DuraPack[®] 4060

SPLIT-BODY REAR LOADER

SERVICE MANUAL ISSUED SEPTEMBER 2017



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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

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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DuraPack® 4060 NOTES

SECTION 1 GENERAL INFORMATION

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 give prompt, professional assistance.

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

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

PRECAUTIONARY STATEMENTS

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

- **DANGER** indicates a hazardous situation, which if not avoided WILL result in 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 Parts and 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.

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.

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

A 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.

A 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.

A 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.

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.

A 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 the Lock-Out/Tag-Out mode if it is necessary to enter the hopper area.

A 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.

A 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.

A 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.

A 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..

Make sure the unit is in the Lock-Out/Tag-Out mode when you do maintenance or service procedures, or when you go in the hopper, climb in or on the body or on equipment. Equipment can be operated when the unit is not in the Lock-Out/Tag-Out mode. When the unit is not in the Lock-Out/Tag-Out 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.

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.

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.

A 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.

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.

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

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.

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.

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.

A 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.

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

Always use your employer's Lock-Out/Tag-Out procedures. If your employer does not have Lock-Out/Tag-Out procedures, use the procedures that follow. Contact your supervisor or ESG Technical Service if you have any questions about Lock-Out/Tag-Out procedures.

NOTICE

You can order Lock-Out/Tag-Out Tags through your Heil Dealer or through Heil.

LOCK-OUT/TAG-OUT PROCEDURES

NOTICE

Always use your employer's Lock-Out/Tag-Out procedures. If your employer does not have Lock-Out/Tag-Out procedures, use the procedures that follow. Contact your supervisor or Heil Technical Service if you have any questions about Lock-Out/Tag-Out procedures.

Put the unit in a Lock-Out/Tag-Out mode:

- BEFORE you enter the unit's body
- · BEFORE you do maintenance, repair or cleaning procedures on the unit.



Tag

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 you raise the tailgate for service, maintenance or cleaning.
- 4. SET the body props when you raise the body for service, maintenance or cleaning.
- 5. When there are in-cab controls, turn the ignition switch to ON then:
 - a. Move the switches of the hydraulic controls. This relieves the pressure in the cylinders.
 - b. Turn the ignition switch to OFF.
- 6. When there are no in-cab controls, move the outside control levers to relieve the pressure in the cylinders.
- 7. Put a LOCK-OUT/TAG-OUT Tag onto the steering wheel.
- 8. Remove the ignition key from the cab, lock the vehicle, and put the key in a secure location.
- 9. You can order Lock-Out/Tag-Out Tags (Part Number 212-1586) through your Heil Dealer or through Heil.

COMPRESSED NATURAL GAS (CNG) FUEL SYSTEM

This section is for units equipped with a CNG fuel system.

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. CNG training is required for any person inspecting, operating, or performing maintenance of a CNG unit.

A. Safety

This section deals with general safety precautions that are necessary when operating compressed natural gas fuel systems and equipment and defueling a compressed natural gas fuel system. For supplemental information, refer to the following codes:

United States: NFPA 52, State and Local Regulations

Canada: CAN/CGA B109, CAN/CSA B108, FMVSS 304

Do not start the engine if a natural gas leak is detected.

Do not transfer compressed natural gas fuel from one vehicle to another vehicle. Transferring compressed natural gas can cause a buildup of static electricity which could create a spark and ignite the fuel.

Never weld or perform any type of "hot work" on any part of a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

A WARNING

Never open system components while the system is under pressure. Treat all cylinders as full until defueling has been completed.

Avoid open flames and sparks near a compressed natural gas vehicle.

Do not smoke cigarettes, cigars, or use any other lit or sparking items within 30 feet of a compressed natural gas vehicle or a dispensing/filling station.

Do not use a cell phone or other electronic device within 30 feet of a compressed natural gas vehicle or a dispensing/filling station.

Keep the compressed natural gas equipment area well ventilated.

General Information

COMPRESSED NATURAL GAS (CNG) FUEL SYSTEM (CONTINUED)

A portable fire extinguisher must be installed on the vehicle in an accessible location.

B. Fill Panel

The fill panel control interface is accessible by opening the fill panel access door (usually on the street side of the unit). See Figure 2. Notice the red Manual Fuel Shutoff Valve in the center of the fill panel. Also shown are the High Pressure Gauge (left) and Low Pressure Gauge (right), the Fuel Fill Receptacles and Dust Caps (bottom right) and the Defueling Receptacle and Dust Cap (bottom left).



Figure 2. CNG Fill Panel (Photo Used with Permission from Agility Fuel Systems)

C. Starting Vehicle

NOTICE

Starting a natural gas vehicle requires a delay between the battery power being turned on and the starter motor being activated.

COMPRESSED NATURAL GAS (CNG) FUEL SYSTEM (CONTINUED)

C. Starting Vehicle (Continued)

- 1. Make sure that the system has been properly leak tested and that no leaks exist.
- 2. Make sure that plastic caps are installed on all exposed vent lines. For roof mounted CNG, vent lines route to both ends of the cylinders. For tailgate mounted CNG, vent lines route to the top of the tailgate. If the plastic caps are missing, contact Heil Parts Central for replacement caps (Part Number 042-2078 for 3/8" and 042-2079 for 1/2") at 800-528-5308.
- 3. Make sure that the cylinder shut-off valves (one on each cylinder) are "OPEN" and the manual shut-off valve is "ON".
- 4. Without starting the engine, turn the key to the "RUN" position and wait 20-30 seconds. This will allow the fuel to properly fill the system and provide adequate back-pressure for the high-pressure solenoid valve to function properly.
- 5. Start the engine.
- 6. If this is the first start of the day, let the vehicle idle for five minutes. This will allow coolant to warm the fuel and ensure that the low-pressure lines down-stream of the primary pressure regulator do not freeze up. On extremely cold days, the vehicle may have to idle for a longer period until the fuel warms adequately.

D. Maintenance

Routine maintenance of the compressed natural gas system in accordance with Section E (below) will ensure that the system and components are functioning properly.

System components must not be under pressure during servicing. Doing so may cause serious injury.

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

Make sure the unit is in the Lock-Out/Tag-Out mode when you do maintenance or service procedures, or when you go in the hopper, climb in or on the body or on equipment. The unit can be operated intentionally or accidentally when the unit is not in the Lock-Out/Tag-Out mode which can cause serious injury or death to anyone in the hopper, in or on the body or on equipment.

Maintenance of a compressed natural gas system is to be performed ONLY by authorized service personnel. Unauthorized maintenance can result in personal injury and/or extensive damage to the unit.

E. Inspection/Preventive Care Schedule

ITEM	FREQUENCY
Storage System:	
Leak Test with Methane Detector*	Every month
Component Inspection*	Every month
Drain Filter	Every 1500 miles
Replace Filter Element	Every 3000 miles
Drain Vent Lines	Every month (or immediately if blue vent cap is missing)
Cylinders*	Inspect compressed gas cylinders as outlined by cylinder manufacturer
* To be completed by a qualified and trained pers	

General Information

COMPRESSED NATURAL GAS (CNG) FUEL SYSTEM (CONTINUED)

F. Defueling with a Defueling Receptacle

Defueling is generally the process of removing any residual fuel from the fuel tanks and on-board fuel delivery system prior to performing any welding or a major repair. Capturing the CNG in a system that can send it back to a CNG fueling station storage facility for reuse is the most environmentally responsible method. Atmospheric venting of CNG might be illegal and against local environmental regulations for your area. Check local laws and regulations before venting CNG to the atmosphere.

Before attempting to defuel a CNG vehicle, read and understand **National Fire Protection Association (NFPA) 52** sections 6.14.1 - 6.14.4.4 as they provide a detailed list of requirements to be followed when performing defueling. Also read and understand all of the safety alert messages and procedures in this section. Maintenance of a compressed natural gas system is to be performed ONLY by authorized service personnel.

Required Tools

- Defueling receptacle on vehicle*
- Defueling nozzle and gas pressure regulation system
- Place to put the fuel removed from the vehicle
- * If your CNG system does not have a defueling receptacle, contact the CNG system manufacturer for defueling instructions specific to your system.

Basic Rules for Defueling

- Consume as much fuel as possible prior to defueling
- Notify appropriate nearby personnel prior to defueling and clear the area of all unessential people
- ALWAYS ground (earth ground) the vehicle AND the fuel system being defueled
- NEVER defuel indoors
- Always wear personal protective equipment
- Be familiar with evacuation routes

G.Defueling Prior to Minor Repairs That Require No Welding

Defueling is required when a CNG fuel system component has failed, or when a CNG fuel storage cylinder has sustained level 2 or 3 damage and must be removed from the vehicle for repair or replacement. Minor repairs of components or systems not connected or related to the CNG fuel system do not require defueling as long as all safety precautions are carefully followed and no welding will be performed.

Relieve the pressure from the CNG tank such that only residual CNG vapor remains. Typically the CNG system would have nominally 689kPa (100 psig) on board in gaseous pressure when the system is "defueled". Defueling to 100 psig is acceptable if none of the repairs involves the CNG equipment on the vehicle or if no welding on the vehicle is required. If the repair involves the fuel system in any way or if welding on the vehicle will be performed, it is necessary to defuel and purge the system with an inert gas such as nitrogen.

COMPRESSED NATURAL GAS (CNG) FUEL SYSTEM (CONTINUED)



Venting does not completely empty the system of combustible gas. Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas. See Paragraph H below.

There are two methods by which to defuel a CNG vehicle using a Defueling Panel with a Defueling Receptacle.

- 1. Atmospheric Venting Method
 - a. You must first check to see if this method is legal in your area. There could be local environmental regulations regarding the release of methane into the atmosphere.
 - b. If atmospheric venting is acceptable in your area, then a vent stack apparatus that meets the requirements established in either the Uniform Building Code or the International Building Code must be followed as well as NFPA 52.
 - c. With the local authority having jurisdiction, typically the Fire Marshal should be consulted.
 - d. BOTH the vehicle AND the fuel system should be grounded. Use a minimum 14-gauge multi-stranded wire. Contact the CNG system manufacturer for attachment points for the ground wire.
 - e. Restrain all tanks during depressurization to prevent the tanks from moving.
 - f. Attach a defueling nozzle to the defueling receptacle. Contact the CNG system manufacturer for the minimum distance the vent hose should be positioned above the ground.
 - g. After this nozzle is connected, the valves that allow system pressure to reach the defueling receptacle must be turned to the "defueling enabled" position (if equipped).
- 2. Compressor Inlet Method
 - a. This procedure requires pre-planning and special equipment installed at the CNG fueling station. Check with your CNG fueling station supplier or installer.
 - b. In this method, the vehicle is connected through the fueling nozzle to the defueling panel receptacle and the compressor at the fueling station extracts the compressed natural gas from the vehicle.
 - c. BOTH the vehicle AND the fuel system should be grounded. Use a minimum 14-gauge multi-stranded wire. Contact the CNG system manufacturer for attachment points for the ground wire.

H. Purging with an Inert Gas Prior to Welding or Major Repairs

If welding or major repairs is required, you must remove all of the fuel from the vehicle including the residual fuel and replace it with an inert gas such as nitrogen. The objective is to completely purge the system of all combustible gas. In order to complete the operation, the entire system should be purged with the inert gas 3 times to a pressure of at least 689kPa (100 psig). Approximately 70kPa (10 psig) of residual inert gas pressure should be left on the system during the major repair.

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

NOTICE

Avoid exposing CNG system parts to molten metal from weld, torch, cutting, or grinding splatter. The CNG system and/or the CNG system components can be damaged.

General Information

COMPRESSED NATURAL GAS (CNG) FUEL SYSTEM (CONTINUED)

I. Recharging the Fuel System after Purging and after Major Repairs

After repairs, the inert gas must be removed from the system in a similar manner as the inert gas was introduced. Specifically, the entire system should be charged 3 times with approximately 689kPa (100 psig) of natural gas. Between each natural gas charging session, the system should be vented or extracted to remove the remaining inert gas from the system. See the Notices below and the atmospheric venting method instructions above.

NOTICE

It is critical when venting between gas charging sessions to make sure the tank pressure never goes below 34kPa (5 psig). 69-138kPa (10-20 psig) is the recommended cutoff for this procedure. This will ensure that outside air does not reenter the tank due to the pressure dropping too low in the tank.

NOTICE

If venting to atmosphere, you must first check to see if this method is legal in your area as some natural gas will be vented along with the inert gas.

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. This corrosion can affect unloading and decrease the structural life of the body. In addition, storing refuse in the body overnight can increase the risk of fire.

MAINTENANCE/LUBRICATION INFORMATION

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

GREASE LUBRICANT RECOMMENDATION

Use a grease gun. Before engaging grease gun, clean the fitting. Always pump enough grease to purge the joint of contaminated grease and wipe off the excess grease. Lubricate a unit as given on the lubrication decal on the unit and in the Parts and Service Manual and Operator's Manual. Use NLGI 000 grease.

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 component in hydraulic system. It transmits power, provides lubrication and cooling function and has following features:

- High viscosity index
- 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 / filterability
- · 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 detail information about it. 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. But system performance and/or oil service life may be compromised.

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

STANDARD TORQUE DATA FOR NUTS AND BOLTS

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

NOTICE

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

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

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

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General Information

STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE							
Bolt Size (D)	Nut Type (STD/Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
		24	5				25
			8				35
7/16	STD	14	5	53	48	35	
.4375			8	76	68	49	
		20	5	60	54	39	
			8	84	76	55	
	Lock	14	5				35
			8				49
		20	5				39
			8				55
1/2	STD	13	5	82	73	53	
.500			8	115	104	75	
		20	5	92	83	60	
			8	130	117	84	
	Lock	13	5				53
			8				75
		20	5				60
			8				84
9/16	STD	12	5	118	106	77	
.5625			8	166	150	108	
		18	5	131	118	85	
			8	186	167	121	
	Lock	12	5				77
			8				108
		18	5				85
			8				121
5/8	STD	11	5	162	146	106	
.625			8	230	207	149	
		18	5	184	166	120	
			8	260	234	169	
	Lock	11	5				106
			8				149

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General Information

STANDARI	D TORQUE DATA	FOR NUTS	AND BO	OLTS TABLE			
Bolt Size (D)	Nut Type (STD/Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
		18	5				120
			8				169
3/4	STD	10	5	288	260	188	
0.750			8	408	367	265	
		16	5	322	290	209	
			8	455	409	295	
	Lock	10	5				188
			8				265
		16	5				209
			8				295
7/8	STD	9	5	465	418	302	
0.8750			8	657	591	427	
		14	5	513	461	333	
			8	724	652	471	
	Lock	9	5				302
			8				427
		14	5				333
			8				471
1	STD	8	5	697	627	453	
1.0000			8	984	886	640	
		14	5	782	704	508	
			8	1105	994	718	
	Lock	8	5				453
			8				640
		14	5				508
			8				718
1-1/8	STD	7	5	869	782	565	
1.1250			8	1395	1256	907	
		12	5	975	877	634	
			8	1564	1408	1017	
	Lock	7	5				565
			8				907

General Information

STANDARD	STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE						
Bolt Size (D)	Nut Type (STD/Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
		12	5				634
			8				1017
1-1/4	STD	7	5	1227	1104	797	
1.2500			8	1969	1772	1280	
		12	5	1358	1222	883	
			8	2179	1961	1417	
	Lock	7	5				797
			8				1280
		12	5				883
			8				1417
1-3/8	STD	6	5	1608	1447	1045	
1.3750			8	2580	2322	1677	
		12	5	1830	1647	1190	
			8	2938	2644	1909	
	Lock	6	5				1045
			8				1677
		12	5				1190
			8				1909
1-1/2	STD	6	5	2134	1921	1387	
1.5000			8	3425	3083	2226	
		12	5	2401	2161	1561	
			8	3854	3468	2505	
	Lock	6	5				1387
			8				2226
		12	5				1561
			8				2505

BOLT TYPE IDENTIFICATION CHART

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

TORQUE FOR HYDRAULIC TUBES AND FITTINGS

FLAT FACE ORFS FITTINGS						
	SET WRENCH TO					
NOMINAL TUBE OD	TORQUE WRENCH SETTING	ALTERNATE TORQUE UNITS				
1/4"	21 ft-lbs.	250 in-lbs.				
3/8"	33.5 ft-lbs.	400 in-lbs.				
1/2"	50 ft-lbs.	600 in-lbs.				
5/8"	50 ft-lbs.	600 in-lbs.				
3/4"	75 ft-lbs.	900 in-lbs.				
1"	105 ft-lbs.	1260 in-lbs.				
1-1/4"	130 ft-lbs.	1560 in-lbs.				
1-1/2"	178.5 ft-lbs.	2140 in-lbs.				



Figure 3. Torque for Hydraulic Tubes and Fittings

General Information

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



Figure 4. Torque for Hydraulic Tubes and Fittings

General Information

FROM SAE J2593 TABLE 7				
BOSS (ORB)	(STEEL) SET WRENCH TO			
NOMINAL TUBE OD	TORQUE WRENCH SETTING	ALTERNATE TORQUE UNITS		
3/16"	9 ft-lbs.	110 in-lbs.		
1/4"	16.5 ft-lbs.	200 in-lbs.		
5/16"	21 ft-lbs.	250 in-lbs.		
3/8"	29 ft-lbs.	350 in-lbs.		
1/2"	64 ft-lbs.	770 in-lbs.		
5/8"	89 ft-lbs.	1070 in-lbs.		
3/4"	130 ft-lbs.	1560 in-lbs.		
7/8"	178.5 ft-lbs.	2140 in-lbs.		
1"	224 ft-lbs.	2690 in-lbs.		
1-1/4"	250 ft-lbs.	3000 in-lbs.		
1-1/2"	300 ft-lbs.	3600 in-lbs.		
ALUMINUM SET				
TORQUE WRENCH SETTING	ALTERNATE TORQUE UNITS			
6 ft-lbs.	70 in-Ibs.			
11 ft-lbs.	130 in-lbs.			
14 ft-lbs.	170 in-lbs.			
21 ft-lbs.	250 in-lbs.			
37.5 ft-lbs.	450 in-lbs.			
54 ft-lbs.	650 in-lbs.			
91.5 ft-lbs.	1100 in-lbs.			
116.5 ft-lbs.	1400 in-lbs.			
146 ft-lbs.	1750 in-lbs.			
154 ft-lbs.	1850 in-lbs.			
200 ft-lbs.	2400 in-lbs.			

General Information



Figure 5. Torque for Hydraulic Tubes and Fittings

SPLIT- FLANGE (HALF CLAMP) CONNECTORS (CODE 61)						
		SET WRENCH TO				
NOMINAL TUBE OD	BOLT SIZE	BOLT TORQUE [FT- LBS]	BOLT TORQUE [IN-LBS]	ALUMINUM FT- LBS [IN-LBS]		
1/2"	5/16-18 x 1.25	17 ft-lbs.	200 in-lbs.	12 [130]		
3/4"	3/8-16 x 1.25	25 ft-lbs.	300 in-lbs.	17 [200]		
1"	3/8-16 x 1.25	32 ft-lbs.	380 in-lbs.	21 [250]		
1-1/4"	7/16-14 x 1.50	41 ft-lbs.	490 in-lbs.	27 [320]		
1-1/2"	1/2-13 x 1.50	53 ft-lbs.	640 in-lbs.	35 [420]		
2"	1/2-13 x 1.50	61 ft-lbs.	730 in-lbs.	40 [480]		
2-1/2"	1/2-13 x 1.75	86 ft-lbs.	1030 in-lbs.	56 [670]		
3"	5/8-11 x 1.75	144 ft-lbs.	1730 in-lbs.	94 [1130]		
3-1/2"	5/8-11 x 2.00	125 ft-lbs.	1500 in-lbs.	82 [980]		
4"	5/8-11 x 2.00	125 ft-lbs.	1500 in-lbs.	82 [980]		
5"	5/8-11 x 2.25	125 ft-lbs.	1500 in-lbs.	82 [980]		

General Information

SPLIT- FLANGE (HALF CLAMP) CONNECTORS (CODE 62)						
		SET WRENCH TO				
NOMINAL TUBE OD	BOLT SIZE	BOLT TORQUE [FT- LBS]	BOLT TORQUE [IN-LBS]	ALUMINUM FT-LBS [IN- LBS]		
1/2"	5/16-18 x 1.25	17 ft-lbs.	200 in-lbs.	12 [130]		
3/4"	3/8-16 x 1.25	30 ft-lbs.	360 in-Ibs.	20 [240]		
1"	3/8-16 x 1.25	46 ft-lbs.	550 in-lbs.	30 [360]		
1-1/4"	1/2-13 x 1.75	69 ft-lbs.	830 in-lbs.	45 [540]		
1-1/2"	5/8-11 x 2.25	125 ft-lbs.	1500 in-lbs.	82 [980]		
2"	3/4-10 x 2.75	209 ft-lbs.	2510 in-lbs.	136 [1640]		

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.

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 EXTEND and PACKER RETRACT 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 streetside 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 that the switch is sensing metal. The light changes color when the switch senses 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.	 Make sure the power source from the chassis manufacturer is clean. The body electrical system is protected from voltage spikes. 			
Improper Sensing Range	Adjust proximity switches to sense metal as follows: PROX. SWITCH METAL 18 MM — MAX. 3/16" SENSING DISTANCE 30 MM — MAX. 3/8" SENSING DISTANCE			
If the controller input light stays on when a switch is unplugged (the signal wire is carrying +12V DC)	Check the proximity switch electrical circuits for the source of the problem.			
If proximity switch LED light is NOT ON.	. Check the 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.			
	Check the power wire (terminal C) for +12 VDC with a multi-meter.			
	 Check ground signal with multi-meter for continuity to chassis ground. 			
	 Check the signal wire for continuity to appropriate controller input terminal. (Refer to SM9.) If all three (3) wires are good, replace the proximity switch. 			

DECALS ON THE UNIT

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

Replace any decal that is damaged, missing, or is 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 or 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 Instructions

Following these instructions 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: 15" minimum
- Water pressure: <= 800 psi
- 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)



INCORRECT TECHNIQUE Figure 7. Incorrect Technique

HYDRAULIC SYMBOLS


DuraPack[®] 4060 General Information

HYDRAULIC SYMBOLS (CONTINUED)



DuraPack® 4060

General Information

ELECTRICAL SYMBOLS

SYMBOL DEFINITIONS



SECTION 2 PUMPS

SINGLE GEAR PUMP WITH POWER PRO DRY VALVE (MUNCIE)





Figure 8. Single Gear Pump

This pump set up does not require a constant flow valve in the OFF mode. The power pro dry valve system allows pump cooling and lubrication through the loop line and back to the tank when the system is in the off mode. In the ON mode the loop line is closed to tank and all fluid is sent to system pressure.

AIR LOGIC

Pump On – Apply air pressure to port #1 and release air pressure from port #2. **Pump Off** – Release air pressure from port #1

and apply air pressure to port #2.



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

Front Loaders, Rear Loaders, Recycle 2000, and Liberty



Figure 10. Tandem O.I.G.A.I. Pump



This is the Hydraulic Controls Operate-In-Gear-At-Idle (OIGAI) System. The pump section (pump 1) closest to the input shaft operates the lift and shuts off first. The pump section (pump 2) farthest from the input shaft operates the packer and stays on at higher RPMs.

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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. Before making adjustments, make sure the unit is in the LOCK-OUT position. LOCK-OUT position is defined as follows:

- 1. Engine stopped and ignition key removed.
- 2. Set the brakes and make sure they are holding.
- 3. Chock all wheels.
- 4. Insert a LOCK-OUT tag on the steering wheel.
- 5. Test the cartridge for damage by flow testing the pump before disassembly.

Required tools to replace the pump:		
Quantity	ΤοοΙ	
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 12. Tools Required

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 13.

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



Figure 14.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 15.

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



Figure 16.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 17.

11.Remove the one-inch hydraulic pressure hose.



Figure 18.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

12.Remove the four suction line flange bolts.



Figure 19.

13.Remove the eight bolts connecting the pump shut-off valve to the pump. There are four small bolts and four large bolts.



Figure 20.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

14.Carefully, remove the shut-off valve from the pump.



Figure 21.

15.Remove the four pump housing connecting bolts.



Figure 22.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

16.Carefully remove the pump case housing.



Figure 23.

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



Figure 24.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

18.Inspect the pump shaft, splines, and bearings for wear and damage. Check for the following:

- Sheared or worn shaft splines
- Broken bearing.



Figure 25.



Figure 26.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 27.

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



SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

21.Place the pump cartridge back on the pump shaft.



Figure 29.

22.Replace the outer pump housing and finger-tighten the four pump housing bolts.



Figure 30.

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SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 31.

24.Install the new pump shut-off valve using the new bolts included with the new valve.



Figure 32.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

25.Tighten the eight pump shut-off valve bolts as follows:

- Four small back bolts 60 ft lb
- Four large front bolts 92 ft lb



Figure 33.

26.Install the suction line flange to the pump shut-off valve and tighten the four bolts on the flange.



Figure 34.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

27.Install one straight connector, 054-3341-10, to the **P Port** on the shut-off valve.



Figure 35.

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



Figure 36.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 37.

30.Install the following two-way Packard connector to the two wires coming from the solenoid on the new shut-off valve:

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



Figure 38.

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SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 39.

32.Attach the grill to the chassis.



Figure 40.

SINGLE PUMP REPAIR PROCEDURES (CONTINUED)

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



Figure 41.



Figure 42.

219-2303 PUMP CONFIGURATION INSTALLED ON ANOTHER CHASSIS



Figure 43.

Figure 44.



Figure 45.

Figure 46.



Figure 47.

TROUBLESHOOT PUMP 219-2303 WITH 031-6427

In 2007, Heil changed the pump control valve to a design that easily allows testing the pump and the pump control valve functions on the vehicle.

A. Hydraulic functions do not operate.

- 1. When pump should be on, verify there is at least 10 volts at the pump coil.
- 2. If 10 or more volts are present proceed to step B.
- 3. If not, determine if the PLC program (if so equipped) is at fault or a wire is broken.

B. When pump should be on, pull red knurled knob on the end of the solenoid valve. See Figure below.

- 1. Does the system work now?
- 2. If so, replace the coil.
- 3. If not, proceed to step C.



Figure 48.

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

C. Remove the unloading cartridge. Temporarily set aside in a clean location.



Figure 49.

- D. Remove test plug located in the side of the pump control valve.
- E. Insert plug in the port where the unload cartridge was removed. There are threads for it at the bottom of the cavity.



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

F. Reinsert the unload cartridge.



Figure 51.

G.Start the truck and test all functions.

- 1. If the system now works correctly the problem is in the pump control valve.
- 2. If the system still does not function correctly the pump cartridge need to be replaced.

H. Remove the unload cartridge. Temporarily set aside in a clean location.

Always remove the test plug before running the truck on route. This prevent hydraulic system failure.

- I. Remove the test plug and replace it in the side of the pump control valve.
- J. Reinstall the unload cartridge.

TANDEM VANE PUMP O.I.G.A.I. HYDRAULIC SYSTEM TROUBLESHOOTING

The Operate-in-Gear-at-Idle (OIGAI) system is designed to perform the side loading operations at standard idle speed. It is comprised of two major components, the monoblock tandem vane pump and attached unloader valve assembly.

On Rapid Rail systems the P1 or front section (closest to the pump input shaft) operates the loader section of the truck while the P2 or rear section (farthest from the input shaft) operates the body section, which includes the packer. On F7000 series units the flows from both pump sections are combined to run the lift (loader) then exit the lift valve to operate the body valve. On the Python, P1 goes to the lift and P2 combines after the lift valve to run the body.

The unloader valve assemblies consist of a manifold (pressure) block, a normally open (N.O. or NO) cartridge valve and a 12VDC-solenoid coil. In operation mode, the current is supplied to the valve coil causing the valve to close, forcing pump flow to the respective hydraulic circuit. In bypass mode, the coil is de-energized causing the valve to open, allowing the oil to re-circulate either back to tank or to the pump inlet.

A. Troubleshooting

The symptoms of a problem in the pump circuit are no operation or slow operation of the loader or packer system. Since the F7000 series uses combined flows, a possible symptom of system malfunction is the packer operating at half the normal speed. On a Rapid Rail body with a Rapid Rail lift, each pump section controls one aspect of the system independent of the other. A malfunction of one pump's section will normally only affect one function of the truck. For example the packer will work correctly but not the loader or vice versa.

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

- Low or no voltage to the unloader valve coil.
- Malfunction in the unloader valve assembly.
- Internal problem with the pump.

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

- 1. Check the Electrical Supply to the Unloader Valve Coils
 - a. With the system turned on and the engine operating at idle, test the voltage at the coil. It should read a minimum of 10 VDC. If proper voltage is present and the problem persists, proceed to step 2. If the voltage is below 10 VDC, check the electrical system for problems that can cause a drop or loss of voltage to the unloader valve solenoid coil. Some examples are a broken or shorted wire, blown fuse, fault in the side door switch (if equipped), no alternator input or a failed PLC calibration.
 - b. Use an ohm meter to check resistance in the coil. If the measurement is less than 5 ohms or more than 20 then the circuit coil is damaged. If the coil is damaged, replace the coil.
- 2. Eliminate the Unloader Valve from the Circuit
 - a. With the engine off, remove the bypass line from the pressure block port marked bypass. Disconnect the pressure hose or hoses sending oil to the lift and body functions. On the Rapid Rail and Pythons, there are two pressure hoses to be capped; on the F7000 and F4000 there is one hose to be capped. Cap and plug the tube connection for the bypass to the pump inlet. This forces all oil to the hydraulic circuits as if the pump is on. (NOTE: Pump control switches in the cab are no longer effective.)
 - b. Restart the truck and test the functions. If the lift and packer functions return to normal operation (speed and pressure within specifications), replace or repair the unloader assembly.

NOTICE

If flow is present and the lift or packer operate only with no load, check the main relief valves for proper adjustment and operation.

TANDEM VANE PUMP O.I.G.A.I. HYDRAULIC SYSTEM TROUBLESHOOTING (CONTINUED)



Figure 52.

MOUNT PUMP MONOBLOCK TO TANDEM PUMP

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

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



Figure 53.

SECTION 3 BODY AND TAILGATE

DuraPack® 4060

Body and Tailgate

BODY AND TAILGATE NOMENCLATURE



Figure 54. Body and Tailgate Nomenclature

DuraPack[®] 4060 Body and Tailgate

SPECIFICATIONS

Hydraulic Oil Tank		
Hydraulic In-Tank Oil Filter		
Hydraulic Oil Tank Suction Strainer		
Hvdraulic Pump	Per Pump – 25 Gal/Min @ 1200 RPM @ 2500 PSI	
Main System Relief Pressure Setting		
Tailaata Valva:		
I aliyate valve.	0050 001	
Blade (Hydraulic Detent)		
Slide (Hydraulic/Electric Detent)		
Blade Back Off		
Port Relief (Both Sides of Eject Cylinder)		
Pump Unload	N/A	
Port Relief (Tailgate Cylinder Base End)		
Cvcle Times @ 28 GPM		

SIDE ACCESS DOORS

Hinged access doors are located on each side of the unit.

Make sure the unit is in the Lock-Out/Tag-Out mode when you do maintenance or service procedures, when you go in the hopper, enter the side access doors, or climb on the body or equipment. Equipment can be operated when the unit is not in the Lock-Out/Tag-Out mode. When the unit is not in the Lock-Out/Tag-Out mode, equipment operated while you do maintenance or service procedures, enter the hopper or climb on the body or equipment can cause serious injury or death.

TAILGATE SUPPORT PROPS

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



DuraPack[®] 4060 Body and Tailgate

TAILGATE LOCK AND UNLOCK INSPECTIONS

Listed are the steps required to ensure the tailgate is locked on the unit.

A. Pre-Trip Inspection

- 1. RED indicator arrows are aligned on the locking arm and the body anchor.
- 2. Locking pin is installed in hole.
- 3. The RED tailgate operating lever on the underbody control valve is in the center (neutral position).
- 4. The large indicator light and alarm in the cab are OFF.

B. Tailgate Unlock/Raise Procedure

- 1. Remove the lock pin and store in the keeper provided.
- 2. Unlock and raise the tailgate by PULLING the red rear handle on the underbody valve. It takes 6 seconds for the tailgate to unlock and begin to rise. See figure below for unlock position of the indicator arrows.
- 3. Continue to PULL and HOLD the handle to raise tailgate completely. This takes approximately 35 seconds.

C. Tailgate Lock/Lower Procedure

- 1. To lower the raised tailgate, PUSH and HOLD the rear red handle on the underbody valve. From the fully raised position it will take approximately 28 seconds to lower the tailgate to position.
- 2. Continue to PUSH and HOLD the valve handle until the indicator arrows are aligned and the indicator light and alarm (in cab) are off.
- 3. Remove the locking pin from the keeper and install the pin into the anchor hole.

DuraPack[®] 4060

Body and Tailgate

TAILGATE LOCK AND UNLOCK INSPECTIONS (CONTINUED)



Figure 57. Tailgate Locked

DuraPack[®] 4060 Body and Tailgate

AUXILIARY QUICK DISCONNECT HOOK-UP

If the unit has hydraulic system trouble and is unable to use the hydraulic system, either body can be emptied of refuse by hooking up an auxiliary pump system to the quick disconnect on the unit. The suction line disconnect is located at the back of the oil tank. See Figure 1 for location of Quick Disconnect.



Figure 58. Auxiliary Quick Disconnect

DuraPack[®] 4060 Body and Tailgate

WELDING AND ELECTRONIC DEVICES / ELECTRICAL LUBRICANTS

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

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 Cortex Controller and all other electronic control units (ECUs).
- If welding within 24 inches of a proximity switch, remove the switch from the unit.

NOTICE

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

Electrical Anti-Corrosion Lubricant

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

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

These lubricants may be obtained at an electrical supply store.

DuraPack® 4060 NOTES
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 has loose or missing hardware	Tighten loose hardware. Replace missing hardware.		
Body structure has 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.		
Air regulator	90 PSI, typically located at front of body.		

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						
	1	*HOU	RS OF C	PERATI	ON	1
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 after first 30 days of operation, then every 6 months or 1000 hours of operation OR when filter bypass light is ON.
				A		Replace tank breather/filter every time you replace filter element.
						Drain, flush, and refill. 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 PTOs (non-wet spline), remove the pump's bolt flange about 2 inches from the PTO and apply grease to female pilot of PTO pump flange. Failure to lubricate female pilot of PTO as given may cause damage to the pump shaft. Greasing is NOT required on wet spline PTOs such as the Chelsea 890/897 series.

DuraPack® 4060

Maintenance and Adjustment

BODY PREVENTIVE MAINTENANCE CHART						
*HOURS OF OPERATION						
COMPONENT/SYSTEM	8	40	200	1000	2000	CHECK/SERVICE
Grease Fittings						Lubricate as shown on Body Lube Chart.
Body Undercoating						Inspect body undercoating and repair as necessary.
Inspect Tailgate Shoes Wear Pads for Wear (both Tailgates)						When a Shoe Wear Pad is worn down to 0.125 inch thickness, rotate the top and bottom Shoe Wear Pads. Replace the Shoe Wear Pads before any pad wears to below 0.125 inch thickness.* See Tailgate Blade Shoe Wear Pal . * For reference, a new Shoe Wear Pad is 0.312 inch thickness; normally the top pad wears down first.
Tailgate Seal Integrity						
* Daily = 8 hrs. Weekly = 40 hrs. Monthly = 200 hrs. 6 Months = 1000 hrs. Yearly = 2000 hrs.						

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. See the figure below.

DuraPack [®] 4060 LUBRICATION GUIDE				
			5 5 5 5 5 5 5 5 5 5 5 5 5 5	
	GREASE WEEKLY/ EVERY 40 HOURS	6	Both Sides/ Both Tailgates	
Ref. No.	Location	Qty.		
1	Tailgate Hinge	4		
2	Inner Slide Pivot (Both Ends)	4		
3 4	Outer Slide to Blade Tailgate Raise Cylinder (Both Ends)	8	Both Both	
5	Control Handles/Linkage: A. Upper Bellcranks B. Handle Pivot	4	5 Tailgates Both Tailgates	
6	Front Mount Pump Driveshaft	2		
7	Ejector Cylinder (Both Ends) (Not Shown)	4		
NOTE: Always fittings NOTE: non-de	Clean fittings then pump grease i pump enough grease to flush old . Remove excess grease from fitti Lubricate moveable, mechanical tergent motor oil every 60 days.	nto fittings. grease fror ngs. parts with	n Both Sides/ Both Tailgates 212-3170	

DuraPack® 4060

Maintenance and Adjustment

PACK/EJECT CYLINDERS MAINTENANCE

Heil Environmental recommends completing the following tasks to make sure the pack/eject cylinders are working properly and not damaged.

Make sure that the unit is in Lock-Out/Tag-Out mode before you perform maintenance/service procedures, or when you enter or climb on the hopper/body/related assemblies. Equipment is operational when the unit is not in Lock-Out/Tag-Out mode. Equipment operated while you do maintenance or service procedures can cause serious injury or death so also make sure to clear the area around the unit of all bystanders.

DO	DO NOT
 DAILY 1. Remove all trash, metal, etc. from behind the packer panel. 2. Visually inspect packer tracks and hopper floor for excessive wear or damage. Repair or replace if necessary 	 Damage cylinder rod by striking it with any piece of metal, shovel, etc, when cleaning behind the panel. Leave trash, metal, etc. behind the packer panel to accumulate as damage to cylinder may occur.
WEEKLY Inspect pack/eject cylinder pins (both ends) for wear or damage. Replace if necessary. Grease all pins. 	A WARNING Failure to follow these instructions can result in damage to the Heil body, truck chassis or can cause personal injury!

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.

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 EXTEND and PACKER RETRACT 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.

DuraPack[®] 4060

Maintenance and Adjustment

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 59. Hydraulic Oil Tank and Sight Gauge

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
- Ejector Panel at the front of the body
- Packer Panel in the in-transit position with all cylinders retracted

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 60. Hydraulic Oil Tank and Sight Gauge

PREPARING THE UNIT TO CHECK THE OIL LEVEL

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

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

The oil 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.





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.

<u>Important</u>: 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 every 1000 hours or every six (6) months or when indicated by the filter monitor light located in the cab.

CHANGE HYDRAULIC OIL FILTER ELEMENT

To change the hydraulic oil filter, refer to the figure below and follow these steps:

- 1. Remove nuts and filter cover.
- 2. Remove the filter element with the by-pass assembly and discard as required.
- 3. Clean the housing with a clean, lint-free cloth.
- 4. Check the o-ring and gasket. Replace them if necessary.
- 5. Lubricate all o-rings and gaskets.
- 6. Install new element.
- 7. Reinstall cover with nuts. Torque nuts to 13 ft/lbs.





DRAIN AND CLEAN THE HYDRAULIC OIL TANK

Change the hydraulic oil at least annually or every 2000 hours of operating time, whichever comes first.

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.

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.

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

1. Disengage the pump, shut off the engine and remove the ignition key.

Make sure the unit is in the Lock-Out/Tag-Out mode when you do maintenance or service procedures, or when you go in the hopper, climb in or on the body or on equipment. Equipment can be operated when the unit is not in the Lock-Out/Tag-Out mode. When the unit is not in the Lock-Out/Tag-Out 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 serious injury or death.

NOTICE

If your employer or company has Lock-Out/Tag-Out procedures that are different from the following procedures, use your employer's or company's procedures. If your employer or company does not have Lock-Out/Tag-Out procedures, use the procedures that follow.

- 2. Contact your supervisor if you have any questions about Lock-Out/Tag-Out procedures. If your supervisor has any questions, that person can contact ESG Technical Service. Perform the Lock Out/Tag Out procedures 8.
- 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 the 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 as described under Check Oil Level 77.

PURGE THE HYDRAULIC SYSTEM

If the hydraulic system becomes contaminated because of component failure or some other reason, you must purge the hydraulic system.

To purge the system, follow these steps:

- 1. Extend the packer/ejector cylinder to lower the oil level in the tank.
- 2. Remove and replace the in-tank oil filter element in the tank.
- 3. Engage the packer/ejector control lever and allow the oil to circulate through the new filter, cleaning the oil.

NOTICE

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

4. Repeat the procedure as necessary until the system is purged.

NOTICE

If contaminated hydraulic oil reaches the cylinders, the unit may need to be removed from service until the contamination is removed. For more information, contact the Heil Technical Services.

TROUBLESHOOTING GUIDE

Problem	Problem Cause	Remedy
Ejector Panel will not relieve.	Ejector panel set higher than	1. Raise main relief setting.
	Main relief.	2. Lower ejector relief setting.
	Fighter relief get too low	1. Lower main relief setting.
Ejector Panel moves forward too much when packing.	Ejector relief set too low.	2. Raise ejector relief setting.
	Figster relief stuck open	1. Remove relief spool and clean.
		2. Replace unload section.
Ejector panel moves forward when other functions of packing cycle are in use.	Cylinder Bottoms before manual kick-outs center spool.	Adjust top kick-out.
Inside cylinder sticks in lower panel (blade) up position.	Detent set higher than main relief.	Lower the lower panel detent setting.
Lower panel will not tuck all the way (inside cylinders) are partially extended.	Lower Panel detent setting is too high.	Adjust lower panel detent setting up.

UNDERBODY VALVE WITH RESISTANCE RELIEF

The resistance valve is located in the ejector section of the underbody valve and preset at 2250 PSI. See Figure 5.

A. Resistance Relief

- 1. When the upper panel moves refuse from the hopper into the body, resistance will begin to increase.
- 2. As resistance increases, pressure passes through 2250 PSI. The valve will open momentarily allowing the ejector panel to slide back into the body for refuse to enter.
- 3. The valve will close when the slide kicks out at 2500 PSI.

B. Packing Loads

When packing loads, the operator may encounter one of these situations:

- 1. When packing a light load, the panel may move approximately one inch.
- 2. If packing a heavy load the panel may move as much as three inches, depending on refuse moisture content.
- 3. If load is too light, be sure system pressure is correct and the slide and blade kick outs are properly set.

C. Valve Adjustment

If adjustment is to the resistance relief is required, follow these steps:

- 1. Loosen lock nut on the adjustment screw.
- 2. If loads are light and the ejector panel reached the front of the body, turn adjustment screw in (clockwise) 1/8 turn.
- 3. Tighten lock nut and check load weights.

UNDERBODY VALVE WITH RESISTANCE RELIEF (CONTINUED)

- 4. If ejector panel stalled before reaching the front of the body, turn adjusting screw out (counter clockwise) 1/8 turn.
- 5. Repeat steps 1 thru 4 to increase or decrease resistance as necessary to get desired payloads. See Figures below:



Figure 63. Underbody Valve with Resistance Relief

UNDERBODY VALVE WITH RESISTANCE RELIEF (CONTINUED)



Figure 64. Underbody Valve: Return Hose and Power Beyond Sleeve



Figure 65. Underbody Valve: Main Relief Valve, Pressure Gauge Port and Resistance Valve

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 and fork 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 and forks will be operated during this procedure
- 5. Make sure unit is full of hydraulic oil
- 6. Make sure Hydraulic oil is at least 100 degrees F before beginning any pressure checks or adjustments.
 - a. If unit oil is not at desired temperature, engage the hydraulic pump.
 - b. Activate and hold the tailgate lock function for two minutes.
 - c. After two minutes release tailgate lock function and cycle the packer/ejector circuit to mix the hot oil.
 - d. Repeat steps (b) and (c) until oil is at desired temperature.
- 7. Connect a 5000 psi hydraulic gauge to the quick-disconnect located on the lift arm control valve.
- 8. Start the engine and engage the hydraulic pump NOTE: The unit must remain in neutral during all pressure setting procedures.

B. Required Tools

These are the tools required to make pressure adjustments.

Quantity	Tool
1	1/8" open end wrench
1	Ratchet with screwdriver attachment
1	0-5000 PSI hydraulic pressure gauge

C. Valve Locations

The hydraulic control valve has been split and relocated to the street side of the body. The arm, fork and packer hydraulic circuits are now located behind a steel cover as seen in Figure 10 at the left arrow location and Figures 11 and 12. The Electric-Over-Hydraulic portion of valve that controls the tailgate lock/unlock, tailgate open/close and top door open/close hydraulic circuits is now located behind a steel cover as seen in Figure 11 at the right arrow location and Figures 12 and 13.

D.Tailgate Valve

The packing mechanism is controlled by an electrical panel (Standard) or two levers (Optional) at both corners of the tailgate. The electrical panel (Standard) or two levers (Optional) operate the lower panel (blade) and upper panel. Refer to Operator's Manual for proper operations of controls.

All adjustments must be made with Throttle Advance Engaged:

- (1) START engine and engage PTO (or front mount pump). Pump will not engage until Throttle advance is activated.
- (2) POSITION the upper panel in fully out position.
- (3) Turn PTO (or front mount pump) OFF.

PRESSURE ADJUSTMENT PROCEDURES (CONTINUED)

- (4) Turn engine ignition OFF, remove keys and follow the Lock-Out/Tag-Out procedure in Service Manual Section 1.
- (5) All mechanical linkage must be free of any binding. Move blade spool by hand in either direction if needed.
- (6) REMOVE any dirt or grease around the underbody valve main relief.
- (7) DECREASE the main relief pressure on the underbody valve by:
 - (a) REMOVE dome nut.
 - (b) LOOSEN lock nut.
 - (c) Turn adjusting screw out (counter-clockwise) of body valve four times to decrease the pressure setting.
- (8) Take unit out of Lock-Out/Tag-Out and start engine.
- (9) Engage the pump and turn throttle switch ON.
- (10) ENGAGE blade control mechanism to shift spool in either direction.
- (11) Blade should complete movement and remain engaged (should not detent).
- (12) If Blade detents:
 - (a) Manually shift control mechanism to disengage blade function.
 - (b) Adjust Main Relief adjusting screw out (counter-clockwise) 1 additional turn.
 - (c) Repeat steps (10) and (11).
- (13) Slowly turn main relief adjusting screw IN to increase pressure. Watch the pressure gauge to see what the pressure is when the spool kicks out or detents (returns to neutral). The correct kick out pressure is 2350 PSI.
- (14) If the setting is incorrect, place unit in Lock-Out/Tag-Out.
- (15) REMOVE the rubber plug from the end of the blade spool to expose the detent release adjusting screw.
- (16) Insert a screwdriver and TURN adjusting screw in to the spool (clockwise) to increase the kick out pressure or turn adjusting screw out of the spool (counter clockwise) to decrease pressure.
- (17) Repeat steps 8 thru 12 to check results.
- (18) DECREASE the main relief pressure on the underbody valve by turning the adjusting screw out (counter clockwise) of the body valve four times to decrease the pressure setting.
- (19) Engage slide out control mechanism.
- (20) Slide should complete out movement and remain engaged (should not detent).

- (21) If Slide detents:
 - (a) Manually shift control mechanism to disengage blade function.
 - (b) Adjust Main Relief adjusting screw out (counter-clockwise) 1 additional turn.
- (22) Repeat steps (19) and (20).
- (23) Slowly turn main relief adjusting screw IN to increase pressure. Watch the pressure gauge to see what the pressure is when the spool kicks out of detent (returns to neutral). The correct kick out pressure is 2350 PSI.
- (24) If the setting is incorrect, place unit in Lock-Out/Tag-Out.
- (25) REMOVE the rubber plug from the end of the slide spool to expose the detent release adjusting screw.
- (26) Insert a screwdriver and TURN adjusting screw in to the spool (clockwise) to increase the kick out pressure or turn adjusting screw out of the spool (counter clockwise) to decrease pressure.
- (27) Repeat steps 18 thru 23 to check results.

A DANGER

Do not apply torque beyond this point, as damage to the adjusting screw could occur. If this happens, adjusting screw will not operate properly and remain at maximum pressure even when the setting is lowered.

E.Underbody Valve - Main Relief

Steps to adjust the underbody valve - Main Relief

- 1. Move tailgate with control panel to lower and hold, while reading the main system pressure gauge.
- 2. It should read 2500 PSI.
- 3. Loosen lock nut.
- 4. Turn adjusting screw out of body (counter clockwise) to decrease the pressure or turn screw in (clockwise) to increase the pressure.
- 5. Tighten lock nut on Main Relief Valve.
- 6. Recheck system pressure.
- 7. Remove pressure gauge.
- 8. Check for any leaks.

BLADE BACK-OFF RELIEF VALVE

A relief is provided in the tailgate valve to allow the lower panel to back off slightly (2 to 5 inches of cylinder stroke) during the final stages of packing the load.

If the cylinders back-off excessively (5 to 7 inches of cylinder stroke) the back-off relief needs to be replaced.

TAILGATE CONTROL LEVER ALIGNMENT

The tailgate control handles should be in line when in the neutral position. Adjustments can only be made to blade control rod. See Figure Tailgate Control Levers below.

If Handle is Out of Align:

- 1. Loosen jam nuts on blade control adjusting rod.
- 2. Turn rod clockwise to shorten or counter clockwise to lengthen, to raise or lower control handle.



Figure 66. Tailgate Control Levers

PROXIMITY SWITCH ADJUSTMENTS

A. Throttle Advance Switch Adjustment

- 1. With the blade and slide spools in neutral position, proximity switch striker should be centered directly in front of and 3/16" away from the face of the proximity switch. See Figure 9.
- 2. Moving the proximity switch striker away from the switch by shifting one slide or blade panel spools in either direction will cause the proximity switch to close and actuate the throttle advance.
- 3. Adjust the switch by loosening the clamp mounting hardware and moving the switch to within 3/16" from striker.
- 4. Tighten clamp after adjustment has been made.
- B. Tailgate Raise/Unlock Alarm Switch Adjustment

This switch is used to indicate the tailgate has been unlocked and raised to the open position.

- 1. When the tailgate is unlocked and raised, the proximity switch will close and cause the tailgate alarm to sound. See Figure 10.
 - a. When tailgate is open, power is sent to alarm.
 - b. When tailgate is closed, power is off from alarm.
- 2. When tailgate is lowered and locked, proximity switch will open and the alarm will stop.
- 3. Adjust the switch by loosening the clamp mounting hardware and moving the switch to within 3/16" from striker.
- 4. Tighten clamp after adjustment has been made.

C. Slide Retract Switch Adjustment

- 1. Start engine and engage PTO (or front mount pump).
- 2. Using the slide control mechanism, position slide to fully in (retracted) position.
- 3. Place unit in Lock-Out/Tag-Out mode,
- 4. Adjust proximity switch to sense striker in this position. Adjustments are made by loosening the striker, and positioning it 3/16" away from the proximity switch. See Figures 11 and 12.
- 5. Remove unit from Lock-Out/Tag-Out mode.
- 6. Start engine and engage PTO (or front mount pump).
- 7. Run full slide panel cycle (in and out) to verify adjustment of proximity striker.

PROXIMITY SWITCH ADJUSTMENTS (CONTINUED)



Figure 67. Slide Panel



Figure 68. Slide Retract Proximity Switch

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.

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.

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 given on the lubrication decal on the unit and in the Body Lubrication Guide paragraph of this section.

Use grade NLG1000 grease or equivalent.

TAILGATE LUBRICATION

See Grease Lubrication Recommendation 3 and Body Lubrication Guidein this section.

INSPECT PROXIMITY SWITCHES

See **Proximity Switch Troubleshooting** for recommended procedures for inspecting proximity switches.

TAILGATE BLADE SHOE WEAR

ALWAYS inspect the Tailgate Shoe Wear Pads for wear once every week (both Tailgates). Failure to do this can result in structural damage to the unit. See the figure below.

The majority of wear typically occurs to the top pad. When a Shoe Wear Pad is worn down to 0.125 inch thickness, rotate the top and bottom Shoe Wear Pads. Replace the Shoe Wear Pads before any pad wears below 0.125 inch thickness.*

* For reference, a new Shoe Wear Pad is 0.312 inch thickness.



Figure 69. Damage from Not Replacing Worn Shoe Wear Pads

CLEAN AND INSPECT THE TAILGATE SEAL

Periodically check the tailgate seal to make sure it mates properly with the body and inspect for possible wear, damage or leaking. Replace the seal as necessary. See the figure below.



Figure 70. Tailgate Seal

SECTION 5 BODY CONTROLLER HARDWARE

DuraPack® 4060

Body Controller Hardware

PLC ASSEMBLY IN ENCLOSURE AND COVER REMOVED VIEWS





TERMINALS AND PERIPHERAL PORT





DuraPack® 4060

Body Controller Hardware

PORT COVERS OPENED AND TERMINAL COVERS REMOVED



Various vehicle applications use the Mini PLC. These applications require two (2) Electronic Over Speeds (EOS). These applications generally use a tandem pump. The EOS set points are part of the PLC program, therefore you do not need the EOS screws.

The Mini PLC is a sourcing system that requires positive input signals.

The Mini PLC does not have a replaceable memory battery.

DuraPack[®] 4060 Body Controller Hardware

HAND HELD LOADER PROGRAMMER



DuraPack® 4060

Body Controller Hardware

HAND HELD LOADER PROGRAMMING PROCEDURES

Downloading Program to PLC

Use the instructions that follow to download a program from an EEPROM in the Hand held Loader (loader) into the PLC's memory.

- 1. Make sure you have an EEPROM (PN 108-7715-EEP) with the correct program,
- 2. Move the loader's locking lever UP.
- 3. Put the EEPROM in the loader (PN 108-7715-HHL) with EEPROM's Pin 1 in the Pin 1 slot of the loader.
- 4. Move the locking lever DOWN and make sure it locks. This secures the EEPROM in the loader.
- 5. Open the cover for the PLC's Peripheral Port and attach the loader's cable connector to the Peripheral Port.
- 6. Turn the igintiion power ON. The green light on the loader should be ON.
- 7. PRESS the DOWNLOAD TO PLC button once and wait for the green light to stop flashing.
- 8. Turn the ignition power OFF.
- 9. Wait 5 seconds and turn the ignition power ON again. The green light should be ON.
- 10.PRESS the DOWNLOAD TO PLC button again and wait for the green light to stop flashing.
- 11. Turn the ignition power OFF.
- 12. Remove the loader's cable connector from the Peripheral Port and close the Peripheral Port's cover.
- 13. Program installation is complete.

Uploading Program to Hand Held Loader

Use the instructions that follow to upload a program from the PLC's memory to an EEPROM in the loader.

- 1. Make sure you have a blank EEPROM.
- 2. Move the loader's locking lever UP.
- 3. Put the EEPROM in the loader with the EEPROM's Pin 1 in the Pin 1 slot of the loader.
- 4. Move the locking lever DOWN and make sure it locks. This secures the EEPROM in the loader.
- 5. Open the cover for the PLC's Peripheral Port and attach the loader's cable connector to the Peripheral Port.
- 6. Turn the ignition power ON. The green light on the loader should be ON.
- 7. PRESS the UPLOAD + DM button once and wait for the green light to stop flashing.
- 8. Turn the ignition power OFF.
- 9. Remove the loader's cable connector from the Peripheral Port and close the Peripheral Port's cover.
- 10. The upload of the PLC's program to the loader's EEPROM is complete.

NOTE: There is no memory in the loader without an EEPROM installed in the loader.

DuraPack[®] 4060 Body Controller Hardware

DIAGNOSTIC LINK



The Diagnostic Link (PN 108-7715-DIS) is a hand-held tool that connects to the PLC's Peripheral Port with a Communication Cable (PN 108-7715-CAB).

Refer to the applicable Body Controller Software manual for the specific instructions for a PLC program.

You use the Diagnostic Link to:

- Perform the calibration setup for a newly installed PLC (password required)
- Monitor input status
- Monitor output status
- Test output device circuits by forcing outputs to ON
- View system parameters (password required)
- View faults
- View fault history.

DuraPack® 4060 NOTES
SECTION 6 BODY CONTROLLER SOFTWARE

Section 1: PLC Hardware

1.01: PLC Indicator Lights

Located on the face of the PLC are the PWR, RUN, COMM, and ERR indicator lights.

The PWR indicator should light when the PLC has power.

The Run light indicates that the PLC CPU is in run mode, which is the normal mode of operation.

The COMM indicator will flash during communication between the PLC and other devices.

The ERR light indicates that an error has occurred in the Central Processing Unit (CPU). With this indicator flashing the error is non-fatal and the processor will continue to run. If the indicator is continuous, the error is fatal and the processor will be shutdown. In the event of a fatal error contact the Heil technical support group.

1.02: Inputs

The PLC Inputs are activated by a positive +12 volt signal. All switches proximity, pressure, toggle, push buttons, etc., used as input devices to the PLC, supply a +12 volt signal to a PLC input to turn the input on. With an Input on, a corresponding LED indicator located on the face of the PLC will also be on.

1.03: Outputs

During each cycle the CPU will analyze the status of the inputs, and based upon the logic of the programming, will produce the appropriate +12v DC outputs. With an output on a corresponding LED indicator, located on the face of the PLC, will also be on.

1.04: Communication Ports

There are two communication ports on the face of the PLC, peripheral and RS232. The peripheral port will be the utilized to download user programs via the hand held loader (P/N: 108-7715-HHL). It will also be used to connect the Diagnostic Link.

1.05: Diagnostic Link

The Diagnostic Link is a hand held tool, which can be connected to the PLC through the peripheral port. The Diagnostic Link is not supported with this program.

1.06: Circuit Identification

The input and output circuits are identified by there point of origin at the PLC. Each connector on the PLC assembly is assigned a number P1 and P2. Each wire is also assigned a number representing the connector and pin number of its origin. Example, the wire exiting connector P1 on pin #10 will be identified "P1-10". The circuit identifications are detailed in the table below, as well as on a decal inside the lid of the PLC enclosure.

CONN	<u>I/O</u>	<u>CONN</u>	<u>I/O</u>	CONN	<u>I I/O</u>	<u>CONN</u>	<u>I/O</u>
<u>P1</u>	ADDRESS	<u>P1</u>	ADDRESS	<u>P2</u>	ADDRESS	<u>P2</u>	ADDRESS
P1-1	12.02	P1-21	12V OUT	P2-1	11.01 (R6)	P2-21	11.06 (R4)
P1-2	12.04	P1-22	12.00	P2-2	10.06 (R7)	P2-22	-
P1-3	11.05	P1-23	11.02	P2-3	10.03 (R8)	P2-23	-
P1-4	10.07	P1-24	00.00	P2-4	-	P2-24	12V OUT
P1-5	10.02	P1-25	10.01	P2-5	02.01	P2-25	02.03
P1-6	02.00	P1-26	02.04	P2-6	01.03	P2-26	01.07
P1-7	01.08	P1-27	-	P2-7	00.09	P2-27	00.11
P1-8	01.04	P1-28	01.02	P2-8	-	P2-28	00.01
P1-9	01.00	P1-29	GND	P2-9	12V IN	P2-29	GND
P1-10	00.08	P1-30	00.04	P2-10	12V IN	P2-30	GND
P1-11	12.05	P1-31	12V OUT	P2-11	11.03 (R5)	P2-31	12.01 (R3)
P1-12	11.07	P1-32	12.07	P2-12	-	P2-32	12.03 (R2)
P1-13	11.04	P1-33	GND	P2-13	-	P2-33	12.06 (R1)
P1-14	11.00	P1-34	10.05	P2-14	12V OUT	P2-34	12V OUT
P1-15	10.04	P1-35	10.00	P2-15	01.11	P2-35	02.05
P1-16	02.02	P1-36	02.06	P2-16	01.05	P2-36	01.09
P1-17	01.10	P1-37	02.10	P2-17	-	P2-37	00.07
P1-18	01.06	P1-38	GND	P2-18	00.05	P2-38	-
P1-19	00.10	P1-39	GND	P2-19	12V IN	P2-39	GND
P1-20	00.06	P1-40	00.02	P2-20	12V IN	P2-40	GND

I/O Listing

PROGR	AM NUMBER 109-0246		
RELEAS	SE LEVEL: ND		
	PROGRAM NUMBER: 109-0236	RAPID RAIL STANDARD O.I.G.A.I.	STARR O.I.N.
IN-CAB	INPUT FUNCTIONS		
A01	CHASSIS SERVICE BRAKE SIGNAL	P1-08 (01.04)	P1-08 (01.04)
A02	TRANS. TEMP. CIRCUIT	P1-26 (02.04)	P1-26 (02.04)
A03	SYSTEM POWER SWITCH	P1-16 (02.02)	P1-16 (02.02)
A04	CHASSIS NEUTRAL SIGNAL	P1-19 (00.10)	P1-19 (00.10)
A05	CHASSIS TACH. SIGNAL	P1-24 (00.00)	P1-24 (00.00)
A06	PACKER RIGHT BUTTON	P1-07 (01.08)	P1-07 (01.08)
A07	PACKER LEFT BUTTON	P1-10 (00.08)	P1-10 (00.08)
A08	MANUAL PACKER MODE BUTTON	P1-17 (01.10)	P1-17 (01.10)
A09	LIFT COORDINATED MODE BUTTON	P1-18 (01.06)	P1-18 (01.06)
A10	GRABBER CLOSE BUTTON	P1-06 (02.00)	P1-06 (02.00)
A11	GRABBER OPEN BUTTON	P1-09 (01.00)	P1-09 (01.00)
A12	UNDUMP BUTTON	P1-20 (00.06)	P1-20 (00.06)
A13	LOADER IN BUTTON	P1-37 (02.10)	P1-37 (02.10)
A14	LOADER OUT BUTTON	P1-40 (00.02)	P1-40 (00.02)
A15	LOADER UP BUTTON	P2-18 (00.05)	P2-18 (00.05)
A16	LOADER DOWN BUTTON	P2-23 (02.11)	P2-23 (02.11)
A17	LOADER DUMP BUTTON	P2-25 (02.03)	P2-25 (02.03)
IN-CAB	OUTPUT FUNCTIONS		
B01	FILTER BYPASS INDICATOR	P1-02 (12.04)	P1-02 (12.04)
B02	IN-CAB ALARM	P1-22 (12.00)	P1-22 (12.00)
B03	LOADER PUMP (PUMP #1)	P1-23 (11.02)	P1-23 (11.02)
B04	BODY PUMP (PUMP #2)	P1-35 (10.00)	P1-35 (10.00)
B05	PACK LEFT INDICATOR	P1-05 (10.02)	P1-05 (10.02)

B06	PACK RIGHT INDICATOR	P1-12 (11.07)	P1-12 (11.07)
B07	BODY/TAILGATE INDICATOR	P1-11 (12.05)	P1-11 (12.05)
B08	PACKER PRESSURE SWITCH INDICATOR	P1-15 (10.04)	P1-15 (10.04)
B09	СНІМЕ	P1-25 (10.01)	P1-25 (10.01)
B10	TRANS TEMP INDICATOR	P1-32 (12.07)	P1-32 (12.07)
BODY I	NPUT FUNCTIONS		
C01	BODY/TAILGATE RAISED ALARM	P2-07 (00.09)	P2-07 (00.09)
C02	LOADER IN PROXIMITY SWITCH	P2-37 (00.07)	P2-37 (00.07)
C03	LOADER DUMP PROXIMITY SWITCH	P2-27 (00.11)	P2-27 (00.11)
C04	PACKER PRESSURE SWITCH	P2-08 (00.03)	P2-08 (00.03)
C05	REVERSE SIGNAL	P2-04 (02.07)	P2-04 (02.07)
C06	PACKER PROXIMITY SWITCH	P2-05 (02.01)	P2-05 (02.01)
C07	FILTER PRESSURE SWITCH	P2-26 (01.07)	P2-26 (01.07)
C08	LOADER UNDUMP PROXIMITY SWITCH	P2-35 (02.05)	P2-35 (02.05)
C09	LOADER UP PROXIMITY SWITCH	P2-06 (01.03)	P2-37 (00.07)
C10	GRABBER OPEN PROXIMITY SWITCH	P2-13 (02.09)	P2-13 (02.09)
C11	COORDINATED IN PROXIMITY SWITCH	N/A	P2-15 (01.11)
C12	STARR JUMPER INPUT	N/A	P2-11 (01.01)
C12 BODY (STARR JUMPER INPUT	N/A	P2-11 (01.01)
C12 BODY 0 D01	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID	N/A P1-04 (10.07)	P2-11 (01.01) P1-04 (10.07)
C12 BODY (D01 D02	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID	N/A P1-04 (10.07) P1-13 (11.04)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04)
C12 BODY (D01 D02 D03	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06)
C12 BODY (D01 D02 D03 D04	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03)
C12 BODY (D01 D02 D03 D04 D05	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03)
C12 BODY (D01 D02 D03 D04 D05 D06	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID LOADER UP SOLENOID LOADER DOWN SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01)
C12 BODY (D01 D02 D03 D04 D05 D06 D07	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID LOADER UP SOLENOID LOADER DUWN SOLENOID LOADER DUWN SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-31 (12.01) P2-21 (11.06)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06)
C12 BODY (D01 D02 D03 D04 D05 D06 D07 D08	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID LOADER DOWN SOLENOID LOADER DUMP SOLENOID LOADER DUMP SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03)
C12 BODY (D01 D02 D03 D04 D05 D06 D07 D08 D09	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID LOADER DOWN SOLENOID LOADER DUMP SOLENOID LOADER RIGHT SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02)
C12 BODY (D01 D02 D03 D04 D05 D06 D07 D08 D09 D10	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID LOADER DOWN SOLENOID LOADER DOWN SOLENOID LOADER DUMP SOLENOID LOADER RIGHT SOLENOID PACKER RIGHT SOLENOID	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00)
C12 BODY (D01 D02 D03 D04 D05 D06 D07 D08 D09 D10 D11	STARR JUMPER INPUT STARR JUMPER INPUT GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID LOADER DOWN SOLENOID LOADER DUMP SOLENOID LOADER UNDUMP SOLENOID PACKER RIGHT SOLENOID PACKER LEFT SOLENOID LOADER LATCH	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-31 (12.01) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-33 (12.06) P2-11 (11.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06)
C12 BODY (D01 D02 D03 D04 D05 D06 D07 D08 D09 D10 D11 D12	STARR JUMPER INPUT DUTPUT FUNCTIONS GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER UP SOLENOID LOADER DUMP SOLENOID LOADER DUMP SOLENOID LOADER UNDUMP SOLENOID PACKER RIGHT SOLENOID PACKER LEFT SOLENOID LOADER LATCH REVERSE FLOOD LIGHTS	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06) P2-01 (11.01)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06) P2-01 (11.01)
C12 BODY (D01 D02 D03 D04 D05 D06 D07 D08 D09 D10 D11 D12 OPTION	STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT SOLENOID GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER DOWN SOLENOID LOADER DUMP SOLENOID LOADER UNDUMP SOLENOID PACKER RIGHT SOLENOID PACKER LEFT SOLENOID LOADER LATCH REVERSE FLOOD LIGHTS IN-CAB INPUT FUNCTIONS	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06) P2-01 (11.01)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06) P2-01 (11.01)
C12 BODY (D01 D02 D03 D04 D05 D06 D07 D08 D09 D10 D11 D12 OPTION N/A	STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT STARR JUMPER INPUT GRABBER CLOSE SOLENOID GRABBER OPEN SOELNOID LOADER IN SOLENOID LOADER OUT SOLENOID LOADER DOWN SOLENOID LOADER DUMP SOLENOID PACKER RIGHT SOLENOID PACKER LEFT SOLENOID LOADER LATCH REVERSE FLOOD LIGHTS NONE	N/A P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-32 (12.03) P2-31 (12.01) P2-21 (11.06) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06) P2-01 (11.01)	P2-11 (01.01) P1-04 (10.07) P1-13 (11.04) P2-33 (12.06) P2-31 (12.03) P2-32 (12.03) P2-31 (12.01) P2-03 (10.03) P1-01 (12.02) P1-14 (11.00) P2-02 (10.06) P2-01 (11.01) NONE

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N/A	NONE		NONE	NONE
OPTION	OPTION BODY INPUT FUNCTIONS			
G01	LOW ENGINE TORQUE PRESSURE SWITCH		P2-16 (01.05)	P2-16 (01.05)
G02	FIFTH WHEEL PROX		N/A	P2-36 (01.09)
OPEN E	BODY OUTPUT			
N/A	SPARE BODY OUTPUT		P1-03 (11.05)	P1-03 (11.05)
OPEN E	CODY INPUTS			
N/A	SPARE BODY INPUT		P2-36 (01.09)	N/A
N/A	SPARE BODY INPUT		P2-15 (01.11)	N/A
N/A	SPARE BODY INPUT		P2-17 (01.01)	N/A
N/A	SPARE BODY INPUT (LOADER)		P2-28 (00.01)	P2-28 (00.01)
OPEN I	N-CAB OUTPUTS			
N/A	SPARE IN-CAB OUTPUT		P1-34 (10.05)	P1-34 (10.05)
OPEN I	N-CAB INPUTS			
N/A	SPARE IN-CAB INPUT		P1-27 (02.08)	P1-27 (02.08)
N/A	SPARE IN-CAB INPUT		P1-28 (01.02)	P1-28 (01.02)
N/A	SPARE IN-CAB INPUT		P1-30 (00.04)	P1-30 (00.04)
N/A	SPARE IN-CAB INPUT		P1-36 (02.06)	P1-36 (02.06)

1.07: PLC Fusing

The PLC is equipped with multiple fuses located on circuit boards in the PLC enclosure. These fuses are detailed in the chart below as well as on the fuse decal inside the lid of the PLC enclosure. The fuse numbers are etched into the printed circuit board at each fuse location.

FUSE	FUSE	<u>I/O</u>	<u>OUTPUT</u>	<u>CIRCUIT</u>
NUMBER	RATTING	ADDRESS	RATTING	<u>I.D.</u>
F1	2A	10.00	2A	P1-35
F2	2A	10.01	2A	P1-25
F3	2A	10.02	2A	P1-05
		10.03	N/A	P2-03
F4	4A	10.04	2A	P1-15
		(R5) 10.05	N/A	P1-34
		10.06	2A	P2-02
		(R1) 10.07	N/A	P1-04
F5	5A	11.00	2A	P1-14
		11.01	2A	P2-01
		(R2) 11.02	N/A	P1-23
		11.03	2A	P2-11
F6	4A	11.04	2A	P1-13
		(R3) 11.05	N/A	P1-03
		11.06	2A	P2-21
		(R4) 11.07	N/A	P1-12
F7	4A	12.00	2A	P1-22
		12.02	2A	P1-01
F8	5A	12.04	2A	P1-02
		12.05	2A	P1-11
F9	8A	RELAY#1	4A	N/A
		RELAY#2	4A	N/A

FUSE	FUSE	<u>I/O</u>	<u>OUTPUT</u>	
NUMBER	RATTING	ADDRESS	RATTING	<u>I.D.</u>
F10	8A	RELAY#3	4A	N/A
		RELAY#4	4A	N/A
F11	8A	RELAY#5	4A	N/A
		RELAY#6	4A	N/A
F12	8A	RELAY#7	4A	N/A
		RELAY#8	4A	N/A
F13	5A	12V OUT	4A/5	N/A

Section 2: PLC Calibration Setup

When installing a PLC it will be necessary to complete the calibration setup procedure, detailed in this section.

2.01: Engine Idle Calibration

The engine idle calibration can be performed by two methods. The first method is through the diagnostic link. This method requires the engine to be at idle speed during calibration, and is performed by simply scrolling the engine idle speed set point to match the actual engine idle speed. Upon completion, verify the calibration by comparing the engine RPM to the chassis tachometer reading.

Requires the engine speed to be at 1000 RPM during calibration, and is performed as follows:

- a. Turn the System Power Switch Off
- b. Press and hold the Loader Down and Pack Left buttons for ten seconds or until the in-cab alarm begins to sound.
- c. Verify the calibration by checking the pump overspeed with the chassis tachometer reading.

Section 3: Default Parameters

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3.01 Program 109-0236 Parameter Defaults

Par	ameter	Default Setting
A.	Max Engage Speed (Pump 1, Loader)-	800 RPM
Β.	Max Operating Speed (Pump 1)	900 RPM
C.	Max Engage Speed (Pump 2, Body)	1700 RPM
D.	Max Operating Speed (Pump 2)	1800 RPM
E.	Start Filter Warning	5 Hours
F.	Start Filter Shutdown	6 Hours

Section 4: I/O Functions

The following sheets detail the functionality as well as provide circuit diagrams for each of the input and output function provided through the PLC.

4.01: Standard In-Cab Input Functions

A01 Input Function – Chassis Service Brake (In Cab Input 01.04)

This circuit monitors the on/off status of the chassis service brake. Used with Python lift only.

Function Logic

Input Device	Channel	LED Lamp	LED Status
A. Chassis Service Brake	1	04	ON (when brake applied)

Note: Reference function B03 and B09 for LED Status conditions during pump/chime operation.

A02 Input Function – Transmission Temp Signal (In Cab Input 02.04)

This circuit uses two methods to monitor the transmission fluid temperature. The first method uses a temperature switch with a 305°F set point. This switch is plumbed into the converter out transmission fluid line. The second method uses a relay to monitor the transmission temperature warning indicator output from the Allison ECU. This ECU output normally turns on when the transmission sump fluid temperature reaches 250°F.

Input Device	Channel	LED Lamp	LED Status
A. Trans Temp Relay	02	04	See Note

Note: Reference function B10 for LED Status conditions during system operation.

A03 Input Function – System Power Switch (In Cab Input 02.02)

This circuit monitors the on/off status of the system power switch.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. System Power Switch	2	02	ON

A04 Input Function – Transmission Neutral Signal (In Cab Input 00.10)

This circuit monitors the transmission neutral signal.

Default Parameters	Defau		
None	N/A		
Function Logic			
Input Device	Channel	LED Lamp	LED Status

-				
A. Chassis Transmission	0	10	ON	(Neutral Applied)

Note: Reference functions B03, B09, and B10 for LED Status conditions during system operation.

A05 Input Function – Chassis Alternator Signal (In Cab Input 00.00)

This circuit monitors the signal generated by the alternator "R" Stator. This signal is typically a -1.4V to +15V square wave, of which the frequency varies relative to engine speed. The PLC uses the Engine Idle, "Tach. Hz/2 at Engine Idle" and "Tach. Hz/2" parameters to form a proportional equation of which the result is engine RPM. This equation is executed every $\frac{1}{2}$ second. Note: The pulse may be too fast to see on the PLC.

Default Parameters	Default Setting		
Engine Idle	700		
<u>Function Logic</u> Input Device	Channel	LED Lamp	LED Status
"R" Stator Pulse	0	00	ON
"R" Stator Pulse	0	00	OFF

Default Setting

A06 Input Function – Packer Right Button (In Cab Input 01.08)

This circuit monitors the on/off status of the Pack Right push button.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Pack Right Button	1	08	ON (momentary)

Note: Reference function D09 for LED Status conditions during packer operation.

A07 Input Function – Pack Left Button (In Cab Input 00.08)

This circuit monitors the on/off status of the Pack Left push button.

Function Logic				
Input Device	Channel	LED Lamp	LED Status	
A. Pack Left Button	0	08	ON (momentary)	

Note: Reference function D10 for LED Status conditions during pack operation. The LED will also be lit during the PLC Calibration routine.

A08 Input Function – Manual Pack Mode Selector (In Cab Input 01.10)

This circuit monitors the on/off status of the Manual Pack Mode Selector switch.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Manual Pack Mode Selector	1	10	ON

Note: Reference functions D09 and D10 for LED Status conditions during pack operation. This switch places the packer in manual mode when the LED is ON.

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A09 Input Function – Lift Coordinated Mode Button (In Cab Input 01.06)

This circuit monitors the on/off status of the Lift Coordinated Mode Button.

Function Logic

Input Device	Channel	LED Lamp	LED Status
A. Lift Coordinated Mode Button	01	06	ON

Note: Reference functions D01, D02, D03, D04, D05, D06, D07, and D09 for **LED Status** conditions during system operation. This switch places the lift controls in coordinated mode when the LED is ON.

A10 Input Function – Grabber Close Push Button (In Cab Input 02.00)

This circuit monitors the on/off status of the grabber close push button.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Grabber Close Button	2	00	ON (momentary)

Note: Reference functions D01, D02, and D06 for LED Status conditions during lift operation.

A11 Input Function – Grabber Open Push Button (In Cab Input 01.00)

This circuit monitors the on/off status of the grabber open push button.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Grabber Open Button	1	00	ON (momentary)

Note: Reference functions B03, D01, and D02 for LED Status conditions during lift operation.

A12 Input Function – Loader Undump Push Button (In Cab Input 0.06)

This circuit monitors the on/off status of the Loader undump push button.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Loader undump Button	0	06	ON (momentary)

Note: Reference functions D08 for LED Status conditions during lift operation.

A13 Input Function – Loader In Push Button (In Cab Input 02.10)

This circuit monitors the on/off status of the Loader In push button.

Function Logic

Input Device	Channel	LED Lamp	LED S	tatus
A. Loader In Button	2	10	ON	(momentary)

Note: Reference functions D03 for LED Status conditions during lift operation.

A14 Input Function – Loader Out Push Button (In Cab Input 00.02)

This circuit monitors the on/off status of the Loader Out push button.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Loader Out Button	0	02	ON (momentary)

Note: Reference functions D04 for LED Status conditions during lift operation.

A15 Input Function – Loader Up Push Button (In Cab Input 00.05)

This circuit monitors the on/off status of the Loader Out push button.

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Function	0010	
1 unetion	Logic	

Input Device	Channel	LED Lamp	LED	<u>Status</u>
A. Loader Out Button	0	05	ON	(momentary)

Note: Reference functions D05 for LED Status conditions during lift operation.

A16 Input Function – Loader Down Push Button (In Cab Input 02.11)

This circuit monitors the on/off status of the Loader In push button.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Loader Down Button	2	11	ON (momentary)

Note: Reference functions D06 for LED Status conditions during lift operation.

A17 Input Function – Loader Dump Push Button (In Cab Input 02.03)

This circuit monitors the on/off status of the Loader In push button.

Function Logic

Input Device	Channel	LED Lamp	LED Status
A. Loader Dump Button	2	03	ON (momentary)

Note: Reference functions D07 for LED Status conditions during lift operation.

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4.02: Standard In-Cab Output Functions

B01 Output Function -- Filter Bypass Indicator (In Cab Output 12.04)

This output function controls the filter bypass indicator. Activation of this light indicates that the filter is or has been in bypass, within the past fifteen minutes. This indicator will flash, once for each accumulated hour of operation with the filter in bypass, then pause for approximately 3 seconds. Once the accumulated time has reached the "Start Filter Warning" time the indicator will become continuous. Once the accumulated time reaches the "Start Filter Shutdown" time Fault #32 will be set, the hydraulic pump will be disengaged and the indicator will flash continuously. Under this condition, the pump will only be allowed to operate in 3-minute intervals. Turning the System Power Switch off then on again will reset the 3-minute time interval. The pump will continue to operate in this fault mode until the hydraulic filter has been serviced and is no longer bypassing oil.

Default Parameters	Default Setting

А.	Start Filter	Warning	 5	Hours	

B. Start Filter Shutdown Warning ----- 6 Hours

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	Led Status
B. System Power Switch	2	02	ON
C. and Hydraulic Pump	11	02	ON
D. and Filter Pressure Switch	2	05	OFF
E. Filter Bypass Indicator	12	04	ON

Note: These conditions indicate that the filter is in bypass. Each time this condition occurs the indicator will continue the flash sequence for 15 minutes after bypass conditions have subsided. Under cold weather conditions, the hydraulic filter may go into bypass when low oil temperatures create a high oil viscosity. This will subside when the hydraulic system reaches operating temperature.

B02 Output Function – In-Cab Alarm (In Cab Output 12.00)

This output function controls the cab alarm circuit.

Default Parameters	Default Setting
A. None	N/A

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. Critical Fault	N/A	N/A	N/A
B. or System Fault	N/A	N/A	N/A
C. or Body/Tailgate Alarm	0	09	OFF
D. In-Cab Alarm	12	00	ON

Note: With either (A, B, or C) true, will activate the In-Cab Alarm (D).

B03 Output Function – Hydraulic Pump, Loader – P1 (In Cab Output 11.02)

This output function controls the hydraulic pump for the loader. Circuit will engage the pump upon activation of the chassis service brake or transmission neutral signal or upon pressing the Grabber Open push button.

Default Parameters	Default Setting

A. Pump Max. Engage Speed ------ 800 RPM

B. Pump Max. Operate Speed ------ 900 RPM

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power Switch	2	02	ON
B. Chassis Service Brake	1	04	ON (momentary)
C. or Chassis Neutral Signal	0	10	ON
D. or Grabber Open PB	1	00	ON (momentary)
E. Hydraulic Pump	11	02	ON

Note: With condition A true, condition B, C, or D will operate pump (E) within the RPM range indicated.

B04 Output Function – Hydraulic Pump, Body – P2 (In Cab Output 10.00)

This output function controls the hydraulic pump for the body functions. Circuit will engage when the engine speed is in the range indicated.

Default Parameters	Default Setting

A. Pump Max. Engage Speed ----- 1700 RPM

B. Pump Max. Operate Speed ----- 1800 RPM

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power Switch	2	02	ON
B. Low Engine Torque PSW (Optional)	1	05	OFF
C. Hydraulic Pump	10	00	ON

Note: With conditions (A and B) true the pump (C) will operate within the RPM range indicated.

B05 Output Function – Packer Left Indicator (In Cab Output 10.02)

This output function controls the indicator lamp for the Pack Left function.

Default Parameters	Default Setting
A. None	N/A

Conditions Necessary to activate the circuit			
Function or Component	Channel	LED Lamp	LED Status
A. Pack Left Solenoid	11	00	ON
B. Pack Left Indicator	10	02	ON

Note: With condition (A) true, the Pack Left Indicator (B) will activate.

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B06 Output Function – Packer Right Indicator (In Cab Output 11.07)

This output function controls the indicator lamp for the Pack Right function.

Default Parameters	Default Setting		
A. None	N/A		
Conditions Necessary to activate the	<u>circuit</u>		
Function or Component	Channel	LED Lamp	LED Status
A. Pack Right Solenoid	12	02	ON
B. Pack Right Indicator	11	07	ON

Note: With condition (A) true, the Pack Right Indicator (B) will activate.

B07 Output Function – Body/Tailgate Indicator (In Cab Output 12.05)

This output function controls the Body/Tailgate Indicator circuit.

Default Parameters	Default Setting
A. None	- N/A

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. Body/Tailgate Alarm	0	09	ON
B. Body/Tailgate Indicator	12	05	ON

Note: With condition (A) true the Body/Tailgate Indicator (B) will activate.

B08 Output Function – Packer Pressure Switch Indicator (In Cab Output 10.04)

This output function controls the Packer Pressure Switch indicator.

Default Parameters	Default Setting
A. None	N/A

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. Packer Pressure Switch	0	03	ON
B. Packer Pressure Switch Indicator	10	04	ON

Note: With condition (A) true, the Packer Pressure Switch (B) will activate.

B09 Output Function – In-Cab Chime (In Cab Output 10.01)

This output function controls In-Cab Chime.

Default Parameters	Default Setting
None	N/A
Conditions Necessary to activate the circuit	

U.	nutions i teessui j to activate the chedit			
	Function or Component	Channel	LED Lamp	LED Status
	A. Body/Tailgate Alarm	0	09	ON
	B. Loader In Prox	0	07	OFF
	C. Chassis Neutral Signal	0	10	OFF
	D. Chassis Service Brake	1	04	OFF
	E. In-Cab Chime	10	01	ON

Note: With condition (A) true or conditions (B and C and D) true, the In-Cab Chime circuit (E) will activate.

B10 Output Function – Transmission Temperature Indicator (In Cab Output 12.07)

This output function controls the transmission indicator light

Default Parameters	Default Setting
A. None	- N/A

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. Trans Temp Relay	2	04	OFF
B. Trans Temp Indicator	12	07	ON

Note: With condition (A) true, the indicator (B) will flash, once per second, when Fault #31 is set. This indicates the transmission fluid temperature has exceeded a safe operating range.

Lamp

LED Status

4.03: Standard Body Input Functions

C01 Input Function – Body/Tailgate Raised Alarm Proximity Switch (Body Input 00.09)

This circuit monitors the on/off status of the Body/Tailgate Raised proximity switch.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Body/Tailgate Alarm	0	09	See Note

Note: Reference functions B07 and B09 for LED Status conditions.

<u>C02</u> Input Function – Loader In Proximity Switch (Body Input 00.07)

This circuit monitors the on/off status of the Loader In proximity switch.

Function Logic		
Input Device	Channel	LED
A. Loader In Proximity Switch	0	07

A. Loader In Proximity Switch007See Note

Note: Reference functions B09 and D03 for LED Status conditions.

C03 Input Function – Loader Dump Proximity Switch (Body Input 00.11)

This circuit monitors the on/off status of the Loader Dump Proximity Switch.

Input Device	Channel	LED Lamp	LED Status
A. Loader Dump Prox. Sw.	0	11	See Note

Note: Reference functions D02 and D07 for LED Status conditions during operation.

C04 Input Function – Packer Pressure Switch (Body Input 00.03)

This circuit monitors the on/off status of the packer pressure switch.

Function Logic

Input Device	Channel	LED Lamp	LED Status
A. Packer Pressure Switch	0	03	See Note

Note: Reference functions B08, D09, and D10 for LED Status conditions during operation.

C05 Input Function – Chassis Reverse Signal (Body Input 02.07)

This circuit monitors the on/off status of the Chassis Reverse signal.

Function Logic

Input Device	Channel	LED Lamp	LED Status
A. Chassis Reverse Signal	2	07	See Note

Note: Reference function D12 for LED Status conditions during operation.

C06 Input Function – Packer Proximity Switch (Body Input 02.01)

This circuit monitors the on/off status of the Packer proximity switch.

Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Packer Proximity Switch	2	01	See Note
lote: Reference functions D09 and D	10 for LED Sta	atus conditions du	ring operation.
C07 Input Function – Filter P	ressure Swi	tch (Body Inpu	ıt 01.07)
This circuit monitors the on/off st	atus of the filte	er pressure switch.	
Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Filter Pressure Switch	1	07	See Note
Note: Reference function B01 for LEI	D Status condi	tions during operat	tion.
		8 -F	
<u>C08 Input Function – Loader</u>	Undump P	roximity Switc	<u>h (Body Input 0</u>
This circuit monitors the on/off st	atus of the load	ler undump proxin	nity switch.
т (т .			
Function Logic	Channal	I ED Low-	I ED Statuc
A Loader Undump Prox Switch	<u>2</u>	<u>LED Lamp</u> 05	<u>See Note</u>
The Douder Chaunip Prox Switch	2	00	50011010
Note: Reference function D08 for LEI	D Status condi	tions during operat	tion.
C00 Input Function I and an	Un Duovins	ity Switch (Doc	Jy Innut ()1 ()2)
CO9 Input Function – Loader	UP Proxim	ler up provimity su	<u>iy input 01.03)</u>
This circuit monitors the on/on st	atus of the load	ier up proximity sv	vitcii.
Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Loader Up Prox Switch	1	03	See Note
Note: Reference function D05 for LEI	D Status condi	tions during operat	tion.
	a –		
<u>C10 Input Function – Grabbe</u>	<u>r Open Pro</u>	ximity Switch	(Body Input 02.
This circuit monitors the on/off st	atus of the grat	ober open proximit	y switch.
Function Logic			
Input Device	Channel	LED Lamp	LED Status
A. Grabber Open Prox Switch	2	09	See Note
*			
Note: Reference function D05 for LEI	D Status condi	tions during operat	tion.

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C11 Input Function – Coordinated In Proximity Switch - STARR (Body Input 01.11)

This circuit monitors the on/off status of the coordinated in proximity switch.

Function Logic

Input Device	Channel	LED Lamp	LED Status
A. Coordinated In Proximity Switc	h 1	11	See Note

Note: Reference function D03 for LED Status conditions during operation. For STARR units only.

C12 Input Function – STARR Jumper Input - STARR (Body Input 01.01)

This circuit monitors the on/off status of the STARR jumper input. This input is a jumper located near the In proximity switch that allows the program to automatically determine that this is a STARR unit instead of a standard Rapid Rail.

Function Logic

Input Device	Channel	LED Lamp	LED Status
A. STARR jumper input	1	01	See Note

Note: Reference function D03 for LED Status conditions during operation.

4.04: Standard Body Output Functions

D01 Output Function – Grabber Close Output (Body Output 10.07)

This output function controls the Grabber Close Output. This output will close the grabbers by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	Default Setting
A Crobber Class Time	08522

A. Grabber Close Time ----- 0.8 Sec.

Conditions Necessary to activate the circuit

Channel	LED Lamp	LED Status
2	02	ON
1	06	(See Note)
2	00	ON
1	00	OFF
11	02	ON
10	07	ON
	<u>Channel</u> 2 1 2 1 1 1 11 10	Channel LED Lamp 2 02 1 06 2 00 1 00 11 02 10 07

Note: With condition (A) true and condition (B) OFF, condition (C, D, and E) will activate the Grabber Close Output (F). With condition (A) true, and condition (B) ON, conditions (C and E) will activate the Grabber Close Output (F) for ca. 0.8 seconds then raise the loader for dumping.

D02 Output Function – Grabber Open Output (Body Output 11.04)

This output function controls the Grabber Open Output. This output will open the grabbers by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	De	efault Setting
A. Grabber Open Time		0.5 Sec.

Conditions Necessary to activate the circuit			
Function or Component	Channel	LED Lamp	LED Status
A. System Power	2	02	ON
B. Lift Coordinated Mode Button	1	06	(See Note)
C. Grabber Open Button	1	00	ON
D. Grabber Close Button	2	00	OFF
E. Loader Dump Proximity Sw.	0	11	OFF
F. Hydraulic Pump, Loader, P1	11	02	ON
G. Grabber Open Output	11	04	ON

Note: With condition (A) true and condition (B) OFF, conditions (C, D, E, and F) will activate the Grabber Open output (G). With condition (A) true and condition (B) ON, conditions (C, E, and F) will activate the Grabber Open output (G) for 0.5 seconds and as long as condition (C) is true.

D03 Output Function -- Loader In Output (Body Output 12.06)

This output function controls the Loader In output. This output will retract the loader by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	Default Setting
A Grabber Close Time	0.8 Sec

A. Glabbel Close Time	0.0 Sec.
B. Grabber Open Time	0.5 Sec.

Conditions Necessary to activate the circuit

Channel	LED Lamp	LED Status
2	02	ON
1	06	(See Note)
2	10	ON
0	07	OFF
2	00	ON
1	00	ON
1	01	(See Note)
1	11	ON (STARR ONLY)
12	06	ON
	Channel 2 1 2 0 2 1 1 12	Channel LED Lamp 2 02 1 06 2 10 0 07 2 00 1 00 1 01 1 11 12 06

Note: With condition (A) true and condition (B) OFF, condition (C) will activate the Loader In output while condition (D) is met. With condition (A) true and condition (B) ON, condition (C) will activate the output or condition (E) will activate the output after 0.8 seconds or condition (F) will activate the output after 0.5 seconds until the following occurs: If condition (G) is OFF, condition (D) will deactivate the output. If condition (G) is ON, condition (H) will deactivate the output.

D04 Output Function -- Loader Out Output (Body Output 11.03)

This output function controls the Loader Out output. This output will extend the loader by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	Default Setting
A. None	N/A

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power	2	02	ON
B. Lift Coordinated Mode Button	1	06	(See Note)
C. Loader Out Button	0	02	ON
D. Hydraulic Pump, Loader, P1	11	02	ON
E. Loader Out Output	11	03	ON

Note: With condition (A) true and condition (B) OFF, conditions (C) and (D) will activate the Loader Out output (E). With condition (A) true and condition (B) ON, conditions (C) and (D) will activate the output.

D05 Output Function -- Loader Up Output (Body Output 12.03)

This output function controls the Loader Up output. This output will raise the loader by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	Default Set	ting
A. Grabber Close Time	1.2 Sec.	

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power	2	02	ON
B. Lift Coordinated Mode Button	1	06	(See Note)
C. Loader Up Button	0	05	ON
D. Grabber Close Button	2	00	ON
E. Hydraulic Pump, Loader, P1	11	02	ON
F. Loader Up Prox Sw	1	03	OFF
G. Grabber Open Prox Sw	2	09	OFF
H. Fifth Wheel Prox (STARR)	1	09	OFF
I. Loader Up Output	12	03	ON

Note: With conditions (A), (E) and (H) true and condition (B) OFF, condition (C) will activate the Loader Up output (I) if condition (G) is true. With condition (A), (E) and (H) true and condition (B) ON and (F, and G) OFF, condition (C) will activate the output or condition (D) will activate the output after 0.8 seconds until condition (D) is released. In either state (i.e. condition (B) on or off), if condition (G) is true (i.e. OFF) then the lift will raise normally. If condition (G) is false (i.e. ON) then the lift will raise for 0.3 seconds then stop to prevent damage to the body of the unit.

D06 Output Function -- Loader Down Output (Body Output 12.01)

This output function controls the Loader Down output. This output will lower the loader by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	Default Setting
A. Loader Un-dump Time	0.5 Sec.

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power	2	02	ON
B. Lift Coordinated Mode Button	1	06	(See Note)
C. Loader Down Button	2	11	ON
D. Loader Un-Dump Button	0	06	ON
E. Hydraulic Pump, Loader, P1	11	02	ON
F. Loader Down Output	12	01	ON

Note: With condition (A) true and condition (B) OFF, conditions (C) and (E) will activate the Loader Down output (F). With condition (A) true and conditions (B) and (E) ON, condition (C) will activate the output or condition (D) will activate the output after 0.5 seconds until condition (D) is released.

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D07 Output Function -- Loader Dump Output (Body Output 11.06)

This output function controls the Loader Dump output. This output will dump the grabbers by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	Default Setting
A. None	N/A

Conditions Necessary to activate the circuit

Function or Component	<u>Channel</u>	LED Lamp	LED Status
A. System Power	2	02	ON
B. Lift Coordinated Mode Button	1	06	(See Note)
C. Loader Dump Button	2	03	ON
D. Grabber Close Button	2	00	ON
E. Loader Dump Proximity Sw.	0	11	ON
F. Hydraulic Pump, Loader, P1	11	02	ON
G. Loader Dump Output	11	06	ON

Note: With condition (A) true and condition (B) OFF, conditions (C) and (F) will activate the Loader Dump output (G). With condition (A) true and conditions (B) ON and (E) true, condition (C) will activate the output or conditions (D) and (E) will activate the output.

D08 Output Function -- Loader Un-Dump Output (Body Output 10.03)

This output function controls the Loader Un-Dump output. This output will un-dump the grabbers by activating either a solenoid or a relay depending on the control package ordered.

Default Parameters	Default Setting
	0 7 0

A. Un-dump Time ----- 0.5 Sec.

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power	2	02	ON
B. Lift Coordinated Mode Button	1	06	(See Note)
C. Loader Un-Dump Button	0	06	ON
D. Hydraulic Pump, Loader, P1	11	02	ON
E. Loader Un-Dump Prox Sw	2	05	OFF
F. Loader Un-Dump Output	10	03	ON

Note: With condition (A) true and condition (D) ON and conditions (B,and E) OFF, condition (C) will activate the Loader Un-Dump output (E). With condition (A) true and conditions (B, and D) ON and condition (E) OFF, condition (C) will activate the output then 0.5 seconds later the lift will lower

D09 Output Function – Pack Right Solenoid (Body Output 12.02)

This output function controls the Pack Right solenoid.

Default Parameters	Default Setting
A. Packer Reverse Delay	0.5 Sec.
B. Packer Startup Time	5.0 Sec.

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power	2	02	ON
B. Hydraulic Pump, Body, P2	10	00	ON
C. Manual Packer Button	1	10	(See Note)
D. Packer Right Button	1	08	ON
E. Packer Proximity Switch	2	01	ON
F. Packer Pressure Switch	0	03	ON
G. Pack Right Solenoid	12	02	ON

Note: With conditions (A) and (B) true, and condition (C) ON, condition (D) will activate the Pack Right solenoid (G). With conditions (A) and (B) true, condition (C) OFF the packer will oscillate between Pack Left and Pack Right. When either conditions (E) or (F) are met the packer will reverse after 0.5 seconds. Turning the vehicle off and then on with the Packer in Auto (condition (C) OFF) will allow the Packer to continue from it's previous location. (i.e. in auto-mode, the packer remembers it's location and continues to pack from there.)

D10 Output Function – Pack Left Solenoid (Body Output 11.00)

This output function controls the Pack Left solenoid.

Default Parameters	Default Setting
A. Packer Reverse Delay	0.5 Sec.
B. Packer Startup Time	5.0 Sec.

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. System Power	2	02	ON
B. Hydraulic Pump, Body, P2	10	00	ON
C. Manual Packer Button	1	10	(See Note)
D. Packer Left Button	0	08	ON
E. Packer Proximity Switch	2	01	ON
F. Packer Pressure Switch	0	03	ON
G. Pack Left Solenoid	11	00	ON

Note: With conditions (A) and (B) true and condition (C) ON, condition (D) will activate the Pack Left solenoid (G). With conditions (A) and (B) true and condition (C) OFF the packer will oscillate between Pack Left and Pack Right. When either conditions (E) or (F) are met the packer will reverse after 0.5 seconds. Turning the vehicle off and then on with the Packer in Auto (condition (C) OFF) will allow the Packer to continue from it's previous location. (i.e. in auto-mode, the packer remembers it's location and continues to pack from there.) If condition (C) is "cycled" (i.e. turned ON then OFF again regardless of the period of time) the Pack Left solenoid will energize for a minimum of 5 seconds. Conditions (E) and (F) will be ignored during this 5 seconds. After the initial 5 seconds the pack will oscillate as normal (if condition (C) is OFF).

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D11 Output Function – Loader Latch Solenoid (Body Output 10.06)

This output function controls the Loader Latch solenoid.

Default Parameters	Default Setting

A. None ----- N/A

Conditions Necessary to activate the circuit			
Function or Component	Channel	LED Lamp	LED Status
A. Loader Pump Output	11	02	ON
B. Loader Latch Solenoid	10	06	ON

Note: With condition (A) true, the Loader Latch Solenoid (B) will be activated.

D12 Output Function – Reverse Flood Lights (Body Output 11.01)

This output function controls the Reverse Flood Light output.

Default Parameters	Default Setting
A. None	N/A

Conditions Necessary to activate the circuit

Function or Component	Channel	LED Lamp	LED Status
A. Chassis Reverse Signal	2	07	ON
B. Reverse Flood Lights Output	11	01	ON

Note: With condition (A) true, the Reverse Flood Lights output (B) will be activated.

4.05: Optional In-Cab Input Functions

Not Applicable.

4.06: Optional In-Cab Output Functions

Not Applicable.

4.07: Optional Body Input Functions

<u>G01 Input Function – Low Engine Torque Pressure Switch (Body Input 01.05)</u>

This circuit monitors the on/off status of the low engine torque pressure switch.

Function Logic

Input DeviceChannelLED LampLED StatusA. Low Engine Torque Pressure Switch105See Note

Note: Reference function B04 for LED Status conditions during operation.

<u>G02 Input Function – Fifth Wheel Proximity Switch (STARR) (Body Input 01.09)</u></u>

This circuit monitors the on/off status of the fifth wheel proximity switch. This input is only used on STARR units.

Function Logic

Input Device	Channel	LED Lamp	<u>LED Status</u>
A. Fifth Wheel Prox Switch	1	09	See Note

Note: Reference function D05 for LED Status conditions during operation.

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4.08: Optional Body Output Functions

Not Applicable.

Section 5: Special Features

5.01: Auto/Manual Pack Mode

Auto/Manual Pack Mode is a standard feature on all PLC controlled products. While in Auto Mode the packer will make an approx. 180° sweep continuously pausing for 0.5 seconds at the end of each sweep (or when the packer pressure switch is seen during the sweep). While in manual mode it will be necessary to hold the packer left or pack right buttons in order to sweep the packer. Manual/Auto Mode is controlled by a rocker switch located on the control panel.

5.02: Coordinated Lift/Manual Lift Mode

This unit is equipped with Coordinated Lift Mode. In Coordinated Lift Mode, the Loader is extended manually by pressing the Loader Out button. Pressing and holding the Grip button will grip a can and approx. 1 second later start the loader in and up, dumping the can when the dump proximity switch is reached. Pressing and holding the Un-dump button will un-dump the can and bring the loader arm down. The loader is then manually extended. Pressing and holding the Release button will release the can then retract the loader arm. In Manual Mode all of the functions of the loader arm are activated by the loader buttons. Manual/Auto mode is controlled by a rocker switch located on the control panel.

Section 6: Diagnostics

6.01: Testing I/O Voltage

To test the voltage at an input or output terminal a Digital Multi Meter is always the best tool. Incandescent test lights cannot be used to test inputs from certain electronic input devices, the amperage required to light and incandescent tester may exceed the maximum output of the device. If using a test light it must be an LED type tester. Upon inspection of the PLC assembly, note that there are through holes in the upper circuit boards. These holes provide test probe access to the lower I/O terminals.

6.02: Monitoring Input Status

Input status can be determined by the state of the LED indicators located on the face of the PLC.

6.03: Monitoring Output Status

Output status can be determined by the state of the LED indicators located on the face of the PLC.

6.04: Diagnostic Beep Codes

Each Diagnostic code consists of a two-digit number. When a fault has been set the In-Cab Alarm will sound for 5 seconds, then pause. Then beep a number of times specifying the first digit of the code, pause for 2 seconds. Then resume to beep a number of times specifying the second digit of the code. Fault information can also be accessed through the Diagnostic Link.

There are two classes of faults the first is a system fault. A system fault indicates a possible electrical problem with some part of a specific circuit. The second is a Critical Fault. A critical fault indicates that a problem is occurring which, has or will shut the hydraulic pump system down.

6.06: Critical Faults

• Fault #31- High Transmission Temperature

Operate In Gear At Idle systems monitor the temperature of the transmission sump fluid and the fluid flowing out of the torque converter to the cooler. This fault will be set when either of these temperature levels exceed operating range. The maximum operating temperature for the transmission sump fluid is 250°F. The maximum operating temperature for the converter out fluid is 300°F.

Indication: A. The transmission temperature has exceeded a safe operating range. B. An open has occurred in the Trans. Temp. input circuit.

Disabled Functions: Hydraulic Pump

Fault Reset: In order to reset this fault:

- 1. the trans. must be placed in neutral range
- 2. and the engine must be running at or above idle speed
- 3. and the trans. temperature. must cool to a safe level and remain at a safe level for three minutes.

• Fault #32- Filter Bypass Shutdown

The hydraulic system has been operating in bypass condition in excess of the number of hours set by the Start Filter Shutdown parameter.

Indications: The hydraulic filter needs servicing

Disabled Functions: Hydraulic Pump

<u>Fault Reset:</u> Cycling the System Power Switch will allow three minutes of further operation or service hydraulic filter

• Fault #41- Engine Speed Not Detected _

The PLC is unable to correctly count the R stator pulse.

B. C. C.

A.

Indication: A. Intermittent connection in the R Stator input circuit. B. Invalid R Stator Signal due to a faulty alternator output. The ignition switch has been left in the run position with the engine shutdown.

Disabled Functions: Hydraulic Pump

Fault Reset: Self reset upon restoration of the R Stator circuit.

• Fault #42- Loss of Engine Idle Calibration _

The Engine Idle parameter has been erased from memory.

Indication: A. Engine Idle needs to be calibrated. B. Internal data storage device has malfunction. Replace PLC

Disabled Functions: Hydraulic Pump

<u>Fault Reset</u>: Cycling the System Power Switch will allow three minutes of further operation or complete the engine speed calibration procedure.

• Fault #43- Loss of Engine Tach. Calibration

The Tach. Hz./2 at Engine Idle has been erased from PLC memory.

Indication: ____A. Engine speed needs to be calibrated. B. Internal data storage device has malfunction. Replace PLC

Disabled Functions: Hydraulic Pump

<u>Fault Reset</u>: Cycling the System Power Switch will allow three minutes of further operation or complete the engine speed calibration procedure.

6.07: System Faults

• Fault #54- Filter Bypass Switch Fault _

The PLC has lost the signal from the filter pressure switch while neither hydraulic pump was in operation. This is recognized as a fault because there should be no hydraulic pressure to bypass the filter under this condition.

Indication: ____A. The filter bypass pressure switch has been disconnected.

- B. An open has occurred in the filter bypass input circuit.
- C. The filter pressure switch has failed open.

Disabled Functions: None

<u>Fault Reset:</u> Cycle System Power Switch or Restore filter pressure switch input to PLC

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

SECTION 8 SCHEMATICS

DuraPack[®] 4060 Schematics

PACKARD CONNECTION KIT, 108-4827


DuraPack[®] 4060 Schematics

PACKARD CONNECTION KIT, 108-4827

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-4827	KIT, Packard connection		REF
1	108-4827-001	CONNECTION, 1-Way Male		20
2	108-4827-002	CONNECTION, 1-Way Female		20
3	108-4827-003	CONNECTION, 2-Way Male		20
4	108-4827-004	CONNECTION, 2-Way Female		20
5	108-4827-005	CONNECTION, 3-Way Male		20
6	108-4827-006	CONNECTION, 3-Way Female		20
7	108-4827-007	CONNECTION, 4-Way Male		20
8	108-4827-008	CONNECTION, 4-Way Female		20
9	108-4827-009	CONNECTION, 6-Way Male		20
10	108-4827-010	CONNECTION, 6-Way Female		20
11	108-4827-110	TERMINAL, Male (18-20 AWG)		60
12	108-4827-111	TERMINAL, Male (16-14 AWG)		200
13	108-4827-112	TERMINAL, Male (10-12 AWG)		60
14	108-4827-120	TERMINAL, Female (18-20 AWG)		60
15	108-4827-121	TERMINAL, Female (16-14 AWG)		200
16	108-4827-122	TERMINAL, Female (10-12 AWG)		60
17	108-4827-130	SEAL, Cable – (20 GA)		20
18	108-4827-131	SEAL, Cable – (18 GA)		100
19	108-4827-132	SEAL, Cable – (16-14 GA)		400
20	108-4827-133	SEAL, Cable – (12 GA)		100
21	108-4827-134	PLUG, Cavity		20
22	108-4828-001	TOOL, Installation		1
23	108-4828-002	TOOL, Removal		1
24	108-4827-014	SEAL, 1-Way Female Connection		A/R
25	108-4827-015	SEAL, 2-Way Female Connection		A/R
26	108-4827-016	SEAL, 3-Way Female Connection		A/R
27	108-4827-017	SEAL, 4-Way Female Connection		A/R
28	108-4827-018	SEAL, 6-Way Female Connection		A/R
29	108-4827-200	GREASE, Trucklite, NYK		A/R
30	108-4827-020	CONNECTION, 2-Way Male		A/R
31	108-4827-211	CONNECTION, 4 Way Male		A/R
32	108-4827-212	CONNECTION, 4 Way Female		A/R

Schematics

CONNECTORS, PLUGS, PINS AND ACCESSORIES FOR DEUTSCH ELECTRICAL PARTS, 108-4815







PINS AND SOCKETS

GOLD PINS & SOCKETS

108-4815-120	PIN (12-14 GA)
108-4815-121	SOCKET (12-14 GA)
108-4815-124	PIN (14-16 GA)
108-4815-125	SOCKET (14-16 GA)
108-4815-122	PIN (16-18 GA)
108-4815-123	SOCKET (16-18 GA)
108-4815-126	PIN (20-24 GA)
108-4815-127	SOCKET (20-24 GA)

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PLASTIC CONNECTOR SHELLS 108-4815-018





108-4815-018	8 (Socket) PLUG (12 GA)
108-4815-020	21-PIN RÉCEPTACLE
108-4815-021	21-PIN SOCKET
108-4815-022	19-PIN RECEPTACLE
108-4815-023	19-PIN SOCKET
108-4815-024	23-PIN RECEPTACLE
108-4815-025	23-PIN SOCKET
108-4815-030	31 PIN RECEPTACLE
108-4815-031	31 SOCKET PLUG
108-4815-032	16 PIN PLUG
108-4815-033	16 SOCKET RECEPTACLE
108-4815-034	16 PIN RECEPTACLE
108-4815-035	16 SOCKET RECEPTACLE
108-4815-036	16 PIN RECEPTACLE
108-4815-037	29 PIN RECEPTACLE
108-4815-038	9 SOCKET RECEPTACLE
108-4815-068	29 SOCKET PLUG WITH RING ADAPTER
108-4815-069	9 SOCKET PLUG WITH RING ADAPTER
108-4815-070	8 PIN RECEPTACLE (12-16)
108-4815-071	8 PIN PLUG (12-16)
108-4815-420	21 PIN RECEPTACLE
108-4815-430	31 PIN RECEPTACLE
108-4815-424	23 PIN RECEPTACLE
108-4815-425	9 PIN PLUG
108-4815-432	9 PIN RECEPTACLE
108-4815-431	21 PIN PLUG
108-4815-019	14 PIN PLUG
108-4815-200	47 PIN PLUG
108-4815-201	47 PIN RECEPTACLE
108-4815-202	47 PIN RECEPTACLE
108-4815-203	21 PIN PLUG
108-4815-204	24 RECEPTACLE
108-4815-205	24 PLUG
108-4815-206	24 RECEPTACLE
108-4815-207	24 PLUG
108-4815-208	18 RECEPTACLE
108-4815-209	18 PLUG

DuraPack[®] 4060 Schematics



ACCESSORIES



108-4815-150	PANEL NUT, 24 SHELL
108-4815-151	LOCKWASHER, 24 SHELL
108-4815-152	STRAIN RELIEF STRAIGHT 24
108-4815-153	STRAIN RELIEF 90° 24
108-4815-154	PANEL NUT, 18 SHELL
108-4815-155	LOCKWASHER, 18 SHELL
108-4815-156	STRAIN RELIEF STRAIGHT 18
108-4815-157	STRAIN RELIEF 90° 18
108-4815-158	REMOVAL TOOL (6 GA)
108-4815-159	REMOVAL TOOL (8-10 GA)
108-4815-160	REMOVAL TOOL (12-14 GÁ)
108-4815-161	REMOVAL TOOL (16-18 GA)
108-4815-162	REMOVAL TOOL (20-24 GA)
108-4815-163	CRIMP TOOL (12-24 GA)
108-4815-164	CRIMP TOOL (6-10 GA)
108-4815-165	RECEPTACLE CAP. 18 PIN
108-4815-166	RECEPTACLE CAP, 24 PIN
108-4815-167	PLUG CAP, 18 PIN
108-4815-168	PLUG CAP, 24 PIN
108-4815-169	****
108-4815-170	DT SCREWDRIVER TOOL
108-4815-180	PANEL NUT, 18 SHELL
108-4815-181	LOCKWASHER, 18 SHELL
108-4815-186	BACKSHELL, 90°, 24 SHELL
108-4815-187	BACKSHELL, STRAIGHT, 24
108-4815-188	LG COMPRESSION BACKSHELL
108-4815-189	LG COMPRESSION NUT
108-4815-190	SM COMPRESSION BACKSHELL
108-4815-191	SM COMPRESSIONS NUT
108-4815-192	BACKSHELL, 90°, 18 SHELL
108-4815-193	BACKSHELL, STRAIGHT 18

KIT 108-4815 IS COMPRISED OF THE FOLLOWING:
• 108-4815-021
• 108-4815-121
• 108-4815-124
• 108-4815-150

• 108-4815-151

KIT 108-4815-027 IS COMPRISED OF THE FOLLOWING:

- 108-4815-021
- 108-4815-121
- 108-4815-125

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Schematics

DEUTSCH DT SERIES CONNECTOR KITS, 108-8411

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-8411	KITS, Deutsch Connector, DT Series		REF
1	108-8411-001	KIT, Deutsch Connector, DT Series		REF
-	108-8411-02R	RECEPTACLE, 2-Way		1
-	108-4815-401	PIN, Gold 12 AWG		2
-	108-8411-2RW	RECEPTACLE, 2-Way Wedge		1
-	108-6461-100	PLUG, Sealing		2
-	108-8411-2RB	BOOT, Receptacle		1
2	108-8411-002	KIT, Deutsch Connector, DT Series		REF
-	108-8411-02P	PLUG, 2-Way		1
-	108-4815-301	PIN. Gold 12 AWG		2
-	108-8411-2PW	PLUG, 2-Way Wedge		1
-	108-6461-100	PLUG, Sealing		2
-	108-8411-2RB	BOOT, Plug		1
3	108-8411-003	KIT, Deutsch Connector, DT Series		REF
-	108-8411-04R	RECEPTACLE, 4-Way		1
-	108-4815-401	PIN, Gold 12 AWG		4
-	108-8411-4RW	RECEPTACLE, 4-Way Wedge		1
-	108-6461-100	PLUG, Sealing		2
-	108-8411-4RB	BOOT, Receptacle		1
4	108-8411-004	KIT, Deutsch Connector, DT Series		REF
-	108-8411-04P	PLUG, 4-Way		1
-	108-4815-301	PIN, Gold 12 AWG		4
-	108-8411-4PW	PLUG, 4-Way Wedge		1
-	108-6461-100	PLUG, Sealing		2
-	108-8411-4PB	BOOT, Plug		1
5	108-8411-005	KIT, Deutsch Connector, DT Series		REF
-	108-8411-22R	RECEPTACLE, 2-Way Mounted		1
-	108-4815-401	PIN, Gold 12 AWG		2
-	108-8411-2RW	RECEPTACLE, 2-Way Wedge		1
-	108-6461-100	PLUG, Sealing		2
-	108-8411-2RB	BOOT, Receptacle		1
6	108-8411-006	KIT, Deutsch Connector, DT Series		REF
-	108-8411-24R	RECEPTACLE, 4-Way Mounted		1
-	108-4815-401	PIN, Gold 12-AWG		4
-	108-8411-4RW	RECEPTACLE, 4-Way Wedge		1
-	108-6461-100	PLUG, Sealing		2
-	108-8411-4RB	BOOT, Receptacle		1

Schematics

DEUTSCH DT SERIES CONNECTOR KITS - BOOT, 108-6461

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-6461	KITS. Deutsch Connection. DT Series		REF
1	108-6461-3PB	BOOT, 3-Way Plug		A/R
2	108-6461-3RB	BOOT, 3-Way Receptacle		A/R
3	108-6461-4PB	BOOT, 4-Way Plug		A/R
4	108-6461-4RB	BOOT, 4-Way Receptacle		A/R
5	108-6461-6PB	BOOT, 6-Way Plug		A/R
6	108-6461-6RB	BOOT, 6-Way Receptacle		A/R
7	108-6461-8PB	BOOT, 8-Way Plug		A/R
8	108-6461-8RB	BOOT, 8-Way Receptacle		A/R
9	108-6461-CPB	BOOT, 12-Way Plug		A/R
10	108-6461-CRB	BOOT, 12-Way Receptacle		A/R
11	108-6461-2PB	BOOT, 2-Way Plug		A/R
12	108-6461-2RB	BOOT, 2-Way Receptacle		A/R

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Schematics

DEUTSCH DT SERIES CONNECTOR KITS - STRAIGHT, 108-6461

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-6461	KITS, Deutsch Connection, DT Series		REF
1	108-6461-001	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-311	PLUG, 3-Way		1
-	108-6461-319	PLUG, 3-Way Wedge		1
-	108-4815-303	SOCKET-NIČKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
2	108-6461-002	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-301	RECEPTACLE, 3-Way		1
-	108-6461-309	RECEPTACLE, 3-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
3	108-6461-003	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-411	PLUG, 4-Way		1
-	108-6461-419	PLUG, 4-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
4	108-6461-004	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-401	RECEPTACLE, 4-Way		1
-	108-6461-409	RECEPTACLE, 4-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
5	108-6461-005	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-611	PLUG, 6-Way		1
-	108-6461-619	PLUG, 6-Way Wedge		1
-	108-4815-403	SOCKET-NIČKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
6	108-6461-006	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-601	RECEPTACLE, 6-Way		1
-	108-6461-609	RECEPTACLE, 6-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
7	108-6461-007	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-811	PLUG, 8-Way		1
-	108-6461-819	PLUG, 8-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
-	108-6461-035	PLUG, 8-Way Straight Backshell		1

Schematics

DEUTSCH DT SERIES CONNECTOR KITS - STRAIGHT - 108-6461, CONTINUED

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-6461	KITS, Deutsch Connection, DT Series		REF
8	108-6461-008	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-801	RECEPTACLE, 8-Way		1
-	108-6461-809	RECEPTACLE, 8-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, sealing		REF
-	108-6461-021	RECEPTACLE, 8-Way Straight Backshell		1
9	108-6461-009	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-122	PLUG, 12-Way		1
-	108-6461-130	PLUG, 12-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
-	108-6461-035	PLUG, 12-Way Straight Backshell		1
10	108-6461-010	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-121	RECEPTACLE, 12-Way		1
-	108-6461-129	RECEPTACLE, 12-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
-	108-6461-023	RECEPTACLE, 12-Way Straight Backshell		1
11	108-6461-011	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-211	PLUG, 2-Way		1
-	108-6461-219	PLUG, 2-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
12	108-6461-012	KIT, Deutsch Connector, DT Series, Straight		REF
-	108-6461-201	RECEPTACLE, 2-Way		1
-	108-6461-209	RECEPTACLE, 2-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-111	PLUG, Sealing		REF
13	108-7142	KIT, 12-Way Panel Mount Receptacle		REF

Schematics

DEUTSCH DT SERIES CONNECTOR KITS - 90° - 108-6461, CONTINUED

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-6461	KITS, Deutsch Connection, DT Series		REF
1	108-6461-041	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-03P	PLUG, 3-Way		1
-	108-6461-3PW	PLUG 3-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-028	PLUG, 3-Way, 90° Backshell		1
2	108-6461-042	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-03R	RECEPTACLE, 3-Way		1
-	108-6461-3RW	RECEPTACLE, 3-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-016	RECEPTACLE, 3-Way 90° Backshell		1
3	108-6461-043	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-04P	PLUG, 4-Way		1
-	108-6461-4PW	PLUG, 4-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-030	PLUG, 4-Way 90° Backshell		1
4	108-6461-044	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-04R	RECEPTACLE, 4-Way		1
-	108-6461-4RW	RECEPTACLE, 4-Way Wedge		REF
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		1
-	108-6461-018	RECEPTACLE, 4-Way 90° Backshell		1
5	108-6461-045	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-06P	PLUG, 6-Way		1
-	108-6461-6PW	PLUG, 6-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-032	PLUG, 6-Way 90° Backshell		1
6	108-6461-046	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-06R	RECEPTACLE, 6-Way		1
-	108-6461-6RW	RECEPTACLE, 6-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		6
-	108-6461-100	PLUG, Sealing		1
-	108-6461-020	RECEPTACLE, 6-way 90° Backshell		1
7	108-6461-047	KII, Deutsch Connector, DT Series, 90°		REF
-	108-6461-08P	PLUG, 8-Way		1
-	108-6461-8PW	PLUG, 8-Way Wedge		<u> </u>
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-034	PLUG, 8-Way 90° Backshell		1

Schematics

DEUTSCH DT SERIES CONNECTOR KITS - 90° - 108-6461, CONTINUED

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-6461	KITS, Deutsch Connection, DT Series		REF
8	108-6461-048	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-08R	RECEPTACLE, 8-Way		1
-	108-6461-8RW	RECEPTACLE, 8-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-022	RECEPTACLE, 8-Way 90° Backshell		1
9	108-6461-049	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-12P	PLUG, 12-Way		1
-	108-6461-CPW	PLUG, 12-Way Wedge		1
-	108-4815-303	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-036	PLUG, 12-Way 90° Backshell		1
10	108-6461-050	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-12R	RECEPTACLE, 12-Way		1
-	108-6461-CRW	RECEPTACLE, 12-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-024	RECEPTACLE, 12-Way 90° Backshell		1
11	108-6461-051	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-02P	PLUG, 2-Way		1
-	108-6461-2PW	PLUG, 2-Way Wedge		1
-	108-4815-303	SOCKET, Gold Plated		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-026	PLUG, 2-Way 90° Backshell		1
12	108-6461-052	KIT, Deutsch Connector, DT Series, 90°		REF
-	108-6461-02R	RECEPTACLE, 2-Way		1
-	108-6461-2RW	RECEPTACLE, 2-Way Wedge		1
-	108-4815-403	SOCKET-NICKEL PLATED, STAMPED		REF
-	108-6461-100	PLUG, Sealing		REF
-	108-6461-014	RECEPTACLE, 2-Way 90° Backshell		1

Schematics

DEUTSCH CONNECTION KIT, 108-6461-PC

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	108-6461-PC	KIT, Deutsch Connection		REF
1	108-6461-003P	PLUG, 3-Way		15
2	108-6461-003PW	WEDGE, 3-Way Plug		15
3	108-6461-003PB	BOOT, 3-Way Plug		15
4	108-6461-003R	RECEPTACLE, 3-Way		15
5	108-6461-003RW	WEDGE, 3-Way Receptacle		15
6	108-6461-003RB	BOOT, 3-Way Receptacle		15
7	108-6461-004P	PLUG, 4-Way		3
8	108-6461-004PW	WEDGE, 4-Way Plug		3
9	108-6461-004PB	BOOT, 4-Way Plug		3
10	108-6461-004R	RECEPTACLE, 4-Way		3
11	108-6461-004RW	WEDGE, 4-Way Receptacle		3
12	108-6461-004RB	BOOT, 4-Way Receptacle		3
13	108-6461-006P	PLUG, 6-Way		3
14	108-6461-006PW	WEDGE, 6-Way Plug		3
15	108-6461-006PB	BOOT, 6-Way Plug		3
16	108-6461-006R	RECEPTACLE, 6-Way		3
17	108-6461-006RW	WEDGE, 6-Way Receptacle		3
18	108-6461-006RB	BOOT, 6-Way Receptacle		3
19	108-6461-008P	PLUG, 8-Way		9
20	108-6461-008PW	WEDGE, 8-Way Plug		9
21	108-6461-008PB	BOOT, 8-Way Plug		9
22	108-6461-008R	RECEPTACLE, 8-Way		9
23	108-6461-008RW	WEDGE, 8-Way Receptacle		9
24	108-6461-008RB	BOOT, 8-Way Receptacle		9
25	108-6461-012P	PLUG, 12-Way		3
26	108-6461-CPW	WEDGE, 12-Way Plug		3
27	108-6461-CPB	BOOT, 12-Way Boot		3
28	108-6461-012R	RECEPTACLE, 12-Way		3
29	108-6461-CRW	WEDGE, 12-Way Receptacle		3
30	108-6461-CRB	BOOT, 12-Way Receptacle		3
31	108-6461-100	PLUG, Sealing		25
32	108-6461-101	PIN, Gold Plated		200
33	108-6461-102	SOCKET, Gold Plated		200
34	108-6461-200	CRIMPER, Production		1
35	108-6461-201	CRIMPER, Field Kit		1
36	108-6461-202	REMOVAL TOOL		1

Schematics

SOLENOID VALVE SCHEMATIC ASSEMBLY - 108-8503-SCH



Schematics

INTEC POWER SYSTEM CONNECTION HARNESS – 161-0420-003



Schematics

ALARM ADAPTER HARNESS, 263-1309-004



DuraPack[®] 4060 Schematics Outside Work Light Harness - 263-1489



Schematics

Mini PLC Harness - 263-1490



Schematics

Tandem Pump Pressure Switch Harness - 263-1491



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Schematics

TRANSMISSION TEMPERATURE RELAY HARNESS - 263-1492



DuraPack[®] 4060 Schematics Neutral Relay Harness - 263-1493



Schematics

BATTERY CONNECTION HARNESS UNITS, 263-1506



NOTE: ASSEMBLY SHOULD BE LOOMED. RED (POWER) WIRE SHOULD BE LOOMED SEPARATELY FROM THE TWO WHITE (GROUND) WIRES.

Schematics

BATTERY CONNECTION HARNESS UNITS, 263-1506-001



NOTE: ASSEMBLY SHOULD BE LOOMED. RED (POWER) WIRE SHOULD BE LOOMED SEPARATELY FROM THE TWO WHITE (GROUND) WIRES.

Schematics

BATTERY CONNECTION HARNESS – 263-1506-002



NOTE: ASSEMBLY SHOULD BE LOOMED. RED (POWER) WIRE SHOULD BE LOOMED SEPARATELY FROM THE TWO WHITE (GROUND) WIRES.

Schematics

REVERSE CONNECTION BATTERY HARNESS - 263-1506-100



Schematics

SS PROXIMITY SWITCH TAILGATE HARNESS - 263-1521-001



Schematics

CS PROXIMITY SWITCH TAILGATE HARNESS – 263-1521-002



Schematics

SS TAILGATE FUSE BLOCK HARNESS – 263-1533-003



Schematics

CS TAILGATE FUSE BLOCK HARNESS – 263-1533-004



Schematics

BYPASS FILTER JUMPER HARNESS, 263-1562-060



Schematics

OAI PUMP ADAPTER HARNESS - 263-1592



Schematics

MAIN BODY ASSEMBLY HARNESS - 263-1616-001



Schematics

SS TAILGATE ASSEMBLY HARNESS – 263-1616-002



Schematics

CS TAILGATE ASSEMBLY HARNESS – 263-1616-003



Schematics

SS TAILGATE LIGHT BOX ASSEMBLY HARNESS - 263-1616-004



Schematics

CS TAILGATE LIGHT BOX ASSEMBLY HARNESS – 263-1616-005



DuraPack[®] 4060 Schematics E-STOP RELAY HARNESS – 263-1704



DuraPack[®] 4060 Schematics
DuraPack[®] 4060 Schematics MINI-PLC KIT - 372-1828-009



DuraPack[®] 4060 Schematics MINI-PLC KIT - 372-1828-010



Schematics

HOPPER TAIL/REVERSE LIGHT ACTIVATED SCHEMATIC - 701-8872-002



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Schematics

HOPPER LIGHT IN CAB SWITCH ACTIVATED SCHEMATIC - 701-8872-003



Schematics

LS ACTIVE INPUT NEUTRAL SCHEMATIC - 701-8872-007



Schematics

HS ACTIVE INPUT NEUTRAL SCHEMATIC - 701-8872-008



Schematics

ALLISON EOS GEN. IV 1000/2000 SCHEMATIC - 701-8872-009



Schematics

ALLISON EOS GEN. IV 3000/4000 SCHEMATIC - 701-8872-010



Schematics

THROTTLE ADVANCE SCHEMATIC - 701-8872-011



Schematics

IN CAB SWITCH ACTIVATED OUTSIDE WORK TAILGATE SCHEMATIC - 701-8872-013



Schematics

MACK BODY LINK AND BODY BUILDER WIRE CONNECTION HARNESS - 42005023-001



Schematics

SWITCH OVERLAY PANEL HARNESS - 263-1831-001



Schematics

CAB TO BODY OVERLAY HARNESS - 263-1831-002

SPLITTER

A SENTE "GROUND" B CRANCE "BUCKET DOWN" C ORANGE "BIN DOWN" SWITCH PANEL OVERLAY

-	A
	в
	C

CRANCE "BUCKET DOWN

Schematics

ORGANIC BIN CLEARANCE LIGHTS HARNESS - 263-1831-004



NOTE: PIN-X = SIZE 16 DEUTSCH PIN PIN-X* = SIZE 12 DEUTSCH PIN PIN-X** = SIZE 20 DEUTSCH PIN



SEE NOTE BELOW.

	D-1
-BLACK "IGN 1" (12 AWG)	- PIN-1*
-BLACK "BATT" (12 AWG)	- PIN-2*
-BLACK "IGN 2" (12 AWG)	- PIN-3*
WHITE "GROUND" (12 AWG)	- PIN-4*
	PIN-5
	PIN-6
	PIN-7
	PIN-8
	- PIN-9
	- PIN-10
	- PIN -11
OWN "801" (THROTTLE LIMIT)	- PIN -12
WN "800" (THROTTLE ADVANCE)	- PIN -13
YELLOW "700" (R-STATOR)	- PIN-14
IK "930" (HEIL TRANS TEMP)	- PIN-15
	- PIN-16
——BLACK "IGN C"———	- PIN-17
INK "900" (NEUTRAL +12V)	
	- PIN-19
RED "623" (EOS ENABLE)	
J1939 HIGH	- PIN-21
J1939 LOW	- PIN-22
PINK "904" (EOS SIGNAL)	
PINK "903" (SUMP TEMP)	
PINK "905" (ALLISON 105)	- PIN-25
PINK "923" (ALLISON 162)	- PIN-26
PINK "920" (ALLISON 103)	
PINK "922" (ALLISON 142)	- PIN-28
PINK "921" (ALLISON 117)	-PIN-29**
	·

Base Chassis Interface Harness 263-1471 02/10/2009

PIN-X = SIZE 16 DEUTSCH PIN PIN-X* = SIZE 12 DEUTSCH PIN PIN-X** = SIZE 20 DEUTSCH PIN





-BROWN "801"-

-BROWN "800".

#10 RING TERMINAL

SEE NOTE BELOW.

-BLACK "IGN C"

WHITE "CAB GND"

	D-1				
N 1" (12 AWG)	PIN-1*				
ATT" (12 AWG)	PIN-2*				
N 2" (12 AWG)	PIN-3*				
DUND" (12 AWG)	PIN-4*				
(PLUGGED)	PIN-5				
(PLUGGED)	PIN-6				
(PLUGGED)	PIN-7				
(PLUGGED)	PIN-8				
(PLUGGED)	PIN-9				
(PLUGGED)	PIN - 10				
(PLUGGED)	PIN-11				
(THROTTLE LIMIT)	PIN-12				
THROTTLE ADVANĆE) 📕	PIN-13				
00" (R-STATOR)	PIN-14	**	GOLD	PIN	**
HEIL TRANS TEMP)	PIN-15				
	 PIN-16				
K "IGN C"	PIN-17				
(NEUTRAL +12V)	 PIN-18**				
"CAB GND"	 PIN-19				
(EOS ENABLE)	 PIN-20**				
(PLUGGED)	 PIN-21				
(PLUGGED)	 PIN-22				
" (EOS SIGNAL)	 PIN-23**				
" (SUMP TEMP)	 PIN-24**				
' (ALLISON 105)	 PIN-25				
' (ALLISON 162)	 PIN-26				
' (ALLISON 103)	 PIN-27**				
' (ALLISON 142)	 PIN-28				
' (ALLISON 117)———	 PIN-29**				

CCC Chassis Interface Harness 263-1471-001 09/29/2009



	D-1A
IEUTRAL +12V)	- PIN-1
"GND"	PIN-2

SEE NOTE BELOW.

	D-1				
1" (12 AWG)	PIN-1*				
T" (12 AWG)	PIN-2*				
2" (12 AWG)	PIN-3*				
ND" (12 AWG)	PIN-4*				
PLUGGED)	PIN-5				
PLUGGED)	PIN-6				
PLUGGED)	PIN-7				
PLUGGED)	PIN-8				
PLUGGED)	PIN-9				
PLUGGED)	PIN-10				
PLUGGED)	PIN-11				
(THROTTLE LIMIT)	PIN-12				
HROTTLE ADVANCE)	PIN-13				
)" (R-STATOR)	PIN-14	**	GOLD	PIN	**
EIL TRANS TEMP)	PIN-15				
I COMMON"	PIN-16				
"IGN C"	PIN-17				
NEUTRAL +12V)	PIN-18**				
CAB GND"	PIN-19				
(EOS ENABLE)	PIN-20**				
PLUGGED)	PIN-21				
PLUGGED)	PIN-22				
(EOS SIGNAL)	PIN-23**				
(SUMP TEMP)	PIN-24**				
(ALLISON 105)	PIN-25				
(ALLISON 162)	PIN-26				
(ALLISON 103)	PIN-27**				
(ALLISON 142)	PIN-28				
(ALLISON 117)	PIN-29**				

Condor Chassis Interface Harness 263-1471-002 09/29/2009



-GRAY "ECM COMMON"

PIN-X = SIZE 16 DEUTSCH PIN PIN-X* = SIZE 12 DEUTSCH PIN PIN-X** = SIZE 20 DEUTSCH PIN

	D-1A
ſ	PIN-1

-PINK "900" (NEUTRAL +12V)-

-WHITE "CAB GND"-

SEE NOTE BELOW.

	D-1				
ACK "IGN 1" (12 AWG)	PIN-1*				
_ACK "BATT" (12 AWG)	PIN-2*				
ACK "IGN 2" (12 AWG)	PIN-3*				
TE "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				
N "801" (THROTTLE LIMIT)	PIN-12				
"800" (THROTTLE ADVANCE)	PIN-13				
LOW "700" (R-STATOR)	PIN-14	**	GOLD	PIN	**
"930" (HEIL TRANS TEMP)	PIN-15				
GRAY "ECM COMMON"	PIN-16				
—BLACK "IGN C"————	PIN-17				
"900" (NEUTRAL +12V)	PIN-18**				
	PIN-19				
D "623" (EOS ENABLE)	PIN-20**				
SPARE (PLUGGED)	PIN-21				
SPARE (PLUGGED)	PIN-22				
NK "904" (EOS SIGNAL)	PIN-23**				
NK "903" (SUMP TEMP)	PIN-24**				
K "905" (ALLISON 105)	PIN-25				
K "923" (ALLISON 162)	PIN-26				
K "920" (ALLISON 103)	PIN-27**				
K "922" (ALLISON 142)	PIN-28				
K "921" (ALLISON 117)	PIN-29**				
	1				

Granite Chassis Interface Harness 263-1471-003 01/21/2011



NOTE: PIN-X = SIZE 16 DEUTSCH PIN PIN-X* = SIZE 12 DEUTSCH PIN PIN-X** = SIZE 20 DEUTSCH PIN

Kenworth Conventional Chassis Interface Harness 263-1471-016 11/15/2010



PINK "900"-	
SEE	NOTE BELOW.
	D-1
BLACK IGN I (12 AWG)	
BLACK "IGN 2" (12 AWG)	- PIN-3*
WHITE "GROUND" (12 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	
PINK 900 (NEUTRAL GND)	
WHILE CAB GND	
SPARE (PLUGGED)	
SPARE (PLUGGED)	
	-PIN-23**
	-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**

Ford F750 Chassis Interface Harness 263-1471-017 07/01/2010



#10 RING TERMINAL

SEE NOTE BELOW.

	D-1
——————————————————————————————————————	PIN-1*
——————————————————————————————————————	PIN-2*
——————————————————————————————————————	PIN-3*
	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
——————————————————————————————————————	PIN-18**
WHITE "CAB GND"	PIN-19
	PIN-20**
SPARE (PLUGGED)	PIN-21
SPARE (PLUGGED)	PIN-22
	PIN-23**
	PIN-24**
	PIN-25
	PIN-26
	PIN-27**
	PIN-28
	PIN-29**

International VZB Chassis Interface Harness 263-1471-018 07/08/2010







Switch Panel Harness 263-1484-001 02/04/2011





SS Tailgate Harness 263-1616-006 05/04/2011



CS Tailgate Hamess 263-1616-008 05/04/2011



1/4" AIRLINE





1/4" AIRLINE





1/4" AIRLINE





WHITE "GHD" (14 AWG)	
1/4" RING TERMINAL	
	RE

SS LED Smart Tailgate Harness 263-1402-001 04/24/2006





Mack MRU Cab To Body Harness 263-1482-001 20/05/2011



Mack Granite Cab To Body Harness 263-1482-002 14/09/2011







CCC Cab To Body Harness 263-1482-005 04/20/2011



Autocar ACX Cab To Body Harness 263-1482-006 09/23/2010






International Panel Mount Cab To Body Harness 263-1482-009 08/10/2010



Mack LEU Cab To Body Harness 263-1482-010 08/10/2010





Autocar WXLL Cab TO Body Harness 263-1482-012 08/10/2010



NOTE:	
PIN-X = SIZE 16 DEUTSCH PIN	
$PIN-X^* = SIZE 12 DEUTSCH PIN$	1
$PIN-X^{**} = SIZE 20 DEUTSCH PI$	

Peterbilt Conventional Cab To Body Harness 263-1482-013 08/10/2010





NOTE:	
PIN-X = SIZE 16 DEUTSCH PIN	
$PIN-X^* = SIZE 12 DEUTSCH PIN$	
$PIN-X^{**} = SIZE 20 DEUTSCH PI$	Ν

100-4010-030			
WHITE 100	3A "GNDL" (TXL) 🗋	A —	WHITE 10GA "GNDL" (TXL)
WHITE 10G	A "GNDR" (TXL)	<u> </u>	
RED 100	A "STOP" (TXL)		
BROWN 10	IGA "TAIL" (TXL)	D	BROWN 10GA "TAIL" (TXL)
YELLO	W 14GA "LTURN"	Е —	YELLOW 14GA "LTURN"
	PINK 14GA "REV"	F	PINK 14GA "REV"
BODY GREE	EN 14GA "RTURN"	G	GREEN 14GA "RTURN"
TO BLAC	X 14GA "CLEAR"	н —	BLACK 14GA "CLEAR"
	PLUGGED	J	
CHA33I3	PLUGGED	Κ	
CONNECTOR #1	PLUGGED	L	
	PLUGGED	M	
	PLUGGED	Ν	
	PLUGGED	Ρ	
	PLUGGED	R	
RED 100	GA "BATT" (TXL)	S	
108-4815-030	DED "KYV"		RED "623"
		-1	
		2	
	DED "033"	3	
	DINK "002"		PINK "902"
	RED '620	7	RED "621"
	PINK "903"	8	PINK "903"
	BLACK "IGNC"	9	BLACK "IGNC"
	YELLOW "700"	10	YELLOW "700"
BODY	RED "601"	11	RED "601"
то	RED "602"	12	RED "602"
	RED "A/N SIG"	13	
CHA3313	BLACK "IGN"	14	BLACK "IGN"
CONNECTOR #2	YELLOW "T/A"	15	YELLOW "T/A"
	BLUE "143"	16	BLUE "143"
	PINK "EOS1"	17	PINK "EO\$1"
	ORANGE "145"	18	ORANGE "145"
	BROWN "T/A"	19	BROWN "T/A"
	RED "631"	20	
	RED "642"	21	RED "642"
	ORANGE "112"	22	
	RED "650"	23	RED "650"
	PLUGGED	24	
	PINK "921"	25	PINK "921" (ALLISON 117)
	PINK "922"	26	PINK "922" (ALLISON 142)
	PINK "920"	27	
	RED "635"	28	RED "635"
	PLUGGED	<u>29</u>	
	PLUGGED	30	
	PLUGGED	31	



RED "623"	1	RED "623"
	2	PLUGGED
RED "633"	3	RED "633"
RED "634"	4	RED "634"
PINK "902"	5	PINK "902"
RED "620"	6	RED "620"
RED "621"	7	RED "621"
PINK "903"	8	PINK "903"
BLACK "IGNC"	9	BLACK "IGNC"
YELLOW "700"	10	YELLOW "700"
RED "601"	11	RED "601"
RED "602"	12	RED "602"
RED "A/N SIG"	13	RED "A/N SIG"
BLACK "IGN"	14	BLACK "IGN"
YELLOW "T/A"	15	YELLOW "T/A"
BLUE "143"	16	BLUE "143"
PINK "EO\$1"	17	PINK "EOS1"
ORANGE "145"	18	ORANGE "145"
BROWN "T/A"	19	BROWN "T/A"
RED "631"	20	RED "631"
RED "642"	21	RED "642"
ORANGE "112"	22	ORANGE "112"
RED "650"	23	RED "650"
- YELLOW 14GA "LTURN"	24	YELLOW 14GA "LTURN"
PINK 14GA "REV"	25	PINK 14GA "REV"
— GREEN 14GA "RTURN" ————	26	GREEN 14GA "RTURN"
— BLACK 14GA "CLEAR" ————	27	BLACK 14GA "CLEAR"
RED "635"	28	RED "635"
PINK "921" (ALLISO N 117)	29	PINK "921"
PINK "922" (ALLISON 142)	30	PINK "922"
PINK "920" (ALLISO N 103)	31	PINK "920"
		_

CHASSIS TO PDC CONNECTOR

- 108-4815-031

E 10GA "GNDR" (TXL)	1	WH
ED 10GA "BAT" (TXL)	2 108-8411-004	REI
E 12GA "GNDL" (TXL)	3	WH
VN 10GA "TAIL" (TXL)	4	BRO

HITE 10GA "GNDR" (TXL) RED 10GA "BAT" (TXL) WHITE 12GA "GNDL" (TXL) BROWN 10GA "TAIL" (TXL)

CHASSIS POWER ΤΟ PDC CONNECTOR









701-9268

20	ORGANIC BIN BODY DUMP CYLINDER
19	FLOW CONTROL VALVE
18	ORGANIC BIN COLLECTION CYLINDER
17	ORGANIC BIN CONTROL VALVE ASSEMBLY
16	PILOT OPERATED CHECK VALVE / SLIDE CONTROL
15	REGENERATIVE VALVE
14	SLIDE CYLINDER
13	SLIDE COUNTERBALANCE VALVE
12	BLADE CYLINDER
11	BLADE COUNTERBALANCE VALVE
10	TAILGATE CONTROL VALVE
9	PACK/EJECT CYLINDER
8	TAILGATE RAISE CYLINDER
7	PILOT OPERATED CHECK VALVE / TAILGATE RAISE
6	UNDERBODY VALVE / EJECT AND TAILGATE RAISE
5	CHECK VALVE
4	TANDEM VANE PUMP AND MANIFOLD ASSEMBLY
3	SINGLE VANE PUMP
2	RETURN LINE FILTER WITH ELECTRIC INDICATOR
1	HYDRAULIC OIL TANK
ITEM	PART DESCRIPTION



DuraPack[®] 4060 Schematics

TAILGATE LOWER SLIDE CYL TAILGATE RAISE CYL EJECTOR CYL BLADE CYL EJECTOR UNLOAD N8 57 **REGENERATIVE VALVE** X CX в GZ CRECK Ê ē Di-93 守 A MAL Q 54 kΦ. ¢, G1 13 3 TT. SECONDARY VALVE UNDERBODY VALVE PUMP CONTROL VALVE TO STREETSIDE VALVE CHECK VALVE Ц, FEMALE Ť QUICK 5 P2 \$2 P1 -11 HYDRAULIC PUMP CURBSIDE SHOWN RETURN LINE SUCTION SUCTION STREETSIDE LINE LINE MALE QUICK DISCONNECT SIMILAR STRAINER STRAINER HYDRAULIC OIL TANK LEGEND = PUMP PRESSURE = RETURN PRESSURE = INTERMEDIATE PRESSURE 701,3829







DuraPack[®] 4060 Schematics

BLADE DOWN SLIDE CYL EJECTOR CYL RAISE CYL BLADE CYL EJECTOR UNLOAD VALVE 518-W REGENERATIVE VALVE X CA в ERECK VALVE Ê, B G2 Þ. 76 -97 I A Q Q. 3 E-U-B G1 Ш-н Ę SECONDARY VALVE UNDERBODY VALVE PUMP CONTROL VALVE TO STREETSIDE VALVE CHECK VALVE i, FEMALE TO SNOW PLOW T QUICK Ē P2 LS2 HYDRAULIC PUMP CURBSIDE RETURN LINE SHOWN e SUCTION SUCTION STREETSIDE LINE QUICK STRAINER 9 STRAINER ١ SIMILAR HYDRAULIC OIL TANK DISCONNECT LEGEND = PUMP PRESSURE = RETURN PRESSURE Tmbs29 05/00







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DuraPack[®] 4060 MANUAL ORDER FORM

To purchase a printed copy of the Parts Manual or complete Parts and Service Manual, fax or make a PDF copy of this form and send to your local Heil dealer.

Do you want a Parts Section ONLY?	Yes or No
Do you want the complete Parts and Service	e Manual? Yes or No
The order number for the Parts Manual ONL TP1D40-PM-0917	Y is:
The order number for the complete Parts an	d Service Manual is:
TP1D40-PSM-0917	
UNIT SERIAL NUMBER:	
NAME:	
COMPANY:	
PHYSICAL ADDRESS:	
CITY:	
STATE: ZIP C	ODE:
CONTACT PHONE NUMBER:	

DuraPack® 4060 NOTES



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 Heilapproved, 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.



www.heil.com

Customer Care: 866-ASK-HEIL (866-275-4345)

Heil Environmental 4301 Gault Avenue North Fort Payne, AL 35967-9984

Parts Central: 800-528-5308

Technical Service: 866-310-4345 TechSupport@DoverESG.com