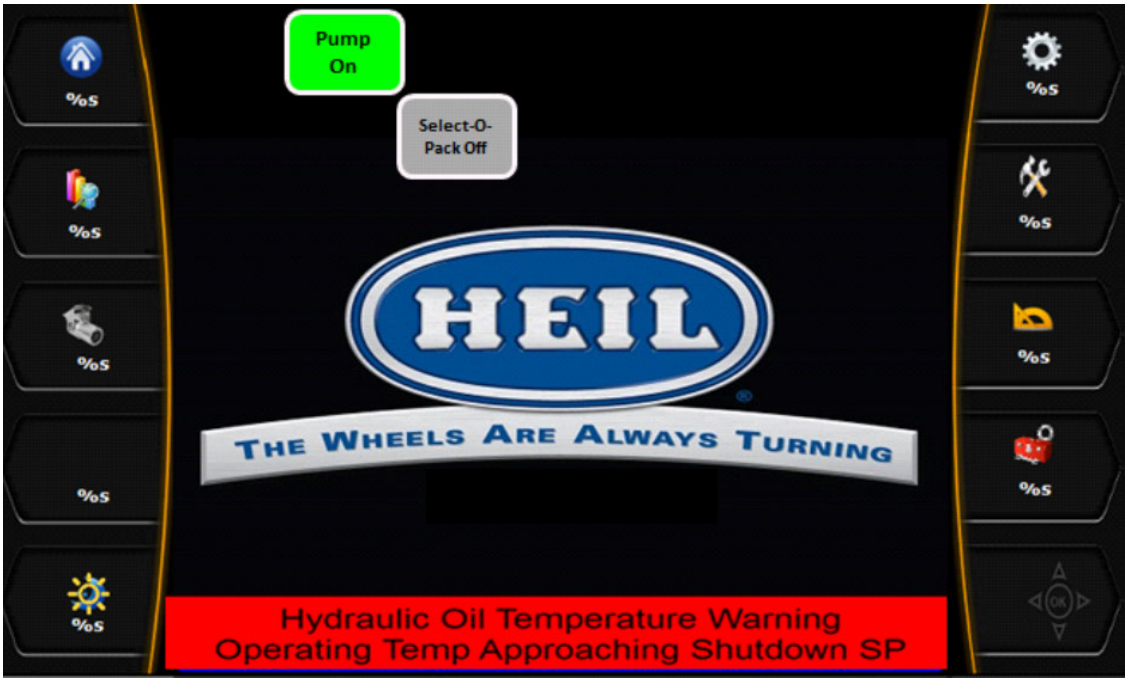


Figure 141.

A. Indication:

1. Hydraulic Oil over temperature warning
2. Operating temperature approaching shutdown set point (180°F)

B. Disabled Functions

None

C. Fault Reset:

Reduce the temperature before operation

PUMP ENABLE PB WITH SYSTEM POWER DISABLED INTERLOCK (STANDARD EQUIPMENT)

With system power turned OFF, and if the pump enable push button is pressed from either the street or curb side of the dual control panel for Bank-1 Switch-1 and Bank-3 Switch-1, the diagnostic message will appear on the InSight display as shown below.

Figure 142.

A. Indication:

System power input is not illuminated

Pump does not turn ON

B. Disabled Functions

Body pump and lift pump

C. Fault Reset

Turn the system power ON before utilizing the pump push button

TAILGATE OPEN INDICATOR AND ROAD SPEED LIMIT FAULT (STANDARD EQUIPMENT)

If the tailgate is open when the truck speed is greater than 10mph, i.e., if the tailgate is open when the unit is in motion, the diagnostic message will appear on the InSight display as shown below.

NOTE: Tailgate operation is possible when the truck speed is under five mph.

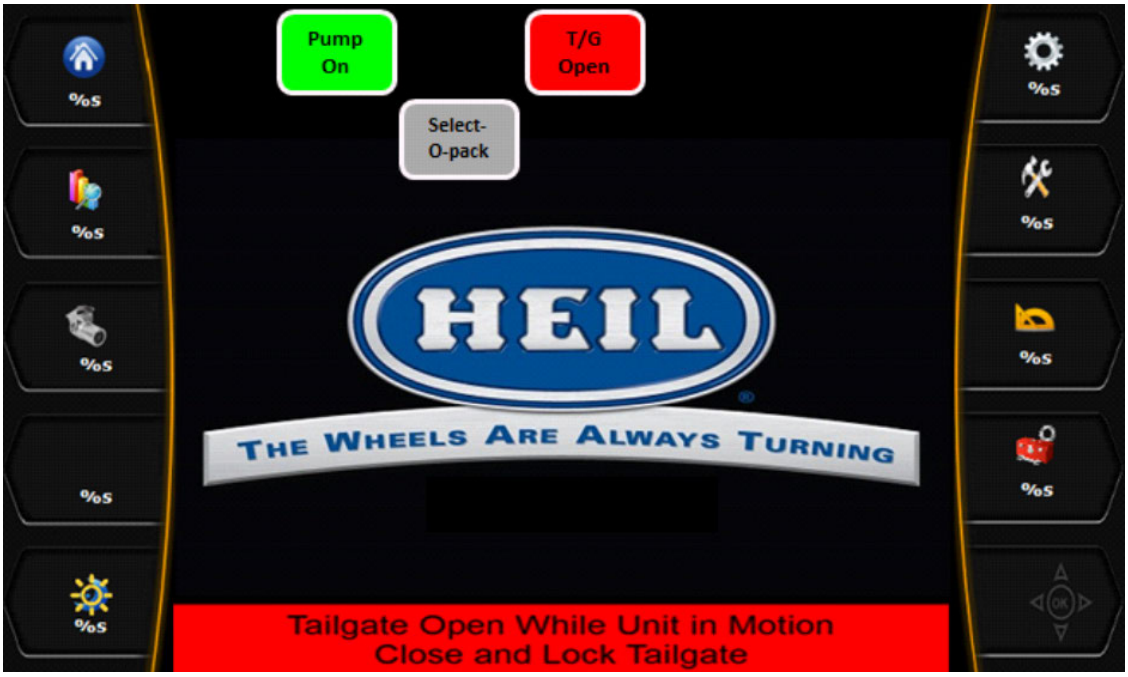


Figure 143.

A. Indication

Tailgate open

B. Disabled Functions

None

C. Fault Reset

Close and lock the tailgate or repair the faulty tailgate open proximity switch to proceed further.

TAILGATE UNLOCKED AND ROAD SPEED HIGH INTERLOCK (STANDARD EQUIPMENT)

If the tailgate is unlocked when the toad speed exceeds 10 mph—i.e., if the tailgate remains unlocked while the unit is in motion, the diagnostic message will appear on the InSight display as shown below.

NOTE: Tailgate operation is possible when the truck speed is under five mph.

Figure 144.

A. Indication

Tailgate Unlocked.

B. Disabled Functions

None

C. Fault Reset

Close and lock the tailgate or repair the faulty tailgate locked proximity switch to proceed further.

FILTER BYPASS SWITCH FAULT (STANDARD EQUIPMENT)

If the Heil controller loses the signal from the filter pressure switch while neither hydraulic pump is in operation, the diagnostic message will be displayed in the Insight display. This is recognized as a fault because there should be no hydraulic pressure to bypass the filter under this condition.

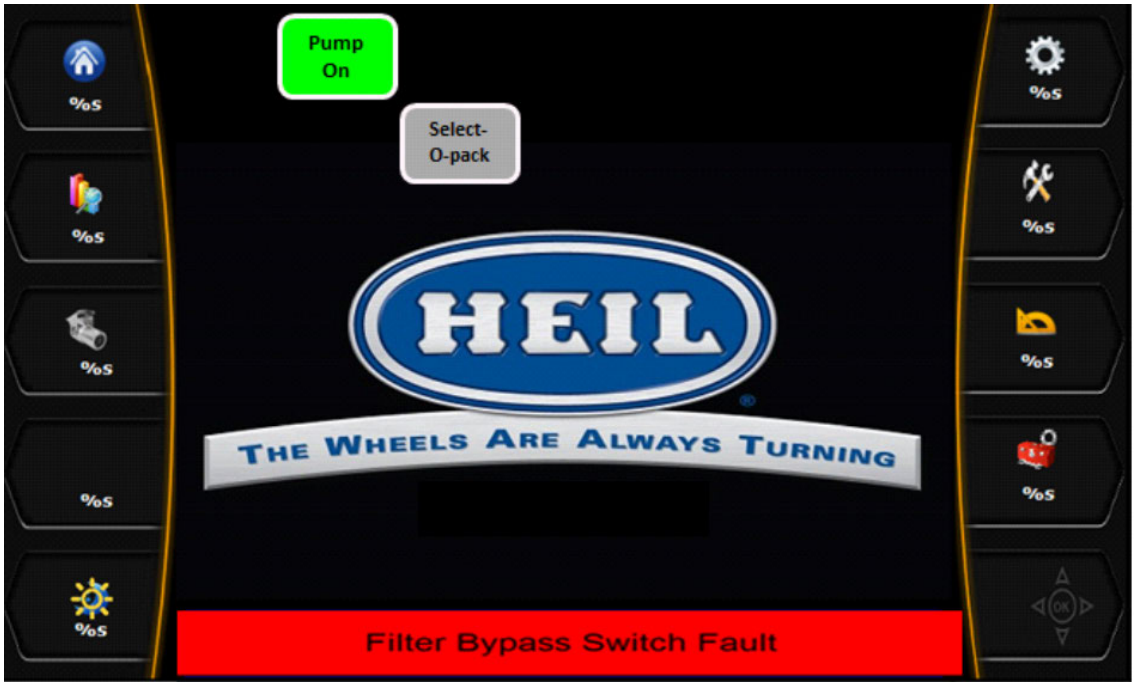


Figure 145.

A. Indication:

1. The filter bypass pressure switch has been disconnected.
2. An open has occurred in the filter bypass input circuit.
3. The filter pressure switch has failed to open.

B. Disabled Functions

None

C. Fault Reset

Cycle System Power Switch or Restore filter pressure switch input to Mobile Controller

Note: This fault is applicable on dry valve pump units only.

TEMPERATURE SENSOR FAULT (STANDARD EQUIPMENT)

The CAB Controller received a signal from the temperature sensor indicating that the hydraulic oil temperature is outside the limit; it is below -100 or above 4000. This indicates a fault as the temperature must remain within the specified range for proper system operation. See InSight display image below.

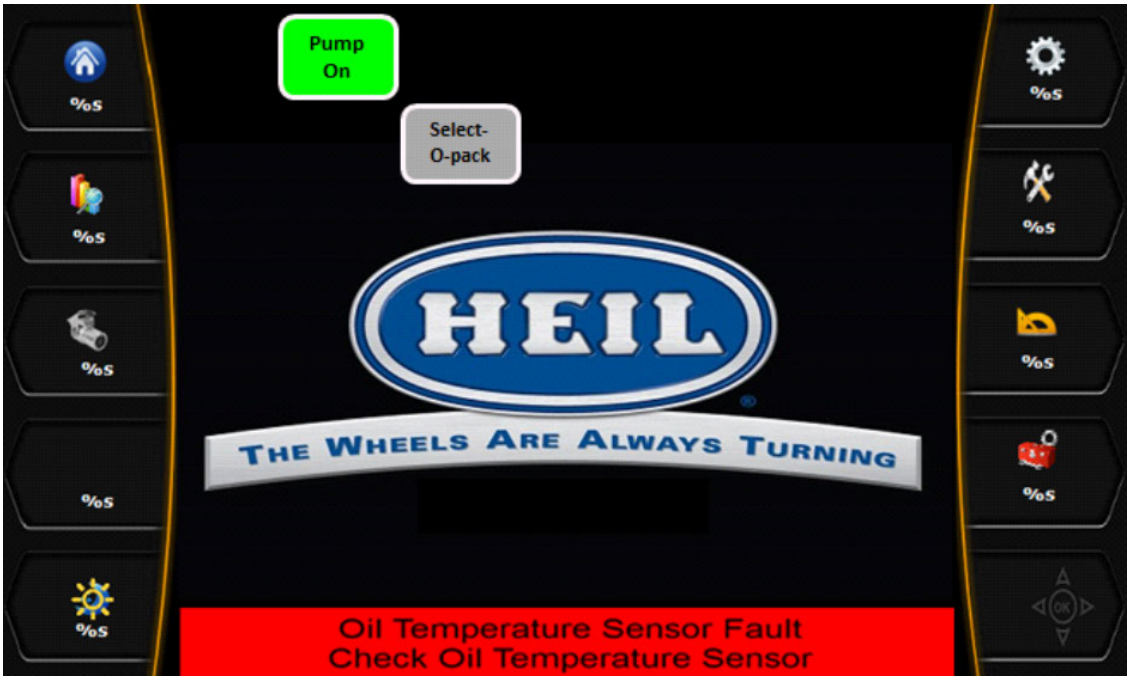


Figure 146.

A. Indication

Oil temperature sensor fault

B. Disabled Functions

None

C. Fault Reset

When the temperature returns to the defined limit (i.e., within -100 to 4000), the switch will reset. If the switch does not reset, there may be a problem with the temperature switch or the harness.

NO VOLTAGE ON EXTENDED CONTROLLER SIDE FAULT (STANDARD EQUIPMENT)

If the voltage measured across VBB1_E, VBB2_E, VBB3_E, and VBB_RELAYIS_VOLTAGE terminal (i.e., Connector-2 Pin-19, Pin-1, Pin-32, and Pin-51) is less than 8 volts, then this is recognized as a fault.

Figure 147.

A. Indication

No voltage on the extended side controller.

B. Disabled Functions

MOBILE32 extended controller

C. Fault Reset

When the voltage (greater than 8 VDC) is available at these VBB terminals (VBB1_E, VBB2_E, VBB3_E, and VBB_RELAYIS_VOLTAGE), the MOBILE32 extended controller will turn ON and start functioning normally. If the extended controller doesn't start, there may be a problem with the MOBILE32 extended controller, the 55-pin connector connection, or the harness.

NO IGNITION VOLTAGE ON EXTENDED CONTROLLER SIDE FAULT (STANDARD EQUIPMENT)

If the voltage measured across VBB2_E and VBB_RELAYIS_VOLTAGE terminal (i.e., Connector-2 Pin-19 and Pin-51) is less than 8 volts, this is recognized as a fault.

Figure 148.

A. Indication

No Ignition voltage on the extended side controller.

B. Disabled Functions

MOBILE32 extended controller.

C. Fault Reset

When the voltage (greater than 8 VDC) is available at these VBB terminals (VBB2_E and VBB_RELAYIS_VOLTAGE), the MOBILE32 extended controller will turn ON and function normally. If it does not start, there may be a problem with the MOBILE32 extended controller, the 55-pin connector connection, or the harness.

UNDER OPERATING TEMPERATURE WARNING

If the hydraulic oil temperature is below 70º F, the diagnostic message will appear on the InSight display as shown below.

Figure 149.

A. Indication

Hydraulic oil temperature under the operating range

B. Disabled Functions

None

C. Fault Reset

Preheat oil before route. Refer to the Cold Weather Warm-Up Procedure 98 for more details.

HOME SCREEN

When the truck key switch is on (for trucks without an integrated camera system) or after you toggle from Camera Mode to Home Screen (for trucks with an integrated camera system), the home screen will be displayed. This screen will show the operator button menu icons, diagnostic display messages and various cab control conditions, including if:

- Pump is on/off,
- Side Door is closed,
- Tailgate is closed,
- Tailgate is locked,
- Select O Pack on/off
- Forks Tucked
- Hydraulic Oil Low/OK,
- Filter Pressure OK.

When a fault occurs, the In-Cab Alarm will sound and a diagnostic message will be displayed with the status of respective Input / Output in the Insight display unit. See the figure below.

See **Body Controller Software Section** 171 for display screen shots of potential diagnostic messages, listed disabled functions and instructions for fault reset.

DIAGNOSTIC DISPLAY MESSAGES
When a fault occurs, the In-Cab Alarm will sound and a Diagnostic Message will be displayed.

CAMERA SCREEN AND SYSTEM (IF EQUIPPED)

Depending on unit option configuration, your unit can be equipped with multiple cameras that are viewable on the InSight™ Diagnostic Display.

Toggle Camera / Home Screen Modes

For trucks equipped with a camera system, when the truck key switch is first tuned ON, the camera views will be shown on the display. You can temporarily view any message on the display by holding down the right arrow on the display. Release the right arrow to return to the camera view. You can also toggle from Camera Mode to the Heil Home Screen by following the instructions below.

1. Models with 109-0309-20180509 revision of display code or later:
   a. Toggle from Camera Mode to Home Screen: Hold right top button for 5 seconds.
   b. Toggle from Home Screen to Camera Mode: Hold left top button for 5 seconds (or power cycle truck ignition).
2. Models with 109-0309-20180416 revision of display code:
   a. Toggle from Camera Mode to Home Screen: Hold OK button + right top button for 5 seconds.
   b. Toggle from Home Screen to Camera Mode: Hold OK button + left top button for 5 seconds (or power cycle truck ignition).

3rd Eye Remote

1. Red Power Button: turns power on/off to the video box.
2. The “JUMP” Button: cycles through the different input configurations for the camera view, i.e. you can select whether you want to see 1,2,3 or 4 different cameras at one time.
3. The “SOURCE” Button: cycles through the different camera views, i.e. once you have the input configuration selected using the “JUMP” button, the “SOURCE” button determines what camera view you see.
4. The “MIRROR” Button: changes the camera view to a mirrored image of the previous view.

Camera Boot Up Process

If the video box gets turned off, the following steps need to be performed:

1. Make sure the key switch is ON for the unit.
2. On the 3rd Eye Remote, press the red power button on the top right.
3. Turn the key switch OFF and then turn the key switch back ON (i.e. power cycle truck ignition).

You should now have the camera box turned on and the camera views (if configured) will be visible on the display.

CAMERA SCREEN AND SYSTEM (IF EQUIPPED)

Camera System Configuration

The camera system will be configured in the InSight™ Diagnostic Display when you receive the Heil unit. However, if you install or uninstall cameras or install a new display on the unit, follow these steps to set the cameras installed on your unit ON or OFF.

1. Select the Camera Config button (3rd button from the top on the left of the display). See the image below.

2. Type in the Camera Configuration password. Contact Heil Technical Service at 866-310-4345 to get the password.
3. Check the unit sales order to find what cameras are to be installed on the unit. On the camera configuration screen, scroll and select using the “OK” button the corresponding cameras per the sales order. ONLY CONFIGURE THE CAMERAS LISTED ON THE SALES ORDER. See the image below.

4. Cycle the power to the display and the cameras will be correctly configured.

CAMERA SCREEN AND SYSTEM (IF EQUIPPED)

Camera System Configuration (Continued)

5. In the event that you need to turn off the camera view and go back to the control screen, press and hold the top right button on the display for 5 seconds. If a trigger is active (Reverse, L Turn, or R Turn), you will not be able to turn off the camera view. See the image below.

6. To turn the cameras back on, press and hold the top left button on the display for 5 seconds OR cycle the power to the display. See the image below.

COUNTERS SCREEN

The Counters Screen allows you to monitor daily and total arm cycles, daily and total pack cycles, maintenance hours, pump hours and filter bypass hours.

SERVICE SCREENS

By pressing the service button you can toggle through several different screens in the display. These screens can be viewed anytime the key switch is on or the truck is running. Nothing on these screens can be adjusted and are view only. Input and Output Screens have several components. To see them all, you may need to press the down directional button to scroll down the list.

- Inputs
- Inputs Ext
- Multiplex Inputs
- Remote Inputs
- Setpoints
- Outputs
- Outputs Ext
- Remote Outputs
- Control Power

SERVICE MODE

The Half/Pack units have a Service Mode within their Mobile Controller programming initiated on the Insight Diagnostic Display. Service Mode is to be used ONLY by authorized service personnel in the event of a cylinder on Half/Pack with Odyssey controls and packer sensor on all other Half/Packs, failure on route to recover to a safe arms and forks position. Service Mode can also be used to move the functions while servicing a failed cylinder sensor.

Watch the Service Shack Video online at **www.Heil.com/Heil-Service-Shack** by selecting **Entering Service Mode**.

NOTICE

Service Mode is to be used ONLY by authorized service personnel. Unauthorized use of Service Mode can result in extensive damage to the unit.

NOTICE

The arms, forks and packer will move very, very slowly due to the unit being in Service Mode.

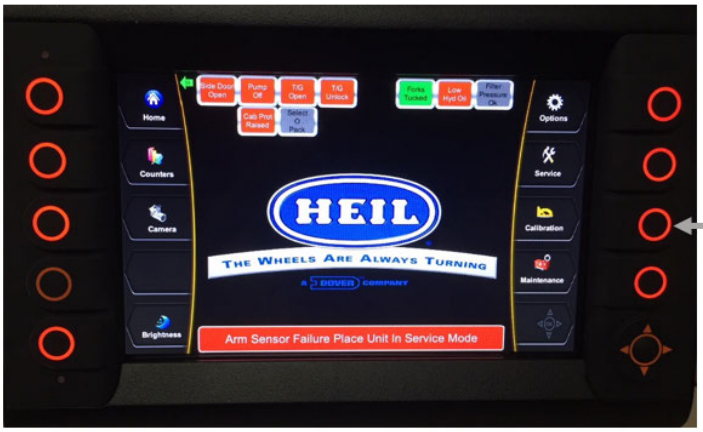
1. Place the unit in Service Mode.
   a. On the Insight Diagnostic display, enter Maintenance Mode and scroll to Service Mode press the OK button for 3 seconds to turn on Service Mode.
   b. The password screen will appear on the display.
   c. Enter the service password 4 3 2 1 and press OK.
   d. Select Service Mode with the arrows, then press OK button down for 3 seconds to enter service mode.
   e. Press ESC to exit.
2. When service is complete, go back to the maintenance screen and turn off Service Mode. See Step 1 above. Service Mode also resets if power to the unit is cycled.

CALIBRATION SCREEN

The Calibration Screen allows you to calibrate various sensors dependent on how the unit is configured.

ARC SENSOR CALIBRATION

Arc Sensor Calibration may be needed when the arc sensor for the packer is changed and needs to be re-calibrated. Calibration should be performed on an annual basis ONLY by properly trained and authorized service personnel. This procedure requires a password to place the unit in Calibration Mode. This password can be provided to authorized service personnel by contacting Heil Technical Services at 866-310-4345.



NOTICE

The unit does NOT have to be placed in Service Mode prior to being placed in Calibration Mode.

1. Remove any carry cans (Curotto or Bayne or any other can) from the forks. The forks have to be empty when doing the calibration. Refer to the Carry Can Manufacturer Operation and Service Manual.
2. Place the unit in **Calibration Mode**
   a. On the InSight™ Diagnostic Display, press and release the Calibration button. See image above.
   b. The password screen will appear on the display.
   c. Enter the Calibration Password provided by Heil Technical Services and press OK. Contact Heil Technical Services for the Calibration Password.
   d. The display will now walk the Authorized Service Person through the calibration routine with prompts on the display.
   e. The Authorized Service Person can cancel the calibration routine at any point or skip a section by selection ESC or SKIP from the menu.

NOTICE

The arms, forks and packer will move very, very slow due to the unit being in Calibration Mode.

3. Perform the calibration steps below.
   a. Fully retract the Packer Blade – press OK (the display will move to the next screen)
   b. Extend the packer manually to the end of the first stage of the cylinder – Press OK (this is the packer fully extended position)
   c. Extend the packer to just inside the body – press OK (this is the packer travel position)
   d. At this point the truck is calibrated and pressing OK finishes the sequence.

MAINTENANCE SCREEN

The Half/Pack unit has a Maintenance Mode within its Mobile Controller programming initiated on the InSight™ Diagnostic Display. Maintenance Mode is to be used ONLY by authorized service personnel in the event of a cylinder or packer sensor failure on route to recover to a safe arms and forks position. Maintenance Mode can also be used to move the functions while servicing a failed cylinder sensor.

NOTICE

Maintenance Mode is to be used ONLY by authorized service personnel. Unauthorized use of Maintenance Mode can result in extensive damage to the unit.

NOTICE

The arms, forks and packer will move very, very slowly due to the unit being in Service Mode.

1. Place the unit in **Maintenance Mode**.
   a. On the InSight™ Diagnostic Display, enter Maintenance Mode and then hold the OK button down for 5 seconds and release.
   b. The password screen will appear on the display.
   c. Enter the service password 4 3 2 1 and press OK.
   d. The bottom option should be Service Mode. Select it with the arrows and then press OK making sure that option changes from OFF to ON.
   e. Press ESC to exit.
2. When service is complete, go back to the maintenance screen and turn off Service Mode. See Step 1 above. Service Mode also resets if power to the unit is cycled.

HALF/PACK
Body Controller Hardware

SECTION 6
BODY CONTROLLER SOFTWARE

MOBILE CONTROLLER DETAILS: PROGRAM 109-0396

The Half/Pack Commercial standard vehicle control system consists of 3 Heil Controllers.

The “MAIN” Controller is an extended controller consisting of 80 Inputs/Outputs, and the CAB & RTG (Remote Tailgate) controllers are standard controllers consisting of 32 Inputs/Outputs and operate with a voltage ranging from 8 to 32 volts DC.

A. Mobile Controller Indicator Lights

Each Controller has a three-color LED (red, green, and blue) that indicates the controller's status. The LED operating status identifications are detailed in the table below.

LED Color	Status	Description
-	OFF	No operating voltage
Yellow	1x ON	Initialization or reset checks
Orange	ON	Error in start-up phase
Green	5.0 Hz	No operating system loaded
Green	2.0 Hz	Application is running (RUN)
	ON	Application stopped (STOP)
Red	2.0 Hz	Run with error
	ON	Fatal error or stop with error
Red[3]	5.0 Hz	Application stopped due to under voltage
	ON	Fatal error (System fault)
Blue[1,2]	2.0 Hz*	Communication OK between 2 Controllers (for 80 I/O Mobile32 Controller)[1]
		Communication OK between Main, RCN, and RTG Controllers (for 32 I/O Mobile32 Controller only)[2]

Note[1]: LED will flash Blue when there is good communication between the 2 halves of the Controller. This condition applies only to 80 I/O CR0233 Controllers.

Note[2]: LED will flash Blue when there is good communication between the MAIN, CAB, and RTG Controllers. This condition applies only to 32 I/O CR2530 Controllers.

Note[3]: Applicable only for Remote Tailgate (RTG) CR2530 Controller.

CONTROLLER & PROGRAM DETAILS

The following information provides details for the controller programs installed.

A. Program Table

Controller	Controller Type	Controller Location	Program Number	Name
1	Heil-0233 Controller (IFM-CR0233)	Street-side of body (behind the panel on the body skirt)	109-0396	Main Controller
2	Heil-2530 Controller (IFM-CR2530)	Cab (behind driver seat)	109-0353	Cab Controller
3	Heil-2530 Controller (IFM-CR2530)	Tailgate (at the upper light bracket)	109-0317	Tailgate Controller

B. Inputs

The Controller Inputs are activated by positive +12-volt signals and some Ground signals (some chassis signals). All Switches, Proximity Sensors, Pressure Sensors, Toggle Switches, Push buttons, etc., used as input devices to the Controller supply a +12-volt signal to a Heil-32 Extended Controller input to turn the input ON, unless otherwise specified. With an Input ON, the corresponding Input field (with Description and Address) shown on the InSight display will also be ON.

C. Outputs

During each cycle, the CPU analyzes the status of the inputs and, based on the programming logic, produces the appropriate +12-volt DC outputs.

D. Pulse Width Modulation (PWM)

1. The primary use of a PWM signal is to allow control of the power supplied to electrical devices.
2. The average voltage (and current) supplied to the load is controlled by rapidly switching the supply to the load ON and OFF. The longer the switch remains ON compared to the OFF periods, the higher the power supplied to the load will be.
3. The main advantage of PWM is that power loss in the switching devices is very low. When a switch is OFF, there is practically no current, and when the switch is ON, there is almost no voltage drop across it. Refer to the figure below for PWM output signals and Waveforms.
4. To test a PWM output, use an incandescent test light; the brightness will vary with the voltage level.

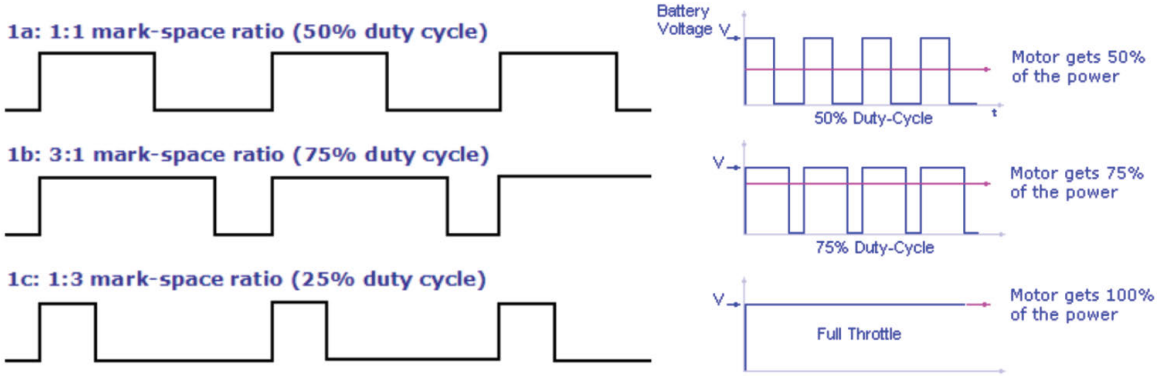


Figure 150. Pulse Width Modulation Output Waveforms

CONTROLLER & PROGRAM DETAILS (CONTINUED)

E. Communication Ports

1. The 80 I/O CR0233 Controller features 4 CAN and one RS-232 communication port, which will be used for programming and communication purposes. The serial port (RS-232) on the ST side will be used to download user programs via the Codesys/IFM Maintenance Download tool (Downloader 32), while the CAN ports on the ST side are used for communication between the Controller and field devices. *See Note below.*
2. The Remote Tailgate (RTG) and CAB 32 I/O CR2530 controllers each feature 2 CAN communication ports. One of these ports will be designated for communication with the “MAIN” controller. The second CAN port in both the Remote Tailgate (RTG) and the CAB controller will remain unused.

Note: Communication ports from both controllers should not be used simultaneously for downloading or uploading programs, as this may lead to system malfunctions or shutdowns. Only the communication ports assigned to the master control unit should be used for programming and communication purposes.

F. Cab Controller Program

The tables below provide the connection details between the controller input, output and connector pins for program **109-0353 (CR2530)**.

CAB CONTROLLER INPUTS		
Program Number:		**109-0353**
Input Signal	**Input Number**	**Pin Number**
SCALE ALARM 1 SW	IN00	55
TRANS TEMP SIG	IN01	36
SCALE ALARM 2 SW	IN02	54
CHASSIS NEUTRAL SIG	IN03	35
PLUGGED	IN04	53
PLUGGED	IN05	34
PLUGGED	IN06	52
PANEL SELECTION SW	IN07	33
PLUGGED	IN08	24
PLUGGED	IN09	41
PLUGGED	IN10	23
PLUGGED	IN11	40
PLUGGED	IN12	22
PLUGGED	IN13	39
MANUAL BAYNE ENABLE SW	IN14	21
PLUGGED	IN15	38
SUPPLY VOLTAGE CONTROLLER BAT	-	10
SUPPLY VOLTAGE OUTPUT 00-07	-	19
SUPPLY VOLTAGE OUTPUT 08-15	-	1

HALF/PACK

Body Controller Software

CAB CONTROLLER OUTPUTS		
Program Number:		**109-0353**
Output Signal	**Output Number**	**Pin Number**
THROTTLE ADVANCE	OUT00	18
THROTTLE LIMIT	OUT01	17
OUT OF DIMENSION	OUT02	16
PLUGGED	OUT03	15
PLUGGED	OUT04	14
ARM FORK CUROTTO LOCK OUT	OUT05	13
PLUGGED	OUT06	12
PLUGGED	OUT07	11
CARRY CAN COVER DOWN	OUT08	2
CARRY CAN COVER UP	OUT09	3
CNG OPEN SOL	OUT10	4
PLUGGED	OUT11	5
AUX AIR SUPPLY	OUT12	6
WARBLE ALARM	OUT13	7
CAB ALARM	OUT14	8
AIR SUPPLY	OUT15	9

CONTROLLER & PROGRAM DETAILS (CONTINUED)

G. Main (Body) Controller Program

The tables below provide the connection details between the controller input, output and connector pins for program **109-0396 (CR0233)**.

BODY CONTROLLER INPUTS - STANDARD SIDE		
Program Number:		**109-0396**
Input Signal	**Input Number**	**Pin Number**
BODY VALVE PRESSURE	I00	55
LIFT BELOW TRANSIT PROX	I01	36
PACKER POSITION SENSOR	I02	54
FORKS TUCKED PROX	I03	35
SIDE DOOR PROX	I04	53
ARMS UP PROX	I05	34
FILTER PRESSURE SWITCH	I06	52
LOW OIL SWITCH	I07	33
SYSTEM POWER SWITCH	I08	24
PLUGGED	I09	41
PLUGGED	I10	23
RIGHT TURN LIGHT	I11	40
OIL TEMPERATURE	I12	22
LEFT TURN SIGNAL	I13	39
CAB PROTECTOR DOWN PROX	I14	21
PLUGGED	I15	38
SUPPLY VOLTAGE CONTROLLER BAT	-	10
SUPPLY VOLTAGE OUTPUT 00-07	-	19
SUPPLY VOLTAGE OUTPUT 08-15	-	1

BODY CONTROLLER OUTPUTS - STANDARD SIDE		
Program Number:		**109-0396**
Output Signal	**Output Number**	**Pin Number**
EOS ENABLE	Q00	18
PLUGGED	Q01	17
CAB PROTECTOR LOWER	Q02	16
CAB PROTECTOR RAISE	Q03	15
ARMS RAISE	Q04	14
ARMS DOWN	Q05	13

HALF/PACK

Body Controller Software

BODY CONTROLLER OUTPUTS - STANDARD SIDE		
Program Number:		**109-0396**
Output Signal	**Output Number**	**Pin Number**
FORKS RAISE	Q06	12
FORKS DOWN	Q07	11
PTO 1 SOLENOID	Q08	02
PTO 2 SOLENOID	Q09	03
PLUGGED	Q10	04
PLUGGED	Q11	05
PACKER EXTEND	Q12	06
PACKER RETRACT	Q13	07
TAILGATE FLOW	Q14	08
CARRY CAN FLOW	Q15	09

BODY CONTROLLER INPUTS - EXTENDED SIDE		
Program Number:		**109-0396**
Input Signal	**Input Number**	**Pin Number**
PLUGGED	I00_E	55
PLUGGED	I01_E	36
PLUGGED	I02_E	54
PLUGGED	I03_E	35
HIGH PRESSURE FILTER	I04_E	53
PLUGGED	I05_E	34
EXTERNAL THROTTLE ADVANCE	I06_E	52
PLUGGED	I07_E	33
PLUGGED	I08_E	24
PLUGGED	I09_E	41
PLUGGED	I10_E	23
PLUGGED	I11_E	40
PLUGGED	I12_E	22
PLUGGED	I13_E	39
PLUGGED	I14_E	21
PLUGGED	I15_E	38
PLUGGED	I16_E	42
PLUGGED	I17_E	43
PLUGGED	I18_E	44
PLUGGED	I19_E	45

HALF/PACK

Body Controller Software

BODY CONTROLLER INPUTS - EXTENDED SIDE		
Program Number:		**109-0396**
Input Signal	**Input Number**	**Pin Number**
PLUGGED	I20_E	46
PLUGGED	I21_E	47
PLUGGED	I22_E	48
PLUGGED	I23_E	49
SUPPLY VOLTAGE CONTROLLER BAT	-	10
SUPPLY VOLTAGE OUTPUT 00-07	-	19
SUPPLY VOLTAGE OUTPUT 08-15	-	1
SUPPLY VOLTAGE OUTPUT 16-23	-	32

BODY CONTROLLER OUTPUTS - EXTENDED SIDE		
Program Number:		**109-0396**
Output Signal	**Output Number**	**Pin Number**
CAB FLOOD LIGHTS	Q00_E	18
PLUGGED	Q01_E	17
PLUGGED	Q02_E	16
PLUGGED	Q03_E	15
PLUGGED	Q04_E	14
PLUGGED	Q05_E	13
PLUGGED	Q06_E	12
PLUGGED	Q07_E	11
PLUGGED	Q08_E	02
PLUGGED	Q09_E	03
HOPPER FLOOD LIGHTS	Q10_E	04
CONTAINER LIGHT	Q11_E	05
BACKUP ALARM	Q12_E	06
AUX LIGHT	Q13_E	07
STROBE LIGHT 1	Q14_E	08
STROBE LIGHT 2	Q15_E	09
PLUGGED	Q16_E	25
PLUGGED	Q17_E	26
PLUGGED	Q18_E	27
PLUGGED	Q19_E	28
CARRY CAN GRAB CLOSE	Q20_E	29
CARRY CAN REL OPEN	Q21_E	30

BODY CONTROLLER OUTPUTS - EXTENDED SIDE		
Program Number:		**109-0396**
Output Signal	**Output Number**	**Pin Number**
PLUGGED	Q22_E	31
PLUGGED	Q23_E	50

H. Tailgate Controller Program

The tables below provide the connection details between the controller input, output and connector pins for program **109-0381 (CR2530)**.

TAILGATE CONTROLLER INPUTS		
Program Number:		**109-0317**
Input Signal	**Input Number**	**Pin Number**
TG CLOSED PROX	IN00	55
TG LOCK PROX CS	IN01	36
TG LOCK PROX SS	IN02	54
TOP DOOR OPEN	IN03	35
PLUGGED	IN04	53
PLUGGED	IN05	34
PLUGGED	IN06	52
PLUGGED	IN07	33
PLUGGED	IN08	24
PLUGGED	IN09	41
PLUGGED	IN10	23
PLUGGED	IN11	40
PLUGGED	IN12	22
PLUGGED	IN13	39
PLUGGED	IN14	21
PLUGGED	IN15	38
SUPPLY VOLTAGE CONTROLLER BAT	-	10
SUPPLY VOLTAGE OUTPUT 00-07	-	19
SUPPLY VOLTAGE OUTPUT 08-15	-	1

TAILGATE CONTROLLER OUTPUTS		
Program Number:		**109-0317**
Output Signal	**Output Number**	**Pin Number**
PLUGGED	OUT00	18

HALF/PACK

Body Controller Software

TAILGATE CONTROLLER OUTPUTS		
Program Number:		**109-0317**
Output Signal	**Output Number**	**Pin Number**
CNG SOL OPEN	OUT01	17
TG UP	OUT02	16
TG DOWN	OUT03	15
TG LOCK	OUT04	14
TOP DOOR OPEN	OUT05	13
TOP DOOR CLOSE	OUT06	12
TG UNLOCK	OUT07	11
PLUGGED	OUT08	2
PLUGGED	OUT09	3
PLUGGED	OUT10	4
PLUGGED	OUT11	5
PLUGGED	OUT12	6
PLUGGED	OUT13	7
PLUGGED	OUT14	8
PLUGGED	OUT15	9

I/O FUNCTIONS

The following information provides details for the input and output functions for the cab, body, and tailgate controller programs.

A. Cab Controller - Input Functions

1. Scale Alarm-1 Switch (IN00 - PIN55)

Function: This circuit monitors the ON/OFF status of the Scale Alarm-1 condition.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: This Scale Input goes High (ON) when approaching maximum weight on the scale system.

Input Device	Status	I/O Address	Status
Weight Scale SW	Activated	%IBO	ON

2. Scale Alarm-2 Switch (IN02 - PIN54)

Function: This circuit monitors the ON/OFF status of the Scale Alarm-2 condition.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: This Scale Input goes Low (OFF) during overweight condition.

Input Device	Status	I/O Address	Status
Weight Scale SW	Activated	%IB2	ON

3. Chassis Neutral Signal (IN03 - PIN35)

Function: This circuit monitors the transmission neutral circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
Chassis Transmission	Activated	%IB3	ON

4. Panel Selection Switch (IN07 - PIN33)

Function: This signal is used for switching between street-side and curb-side joysticks and panels.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
Selector Switch	Activated	%IB7	ON

5. Manual Bayne Enable Switch (IN14 - PIN21)

Function: Not used.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
-	Activated	%IB14	ON

B. Cab Controller - Output Functions

1. Throttle Advance (OUT00 - PIN18)

Function: This output function controls the throttle advance signal transmitted to the vehicle's engine.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Packer Extraction	Activated	N/A	ON
B	Packer Retraction	Activated	N/A	ON
C	Packer Extracted & TG Closed	Deactivated	N/A	OFF
D	Over height & Ride PB (Switch Bank)	Deactivated	CAN	OFF
E	Configure Disable Throttle ADV	Deactivated	CAN	OFF
F	Chassis Neutral Signal	Activated	IN03	OFF
G	Service Mode	Deactivated	HMI-CAN	OFF
H	Calibration Mode	Deactivated	HMI-CAN	OFF
I	Packer Full Extraction	Activated	N/A	ON
J	Auto retract	Activated	N/A	ON
K	System Power Switch	Activated	%IX0.8	ON
L	Aux Control Enable (Switch Bank)	Activated	CAN	ON
H	Aux Throttle Advance PB (Switch Bank)	Activated	CAN	ON

Note:

Condition 1: (A OR B) AND NOT (C) AND NOT (D) AND NOT (E) AND (F) AND NOT (G) AND NOT (H) will activate the throttle advance output.

Condition 2: ((I) AND (J) AND (K)) AND NOT (D) AND NOT (E) AND (F) AND NOT (G) AND NOT (H) will activate the throttle advance output.

Condition 3: ((L) AND (H)) AND (F) AND NOT (G) AND NOT (H) will activate the throttle advance output.

2. Throttle Limit (OUT01 - PIN17)

Function: This output controls the throttle limit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: This output function controls the throttle limit command sent to the engine.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Enable Hydraulic Pump	Activated	N/A	ON
B	Chassis Neutral Signal	Deactivated	IN03	OFF

Note: Condition: (A) AND (B) will activate the throttle limit output.

3. Out of Dimension (OUT02 - PIN16)

Function: This output controls the throttle limit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the engine control relay, road speed limit or accelerator interlock.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Configure NYC HP	Activated	HMI	ON
B	Vehicle Speed > Set MPH (7 MPH)	Activated	N/A	ON
C	TG Open Indication	Activated	N/A	ON
D	Arms UP Indication	Activated	N/A	ON
E	Side Door Prox	Deactivated	%IX0.4	OFF
F	Pump Enable	Deactivated	%IX0.4	OFF

Note:

Condition 1: (A) AND ((B) OR (C) OR NOT (D)) will activate the out of dimension output.

Condition 2: NOT (A) AND NOT (F) will activate the out of dimension output.

4. CNG Open Solenoid (OUT10 - PIN4)

Function: This output controls the CNG open solenoid.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Ignition Power	Activated	N/A	ON
B	Engine RPM < 100	Deactivated	CAN	OFF (See note below)
C	xJ1939_Error	Deactivated	CAN	OFF

Conditions: (A) AND NOT (B) AND NOT (C) will activate the CNG open solenoid output.

Note: If the engine RPM remains below 100 for more than 2 minutes, condition B will activate, which will result in turning off the CNG open solenoid output.

5. Auxiliary Air Supply (OUT12 - PIN06)

Function: This output controls the auxiliary air supply solenoid.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: When PTO1 or PTO2 is on, it activates the AUX air supply output.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	PTO1 or PTO2 (Main Controller)	Activated	(%QX0.8 or %QX0.9)	ON
B	Aux Control Enable (Switch Bank)	Activated	CAN	ON
C	Arms Down Lock	Deactivated	N/A	OFF
D	Arms Up Lock	Deactivated	N/A	OFF
F	300ms Delay	Activated	TON	ON

Conditions (A) AND (B) AND NOT (C) AND NOT (D) AND (F) will activate the AUX Air Supply output.

6. Warble Alarm (OUT13 - PIN07)

Function: This output controls the warble alarm.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Tailgate Closed Prox. Switch (RTG Controller input)	Deactivated	IN00	ON

Conditions: If TG is opening or TG is not locked, it will activate the warble alarm output.

7. Cab Alarm (OUT14 - PIN08)

Function: This output function controls the cab alarm.

Function Logic: The cab alarm triggers whenever there is an alarm on the HMI screen for diagnosis.

8. Air Supply (OUT15 - PIN09)

Function: This output controls the air supply solenoid.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: When PTO1 or PTO2 is on, it activates the Air supply output.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	PTO1 or PTO2 (Body Controller)	Activated	(%QX0.8 or %QX0.9)	OFF
B	300ms Delay	Activated	TON	OFF

Note: Conditions: (A) AND (B) will activate the air supply output.

C. Standard Side Body Controller - Input Functions

1. Body Valve Pressure (I00 - PIN55)

Function: This circuit is used to measure the body valve pressure.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: 0-10V analog input measures pressure.

Input Device	Status	I/O Address	Status
Pressure Transducer	Activated	%IW02	ON

2. Lift Below Transit Prox. (I01 - PIN36)

Function: This circuit is used to monitor the ON/OFF status of the lift below transit proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is ON when the forks and arms are in safe to drive position.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IX0.1	ON

3. Packer Position Sensor (I02 - PIN54)

Function: This circuit measures the value of the packer position.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: 0.5-4.5V analog input measures position.

Input Device	Status	I/O Address	Status
Position Sensor	Activated	%IW04	ON

4. Forks Tucked Prox. (I03 - PIN35)

Function: This circuit monitors the ON/OFF status of the forks tucked proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is ON when the forks are in the fully tucked position.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IX0.3	ON

5. Side Door Prox. (I04 - PIN53)

Function: This circuit monitors the ON/OFF status of the side door CLOSED proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is ON when the side door is closed.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IX0.4	ON

6. Arms Up Prox. (I05 - PIN34)

Function: This circuit monitors the ON/OFF status of the arms UP proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is ON when the arms are in the raised position.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IX0.5	ON

7. Filter Pressure Switch (I06 - PIN52)

Function: This circuit monitors the ON/OFF status of the oil filter pressure switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is OFF when the filter is in bypass. The input is ON when the filter is in normal operation, i.e. not in bypass.

Input Device	Status	I/O Address	Status
Pressure switch	Activated	%IX0.6	ON

8. Low Oil Switch (I07 - PIN33)

Function: This circuit monitors the hydraulic oil level.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is OFF when the hydraulic oil drops below the safe level.

Input Device	Status	I/O Address	Status
Level switch	Activated	%IX0.7	ON

9. System Power Switch (I08 - PIN24)

Function: This circuit monitors the ON/OFF status of the system power switch (mushroom button) (In-cab input).

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
Mushroom button	Activated	%IX0.8	ON

10. Right Turn Signal (I11 - PIN40)

Function: This circuit monitors the status of the right turn signal circuit. This circuit is used for enabling and disabling front and rear strobe circuits. (In Cab input)

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
Enable switch	Activated	%IX0.11	ON

11. Oil Temperature (I12 - PIN22)

Function: This circuit measures the hydraulic oil temperature.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: PT1000-RTD (Resistance Temperature Detectors)

Input Device	Status	I/O Address	Status
Temperature Transducer	Activated	%IW14	ON

12. Left Turn Signal (I13 - PIN39)

Function: This circuit monitors the status of the left turn signal circuit. This circuit is used for enabling and disabling the front and rear strobe circuits. (In Cab input)

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
Enable switch	Activated	%IX0.13	ON

13. Cab Protector Prox. (I14 - PIN21)

Function: This circuit monitors the ON/OFF status of the cab protector down proximity switch. (Body input)

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is ON when the cab protector is down. This circuit is used to interlock the arms when the aluminum cab protector is raised..

Input Device	Status	I/O Address	Status
Proximity	Activated	%IX0.14	ON

D. Extended Side Body Controller - Input Functions

1. High Pressure Filter (I04_E - PIN53)

Function: This circuit monitors the ON/OFF status of the high-pressure filter switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
Pressure switch	Activated	%IX128.4	ON

2. External Throttle Advance (I06_E - PIN52)

Function: Input assigned, not used

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Input Device	Status	I/O Address	Status
Pressure switch	Activated	%IX128.6	ON

E. Standard Side Body Controller - Output Functions

1. Engine Over Speed (EOS) Enable (Q00 - PIN18)

Function: This output controls the pump Engine Over Speed (EOS) Enable.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: PTO Enable.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Enable Hydraulic Pump	Activated	CAN	ON
B	Speed in PTO range	Activated	N/A	ON (See note below)
C	Pump ON oil Temperature Activated	Activated	N/A	ON (See note below)

Note: Condition B to be true when engine speed is less than 900.

Condition C to be true when the hydraulic oil temperature is less than the set point. (180 Fahrenheit).

Condition: (A) AND (B) AND (C) will activate the EOS enable output.

2. Cab Protector Lower (Q02 - PIN16)

Function: This function controls the cab protector DOWN output.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the cab protector lower solenoid.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Configure-Hydraulic Protection	Activated	HMI	ON
B	CAB cover lower PB	Activated	CAN	ON
C	PTO Enabled	Activated	N/A	ON
D	Lift below Transit Prox	Activated	%IX0.1	ON

Note:

Conditions: (A) AND (B) AND (C) AND (D) will activate the cab protector lower SOL.

3. Cab Protector Upper (Q03 - PIN15)

Function: This function controls the cab protector UP output.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the cab protector UPPER solenoid.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Configure-Hydraulic Protection	Activated	HMI	ON
B	CAB cover UP PB	Activated	CAN	ON

Condition	Function or Component	Status	I/O Address	Status
C	PTO Enabled	Activated	N/A	ON
D	Lift below Transit Prox.	Activated	%IX0.1	ON

Note:

Conditions: (A) AND (B) AND (C) AND (D) will activate the cab protector UP SOL.

4. Arms Raise (Q04 - PIN14)

Function: This function controls the arms raise output.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to arm raise solenoid.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Packer full Retract	Deactivated	N/A	OFF
B	Over height & Ride PB	Deactivated	HMI Rocker	OFF
C	Lift below Transit Prox	Deactivated	%IX0.1	OFF
D	Configure-Top Door	Activated	HMI	ON
E	PTO-1 SOL	Activated	%QX0.8	ON
E	PTO-2 SOL	Activated	%QX0.9	ON
F	Top Door Open Prox (TG controller input)	Deactivated	%IX0.1	OFF
G	Configure-CAB Protector	Activated	HMI	ON
H	Cab protector down prox	Deactivated	%IX0.14	OFF
I	Vehicle Speed in Range	Activated	N/A	ON (See note below)

Note: Condition I to be true when the hydraulic pump (PTO) is at vehicle speed more than 15MPH.

Condition 1: NOT (A) AND NOT (B) AND NOT (C)

Condition 2: (D) AND (E OR F) AND NOT (F) AND NOT (C)

Condition 3: (G) AND NOT (H)

Condition 4: (I)

Condition 1 OR Condition 2 OR Condition 3 OR Condition 4 will activate the arm raise SOL.

5. Arms Down (Q05-PIN13)

Function: This function controls the arms down output.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to arm down solenoid.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Configure-CAB Protector	Activated	HMI	ON
B	Cab protector down prox	Deactivated	%IX0.14	OFF
C	Vehicle Speed in Range	Activated	N/A	ON (See note below)

Note: Condition C to be true when the hydraulic pump (PTO) is at vehicle speed more than 15MPH.

Condition: (A) AND NOT (B) OR (C) will activate the arm down SOL.

6. PTO 1 Solenoid (Q08-PIN02)

Function: This output controls the Power Take-Off (PTO) system.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to PTO Solenoid.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	EOS Enable	Activated	%QX0.0	ON
B	500 milli Sec Delay	Activated	TON	ON
C	Engine Speed in Range	Activated	N/A	ON (See note below)
D	Configure-Tandem Pump	Deactivated	HMI	OFF
E	Tandem Pump pressure Limit	Deactivated	N/A	OFF
F	Tandem Pump TG Flow SOL	Deactivated	%QX0.14	OFF

Note: Condition C is true when the Engine RPM is less than 900.

Condition: (A) AND (B) AND (C OR ((E) AND NOT(F)) will activate the PTO-1 SOL.

7. PTO 2 Solenoid (Q09-PIN03)

Function: This output controls the Power Take-Off (PTO 2) system.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to PTO-2 Solenoid.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	EOS Enable	Activated	%QX0.0	ON
B	1 Sec Delay	Activated	TON	ON

Condition	Function or Component	Status	I/O Address	Status
C	Engine Speed in Range	Activated	N/A	ON (See note below)

Note: Condition C to be true when Engine RPM should be less than 1800.

Condition: (A) AND (B) AND (C) will activate the PTO-2 SOL.

8. Packer Extend (Q12-PIN06)

Function: This output controls the packer extend operation.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the packer extend SOL.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	A1. Aux Control Enable (Switch Bank)	Deactivated	CAN	OFF
	A2. Aux Control Enable (Switch Bank)	Activated	CAN	ON
B	B1. Packer Extend PB (Switch Bank)	Activated	CAN	ON
	B2. Aux Packer Extend PB (Switch Bank)	Activated	CAN	ON
C	Lift below Transit Prox	Activated	%IX0.1	ON
D	Travel Position Switch	Deactivated	N/A	OFF
E	Packer Full Extraction	Deactivated	N/A	OFF
F	System Power Switch	Activated	%IX0.8	ON
G	Packer Retract SOL	Deactivated	%QX0.13	OFF
H	Auto-pack Timer	Deactivated	TON	OFF
I	Packer Sensor Failure	Deactivated	N/A	OFF
J	Top Door Open Prox (TG input)	Activated	IN1	ON
K	PTO1 or PTO2	Activated	(%QX0.8 or % QX0.9)	ON
L	Side Door Prox	Activated	%IX0.4	ON

Note: If either the Auto Pack or Double Auto Pack command is enabled, the conditions for activating the Packer Extend SOL remain unchanged from Condition C to Condition L, as stated above.

Conditions: ((NOT A1 AND B1) OR (A2 AND B2)) AND (C) AND NOT (D) AND NOT(E) AND (F) AND NOT (G) AND NOT (H) AND NOT(I) AND (J) AND (K) AND (L) will activate the packer extend SOL.

9. Packer Retract (Q13 - PIN07)

Function: This output controls the packer retract operation.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the packer retract SOL.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	A1. Packer Fully Extended (Packer Position Value)	Activated	N/A	ON
	A2. Auto Pack Timer (35S)	Deactivated	TON	ON
B	Packer Full Retraction	Deactivated	N/A	ON
C	Auto Retract	Activated	N/A	ON
D	Sensor Calibration Mode	Deactivated	HMI	OFF
E	Packer Extend PB (Switch Bank)	Deactivated	CAN	OFF
F	PTO1 or PTO2	Activated	(%QX0.8 or % QX0.9)	ON
G	Lift Below Transit Prox	Activated	%IX0.1	ON
H	Packer Sensor Failure	Deactivated	N/A	OFF
I	System Power Switch	Activated	%IX0.8	ON
J	Side Door Prox	Activated	%IX0.4	ON
K	Packer Retract Timer (35S)	Deactivated	TON	OFF
L	Travel Position Switch	Deactivated	N/A	OFF

Note: If the Double Retract command is enabled, the conditions for activating the Packer Retract SOL remain the same from Condition F to Condition L, as mentioned above. For manual retract operation (Packer retract PB), the conditions will remain the same from Condition D to Condition L.

Conditions: (A1 OR A2) AND NOT (B) AND (C) AND NOT (D) AND NOT (E) AND (F) AND (G) AND NOT (H) AND (I) AND (J) AND NOT(K) AND NOT(L) will activate the packer retract SOL.

10. Tailgate Flow Solenoid (Q14 - PIN08) PWM Output (%IW32)

Function: This output controls the tailgate hydraulic flow system.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to TG flow solenoid.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	TG Up (RTG Controller)	Activated	OUT2	ON
B	TG Down (RTG Controller)	Activated	OUT3	ON
C	TG Lock (RTG Controller)	Activated	OUT4	ON

D	TG Unlock (RTG Controller)	Activated	OUT5	ON
E	TG Top Door Open (RTG Controller)	Activated	OUT6	ON
F	TG Top Door Close (RTG Controller)	Activated	OUT7	ON

Note: This PWM output is used to control the tailgate (TG) operations in the controlled flow.

Conditions: (A) OR (B) OR (C) OR (D) OR (F) will activate the TG flow solenoid.

11. CAN Flow Solenoid (Q15 - PIN09)

Function: Power to CAN flow solenoid.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: PT1000-RTD (Resistance Temperature Detectors)

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Forks In (Switch Bank)	Activated	N/A	ON
B	Forks Out (Switch Bank)	Activated	N/A	ON
C	Commander Close Command (Switch Bank)	Activated	N/A	ON
D	Commander Open Command (Switch Bank)	Activated	N/A	ON
E	Cab Protector Up SOL	Activated	%QX0.3	ON
F	Cab Protector Down SOL	Activated	%QX0.2	ON
G	PTO Enabled	Activated	N/A	ON

Conditions: ((A) OR (B) OR (C) OR (D) OR (F)) AND (G) will activate the CAN flow solenoid.

F. Extended Side Body Controller - Output Functions

1. Cab Flood Light (Q00_E - PIN18)

Function: This output controls the cab flood light.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the cab flood light.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Cab Light Switch (Switch Bank)	Activated	CAN	ON

Note:

Conditions: Cab light switch will activate the cab flood light.

2. Hopper Light (Q10_E - PIN04)

Function: This output controls the hopper light.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the hopper light.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Hopper Light Switch (Switch Bank)	Activated	CAN	ON

Note:

Conditions: Hopper light switch will activate the hopper light.

3. Container Light (Q11_E - PIN05)

Function: This output controls the container light.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to the container light.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Container Light Switch (Switch Bank)	Activated	CAN	ON

Note:

Conditions: Container light switch will activate the container light.

4. Back-up Alarm (Q11_E - PIN05)

Function: This output controls the back-up alarm circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to alarm while the TG is opening or not locked.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	TG Open Indication	Activated	N/A	ON
B	TG Unlock Indication	Activated	N/A	ON
C	Reverse Gear and CONF NYC HP	Activated	N/A	ON

Note:

Conditions: (A) OR (B) OR (C) will activate the back-up alarm.

5. Auxiliary Light (Q13_E - PIN07)

Function: This output controls the auxiliary light circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to aux lights when the vehicle is in reverse gear.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Aux light Switch (Switch Bank)	Activated	CAN	ON
B	Reverse Gear	Activated	N/A	ON

Note:

Conditions: (A) OR (B) will activate the auxiliary light.

6. Strobe-1 Light (Q14_E - PIN08)

Function: This output controls the strobe light circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to strobe lights.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Strobe Switch (Switch Bank)	Activated	CAN	ON
B	Pump Enable	Activated	N/A	ON
C	Reverse Gear	Activated	N/A	ON
D	Turn Signals (Left OR Right)	Deactivated	N/A	OFF
E	Configure Speed Control Strobe	Deactivated	HMI	OFF (See note below)

Note: If the Configure Speed Control Strobe is enabled, the strobe light activates when the vehicle speed exceeds 30 MPH and remains on until it falls below 10 MPH. The strobe switch must be enabled, and the turn signals will activate the strobe output.

Condition: ((A) OR (B) OR (C)) AND NOT (D) AND NOT (E) will activate the strobe light-1.

7. Strobe-2 Light (Q15_E - PIN09)

Function: This output controls the strobe light circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to strobe lights.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Strobe Switch (Switch Bank)	Activated	CAN	ON
B	Pump Enable	Activated	N/A	ON
C	Reverse Gear	Activated	N/A	ON
D	Turn Signals (Left OR Right)	Deactivated	N/A	OFF
E	Configure Speed Control Strobe	Deactivated	HMI	OFF (See note below)

Note: If the Configure Speed Control Strobe is enabled, the strobe light activates when the vehicle speed exceeds 30 MPH and remains on until it falls below 10 MPH. The strobe switch must be enabled, and the turn signals will activate the strobe output.

Condition: ((A) OR (B) OR (C)) AND NOT (D) AND NOT (E) will activate the strobe light-2.

8. Carry CAN Grab Close (Q20_E - PIN29)

Function: This output controls the carry can close and forks IN.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to carry can grab close SOL.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Forks IN (Switch Bank)	Activated	CAN	ON
B	Commander Grab Close (Switch Bank)	Activated	CAN	ON

Note:

Condition 1: If the configure bottom forks and configure commercial gripper are enabled, then Conditions (A) OR (B) will activate the carry can grab close SOL.

Condition 2: If only the configure bottom is enabled, then forks IN (A) will activate the carry can grab close SOL.

Condition 3: If only the configure commercial gripper is enabled, then the commander grab close (B) will activate the carry can grab close SOL.

9. Carry CAN Grab REL Open (Q20_E - PIN29)

Function: This output controls the carry can open and forks OUT.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: Power to carry can grab open SOL.

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Forks OUT (Switch Bank)	Activated	CAN	ON
B	Commander Grab Open (Switch Bank)	Activated	CAN	ON

Note:

Condition 1: If the configure bottom forks and configure commercial gripper are enabled, then Conditions (A) OR (B) will activate the carry can grab open SOL.

Condition 2: If only the configure bottom is enabled, then forks OUT (A) will activate the carry can grab close SOL.

Condition 3: If only the configure commercial gripper is enabled, then the commander grab open (B) will activate the carry can grab open SOL.

G. Rear Tailgate Controller - Input Functions

1. Tailgate Closed Prox. (IN00 - PIN55)

Function: This circuit monitors the ON/OFF status of the tailgate closed proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is ON when the tailgate is closed.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IB0	ON

2. Tailgate Lock Prox. Curb Side (IN01 - PIN36)

Function: This circuit monitors the ON/OFF status of the tailgate locked proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: This input indicates the position of the tailgate lock cylinders for CURB SIDE (CS). The input is ON when the tailgate cylinder is locked.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IB1	ON

3. Tailgate Lock Prox. Street Side (IN02 - PIN54)

Function: This circuit monitors the ON/OFF status of the tailgate locked proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: This input indicates the position of the Tailgate lock cylinders for STREET SIDE (SS). The input is ON when the tailgate cylinder is locked.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IB2	ON

4. Top Door Open (IN03 - PIN35)

Function: This circuit monitors the ON/OFF status of the top door open proximity switch.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic: The input is ON when the top door is fully open.

Input Device	Status	I/O Address	Status
Proximity	Activated	%IB3	ON

H. Rear Tailgate Controller - Output Functions

1. CNG Open Solenoid (OUT01 - PIN17)

Function: This output controls the CNG open SOL.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Ignition Power	Activated	N/A	ON
B	Engine RPM < 100	Deactivated	CAN	OFF (See note below)
C	xJ1939_Error	Deactivated	CAN	OFF

Note: If the engine RPM remains below 100 for more than 2 minutes, condition B will be activated, which will turn off the CNG open SOL output.

Conditions: (A) AND NOT (B) AND NOT (C) will activate the CNG open SOL output.

2. Tailgate Up (OUT02 - PIN16)

Function: This output function controls the tailgate up output circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Road Speed OK	Activated	N/A	ON (See note below)
B	TG Unlock PB (Switch Bank)	Deactivated	CAN	OFF
C	TG Raise PB (Switch Bank)	Activated	CAN	ON
D	TG Lock SS	Deactivated	IN01	OFF
E	TG Lock CS	Deactivated	IN02	OFF
F	Configure TG LOCK	Activated	HMI	ON
G	PTO ON	Activated	N/A	ON

Note: For condition A to be true, the road speed value should be less than ‘5’ mph.

Conditions: (A) AND NOT (B) AND (C) AND NOT (D) AND NOT (E) AND (F) AND (G) will activate the TG UP SOL.

3. Tailgate Down (OUT03 - PIN15)

Function: This output function controls the tailgate down output circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Road Speed OK	Activated	N/A	ON (See note below)
B	TG Lower PB (Switch Bank)	Activated	CAN	ON
C	PTO ON	Activated	N/A	ON
D	Packer Full Extract	Deactivated	N/A	OFF

Note: For condition A to be true, the road speed value should be less than ‘5’ mph.

Conditions: (A) AND (B) AND (C) AND NOT (D) will activate the TG DOWN SOL.

4. Tailgate Lock (OUT04 - PIN14)

Function: This output function controls the tailgate lock output circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Road Speed OK	Activated	N/A	ON (See note below)
B	TG Lower PB (Switch Bank)	Activated	CAN	ON
C	PTO ON	Activated	N/A	ON

Note: For condition A to be true, the road speed value should be less than ‘5’ mph.

Conditions: (A) AND (B) AND (C) will activate the TG LOCK SOL.

5. Top Door Open (OUT05 - PIN13)

Function: This output function controls the top door open output.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Top Door Open PB (Switch Bank)	Activated	CAN	ON
B	Configure Top Door	Activated	CAN	ON
C	PTO ON	Activated	N/A	ON
D	Top Door Last State	Activated	N/A	ON (See note below)

E	Top Door Open Prox	Deactivated	IN01	OFF
F	Road Speed Below 10 MPH	Activated	N/A	ON

Note: For Condition D to be true, the command to open the top door must be initiated, and the top door open proximity switch must be turned ON. This state remains true until the top door close PB command is given.

Condition 1: (A) AND (B) AND (C) will activate the TOP DOOR OPEN SOL.

Condition 2: (D) AND NOT(E) AND (F) will activate the TOP DOOR OPEN SOL.

6. Top Door Close (OUT06 - PIN12)

Function: This output function controls the top door close output.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

Condition	Function or Component	Status	I/O Address	Status
A	Top Door Close PB (Switch Bank)	Activated	CAN	ON
B	Configure Top Door	Activated	CAN	ON
C	PTO ON	Activated	N/A	ON

Note:

Conditions: (A) AND (B) AND (C) will activate the TOP DOOR OPEN SOL.

7. Tailgate Unlock (OUT07 - PIN11)

Function: This output function controls the tailgate unlock output circuit.

Condition	Modifiable Parameters	Default Setting
A	None	N/A

Function Logic:

Conditions necessary to activate the circuit:

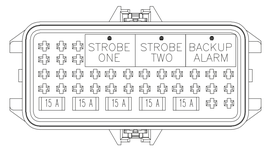
Condition	Function or Component	Status	I/O Address	Status
A	Road Speed OK	Activated	N/A	ON (See note below)
B	TG Raise PB (Switch Bank)	Activated	CAN	ON
C	TG Unhlock PB (Switch Bank)	Activated	CAN	ON
D	PTO ON	Activated	N/A	ON

Note: For condition A to be true, the road speed value should be less than ‘5’ mph.

Conditions: (A) AND (B) AND (C) AND (D) will activate the TG UNLOCK SOL.

HALF/PACK
NOTES

SECTION 7
SCHEMATICS



NOTE:
RELAYS ARE HEIL PN: 108-8391
(DOT INDICATES EMPTY POSITION)
FUSES ARE 10 & 15 AMP
HEIL PN: 108-7113-210
& 108-7113-215
TERMINALS (TYCO PN) 1-968857-1
WIRE SEALS (TYCO PN) 828905-1
HOLE PLUGS (TYCO PN) 828922-1
FUSE BLOCK IS HEIL PN: 108-8502-001
FUSE BLOCK COVER IS HEIL PN: 108-8502-002

RELAY BOX DETAIL

CNTL LGTS
PIN-1 — RED "STOP" (14 AWG)
PIN-2 — BLACK "CLEAR" (14 AWG)
PIN-3 — BROWN "TAIL" (14 AWG)
PIN-4 — PINK "REV" (14 AWG)
PIN-5 — YELLOW "L. TURN" (14 AWG)
PIN-6 — GREEN "R. TURN" (14 AWG)
PIN-7 — GRAY "BACKUP ALARM OUT"
PIN-8 — RED "AUX. BACKUP LIGHT"
PIN-9 — RED "CONTAINER FLOOD LIGHTS"
PIN-10 — RED "CAB FLOOD LIGHTS"
PIN-11 — RED "STROBE 1 OUT"
PIN-12 — PLUGGED

CNTL PWR
PIN-A — WHITE "GND 1" (10 AWG)
PIN-B — WHITE "GND 2" (10 AWG)
PIN-C — BLACK "IGNITION 1" (12 AWG)
PIN-D — BLACK "IGNITION 2" (12 AWG)
PIN-E — BLACK "IGNITION 1F" (12 AWG)
PIN-F — BLACK "IGNITION 2F" (12 AWG)
PIN-G — ORANGE "OUTPUT PWR 1" (14 AWG)
PIN-H — ORANGE "OUTPUT PWR 2" (14 AWG)

CNTL PTO/OIL (GOLD PINS)
PIN-1 — RED "ALLISON PTO ENABLE"
PIN-2 — RED "PTO 1 SOL"
PIN-3 — RED "PTO 2 SOL"
PIN-4 — ORANGE "PTO PSW"
PIN-5 — NATURAL "OIL TEMP GND"
PIN-6 — BARE "OIL TEMP SHIELD"
PIN-7 — BLACK "OIL TEMP"
PIN-8 — ORANGE "OIL LEVEL SWITCH"
PIN-9 — ORANGE "OIL TANK FILTER PSW"
PIN-10 — ORANGE "HIGH PRESSURE FILTER INDICATOR"
PIN-11 — PLUGGED
PIN-12 — PLUGGED

CNTL INPUT (GOLD PINS)
PIN-1 — BROWN "PACKER SENSOR PWR"
PIN-2 — WHITE "PACKER SENSOR GND"
PIN-3 — YELLOW "PACKER POSITION SENSOR"
PIN-4 — BARE "PACKER SENSOR SHIELD"
PIN-5 — ORANGE "SIDE DOOR PROX"
PIN-6 — ORANGE "SIDE DOOR PROX"
PIN-7 — BROWN "BODY PRESS VALVE POWER"
PIN-8 — WHITE "BODY PRESS VALVE GROUND"
PIN-9 — YELLOW "BODY VALVE PRESSURE"
PIN-10 — BARE "BODY PRESS VALVE SHIELD"
PIN-11 — PURPLE "GRAB/FORKS IN"
PIN-12 — PURPLE "RELEASE/FORKS OUT"

GOLD PINS
CAN-1 PIN-1, PIN-2 — **T.R.** PIN-1, PIN-2

GOLD PINS
J1939-1 PIN-1, PIN-2 — **T.R.** PIN-1, PIN-2

GOLD PINS
J1939-2 PIN-1, PIN-2 — **T.R.** PIN-1, PIN-2

PRG
PIN-1 — WHITE "GND 1"
PIN-2 — RED "RS232 RxD"
PIN-3 — WHITE "RS232 TxD"

GOLD PINS
CNTL-CAN
PIN-1 — GREEN "CAN 1 L, DISPLAY (CANOPEN)"
PIN-2 — YELLOW "CAN 1 H, DISPLAY (CANOPEN)"
PIN-3 — GREEN "J1939 1 L, HEIL NETWORK 1"
PIN-4 — YELLOW "J1939 1 H, HEIL NETWORK 1"
PIN-5 — GREEN "J1939 2 L, CHASSIS NETWORK"
PIN-6 — YELLOW "J1939 2 H, CHASSIS NETWORK"
PIN-7 — GREEN "J1939 3 L, HEIL NETWORK 2"
PIN-8 — YELLOW "J1939 3 H, HEIL NETWORK 2"

GOLD PINS — PLUGGED
J1939-3 PIN-1, PIN-2 — **CAP** PIN-1, PIN-2

CNTL-VLV
PIN-1 — PURPLE "FORKS UP"
PIN-2 — PURPLE "FORKS DOWN"
PIN-3 — PURPLE "ARMS UP"
PIN-4 — PURPLE "ARMS DOWN"
PIN-5 — PURPLE "PACKER EXTEND"
PIN-6 — PURPLE "PACKER RETRACT"
PIN-7 — GRAY "TAILGATE FLOW"
PIN-8 — GRAY "CARRY CAN FLOW"
PIN-9 — PURPLE "CAB PROT DOWN"
PIN-10 — PURPLE "CAB PROT UP"
PIN-11 — BLACK "VALVE POWER" (14 AWG)
PIN-12 — WHITE "GND 1" (14 AWG)

PROX
BLACK "PROX POWER" (16 AWG) — PIN-1
ORANGE "LIFT BELOW TRANSIT PROX" — PIN-2
ORANGE "FORKS TUCKED PROX" — PIN-3
ORANGE "ARMS UP PROX" — PIN-4
PLUGGED — PIN-5
WHITE "PROX GROUND" (16 AWG) — PIN-6

RBDY PWR
BLACK "IGNITION 2F" (14 AWG) — PIN-1
WHITE "GND 1" (12 AWG) — PIN-2
WHITE "GND 2" (12 AWG) — PIN-3
BLACK "IGNITION 1F" (14 AWG) — PIN-4

RBDY CAN
YELLOW "J1939 3 H, HEIL NETWORK 2" — PIN-1 GOLD PIN
GREEN "J1939 3 L, HEIL NETWORK 2" — PIN-2 GOLD PIN

RBDY LGTS
RED "STOP" (14 AWG) — PIN-1
BLACK "CLEAR" (14 AWG) — PIN-2
BROWN "TAIL" (14 AWG) — PIN-3
PINK "REV" (14 AWG) — PIN-4
YELLOW "L. TURN" (14 AWG) — PIN-5
GREEN "R. TURN" (14 AWG) — PIN-6
GRAY "BACKUP ALARM OUT" — PIN-7
RED "STROBE LT 1 OUT" — PIN-8
RED "STROBE LT 2 OUT" — PIN-9
PLUGGED — PIN-10
PLUGGED — PIN-11
PLUGGED — PIN-12

CNTL EXT
BLACK "IGNITION 2F MODULE" — PIN-1
PLUGGED — PIN-2
PLUGGED — PIN-3
RED "HOPPER FLOOD LIGHTS" — PIN-4
RED "CONTAINER FLOOD LIGHTS" — PIN-5
GRAY "BACKUP ALARM" — PIN-6
RED "AUX BACKUP LIGHT" — PIN-7
RED "STROBE LT 1" — PIN-8
RED "STROBE LT 2" — PIN-9
PLUGGED — PIN-10
PLUGGED — PIN-11
PLUGGED — PIN-12
PLUGGED — PIN-13
PLUGGED — PIN-14
PLUGGED — PIN-15
PLUGGED — PIN-16
PLUGGED — PIN-17
RED "CAB FLOOD LIGHTS" — PIN-18
BLACK "IGNITION 2F MODULE" — PIN-19
WHITE "GND 2" — PIN-20
PLUGGED — PIN-21
PLUGGED — PIN-22
PLUGGED — PIN-23
PLUGGED — PIN-24
PLUGGED — PIN-25
PLUGGED — PIN-26
PLUGGED — PIN-27
PLUGGED — PIN-28
PURPLE "GRAB/FORKS IN" — PIN-29
PURPLE "RELEASE/FORKS OUT" — PIN-30
PLUGGED — PIN-31
ORANGE "OUTPUT PWR 2" — PIN-32
PLUGGED — PIN-33
PLUGGED — PIN-34
PLUGGED — PIN-35
PLUGGED — PIN-36
WHITE "GND 2" — PIN-37
PLUGGED — PIN-38
PLUGGED — PIN-39
PLUGGED — PIN-40
PLUGGED — PIN-41
PLUGGED — PIN-42
PLUGGED — PIN-43
PLUGGED — PIN-44
PLUGGED — PIN-45
PLUGGED — PIN-46
PLUGGED — PIN-47
PLUGGED — PIN-48
PLUGGED — PIN-49
PLUGGED — PIN-50
BLACK "IGNITION 2F MODULE" — PIN-51
GRAY "EXTERNAL THROTTLE ADVANCE" — PIN-52
ORANGE "HIGH PRESS FILTER INDICATOR" — PIN-53
PLUGGED — PIN-54
PLUGGED — PIN-55

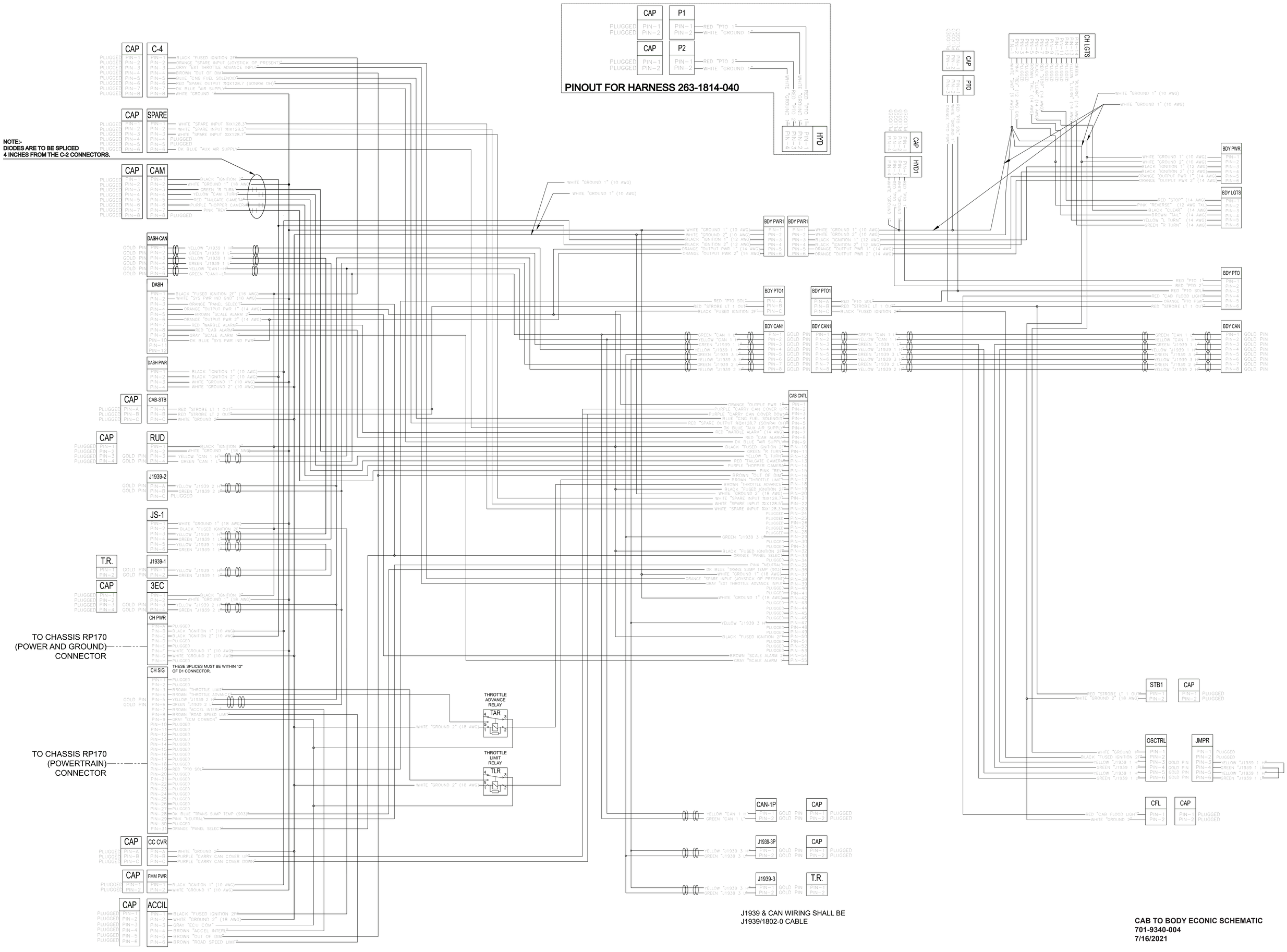
15A — CB #2 15A — CB #1 15A

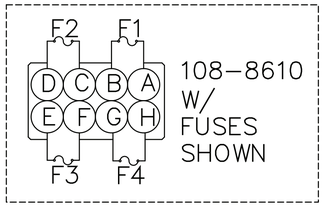
CB #1 15A
PIN-A01 — BLACK "IGNITION 1F MODULE" (14 AWG)
PIN-A02 — BLACK "IGNITION 1" (14 AWG)
PIN-A03 — BLACK "IGNITION 1F" (12 AWG)
PIN-A04 — BLACK "IGNITION 1" (12 AWG)
PIN-A05 — BLACK "IGNITION 2F MODULE" (14 AWG)
PIN-A06 — BLACK "IGNITION 2" (14 AWG)
PIN-A07 — BLACK "IGNITION 2F" (12 AWG)
PIN-A08 — BLACK "IGNITION 2" (12 AWG)
PIN-A09 — BLACK "STROBE POWER" (12 AWG)
PIN-A10 — BLACK "STROBE POWER FUSED" (12 AWG)
PIN-A11
PIN-A12
PIN-B01
PIN-B02
PIN-B03
PIN-B04
PIN-B05
PIN-B06
PIN-B07
PIN-B08
PIN-B09
PIN-B10
PIN-B11
PIN-B12
PIN-C01
PIN-C02
PIN-C03
PIN-C04
PIN-C05
PIN-C06
PIN-C07
PIN-C08
PIN-C09
PIN-C10
PIN-C11
PIN-C12
PIN-D01
PIN-D02
PIN-D03
PIN-E01
PIN-E02
PIN-E03
PIN-D04 — RED "STROBE LT 2 OUT"
PIN-D05
PIN-D06 — RED "STROBE LT 2"
PIN-E04 — WHITE "GND 2"
PIN-E05
PIN-E06 — BLACK "STROBE POWER FUSED"
PIN-D07 — RED "STROBE LT 1 OUT"
PIN-D08
PIN-D09 — RED "STROBE LT 1"
PIN-E07 — WHITE "GND 2"
PIN-E08
PIN-E09 — BLACK "STROBE POWER FUSED"
PIN-D10 — GRAY "BACKUP ALARM OUT"
PIN-D11
PIN-D12 — GRAY "BACKUP ALARM"
PIN-E10 — WHITE "GND 2"
PIN-E11
PIN-E12 — BLACK "STROBE POWER FUSED"

FRONT STROBE RELAY — REAR STROBE RELAY — BACKUP ALARM RELAY

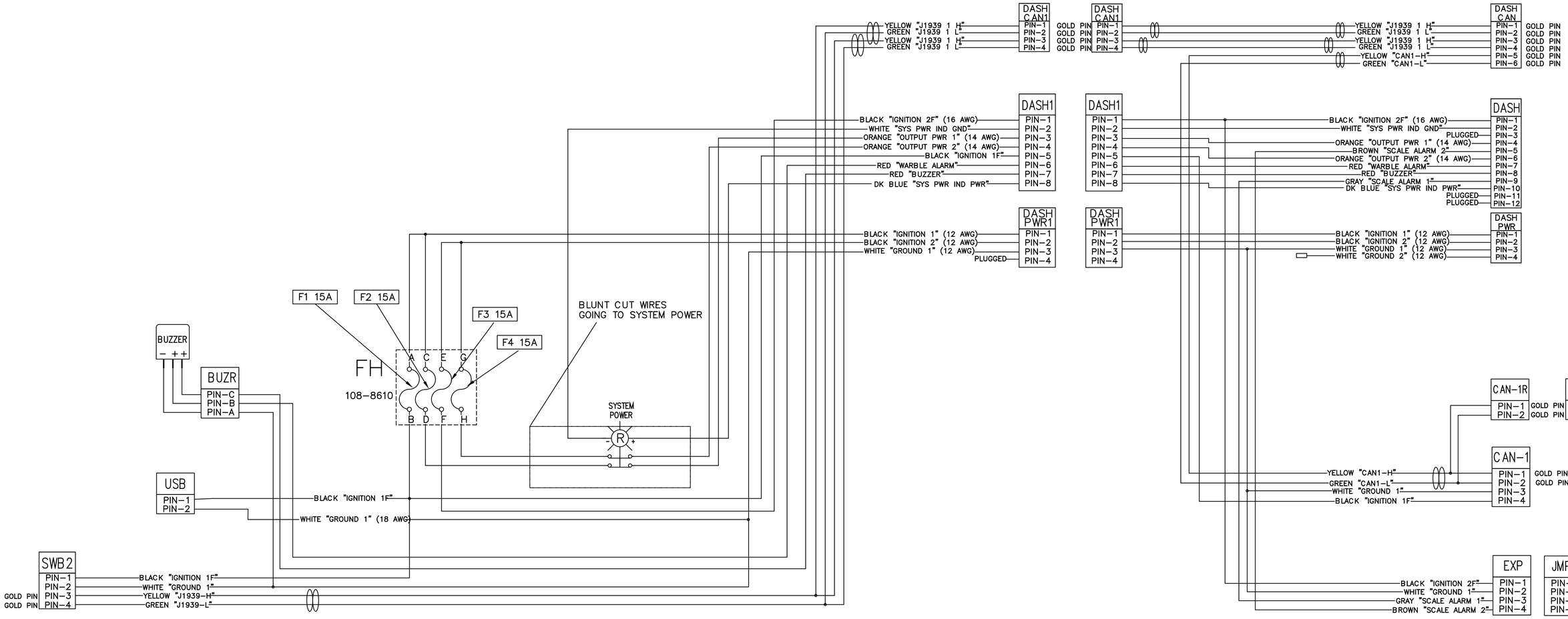
STD
PIN-1 — ORANGE "OUTPUT PWR 1"
PIN-2 — RED "PTO 1 SOL"
PIN-3 — RED "PTO 2 SOL"
PIN-4 — PLUGGED
PIN-5 — PLUGGED
PIN-6 — PURPLE "PACKER EXTEND"
PIN-7 — PURPLE "PACKER RETRACT"
PIN-8 — GRAY "TAILGATE FLOW"
PIN-9 — GRAY "CARRY CAN FLOW"
PIN-10 — BLACK "IGNITION 1F MODULE"
PIN-11 — PURPLE "FORKS DOWN"
PIN-12 — PURPLE "FORKS UP"
PIN-13 — PURPLE "ARMS UP"
PIN-14 — PURPLE "ARMS DOWN"
PIN-15 — PURPLE "CAB PROT UP"
PIN-16 — PURPLE "CAB PROT DOWN"
PIN-17 — PLUGGED
PIN-18 — RED "ALLISON PTO ENABLE"
PIN-19 — ORANGE "OUTPUT PWR 1"
PIN-20 — WHITE "GND 1"
PIN-21 — ORANGE "CAB PROTECTOR PROX"
PIN-22 — BLACK "OIL TANK TEMP"
PIN-23 — PLUGGED
PIN-24 — DK BLUE "SYS POWER OUT"
PIN-25 — RED "RS232 RxD"
PIN-26 — GREEN "J1939 3 L, HEIL NETWORK 2"
PIN-27 — GREEN "J1939 2 L, CHASSIS NETWORK"
PIN-28 — GREEN "J1939 1 L, HEIL NETWORK 1"
PIN-29 — GREEN "CAN 1 L, DISPLAY (CANOPEN)"
PIN-30 — PLUGGED
PIN-31 — PLUGGED
PIN-32 — BLACK "IGNITION 1F MODULE"
PIN-33 — ORANGE "OIL LEVEL SWITCH"
PIN-34 — ORANGE "ARMS UP PROX"
PIN-35 — ORANGE "FORKS TUCKED PROX"
PIN-36 — ORANGE "LIFT BELOW TRANSIT PROX"
PIN-37 — WHITE "GND 1"
PIN-38 — PLUGGED
PIN-39 — YELLOW "L. TURN"
PIN-40 — GREEN "R. TURN"
PIN-41 — ORANGE "PTO PSW"
PIN-42 — WHITE "GND 1"
PIN-43 — WHITE "RS232 TxD"
PIN-44 — YELLOW "J1939 3 H, HEIL NETWORK 2"
PIN-45 — YELLOW "J1939 2 H, CHASSIS NETWORK"
PIN-46 — YELLOW "J1939 1 H, HEIL NETWORK 1"
PIN-47 — YELLOW "CAN 1 H, DISPLAY (CANOPEN)"
PIN-48 — PLUGGED
PIN-49 — PLUGGED
PIN-50 — BLACK "IGNITION 1F MODULE"
PIN-51 — PLUGGED
PIN-52 — ORANGE "OIL TANK FILTER PSW"
PIN-53 — ORANGE "SIDE DOOR PROX"
PIN-54 — YELLOW "PACKER POSITION SENSOR"
PIN-55 — YELLOW "BODY VALVE PRESSURE"

SCHEMATIC, BODY CONTROLLER
701-9341-002
07/17/2020

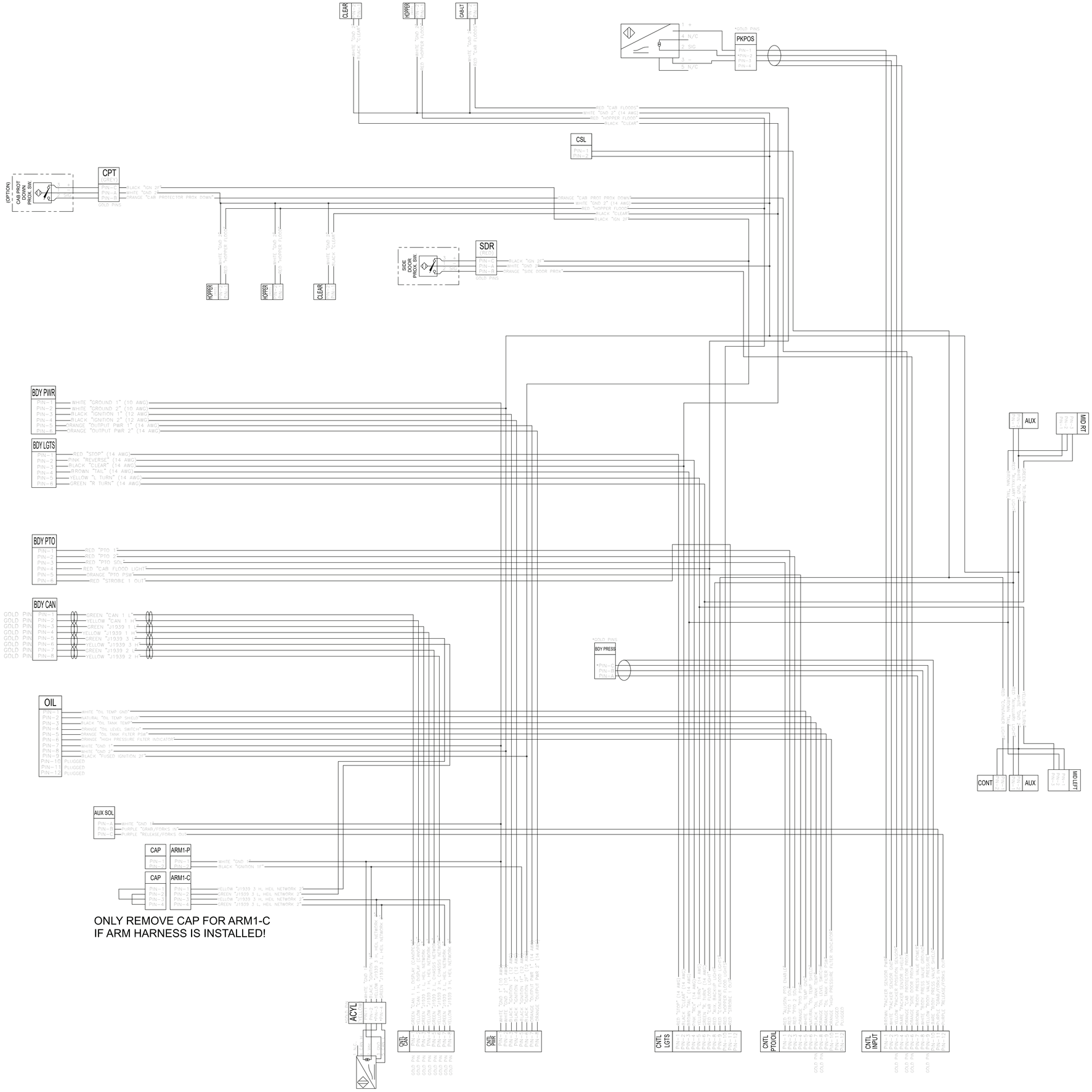

PINOUT FOR HARNESS 263-1814-040
CAP
P1
P2
HYD
PTO
HYD1
CHLGTS
NOTE:-
DIODES ARE TO BE SPLICED
4 INCHES FROM THE C-2 CONNECTORS.
C-4
SPARE
CAM
DASH-CAN
DASH
DASH PWR
CAB-STB
RUD
J1939-2
JS-1
J1939-1
3EC
CH PWR
CH SIG
CC CVR
FMM PWR
ACCIL
THESE SPLICES MUST BE WITHIN 12"
OF D1 CONNECTOR.
TO CHASSIS RP170
(POWER AND GROUND)
CONNECTOR
TO CHASSIS RP170
(POWERTRAIN)
CONNECTOR
THROTTLE
ADVANCE
RELAY
TAR
THROTTLE
LIMIT
RELAY
TLR
BDY PWR
BDY LGTS
BDY PTO
BDY PWR1
BDY PTO1
BDY CAN1
CAB CNTL
CAN-1P
J1939-3P
J1939-3
T.R.
STB1
OSCTRL
JMPR
CFL
J1939 & CAN WIRING SHALL BE
J1939/1802-0 CABLE
CAB TO BODY ECONIC SCHEMATIC
701-9340-004
7/16/2021



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

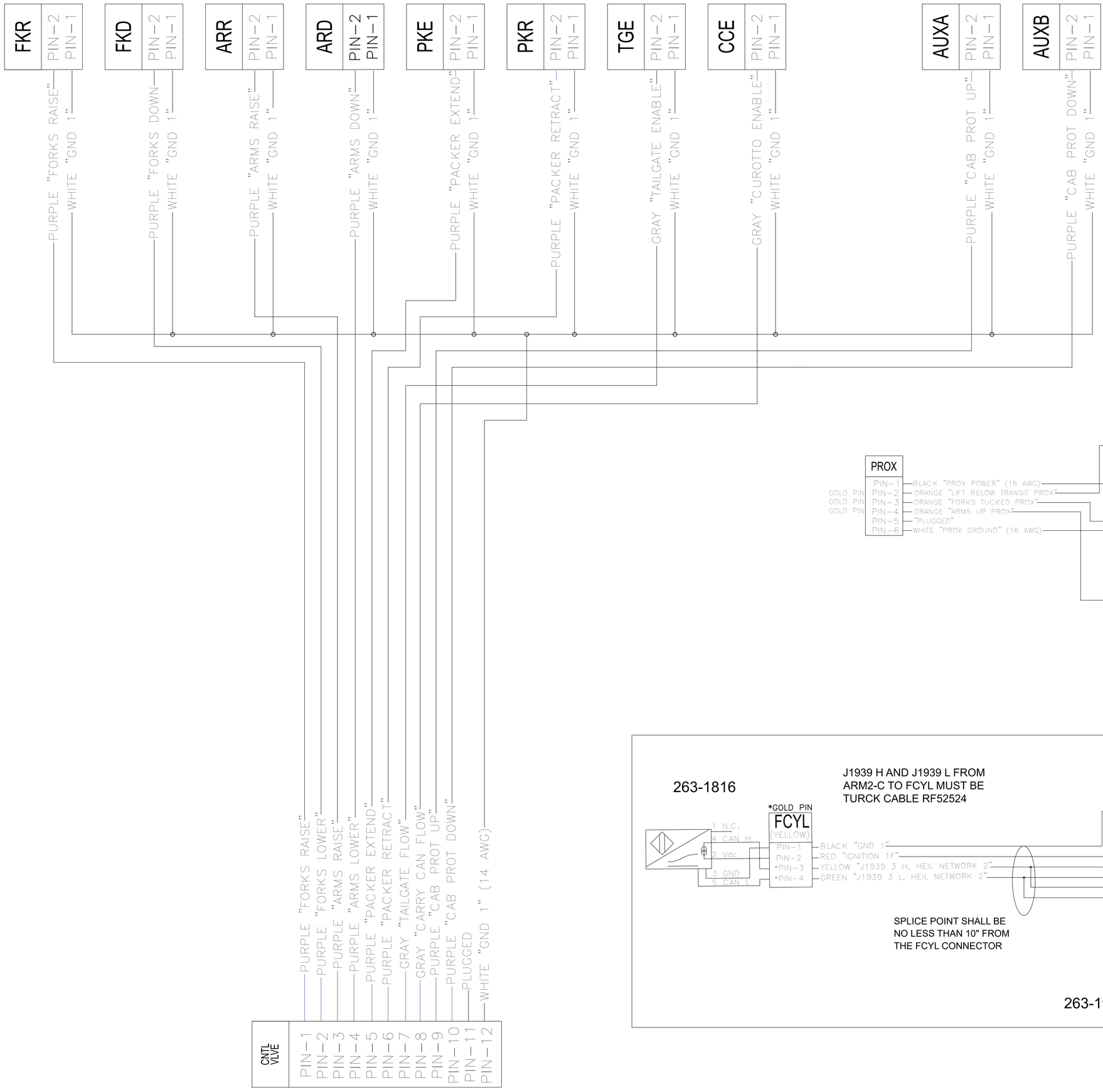


SCHEMATIC, IN CAB CONTROLS, 2021 HP REFRESH, ECONIC
701-9340-005
7/27/2020

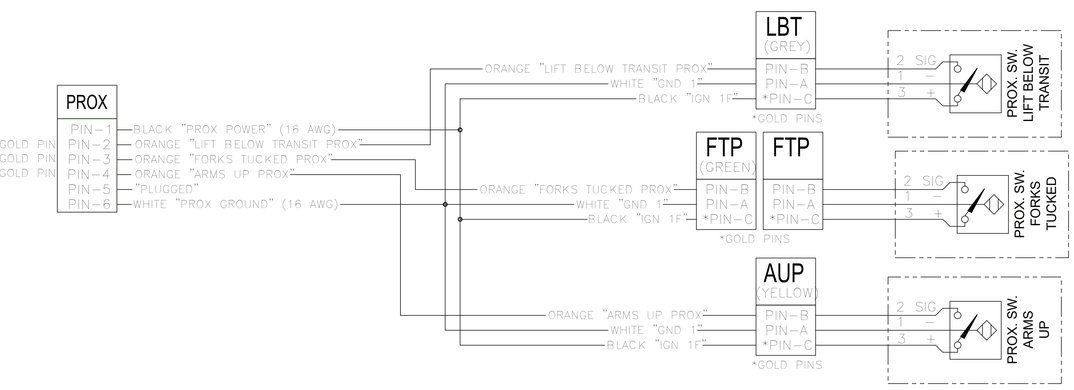


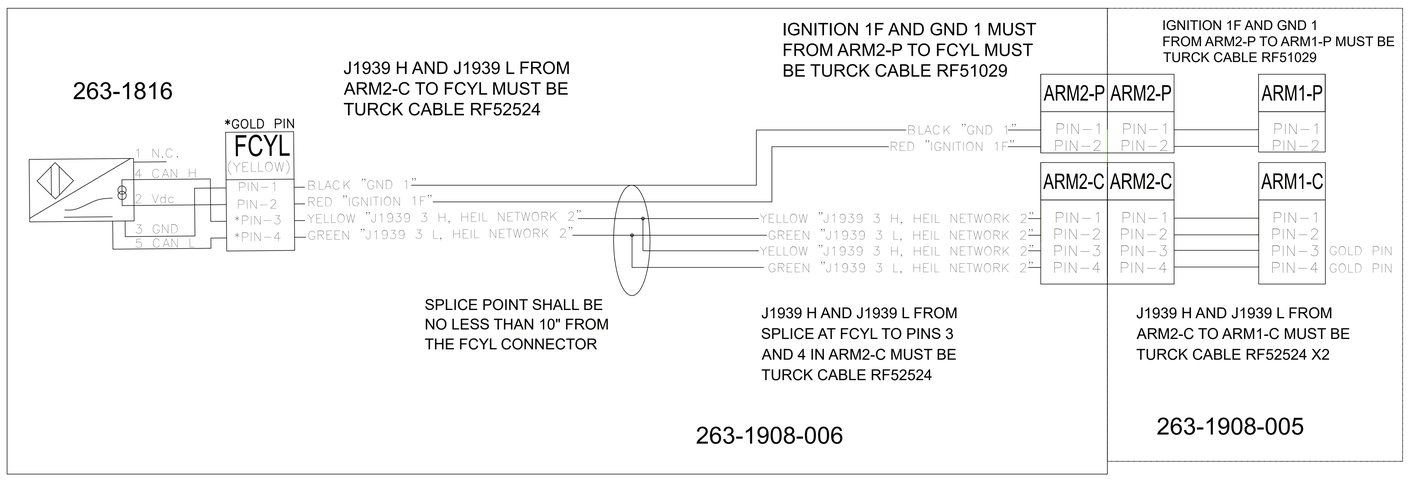
SCHEMATIC, BODY FRONT, 2021 HP REFRESH
701-9341-001
07/16/2020

263-1908-012

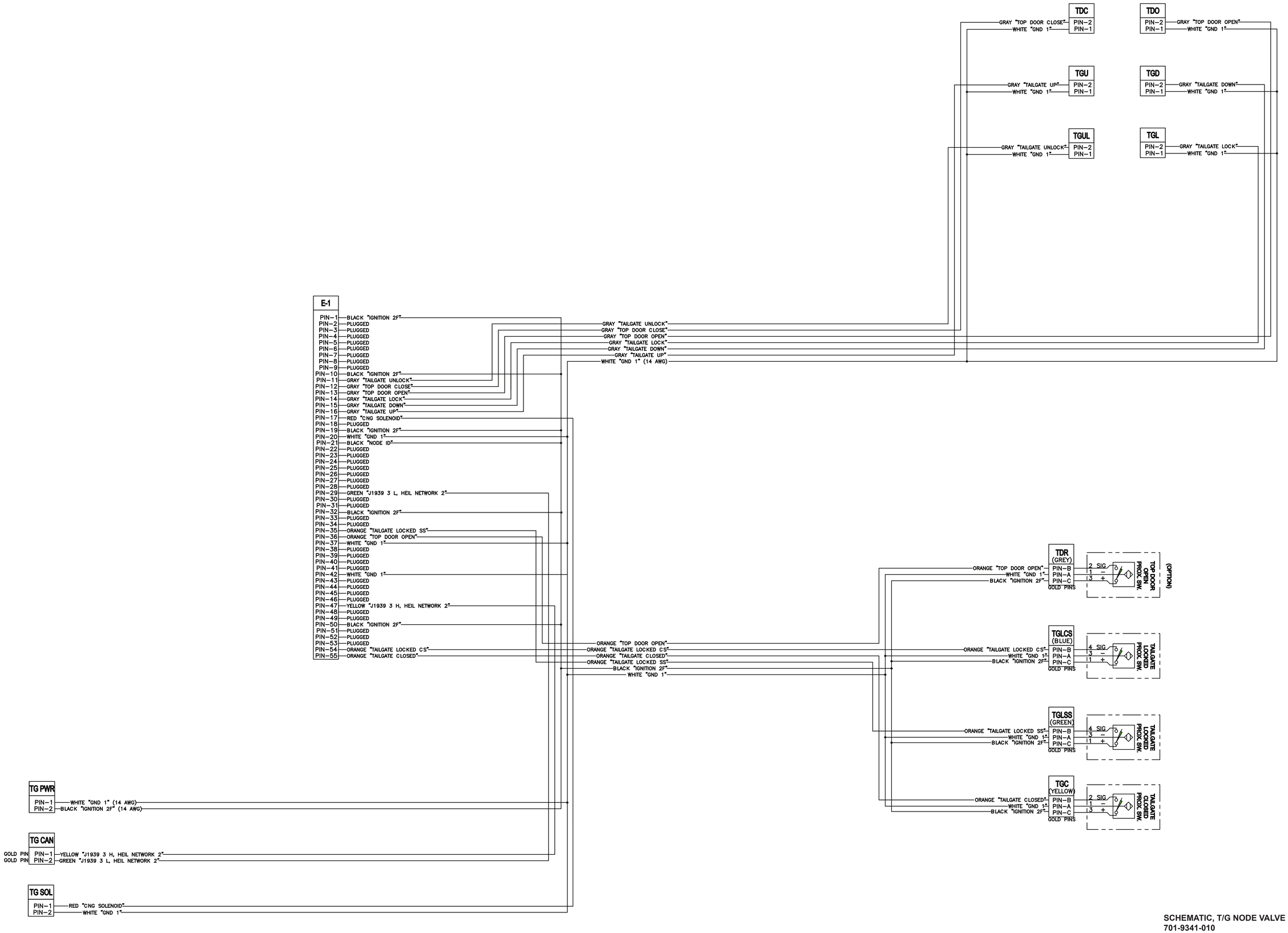


263-1908-013

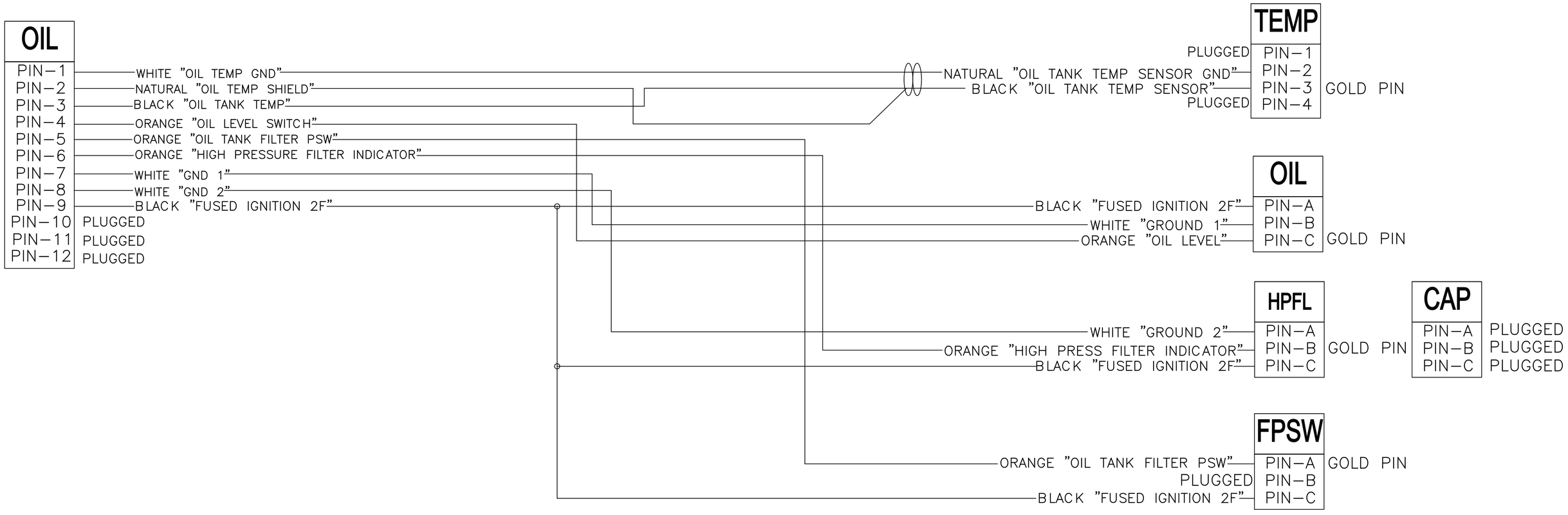




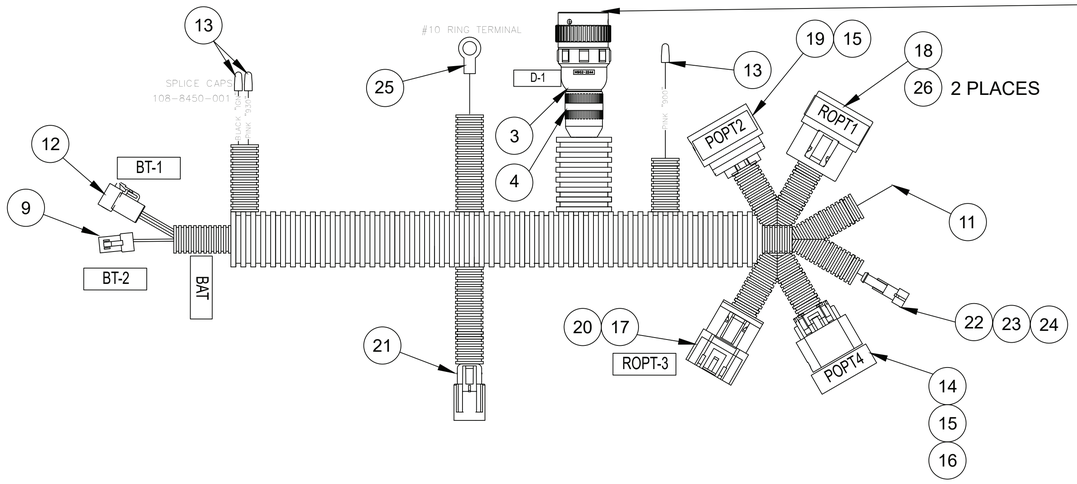
SCHEMATIC, BODY 2021 HP REFRESH
701-9341-003
07/17/2020



SCHEMATIC, T/G NODE VALVE 2021 HP REFRESH
701-9341-010
06/14/2022



SCHEMATIC, OIL TANK 2021 HP REFRESH
701-9341-011
07/22/2020



REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-006	DEUTSCH CONNECTOR	1
2	108-4815-105	TERMINATOR, 20-16 SOCKET	1
3	108-4815-188	DEUTSCH BACKSHELL	1
4	108-4815-189	DEUTSCH COMPRESSION NUT	1
5	108-4815-100	TERMINATOR, #12 SOCKET 15 GA.	1
6	108-4815-101	TERMINATOR, #12 SOCKET	3
7	108-4815-103	TERMINATOR, #16 SOCKET	1
8	108-4815-104	TERMINATOR, #20 SOCKET	3
9	108-4481-011	DEUTSCH CONNECTOR	1
10	108-4481-100	PLUG, SEALING	10
11	108-7114-016	MOLEX TERMINAL	1
12	108-8411-004	DEUTSCH CONNECTOR	1
13	108-8450-001	SHRINK CAP	1
14	108-8471-001	PACKARD CONNECTOR	1
15	108-8471-004	TERMINATOR, SOCKET	1
16	108-8471-005	TERMINATOR, SOCKET	1
17	108-8471-007	PACKARD CONNECTOR	1
18	108-8471-008	PACKARD CONNECTOR	1
19	108-8471-009	PACKARD CONNECTOR	1
20	108-8471-011	TERMINATOR, PIN	1
21	108-8471-013	CONNECTOR, 2 WAY GT-280	1
22	108-8492-101	TYCO CONNECTOR	1
23	108-8492-106	TYCO TERMINAL	1
24	108-8492-010	TYCO WIRE SEAL	1
25	108-8551-007	RING TERMINAL	1
26	108-8971-001	TERMINATOR, PIN	1

#10 RING TERMINAL

SPLICE CAP

SEE NOTE BELOW.

** GOLD PIN **

SPLICE CAPS

BLACK "IGN"

PINK "930"

YELLOW "700"

PINK "900"

D-1

PIN-1*	BLACK "IGN 1" (12 AWG)
PIN-2*	BLACK "BATT" (12 AWG)
PIN-3*	BLACK "IGN 2" (12 AWG)
PIN-4*	WHITE "GROUND" (10 AWG)
PIN-5	SPARE (PLUGGED)
PIN-6	SPARE (PLUGGED)
PIN-7	SPARE (PLUGGED)
PIN-8	SPARE (PLUGGED)
PIN-9	SPARE (PLUGGED)
PIN-10	SPARE (PLUGGED)
PIN-11	SPARE (PLUGGED)
PIN-12	BROWN "801" (THROTTLE LIMIT)
PIN-13	BROWN "800" (THROTTLE ADVANCE)
PIN-14	YELLOW "700" (R-STATOR)
PIN-15	PINK "930" (HEIL TRANS TEMP)
PIN-16	GRAY "ECM COMMON"
PIN-17	BLACK "IGN C"
PIN-18**	PINK "900" (NEUTRAL +12V)
PIN-19	WHITE "CAB GND"
PIN-20**	RED "623" (EOS ENABLE)
PIN-21	SPARE (PLUGGED)
PIN-22	SPARE (PLUGGED)
PIN-23**	PINK "904" (EOS SIGNAL)
PIN-24**	PINK "903" (SUMP TEMP)
PIN-25	PINK "905" (ALLISON 105)
PIN-26	PINK "923" (ALLISON 162)
PIN-27**	PINK "920" (ALLISON 103)
PIN-28	PINK "922" (ALLISON 142)
PIN-29**	PINK "921" (ALLISON 117)

ROPT1

PIN-A	PINK "905"
PIN-B	
PIN-C	
PIN-D	
PIN-E	
PIN-F	
PIN-G	PINK "921"
PIN-H	
PIN-J	
PIN-K	

POPT2

PIN-A	BROWN "800"
PIN-B	
PIN-C	
PIN-D	
PIN-E	
PIN-F	
PIN-G	GRAY "ECM COMMON"
PIN-H	BROWN "801"
PIN-J	PINK "903"
PIN-K	PINK "920"

PINK "923"

PINK "923"

ROPT3

PIN-A	PINK "922"
PIN-B	PINK "904"
PIN-C	RED "623"
PIN-D	PINK "900"
PIN-E	WHITE "CAB GND"
PIN-F	
PIN-G	
PIN-H	

POPT4

PIN-A	PINK "REVERSE" (14 AWG)
PIN-B	
PIN-C	
PIN-D	
PIN-E	BLACK "IGN C"
PIN-F	
PIN-G	WHITE "CAB GND"
PIN-H	

BAT

BT-1

PIN-1	BLACK "IGN 1" (12 AWG)
PIN-2	BLACK "BATT" (12 AWG)
PIN-3	WHITE "GROUND" (10 AWG)
PIN-4	BLACK "IGN 2" (12 AWG)

BT-2

PIN-1	BLACK "IGN C"
PIN-2	WHITE "CAB GND"

RPTO

PIN-1	GRAY "ECM COMMON"
PIN-2	BROWN "800"

PINK "REVERSE" (14 AWG)

REVERSE

PIN-A	

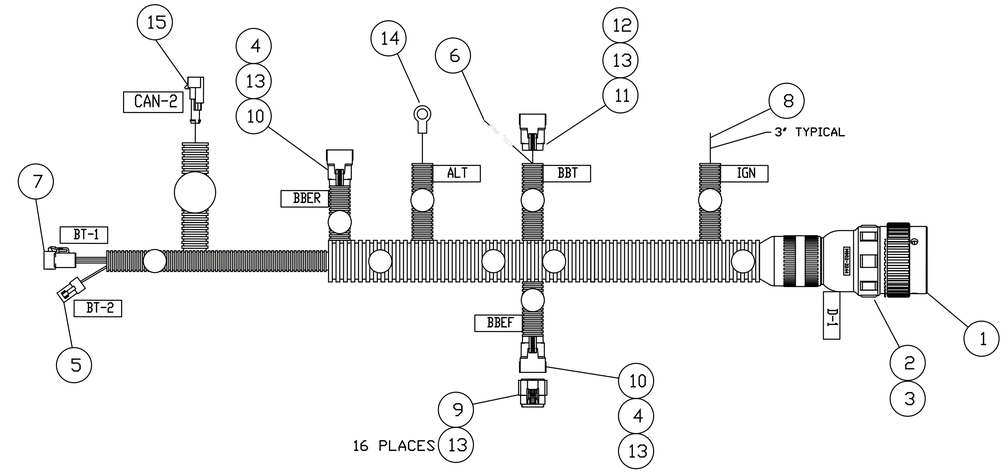
NOTE:

PIN-X = SIZE 16 DEUTSCH PIN

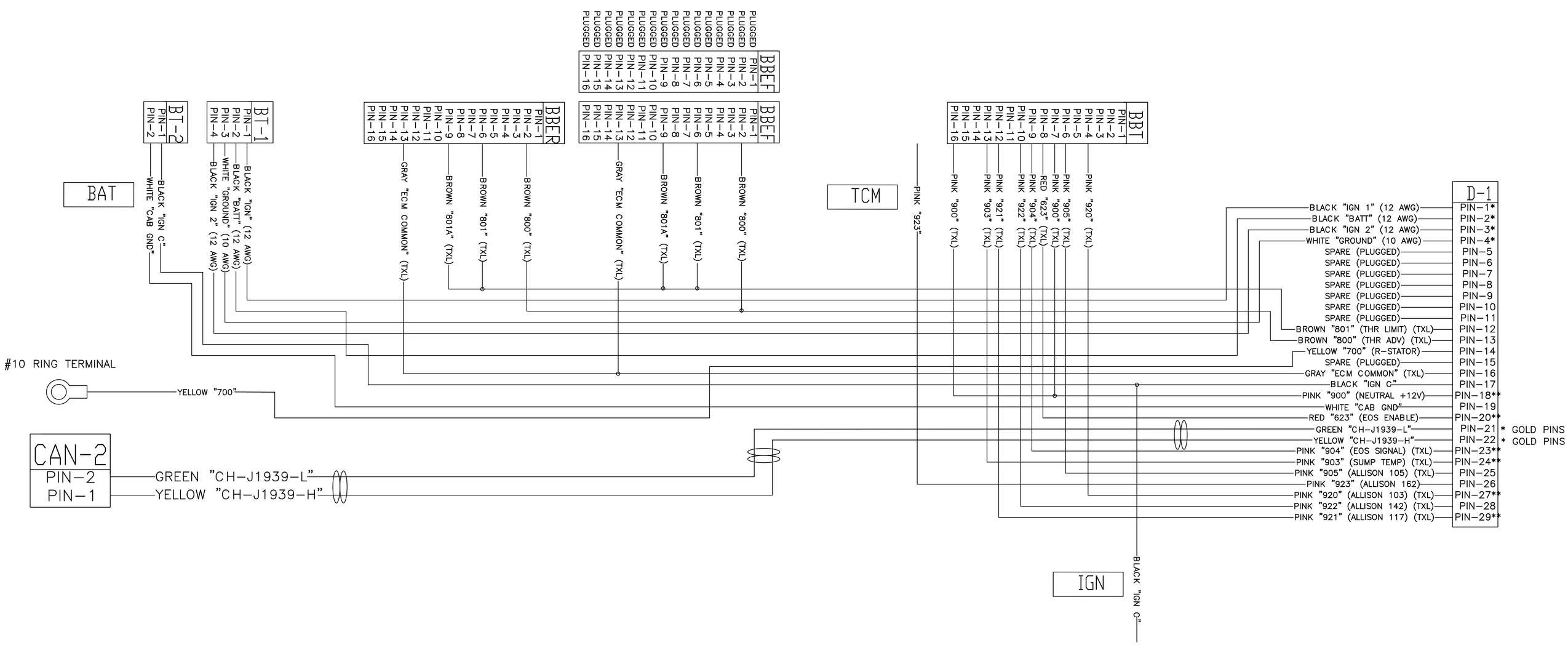
PIN-X* = SIZE 12 DEUTSCH PIN

PIN-X = SIZE 20 DEUTSCH PIN**

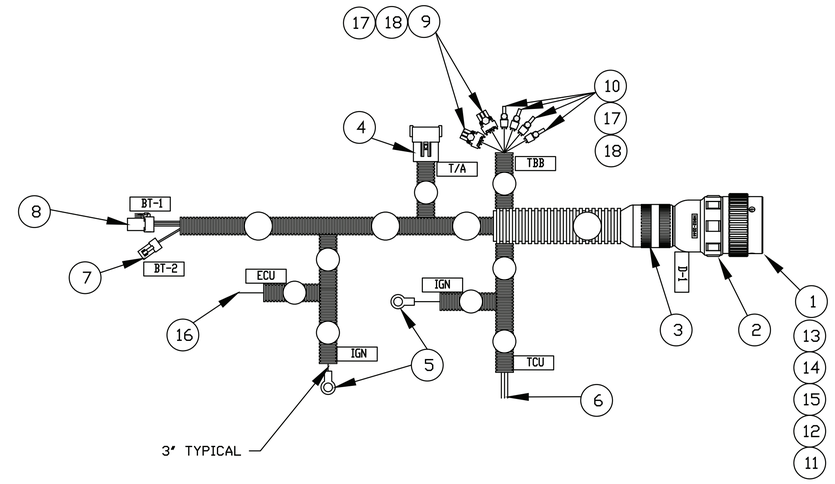
HARNESS, CHASSIS INTERFACE
263-1471-006
2/06/2015



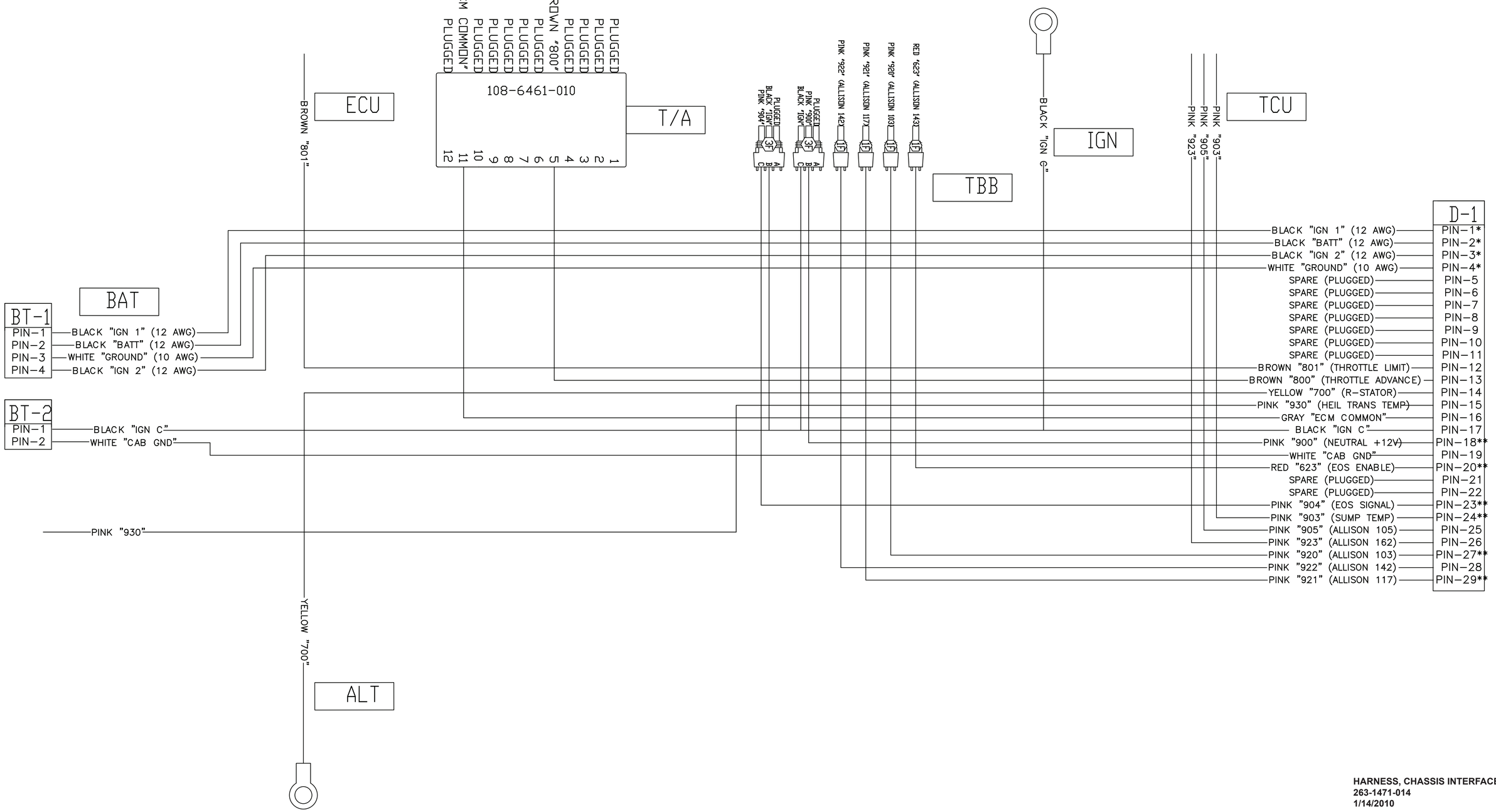
REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-068	DEUTSCH CONNECTOR	1
2	108-4815-188	LG COMPRESSION BACKSHELL	1
3	108-4815-189	LG COMPRESSION NUT	1
4	108-4825-202	TERMINAL, #16 SOCKET	8
5	108-6461-211	DUETSCH CONNECTOR	1
6	108-7114-016	MOLEX TERMINAL	9
7	108-8411-14P	DEUTSCH CONNECTOR	1
8	108-8470-022	PACKARD TERMINAL	3
9	108-8524-001	16 PIN FCI PLUG (BLACK)	1
10	108-8524-101	16 PIN FCI CAP (BLACK)	2
11	108-8524-102	16 PIN FCI CAP (GREY)	1
12	108-8524-302	TERMINAL, #16 PIN	9
13	108-8524-401	PLUG, SEALING	35
14	108-8551-007	RING TERMINAL	1
15	108-8588-2RGY	DTM SERIES 2-WAY REC.	1



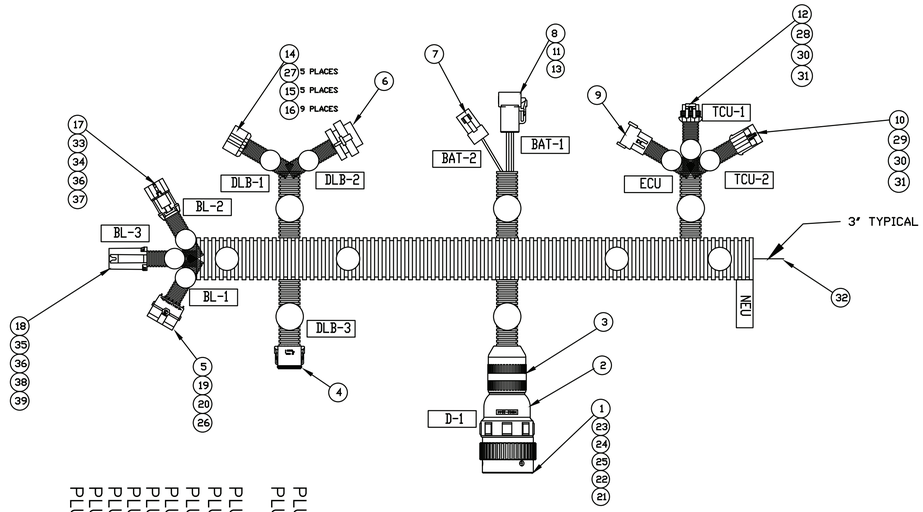
HARNESS, CHASSIS INTERFACE, FREIGHTLINER
263-1471-013
1/13/2009



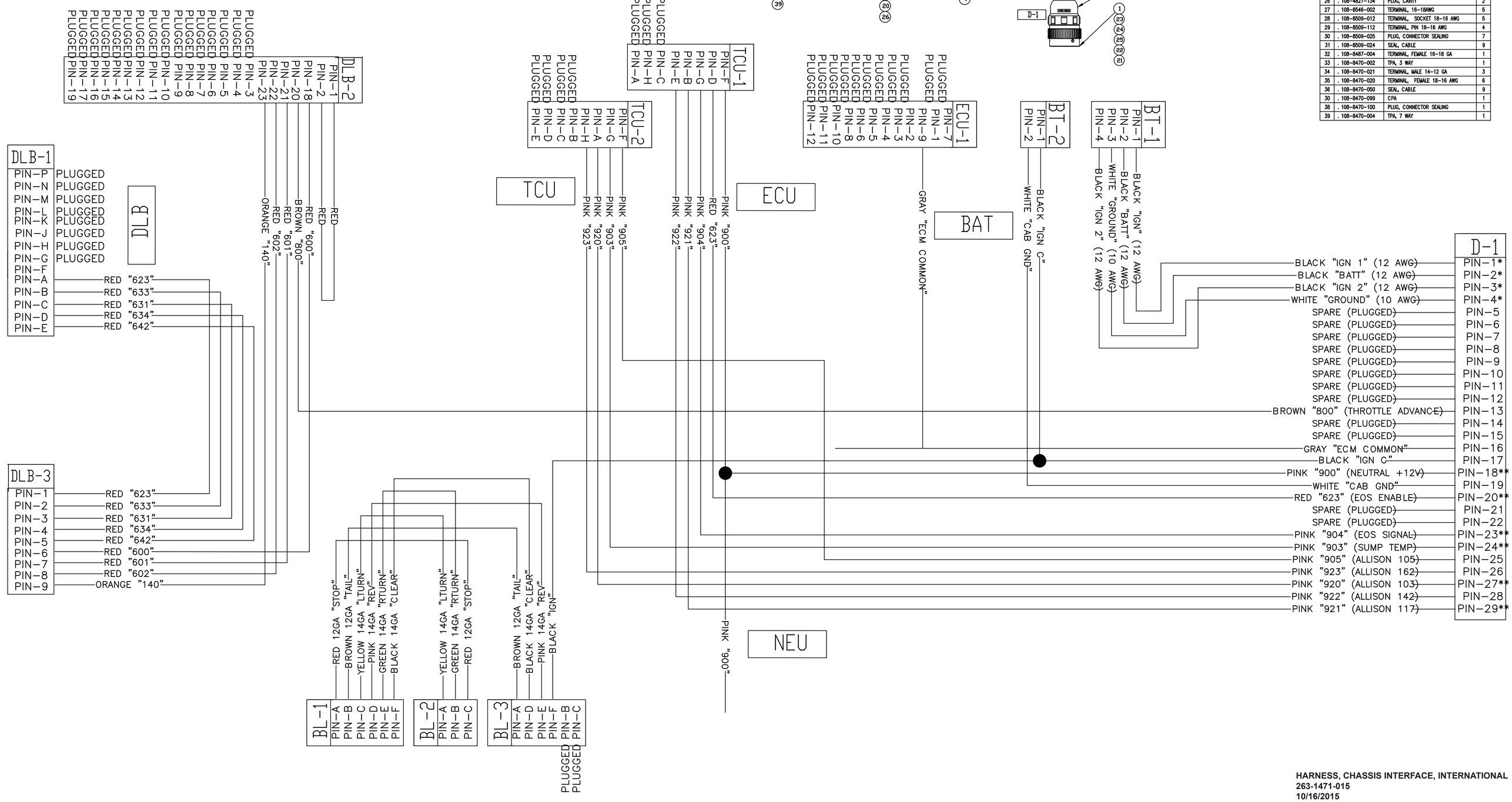
REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-068	DEUTSCH CONNECTOR	1
2	108-4815-188	DUETSCH BACKSHELL	1
3	108-4815-189	DUETSCH COMPRESSION NUT	1
4	108-6461-010	DUETSCH CONNECTOR	1
5	108-8551-007	RING TERMINAL	1
6	108-7114-016	MOLEX TERMINAL	9
7	108-6461-011	DUETSCH CONNECTOR	1
8	108-8411-004	DUETSCH CONNECTOR	1
9	108-4827-005	CONNECTOR, 3 FEWAY MALE	2
10	108-4827-002	CONNECTOR, 1 FEWAY MALE	4
11	108-6461-100	PLUG, SEALING	9
12	108-4815-300	TERMINAL, #12 SOCKET 10 AWG	1
13	108-4815-301	TERMINAL, #12 SOCKET	6
14	108-4815-303	TERMINAL, #16 SOCKET	10
15	108-4815-304	TERMINAL, #20 SOCKET	6
16	108-4815-303	DUETSCH SOCKET	1
17	108-4827-121	CONNECTOR TERMINAL, MALE	9
18	108-4827-132	SEAL, WIRE	9



HARNESS, CHASSIS INTERFACE, PETERBILT
263-1471-014
1/14/2010

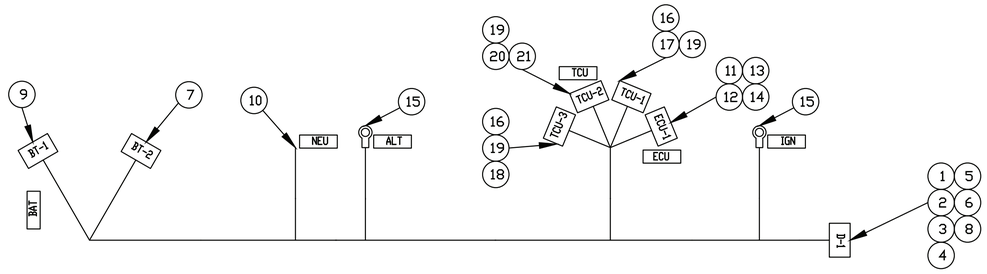


REF.	PART No.	DESCRIPTION	QTY.
1	. 108-4815-068	DEUTSCH CONNECTOR	1
2	. 108-4815-188	DUETSCH BACKSHELL	1
3	. 108-4815-189	DUETSCH COMPRESSION NUT	1
4	. 108-6461-009	DUETSCH CONNECTOR	2
5	. 108-4827-9	PACKARD CONNECTOR	1
6	. 108-8559-001	AMPSEAL CONNECTOR	9
7	. 108-6461-011	DUETSCH CONNECTOR	1
8	. 108-8411-004	DUETSCH CONNECTOR	1
9	. 108-8556-001	CONNECTOR, 12 PIN RECEPTACLE	1
10	. 108-8509-008	CONNECTOR, FEMALE PLUG	1
11	. 108-6461-100	PLUG, SEALING	9
12	. 108-8509-108	CONNECTOR, MALE RECEPTACLE	1
13	. 108-4815-301	TERMINAL, #12 SOCKET	6
14	. 108-8546-015	PACKARD CONNECTOR	1
15	. 108-8546-033	SEAL, CABLE	5
16	. 108-8509-025	PLUG, CAVITY	9
17	. 108-8470-001	CONNECTOR, 3 WAY MALE	1
18	. 108-8470-003	CONNECTOR, 8 WAY FEMALE	3
19	. 108-4827-132	TERMINAL, PIN 14-16 AWG	3
20	. 108-4827-133	TERMINAL, PIN 12 AWG	1
21	. 108-6461-100	PLUG, SEALING	12
22	. 108-4815-300	TERMINAL, #12 SOCKET 10 AWG	1
23	. 108-4815-301	TERMINAL, #12 SOCKET	6
24	. 108-4815-303	TERMINAL, #16 SOCKET	7
25	. 108-4815-304	TERMINAL, #20 SOCKET	6
26	. 108-4827-134	PLUG, CAVITY	2
27	. 108-8546-002	TERMINAL, 16-18AWG	5
28	. 108-8509-012	TERMINAL, SOCKET 18-16 AWG	5
29	. 108-8509-112	TERMINAL, PIN 18-16 AWG	4
30	. 108-8509-025	PLUG, CONNECTOR SEALING	7
31	. 108-8509-024	SEAL, CABLE	9
32	. 108-8487-004	TERMINAL, FEMALE 16-18 GA	1
33	. 108-8470-002	TPA, 3 WAY	1
34	. 108-8470-021	TERMINAL, MALE 14-12 GA	3
35	. 108-8470-020	TERMINAL, FEMALE 18-16 AWG	6
36	. 108-8470-050	SEAL, CABLE	9
30	. 108-8470-099	CPA	1
38	. 108-8470-100	PLUG, CONNECTOR SEALING	1
39	. 108-8470-004	TPA, 7 WAY	1



HARNESS, CHASSIS INTERFACE, INTERNATIONAL
263-1471-015
10/16/2015

REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-068	DEUTSCH CONNECTOR	1
2	108-4815-188	DUETSCH BACKSHELL	1
3	108-4815-189	DUETSCH COMPRESSION NUT	1
4	108-4815-300	TERMINAL, #12 SOCKET 10 AWG	1
5	108-4815-301	TERMINAL, #12 SOCKET	3
6	108-4815-303	TERMINAL, #16 SOCKET	15
7	108-6461-011	DUETSCH CONNECTOR	1
8	108-6461-100	PLUG, SEALING	10
9	108-8411-004	DUETSCH CONNECTOR	1
10	108-8487-004	PACKARD TERMINAL	1
11	108-8509-010	10 WAY METRI-PACK 150	1
12	108-8509-012	TERMINAL, SOCKET 18-16 AWG	4
13	108-8509-040	10 WAY LOCK	1
14	108-8509-150	CAVITY PLUG	6
15	108-8551-007	RING TERMINAL	2
16	108-8557-001	TERMINAL, APEX, PIN 16-14 AWG	5
17	108-8557-002	CONNECTOR, APEX 14 WAY MALE RECEP	1
18	108-8557-004	CONNECTOR, APEX 10 WAY MALE RECEP	1
19	108-8557-005	APEX CAVITY PLUG	29
20	108-8557-006	CONNECTOR, APEX 14 WAY FEMALE PLUG	1
21	108-8557-008	TERMINAL, APEX, SOCKET 16-14 AWG	4



TCU

ECU

BAT

TCU-3
PIN-10 — PINK "923"

TCU-2
PIN-13 — PINK "905"
PIN-1 — PINK "900"
PIN-11 — PINK "922"
PIN-12 — PINK "921"

TCU-1
PIN-4 — PINK "920"
PIN-10 — RED "623"
PIN-2 — PINK "904"
PIN-12 — PINK "903"

ECU-1
PIN-K — BROWN "801"
PIN-D — BROWN "800"
PIN-A — GRAY "ECM COMMON"
PIN-B — BROWN "800"

BT-2
PIN-1 — BLACK "IGN C"
PIN-2 — WHITE "CAB GND"

BT-1
PIN-1 — BLACK "IGN" (12 AWG)
PIN-2 — BLACK "BATT" (12 AWG)
PIN-3 — WHITE "GROUND" (10 AWG)
PIN-4 — BLACK "IGN 2" (12 AWG)

#10 RING TERMINAL

YELLOW "700"

ALT

NEU — PINK "900"

D-1

BLACK "IGN 1" (12 AWG)	PIN-1*
BLACK "BATT" (12 AWG)	PIN-2*
BLACK "IGN 2" (12 AWG)	PIN-3*
WHITE "GROUND" (10 AWG)	PIN-4*
SPARE (PLUGGED)	PIN-5
SPARE (PLUGGED)	PIN-6
SPARE (PLUGGED)	PIN-7
SPARE (PLUGGED)	PIN-8
SPARE (PLUGGED)	PIN-9
SPARE (PLUGGED)	PIN-10
SPARE (PLUGGED)	PIN-11
BROWN "801" (THROTTLE LIMIT)	PIN-12
BROWN "800" (THROTTLE ADVANCE)	PIN-13
YELLOW "700" (R-STATOR)	PIN-14
SPARE (PLUGGED)	PIN-15
GRAY "ECM COMMON"	PIN-16
BLACK "IGN C"	PIN-17
PINK "900" (NEUTRAL +12V)	PIN-18**
WHITE "CAB GND"	PIN-19
RED "623" (EOS ENABLE)	PIN-20**
SPARE (PLUGGED)	PIN-21
SPARE (PLUGGED)	PIN-22
PINK "904" (EOS SIGNAL)	PIN-23**
PINK "903" (SUMP TEMP)	PIN-24**
PINK "905" (ALLISON 105)	PIN-25
PINK "923" (ALLISON 162)	PIN-26
PINK "920" (ALLISON 103)	PIN-27**
PINK "922" (ALLISON 142)	PIN-28
PINK "921" (ALLISON 117)	PIN-29**

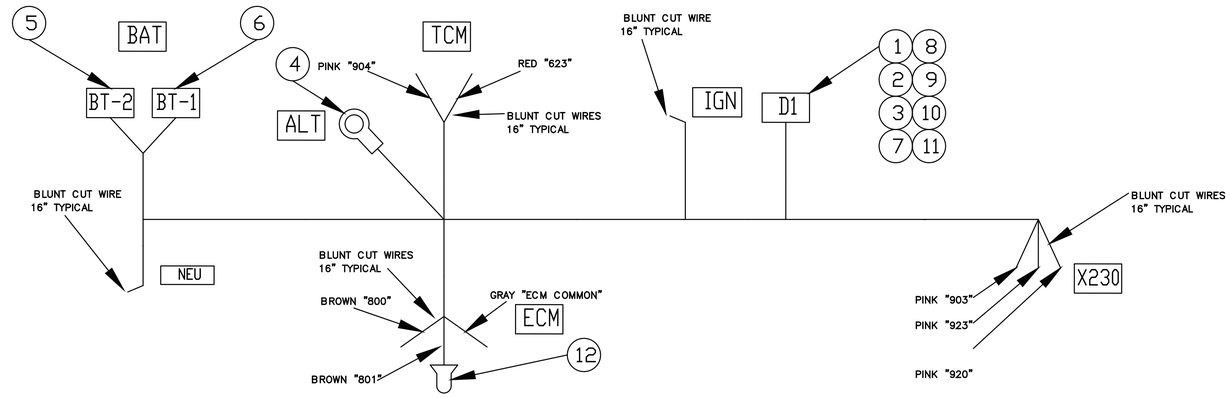
IGN

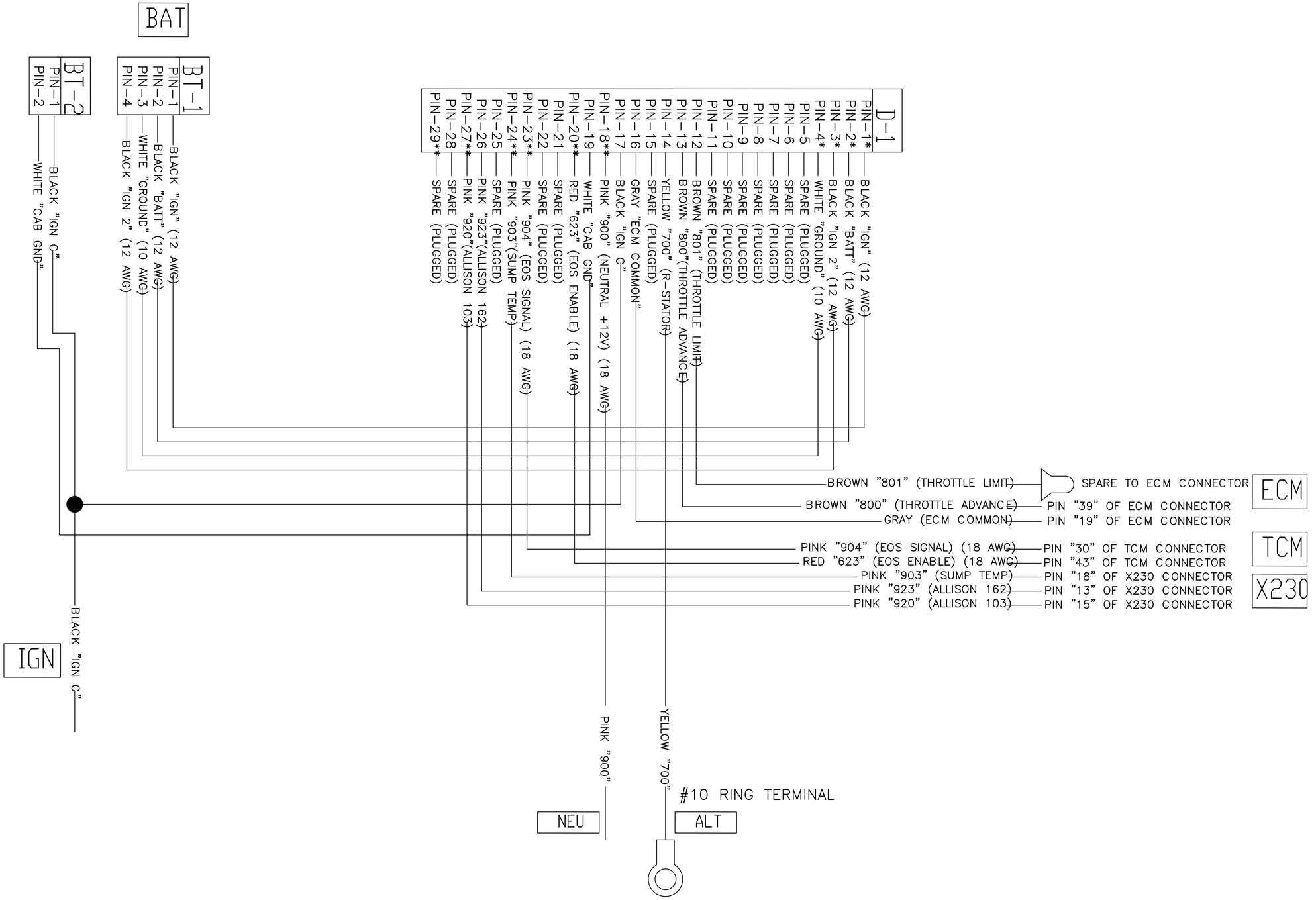
BLACK "IGN C"

#10 RING TERMINAL

HARNESS, CHASSIS INTERFACE, CAT
263-1471-020
09/10/2014

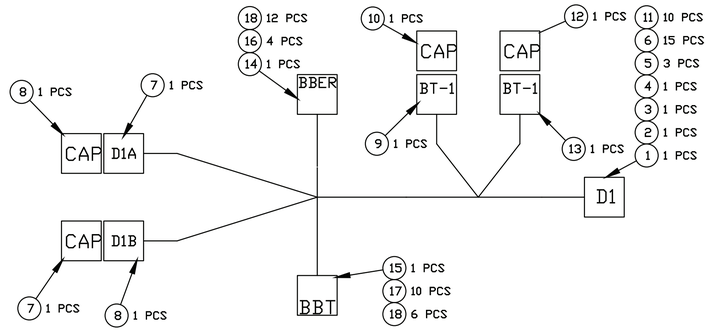
REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-068	DEUTSCH CONNECTOR	1
2	108-4815-188	DUETSCH BACKSHELL	1
3	108-4815-189	DUETSCH COMPRESSION NUT	1
4	108-8551-007	RING TERMINAL	1
5	108-6461-011	DUETSCH CONNECTOR	1
6	108-8411-004	DUETSCH CONNECTOR	1
7	108-6461-100	PLUG, SEALING	13
8	108-4815-300	TERMINAL, #12 SOCKET 10 AWG	1
9	108-4815-301	TERMINAL, #12 SOCKET	3
10	108-4815-303	TERMINAL, #16 SOCKET	7
11	108-4815-304	TERMINAL, #20 SOCKET	5
12	108-8450-001	SHRINK CAP	1

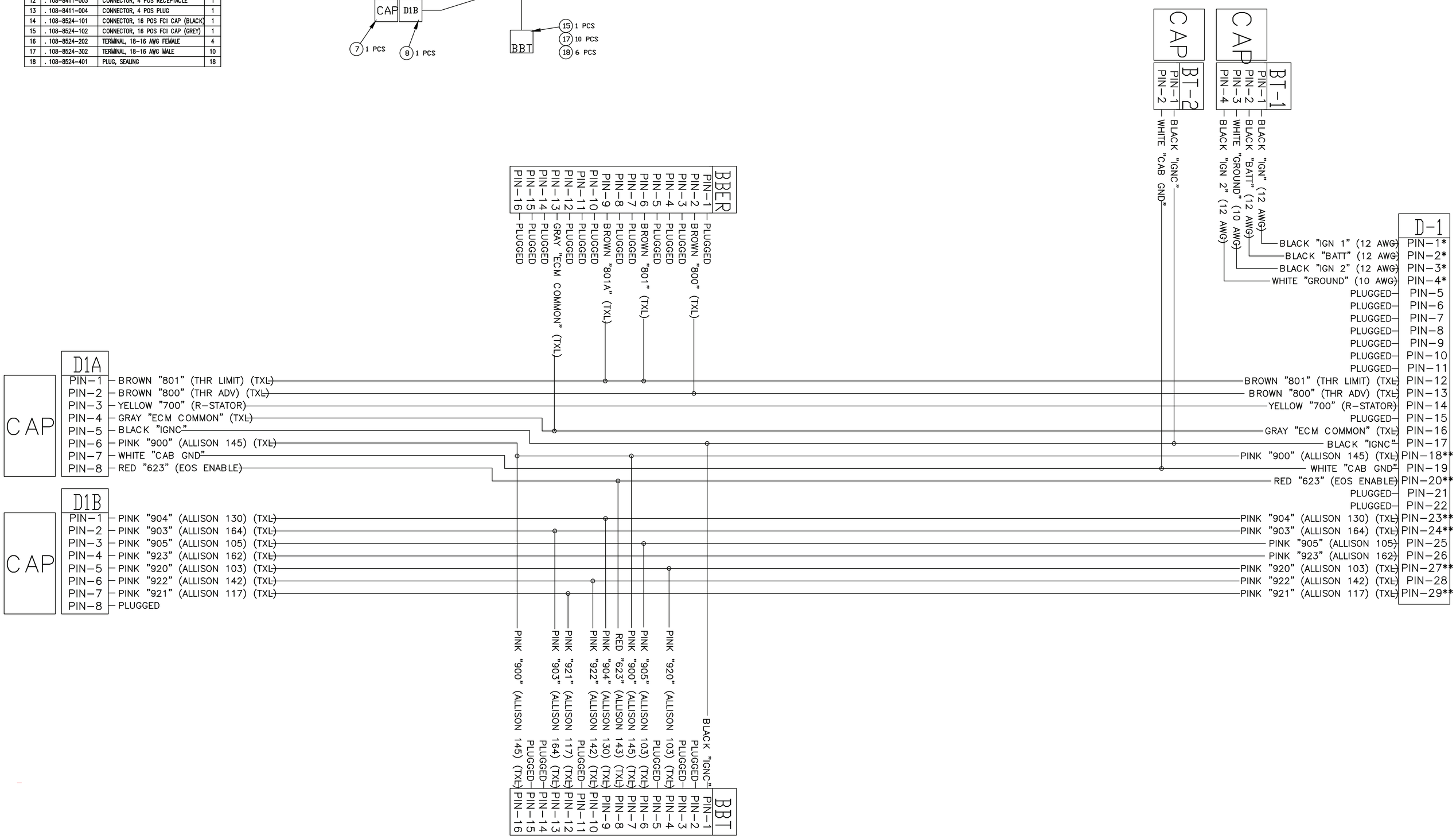




HARNESS, CHASSIS INTERFACE, AUTOCAR
263-1471-021
06/21/2013

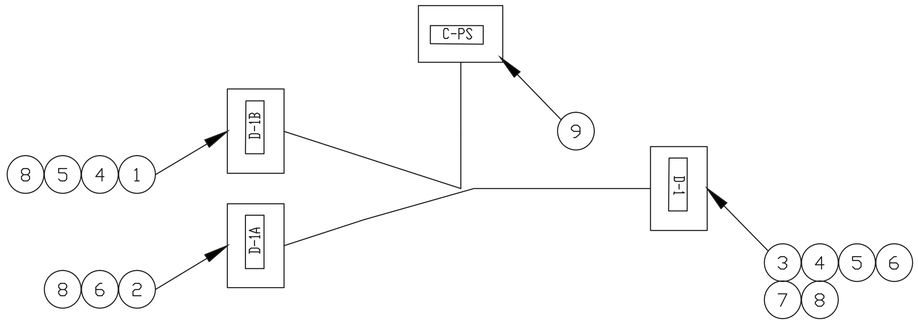
REF.	PART No.	DESCRIPTION	QTY.
1	. 108-4815-068	CONNECTOR, 29 POS PLUG	1
2	. 108-4815-188	BACKSHELL, LG COMPRESSION	1
3	. 108-4815-189	COMPRESSION NUT, BACK SHELL	1
4	. 108-4815-300	TERMINAL, 10-12 AWG FEMALE	1
5	. 108-4815-301	TERMINAL, 12-14 AWG FEMALE	3
6	. 108-4815-304	TERMINAL, 16-22 AWG FEMALE	15
7	. 108-6461-007	CONNECTOR, 8 POS PLUG	2
8	. 108-6461-008	CONNECTOR, 8 POS RECEPTACLE	2
9	. 108-6461-011	CONNECTOR, 2 POS PLUG	1
10	. 108-6461-012	CONNECTOR, 2 POS RECEPTACLE	1
11	. 108-6461-100	PLUG, SEALING	10
12	. 108-8411-003	CONNECTOR, 4 POS RECEPTACLE	1
13	. 108-8411-004	CONNECTOR, 4 POS PLUG	1
14	. 108-8524-101	CONNECTOR, 16 POS FCI CAP (BLACK)	1
15	. 108-8524-102	CONNECTOR, 16 POS FCI CAP (GREY)	1
16	. 108-8524-202	TERMINAL, 18-16 AWG FEMALE	4
17	. 108-8524-302	TERMINAL, 18-16 AWG MALE	10
18	. 108-8524-401	PLUG, SEALING	18





HARNESS, CHASSIS INTERFACE, FREIGHTLINER M2, BACK OF CAB CONNECTION
263-1471-022
01/13/2009

REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-023	HDP 19 SOCKET PLUG	1
2	108-4815-031	HDP 31 SOCKET PLUG	1
3	108-4815-068	HDP 29 SOCKET PLUG	1
4	108-4815-300	TERMINAL, #12 SOCKET 10 AWG	4
5	108-4815-301	TERMINAL, #12 SOCKET	4
6	108-4815-303	TERMINAL, #16 SOCKET	22
7	108-4815-304	TERMINAL, #20 SOCKET	6
8	108-6461-100	PLUG, SEALING	43
9	108-6461-012	CONNECTOR ASS'Y, 2 POS RECEPTACLE	1



C-PS
PIN-2 PLUGGED
PIN-1 ORANGE "PANEL SELECT"

D-1B

PIN-5	ORANGE "PANEL SELECT"
PIN-10	BLACK "IGN 1" (12 AWG)
PIN-8	BLACK "IGN 2" (12 AWG)
PIN-14	WHITE "GROUND" (10 AWG)
PIN-16	WHITE "GROUND" (10 AWG)
PIN-18	WHITE "GROUND" (10 AWG)

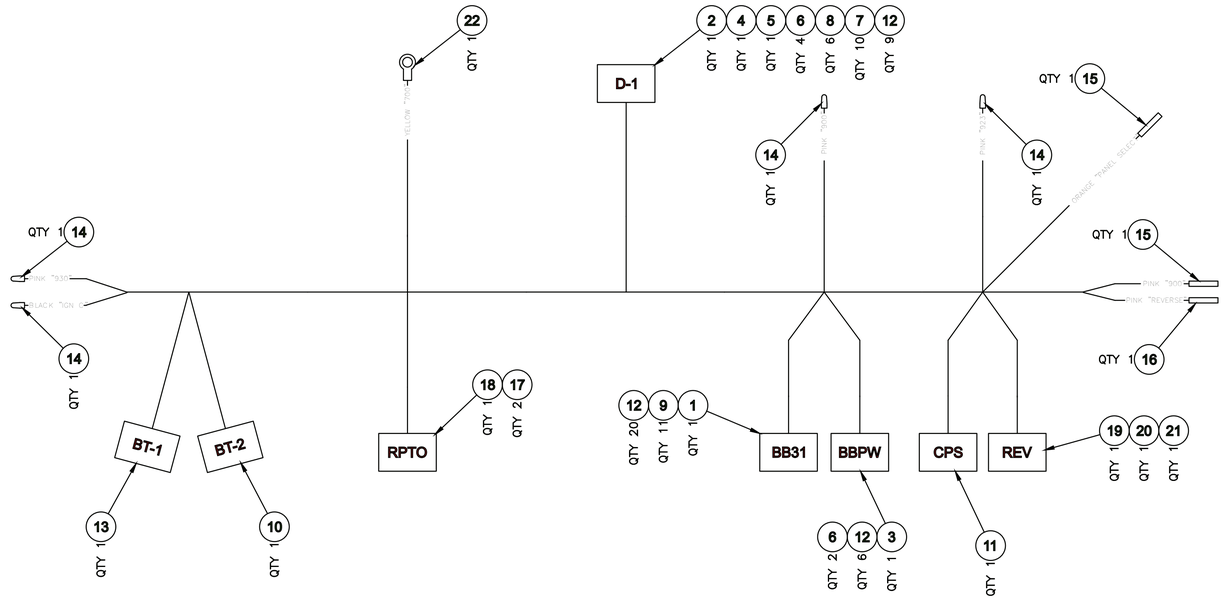
D-1A

PIN-3	BROWN "801" (THROTTLE LIMIT)
PIN-5	YELLOW "CAN H"
PIN-6	GREEN "CAN L"
PIN-8	BROWN "800" (THROTTLE ADVANCE)
PIN-9	GRAY "ECM COMMON"
PIN-28	PINK "903" SUMP TEMP
PIN-19	RED "623" (EOS ENABLE)
PIN-24	PINK "921" (ALLISON 117)
PIN-25	PINK "904" (EOS SIGNAL)
PIN-26	PINK "900" (NEUTRAL +12V)
PIN-21	PINK "922" (ALLISON 142)
PIN-23	PINK "923" (ALLISON 162)
PIN-17	PINK "920" (ALLISON 103)

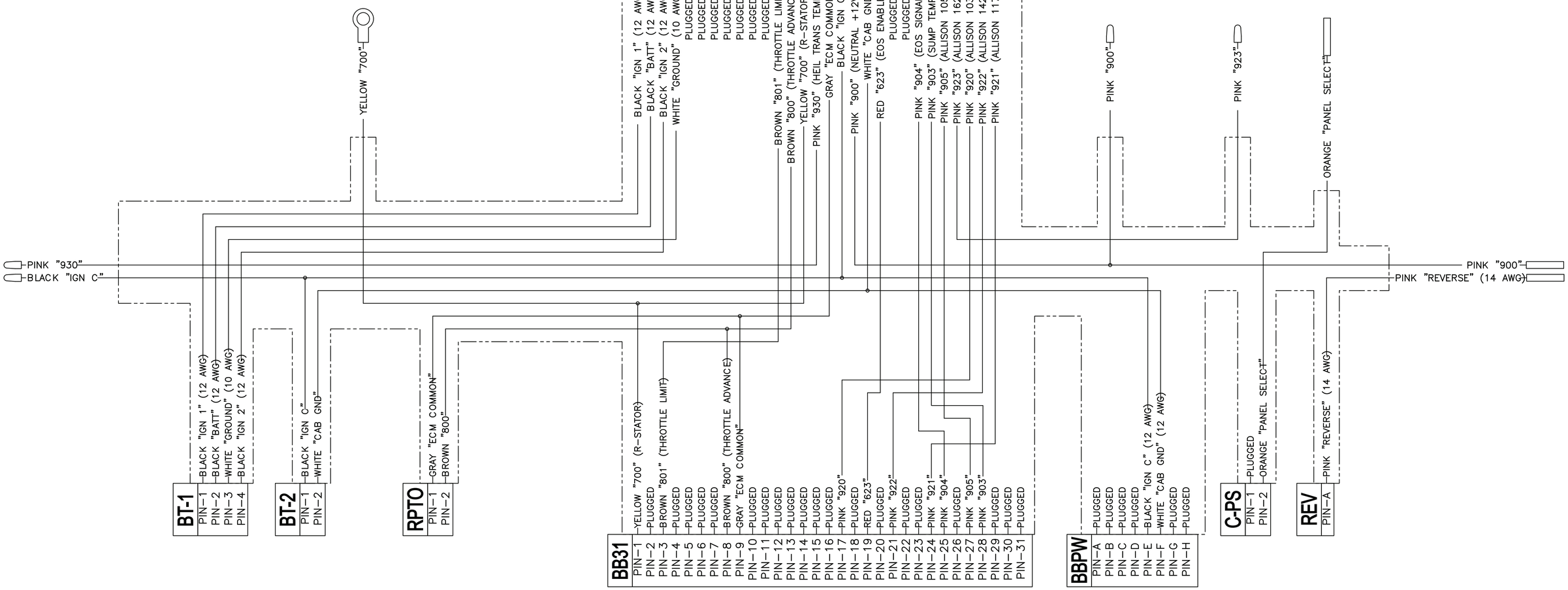
D-1

BLACK "IGN 1" (12 AWG)	PIN-1*
SPARE (PLUGGED)	PIN-2*
BLACK "IGN 2" (12 AWG)	PIN-3*
WHITE "GROUND" (10 AWG)	PIN-4*
SPARE (PLUGGED)	PIN-5
SPARE (PLUGGED)	PIN-6
SPARE (PLUGGED)	PIN-7
SPARE (PLUGGED)	PIN-8
SPARE (PLUGGED)	PIN-9
SPARE (PLUGGED)	PIN-10
SPARE (PLUGGED)	PIN-11
BROWN "801" (THROTTLE LIMIT)	PIN-12
BROWN "800" (THROTTLE ADVANCE)	PIN-13
SPARE (PLUGGED)	PIN-14
SPARE (PLUGGED)	PIN-15
GRAY "ECM COMMON"	PIN-16
BLACK "IGN C"	PIN-17
PINK "900" (NEUTRAL +12V)	PIN-18**
WHITE "CAB GND"	PIN-19
RED "623" (EOS ENABLE)	PIN-20**
YELLOW "CAN H"	PIN-21
GREEN "CAN L"	PIN-22
PINK "904" (EOS SIGNAL)	PIN-23**
PINK "903" (SUMP TEMP)	PIN-24**
SPARE (PLUGGED)	PIN-25
PINK "923" (ALLISON 162)	PIN-26
PINK "920" (ALLISON 103)	PIN-27**
PINK "922" (ALLISON 142)	PIN-28
PINK "921" (ALLISON 117)	PIN-29**

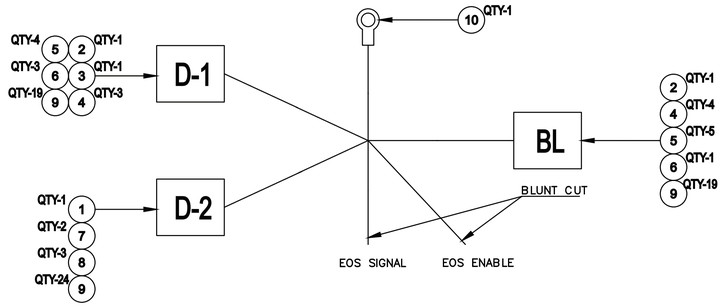
HARNESS, CHASSIS INTERFACE, 2014 PETERBILT
263-1471-023
01/29/2016



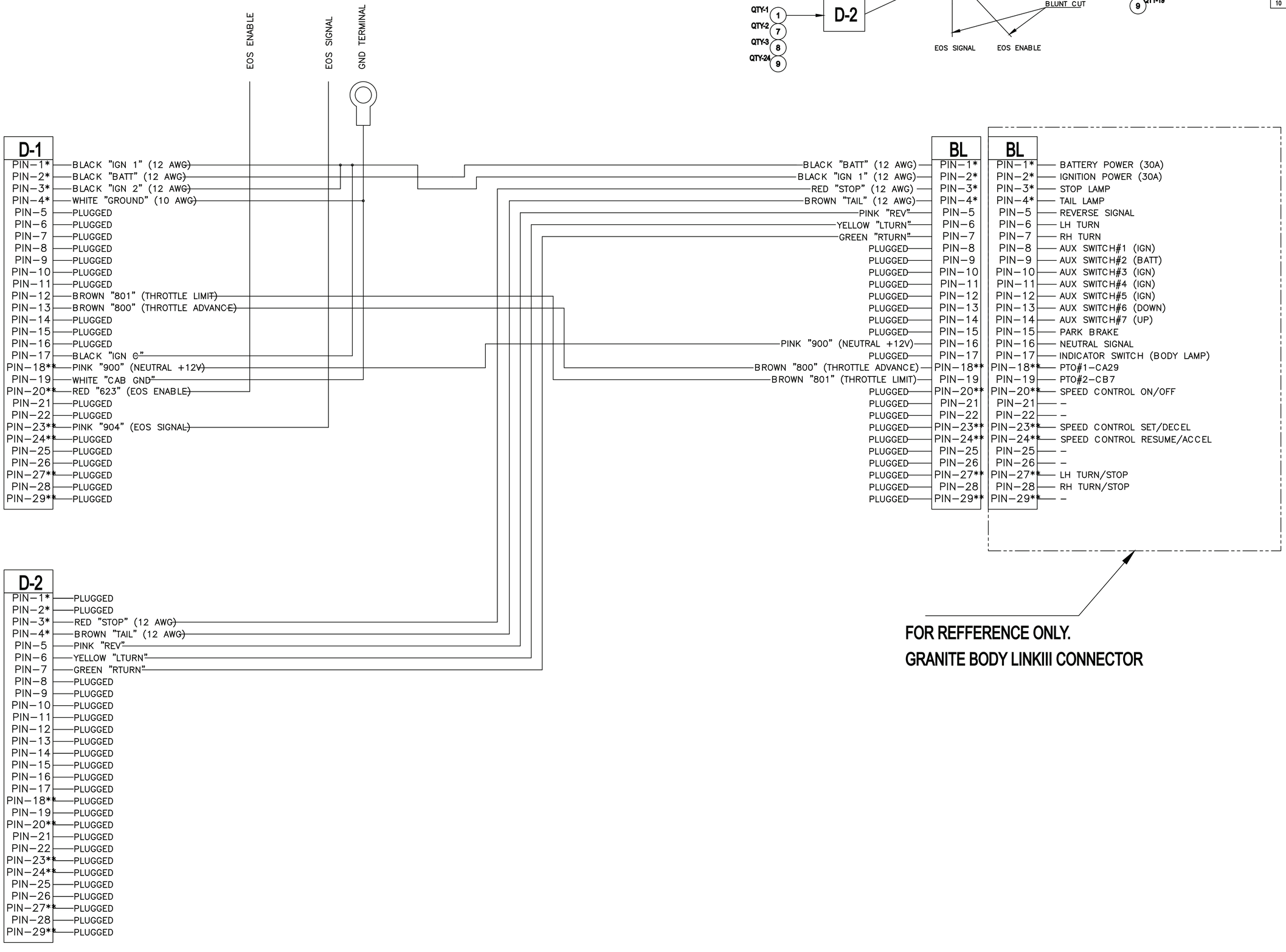
REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-030	CONNECTOR, 31 POSITION RECEPTACLE	1
2	108-4815-068	CONNECTOR, 29 POSITION PLUG	1
3	108-4815-071	CONNECTOR, 9 POSITION PLUG	1
4	108-4815-188	COMPRESSION BACKSHELL, LARGE	1
5	108-4815-189	COMPRESSION NUT, LARGE	1
6	108-4815-301	12GA TERMINAL,12-14 AWG FEMALE	6
7	108-4815-303	16GA TERMINAL, 14-18 AWG FEMALE	10
8	108-4815-304	20GA TERMINAL, 16-22 AWG FEMALE	6
9	108-4815-403	16GA TERMINAL, 14-18 AWG MALE	11
10	108-6461-011	CONNECTOR ASS'Y, 2 POS PLUG	1
11	108-6461-012	CONNECTOR ASS'Y, 2 POS RECEPTACLE	1
12	108-6461-100	SEALING PLUG	35
13	108-8411-004	CONNECTOR ASS'Y, 4 POS PLUG	1
14	108-8450-001	CAP, HEATSHRINK, ADHESIVE LINED	4
15	108-8471-004	TERMINAL, 16-18 AWG FEMALE	2
16	108-8471-005	TERMINAL, 12-14 AWG FEMALE	1
17	108-8471-011	TERMINAL, 16-18 AWG MALE	2
18	108-8471-013	CONNECTOR, 2 POSITION RECEPTACLE	1
19	108-8493-001	CONNECTOR, 1 POSITION RECEPTACLE	1
20	108-8493-007	TERMINAL, 18.5-15.5 AWG MALE	1
21	108-8493-010	WIRE SEAL	1
22	108-8551-007	TERMINAL, 16 AWG #10 RING	1



HARNESS, RP170 INTERFACE, AUTOCAR
263-1471-024
01/14/2015



REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-037	CONNECTOR, 29 POS, RECEPTACLE	1
2	108-4815-068	CONNECTOR, 29 POS, PLUG	2
3	108-4815-300	SIZE 12, SOCKET, 10 AWG	1
4	108-4815-301	SIZE 12, SOCKET, 12-14 AWG	7
5	108-4815-303	SIZE 16, SOCKET, 14-18 AWG	9
6	108-4815-304	SIZE 20, SOCKET, 16-22 AWG	4
7	108-4815-401	SIZE 12, PIN, 12-14 AWG	2
8	108-4815-403	SIZE 16, PIN, 14-18 AWG	3
9	108-6461-100	SIZE 16, CAVITY PLUG	62
10	108-8551-007	RING TERMINAL	1

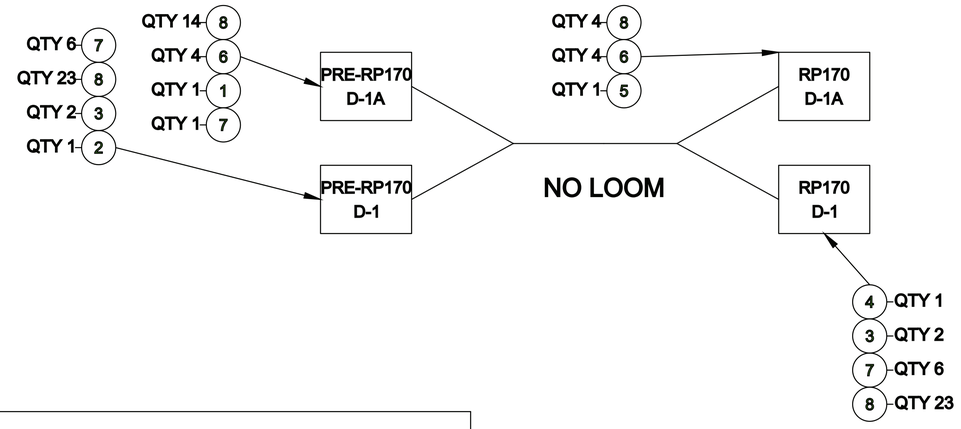


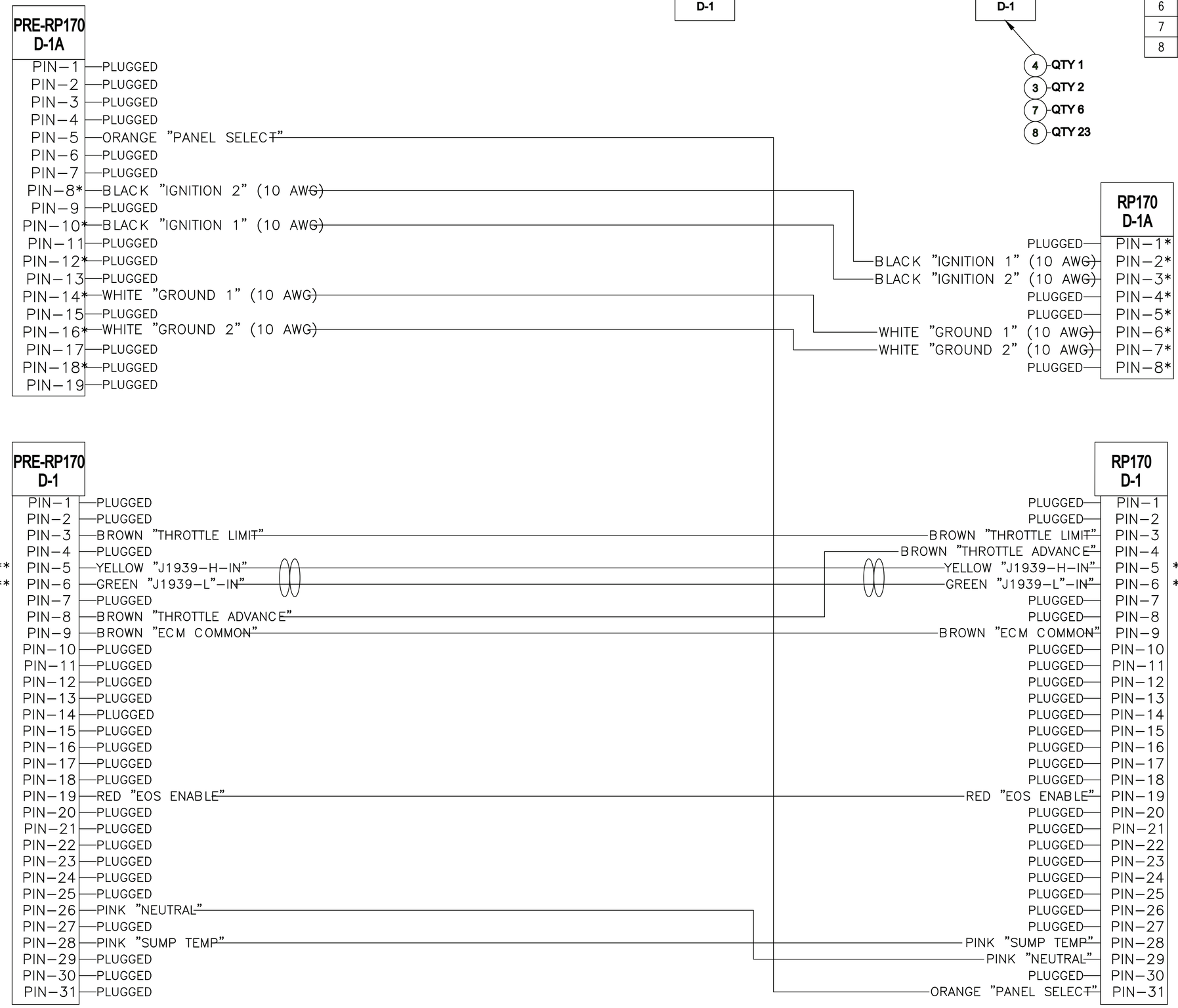
FOR REFFERENCE ONLY.

GRANITE BODY LINKIII CONNECTOR

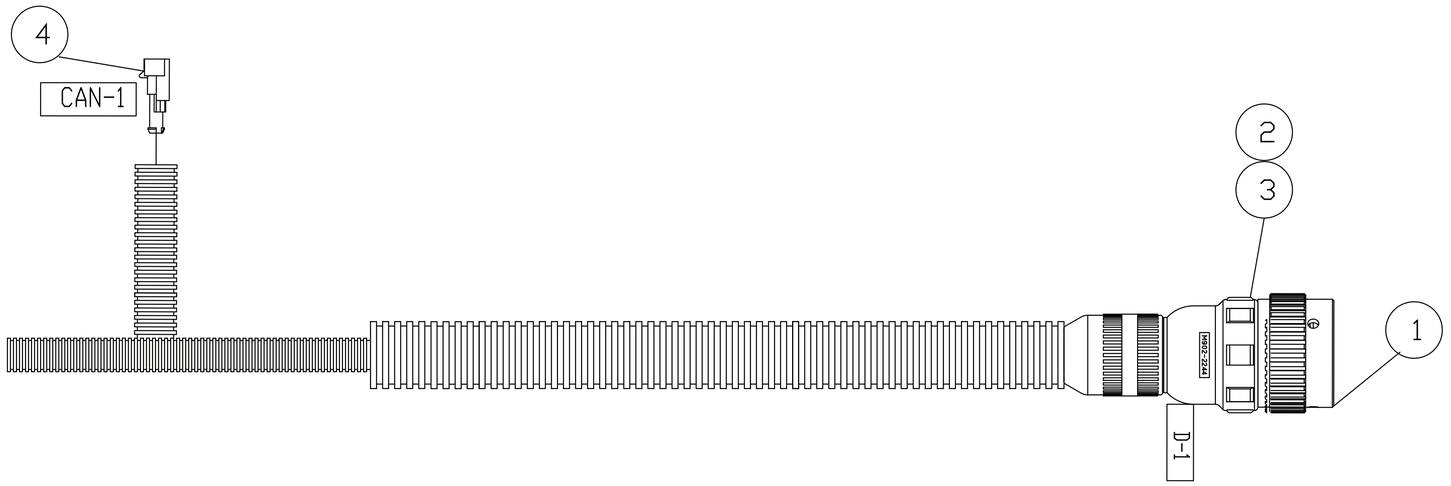
HARNESS, MACK GRANIT INTERFACE
263-1471-025
08/28/2017

REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-023	CONNECTOR, 19 POS PLUG	1
2	108-4815-031	CONNECTOR, 31 POS PLUG	1
3	108-4815-123	GOLD TERM, FEMALE SIZE 16 (16-20AWG)	4
4	108-4815-206	CONN, 31 POS RECEPTACLE (RP170, D-1)	1
5	108-4815-208	CONN, 8 POS RECEPTACLE (RP170, D-1A)	1
6	108-4815-300	TERMINAL, FEMALE SIZE 12 (10 AWG)	8
7	108-4815-303	TERMINAL, FEMALE SIZE 16 (14-18 AWG)	13
8	108-6461-100	CAVITY PLUG, SIZE 12-16	64





HARNESS, ADAPTER CAB BBC, PRE-RP170 TO RP170, PETERBILT 350/250
263-1471-026
06/16/2017



REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-206	DEUTSCH CONNECTOR	1
2	108-4815-188	LG COMPRESSION BACKSHELL	1
3	108-4815-189	LG COMPRESSION NUT	1
4	108-8588-2RGY	DTM SERIES 2-WAY REC.	1

DASH UNDER THE STEERING WHEEL

BLUNT CUT WIRE

ALLISON BB CONNEC
PIN-9
PIN-11

BLUNT CUT WIRE

DASH UNDER THE STEERING WHEEL

TCM

WHITE/ORG "PIN 64" "TRANS TEMP SIG"

WHITE/ORG "NEUTRAL SIG"

WHITE/ORG "PTO SOL"

SEE NOTE BELOW.

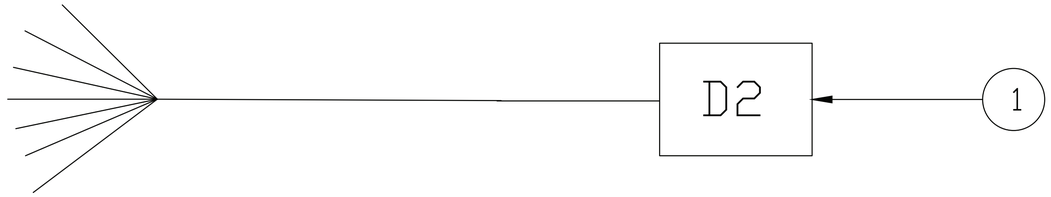
CAN-1
PIN-2 — GREEN "CH-J1939-L"
PIN-1 — YELLOW "CH-J1939-H"

diagnostics plug

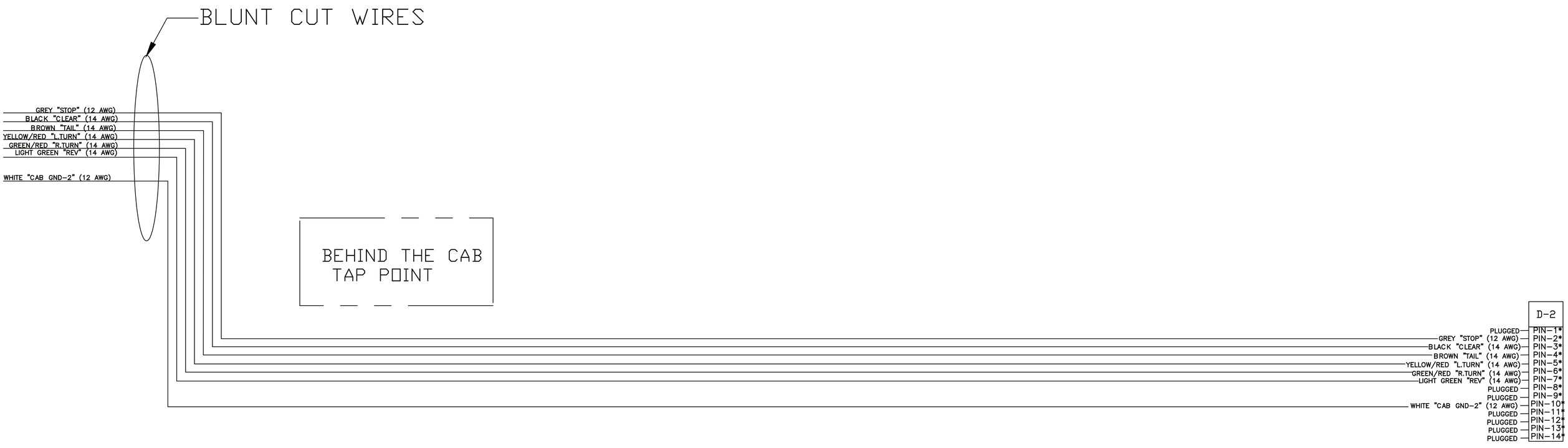
D-1

SPARE (PLUGGED)	PIN-1*	
SPARE (PLUGGED)	PIN-2*	
SPARE (PLUGGED)	PIN-3*	
SPARE (PLUGGED)	PIN-4*	
GREEN "CH-J1939-L"	PIN-5	
YELLOW "CH-J1939-H"	PIN-6	
SPARE (PLUGGED)	PIN-7	
SPARE (PLUGGED)	PIN-8	
SPARE (PLUGGED)	PIN-9	
SPARE (PLUGGED)	PIN-10	
SPARE (PLUGGED)	PIN-11	
SPARE (PLUGGED)	PIN-12	
SPARE (PLUGGED)	PIN-13	
SPARE (PLUGGED)	PIN-14	
SPARE (PLUGGED)	PIN-15	
SPARE (PLUGGED)	PIN-16	
SPARE (PLUGGED)	PIN-17	
SPARE (PLUGGED)	PIN-18**	
RED/WHITE "PTO SOL"	PIN-19	
SPARE (PLUGGED)	PIN-20**	
SPARE (PLUGGED)	PIN-21	* GOLD PINS
SPARE (PLUGGED)	PIN-22	* GOLD PINS
SPARE (PLUGGED)	PIN-23**	
SPARE (PLUGGED)	PIN-24**	
SPARE (PLUGGED)	PIN-25	
SPARE (PLUGGED)	PIN-26	
SPARE (PLUGGED)	PIN-27**	
RED/WHITE "TRANS TEMP SIG"	PIN-28	
RED/WHITE "NEUTRAL SIG"	PIN-29**	
SPARE (PLUGGED)	PIN-30	
SPARE (PLUGGED)	PIN-31**	

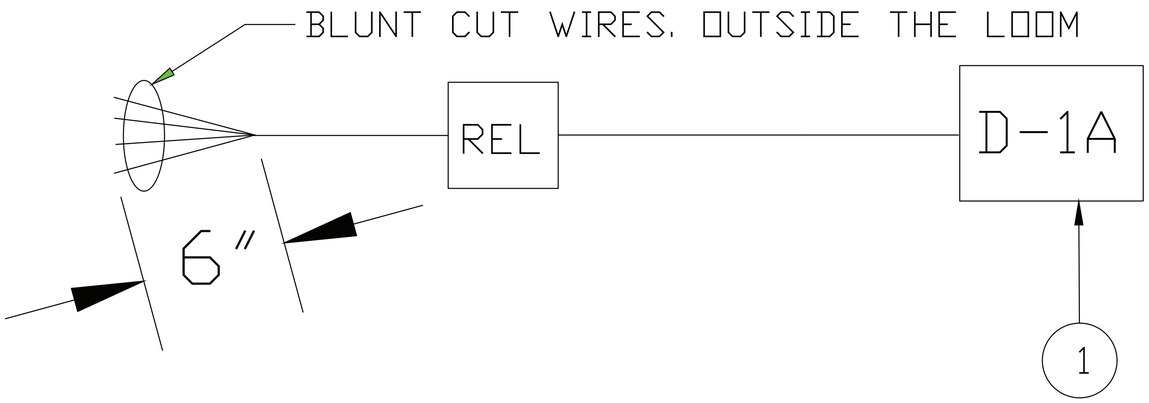
D1 HARNESS, CHASSIS INTERFACE, MACK
263-1471-027
08/14/2024



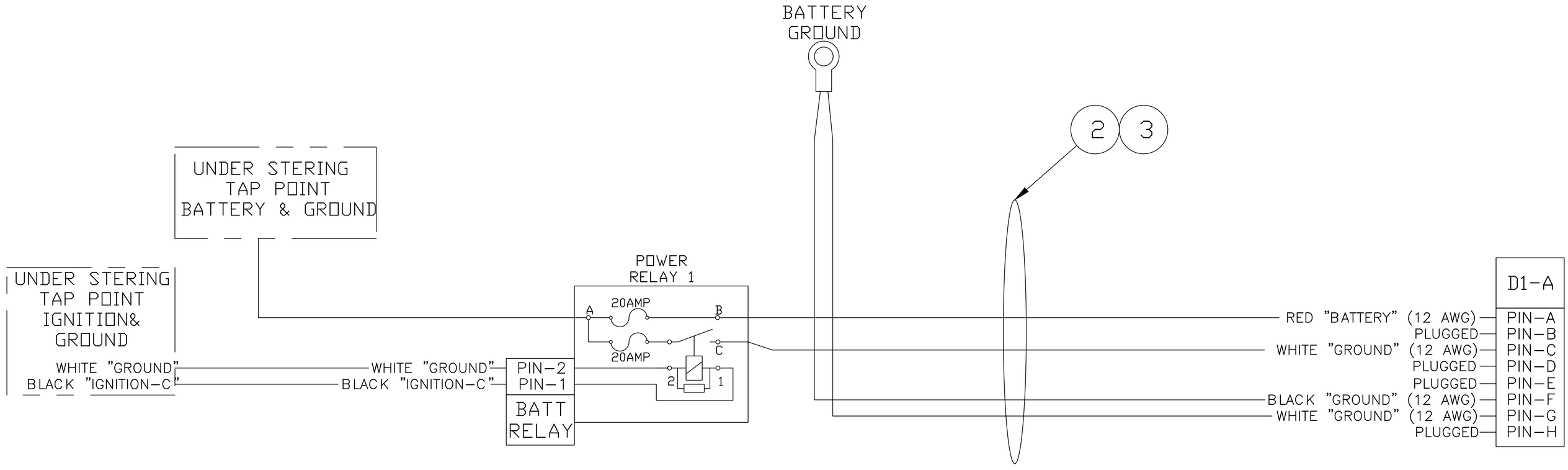
REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-204	CONNECTOR, 14 POS PLUG	1



D2 HARNESS, CHASSIS INTERFACE, MACK
263-1471-028
08/14/2024

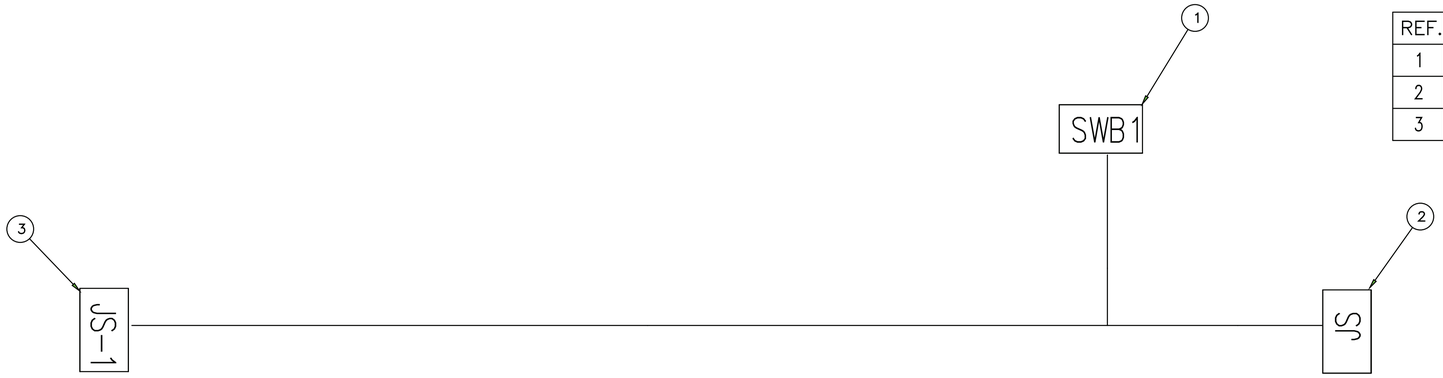


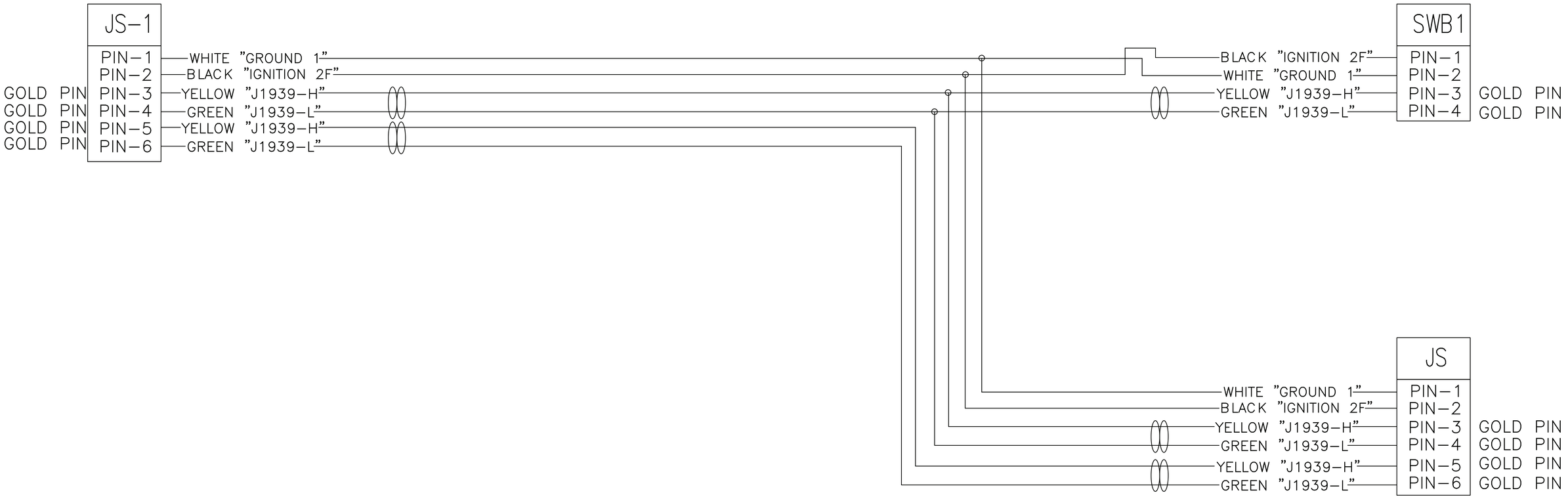
REF.	PART No.	DESCRIPTION	QTY.
1	108-4815-208	CONNECTOR, 8 POS RECEPTICLE	1
2	263-1880-002	HARNESS, BATT. POWER RELAY	1
3	311-6202	BRACKET, BATTER BOX RELAY	1



D1-A HARNESS, CHASSIS INTERFACE, MACK
263-1471-029
08/14/2024

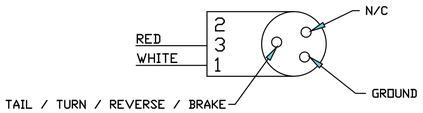
REF.	PART No.	DESCRIPTION	QTY.
1	108-6461-411	CONNECTOR, 4-WAY, PLUG, BLACK	1
2	108-8588-6PY	DTM, 6-WAY, PLUG, YELLOW	1
3	108-8588-6RY	DTM, 6-WAY, RECEPTACLE, YELLOW	1



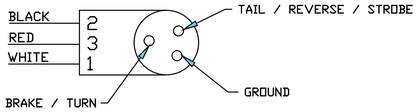


HARNESS, JOYSTICK COMMAND-SST, ECONIC
263-1886-008
10/04/2021

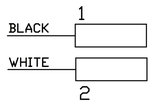
REF PINOUT 108-8721-005

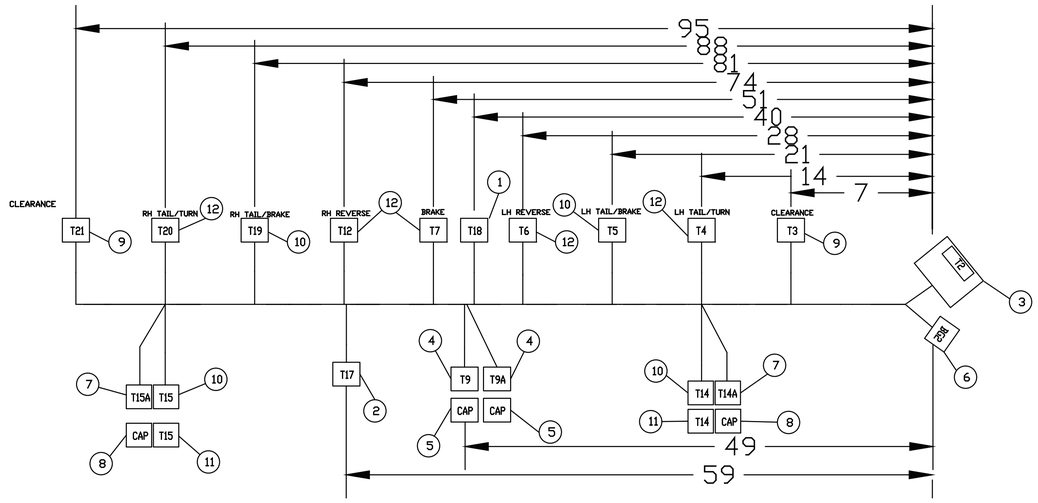


REF PINOUT 108-8721-004

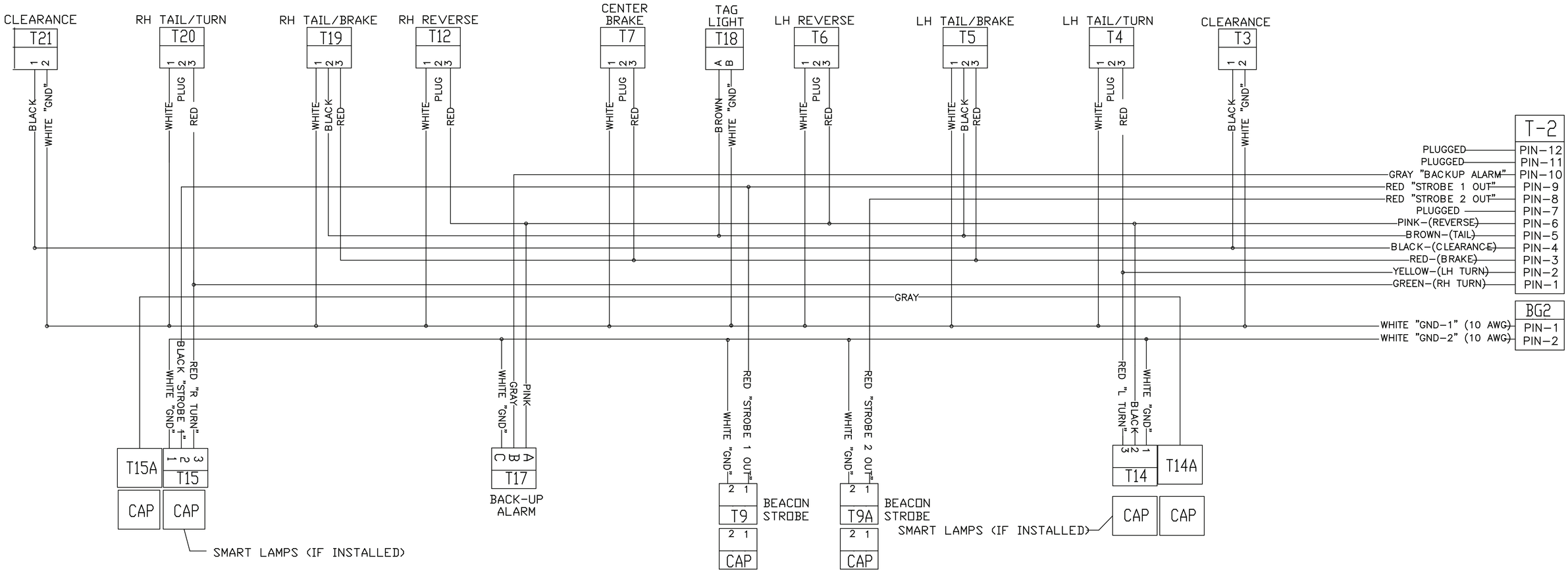


REF PINOUT 108-8721-001



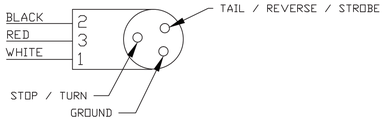


REF.	PART No.	DESCRIPTION	QTY.
1	108-4827-003	2 WAY MALE CONNECTOR	1
2	108-4827-006	3 WAY FEMALE CONNECTOR	1
3	108-6461-121	12 WAY RECEPTACLE-GRAY	1
4	108-6461-211	2 WAY PLUG-BLACK	2
5	108-6461-201	2 WAY RECEPTACLE-BLACK	2
6	108-8411-12R	2-WAY RECEPTACLE STRAIN RELIEF, BLK	1
7	108-8493-001	SUPER SEAL 1 WAY PLUG HOUSING	2
8	108-8493-101	SUPER SEAL 1 WAY CAP HOUSING	2
9	108-8721-001	OVERMOLDED TERM, FEMALE 0.18 BULLET	2
10	108-8721-004	OVERMOLDED PLUG, 3 WIRE, 90°	4
11	108-8721-006	3 WIRE CAP	2
12	108-8721-005	OVERMOLDED PLUG, 2 WIRE, 90°	5

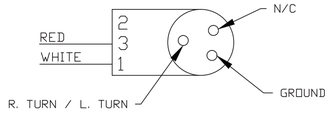


HARNESS, TAILGATE LOWER CLUSTER
263-1890-001
10/01/2021

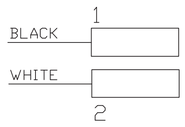
REF PINOUT 108-8721-004

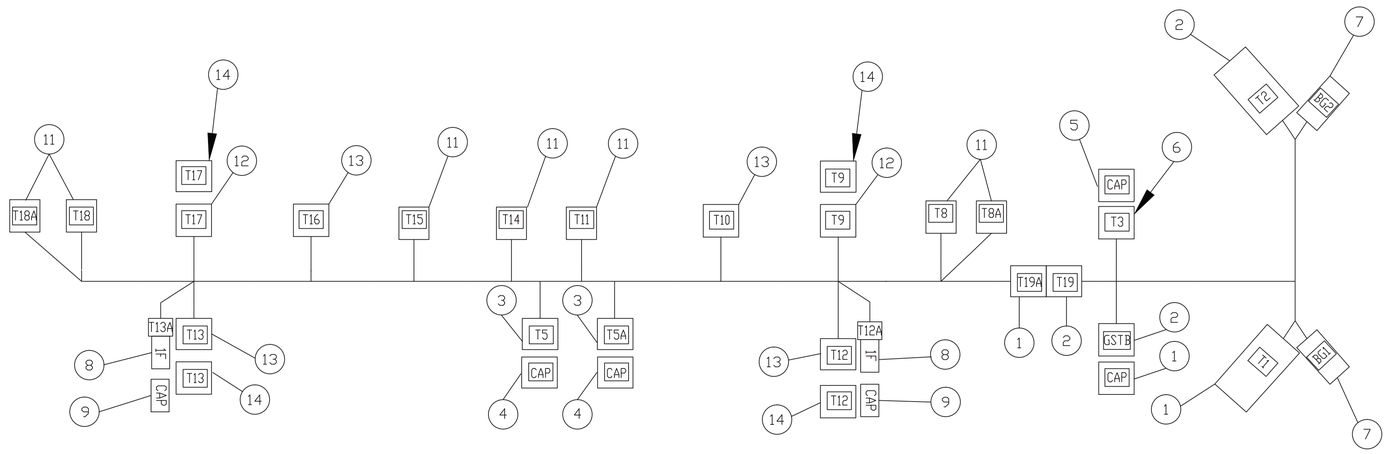


REF PINOUT 108-8721-005

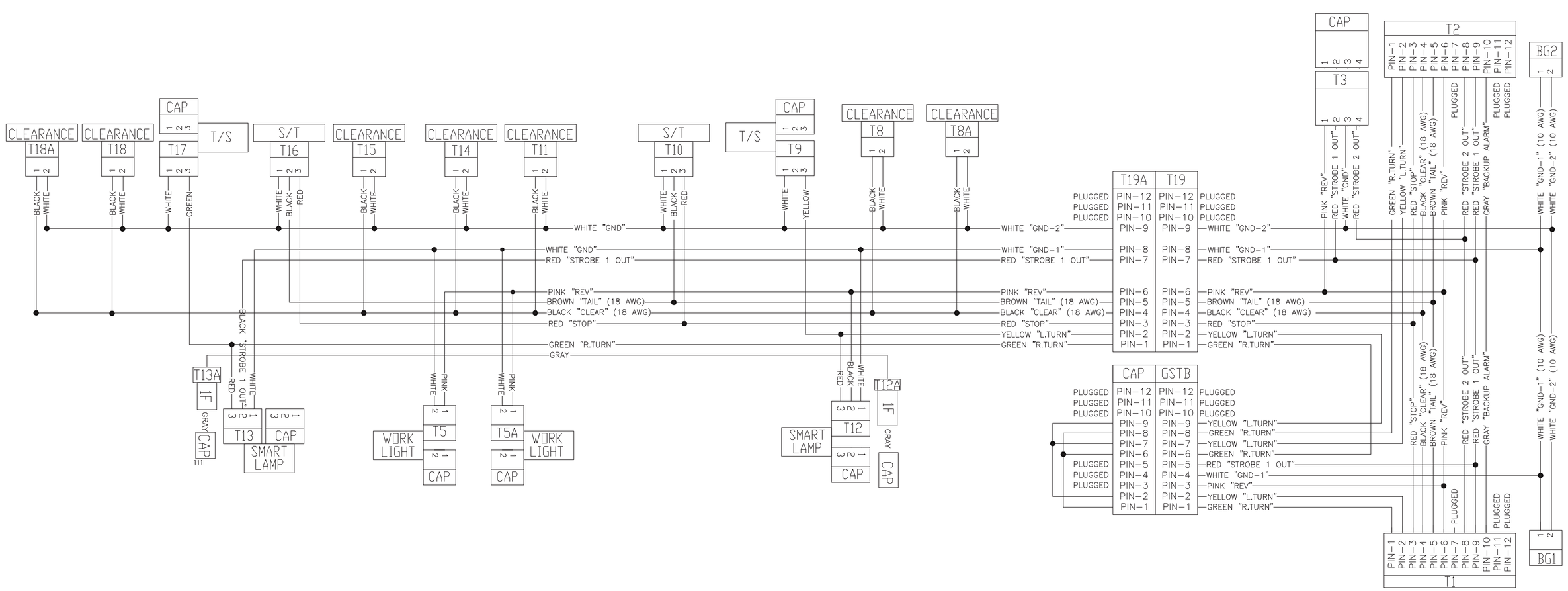


REF PINOUT 108-8721-001





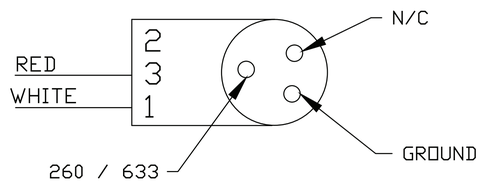
REF.	PART No.	DESCRIPTION	QTY.
1	108-6461-121	AT 12 WAY RECEPTACLE-GRAY	3
2	108-6461-122	AT 12 WAY PLUG-GRAY	3
3	108-6461-201	AT 2 WAY RECEPTACLE-BLACK	2
4	108-6461-211	AT 2 WAY PLUG-BLACK	2
5	108-6461-401	AT 4 WAY RECEPTACLE-BLACK	1
6	108-6461-411	AT 4 WAY PLUG-BLACK	1
7	108-8411-12P	2-WAY PLUG STRAIN RELIEF, BLACK	2
8	108-8493-001	SUPER SEAL 1 WAY PLUG HOUSING	2
9	108-8493-101	SUPER SEAL 1 WAY CAP HOUSING	2
10	108-8721-001	OVERMOLDED TERM, FEMALE 0.18 BULLET	7
11	108-8721-004	OVERMOLDED PLUG, 3 WIRE, 90°	4
12	108-8721-005	OVERMOLDED PLUG, 2 WIRE, 90°	2
13	108-8721-006	3 WIRE CAP	4

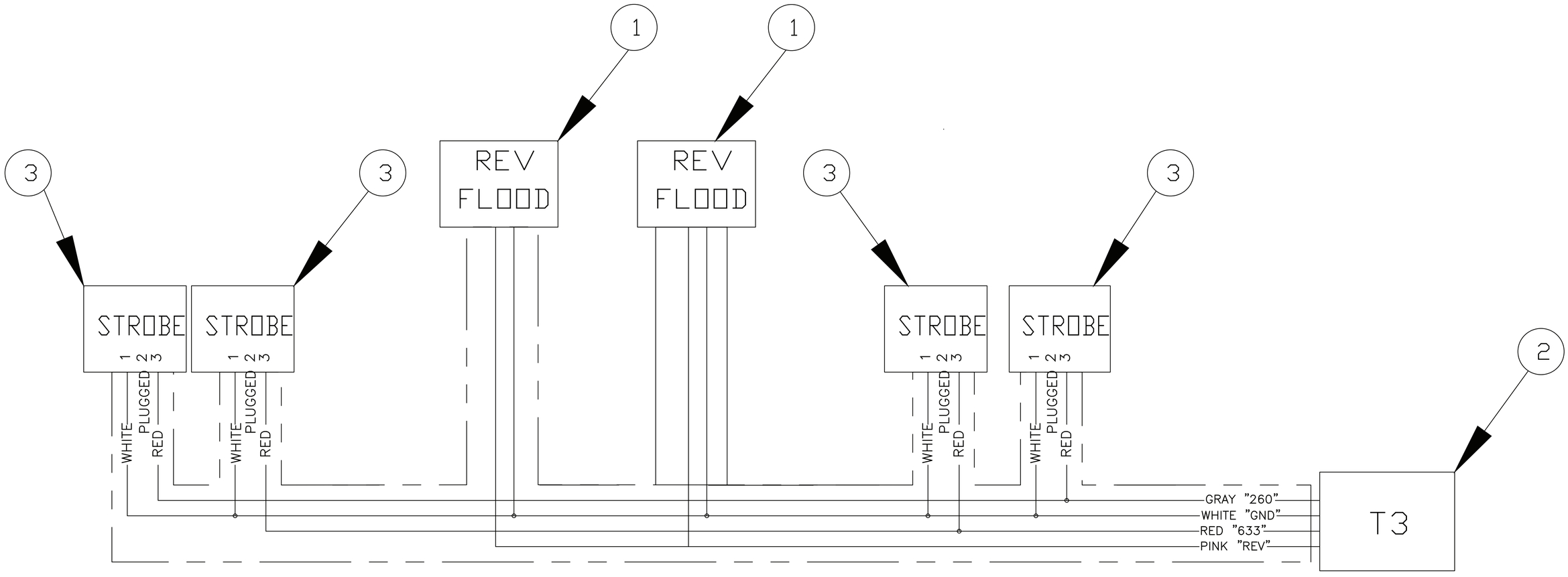


HARNESS, TAILGATE UPPER CLUSTER
263-1890-003
10/01/2021

REF.	PART No.	DESCRIPTION	QTY.
1	108-6461-207	CONNECTOR, AT, GRAY, 2 PIN	2
2	108-6461-401	CONNECTOR, 4 WAY RECEPTACLE-BLACK	1
3	108-8721-005	OVERMOLDED PLUG, 2 WIRE, 90°	4

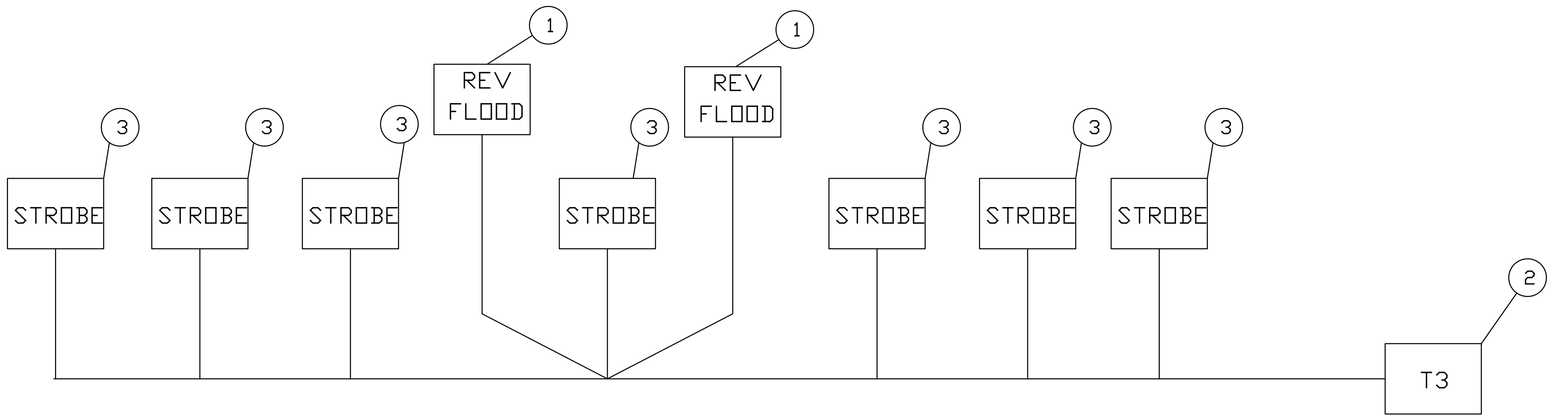
REF PINOUT 108-8721-005

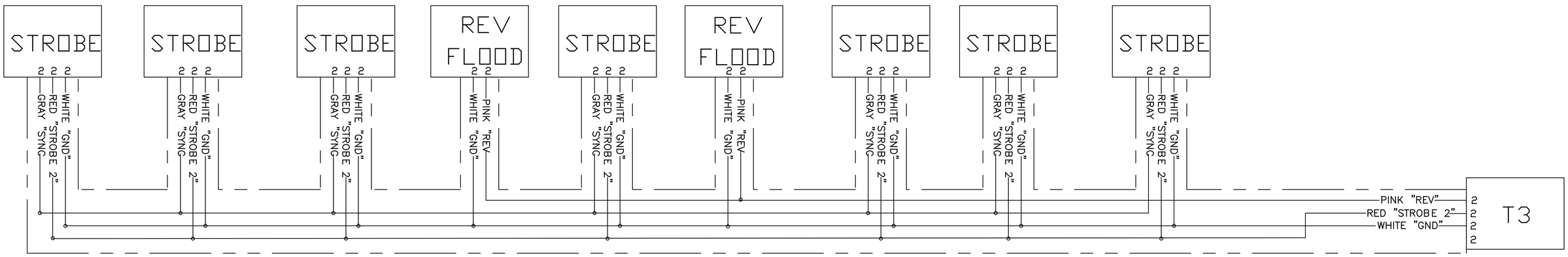




HARNESS, TAILGATE MIDDLE CLUSTER, HALFPACK 2018
263-1890-005
06/14/2024

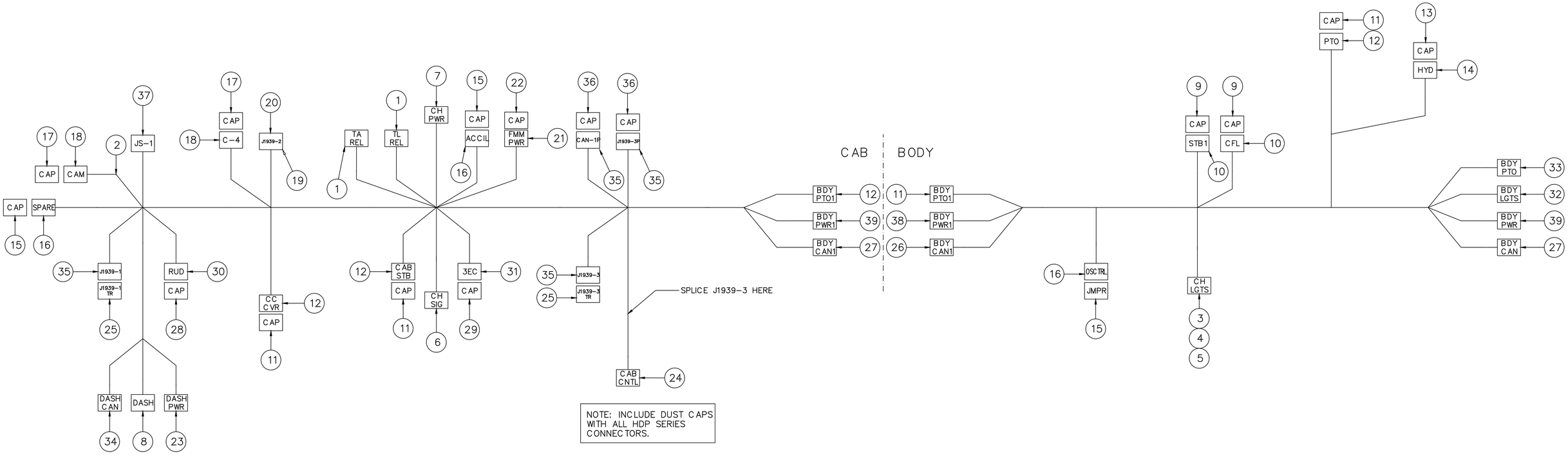
REF.	PART No.	DESCRIPTION	QTY.
1	108-6461-211	AT 2 WAY PLUG-BLACK	2
2	108-6461-401	4-WAY RECEPTACLE	1
3	108-8493-003	CONNECTOR 3 WAT HOUSING	7



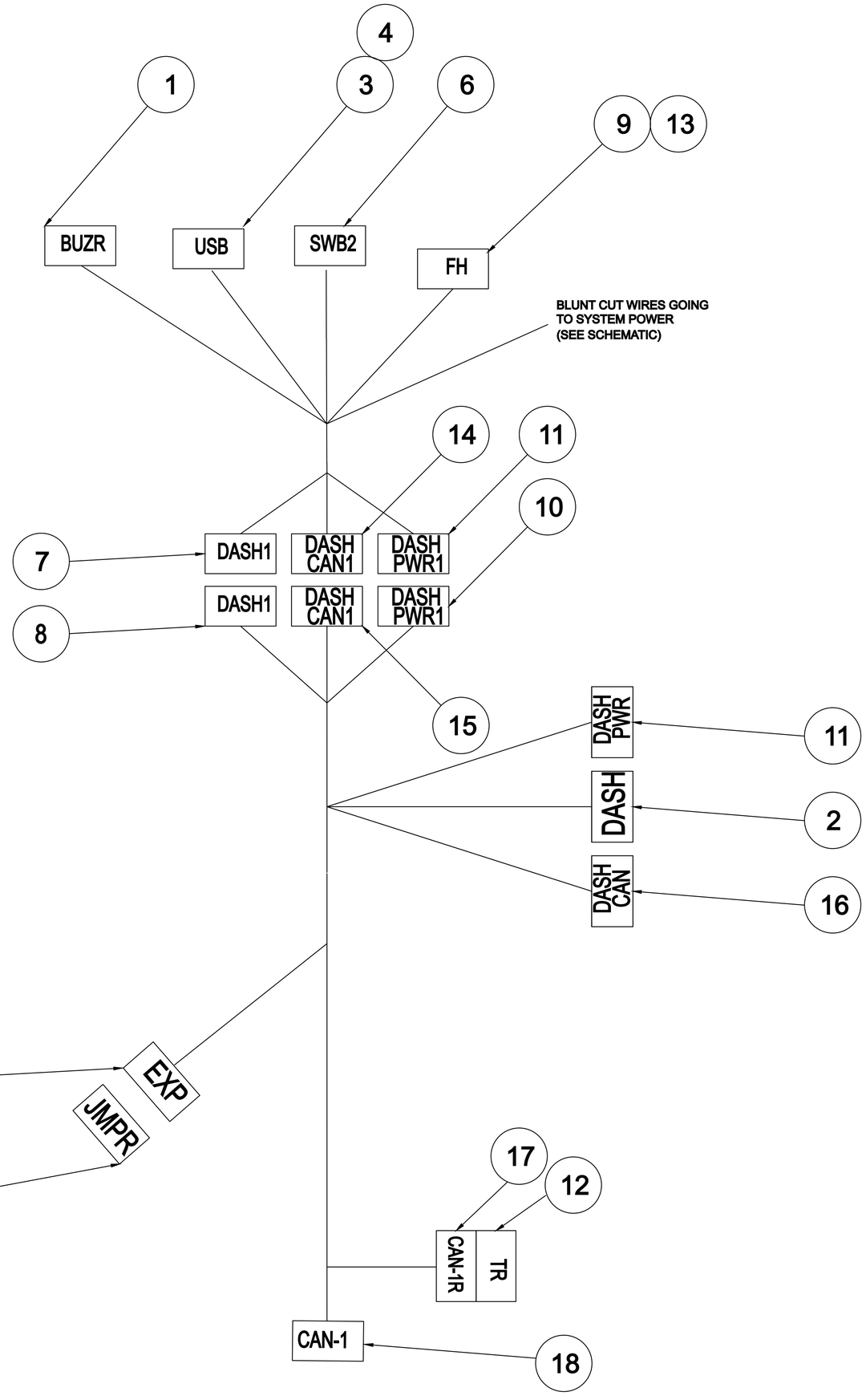


HARNESS, TAILGATE MIDDLE CLUSTER
263-1890-004
10/01/2021

REF.	PART No.	DESCRIPTION	QTY.
1	069-0032	ASSY, MICRO RELAY	2
2	108-2648	DIODE, SILICON RECTIFIER, 6 AMPS	4
3	108-4815-188	COMPRESSION BACKSHELL	1
4	108-4815-189	COMPRESSION NUT	1
5	108-4815-205	CONNECTOR, 14 POS PLUG (RP170 D-2)	1
6	108-4815-207	CONNECTOR, 31 POS PLUG (RP170 D-1)	1
7	108-4815-209	CONNECTOR, 8 POS PLUG (RP170 D-1A)	1
8	108-6461-128	CONNECTOR, 12 POS PLUG, GRAY	1
9	108-6461-203	CONNECTOR, 2 POS RECEPTACLE (RED)	2
10	108-6461-213	CONNECTOR, 2 POS PLUG (RED)	2
11	108-6461-301	CONNECTOR, 3 POS RECEPTACLE, BLACK	4
12	108-6461-311	CONNECTOR, 3 POS PLUG, BLACK	4
13	108-6461-401	CONNECTOR, 4 POS RECEPTACLE, BLACK	1
14	108-6461-411	CONNECTOR, 4 POS PLUG, BLACK	1
15	108-6461-601	CONNECTOR, 6 POS RECEPTACLE, BLACK	3
16	108-6461-611	CONNECTOR, 6 POS PLUG, BLACK	3
17	108-6461-801	CONNECTOR, 8 POS RECEPTACLE, GRAY	2
18	108-6461-811	CONNECTOR, 8 POS PLUG, GRAY	2
19	108-6461-J3P	CONNECTOR, 3 POS PLUG J1939	1
20	108-6461-JPW	CONNECTOR, 3 POS WEDGE J1939	1
21	108-8411-02P	DTP 2 WAY PLUG	1
22	108-8411-02R	DTP 2 WAY RECEPTACLE	1
23	108-8411-04P	DTP 4 WAY PLUG	1
24	108-8572-001	IFM 55 POS CONNECTOR	1
25	108-8588-200	ATM 2 PIN 120 OHM RESISTOR	2
26	AT04-08PA-SR2YL	CONNECTOR, 8 POS RECEPTACLE, YELLOW	1
27	AT06-08SA-SR2YL	CONNECTOR, 8 POS PLUG, YELLOW	2
28	AT04-4P-SR02BLU	AT 4 WAY RECEPTACLE, BLUE	1
29	AT04-4P-SR02BRN	AT 4 WAY RECEPTACLE, BROWN	1
30	AT06-4S-SR02BLU	AT 4 WAY PLUG, BLUE	1
31	AT06-4S-SR02BRN	AT 4 WAY PLUG, BROWN	1
32	AT06-6S-SR01BLK	AT 6 WAY PLUG, BLACK	1
33	AT06-6S-SR02GRY	AT 6 WAY PLUG, GRAY	1
34	AT06-6S-SR02YEL	CONNECTOR, 6 POS PLUG, YELLOW	1
35	ATM04-2P-SR01YL	ATM 2 WAY RECEPTACLE, YELLOW	4
36	ATM06-2S-SR01YL	ATM 2 WAY PLUG, YELLOW	2
37	ATM06-6S-SR01YL	ATM 6 WAY PLUG, YELLOW	1
38	ATP04-6P-MM01	DTP 6 WAY RECEPTACLE, GREY, END CAP	1
39	ATP06-6S-MM01	DTP 6 WAY PLUG, GREY, END CAP	2



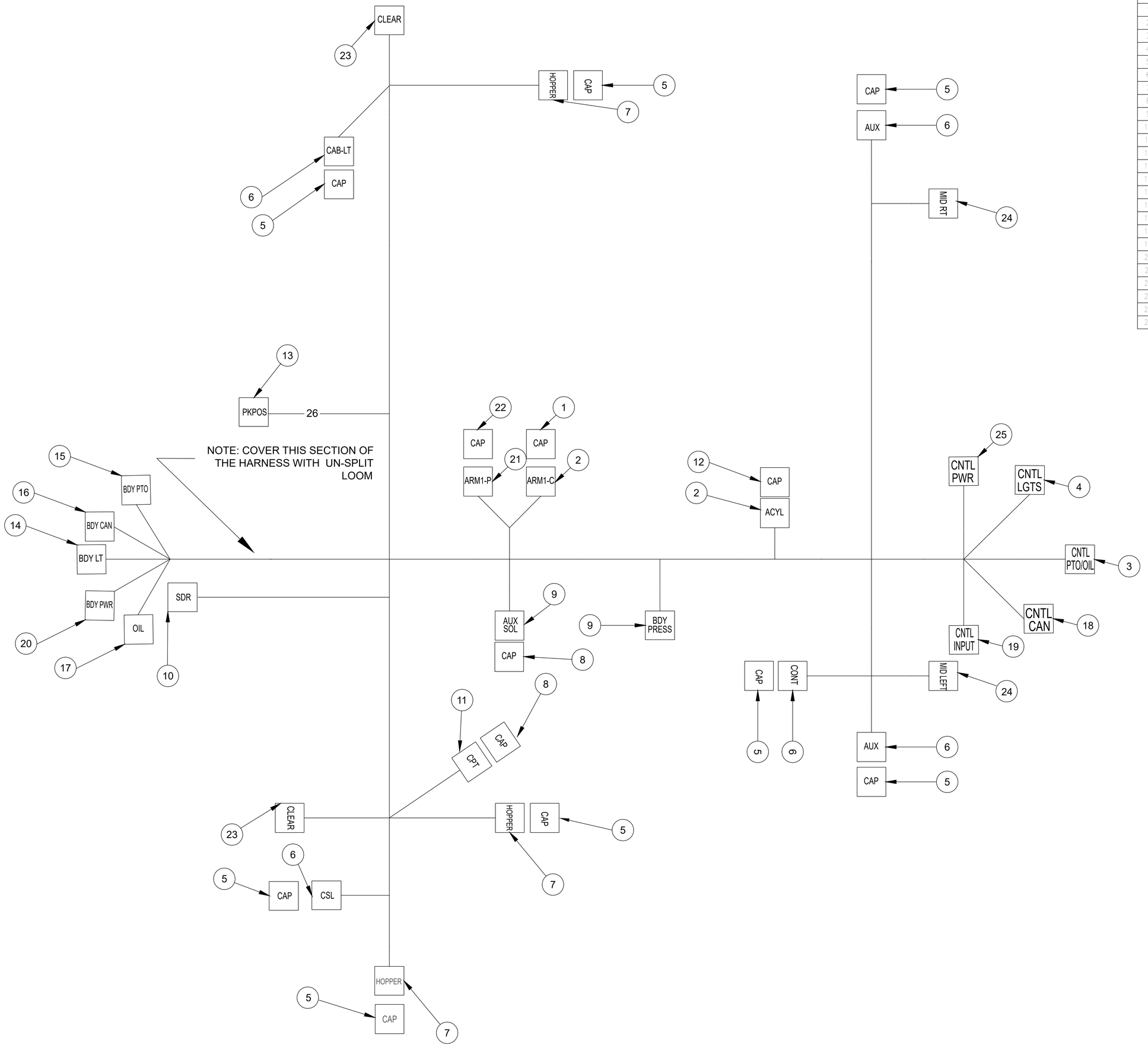
HARNESS, CAB TO BODY, 2021 HP REFRESH, ECONIC
263-1907-006
02/26/2021



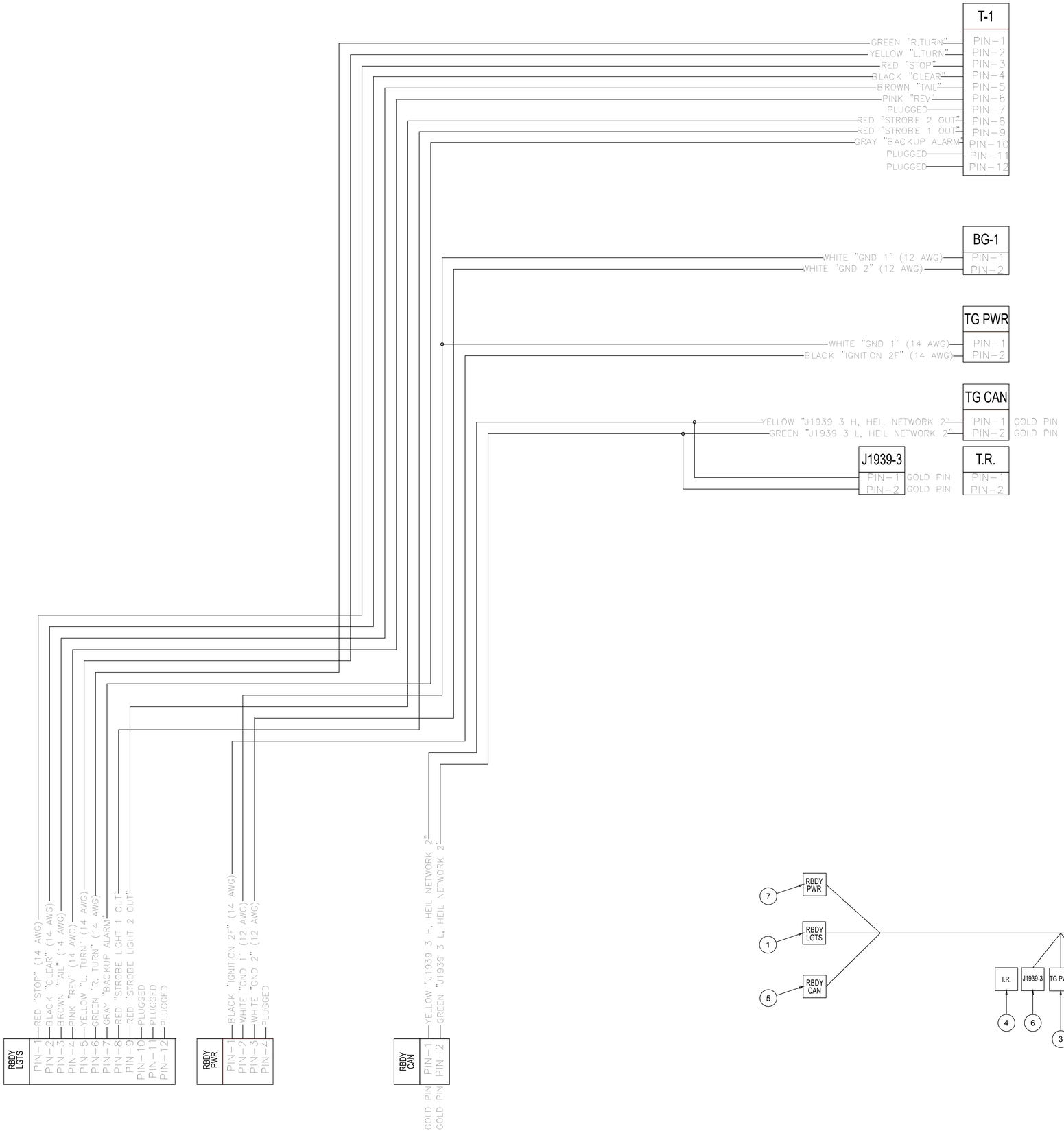
REF.	PART No.	DESCRIPTION	QTY.
1	108-4827-006	3-WAY PACKARD FEMALE	1
2	108-6461-127	CONNECTOR, 12-WAY RECEPTACLE, GRAY	1
3	108-6461-201	CONNECTOR, 2-WAY RECEPTACLE	1
4	108-6461-211	CONNECTOR, 2-WAY PLUG	1
5	108-6461-401	CONNECTOR, 4 POS, RECEPT	1
6	108-6461-411	CONNECTOR, 4 POS, PLUG, BLACK	2
7	108-6461-801	CONNECTOR, 8 POS, RECEPT, GRAY	1
8	108-6461-811	CONNECTOR, 8 POS, PLUG, GRAY	1
9	108-7112-015	FUSE 15 AMP MINI BLADE	4
10	108-8411-04P	CONNECTOR, 4-WAY PLUG	1
11	108-8411-04R	CONNECTOR, 4-WAY RECEPTACLE	2
12	108-8588-200	120 OHM TERMINATING RESISTOR	1
13	108-8610	BUSSMANN MINI FUSE HOLDER	1
14	AT04-4P-SR02YEL	CONNECTOR, 4-WAY RECEPTACLE, YELLOW	1
15	AT06-4S-SR02YEL	CONNECTOR, 4-WAY PLUG, YELLOW	1
16	AT04-6P-SR02YEL	CONNECTOR, 6-WAY RECEPTACLE, YELLOW	1
17	ATM04-2P-SR01YL	CONNECTOR, DTM 2 WAY RECEPT., YELLOW	1
18	DT04-4P-CL03	CONNECTOR, 4 POS, RECEPT, FLANGE	1

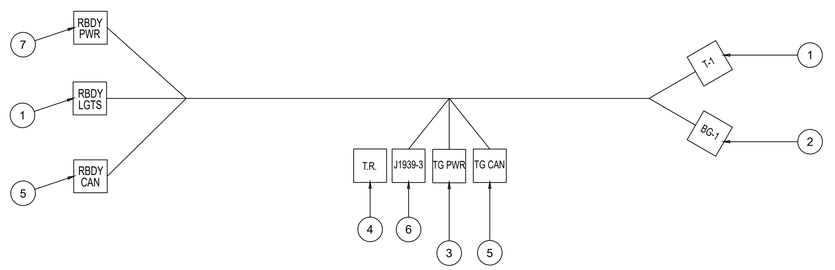
HARNESS, IN CAB CONTROLS 2021 HP REFRESH, ECONIC
263-1907-007
02/26/2021

REF.	PART No.	DESCRIPTION	QTY.
1	108-6461-131	CONNECTOR, 4 WAY RECEPTACLE-YELLOW	1
2	108-6461-132	CONNECTOR, 4 WAY PLUG-YELLOW	2
3	108-6461-133	CONNECTOR, 12 POS PLUG (B KEY), BLACK	1
4	108-6461-134	CONNECTOR, 12 WAY PLUG-GRAY	1
5	108-6461-201	CONNECTOR, 2 WAY RECEPTACLE-BLACK	8
6	108-6461-211	CONNECTOR, 2 WAY PLUG-BLACK	5
7	108-6461-213	AT 2-WAY PLUG-RED	3
8	108-6461-301	CONNECTOR, 3-WAY, RECEPTACLE-BLACK	2
9	108-6461-311	CONNECTOR, 3 WAY PLUG-BLACK	2
10	108-6461-313	CONNECTOR, 3-WAY, PLUG, RED	1
11	108-6461-317	CONNECTOR, 3-WAY, PLUG, GRAY	1
12	108-6461-401	CONNECTOR, 4-WAY, RECEPTACLE-BLACK	1
13	108-6461-411	CONNECTOR, 4-WAY, PLUG	1
14	108-6461-623	CONNECTOR, 6 WAY PM REC-BLACK	1
15	108-6461-624	CONNECTOR, 6 WAY PM REC-GRAY	1
16	108-6461-823	CONNECTOR, 8 WAY PM REC-YELLOW	1
17	108-6461-825	CONNECTOR, 12 WAY PM REC-GRAY	1
18	108-6461-835	CONNECTOR, 8 WAY PLUG-YELLOW	1
19	108-6461-836	CONNECTOR, 12 WAY PLUG-GREEN	1
20	108-8411-009	CONNECTOR, 6 POS RECEPTACLE, PANEL MOUNT	1
21	108-8411-12P	CONNECTOR, 2-WAY PLUG STRAIN RELIEF, BLACK	1
22	108-8411-12R	CONNECTOR, 2-WAY RECEPTACLE STRAIN RELIEF, BLK	1
23	108-8493-002	CONNECTOR, 2-WAY, PLUG	2
24	108-8493-003	CONNECTOR, 3-WAY, PLUG	2
25	HDP26-18-8SE-L017	CONNECTOR, HDP 8 POS PLUG	1



HARNESS, BODY FRONT 2021 HP REFRESH
263-1908-001
10/04/2021

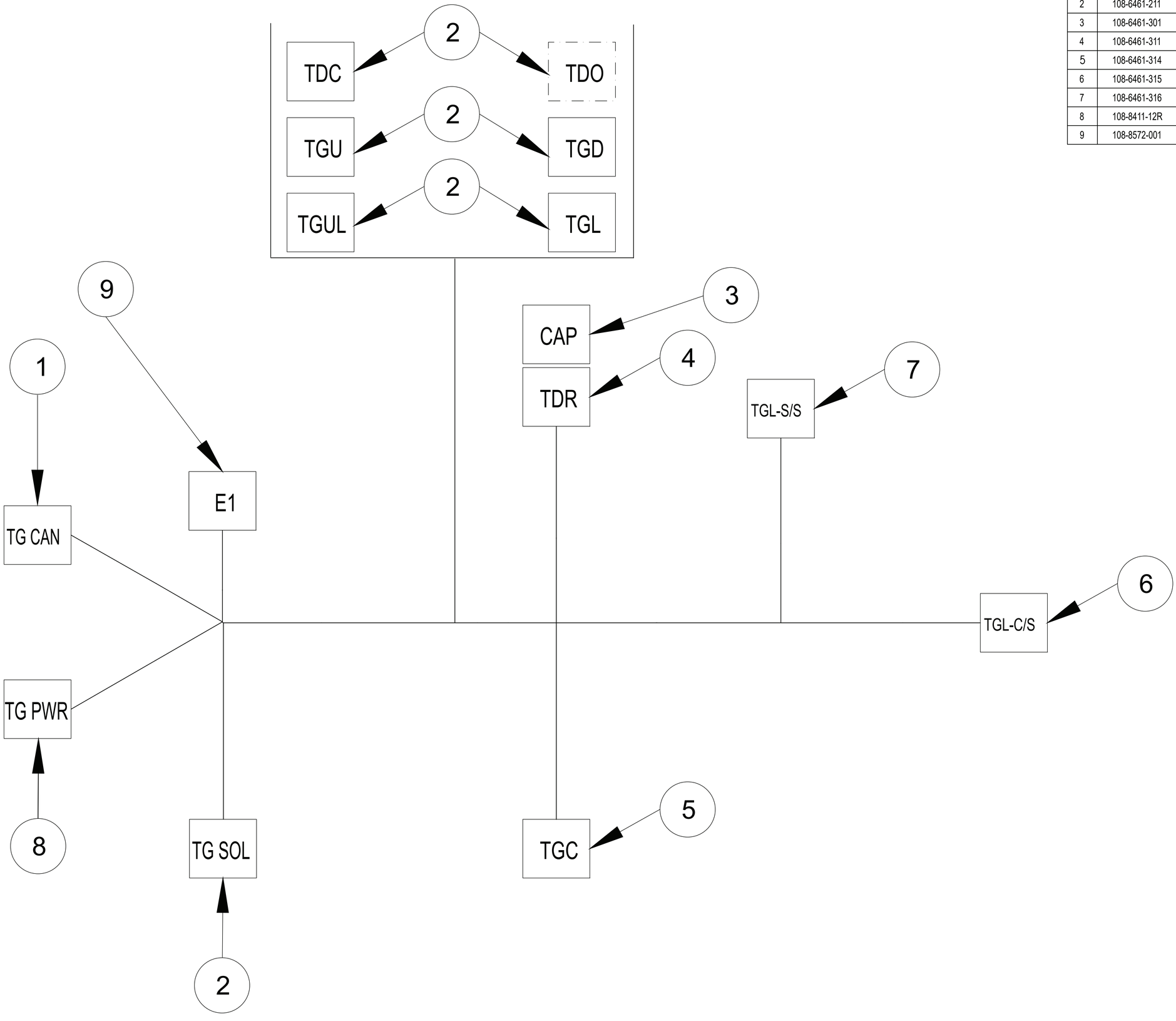




REF.	PART No.	DESCRIPTION	QTY.
1	108-6461-009	CONNECTOR, 12-WAY, PLUG	2
2	108-8411-001	CONNECTOR, 2-WAY, RECEPTACLE	1
3	108-8411-002	CONNECTOR, 2-WAY, PLUG	1
4	108-8588-200	120 OHM TERMINATING RESISTOR	1
5	AT06-2S-SR02YL	CONNECTOR, 2-WAY, PLUG, YELLOW	2
6	ATM04-2P-SR01YL	CONNECTOR, 2-WAY, RECEPTACLE, YELLOW	2
7	ATP06-4S-RD01	CONNECTOR, ATP 4-WAY, RECEPTACLE	1

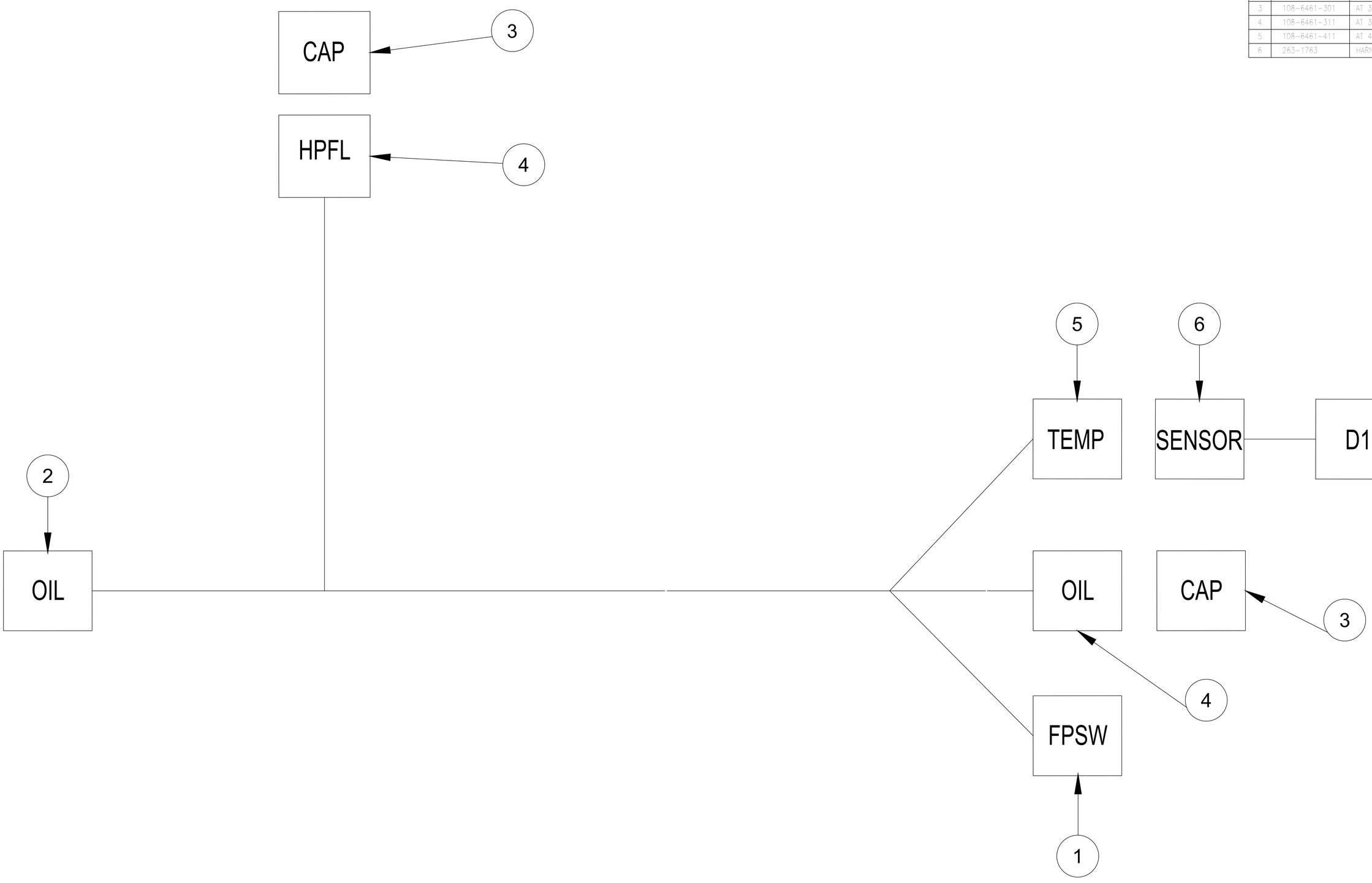
SCHEMATIC, BODY REAR
263-1908-003
11/18/2020

REF.	PART No.	DESCRIPTION	QTY.
1	108-6461-204	CONNECTOR, 2-WAY RECEPTACLE, YELLOW	1
2	108-6461-211	CONNECTOR, 2 WAY PLUG	7
3	108-6461-301	CONNECTOR, 3-WAY RECEPTACLE	1
4	108-6461-311	CONNECTOR, 3-WAY PLUG	1
5	108-6461-314	CONNECTOR, 3-WAY PLUG, YELLOW	1
6	108-6461-315	CONNECTOR, 3-WAY PLUG, GREEN	1
7	108-6461-316	CONNECTOR, 3 WAY PLUG, BLUE	1
8	108-8411-12R	CONNECTOR. 2-WAY RECEPTACLE, BLACK	1
9	108-8572-001	IFM 55 POS CONNECTOR	1



HARNESS, T/G NODE VALVE 2021 HP REFRESH
263-1908-010
06/14/2022

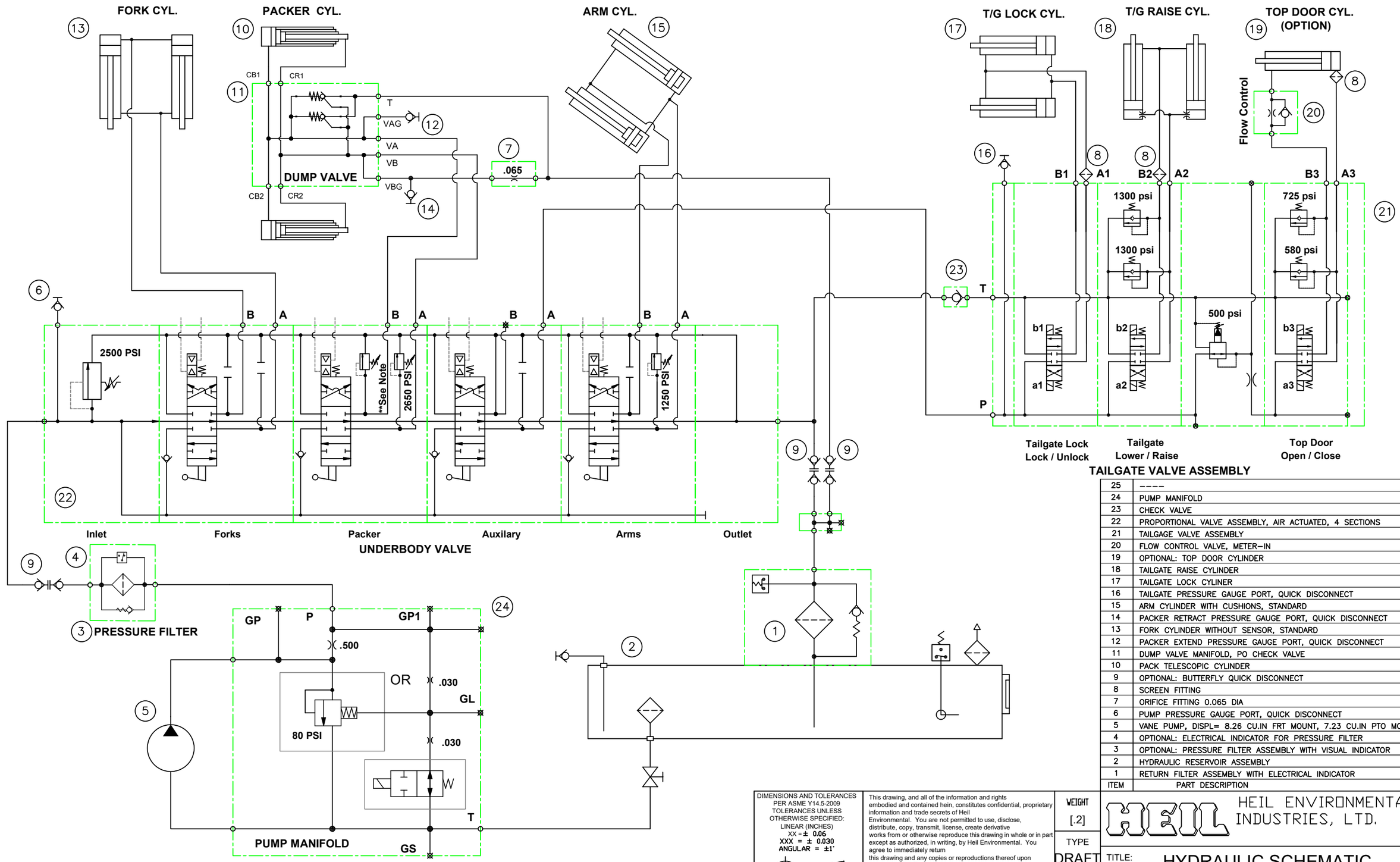
REF.	PART No.	DESCRIPTION	QTY.
1	108-4827-006	PACKARD 3 WAY FEMALE	1
2	108-6461-134	CONNECTOR, 12 WAY PLUG-GRAY	1
3	108-6461-301	AT 3 WAY RECEPTACLE-BLACK	2
4	108-6461-311	AT 3 WAY PLUG-BLACK	2
5	108-6461-411	AT 4 WAY PLUG-BLACK	1
6	263-1763	HARNESS, SENSOR PIGTAIL	1



HARNESS, OIL TANK 2021 HP REFRESH
263-1908-011
10/05/2021

INTENTIONALLY LEFT BLANK

HYDRAULIC SCHEMATICS



TAILGATE VALVE ASSEMBLY

ITEM	PART DESCRIPTION
25	----
24	PUMP MANIFOLD
23	CHECK VALVE
22	PROPORTIONAL VALVE ASSEMBLY, AIR ACTUATED, 4 SECTIONS
21	TAILGAGE VALVE ASSEMBLY
20	FLOW CONTROL VALVE, METER-IN
19	OPTIONAL: TOP DOOR CYLINDER
18	TAILGATE RAISE CYLINDER
17	TAILGATE LOCK CYLINER
16	TAILGATE PRESSURE GAUGE PORT, QUICK DISCONNECT
15	ARM CYLINDER WITH CUSHIONS, STANDARD
14	PACKER RETRACT PRESSURE GAUGE PORT, QUICK DISCONNECT
13	FORK CYLINDER WITHOUT SENSOR, STANDARD
12	PACKER EXTEND PRESSURE GAUGE PORT, QUICK DISCONNECT
11	DUMP VALVE MANIFOLD, PO CHECK VALVE
10	PACK TELESCOPIC CYLINDER
9	OPTIONAL: BUTTERFLY QUICK DISCONNECT
8	SCREEN FITTING
7	ORIFICE FITTING 0.065 DIA
6	PUMP PRESSURE GAUGE PORT, QUICK DISCONNECT
5	VANE PUMP, DISPL= 8.26 CU.IN FRT MOUNT, 7.23 CU.IN PTO MOUNT
4	OPTIONAL: ELECTRICAL INDICATOR FOR PRESSURE FILTER
3	OPTIONAL: PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

Note Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body**

REV.	WAS	DATE	ECO
C	FULL SCHEMATIC UPDATE	03/04/2022	-
B	UN-OFFICIAL UPDATE	2016	-
A	see ECO	03/11/13	HP13042
-	RELEASED	02/15/12	HP12197

DIMENSIONS AND TOLERANCES PER ASME Y14.5-2009
TOLERANCES UNLESS OTHERWISE SPECIFIED:
LINEAR (INCHES)
XX = ± 0.05
XXX = ± 0.030
ANGULAR = ±1°

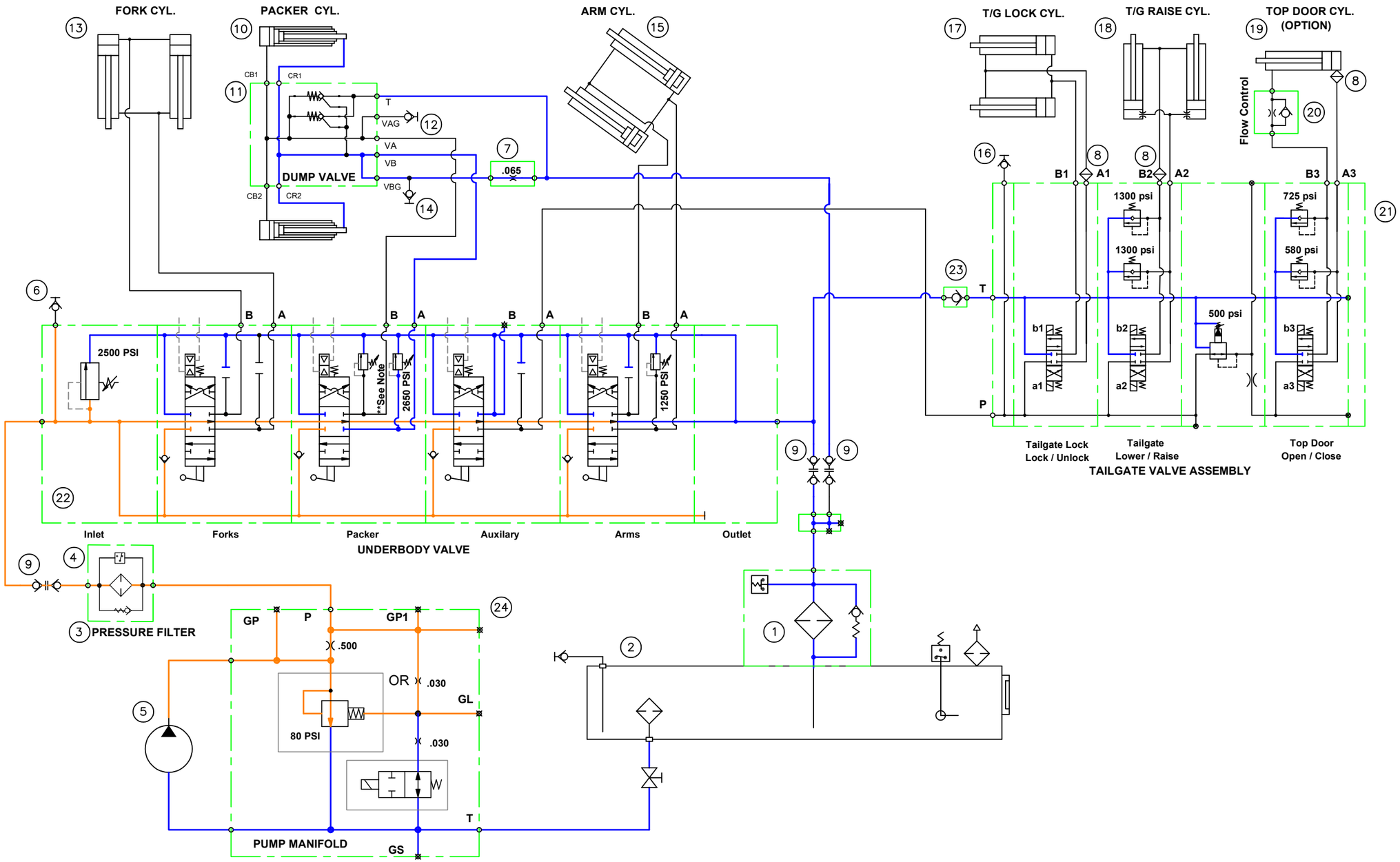
WEIGHT [.2]
TYPE DRAFT
DATE: Feb. 28, 2022
SCALE: N/A
MATERIAL:

HEIL ENVIRONMENTAL INDUSTRIES, LTD.

TITLE: HYDRAULIC SCHEMATIC
2022 Standard HalfPack

DRAWN BY: EW
PART No. 701-7095

PUMP OFF



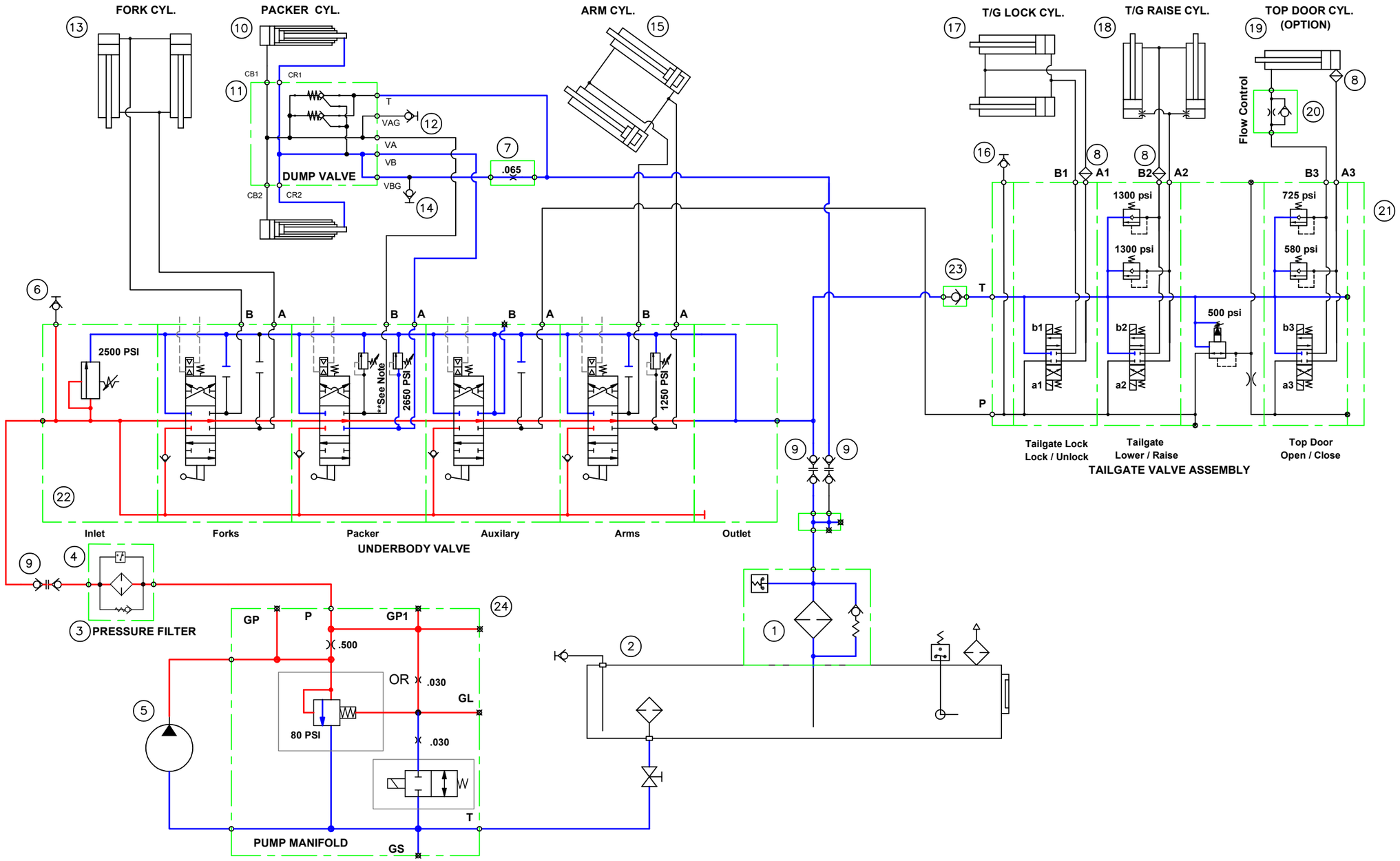
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

PUMP ON



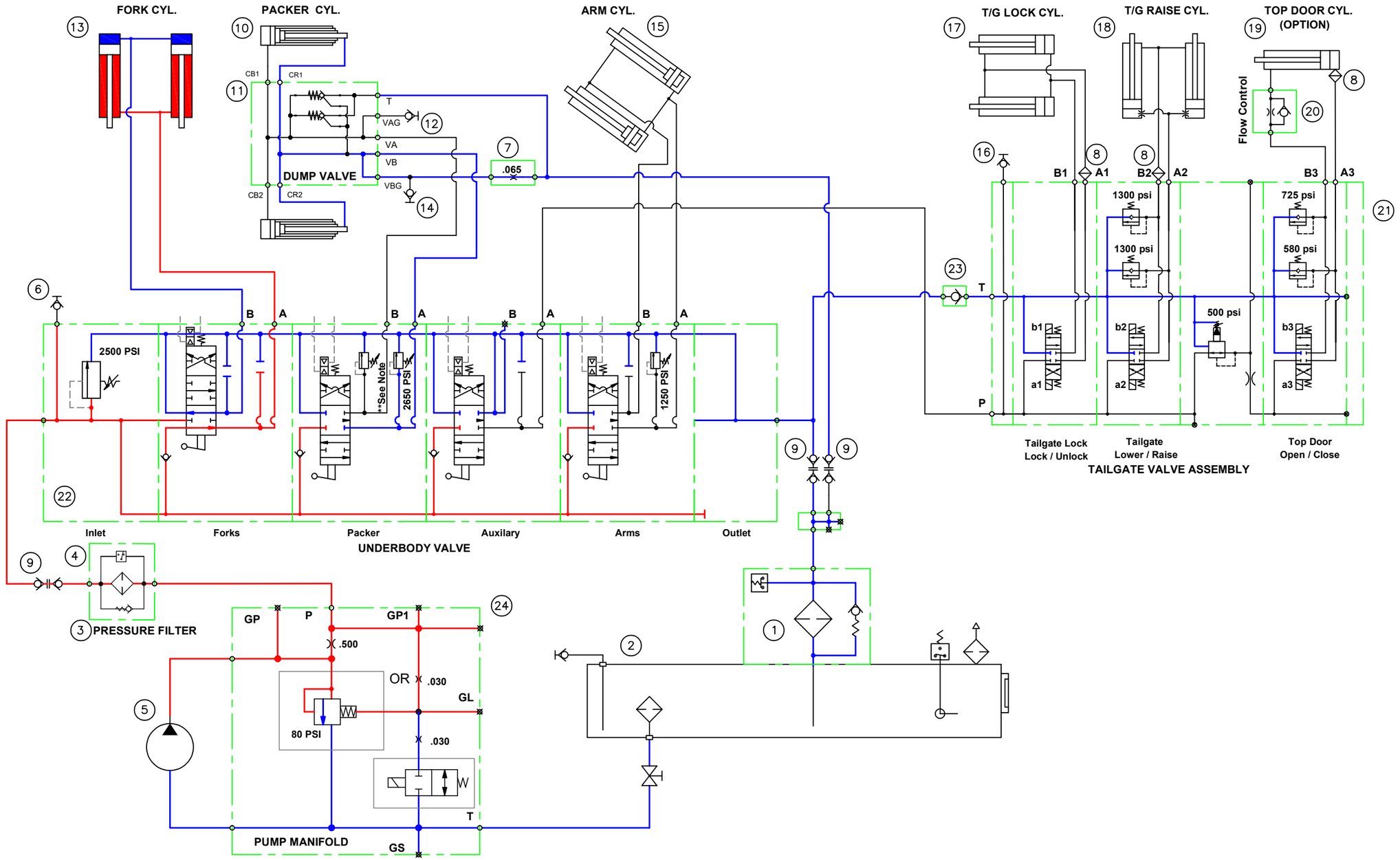
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

FORKS RAISE



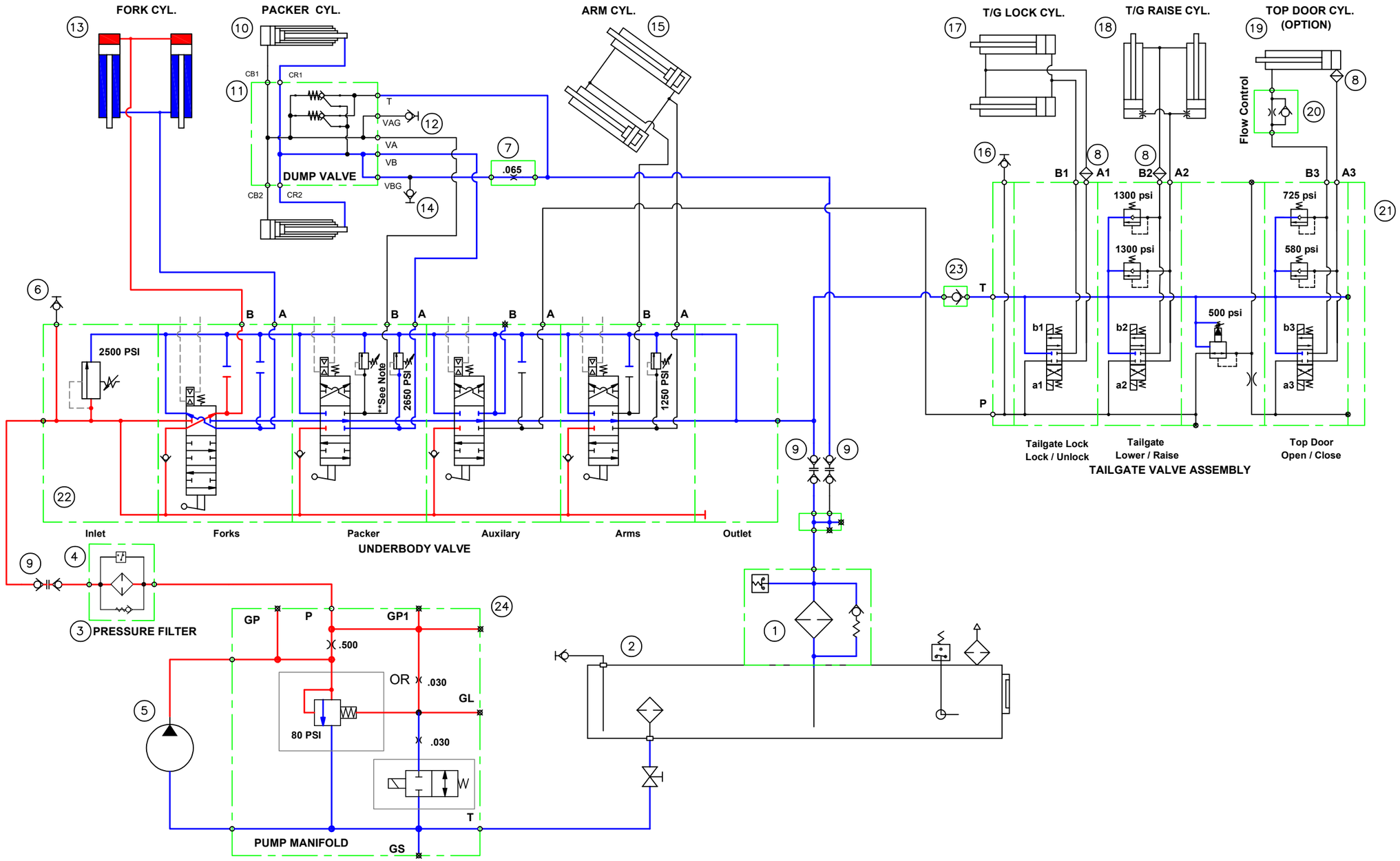
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

FORKS DOWN



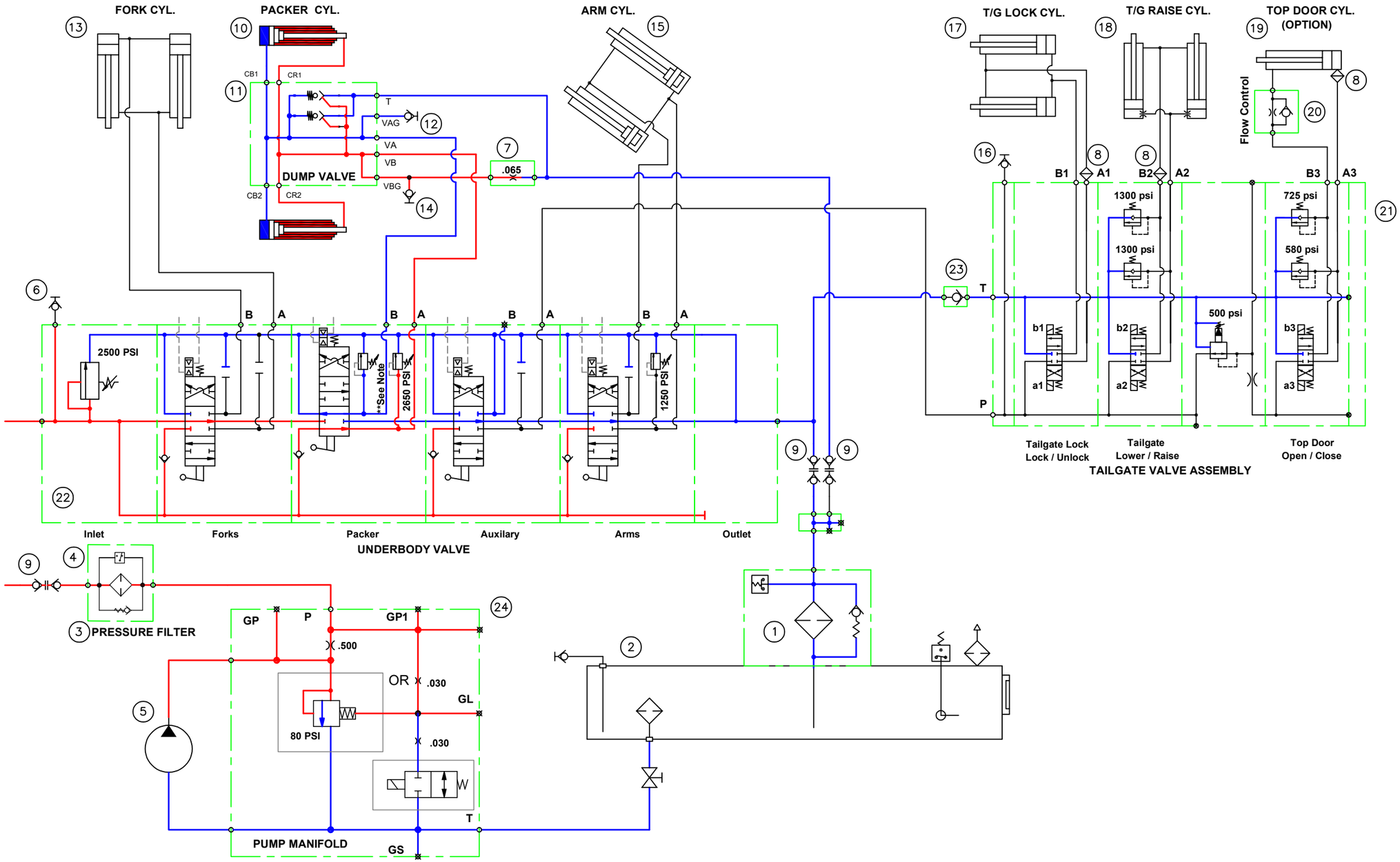
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

PACKER RETRACT



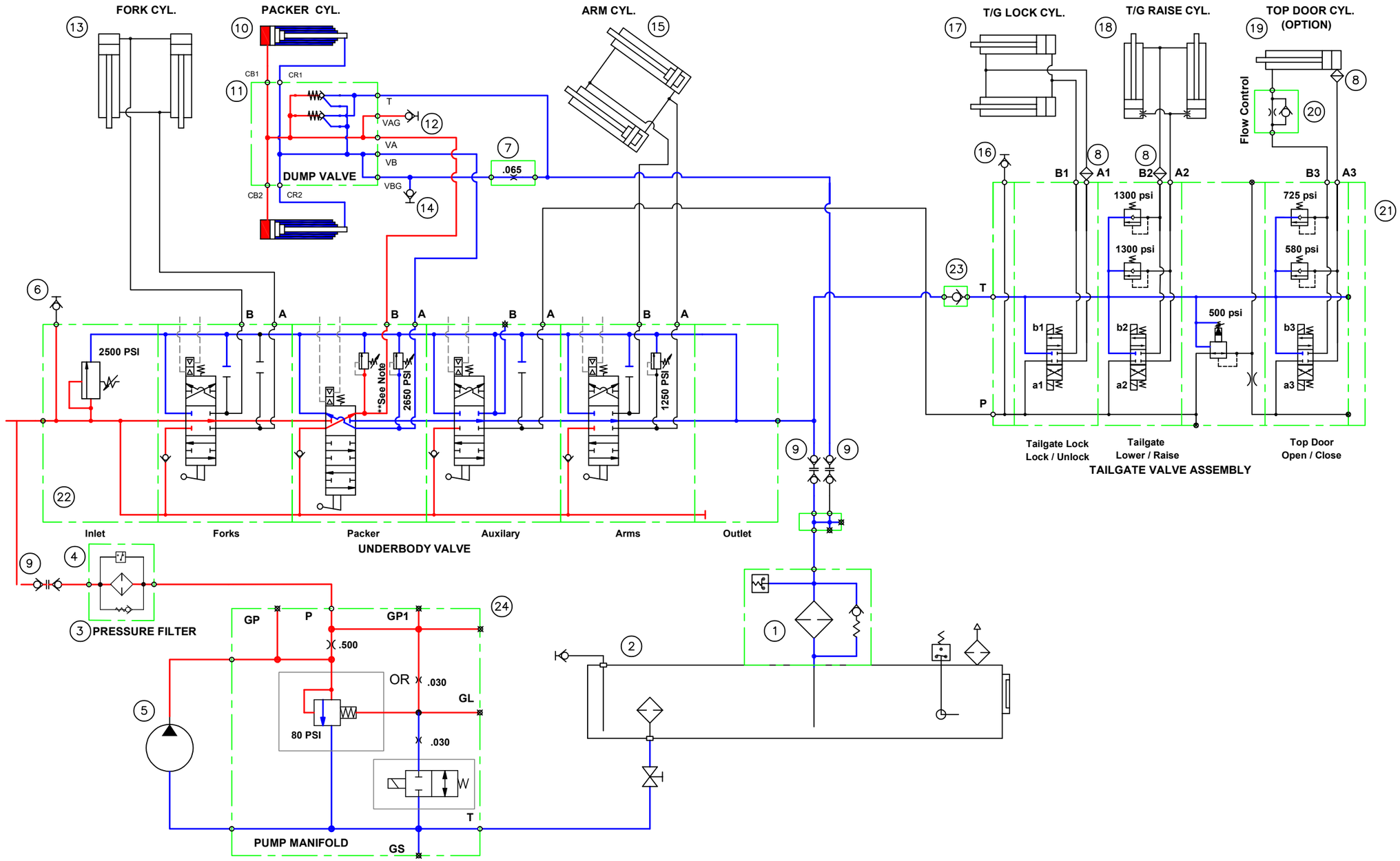
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

PACKER EXTEND



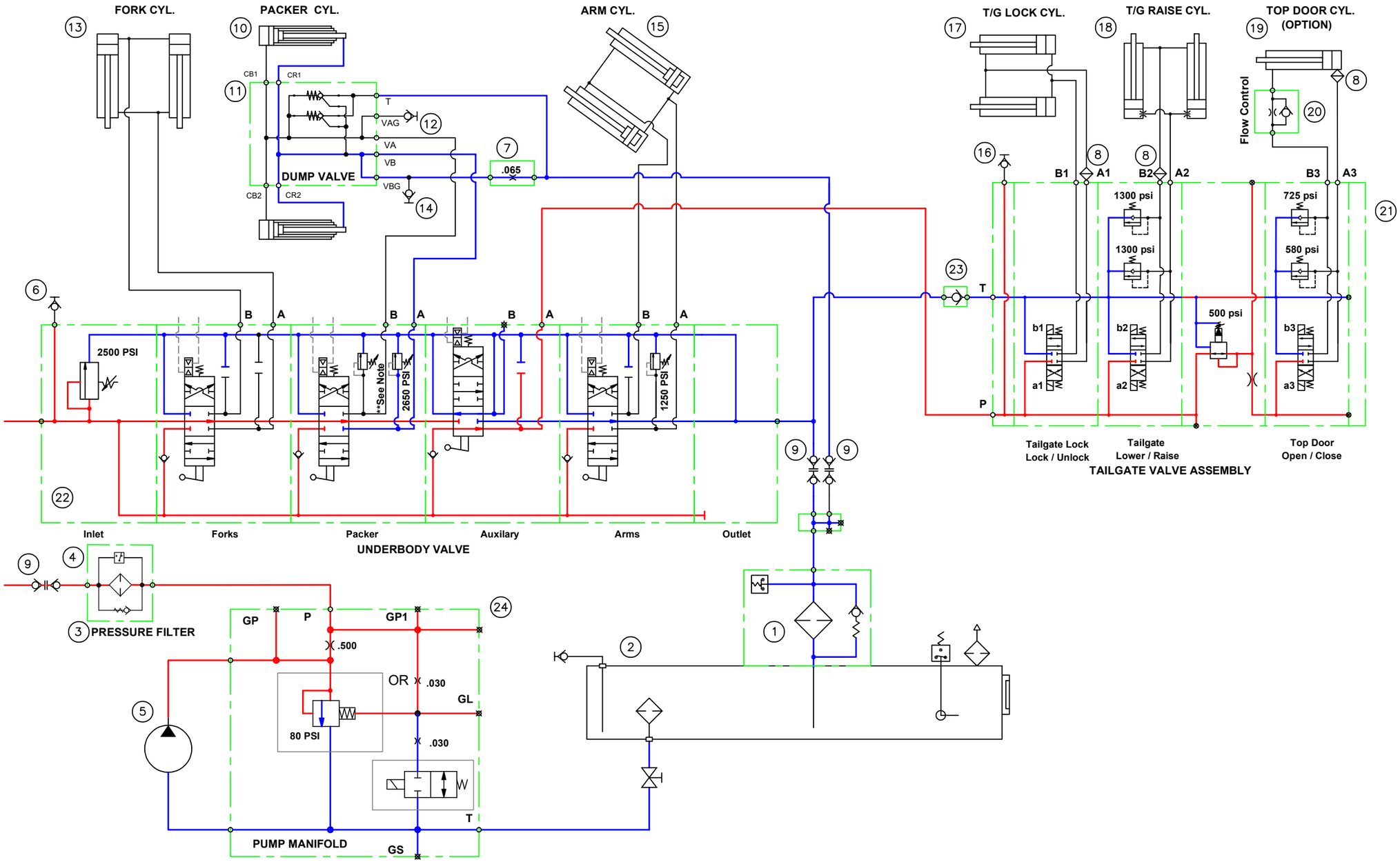
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

AUXILIARY SECTION



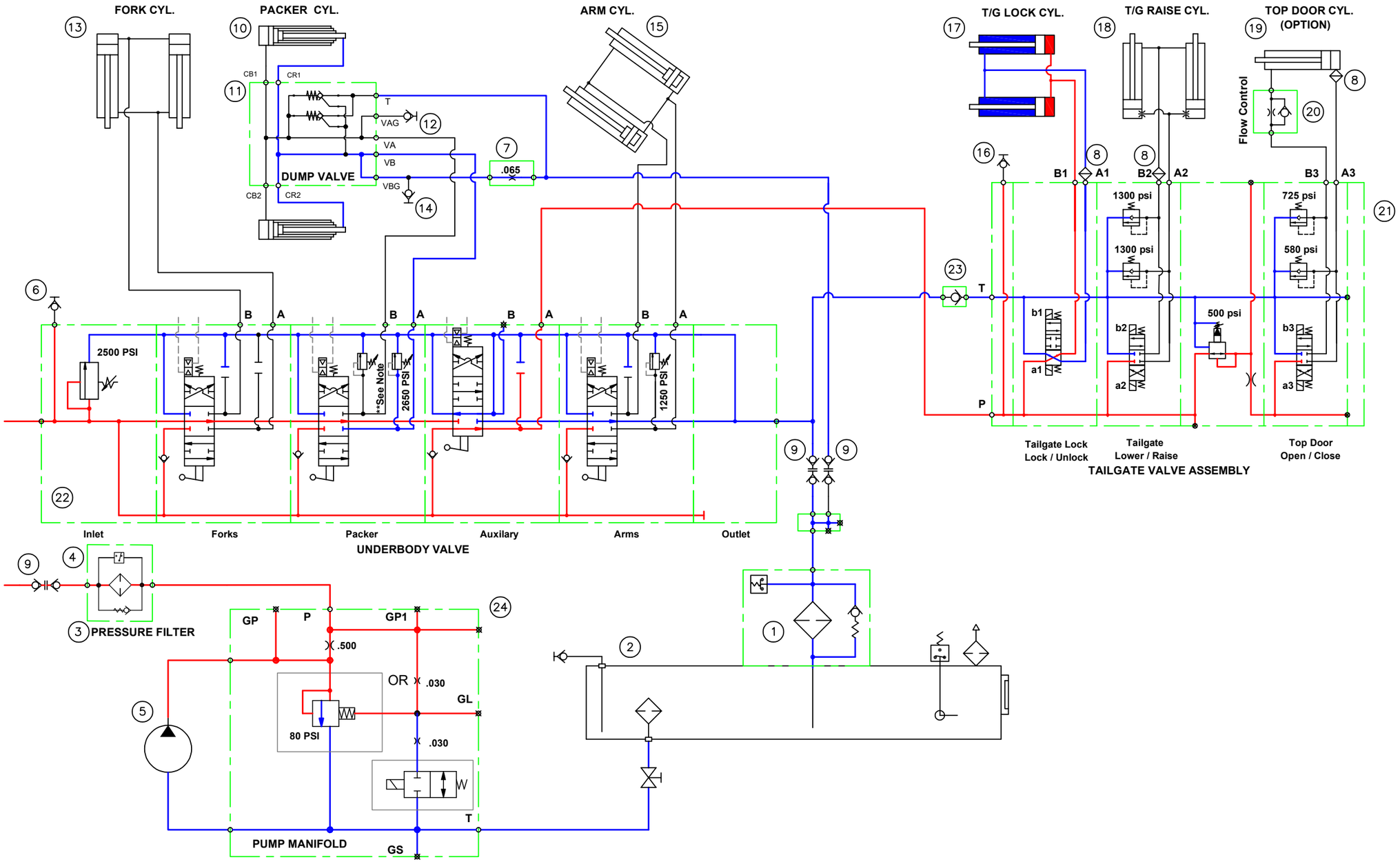
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

TG LOCK



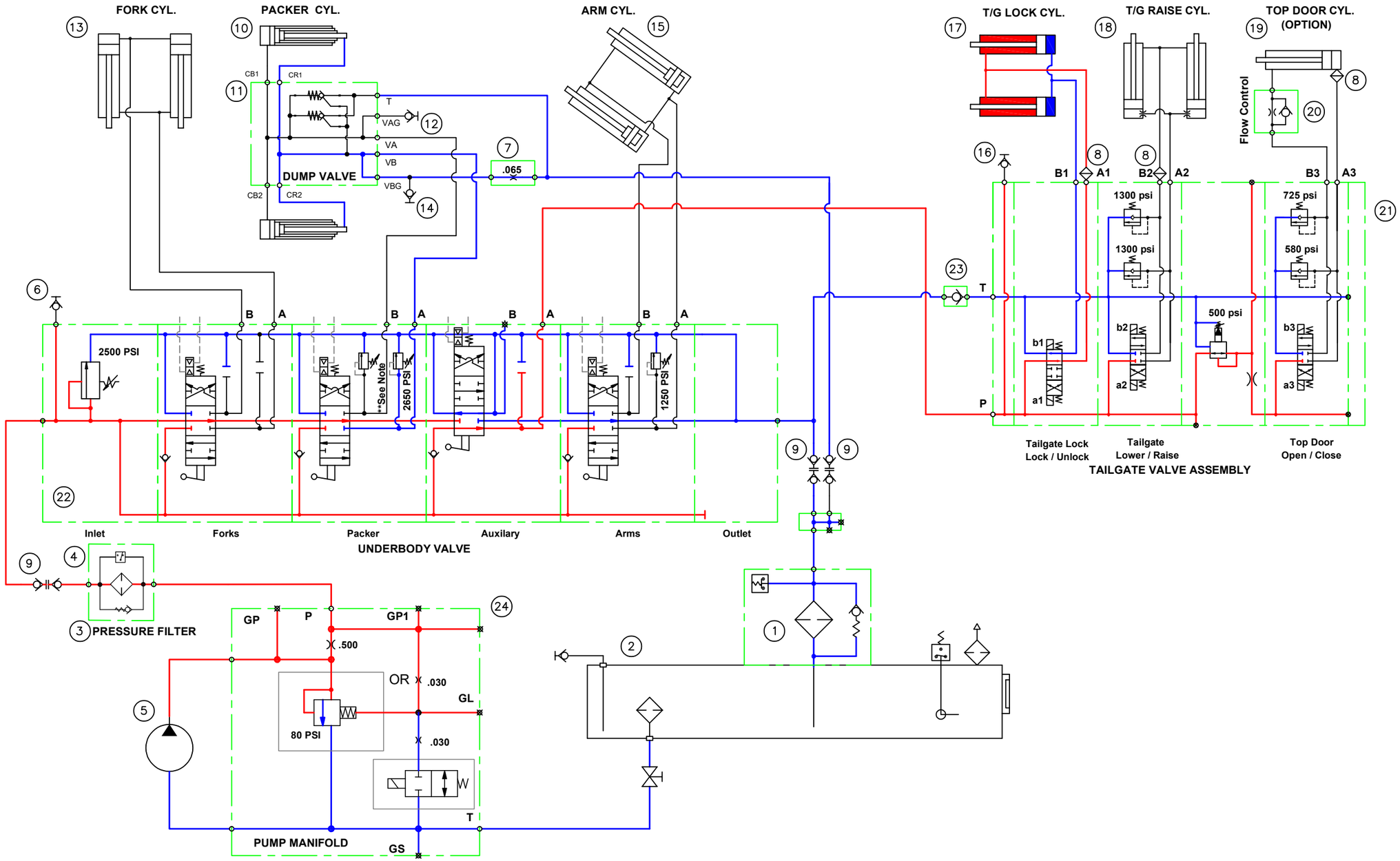
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

TG UNLOCK



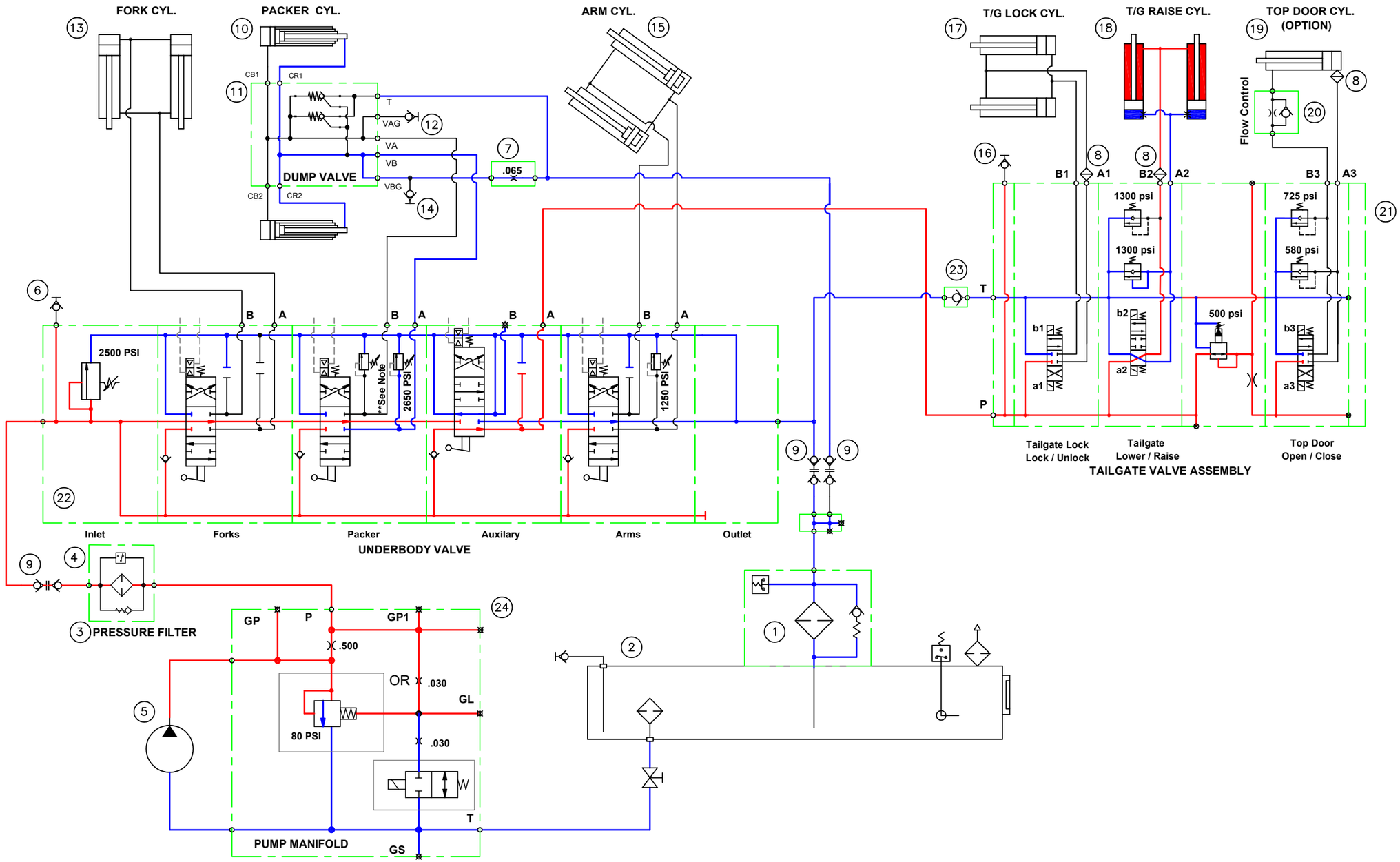
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

TG LOWER



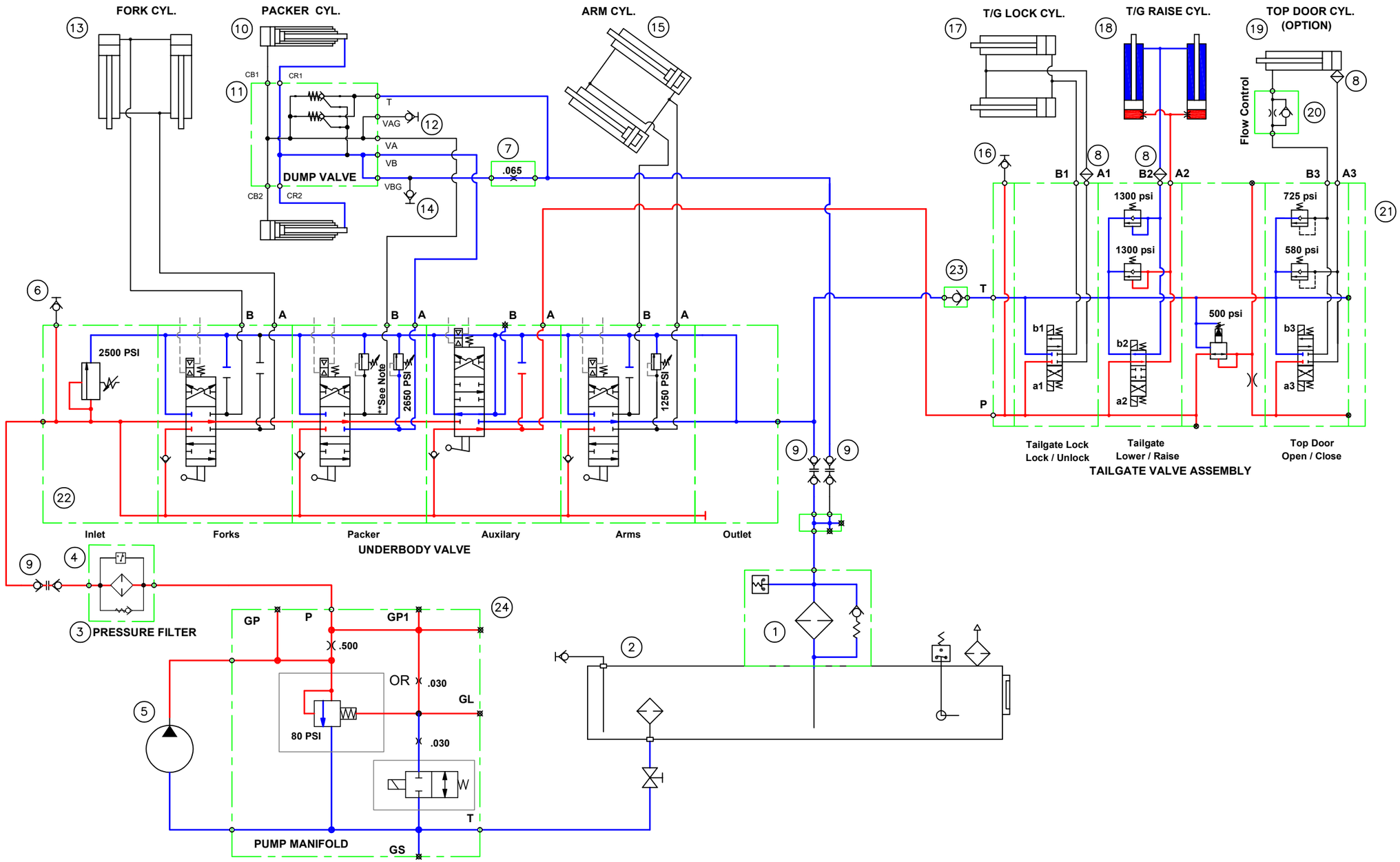
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

TG RAISE



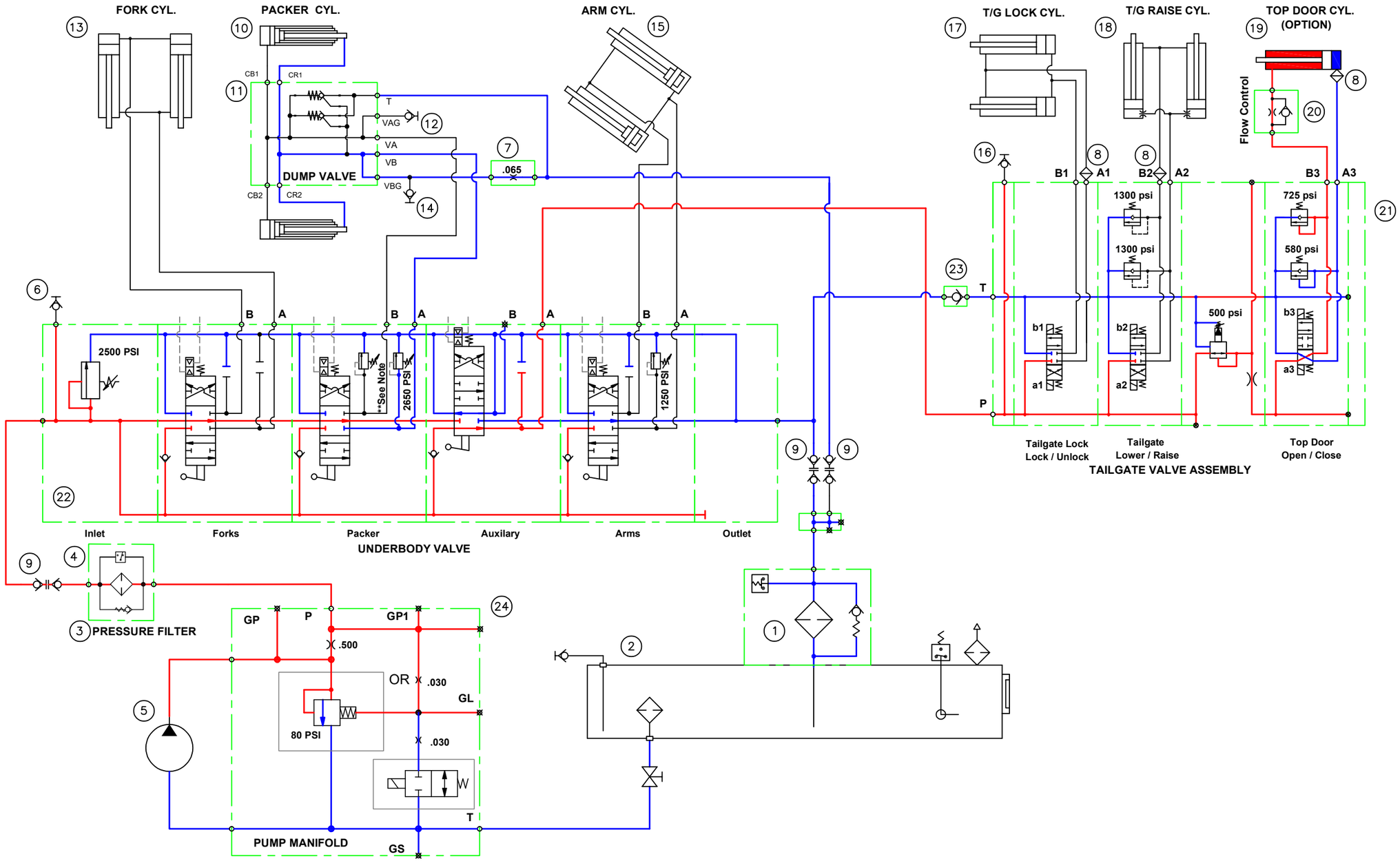
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

TOP DOOR OPEN



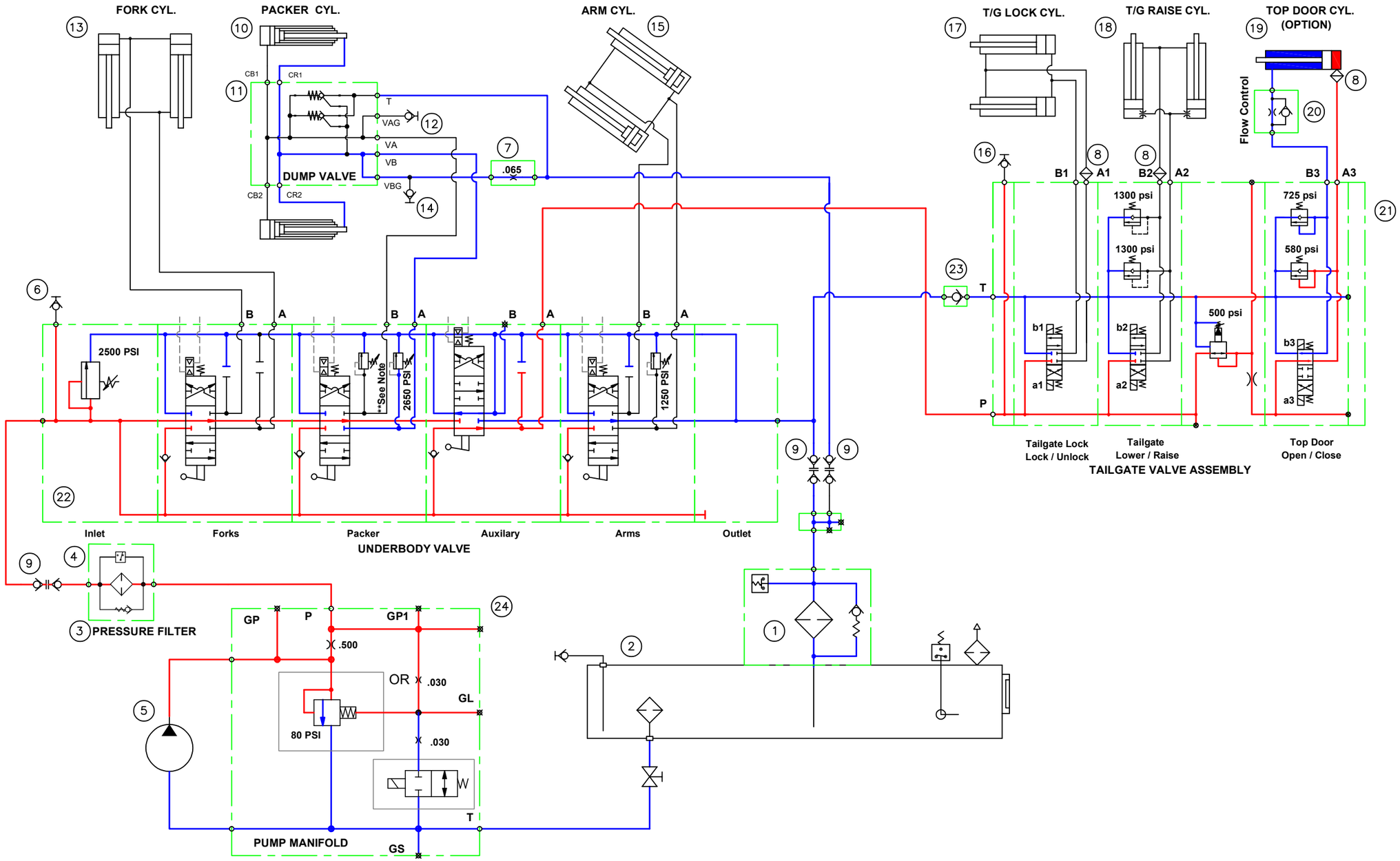
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

TOP DOOR CLOSE



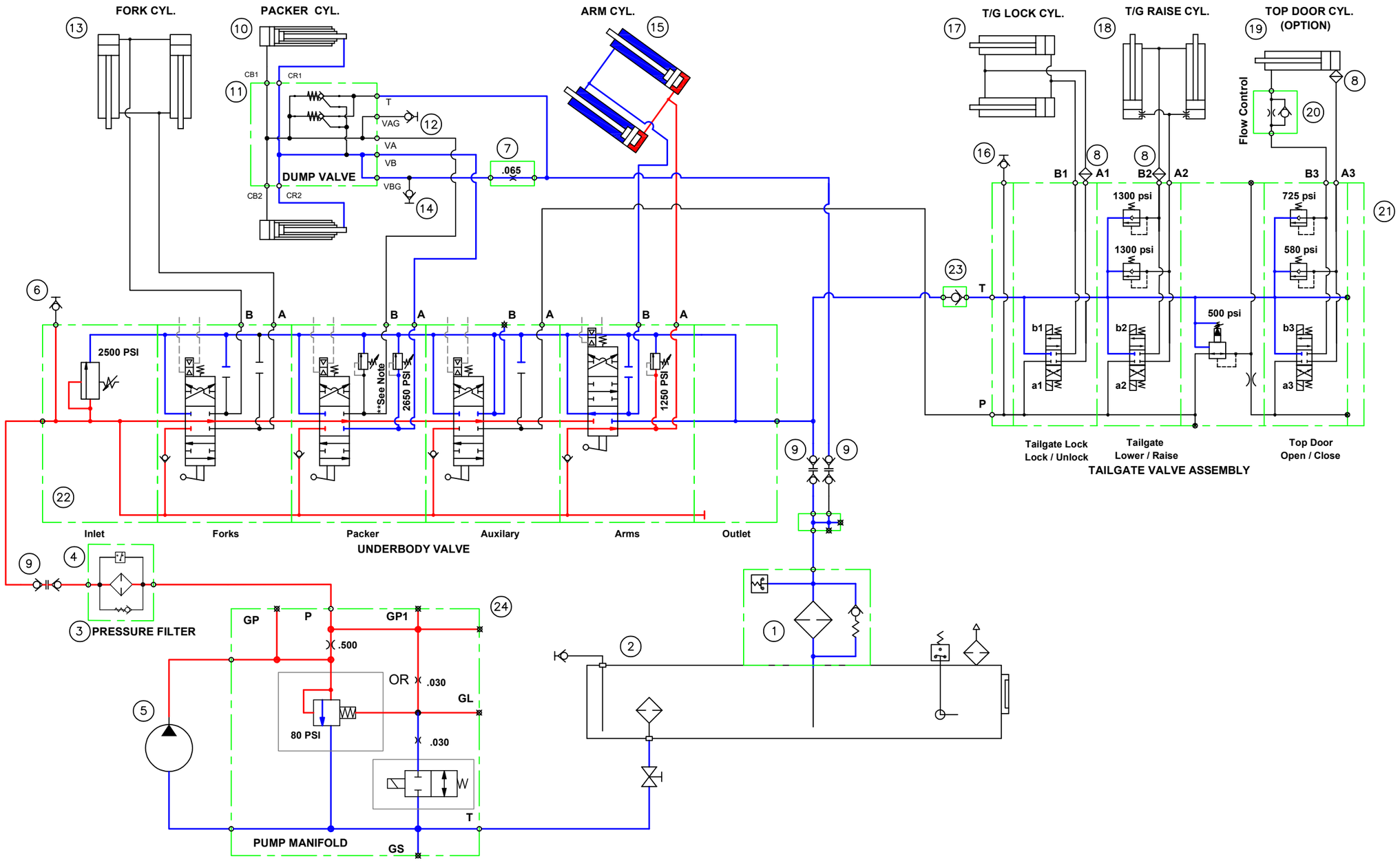
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

ARMS LOWER



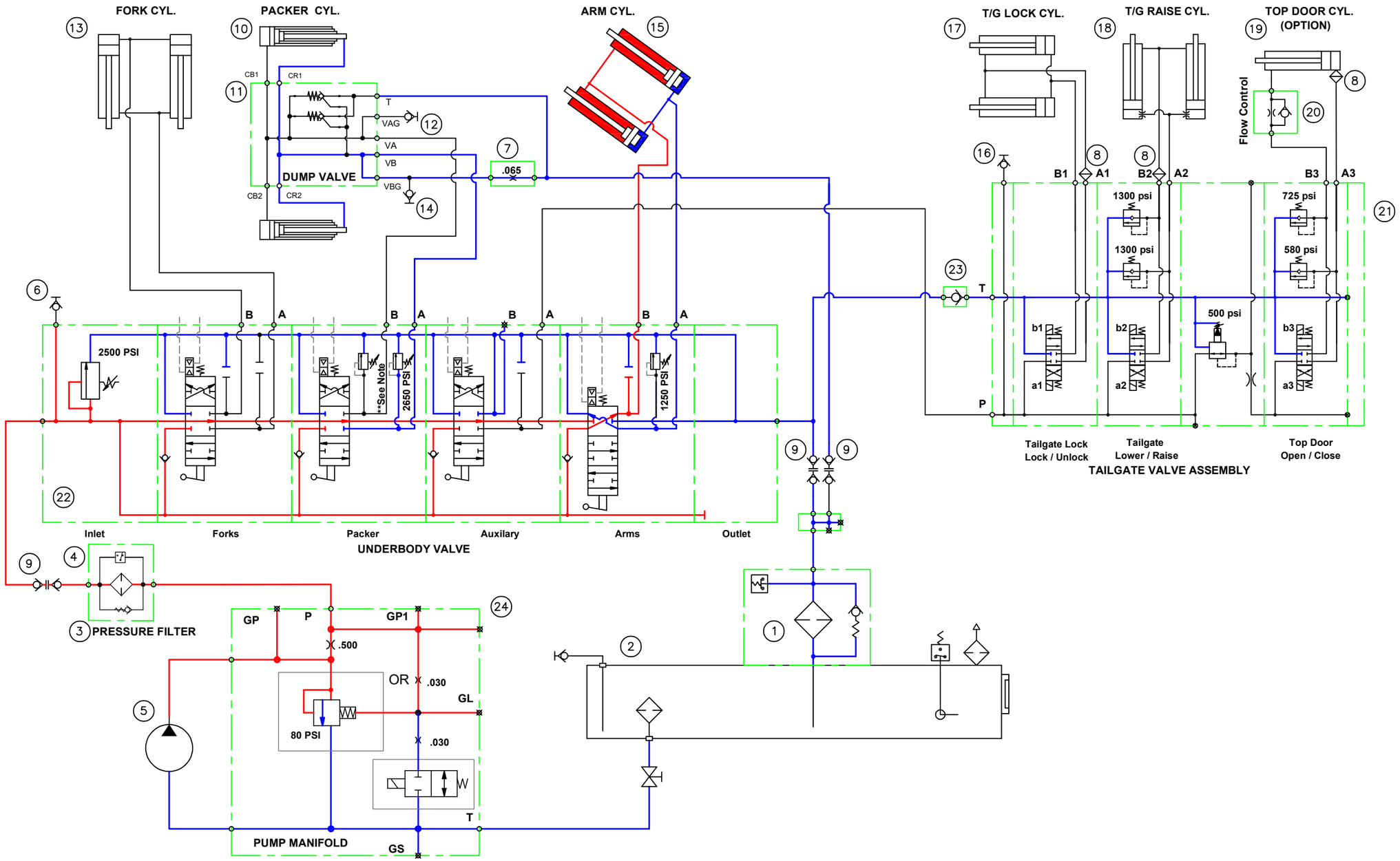
Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

ARMS RAISE



Note** Packer pressure = 2000 PSI for Lightweight body, 2650 PSI for Standard body

High pressure / High flow

Return pressure / Return flow

Low pressure / Partial flow

HALF/PACK
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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 dealer-supplied 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

WE NEVER STOP WORKING FOR YOU

www.heil.com

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(866-275-4345)

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