Command-SST™

AUTOMATED SIDE LOADER

OPERATION AND SERVICE MANUAL

ISSUED APRIL 2021

⚠ WARNING

Failure to follow all instructions and safety precautions in this manual, in the Service Manual, in other manufacturers' 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 this Operation Manual, the Service Manual for this unit, other applicable manufacturers' 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.

TP1C-OSM-0421

READ THIS MANUAL!

EVERY PERSON who will **OPERATE, MAINTAIN, REPAIR, OR OTHERWISE WORK** with the Heil unit **MUST READ AND UNDERSTAND** this entire Operator's Manual before starting the engine or activating any switches or controls. **MAKE SURE** to read the Service Manual for the unit **BEFORE** you do any maintenance or repair procedures.

ALL USERS of this equipment must be trained professionals who understand how the machine operates and know how to avoid the risks associated with driving the vehicle and with picking up, compacting, and dumping refuse in an ever-changing traffic environment.

If you do not understand an operation or instruction, seek additional help or instruction from a qualified source **BEFORE** you operate the unit.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Schematics

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

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TP1C-OSM-0421

NOTES:

SECTION 1
INTRODUCTION

CONTACT INFORMATION

Customer Care
Phone: 866-275-4345

Technical Service
Phone: 866-310-4345

Parts Central
Phone: 800-528-5308

4301 Gault Avenue North
Fort Payne, AL 35967
www.heil.com

HOW TO USE THIS MANUAL

Product Variance

This manual may cover options not included on your unit. Also, the location and appearance of the controls on your unit may be different than those shown in this manual. Make sure you know the location of the controls and how to properly operate the controls on your unit before operation.

Manual Sections

This manual is divided into eight (8) sections.

1. Introduction
2. Safety Messages and Decals
3. Operation
4. InSight™ Diagnostic Display
5. Cortex Controller™
6. Maintenance
7. Schematics
8. Compressed Natural Gas (CNG) Option

Terminology

This manual uses terminology that is defined in the **Glossary** 29 which is in Section 1, Introduction.

Directives

When we give directions for using the equipment, we capitalize key words. These words are usually a command followed by a result.

For example, “DEPRESS the T/G RAISE push button on the Main Push Button Controls to raise the tailgate ...”.

*Use of **Bold** and CAPITAL Letters*

We also put some words in **BOLD AND CAPS** for emphasis, usually related to safety or something of other importance, such as “**MAKE SURE** you close the side doors”.

We put some words in just bold for emphasis, such as “All warranty repairs **must** be performed by …”.

Each DANGER, WARNING, and CAUTION notice precedes its applicable text.

WARRANTY CLAIMS AND INQUIRIES

The HEIL ENVIRONMENTAL WARRANTY STATEMENT is printed on the inside, back cover of this manual. Should a failure occur that is covered by this warranty, contact the nearest Heil dealer for warranty repair unless otherwise authorized by Heil.

For all parts, warranty claims, and inquiries, please give the dealer or service center the unit's model and serial number located on the body serial plate. See **Serial Plate Location** 13 page for the location of the body serial plate.

ELECTRONIC PARTS CATALOG

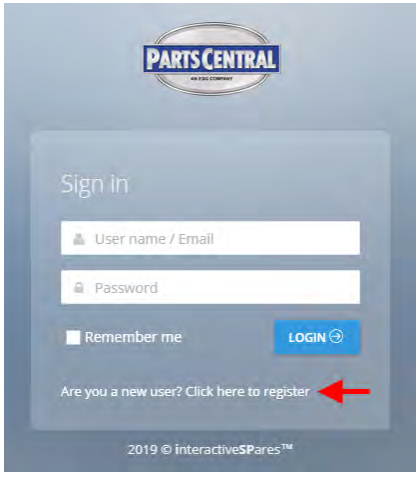
The Parts Central Electronic Parts Catalog (EPC) includes electronic versions of the Heil Parts Manuals, specific to a Customer's truck configuration and options. After registering and logging in, the user can search by **Keyword(s) or Part Number** and/or **Heil Body Serial Number** to quickly identify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

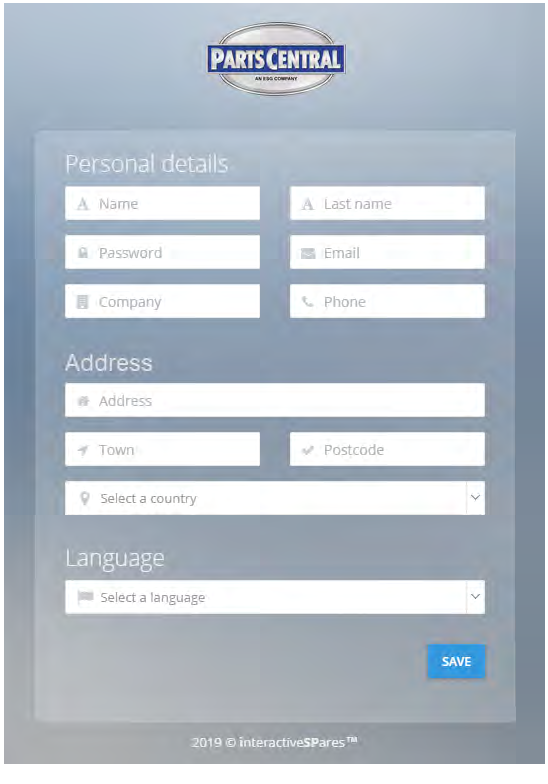
Note: This tool is currently for reference use only and the cart function is disabled. Please contact your local Heil Dealer for parts quoting and ordering.

ELECTRONIC PARTS CATALOG (CONTINUED)

Registration and Login

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

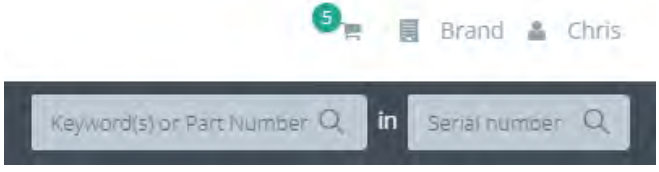




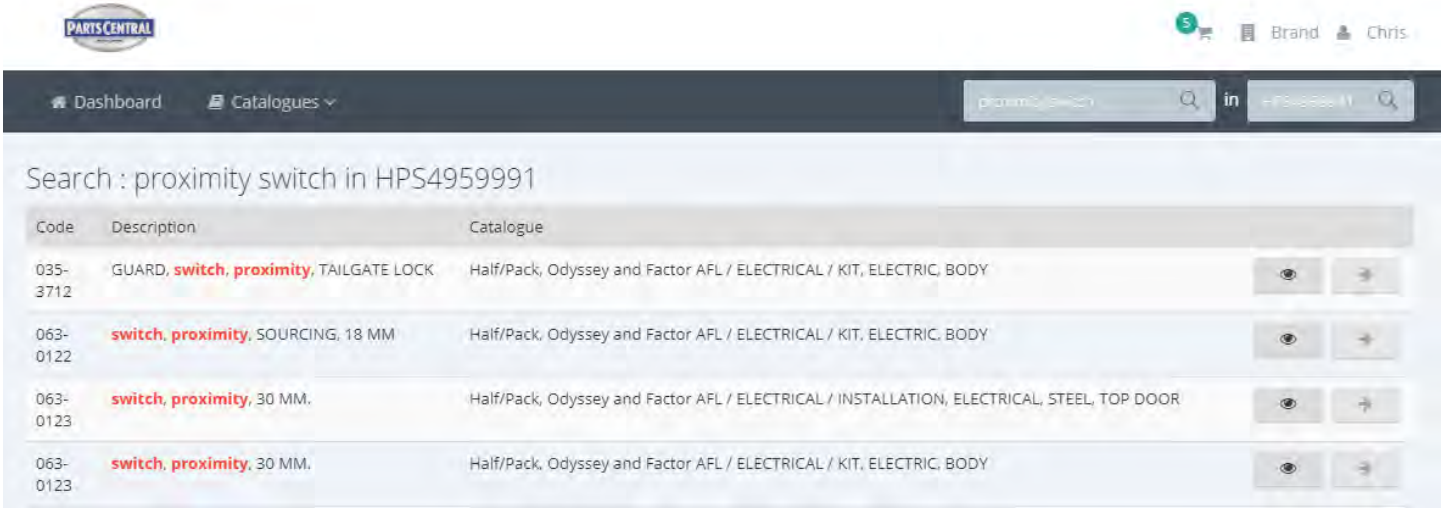
ELECTRONIC PARTS CATALOG (CONTINUED)

Log in here with your supplied credentials: **https://epc.partscentral.com/**

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



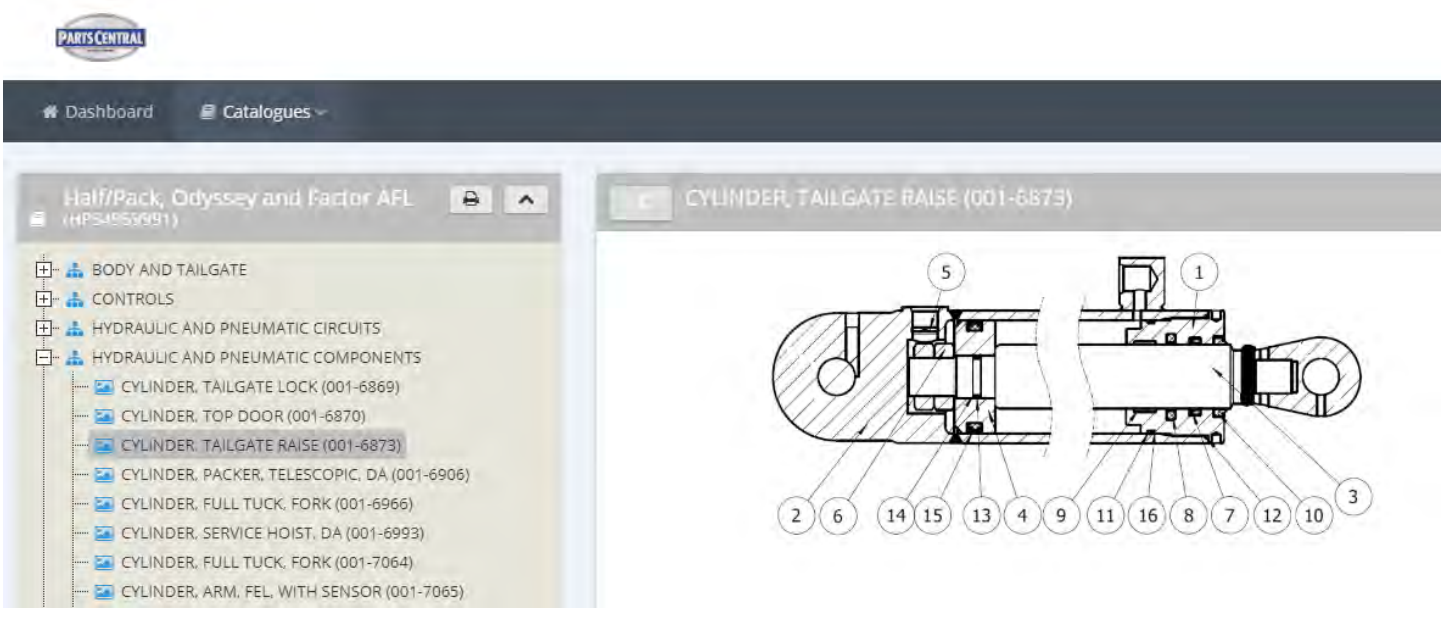
You can search by **Keyword(s) or Part Number** within a specific Heil Body **Serial Number**. For example, if you are looking for the **proximity switch** for Body Serial Number **HPS4959991**, you can enter this information into these two fields and the search results will include all parts within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



ELECTRONIC PARTS CATALOG (CONTINUED)

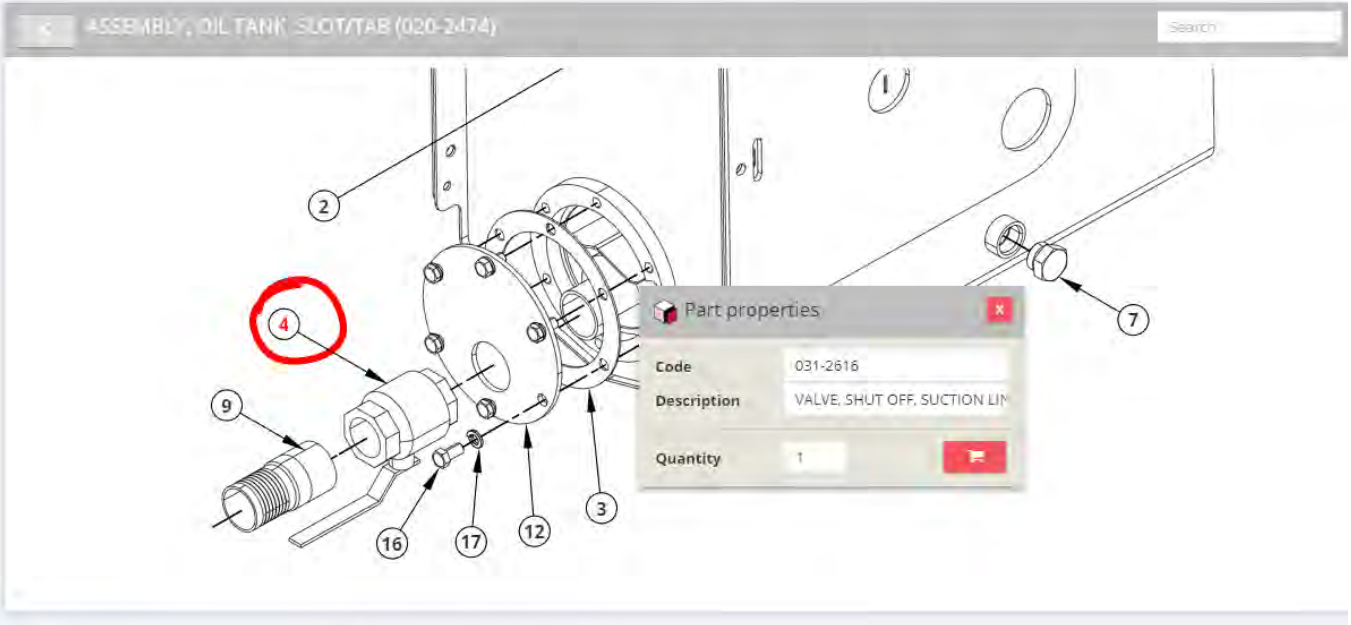
From the search results list, select the eye icon on the right to see part specifics (including any notes) or to quickly add it to cart. Alternatively, you can select the right arrow icon to view the part within its associated assembly/kit.

Alternatively, you can search by just the Heil Body **Serial Number**, leaving the **Keyword(s) / Part Number** field blank. The search result will then be the Body Serial Number specific parts catalog with familiar catalog sections that you can browse. You can navigate through the catalog using the section/topic menu on the left. See the image below.



ELECTRONIC PARTS CATALOG (CONTINUED)

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



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

MODELS

The Command-SST™ has two body models:

- Eject
- Service Hoist

Eject and Service Hoist models use a Packer/Eject panel and two cylinders to compact the refuse from the hopper into the body (packer mode) and to push all of the refuse from the body (eject mode).

The Eject model does not have Service Hoist Cylinders.

The Service Hoist body model is an Eject body with two service hoist cylinders to raise the body a short distance for service and maintenance operations.

SERIAL PLATE LOCATIONS

You determine the sides of the unit by facing the direction of forward travel. The left side is the “street side” and the right side is the “curb side”. The figure below shows the location of the body serial plate on the street side of the unit’s body. The loader serial plate will be located on the loader arm. See the next page for a description of the information that is on the body serial plate.

Figure 1. Serial Plate Locations

READING THE BODY SERIAL PLATE

The serial plate is the “birth certificate” of the unit. See the figure below.

Figure 2. Reading the Serial Plate

Information stamped in the boxes on the serial plate indicates:

Model number:
612-nnn-nnnn (“n” is any single-digit number)

Unit’s unique serial number

Body size (cu. yd.)

Date of manufacture (last number of the year followed by the number of the day of the year, e.g. J078 is year 2018 and the 78th day of 2018).

NOTICE

The code for the year of manufacture is in accordance with FMVSS 115. See the following table.

Year of Manufacture			
Year Code	**Year**	**Year Code**	**Year**
5	2005	F	2015
6	2006	G	2016
7	2007	H	2017
8	2008	J	2018
9	2009	K	2019
A	2010	L	2020
B	2011	M	2021
C	2012	N	2022
D	2013	P	2023
E	2014	R	2024

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

NOTICE

Cold weather operation requires special oil considerations. Viscosity should not exceed 7500 SSU at lowest startup temperature. Continuous operation should range between 40–1000 SSU for all temperature ranges.

NOTICE

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.

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.

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 **Lubrication Guide** section of this manual.

Use grade NLG1000 grease or equivalent.

NOTES:

PRODUCT NOMENCLATURE

Hydraulic Pump - The unit's hydraulic pump provides the oil flow for the hydraulic system. It is located either in front of the unit's engine or underneath the unit, powered by the transmission through a Power Take-Off (PTO). The pump is activated when the operator turns ON the SYSTEM POWER switch located on the in-cab control panel and is deactivated when the operator turns OFF the SYSTEM POWER switch. Depending on the pump and PTO combination, hydraulic oil may flow through the system when the pump is off, however, the operator controls are inoperative and the system hydraulic oil pressure is not sufficient to operate the unit's functions.

⚠ WARNING

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

Cab Controls – The standard cab control panel is located in the vehicle cab. See **Operation section** 59 for the different controls that may be installed in your unit. The standard and optional lift arm controls are located in the cab.

Lift Arm – The loader is the assembly that includes the lift arm, the grabber assembly, hoses and other parts. Use the loader's lift arm to pick up and dump refuse from a refuse container into the hopper. The operator can do this either inside the cab with the **Joystick Controls** 82 or **Manual Key Pad controls** 81.

⚠ DANGER

Do not enter the hopper unless the unit is in the Lock-Out/Tag-Out mode. When the unit is not in the Lock-Out/Tag-Out mode, the packer/ejector panel can be operated. DEATH or SERIOUS INJURY may occur if the packer/ejector panel moves while a person is in the hopper.

Hopper – The hopper is the front part of the body assembly. The packer panel is in the hopper. The hopper is the loading chamber for the refuse. Refuse dumped into the unit falls inside the hopper where it is moved by the packer paddle into the body.

Body – The body stores the compacted refuse until you dump the refuse at the landfill. **DO NOT** enter the body from the hopper opening.

Body Props – Always use both body props, one on each side of the unit, when you raise the body for maintenance or service procedures.

⚠ WARNING

Make sure hopper area is clear of people on both sides of unit before starting packer cycle. Packer completes one or two cycles when ANY packer EXTEND button is ON or when Auto-Pack is ON and cart lowers from hopper. Death or serious injury can occur if any part of your body is in the hopper when the panel is in motion.

Packer/Eject Panel & Cylinders – The packer/eject panel is inside the hopper (at the front of the hopper) and has two functions:

- The packer function compacts the loaded refuse from the hopper into the body (packer mode)
- The eject function pushes the loaded refuse out of the body (eject mode) through the open tailgate.

During the PACKER mode, you extend the packer/eject panel cylinders to push the packer panel towards the rear of the body, which compacts the load.

The packer panel has a follower panel, so the operator can dump a container into the hopper no matter where the packer is in the pack cycle.

Normal operation of the AutoPack™ feature consists of one extension and retraction of the packer panel.

During the EJECT mode, you use the packer/eject panel and cylinders to remove the refuse from the body.

- On the Eject and Service Hoist models when the tailgate is open, the EJECT mode lets the packer/eject panel travel further than during the packer mode. This extra travel of the panel removes ALL of the refuse from the body. The Service Hoist option is NOT intended to be used as a dumping option and should NOT be used to raise the body with a payload inside the body.

⚠ DANGER

Before entering the body area, place the unit in Lock-Out/Tag-Out mode. See **Lock-Out/Tag-Out Procedure** 40.

⚠ WARNING

The side door must be closed before you start a packer operation. Serious injury or death may occur if a person is inside the body or hopper. Make sure no one is inside the hopper or body before you close the door and begin a packer function.

Side Access Door – Use this street side door to enter the body when required for cleaning or other maintenance tasks. MAKE SURE the unit is in Lock-Out/Tag-Out mode and the keys removed from the ignition and in the operator's control BEFORE you enter through the side door.

The door has a proximity switch that the Cortex Controller™ uses to disable the hydraulic system unless the door is closed.

⚠ DANGER

Always prop a 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. Serious injury or death may occur if any part of your body is between the tailgate and the body if the tailgate suddenly closes.

Sump Doors – A sump door is located on the front corner on each side of the body and needs to be open when cleaning out the sump area.

Tailgate Props – Always use both tailgate props, one on each side of the unit, when you raise the tailgate for maintenance or service procedures.

Tailgate Cylinders – You use these cylinders to RAISE the tailgate before you unload the compacted refuse at the landfill. After you unload the refuse, you use the cylinders to LOWER the tailgate.

Tailgate Lock Cylinders – Heil's patented Shur-Lock™ system uses tailgate lock cylinders to UNLOCK the tailgate before you RAISE the tailgate and to LOCK the tailgate after you LOWER the tailgate.

⚠ DANGER

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

Tailgate – Raise the tailgate at the landfill or transfer station to unload the refuse. See **Propping the Tailgate** 88.

A red light and an alarm inside the cab let the operator know when the tailgate is raised. The red light illuminates (is ON) and the alarm sounds when the tailgate is RAISED. The light is OFF and the alarm stops when the tailgate is CLOSED.

NOTICE

You must use the tailgate lock cylinder (described previously) to unlock the tailgate in order to raise the tailgate or to fully close (lock) the tailgate.

⚠ 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.

⚠ WARNING

Raising the body with the tailgate closed can damage the underride bumper. The underride bumper can hit the ground when the tailgate is not fully raised before you raise the body. Serious injury or death may occur and also cause damage to the unit.

Service Hoist Cylinders – When equipped, use the Service Hoist function to RAISE the body to perform service or maintenance on the unit. When you do service or maintenance with the body raised, ALWAYS use the body props. After completion of the service or maintenance procedures, always LOWER the body until it rests on the chassis. For instructions, see **Propping the Body of a Service Hoist Unit** 85.

Controller – The Controller monitors critical components and controls operation of the various functions. When the Controller detects a fault or unsafe condition, it alerts the operator with an indicator light and/or a buzzer alarm. During certain conditions, the Controller will not allow operation of all functions.

Hydraulic Oil Tank - The tank is the reservoir for the hydraulic oil which operates all hydraulic cylinders described above.

⚠ WARNING

Operating the unit's controls with a suspended load, such as a raised tailgate or a container on a lift mechanism, will allow the load to move even when the hydraulic pump is OFF.

Operator Controls – The standard operator controls for running the components are inside the vehicle cab. See **Operation section** 59 for the different controls that may be installed in your unit.

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
BODY AND TAILGATE ASSEMBLIES		
022-3509	SEAL, TAILGATE	1
003-5142	BEARING, LOCK	2
022-4058	SEAL, SUMP DOOR	1
094-2834	PANEL, RUBBER, FOLLOWER, SIDE	2
LOADER AND GRABBER ASSEMBLIES		
048-7544	PIN, MAIN PIVOT	1
003-5309	BEARING, MAIN PIVOT	2
048-7544-100	TUBE, MAIN PIVOT	1
001-7204	ROTARY ACTUATOR-HELAC	1
093-3447-350	WEAR PAD ASSY, TOP, INNER BOOM	1
093-3447-451	WEAR PAD ASSY, SIDE UPPER, OUTER BOOM	2
093-3447-550	WEAR PAD ASSY, SIDE UPPER, OUTER BOOM	1
093-3447-650	WEAR PAD ASSY, BOTTOM, OUTER BOOM	1
093-3447-750	WEAR PAD ASSY, SIDE BOTTOM, OUTER BOOM	1
093-3449-053	WEAR PAD, SIDE, OUTER BOOM	1
093-3449-054	PAD, INNER, TOP	3

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
093-3449-055	WEAR PAD, BOTTOM, OUTER BOOM	1
093-3463-003	SHIM, OUTER, TOP	2
093-3463-008	SHIM, OUTER, LOWER	2
093-3463-009	SHIM, OUTER, BOTTOM	1
093-3463-012	SHIM, OUTER, TOP, SINGLE	1
093-3463-100	WEAR PAD RETAINER BRACKET	1
093-3463-200	WEAR PAD RETAINER BRACKET	1
093-3463-300	WEAR PAD RETAINER BRACKET	1
093-3463-400	WEAR PAD RETAINER BRACKET	1
093-3463-500	WEAR PAD RETAINER BRACKET	1
093-3463-600	WEAR PAD RETAINER BRACKET	1
093-3449-014	WEAR PAD RETAINER BRACKET	1
093-3449-009	WEAR PAD RETAINER BRACKET	1
093-3464-100	WEAR PAD RETAINER BRACKET	1
093-3464-001	SHIM, RH, TOP	1
093-3464-002	SHIM, LH, TOP	1
858-5919-001	6" BELT	2

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
858-5913	BRACKET GRIPPER BELT	2
858-5915	BELT, REAR RETAINER	2
858-5916	BELT RETAINER	2
858-5918	BRACKET RETAINER	2
234-3434-515	ROTARY SENSOR BRACKET	1
858-5881-002	EXTENDED 4" SPRING GRABBER	2
858-5881-003	EXTENDED 4" BACKUP SPRING GRABBER	2
HYDRAULICS		
075-0953-001	ELEMENT, RETURN FILTER	1
075-0712	BREATHER, FILTER	1
001-7017	CYLINDER, LIFT	1
001-7062	EXTEND CYL.	1
001-7196	CYLINDER, GRIP, IN CYL SENSOR	1
001-7148	CYLINDER, TAILGATE LOCK	1
001-7149	CYLINDER, TAILGATE RAISE	1
001-7205	CYLINDER, PACKER, 24 YD	1
001-7109	CYLINDER, PACKER, 28 YD	1

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
001-7112	CYLINDER, PACKER, 33 YD	1
031-6639	BODY VALVE	1
031-6647	TAILGATE VALVE	1
031-6638	ARM VALVE	1
253-2541	HYDRAULIC OIL COOLER	1
ELECTRICAL		
063-0123	SWITCH, PROX, 30MM, DEUTSCH	1
254-4930	CONTROLLER, IFM REMOTE MODULE, 32 BIT	1
254-4931	CONTROLLER, IFM 16 I/O MODULE	1
263-1857-010	HARNESS, BODY CONTROLLER	1
263-1857-011	HARNESS, BODY FRONT	1
263-1857-012	HARNESS, BODY VALVE	1
263-1857-013	HARNESS, LIFT VALVE	1
263-1857-014	HARNESS, TAILGATE VALVE	1
263-1857-015	HARNESS, LIFT	1
263-1857-016	HARNESS, OIL TANK	1
263-1857-017	HARNESS, BODY REAR	1

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
263-1857-018	HARNESS, TOP DOOR	1
263-1886-001	HARNESS, CAB TO BODY, AUTOCAR	1
263-1886-002	HARNESS, CAB TO BODY, MACK LR	1
263-1886-003	HARNESS, CAB TO BODY, PETERBILT	1
263-1886-004	HARNESS, CAB CONTROL PANEL	1
263-1886-005	HARNESS, CAB CONTROL PANEL SPLITTER	1
263-1886-006	HARNESS, JS SPLITTER	1
263-1886-007	HARNESS, SECONDARY CAB CONTROL PANEL	1
161-0551	CAMERA CABLE 10'	1
161-0676-001	CAMERA DISPLAY 9" SD CAPABILITY	1
063-0156	LASER SENSOR WITH CABLE CONNECTOR	2
108-8738	DC-DC CONVERTER, 12-24V 3A, COMMAND SST	1
263-1857-020	HARNESS, GRABBER BEAM, HALO SENSORS, COMMAND SST	1
115-1520	LED SCENE LIGHT	1
263-1857-021	HARNESS, FOOT SWITCHES, HALO, COMMAND SST	1
108-8745	DISPLAY, 7" TFT PANEL	1
108-8746	HARNESS SPECIFICATION, 7" TFT PANEL	1

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
108-8747	BEAM SPLITTER-SPY MIRROR GLASS	1
063-0137	ROTARY SENSOR MAGNET	1
063-0136-100-SER	SENSOR, ROTARY, W/CONNECTOR	1
253-2393-001	TEMP SENSOR	1
063-0145	PRESSURE SENSOR	1
CONTROLS		
108-8626-500	SWITCH BANK #1, BODY FUNCTIONS	1
108-8626-501	SWITCH BANK #2, LIGHTS/LIFT FUNCTIONS	1
108-8626-502	SWITCH BANK #3, BODY FUNCTIONS	1
108-8626-503	SWITCH BANK #4, LIGHTS/LIFT FUNCTIONS	1
108-8626-504	SWITCH BANK #5, MANUAL/CALIBRATION	1
108-8728	5 BUTTON JOYSTICK SS, ERGONOMIC GRIP	1
108-8729	5 BUTTON JOYSTICK CS, ERGONOMIC GRIP	1
108-8735	5 BUTTON JOYSTICK, PRIMARY, ERGONOMIC GRIP, H.A.L.O	1
108-8736	5 BUTTON JOYSTICK, SECONDARY, ERGONOMIC GRIP, H.A.L.O.	1
108-8737	SWITCH, FOOT SWITCH HALO	1
108-8737-001	SWITCH, PEDAL FOOT HALO	1

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
108-8737-002	SWITCH, PEDAL FOOT HALO	1
311-6795-SER	PEDAL ASSEMBLY HALO, COMMAND-SST	1

GLOSSARY

TERM	DEFINITION
bin	The refuse collection container
body	The complete body assembly or the area of the body where the refuse is stored.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
collapsed position	The fully retracted position of a cylinder
Controller	The Controller (Heil Electronic Body Controller) used on the Command-SST™ is the computer control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices.
Auto-Lift	A feature of the Command-SST™ loader that automatically lifts and dumps a container into the hopper. See **Features** 71.
Auto-Pack	A feature of the Command-SST™ that allow the packer to cycle automatically with a momentary activation of the packer extend push button. See **Auto/Manual Pack Mode** in **Features** 71.
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
extend	Make a cylinder rod move out its base / Command to move the packer panel towards the body
fouling	Damage to the lid(s) of the refuse bins (containers) that interferes with unloading the refuse
fully retracted position	The packer/extend cylinder is fully retracted and the packer panel is all the way to the front of the hopper. May also be referred to as “Home Position” or “Front Head”.
grabber	The entire grabber assembly or the grabber arms.
grip	The command to close the grabber arms around a refuse container.
harm	An action that causes death, injury or property damage.
hazard	A potential source of harm.

GLOSSARY

TERM	DEFINITION
hopper	The loading chamber of the unit in front of the packer panel where you dump the refuse material.
illuminate	Make a lamp shine light (the lamp is on).
incident	An unintended and undesired event that has the potential to harm.
InSight™ Diagnostic Display	The Heil InSight™ Diagnostic Display (also referred to as "display") is located in the cab and is the information center for the operator and troubleshooting tool for the service mechanic.
interlock	A safety mechanism that disables a function or action.
latched	The condition when the tailgate is fully CLOSED, thereby locking the tailgate.
lock	Command to use the tailgate lock/unlock switch and lock the tailgate lock cylinders.
must	The action is mandatory.
NOTICE	Alerts you to practices not related to personal injury, such as damage to the unit or other equipment.
off/OFF	When a light or lamp does not illuminate / The position of a switch or other control to stop a function
on/ON	When a light or lamp illuminates / The position of a switch or other control to start a function
operator	Any person who uses the unit and its equipment. One who controls the operation of various unit accessories and mechanisms, loads material, performs functions such as operating the loader, cart tipping and packing of wastes or recycled products, and who may also drive the unit along the route during the collection process. The operator may also be the driver.
PTO	Power Takeoff
retract	Make a cylinder rod go into its base / Command to move the packer panel towards the hopper
RPM	Revolutions Per Minute

GLOSSARY

TERM	DEFINITION
Select-O-Pack™	The Select-O-Pack feature allows the operator to set the number of lift cycles before automatic operation of the packer. Refer to **Features** 72, **Select-O-Pack Adjust Screen** 111, **Operation Specifications** 74 and **Compacting the Load** 99 for more information.
side access door	The side access door is located on the street side of the unit. This is the preferred access into the body. ALWAYS **Lock-Out/Tag-Out** 40 the unit BEFORE entering the body.
top door (hopper cover)	This optional top door covers and uncovers the hopper. The cover is closed during transit and must be open during loading of refuse in the hopper.
unit	The Command-SST™ refuse collection vehicle referred to in this manual.
unlatched	The side access door is not closed or secured.
unlock	Command to use a tailgate lock and tailgate unlock push buttons that lock and unlock the tailgate.
WARNING	Indicates a hazardous situation, which if not avoided, could result in death or serious injury.

NOTES:

SECTION 2
SAFETY MESSAGES AND DECALS

PRECAUTIONARY STATEMENTS

Read this entire manual and especially this safety section before you operate the vehicle. Failure to follow these important precautions could result in serious injury, death, or property damage.

This safety alert symbol indicates important safety messages in this manual and on safety decals attached to the equipment. Make sure you read all of these messages and follow the instructions and precautions.

In the general text of the manual and in the safety labels attached to the product, signal words indicate the type and seriousness of risk that you could encounter if you do not follow the precautions. The signal words and their definitions follow:

DANGER

DANGER indicates a hazardous situation which, if not avoided, WILL result in DEATH or SERIOUS INJURY.

WARNING

WARNING indicates a hazardous situation which, if not avoided, COULD result in DEATH or SERIOUS INJURY.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, COULD result in MINOR or MODERATE INJURY.

NOTICE

NOTICE addresses practices not related to personal injury, such as property damage or damage to the equipment.

The following pages provide a summary of some of the more important safety precautions that are in this manual. There are additional safety precautions in other sections of this manual that are not contained in this section. You must also read, understand and follow those messages.

⚠ GENERAL SAFETY PRECAUTIONS

- **DO NOT** operate the unit under the influence of alcohol or drugs or when extremely tired or when you are not alert, as this may result in an accident that can cause serious injury or death.
- **DO NOT** operate the unit unless you have the proper training and vehicle operator license.
- **ALWAYS** carry and maintain a fire extinguisher and first aid kit in the unit. **MAKE SURE** you know how to use them.
- **CLEAN AS NECESSARY** any safety decals that you cannot read at a safe viewing distance from the hazard because of dirt. If any decals are illegible from damage or wear, **REPLACE** them **IMMEDIATELY**. Get decals from your Heil dealer or Heil.
- **DO NOT** use this refuse collection vehicle to TOW another vehicle or equipment. It **IS NOT DESIGNED** or equipped to tow another vehicle or other equipment. Towing another vehicle or equipment may result in injury or death to the operator or other people or damage to the unit.
- **MAKE SURE** all individuals are clear of any moving parts, mechanisms or components of the unit before you operate the controls.
- **DISENGAGE** the PTO or PUSH the SYSTEM POWER switch so the pump shuts off when you are not using the unit, when you are repairing the unit, when you are working on the unit, or when traveling in the unit for longer than two minutes.
- ENGAGE the PTO or PULL the SYSTEM POWER switch ONLY when you are on route OR as necessary to perform repairs.
- When the unit is stored or not in use, you **MUST** do the following:
  - SET ALL lift cylinders (including the body raise cylinders) to the collapsed position.
  - For units with manual transmissions, DISENGAGE the PTO and PUSH the PUMP switch so it shuts off the pump.
  - For units with automatic transmissions PUSH the SYSTEM POWER switch so the pump shuts off.
  - **REMOVE** the key from the ignition. This helps prevent tampering by unauthorized persons.
  - Refer to **Lock-Out/Tag-Out Procedure**.
- You must be attentive at all times while you operate the controls and be ready to stop or reverse the function if necessary.

BEFORE OPERATING THE EQUIPMENT

- **DO NOT** operate or service this machine until you are fully trained and have read and understand this entire manual.
- **NEVER** operate the unit UNLESS you are fully knowledgeable of all control functions. See the **In-Cab Display and ControlsOperation section** 59 of this manual.
- **MAKE SURE BEFORE** you operate the vehicle or its controls that all individuals are at a safe distance away from the unit.
- **DO NOT** operate the unit when it needs service or repair.
- **DO A VISUAL CHECK** at the beginning of each shift of the unit and run it through several cycles to find fluid leaks, broken, missing or malfunctioning, and excessively worn components (including hoses). See the **Daily Checklist section** of this manual. If you find leaks, broken, missing or malfunctioning parts, immediately stop and get the condition repaired or serviced.

USE PERSONAL PROTECTIVE EQUIPMENT

- **ALWAYS WEAR** the proper safety equipment, such as hard hats, safety shoes, protective eye wear, reflective clothing and gloves. Confirm with the owner/operator that you are using proper safety equipment.
- **WEAR PROPER EYE PROTECTION** and avoid contact with oil if possible whenever you work on or about hydraulic lines or components. **NEVER** check for oil leaks with your bare hands.

BEWARE OF OVERHEAD OBSTRUCTIONS

- **KNOW** the clearance required for **ALL** overhead obstructions (such as viaducts and bridges) that you may encounter when you drive the unit. See the decal in the chassis cab for your unit's overall height.
- **NEVER** drive the unit under any overhead obstruction of unknown height clearance.
- Become familiar with your route. Be aware of all overhead trees and obstructions that could cause problems during refuse collection.
- **CHECK** the height of the unit after you do any modifications to the chassis suspension. Any chassis suspension modification may change the height of the unit. See Tables 1 and 2.

- **LOOK UP AND LIVE. MAKE SURE** there is enough clearance between a lowered or raised container and overhead power lines. It is not necessary for the unit or container to touch the electric cable for the electricity to pass through the unit. See Tables 1 and 2.
- **STAY IN THE CAB** and **KEEP AWAY FROM ALL METAL PARTS OF THE UNIT** if the unit does touch a power line. **STAY IN THE UNIT UNTIL HELP ARRIVES.**

OVERHEAD CLEARANCES

NOTICE

Table 1 and 2 is in accordance with OSHA 29CFR 1910.333. (Also refer to ANSI Standard B30.5-2004, 5-3.4.5.) If local rules and laws require more clearance, you must follow those.

Table 1. Overhead Clearances When Operating the Unit

Voltage of Electric Line	Minimum Clearance
50,000 or less	10 feet (3 m)
Above 50,000 to 200,000	15 feet (4.6m)
Above 200,000 to 350,000	20 feet (6.1 m)
Above 350,000 to 500,000	25 feet (7.6 m)
Above 500,000 to 750,000	35 feet (10.7 m)
Above 750,000 to 1,000,000	45 feet (13.7 m)

Table 2. Overhead Clearances When Driving the Unit

Voltage of Electric Line	Minimum Clearance
750 or less	4 feet (1.2 m)
Above 750 to 50,000	6 feet (1.8 m)
Above 50,000 to 345,000	10 feet (3 m)
Above 345,000 to 750,000	16 feet (4.9 m)

Table 2. Overhead Clearances When Driving the Unit

Voltage of Electric Line	Minimum Clearance
Above 750,000 to 1,000,000	20 feet (6.1 m)

LOADING REFUSE INTO THE UNIT

- **YOU MUST BE ATTENTIVE** at all times when you load refuse and be ready to stop or reverse the function in use if necessary.
- **ALL PERSONS MUST STAND CLEAR** when the tailgate is in motion and during the unloading cycle. **MAKE SURE** no one stands under or crosses under a raised tailgate.
- **LOOK UP AND LIVE**. Make sure there is enough clearance between a raised container and overhead power lines. Refer to Tables 1 and 2.

UNLOADING

- **MAKE SURE** the unloading area is clear of all personnel.
- **ALL PERSONS MUST STAND CLEAR** when the tailgate is in motion and during the unloading cycle. **MAKE SURE** no one stands under or crosses under a raised tailgate.
- While you raise the body, be attentive at all times and be ready to stop or reverse the function if necessary.

WHEN WORKING IN OR AROUND THE VEHICLE

- **MAKE SURE** the unit is in **Lock-Out/Tag-Out** condition **BEFORE** you work in or around the unit.
- **NEVER** put any part of your body between a raised body and the chassis frame unless the frame is securely propped up. Read and follow the instructions for **Propping the Body** 85.
- **DO NOT** go under the chassis or enter the body area unless the unit is locked-out. To lock-out the unit, stop the engine, apply the brakes and make sure the brakes hold and work properly, chock all wheels, remove the keys from the cab, and place a lock-out tag on the steering wheel. See **Lock-Out/Tag-Out Procedure**.

TOWING OF ANY EQUIPMENT

- Heil DOES NOT recommend that you tow any kind of equipment with the unit. The unit was NOT DESIGNED nor intended for towing.

LOCK-OUT/TAG-OUT PROCEDURE

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 perform maintenance, repair, or cleaning procedures on the unit.

☑ 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** 88 when you raise the tailgate for service, maintenance or cleaning.
4. If equipped, **SET the body props** 86 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.

Figure 3. Lock-Out/Tag-Out Tag
(Do Not Operate Tag)

NOTICE

You can order Lock-Out/Tag-Out tags (Part No. 212-1586) through your Heil dealer or through Heil.

DECALS

The following pages show the DANGER, WARNING and CAUTION decals and list the reflective safety materials that are on the vehicle. See the Parts and Service Manual for the location and part numbers of all decals on the unit.

NOTICE

Replace any decal with a new decal if the old decal is lost, destroyed, painted over or cannot be read. When you replace a part that had decals, make sure you install new decals on each new part. Decal part numbers can be found below and in the Parts Manual. You can purchase replacement decals from your **Heil Dealer** or from the **Heil Parts Central**, 800-528-5308.

REFLECTIVE SAFETY MATERIALS

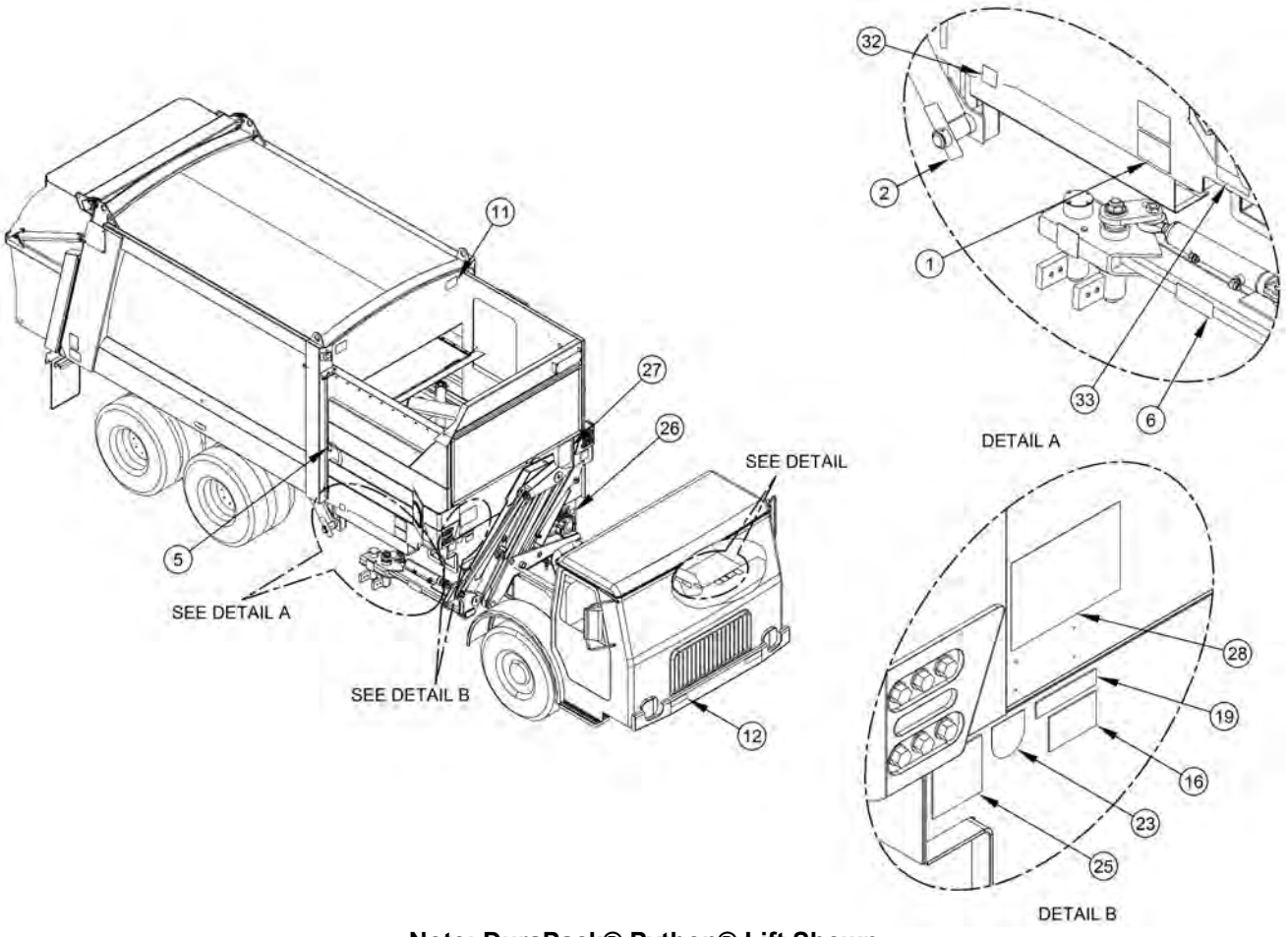
See the Parts and Service Manual for the location and part numbers of the reflective safety materials on the unit.

NOTICE

Replace any safety material with new safety material if the old safety material is lost, destroyed, painted over or cannot be seen. When you replace a part that had safety material on it, make sure you install new safety material on the new replacement part. See the Parts and Service Manual for all part numbers and location of the safety materials.

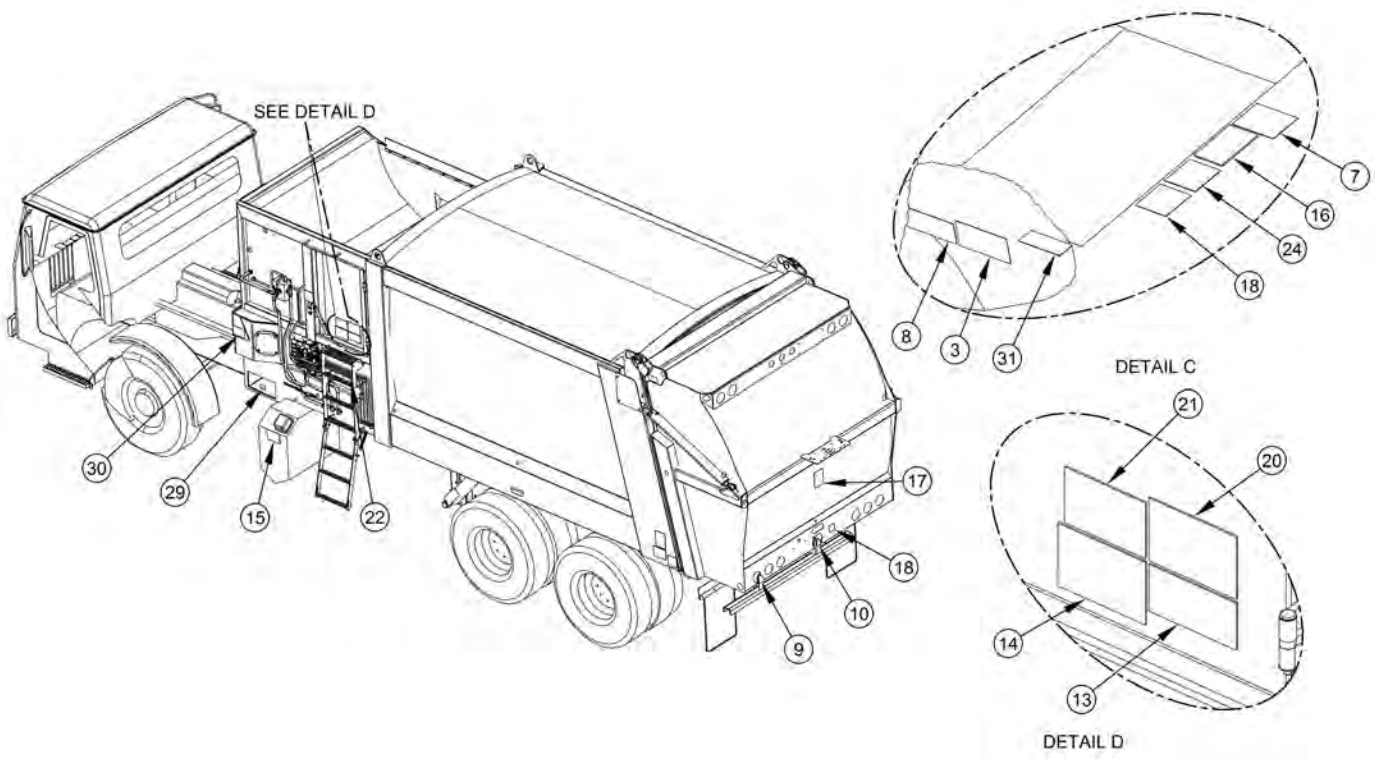
You can purchase replacement decals from your **Heil Dealer** or from the **Heil Parts Central**, **800-528-5308**.

DECAL PLACEMENT



Note: DuraPack® Python® Lift Shown

DECAL PLACEMENT (CONTINUED)



DECAL PLACEMENT (CONTINUED)

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-		Decal Kit, Command-SST™	-	REF
1	212-0980	DECAL, Danger, Stay Clear, Container Off Ground	-	1
2	212-1103	DECAL, Danger, Body Elevated, Large	-	2
3	212-1104	DECAL, Danger, Body Elevated, Small	-	1
4	212-1242	DECAL, Danger, Stand Clear, Automated Lift Device In Motion	-	1
5	212-1329	DECAL, Instruction, Body Prop	-	2
6	212-1330	DECAL, Warning	-	1
7	212-1584	DECAL, Overall Height	-	1
8	212-1626	DECAL, Danger, Tailgate Raise, Before Body	-	1
9	212-1631	DECAL, Warning, Bumper, Not Step	-	1
10	212-1634	DECAL, Danger, Stand Clear	-	1
11	212-1642	DECAL, Danger, Top Hopper and Tailgate Opening	-	5
12	212-1764	DECAL, Danger, Under Chassis, Stop Engine...	-	2
13	212-1780	DECAL, Caution, Side Door	-	1
14	212-1781	DECAL, Caution, Enter Body, Stop Engine	-	1
15	212-1782	DECAL, Hydraulic Oil Only	-	1
16	212-1783	DECAL, Warning, Operator's Manual	-	2
17	212-1801	DECAL, Danger, Stand Clear	-	3
18	212-1820	DECAL, Danger, Towing, In Cab	-	2
19	212-1841	DECAL, ANSI Specifications	-	1
20	212-1907	DECAL, Danger, Access Door	-	1
21	212-1911	DECAL, Caution, Panel In Motion	-	1
22	212-1914	DECAL, Caution, Ladder	-	1
23	212-1915	DECAL, Warranty Parts	-	1
24	212-1918	DECAL, Safety Instructions	-	1
25	212-2228	DECAL, Proximity Switch, Adjustment	-	5
26	212-2275	DECAL, Oil Level	-	1
28	212-3518	DECAL, Lubrication Guide, Body	-	1
29	212-2605	DECAL, Sump Door	-	1
30	212-2689	DECAL, Flag	-	1

DECAL PLACEMENT (CONTINUED)

ITEM	PART NO.	DESCRIPTION	EFF	QTY
32	212-2875	DECAL, Battery, Warning	-	1
33	212-3505	DECAL, Lubrication Guide, Command-SST™ Loader	-	1

DECAL IMAGES

Figure 4. Danger: Stay clear container off ground, PN 212-0980

Figure 5. Danger: Elevated body emtpied and propped, PN 212-1103

Figure 6. Danger: Stand clear automatic lift, PN 212-1242

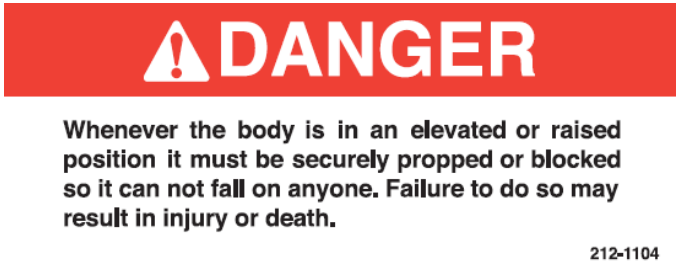


Figure 7. Danger: Elevated body propped, PN 212-1104

DECAL IMAGES (CONTINUED)

Figure 8. Danger: Stand clear tailgate, PN 212-1801

Figure 9. Warning: Never use bumper as step, PN 212-1631

Figure 10. Danger: Stand clear tailgate, PN 212-1634

Figure 11. Danger: Do not enter under chassis, PN 212-1764

DECAL IMAGES (CONTINUED)

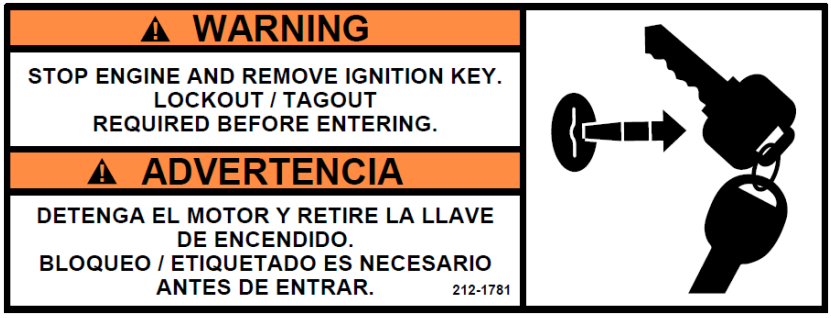


Figure 12. Warning: Lock-out / Tag-out, PN 212-1781

Figure 13. Danger: Access Door Closed, PN 212-1907

Figure 14. Caution: Side Access Door, PN 212-1780

Figure 15. Danger: Not an entrance or exit, PN 212-1642

DECAL IMAGES (CONTINUED)

Figure 16. Warning: Operations Manual, PN 212-1783

Figure 17. Caution: Stand Clear Panel, PN 212-1911

Figure 18. Danger: Do not use for towing, PN 212-1820

Figure 19. Warning: Battery disconnect switch, PN 212-2875

Figure 20. Caution: Ladder safety/balance, PN 212-1914

DECAL IMAGES (CONTINUED)

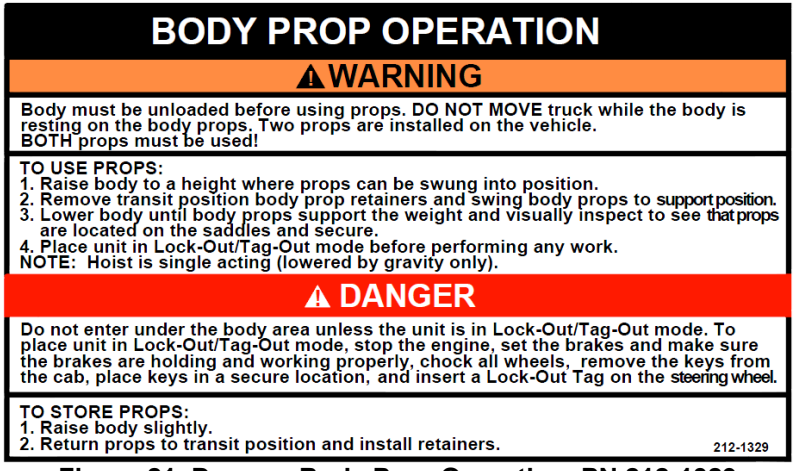


Figure 21. Danger: Body Prop Operation, PN 212-1329

Figure 22. Warning: Overall height, PN 212-1584

Figure 23. Warning: Keep away from gear, PN 212-1330

Figure 24. Danger: Raise Tailgate before Raising Body, PN 212-1626

DECAL IMAGES (CONTINUED)

Figure 25. Safety Instructions, Back-up Alarm, PN 212-1918

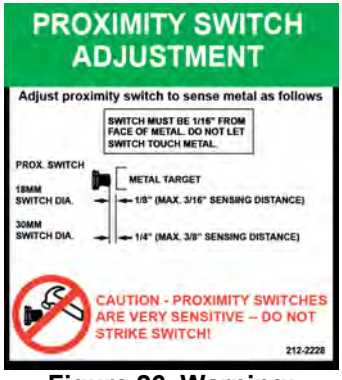


Figure 26. Warning: Proximity Switch Adjustment, PN 212-2228

Figure 27. Oil Level, PN 212-2275

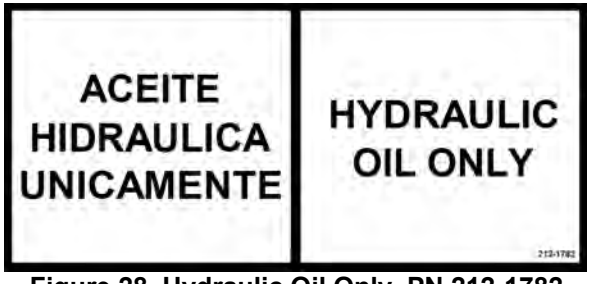


Figure 28. Hydraulic Oil Only, PN 212-1782

DECAL IMAGES (CONTINUED)

Figure 29. Flag, Made in the USA, PN 212-2689

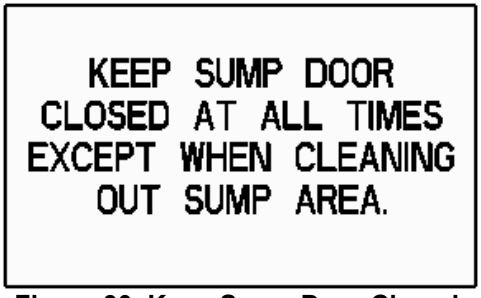


Figure 30. Keep Sump Door Closed, PN 212-2605

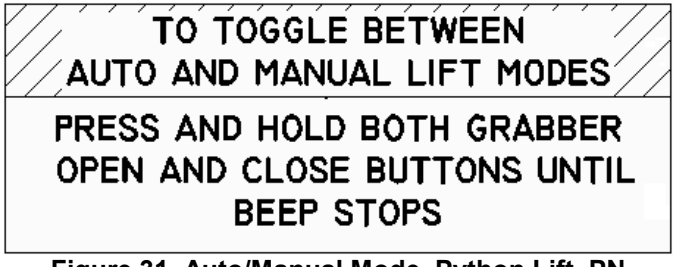


Figure 31. Auto/Manual Mode, Python Lift, PN 212-2738-010

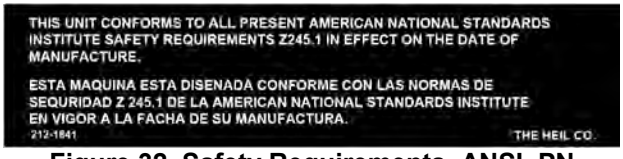


Figure 32. Safety Requirements, ANSI, PN 212-1841

DECAL IMAGES (CONTINUED)

Figure 33. Warning: Overall Height, PN 212-1915

Figure 34. ANSI Specifications, PN 212-1841

DECAL IMAGES (CONTINUED)

Figure 35. Body Lubrication Guide, PN 212-3518

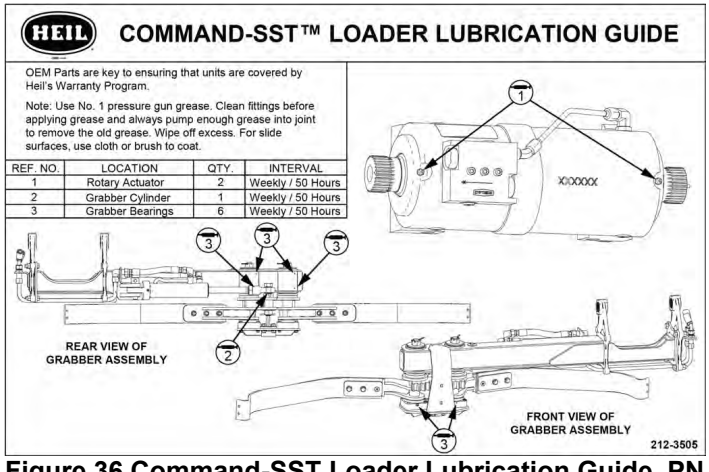


Figure 36.Command-SST Loader Lubrication Guide, PN 212-3505

CARE OF DECALS

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.

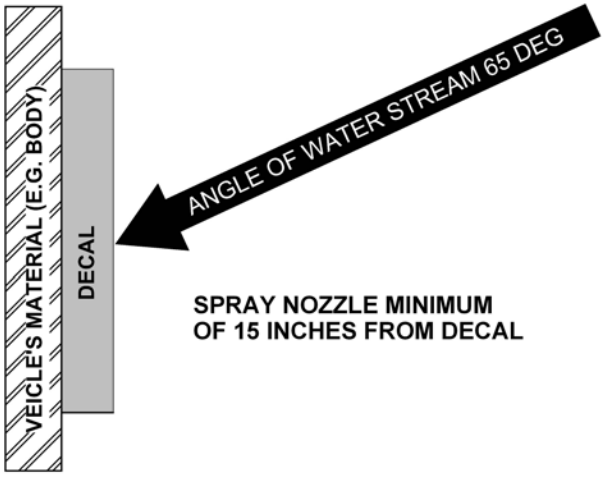
General Instructions

- 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.

Pressure Washer Precautions

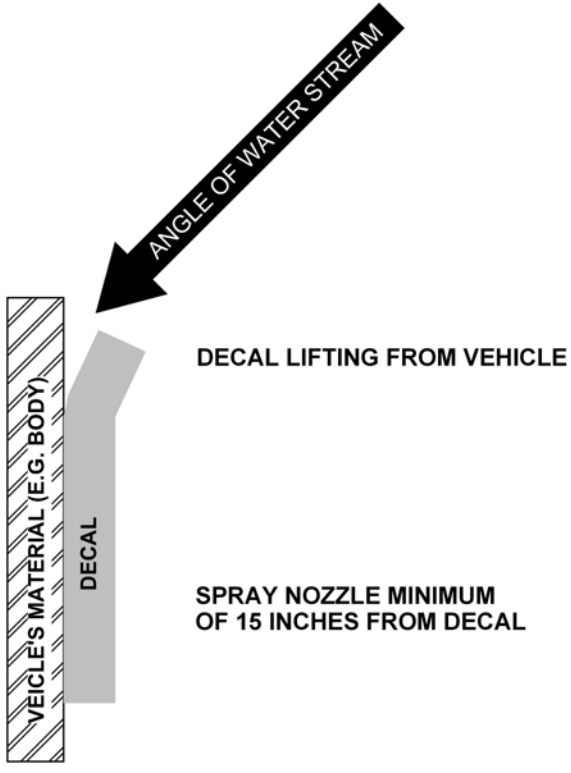
- Pressure washing can cause damage to decals. It can cause the edges of the decals to lift and peel the decal away from the unit. Over time, the decal can fade, crack or chip away.
- See the following figures for correct and incorrect methods of pressure washing.
- Use pressure washing only when other 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
  - Distance of nozzle to decal: 15" minimum
  - Water pressure: <= 800 psi
  - Length of time: not more than 30 sec.
  - Do not use sharp angles to clean the decals – this can lift the decals from the unit.
  - NEVER use a "turbo pressure nozzle".

PRESSURE WASHER TECHNIQUE



RECOMMENDED TECHNIQUE

Figure 37. Recommended Technique



INCORRECT TECHNIQUE

Figure 38. Incorrect Technique

ALTERNATIVE CLEANING PROCEDURE

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

⚠ WARNING

Isopropyl alcohol is flammable and is harmful to eyes and skin. Keep isopropyl alcohol away from heat or open sources of ignition. Flush eyes and skin with water for 15 minutes after contact. Seek immediate medical help.

- 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 Service.

NOTES:

SECTION 3
OPERATION

DAILY CHECKLIST

DAILY CHECKLIST

Make sure you perform a daily check of the unit. Make copies of the **Refuse Vehicle Daily Inspection** 63 on the next several pages to have the Operator mark completed items before each route. Many checks in the Daily Checklist are maintenance related, such as checking tire pressures and hoses for wear and damage.

Refer to the **Daily Checklist Maintenance Items Chart** below for items to check and the required action.

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

DAILY CHECKLIST MAINTENANCE ITEMS	
Item	**Required Action**
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 (typically located at front of body)	90 PSI

REFUSE VEHICLE DAILY INSPECTION

DATE: _____/_____/_____

UNIT NO. _____

Enter one of the following codes in the Inspection Results Code column:

Use a √ to indicate inspected and no repair, service or adjustment is necessary.
Use an **R** to indicate repair, service or adjustment is necessary.
Use an **N** to indicate vehicle not equipped.

FOLLOW ALL APPLICABLE LOCK-OUT / TAG-OUT PROCEDURES

Printed Name of Operator:

_____

I certify with the signature that follows that I performed a complete inspection in accordance with the following check list on the date given above.

Refer to **Preventative Maintenance Chart** and **Lubrication Guide** for additional information and requirements.

Signature of Operator:

_____

CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
INSPECT PER APPLICABLE MANUFACTURER MANUAL	
Cab/Drive	
Wheels and Tires	
Tractor and Chassis Electrical	
Chassis	
Engine & Transmission & Fluid Levels	
Tractor, 5th Wheel and Chassis Lubrication	
REFUSE COLLECTION SYSTEMS AND COMPONENTS	
CAB OUTSIDE AREA	
Check air pressure of tire. Add air if air pressure lower than recommended on the tire before going on route	
Check wear of tire tread. Replace tire worn below tire manufacturer's recommendation or state requirement before going on route	
Check tires for damage. Replace any damaged tire before going on route	
Inspect pump for leaks	
Inspect pump for damage or loose hardware	
Decals on bumper for damage and readability	
Inspect unit for refuse on or about the engine or exhaust components. **Remove all refuse to prevent a fire**	
BODY AND CHASSIS CURB SIDE INSPECTION	
Inspect level of hydraulic oil if tank is mounted on curb side. It must be full. **Add recommended oil as necessary**	
Inspect loader hydraulics for	
Cylinder, hoses and fittings for leaks	

CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Hoses for wear and damage	
Cylinders for damage	
Loose or missing mounting hardware	
Worn fiber guards – replace hoses/fittings as necessary – MAKE SURE TO INSTALL FIBER GUARD ON NEW HOSE TO PREVENT HYDRAULIC LEAKS REACHING ENGINE SURFACES WHICH CAN CREATE A FIRE HAZARD	
Inspect decals on body prop for damage and readability	
Inspect body structure for damage, loose or missing nuts and bolts and for cracked welds and metal	
Inspect body mounting brackets for cracked welds, missing bolts or nuts or movement	
Inspect decals on curb side body for damage and readability	
Check air pressure of tires. Add air to any tire with air pressure lower than recommended before going on route	
Check wear of tire treads. Replace any tire worn below tire manufacturer's recommendation or state requirement before going on route	
Check tires for damage. Replace any damaged tire before going on route	
Inspect tailgate raise components	
Cylinder, hoses and fittings for leaks	
Hoses for wear and damage	
Cylinder for damage	
Loose or missing mounting hardware	
Inspect tailgate lock components	
Latch components for wear or damage	
Loose or missing mounting hardware	

CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Tailgate is locked	
TAILGATE	
Inspect decals on tailgate and underride bumper for damage and readability	
Inspect tailgate seal for visible damage	
Inspect underride bumper for damage and loose components	
BODY AND CHASSIS STREET SIDE INSPECTION	
Tailgate is locked	
Inspect tailgate lock components	
Latch components for wear and damage	
Loose or missing mounting hardware	
Inspect tailgate raise components	
Cylinder, hoses and fittings for leaks	
Hoses for wear and damage	
Cylinder for damage	
Loose or missing mounting hardware	
Check air pressure of tires. Add air to any tire with air pressure lower than recommended before going on route	
Check wear of tire treads. Replace any tire worn below tire manufacturer's recommendation or state requirements before going on route	
Check tires for damage. Replace any damaged tire before going on route	
Inspect all decals on curb side body for damage and readability	
Inspect body structure for damage, loose or missing nuts and bolts and for cracked welds	

CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Inspect body mounting brackets for cracked weld, missing bolts or nuts or movement	
Inspect decals on body prop for damage and readability	
Inspect level of hydraulic oil if tank is mounted on streetside. It must be full. **Add recommended oil as necessary**	
If equipped, the hopper cover is DOWN	
Battery disconnect switch is turned to OFF then:	
Check wiring and battery cables from the battery box to the engine starter for wear and other damage. **IMMEDIATELY REPLACE WORN OR DAMAGED WIRING**	
Check wiring and cables for loose connections. **IMMEDIATELY TIGHTEN LOOSE CONNECTIONS**	
OPERATION OF UNIT - *Skip this section if the unit will not be operated today*	
Close the air tank drain valve	
Turn battery disconnect to ON	
Apply parking brake	
Make sure the starter interlock operates – make sure unit will not start in gear	
Start the engine. Indicator lights and gauges show normal operation of engine	
Make sure the parking brake does not allow the vehicle to move forward or reverse at idle	
Make sure the throttle advance (if equipped) operates only in neutral	
Make sure all cab, body and tailgate lights operate	
Make sure the backup alarm and light operate	
Make sure all people not necessary and any hazards are clear of the area and then:	
If equipped, engage the PTO	
Pull the System Power knob UP – the switch's red light is ON and the PUMP ON light is ON	

CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Push the System Power knob DOWN – the switch's red light is OFF and the PUMP ON light is OFF	
Pull the System Power knob UP – the switch's red light is ON and the PUMP ON light is ON	
The FILTER CHANGE light is OFF. If not, and the filter was not changed before starting the unit, report this to your supervisor immediately. DO NOT go on route until the unit is repaired if the filter was not changed	
Operate the packer in the auto mode – the packer does one extend and retract cycle	
Operate the packer in the manual mode – manually extend and retract the packer	
Start a packer extend operation then press the Retract button. The packer should stop extending and move towards the cab.	
Start a packer retract operation then press the Extend button. The packer should stop retracting and move towards the body.	
The TRANS TEMP light is OFF. If not, report this to your supervisor immediately. Do not go on route until the unit is repaired	
Operate all four single functions of the lift with the standard Command-SST™ joystick controls:	
OUT, IN, RAISE, LOWER, DUMP and UNDUMP	
Do a Coordinated Lift cycle with the standard Command-SST™ joystick controls.	
For Service Hoist units, if the body has refuse:	
Raise the body slightly – the BODY T/G UP light and alarm are ON	
Lower the body completely until it rests on the chassis	
The BODY T/G UP light and alarm are OFF	
For Service Hoist units, if the body does not have refuse, use the in-cab controls and:	
Raise the body	
The BODY T/G UP light and alarm are ON	
Make sure the body props rotate fully down, then store the body props	

CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Lower the body completely	
The BODY T/G UP light and alarm are OFF	
Open the tailgate	
The BODY T/G UP light and alarm are ON	
Set the tailgate props	
Inspect the tailgate seal for damage	
Store the tailgate props and raise the tailgate completely	
Close the tailgate	
The BODY T/G UP light and alarm are OFF	
Make sure the tailgate flag is DOWN (if equipped).	
Move the lift arm to the TRANSIT position – lift arm is stowed and the grabber is fully OPEN and against the unit	
Keep the engine running and continue the inspection	
IN-CAB INSPECTION	
Inspect all in-cab decals for damage and readability	
Do one automatic packer cycle	
Make sure the following control panel indicator lights are OFF:	
T/G RAISE	
TRANS TEMP	
FILTER CHANGE	
PUMP is OFF (RED) – if it is ON (GREEN), push the System Power knob DOWN	

CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
If equipped, check the operation of each camera	
FINAL INSPECTION	
While you walk completely around the vehicle, look for:	
Fluid leaks	
Cracked or damaged welds and metal	
Loose or missing bolts, nuts and clamps	

FEATURES

FEATURES

InSight™ Diagnostic Display

The Controller uses the Insight™ Diagnostic Display for displaying the current status of inputs/outputs, engine speed, temperatures, etc. This can also be used for configuring or selecting different options in the Controller and placing the unit in various **Operation Modes** 76.

For more information, see **InSight Diagnostic Display** 107.

Auto-Lift

Auto-Lift Mode is standard on all Controller controlled units. While in Normal Mode, the lift will automatically raise and dump with lift raise function. See **Operation Modes** 76.

Select-O-Pack™

Select-O-Pack is a standard feature on all Controller controlled Heil DuraPack Automated Side Loaders. This feature automatically cycles the Auto-Pack after a predetermined number of lift cycles. This setting can be adjusted on the InSight Diagnostic Display.

Refer to **Select-O-Pack Adjust Screen** 111 and **Operation Specifications** 74 for more information.

You can also pack the refuse manually any time after loading the refuse in the hopper. You can use the in-cab controls for the packer panel to compact the load again with a manual cycle.

Auto/Manual Pack Mode

Auto/Manual Pack Mode is a standard feature on all Controller controlled products. While in Auto Mode, the packer will complete its cycle automatically with a momentary activation of the packer extend push button. While in manual mode, it will be necessary to hold the packer extend or retract buttons in order to keep the packer cycling.

Also while in manual mode, all control interlocks will be disabled. This is only intended for special occasions when an operator needs to bypass the control interlocks.

To toggle the control between Auto and Manual Pack Modes with the System Power (E-Stop) button ON, PRESS and HOLD the Packer Extend and Retract buttons simultaneously until the in cab alarm stops sounding.

Operation Modes

There are several Operation Modes available to Operators. Some modes should only be used by Authorized Service Personnel, such as Service and Calibration Modes. See **Operation Modes** 76 for more information.

FEATURES (CONTINUED)

Spear Mode

When Spear Mode is ON, the loader arm and grabber will be in its preset position to pick cans. See **Spearing Dimension Adjust Screen** 114.

Proportional Grip

The Command-SST™ uses a Load-Sense Piston Pump allowing for proportional controls and reduced cab shake.

"On-The-Fly" Adjustable Pick Height and Angle

Using the joystick, the Operator can adjust the pick height and angle to be able to pick hard to reach cans. See **Joystick Controls** 83 and **Pick Height Adjust Screen** 113.

Can Shake

With the press of a joystick button or foot switch (when equipped), the Operator can perform a "can shake" that will help with dislodging stubborn refuse from the can into the hopper. See **Joystick Controls** 83.

Soft-Touch Grabbers

The Command-SST™ comes equipped with Soft-Touch Grabbers that reduce cart damage. Also see **Grabber Pressure Adjust Screen** 112.

Lift Light

If the Lift Light is in the OFF position with the PTO on, RPMs less than 1000, Road Speed less than 15 mph, and the service brake applied, the Lift Light will automatically activate.

Lift Light (Continued)

Once you have left any of the above-mentioned conditions, the Lift Light will remain on for an additional 10 seconds before automatically turning OFF.

This automatic light feature also applies if you put your unit in neutral, engage the parking brake, and utilize any lift arm function.

Heads-Up Display (Optional)

On the 3rd Eye Heads-Up Display, grid lines allow for eyes-forward operation and help the Operator line up the Command-SST™ Loader to the cans. See **Lifting and Loading Refuse** 97.

Heil Autonomous Lift Option (H.A.L.O.)

The Heil Autonomous Lift Option (H.A.L.O.) simplifies the operation of picking up residential carts. When equipped, an operator can grab, dump and return a cart to its original location with the push of a button on the joystick. See **H.A.L.O. Joystick Controls** 84.

Foot Switches (Optional)

An optional foot switch is available that also operates H.A.L.O. When equipped, an operator can grab, dump and return a cart to its original location with the push of the left foot switch. To help dislodge stubborn refuse from the can into the hopper, the right foot switch can be used to activate Can Shake.

OPERATION SPECIFICATIONS

Pump System

- The pump will be on only when the in-cab red SYSTEM POWER switch is activated, the pump push button is ON (Green), the hopper side door is closed and locked, and the filter is not in by-pass mode.
- The pump will be active when the above conditions are met and the packer is activated.
- The lift will function in neutral or in gear when foot brake is applied and the RPM is below 900.
- The lift will grab, lift, lower and release in 6-8 seconds at engine idle (700 RPM).
- See **Pump** 159.

Packer

- The packer will complete one cycle (extend and retract) in 12-14 seconds at 1200 RPM.
- The packer will slow during lift operation.
- The packer will function at any RPM below 2000 RPM.

Select-O-Pack™

- Triggered off the grabber release push-button, this system initiates a pack cycle once the programmed number of lift cycles have been completed. (Factory pre-set is two (2) lift cycles). See **Features** 72 and **Select-O-Pack Adjust Screen** 111 for more information.

Auto-Lift

- In Normal Coordinated Mode, the Grabber Close function will initiate a Auto-Lift sequence. The Operator's hand must remain grasped around the Joystick during entire Auto-Lift sequence.
- Cart will raise and retract automatically to the dump position.
- Operator manually replaces cart to desired position on the ground.
- Pressing the STOW POS button on the **Supporting Functions Push Button Controls** 80 will return lift to stowed position.
- See **Features** 72 for more information.

OPERATION SPECIFICATIONS (CONTINUED)

Warning Signals

- The arm extended light will activate any time the arm is extended or grabbers are not fully open.
- The arm extended light and alarm will activate when the arm is extended or grabbers are not fully open, the transmission is in gear and the foot brake is not applied.
- An alarm will sound and a light will illuminate if the body or tailgate is raised.
- The backup (reverse) alarm will sound if the body or tailgate is raised or the transmission is in reverse.

NOTES:

OPERATION MODES

There are several Operation Modes available to Operators. Some modes should only be used by Authorized Service Personnel, such as Service and Calibration Modes.

⚠ WARNING

Moving equipment can be dangerous. Serious injury or death may 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.

A. Normal Mode

1. Description: Allows for normal operation for container picks with the lift arm
2. Interlocks: All
3. How to Activate/Deactivate: Automatically activates/ reactivates with Key Switch

B. Weigh Mode

1. Description: Allows for normal operation for container picks with the lift arm, weighing each can and saving total route collection weight
2. Interlocks: All
3. How to Activate/Deactivate: Automatically activates/ reactivates with Key Switch

C. Coordinated/Manual Mode

1. Description: Switches between Joystick controls and Manual Control Key Pad controls
2. Interlocks: All
3. How to Activate/Deactivate: Display (defaults to Normal Mode with Key Switch)

D. Spear Mode

1. Description: Prepositions the lift arm and grabber for quicker container picks.
2. Interlocks: All
3. How to Activate/Deactivate: Display (defaults to Normal Mode with Key Switch)

E. Above/Below Grade Mode

⚠ WARNING

In **Above/Below Grade Mode**, there are NO interlocks to prevent the lift arm from striking the body or ground. Extreme caution must be used when operating the unit in this mode. Due to reduced visibility of the lift arm by the operator, street side controls do not allow ABOVE / BELOW grade mode functionality.

1. Description: Allows for above or below grade container picks.
2. Interlocks: None (Use CAUTION)
3. How to Activate/Deactivate: Display (defaults to Normal Mode with Ignition Key Switch)

OPERATION MODES (CONTINUED)

⚠ WARNING

Moving equipment can be dangerous. Serious injury or death may 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.

F. Service Mode

1. Description: In the event of a Cylinder or Packer Sensor failure on route, allows Qualified Service Personnel to recover to a stowed lift position. Maintenance Mode can also be used to move the functions while servicing a failed Cylinder Sensor.
2. Interlocks: Some (lift cannot hit body or ground)
3. How to Activate/Deactivate: Display (defaults to Normal Mode with Key Switch)

G. Calibration Mode

Follow the InSight Diagnostic Display instructions to **calibrate the unit** 132. Contact Heil Technical Service at 866-310-4345 for more information.

1. Description: Allows Qualified Service to calibrate the unit after a cylinder replacement
2. Interlocks: Some (lift cannot hit body or ground)
3. How to Activate/Deactivate: Display (defaults to Normal Mode with Key Switch)

CONTROLS

MAIN PUSH BUTTON CONTROLS

The Main Push Button Controls are located in the cab. This key pad is water-resistant with a lighted ring around each button.

A. Push Button Controls Functions

The Main Push Button Controls can vary with different models of truck chassis. Individual buttons have markings that identify each function and its operations. Make sure you are familiar with the Main Push Button Controls for your unit prior to operating the unit.

1. PUMP - Turns the Hot Shift PTO ON (Green) or OFF (Red)
2. PACK EXT - Extends the Packer, command active (Green flashing) or no command (Blue)
3. PACK RET - Retracts the Packer, command active (Yellow flashing) or no command (Blue)

   Toggle the control between Auto and Manual Pack Modes by selecting **Select-O-Pack** on the InSight™ Diagnostic Display. Refer to **Select-O-Pack Adjust Screen** 111, **Operation Specifications** 74 and **Compacting the Load** 99 for more information.
4. T/G RAISE - Raises the Tailgate, command active (Green) or no command (Blue)
5. T/G LOWER - Lowers the Tailgate, command active (Green) or no command (Blue)
6. T/G LOCK - Locks the Tailgate, command active (Green) or no command (Blue)
7. T/G UNLOCK - Unlocks the Tailgate, command active (Green) or no command (Blue)
8. TP DR OPEN - Opens the Top Door, command active (Green) or no command (Blue)
9. TP DR CLOSE - Closes the Top Door, command active (Green) or no command (Blue)
10. SPARE BUTTONS - There may be spare buttons that are unused.

Figure 39. Main Push Button Controls

SUPPORTING FUNCTIONS PUSH BUTTON CONTROLS

The Supporting Functions Push Button Controls are located in the cab. This key pad is water-resistant with a lighted ring around each button.

A. Push Button Controls Functions

The Supporting Push Button Controls can vary with different models of truck chassis and configurations. Individual buttons have markings that identify each function and its operations. Make sure you are familiar with the Supporting Functions Push Button Controls for your unit prior to operating the unit.

1. STROBE LIGHT - Turns the Strobe Lights ON (Green) or OFF (Blue). The Strobe Lights also turn ON automatically with the PTO.
2. HOPPER LIGHT - Turns the Hopper Light ON (Green) or OFF (Blue).
3. AUX LIGHT - Turns the Auxiliary Work Lights ON (Green) or OFF (Blue). The Auxiliary Work Lights also turn ON automatically when the truck is in reverse.
4. LIFT LIGHT - Turns the Lift Light ON (Green) or OFF (Blue).
5. COORD MODE - Turns the Coordinated Mode ON (Green) or OFF (Blue). Coordinated Mode allows joystick operations only when ON and must be OFF for manual functions.
6. SPEAR MODE - Turns the Spear Mode ON (Green) or OFF (Blue).

⚠ WARNING

In **Above/Below Grade Mode**, there are NO interlocks to prevent the lift arm from striking the body or ground. Extreme caution must be used when operating the unit in this mode. Due to reduced visibility of the lift arm by the operator, street side controls do not allow ABOVE / BELOW grade mode functionality.

7. ABOVE / BELOW - Turns the Above / Below Grade Mode ON (Red), OFF (Green), OFF and Manual Head Rotate (Yellow), ON and Manual Head Rotate (Flashing Red).
8. STOW POS - Turns the Stow Position ON (Green) or Work Position ON (Magenta).
9. SPARE BUTTONS - There may be spare buttons that are unused.

Figure 40. Supporting Functions Push Button Controls

MANUAL CONTROLS PUSH BUTTON CONTROLS

The Manual Controls Push Button Controls is typically located in the cab, under the curb side seat and can be used for calibration purposes. This key pad is water-resistant with a lighted ring around each button. See **Unit Calibration** 132.

NOTICE

Calibration Mode should only be used by Authorized Service Personnel when replacing any hydraulic component in the lift or pack circuits.

A. Push Button Controls Functions

The Manual Controls Push Button Controls can vary with different models of truck chassis. Individual buttons have markings that identify each function and its operations. Make sure you are familiar with the Manual Control Push Button Controls for your unit prior to operating the unit.

1. ENABLE - Turns the Manual Control Key Pad ON (Green) or OFF (Blue). Coordinated Mode must be OFF (Blue) on the **Supporting Functions Push Button Controls** 80.
2. PUMP ON - Turns the Hot Shift PTO ON (Green) or OFF (Blue)
3. DUMP - Rotates the Grabber Head in Dump Position, ON (Green) or OFF (Blue)
4. UNDUMP - Rotates the Grabber Head in Dump Position, ON (Green) or OFF (Blue)
4. UP - Moves the Lift Arm in the UP direction, ON (Green) or OFF (Blue)
5. DOWN - Moves the Lift Arm in the DOWN direction, ON (Green) or OFF (Blue)
6. OUT - Moves the Lift Arm in the OUT direction, ON (Green) or OFF (Blue)
7. IN - Moves the Lift Arm in the IN direction, ON (Green) or OFF (Blue)
8. GRAB - Moves the Grabbers in the CLOSED direction, ON (Green) or OFF (Blue)
10. RELEASE - Moves the Grabbers in the OPEN direction, ON (Green) or OFF (Blue)
11. OK - Provide OK input for Calibration Process, ON (Green) or OFF (Blue)
12. CAN SHAKE - Activates the Can Shake function, ON (Green), OFF (Blue), OFF with ENABLE Active and COORD MODE ON (Yellow)

Figure 41. Manual Control Push Button Controls (DISABLE and PUMP OFF buttons shown may not be found on all units.)

JOYSTICK CONTROLS

The joystick controls all of the lift functions and has five (5) push buttons to control various functions of the loader.

A. Joystick Movements

The joystick can be moved forward, backward and sideways for the different functions while in **Coordinated Mode** 76. See the figure the right for the different movements and the functions they control. Make sure you are familiar with the joystick controls for your unit prior to operating the unit.

1. LIFT RAISE - In ABOVE / BELOW GRADE MODE, PULL and HOLD joystick to RAISE the lift. Release the joystick to stop the movement of the lift.
2. LIFT LOWER - In ABOVE / BELOW GRADE MODE, push FORWARD and HOLD joystick to LOWER the lift. Release joystick to stop the movement of the lift.
3. LIFT RETRACT (IN) - Move joystick to LEFT and HOLD to RETRACT the lift IN. Release joystick to stop the movement of the lift.
4. LIFT EXTEND (OUT) - Move joystick to RIGHT and HOLD to EXTEND the lift OUT. Release joystick to stop the movement of the lift.

   Note: In COORDINATED MODE for LIFT RETRACT (IN) and LIFT EXTEND (OUT), Raise/Lower Cylinder will respond accordingly to keep lift level. In ABOVE / BELOW GRADE MODE for LIFT RETRACT (IN) and LIFT EXTEND (OUT), only the In/Out Cylinder will be active and will move proportionally based on the percentage that the joystick is moved.

5. UNDUMP - In COORDINATED MODE, push joystick FORWARD and HOLD for to move lift OUT and DOWN to place container on the ground. Release joystick to stop the movement of the lift.
6. Sensor (Dead Man) - The Operator's hand **must be grasped around the Joystick control lift functions.** If the joystick is released, the joystick lift functions will not operate.

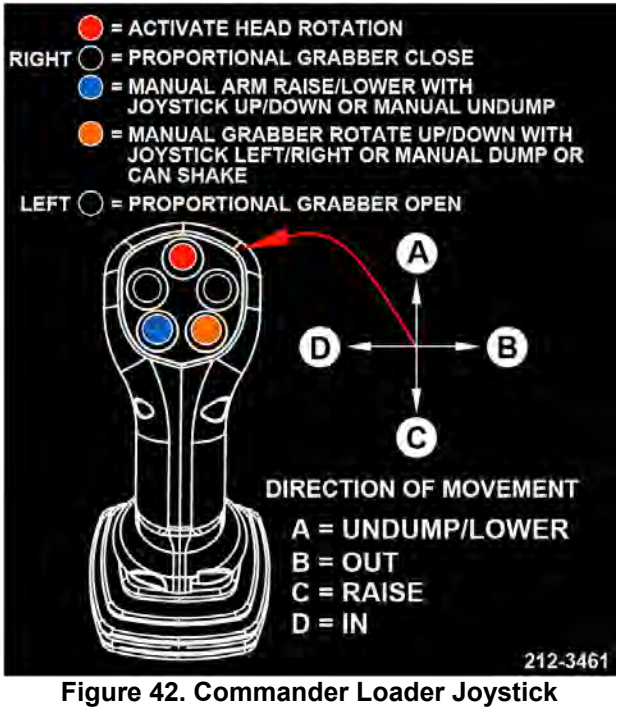


Figure 42. Commander Loader Joystick Movements/Functions

JOYSTICK CONTROLS (CONTINUED)

B. 5 Push-Button Controls

The joystick has 5 push-buttons on the handle that control the grabber head rotation, pick angle, pick height, can shake and proportional grabber open/close functions while in **Coordinated Mode** 76. See the figure on the previous page for the different functions of the push-buttons.

1. ZERO PICK ANGLE / ACTIVATE HEAD ROTATION (RED BUTTON)
   a. DEPRESS and RELEASE button to make the pick angle go back to the default zero pick angle position (center/level the grabber head).
   b. DEPRESS and HOLD button five (5) seconds to activate head free rotation. Then DEPRESS and HOLD either the blue or orange button to rotate the grabber head clockwise or counter-clockwise.
2. PROPORTIONAL GRABBER CLOSE (RIGHT BLACK BUTTON) - DEPRESS and HOLD button until grabbers are fully and securely closed around the container, then release button. Close speed will be proportional based on percentage button is depressed.

   In NORMAL COORDINATED MODE, closing grabbers will initiate Auto-Lift sequence. Operator must hold grabber closed button to continue cycle. Release the joystick to stop the movement of the lift.
3. PROPORTIONAL GRABBER OPEN (LEFT BLACK BUTTON) - DEPRESS and HOLD button to open the grabbers until at the desired open position, then release button. Release speed will be proportional based on percentage button is depressed.
4. MANUAL ARM RAISE/LOWER WITH JOYSTICK UP/DOWN OR MANUAL UNDUMP (BLUE BUTTON)
   a. DEPRESS and HOLD this button while moving the joystick FORWARD or BACK to adjust Grabber Head Pick Height. The Grabber Head will return to the height position shown on the display once a can has been grabbed.
   b. Head Free Rotate - DEPRESS to move head in undump direction.
5. MANUAL GRABBER ROTATE UP/DOWN WITH JOYSTICK LEFT/RIGHT OR MANUAL DUMP OR CAN SHAKE (ORANGE BUTTON)
   a. DEPRESS and HOLD this button while moving the joystick LEFT or RIGHT to adjust Grabber Head Pick Angle. The Grabber Head will return to the height position shown on the display once a can has been grabbed.
   b. Head Free Rotate - DEPRESS to move head in dump direction.
   c. Can Shake - When the arm is in the UP, IN and DUMP position, DEPRESS and HOLD button to perform a can shake. This feature will only be active while the button is depressed, with a maximum of three (3) shakes per button press.

      Note: In Normal Coordinated Mode, opening grabbers will initiate Auto-Home sequence. Operator must HOLD GRABBER OPEN button to continue cycle.

H.A.L.O. JOYSTICK CONTROLS (OPTIONAL)

The optional Heil Autonomous Lift Option (H.A.L.O.) joystick controls all of the lift functions. When equipped, an operator can grab, dump and return a cart to its original location with the push of the red button on the joystick. See **Features** 73 and **Lifting and Loading Refuse** 98.

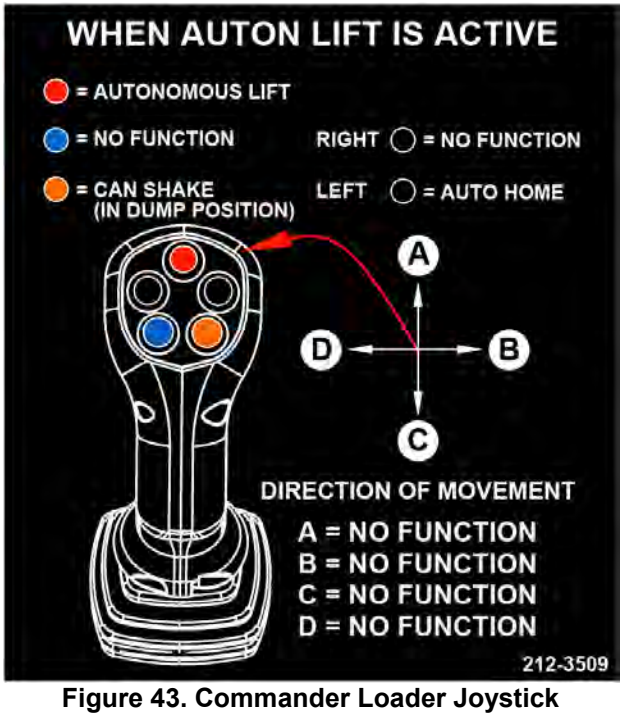


Figure 43. Commander Loader Joystick Movements/Functions

NOTES:

PROPPING THE BODY OF A SERVICE HOIST UNIT

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

Observe and obey the following DANGER and WARNING notices while you prop the body with the factory body props.

⚠ DANGER

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

⚠ DANGER

The unit may roll when you raise the body on unstable or uneven ground and cause serious injury or death to you or bystanders. Do not prop the body while the unit is on unstable or uneven ground. Clear the area of all people not necessary for this procedure and set the unit on stable and even ground before you start this procedure. Make sure all tire pressures are correct.

⚠ WARNING

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

⚠ WARNING

Never drive the unit with the body propped.

NOTICE

Empty body of all refuse before using body props.

PROPPING THE BODY OF A SERVICE HOIST UNIT (CONTINUED)

Factory Body Props

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

☑ Follow These Steps:

Raising the Body

1. Empty body of all refuse.
2. Make sure that body is on firm, level ground with the Parking Brake engaged and holding and place chocks on the wheels.
3. CLOSE the manual override valve on the power unit – PUSH the knob IN and turn it CLOCKWISE.
4. **Lock-Out/Tag-Out** the unit.
5. Remove the bolts and springs from the chassis mounting brackets. See the figure below.

Figure 44. Removing Bolts and Springs from Chassis Mounting Brackets

Raising the Body (Continued)

1. If equipped with quick disconnects, uncouple prior to raising the body.
2. Make sure there is adequate slack in hoses that do not have disconnects. If there is not adequate slack in hoses that do not have disconnects, remove those hose clamps.
3. Observe and obey the DANGER labels for an elevated chassis.
4. PRESS and HOLD the UP button to RAISE the body.
5. RELEASE the UP button when the body is at the height you want.
6. Release the prop handles and LOWER the body props, then PRESS the DOWN button to lower the body onto the lugs. See the figure below.

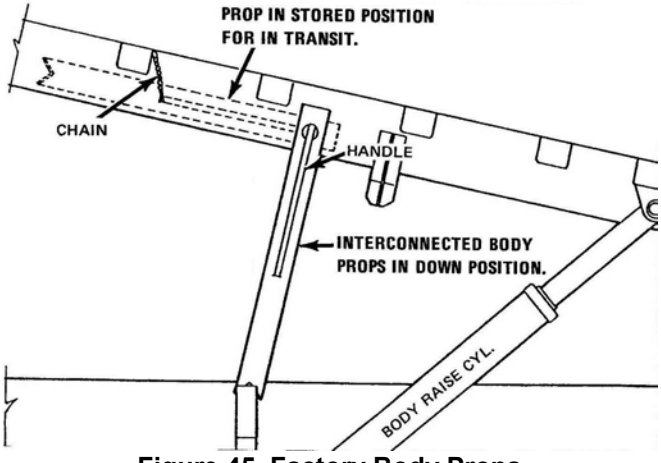


Figure 45. Factory Body Props

PROPPING THE BODY OF A SERVICE HOIST UNIT (CONTINUED)

Raising the Body (Continued)

7. NEVER open the override valve when the body is elevated.
8. Perform the maintenance or service procedures.

Lowering the Body

1. PRESS the UP button until the body is not resting on the body props.
2. RAISE the body props and store the handles.
3. Press and hold the DOWN button to lower the body.
4. Release the DOWN button when the body is completely down and resting on the chassis.
5. OPEN the manual override valve – PUSH the knob IN and turn it COUNTER-CLOCKWISE.
6. Make sure the manual override valve is open – PUSH the service hoist UP button. The body will not raise.
7. If any hose clamps were removed to create adequate slack during body raise, then re-install those hose clamps.
8. If equipped with quick disconnects, reattach the quick disconnects.
9. Install the bolts and springs to the chassis mounting brackets.

NOTES:

PROPPING THE TAILGATE

YOU MUST prop the tailgate when you open it for service or maintenance. Use the instructions that follow and prop the tailgate with either the factory-installed tailgate props or a tailgate prop built specifically for your unit.

Observe and obey the following DANGER and WARNING notices while you prop the body with either the factory body props or with alternate props.

⚠ DANGER

A tailgate is dangerous while you raise or lower it. A prop may fail and cause the tailgate to close suddenly which can result in serious injury or death if you become trapped between the tailgate and the body. Do not walk under or go between the body and the tailgate when the tailgate is in motion, while you prop the tailgate or while the tailgate is propped.

Factory Tailgate Props

YOU MUST USE BOTH of the two support props at the rear of each unit whenever you open the tailgate for service or maintenance.

Refer to the figure on the next page and carefully follow the tailgate propping procedures below.

☑ Follow These Steps:

A. How to Use the Tailgate Props

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

PROPPING THE TAILGATE (CONTINUED)

B. How to Store the Tailgate Props

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

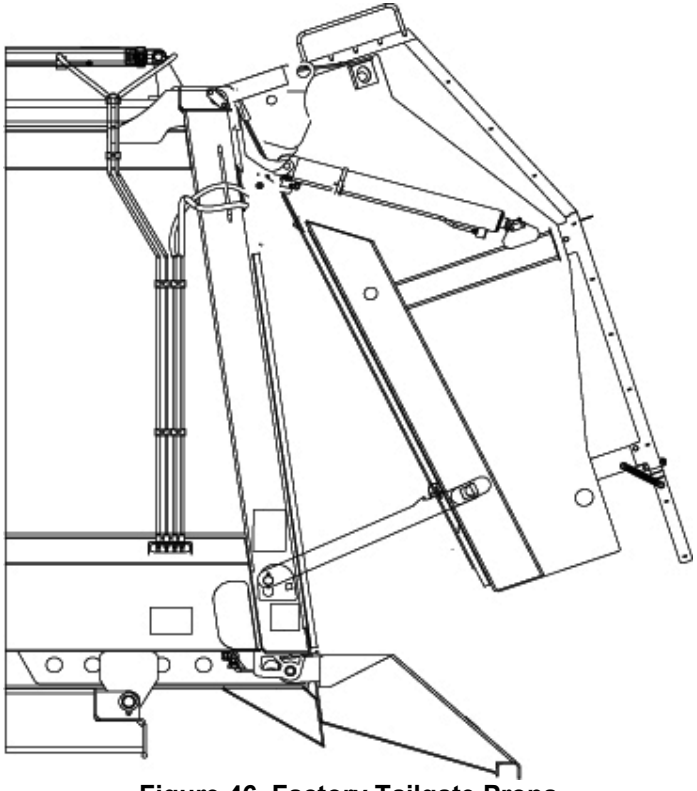


Figure 46. Factory Tailgate Props

SIDE ACCESS DOOR

A hinged access door is located on the street side of the unit and provides access to the body area for cleanout purposes. Never enter the door unless the truck engine is stopped, the ignition key is removed, and the unit is in **Lock-Out/Tag-Out mode** 40. See the figure to the right.

⚠ WARNING

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.

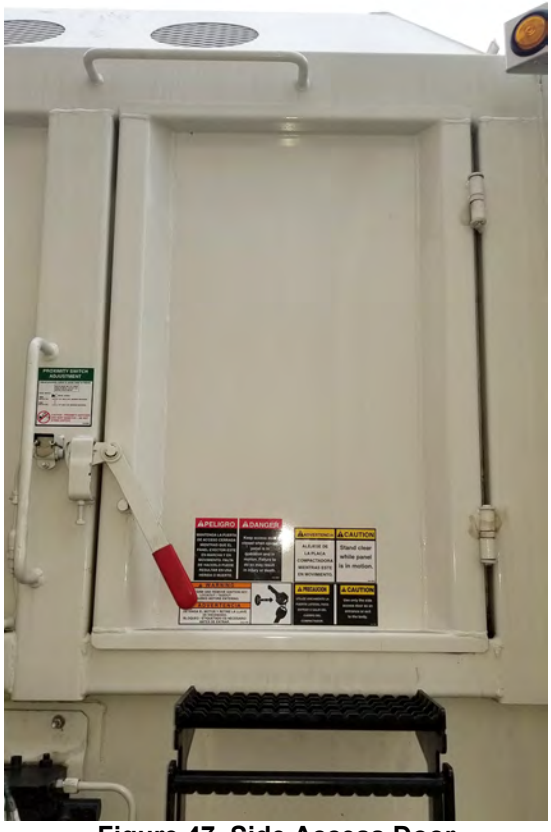


Figure 47. Side Access Door

BEFORE STARTING A ROUTE

Before you start a route, do the following:

- ☐ Perform an inspection of the unit with the **Daily Checklist**.
- ☐ Check the **Hydraulic Oil Level** 93.
- ☐ Cycle all **Hydraulic Functions**.
- ☐ If equipped, close the Side Access Door.
- ☐ If equipped, close the Sliding Top Door (Hopper Cover).
- ☐ Check the **"In-transit" Position Settings** 94.

Use the Daily Checklist to Inspect the Unit

It is the operator's responsibility to do a visual inspection of the unit and make sure the unit is in good operating condition before you start a route.

The requirements for the daily checks are given in the **Daily Checklist section** 60. Make sure you complete the inspections on the checklist and you make all entries, including your signature.

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 or to check the oil level. The hydraulic oil is sufficiently warmed when the temperature is between 120° and 160°F.

⚠ WARNING

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

Follow the steps below to warm up the hydraulic oil.

1. START the TRUCK and let the engine idle.
2. APPLY the PARKING BRAKE and make sure it holds.
3. MAKE SURE the AREA IS CLEAR of all unnecessary people.
4. ENGAGE the HYDRAULIC PUMP.
5. If no hydraulic function is requested and hydraulic oil temperature is below the **set temp on the InSight™ Diagnostic Display** 128, the hydraulic heater circuit will activate to warm the hydraulic oil. The hydraulic heater circuit will shut off when a hydraulic function is requested or temperature is 10°F above set point.
6. Check for fluid leaks. Repair if necessary.

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.

NOTES:

PREPARING THE UNIT TO CHECK THE HYDRAULIC OIL LEVEL

Before checking the oil level or adding oil, make sure the oil is warmed up and 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

CHECK HYDRAULIC OIL LEVEL

Check the hydraulic oil level (after warming up the oil) daily or every eight (8) hours, whichever comes first. Fill as necessary. For more information, see **Check Hydraulic Oil Level** 151.

CYCLE ALL HYDRAULIC FUNCTIONS

☑ Follow These Steps:

1. Operate the lift arm, grabbers, top door (if equipped), packing panel, body and tailgate functions two or three times each. See **Operation section** 59 for proper operation of controls.
2. Put the unit back in the position described above and check the oil level again.
3. Add oil if necessary. Refer to the Service Manual for instructions for filling the oil tank.

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. Refer to **Hydraulic Oil Specifications** 151 for other approved hydraulic oils.

NOTICE

Cold weather operation requires special oil considerations. Viscosity should not exceed 7500 SSU at lowest startup temperature. Continuous operation should range between 40–1000 SSU for all temperature ranges.

NOTICE

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.

CHECK THE TRAVELING OR "IN-TRANSIT" POSITION

Whenever you drive to and from a route, along the route (when not picking up refuse containers), and to and from the landfill or transfer station, make sure the unit is in the In-Transit Position as follows:

- The Body is fully LOWERED.
- The Tailgate is DOWN and LOCKED.
- The Lift Arm is in a transit position:
  - The lift arm is fully stowed in the cradle
  - The grabber arm assembly is against the chassis and the grabbers are fully open
- The Top Door (Hopper Cover) is:
  - For a unit before it is on-route – CLOSED
  - For an on-route unit – OPEN
- The Packer Panel is:
  - For an empty unit, it is at the front of hopper.
  - For a unit with refuse in the body, it is up tight against refuse.
- The Mirrors are properly adjusted and clean.
- The Side Access Door and Sump Doors are CLOSED and LATCHED.
- ALL outside lights operate properly.
- The street side driver's station is used for traveling.

Use of Curbside Drive

If equipped, drive from the curbside driver position **ONLY** on the collection route. **DO NOT** use this station during travel to and from a route, landfill, or transfer station.

ON-ROUTE OPERATION PROCEDURES

DRIVING TO PICK-UP LOCATIONS

Whenever you drive to and from a route, along the route (when not picking up refuse containers), and to and from the landfill or transfer station, make sure the unit is in the In-Transit Position as follows:

- The Body is fully LOWERED.
- The Tailgate is DOWN and LOCKED.
- The Lift Arm is in a transit position:
  - The lift arm is fully stowed in the cradle
  - The grabber arm assembly is against the chassis and the grabbers are fully open
- The Top Door (Hopper Cover) is:
  - For a unit before it is on-route – CLOSED
  - For an on-route unit – OPEN
- The Packer Panel is:
  - For an empty unit, it is at the front of hopper.
  - For a unit with refuse in the body, it is up tight against refuse.
- The Mirrors are properly adjusted and clean.
- The Side Access Door and Sump Doors are CLOSED and LATCHED.
- ALL outside lights operate properly.
- The street side driver's station is used for traveling.

Use of Curbside Drive

If equipped, drive from the curbside driver position **ONLY** on the collection route. **DO NOT** use this station during travel to and from a route, landfill, or transfer station.

LIFTING AND LOADING REFUSE

Use the following procedures at each stop along the route to load refuse into the unit. Observe all DANGER and WARNING hazard alerts.

NOTICE

Refer to **Tables 1 and 2. Overhead Clearances** 36. If local rules and laws require more clearance, you must follow them.

1. Move the unit to a position that is best to load the refuse with the lift arm. Practice this maneuver for best results. Pick Height can be set on the InSight Diagnostic Display. See **Pick Height Adjust Screen** 113. When in **Spear Mode** 76, the loader arm and grabber pick position is prepositioned at the positions set by the operator on the InSight™ Diagnostic Display. See **Spearing Dimension Adjust Screen** 114.
2. ADJUST the container spot mirror for BEST overhead vision of the hopper while you raise container and, if equipped, use the grid lines on the optional **Heads-Up Display** 73 to help with lining up the Command-SST™ lift arm to the cans. See image on the right of this page.
3. PULL the SYSTEM POWER switch UP (and engage the PTO if equipped). The PUMP push button light should be ON (Green).

NOTICE

If the engine RPMs go above 900, the lift will not operate.

Figure 48. Optional 3rd Eye Heads-Up Display Grid Lines

4. The Operator's foot is on the service brake and the engine RPMs are at or below 900.

⚠ WARNING

Moving equipment can be dangerous. Serious injury or death may 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.

5. Make sure the loading area is clear of all unnecessary people.
6. Make sure the packer is in the **Auto-Pack Mode**.
7. If equipped, the hopper cover or top door is OPEN. You can damage the unit if you try to load refuse if the hopper cover or top door is CLOSED.

LIFTING AND LOADING REFUSE (CONTINUED)

⚠ DANGER

Contact of the unit with overhead electric lines is dangerous. Serious injury or death may occur. Make sure there is adequate overhead clearance before you raise the container. Refer to **Tables 1 and 2. Overhead Clearances** 36. 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.

NOTICE

If local rules and laws require more clearance, you must follow them.

NOTICE

Make sure the container is in the center of the grabbers. DO NOT use the tips of the grabbers to squeeze and lift the container.

8. MOVE the joystick to the OUT position and HOLD until the arm is in position to pick up the refuse container.
9. DEPRESS and HOLD the right black button on the joystick, the grabbers CLOSE around the can, and the arm automatically carries the can up and into the hopper, dumping automatically.

Note: All units are equipped with the Auto-Lift feature. When operating in Normal Mode, Weigh Mode or Spear Mode, this feature is enabled automatically and allows the operator to partially automate the lifting, dumping and returning of the refuse container to the ground.

For units equipped with the Heil Autonomous Lift Option (H.A.L.O.), press the red button to grab, dump and return a cart to its original location. See **Features** 73 and **H.A.L.O. Joystick Controls** 84. You would then be able to skip Steps 10-13 below.

NOTICE

When the arm is in the UP, IN and DUMP position, DEPRESS and HOLD button to perform a can shake. This feature will only be active while the button is depressed, with three (3) shakes per button press.

10. When the container is empty of refuse, PUSH and HOLD the joystick to the UNDUMP position. The lift arm will rotate the container out of the hopper and lower the container to the ground.
11. DEPRESS and HOLD the left black button on the joystick, the grabbers RELEASE the container and move the lift arm IN to the work position.
13. Press the STOW POS button on the **Supporting Functions Push Button Controls** 80 to return lift to stowed position.
14. Go to the next stop on the route.

COMPACTING THE LOAD

Loads can be compacted automatically or manually. In addition to the auto-pack mode during loading, you can pack the refuse manually any time after loading the refuse in the hopper. You can use the in-cab controls for the packer panel to compact the load again with a manual cycle.

Note: The Command-SST™ Packer will not operate while the Lift Arm is being operated.

Select-O-Pack™

Select-O-Pack is a standard feature on all Controller controlled Heil Automated Side Loaders. This feature automatically cycles the Auto-Pack after a predetermined number of lift cycles.

Refer to **Select-O-Pack Adjust Screen** 111 for instructions on setting the Select-O-Pack feature on the InSight™ Diagnostic Screen.

Packing Near Full Load

When the body is near a full load, the packing cylinder will not extend fully before returning to the front of the hopper.

Packing On-The-Move

Command-SST™ units can pack on-the-move. This means you can operate the packing mechanism while the vehicle is moving, as well as when it is stationary. The default mode of the body pump is the AUTO PACK mode. This allows for continuous packing while the SYSTEM POWER switch is set to ON (and if equipped, the PTO is engaged), the pump is ON and the unit's engine is running.

You can pack-on-the-move when the Controller determines that all conditions are OK. The Controller shuts down the pump system when the engine RPMs are above safe operating speeds or the Controller determines that conditions are not correct for pump operation. The packing cycle will not begin if the RPMs are above a safe operating speed.

Refer to **Auto/Manual Pack Mode** in **Features** 72 for operation of the Auto Pack feature.

Achieving Payloads

Read this section for advice and tips on how to pack the most efficient loads with your unit. Many factors affect how often you need to compact the load, including the operator's experience.

Payloads in any refuse/waste handling vehicle will vary greatly, depending on the type of material loaded. Dry bulk cardboard and reconstruction/building materials, Styrofoam, foam packing materials, loose plastic, etc. cannot be compressed and packed as effectively as wet, soft, garbage type materials. If dry materials can be mixed with some wet material, more effective payloads can be achieved.

Follow these techniques to attain greater efficiency in packing the load in your unit:

1. After you empty the first few bins, the body begins to fill and material can begin to "fall back" into the hopper
2. If the route allows, mix some wet bins in with dry bins. This helps compact the dry material more and also helps lubricate the body, which results in better packing.

LEAVING THE ROUTE FOR THE LANDFILL/ TRANSFER STATION

At the end of the route, or when the unit has a full load, prepare the unit to go to the landfill.

- The Body is fully LOWERED.
- The Tailgate is DOWN and LOCKED.
- The Lift Arm is in a transit position:
  - The lift arm is lowered with the grabber arm stowed in the cradle and the grabbers are fully open.
- The Top Door (Hopper Cover) is:
  - For a unit before it is on-route – CLOSED
  - For an on-route unit – OPEN
- The Packer Panel is:
  - For an empty unit, it is at the front of hopper.
  - For a unit with refuse in the body, it is up tight against refuse.
- The PTO or Pump Switch is OFF.
- The Mirrors are properly adjusted and clean.
- The Side Access Door and Sump Doors are CLOSED and LATCHED.
- ALL outside lights operate properly.
- The street side driver's station is used for traveling.

Use of Curb Side Drive

If equipped, drive from the curbside driver position **ONLY** on the collection route. **DO NOT** use this station during travel to and from a route, landfill, or transfer station.

LANDFILL/TRANSFER STATION/ RECYCLE CENTER PROCEDURES

SETTING UP AN EJECT UNIT FOR UNLOADING

Set up the Unit

After positioning unit on firm stable ground for unloading at the landfill, set up as follows.

⚠ WARNING

Make sure that all individuals are clear of the point of operation before actuating controls. Be ready to stop or reverse the function.

1. Shift the transmission to NEUTRAL.
2. APPLY the parking brake and MAKE SURE it is holding.
3. PRESS and RELEASE the pump (red) button on the Joystick to activate the Pump.
4. UNLOCK the tailgate by PUSHING and HOLDING the T/G UNLOCK button on the **Main Push Button Controls** 79 (located on control panel in cab), until the tailgate is completely unlocked.

Raise the Tailgate

⚠ DANGER

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

Raise the Tailgate (Continued)

1. PRESS and HOLD the T/G RAISE button until the tailgate is COMPLETELY raised, which is about 30º above the body. See the figure below.
2. RELEASE the switch.

NOTICE

The BODY TAILGATE UP notification turns ON and the in-cab alarm will sound to indicate the tailgate is open.

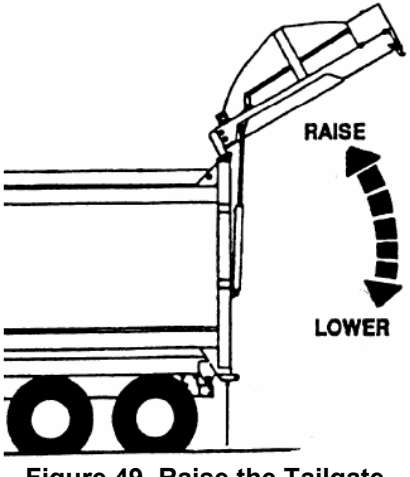


Figure 49. Raise the Tailgate

UNLOADING EJECT UNITS

After positioning unit on firm stable ground for unloading at the landfill and setting up as described in **Setting Up Eject Units for Unloading**, follow this procedure to unload a eject unit.

⚠ WARNING

Stand clear when body is raised or unloading.

⚠ WARNING

Keep access doors closed when packer is in motion.

NOTICE

ALWAYS raise the tailgate BEFORE raising body.

Emptying the Body

1. With the tailgate completely raised, EJECT (remove) the refuse by depressing the PACK EXT button on the Main Push Button Controls (located in the cab) until the refuse is to the end of the hopper. Release the button.
2. Depress and HOLD the PACK RET button to fully retract the packer to the front head, allowing refuse at the top of the body to fall down. Release the button.
3. Depress and HOLD the PACK EXT button again until packer is halfway in body. Release the button.
4. Depress and HOLD the PACK RET button to fully retract the packer to the front head. Release the button.
5. Depress and HOLD the PACK EXT button again until all refuse is emptied out of the body and the packer panel comes to a complete stop. Release the button.
6. To retract the panel, depress and HOLD the PACK RET until panel is completely retracted forward into the body. Release the pushbutton.

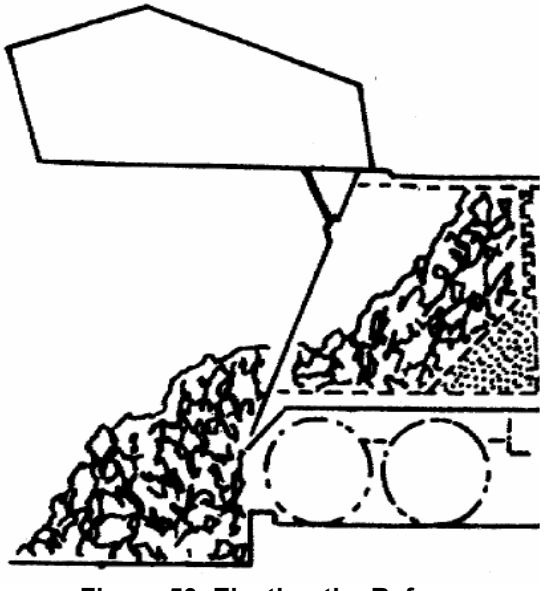


Figure 50. Ejecting the Refuse

UNLOADING AN EJECT UNIT (CONTINUED)

Prop the Tailgate

Before you clean and inspect the tailgate seal, prop the tailgate with the two factory body props. See **Propping the Tailgate** 88.

Clean/Inspect Tailgate Seal

BEFORE you lower the tailgate, MAKE SURE the area where the tailgate seal mates with the body is CLEAN AND FREE of any refuse and debris. Inspect seal for possible excessive wear or damage and replace if necessary. Report any excessive wear or damage to your supervisor.

⚠ DANGER

Stand clear when tailgate is in motion and during unloading cycle. Do not stand under or cross under raised tailgate. Doing so may result in injury or death.

Lower the Tailgate

1. DEPRESS and HOLD the T/G RAISE button to RAISE the tailgate sufficiently to rotate the props out of the prop pockets.
2. STORE the tailgate props.
3. DEPRESS and HOLD the T/G LOWER button to fully LOWER the tailgate, then RELEASE the switch.

NOTICE

The BODY TAILGATE warning notification light will go OFF and the alarm will stop when body is FULLY down and the tailgate is completely closed.

Lock the Tailgate

DEPRESS and HOLD the T/G LOCK button until the tailgate if fully locked.

UNLOADING AN EJECT UNIT (CONTINUED)

Clean Behind the Packer Panel

1. Extend the packer panel to the rear of the body.
2. Disengage the PTO or Pump Switch
3. Turn OFF engine and REMOVE the ignition key and place unit in **Lock-Out/Tag-Out mode** 40.

⚠ DANGER

Before entering the body area, place the unit in Lock-Out/Tag-Out mode. See **Lock-Out/Tag-Out Procedures** 40.

4. Open access door and clean behind the packer panel after each load.
5. Inspect packer tracks and hopper floor for excessive wear or possible damage.
6. Close access door and return packer panel to front of body.

Clean Out Hopper Sump

A sump door is located on the front corner on each side of the body and needs to be open when cleaning out the sump area. A cleaning tool is provided with each unit to clean out the sump area. Clean out the sump area after unloading at the landfill. Be sure to close and latch BOTH sump doors when completed.

NOTICE

Sump doors should be closed at all times except when open for cleaning.

Figure 51. Curb Side Hopper Sump Door Closed

Remove Refuse from the Engine and Exhaust Areas

Inspect unit for refuse on or about the engine or exhaust components. Remove all refuse to prevent a fire.

Preparing to Return to Route

MAKE SURE before you leave the landfill or transfer station that the unit is in the **In-Transit Position** 94.

END OF DAY PROCEDURES

Parking the Unit

1. Park the unit in the space designated by your employer/supervisor.
2. Set the parking brake.

Washout System

If the unit has a washout system and you did not use it at the landfill/transfer station, you should clean the body and hopper, unless your employer has a different policy. If your employer's policy is different from this manual, follow their policy.

Final Inspection

Perform a final inspection of the unit:

1. Clear the area of all people.
2. Start the engine if it is not running.
3. Make sure all lights and in-cab control switches operate correctly.
4. Put the transmission in reverse while you press the service brake. The backup alarm should sound in the cab. If the alarm does not sound in the cab, report this to your employer/supervisor immediately.
5. Check the unit for fluid leaks from the hoses, cylinders, valves, pump and fittings. Report any leaks to your employer/supervisor.
6. Make sure all cylinders (except tailgate lock cylinders and arm raise cylinders) are in their retracted position.
7. APPLY the parking brake.
8. Put the transmission in neutral and turn the engine OFF.
9. Put the unit in the **Lock-Out/Tag-Out mode** 40.
10. Open the air tank drain valve.
11. Turn the battery disconnect switch to OFF.
12. Follow the company policy for locking the cab doors.

Reports to Employer/Supervisor

Complete any reports required by your employer/supervisor. If you found any problems during the final inspection, prepare the necessary report for the employer/supervisor.

Ignition Keys

Put the ignition keys in a secure storage area designated by your employer/supervisor.

NOTICE

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.

SECTION 4
INSIGHT™ DIAGNOSTIC DISPLAY

INSIGHT™ DIAGNOSTIC DISPLAY

The Heil InSight™ Diagnostic Display is the information center for the operator and troubleshooting tool for the service mechanic. The next few pages cover basic functionality. For additional information, see **Body Controller Software** 135.

For the operator, it shows operation warnings and explains why the system may prevent a function so the operator can correct and operate in a safe and productive manner.

For the service technician, it displays information regarding sensor failures, and with proper training, can be used to test sensors and other inputs and output functions.

- Circle Buttons 1-4 below the screen - correspond to menu items listed on the screen (directly above the buttons) and vary from page to page
- OK Button - selects items on the screen
- UP Arrow - scrolls up while in menu screen
- Right Arrow - momentarily toggles to display controls while camera view is active
- Down Arrow - scrolls down while in menu screen
- Left Arrow - acts as backspace while in password screen

Diagnostic Display Messages

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

See the **Body Controller Software Section** 135 for for display screen shots of potential diagnostic messages, listed disabled functions and instructions for fault reset.

SCREENS

MAIN SCREEN

When the truck key switch is on, the home screen below will be displayed. This screen will show the operator various cab control conditions, including if:

- Pump is ON/OFF,
- Side Door is CLOSED,
- Tailgate is CLOSED,
- Tailgate is LOCKED,
- Select-O-Pack ON/OFF,
- Hydraulic Oil LOW/OK,
- Filter Pressure OK.

A. Main Screen Button Functions

1. SEL-O-PACK ADJUST - Accesses the Select-O-Pack Adjust Screen
2. SPEAR DIM ADJUST - Accesses the Spear Adjustment Screen (Only shown when Spear Mode is active)
3. GRAB PRESS ADJUST - Accesses the Grabber Pressure Adjustment Screen
4. PICK HEIGHT ADJUST - Accesses the Pick Height Adjustment Screen

SELECT-O-PACK™ ADJUST SCREEN

Triggered off the grabber release push-button, this system initiates a pack cycle once the programmed number of lift cycles have been completed. Valid range is 0-5 cans per pack. Select-O-Pack is OFF when set to 0.

GRABBER PRESSURE ADJUST SCREEN

Grabber pressure can be adjusted on the InSight™ Diagnostic Display. Valid range is 1000-2000 PSI.

PICK HEIGHT ADJUST SCREEN

Pick Height can be adjusted on the InSight™ Diagnostic Display. Increase the value to decrease the Pick Height. Decrease the value to increase the Pick Height. Valid range is +/- 6 inches.

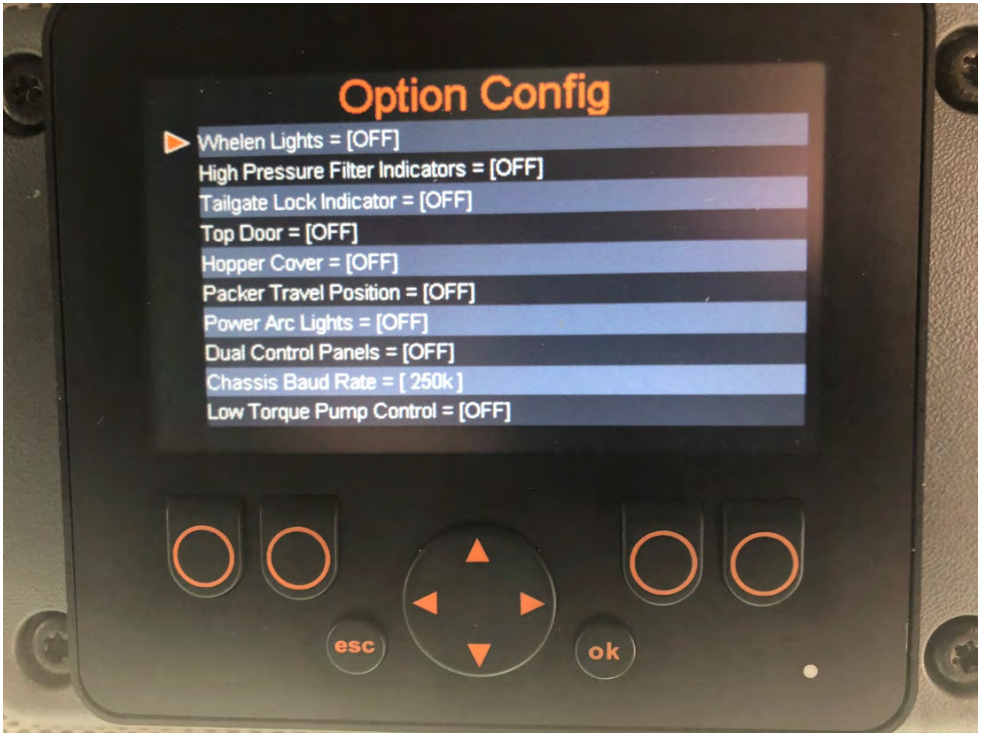
SPEARING DIMENSION ADJUST SCREEN

Spearing Dimension Setpoint can be adjusted on the InSight™ Diagnostic Display. Valid range is 4000 to 8000 (equates to 4" to 8"), set at 0.10" increments.

OPTION CONFIG SCREEN

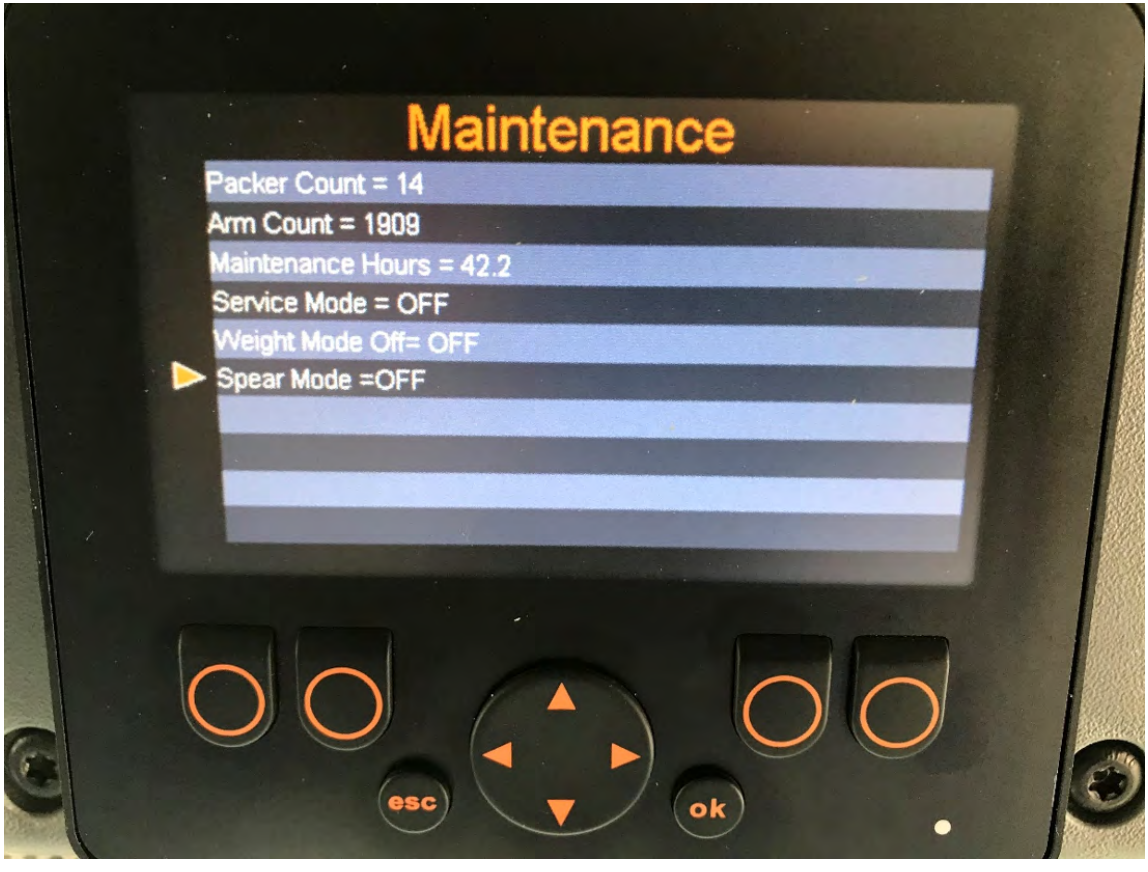
The Option Configuration Screen allows Authorized Service Personnel to turn unit options ON or OFF when unit options have been installed or removed from the unit.

- Whelen Lights
- High Pressure Filter
- Tailgate Lock
- Top Door
- Hopper Cover
- Packer Travel
- Veolia Arc Lights
- Dual Control Panels
- Chassis Baud Rate
- Low Torque Pump Control
- Operator Presence
- Road Speed Limit



MAINTENANCE SCREEN

The Maintenance Screen can be used by Authorized Service Personnel to turn Service Mode ON/OFF, Weight Mode ON/OFF, and Spear Mode ON/OFF, as well to view the unit's cumulative Packer Count, Arm Count and Maintenance Hours.



GENERAL COUNTERS SCREEN

The General Counters Screen shows Daily and Total Arm Cycles, Daily and Total Pack Cycles, Maintenance Hours, Filter Bypass Hours and Total Pump Hours.

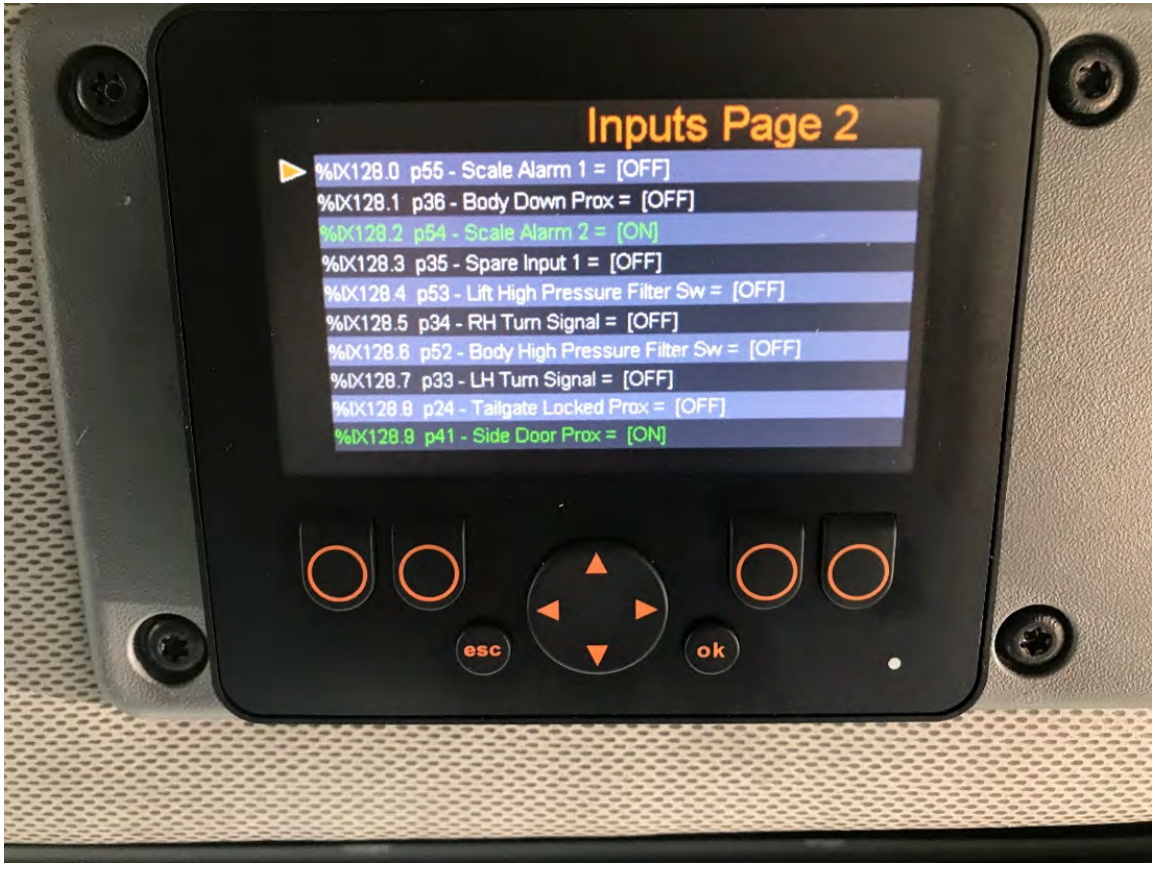
INPUTS SCREENS

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

Example Input:

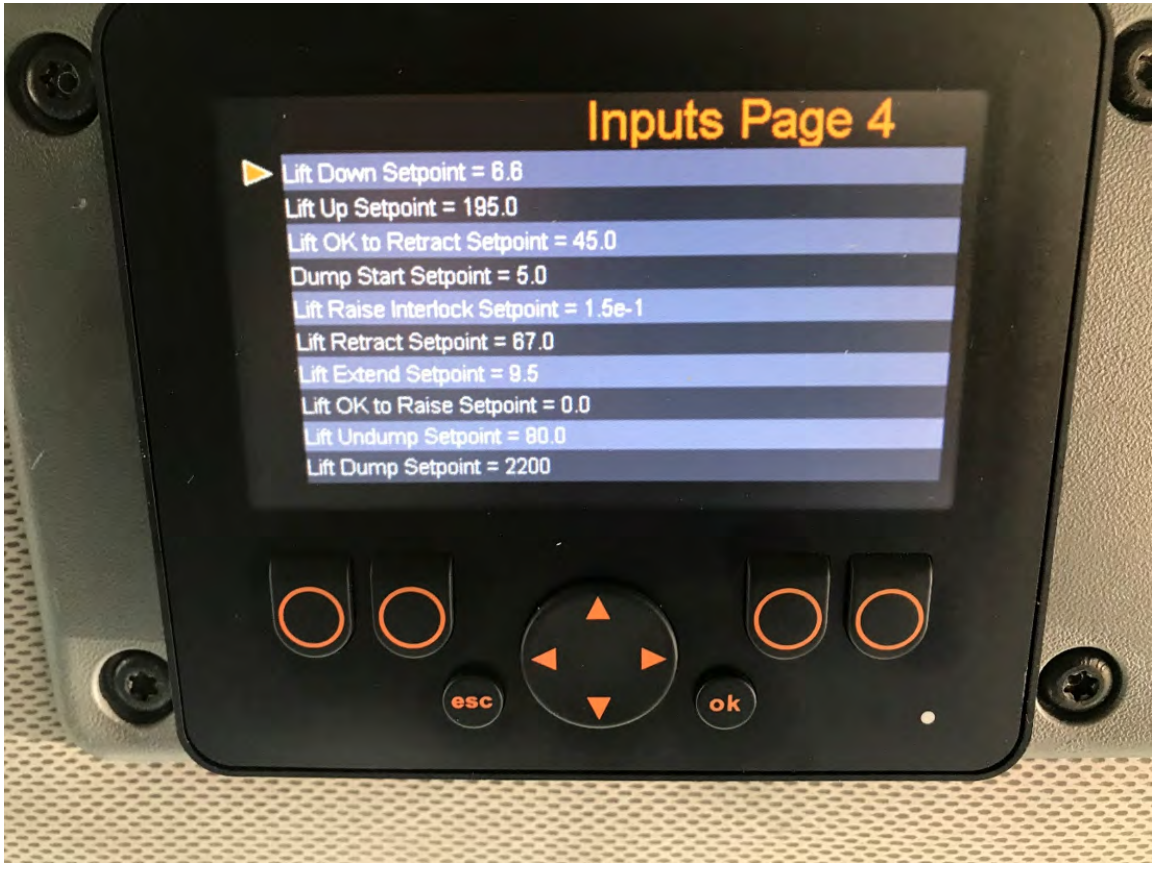
Side Door Proximity Switch is CLOSED: the signal from the Side Door Proximity Switch will travel to the Controller. When this happens, the InSight Diagnostic Display will show the Input to be ON. See the figures to the right and on the next pages.

INPUTS SCREENS (CONTINUED)



INPUTS SCREENS (CONTINUED)

INPUTS SCREENS (CONTINUED)



OUTPUTS SCREENS

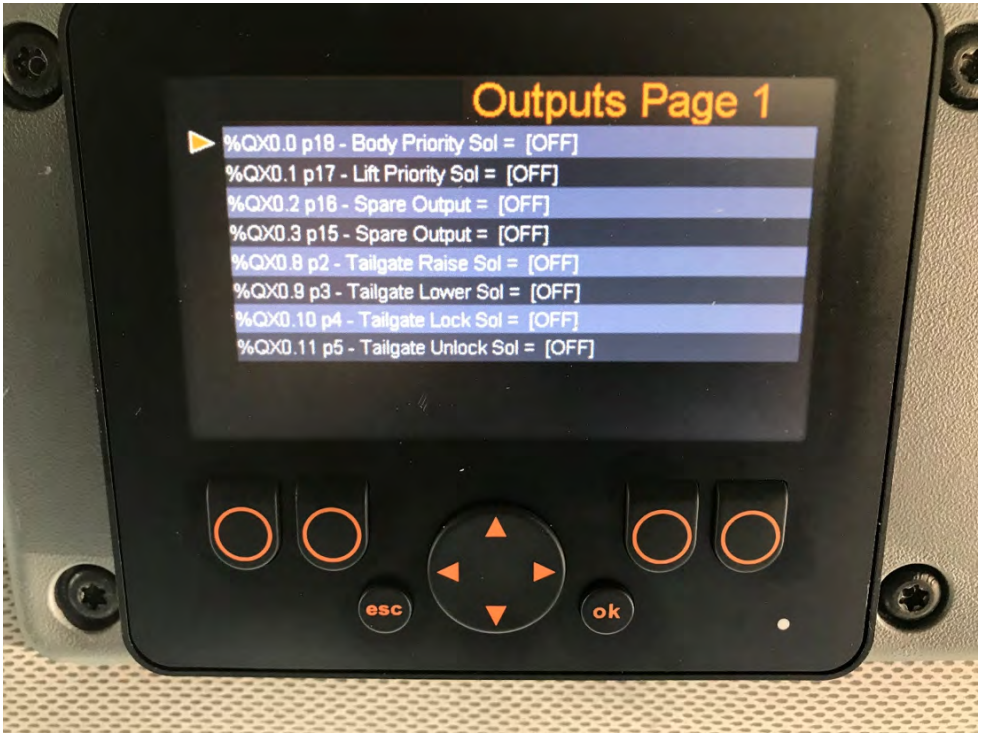
Outputs are signals sent out of the Cortex Controller™ to turn something ON or to make something happen. Any signal that is sent out of the controller is an output. Output examples are: Signals sent to valve coils that move a valve spool or to turn on a light. See the figure below.

Example Output:

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

Output signals send power to:

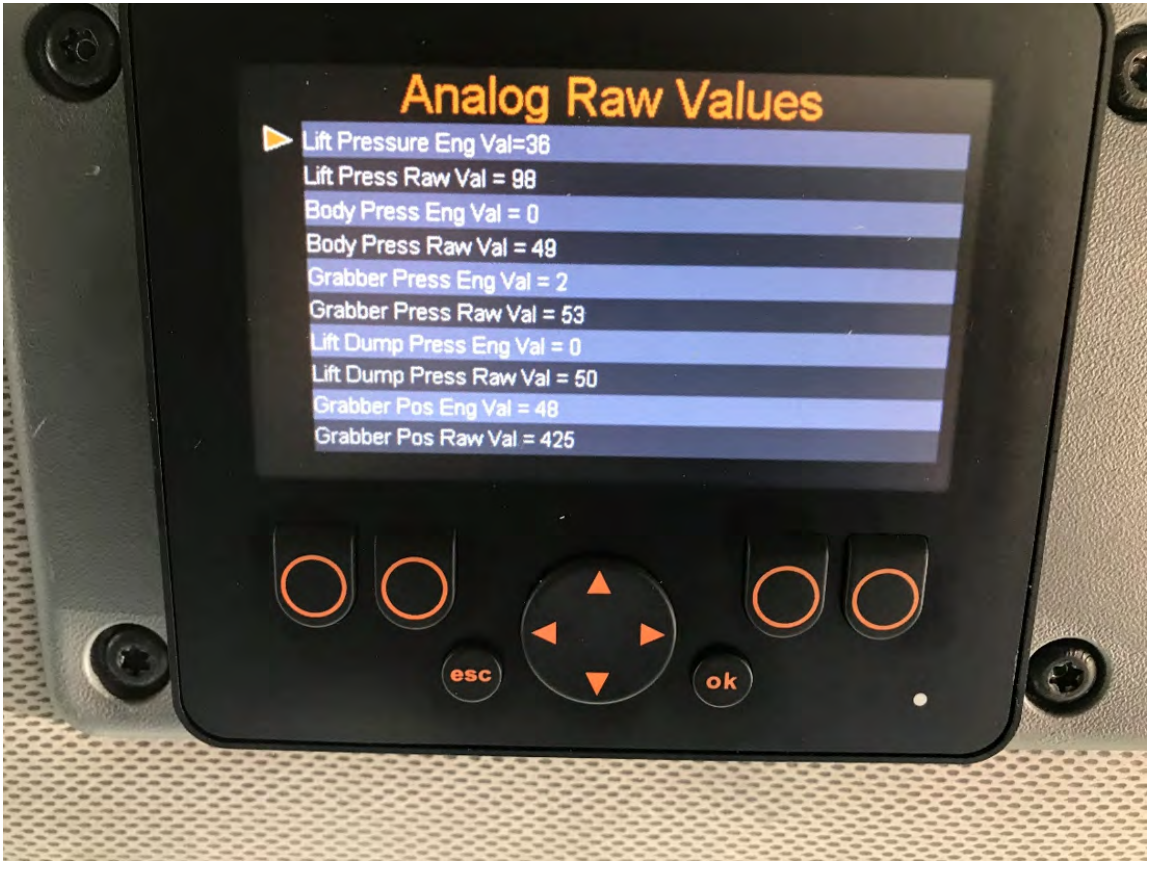
- Coils/Solenoids
- Lights
- Body Valve Coils/Pulse Width Modulation (PWM)
  - Packer Extend PWM
  - Packer Retract PWM
  - Tailgate Flow PWM
- Tailgate Valve Coils/SOL
- Screen readouts



OUTPUTS SCREENS (CONTINUED)

OUTPUTS SCREENS (CONTINUED)

ANALOG RAW VALUES



STATISTICAL DATA

The Statistics Screen shows Pack Extend and Retract Times, Total Pack Time (includes delays), Total Lift Cycle Time, Average Lift Cycle Time, and Can Counts (based on weight). Pressing button 1 + 4 + OK resets statistics.

HYDRAULIC WARM UP FLOW ADJUST SCREEN

Valid range is 850-1150 PSI.

HYDRAULIC WARM UP TEMP ADJUST SCREEN

Valid range is 70 - 110°F.

SECTION 5
CONTROLLER

CONTROLLER LOCATIONS

The Command-SST™ features a distributed 56 I/O controller system utilizing five body controller nodes. This type of setup decreases wiring running the length of the vehicle, facilitates troubleshooting, and increases the reliability of the system.

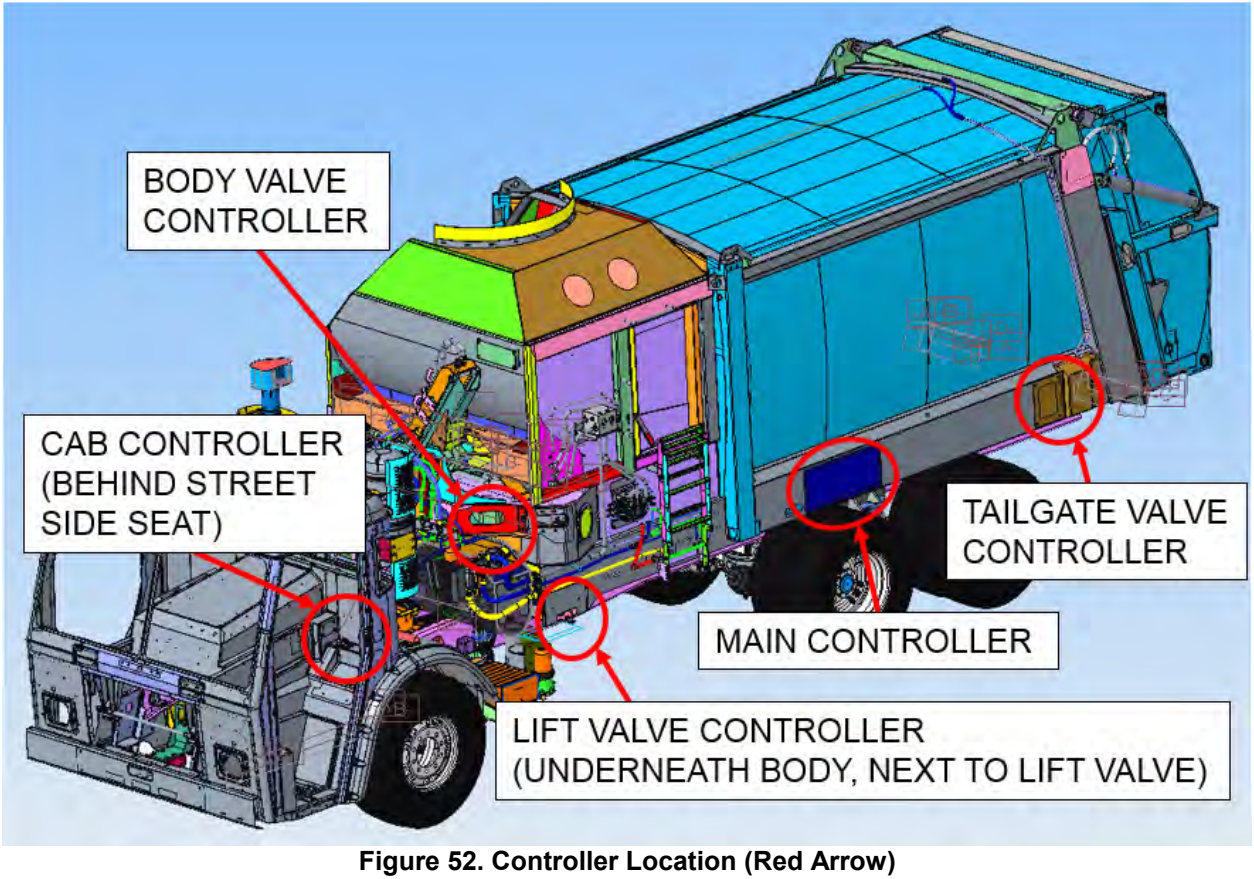
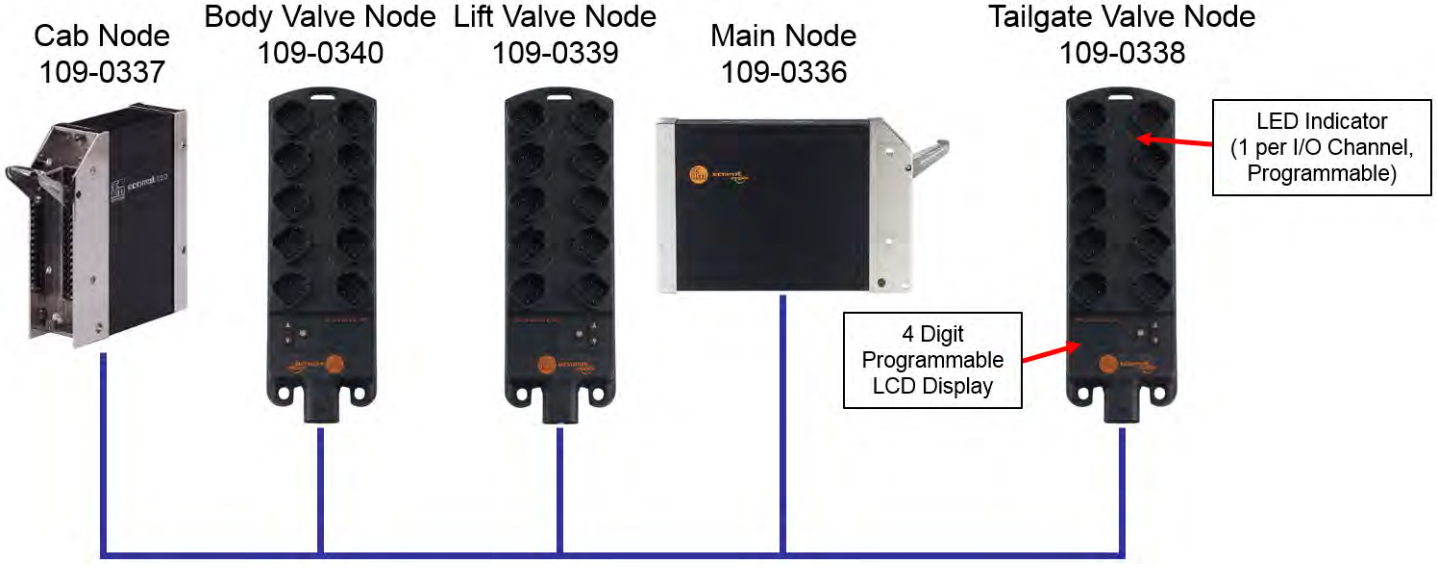


Figure 52. Controller Location (Red Arrow)

CONTROLLER NODES

Illustrations and part numbers of the five body controller nodes are shown below.



UNIT CALIBRATION

⚠ DANGER

For certain steps within this procedure, there are no interlocks to prevent lift arm movement.

NOTICE

Calibration Mode should only be used by Authorized Service Personnel when replacing any hydraulic component in the lift or pack circuits.

Also refer to the Service Shack Video (**www.heil.com/heil-service-shack**).

For help with Unit Calibration or if you need the InSight™ Diagnostic Display alibration screen access password, contact Heil Technical Services at 866-310-4345.

Unit Preparation

1. Clear the area of all unnecessary personnel.
2. Chock the tires and quarantine the workspace.
3. Ensure that you have enough overhead clearance to safely operate the lift arm.
4. Start the engine and make sure the parking brake is applied and place the unit in operating condition.
5. Ensure that the packer is fully retracted.
6. On the **Supporting Functions Push Button Controls** 80, turn OFF Coordinated Mode (COORD MODE button light will be solid blue). This allows for manual control using the **Manual Control Push Button Controls** 81.
7. On the InSight™ Diagnostic Display, navigate to the **Unit Calibration Screen** and follow the instructions on the screen and below.

NOTICE

Manual controls cannot be enabled until the Coordinated Mode has been turned OFF.

8. On the **Manual Control Push Button Controls** 81, enable the manual controls by pressing ENABLE (button light will be solid green). Use the Manual Control Push Button Controls to perform the following steps.

Cylinder Position Calibration

9. Place the arm in the full DOWN and full IN position. Place the grabbers in the full OPEN position.

   Note: Dead Head the valve in all positions to ensure each position is correctly met.

   Place the grabber head level. This sets the home positions for the cylinders and the level position for the grabber beam. Press “OK” and then press "OK" again to confirm the position.

UNIT CALIBRATION (CONTINUED)

Cylinder Position Calibration (Continued)

10. Carefully move the arm to where it is clear of the body (there are no interlocks during this stage). Once arm is clear of the body, move the head to the full UNDUMP position. This sets the full UNDUMP position of the grabber beam. Press “OK” and then press "OK" again to confirm the position.
11. Move the head to the full DUMP position. This sets the full dump position of the grabber beam. Press “OK” and then press "OK" again to confirm the position.
12. Place the arm in the full RAISE and full EXTEND position. Close the grabbers to the fully CLOSED position.

    Note: Dead Head the valve in all positions to ensure each position is correctly met. This sets the max extended positions for the cylinders.

    Press “OK” and then press "OK" again to confirm the position.
13. Retract the arm approximately half way (this allows for accurate visibility of the grabber beam). Place the grabber beam in the level position. This sets the upper value for the grabber beam level position. Press “OK” and then press "OK" again to confirm the position.

Lift Valve Minimum Currents Calibration

14. Extend each cylinder (raise, extend, dump, and grabber) approximately half way. This will provide the needed movement for calibration.

    Note: Each valve section will take time to perform this task and will be different from truck to truck based on the Lift Valve and Counterbalance Valve crack points, and how much flow each cylinder will require to move.

    Press "OK" again to confirm the position.
15. Press and hold the DUMP push button until the grabber beam starts to move in the dump direction. Press "OK" again to confirm the position.
16. Press and hold the UNDUMP push button until the grabber beam starts to move in the undump direction. Press "OK" again to confirm the position.
17. Press and hold the UP push button until the arm starts to move in the up direction. Press "OK" again to confirm the position.
18. Press and hold the DOWN push button until the arm starts to move in the down direction. Press “OK” to confirm the position.

Lift Valve Minimum Currents Calibration (Continued)

19. Press and hold the OUT push button until the arm starts to move in the out direction. Press “OK” to confirm the position.
20. Press and hold the IN push button until the arm starts to move in the in direction. Press “OK” to confirm the position.
21. Press and hold the GRAB push button until the grabbers starts to move in the close direction. Press “OK” to confirm the position.
22. Press and hold the RELEASE push button until the grabbers starts to move in the open direction. Press "OK" to confirm the position.

Packer Calibration

23. Place the arm back into the cradle/home position. Press and hold the PACKER EXTEND push button until the packer is at the pack position (approximately 1625-1700). Make sure the black rubber pad on the back of the follower panel does not have a gap between it and the packer floor. Press "OK" to confirm the postion.
24. Press and hold the PACKER EXTEND push button until the packer is at the travel position (approximately 1900-2000). Press “OK” to confirm the position.

Packer Minimum Currents Calibration

25. Place packer approximately halfway between home and pack positions. Press “OK” to confirm the position.
26. Press and hold the PACKER EXTEND push button until the packer starts to move in the out/extend/pack direction. Press “OK” to confirm the position.
27. Press and hold the PACKER RETRACT push button until the packer starts to move in the in/retract direction. Press “OK” to confirm the position.

    Once you have confirmed the final calibration position, you will return to the home screen on the InSight™ Diagnostic Display.
28. Fully retract the packer panel before proceeding.

Test Lift Arm Operation

29. Test the operations of the lift arm to make sure that it is operating as designed before placing the unit back into service.

BODY CONTROLLER SOFTWARE

This section is to be supplied.

NOTES:

SECTION 6
MAINTENANCE

BODY PREVENTIVE MAINTENANCE CHART

BODY AND LOADER 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 be checked and serviced.

***HOURS OF OPERATION** * **Daily = 8 hrs. Weekly = 40 hrs. Monthly = 200 hrs. 6 Months = 1000 hrs. Yearly = 2000 hrs.**

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.
				☑		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.

***HOURS OF OPERATION** * Daily = 8 hrs. Weekly = 40 hrs. Monthly = 200 hrs. 6 Months = 1000 hrs. Yearly = 2000 hrs.

COMPONENT/SYSTEM	8	40	200	1000	2000	CHECK/SERVICE
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.
Grease Fittings		☑				Lubricate as shown on **Body** and **Loader** 145 Lubrication Guides.
Body Undercoating					☑	Inspect body undercoating and repair as necessary.
Tailgate Seal Integrity	☑					Check tailgate seal integrity and replace as necessary.
Packer/Ejector Cylinder Preventive Maintenance	☑	☑	☑			See **Packer/Ejector Cylinder Preventive Maintenance** 142
Packer/Ejector Panel Bolt-in Cylinder Mount Bolts			☑			Check for tightness. Bolt torques should be 192 Ft-Lbs. (lubricated threads)

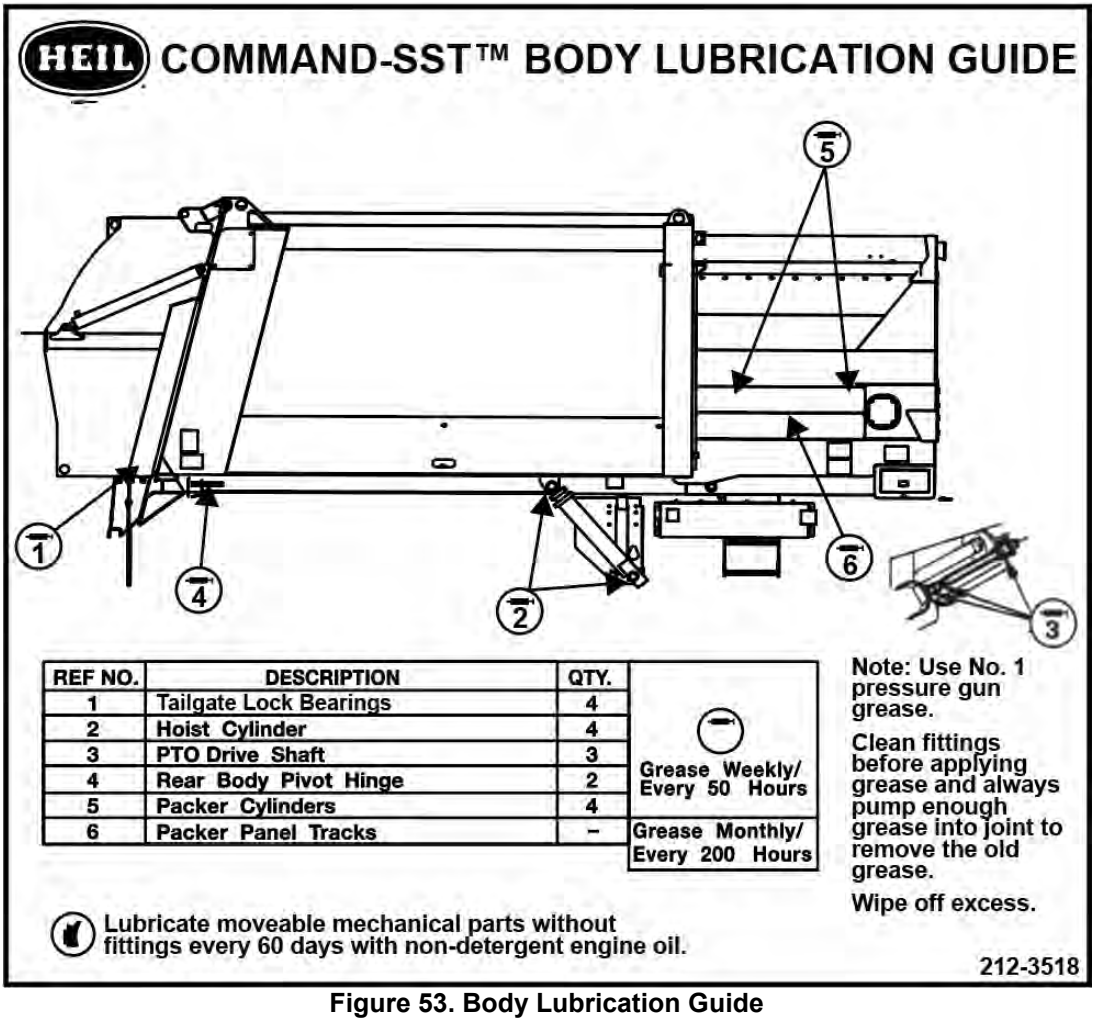


Figure 53. Body Lubrication Guide

PACKER/EJECTOR CYLINDERS PREVENTIVE MAINTENANCE

⚠ WARNING

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.

⚠ CAUTION

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

Failure to follow stated routine preventive maintenance can lead to premature cylinder failure that is not covered by your warranty. Side Loading and Premature Cylinder Failure can be caused by:

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

HEIL PACKER/EJECTOR CYLINDERS PREVENTIVE MAINTENANCE CHART

DAILY

- Using a plastic bladed shovel, clean behind the packer panel and pockets around sphericals. DO NOT damage cylinder rods by striking with any metal object.
- Visually inspect that lube lines (if equipped) are connected and not damaged or leaking.
- Visually inspect packer tracks and hopper floor for excessive wear or damage. Repair or replace if necessary.

WEEKLY

- Grease Packer/Ejector cylinder spherical bearings/ pins
- Inspect packer/ejector cylinder bearings/pins (both ends) for wear, rust or damage and replace if necessary.

MONTHLY

Perform the operational “Checks and Inspections” found in the Operation Manual. If Unit Recalibration is required, refer to **Unit Calibration** 132.

LOADER PREVENTIVE MAINTENANCE CHART

LOADER PREVENTIVE MAINTENANCE CHART

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

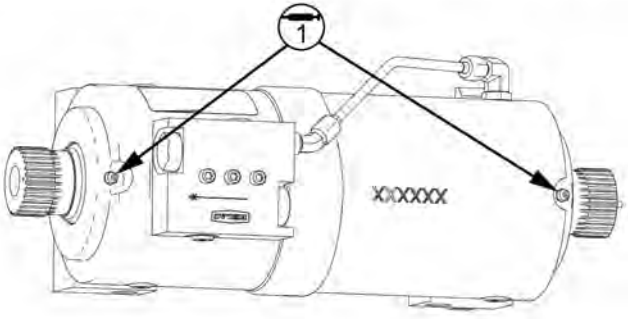
REF NO.	ACTIVITY	INTERVAL	SERVICE/CHECK
1	Grease Lift	Weekly (50 hrs)	See the **Loader Lubrication Guide** 145 or the lubrication decal on the lift arm.
2	Hydraulic Plumbing	Weekly (50 hrs)	Check for damage, worn, or leaking hoses, tubes or fittings. Replace as necessary. NOTE: Do not replace steel tubes with hoses.
3	Check Lift Body Mount Base Bolts	Weekly (50 hrs)	Inspect the bolts clamping the arm to the main pivot boss for looseness or damage. Replace if damaged.
4	Grabber Assembly with Belt	Weekly (50 hrs)	Inspect belt condition for wear, cuts or damage. Replace if present.
5	Hoses	Weekly (50 hrs)	Check for tears, wear or holes. Replace if present.
6	Loader Main Arm Pivot	Monthly (200 hrs)	Inspect for damage/wear. Replace if present.
7	Loader Arm Wear Pads	Monthly (200 hrs)	Check wear pads for excessive wear. Replace if present. See **Loader Arm Wear Pads** 147 for acceptable wear values.

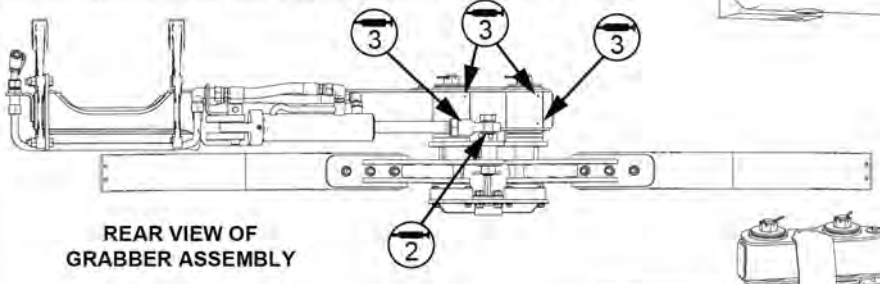
COMMAND-SST™ LOADER LUBRICATION GUIDE

OEM Parts are key to ensuring that units are covered by Heil's Warranty Program.

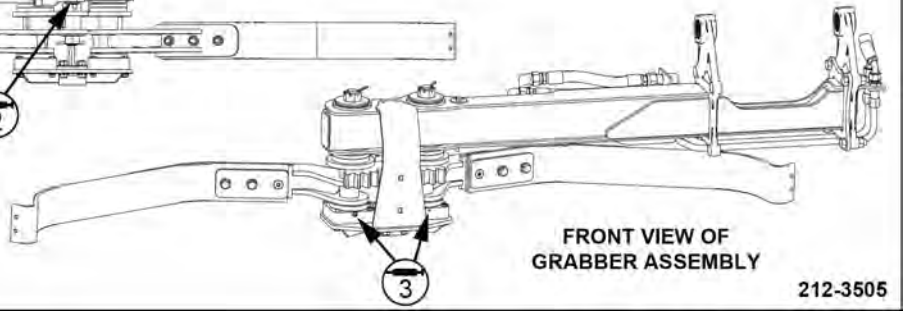
Note: Use No. 1 pressure gun grease. Clean fittings before applying grease and always pump enough grease into joint to remove the old grease. Wipe off excess. For slide surfaces, use cloth or brush to coat.

REF. NO.	LOCATION	QTY.	INTERVAL
1	Rotary Actuator	2	Weekly / 50 Hours
2	Grabber Cylinder	1	Weekly / 50 Hours
3	Grabber Bearings	6	Weekly / 50 Hours





REAR VIEW OF GRABBER ASSEMBLY



FRONT VIEW OF GRABBER ASSEMBLY

212-3505

GRABBER BELTS ADJUSTMENT

The Command-SST™ Grabber Belts are delivered from Heil in the tightest configuration. This provides for good grip on most 90-gallon cans without excessive mashing of the container. The Grabber Belts only need adjustment to accommodate different size residential cans.

See **Grabber Pressure Adjust Screen** 112 for instructions on how to adjust the grabber pressure.

Contact Heil Technical Services at 866-310-4345 for more information.

LOADER ARM WEAR PADS

Inspect loader arm wear pads monthly (200 hours) and replace as necessary. Regular inspection and maintenance extends the service life of the loader arm.

Contact Heil Technical Services at 866-310-4345 for more information.

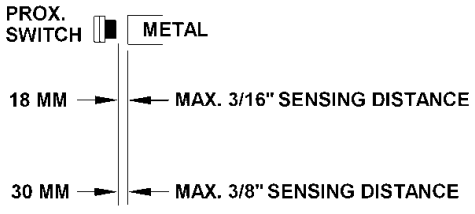
PROXIMITY SWITCH TROUBLESHOOTING

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

NOTICE

Heil proximity switches have a Light Emitting Diode (LED) on the switch to indicate 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.	1. Make sure the power source from the chassis manufacturer is clean. 2. The body electrical system is protected from voltage spikes.
Improper Sensing Range	Adjust proximity switches to sense metal as follows:

PROXIMITY SWITCH TROUBLESHOOTING TABLE	
	
If the controller input light stays on when a switch is unplugged **(the signal wire is carrying +12V DC)**	Check the proximity switch electrical circuits for the source of the problem.
If proximity switch LED light is NOT ON.	1. Check the fuse relay block (Half/Packs with IFM controllers). The fuse/relay box is located in the cab. Or Check the in-line fuses (Side Loaders with IFM controllers). The in-line fuses are located in the cab. 2. Unplug proximity switch. 3. Check the power wire (terminal C) for +12 VDC with a multi-meter. 4. Check ground signal with multi-meter for continuity to chassis ground. 5. Check the signal wire for continuity to appropriate controller input terminal. See Service Manual. 6. If all three (3) wires are good, replace the proximity switch.

HYDRAULIC

CHECK HYDRAULIC OIL LEVEL

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 – is fully retracted and in the stowed position

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

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

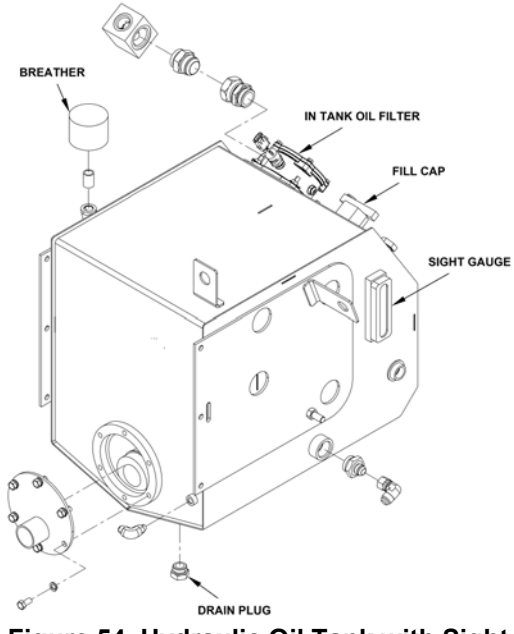


Figure 54. Hydraulic Oil Tank with Sight Gauge

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 Dealer.

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.

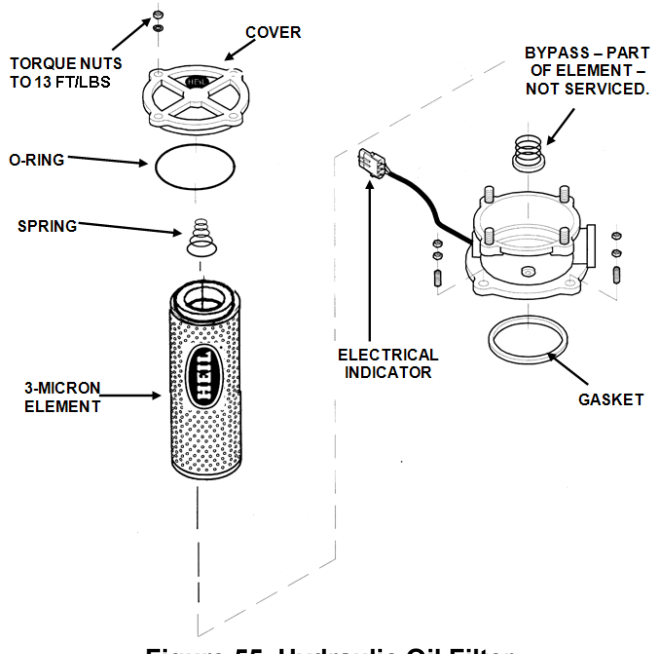


Figure 55. Hydraulic Oil Filter

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.

⚠ CAUTION

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

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

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

⚠ WARNING

Make sure the unit is in the **Lock-Out/Tag-Out mode** 40 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 Procedure** 40.
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 Element** 152.
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.

DRAIN AND CLEAN THE HYDRAULIC OIL TANK (CONTINUED)

11. Install the drain plug in the tank bottom.
12. Reconnect and tighten all hose connections that were disconnected.

NOTICE

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

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

⚠ WARNING

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

16. Operate the packing panel through 10 cycles to be sure all air is out of the circuits.
17. Operate the automated container lift mechanism.
18. Operate tailgate – full up and full down.
19. With the packing panel in the retracted position and lift in the in-transit position, check tank oil level. If necessary, add recommended as described under **Check the Hydraulic Oil Level** 93.

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.

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.

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.

PRESSURE ADJUSTMENT SETTINGS

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.
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 unit will be operated during this procedure.
5. Make sure unit is full of hydraulic oil.
6. Make sure hydraulic oil is at least 120 degrees F before beginning any pressure checks or adjustments. See **Cold Weather Warmup Procedure** 91.

⚠ WARNING

The unit must remain in neutral during all pressure setting procedures. Make sure that the work area is clear of uninvolved people and that the parking brake is fully applied and wheels fully chocked.

B. Required Tools

These are the tools required to make pressure adjustments.

QTY	TOOL
1	Open end wrench
1	Ratchet with screwdriver attachment
1	0-5000 PSI hydraulic pressure gauge

PRESSURE ADJUSTMENT SETTINGS (CONTINUED)

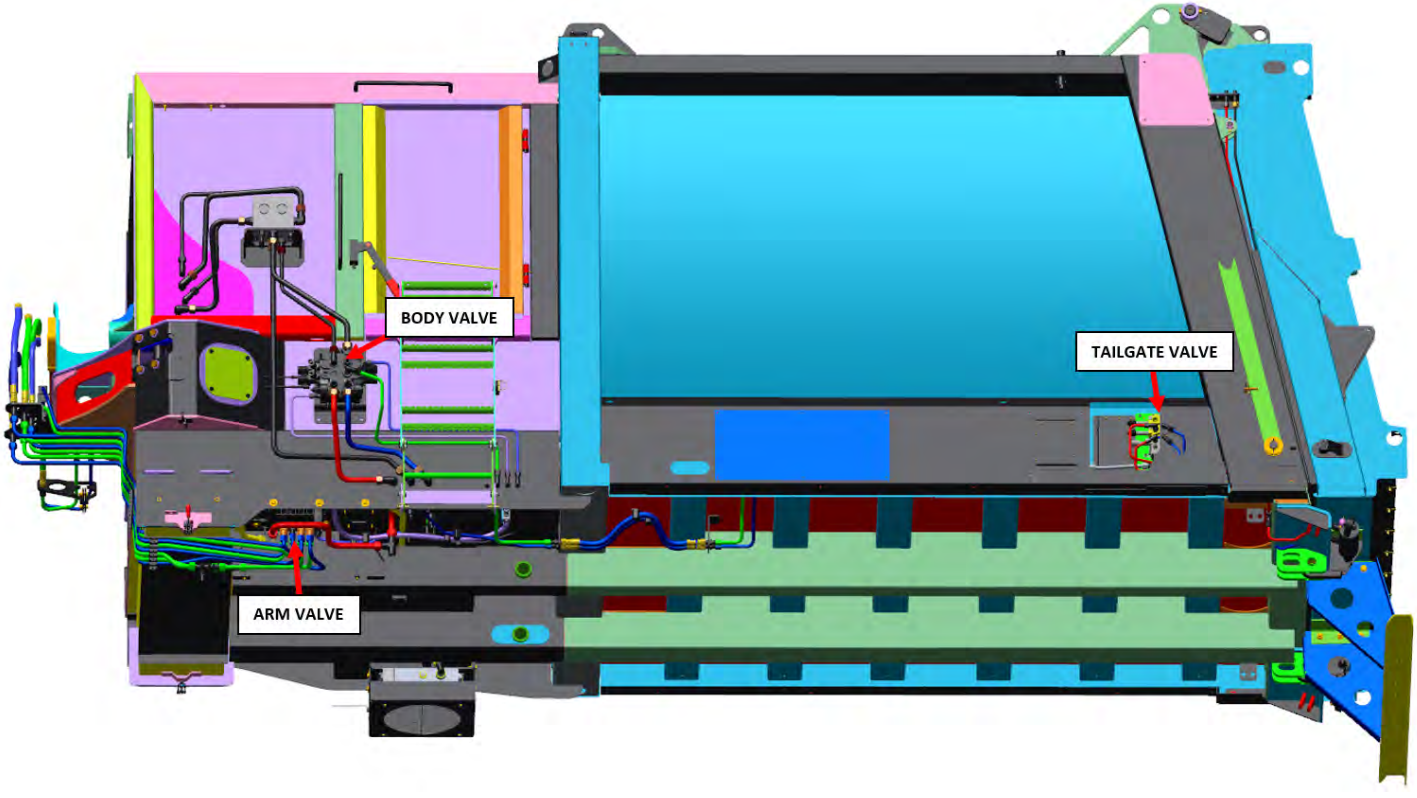
C. Pressures

MAX PUMP PRESSURE COMPENSATOR	PUMP STANDBY PRESSURE @ IDLE	GRABBER CROSS PORT RELIEF	GRABBER PRESSURE TRANSDUCER	BODY MAIN RELIEF	CNrG TAILGATE UP PORT RELIEF	TAILGATE RAISE TIME @ IDLE
2500 psi	500 psi	1300 psi	1000-1500 PSI	2500 psi	1300 psi	25-30 sec
TAILGATE LOWER TIME @ IDLE	TOP DOOR OR HOPPER COVER	LIFT CYCLE TIME AT FULL EXTEND NON-H.A.L.O. & H.A.L.O. OPERATIONS	PACKER CYCLE TIME @ IDLE	LIFT FULL EXTEND TIME FROM CRADLE POSITION (H.A.L.O. OFF IF INSTALLED)	LIFT FULL EXTEND TIME FROM WORK POSITION (H.A.L.O. OFF IF INSTALLED)	LIFT RETRACT FROM FULL EXTEND TO WORK POSITION TIME (H.A.L.O. OFF IF INSTALLED)
24-27 sec	1300 psi	6-8.5 sec	14-17 sec	3-5 sec	2-4 sec	2.5-4 sec

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

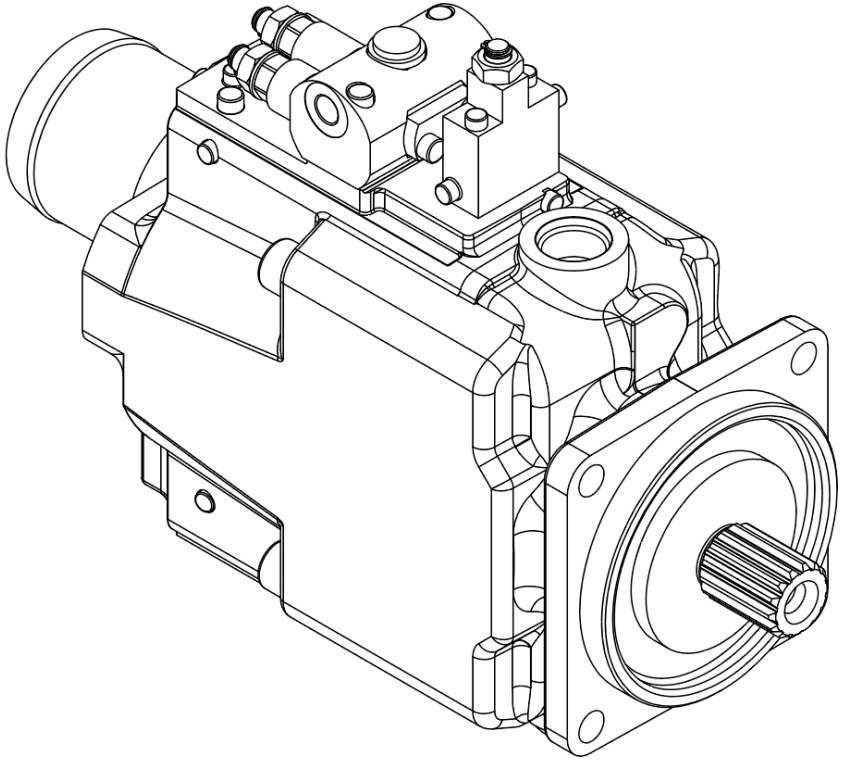
VALVE LOCATIONS

The Command-SST™ has three (3) primary hydraulic valves for body, lift arm and tailgate functions. See image below.

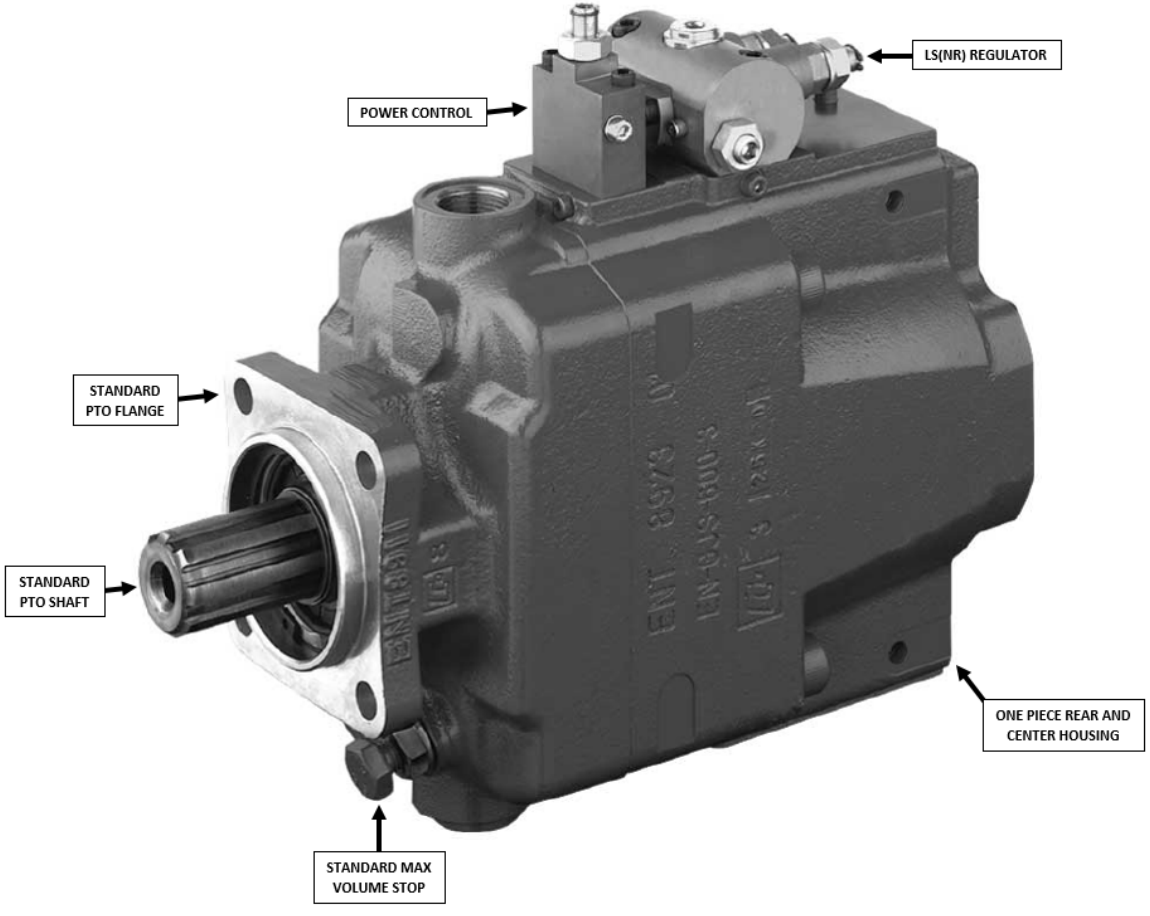


PUMP

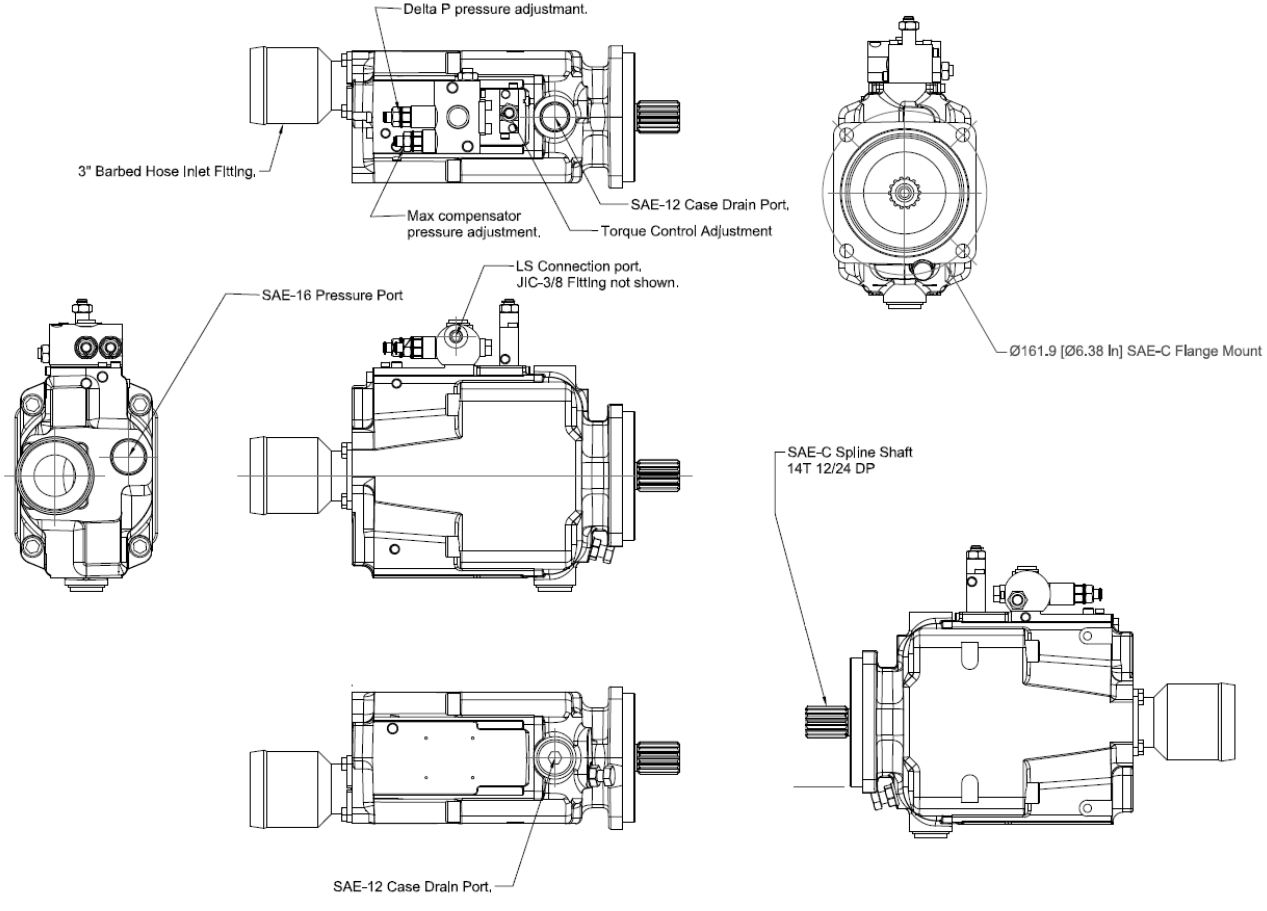
The Command-SST™ uses a 130cc Load-Sense Piston Pump with Hot Shift PTO. Load-Sense hydraulics are more efficient and provide only the flow needed.



LOAD SENSE PISTON PUMP (219-2426) NOMENCLATURE



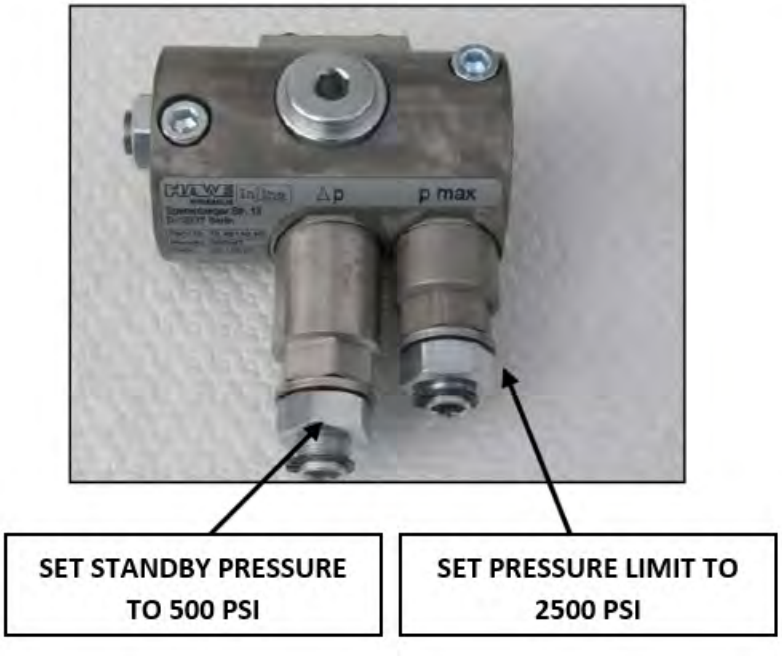
LOAD SENSE PISTON PUMP (219-2426) NOMENCLATURE (CONTINUED)



LOAD SENSE PISTON PUMP (219-2426) COMPENSATOR

The Compensator regulates the hydraulic pressure and is preset at the factory. It is set to signal the pump to provide and maintain Stand-By Pressure (500 psi). Also, it limits the working pressure to 2500 psi. It also acts as a variable flow switch for the pump. The more pressure we provide to the load sense line from the valve, the more flow the pump provides the valve and cylinders we are using.

Please call Heil Technical Services at 866-310-4345 BEFORE attempting any adjustments. It is rare for this to be out of adjustment.



PUMP INSPECTION

Important Inspection Tasks

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

NOTICE

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

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

NOTICE

Damaged tubes and hoses should be replaced immediately!

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

PUMP MAINTENANCE

Important Inspection Tasks

Hydraulic Fluid

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

NOTICE

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

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

NOTICE

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

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

NOTICE

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

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

PUMP REPAIR

Important Inspection Tasks

A. Troubleshooting

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

B. Repair

NOTICE

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

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

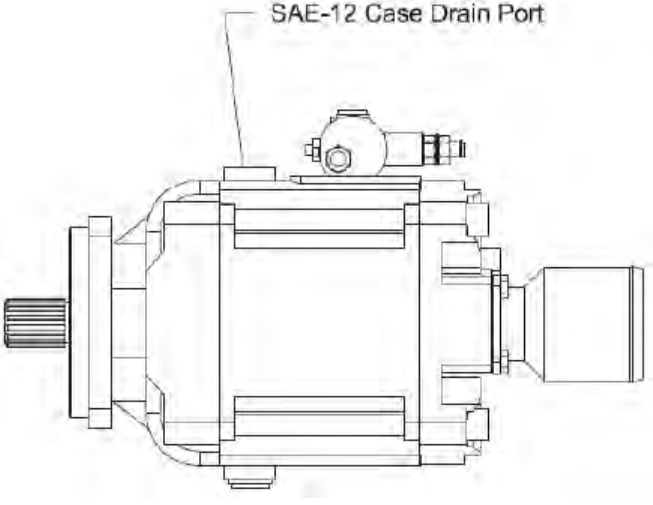
PUMP START-UP PROCEDURE

NOTICE

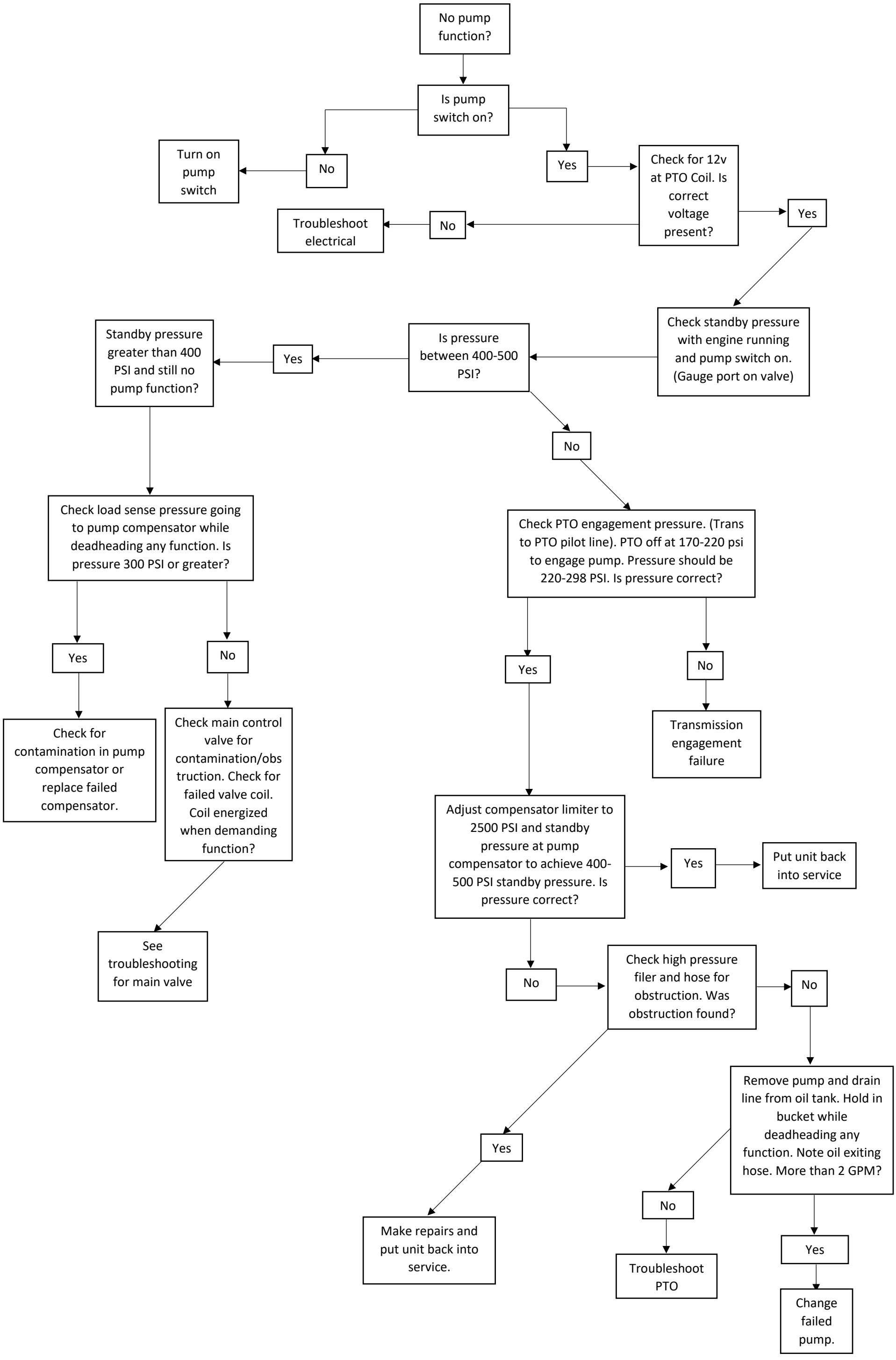
When installing a new pump, you MUST prime (fill) the new pump with hydraulic fluid BEFORE operating, otherwise damage WILL occur.

When replacing or re-installing the hydraulic pump after repairs, the housing of the pump must be filled with hydraulic fluid through the case drain port, either before or after mounting the transmission.

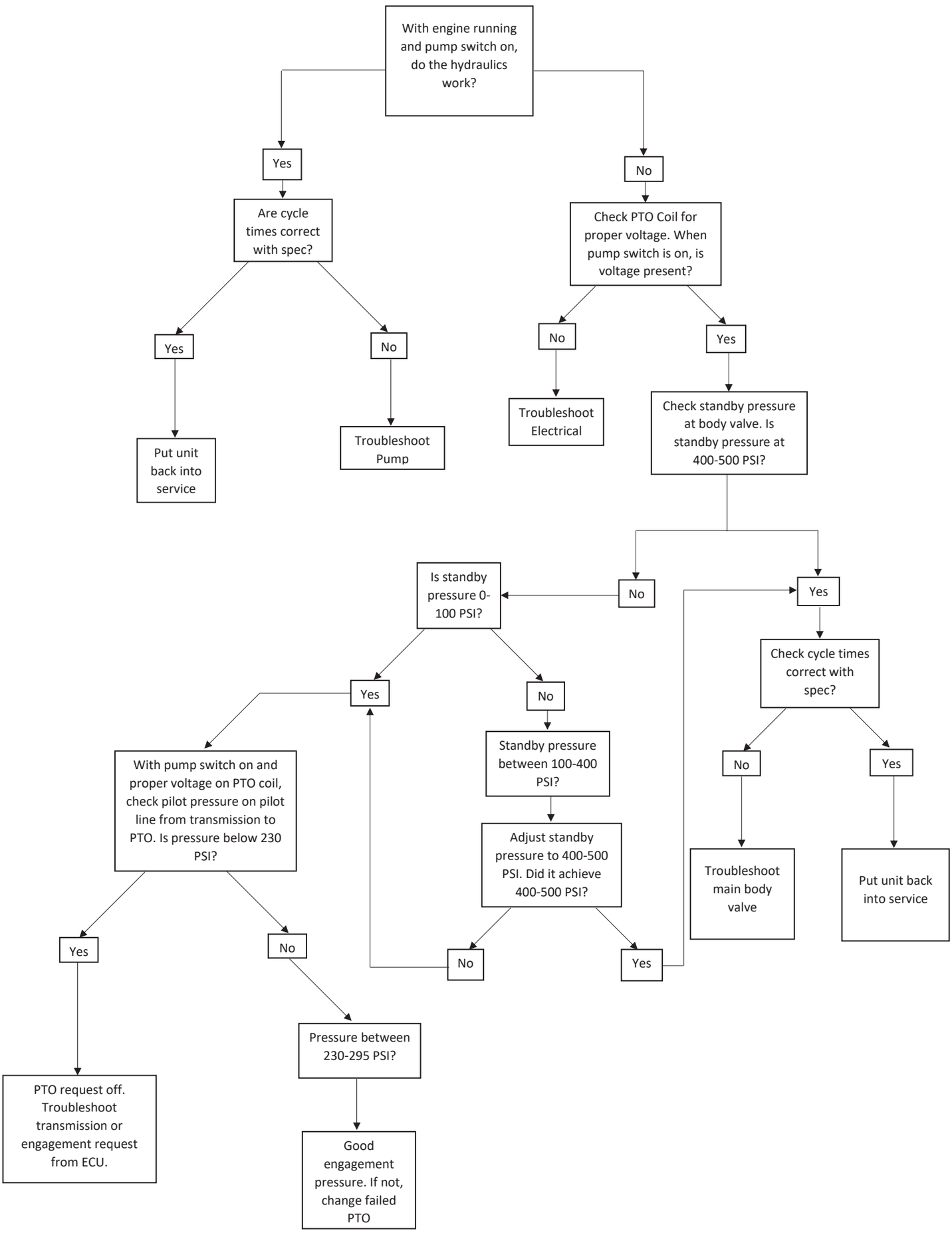
1. Attach case drain hose between the pump connection and the reservoir.
2. Connect the inlet hose to the rear of the pump and reservoir. After filling reservoir, loosen top adapter screws on the inlet and rotate hose adapter down, cracking the top of the adapter away from the pump.
1. Open the tank shut-off valve to purge as much air as possible out of the hose, filling the inlet hose with oil.
2. Tighten the inlet retainer screws, top off fluid level of the reservoir if necessary.



Troubleshooting Pump on Command-SST™



Troubleshooting Hot Shift PTO on Command-SST™



ELECTRICAL

SENSORS

A. Hydraulic Oil Temperature Sensor

- Hydraulic Oil Tank

B. Lift Position Sensors

- Raise Sensor - Inside Cylinder, J1939
- Extend Sensor - Inside Cylinder, J1939
- Grabber Open/Close Sensor - Inside Cylinder, J1939
- Head Rotate Sensor - Side of Hydraulic Actuator Motor, Dual Channel Encoder, Field Replaceable

C. Packer/Ejector Position Sensor

- Body - Street Side Corner of Front Head, Arc Sensor

D. Pressure Transducers (0-3600 PSI)

- Body Pressure - Body Valve
- Lift Pressure - Lift Valve
- Grabber Pressure - Grabber Hydraulic Tubing
- Dump Rotation Pressure - Dump Rotation Hydraulic Tubing, weigh cans (<350 lbs) on-the-fly; can be disabled

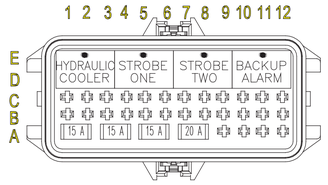
SECTION 7
SCHEMATICS

ELECTRICAL SCHEMATICS

Reference the schematics on the following pages. Printed copies of 1-6 are included in the manual kit.

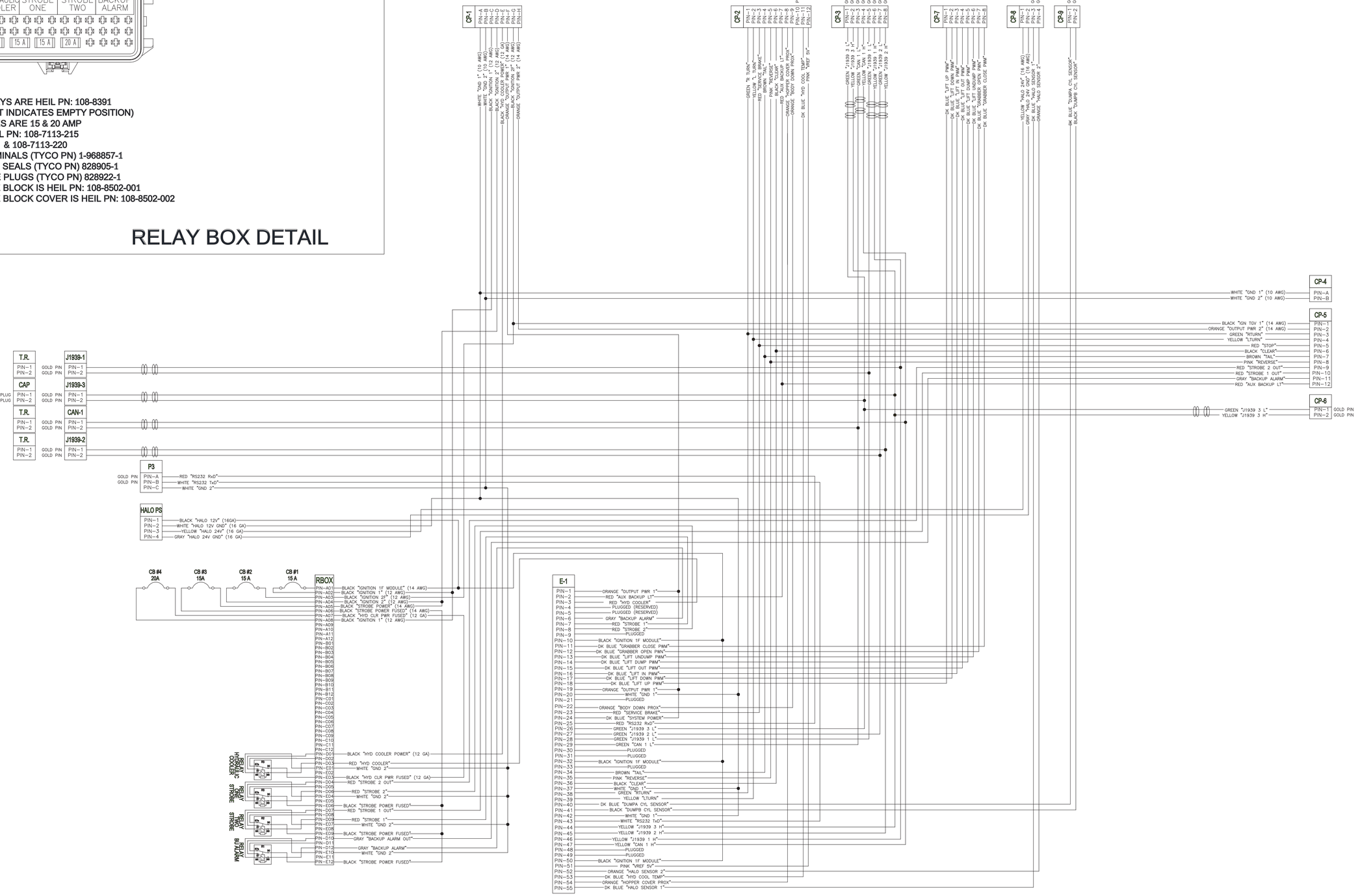
1. Electrical Schematic, Main Controller - 701-9287-010
2. Electrical Schematic, Body - 701-9287-011
3. Electrical Schematic, Body Valve - 701-9287-012
4. Electrical Schematic, Lift Valve - 701-9287-013
5. Electrical Schematic, Tailgate Valve - 701-9287-014
6. Electrical Schematic, Cab to Body RP 170 - 701-9287-016
7. Electrical Schematic, Cab Control Panels - 701-9287-017
8. Electrical Schematic, Cab to Body RP 170, Peterbilt - 701-9287-018
9. Electrical Schematic, Desktop Programming - 701-9287-019
10. Electrical Schematic, CAN Network - 701-9287-015

263-1857-010



NOTE:
RELAYS ARE HEIL PN: 108-8391
(DOT INDICATES EMPTY POSITION)
FUSES ARE 15 & 20 AMP
HEIL PN: 108-7113-215
& 108-7113-220
TERMINALS (TYCO PN) 1-968857-1
WIRE SEALS (TYCO PN) 828905-1
HOLE PLUGS (TYCO PN) 828922-1
FUSE BLOCK IS HEIL PN: 108-8502-001
FUSE BLOCK COVER IS HEIL PN: 108-8502-002

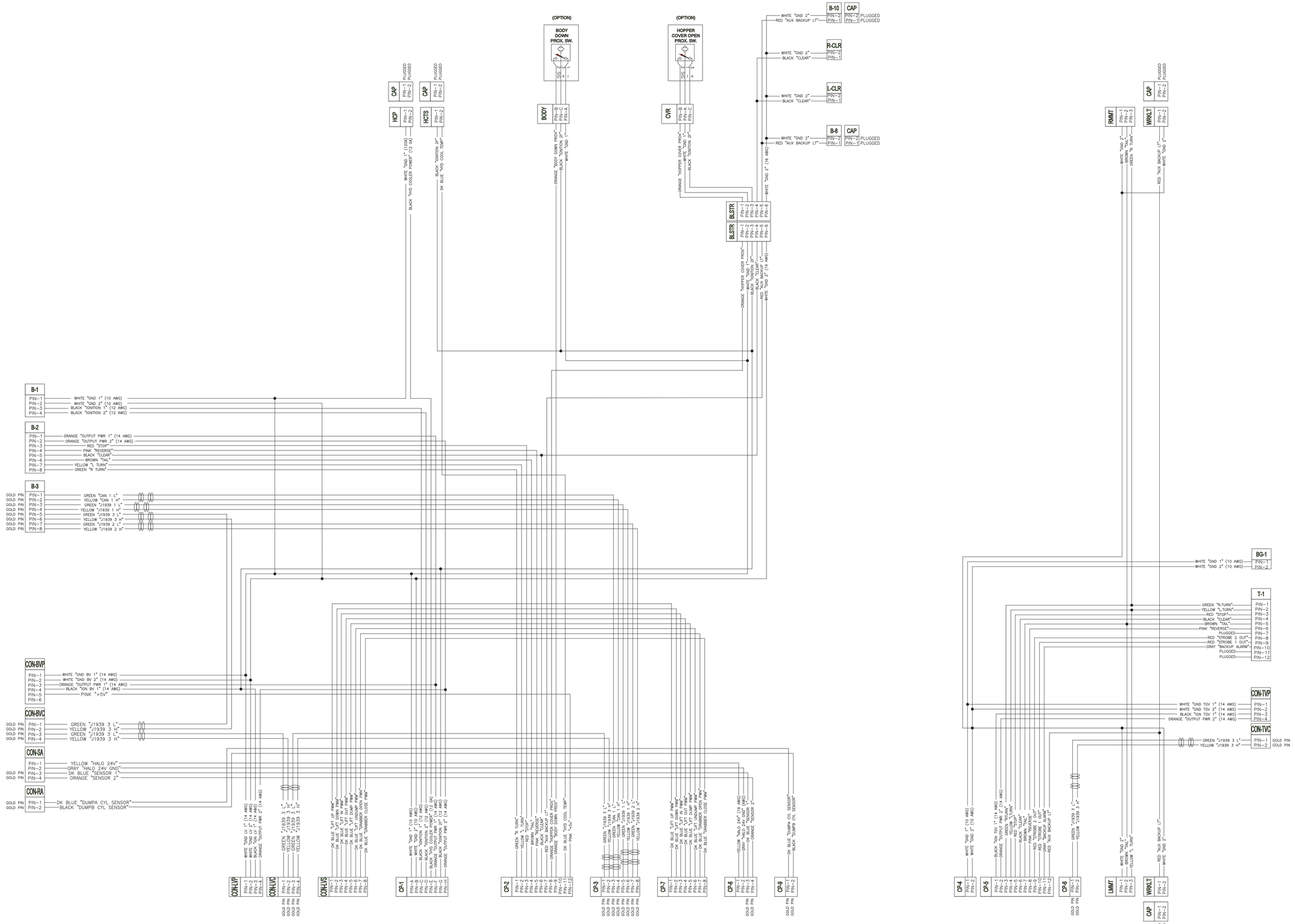
RELAY BOX DETAIL



701-9287-010

SCHEMATIC, CONTROLLER
COMMAND-SST

701-9287-010
REV A



263-1857-011

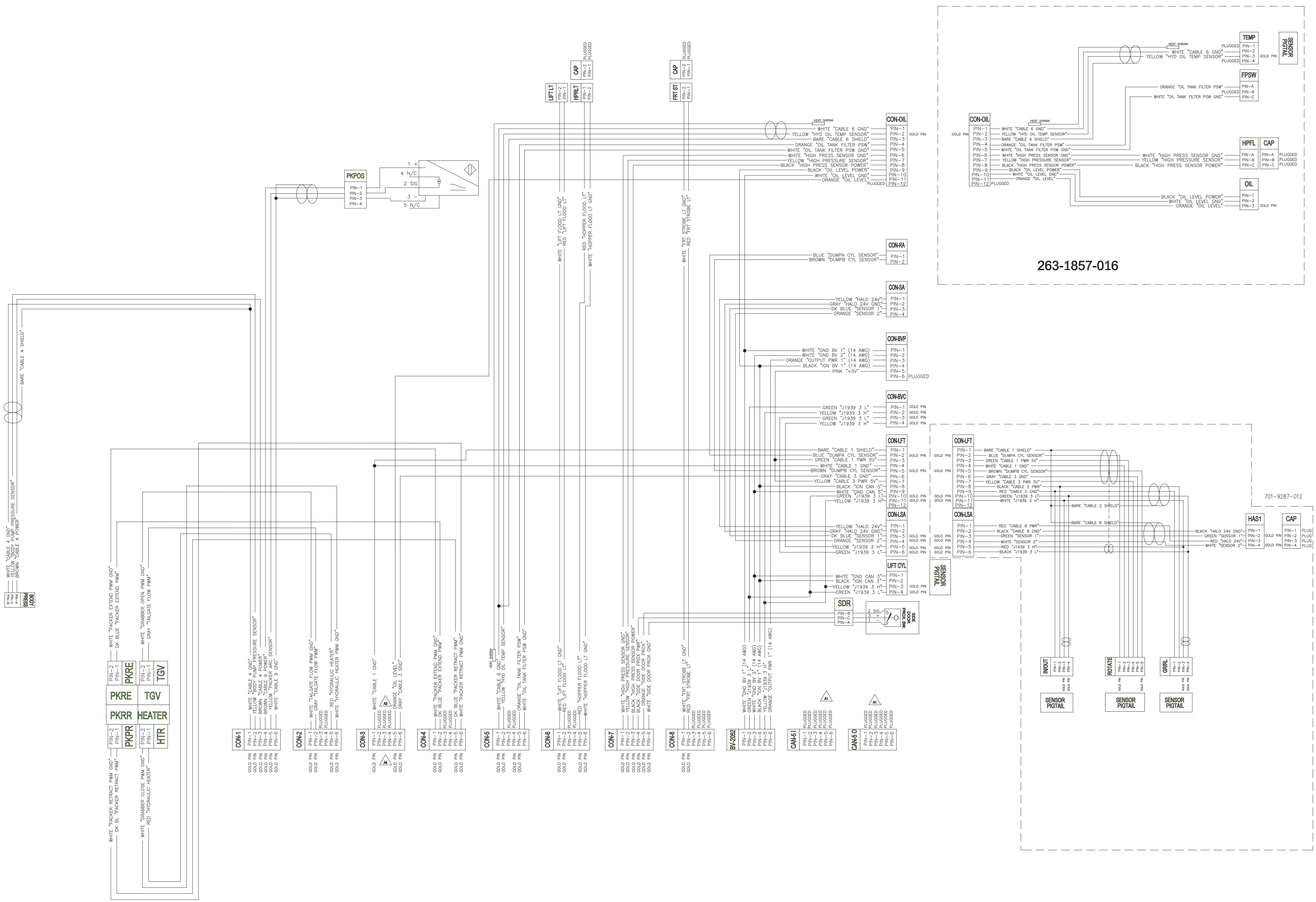
263-1857-017

701-9287-011

SCHEMATIC, BODY COMMAND-SST

701-9287-011

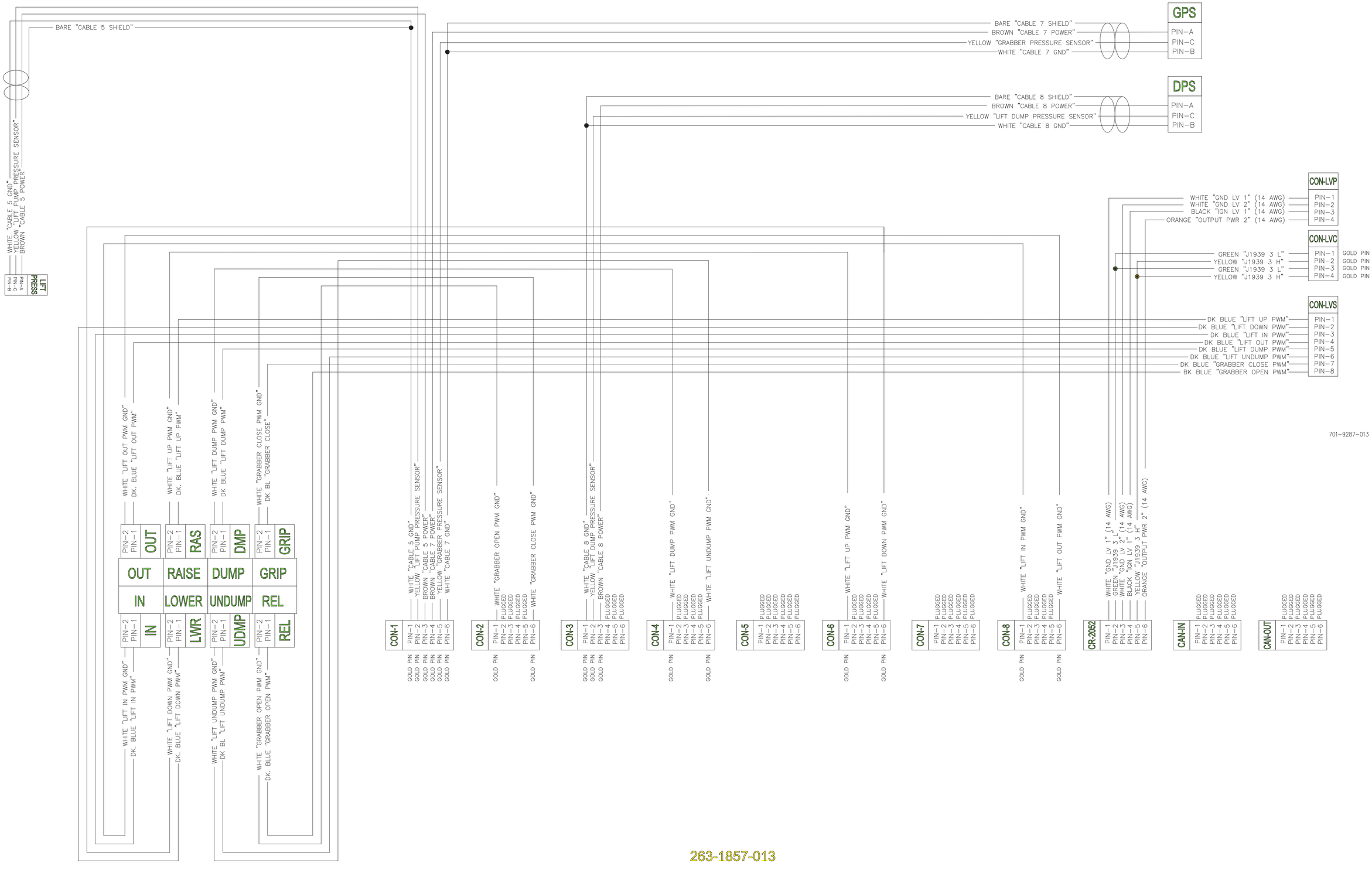
REV A

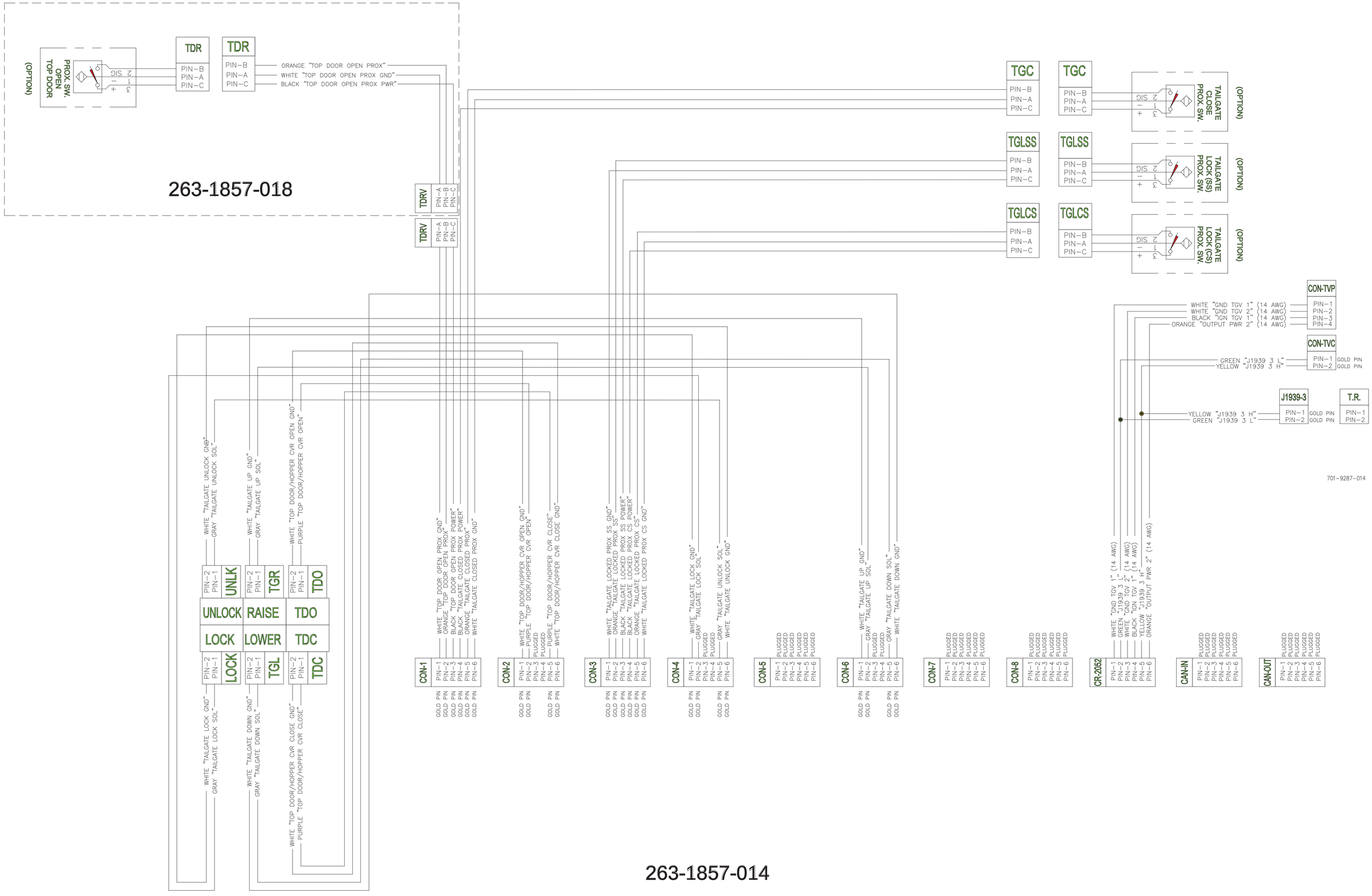


263-1857-012

SCHEMATIC, BODY VALVE
COMMANDER

701-9287-012
REV A


BARE "CABLE 5 SHIELD"
WHITE "CABLE 5 GND"
YELLOW "LIFT PUMP PRESSURE SENSOR"
BROWN "CABLE 5 POWER"
LIFT PRESS
PIN-B
PIN-C
PIN-A
BARE "CABLE 7 SHIELD"
BROWN "CABLE 7 POWER"
YELLOW "GRABBER PRESSURE SENSOR"
WHITE "CABLE 7 GND"
GPS
PIN-A
PIN-C
PIN-B
BARE "CABLE 8 SHIELD"
BROWN "CABLE 8 POWER"
YELLOW "LIFT DUMP PRESSURE SENSOR"
WHITE "CABLE 8 GND"
DPS
PIN-A
PIN-C
PIN-B
WHITE "LIFT IN PWM GND"
DK. BLUE "LIFT IN PWM"
WHITE "LIFT DOWN PWM GND"
DK. BLUE "LIFT DOWN PWM"
WHITE "LIFT UNDUMP PWM GND"
DK BL "LIFT UNDUMP PWM"
WHITE "GRABBER OPEN PWM GND"
DK. BLUE "GRABBER OPEN PWM"
WHITE "LIFT OUT PWM GND"
DK. BLUE "LIFT OUT PWM"
WHITE "LIFT UP PWM GND"
DK. BLUE "LIFT UP PWM"
WHITE "LIFT DUMP PWM GND"
DK BLUE "LIFT DUMP PWM"
WHITE "GRABBER CLOSE PWM GND"
DK BL "GRABBER CLOSE"
PIN-2
PIN-1
IN
OUT
LWR
LOWER
RAISE
UDMP
UNDUMP
DUMP
REL
GRIP
RAS
DMP
GRIP
CON-LVP
WHITE "GND LV 1" (14 AWG)
WHITE "GND LV 2" (14 AWG)
BLACK "IGN LV 1" (14 AWG)
ORANGE "OUTPUT PWR 2" (14 AWG)
PIN-1
PIN-2
PIN-3
PIN-4
CON-LVC
GREEN "J1939 3 L"
YELLOW "J1939 3 H"
GREEN "J1939 3 L"
YELLOW "J1939 3 H"
GOLD PIN
CON-LVS
DK BLUE "LIFT UP PWM"
DK BLUE "LIFT DOWN PWM"
DK BLUE "LIFT IN PWM"
DK BLUE "LIFT OUT PWM"
DK BLUE "LIFT DUMP PWM"
DK BLUE "LIFT UNDUMP PWM"
DK BLUE "GRABBER CLOSE PWM"
BK BLUE "GRABBER OPEN PWM"
PIN-1
PIN-2
PIN-3
PIN-4
PIN-5
PIN-6
PIN-7
PIN-8
CON-1
WHITE "CABLE 5 GND"
YELLOW "LIFT PUMP PRESSURE SENSOR"
BROWN "CABLE 5 POWER"
BROWN "CABLE 7 POWER"
BROWN "CABLE 8 POWER"
YELLOW "GRABBER PRESSURE SENSOR"
WHITE "CABLE 7 GND"
CON-2
WHITE "GRABBER OPEN PWM GND"
WHITE "GRABBER CLOSE PWM GND"
CON-3
WHITE "CABLE 8 GND"
YELLOW "LIFT DUMP PRESSURE SENSOR"
CON-4
WHITE "LIFT DUMP PWM GND"
WHITE "LIFT UNDUMP PWM GND"
CON-5
CON-6
WHITE "LIFT UP PWM GND"
WHITE "LIFT DOWN PWM GND"
CON-7
CON-8
WHITE "LIFT IN PWM GND"
WHITE "LIFT OUT PWM GND"
PLUGGED
CR-2052
WHITE "GND LV 1" (14 AWG)
GREEN "J1939 3 L" (14 AWG)
WHITE "GND LV 2" (14 AWG)
BLACK "IGN LV 1" (14 AWG)
YELLOW "J1939 3 H" (14 AWG)
ORANGE "OUTPUT PWR 2" (14 AWG)
CAN-IN
CAN-OUT
701-9287-013
263-1857-013
SCHEMATIC, VALVE, LIFT
COMMAND-SST
701-9287-013
REV A


(OPTION)
PROX. SW. OPEN TOP DOOR
2 SIG
1 –
3 +
TDR
PIN–B
PIN–A
PIN–C
TDR
PIN–B
PIN–A
PIN–C
ORANGE "TOP DOOR OPEN PROX"
WHITE "TOP DOOR OPEN PROX GND"
BLACK "TOP DOOR OPEN PROX PWR"
263-1857-018
TDRV
PIN–A
PIN–B
PIN–C
TDRV
PIN–A
PIN–B
PIN–C
TGC
PIN–B
PIN–A
PIN–C
TGC
PIN–B
PIN–A
PIN–C
TAILGATE CLOSE PROX. SW.
(OPTION)
TGLSS
PIN–B
PIN–A
PIN–C
TGLSS
PIN–B
PIN–A
PIN–C
TAILGATE LOCK (SS) PROX. SW.
(OPTION)
TGLCS
PIN–B
PIN–A
PIN–C
TGLCS
PIN–B
PIN–A
PIN–C
TAILGATE LOCK (CS) PROX. SW.
(OPTION)
CON-TVP
WHITE "GND TGV 1" (14 AWG)
WHITE "GND TGV 2" (14 AWG)
BLACK "IGN TGV 1" (14 AWG)
ORANGE "OUTPUT PWR 2" (14 AWG)
PIN–1
PIN–2
PIN–3
PIN–4
CON-TVC
GREEN "J1939 3 L"
YELLOW "J1939 3 H"
PIN–1
PIN–2
GOLD PIN
J1939-3
T.R.
YELLOW "J1939 3 H"
GREEN "J1939 3 L"
CON-1
CON-2
CON-3
CON-4
CON-5
CON-6
CON-7
CON-8
CR-2052
CAN-IN
CAN-OUT
PLUGGED
WHITE "TAILGATE UNLOCK GND"
GRAY "TAILGATE UNLOCK SOL"
WHITE "TAILGATE UP GND"
GRAY "TAILGATE UP SOL"
WHITE "TOP DOOR/HOPPER CVR OPEN GND"
PURPLE "TOP DOOR/HOPPER CVR OPEN"
WHITE "TAILGATE LOCK GND"
GRAY "TAILGATE LOCK SOL"
WHITE "TAILGATE DOWN GND"
GRAY "TAILGATE DOWN SOL"
WHITE "TOP DOOR/HOPPER CVR CLOSE GND"
PURPLE "TOP DOOR/HOPPER CVR CLOSE"
UNLOCK
LOCK
RAISE
LOWER
TDO
TDC
UNLK
TGR
TDO
LOCK
TGL
TDC
WHITE "TOP DOOR OPEN PROX GND"
ORANGE "TOP DOOR OPEN PROX"
BLACK "TOP DOOR OPEN PROX POWER"
BLACK "TAILGATE CLOSED PROX POWER"
ORANGE "TAILGATE CLOSED PROX"
WHITE "TAILGATE CLOSED PROX GND"
WHITE "TOP DOOR/HOPPER CVR OPEN GND"
PURPLE "TOP DOOR/HOPPER CVR OPEN"
WHITE "TOP DOOR/HOPPER CVR CLOSE GND"
PURPLE "TOP DOOR/HOPPER CVR CLOSE"
WHITE "TAILGATE LOCKED PROX SS GND"
ORANGE "TAILGATE LOCKED PROX SS"
BLACK "TAILGATE LOCKED PROX SS POWER"
BLACK "TAILGATE LOCKED PROX CS POWER"
ORANGE "TAILGATE LOCKED PROX CS"
WHITE "TAILGATE LOCKED PROX CS GND"
WHITE "TAILGATE LOCK GND"
GRAY "TAILGATE LOCK SOL"
WHITE "TAILGATE UNLOCK SOL"
WHITE "TAILGATE UNLOCK GND"
WHITE "TAILGATE UP GND"
GRAY "TAILGATE UP SOL"
WHITE "TAILGATE DOWN SOL"
WHITE "TAILGATE DOWN GND"
WHITE "GND TGV 1" (14 AWG)
WHITE "GND TGV 2" (14 AWG)
BLACK "IGN TGV 1" (14 AWG)
YELLOW "J1939 3 H" (14 AWG)
ORANGE "OUTPUT PWR 2" (14 AWG)
GREEN "J1939 3 L" (14 AWG)
263-1857-014
701-9287-014
SCHEMATIC, VALVE, TAILGATE COMMAND-SST
701-9287-014
REV A

IN-CAB DIAGNOSTIC DISPLAY

D1

BROWN
BLACK
GRAY
BLUE
WHITE

YELLOW
GREEN
WHITE
BLACK

CAN-1
PIN-1
PIN-2
PIN-3
PIN-4

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

(OPTIONAL)
CHASSIS
PROVIDED
WHELEN STROBE

R.H. STB
L.H. STB

TO CHASSIS RP170
(POWER AND GROUND)
CONNECTOR

TO CHASSIS RP170
(POWERTRAIN)
CONNECTOR

C-3
PLUGGED PIN-1
PLUGGED PIN-2
PLUGGED PIN-3
PLUGGED PIN-4
PLUGGED PIN-5
PLUGGED PIN-6

C-3
PIN-1 — WHITE "SPARE INPUT %IX128.7"
PIN-2 — WHITE "SPARE INPUT %IX128.5"
PIN-3 — WHITE "SPARE INPUT %IX128.3"
PIN-4 — RED "SPARE OUTPUT %QX128.19"
PIN-5 — RED "SPARE OUTPUT %QX128.20"
PIN-6 — RED "SPARE OUTPUT %QX128.21"

FS-CS
GOLD PIN PIN-A — BLACK "IGNITION 2"
GOLD PIN PIN-B — RED "HALO ACT FT SW CS"
GOLD PIN PIN-C — ORANGE "HALO CSH FT SW CS"

C-2
PLUGGED PIN-1
PLUGGED PIN-2
PLUGGED PIN-3
PLUGGED PIN-4
PLUGGED PIN-5
PLUGGED PIN-6
PLUGGED PIN-7
PLUGGED PIN-8

C-2
PIN-1 — BLACK "IGNITION 2"
PIN-2 — WHITE "GROUND 1" (18 AWG)
PIN-3 — GREEN "CAM TRIG A"
PIN-4 — YELLOW "CAM TRIG B"
PIN-5 — RED "CAM TRIG C"
PIN-6 — BROWN "CAM TRIG 5"
PIN-7 — PINK "CAM TRIG R"
PIN-8 — BLACK "IGNITION 1"

C-1C
GOLD PIN PIN-1 — YELLOW "J1939 1 H"
GOLD PIN PIN-2 — GREEN "J1939 1 L"
GOLD PIN PIN-3 — YELLOW "J1939 1 H"
GOLD PIN PIN-4 — GREEN "J1939 1 L"
GOLD PIN PIN-5 — YELLOW "CAN1-H"
GOLD PIN PIN-6 — GREEN "CAN1-L"

C-1
PIN-1 — BLACK "FUSED IGNITION 2F" (16 AWG)
PIN-2 — WHITE "SYS PWR IND GND" (18 AWG)
PIN-3 — ORANGE "PANEL SELECT"
PIN-4 — ORANGE "OUTPUT PWR 1" (14 AWG)
PIN-5 — BROWN "SCALE ALARM 2"
PIN-6 — ORANGE "OUTPUT PWR 2" (14 AWG)
PIN-7 — RED "WARBLE ALARM"
PIN-8 — RED "CAB ALARM"
PIN-9 — GRAY "SCALE ALARM 1"
PIN-10 — DK BLUE "SYS PWR IND PWR"
PIN-11
PIN-12

C-1P
PIN-1 — BLACK "IGNITION 1" (12 AWG)
PIN-2 — BLACK "IGNITION 2" (12 AWG)
PIN-3 — WHITE "GROUND 1" (12 AWG)
PIN-4 — WHITE "GROUND 2" (12 AWG)

CAB-STB
"507" PLUGGED PIN-3 — RED "STROBE LT 1 OUT"
"508" PLUGGED PIN-2 — RED "STROBE LT 2 OUT"
"510" PLUGGED PIN-4 — WHITE "GROUND 2" (18 AWG)
PIN-1 PLUGGED

CAP
PLUGGED PIN-1
PLUGGED PIN-2

CAN-1P
GOLD PIN PIN-1 — YELLOW "CAN 1 H"
GOLD PIN PIN-2 — GREEN "CAN 1 L"

FS-SS
A1
GOLD PIN PIN-A — BLACK "IGNITION 2"
GOLD PIN PIN-B — RED "HALO ACT FT SW SS"
GOLD PIN PIN-C — ORANGE "HALO CSH FT SW SS"

JS-1
PIN-1 — WHITE "GROUND 1" (18 AWG)
PIN-2 — BLACK "FUSED IGNITION 2F"
PIN-3 — YELLOW "J1939 1 H"
PIN-4 — GREEN "J1939 1 L"
PIN-5 — YELLOW "J1939 1 H"
PIN-6 — GREEN "J1939 1 L"

T.R.
PIN-1
GOLD PIN PIN-2

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

CAP
PLUGGED PIN-1
PLUGGED PIN-2
PLUGGED PIN-3
PLUGGED PIN-4

SEC
PIN-1 — BLACK "IGNITION 2"
PIN-2 — WHITE "GROUND 1" (18 AWG)
GOLD PIN PIN-3 — YELLOW "J1939 2 H"
GOLD PIN PIN-4 — GREEN "J1939 2 L"

D-1A
PIN-1 — PLUGGED
PIN-2 — BLACK "IGNITION 1" (10 AWG)
PIN-3 — BLACK "IGNITION 2" (10 AWG)
PIN-4 — PLUGGED
PIN-5 — PLUGGED
PIN-6 — WHITE "GROUND 1" (10 AWG)
PIN-7 — WHITE "GROUND 2" (10 AWG)
PIN-8 — PLUGGED

D-1
PIN-1 — PLUGGED
PIN-2 — PLUGGED
PIN-3 — PLUGGED
PIN-4 — BROWN "THROTTLE ADVANCE"
GOLD PIN PIN-5 — YELLOW "J1939 2 H"
GOLD PIN PIN-6 — GREEN "J1939 2 L"
PIN-7 — BROWN "ACCEL INTERL"
PIN-8 — BROWN "ROAD SPEED LIMIT"
PIN-9 — BROWN "ECM COMMON"
PIN-10 — PLUGGED
PIN-11 — PLUGGED
PIN-12 — PLUGGED
PIN-13 — PLUGGED
PIN-14 — PLUGGED
PIN-15 — PLUGGED
PIN-16 — PLUGGED
PIN-17 — DK BLUE "920"
PIN-18 — PLUGGED
PIN-19 — RED "EOS ENABLE"
PIN-20 — PLUGGED
PIN-21 — DK BLUE "922"
PIN-22 — PLUGGED
PIN-23 — PLUGGED
PIN-24 — DK BLUE "921"
PIN-25 — PLUGGED
PIN-26 — PLUGGED
PIN-27 — PLUGGED
PIN-28 — DK BLUE "TRANS SUMP TEMP (903)"
PIN-29 — PINK "NEUTRAL"
PIN-30 — PLUGGED
PIN-31 — ORANGE "PANEL SELECT"

CAP
PLUGGED PIN-1
PLUGGED PIN-2
PLUGGED PIN-3
PLUGGED PIN-4
PLUGGED PIN-5
PLUGGED PIN-6

FN
PIN-1 — BLACK "FUSED IGNITION 2F"
PIN-2 — WHITE "GROUND 1" (18 AWG)
PIN-3 — DK BLUE "FORCED NEUTRAL"
PIN-4 — DK BLUE "920"
PIN-5 — DK BLUE "922"
PIN-6 — DK BLUE "921"

CAP
PLUGGED PIN-1
PLUGGED PIN-2
PLUGGED PIN-3
PLUGGED PIN-4
PLUGGED PIN-5
PLUGGED PIN-6

ACCIL
PIN-1 — BLACK "FUSED IGNITION 2F"
PIN-2 — WHITE "GROUND 2" (18 AWG)
PIN-3 — BROWN "ECU COM"
PIN-4 — BROWN "ACCEL INTERL"
PIN-5 — BROWN "ROAD SPEED LIMIT OUTPUT"
PIN-6 — BROWN "ROAD SPEED LIMIT"

THROTTLE ADVANCE RELAY
4 — 3
5 — 2
1 — 2

WHITE "GROUND 2" (18 AWG)

CAP
PLUGGED PIN-1
PLUGGED PIN-2
PLUGGED PIN-3
PLUGGED PIN-4

PTO
PIN-1
PIN-2 — RED "PTO SOL"
PIN-3 — ORANGE "PTO PSW"

WHITE "GROUND 1" (10 AWG)
WHITE "GROUND 2" (10 AWG)

D-2
PIN-1 — WHITE "CND" (6 AWG)
PIN-2 — PINK "RDC" (12 AWG)
PLUGGED PIN-3
PLUGGED PIN-4 — BROWN "TAIL" (14 AWG)
PLUGGED PIN-5 — RED "STOP" (14 AWG)
PLUGGED PIN-6
PLUGGED PIN-7
PLUGGED PIN-8
PLUGGED PIN-9
PLUGGED PIN-10
PLUGGED PIN-11
PLUGGED PIN-12
PLUGGED PIN-13 — YELLOW "L TURN" (14 AWG)
PIN-14 — GREEN "R TURN" (14 AWG)

B-1
PIN-1 — WHITE "GROUND 1" (10 AWG)
PIN-2 — WHITE "GROUND 2" (10 AWG)
PIN-3 — BLACK "IGNITION 1" (12 AWG)
PIN-4 — BLACK "IGNITION 2" (12 AWG)

B-2
PIN-1 — ORANGE "OUTPUT PWR 1" (14 AWG)
PIN-2 — ORANGE "OUTPUT PWR 2" (14 AWG)
PIN-3 — RED "STOP"
PIN-4 — PINK "REVERSE"
PIN-5 — BLACK "CLEAR"
PIN-6 — BROWN "TAIL"
PIN-7 — YELLOW "L TURN"
PIN-8 — GREEN "R TURN"

B-3
PIN-1 GOLD PIN — GREEN "CAN 1 L"
PIN-2 GOLD PIN — YELLOW "CAN 1 H"
PIN-3 GOLD PIN — GREEN "J1939 1 L"
PIN-4 GOLD PIN — YELLOW "J1939 1 H"
PIN-5 GOLD PIN — GREEN "J1939 3 L"
PIN-6 GOLD PIN — YELLOW "J1939 3 H"
PIN-7 GOLD PIN — GREEN "J1939 2 L"
PIN-8 GOLD PIN — YELLOW "J1939 2 H"

E-2
PIN-1 — ORANGE "OUTPUT PWR 1"
PIN-2 — RED "STROBE LT 1 OUT"
PIN-3 — RED "STROBE LT 2 OUT"
PIN-4 — RED "SPARE OUTPUT %QX128.19"
PIN-5 — RED "SPARE OUTPUT %QX128.20"
PIN-6 — RED "SPARE OUTPUT %QX128.21"
PIN-7 — RED "WARBLE ALARM" (14 AWG)
PIN-8 — RED "CAB ALARM"
PIN-9 — RED "PTO SOL"
PIN-10 — BLACK "FUSED IGNITION 2F"
PIN-11 — GREEN "CAM TRIG A"
PIN-12 — YELLOW "CAM TRIG B"
PIN-13 — RED "CAM TRIG C"
PIN-14 — BROWN "CAM TRIG 5"
PIN-15 — PINK "CAM TRIG R"
PIN-16 — BROWN "ROAD SPEED LIMIT OUTPUT"
PIN-17 — DK BLUE "FORCED NEUTRAL"
PIN-18 — BROWN "THROTTLE ADVANCE"
PIN-19 — BLACK "FUSED IGNITION 2F"
PIN-20 — WHITE "GROUND 2" (18 AWG)
PIN-21 — WHITE "SPARE INPUT %IX128.7"
PIN-22 — WHITE "SPARE INPUT %IX128.5"
PIN-23 — WHITE "SPARE INPUT %IX128.3"
PIN-24 — ORANGE "PTO PSW"
PLUGGED — PIN-25
PLUGGED — PIN-26
PLUGGED — PIN-27
PLUGGED — PIN-28
PIN-29 — GREEN "J1939 3 L"
PLUGGED — PIN-30
PLUGGED — PIN-31
PLUGGED — PIN-32
PIN-33 — ORANGE "PANEL SELECT"
PLUGGED — PIN-34
PIN-35 — PINK "NEUTRAL"
PIN-36 — DK BLUE "TRANS SUMP TEMP (903)"
PIN-37 — WHITE "GROUND 1" (18 AWG)
PLUGGED — PIN-38
PLUGGED — PIN-39
PIN-40 — ORANGE "HALO CAN SHAKE FTSW"
PIN-41 — RED "HALO ACT FT SW"
PIN-42 — WHITE "GROUND 1" (18 AWG)
PLUGGED — PIN-43
PLUGGED — PIN-44
PLUGGED — PIN-45
PLUGGED — PIN-46
PIN-47 — YELLOW "J1939 3 H"
PLUGGED — PIN-48
PLUGGED — PIN-49
PLUGGED — PIN-50
PLUGGED — PIN-51
PLUGGED — PIN-52
PLUGGED — PIN-53
PIN-54 — BROWN "SCALE ALARM 2"
PIN-55 — GRAY "SCALE ALARM 1"

J-5
PIN-1 — RED "STROBE LT 1 OUT"
PIN-2 — WHITE "GROUND 2" (18 AWG)

CAP
PIN-1 PLUGGED
PIN-2 PLUGGED

J-6
PIN-1 — RED "STROBE LT 2 OUT"
PIN-2 — WHITE "GROUND 2" (18 AWG)

CAP
PIN-1 PLUGGED
PIN-2 PLUGGED

J1939-3P
PIN-1 GOLD PIN — YELLOW "J1939 3 H"
PIN-2 GOLD PIN — GREEN "J1939 3 L"

CAP
PIN-1 PLUGGED
PIN-2 PLUGGED

J1939-3
PIN-1 GOLD PIN — YELLOW "J1939 3 H"
PIN-2 GOLD PIN — GREEN "J1939 3 L"

T.R.
PIN-1
PIN-2

263-1886-001 - AUTOCAR
263-1886-003 - MACK LR

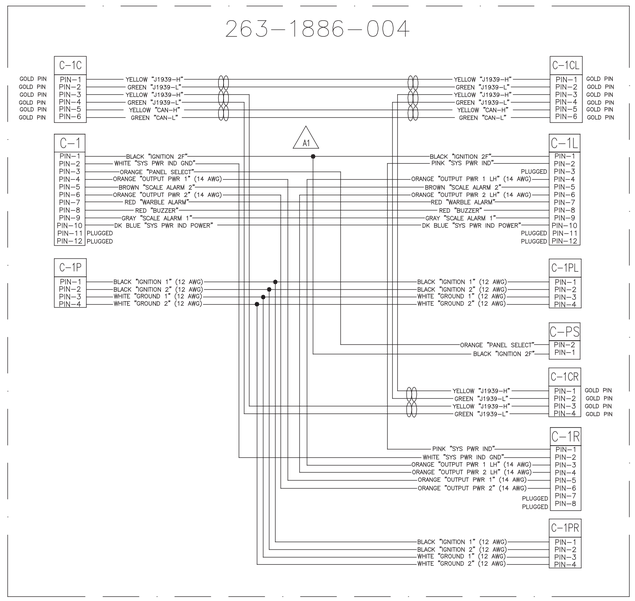
701-9287-016

SCHEMATIC, CAB TO BODY
COMMAND-SST, RP170

701-9287-016
REV A

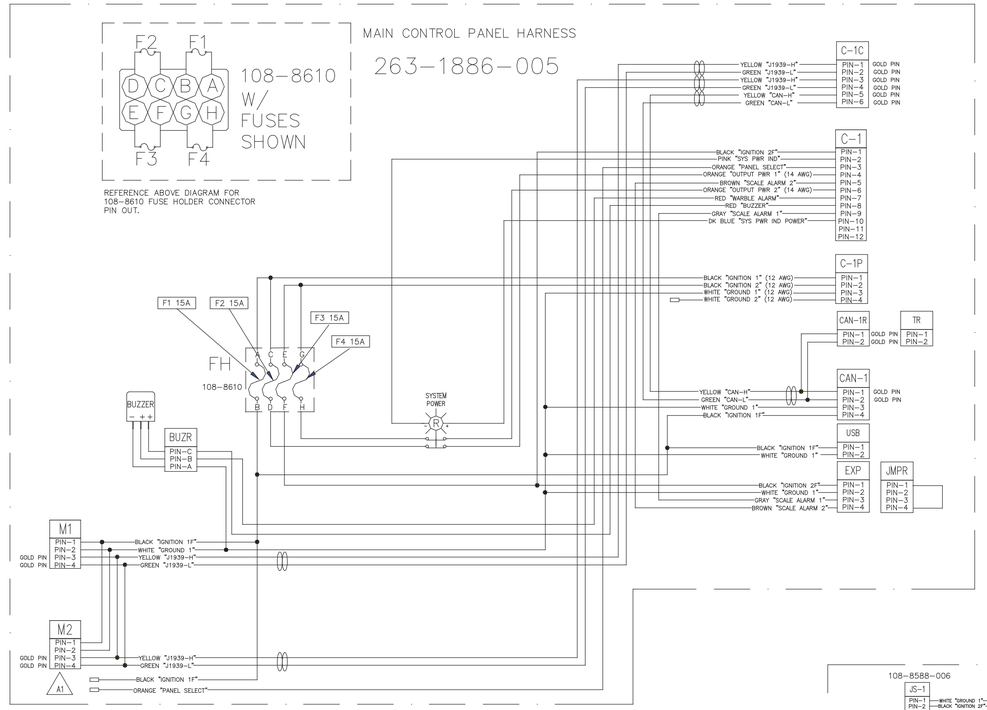
PANEL SPLITTER HARNESS

263-1886-004

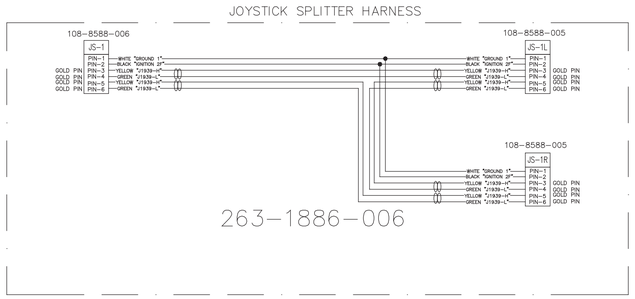


MAIN CONTROL PANEL HARNESS

263-1886-005



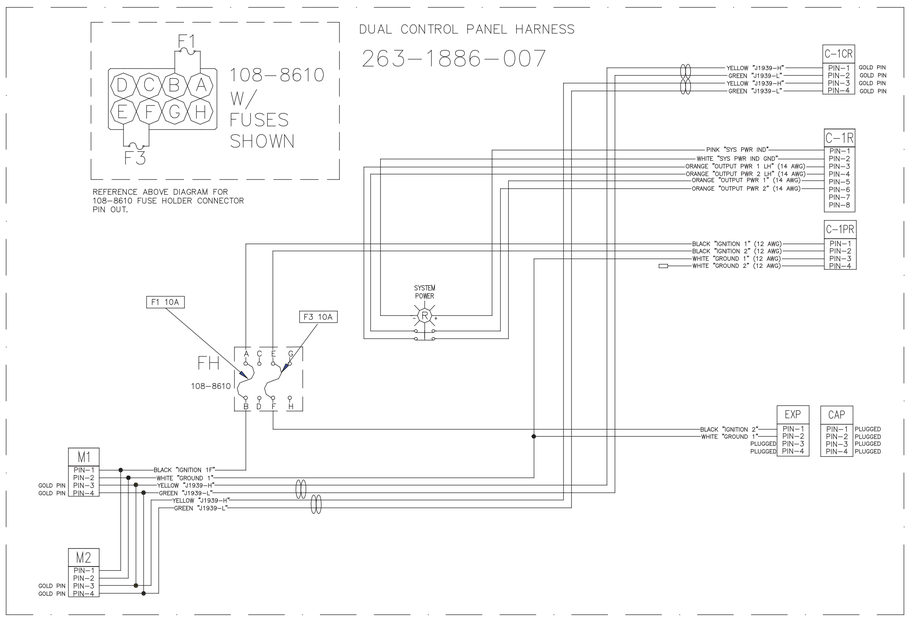
JOYSTICK SPLITTER HARNESS



263-1886-006

DUAL CONTROL PANEL HARNESS

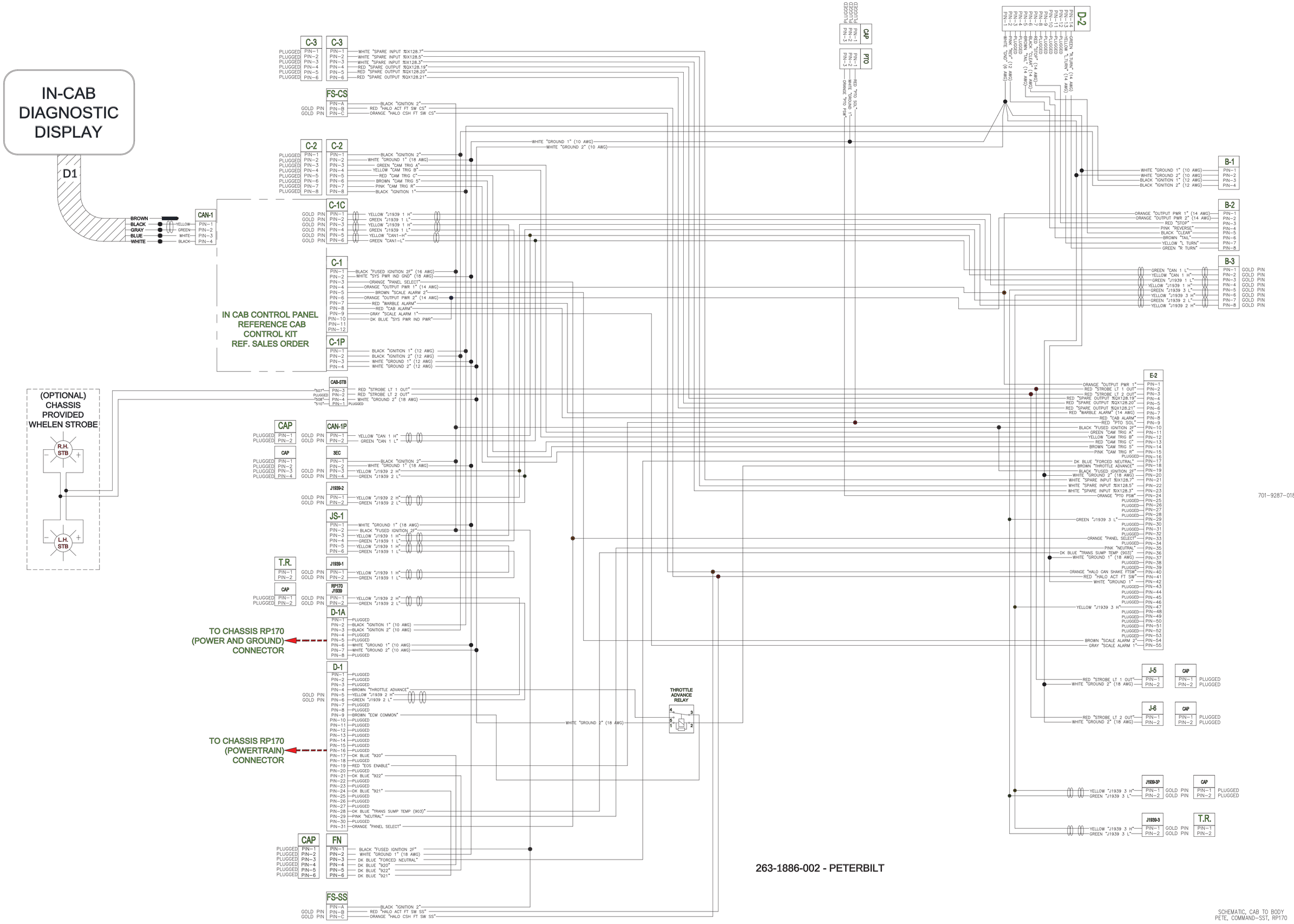
263-1886-007



SCHEMATIC, CAB CONTROL PANELS
COMMAND-SST

701-9287-017
REV A

701-9287-017

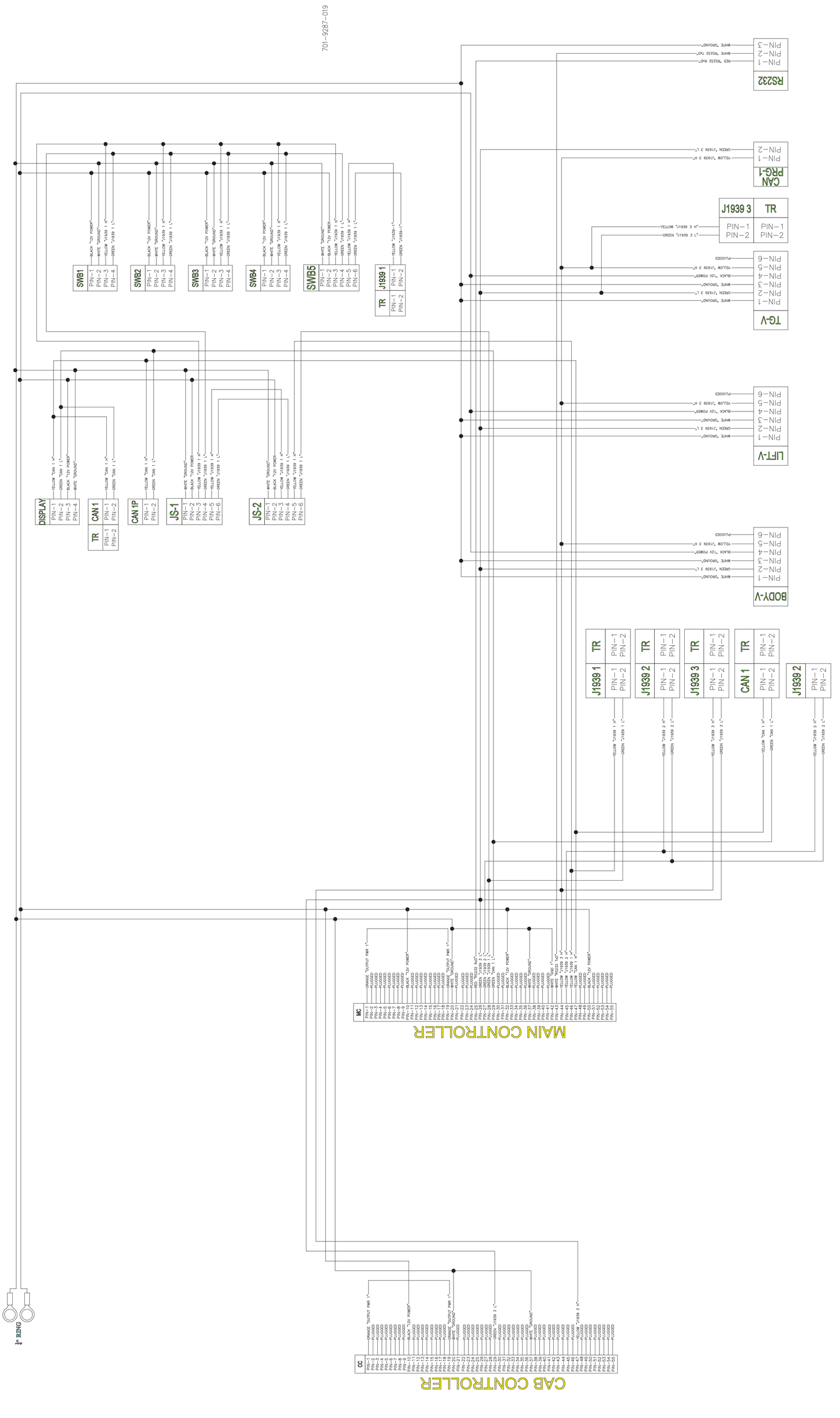

IN-CAB DIAGNOSTIC DISPLAY
D1
BROWN
BLACK
GRAY
BLUE
WHITE
YELLOW
GREEN
WHITE
BLACK
CAN-1
PIN-1
PIN-2
PIN-3
PIN-4
IN CAB CONTROL PANEL REFERENCE CAB CONTROL KIT REF. SALES ORDER
C-3
C-2
C-1C
C-1
C-1P
CAB-STB
CAP
CAN-1P
3EC
J1939-2
JS-1
T.R.
J1939-1
RP170 J1939
D-1A
D-1
FN
FS-CS
FS-SS
TO CHASSIS RP170 (POWER AND GROUND) CONNECTOR
TO CHASSIS RP170 (POWERTRAIN) CONNECTOR
(OPTIONAL) CHASSIS PROVIDED WHELEN STROBE
R.H. STB
L.H. STB
THROTTLE ADVANCE RELAY
D-2
B-1
B-2
B-3
E-2
J-5
J-6
J1939-3P
J1939-3
PTO
WHITE "GROUND 1" (10 AWG)
WHITE "GROUND 2" (10 AWG)
WHITE "GROUND 2" (18 AWG)
263-1886-002 - PETERBILT
701-9287-018
SCHEMATIC, CAB TO BODY
PETE, COMMAND-ST, RP170
701-9287-018
REV A

SCHEMATIC, DESKTOP PROGRAMMING HARNESS, COMMAND-SST

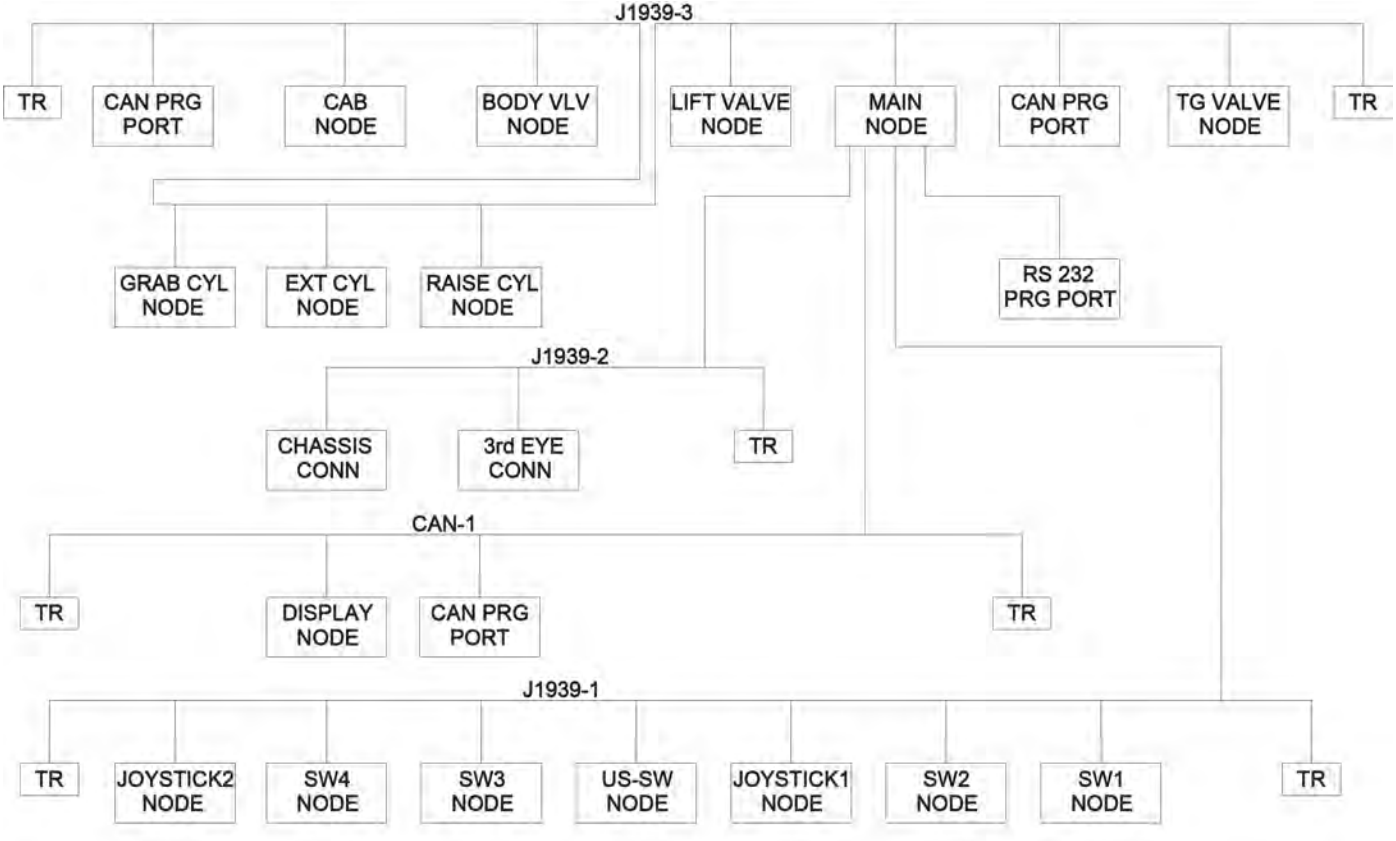
701-9287-019

REV A

701-9287-019



CAN NETWORK (701-9287-015 REV A, 03/01/20)



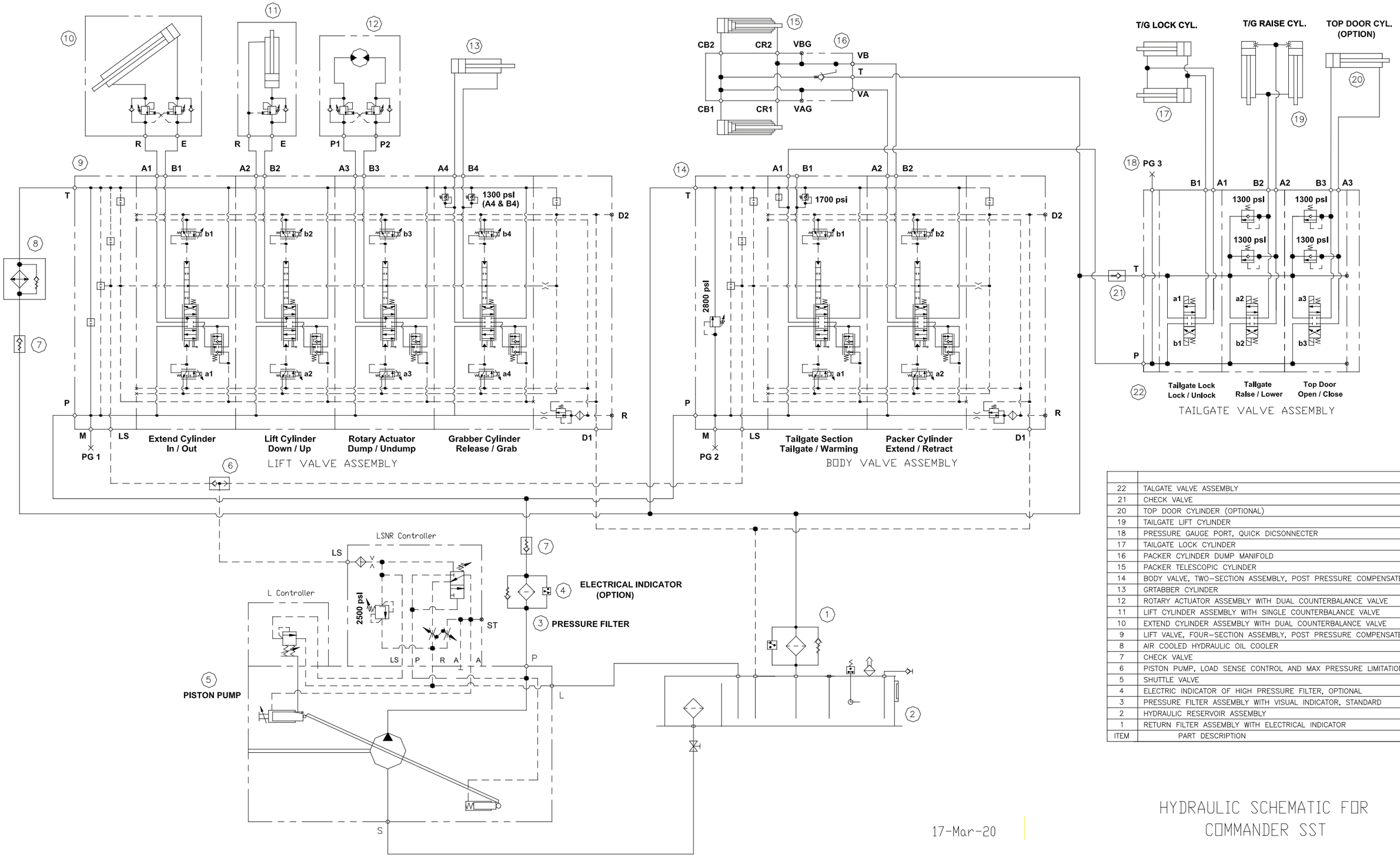
CAN-1 - DISPLAY NETWORK (CANOPEN STANDARD BASED)
J1939-1 - HMI NETWORK (J1939 BASED)
J1939-2 - CHASSIS NETWORK (J1939 BASED)
J1939-3 - CONTROLLER INTERFACE NETWORK (J1939 BASED)

SCHEMATIC, NETWORK, CAN
COMMAND-SST
07/21/19 701-9287-015

HYDRAULIC SCHEMATICS

Reference the schematics on the following pages. A printed copy of 1 is included in the manual kit.

1. Command-SST™, Schematic - 701-9298
2. Command-SST™, System At Idle - 701-9298-001
3. Command-SST™, Arm Out - 701-9298-002
4. Command-SST™, Arm-In - 701-9298-003
5. Command-SST™, Arm Up - 701-9298-004
6. Command-SST™, Arm Down - 701-9298-005
7. Command-SST™, Arm Dump - 701-9298-006
8. Command-SST™, Arm Undump - 701-9298-007
9. Command-SST™, Arm Grab - 701-9298-008
10. Command-SST™, Arm Release - 701-9298-009
11. Command-SST™, Packer Extend - 701-9298-010
12. Command-SST™, Packer Retract - 701-9298-011
13. Command-SST™, Oil Warming - 701-9298-012
14. Command-SST™, Tailgate Lock - 701-9298-013
15. Command-SST™, Tailgate Unlock - 701-9298-014
16. Command-SST™, Tailgate Raise - 701-9298-015
17. Command-SST™, Tailgate Down - 701-9298-016
18. Command-SST™, Top Door Close - 701-9298-017
19. Command-SST™, Top Door Open - 701-9298-018
20. Command-SST™, Arm Out Down Undump - 701-9298-019
21. Command-SST™, Arm In Up Dump - 701-9298-020
22. Command-SST™, Arm In and Packer Retract - 701-9298-021
23. Command-SST™, Arm In and Packer Extend - 701-9298-022
24. Command-SST™, Arm Out Down Release - 701-9298-023
25. Command-SST™, Arm Out Down Grab - 701-9298-024

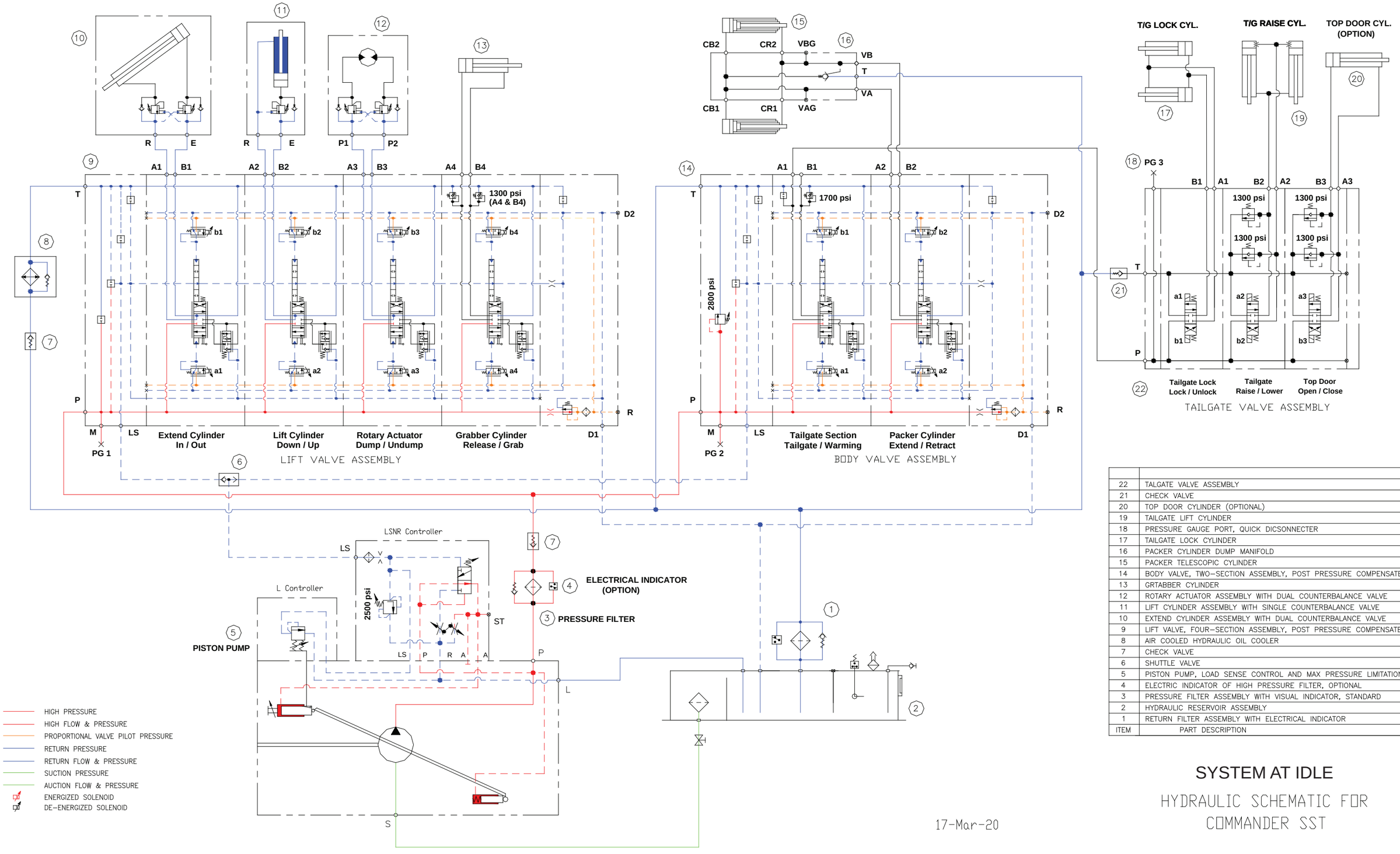


ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
19	TAILGATE LIFT CYLINDER
18	PRESSURE GAUGE PORT, QUICK DICSONNECTER
17	TAILGATE LOCK CYLINDER
16	PACKER CYLINDER DUMP MANIFOLD
15	PACKER TELESCOPIC CYLINDER
14	BODY VALVE, TWO-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
13	GRTABBER CYLINDER
12	ROTARY ACTUATOR ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
11	LIFT CYLINDER ASSEMBLY WITH SINGLE COUNTERBALANCE VALVE
10	EXTEND CYLINDER ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
9	LIFT VALVE, FOUR-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
8	AIR COOLED HYDRAULIC OIL COOLER
7	CHECK VALVE
6	PISTON PUMP, LOAD SENSE CONTROL AND MAX PRESSURE LIMITATION
5	SHUTTLE VALVE
4	ELECTRIC INDICATOR OF HIGH PRESSURE FILTER, OPTIONAL
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

17-Mar-20

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298



ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
19	TAILGATE LIFT CYLINDER
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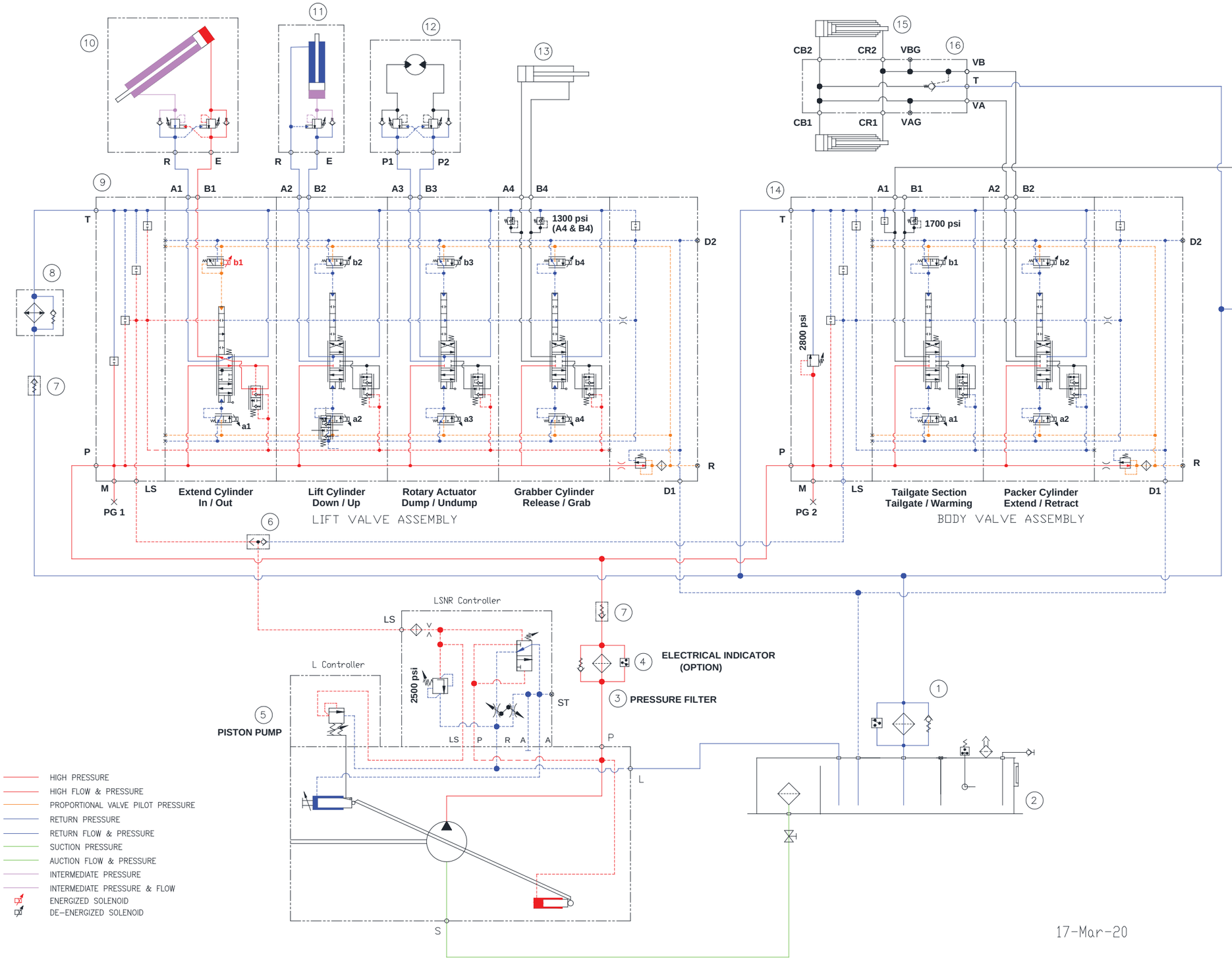
17	TAILGATE LOCK CYLINDER
16	PACKER CYLINDER DUMP MANIFOLD
15	PACKER TELESCOPIC CYLINDER
14	BODY VALVE, TWO-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
13	GRTABBER CYLINDER
12	ROTARY ACTUATOR ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
11	LIFT CYLINDER ASSEMBLY WITH SINGLE COUNTERBALANCE VALVE
10	EXTEND CYLINDER ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
9	LIFT VALVE, FOUR-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
8	AIR COOLED HYDRAULIC OIL COOLER
7	CHECK VALVE
6	SHUTTLE VALVE
5	PISTON PUMP, LOAD SENSE CONTROL AND MAX PRESSURE LIMITATION
4	ELECTRIC INDICATOR OF HIGH PRESSURE FILTER, OPTIONAL
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

SYSTEM AT IDLE

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-001



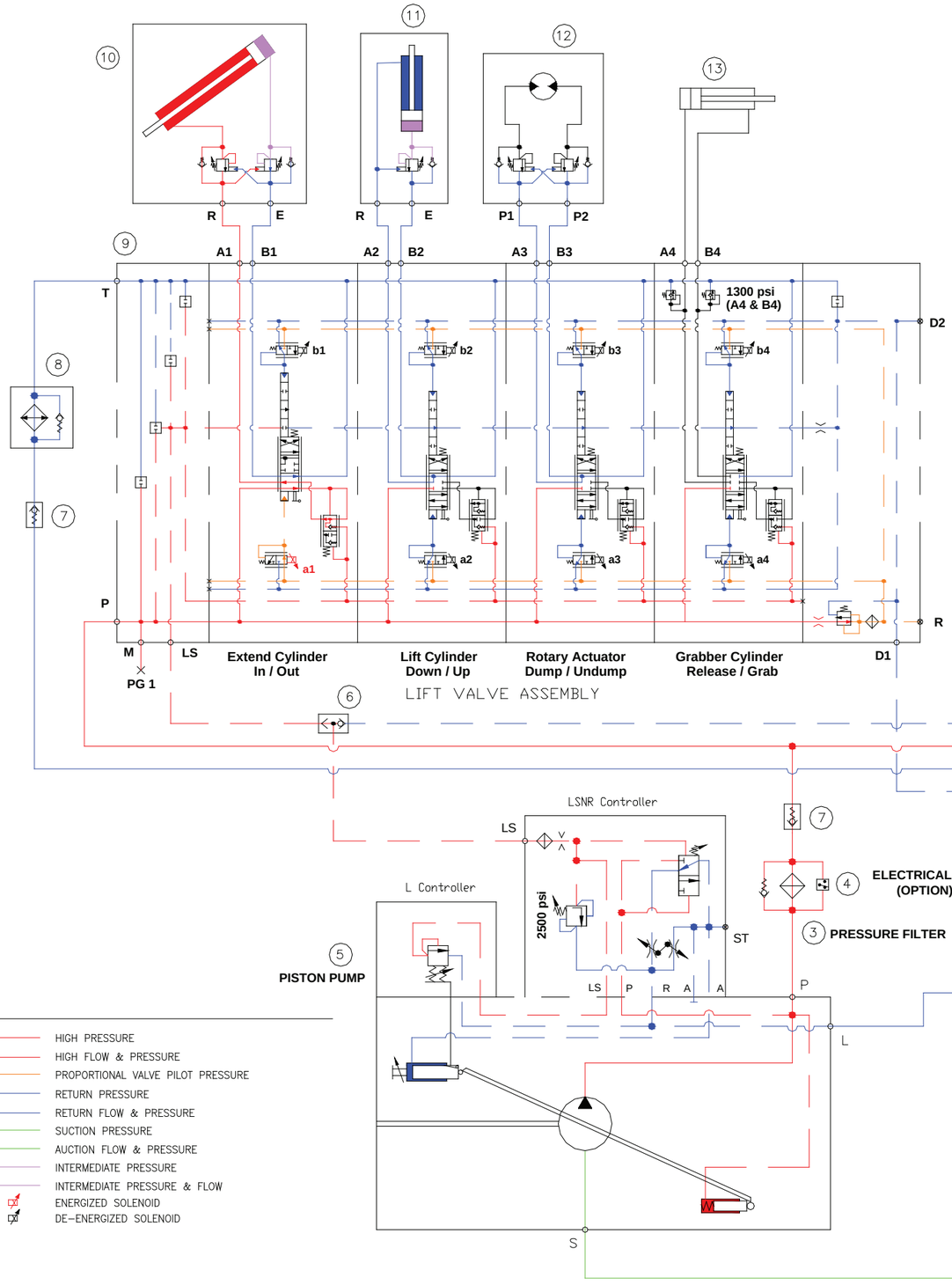
17-Mar-20

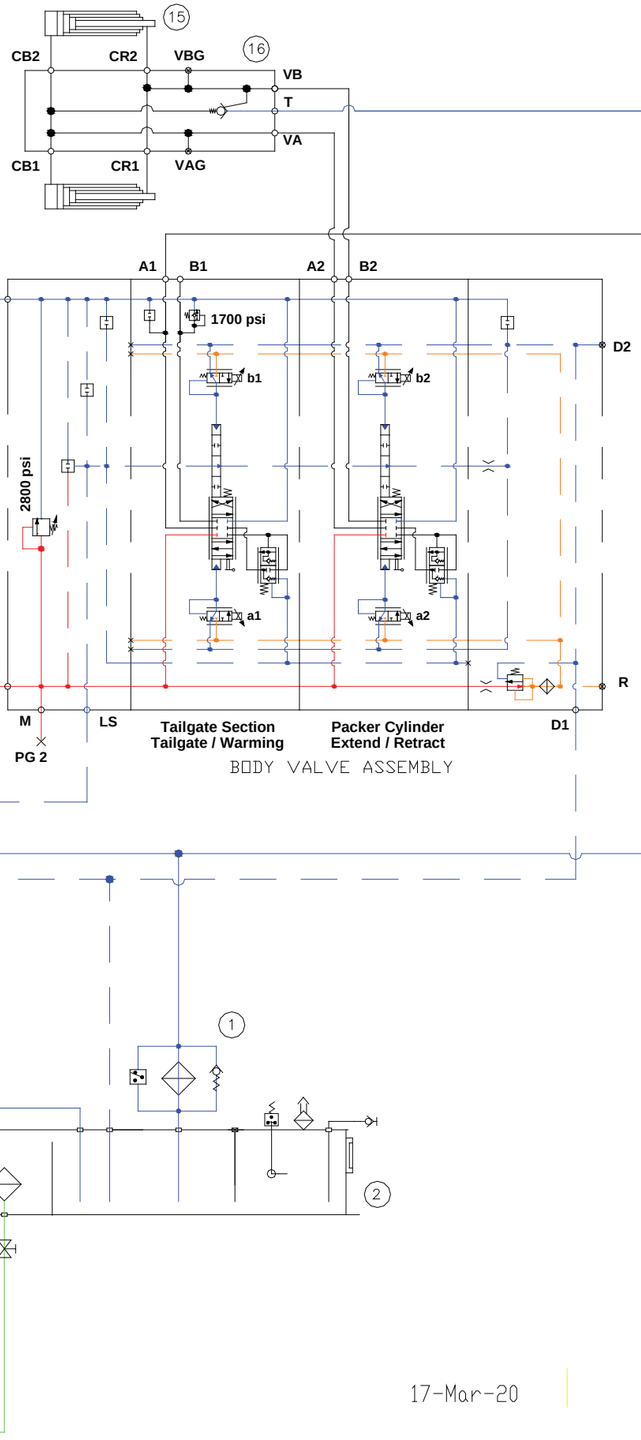
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
19	TAILGATE LIFT CYLINDER
18	PRESSURE GAUGE PORT, QUICK DICSONNECTER
17	TAILGATE LOCK CYLINDER
16	PACKER CYLINDER DUMP MANIFOLD
15	PACKER TELESCOPIC CYLINDER
14	BODY VALVE, TWO-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
13	GRTABBER CYLINDER
12	ROTARY ACTUATOR ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
11	LIFT CYLINDER ASSEMBLY WITH SINGLE COUNTERBALANCE VALVE
10	EXTEND CYLINDER ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
9	LIFT VALVE, FOUR-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
8	AIR COOLED HYDRAULIC OIL COOLER
7	CHECK VALVE
6	SHUTTLE VALVE
5	PISTON PUMP, LOAD SENSE CONTROL AND MAX PRESSURE LIMITATION
4	ELECTRIC INDICATOR OF HIGH PRESSURE FILTER, OPTIONAL
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR
ITEM	PART DESCRIPTION

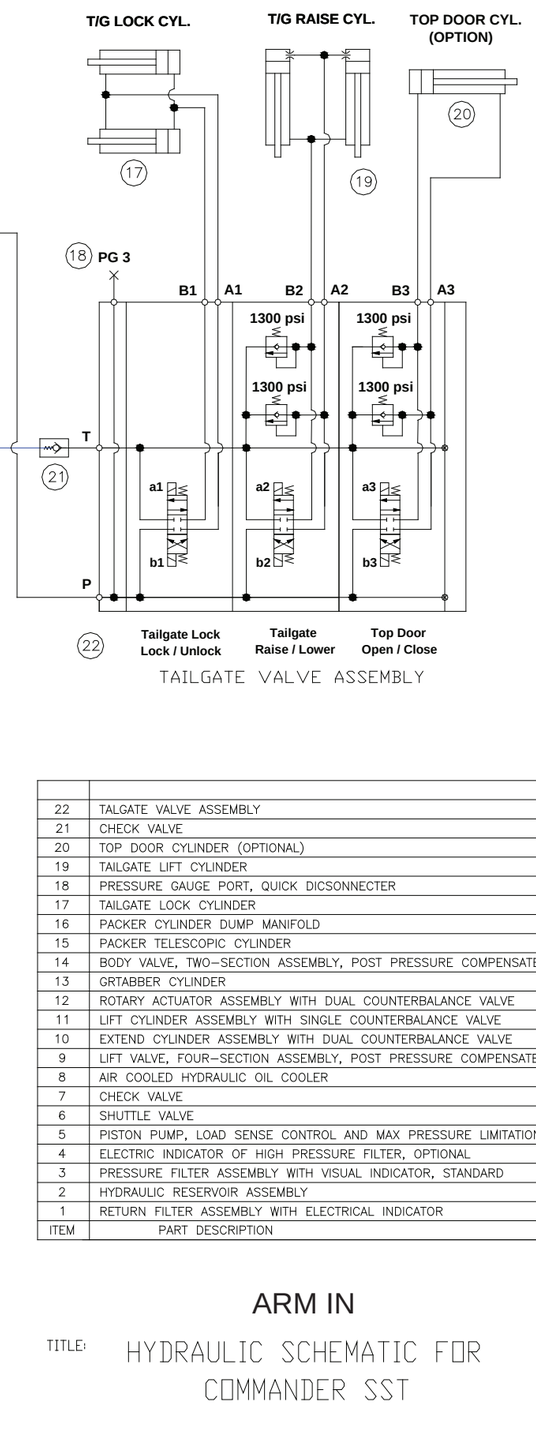
ARM OUT

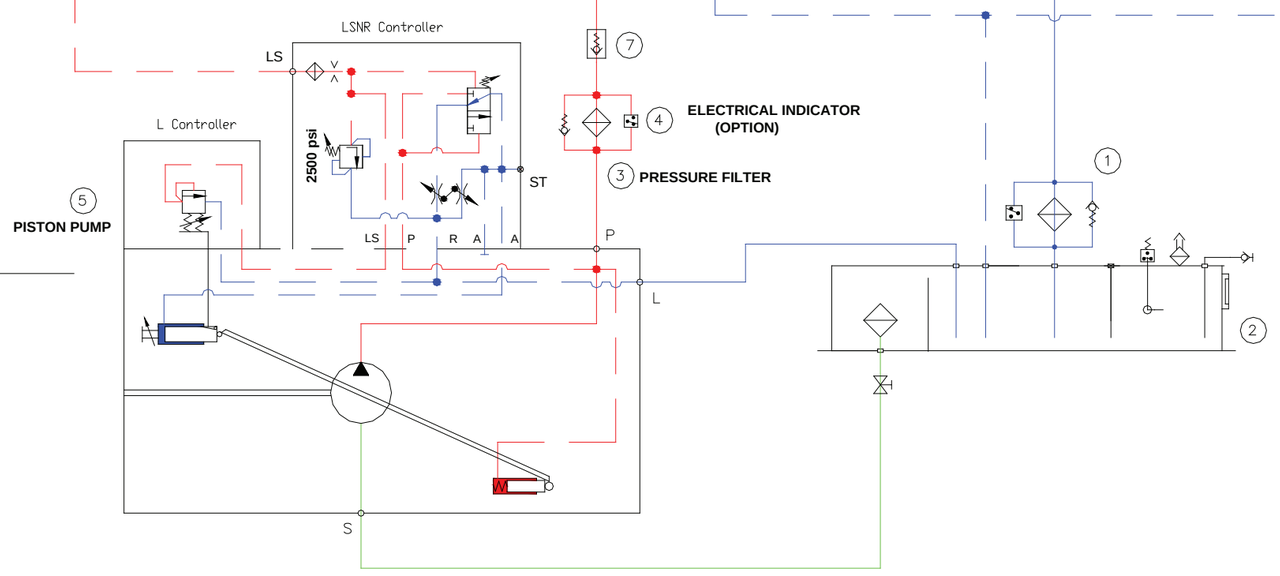
HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-002









HIGH PRESSURE
HIGH FLOW & PRESSURE
PROPORTIONAL VALVE PILOT PRESSURE
RETURN PRESSURE
RETURN FLOW & PRESSURE
SUCTION PRESSURE
AUCTION FLOW & PRESSURE
INTERMEDIATE PRESSURE
INTERMEDIATE PRESSURE & FLOW
ENERGIZED SOLENOID
DE-ENERGIZED SOLENOID

ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
19	TAILGATE LIFT CYLINDER
18	PRESSURE GAUGE PORT, QUICK DICSONNECTER
17	TAILGATE LOCK CYLINDER
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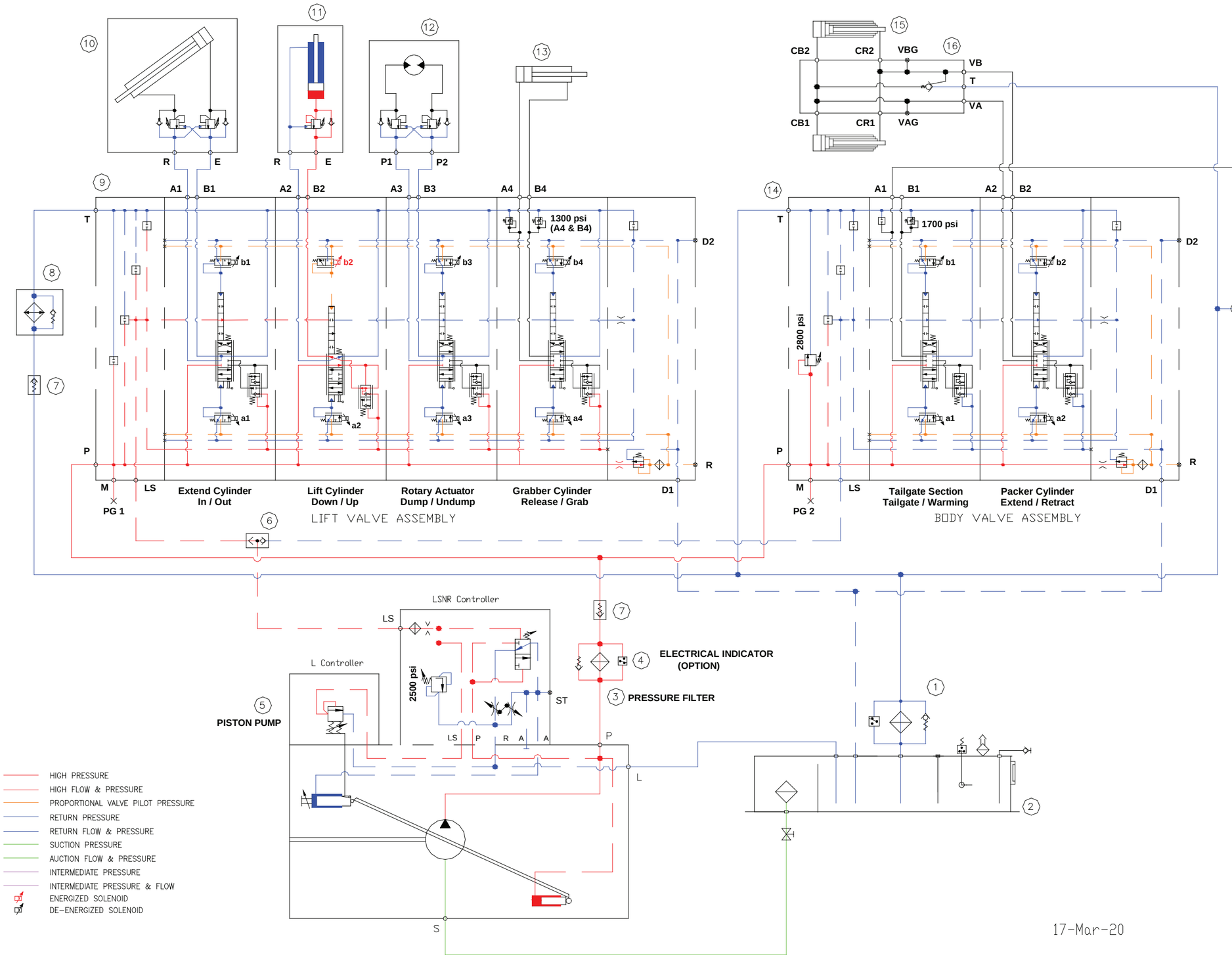
7	CHECK VALVE
6	SHUTTLE VALVE
5	PISTON PUMP, LOAD SENSE CONTROL AND MAX PRESSURE LIMITATION
4	ELECTRIC INDICATOR OF HIGH PRESSURE FILTER, OPTIONAL
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

17-Mar-20

ARM IN

TITLE: HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-003



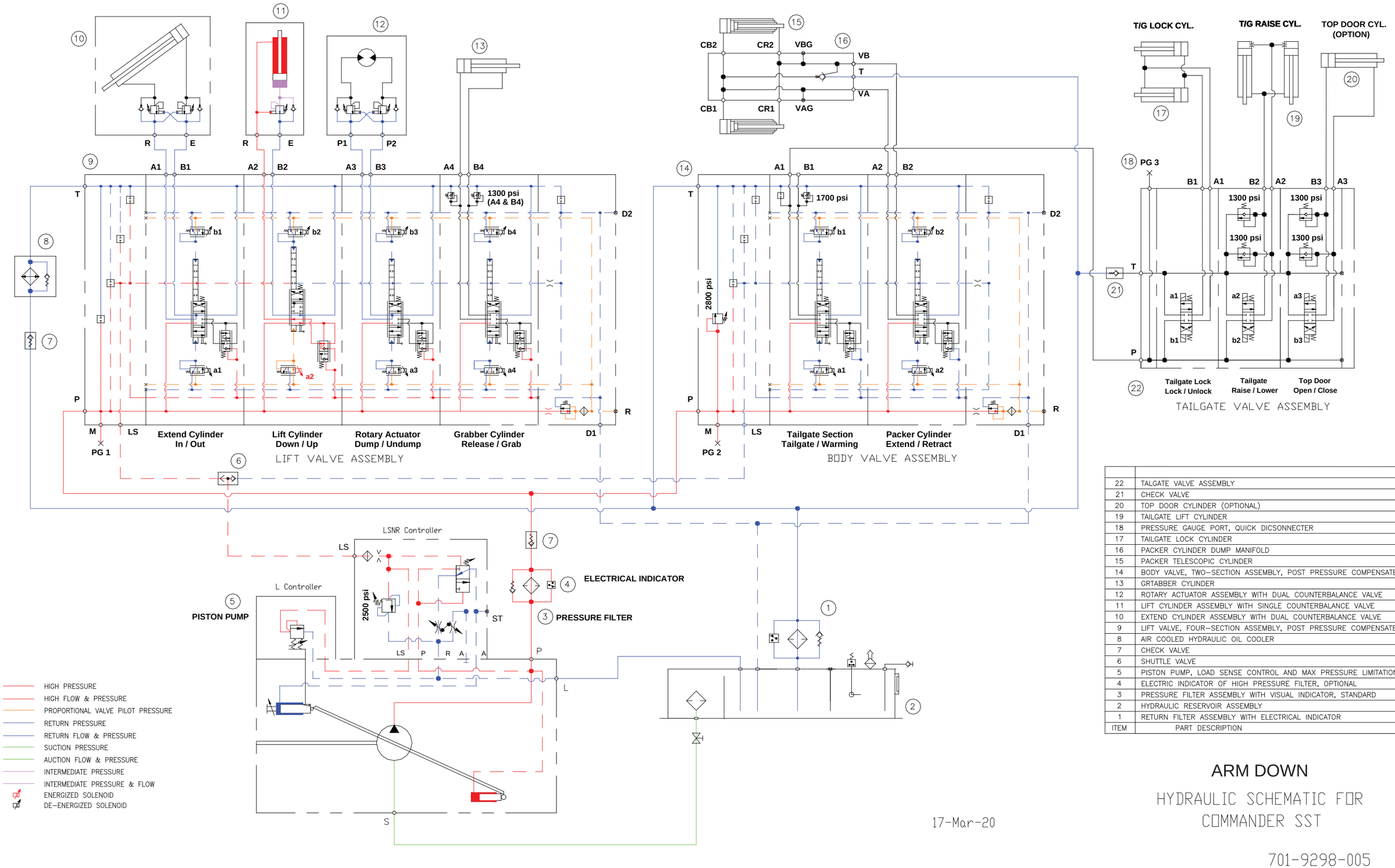
ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
19	TAILGATE LIFT CYLINDER
18	PRESSURE GAUGE PORT, QUICK DICSONNECTER
17	TAILGATE LOCK CYLINDER
16	PACKER CYLINDER DUMP MANIFOLD
15	PACKER TELESCOPIC CYLINDER
14	BODY VALVE, TWO-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
13	GRTABBER CYLINDER
12	ROTARY ACTUATOR ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
11	LIFT CYLINDER ASSEMBLY WITH SINGLE COUNTERBALANCE VALVE
10	EXTEND CYLINDER ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
9	LIFT VALVE, FOUR-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
8	AIR COOLED HYDRAULIC OIL COOLER
7	CHECK VALVE
6	SHUTTLE VALVE
5	PISTON PUMP, LOAD SENSE CONTROL AND MAX PRESSURE LIMITATION
4	ELECTRIC INDICATOR OF HIGH PRESSURE FILTER, OPTIONAL
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

ARM UP

HYDRAULIC SCHEMATIC FOR COMMANDER SST

17-Mar-20

701-9298-004



ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
19	TAILGATE LIFT CYLINDER
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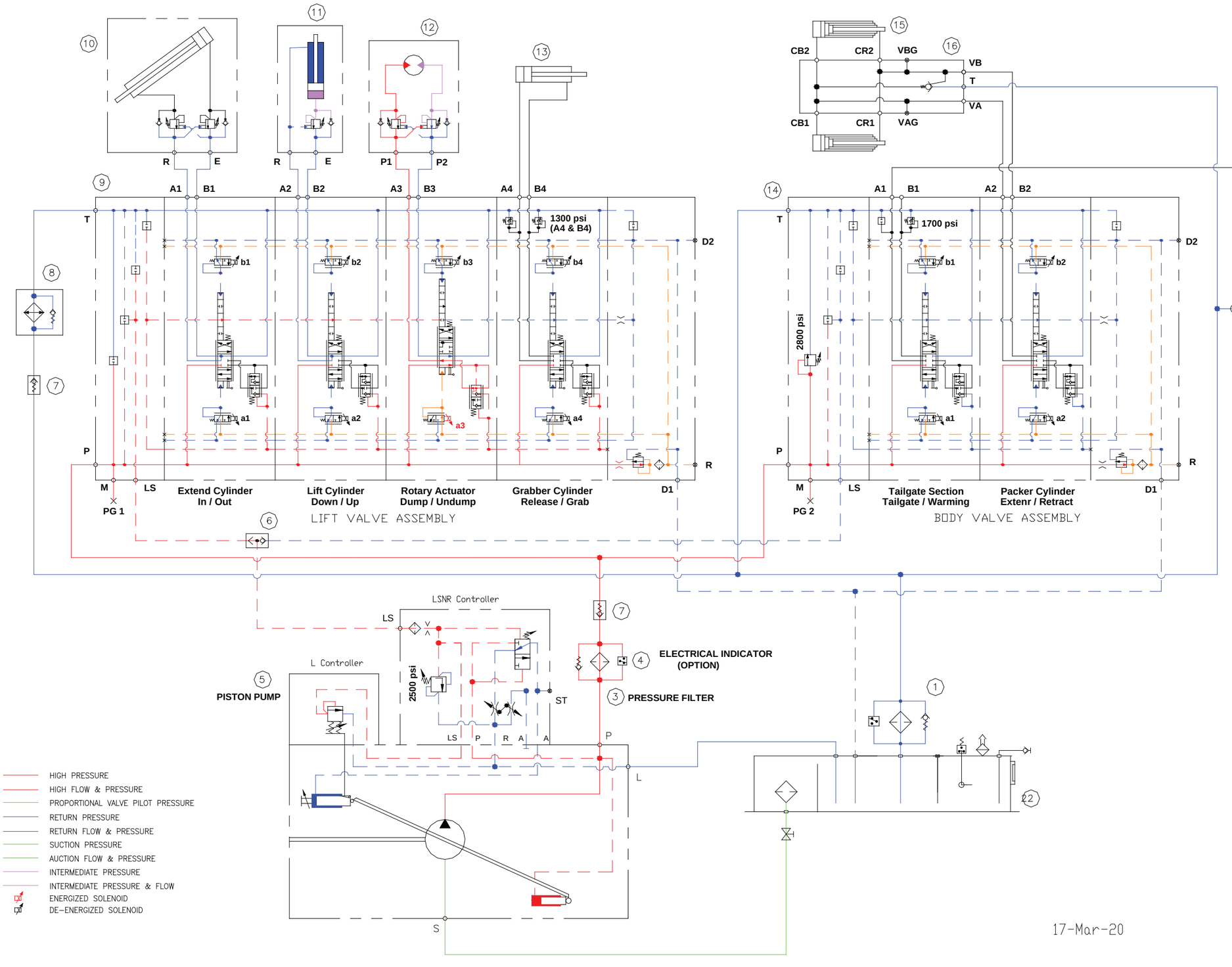
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

17-Mar-20

ARM DOWN

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-005



ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
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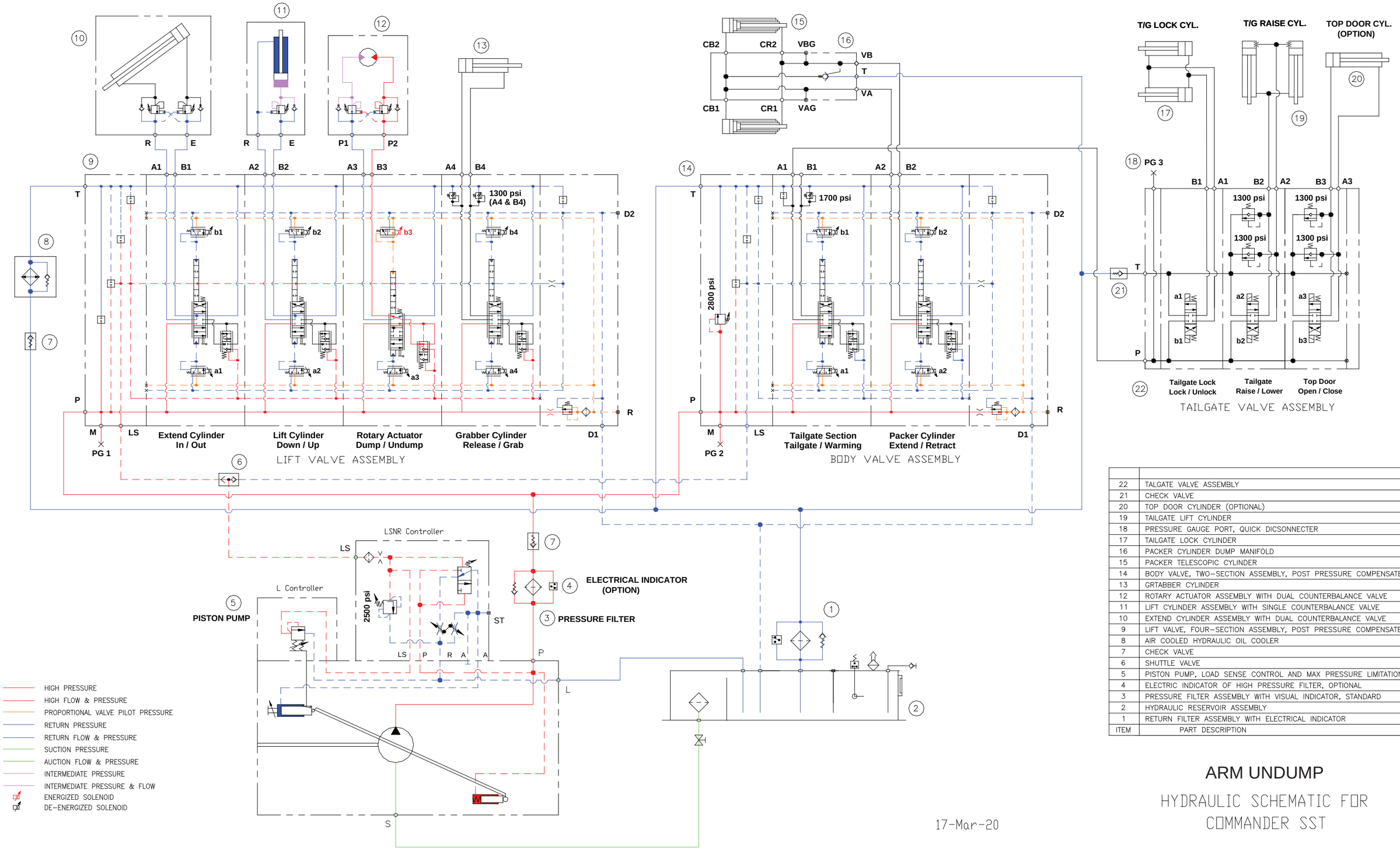
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

ARM DUMP

HYDRAULIC SCHEMATIC FOR COMMANDER SST

17-Mar-20

701-9298-006



22	TALGATE VALVE ASSEMBLY
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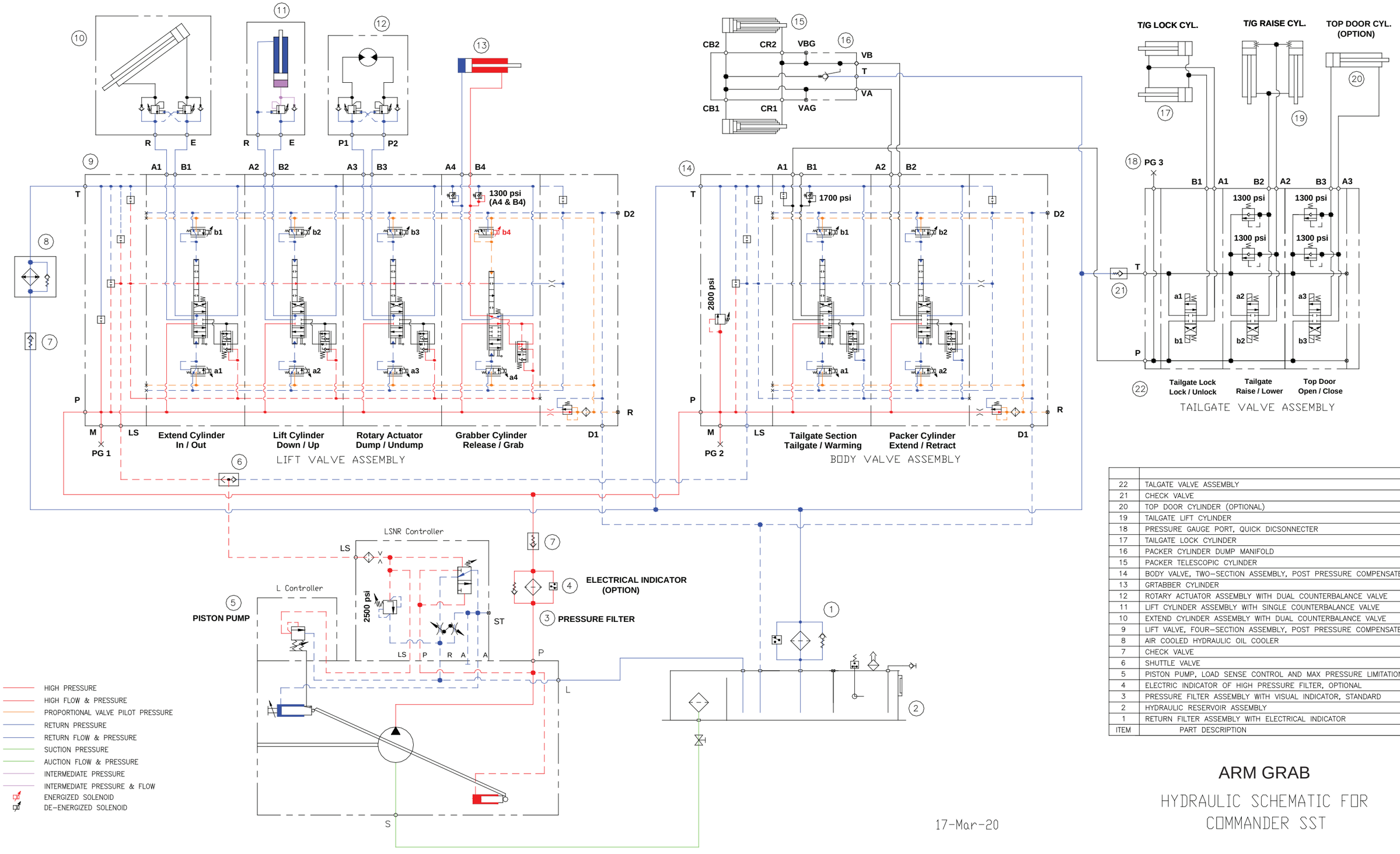
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR
ITEM	PART DESCRIPTION

ARM UNDUMP

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-007



ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
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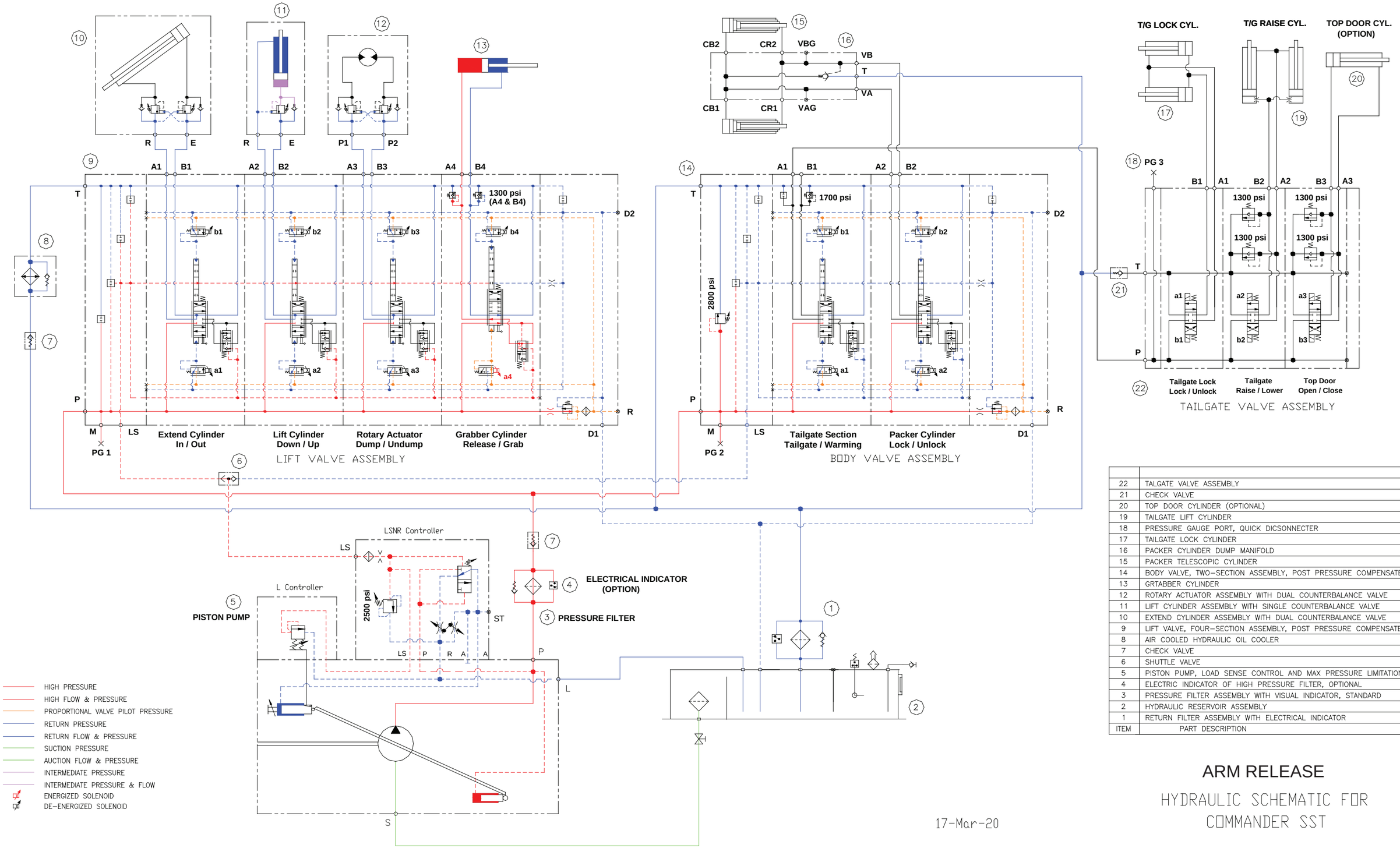
ARM GRAB

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-008



22	TALGATE VALVE ASSEMBLY
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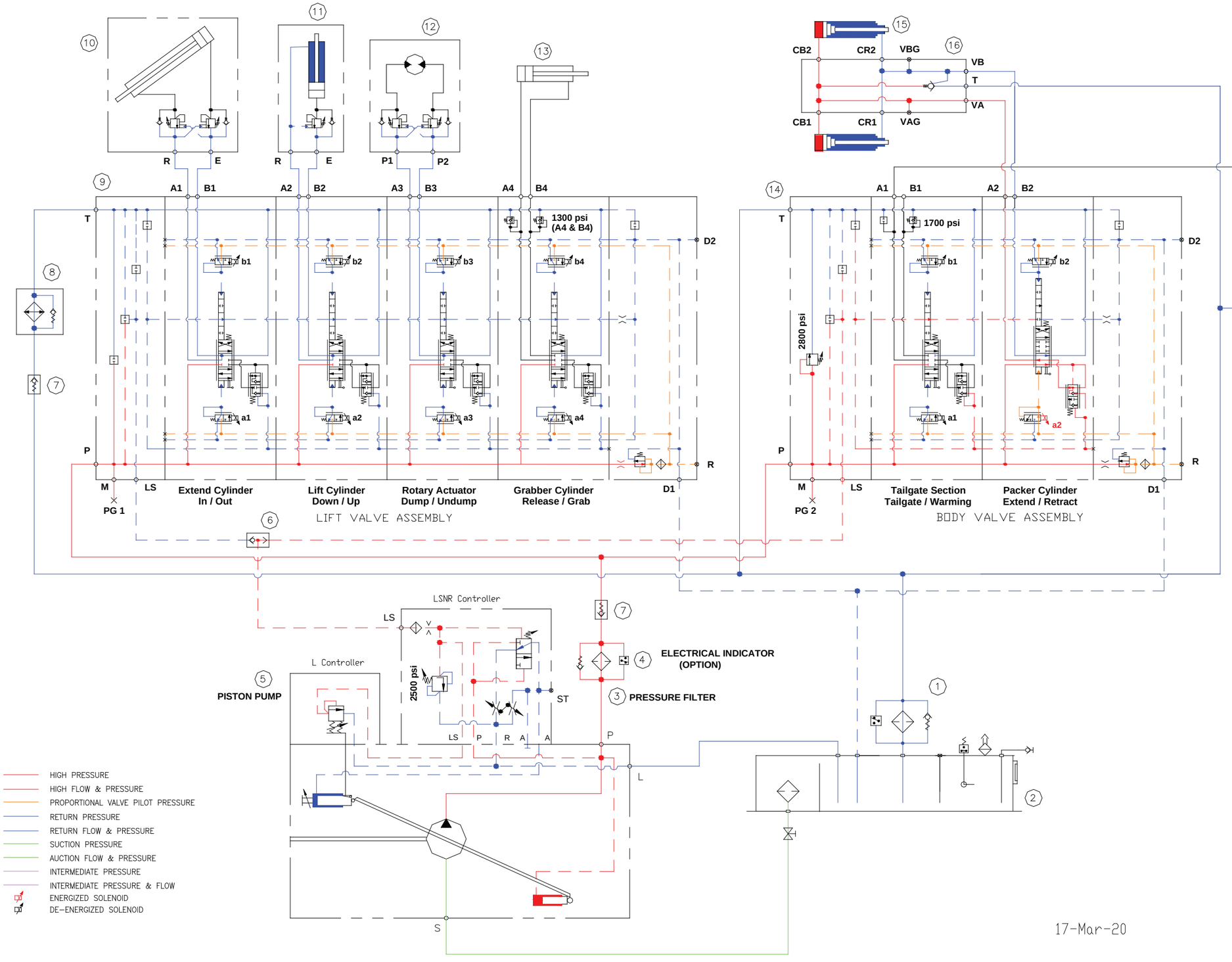
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR
ITEM	PART DESCRIPTION

ARM RELEASE

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-009



ITEM	PART DESCRIPTION
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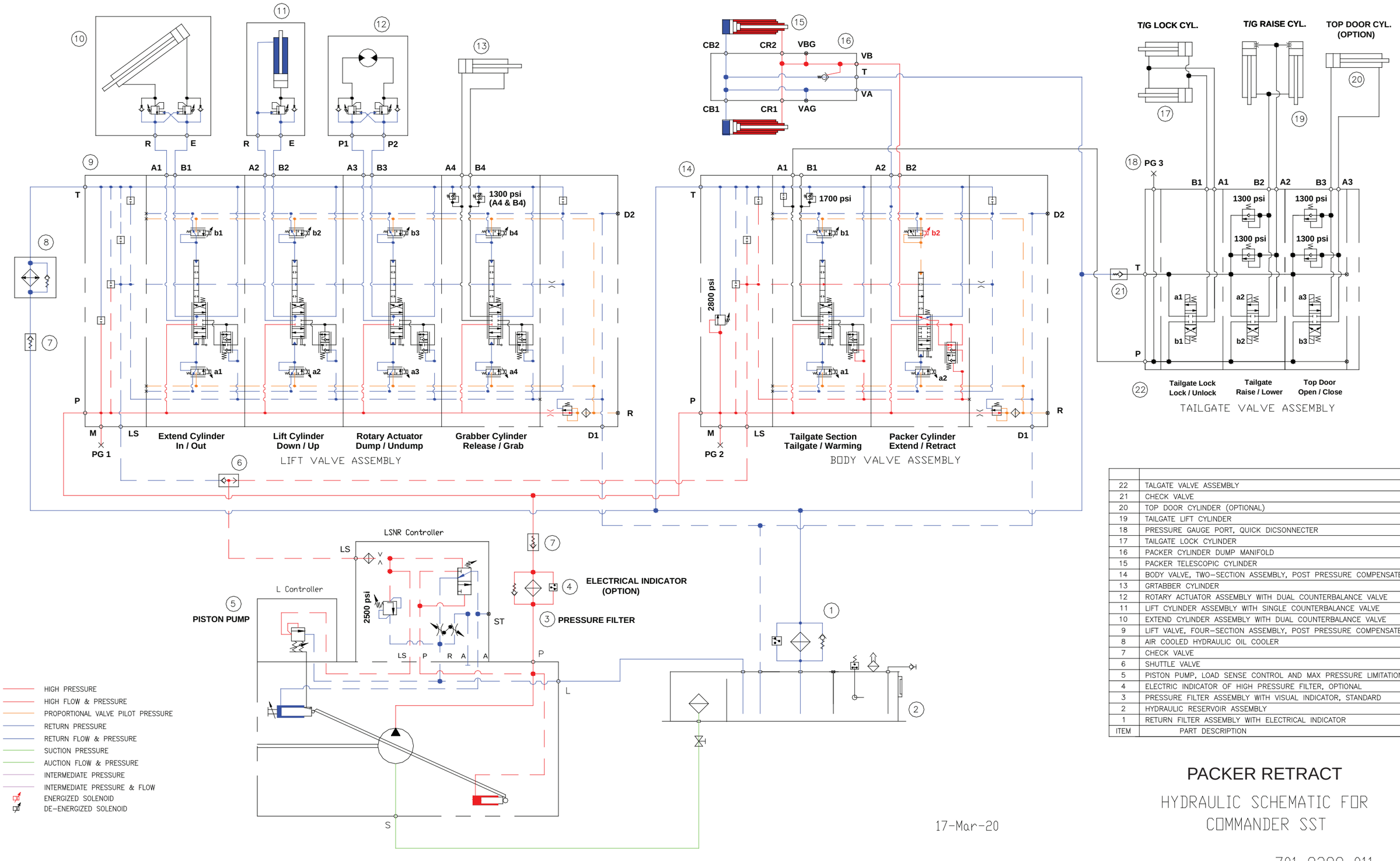
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

17-Mar-20

PACKER EXTEND

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-010



ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
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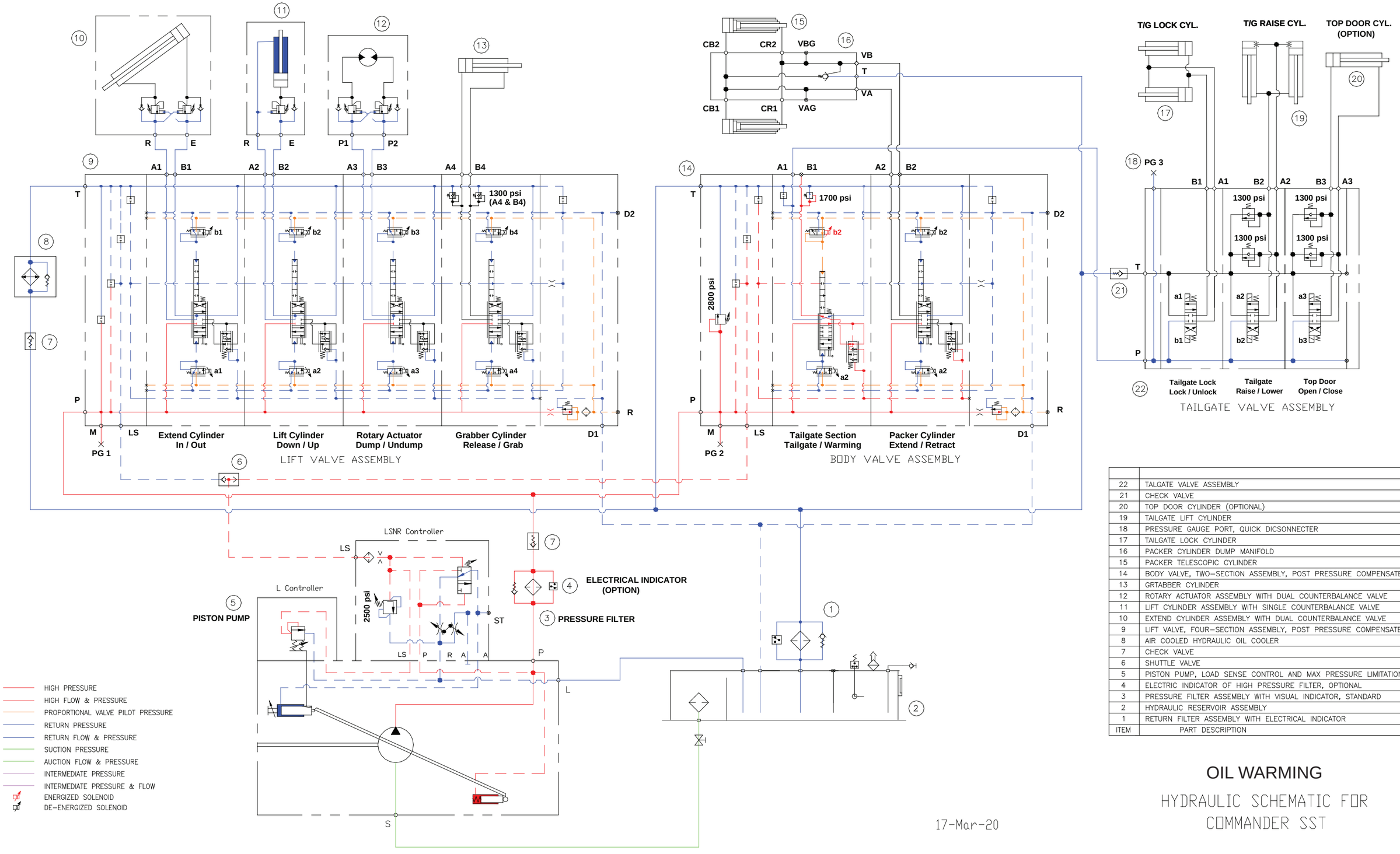
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

PACKER RETRACT

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-011



22	TALGATE VALVE ASSEMBLY
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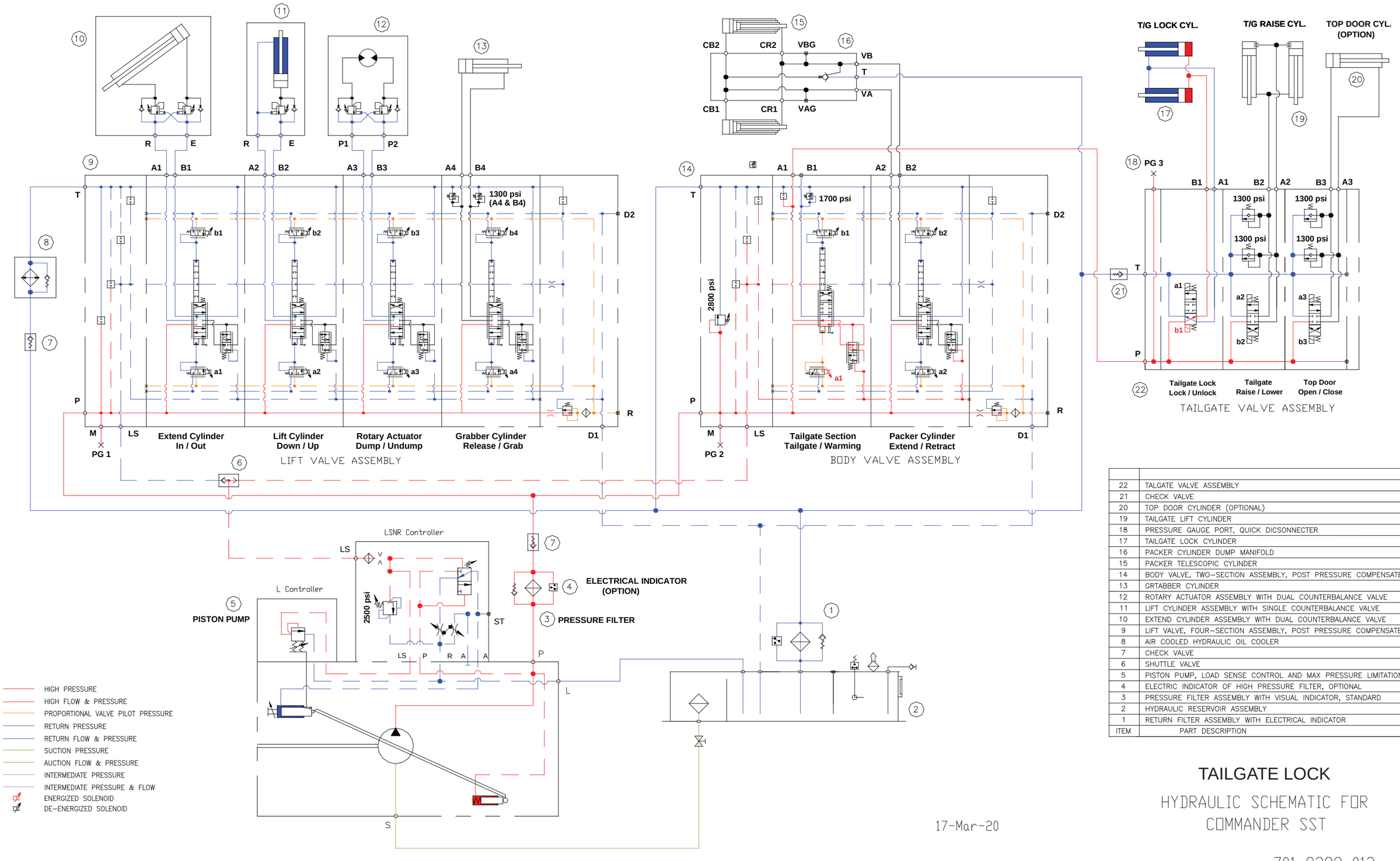
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR
ITEM	PART DESCRIPTION

OIL WARMING

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-012



ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
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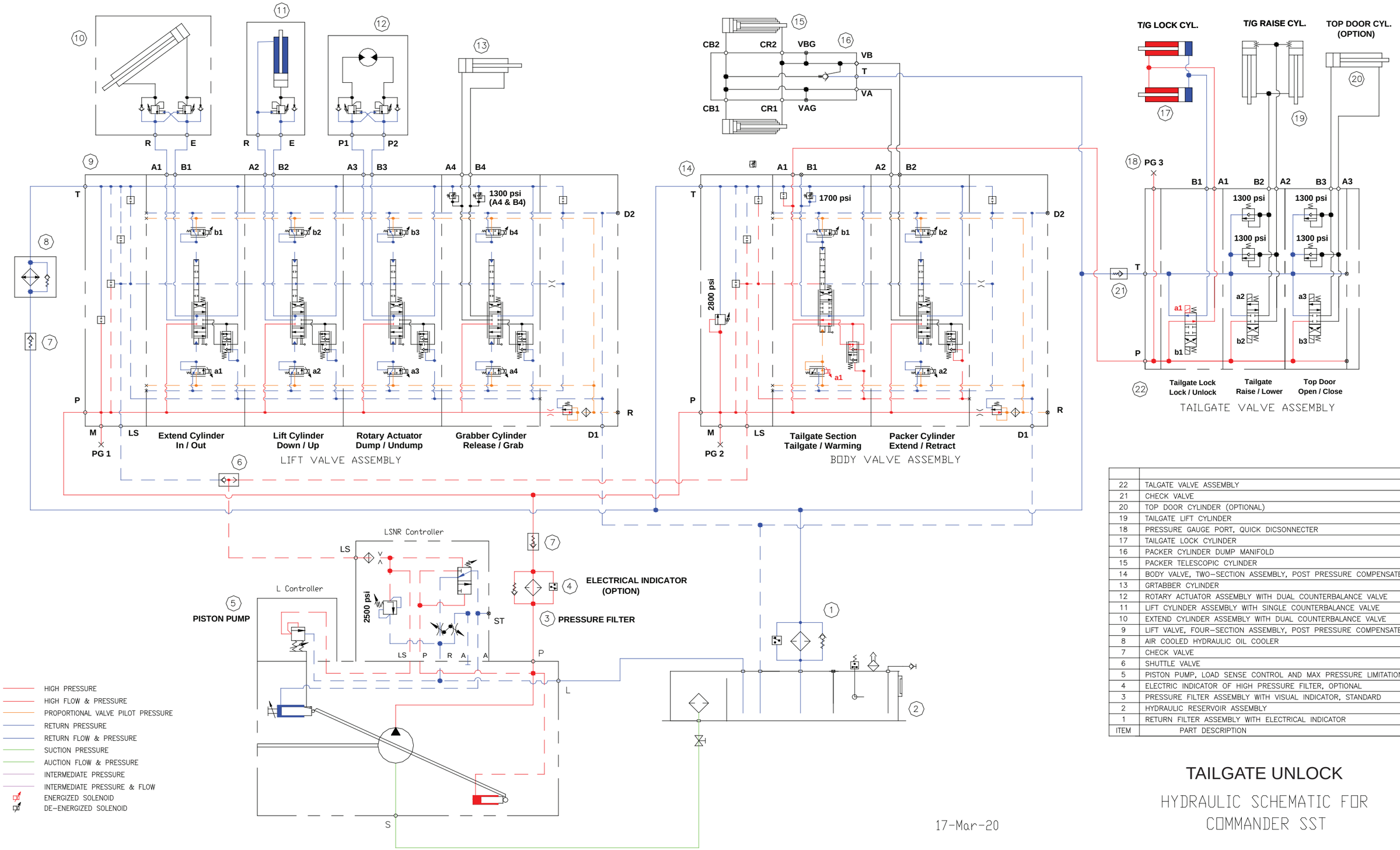
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

TAILGATE LOCK

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-013



ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
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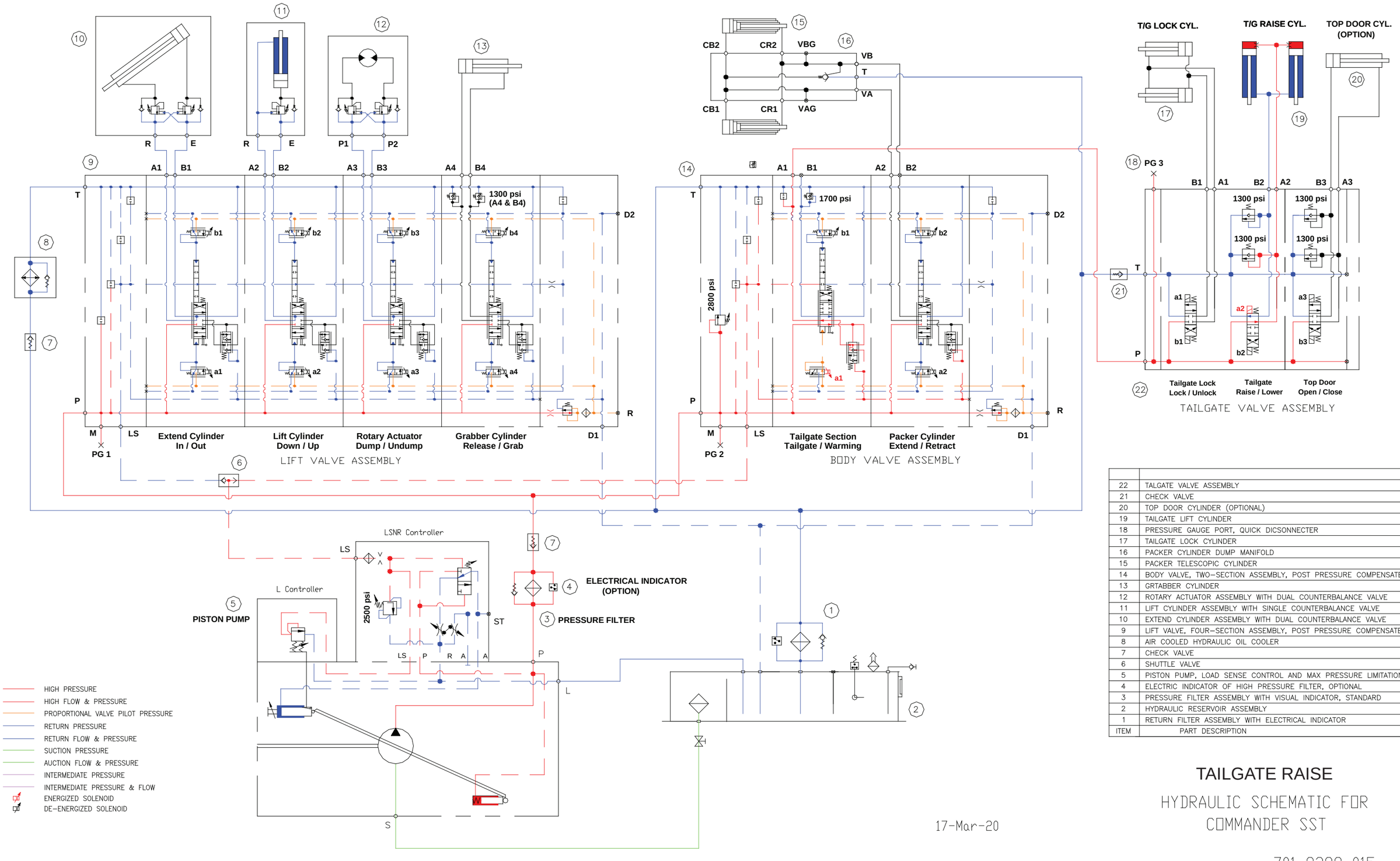
17-Mar-20

TAILGATE UNLOCK

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-014



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22	TALGATE VALVE ASSEMBLY
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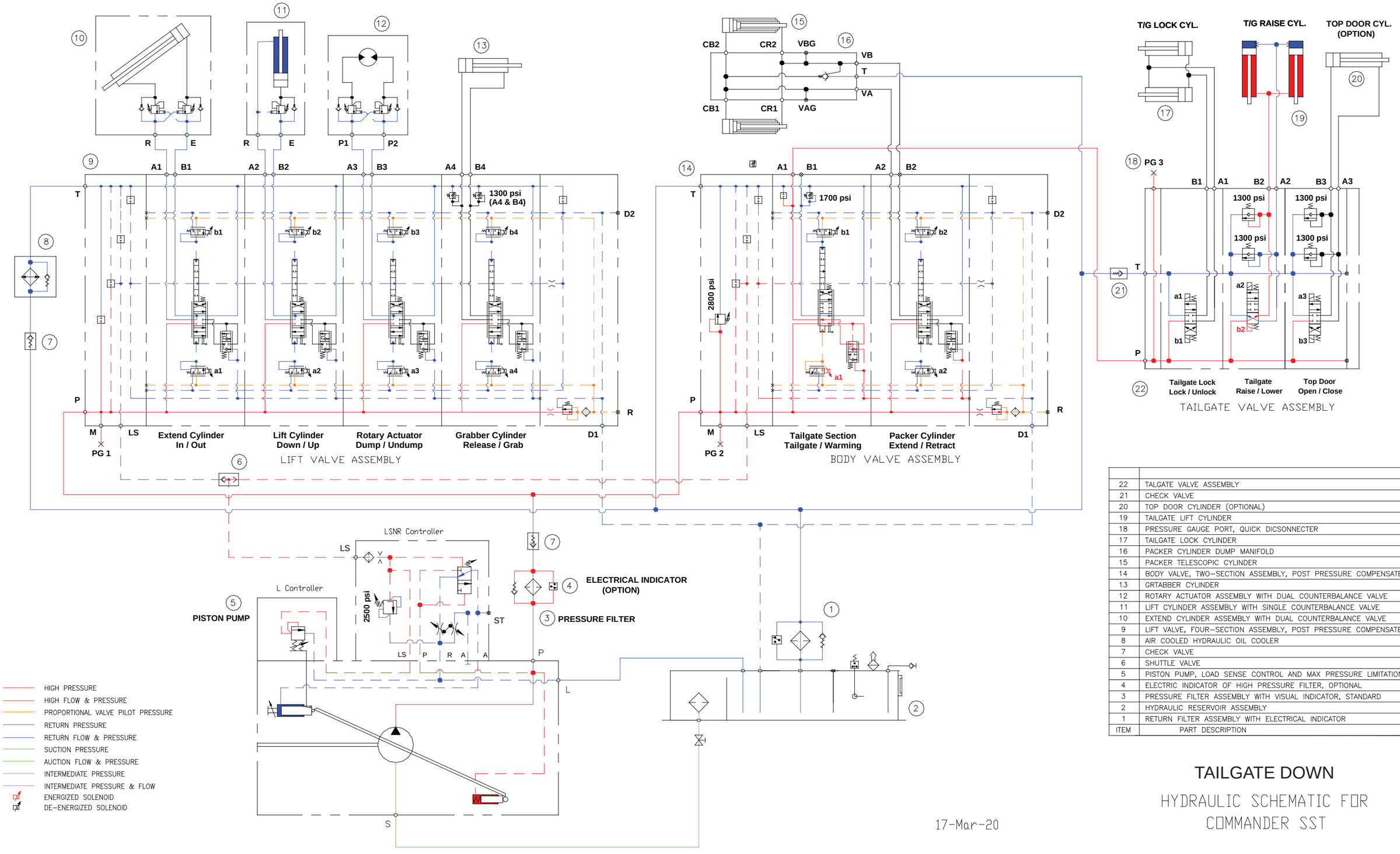
TAILGATE RAISE

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-015



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22	TALGATE VALVE ASSEMBLY
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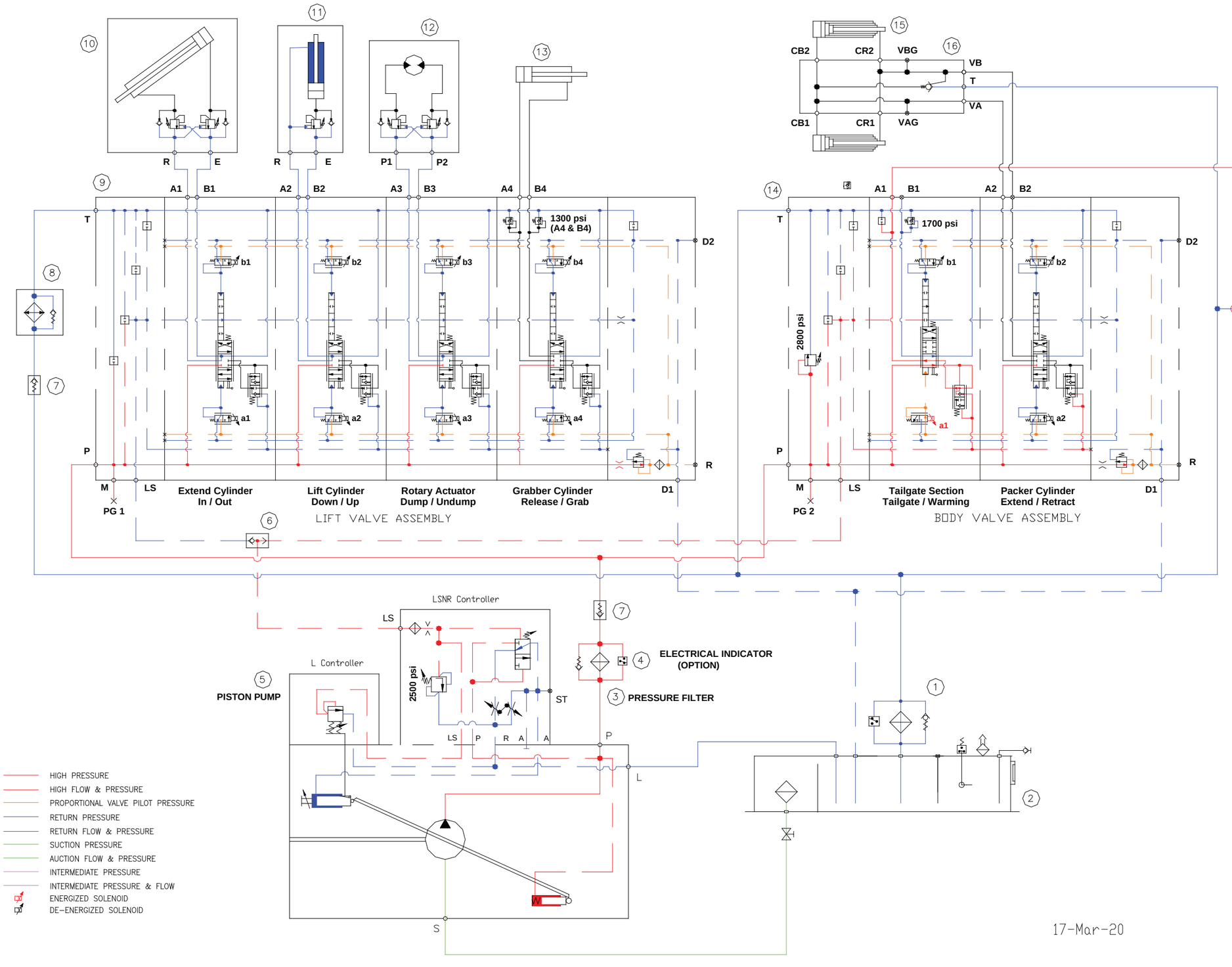
17-Mar-20

TAILGATE DOWN

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-016



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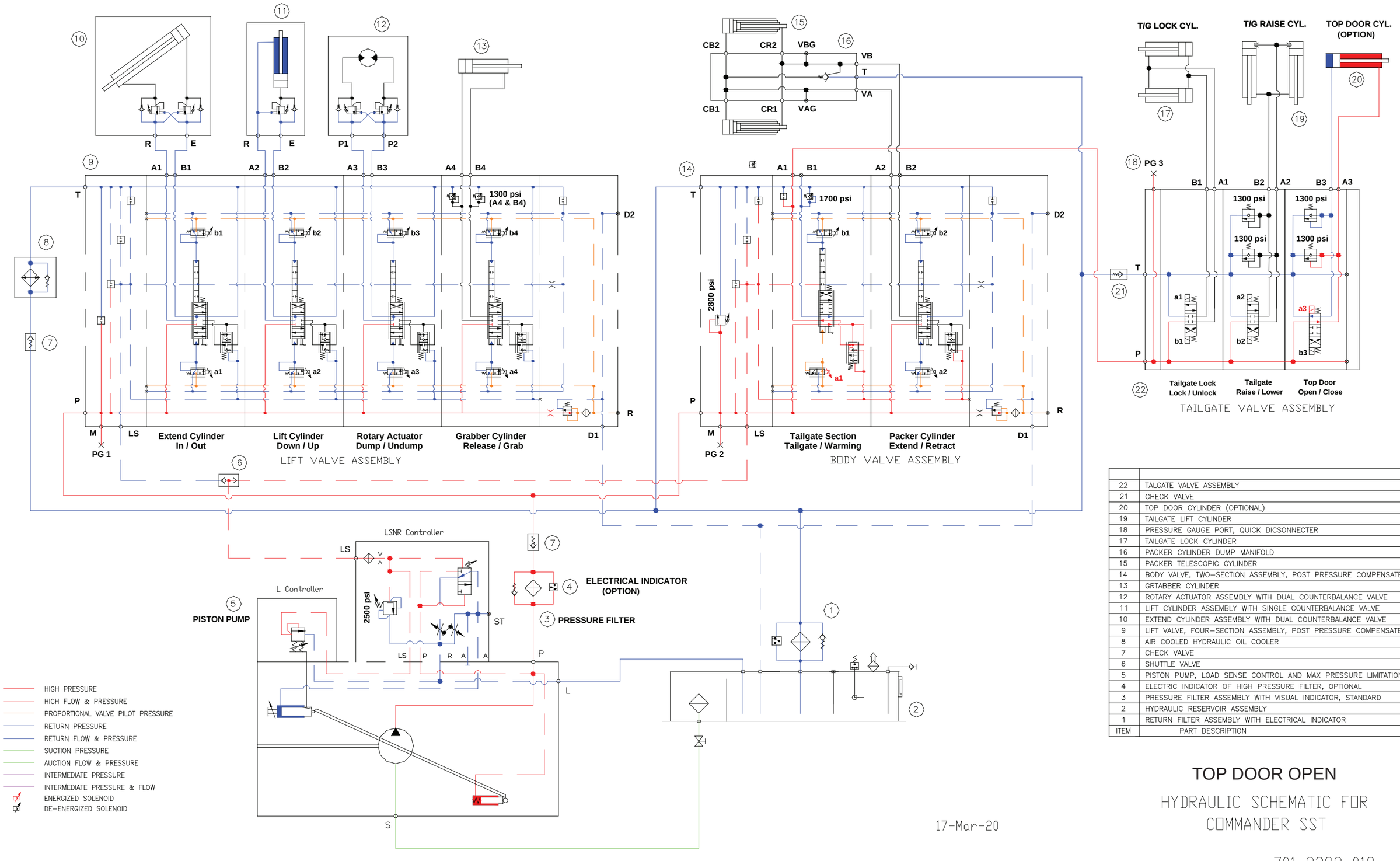
TOP DOOR CLOSE

HYDRAULIC SCHEMATIC FOR
COMMANDER SST

701-9298-017



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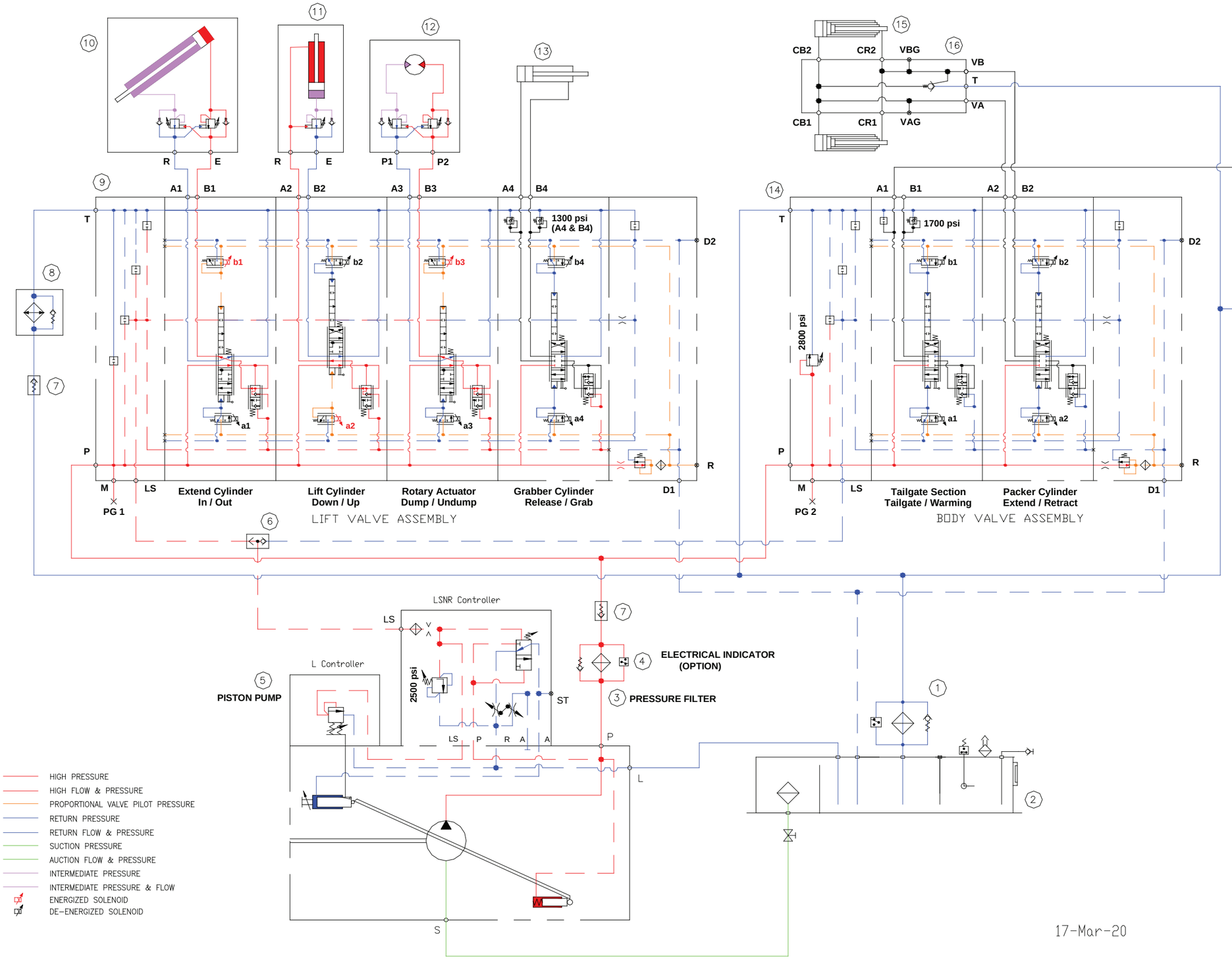
17-Mar-20

TOP DOOR OPEN

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-018



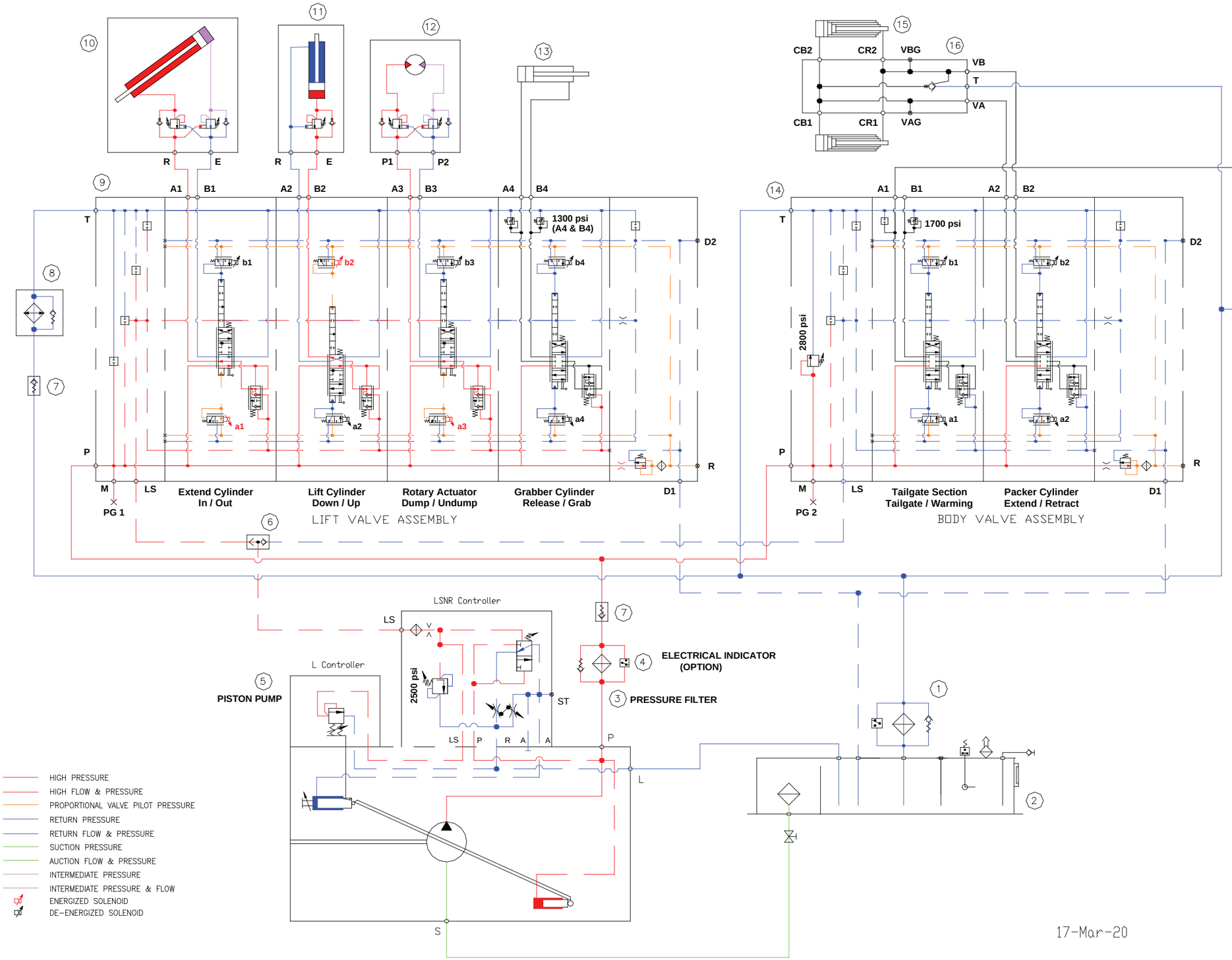
ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
19	TAILGATE LIFT CYLINDER
18	PRESSURE GAUGE PORT, QUICK DICSONNECTER
17	TAILGATE LOCK CYLINDER
16	PACKER CYLINDER DUMP MANIFOLD
15	PACKER TELESCOPIC CYLINDER
14	BODY VALVE, TWO-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
13	GRTABBER CYLINDER
12	ROTARY ACTUATOR ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
11	LIFT CYLINDER ASSEMBLY WITH SINGLE COUNTERBALANCE VALVE
10	EXTEND CYLINDER ASSEMBLY WITH DUAL COUNTERBALANCE VALVE
9	LIFT VALVE, FOUR-SECTION ASSEMBLY, POST PRESSURE COMPENSATED
8	AIR COOLED HYDRAULIC OIL COOLER
7	CHECK VALVE
6	SHUTTLE VALVE
5	PISTON PUMP, LOAD SENSE CONTROL AND MAX PRESSURE LIMITATION
4	ELECTRIC INDICATOR OF HIGH PRESSURE FILTER, OPTIONAL
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

17-Mar-20

ARM OUT DOWN UNDUMP

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-019



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22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
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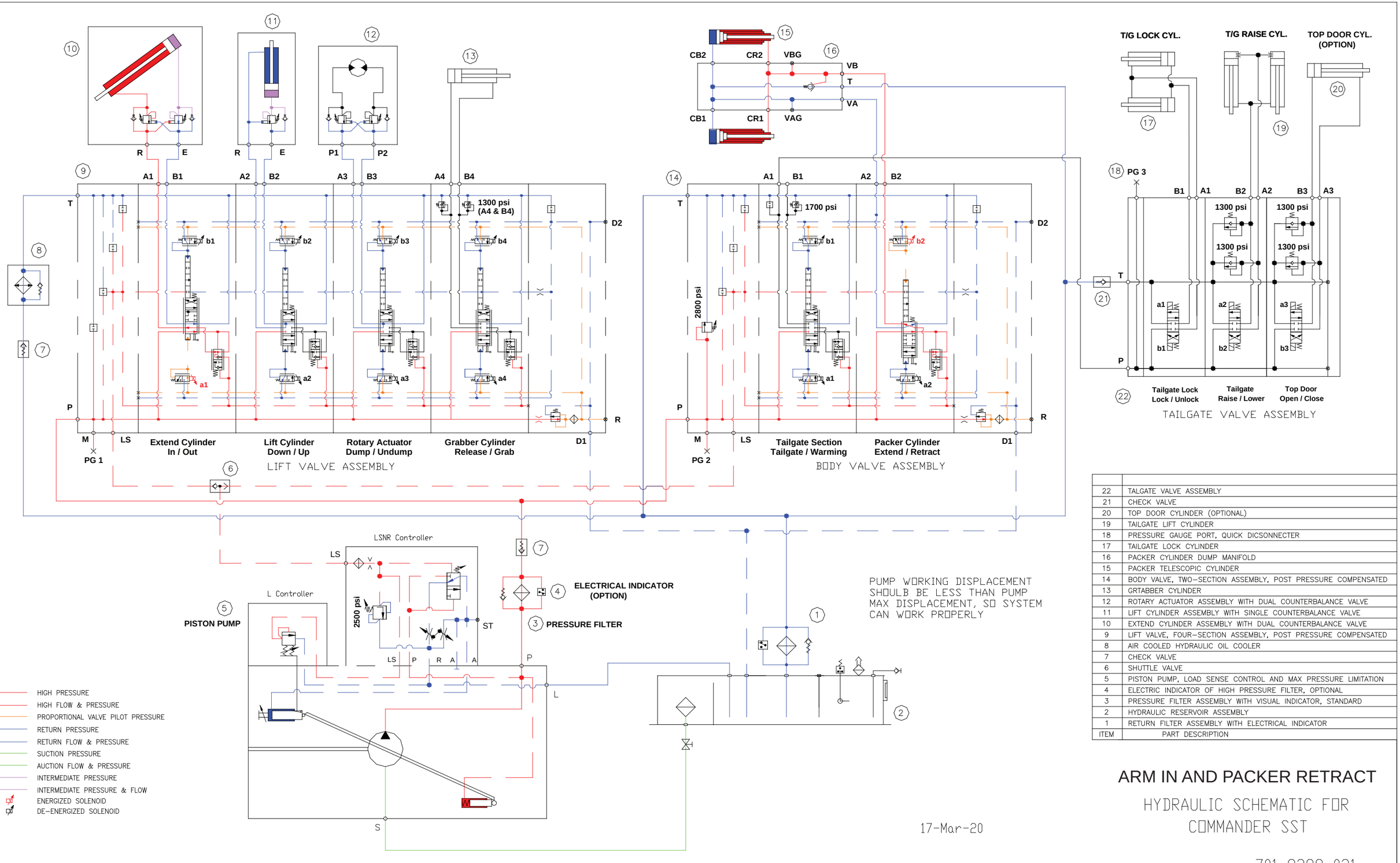
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

ARM IN UP DUMP

HYDRAULIC SCHEMATIC FOR COMMANDER SST

17-Mar-20

701-9298-020



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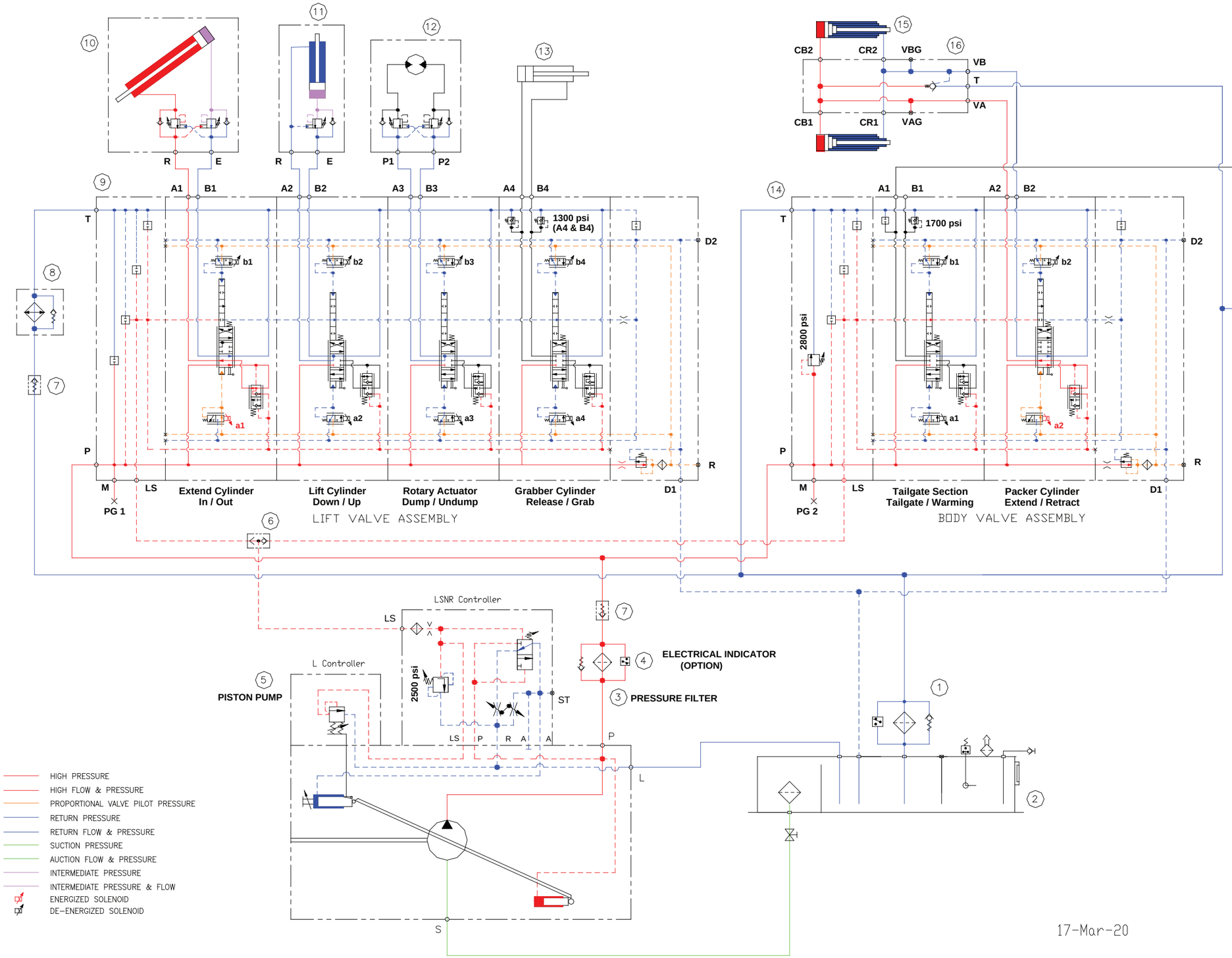
3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

ARM IN AND PACKER RETRACT

HYDRAULIC SCHEMATIC FOR COMMANDER SST

17-Mar-20

701-9298-021



HIGH PRESSURE
HIGH FLOW & PRESSURE
PROPORTIONAL VALVE PILOT PRESSURE
RETURN PRESSURE
RETURN FLOW & PRESSURE
SUCTION PRESSURE
AUCTION FLOW & PRESSURE
INTERMEDIATE PRESSURE
INTERMEDIATE PRESSURE & FLOW
ENERGIZED SOLENOID
DE-ENERGIZED SOLENOID

ITEM	PART DESCRIPTION
22	TALGATE VALVE ASSEMBLY
21	CHECK VALVE
20	TOP DOOR CYLINDER (OPTIONAL)
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18	PRESSURE GAUGE PORT, QUICK DICSONNECTER
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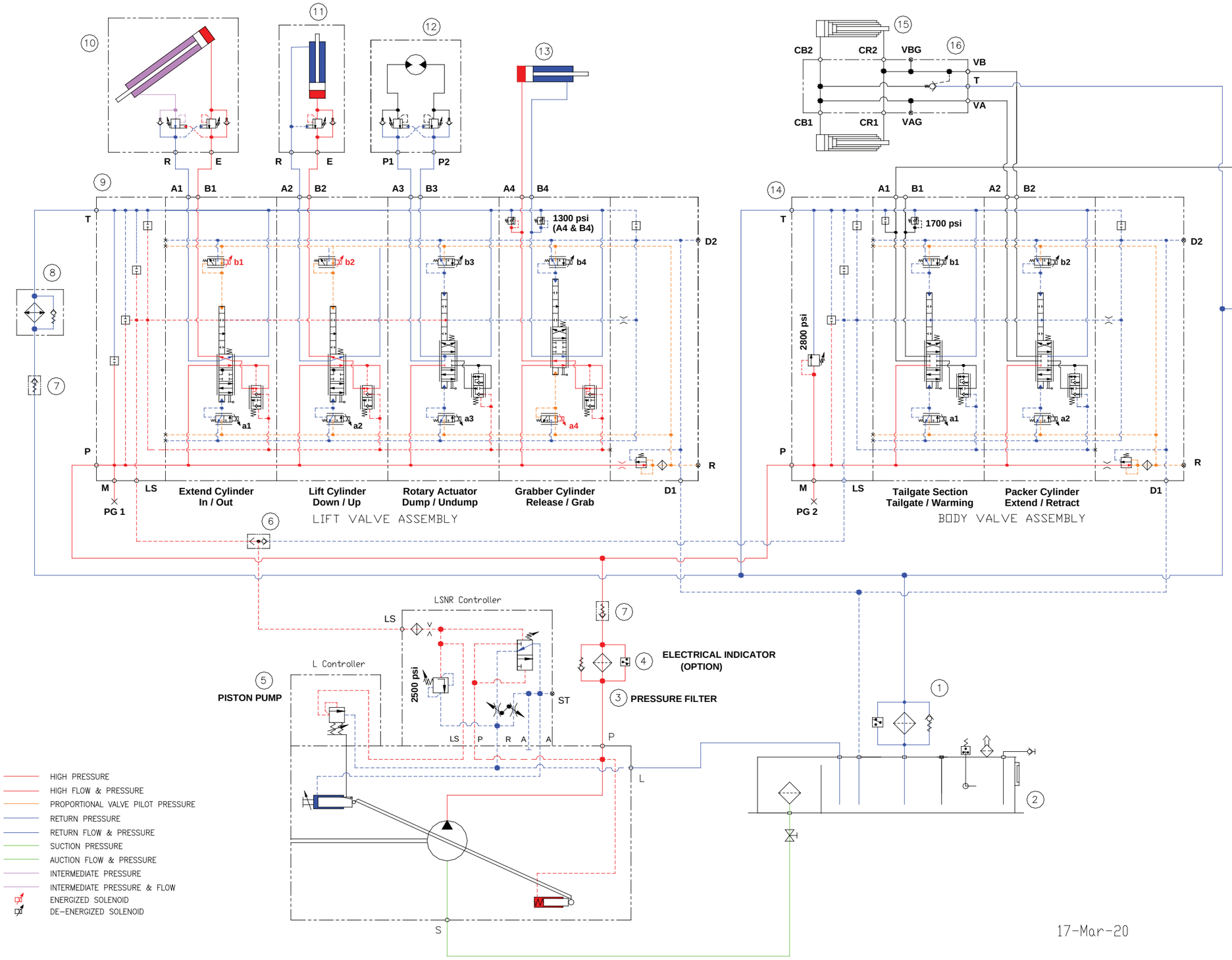
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

ARM IN AND PACKER EXTEND

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-022



ITEM	PART DESCRIPTION
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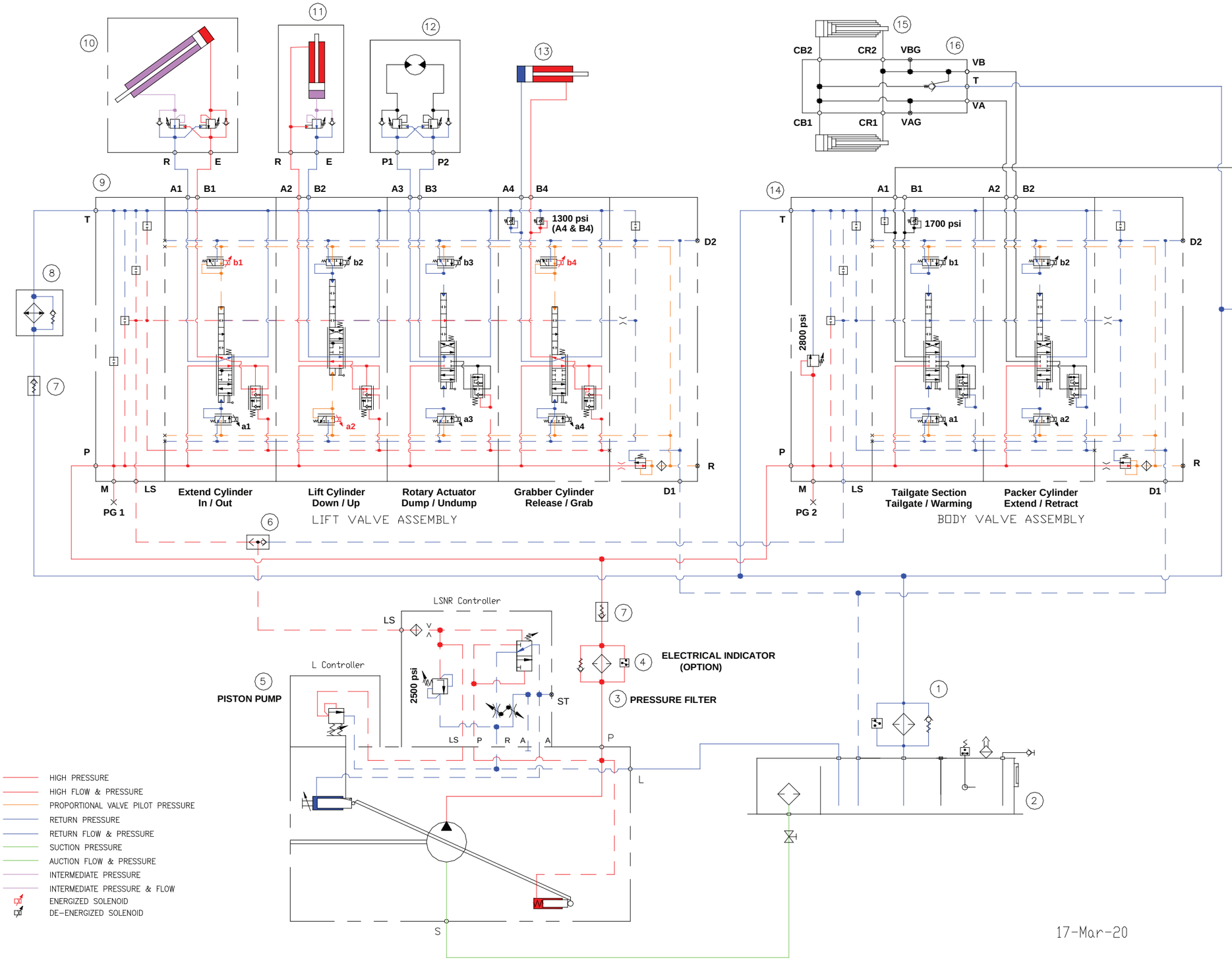
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR

ARM OUT DOWN RELEASE

HYDRAULIC SCHEMATIC FOR COMMANDER UNIT

701-9298-023



22	TALGATE VALVE ASSEMBLY
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3	PRESSURE FILTER ASSEMBLY WITH VISUAL INDICATOR, STANDARD
2	HYDRAULIC RESERVOIR ASSEMBLY
1	RETURN FILTER ASSEMBLY WITH ELECTRICAL INDICATOR
ITEM	PART DESCRIPTION

17-Mar-20

ARM OUT DOWN GRAB

HYDRAULIC SCHEMATIC FOR COMMANDER SST

701-9298-024

SECTION 8
COMPRESSED NATURAL GAS (CNG) OPTION

IMPORTANT SAFETY INFORMATION

NOTICE

For CNG units, this manual should be used in conjunction with any associated CNG Fuel System and Cylinder Manufacturers' Operation, Inspection and Maintenance Manuals. Always read and understand all associated manuals alongside the Heil Operation Manual and Heil Parts and Service Manual before operating or servicing the unit. CNG training is required for any person inspecting, operating, or performing maintenance on a CNG unit. When replacing CNG components, replace with equal or higher pressure rated components.

Read, understand and follow the instructions within this document before operating, servicing or adjusting referenced equipment. Anyone using or maintaining this equipment must be familiar with the product and fully trained to operate and maintain the unit. Improper usage or maintenance of this equipment may result in injury or death.

Always keep a copy of this manual readily available for persons who operate the equipment or perform maintenance procedures. Safe working procedures must be followed at all times. **Lock-Out/Tag-Out procedures** must be followed when performing applicable procedures.

A vehicle equipped with a compressed natural gas fuel system will have a blue reflective decal on the rear of the vehicle identifying Compressed Natural Gas (CNG). See the image below.

IMPORTANT SAFETY INFORMATION (CONTINUED)

A. Safety Notices

Throughout this manual, safety notices are included to warn operators and maintenance technicians of the dangers associated with the described equipment operations and maintenance. Improper operation or maintenance procedures may cause serious injury or death. Safety notices accompany potentially hazardous situations throughout this manual. Please read and follow instructions carefully.

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

⚠ DANGER

The CNG Fuel System contains some lines that are under continuous high pressure. DO NOT attempt to loosen or disconnect those lines.

⚠ DANGER

Natural Gas is Flammable and Explosive. Never use an open flame (match, lighter, or other) to light a work area near the CNG fuel storage system.

⚠ DANGER

Keep work area well ventilated to avoid asphyxiation due to concentrated levels of carbon monoxide.

⚠ WARNING

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

IMPORTANT SAFETY INFORMATION (CONTINUED)

⚠ WARNING

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

⚠ WARNING

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.

⚠ WARNING

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

⚠ WARNING

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.

⚠ WARNING

When replacing CNG components, replace with equal or higher pressure rated components.

⚠ CAUTION

Keep the compressed natural gas equipment area well ventilated.

⚠ CAUTION

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

PROPERTIES OF NATURAL GAS

CNG is a naturally occurring hydrocarbon gas mixture which consists primarily of methane. This gas is lighter than air, which means if gas were to leak, it would float upwards and quickly dissipate into the atmosphere.

CNG will burn only when in an air-to-gas mixture of approximately 5-15% so its range of flammability is limited compared to other fuels. The gas also has an ignition temperature of 1076°F which is significantly higher than diesel. As a fuel, CNG is less expensive and burns cleaner than diesel fuel, producing low emissions. These characteristics make CNG an efficient, safe choice for fueling vehicles.

It is:

- Colorless
- Odorless
- Non-corrosive
- Non-toxic

It has an:

- Auto Ignition Point: 900 - 1170° F (482 - 632°C)
- Lower Explosive Limit (%): 3.8 – 6.5
- Upper Explosive Limit (%): 13 – 17

SIGNS OF A FUEL LEAK

An odorant which smells like rotten eggs is added to compressed natural gas to aid in detection of a leak. If you notice this kind of lingering odor coming from your vehicle, you may have a leak in the CNG fuel system.

NOTE: It is normal to detect this slight odor when the fueling nozzle is being connected or disconnected during the refueling process. The odor should quickly dissipate when fueling has been completed.

If you notice any of the following, you may have a leak in the CNG fuel system:

- Frosting at suspected leak point
- Bubbling in wet area
- Blowing or hissing sound
- Flames, if a leak has ignited

If a fuel leak is suspected, the system should be shut down immediately. Refer to **Fuel System Shut Down Procedure** 218. Have the unit inspected for leaks by a qualified service technician using a methane detector or an approved liquid leak detector. Do not use any other method or products to find leaks.

CNG FUEL SYSTEM COMPONENTS

The following pages detail a typical CNG system configuration. Your CNG fuel system configuration may vary.

A. Fuel Management Module (FMM) Functions

The CNG Fuel Management Module serves multiple functions within a natural gas vehicle (NGV) fuel system.

These functions include:

- Storage tank refueling
- Transfer fueling (defueling)
- Pressure display of high pressure side of system
- Pressure display of low pressure side of system
- Manual and ignition controlled fuel shut-off
- Pressure reduction from storage tanks to engine supply
- Fuel system filtration
- Liquid removal from fuel system

B. Fuel Management Module (FMM) Components

1. Manual Shut-Off Valve

   The FMM Manual Shut-Off Valve isolates the fuel storage system from the engine.The manual shut-off valve handle is RED and is located on the left front of the fuel control module. Rotate the handle clockwise so arrow points right to the ‘OFF’ position to prohibit fuel flow from the tanks to the vehicle’s engine.

   Rotate the handle counterclockwise so arrow points up to the ‘ON’ position to allow fuel flow from the tanks to the vehicle’s engine.

2. High Pressure Gauge

   The high pressure gauge indicates the fuel pressure in the fuel system. The gauge has a range of 0 to 5000 psi. When cylinder(s) are full and the cylinder Manual Shut-Off Valve is open, the pressure reading should read approximately 3600 psi.

3. Low Pressure Gauge

   The low pressure gauge indicates the fuel pressure sent to the engine.

   Momentum FMM (CNrG® Tailgate): The gauge has a range 0 to 150 psi. Normal engine operating pressure is 70-100 psi for these Cummins CNG engines:

   - 8.9 L ISL G (2007+)
   - 11.9 L ISX12 G (2013-2018)
   - 8.9 L L9N (2018+)
   - 11.9 L ISX 12N (2019+)

   Agility FMM (Top of Body and Back of Cab): The gauge has a range 0 to 150 psi. Normal engine operating pressure is 60-100 psi for Cummins Westport ISX 12N engines and 70-140 psi for all other engines.

4. Fill Receptacles

   Fill receptacles are used to fill the CNG storage cylinders with fuel. There are two sizes: standard NGV1 (slow) or HD bus transit (fast) fill. The receptacles are equipped with built-in check valves to prevent fuel from escaping when the fuel fill nozzle is connected and disconnected.

CNG FUEL SYSTEM COMPONENTS (CONTINUED)

B. Fuel Management Module Components (Continued)

5. Fast Fill/HD Bus Fuel Receptacle

   The fast fill/HD bus fuel receptacle is the filling port for fueling the vehicle at public fueling stations.

6. Slow Fill/NGV1 Fuel Receptacle

   The slow fill/NGV1 fuel receptacle is the filling port for fueling the vehicle at slow fueling facility, usually overnight.

7. Defuel Port

   The defueling port allows the transfer of CNG fuel into the fill receptacle of a second CNG vehicle, using a defueling hose, capturing of CNG fuel in a system that can send it back to a CNG fueling station storage facility for reuse, or atmospheric venting (if legal in your area).

8. Defuel Valve

   The defuel valve controls fuel flow when removing fuel from the cylinder during defueling operations. It is a 3-way type valve marked OFF-DEFUEL-VENT. The valve must be in the OFF position when operating the vehicle.

9. Door Sensor

   The door sensor that is located on the FMM functions as a safety interlock to prevent the vehicle from starting if the FMM access door is open.

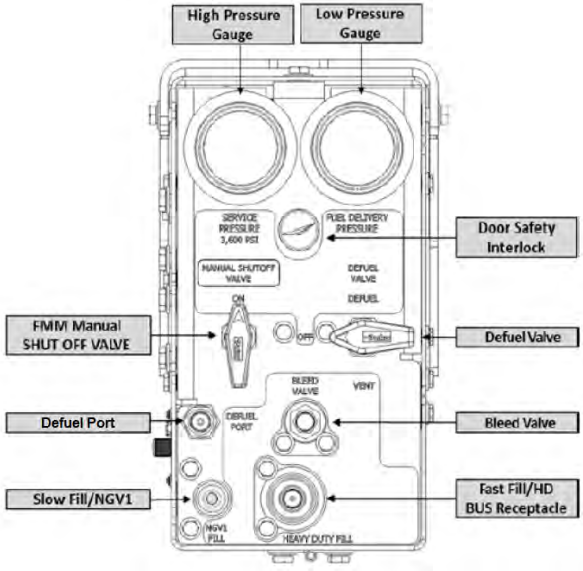


Figure 56. Manual Shut-Off Valve

C. CNG Fuel System Components

1. Fuel Cylinder(s)

   The fuel cylinder(s) stores CNG fuel at a service pressure of 3,600 psi. The fuel cylinders used on CNrG® Tailgate vehicles are type-4 composite containers, manufactured to meet FMVSS 304 and NGV2b-2012 specifications. The fuel cylinders used on Top of Body and Back of Cab CNG vehicles with the Agility FMM varies, as those are supplied by the customer. In accordance with applicable regulations, the cylinders must display permanent labels which provide information necessary for inspection.

CNG FUEL SYSTEM COMPONENTS (CONTINUED)

C. CNG Fuel System Components (Continued)

2. Cylinder Manual Shut-Off Valve

   The cylinder Manual Shut-Off Valve attached to each cylinder controls the flow of gas in and out of the cylinder. Each valve is located under a valve access cover labeled "MANUAL SHUTOFF VALVE" that is adjacent to the cylinder. Turn the valve handle FULLY clockwise to close the valve or FULLY counter-clockwise to open it.

3. Check Valve

   The 1-way check valve, located in the FMM box, is used to prevent fuel from backing up during the fuel filling process.

4. High Pressure Filter

   The high pressure coalescing filter is used to remove contaminants and oil from the fuel prior to it entering the low pressure portion of the fuel system.

5. Low Pressure Filter

   The low pressure filter is located on the frame near the engine. The low pressure filter is used to remove contaminants and oil from the fuel prior to it entering the engine. See to the engine manufacturer's recommended instructions for maintenance and replacement.

6. Pressure Regulator

   The pressure regulator reduces the pressure of fuel in the system from high pressure (3,600 psi) to low pressure (70-100 psi for the Momentum FMM) for the engine to use. Coolant from the engine circulates through the regulator to keep it from freezing. Also see **High Pressure Gauge** 214 and **Low Pressure Gauge** 214.

7. Solenoid Valve

   The solenoid valve allows pressure to flow from the regulator inlet port to the outlet port when the ignition is on.

8. Bleed Valve

   The bleed valve vents residual pressure in the FMM portion of the system to allow for maintenance procedures and purging. The bleed valve is the only fitting that it is safe to open while under pressure.

⚠ WARNING

The Bleed Valve shall not be used to defuel the system. The system must be defueled before using the bleed valve. See **Transfer Fueling (Defueling) section**.

CNG FUEL SYSTEM COMPONENTS (CONTINUED)

C. CNG Fuel System Components (Continued)

9. Pressure Relief Devices

   The Pressure Relief Devices (PRD) are thermally-activated valves that open at a temperature of approximately 230°F. In the event of a fire, they are designed to release the fuel stored in the cylinders a safe distance from the vehicle to prevent over-pressurizing the fuel cylinders. When activated, the PRD cannot be closed and will vent all gas.

NOTES:

FUEL SYSTEM SHUT DOWN PROCEDURE

1. Turn OFF the Fuel Management Module (FMM) Manual Shut-Off Valve.
2. Turn OFF the Fuel Cylinder Manual Shut-Off Valve on EACH tank.

CNG VEHICLE OPERATOR EMERGENCY RESPONSE

⚠ WARNING

During an emergency situation, never jeopardize safety to shut down the system. If it becomes evident that the steps cannot be safely completed, move to a safe distance, call 9-1-1 and alert emergency personnel of the situation, informing them of the presence of a CNG system and that it is not properly shut down.

Emergency Response for Gas Leaks

If the vehicle has sustained damage or a gas leak is detected:

1. Do not approach the vehicle if any sources of ignition may exist such as fire, sparks, electrostatic charges, lights or electronic devices.
2. If the vehicle is indoors, move the vehicle outside and away from any ignition sources.
3. Do not use road flares.
4. Do not smoke or allow anyone else to smoke near the vehicle.
5. Turn OFF the ignition switch, set the parking brake and turn OFF the battery at the main disconnect.
6. If it is safe to do so, turn OFF the Fuel Management Module Manual Shut-Off Valve and turn OFF the Fuel Cylinder Manual Shut-Off Valve on EACH tank. Check the fuel system near the damaged area for leaks by smell, sight, and sound. CNG is odorized and can be detected by smell.
7. Keep traffic and pedestrians away.
8. Beware that gas may continue to leak once ignition is turned off and the manual shutoff valves are closed.
9. Have a qualified technician verify leak locations with suitable methane detection fluid.
10. Have the leaks repaired by a qualified technician immediately.

Vehicle Fire Procedures

In the event of a CNG fire, it is imperative that the vehicle operator acts quickly:

1. Get passengers out of the vehicle as quickly as possible.
2. Evacuate the area.
3. Call 9-1-1.
4. If possible without putting yourself in harm's way, dump the refuse load from the body and move the vehicle a safe distance away from any burning refuse.

CNG VEHICLE OPERATOR EMERGENCY RESPONSE (CONTINUED)

CNG Vehicle Emergency Shut Down Procedure

⚠ WARNING

During an emergency situation, never jeopardize safety to shut down the system. If it becomes evident that the steps cannot be safely completed, move to a safe distance, call 9-1-1 and alert emergency personnel of the situation, informing them of the presence of a CNG system and that it is not properly shut down.

Complete the following steps to shut down the CNG system:

1. Turn OFF Ignition and Electrical System.
2. Turn OFF Fuel Management Module Manual Shut-Off Valve.
3. Turn OFF the Fuel Cylinder Manual Shut-Off Valve on EACH tank.
4. Call Technical Services at 866-310-4345 for further assistance.

Emergency Venting/Defueling Procedure

If an emergency arises in which the fuel must be purged immediately, an emergency vent can be performed as follows:

1. Ensure that an electrical ground connection has been established between the cylinders, the vent system, and earth ground.
2. Connect the on-board defueling connection to the vent system using a conductive high pressure defueling hose.
3. Slowly open the hand valve to achieve a slow and steady flow to prevent freezing. No gas flow may indicate a normally closed solenoid valve on the cylinder. Consult the vehicle manufacturer for information on opening electronic solenoids.
4. Allow the on-board storage system to vent completely.
5. When completed, disconnect the on-board defueling connection from the vent system and disconnect the earth ground.

STARTING VEHICLE

NOTICE

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

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 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.

FUELING PROCEDURE

A. CNG Fueling Steps

Two options exist for filling a vehicle with CNG – timed fill or fast fill. Despite the size of the receptacle, the fueling hose connects in the same manner for either type of fill.

⚠ WARNING

BEFORE fueling the CNrG® Solenoid System (if equipped), **Fuel Fill Mode** MUST be engaged on the in-cab InSight™ Diagnostic Display. **While Fuel Fill Mode is engaged, the system will not detect leaks.**

The steps include:

1. For the CNrG® Solenoid System only, engage **Fuel Fill Mode** on the in-cab InSight™ Diagnostic Display. For more information, see **Fuel Fill Mode** 257.
2. Locate the fueling fill receptacle in the CNG fuel module. Optional fill receptacles may be installed in a remote location on the vehicle's front bumper.
3. Remove the dust cover on the fill receptacle.
4. Remove fueling nozzle from the CNG dispenser holder.
5. Begin fueling the CNG vehicle.
6. When complete, disengage the Fueling Nozzle.
7. Return the nozzle to the CNG dispenser.
8. Replace the dust cover on the receptacle.
9. Close the CNG fuel module door and engage door lock.

FUELING PROCEDURE (CONTINUED)

B. Types of Fueling Hoses

Dependent upon the fueling station, different types of fueling hoses may be utilized. Refer to the figures below and on the next page to determine which type of fueling hoses you will be using.

1. Type 1:

   When utilizing this type of nozzle, follow directions below to refuel:

   a. Slide the nozzle over the receptacle intake. In order to properly engage the fill hose with the receptacle, hold the nozzle in one hand. With the free hand, twist the lever counterclockwise to line up the two arrows, facing each other. Complete the connection by pushing the fueling hose fully onto the receptacle.

   b. Once the hose fits completely onto the fill receptacle, you will hear a click and the arrow on the lever will shift, misaligning with the arrow on the actual hose. This indicates that the hose fueling nozzle is properly seated onto the receptacle.

   c. When the hose fully connects, turn the lever clockwise until both arrows are pointing toward the fill receptacle to begin fueling.

   d. When fueling is complete, release the nozzle connection. Holding the nozzle in one hand, use the other hand to turn the nozzle so that arrows again point toward each other (as shown in step "a"). You will hear a release of pressure.

   e. Disconnect the fuel hose, and return it to the fuel dispenser.

Figure 57. Type 1 Fueling Hoses

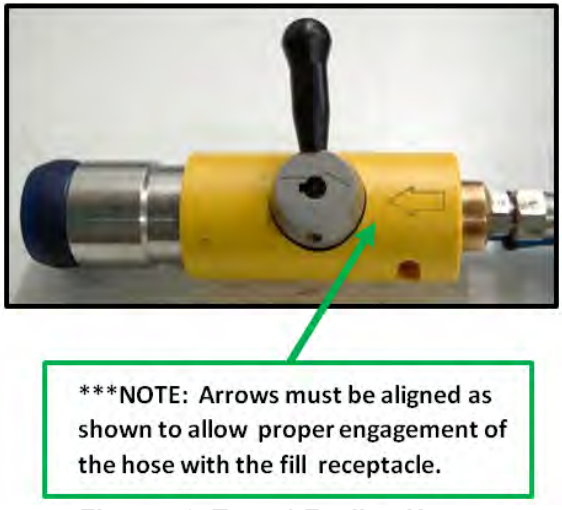


Figure 58. Type 1 Fueling Hoses

FUELING PROCEDURE (CONTINUED)

B. Types of Fueling Hoses (Continued)

1. Type 1 (Continued):

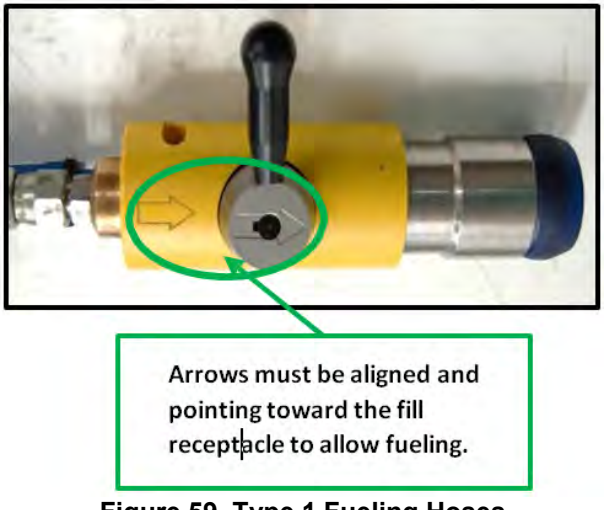


Figure 59. Type 1 Fueling Hoses

2. Type 2:

   This fueling hose operates in the following manner:

   a. Locate fill receptacle and remove dust cap.
   b. Slide fueling hose nozzle onto the fueling receptacle.
   c. Compress the hand grip until the locking lever engages.
   d. Begin fueling.
   e. When complete, release the locking lever and disconnect the fueling hose.

Figure 60. Type 2 Fueling Hose

FUELING PROCEDURE (CONTINUED)

3. Type 3:

   To utilize this hose:

   a. Locate fill receptacle and remove dust cap.
   b. Holding firmly, press nozzle onto fill receptacle.
   c. Rotate lever clockwise 180° to begin fueling.
   d. When fueling is complete, rotate lever counterclockwise 180° to allow fuel hose disconnection.

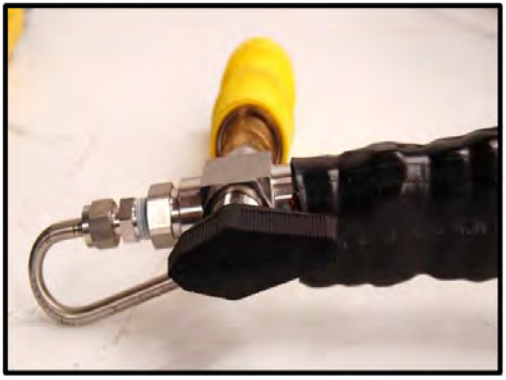


Figure 61. Type 3 Fueling Hose

TRANSFER FUELING (DEFUELING) PROCEDURES

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.

⚠ WARNING

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

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 the **Momentum or Agility CNG Fuel System Operation and Maintenance Manual** and the **Agility (or equipped fuel cylinder manufacturer) CNG Fuel Cylinder Inspection Manual**.

CNG FUEL SYSTEM MAINTENANCE

Routine maintenance of the compressed natural gas system in accordance with the **CNG Fuel System Inspections Section** 231 will ensure that the system and components are functioning properly. Refer to your Heil Service Manual for CNG fuel system schematics.

⚠ WARNING

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

⚠ WARNING

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

⚠ WARNING

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.

⚠ CAUTION

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.

MAINTENANCE PART NUMBERS

When replacing CNG components, replace with equal or higher pressure rated components.

PART NUMBER	DESCRIPTION
151-4773-107	High-Pressure Coalescing Filter Element Kit
Refer to Engine OEM	Low-Pressure Fuel Filter Element
151-4773-126	Fast-Fill Fuel Receptacle O-Ring
To be supplied	#6 O-Ring Face Seal – O-Ring
151-4773-123	#8 O-Ring Face Seal – O-Ring
151-4773-124	#6 O-Ring Boss – O-Ring
151-4773-121	#8 O-Ring Boss – O-Ring
151-4773-125	#4 O-Ring Boss – O-Ring (Transducer O-Ring)

Note: For a complete breakdown of the FMM and CNG system, refer to the Parts Central Electronic Parts Catalog (EPC).

Register online to gain access to the EPC:
https://epc.partscentral.com

Google Chrome web browser is recommended.

NOTES:

DEPRESSURIZING PROCEDURE

It is necessary to prepare the truck to be serviced. A mechanic's initial focus while preparing the vehicle for service should be **safety**. The primary preparation involves relieving the pressure within the system BEFORE performing any maintenance procedures, including draining or changing the high-pressure filter. Use the following procedure to remove fuel pressure from the lines connected to the high-pressure filter assembly.

⚠ WARNING

After following the Depressurization Procedure, pressure may still remain downstream of the solenoid valve, including inside the fuel cylinder(s). Use care when loosening fittings for the first time. DO NOT open any cylinder Manual Shut-Off Valves after any CNG fitting, connection, or component is loosened or disassembled

⚠ WARNING

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

1. Make sure that the ignition is turned OFF.

DEPRESSURIZING PROCEDURE (CONTINUED)

2. Close ALL cylinder Manual Shut-Off Valves (one on each cylinder) by turning the valve clockwise to the OFF position. See the image below.

Figure 62. Cylinder Manual Shut-Off Valve

3. Verify that the FMM Manual Shut-Off Valve is in the ON position.
4. Start the vehicle and let the engine run until it stops.
5. Turn the vehicle ignition switch OFF. Follow the manufacturer's recommended vehicle lock-out procedures. Remove the ignition key.
6. Make sure the high pressure gauge on the FMM reads 0 psi.
7. Remove the FMM access panel.
8. Slowly open the bleed valve to relieve the remaining pressure.

DEPRESSURIZING PROCEDURE (CONTINUED)

9. Turn OFF the power supply if an electrical component of the system requires service.
10. Perform any maintenance ONLY after completing these instructions.

Once this process is complete, the system will be fully depressurized up to the primary solenoid lock-off valve. Pressure may still remain downstream of the solenoid valve, including inside the fuel cylinder(s). Use care when loosening fittings for the first time. Be aware that it is normal for a small amount of gas to leak out of any fitting downstream of the solenoid lock-off valve.

RE-PRESSURIZING PROCEDURE

Once the high-pressure filter drain or change procedure is complete, perform the following procedure to re-pressurize the lines.

1. Make sure that the vehicle is OFF. Take the keys out of the ignition.
2. Close the bleed valve and torque the fitting to 4-5 FT-LBS.
3. Check that the filter bowl and the drain plug are installed and tightened.
4. Check that the FMM Manual Shut-Off Valve is in the ON position.
5. On each cylinder, slowly turn the cylinder Manual Shut-Off Valve by turning the valve counter-clockwise to the ON position.
6. Re-install the fill panel cover (if removed).
7. Insert the ignition key and start the engine.

HIGH PRESSURE FILTER DRAIN PROCEDURE

1. Remove the excess fuel in the filter per the **Depressurizing Procedure** 226.
2. Make sure the FMM Manual Shut-Off Valve is in the OFF position.
3. Locate and access the high pressure coalescing filter inside the filter service access door. The filter location will vary, depending on the system configuration.
4. Locate the drain plug at the bottom of the filter. Hold a cloth under the port to catch any draining liquid.
5. Remove the plug and allow the liquid inside the filter to drain.
6. Re-install the drain plug and torque to 27 FT-LBS.
7. Confirm the bleed valve is closed.
8. Slowly open the FMM Manual Shut-Off Valve.
9. Check the high pressure gauge to ensure the fuel pressure has been returned in the system.

HIGH PRESSURE FILTER CHANGE PROCEDURE

1. Remove the excess fuel in the filter per the depressurization procedure.
2. Ensure the FMM Manual Shut-Off Valve is in the OFF position.
3. Locate and access the high pressure coalescing filter inside the service access door/panel. The filter location will vary, depending on the system configuration.
4. Unscrew and remove the filter bowl from the filter housing. Note the filter is equipped with wrench flats to assist removal.
5. Empty and clean the filter bowl.
6. Remove the filter element by grasping and pulling it downward out of the filter housing. Place the new filter element into position and press it into place.
7. Install a new O-ring (supplied with the filter element) into the groove on the filter housing, using lubricant supplied in the kit.
8. Re-install the filter bowl in the filter housing and torque to 40 FT-LBS.
9. Verify that the bleed valve is closed.
10. Slowly open the FMM Manual Shut-Off Valve.
11. Check the high pressure gauge to ensure fuel pressure has returned in the system.

WELDING AND HOT WORK PROCEDURES

⚠ WARNING

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

⚠ DANGER

Never weld on any fuel system components. Welding can ignite the fuel, resulting in an explosion or fire causing serious personal injury or death.

If any welding or 'hot work' (i.e., any work that involves burning or use of tools that produce a spark, flame, or source of ignition) is required on a CNG fuel vehicle excluding the CNG fuel system, you must perform the following procedures:

1. Conduct work in a well-ventilated area.
2. Shut off every cylinder in the fuel system by turning the valve clockwise to OFF.
3. Ensure the FMM Manual Shut-Off Valve is in the ON position.
4. Start the vehicle and let it run until the engine stops.
5. Turn the ignition key OFF and remove the key.
6. Check the gauges on the FMM to ensure all pressure is at ZERO.

WELDING AND HOT WORK PROCEDURES (CONTINUED)

7. Slowly relieve excess pressure by turning the bleed valve cap counter-clockwise until a hissing sound is heard. Close the bleed valve when the hissing stops.
8. Purge the CNG fuel system with inert gas, including the tanks. See **Purging with an Inert Gas Prior to Welding or Major Repairs**.
9. Use a welding blanket to protect the fuel system from slag and sparks produced from welding and hot work operations.

LIFTING THE VEHICLE

⚠ WARNING

Never use any part of the fuel system as a lifting point to raise the vehicle. Do not allow fuel system components to come into contact with any part of the lifting device. The fuel system can become damaged, resulting in a leak. Serious personal injury or death can occur if the gas is ignited.

Always raise the vehicle using the lifting points recommended by the vehicle manufacturer. Refer to the vehicle manufacturer's instructions for correct lifting instructions.

TOWING THE VEHICLE

⚠ WARNING

Do not attach towing equipment to or allow towing equipment to come into contact with any part of the fuel system. The fuel system can become damaged, resulting in a leak. Serious personal injury or death can occur if the gas is ignited.

Before towing the vehicle, close the Manual Shut-Off Valves on the FMM and all fuel cylinders using the **Fuel System Shut Down Procedure** 218.

Once the fuel system is shut down, follow the vehicle manufacturer's instructions for towing the vehicle.

NOTES:

PRE-TRIP INSPECTION

Perform a Pre-Trip Inspection each day before driving the vehicle.

1. Verify the Manual Shut-Off Valve on the FMM is in the ON position.
2. Check the high-pressure gauge on the FMM to ensure it is operating and reading in a range consistent with the fuel gauge on the dash board. The fuel system maximum pressure is 3,600 psi.

   NOTE: Pressure of less than 250 psi could make the engine run rough.
3. Check the vent ports and vent caps for any signs the PRDs have been activated. Verify the vent ports and vent caps are clear of debris or damage.
4. Check the entire fuel system for any signs of damage or wear. Include checks for:

   a. Gas leaks – Smell for gas, look for frost or ice, and listen for hissing noises at joints and components.

   b. Look for external damage to housings and covers.
5. Drain the low pressure filters per the engine manufacturer's recommendation.
6. Turn the ignition key to ON and check that the low pressure gauge reading is approximately 125 psi.
7. Verify the dashboard fuel gauge is functioning properly.
5. Have the fuel system and cylinders inspected by a certified CSA Cylinder and Fuel System Inspector if damage is found on any part of the components or structural parts of the fuel system.

WEEKLY SYSTEM INSPECTION

Perform the Weekly System Inspection to ensure the system is operating correctly, safely, and to maximize component performance.

1. Verify all of the cylinder Manual Shut-Off Valves move freely and are in the ON position.
2. Visually inspect the fuel system for any signs of damage or wear.
3. Check for damage on the cylinder shields and covers.
4. Check to ensure the cylinders are mounted securely. Inspect the mounts, brackets, rubber isolators, and all fasteners.
5. Check for leaks on all CNG fuel plumbing tubes, hoses, and fuel flow components. Check for the odor of rotten eggs. Look for frosting or the sound of hissing at valves and fittings.
6. If any system components or structural parts are damaged, the system and cylinders must be inspected by a CSA-certified fuel system inspector.

CNG FUEL SYSTEM INSPECTION/PREVENTIVE CARE SCHEDULE

ITEM	FREQUENCY
Check Vent Lines	Daily
Drain Low Pressure Filter	Daily
Perform **Daily CNG Fuel System Inspection** 233 on next page.	Daily
Replace Low Pressure Filter	Refer to the engine manufacturer for maintenance and replacement guidelines.
Drain High Pressure Filter	Weekly
Replace High Pressure Filter Element	At regular oil change intervals or every 30,000 miles
Drain Vent Lines	Every month (or immediately if blue vent cap is missing)
Leak Test with Methane Detector*	Monthly, or if involved in any accident, or if you smell gas.
Component Inspection*	Monthly
Cylinders*	Inspect compressed gas cylinders as outlined by cylinder manufacturer
* To be completed by a qualified and trained person.	

CNG FUEL CYLINDER AND SYSTEM INSPECTION

⚠ WARNING

If a CNG-fueled vehicle has been involved in an accident or fire, the system and cylinders must be inspected by a certified CNG fuel system inspector.

NOTICE

Inspections must be performed by qualified inspectors using guidelines from the fuel cylinder manufacturer in addition to the guidelines listed here.

1. Based on cylinder manufacturer recommendations and industry standard practices, visual CNG cylinder inspections should be performed at a frequency of 3 years or 36,000 miles, whichever occurs first.
2. In addition, Heil recommends a daily walk-around or pre-trip and post-trip visual inspection be performed.

3. NOTES:

DAILY CNrG® FUEL SYSTEM INSPECTION

Inspect the following items each day before vehicle operation. If all items pass inspection, the vehicle is cleared for operation. If any issues are identified, a qualified CNG System Technician should make the necessary repairs.

1. Check all CNrG® Tailgate guards and covers for damage.
2. Remove the Oblong Access Covers fastened with Thumbscrews.

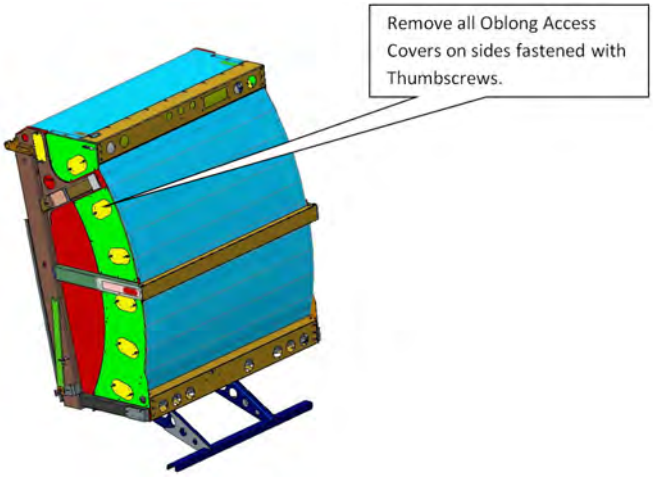


Figure 63. Tailgate Access Covers

3. Thoroughly pressure wash inside (refuse side) of tailgate and inspect for any dents over 1/4” in depth, or punctures.
4. Make sure cylinders mounts are secure. Check mounts and all fasteners.

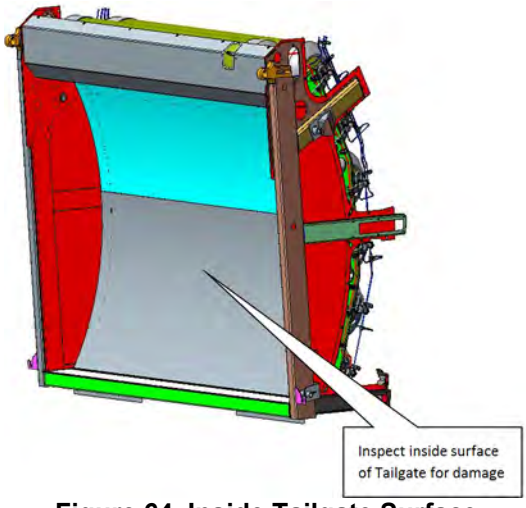


Figure 64. Inside Tailgate Surface

4. Verify cylinder labels are in place and for each cylinder, make sure cylinder service life has not expired.
5. Inspect cylinder valves and PRDs for leaks and damage.
6. Inspect all plumbing tubes, hoses and fuel flow components for leaks. A CNG Gas Leak Detector is recommended.
7. Examine all cylinders for damage using the cylinder manufacturer’s guidelines. Inspection records should be kept with vehicle records, and the system label should be updated to reflect the current inspection status.
8. Check condition of tailgate to body hose connection and guards.

CNG FUEL SYSTEM TROUBLESHOOTING

Heil offers support via the technical assistance line, as well as products, such as a Fuel Module Mini-Tester (Part Number 044-0488), to assist with troubleshooting.

Please provide the following when calling Heil Technical Services at 866-310-4345 with troubleshooting questions:

1. Serial # of CNG Fuel Module
2. Truck Serial #
3. Details of:
   - When the problem started
   - What the problem entails
   - Any troubleshooting performed
   - Results of troubleshooting actions

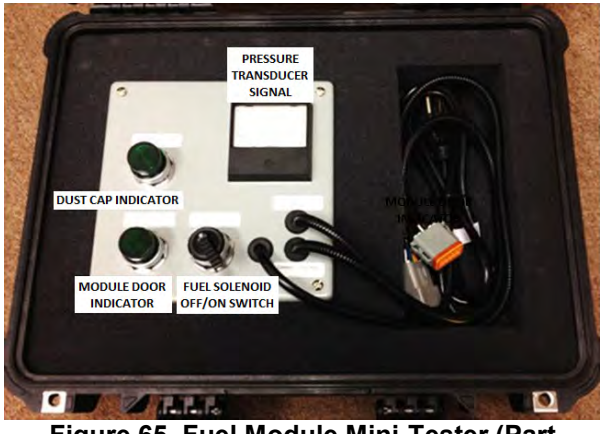


Figure 65. Fuel Module Mini-Tester (Part Number 044-0488)

CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/ DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Vehicle's starter will not operate.	Interrupt door switch signal is not being properly recognized by the vehicle.	Disconnect the 12-pin electrical connector at the rear of the fuel module. Use an ohm meter or continuity tester across pins (GRN) and 10 (YEL) of the fuel module side of the connector (female connector). Press and release the fuel module interrupt door switch. When the switch is depressed, there should be continuity between pins 9 (GRN) and 10 (YEL). Continuity should be lost when the switch is released.	If operation of the door switch makes and breaks continuity as described, and the starter will not operate, there is most likely a problem in the vehicle's wiring. If the operation of the door switch does NOT make or break continuity as described, there is most likely a wiring problem in the fuel module. If the problem cannot be resolved, call **866-310-4345** for technical assistance.

CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Vehicle's starter operates but the vehicle does not run.	Fuel is not making it through the fuel module to the engine.	*The manual valve on the front of the fuel module should be set to "On". *The fuel module high pressure gauge should read above 5000 psi. Disconnect the 12-pin electrical connector at the rear of the fuel module. Use a DC voltmeter across pins 8 (BLU) and 9 (GRN) of the vehicle side of the connector (male connector). The voltage should read: • Ignition switch "Off" 0 vdc. • Ignition switch "Run" 12 vdc. • Ignition switch "Start" 12 vdc. *Reconnect the 12-pin electrical connector at the rear of the fuel module. Have an assistant repeatedly cycle the ignition switch between "Off" and "Run" while listening for the "click" of the fuel solenoid being actuated near the maintenance door.	*If the voltage does NOT change as described, the problem is most likely located in the vehicle's electrical signal that actuates the fuel solenoid. *If the voltage changes as described and the "click" of the fuel solenoid is detected, the problem is most likely an engine control problem prohibiting the vehicle from starting. *If the voltage changes as described but the "click" of the fuel solenoid is NOT detected then the problem is most likely a failed solenoid in the fuel module. *If the problem cannot be resolved, call **866-310-4345** for technical assistance.

CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Heil Standard CNG and CNrG™ Tailgate Solenoid System Options: In-cab fuel gauge does not indicate the fuel level correctly.	The fuel module pressure transducer, the fuel gauge or the interconnecting wiring may be defective.	Confirm that the 12-pin electrical connector at the rear of the fuel module is connected and place the vehicle's ignition switch in the "Run" position. Use a voltmeter to read: • Voltage between connector positions 2 (RED) and 3 (BLK). the voltage should be 12 vdc. • Voltage between connector positions 3 (BLK) and 4 (WHT). the voltage should be between 0.5 to 5.0 vdc.	*If the voltage across 2 and 3 is 0 or significantly below battery voltage, there is a problem with the vehicle's wiring not supplying power to the fuel module's pressure transducer. *If the voltage across 3 and 4 is either 0 or 5.5 vdc, the fuel module's pressure transducer is most likely defective. Call **866-310-4345** for technical assistance. *If the voltage across 3 and 4 is between 0.5 to 5.0 vdc then the fuel module's pressure transducer is operating correctly. The problem is likely in the vehicle's wiring or the in-cab fuel gauge. *If the problem cannot be resolved, call **866-310-4345** for technical assistance.

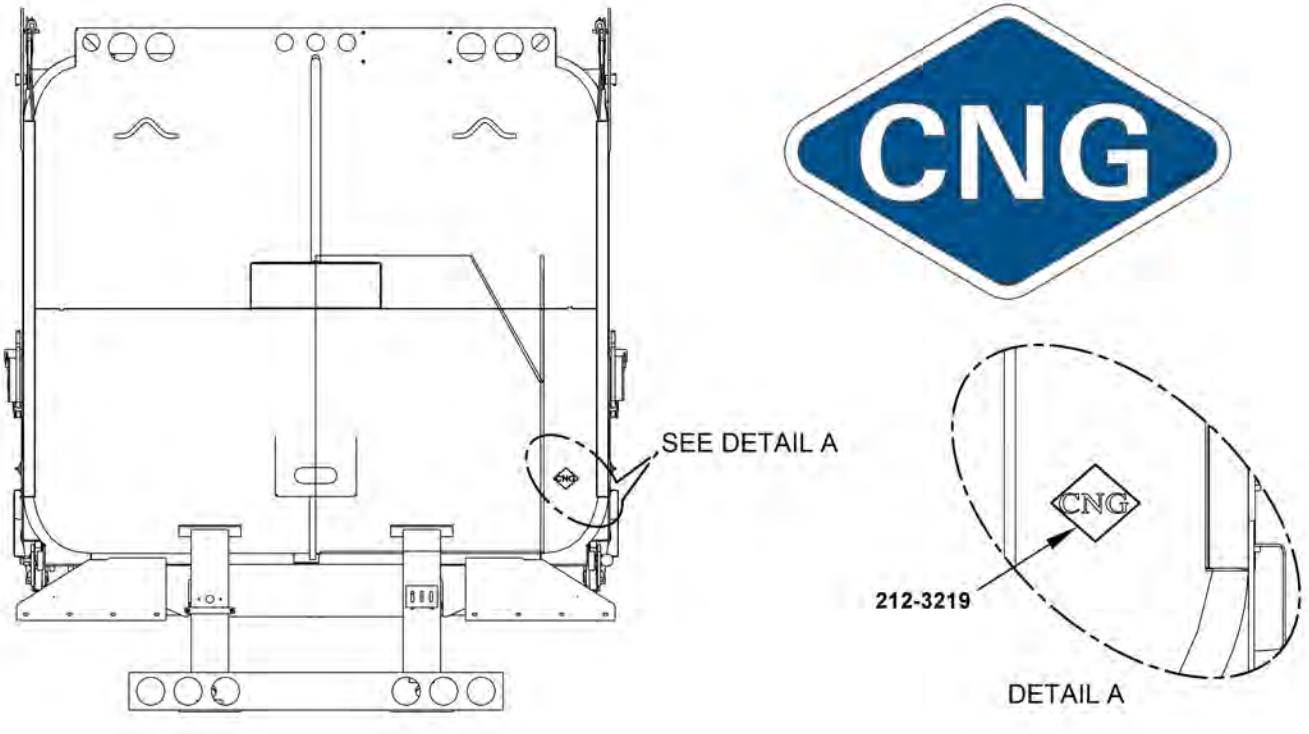
CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Heil CNrG™ Tailgate Solenoid System Option: In-cab Display does not indicate the fuel level correctly or an alarm is activated on the Display indicating "Transducer-# Unplugged/Short Check Sensor and Wiring" Fail for a given Tank#.	The fuel cylinder pressure transducer or the interconnecting wiring may be defective.	Confirm that the 3pin electrical connector at the transducer is connected and place the vehicle's ignition switch in the "Run" position. Use a voltmeter to read: • Voltage between connector positions A (BRN) and B (BLK). The voltage should be approximately 12 vdc. • Voltage between connector positions B (BLK) and C (YEL). The voltage should be between 0.5 to 5.0 vdc.	*If the voltage across A and B is 0 or significantly below battery voltage, there is a problem with the vehicle's wiring not supplying power to the fuel module's pressure transducer. *If the voltage across B and C is either 0 or 5.5 vdc, the fuel tank's pressure transducer is most likely defective. Call **866-310-4345** for technical assistance. *If the voltage across B and C is between 0.5 to 5.0 vdc then the fuel module's pressure transducer is operating correctly. The problem is likely in the Display or the Controller. *If the problem cannot be resolved, call **866-310-4345** for technical assistance.

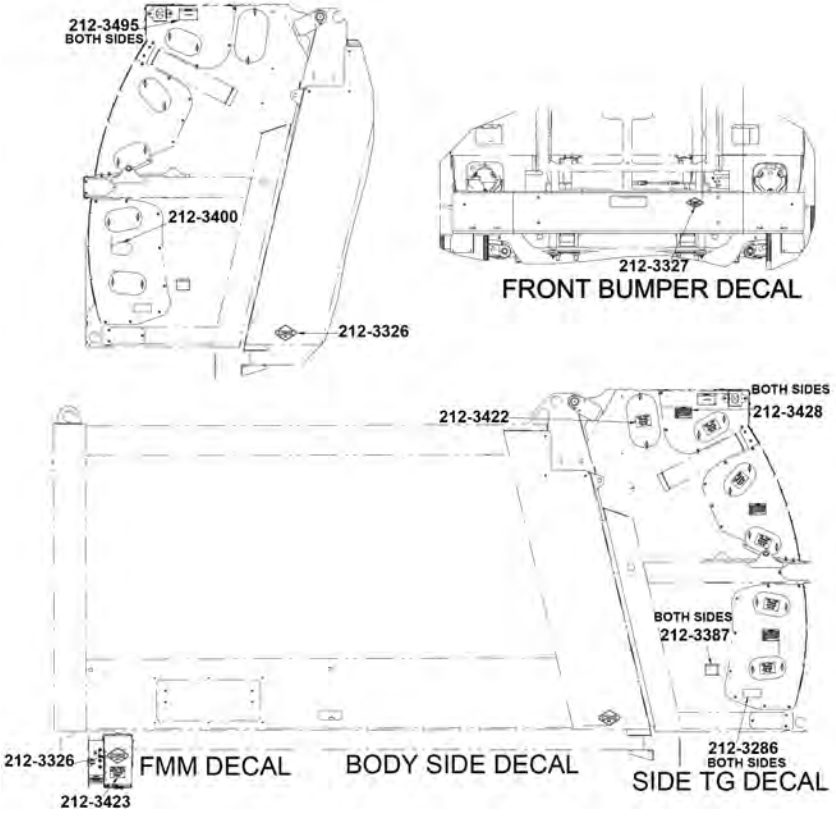
CNG FRONT OF BODY / TOP OF BODY DECAL PLACEMENT

In addition to the decal shown below, there may be other decals placed on the Fuel Management Module (FMM), tank compartments or elsewhere on the CNG system components. Refer to the CNG Fuel System Manufacturer's Operation and Maintenance Manuals for replacement decal part numbers.

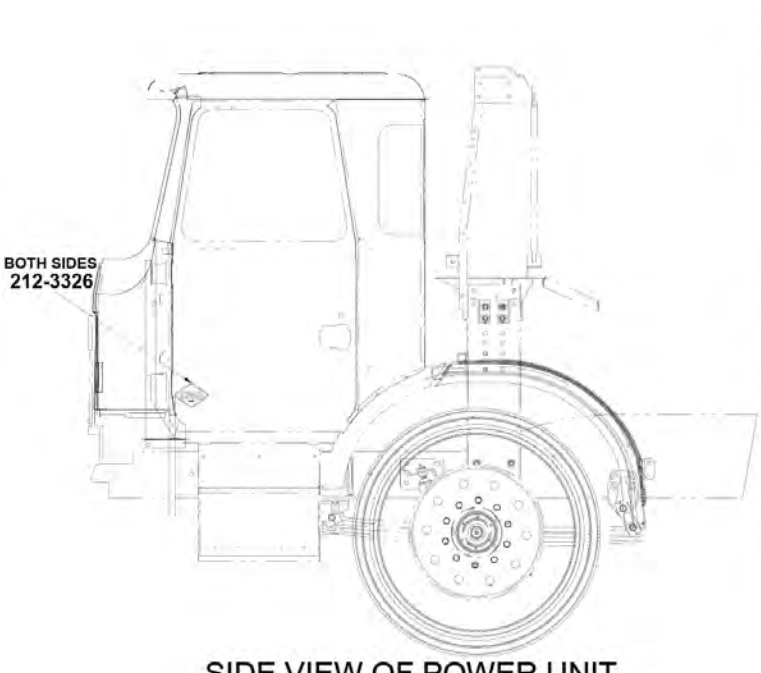


CNrG® TAILGATE DECAL PLACEMENT

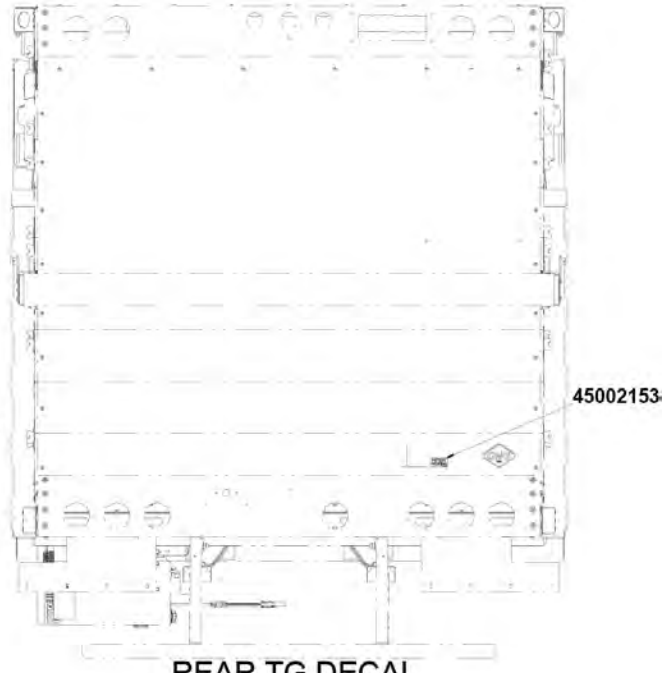
In addition to the decals shown below, there may be other decals placed on the Fuel Management Module (FMM), tank compartments or elsewhere on the CNG system components. Refer to the CNG System Manufacturer's Operation and Maintenance Manuals for replacement decal part numbers.



CNrG® TAILGATE DECAL PLACEMENT (CONTINUED)



SIDE VIEW OF POWER UNIT



REAR TG DECAL

CNrG® TAILGATE DECAL IMAGES

Figure 66.CNG Fuel (5.88" x 3.88"), PN 212-3326

Figure 67.CNG Fuel (4.25" x 2.63"), PN 212-3327

Figure 68. Warning: Vehicle uses CNG fuel, PN 212-3387

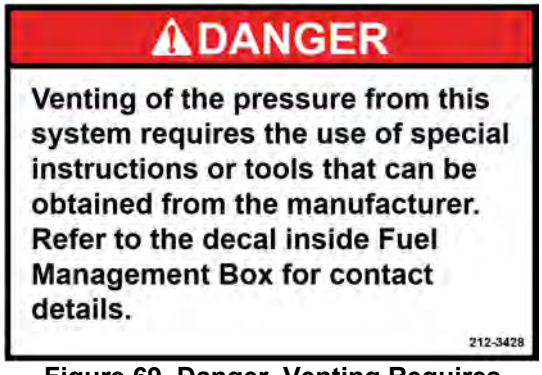


Figure 69. Danger, Venting Requires Special Instructions/Tools, PN 212-3428

CNrG® TAILGATE DECAL IMAGES

Figure 70. Patent Pending, PN 45002153

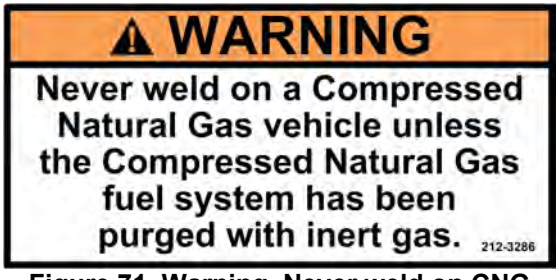


Figure 71. Warning, Never weld on CNG vehicle unless purged, PN 212-3286

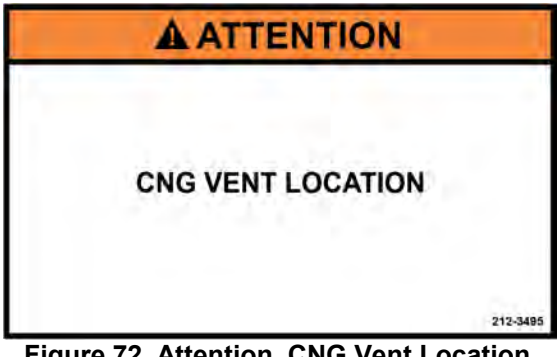


Figure 72. Attention, CNG Vent Location, PN 212-3495

Figure 73. Warning, CNrG Solenoid System, CNG tank empty before removing transducer, PN 212-3388

CNrG® TAILGATE DECAL IMAGES

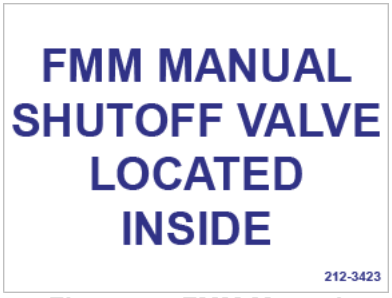


Figure 74. FMM Manual Shutoff Located Inside, PN 212-3423

Figure 75. CNG Tank Manual Shutoff Valve, PN 212-3422

Figure 76. Notice, CNrG Solenoid System, Transducers MUST be functioning, PN 212-3389

Figure 77. Notice, CNrG Solenoid System, Fuel Fill Mode MUST Be Engaged, PN 212-3429

CNrG® TAILGATE DECAL IMAGES

Figure 78. Heil CNrG Tailgate Fuel Delivery System, PN 212-3400

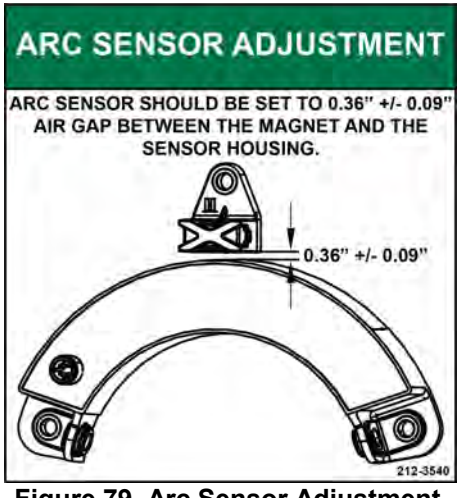


Figure 79. Arc Sensor Adjustment, PN 212-3540

Figure 80. Rated Lifting Capacity, PN 212-0983-001

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION

When equipped, the optional Heil CNrG Solenoid System will monitor and display live in-cab CNG system and tank pressures and notifications on the InSight™ Diagnostic Display. Additionally, the system detects and alerts of leaks (visually and audibly) while closing solenoid valves of affected tanks to isolate the leak(s).

On the display, tanks are numbered starting with the tank at the top of the of the CNrG tailgate, "TANK-1", and ending with the tank lowest in the CNrG tailgate, in the system shown below, "TANK-7". When the system is operating without any issues, all boxes are green as shown below.

Figure 81. Main Display Screen

Summary of Features

- Display screen inside the cab which gives live pressure monitoring for each tank and system.
- Visual warning in form of messages and color on the screen along with audible alarm whenever solenoid failure occurs.
- System visual and audible warning if one of the pressure transducers is unplugged in either ignition ON or OFF conditions.
- Whenever the ignition is OFF and truck is not running, system gives audible alarm in the event of any leaks on tank or system side. The operator needs to turn the ignition ON and check the display screen that will show the tank location of the leak.
- As a safety feature, all solenoids will be closed whenever there is a leak. A maintenance bypass code will need to be entered to be able to open solenoids and drive the vehicle. The leak detection feature is available only when the ignition is OFF.
- Leaks are detected at a pressure difference of 600 psi.

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

Pressure Transducer Sensors

⚠ WARNING

ALL Pressure Transducer Sensors MUST be functioning for System to be able to detect a leak.

⚠ WARNING

Tank MUST be empty before removing tank Pressure Transducer Sensor.

Plugged directly into the live port of the valve of each tank and behind the FMM (Fuel Management Module) box live line, the pressure transducer sensors measure live pressures of each tank and of the system. When a pressure transducer sensor fails or becomes unplugged, the system sends a visual warning on the InSight™ Diagnostic Display along with an audible alarm.

Whenever there is a single sensor issue, the main screen will show which sensor has failed as shown in the figure to the top right. However, if there are multiple sensor issues, it will tell you to go to alarm summary screen to get more details as shown in the figure to the bottom right.

NOTICE

The audible buzzer will be active regardless of ignition ON or ignition OFF and will not turn OFF until the issue is corrected.

Figure 82. Pressure Transducer Sensor behind FMM Unplugged/Faulty

Figure 83. Multiple Pressure Transducer Sensors Unplugged/Faulty

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

The Alarm Summary Screen can be reached by pressing the right arrow on the display twice.

Figure 84. Path to Alarm Summary Screen

Figure 85. Alarm Summary Screen

Solenoid System Function

The valve body on each CNG tank has an integrated solenoid. The solenoids are normally closed when the ignition is OFF and open when ignition is ON and a voltage is supplied to them.

Leak Detection/Solenoid Lock

The system is capable of detecting a leak in the system or leak in any tank when the ignition is initially OFF and the leak starts. For safety purposes, if a leak is detected, all solenoids are locked in the closed position and not allowed to open until a maintenance code is entered and bypass is activated. The audible alarm activates whenever there is pressure difference detected of 600 psi or more and the truck ignition is OFF (ignition must be turned ON to see more details about the leak on the display screen).

NOTICE

Authorized Service Personnel should contact Heil Technical Service for the maintenance code to unlock the CNG solenoids.

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

Leak Detection/Solenoid Lock (Continued)

The figures on this page show example display screenshots of possible leak detection notifications. Other leak detection notifications exist and are not shown here.

⚠ WARNING

You must follow all safety/emergency procedures of your company in the event of a CNG leak. At a minimum, follow the instructions on Emergency Shutdown Procedure section of this manual.

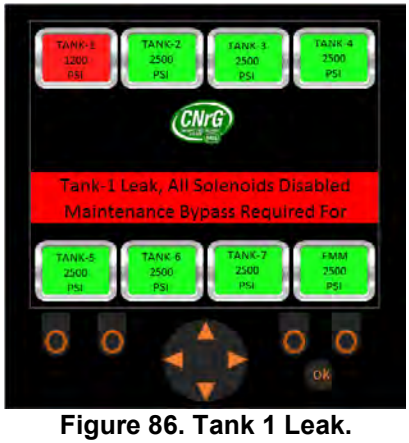


Figure 86. Tank 1 Leak. Maintenance Bypass Required.

Figure 87. Mutiple Tank Leaks. Maintenance Bypass Required.

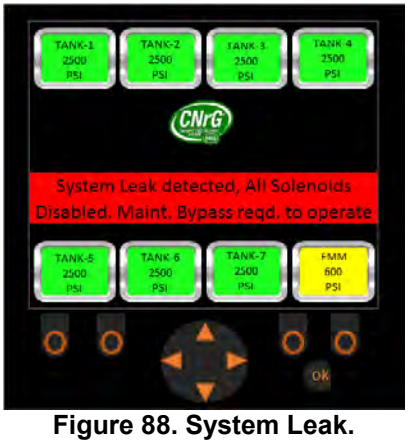


Figure 88. System Leak. Maintenance Bypass Required.

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

Solenoid Failure Detection

The system is capable of detecting solenoid failures to open (in the event of a wiring or component issue) when the ignition is turned ON as per requirement of NFPA 52.

Whenever there is a single solenoid issue, the main screen will show which solenoid has failed as seen on the figure to the top right of this page. However, if there are multiple solenoid issues, it will tell you to go to alarm summary screen to get more details as seen in the figure to the bottom right. **Alarm Summary Screen** 250 can be reached by pressing the right arrow on the display twice.

The figures on this page show example display screenshots of solenoid failure detection notifications. Other solenoid failure detection notifications exist and are not shown here.

To defuel after a solenoid failure on one of the tanks, first refer to **Heil CNrG™ Solenoid System Defueling After Solenoid Failure** 257 and then use one of the methods described in **CNG Fuel Module Defueling Methods**.

NOTICE

The audible buzzer will be active only when ignition is ON and will not turn OFF until the issue is corrected.

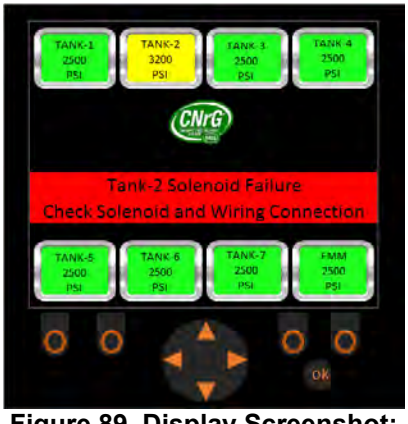


Figure 89. Display Screenshot: Tank 2 Solenoid Failure

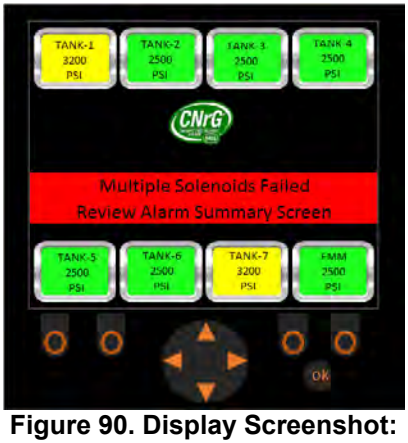


Figure 90. Display Screenshot: Multiple Solenoids Failed

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

Maintenance Bypass

The following are the steps must be followed by a qualified maintenance technician after getting any display messages described in this manual. This will allow a qualified service person to get the truck back on route/correct the issue:

⚠ WARNING

Enabling Bypass Mode will disable System Leak Interlocks. Bypass will not open the solenoid of a leaking tank.

1. Driver will need to call maintenance department of their company in order to drive/move the truck since all solenoids are locked and need maintenance bypass for them to open.
2. For any leaking tank, open the oblong access covers on the street side of the CNrG tailgate and then close that tank's manual shut off valve. (You must correct the leaking tank before the system will allow the solenoid for that tank to open.) In case of system leak, solenoids will not open until Bypass Mode is "ON" (system leak is a leak detected in the line going from FMM to tanks on high pressure side).
3. Go inside the cab and on display screen hold "ok" button on screen until it prompts you to enter maintenance code.
4. Enter the maintenance bypass code and you will see the screen shown in the figure to the right.

NOTICE

Authorized Service Personnel should contact Heil Technical Service for the maintenance bypass code to unlock the CNG solenoids.

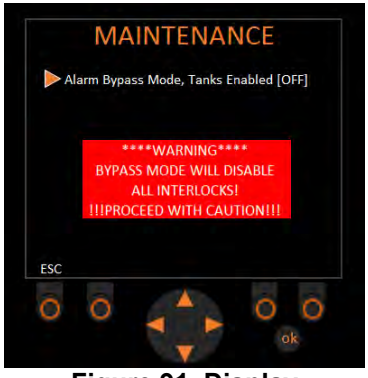


Figure 91. Display Screenshot: Maintenance Screen

5. Make sure you have first closed the manual shut off valves on the tanks that are leaking (Step 2). You will notice that the Bypass Mode is OFF by default. Press "ok" button and turn ON Bypass Mode. Once you do this, all solenoids (except leaking tank/tanks) open. However, all tanks are now connected to each other and to the main supply/return line. This is the reason it is very important to first perform Step 2 before performing this step.
6. You will now be able to drive the truck to your maintenance department to evaluate and repair the leak. The audible alarm will not go OFF until the issue is corrected.

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

Low Fuel Level Detection

The system is capable of detecting low fuel levels and will give audible and visual alerts that the truck needs to be refueled, as shown in the figure below. Whenever pressure drops below 500 psi on the system side, the system will show a Low Fuel Warning alert message along with an audible alert.

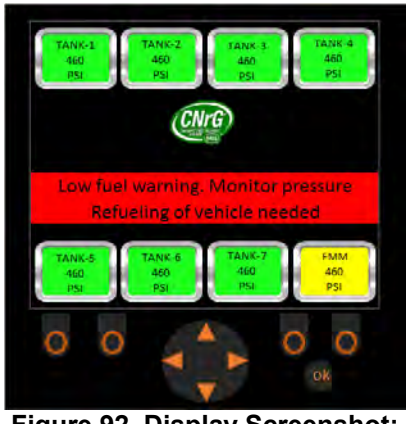


Figure 92. Display Screenshot: Low Fuel Warning

CNG Tank Option Configuration

The system is designed for different tank configurations and is a common design which will work from 3 tank to 7 tank system. This helps the customer to upgrade to higher DGE (Diesel Gallon Equivalents) by adding more tanks without need to modify anything in this system. The figure below shows a snapshot of the Tank Option Configuration maintenance screen where you can configure the number of tanks on the truck.

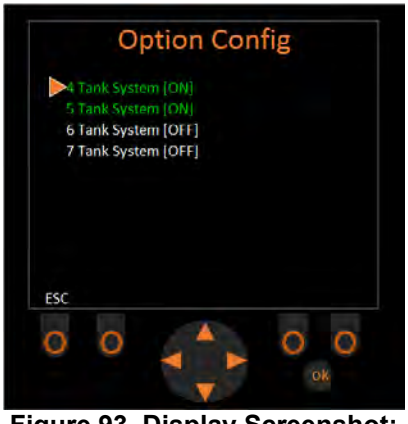


Figure 93. Display Screenshot: Tank Option Configuration

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

System Inputs

The display screenshot shown below (within the maintenance mode menu) is used for troubleshooting and maintenance to gather information for the current status of the Ignition Power (ON or OFF) and the system voltage being supplied to the Controller. It also provides the software revisions of the Display and Controller programs.

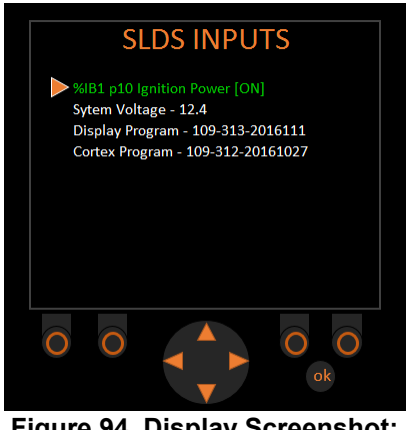


Figure 94. Display Screenshot: System Inputs

System Outputs

The display screenshot shown below (within the maintenance mode menu) is used for troubleshooting and maintenance to gather information for the current status of the Solenoids on each Tank (ON or OFF). It also provides the status of the System Alarm for the Controller.

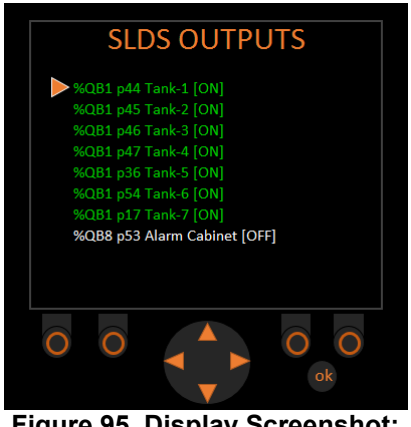


Figure 95. Display Screenshot: System Outputs

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

Ignition Power OFF

The display notification shown in the figure below will only be displayed in the event that the InSight™ Diagnostic Display has Ignition Power and the Controller does not have Ignition Power. This Alarm can be beneficial in the event that all Tank Solenoids Valves have failed to open due to the loss of Ignition Power, which is required to open the Tank Solenoids Valves.

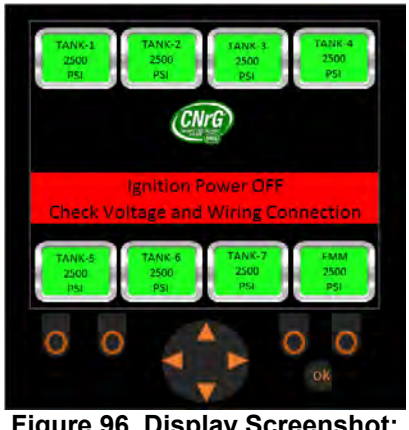


Figure 96. Display Screenshot: Ignition Power OFF

System Over Voltage

The display notification shown in the figure below will only be displayed in the event that the System Voltage is greater than 36 volts for 10 seconds, indicating that there is voltage too high to safely operate the Controller and Display.

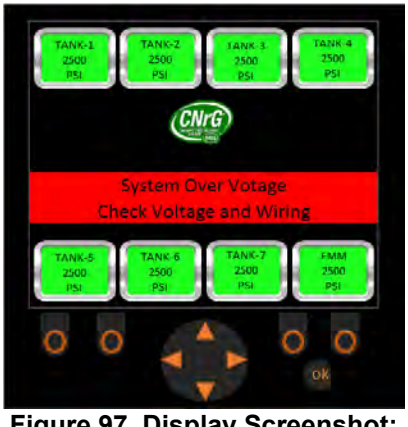


Figure 97. Display Screenshot: System Over Voltage

HEIL CNrG® SENTINEL™ SOLENOID SYSTEM OPTION (CONTINUED)

System Under Voltage

The display notification shown in the figure below will only be displayed in the event that the System Voltage is less than 8 volts, indicating that there is voltage too low to safely operate the Controller and Display.

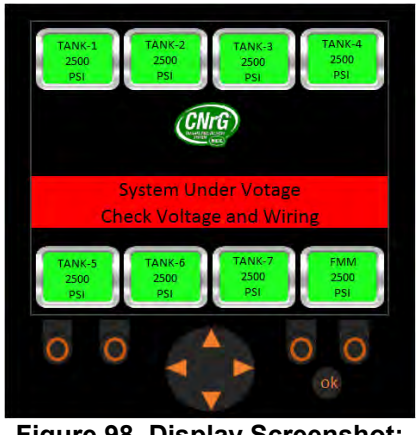


Figure 98. Display Screenshot: System Under Voltage

Fuel Fill Mode

For the CNrG Solenoid System only, engage Fuel Fill Mode on the in-cab InSight™ Diagnostic Display to open the CNG solenoids, allowing for fast fill fueling. The "FUEL FILL MODE" button turns green when engaged. After Fuel Fill Mode is engaged, the Fuel Fill Mode remains active for one (1) hour or until the ignition key switch cycles ON-OFF-ON.

⚠ WARNING

BEFORE fueling the CNrG Solenoid System (if equipped), **Fuel Fill Mode** MUST be engaged on the in-cab InSight™ Diagnostic Display. **While Fuel Fill Mode is engaged, the system will not detect leaks.**

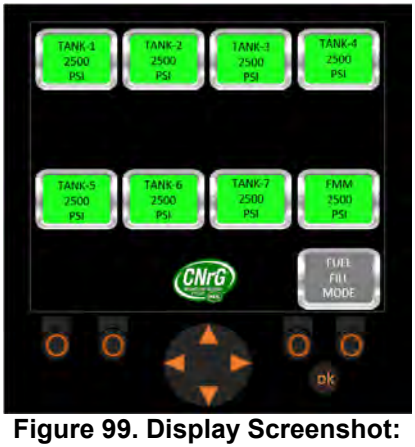


Figure 99. Display Screenshot: Fuel Fill Mode OFF

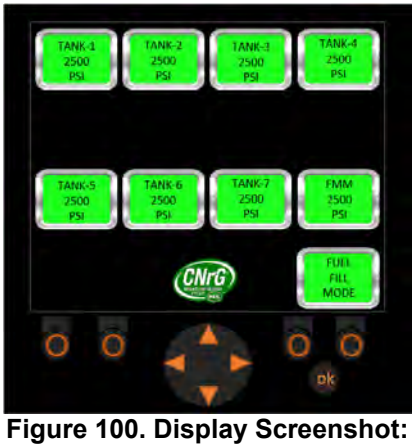


Figure 100. Display Screenshot: Fuel Fill Mode ON

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HEIL ENVIRONMENTAL WARRANTY STATEMENT

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

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

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

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

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

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

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

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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