

## B50HPSC TECHNICAL MANUALS

**Operations, Maintenance, Schematics, Parts, Safety**



### OPERATIONS/ MAINTENANCE

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- Safety
- Operation
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- Priming
- Pumping
- Clean-up
- Maintenance
- Check-List

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- Frame Installation
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### SAFETY MANUAL AMERICAN CONCRETE PUMPING ASSOCIATION



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REV	DATE	DESCRIPTION	NAME
*	8/31/2020	TIER4	J. SLACK



## INTRODUCTION

This manual introduces the warranty policy, safe operation, safe maintenance, parts, and other aspects of the concrete equipment.

Reading and understanding this operation manual will help maximize performance and reliability, and help minimize dangers, improper operation, and repair costs. Contact REED Customer Service for additional replacement manuals.

All safety guidelines, product descriptions, illustrations, and specifications found throughout this manual were in effect at the time the manual was released for printing. It should be noted; **REED RESERVES THE RIGHT TO MAKE CHANGES IN DESIGN OR TO MAKE ADDITIONS TO OR IMPROVEMENTS IN THE PRODUCT WITHOUT IMPOSING ANY OBLIGATIONS UPON ITSELF TO INSTALL THEM ON PRODUCTS PREVIOUSLY MANUFACTURED.**

Everyone involved with the operation, maintenance, inspection, and repair of the concrete pump **MUST READ** and **UNDERSTAND** this manual and the accompanying Safety Manual.



## WARRANTY

**REED** warrants each new Concrete equipment A,B, and C Series to be free of defects in material and workmanship under normal use and service for a period as follows:

### CONCRETE PUMP

- 1 year or 1200 operating hours, whichever occurs first
- A,B, and C Series all Structural Parts for 3 years

The warranty is issued **ONLY** to the **INITIAL USER**. The warranty period begins when the product is delivered to the initial user or when first put into service, whichever occurs first. Said warranty is void if the machine is subject to misuse, neglect, accident, and/or abuse.

**REED's** obligation under this warranty is limited to correcting without charge, at its factory, any parts or parts thereof which shall be returned to its factory, transportation prepaid and upon **REED's** examination proves to have been originally defective. Correction of such defects by repair or replacement shall constitute fulfillment of all obligations to the initial user. This warranty does not include labor or transportation charges unless specifically identified and authorized in writing by **REED**. Nor does the warranty apply to any unit upon which repairs, or unauthorized alterations have been made.

This warranty does not apply to normal maintenance service or to normal replacement of certain machine parts which are subject to normal wear (such as concrete cylinders and wear components, valve mechanisms, delivery systems, hopper grate, etc.) **REED** makes no warranty in respect to trade accessories or outside vendor components, such being subject to the warranties of their respective manufacturers.

*THIS IS A LIMITED WARRANTY AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE.* In no event shall **REED** be made liable for incidental, general or consequential damage, loss or any expense directly or indirectly related and resulting from use or lack of use caused by delay in delivery, parts failure, or any other causes associated with the product use. No person, firm or corporation is authorized to assume for **REED** any other liability in connection with the sale of **REED** products.

Effective April 2010



# OPERATION and MAINTENANCE

[www.reedpumps.com](http://www.reedpumps.com)

(909)287-2100

WARRANTY CLAIM FORM					
Claim Number:			Date:		
Distributor Account Number:			End User Account Number:		
Distributor:			End User:		
Address:			Address:		
City:	State:	Zip:	City:	State:	Zip:
Phone ( )			Phone ( )		
Pump Model: _____			In Service Date: _____		
Pump Serial Number: _____			Hours of Operation: _____		
			Failure Date: _____		
			Repair Date: _____		
Do not send part(s) until requested by <b>REED</b> or until claim is approved. All parts requested to be returned must have a Return Authorization Number provided by <b>REED</b> and shipping freight prepaid. Parts must ship within 30 days from <b>REED</b> request.					
Return Authorization Number:			Ship Date:		
Part Number	Description	Qty	Unit Price	Total Price	Replacement Part Invoice No.
Failure Description and Cause: _____					
<b>REED</b> Comments: _____					
Claim Value Approved:\$ _____			Claim Value Denied:\$ _____		
<b>REED</b> Print Name, Sign, and Date: _____					
Dealer Print Name, Sign, and Date: _____					

## SAFETY

Everyone involved with the operation, maintenance, inspection, and repair of the concrete pump **MUST READ** and **UNDERSTAND** this manual and the accompanying Safety Manual.

### SAFETY ALERT SYMBOLS AND SIGNAL WORDS

The following safety alert symbols, signals, and explanations are intended to warn the operator of hazardous and potentially hazardous situations.

The triangle with the exclamation point inside is used to alert the operator to an important safety point and is called a safety alert symbol. One of the following signal words will appear after the safety alert symbol:



If the safety alert symbol is followed by the signal word **DANGER**, the safety alert symbol indicates a hazardous situation which, if not avoided, **WILL** lead to death or serious injury.

If the safety alert symbol is followed by the signal word **WARNING**, the safety alert symbol indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.

If the safety alert symbol is followed by the signal word **CAUTION**, the safety alert symbol indicates a potentially hazardous situation which, if not avoided, **COULD** result in minor to moderate injury.

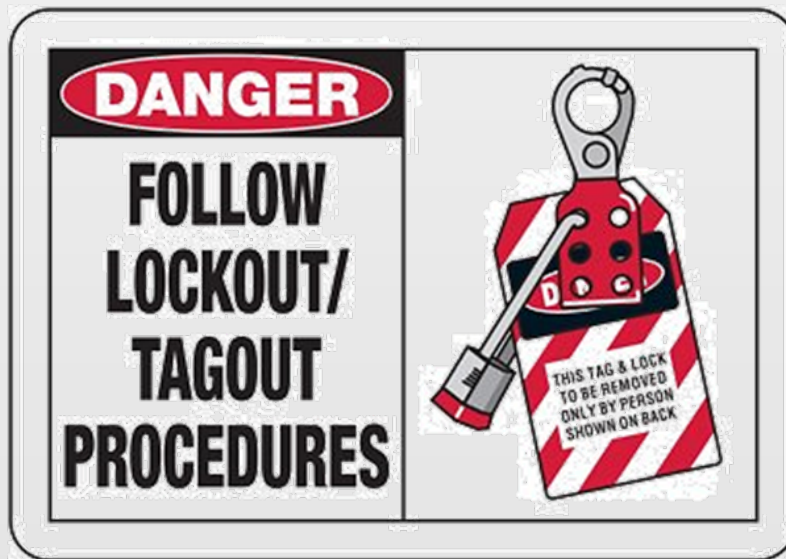
The signal word **CAUTION**, but without safety alert symbol means the safety symbol alert addresses a hazard which, if not avoided, **COULD** cause damage to equipment or property.

### LOCKOUT / TAGOUT

The Lockout/Tagout procedure applies to all **REED** concrete placing equipment. Before performing any maintenance and/or repair on equipment;

1. Remove keys lock-out signage must be posted to indicate machine is currently under Lockout/Tagout.

The following symbol is a reminder to Lock Out and Tag Out equipment before working on equipment.



---

## GENERAL SAFETY GUIDELINES

** WARNING**

Use Only Qualified, Experienced, and Trained Personnel  
Wearing Protective Equipment At All Times

** WARNING**

For Safe Use, Maintenance, Inspection, and Repair,  
Only Operate, Maintain, Inspect, and Repair  
In Accordance with This Operation Manual and the Safety Manual

** WARNING**

Performance and Safety Features Must Never Be Altered, Disconnected, or Removed

** WARNING**

Contact **REED** Technical Support and Service When Assistance Is Required



### SAFETY DECALS

Decals and placement of decals are standardized by the Concrete Pump Manufacturers Association (CPMA) for your protection. They are placed at appropriate areas on the concrete pump to be constant warnings of dangers. Know and adhere to the information they provide. Contact **REED** Customer Service for complimentary replacements of safety decals, shipping charges may apply.

#### DECALS PLACED NEAR CONTROL BOX AREA



! **WARNING**

Do not operate this machine without training. Understand the warnings in safety manuals and on decals.

! **ADVERTENCIA**


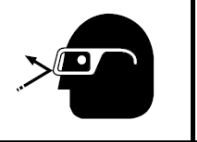
No use esta maquinaria sin estar capacitado. Entienda las advertencias de los manuales de seguridad y de las calcomanías.

Do not paint over this label/No pintar encima de ésta etiqueta 800925

<b>IMPORTANT</b>	<b>IMPORTANTE</b>
<p>You can order additional operation manuals, spare parts books, safety manuals and decal sets by contacting us at:</p> <p>REED Manufacturing            1-(888)-779-7333            7:00 AM to 5:00 PM            Pacific Time            Monday through Friday</p>	<p>Usted puede solicitar manuales de operacion, catalogos de refacciones, manuales de seguridad y juegos de calcomanias adicionales contactando a:</p> <p>REED Manufacturing            1-(888)-779-7333            DE 7:00 AM a 5:00 PM            Hora Pacifico            LUNES A VIERNES</p>
<p>Do not paint over this label/No pintar encima de ésta etiqueta <span style="float: right;">803226</span></p>	

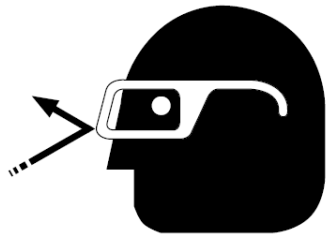
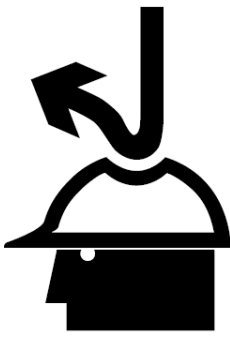
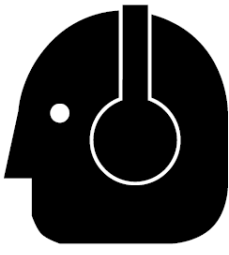


**DO NOT OPERATE  
MACHINE  
WITHOUT ALL  
GRATES IN PLACE**

<b>⚠ WARNING</b>			<b>SAFETY INSTRUCTIONS</b>	
			<ol style="list-style-type: none"> <li>1. Relieve system pressure before opening any system or coupling.</li> <li>2. Regularly inspect system condition and wall thickness.</li> <li>3. Wear reduces system burst pressure.</li> <li>4. Use recommended clean out procedures - consult manufacturer.</li> <li>5. Use retaining pins in delivery system snap couplings.</li> </ol>	
<ul style="list-style-type: none"> <li>• Stay clear of pressurized concrete placing system.</li> <li>• Wear eye protection.</li> <li>• Do not operate at pressures exceeding the rating of any piece of the material delivery system.</li> </ul>			<b>INSTRUCCIONES DE SEGURIDAD</b>	
<b>⚠ ADVERTENCIA</b>			<ol style="list-style-type: none"> <li>1. Alivie la presión del sistema ante de abrir un sistema o un acoplamiento.</li> <li>2. Inspeccione periódicamente el estado del sistema y el espesor de las paredes.</li> <li>3. El desgaste reduce la presión de rotura por estallido.</li> <li>4. Use los procedimientos de limpieza recomendados, consulte con el fabricante.</li> <li>5. Use los pasadores de retención en los acoplamientos de fijación a presión.</li> </ol>	
<ul style="list-style-type: none"> <li>• Permanezca alejado del sistema de distribución de concreto presurizado.</li> <li>• Use protección para los ojos.</li> <li>• No opere a presiones mayores que las de la capacidad de cualquier pieza del sistema de descarga.</li> </ul>				

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**ADVERTENCIA ⚠ WARNING**

		
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Do not paint over this label/No pintar encima de ésta etiqueta

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INSTRUCCIONES DE SEGURIDAD		SAFETY INSTRUCTIONS				
<p>Recommended hand signals Señales de mano recomendadas</p>						
<p>1. START PUMP SPEED UP</p>	<p>2. SLOW PUMP DOWN</p>	<p>3. STOP PUMP</p>	<p>4. LITTLE BIT</p>	<p>(2 golpecitos) (2 taps)</p> <p>5. RELIEVE PRESSURE</p>	<p>6. ADD WATER 4-GALLONS</p>	<p>7. ALL DONE CLEAN UP</p>
1. PRENDER LA BOMBA ACELERAR	2. BAJAR VELOCIDAD A LA BOMBA	3. PARAR LA BOMBA	4. UN POCO	5. ALIVIAR LA PRESIÓN	6. AÑADIR AGUA 4-GALONES	7. TERMINADO LIMPIAR
<small>Do not paint over this label/No pintar encima de ésta etiqueta</small>						
<small>803235</small>						

### DECALS PLACED NEAR HOPPER GRATE AREA

Do not paint over this label/No pintar encima de esta etiqueta



**! WARNING**

Keep hands out of hopper and valve assembly. See operation manual if access is required.

**! ADVERTENCIA**

No meta las manos a la tolva o válvula. Consulte el manual de operación si necesita tener acceso.

800917

Do not paint over this label/No pintar encima de esta etiqueta



**! WARNING**

Stay off hopper grates.

**! ADVERTENCIA**

Manténgase alejado de la rejilla que cubren la tolva.

800918

Do not paint over this label/No pintar encima de esta etiqueta

**! WARNING**



**Cement dust is toxic. Use lung protection when exposed.**

**! ADVERTENCIA**

**El polvo de cemento es tóxico. Use protección para los pulmones cuando se exponga.**

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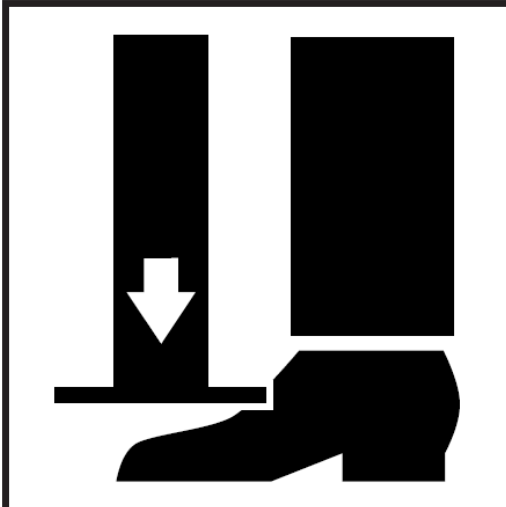


### DECALS PLACED NEAR WATERBOX AREA

	<b>⚠ WARNING</b>
	Keep hands out of waterbox. Stop motor if access is required. Keep guards in place.
	<b>⚠ ADVERTENCIA</b>
	No meta las manos a la caja de agua. Pare el motor si necesita tener acceso. Mantenga las cubiertas cerradas.

Do not paint over this label/No pintar encima de ésta etiqueta 800916

### DECALS PLACED NEAR OUTRIGGER CONTROL AREA

	<b>⚠ WARNING</b>
	Clear area before activating outriggers.
	<b>⚠ ADVERTENCIA</b>
	Despeje el área antes de activar los estabilizadores.

Do not paint over this label/No pintar encima de ésta etiqueta 800919

### DECALS PLACED ON SIDE PANEL AREA



#### **⚠ WARNING**

This machine is remote controlled and may start at any time. Stop engine before servicing unit.

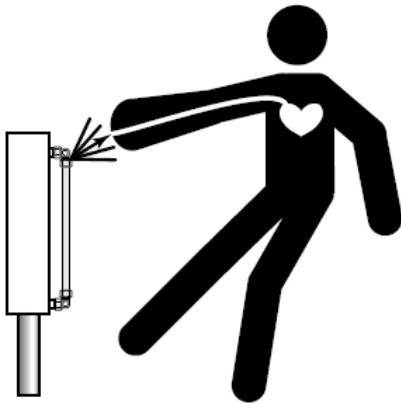
#### **⚠ ADVERTENCIA**

Esta máquina funciona a control remoto y puede ponerse en marcha en cualquier momento. Apagar el motor antes de realizar el mantenimiento.

Do not paint over this label/No pintar encima de esta etiqueta

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#### **⚠ WARNING**



Do not paint over this label/No pintar encima de esta etiqueta

Do not touch hydraulic oil leaks. Get immediate medical attention if oil penetrates skin.

#### **⚠ ADVERTENCIA**

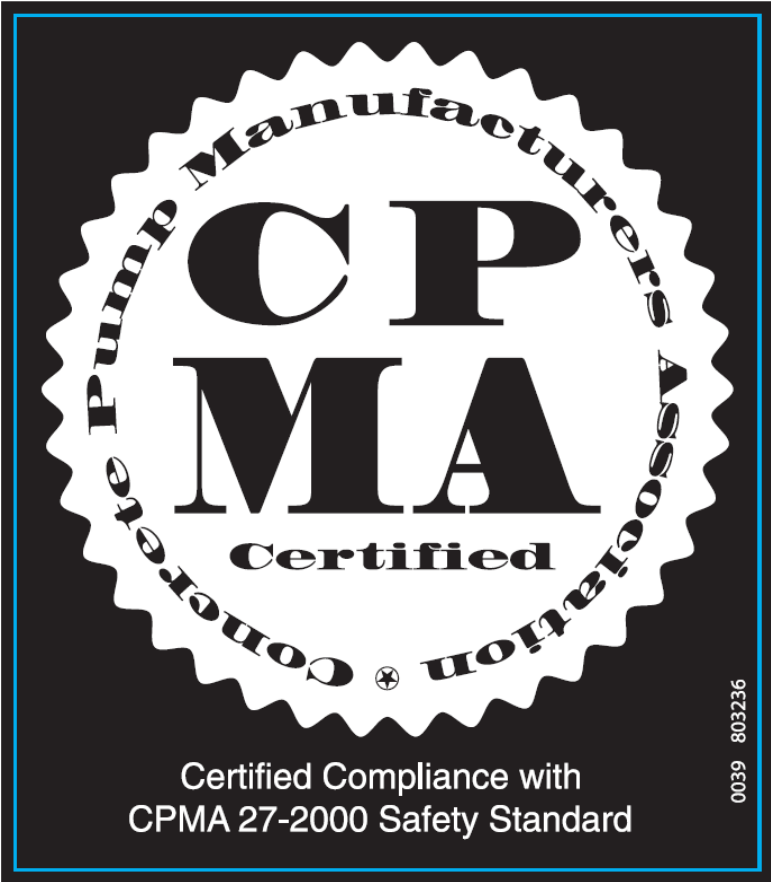
No toque las fugas de aceite hidráulico. Obtenga atención médica inmediata si el aceite penetra en la piel.

803225



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## OPERATION

### OPERATOR QUALIFICATIONS

**Everyone involved with the operation, maintenance, inspection, and repair of the concrete pump MUST READ and UNDERSTAND this operation manual and the accompanying Safety Manual.**

The following are a few general warnings for operator qualifications outlined in the Safety Manual.



- Individuals who cannot read and understand this operation manual, Safety Manual, signs, warnings, notices, and operating instructions, in the language in which they are printed, must not be allowed to operate the concrete equipment / mixer.
- Only qualified, experienced, and trained personnel may be allowed to operate the concrete equipment / mixer.
- Operation, maintenance, inspections, and repair must only be made by qualified, experienced, and trained personnel.
- Obey all applicable local and government statutes and regulations applying to safely operate equipment in their location.

### SERIAL PLATE IDENTIFICATION

#### A-SERIES



#### B-SERIES

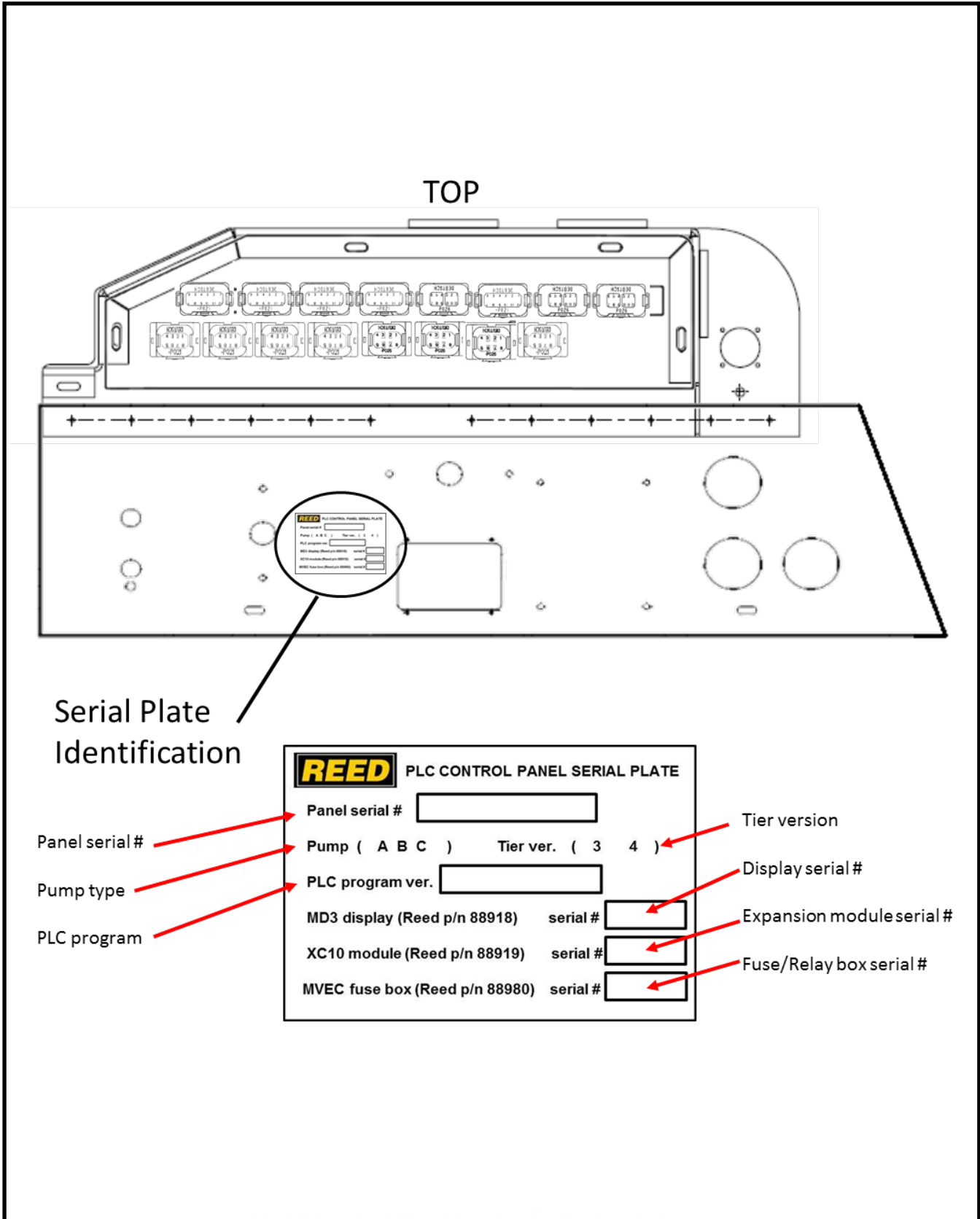


#### C-SERIES





# MAIN PANEL SERIAL IDENTIFICATION



### PRODUCT DESCRIPTION

The operation of the concrete equipment encompasses the use of hydraulic and electrical systems. This Concrete Pump is designed to safely mix wet concrete or material within its published ratings and specifications.

Stability of the concrete pump during operation is provided by the (2) outrigger legs and the front jack that can be raised or lowered from the concrete pump, to accommodate terrain.

The features:



### CONTROLS

#### PLC MAIN CONTROLS B, C-SERIES

**EMERGENCY STOP** This push/pull emergency switch is used to shut down the pump in an emergency by disabling the hydraulic systems. It does not shut the engine or motor off. Depress **PUSH** knob in to **STOP** operation. **PULL** knob out to **REACTIVATE** system. **NOTE:** the **HORN/RESET** must be switched one time to restart pump operation.



#### STROKE-SWITCH

Press button to test stroke change. It is used for the purpose of pressure testing the main drive cylinders. Both main and swing cylinders reverse direction when button is depressed. When the main cylinders reach the end of the stroke they will "dead head" until the button is released.

#### PUMP ON/OFF SWITCH

this is to turn the pump on and off. Press button **PUMP ON** to turn pump on, and press button **PUMP OFF** to turn pump off. It will be backlit when each function is engaged.

#### PUMP DIRECTION SWITCHES

this is used to select and controls of the cycle direction of the concrete pump. Press button **FORWARD** to control pump forward, and press button **REVERSE** to control pump reverse functions. It will be backlit when each function is engaged.

#### CONTROL SWITCH (LOCAL/REMOTE)

this is used to select the pump control location. Press button to **LOCAL** to enable operation of concrete pump for main stationary panel. Press button to **REMOTE** for operation using the remote control. It will be backlit when each function is engaged

#### HORN/RESET

Press button down to activate horn/reset, it is used to reactivate the control and **PUMP CIRCUIT** after machine has been shut down using the **EMERGENCY STOP** switch or when you start the pump. Once the emergency stop has been depressed it will be necessary to press down the **HORN** button to **RESET**. It will be backlit when engaged.



**NOTE:** Hopper grate safety switch engages **EMERGENCY STOP** when grate is lifted

### PLC MAIN CONTROLS B,C-SERIES

**MAIN POWER KEY** this is a three (3) position key switch. Turnkey to the **ON** position to power control box. Shut down power by turning key to **OFF** position.

**MAIN DIGITAL DISPLAY** this is where all the pumping statuses are displayed.



**RPM +/-** controls increase and decrease of engine RPM. It will be backlit when each function is engaged.

**FAST CHANGE** (if equipped-closed loop only) controls the fast change feature for smoother operation under certain conditions

**VIBRATOR** (if equipped-HOPPER OPTION) controls vibrator activation. (AUTO/PUMP/ON/OFF)



**PUMP VOLUME** this is to turn the pump volume up or down. Press button **VOLUME UP** to increase volume, and press button **VOLUME DOWN** to reduce volume. It will be backlit when each function is engaged.

**THESE CONTROLS ARE USED FOR (OPTION SYNCHRONISED CHEMICAL PUMP)**

- Manual mode is used when you can control the speed of the chemical pump.
- Auto mode is used when you need a specific amount of chemical to be pumped. With each stroke of the concrete pump.



# REED CONCRETE PUMPS

## SCREEN OPERATION INSTRUCTIONS

### GENERAL DESCRIPTION

This is the standard operation instructions and review of the PLC screen functions.

### EMERGENCY AND ALTERNATE CONTROLS

These instructions are to be used in an Emergency situation with computer or communication failure, for back-up operation ONLY.

### INITIALIZING SCREEN



1. Pump Key Switch Turn ON –When power is first activated with key switch the Initializing screen will be visible to provide any possible start up issues with pump devices. Any non-typical device operation will trigger an ERROR popup providing more detailed information or providing alternate paths of operations.

### READY TO START ENGINE



2. **Initializing routine complete** – When the REED Logo is present initialization is complete and engine is ready to start. Control button lights have been updated for a more consistent look and intuitive operation. If E-Stop function has Push Button pulled out and Grate sensor show grate as closed the Horn Button will flash Green showing ready to operate. If E-Stop is triggered Horn light will be Yellow. Stop buttons are always RED and control buttons are Yellow until pressed where they will turn Green showing Active.

### ENGINE RUNNING PUMP READY TO OPERATE





GRATE SENSOR



DEF TANK LEVEL



3. Scrolling Screens – Providing a Straight forward convenience for the operator and easier access to pump status items using the up and down arrows to scroll through the primary operational and status displays.

### MAIN MENU DISPLAYS AND CONTROL

Press Menu Button for more pump options and info.



4. Main Menu Screen - After pressing the menu button a screen appears that provides the operator three options Adjust, Preferences, and Info



Selecting INFO provides the operator with 2 more options, See the list of Modules and status (Above) and See the system logs of operation and/or errors that have occurred during operation. (Below)



Selecting PREFERENCES provides the operator with 3 more options, Adjust the display (Above), Setting the date and time (Useful for log entries) and selecting the language the software should display. Currently English and Spanish are available (Below)





Selecting ADJUST provides the operator the ability to make setting to basic pump features (Above)

### EMERGENCY AND ALTERNATE CONTROLS

1. **Prox Sensor Fail / Engine Communication Loss Override** - If at any time the pump detects both prox Sensors are active at the same time it will assume there has been a failure of one or more of the sensors. When this happens, it will stop the pump from trying to stroke and provide the operator with a popup messages of the issue while providing a option to go into a **OVERRIDE** mode. If the Operator selects to go into the override mode, the operation of stroking the pump becomes only available in **LOCAL** and requires a **Dead man** operation of the **Stroke** button.



2. **PROX OVERRIDE MODE** - Select **Override** from the popup (above) **Stroke** button will be flashing to indication **Override** mode. (Below)

Blow Horn, Press and hold **Stroke** button to begin stroking. OPERATOR MUST RELEASE BUTTON WHEN PUMP BEGINS TO DEADHEAD! After release press and hold **stroke** button and pump will change direction and stroke until it begins to deadhead again.

PRESS HOLD **STROKE** BUTTON, RELEASE AT START OF DEAEHEAD, PRESS AND HOLD **STROKE** BUTTON, REPEAT.

**WARNING** - THIS MODE IS ALSO AVAILABLE WHEN COMMUNICATION IS LOST TO THE ENGINE, ENGINE WILL ONLY BE AT IDLE AND USE THIS MODE FOR CLEAN OUT AND GET OUT. DO NOT OPERATE PUMP IN THIS MODE FOR ANY EXTENDED PERIOD OF TIME.



**Alternate Control Mode** - If at any time the pump detects a loss of communication to the 2X4 or 2X6 control button pads or with the MVEC relay box it will assume there has been a failure of one or more of

these devices. When this happens, it will stop the pump from trying to stroke and provide the operator with a popup messages of the issue while providing a options to go into a ALTERNATE CONTROL or use REMOTE mode. If the Operator selects to go into the alternate control mode, the 2X4 and 2X6 control button pads will turn RED if possible and the alternate control will be available using the buttons on the main screen MD# display.



3. ALTERNATE CONTROL MODE - Selecting REMOTE when there is an error will allow normal remote controls. Pressing the OK Button toggles REMOTE and LOCAL.

Selecting yes to go into Alternate control displays 2 screens on the main display which are navigated with the arrow buttons. Pump will operate normally using the alternate button but may not allow Horn to blow or Vibrator to operate.

It is possible to have both the need for alternate controls and override at the same time. Pump will operate as described on the override section but requires holding the alt control for stroke.





## GAUGES

PUMP or DRIVE CYLINDER GAUGE indicates the hydraulic pressure requirement of the pumping cylinders to push material. Gauge reading varies depending upon many circumstances such as: material slump, material line type, size and length, vertical, uphill, downhill or horizontal placement, pumping speed, etc.

S-TUBE GAUGE indicates amount of oil pressure stored in accumulator circuit. Pressure will build and stabilize at a set pressure once E-STOP is reset. Pressure will fluctuate as swing cylinder(s) shift but will always recharge to the same set pressure.

PILOT GAUGE (CLOSED LOOP ONLY) indicates volume adjustment of main hydraulic pump,  
Works between a range of 90 PSI(6bar) min and 275 PSI (19 Bar max).



## JOBSITE SET-UP

Refer to the Safety Manual for set-up safety precautions not limited to the following guidelines:

### **WARNING**

Ensure Machine Can Be Safely Operated in Set-Up Location  
Away from Hazards and Dangers  
Away from Slopes and Excavations

### **WARNING**

Position Machine on As Solid and Level Ground As Possible

### **WARNING**

Adjust height of Machine and remove Leg pins

### **WARNING**

Secure Machine Positions with Leg Pins and Locks

## PRIMING

Priming consists of pumping a lubricant to coat the s-tube and delivery lines to assist the initial concrete material in getting through the delivery lines and avoid blockages. Once the delivery lines are full of concrete, that material will supply the lubrication necessary for the material to flow through the delivery lines. However, it is imperative that a primer be used ahead of the initial concrete material to pre-lubricate the lines in order to avoid blockages.

A suggested grout to use for priming and lubrication may consist of 2 parts sand and 1-part cement and mixed to a consistency of a thick cream.

The amount of grout required depends on the length of the delivery line as well as the material being pumped. Operator experience will eventually indicate the amount to be required.

In addition to grout, there is a wide variety of priming products available on the market.



## PREPARING FOR SYSTEM START-UP

Everyone involved with the operation, maintenance, inspection, and repair of the concrete pump **MUST READ** and **UNDERSTANDS** this manual and the Safety Manual.

Refer to the Safety Manual for pumping and blockages safety precautions not limited to the following guidelines:



Perform Required Inspection, Lubrication, and Maintenance  
Before, During, and After Pumping Operations



Do Not Remove Hopper Grate  
Or Other Safety Components



Do Not Insert Body Parts into Hopper, S-Tube, or Water box  
Or Other Moving Components

### OPERATION OF CONTROLS

**THE HOPPER GRATE MUST BE CLOSED** (There is a safety interlock that guards against the opening of the mixer grate.)

#### SYSTEM START-UP



Turn Pump ON Only When Hopper Is Full of Concrete



Ensure the following conditions are met before activating pump:

- PUMP Switch Is "OFF"
- VOLUME CONTROL Is Set To MINIMUM
- AGITATOR Control Is placed in the "OFF" Position
- EMERGENCY STOPS Are Not Activated
- Controls "On" LOCAL Position



1. Turn KEY operated SYSTEM POWER Switch to "ON"
2. Turn KEY switch to start engine
3. Activate the HORN/RESET to prepare the concrete pump for operation
4. After engine warms up, increase RPM to desired engine RPM by adjusting THROTTLE CONTROL
5. Adjust VOLUME CONTROL to low output when starting pumping operations
6. Switch PUMP Switch to "ON" to pump concrete when hopper is full, maintain full level
7. Closely monitor the PUMP pressure gauge while pumping
8. Turn PUMP Switch to "REVERSE" to reverse the pumping action if necessary. REVERSE function is typically used to relieve pressure in the delivery line in the event of a blockage. A blockage will generally result in the main hydraulic system reaching maximum pressure as indicated on the PUMP PRESSURE GAUGE
9. Turn PUMP Switch "OFF" to stop cycling and stop pumping concrete
10. In the event of an emergency, push the "EMERGENCY STOP" Button "IN" to stop all functions of the concrete pump. Pull the "EMERGENCY STOP" Button "OUT" to enable system to reset; Horn/Reset function must be activated to reset pump operation.

## MAINTENANCE

### RECOMMENDED MAINTENANCE PRACTICES

#### MAINTENANCE MANAGEMENT

Schedule lubrication and maintenance inspections to anticipate maintenance issues. Maintenance management requires the assignment of responsibilities to individual personnel, training of personnel, keeping of records, and the exercise of judgment.

#### INSPECTION AND LUBRICATION CHECKLISTS AND OPERATOR REPORTS

Utilize checklists for scheduled inspection and lubrication and maintain a written record regarding observations and actions performed. Maintain all scheduled maintenance reports by the operator listing any malfunctions and observations.

#### MIXER HISTORY FILE NOTING MIXER SERIAL NUMBER

File the operator reports, inspection and lubrication checklists, shop repair, work orders and tickets, parts replacement and pump usage records. This file should also include the parts book for the specific serial number and engine.

#### ANNUAL REVIEW

Review the history records of each unit once every year to find evidence of repetitive failures, adjustments, problems, or excessive wear so that action can be taken to minimize breakdowns and reduce excessive maintenance costs. A review of the machine history will help in the stocking of spare parts and assemblies in advance of a possible need.

**CAUTION**

Engine Manufacturer Maintenance Schedule Must Be Followed  
Read Engine Manufacturer Manual

**REED** has provided only general guidelines regarding engine maintenance and will not cover engine warranty claims.

### MAINTENANCE

#### **WARNING**

Hydraulic Pressure in All Systems Must Be ZERO Before and During Any Maintenance Procedures

Engine Must Be Turned OFF and Lockout / Tagout Procedures Must Be Followed Before and During Any Maintenance Procedures



## GENERAL MAINTENANCE AREAS

Perform scheduled inspections to identify and detect any potential problems. The list presented should be inspected and checked on a regular basis and is a recommended minimum.

### MAIN CONTROLS

- Control box in good condition, sealed, not damaged
- All Switches, Push buttons, E-Stop in good condition, not broken, jammed or bent and stay in position or momentarily return to center
- Control identification in good condition, legible
- Gauges in good condition

### REMOTE CONTROLS

- Control console in good condition, not damaged
- Switch in good condition
- Cord in good condition, no cuts, securely mounted to box

### HYDRAULIC SYSTEM

- Hydraulic tank securely mounted, covers tight
- Breather, filler cap and strainer in place, level sight gauge in proper condition
- Check filter condition indicators
- Hydraulic oil cooler securely mounted; connections tight
- Hydraulic fluid to proper level and clean
- All hoses and tubing secure, check for leaks

## LUBRICATION

Rapid wear and possible shutdown will result if the unit is operated with inadequate lubrication. Follow the recommendations stated herein, and if needed increase the application of lubricants above these recommendations when the equipment is subject to heavy usage.

### RECOMMENDED LUBRICATING INTERVALS

Recommended lubrication intervals are based on normal use under normal conditions. The lubrication interval must be increased to meet more challenging uses and uses which subject the equipment to high and/or unusual concentration of forces. The lubrication interval must be increased if the pump has been exposed to environmental conditions such as low humidity, high humidity, excessive dust, high temperatures, low temperatures, heavy rainfall, long term storage, ocean air, etc...

1) every hour of operation

2) after completion of every job

All lubrication points must be greased on every interval as recommended.

### TYPE OF LUBRICANT

- Use EP grease, extreme pressure grease available for wheel bearings, general purpose grease, Shell Alvania EP (LFH2), or equivalent if this lubricant is unavailable in your area



- Do NOT use Moly grease, grease with Moly additives

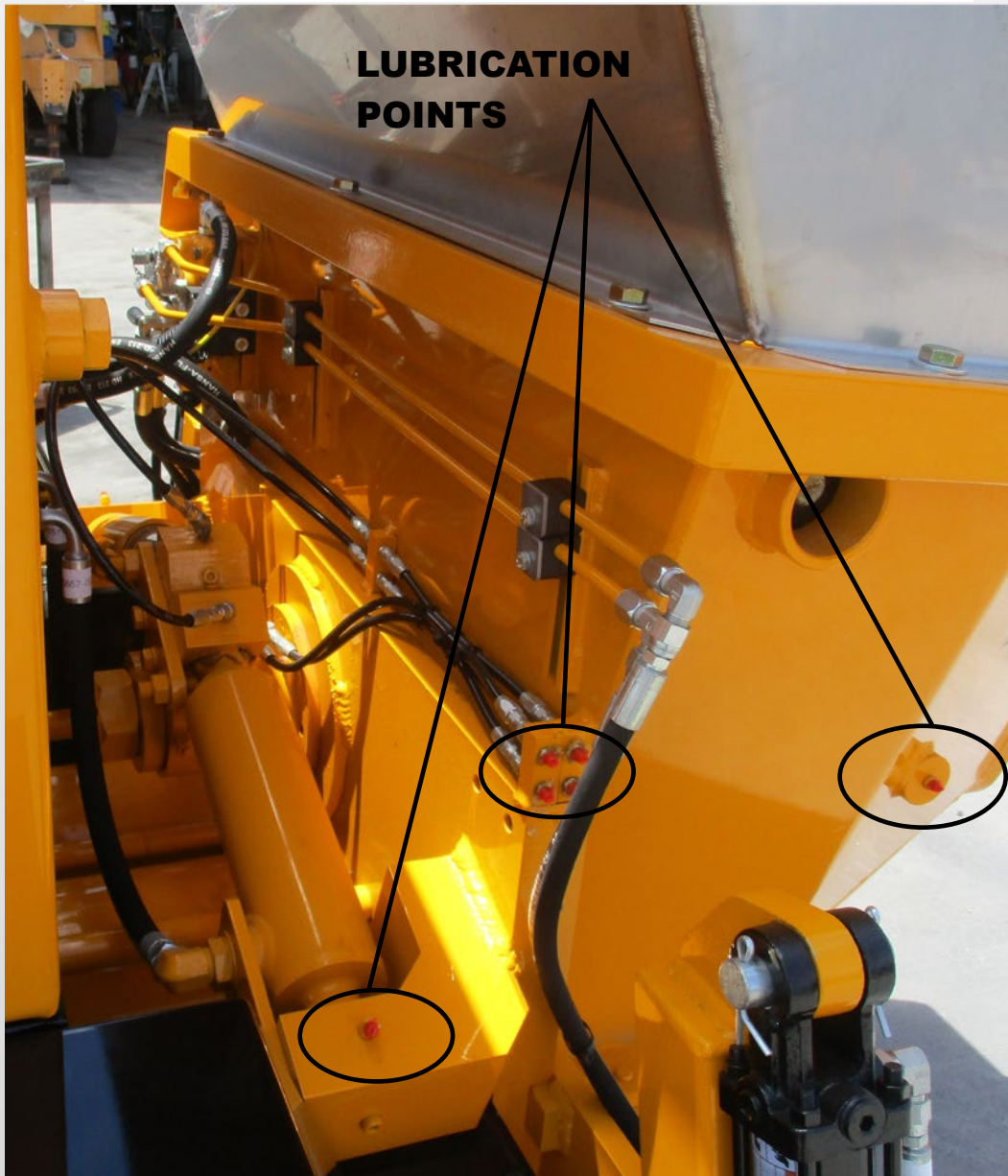


### LUBRICATION POINTS

The following graphics are for REFERENCE ONLY.

#### CAUTION

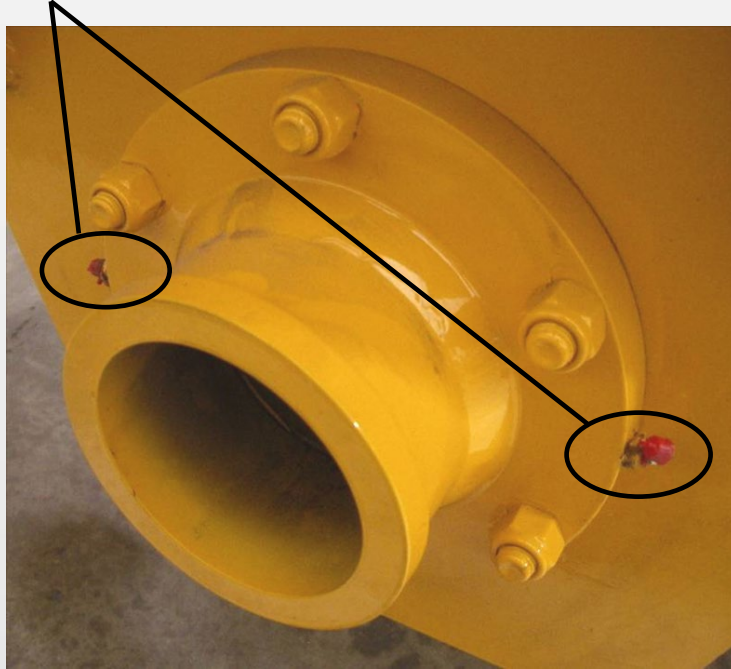
IF EQUIPPED WITH DUAL (2) HYDRAULIC SHIFT CYLINDERS,  
RELIEVE SHIFT CIRCUIT HYDRAULIC PRESSURE TO PROPERLY GREASE  
HYDRAULIC SHIFT CYLINDERS AND BELL CRANK





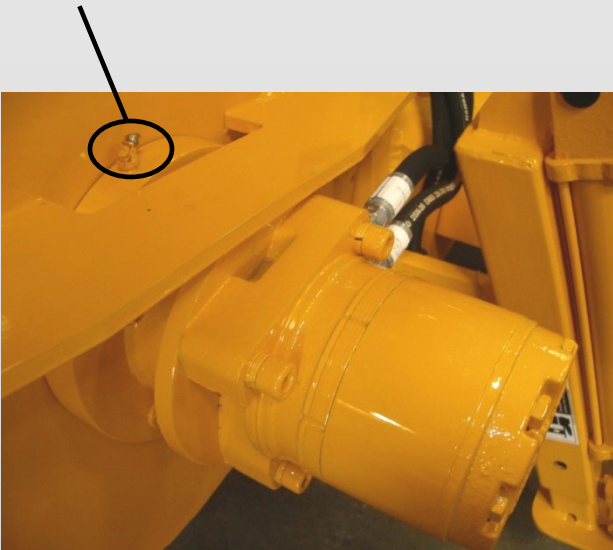
### LUBRICATION POINTS

#### S-TUBE OUTLET GREASE POINTS

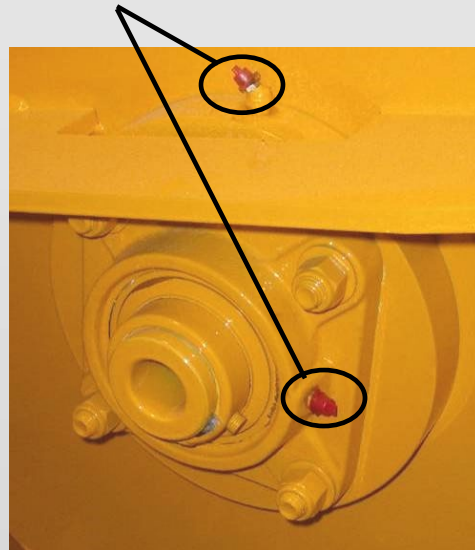


#### AGITATOR GREASE POINTS

HYDRAULIC MOTOR SIDE GREASE POINTS



BEARING SIDE GREASE POINTS



### HYDRAULIC SYSTEM

Hydraulic pumps are used to supply the flow of oil necessary to operate actuators of the concrete pump.

### CAUTION

Contamination of the Oil Is the Leading Contributor to System Malfunctions

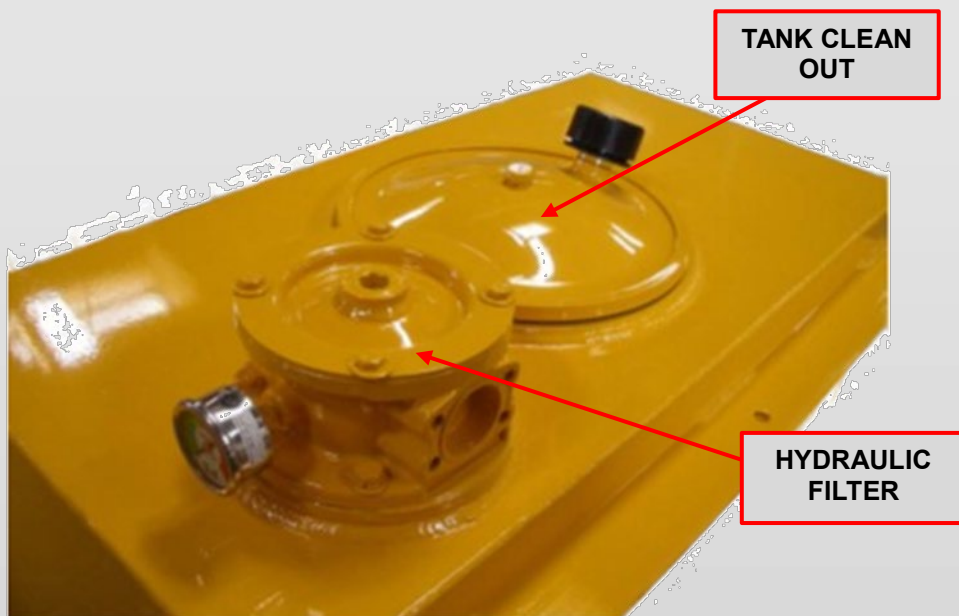
Extreme care must be exercised to prevent contaminants from entering the system. Always cap or plug open ports and hydraulic lines.

### HYDRAULIC TANK

Hydraulic tank can be equipped with an access cover with breather. A sight and temperature gauge are installed on the tank to determine the fluid level and temperature inside the tank. The tank is also equipped with drain valve.

To accomplish filtration, hydraulic tanks can be equipped with the following: internal magnetic suction strainers, a suction filter, a return filter and a pressure filter.

NOTE: Not all models use all these components. Suction and return filters are equipped with an indicator gauge to monitor filter restriction. An oil cooler is adjacent to the engine cooling unit.



## HYDRAULIC SYSTEM MAINTENANCE ITEM DESCRIPTIONS

### FLUID

Check fluid level and oil clarity daily with sight gauge provided. Maintain level at full mark. Add hydraulic oil through the return filter fill port when necessary.

### TANK BREATHER

Clean every 50 hours of operation. Remove from tank, clean with solvent and air blow dry.

### FILTER

Change after first 50 hours of operation. Thereafter change every 250 hours of operation or when condition gauge indicates change is necessary.

### HYDRAULIC TANK

Change oil in tank every 500 hours of operation or yearly, whichever comes first.

### HYDRAULIC FLUID

The hydraulic system is filled with Shell Oil Company TELLUS #46. It is to be used in ambient temperatures of 39-90° F (4-32° C). The normal fluid temperature will range from 100-167° F (38-75° C).

For ambient temperatures of 90° F (32° C) and above, use fluid designated with an ISO rating of 68. Use ISO 32 for ambient temperatures of 32° F (4° C) and below.

**CAUTION**

Use Only Shell Tellus 46 or Equivalent  
Never Mix with Other Types of Fluids

**CAUTION**

Always Use Clean and New Fluid

Using impure or other type of fluids not specified will contaminate the hydraulic system and lead to eventual system malfunction and/or damage.

## ADDING HYDRAULIC FLUID

There are a few common methods for filling the hydraulic tank as described below. Exercise extreme care when adding fluid to the hydraulic tank to avoid contamination.

- To prevent any dirt or water from entering the hydraulic tank, thoroughly clean area around the return filter fill port plug, the vented fill cap or the inspection cover.
- Remove return filter fill port plug, vented cap or inspection cover.
- Fill system to MAX LEVEL mark on sight gauge with new clean hydraulic fluid. If a pump is used to transfer the fluid, ensure the pump filter is clean. If pouring fluid from a container, pour it through a fine wire mesh screen, 200 mesh or finer.
- Replace filter fill port plug, vented cap or inspection cover immediately after filling tank to proper level

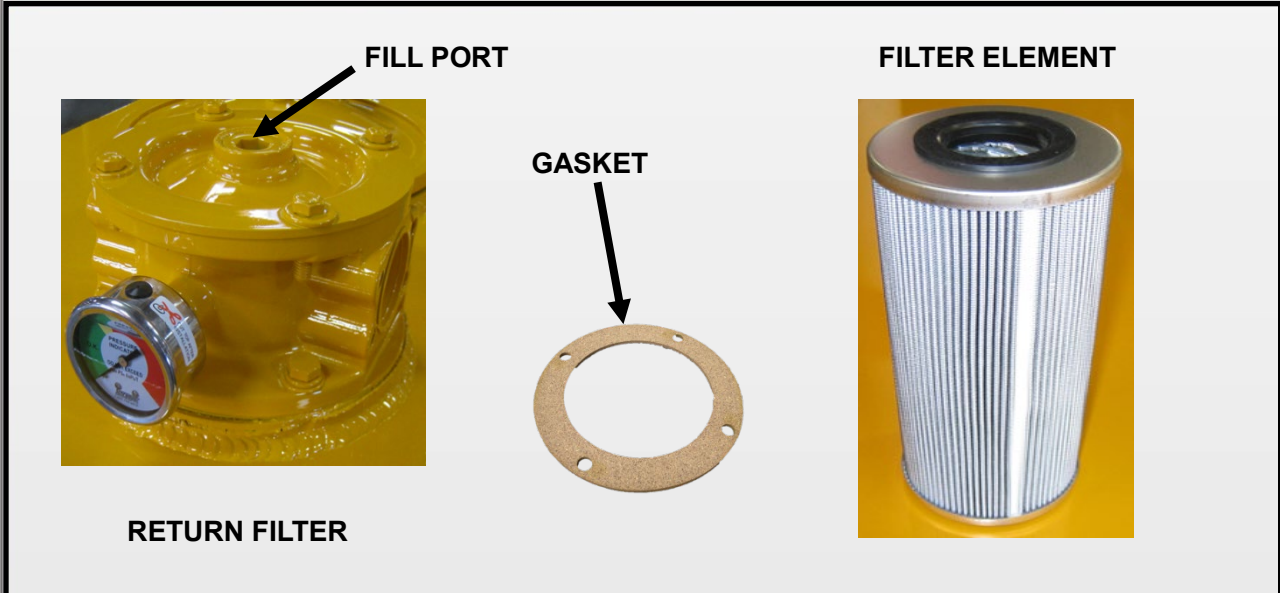
## FILTER SERVICING

Hydraulic filters provide a means of continuous hydraulic fluid filtration to prevent recirculation of contamination which will cause rapid wear and component breakdown.

A filter that is equipped with a condition indicator gauge should be checked daily and the element changed when indicated to do so. Below are TYPICAL filters and filter elements.

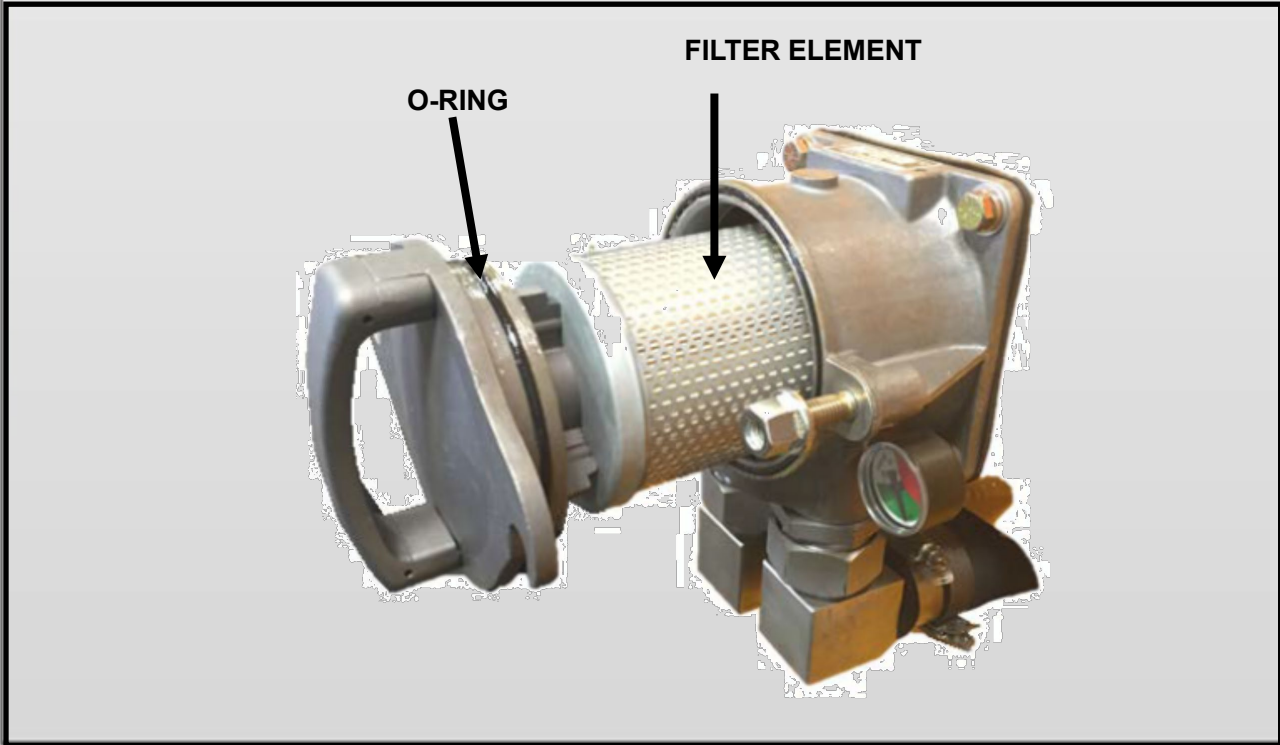






### CAUTION

**Do Not Use Cloth for Straining Fluid  
Lint Is a Contaminant Harmful to the Hydraulic System**



To change the filter elements:



1. Shut off machine.
2. VERIFY PRESSURES IN ALL CIRCUITS READ ZERO!
3. Wipe clean any dirt and grime from area surrounding filter housing
4. Loosen the filter cover plate bolts
5. Carefully remove cover so as not to damage the gasket or O-ring
6. Discard only element and discard responsibly
7. Install bypass valve (if equipped) and new element and replace cover
8. Wipe clean any contaminants around high pressure filter
9. Remove filter housing then remove and discard filter element
10. Check and replace O-ring or gasket if necessary
11. Replace filter element and install filter housing
12. Start-up machine and observe for leakage

**CAUTION**

Do Not Wash Out and Reuse Disposable Filter Elements

#### CLEANING THE HYDRAULIC TANK

The hydraulic tank should be drained and cleaned after 500 hours of operation or yearly, whichever occurs first, to assist in keeping the systems clean and in proper condition.

1. Shut off machine
2. VERIFY PRESSURES IN ALL CIRCUITS READ ZERO!
3. Place a suitable size container under the hydraulic tank drain fitting and then remove drain plug. Dispose of used oil responsibly
4. After draining, remove the access cover on the hydraulic tank being careful not to damage the gasket
5. Remove, disassemble and clean magnetic suction strainers before reassembly (if equipped)
6. Flush the inside of hydraulic tank with clean solvent and wipe clean with lint free cloths
7. Install suction strainers (if equipped)
8. Replace sight gauge
9. Install the tank drain plug and access cover with gasket.
10. Change the hydraulic system filter element(s) and breather cap
11. Refill the hydraulic tank with new clean hydraulic fluid to MAX LEVEL mark
12. Start machine and check for leaks

## COMPONENT REPLACEMENT

When parts are worn, do not delay in replacement. Continued usage with worn parts may lead to damage of other components.

Please contact the **REED** Service Department or your local dealer for technical support.





# PUMP MAINTENANCE SCHEDULE AND CHECKLISTS

Providing a maintenance schedule defined specifically by run hours or yardage pumped serves only as a general guideline given the large amount of variables a unit might be subject to, such as weather and ambient temperature conditions, jobsite conditions, material differences of mix design, the load burden the unit is typically subject to, i.e. light, medium or heavy duty operation, etc.

The list that follows is to be used as a reference guide. However, the end user is encouraged to develop a preventative maintenance program that specifically suites their needs depending on the usage of the equipment.

DAILY PUMP MAINTENANCE CHECKLIST		
Actual Hours _____		Date ____ / ____ / ____
#	Maintenance Description	Initials
1	Check hydraulic tank fluid levels	
2	Check condition of hydraulic oil for water or other contamination.	
3	Drain water from hydraulic tank	
4	Check engine fluid levels (see engine manufacturer maintenance schedule for additional requirements)	
	Additional Notes:	
5	Check hydraulic filter indicator condition	
6	Lubricate lubrication points, during and after pumping	
7	Inspect unit for fluid leaks, loose hoses, loose nuts, bolts, fasteners etc.	
	Additional Notes:	
8	Additional Notes:	



# OPERATION and MAINTENANCE

[www.reedpumps.com](http://www.reedpumps.com)

(909)287-2100

INITIAL 50 HOUR MAINTENANCE CHECKLIST		
Actual Hours _____		Date ____ / ____ / ____
#	Maintenance Description	Initials
1	Change engine oil and filters (see engine manufacturer maintenance schedule for additional requirements) IF REQUIRED	
	Additional Notes:	
2	Change hydraulic oil filters	
3	Inspect hydraulic hoses and fittings for any signs of external wear or damage	
	Additional Notes:	



# OPERATION and MAINTENANCE

[www.reedpumps.com](http://www.reedpumps.com)

(909)287-2100

EVERY 100 HOUR MAINTENANCE CHECKLIST		
Actual Hours _____		Date ____ / ____ / ____
#	Maintenance Description	Initials
1	Clean hydraulic tank breather	
2	Inspect all structural components (check frame, hopper, and other structural members for any damage)	
	Additional Notes:	
	Additional Notes:	
3	Check coolers and radiators for dirt or debris. Clean as necessary	
4	Check condition of engine drive belts. Change if necessary (see engine manufacturer maintenance schedule for additional requirements) IF REQUIRED	
Additional Notes:		



# OPERATION and MAINTENANCE

[www.reedpumps.com](http://www.reedpumps.com)

(909)287-2100

EVERY 250 HOUR MAINTENANCE CHECKLIST		
Actual Hours _____		Date ____ / ____ / ____
#	Maintenance Description	Initials
1	Change hydraulic filters (or change more frequently as indicated by indicator gauge on filter)	
	Additional Notes:	
2	Check that all electrical wires, cables, terminals, plugs are in good condition	
	Additional Notes:	
3	Change engine oil and filters (see engine manufacturer guide for all engine requirements) IF REQUIRED	
	Additional Notes:	
4	Check condition of fuel hoses, fittings, and clamps	
	Additional Notes:	
5	Inspect all safety decals to ensure that they are completely visible and legible	
6	Perform complete inspection of the controls	
7	All toggles in good condition, stay in position or momentarily return to center	
8	Control identification in good condition, legible	
9	Perform complete inspection of the controls	
10	All toggles in good condition, stay in position or momentarily return to center	
11	Control identification in good condition, legible	
12	Gauges in good condition	
	Additional Notes:	



# OPERATION and MAINTENANCE

[www.reedpumps.com](http://www.reedpumps.com)

(909)287-2100

EVERY 250 HOUR MAINTENANCE CHECKLIST		
Actual Hours _____		Date ___ / ___ / ___
#	Maintenance Description	Initials
13	Control console in good condition	
14	Switch in good condition	
	Additional Notes:	



# OPERATION and MAINTENANCE

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(909)287-2100

EVERY 500 HOUR MAINTENANCE CHECKLIST		
Actual Hours _____		Date ____ / ____ / ____
#	Maintenance Description	Initials
1	Inspect hydraulic hoses and fittings for any signs of external wear or damage	
	Additional Notes:	
2	Inspect all wear parts and change as necessary (excessive wear may cause inefficient performance and/or shutdown of operation)	
	Additional Notes:	
3	Change hydraulic fluid, clean the reservoir and the suction strainers within reservoir, and replace all hydraulic oil filters	
	Additional Notes:	
4	Complete inspection of the engine (refer to engine manufacturer maintenance schedule for details) IF REQUIRED	
5	Inspect mountings, bolts, brackets	
6	Oil level proper, coolant level proper, check for leaks	
7	Fuel system, tank mounting, filter condition, check for leaks, damaged lines	
11	Air cleaner and muffler securely mounted IF REQUIRED	
Additional Notes:		





**OPERATION and MAINTENANCE**



EVERY 500 HOUR MAINTENANCE CHECKLIST	
Actual Hours _____	Date _ / _ / _
ADDITIONAL GENERAL NOTES:	



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NOTES

**REED**

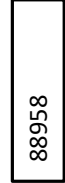
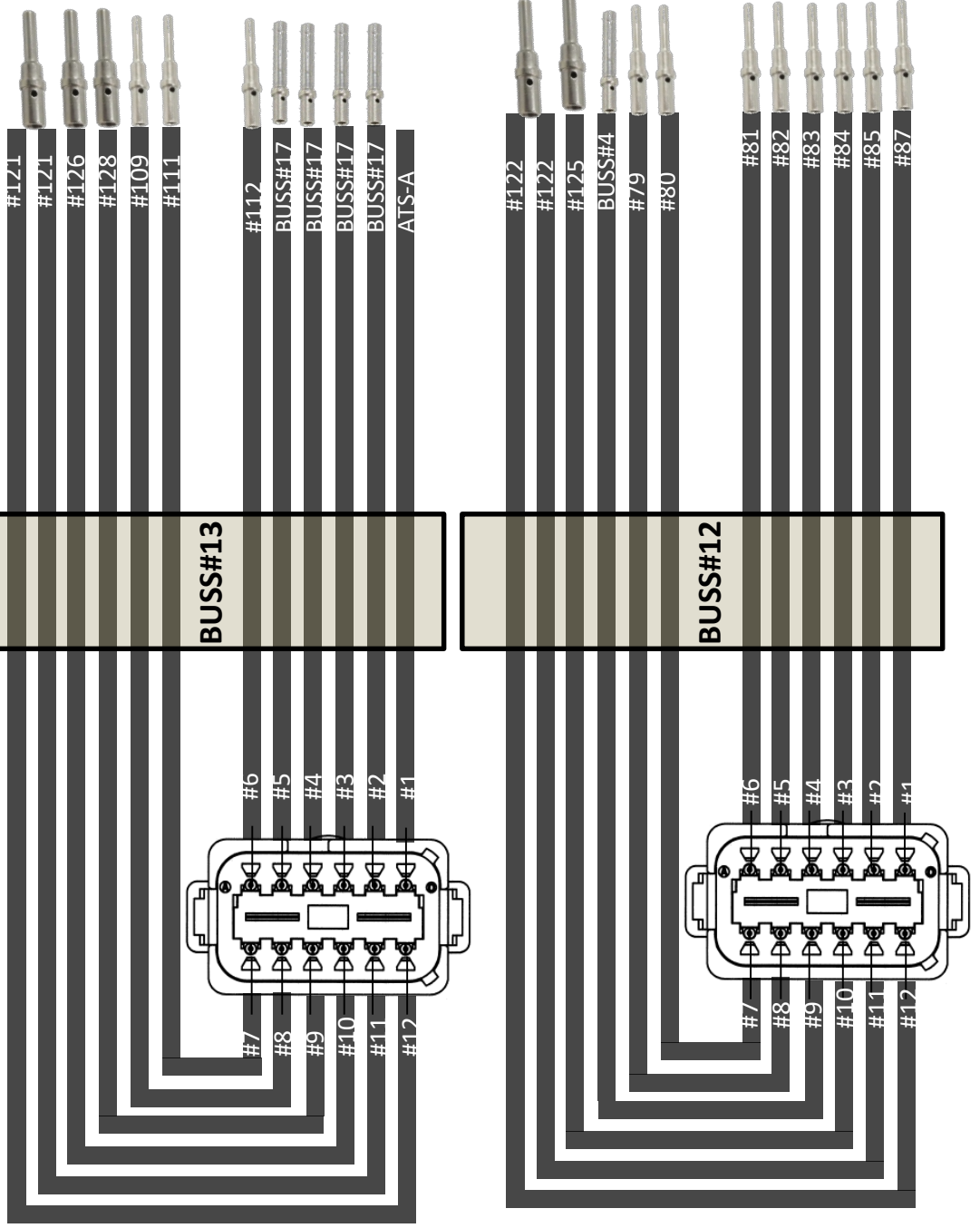
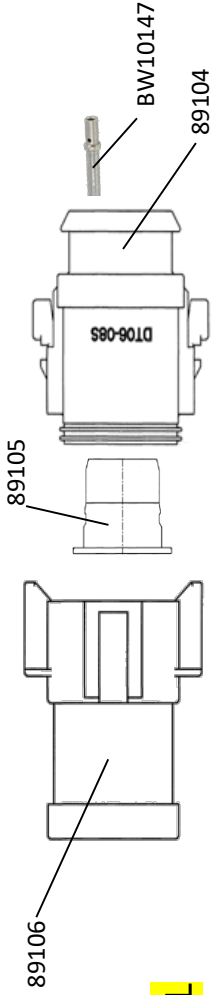
**89334-T4 C-SERIES CONTROL PANEL**



**89113 PCL WIRING HARNESS SCHEMATIC**

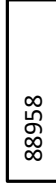
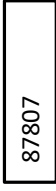
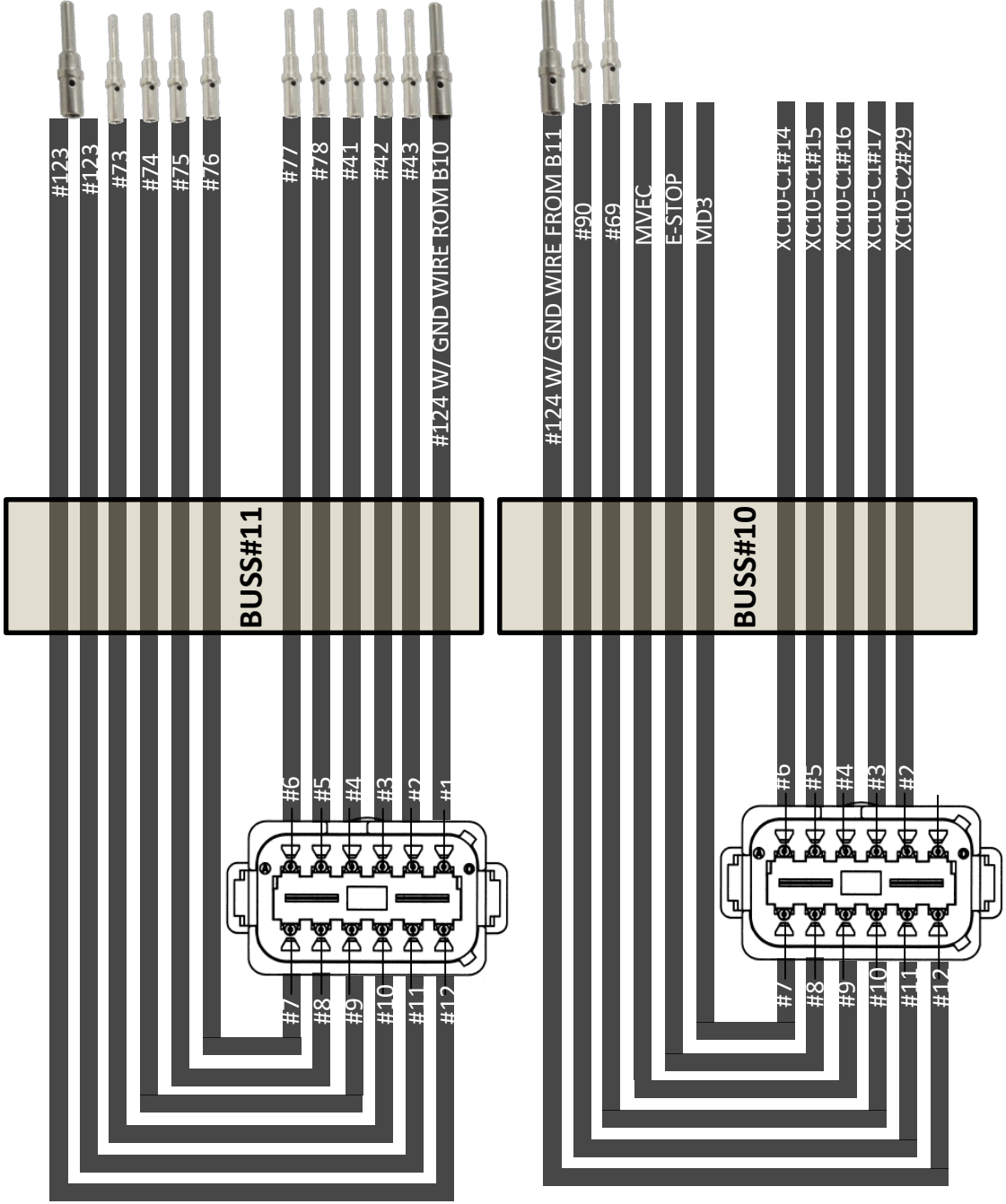
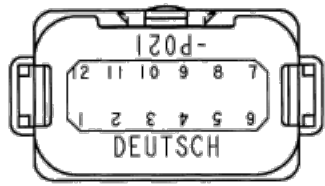
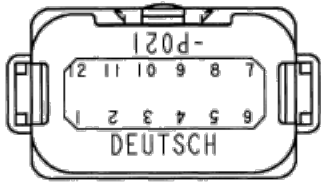
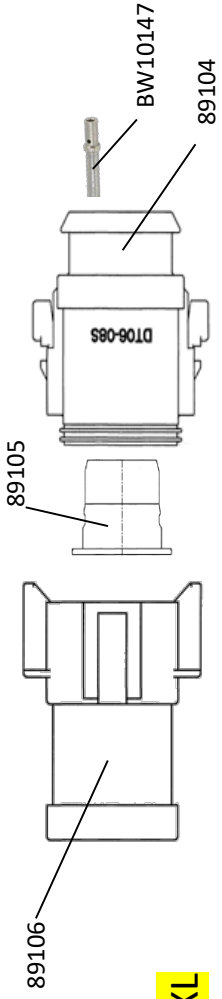
# GROUND BUSES

CUT ALL WIRES 4FT 18 AWG TXL

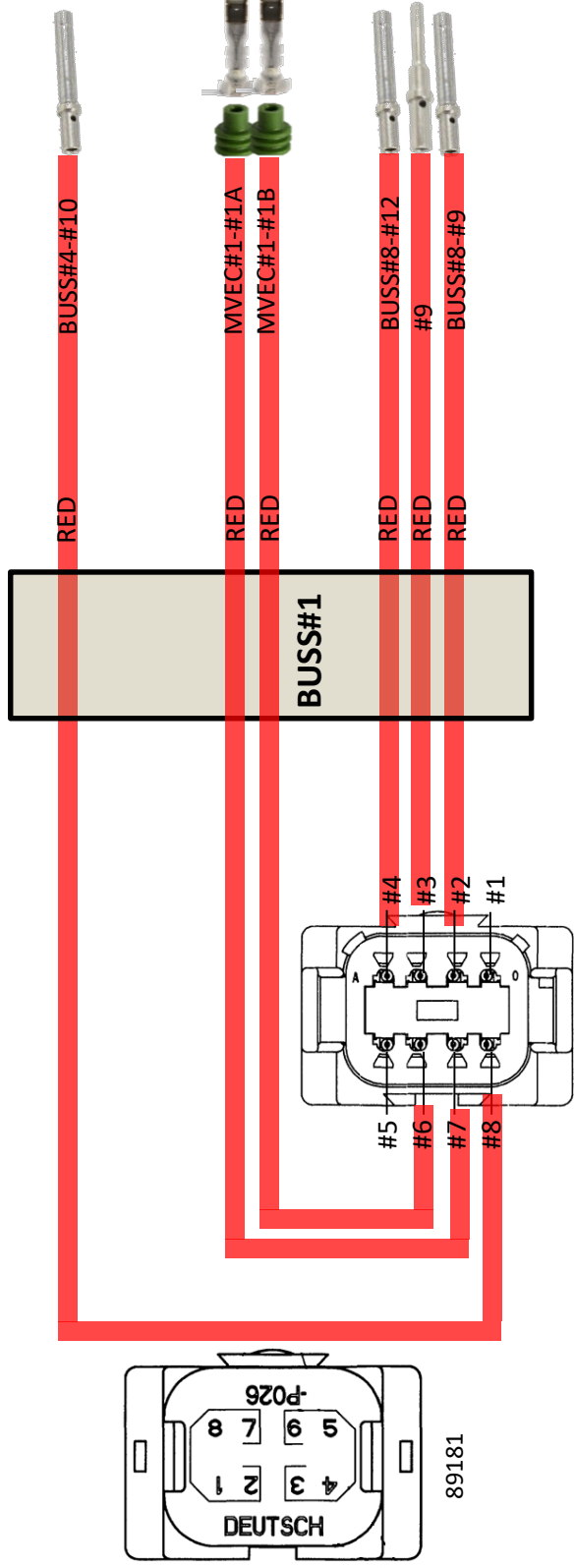
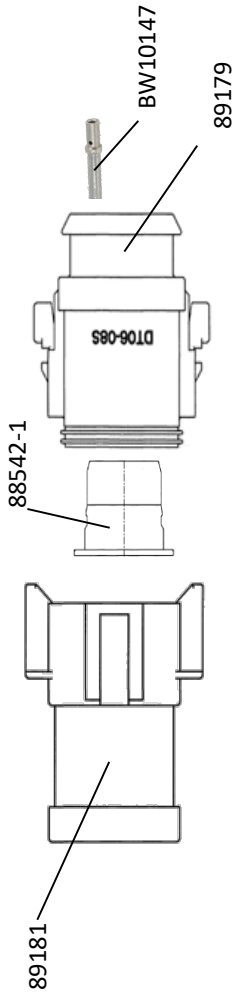


# GROUND BUSES

CUT ALL WIRES 4FT 18 AWG TXL



# BUSS #1



BW10147



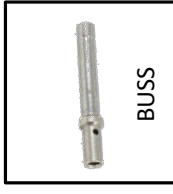
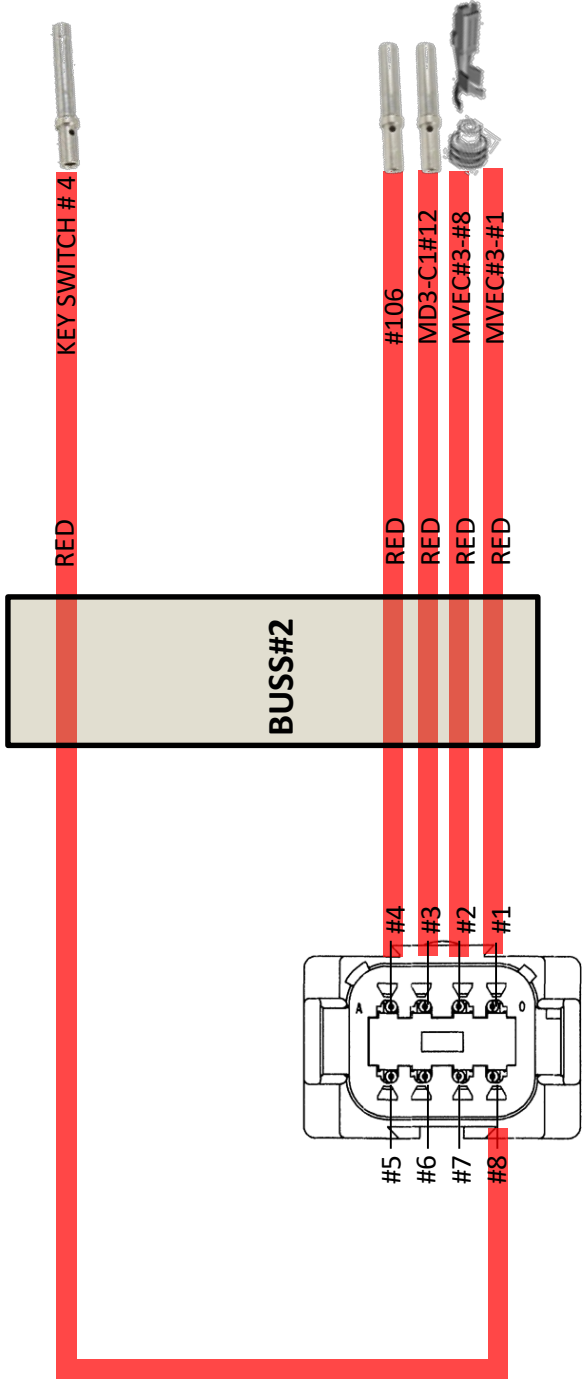
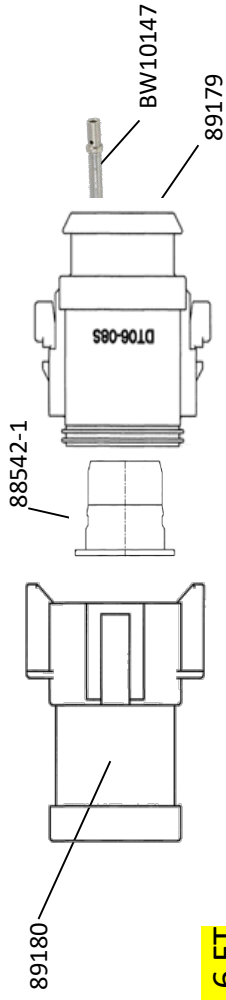
88960-1S  
89110-6



88958

# BUSS #2

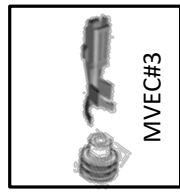
CUT WIRE 4 @ 4'  
 REMAINING 4 WIRES @ 6 FT  
 18 AWG RED TXL WIRE



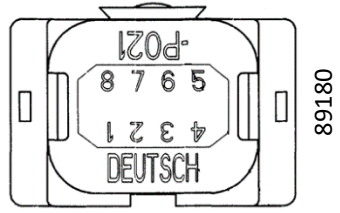
BW10147



88959

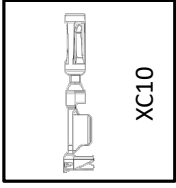
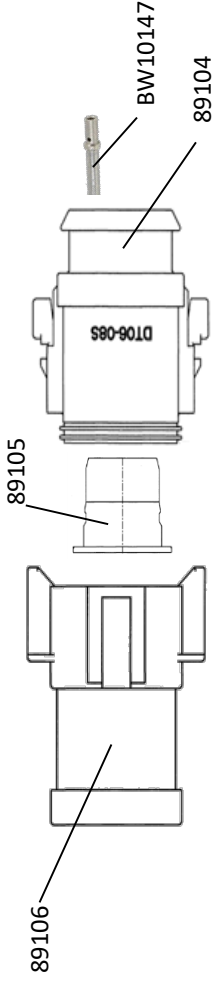


89112-2  
 89112-3





# BUSS #3



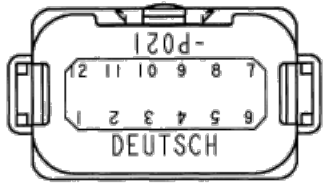
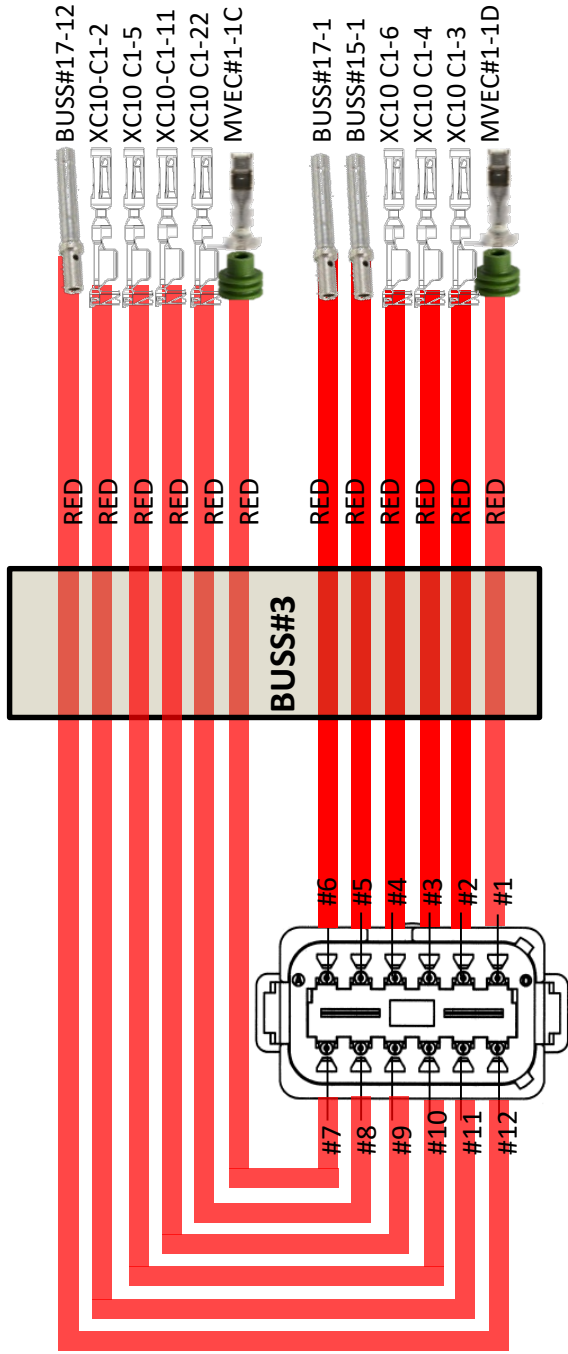
88945-S



BW10147

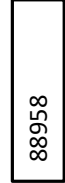
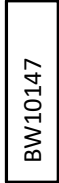
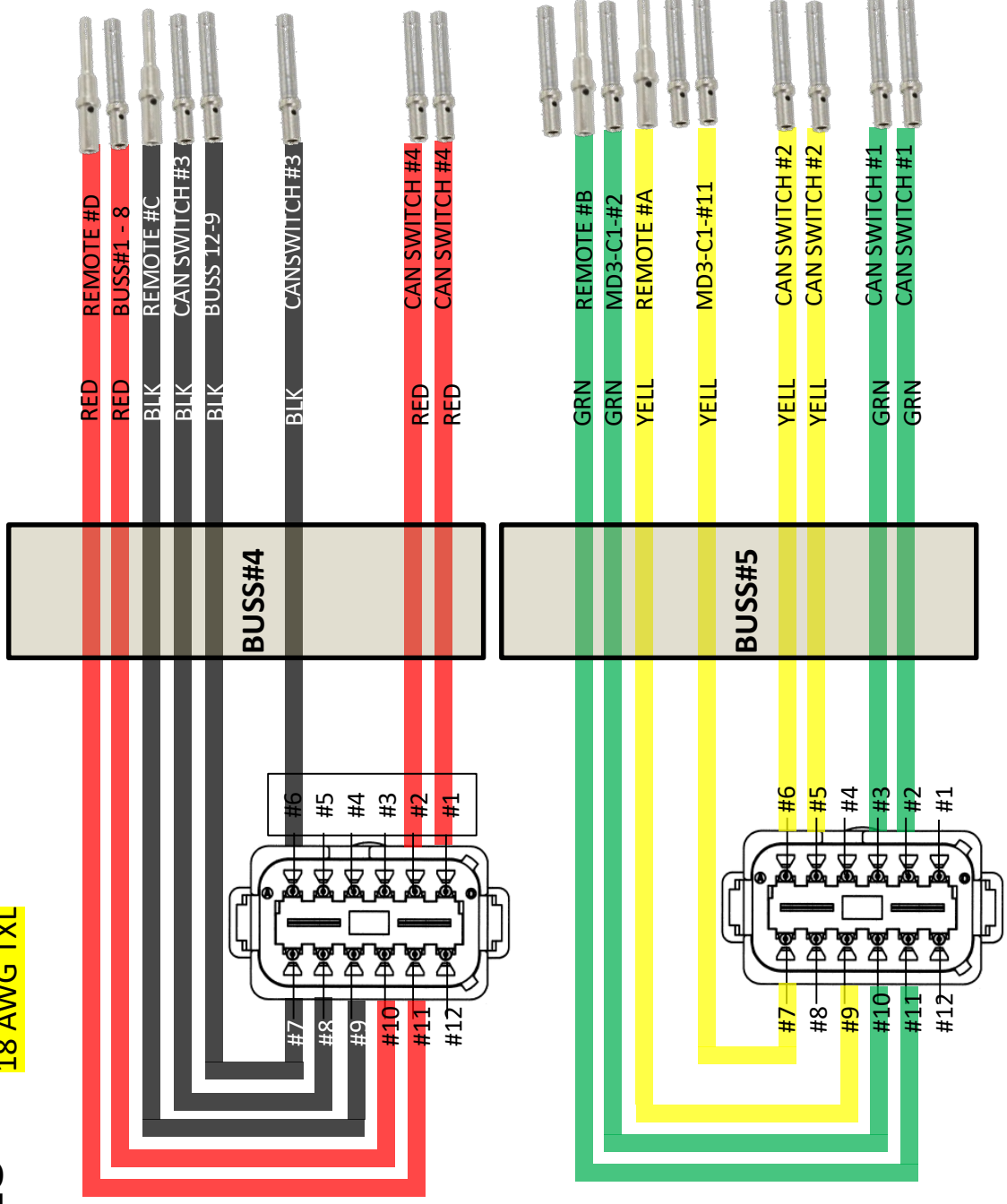
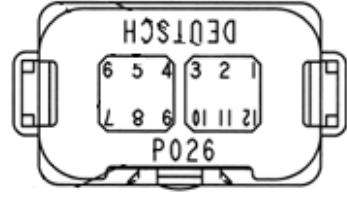
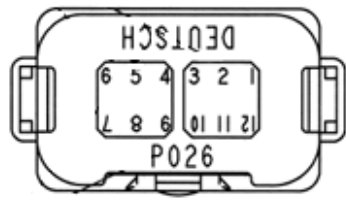
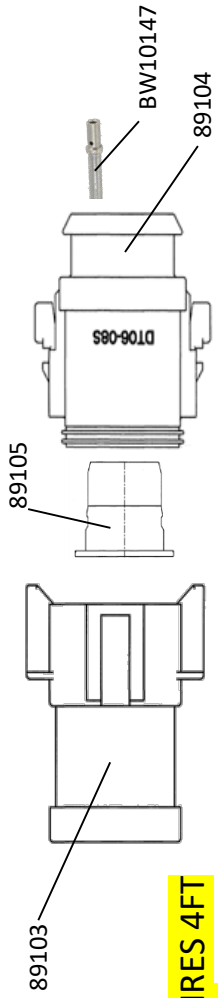


88960  
89110-6 GRN

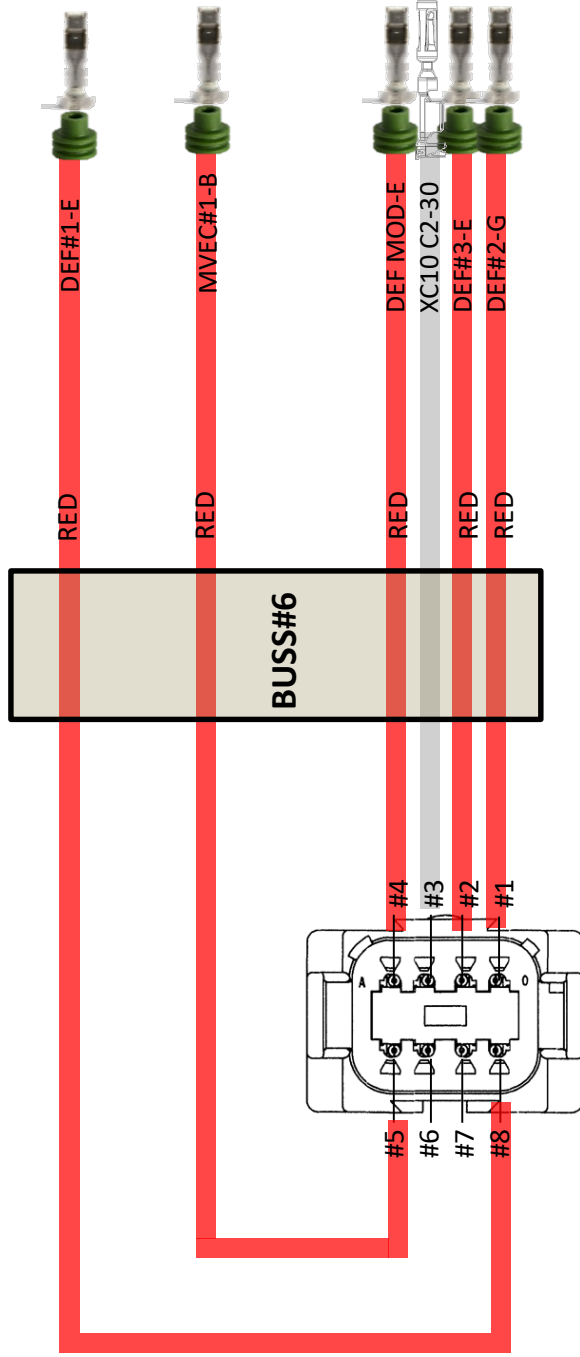
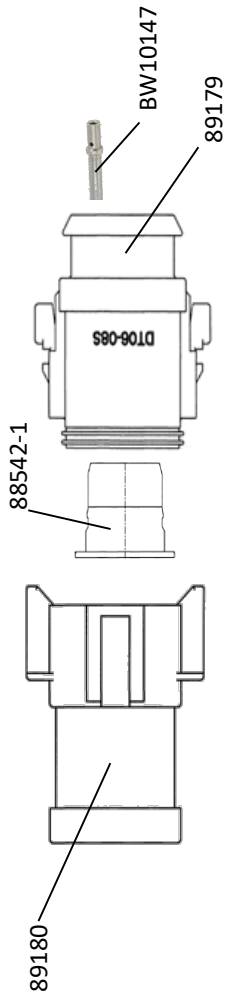


# BUSS #4 BUSS #5 CAN HI/LO

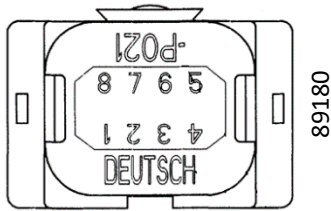
CUT ALL WIRES 4FT  
18 AWG TXL



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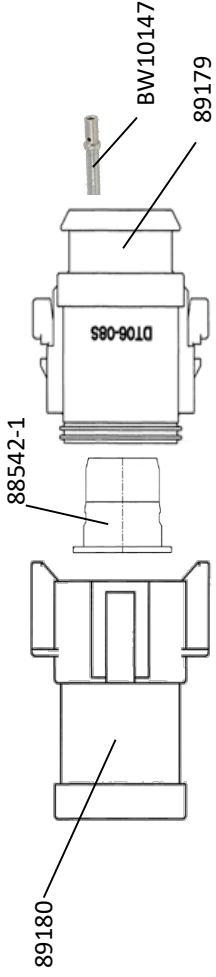


88960-1S  
89110-6 GRN



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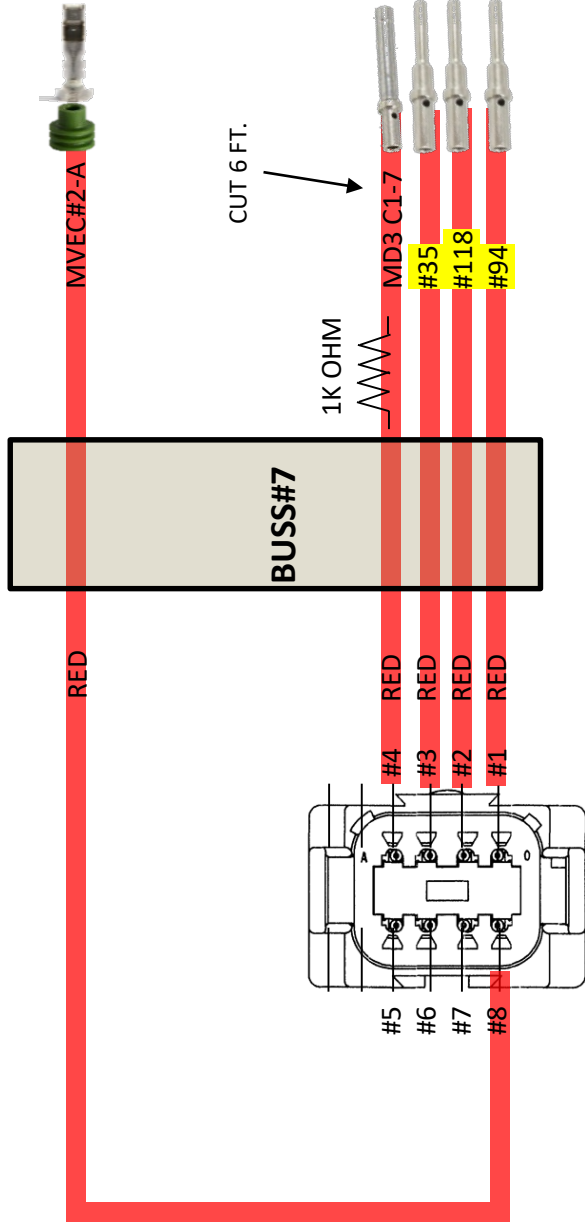
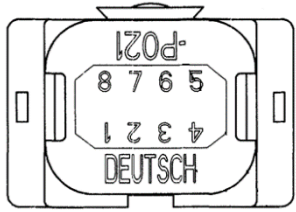
WIRES 1,2, & 3 CUT @4FT  
18AWG RED TXL WIRE



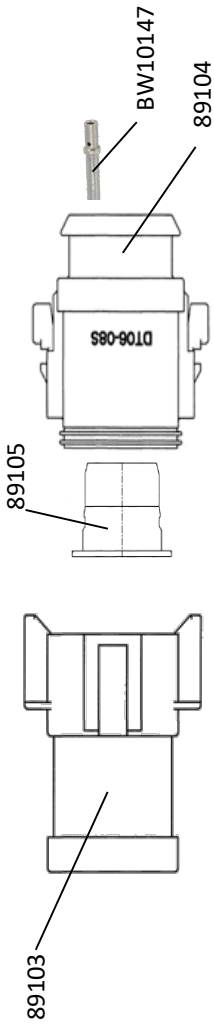
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89110-6 GRN



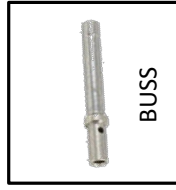
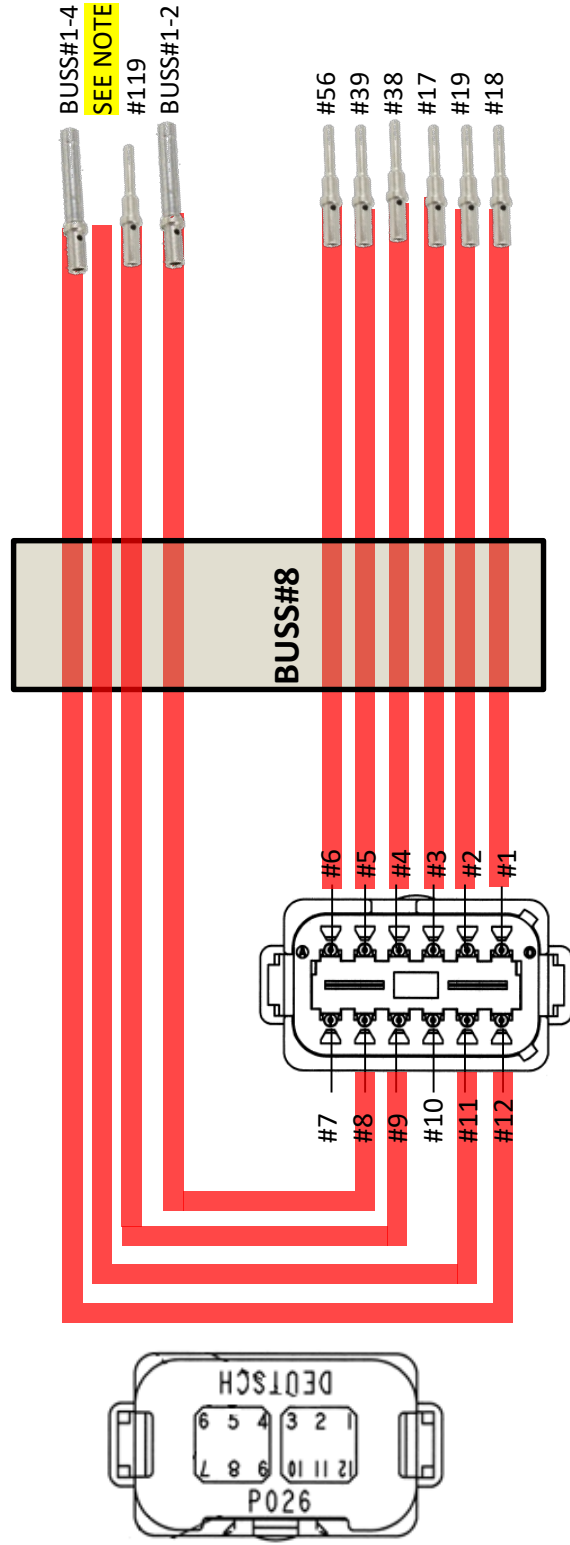
128 PLUG  
88958



# BUSS #8



**CUT ALL WIRES EXCEPT PIN 11 TO 4FT  
18 AWG RED TXL WIRE**



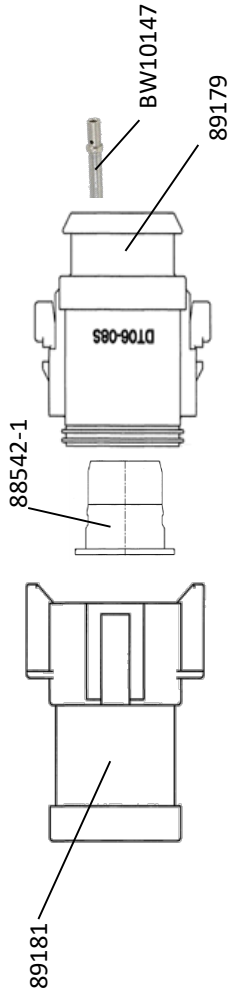
BW10147



88958

**FOR PIN 11  
T3: PIN TO TIER3 - 3  
T4: PIN TO ATS - G**

# BUSS #9



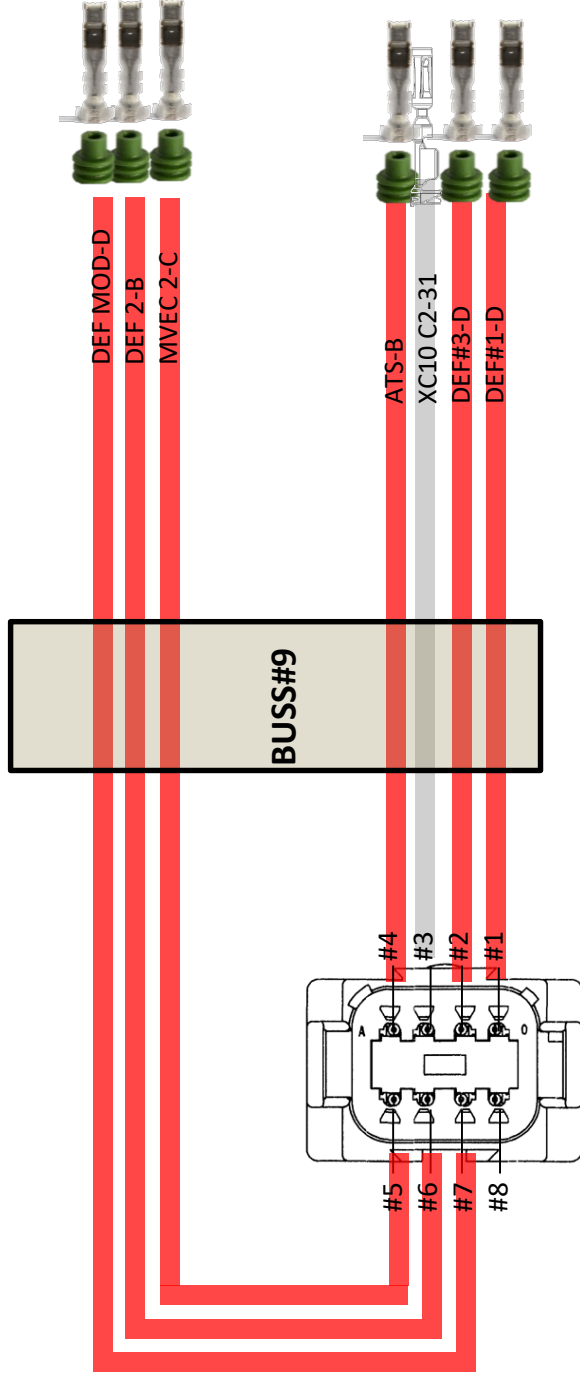
MVEC#1-2  
DEF RELAYS

88960  
89110-6

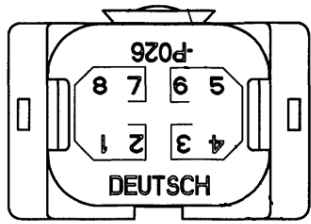
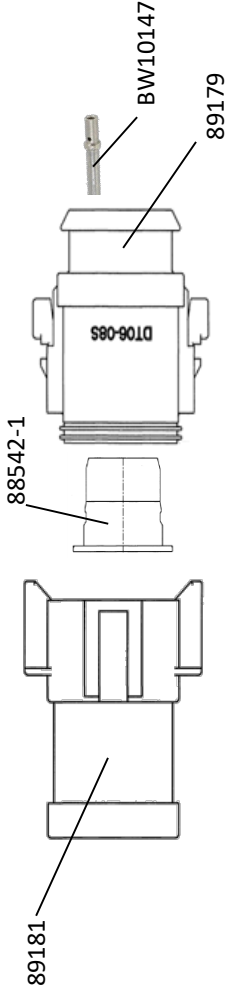


128 PLUG

88958



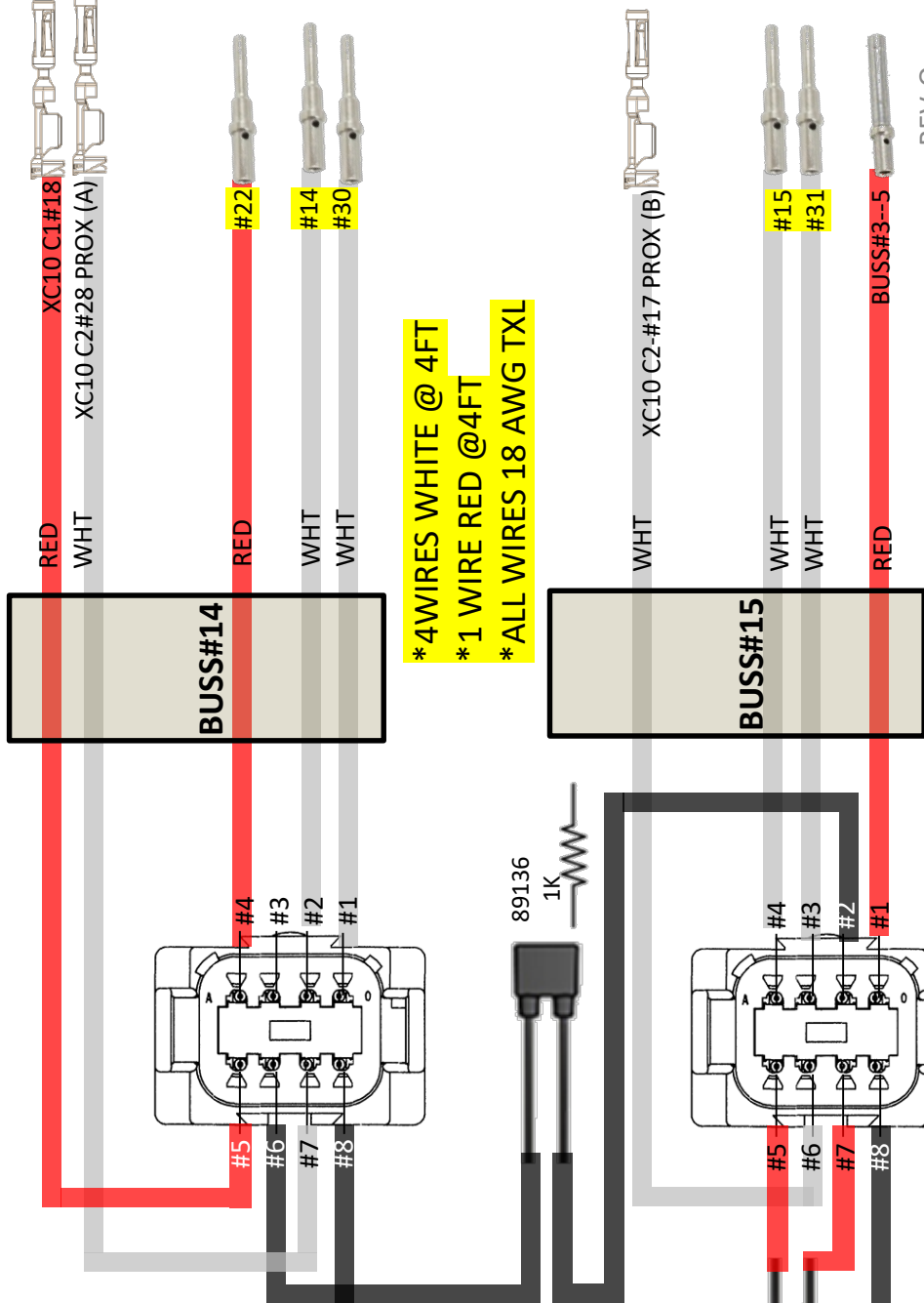
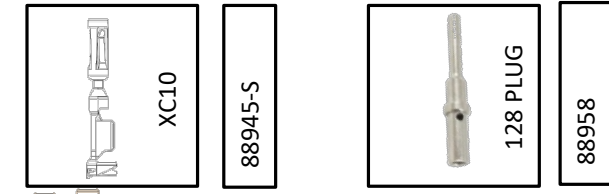
# BUSS #14 BUSS #15 PROX A/B



89181

89136  
1K

89136  
1K

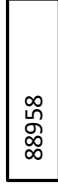
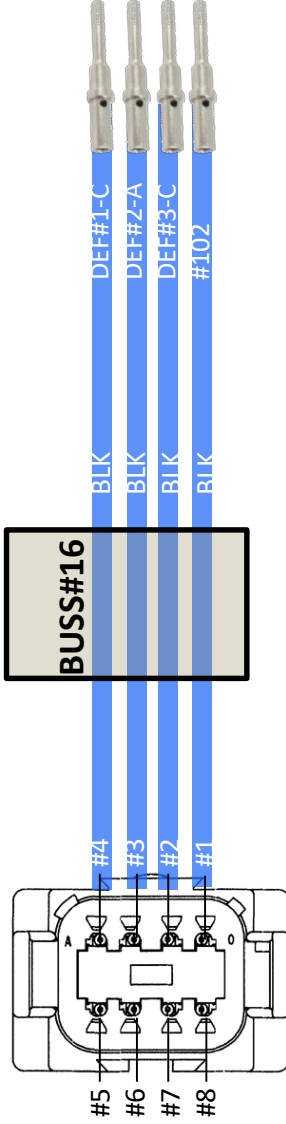
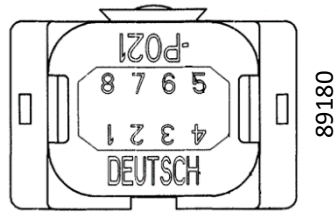
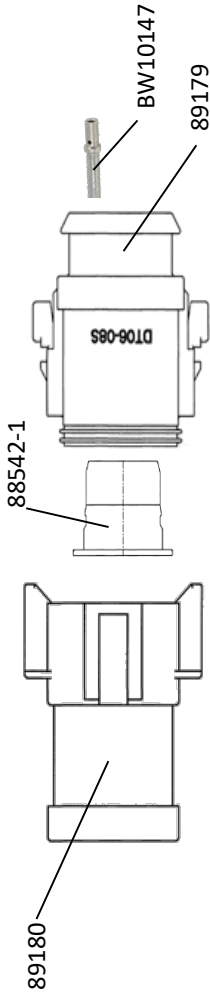


8/26/2020

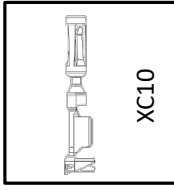
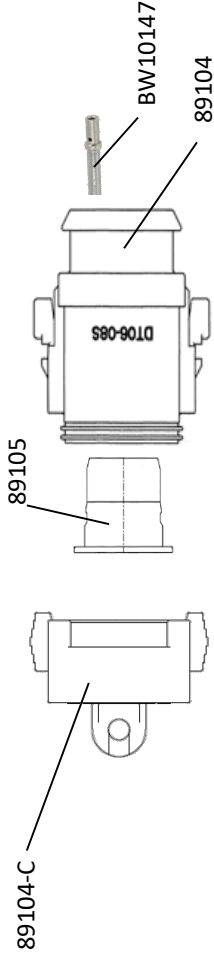
REV-Q



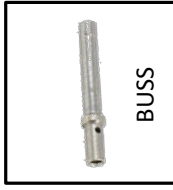
# BUSS #16



# PLUG #17 OPTION VOLUME



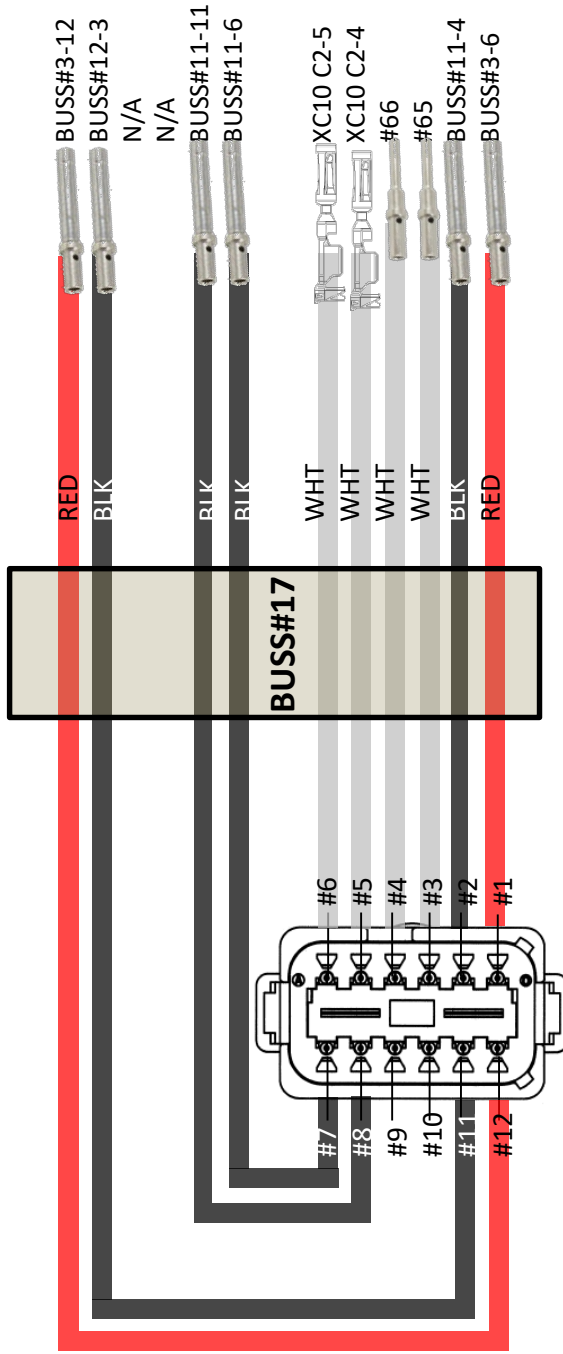
88945-S



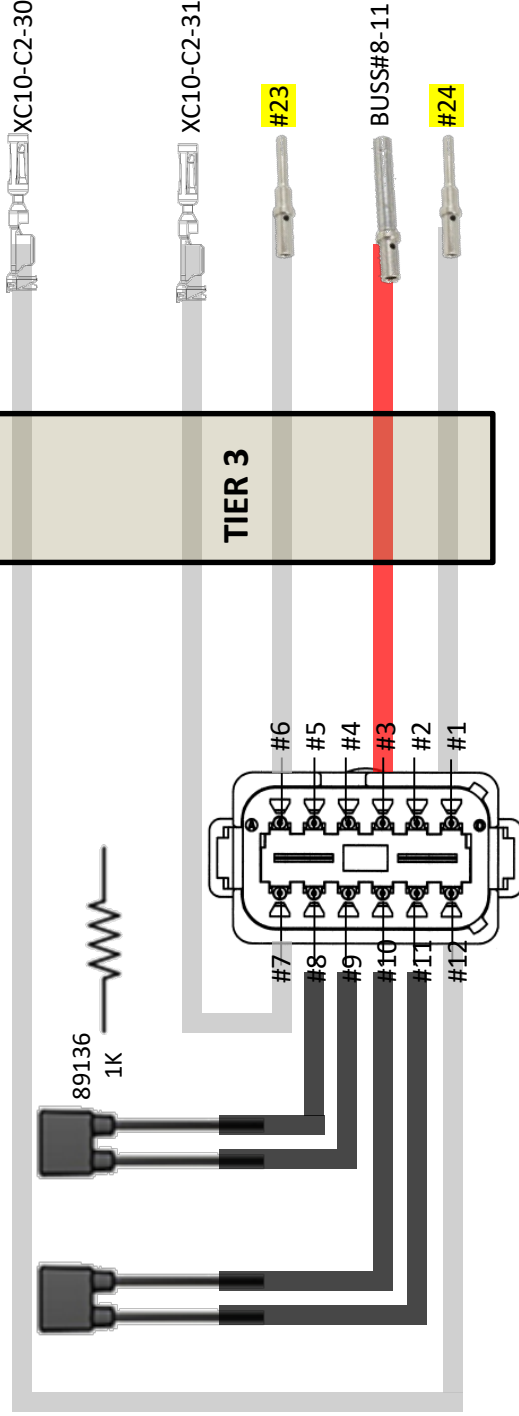
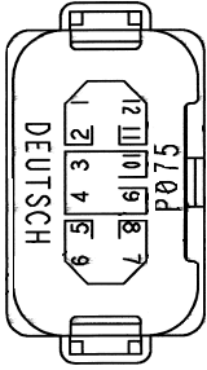
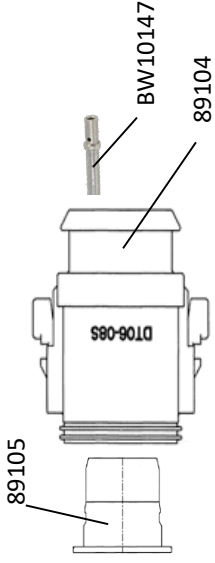
BW10147



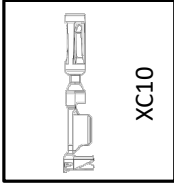
88958



# TIER 3



**WIRES 1 & 6 @ 4 FT  
18 AWG WHT TXL**



88945-S

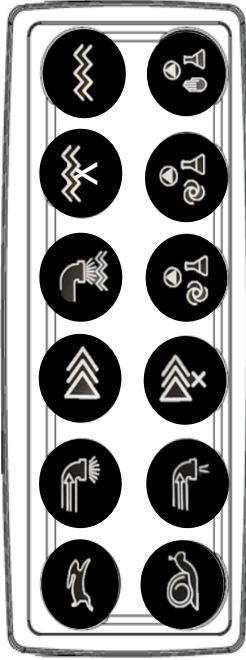


BW10147



88958

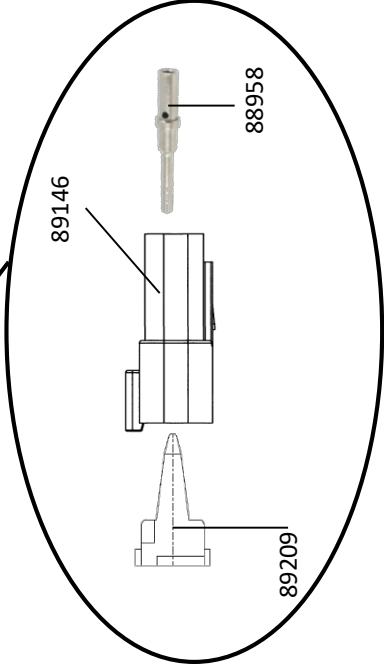
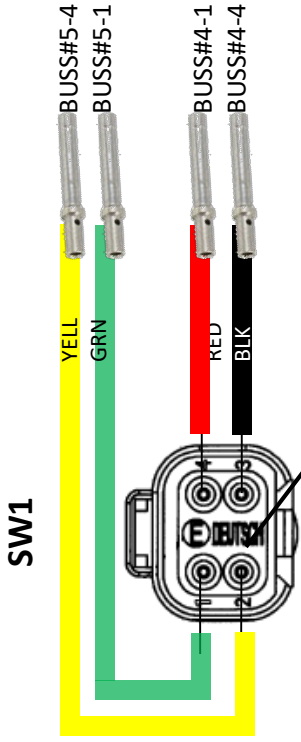
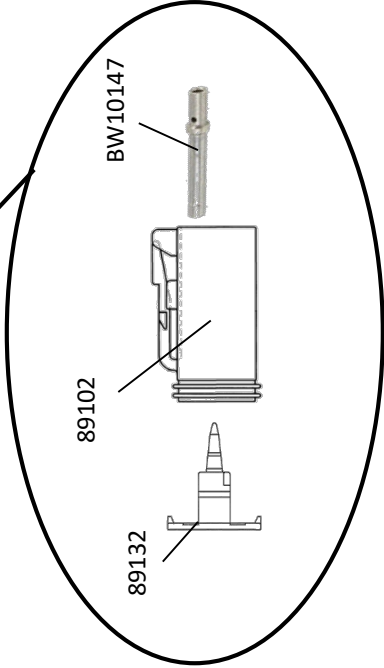
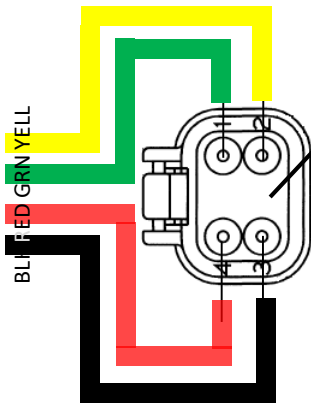
# CAN/SWITCHES



88958



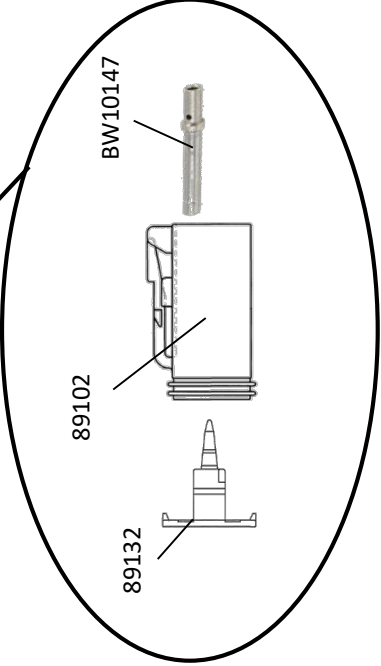
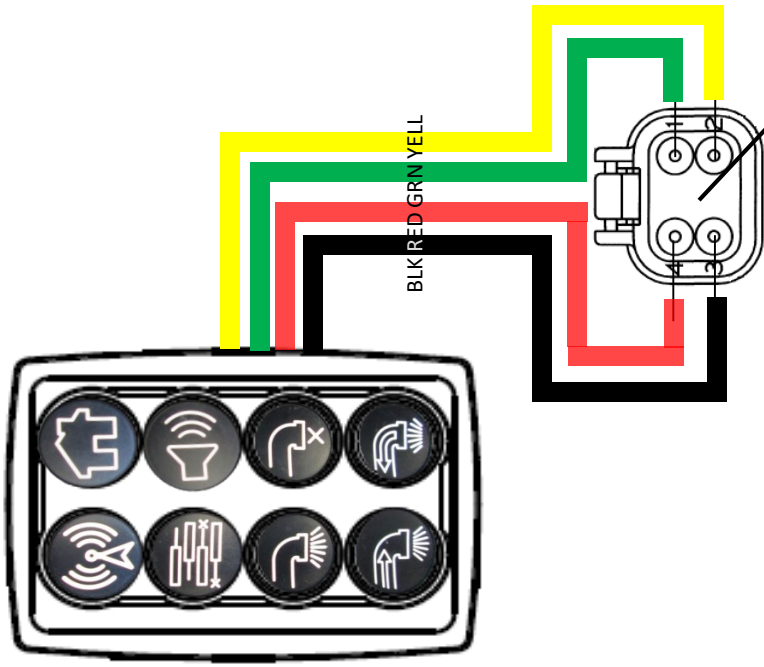
BW10147



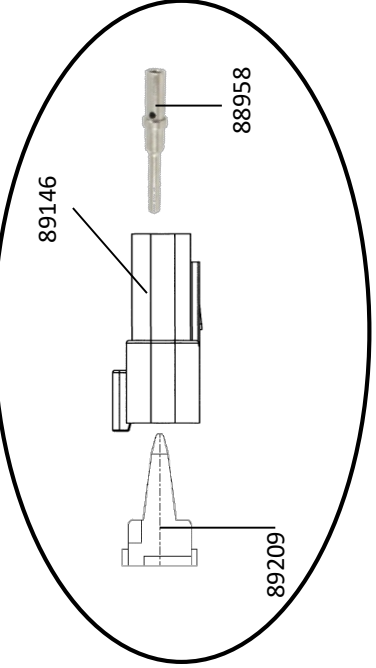
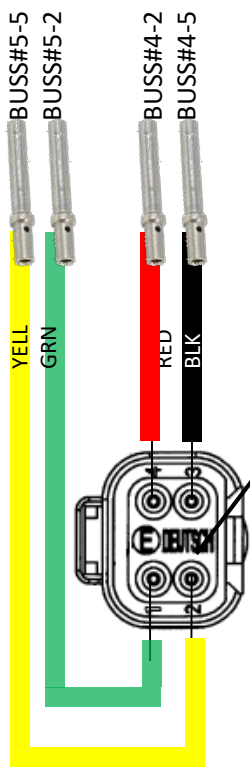
# CAN/SWITCHES



BW10147



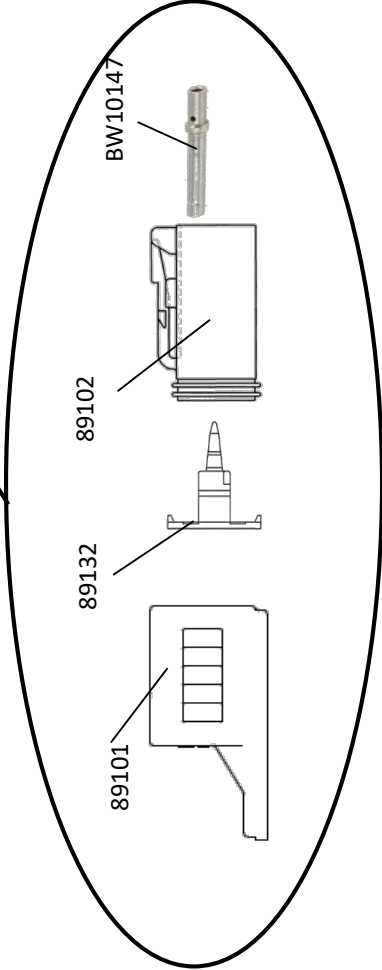
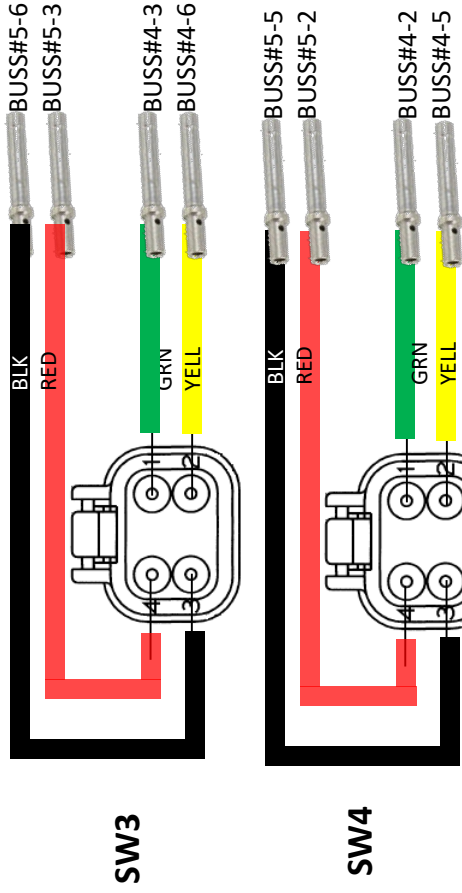
SW2



# CAN/SWITCHES SPARE

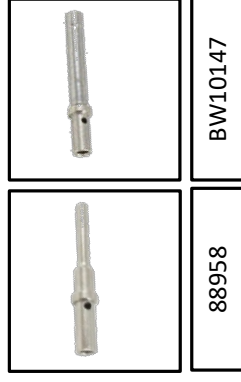
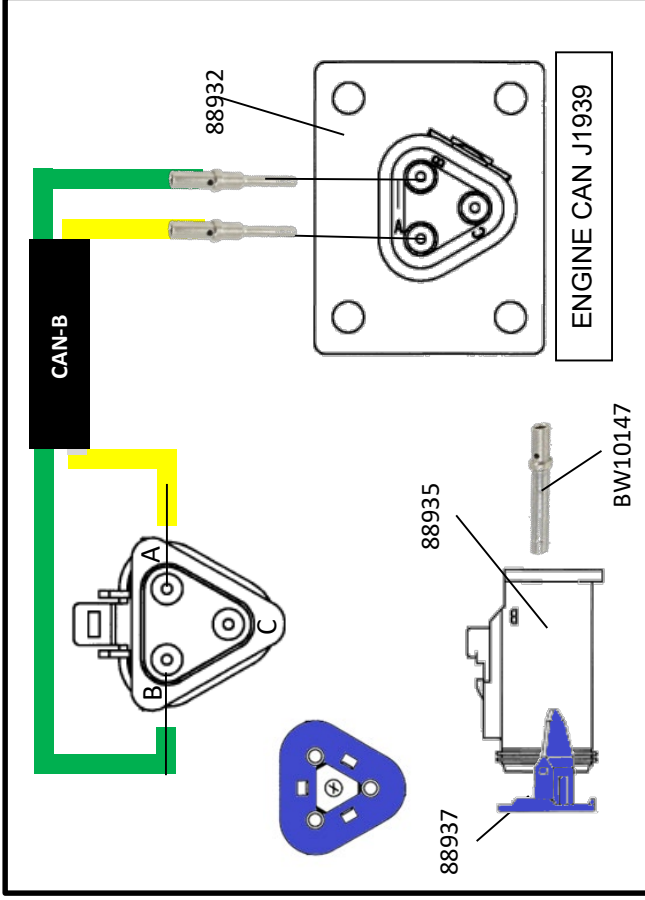
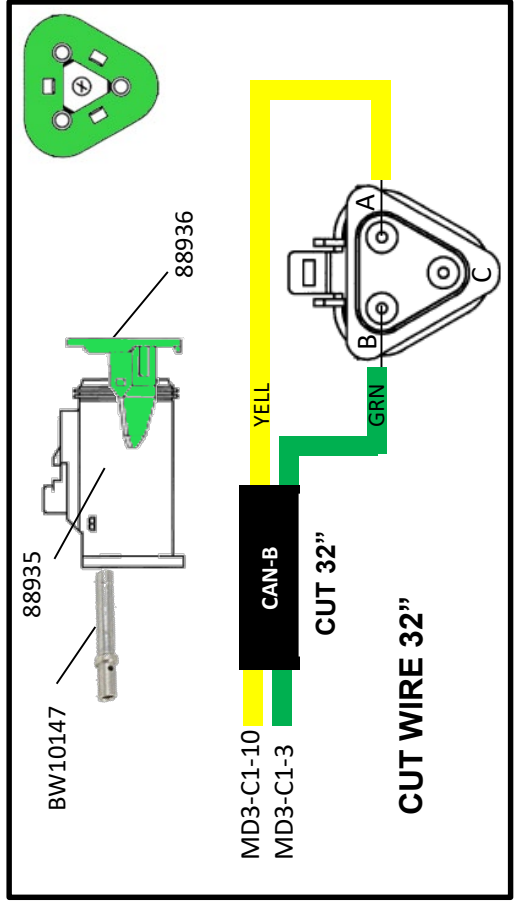
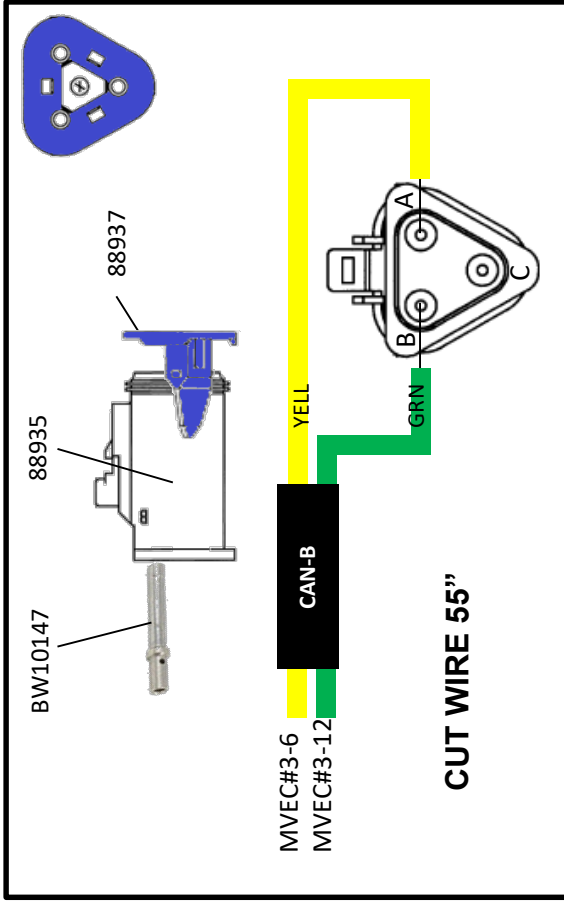


BW10147

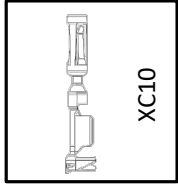




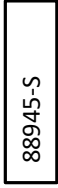
# CAN/SWITCHES SPARE



# MD3



XC10



88945-S



BUSS



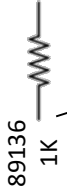
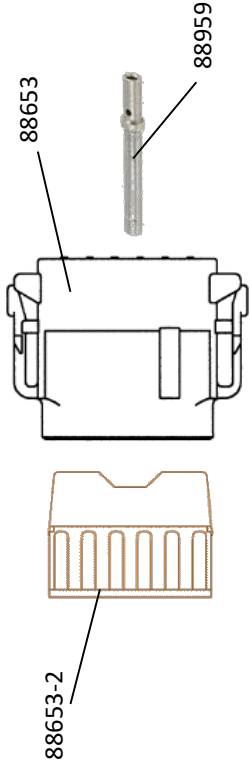
BW10147



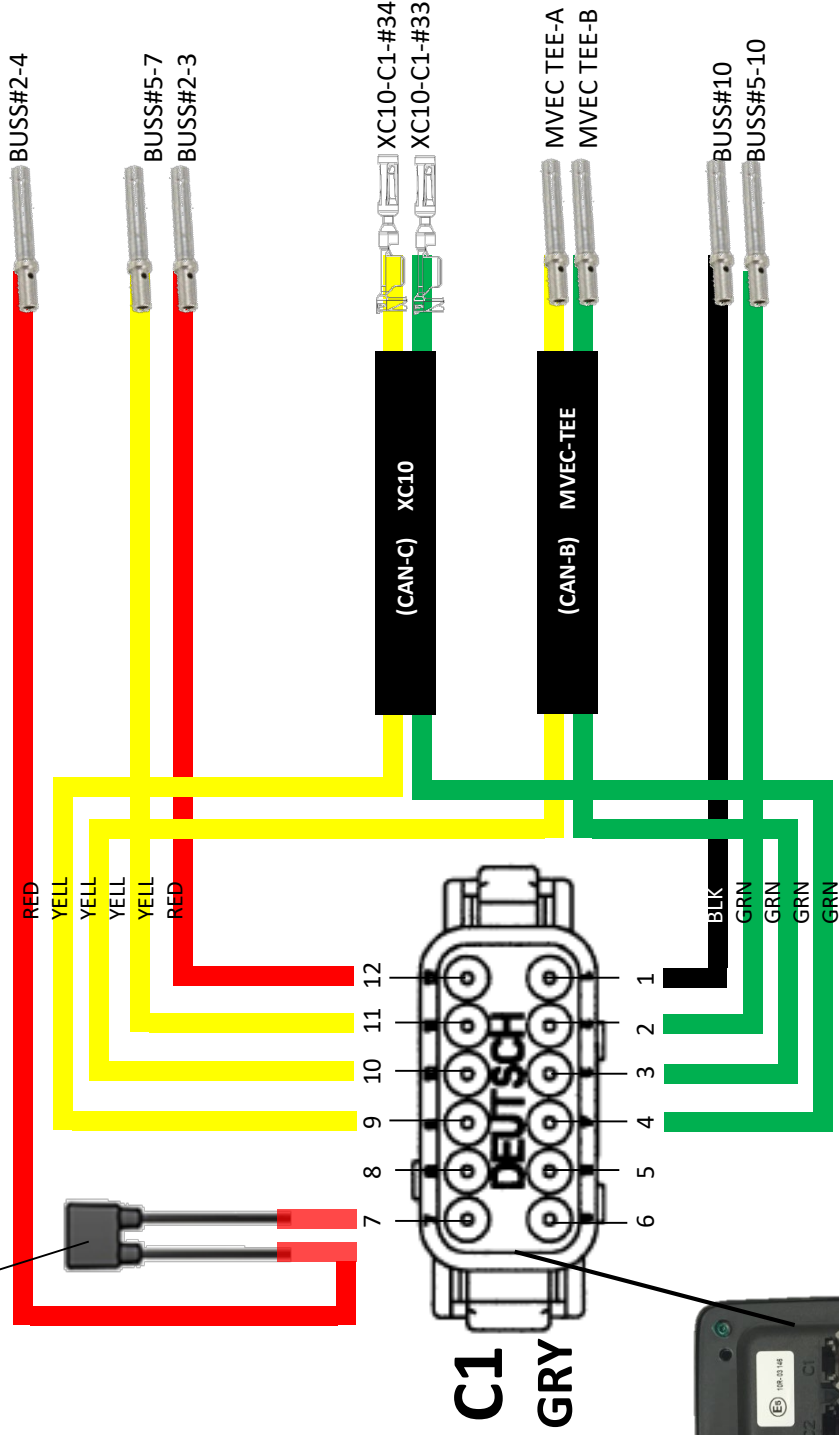
MD3 C1



BW10147



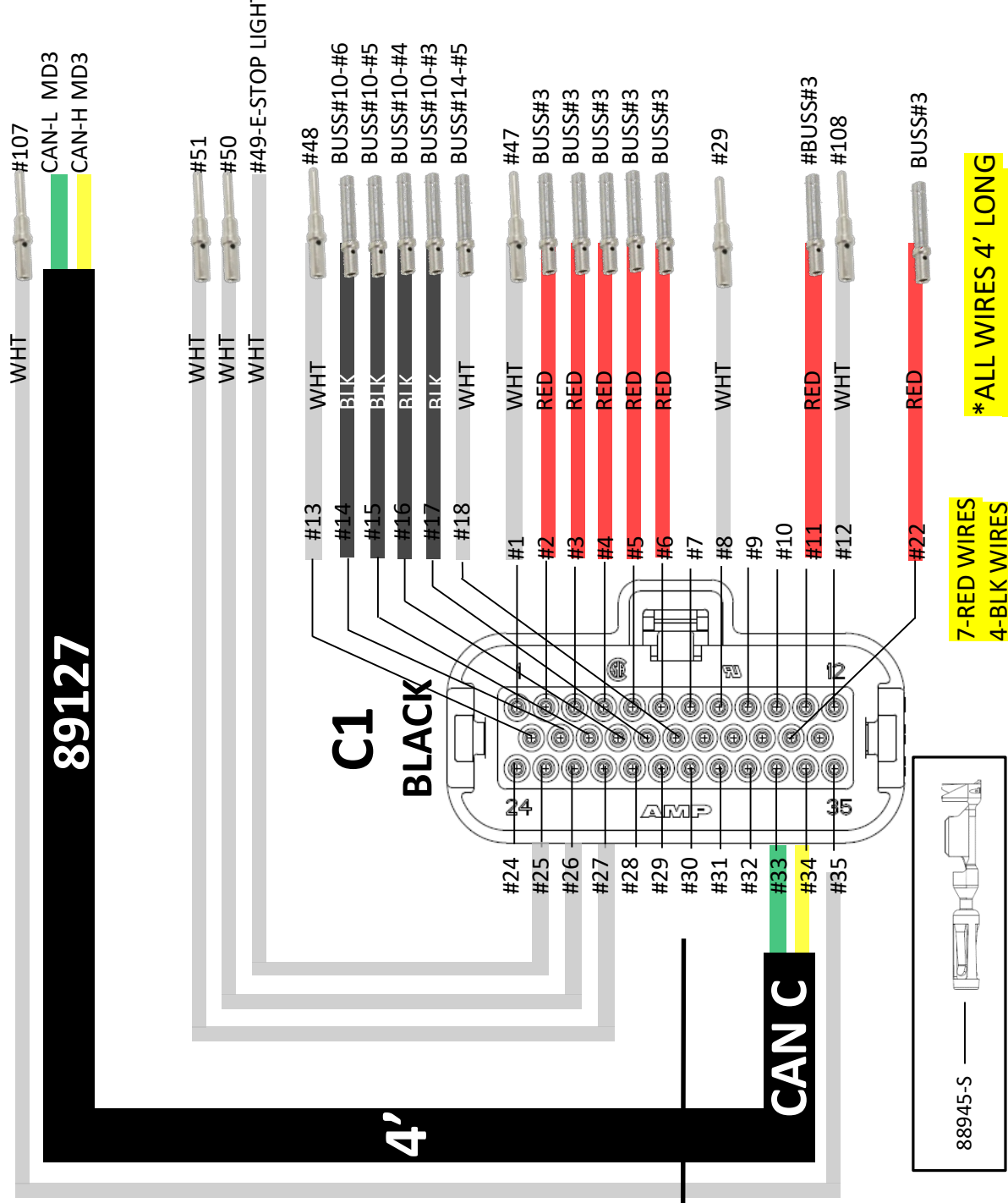
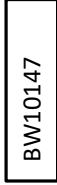
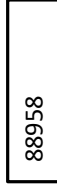
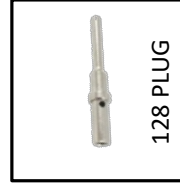
89136  
1K



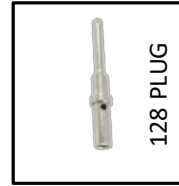
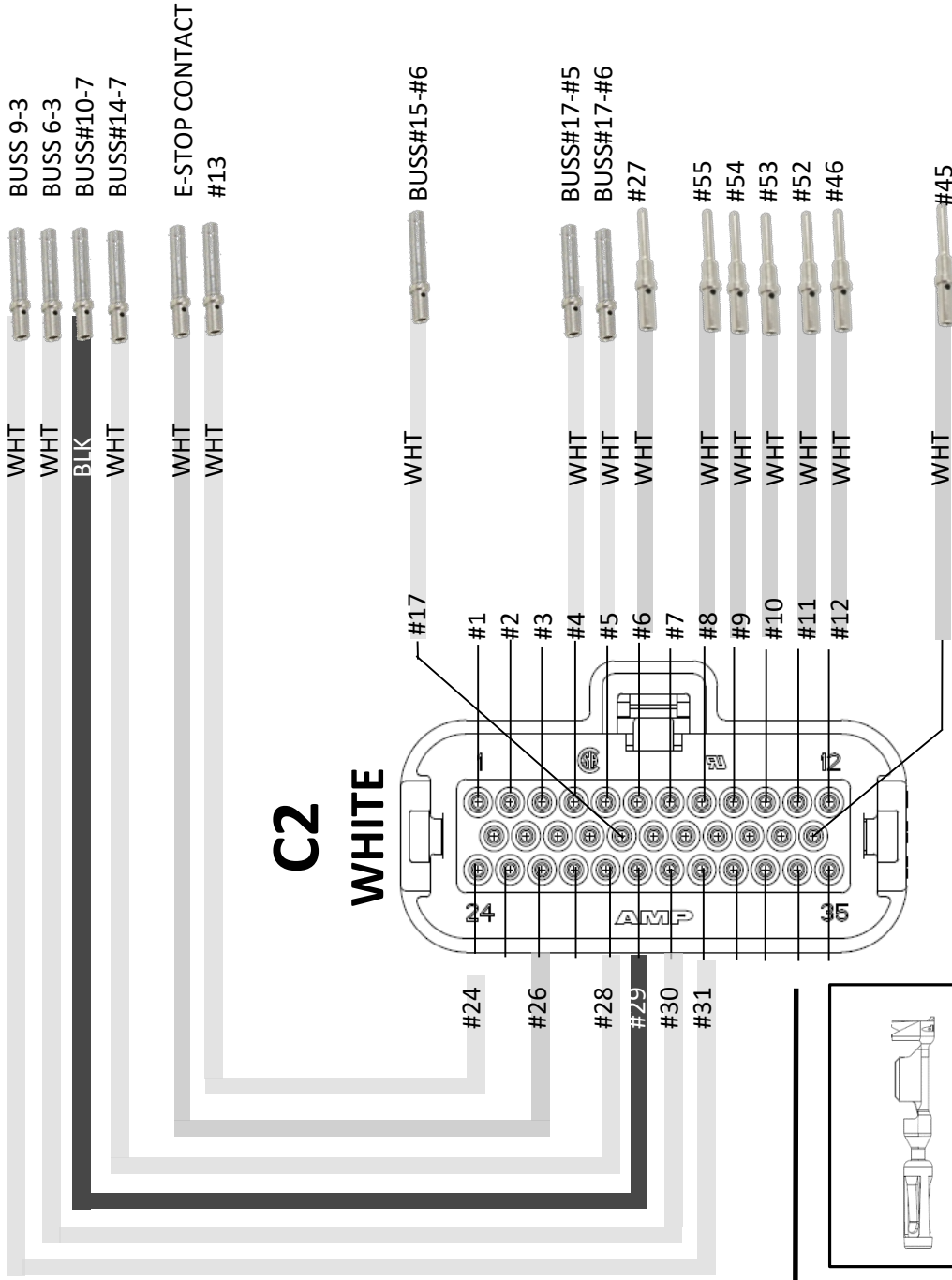
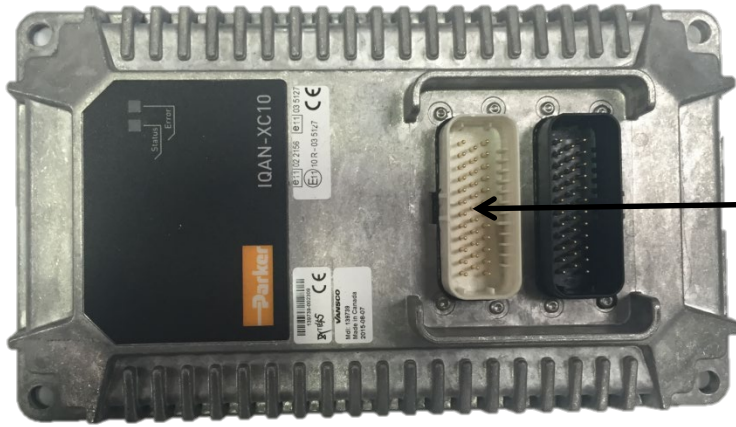
**C1**  
**GRY**



# XC10



# XC10

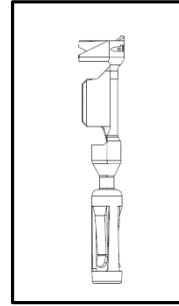


128 PLUG

88958



BW10147



88945-S

1-BLK WIRE

13- WHT WIRES

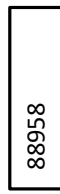
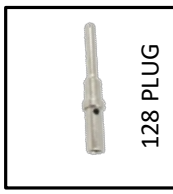
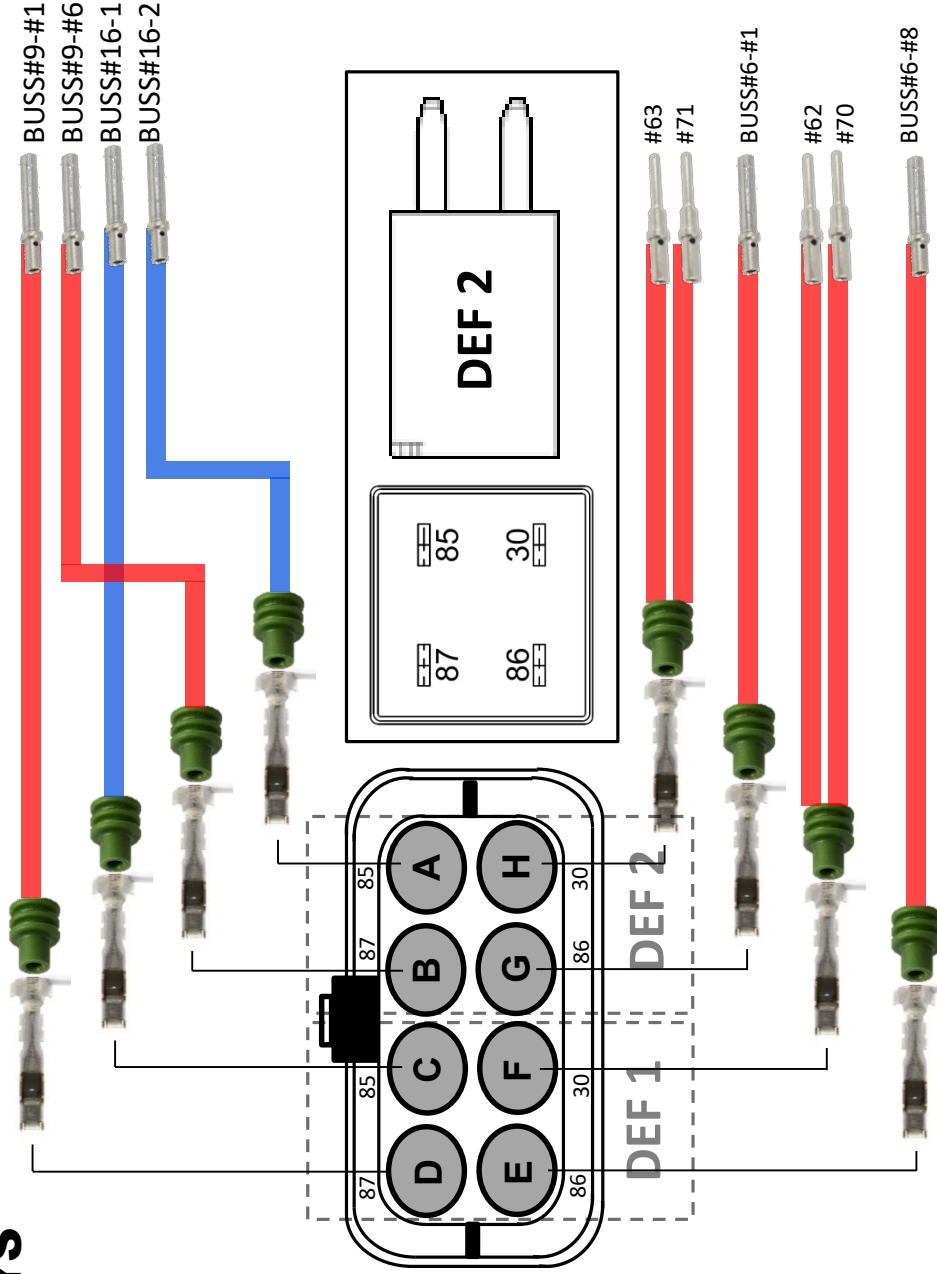
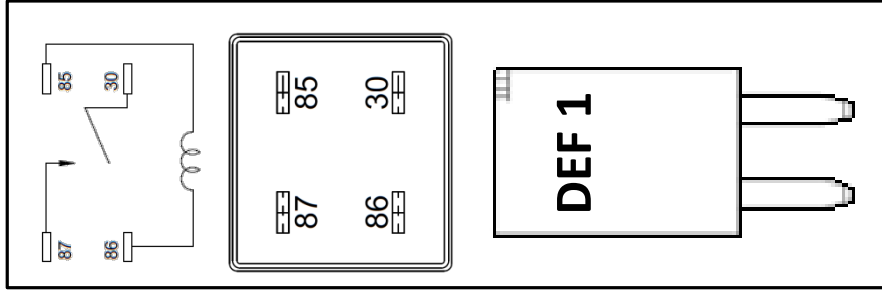
\* ALL WIRES 4' LONG

\* 18 AWG TXL WIRE

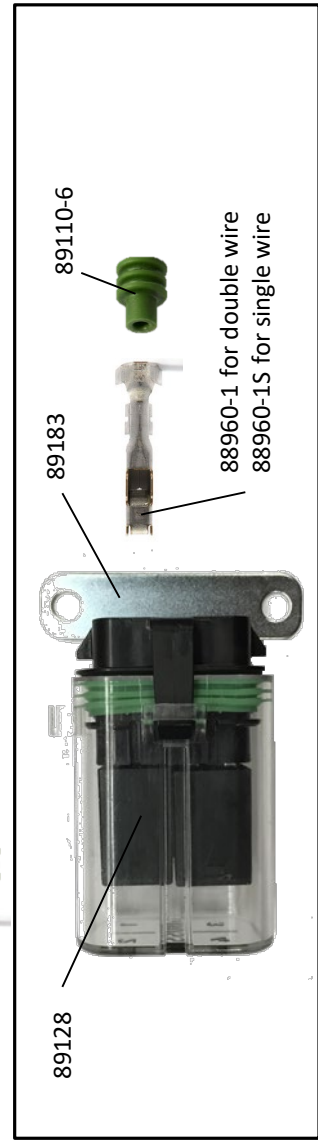
# DEF RELAYS

DEF 1

DEF 2



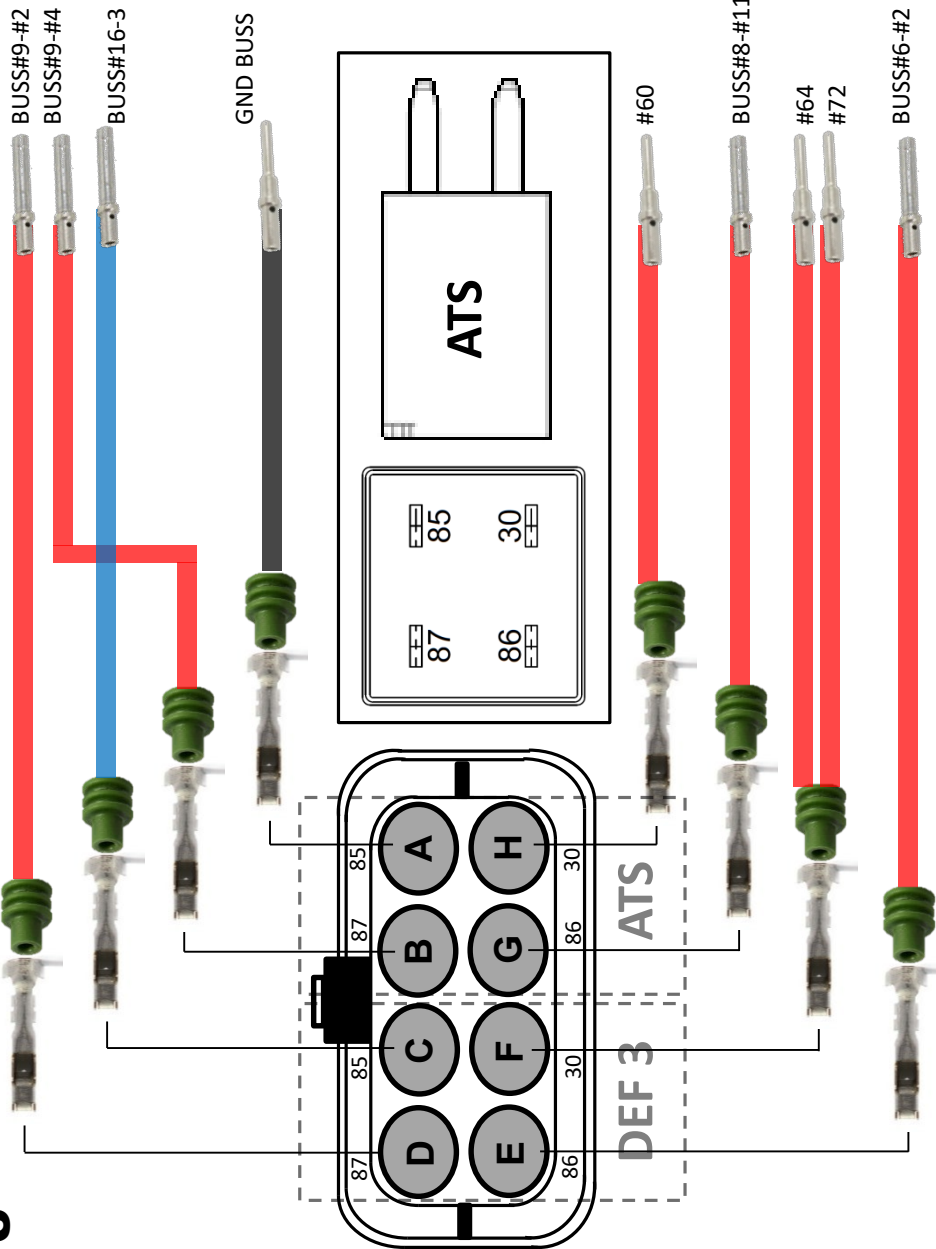
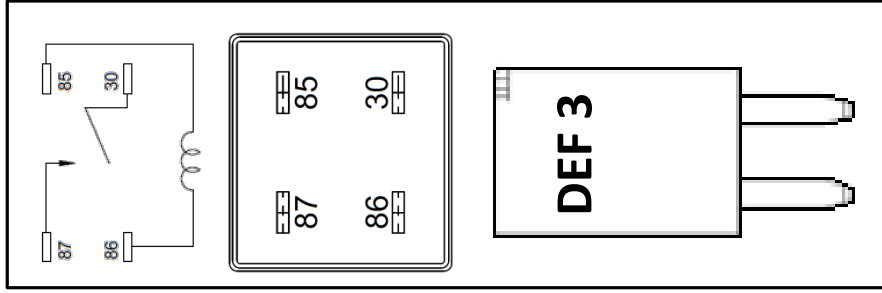
**CUT ALL WIRES  
4FT 18 AWG TXL**



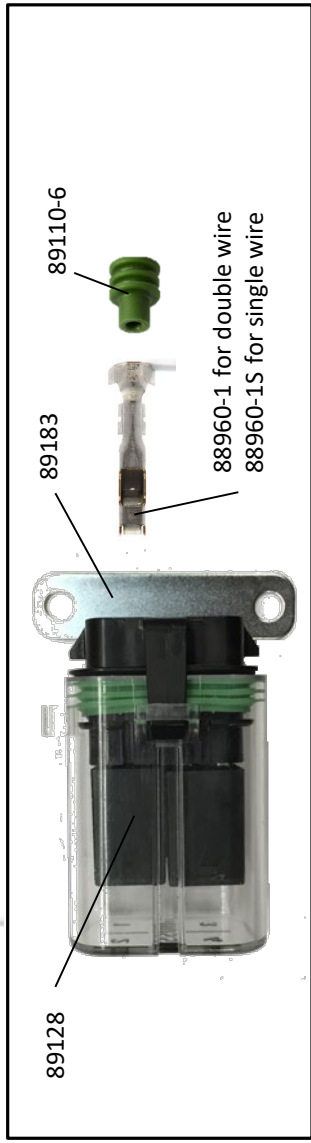
# DEF RELAYS

DEF 3

ATS



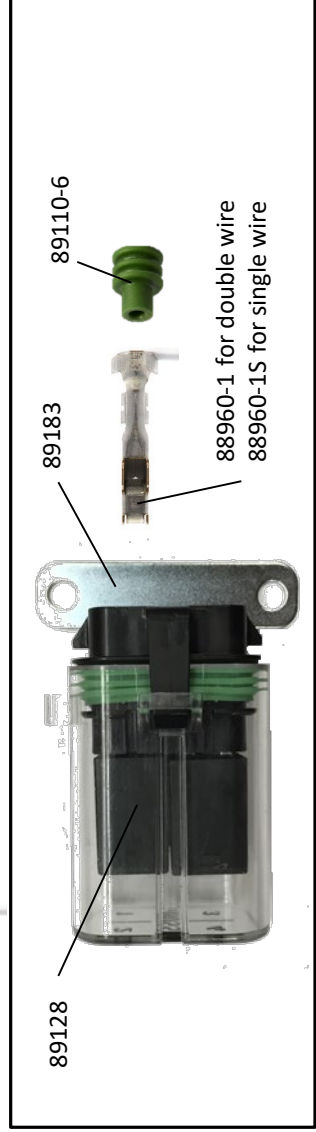
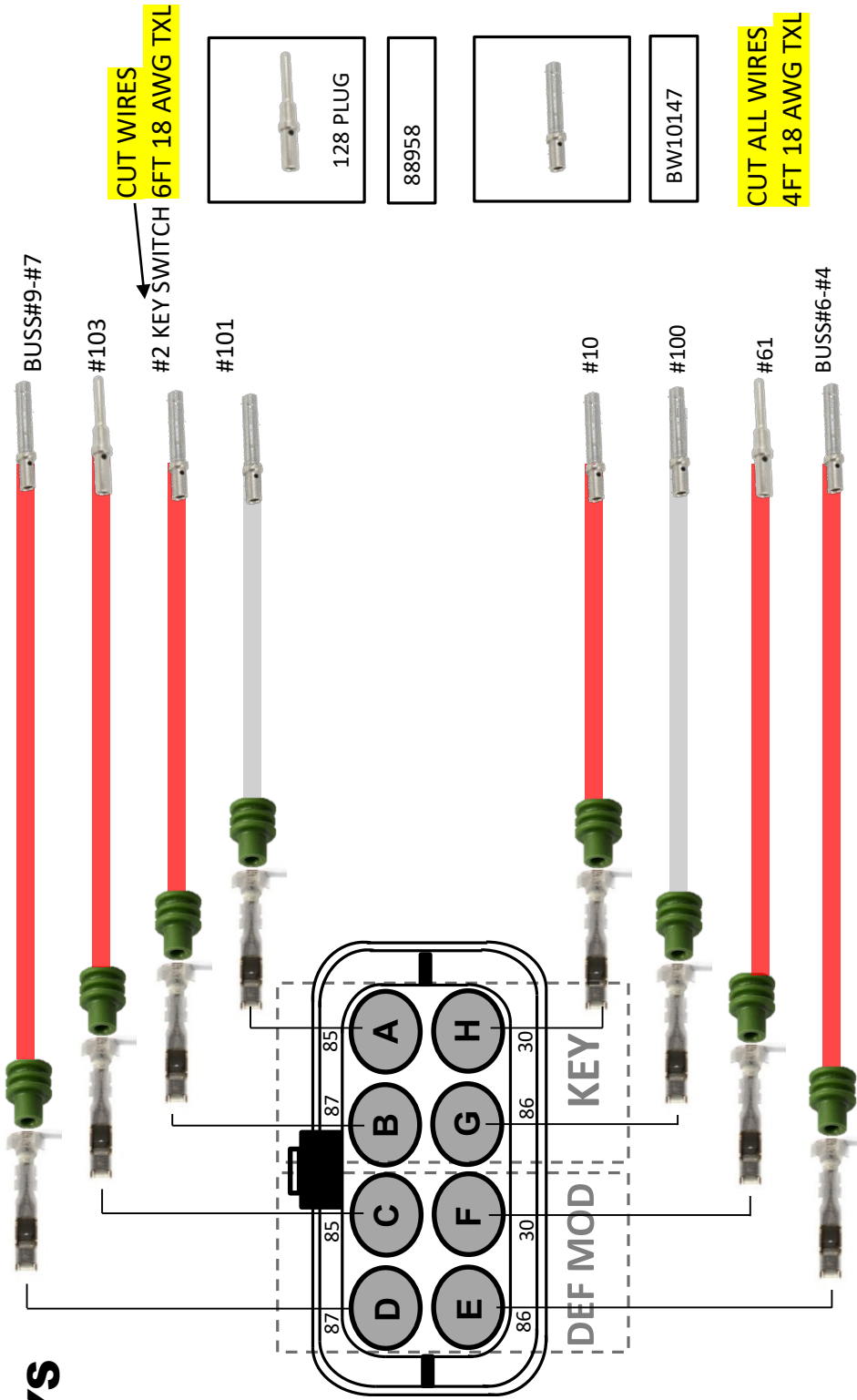
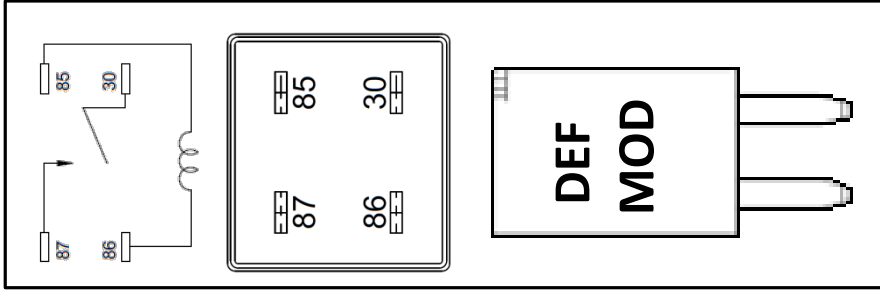
**CUT ALL WIRES  
4FT 18 AWG TXL**



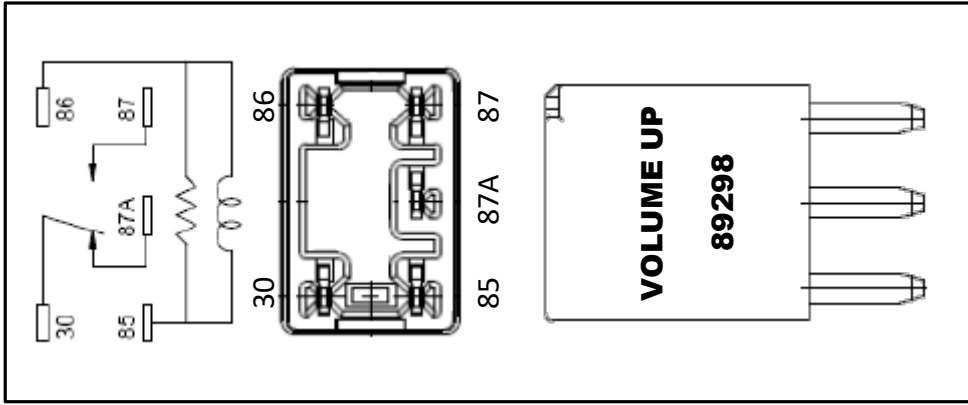


# DEF RELAYS

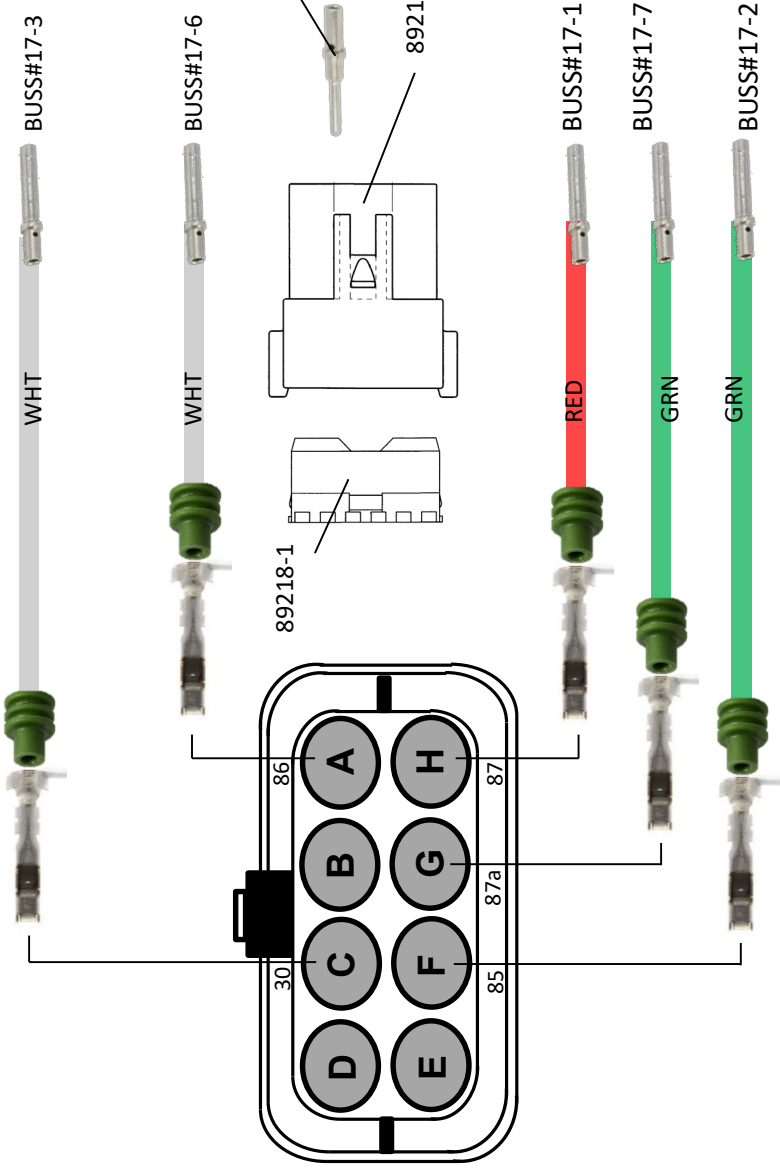
## DEF MOD



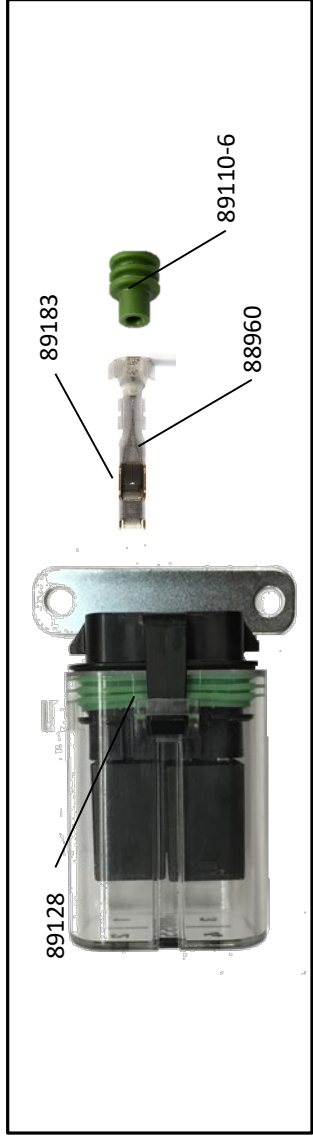
# VOLUME RELAY OPTION (UP) RELAY



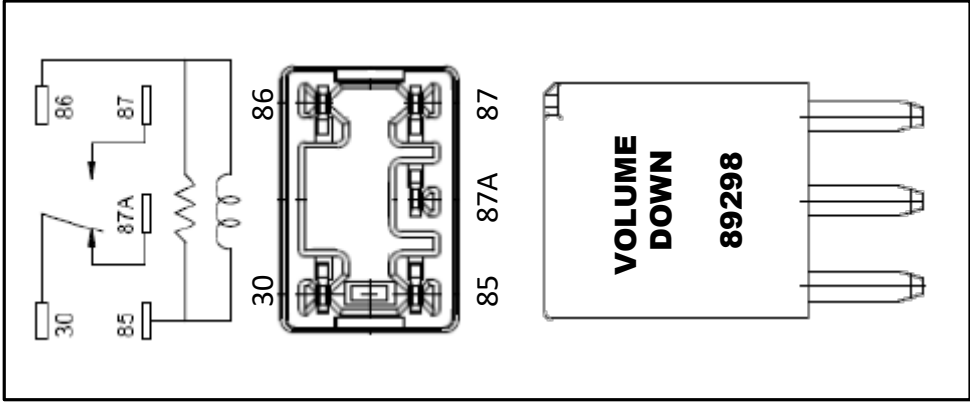
CUT WIRE 1 1/2" LONG



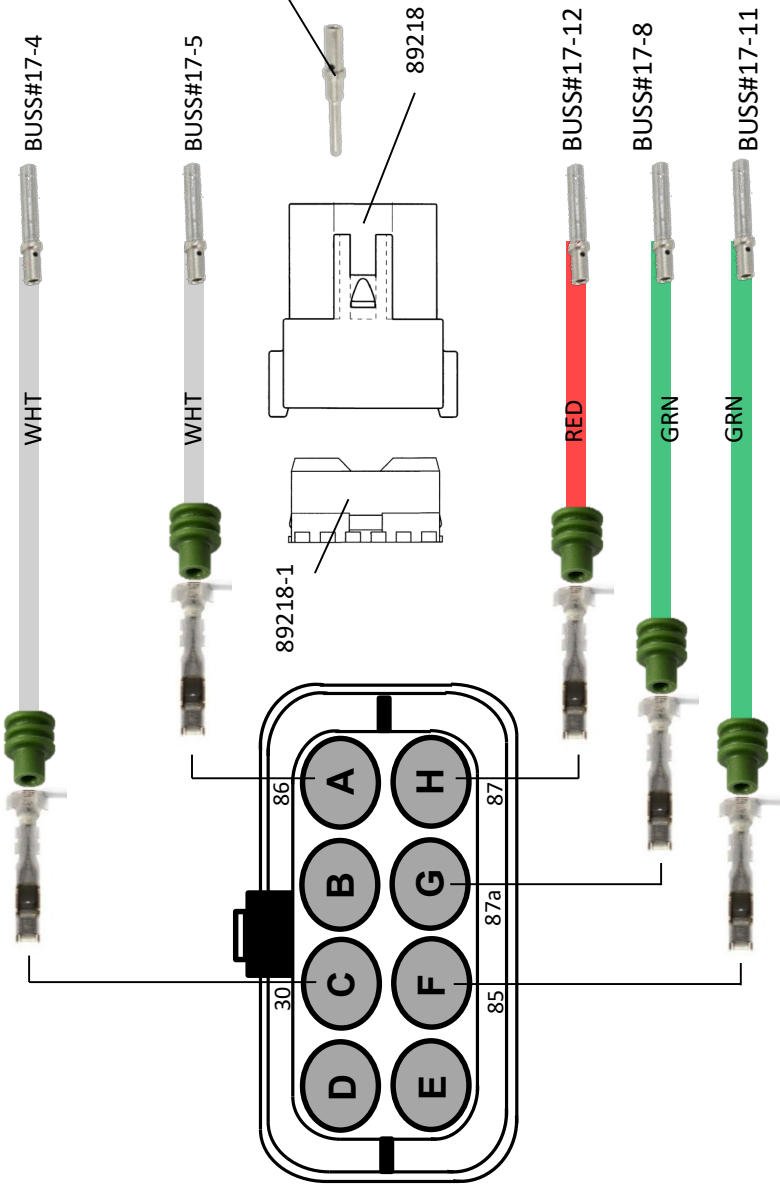
88958



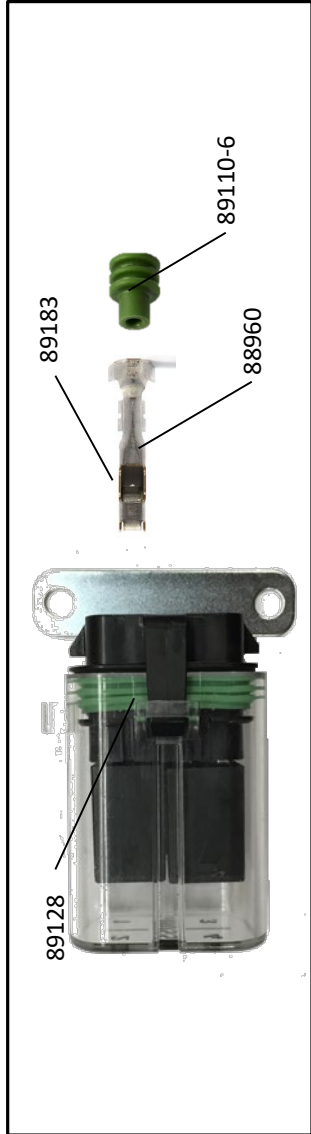
# VOLUME RELAY OPTION (DOWN) RELAY



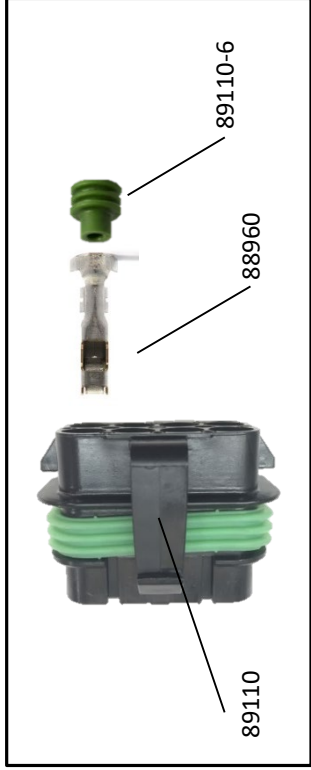
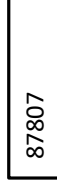
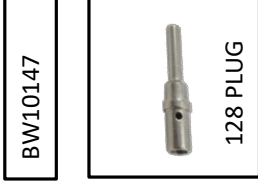
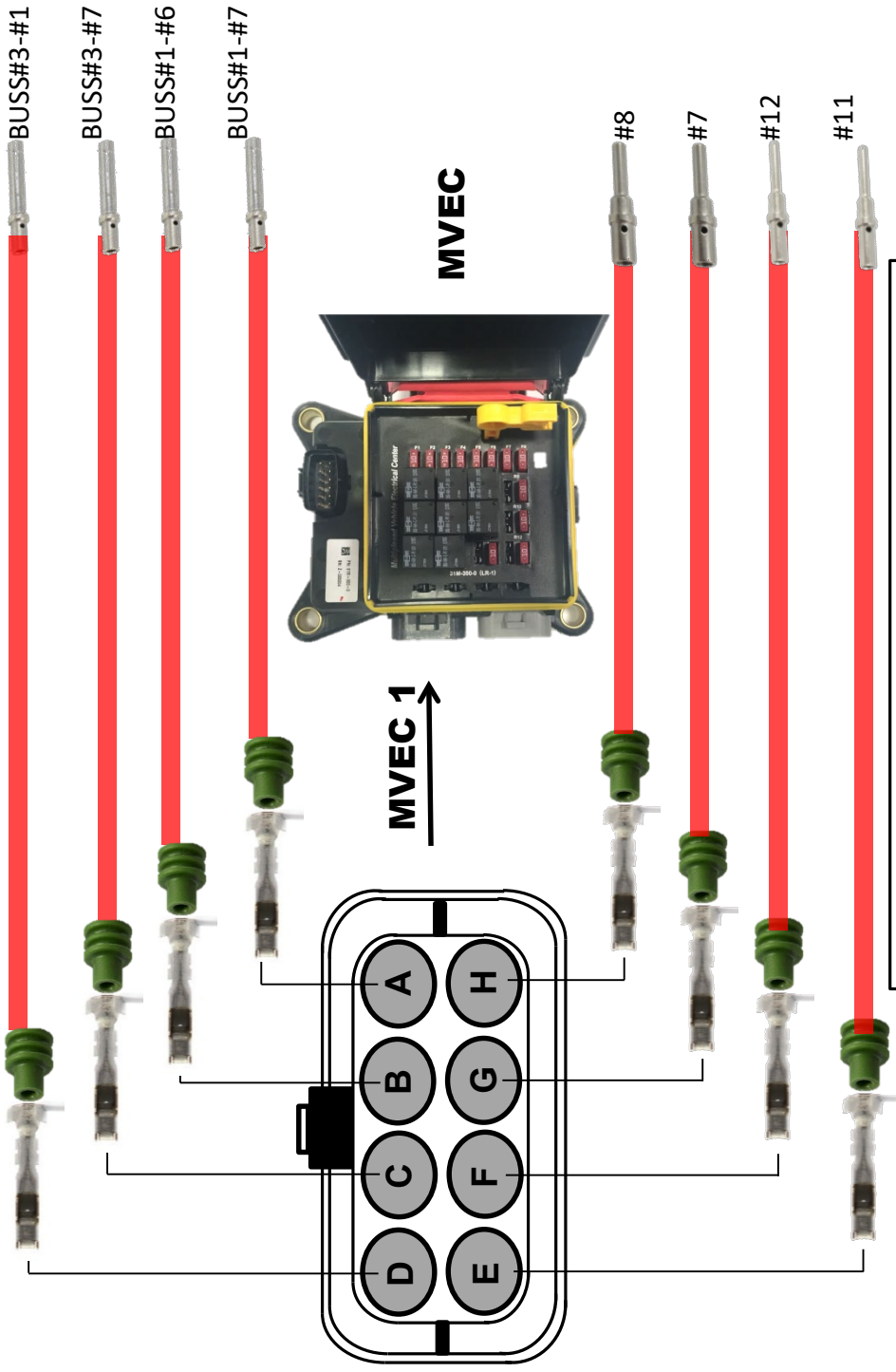
CUT WIRE 1 1/2" LONG



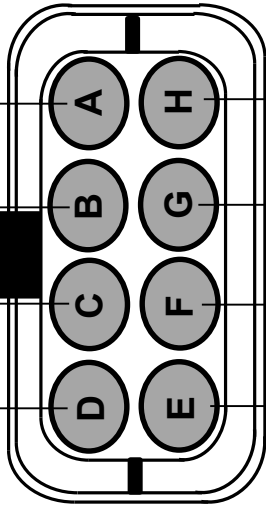
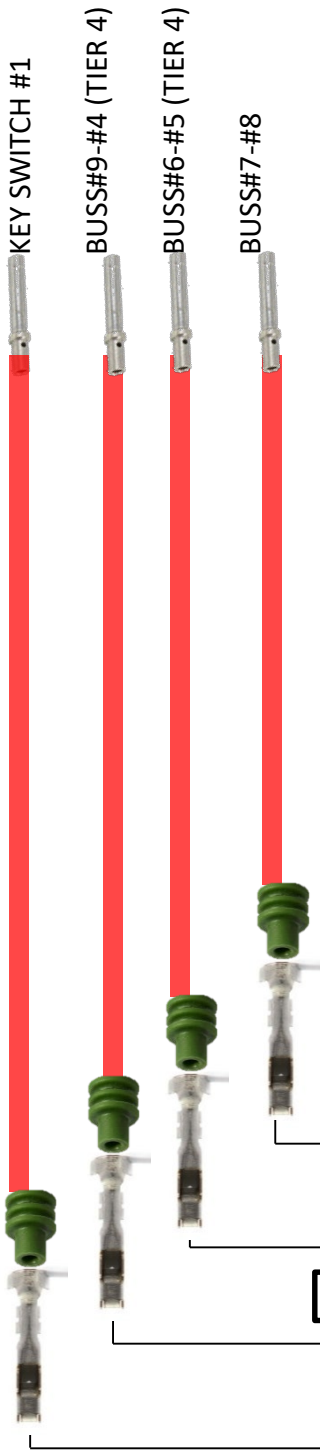
88958



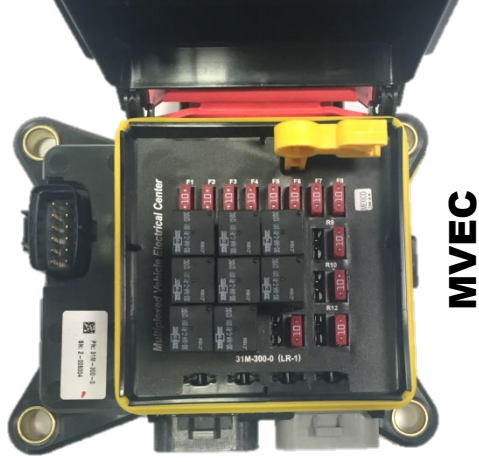
# MVEC #1



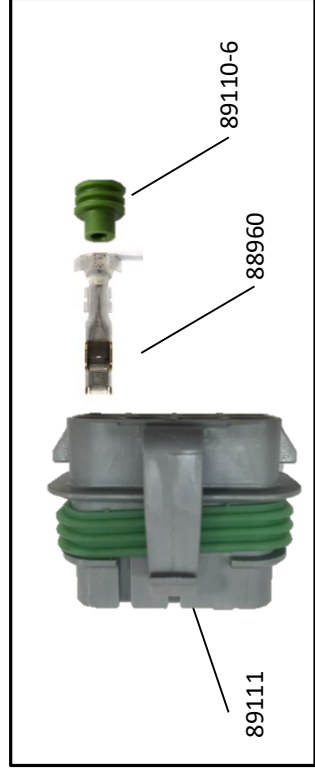
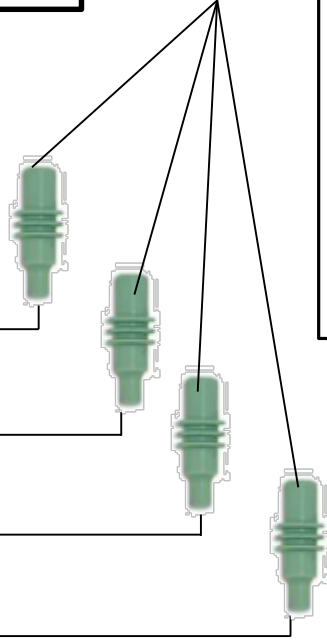
# MVEC #2



# MVEC 2



# MVEC



128 PLUG



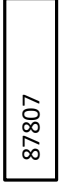
88958



BW10147



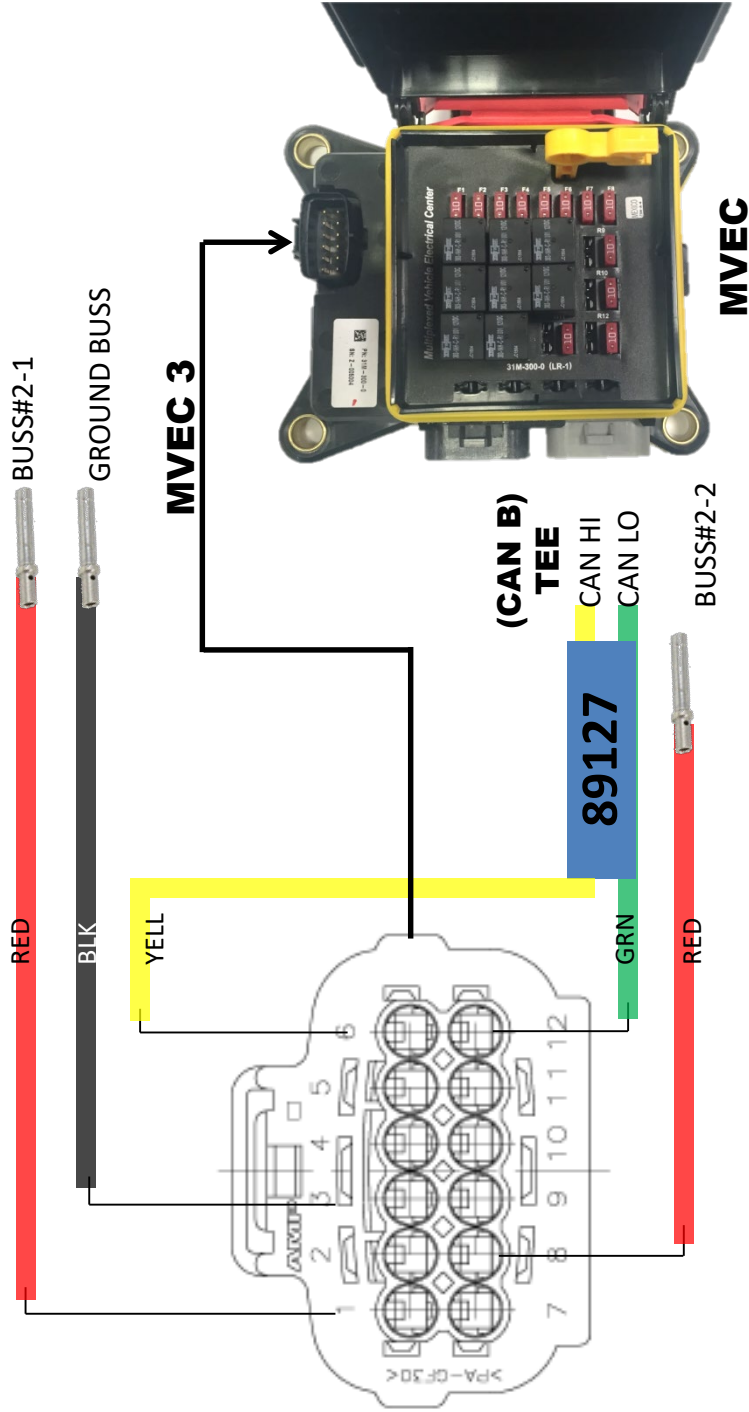
128 PLUG



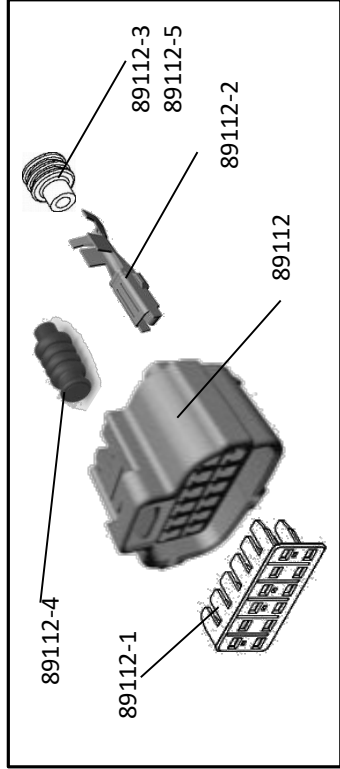
87807

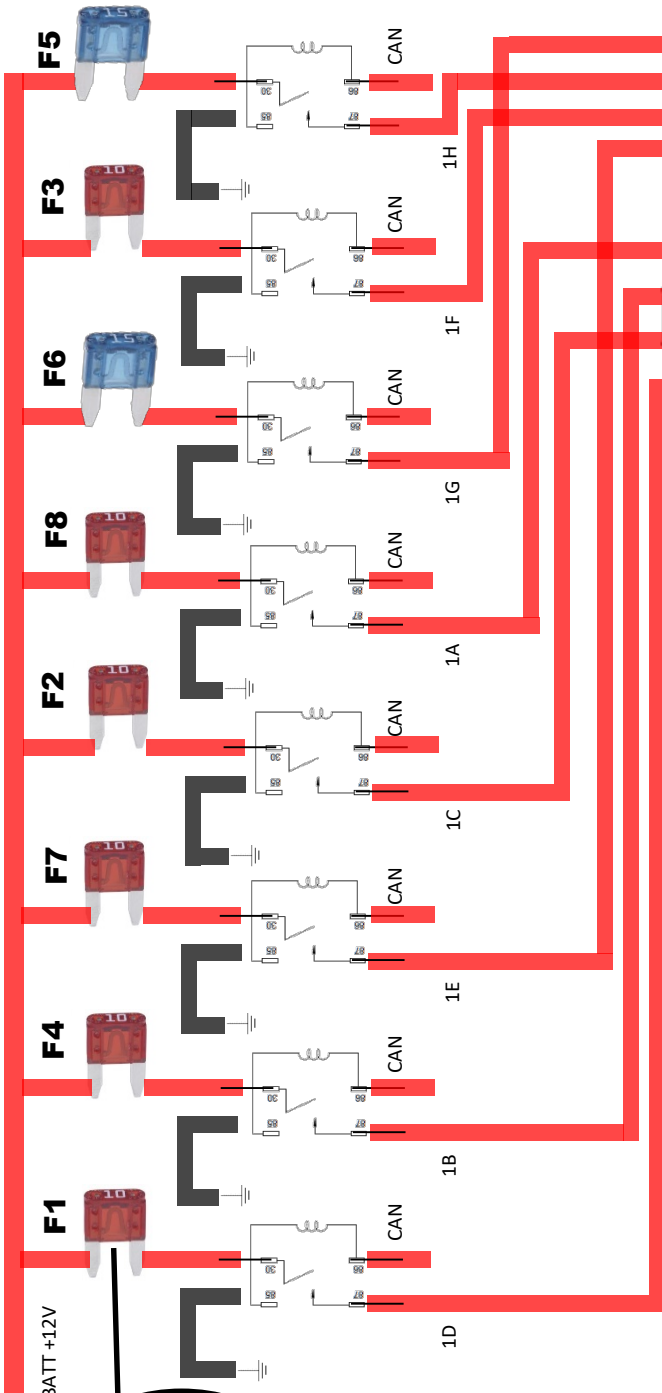
**CUT ALL WIRES  
5FT 18 AWG TXL**

# MVEC #3



BW10147



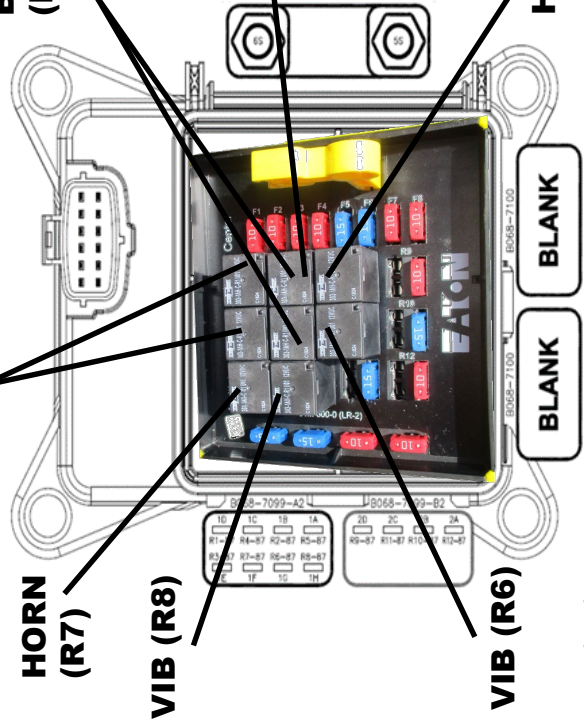
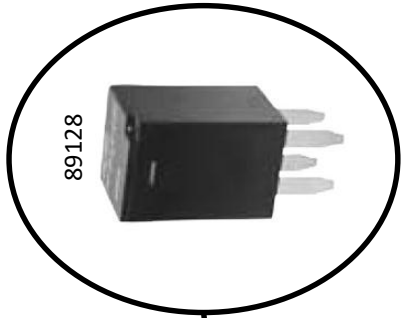


**MVEC #1 FUSE/RELAY OUTPUT**



- F8 -- R5 -1A BUSS 1-#7**
- F4 -- R2 -1B BUSS 1-#6**
- F2 -- R4 -1C BUSS 3-#7**
- F1 -- R1 -1D BUSS 3-#1**
- F7 -- R3 -1E 128-11 HORN**
- F3 -- R7 -1F 128-12 HORN**
- F6 -- R6 -1G 128-7 VIB**
- F5 -- R8 -1H 128-8 VIB**

**BUSS#1 (R2,R5)**



**MVEC#1 OUTPUT**

**15 AMP**



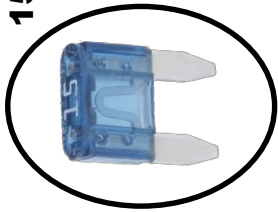
88944



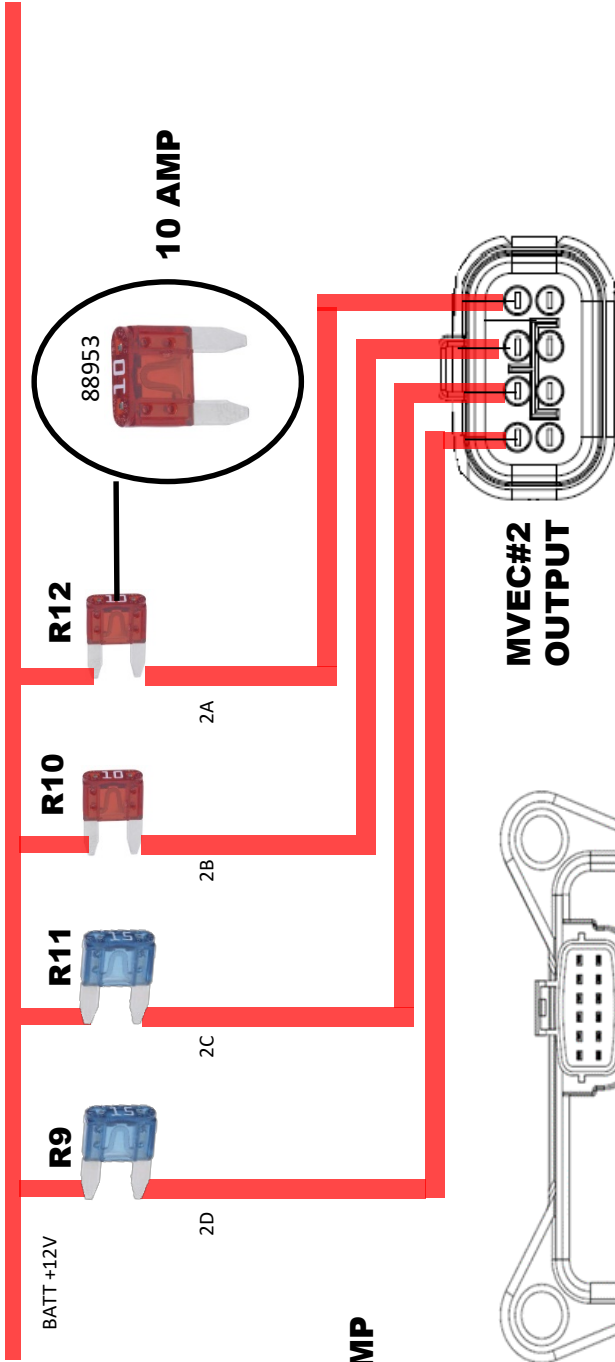
# MVEC #2 FUSE/RELAY OUTPUT

- R12** -- 2A BUSS 7 KEY ON
- R10** -- 2B BUSS 6 DEF
- R11** -- 2C BUSS 9 DEF
- R9** ----2D KEY-1

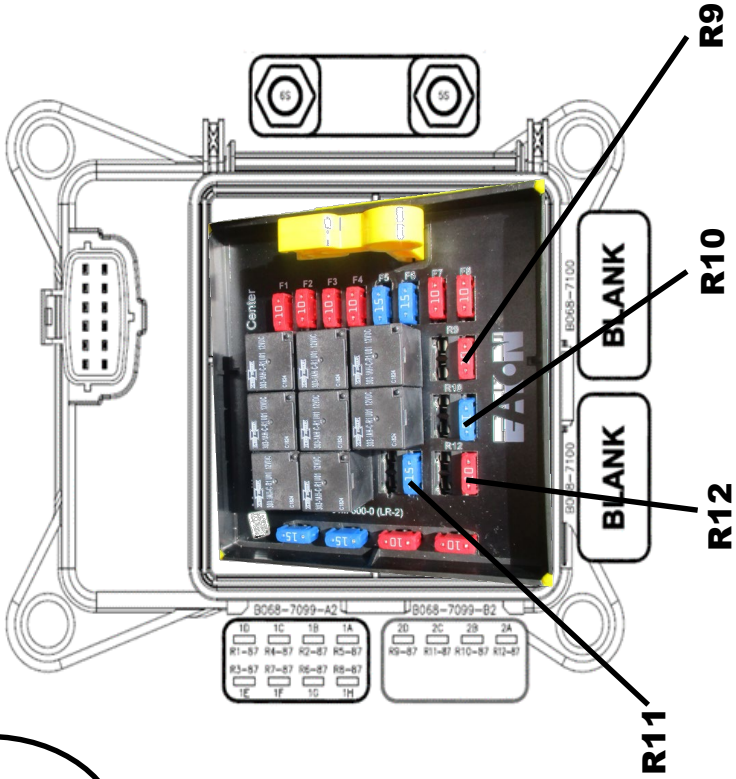
**15 AMP**



88944

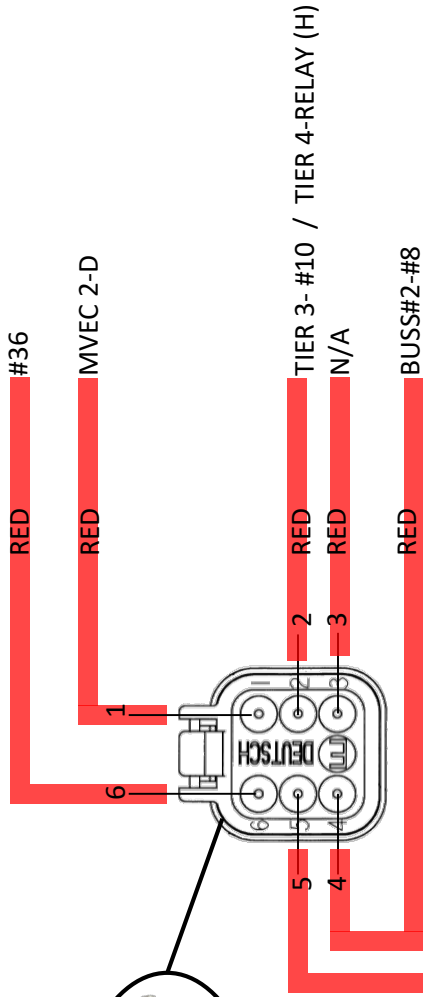
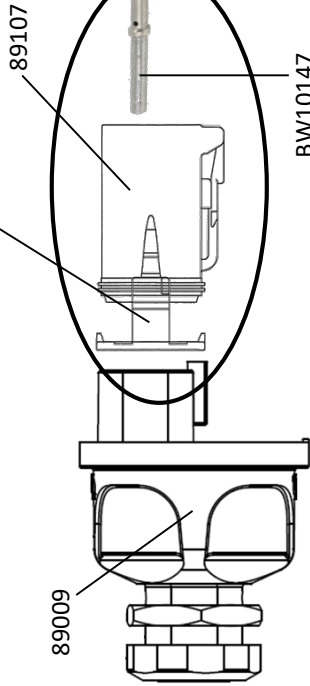


**MVEC#2  
OUTPUT**

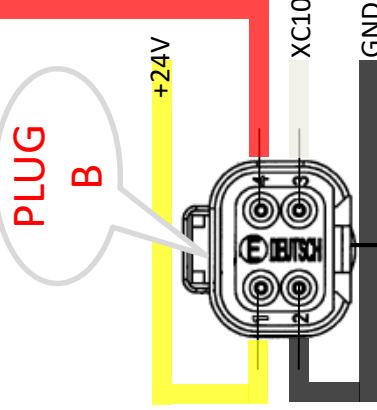
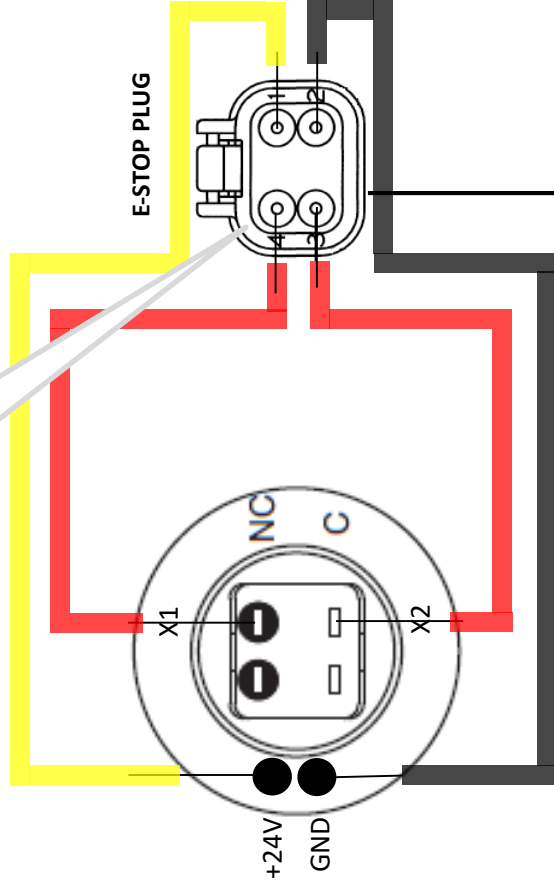


# KEY SWITCH

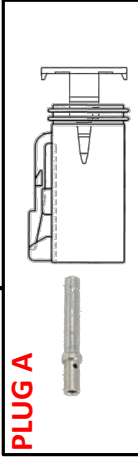
89108



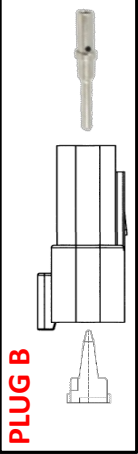
PLUG A

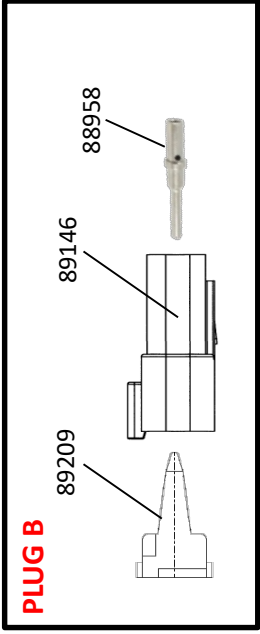
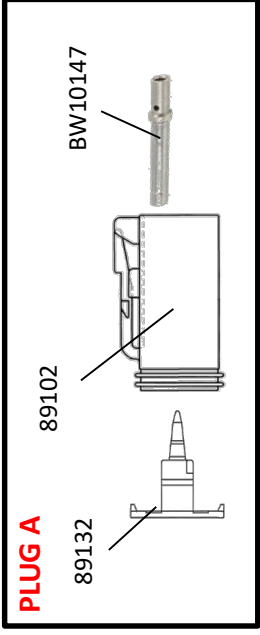
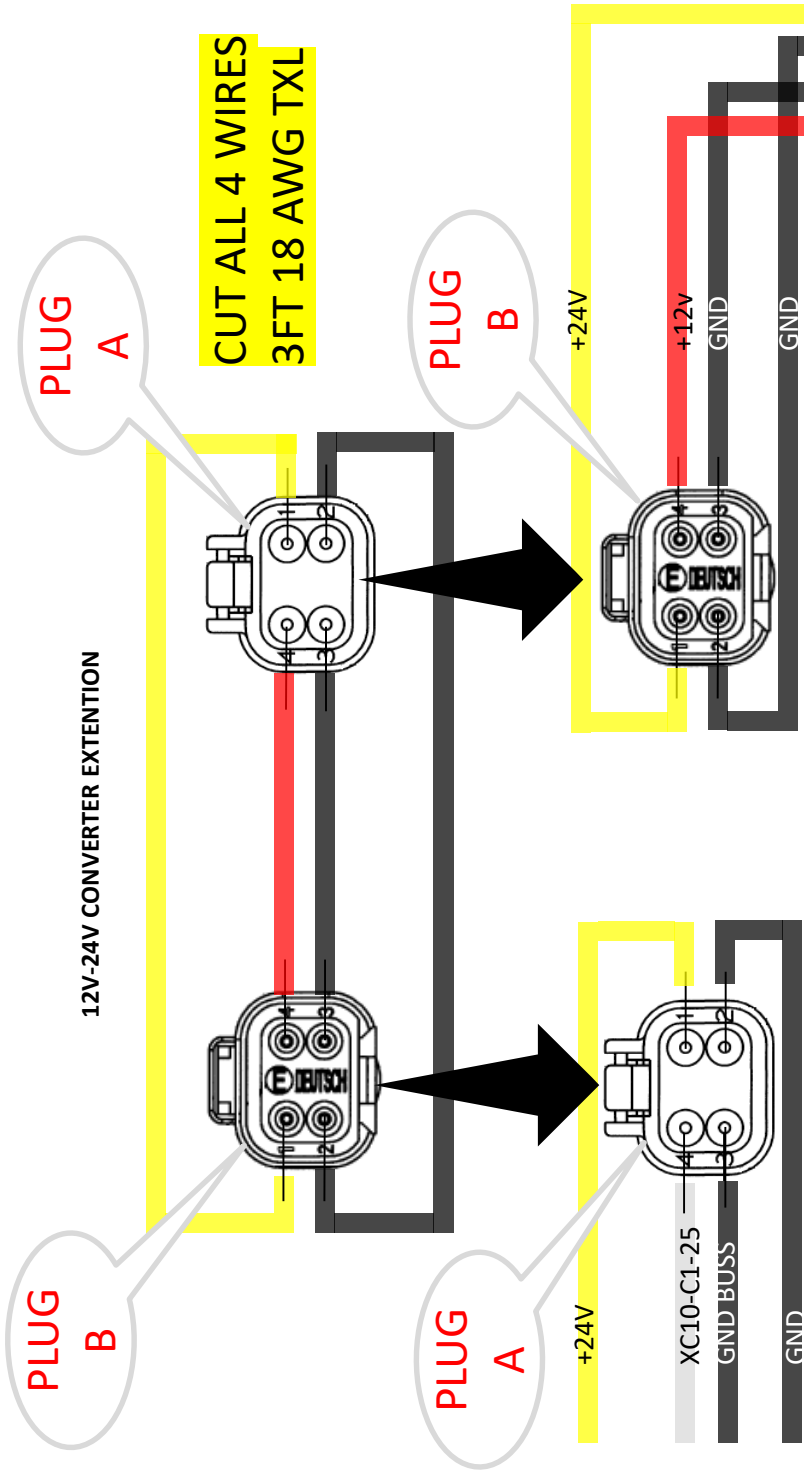


PLUG A

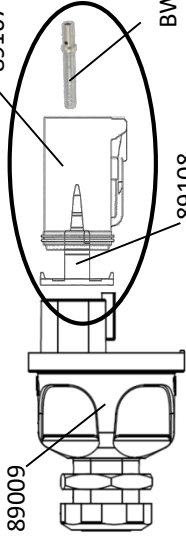


PLUG B

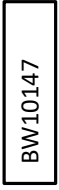
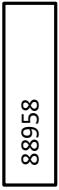
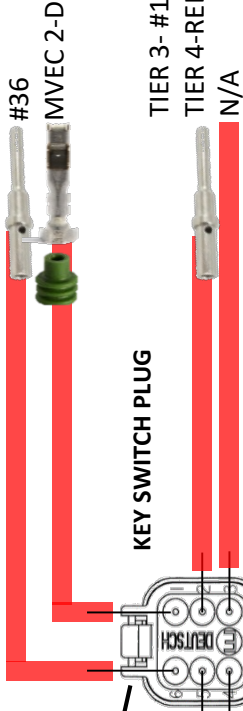




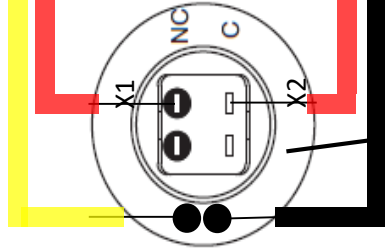
# KEY SWITCH



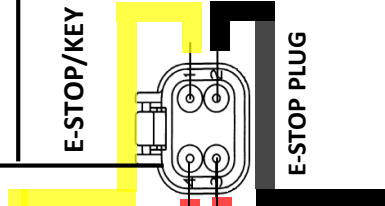
## KEY SWITCH PLUG



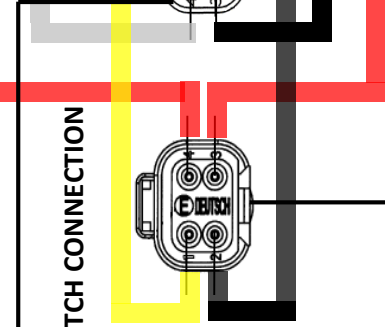
## E-STOP SWITCH



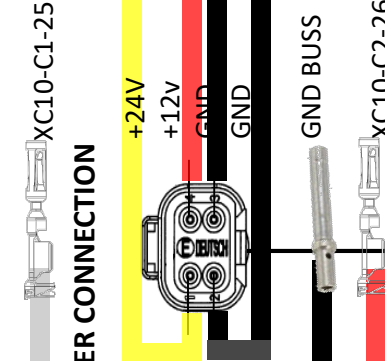
## E-STOP/KEY SWITCH CONNECTION



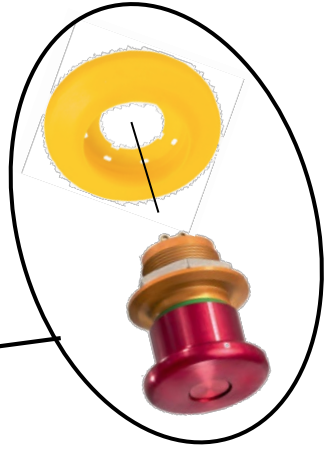
## 12-24 CONVERTER CONNECTION



## XC10-C1-25

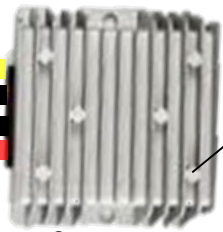
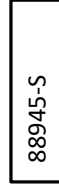
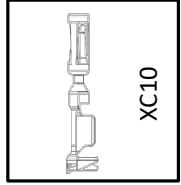
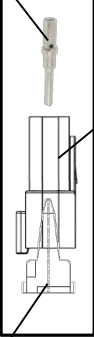


## E-STOP PLUG



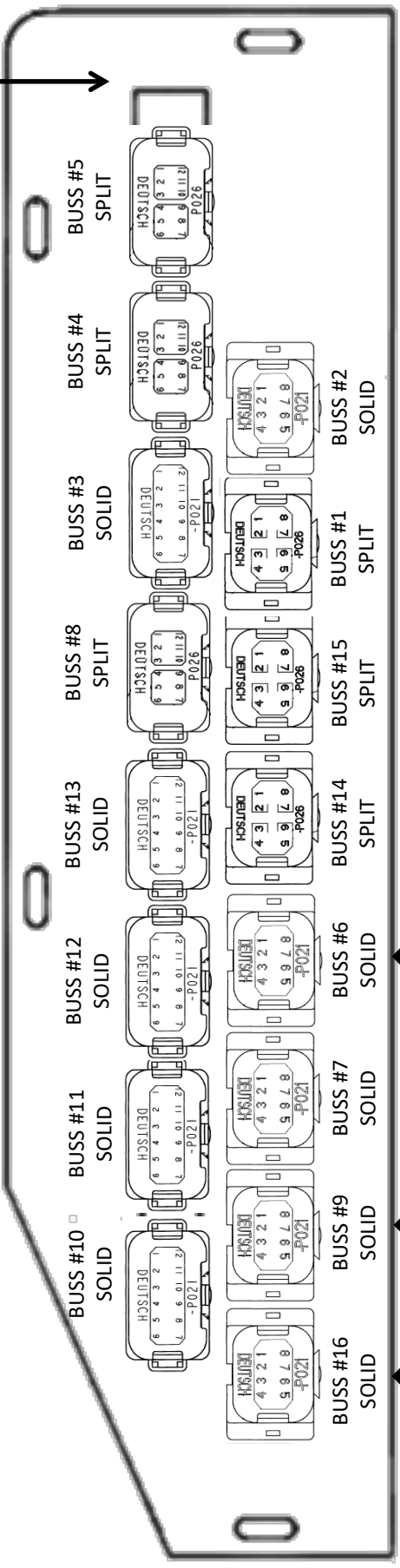
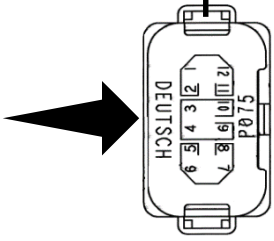
89209

88958



# BUSS BAR SET-UP

TIER-3 ONLY

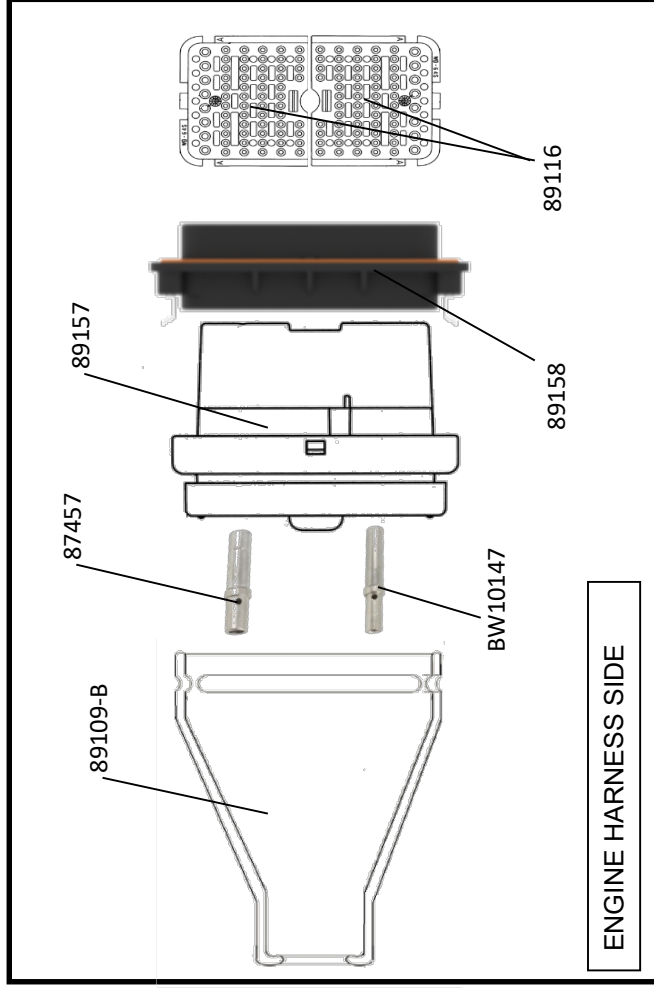
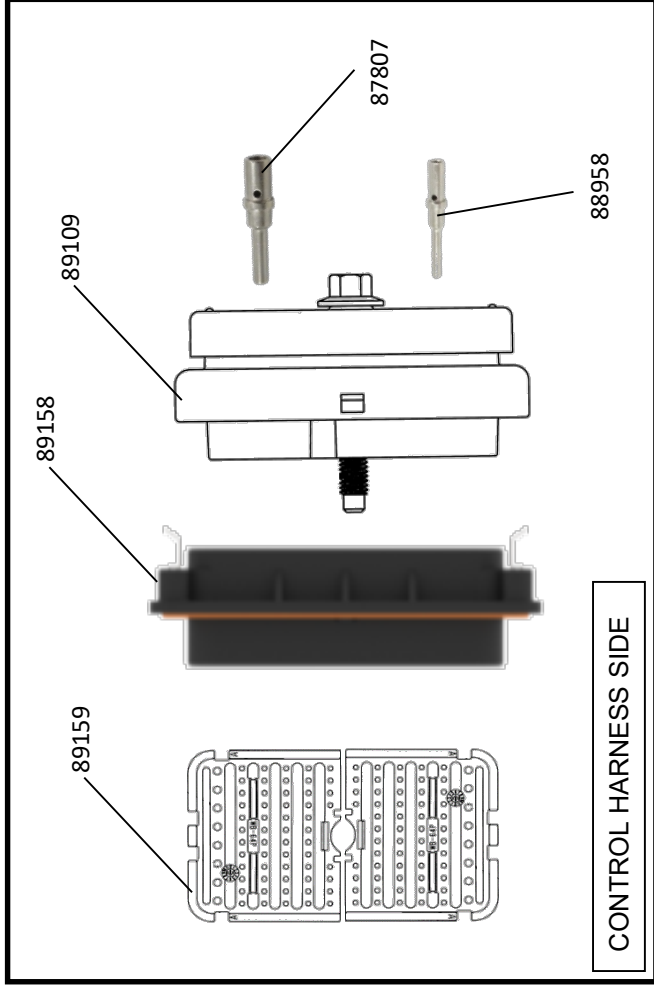
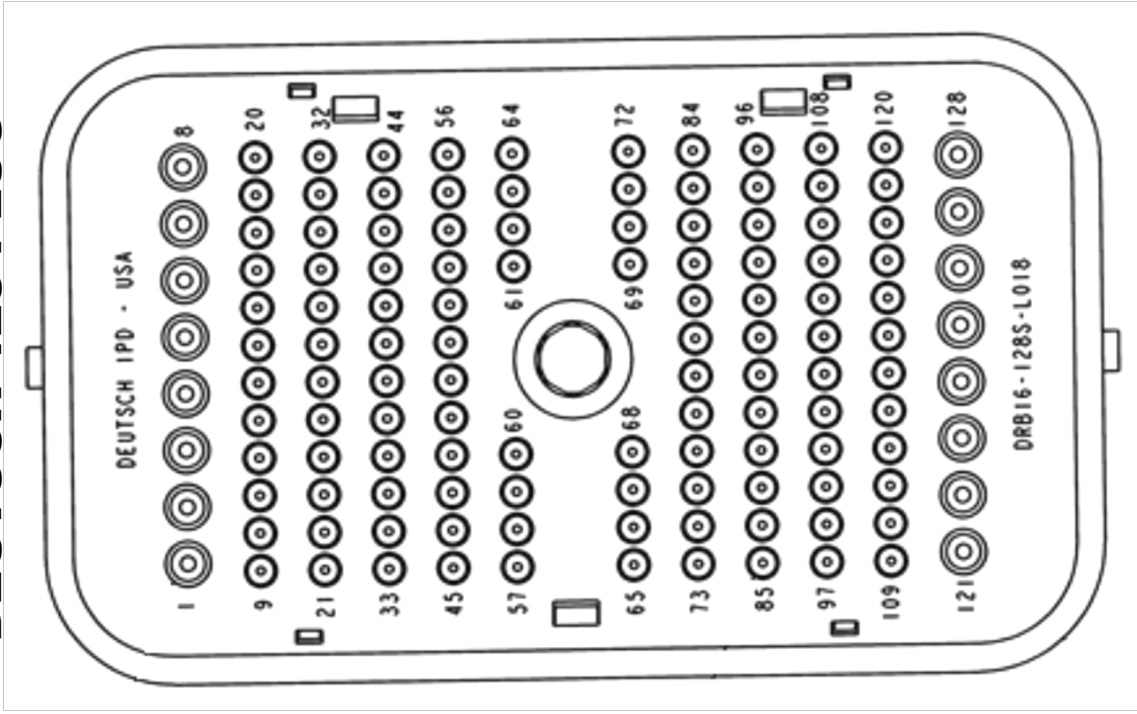


TIER-4 ONLY

TIER-4 ONLY

TIER-4 ONLY

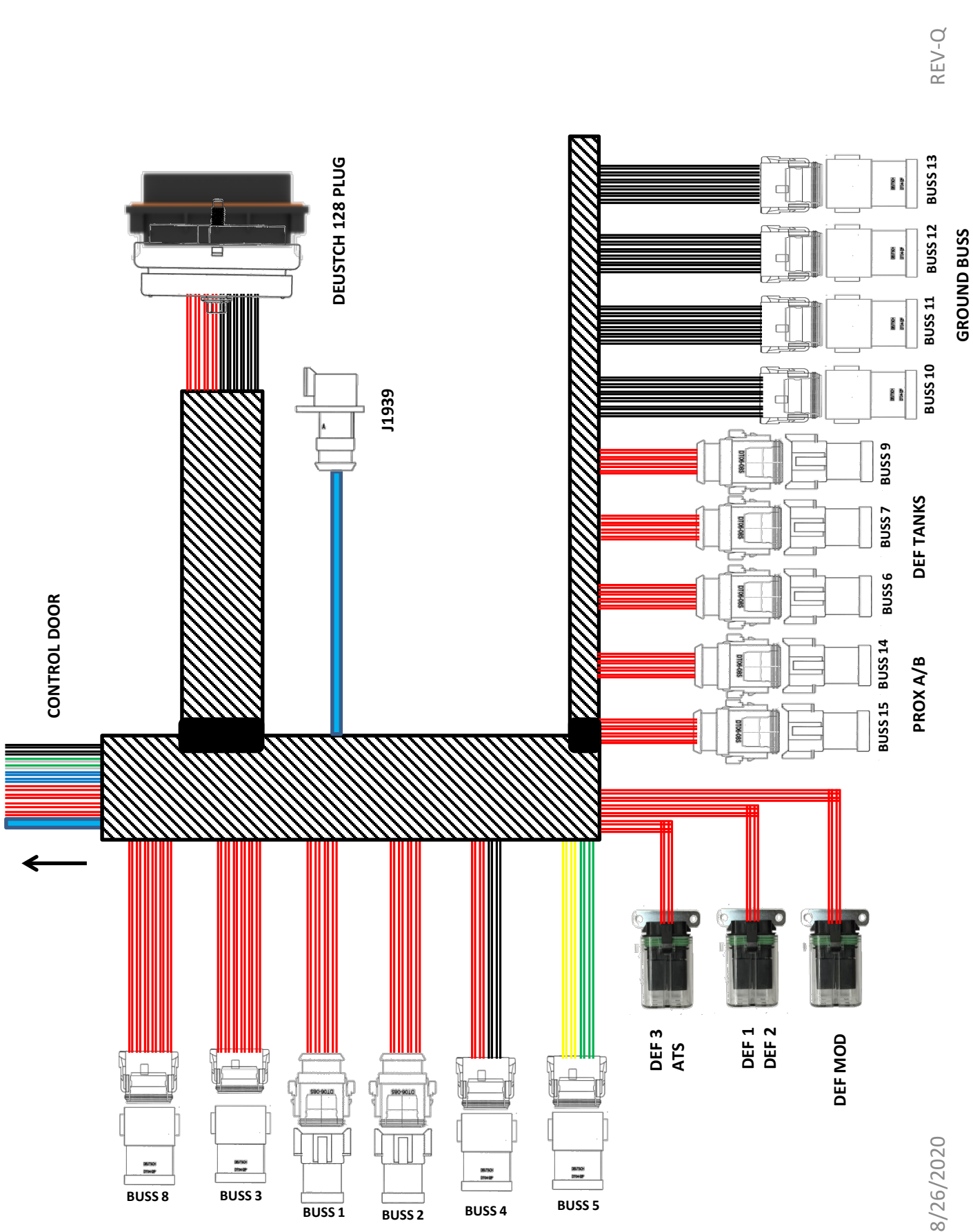
# DEUTSCH 128 PLUG

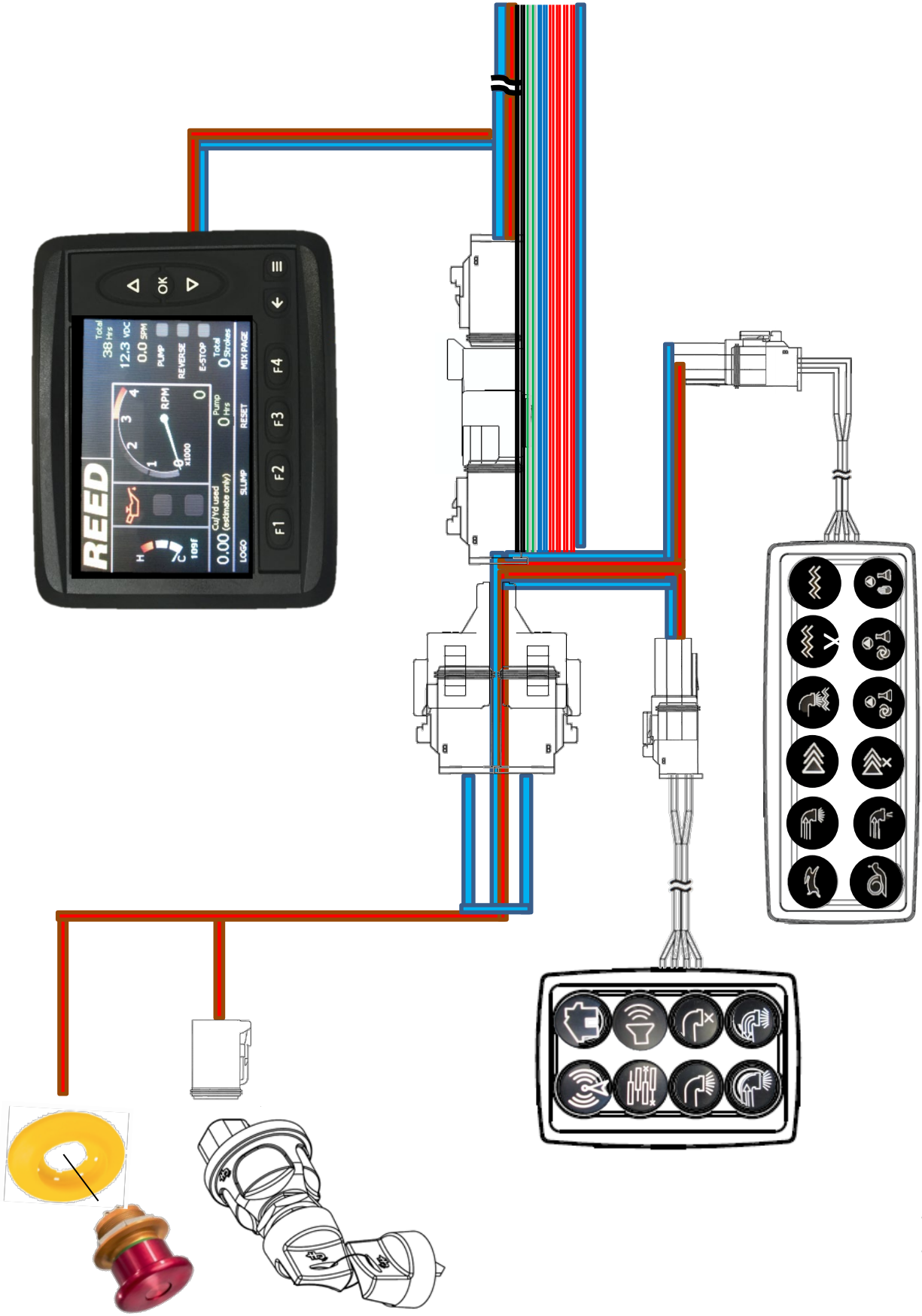


# DEUTSCH 128 PLUG TIER 4 PIN OUT

FROM	DESCRIPTION	WIRE SIZE/COLOR		TO	FROM	DESCRIPTION	WIRE SIZE/COLOR
MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		65	BUSS#17-3	VOLUME +	B-WHT 18/19 AWG
MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		66	BUSS#17-4	VOLUME -	B-WHT 18/19 AWG
MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		67			
MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		68			
MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		69			
MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		70	DEF1 (F)		RED 18 AWG
MVEC #1-G	VIBRATER V+	RED 16 AWG		71	DEF 2 (H)		RED 18 AWG
MVEC #1-H	VIBRATER V+	RED 16 AWG		72	DEF 3 (F)		RED 18 AWG
BUSS#1-3	KEY PWR BUSS	RED 18/19 AWG		73	BUSS#13-8	FAST CHANGE	BLK 18/19 AWG
TIER4 RELAY (H)	STARTER RELAY	RED 18/19 AWG		74	BUSS#13-9	REVERSE VALVE	BLK 18/19 AWG
MVEC#1-E	HORN V+	RED 16 AWG		75	BUSS#13-10	GND (OPTION)	BLK 18/19 AWG
MVEC#1-F	HORN V+	RED 16 AWG		76	BUSS#13-11	CHEM PUMP GND	BLK 18/19 AWG
XC10 C2-24	STROKE	HAYWARD BAKER		77	BUSS#12-11	E-STOP LIGHT	BLK 18/19 AWG
BUSS #14-2	PROX-A	HAYWARD BAKER		78	BUSS#12-10	SAFETY VALVE 1	BLK 18/19 AWG
BUSS#15-4	PROX-B	HAYWARD BAKER		79	BUSS#12-9	SAFETY VALVE 2	BLK 18/19 AWG
				80	BUSS#12-8	S-TUBE COIL (A)	BLK 18/19 AWG
BUSS#8-3	GRATE SENSOR	RED 18/19 AWG		81	BUSS#12-7	S-TUBE COIL(B)	BLK 18/19 AWG
BUSS#8-1	PROX SENSOR B	RED 18/19 AWG		82	BUSS#12-6	PUMP COIL (A)	BLK 18/19 AWG
BUSS#8-2	PROX SENSOR A	RED 18/19 AWG		83	BUSS#12-5	PUMP COIL (B)	BLK 18/19 AWG
				84	BUSS#13-2	OUTRIGGER (-	BLK 18/19 AWG
				85	BUSS#13-7	OUTRIGGER (-	BLK 18/19 AWG
				86			
BUSS#14-4	HOT OIL SENSOR	RED 18/19 AWG		87	BUSS#12-2	GND BUSS	BLK 18/19 AWG
				88			
				89			
				90	BUSS#10	GROUND BUSS	GREEN 18 AWG
XC10 C2-6	STUBE DUMP 2	RED 18/19 AWG		91			
				92			
XC10 C1-8	GRATE SENSOR	WHT 18/19 AWG	<b>TIER 4 REV B</b>	93			
BUSS#14-1	PROX SENSOR A	WHT 18/19 AWG		94	BUSS#7-1	POWER OPTION	RED 18/19 AWG
BUSS#15-3	PROX SENSOR B	WHT 18/19 AWG		95			
				96			
				97			
				98			
				99			
BUSS#7-3	GREASER 12V+	RED 18/19 AWG		100	TIER 4-G	TIER 4 RELAY	WHT 18/19 AWG
KEY SWITCH -6	OPTION (12V+	RED 18/19 AWG		101	TIER 4-A	TIER 4 RELAY	WHT 18/19 AWG
				102	BUSS#16	DEF 1,2,3 GND	BLK 18/19 AWG
BUSS#8-4	V+ OPTION	RED 18/19 AWG		103	DEF MOD-C	DEF MOD RELAY	RED 18/19 AWG
BUSS#8-5	HOT OIL VALVE	RED 18/19 AWG		104			
				105			
BUSS#13-5	GRATE SENSOR	BLK 18/19 AWG		106	BUSS#8-7	KEY-ON	RED 18/19 AWG
BUSS#13-4	PROX SENSOR B	BLK 18/19 AWG		107	XC10 C1-35	HOT OIL VALVE	RED 18/19 AWG
BUSS#13-3	PROX SENSOR A CHEMICAL	BLK 18/19 AWG		108	XC10 C1-12	PWM SIGNAL	WHT 18/19 AWG
XC10 C2-23	FAST CHANGE	RED 18/19 AWG		109	BUSS#11	VIBRATOR GND	BLK 18/19 AWG
XC10 C2-12	REVERSE VALVE	RED 18/19 AWG		110			
XC10 C1-1	PWM SIGNAL (V+)	RED 18/19 AWG		111	BUSS#11-3	HORN GND	BLK 18/19 AWG
XC10 C1-13	CHEM PUMP	WHT 18/19 AWG		112	BUSS#11-2	HORN GND	BLK 18/19 AWG
XC10 C1-25	E-STOP LIGHT V+	WHT 18/19 AWG		113			
XC10 C1-26	STUBE DUMP 1	RED 18/19 AWG		114			
XC10 C1-27	REMIX DUMP V+	RED 18/19 AWG		115			
XC10 C2-11	S-TUBE COIL-A	RED 18/19 AWG		116			
XC10 C2-10	S-TUBE COIL-B	RED 18/19 AWG		117			
XC10 C2-9	PUMP COIL-A	RED 18/19 AWG		118	BUSS#7-2	SPARE V+ FUSE	RED 18/19 AWG
XC10 C2-8	PUMP COIL-B	RED 18/19 AWG		119	BUSS#8-8	ALT DIODE FEED	RED 18/19 AWG
BUSS#8-6	OUTRIGGER	RED 18/19 AWG		120			
				121	BUSS#12-1-12	GND (BATTERY)	BLK 18/19 AWG
				122	BUSS#12-1-12	GND (BATTERY)	BLK 18/19 AWG
				123	BUSS#10-1-12	GND (BATTERY)	BLK 18/19 AWG
ATS RELAY (H)	DEF RELAY	RED 18/19 AWG		124	BUSS#11-1-12	GND (BATTERY)	BLK 18/19 AWG
DEF MOD RELAY (F)	DEF RELAY	RED 18/19 AWG		125	BUSS#11-8	GND (BATTERY)	BLK 18/19 AWG
DEF #1 RELAY (F)	DEF RELAY	RED 18/19 AWG		126	BUSS#11-7	GND (BATTERY)	BLK 18/19 AWG
DEF#2 RELAY (H)	DEF RELAY	RED 18/19 AWG		127			
DEF#3 RELAY (F)	DEF RELAY	RED 18/19 AWG		128	BUSS#11-9	GND (VIBRATOR)	BLK 18/19 AWG



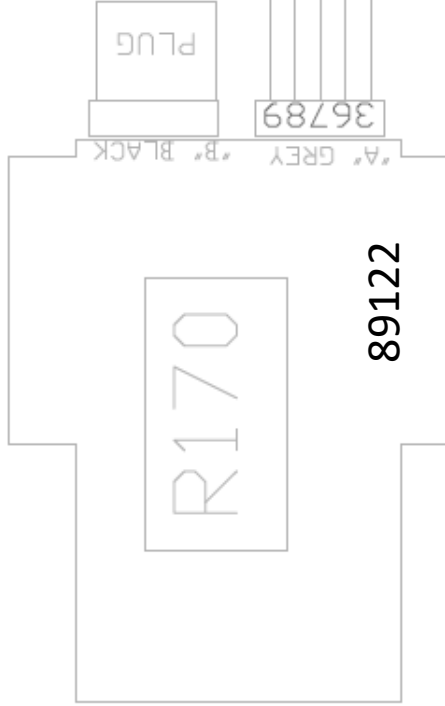




REV-Q

8/26/2020

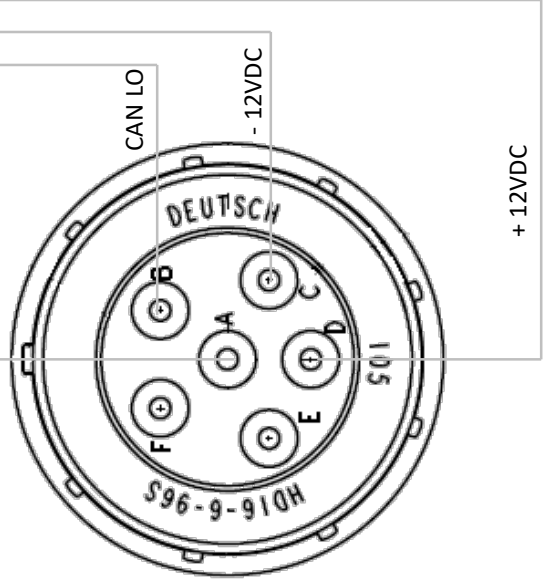
# OMNEX RADIO REMOTE PIN-OUT



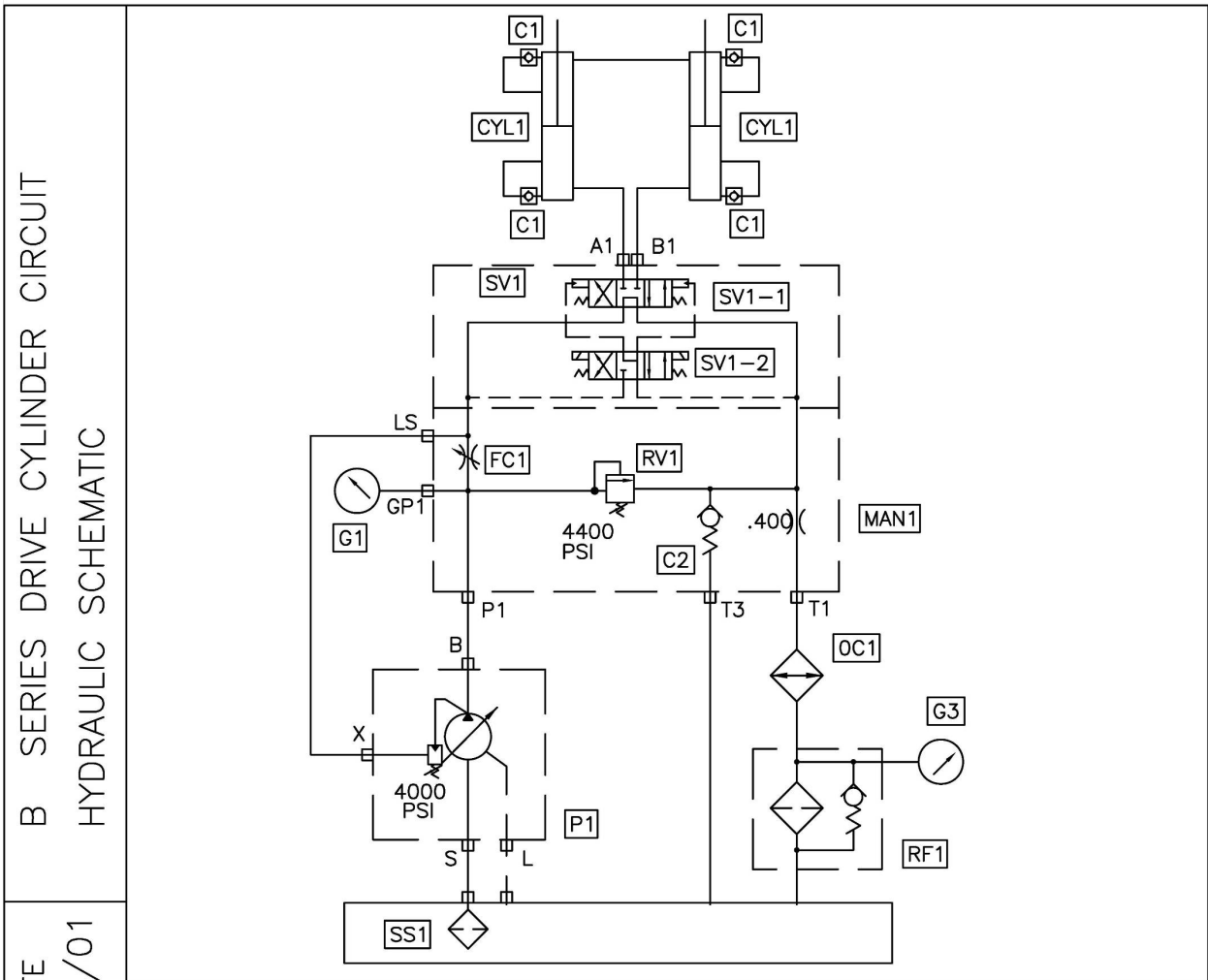
- PIN 9- ORANGE / GREEN
- PIN 8- BLUE
- PIN 7- GREEN / WHITE
- PIN 6- RED / BLACK
- PIN 3- BLACK / RED / WHITE

HARNESS LENGTH  
2.5' LONG

CAN HI



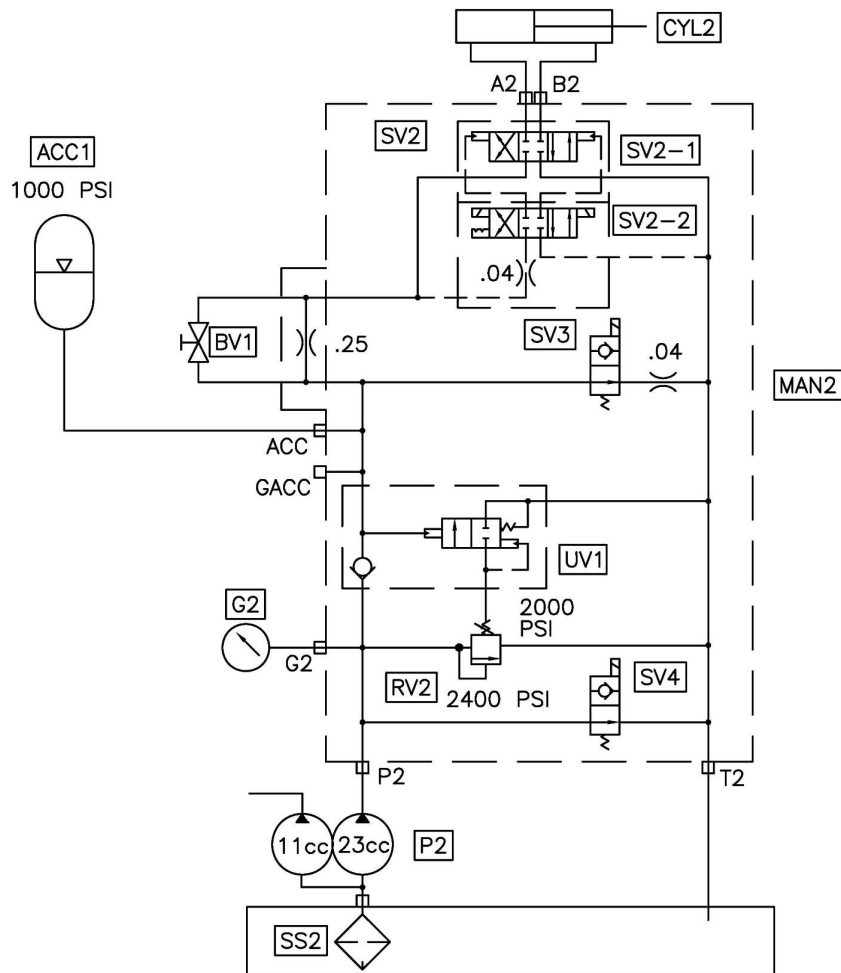
# HYDRAULIC / ELECTRICAL SCHEMATICS



B SERIES DRIVE CYLINDER CIRCUIT HYDRAULIC SCHEMATIC		DATE	DESCRIPTION	PART NO.	QTY.
PART NO. REV.	86708 B	12/3/01	P1	Main Pump	
			CYL1	Hydraulic Drive Cylinder	
			MAN1	Manifold Drive Cylinder Circuit	85248 1
			SV1	Solenoid Valve, Drive Cylinder Circuit	85689 1
			SV1-1	Valve Main	85690 1
				Seal Kit	74994 1
			SV2-2	Solenoid Valve Pilot	85691 1
				Coil For SV2-2	85692 2
				Seal Kit	72313 1
			RV1	Relief Valve Cartridge	85696 1
				Seal Kit	85696-SK 1
			FC1	Flow Control Valve Cartridge	85697 1
				Seal Kit	85697-SK 1
			C1	Check Valve	78961 4
			C2	Check Valve Cartridge	85698 1
				Seal Kit	85698-SK 1
			G1	Pressure Gauge 6000 psi	74562 1
			G3	Pressure Gauge Return	85575 1
			OC1	Oil Cooler	85713 1
			RF1	Return Filter	85282 1
				Return Filter Element	85283 1
				Seal Kit Return Filter	BW10241 1
			SS1	Magnetic Suction Strainer 3"	800230 1

**REED**

B50/60/70 SERIES SWING TUBE HYDRAULIC SCHEMATIC, SINGLE SHIFT CYLINDER



DATE  
11/7/01

REV.  
B

PART NO.  
86705

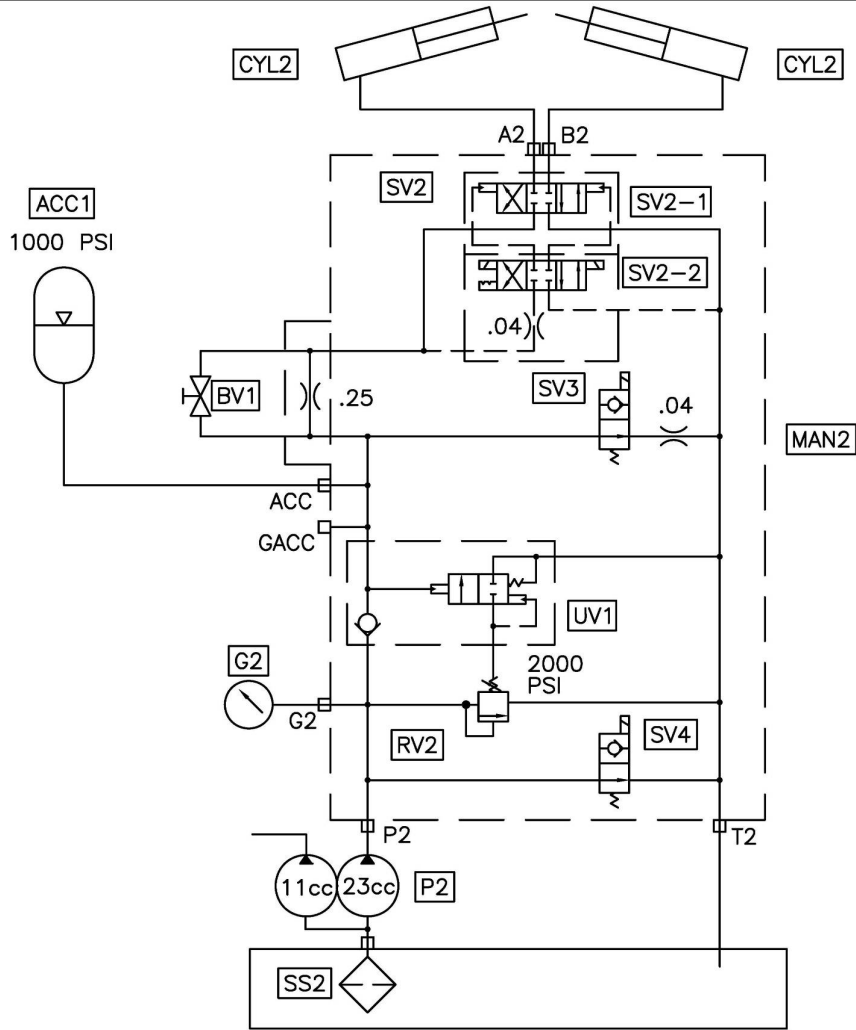
**REED**

CODE	DESCRIPTION	PART NO.	QTY.
P2	Gear Pump	87571-1	1
CYL2	S Tube Single Shift Cylinder	86221	1
	Seal Kit, GRATE BEND or TEXAS	86221-SK??	1
MAN2	Manifold S Tube Circuit	85249	1
SV2	Solenoid Valve S Tube Circuit	85693	1
SV2-1	Valve Main	85694	1
	Seal Kit	74994	1
SV2-2	Solenoid Valve Pilot	85695	1
	Seal Kit	72313	1
	Coil For SV2-2	85692	2
SV3	Solenoid Valve Cartridge	87246	1
	Coil For SV3	87247	1
SV4	Solenoid Valve Cartridge	87248	1
	Coil For SV4	87249	1
RV2	Relife Valve Cartridge	85703	1
	Seal Kit For Relife Valve	85703SK	1
UN1	Unloading Valve Cartridge	85704	1
	Seal Kit For Unloder Valve	85704SK	1
BV1	Ball Valve	85705	1
AAC1	Accumulator	74515	1
	Accumulator, Bladder	74516	1
	Seal Kit Accumulator, Bladder	85812	1
G2	Pressure Gauge 3000 PSI	70366	1
SS2	Magnetic Suction Strainer 1 1/4"	79247	1

B SERIES SWING TUBE HYDRAULIC SCHEMATIC, DUAL SHIFT CYLINDER

DATE 11/7/01  
 REV. B  
 PART NO. 86706

**REED**



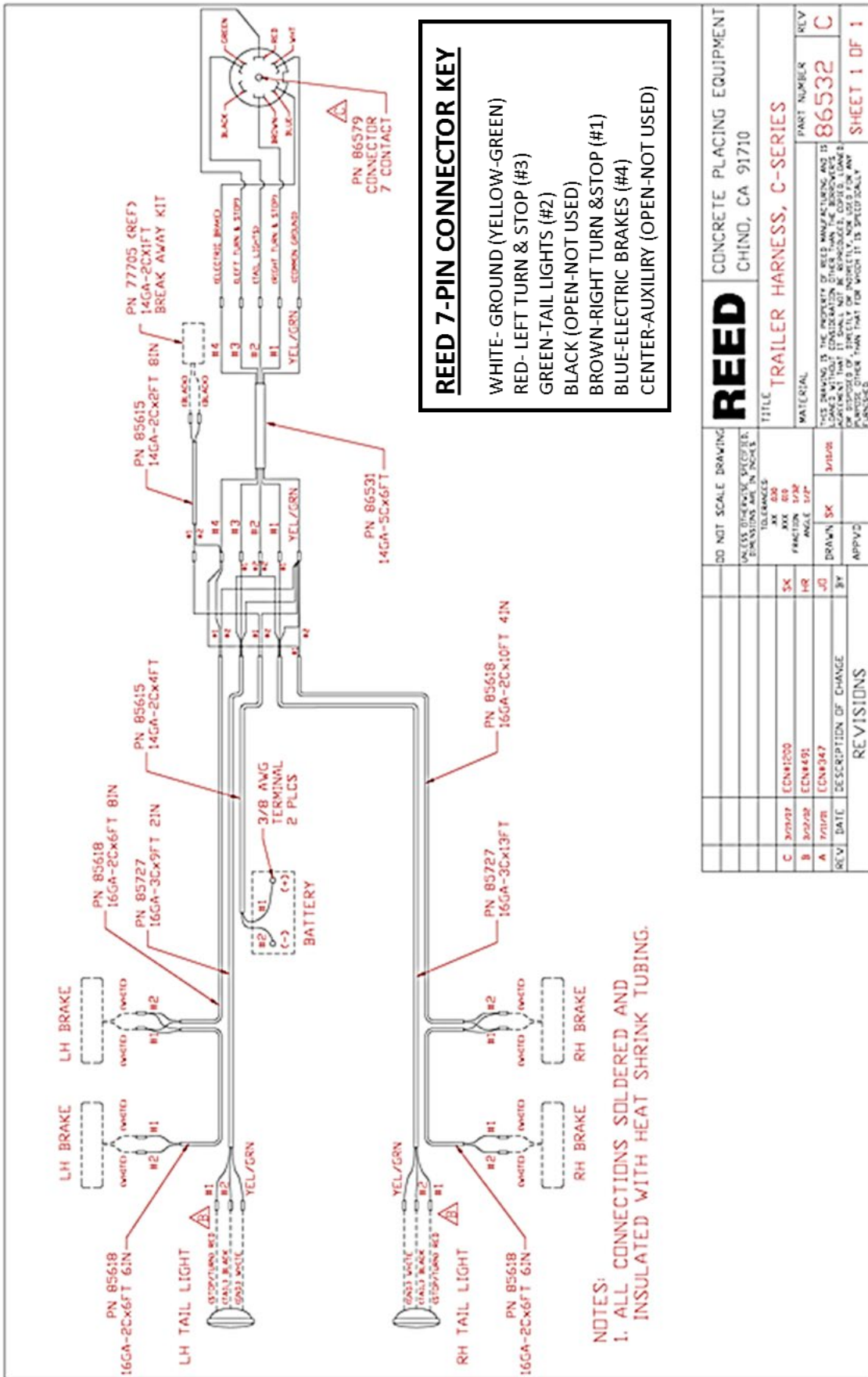
CODE	DESCRIPTION	PART NO.	QTY.
P2	Gear Pump		1
CYL2	S Tube Single Shift Cylinder	86220	2
	Seal Kit	86220-SKTX	1
MAN2	Manifold S Tube Circuit	85249	1
SV2	Solenoid Valve S Tube Circuit	85693	1
SV2-1	Valve Main	85694	1
	Seal Kit	74994	1
SV2-2	Solenoid Valve Pilot	85695	1
	Seal Kit	72313	1
	Coil For SV2-2	85692	2
SV3	Solenoid Valve Cartridge	87246	1
	Coil For SV3	87247	1
SV4	Solenoid Valve Cartridge	87248	1
	Coil For SV4	87249	1
RV2	Relife Valve Cartrige	85703	1
UN1	Unloading Valve Cartrige	85704	1
BV1	Ball Valve	85705	1
AAC1	Accumulator	74515	1
	Accumulator, Bladder	74516	1
	Seal Kit Accumulator, Bladder	85812	1
G2	Pressure Gauge 3000 PSI	70366	1
SS2	Magnetic Suction Strainer 1 1/4"	79247	1

REV B-5/7/2009





# TRAILER HARNESS



DD NOT SCALE DRAWING	CONCRETE PLACING EQUIPMENT	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	CHINO, CA 91710	
TOLERANCES	<b>REED</b>	
XX ±.00	TITLE TRAILER HARNESS, C-SERIES	
FRACTION 1/32	MATERIAL	
ANGLE 1/16	PART NUMBER	
	86532	
	REV	
	C	
	SHEET 1 OF 1	

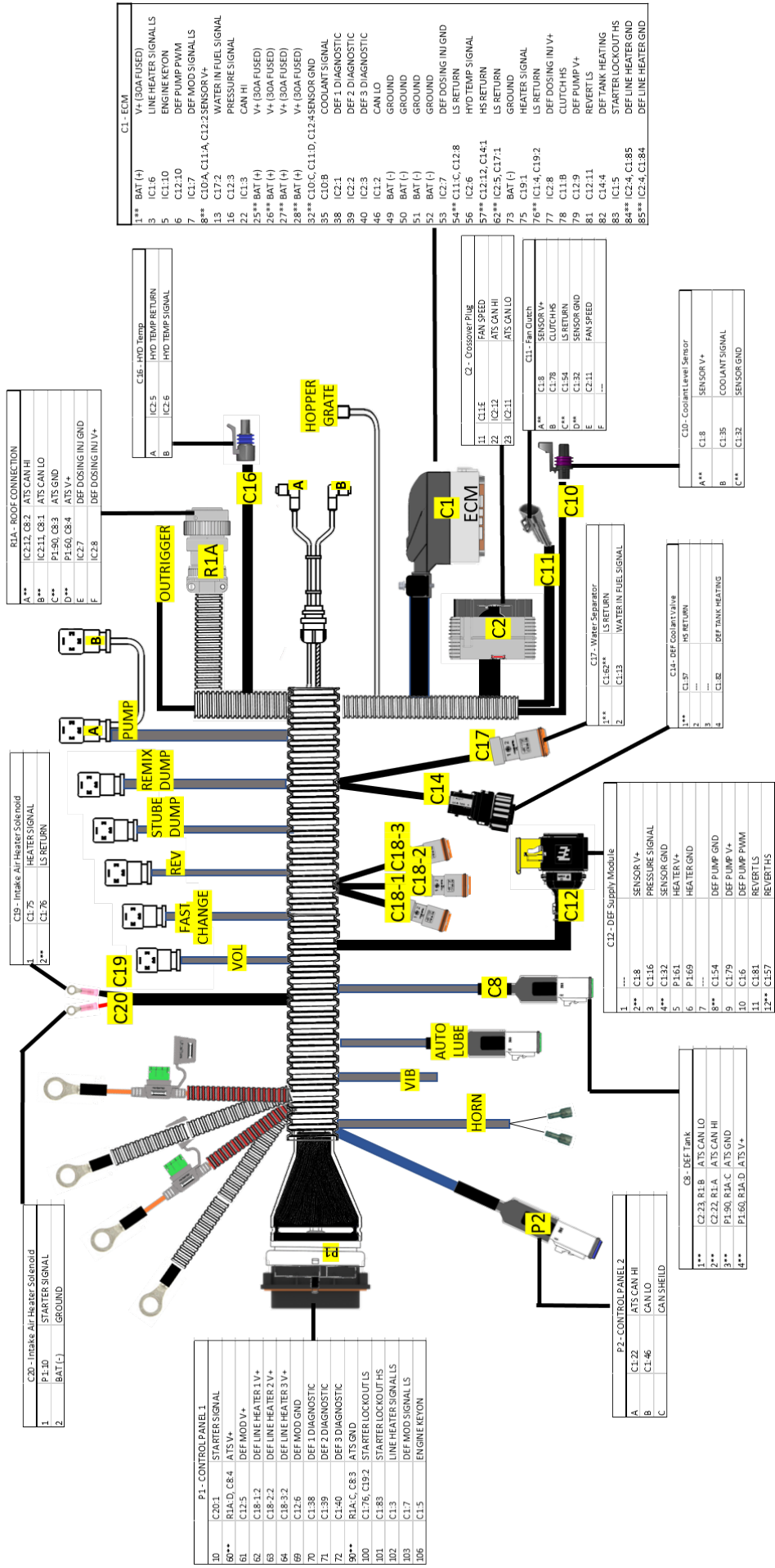
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	CONCRETE PLACING EQUIPMENT	
TOLERANCES	CHINO, CA 91710	
XX ±.00	TITLE TRAILER HARNESS, C-SERIES	
FRACTION 1/32	MATERIAL	
ANGLE 1/16	PART NUMBER	
	86532	
	REV	
	C	
	SHEET 1 OF 1	

# 89113 PLC WIRING HARNESS PIN-OUT

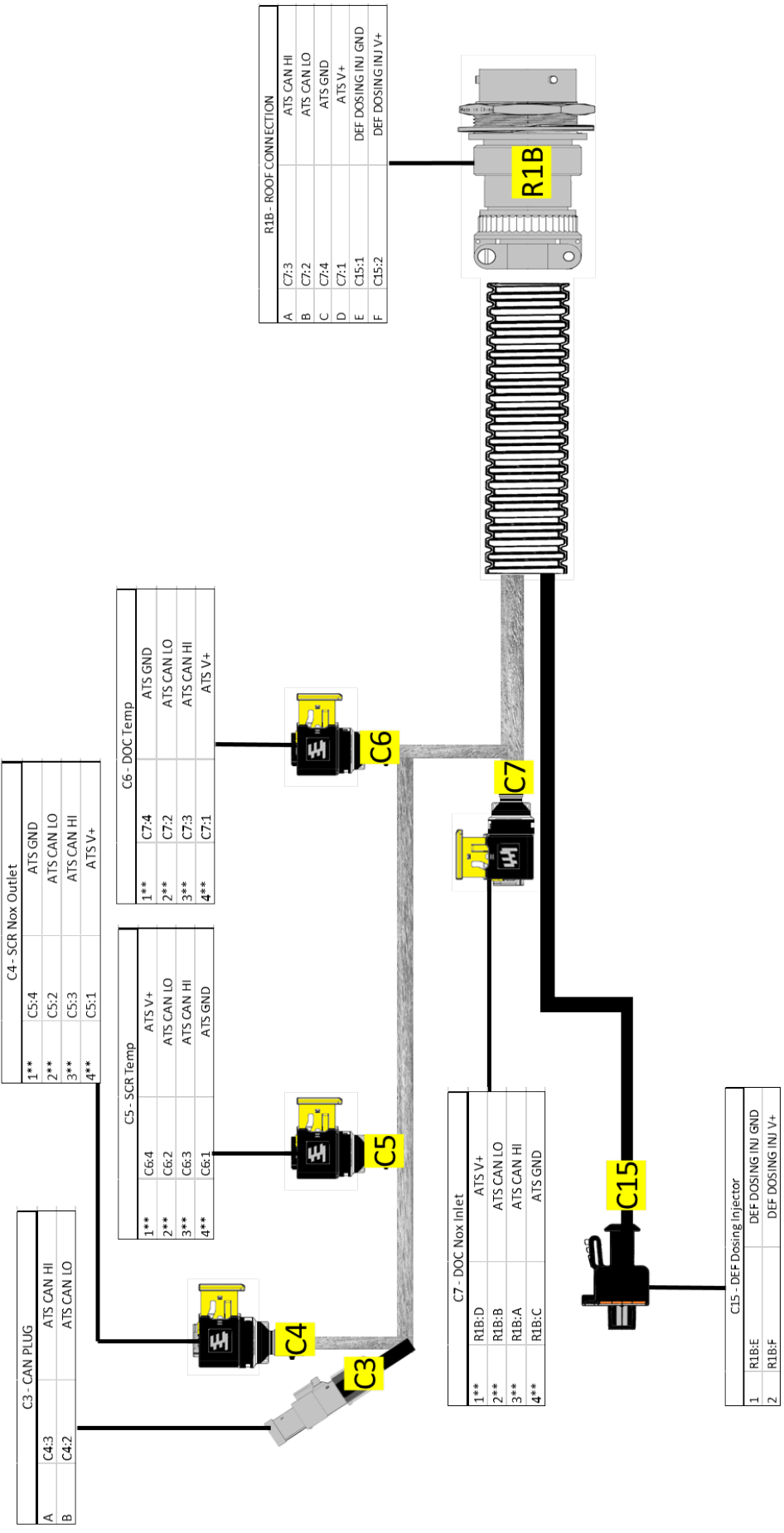


TO	FROM	DESCRIPTION	WIRE SIZE/COLOR		TO	FROM	DESCRIPTION	WIRE SIZE/COLOR
1	MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		65	BUSS#17-3	VOLUME +	B-WHT 18/19 AWG
2	MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		66	BUSS#17-4	VOLUME -	B-WHT 18/19 AWG
3	MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		67			
4	MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		68			
5	MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		69	BUSS 10	GND BUSS	GREEN 18 TXL
6	MVEC MAIN PWR	V+ (BATTERY)	RED 14 AWG		70	DEF 1 (F)		
7	MVEC #1-G	VIBRATER V+	RED 16 AWG		71	DEF 2 (H)		
8	MVEC #1-H	VIBRATER V+	RED 16 AWG		72	DEF 3 (F)		
9	BUSS#1-3	KEY PWR BUSS	RED 18/19 AWG		73	BUSS#13-8	FAST CHANGE	BLK 18/19 AWG
10	TIER4 RELAY (H)	STARTER RELAY	RED 18/19 AWG		74	BUSS#13-9	REVERSE VALVE	BLK 18/19 AWG
11	MVEC#1-E	HORN V+	RED 16 AWG		75	BUSS#13-10	GND (OPTION)	BLK 18/19 AWG
12	MVEC#1-F	HORN V+	RED 16 AWG		76	BUSS#13-11	CHEM PUMP GND	BLK 18/19 AWG
13	XC10 C2-24	STROKE	HAYWARD BAKER		77	BUSS#12-11	E-STOP LIGHT	BLK 18/19 AWG
14	BUSS#14-2	PROX -A	HAYWARD BAKER		78	BUSS#12-10	SAFETY VALVE 1	BLK 18/19 AWG
15	BUSS-15-4	PROX-B	HAYWARD BAKER		79	BUSS#12-9	SAFETY VALVE 2	BLK 18/19 AWG
16					80	BUSS#12-8	S-TUBE COIL (A)	BLK 18/19 AWG
17	BUSS#8-3	GRATE SENSOR	RED 18/19 AWG		81	BUSS#12-7	S-TUBE COIL(B)	BLK 18/19 AWG
18	BUSS#8-1	PROX SENSOR B	RED 18/19 AWG		82	BUSS#12-6	PUMP COIL (A)	BLK 18/19 AWG
19	BUSS#8-2	PROX SENSOR A	RED 18/19 AWG		83	BUSS#12-5	PUMP COIL (B)	BLK 18/19 AWG
20					84	BUSS#13-2	OUTRIGGER (-	BLK 18/19 AWG
21					85	BUSS#13-7	OUTRIGGER (-	BLK 18/19 AWG
22	BUSS#14-4	HOT OIL SENSOR	RED 18/19 AWG		86			
23					87	BUSS#12-2	GND BUSS	BLK 18/19 AWG
24					88			
25					89			
26					90	BUSS 10	GROUND BUSS	BLK 18/19 AWG
27	XC10 C2-6	STUBE DUMP 2	RED 18/19 AWG		91			
28					92			
29	XC10 C1-8	GRATE SENSOR	WHT 18/19 AWG		93			
30	BUSS#14-1	PROX SENSOR A	WHT 18/19 AWG	<b>TIER 4 REV C</b>	94	BUSS#7-1	POWER OPTION	RED 18/19 AWG
31	BUSS#15-3	PROX SENSOR B	WHT 18/19 AWG		95			
32					96			
33					97			
34					98			
35	BUSS#7-3	GREASER 12V+	RED 18/19 AWG		99			
36	KEY SWITCH -6	OPTION (12V+	RED 18/19 AWG		100	TIER 4-G	TIER 4 RELAY	WHT 18/19 AWG
37					101	TIER 4-A	TIER 4 RELAY	WHT 18/19 AWG
38	BUSS#8-4	V+ OPTION	RED 18/19 AWG		102	BUSS#16	DEF 1,2,3 GND	GRN 18/19 AWG
39	BUSS#8-5	HOT OIL VALVE	RED 18/19 AWG		103	DEF MOD-C	DEF MOD RELAY	RED 18/19 AWG
40					104			
41	BUSS#13-5	GRATE SENSOR	BLK 18/19 AWG		105			
42	BUSS#13-4	PROX SENSOR B	BLK 18/19 AWG		106	BUSS 2	KEY-ON	RED 18/19 AWG
43	BUSS#13-3	PROX SENSOR A	BLK 18/19 AWG		107	XC10 C1-35	HOT OIL VALVE	RED 18/19 AWG
44		CHEMICAL			108	XC10 C1-12	PWM SIGNAL	WHT 18/19 AWG
45	XC10 C2-23	FAST CHANGE	RED 18/19 AWG		109	BUSS#11	VIBRATOR GND	BLK 18/19 AWG
46	XC10 C2-12	REVERSE VALVE	RED 18/19 AWG		110			
47	XC10 C1-1	PWM SIGNAL (V+)	RED 18/19 AWG		111	BUSS#11-3	HORN GND	BLK 18/19 AWG
48	XC10 C1-13	CHEM PUMP	WHT 18/19 AWG		112	BUSS#11-2	HORN GND	BLK 18/19 AWG
49	XC10 C1-25	E-STOP LIGHT V+	WHT 18/19 AWG		113			
50	XC10 C1-26	STUBE DUMP 1	RED 18/19 AWG		114			
51	XC10 C1-27	REMIX DUMP V+	RED 18/19 AWG		115			
52	XC10 C2-11	S-TUBE COIL-A	RED 18/19 AWG		116			
53	XC10 C2-10	S-TUBE COIL-B	RED 18/19 AWG		117			
54	XC10 C2-9	PUMP COIL-A	RED 18/19 AWG		118	BUSS#7-2	SPARE V+ FUSE	RED 18/19 AWG
55	XC10 C2-8	PUMP COIL-B	RED 18/19 AWG		119	BUSS#8-8	ALT DIODE FEED	RED 18/19 AWG
56	BUSS#8-6	OUTRIGGER	RED 18/19 AWG		120			
57					121	BUSS#12-1-12	GND (BATTERY)	BLK 18/19 AWG
58					122	BUSS#12-1-12	GND (BATTERY)	BLK 18/19 AWG
59					123	BUSS#10-1-12	GND (BATTERY)	BLK 18/19 AWG
60	ATS RELAY (H)	DEF RELAY	RED 18/19 AWG		124	BUSS#11-1-12	GND (BATTERY)	BLK 18/19 AWG
61	DEF MOD RELAY (F)	DEF RELAY	RED 18/19 AWG		125	BUSS#11-8	GND (BATTERY)	BLK 18/19 AWG
62	DEF #1 RELAY (F)	DEF RELAY	RED 18/19 AWG		126	BUSS#11-7	GND (BATTERY)	BLK 18/19 AWG
63	DEF#2 RELAY (H)	DEF RELAY	RED 18/19 AWG		127			
64	DEF#3 RELAY (F)	DEF RELAY	RED 18/19 AWG		128	BUSS#11-9	GND (VIBRATOR)	BLK 18/19 AWG

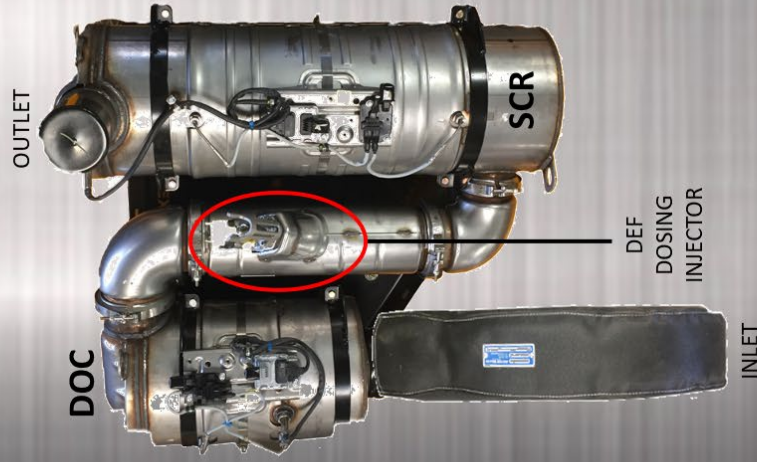
# 89052 B-SERIES HARNESS



# 89052-R TIER-4 ROOF HARNESS

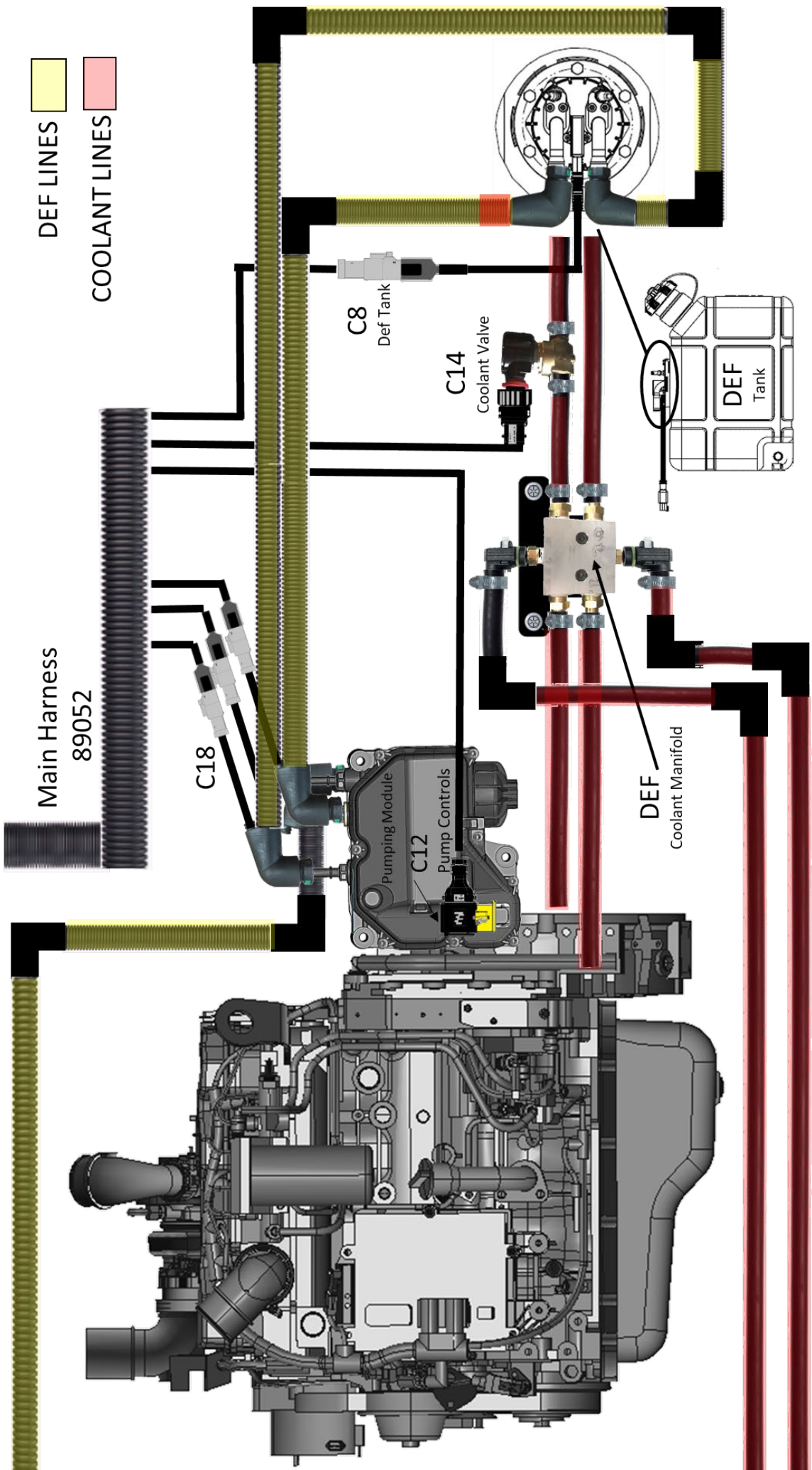






## TIER4 AFTERTREATMENT TERMINOLOGY

- **DEF**-Diesel exhaust fluid Specifically (DEF) is an aqueous urea solution made with 32.5% urea and 67.5% deionized water.
- **SCR**-Selective Catalytic Reduction is an advance active emission control technology system that injects a liquid-reductant agent (DEF) through a special catalyst into the exhaust stream of a diesel engine.
- **DOC**-Diesel Oxidation Catalyst DOC is an aftertreatment component that is designed to convert carbon monoxide (CO) and hydrocarbons into carbon dioxide (CO<sub>2</sub>) and water.
- **DPF**-Diesel Particulate Filter A DPF traps particulate matter that's carried in the exhaust stream, preventing it from being released into the atmosphere. Inside the DPF, particulate matter, sometime referred as "soot," is trapped until it is oxidized during regeneration.
- **AMOX**-Ammonia Oxidation Catalyst In order to ensure sufficient Nox reduction, a small amount of excess Diesel Exhaust Fluid (DEF) is injected into the exhaust stream. This excess DEF may pass through the Selective Catalytic Reduction (SCR) catalyst as ammonia. To prevent excess ammonia from entering the atmosphere, the exhaust gas flows through an Ammonia Oxidation Catalyst (AMOX) where the ammonia reacts with oxygen in the presence of the catalyst to form nitrogen and water.
- **PETU**-Pump Electronics Tank Unit The PETU is responsible for storing, controlling and supplying the appropriate quantity of Diesel Exhaust Fluid from the DEF tank to the DEF injector. The Diesel Exhaust fluid is used by the SCR system to reduce Nox emissions to the exhaust
- **NRS**- Nox Reduction System NRS captures and cools a small quantity of exhaust gas, then routes it back into the combustion chamber where it drives down combustion temperatures and reduces oxides of nitrogen (Nox) emissions.



DEF LINES

COOLANT LINES

Main Harness  
89052

C18

C8  
Def Tank

C14  
Coolant Valve

DEF  
Coolant Manifold

DEF  
Tank

Pumping Module  
C12  
Pump Controls



DEF LINES

COOLANT LINES

R1B

Roof Harness 89052-R

ROOF, TOP

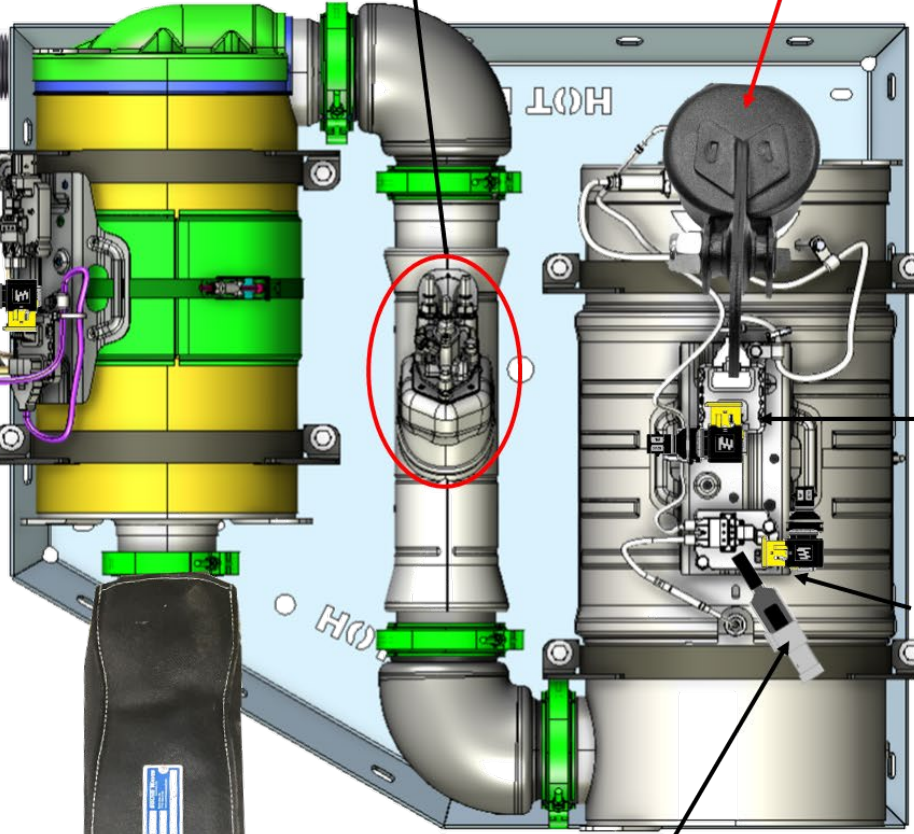
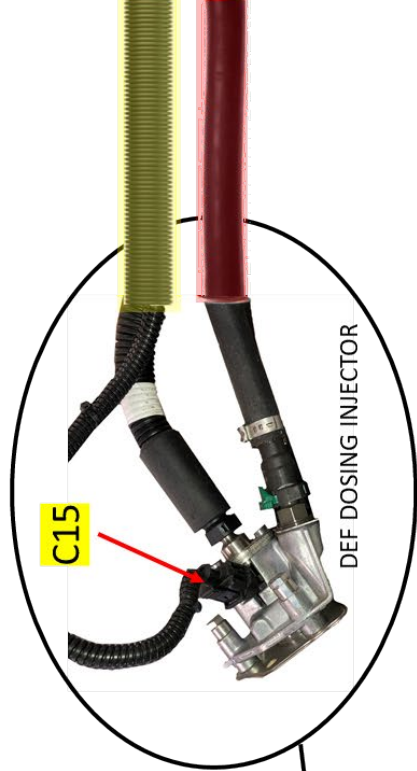
DOC NOX INLET

C6

C7

DOC TEMP

AFTER TREATMENT INLET



CAN PLUG TERM RESISTOR

C3

EXHAUST OUTLET

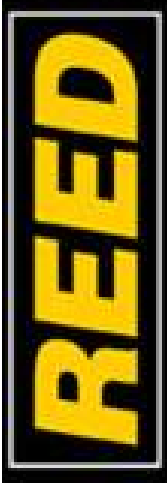
C5 SCR TEMP

C4 SCR NOX OUTLET

HO1

HO2



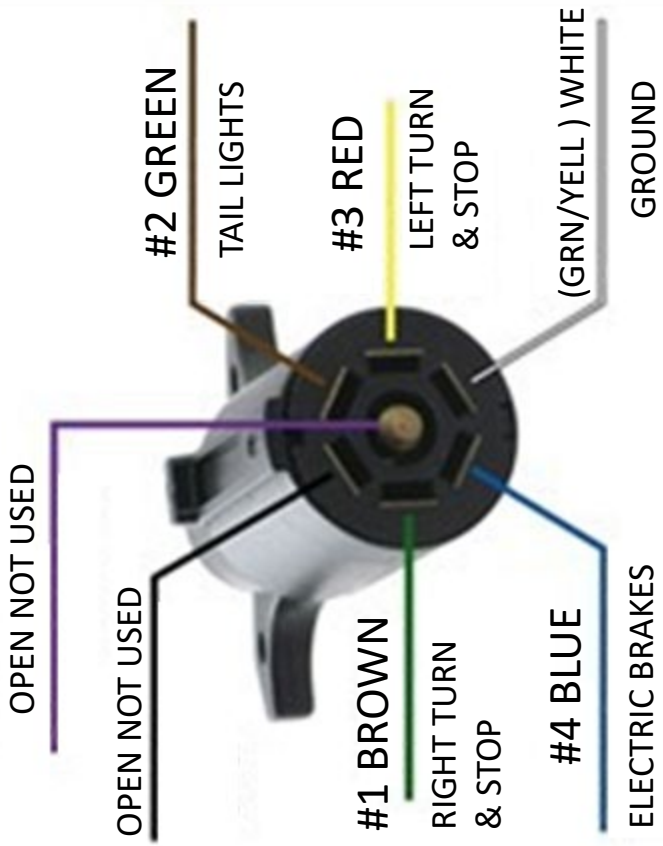
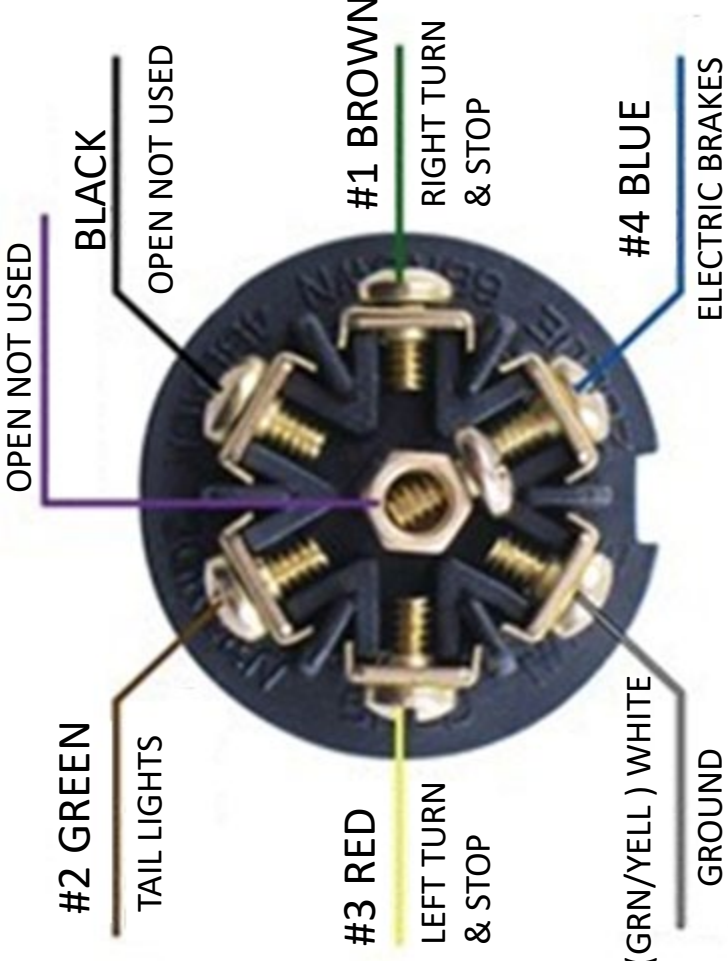


# TRAILER PLUG PINOUT

## 7 Way Trailer Connector

Inside

Outside





# B50HPSC TIER4

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13822 Oaks Avenue  
Chino, CA 91710  
reedpumps.com  
(909) 287 - 2100

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# B50HPSC TIER4 PARTS

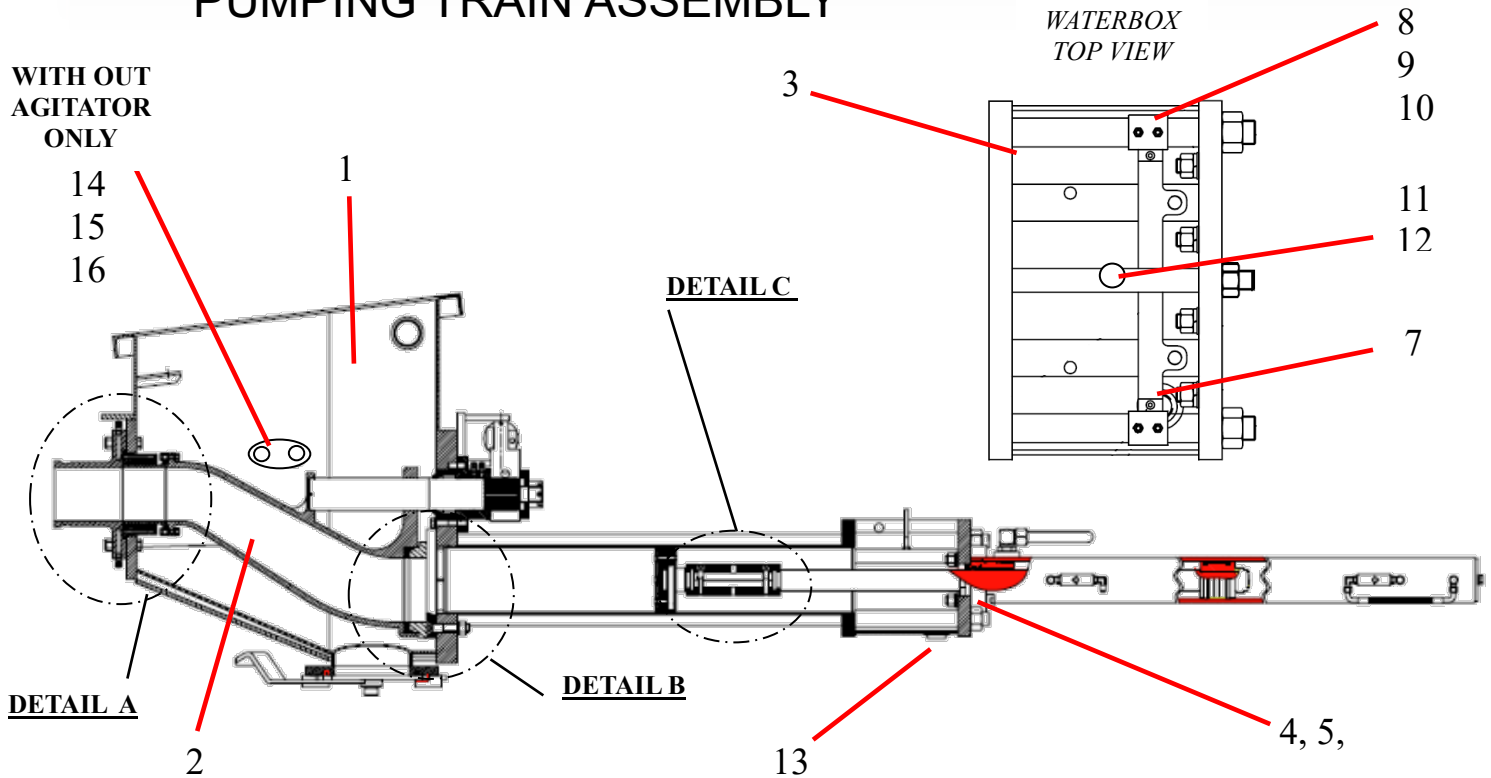
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reedpumps.com  
(909) 287 - 2100

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REV	DATE	DESCRIPTION	NAME
B50HPSC-V20	9/1/2020	*	J.SLACK

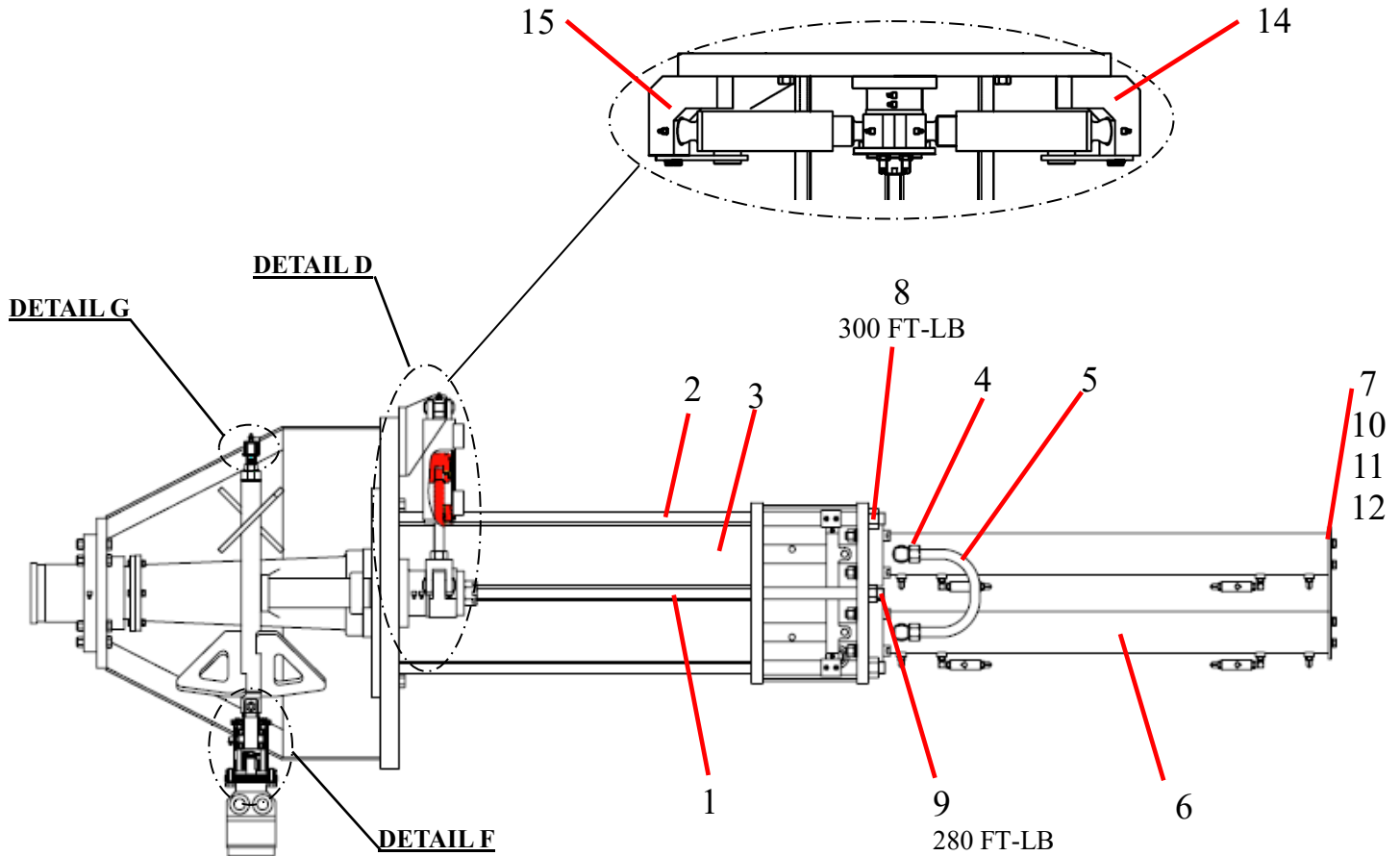
### PARTS

### PUMPING TRAIN ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
	88804	DUAL SHIFT PUMPING TRAIN, HYDRA	REF	
1	86121A	HOPPER WELDMENT, 6" DUAL	REF	
2	86984	S TUBE WLD, 6X5 SELL	1	EA
3	86095	FLUSH BOX WELDMENT, 6 IN	1	EA
4		SHCS 3/4 - 10X5" GR 8	8	EA
5		HEX NUT, 3/4 - 10	12	EA
6		LOCK WASHER 3/4"	13	EA
7	86006	BRACKET, PROX SWITCH	1	EA
8	86752	HHCS, 1/4 -20X3/4" GR 8	6	EA
9		LOCK WASHER, 1/4"	2	EA
10		FLAT WASHER, 1/4"	2	EA
11	86665	STUD, 3/8-16X3" LONG	1	EA
12	80072	LOCKWASHER-3/8"	1	EA
13	10282	PLUGS-PIPE GALV 1"	1	EA
14	73434	COVER PLATE-REMIX (INSIDE)	1	EA
15	73433	COVER PLATE-REMIX (OUTSIDE)	1	EA
16	86623	SEAL, AGITATOR (INSIDE)	1	EA
	86539	SPACER-FLUSHBOX-1/2"	1	EA

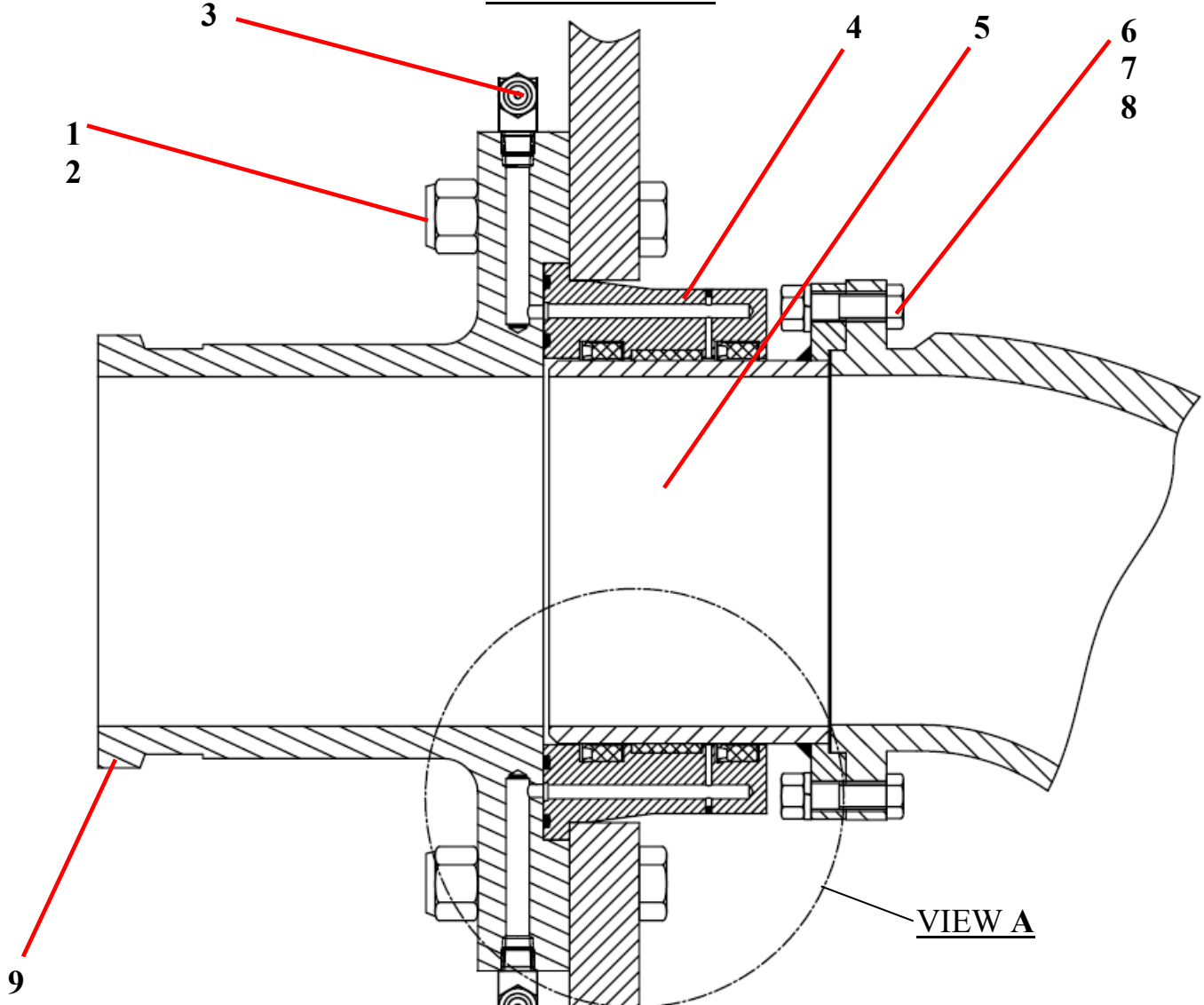
### PUMPING TRAIN ASSEMBLY CONTINUED



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86023	TIE ROD, 1" X 57.50"	2	EA
2	86022	TIE ROD, 1.25" X 57.50"	4	EA
3	86147	CONCRETE CYLINDER, 6 X 42	2	EA
4		ELBOW, MB – MJ-16-16	2	EA
5	85427	TUBE, HYD, LOOP LINE	1	EA
6	86225HT	DRIVE CYLINDER -4.00 X 2.50 X 41.75	2	EA
7	87554	END PLATE - DRIVE CYLINDER- PAINTED	1	EA
8		HEX, NUT 1 1/4" -12	4	EA
9		HEX NUT, 1" -12	2	EA
10		HHCS, 1/2 -13X1 1/4" GR 8	4	EA
11		WASHER, 1/2	4	EA
12		LOCK WASHER, 1/2"	6	EA
	74679-1	MODIFIED PLUG CUT OF 1/8"	2	EA
14	85941	HOUSING, RH SWING RAM	1	EA
15	85942	HOUSING, LH SWING RAM	1	EA

### S-TUBE 5" OUTLET ASSEMBLY

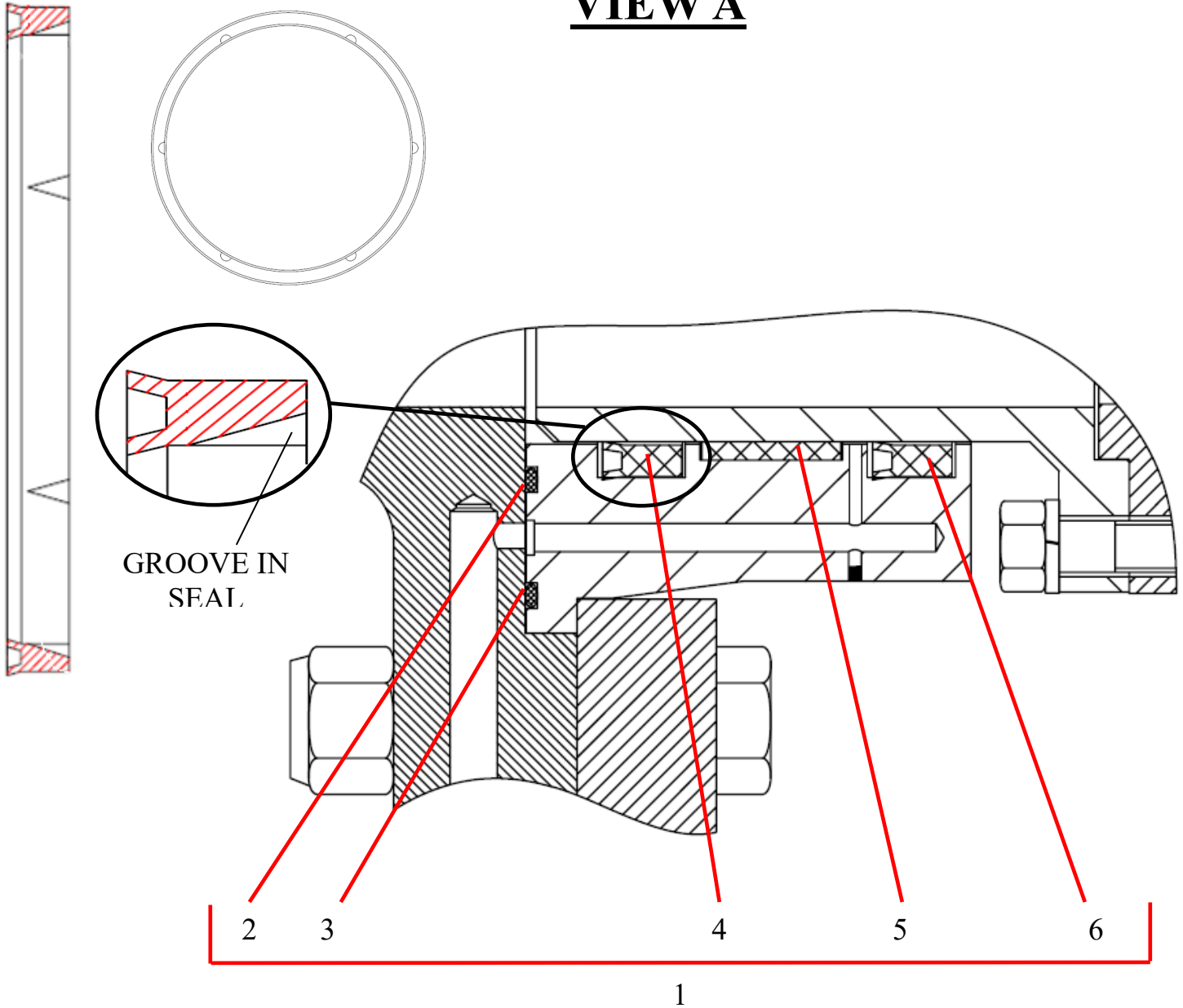
#### DETAIL A



ID #	PART #	PART DESCRIPTION	QUANTITY	
		OUTLET ASSEMBLY	1	EA
1		HHCS, 5/8 – 18X3" 1/4" GR 8	6	EA
2		LOCK NUT, 5/8 -18	6	EA
3		GREASE FITTING, 1/8" NPT 90°	2	EA
4	72309	OUTLET SEAL HOUSING	1	EA
5	70042	CHROMED OUTLET	1	EA
6		HHCS, 3/8 – 16X1 1/2" GR 8	6	EA
7		HEX NUT, 3/8" - 16	6	EA
8		LOCK WASHER, 3/8"	6	EA
9	70122	OUTLET, 5" (1-PIECE)	1	EA

### 5" OUTLET SEAL KIT INSTALLATION

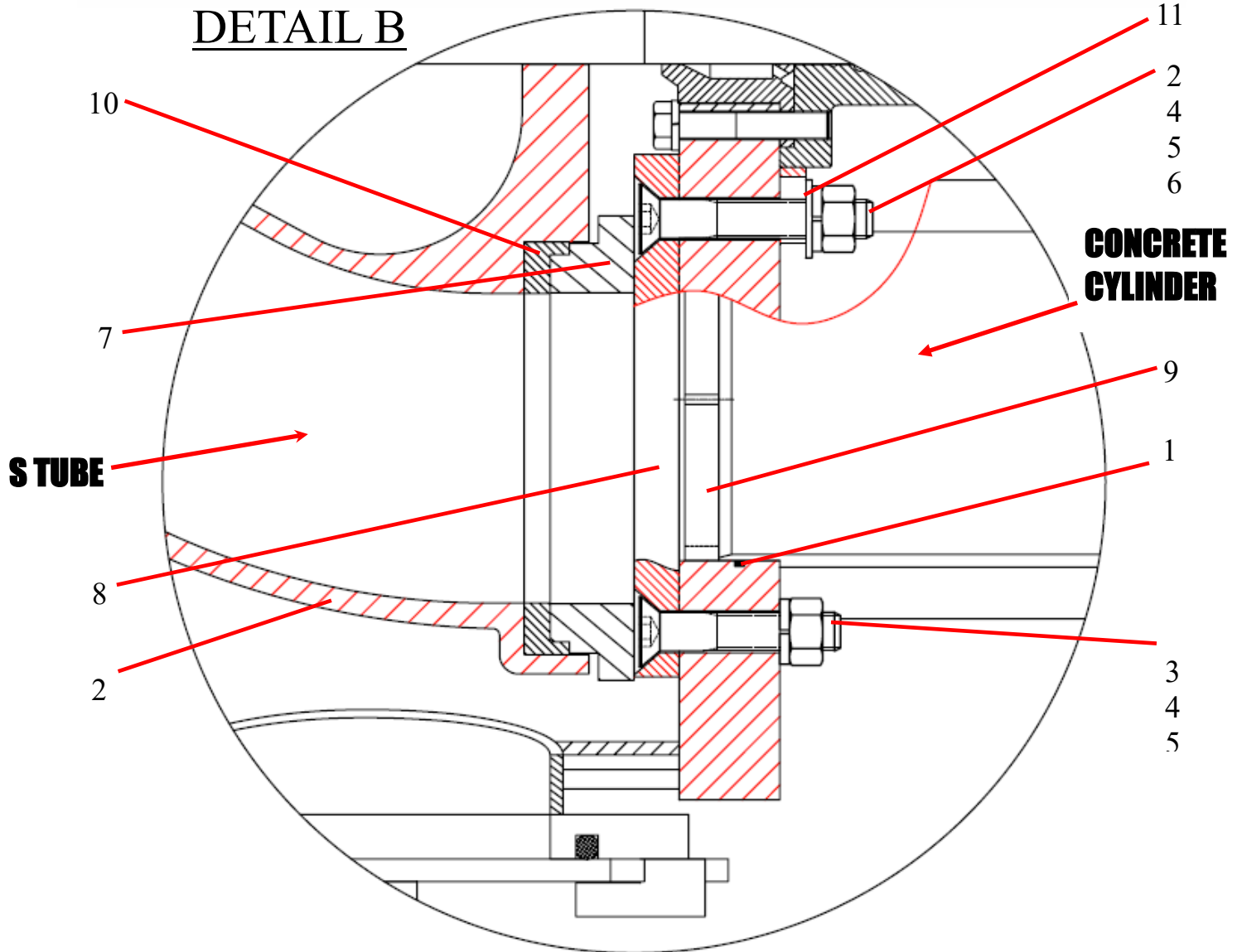
### VIEW A



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	79895	SEAL KIT	1	EA
2	77762	O-RING-#257 BUNA 90	1	EA
3	77761	O-RING-#264 BUNA 90	1	EA
4	86504	SEAL-MODIFIED- 5 IN OUTLET	1	EA
5	77763	GUIDE BAND - 5.75 OD X 1.00W	1	EA
6	77765	LIP SEAL-5.50 ID X 6.00 OD X .56 D	1	EA



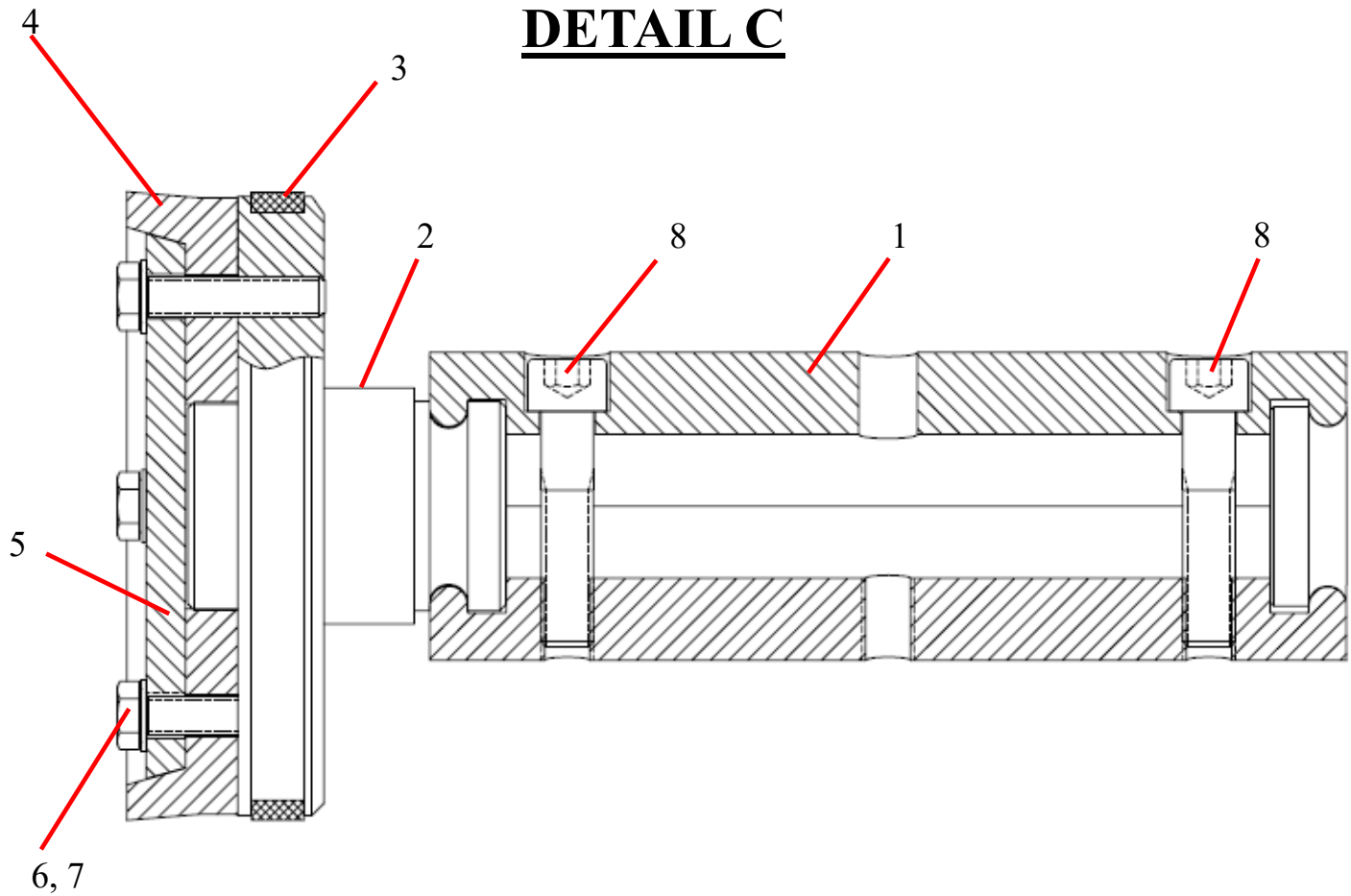
### WEAR PLATE ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86149	O-RING, #259 BUENA 70	2	EA
2		FHCS, 3/4" - 10X 4 1/2" GR 8	1	EA
3		FHCS, 3/4" - 10X 3 1/2" GR 8	3	EA
4		HEX NUT, 3/4" - 10	4	EA
5		LOCK WASHER, 3/4"	4	EA
6		FLATWASHER, 3/4"	4	EA
7	72310	WEAR RING, 6"	1	EA
8	86031	WEAR PLATE, 6"	1	EA
9	86086	CHIP RING, 6"	2	EA
10	86085	SEAL, SINGLE LIP, 6"	1	EA
11	86502	LOCATOR RING - FLANGE BEARING	1	EA

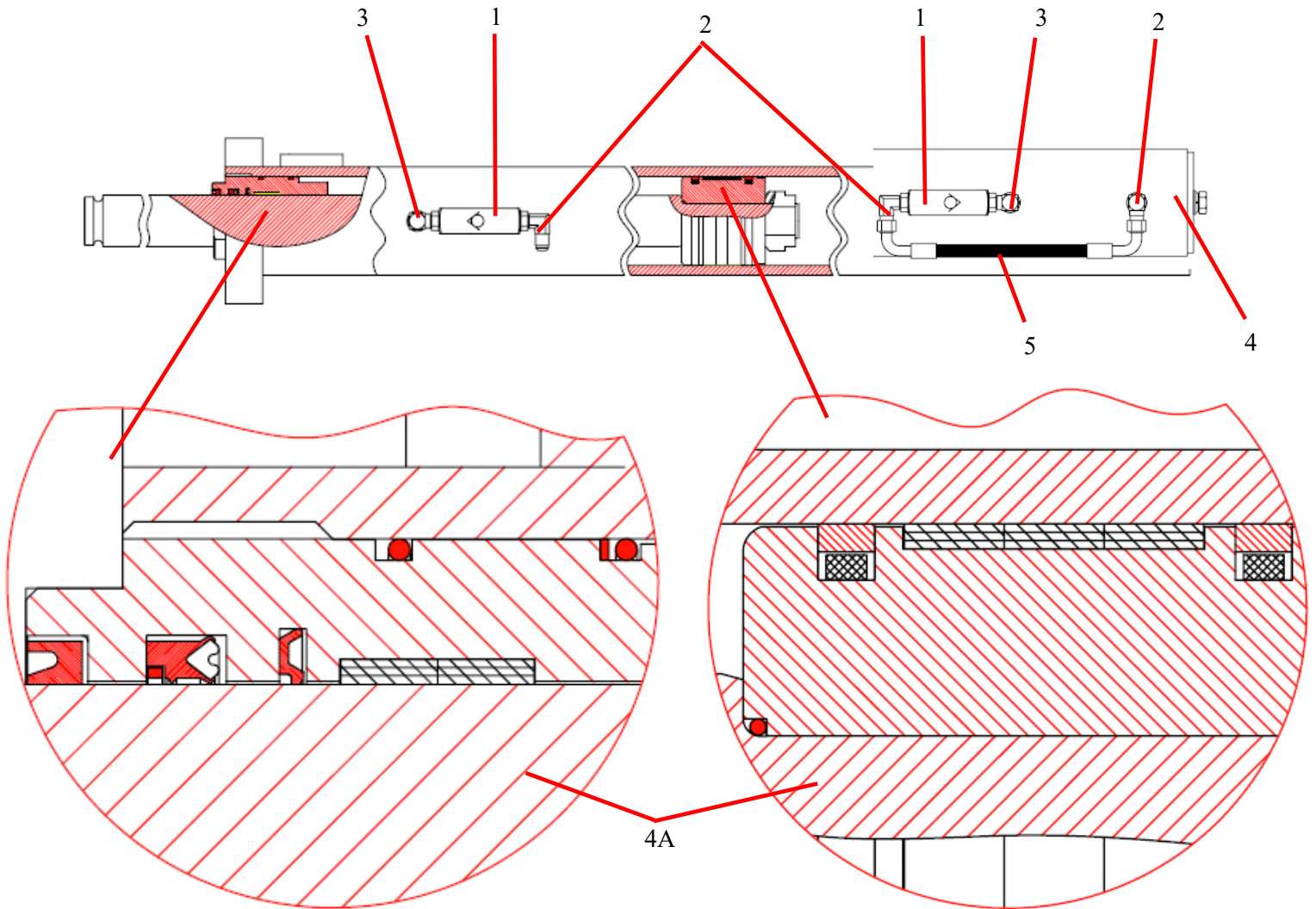
### 6" PISTON CUP ASSEMBLY

### DETAIL C



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86024	PISTON COUPLING, 8.75 LONG	2	EA
2	77194	PISTON-CONC. ADAPTER 6"	2	EA
3	77120	WEAR RING (GUIDE BAND) 6"	2	EA
4	70048	PISTON CUP, 6 IN	2	EA
5	70057	PISTON PLATE 6 INCH	2	EA
6		HHCS, 3/8 - 16X1" GR 8	4	EA
7		LOCK WASHER 3/8	4	EA
8		SHCS 1/2 - 13 X 2 1/4"	2	EA

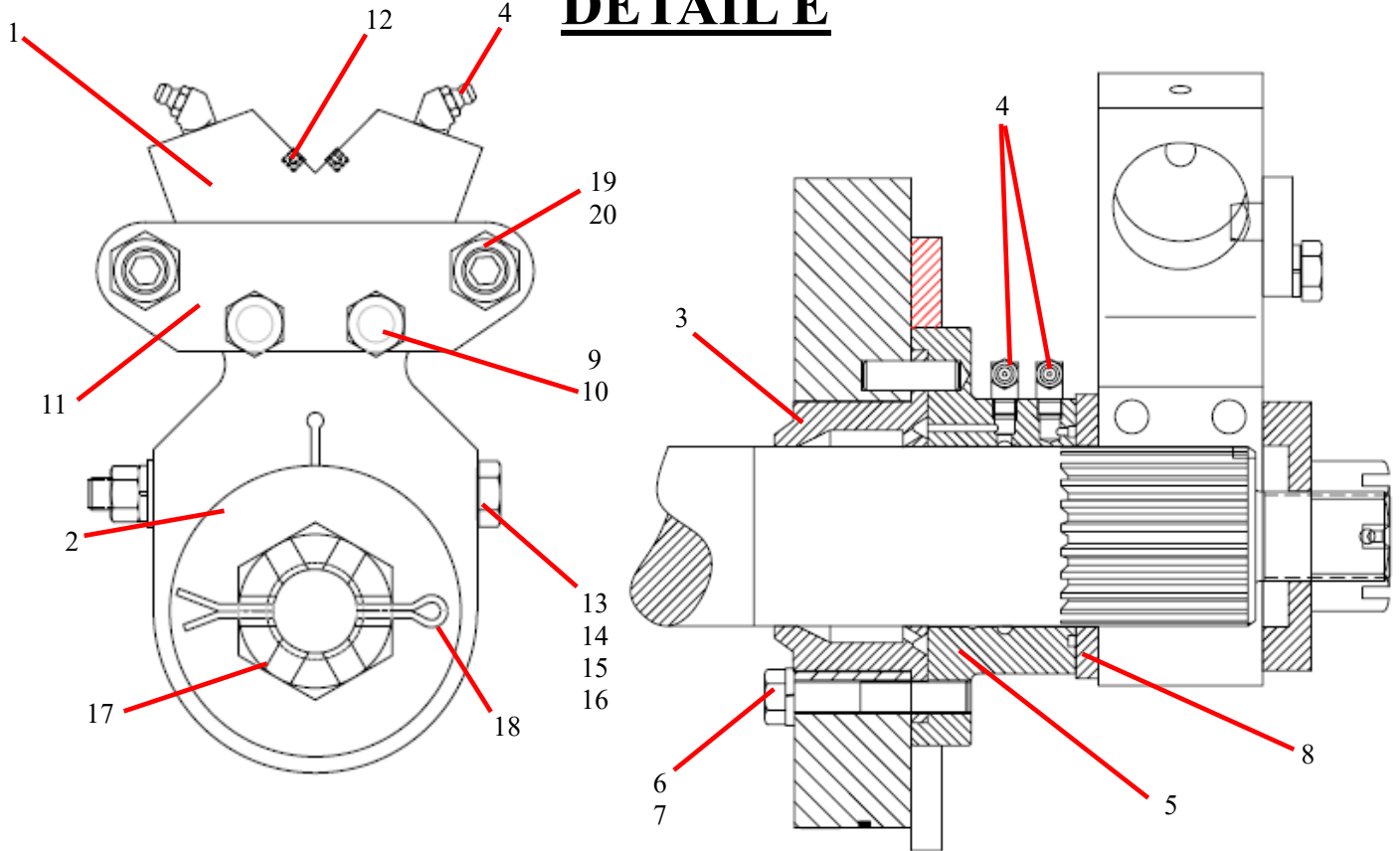
### DRIVE CYLINDER ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	78961	CHECK VALVE-5K PSI O-RING	4	EA
2	86748	FITTING-MB-MJ90-6-6	3	EA
3		ELBOW, MB-MB90-6-6	2	EA
4	86225HT	HYDRAULIC CYLINDER 4.00 X 2.50 X 41.75	1	EA
4A	86225A-SK	SEAL KIT	1	EA
5	85659-002	HOSE, 4M2T-6FJX90S-6FJX90S-11.25	1	EA/SIDE

### DUAL SHIFT BELL CRANK ASSEMBLY

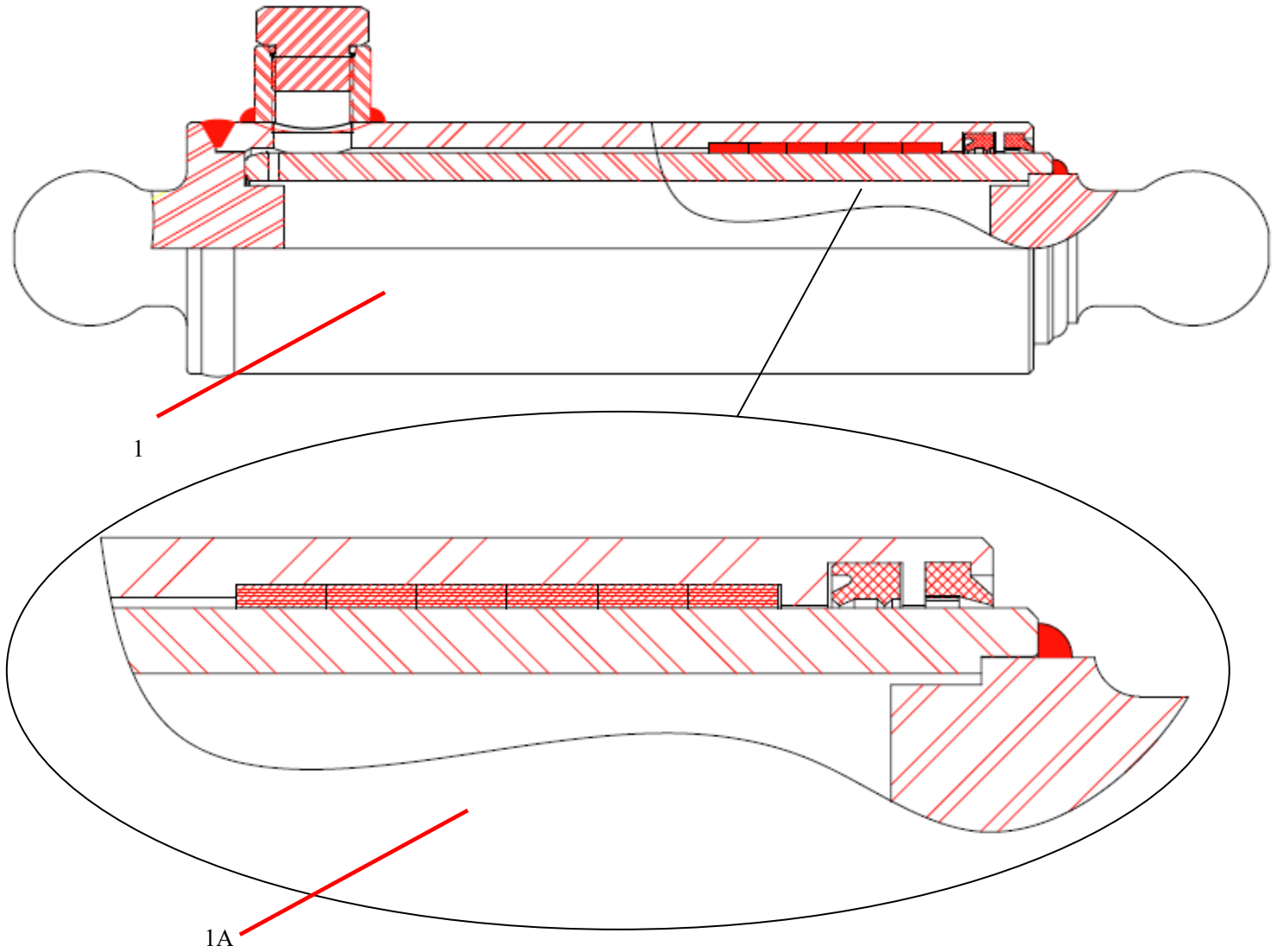
### DETAIL E



ID #	PART #	PART DESCRIPTION	QUANTITY	
	86320-3	S-TUBE SHIFT GROUP, DUAL		
1	85956	BELL CRANK, 3" SPLINE, DUAL	1	EA
2	85134	SPACER, S-TUBE NUT	1	EA
3	85962	SEAL, FLANGE BEARING	1	EA
4		GREASE FITTING, 1/8" NPT	4	EA
5	85962	FLANGED BEARING 3" SHAFT	1	EA
6		HHCS, 9/16 - 12X3" GR 8	4	EA
7		LOCK WASHER, 9/16"	4	EA
8	85294	THRUST WASHER, S -TUBE	1	EA
9		HHCS, 1/2-13X1 1/4" GR 8	2	EA
10		LOCKWASHER, 1/2"	2	EA
11	86282	RETAINER - SHIFT CYLINDER	1	EA
12		PIPE PLUG 1/4" NPT	2	EA
13		HHCS, 1/2-13X6 1/4" GR 8	2	EA
14		FLAT WASHER 1/2"	4	EA
15		LOCK WASHER 1/2"	2	EA
16		HEX NUT, 1/2"-13	2	EA
17	87012	NUT 2" -12 CASTLE GRADE 5	2	EA
18		COTTER PIN, 1/4X4"	1	EA
19	86283	SET SCREW-5/8-11X2.00" CUP POINT	2	EA
20	80005	NUT HEX-5/8-11 UNC USS RH THREAD	2	EA

## DUAL SHIFT CYLINDER ASSEMBLY

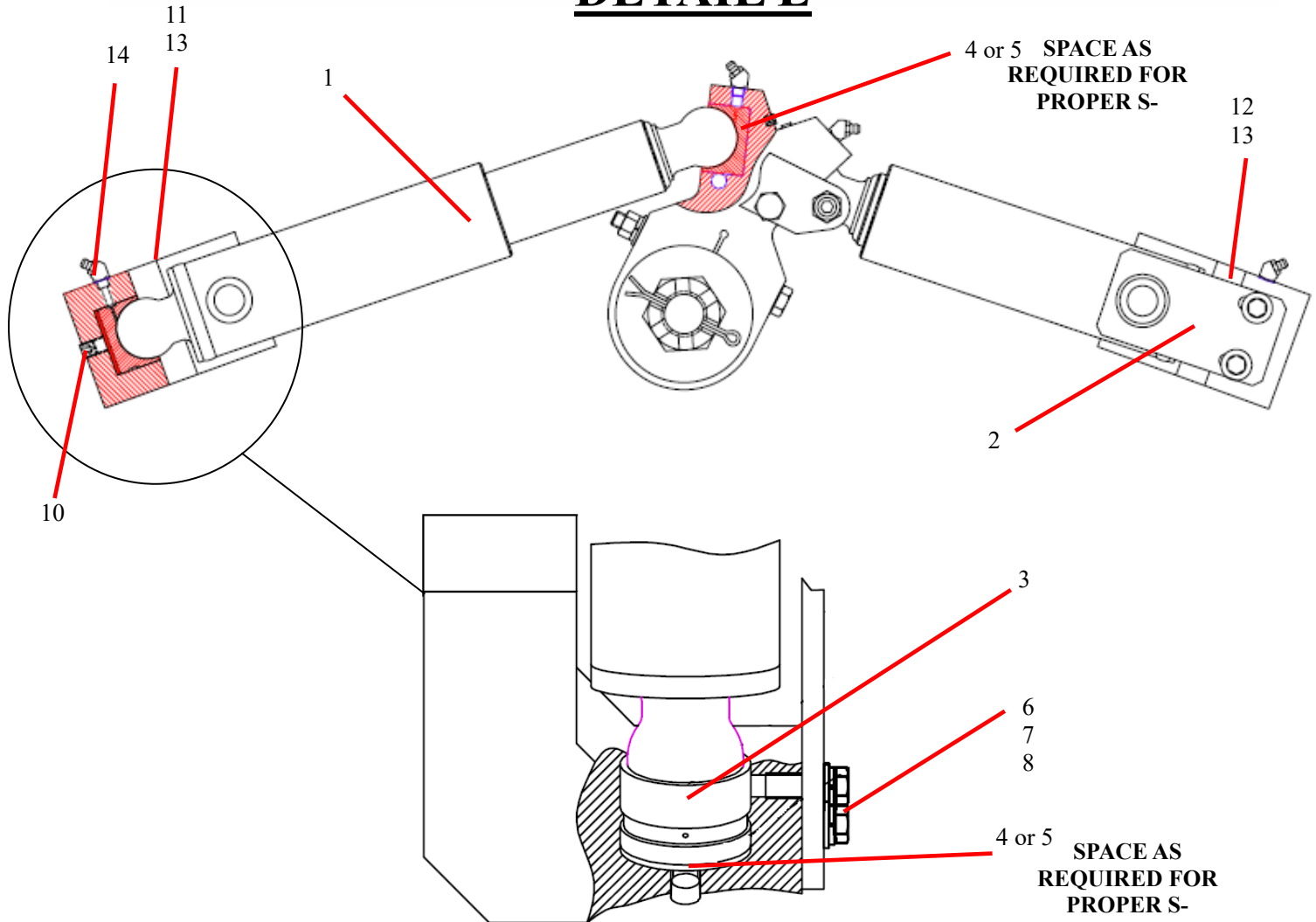
### DETAIL E



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86220HT	SWING RAM-DUAL-2.50 X 5.75 STROKE	2	EA
1A	86220A-SK	SEAL KIT	2	EA

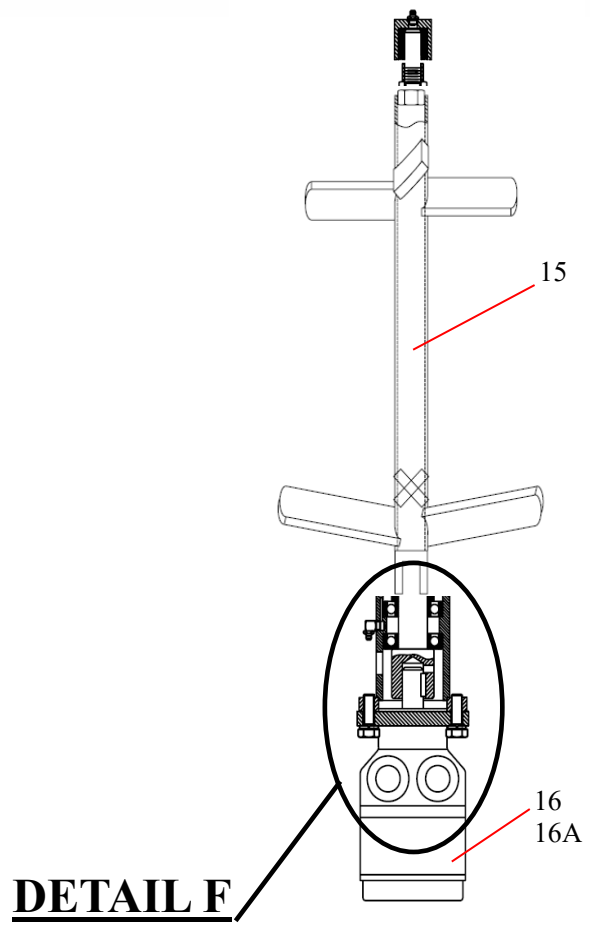
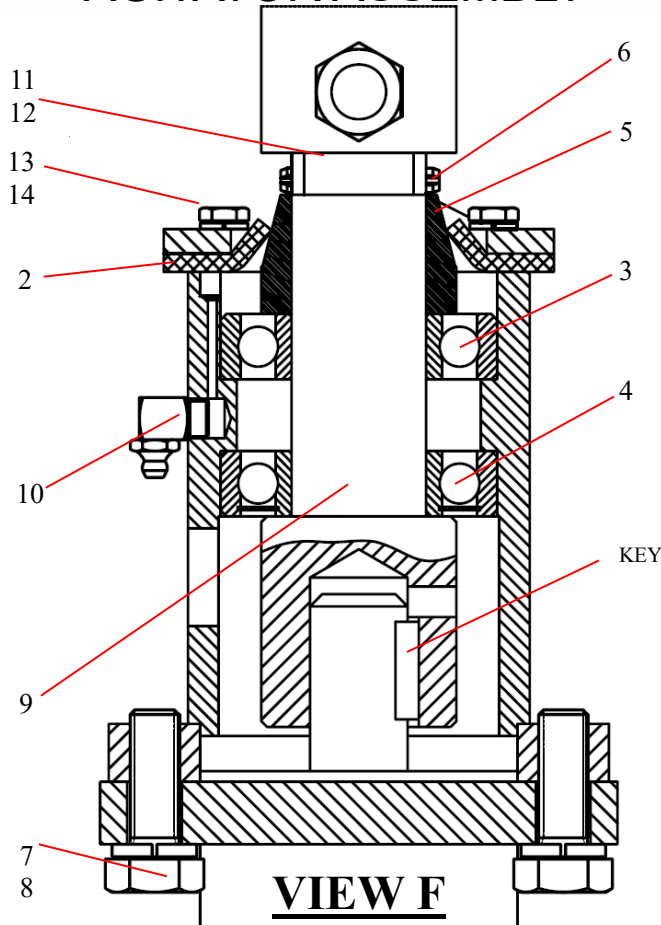
### DUAL SHIFT ASSEMBLY

### DETAIL E



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86220HT	SWING RAM – 2.5 X 5.75 STROKE	REF	
2	86441	RETAINER, SWING RAM	2	EA
3	76798-1	BALL SOCKET, NYLON	4	EA
4	75501	SPACER 1/8"	A/R	EA
5	75502	SPACER 1/16"	A/R	EA
6		HHCS, 3/8-24X1 1/4" GR8	4	EA
7		WASHER, 3/8"	4	EA
8		LOCK WASHER, 3/8"	4	EA
10	86283	SETSCREW – 5/8 -11X2.00 CUP	2	EA
11	85956	HOUSING,RH SWING RAM	1	EA
12	85942	HOUSING, LH SWING RAM	1	EA
13	86052	DOWEL PIN, 1/2" DIA X 2"	4	EA
14		GREASE FITTING, 1/8" NPT	2	EA

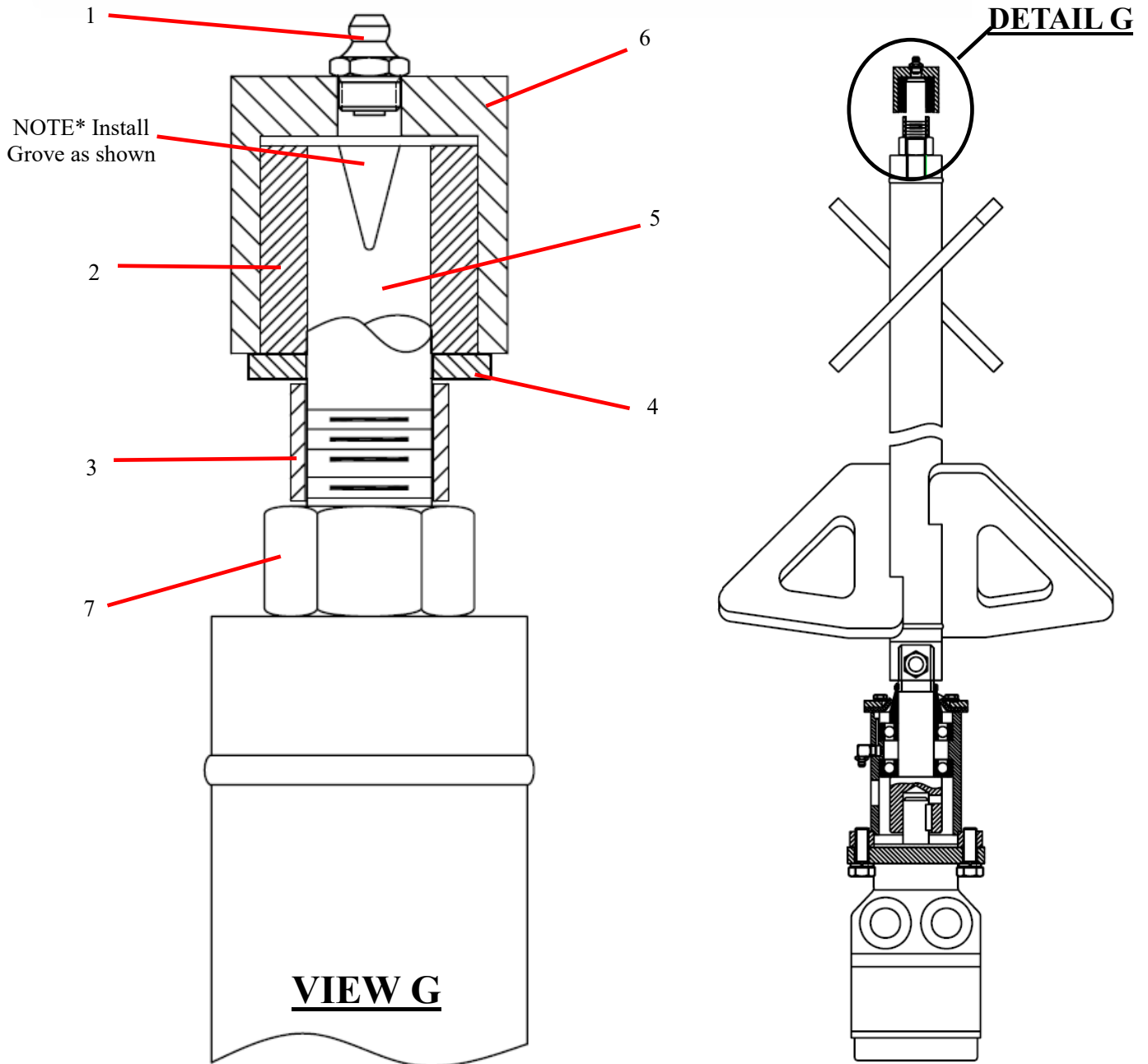
### HOPPER AGITATOR ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
	86322	AGITATOR ASSEMBLY	1	EA
1	70211	FLANGE SEAL SW	1	EA
2	70212	SEAL REMIXER	1	EA
3	85978	BEARING, BALL, PLAIN	1	EA
4	85979	BEARING, BALL 1 SEAL	1	EA
5	85976	WEAR RING, AGITATION	1	EA
6	86758	SPRING PIN, 1/4" DIA X 1 3/4"	1	EA
7	86755	HHCS, 1/2 -20X1 1/2" GR 8	2	EA
8	86754	LOCK WASHER, 1/2"	2	EA
9	85923	SHAFT, AGITATOR	1	EA
10		GREASE FITTING, 1/8" NPT 90°	1	EA
11	86753	HHCS, 1/2 -13X2 1/4" GR 8	2	EA
12	80075	LOCK NUT, 1/2" -13	1	EA
13	86744	BOLT, 1/4-28X3/4"	6	EA
14	86743	LOCK WASHER, 1/4"	6	EA
15	86330	AGITATOR, STD HOPPER, PAINTED	1	EA
16	89455	HYD MOTOR, 48 CID, 1" SHAFT	1	EA
16A	89455-SK	SEAL KIT	1	EA

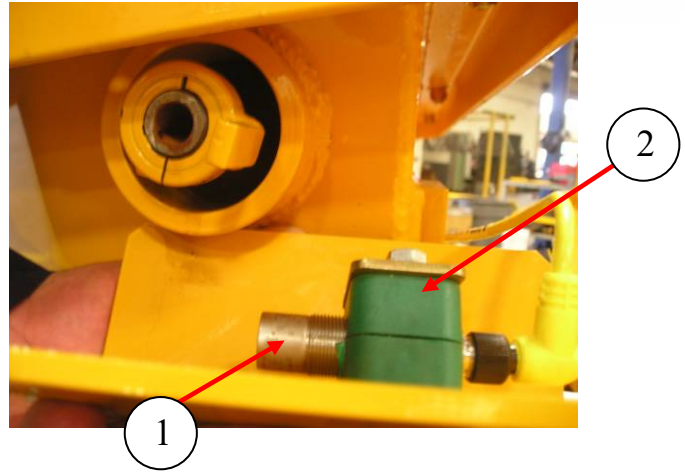
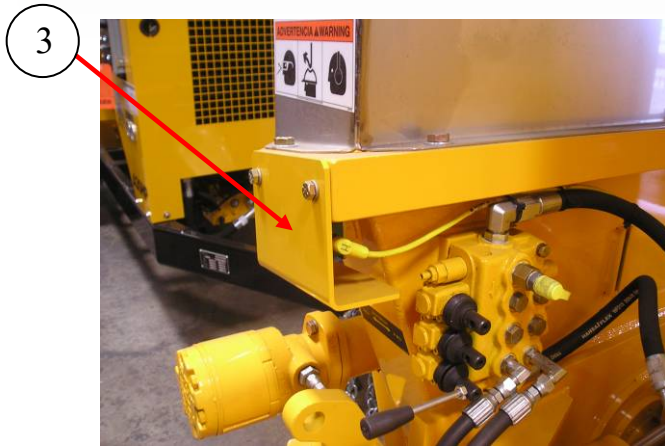


### AGITATOR ASSEMBLY CONTINUED



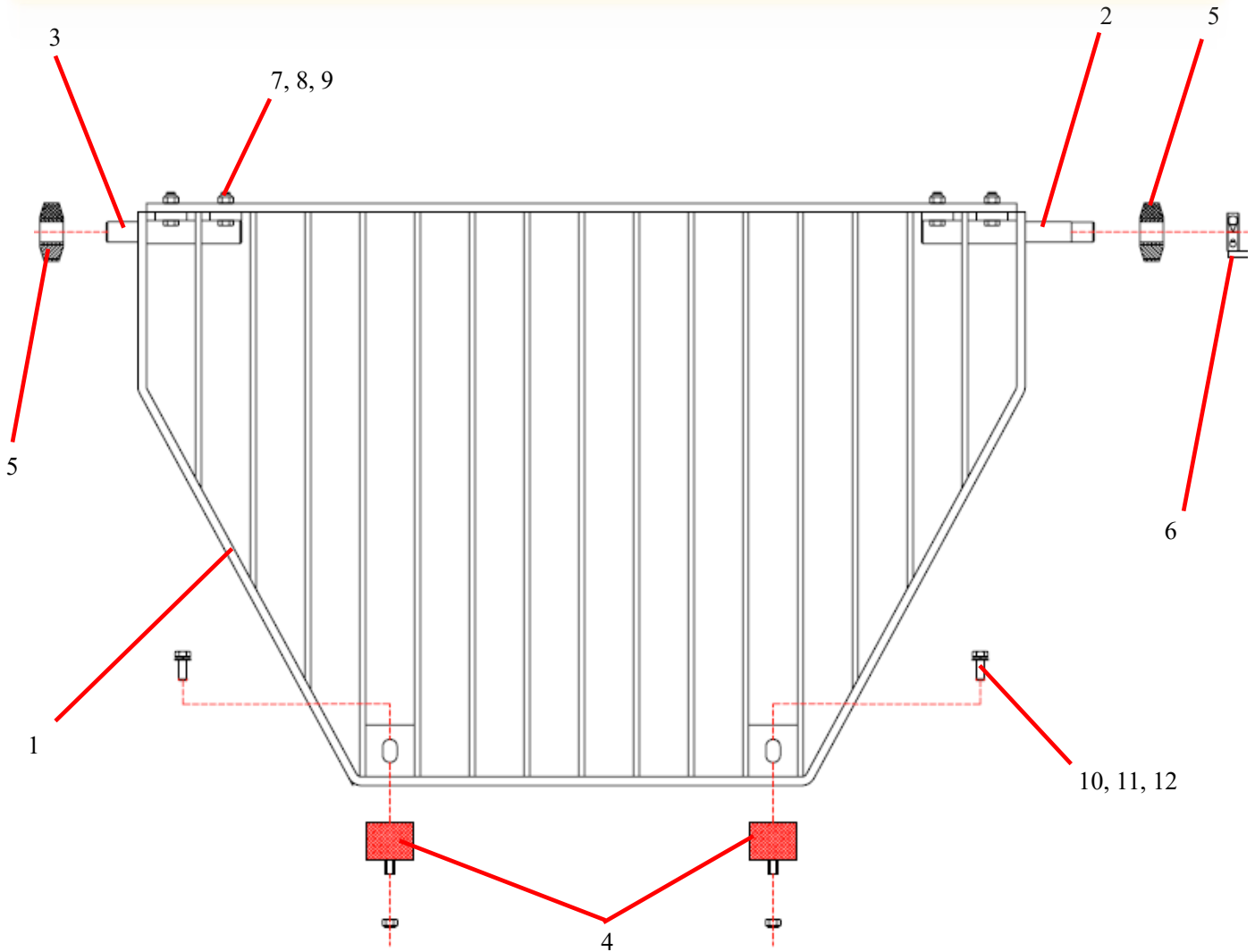
ID #	PART #	PART DESCRIPTION	QUANTITY	
1		GREASE FITTING, 1/8" NPT STRAIT	1	EA
2	70219	REMIX SHAFT BUSHING	1	EA
3	77877	SPACER, REMIX	1	EA
4	86824	FLAT WASHER, 3/4" SAE	1	EA
5	70214	IDLER SHAFT, AGITATOR	1	EA
6	70210	IDLER BREARING HOUSING	1	EA
7	80030	HEX NUT-M20X2.5 PLATED	1	EA

### SAFETY GRATE



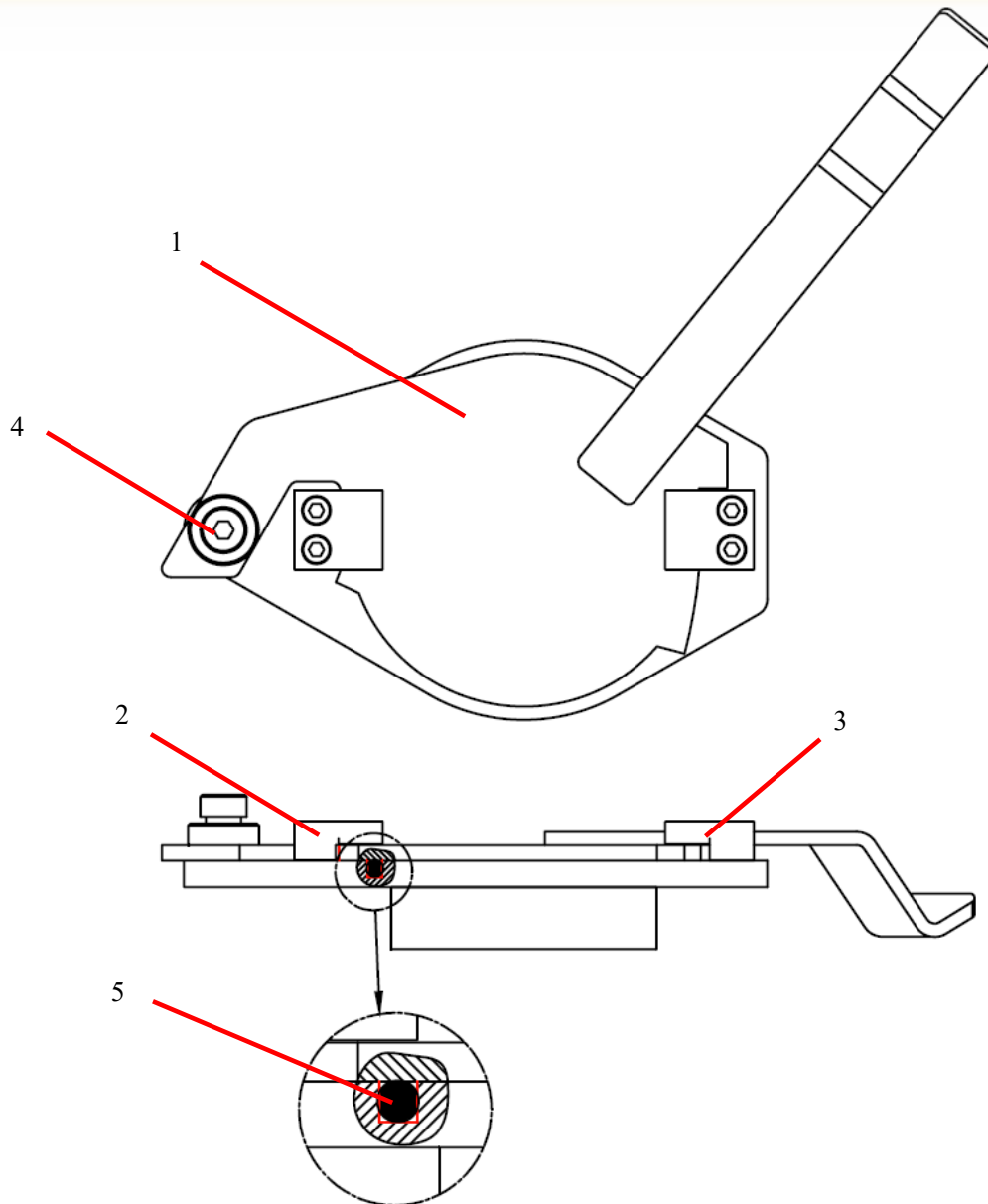
ID #	PART #	PART DESCRIPTION	QUANTITY	
	87835	GRATE WELDMNT, STD HOPPER	REF	
1	87369	PROXIMITY SENSOR PNP HOPPER GRATE	1	EA
2	801902-006	CLAMP,18MM TUBE CLAMP SET	1	EA
3	87997	COVER WELD PROX SWITCH HOPPER	1	EA

### GRATE ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	87835	GRATE WELDMENT, STD HOPPER	1	EA
2	87857	PIN WELDMENT LONG	1	EA
3	87858	PIN WELDMENT SHORT	1	EA
4	86083	BUMPER, HOPPER GRATE	2	EA
5	W114850	RUBBER BUFFER	2	EA
6	87769	COLLAR SHAFT, 7/8" DIA	1	EA
7		3/8"-16 X 1 1/4" HEX BOLT	4	EA
8		3/8 FLAT WASHER	8	EA
9		3/8-16 LOCK NUT	4	EA
10		3/8"-16 X 1" HEX BOLT	2	EA
11		3/8" FLAT WASHER	2	EA
12		3/8" LOCK WASHER	2	EA

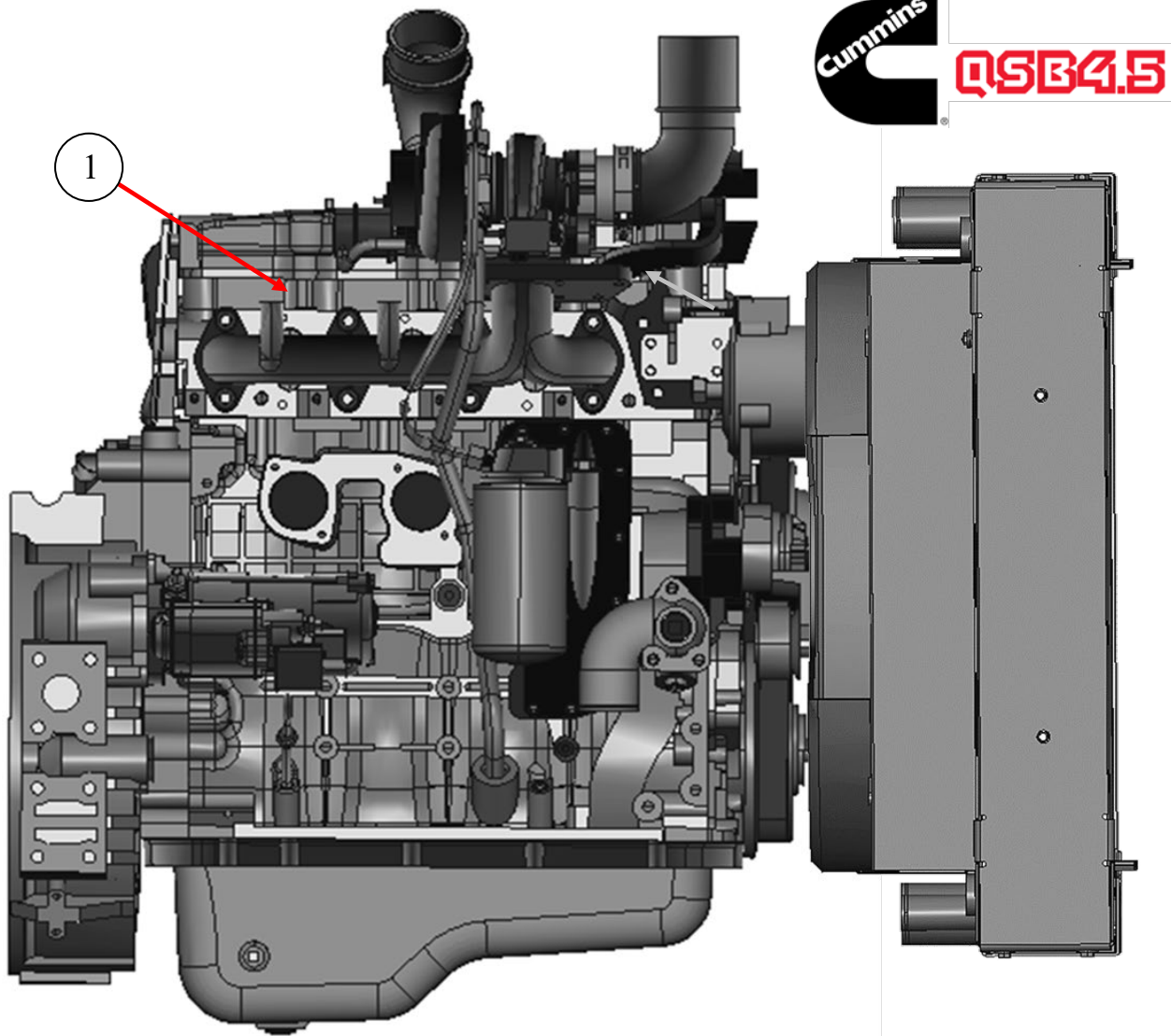
### CLEAN OUT DOOR ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86988	DOOR WELDMENT, CLEAN OUT	1	EA
2	86559	BLOCK, CLEAN OUT DOOR, LH	1	EA
3	86560	BLOCK, CLEAN OUT DOOR, RH	1	EA
4	86922	SHOULDER SCREW 1" DIA-1 1/4"	1	EA
5	W-102908A	O-RING CORD, HOPPER DOOR	2.21	FT

### POWER TRAIN GROUP

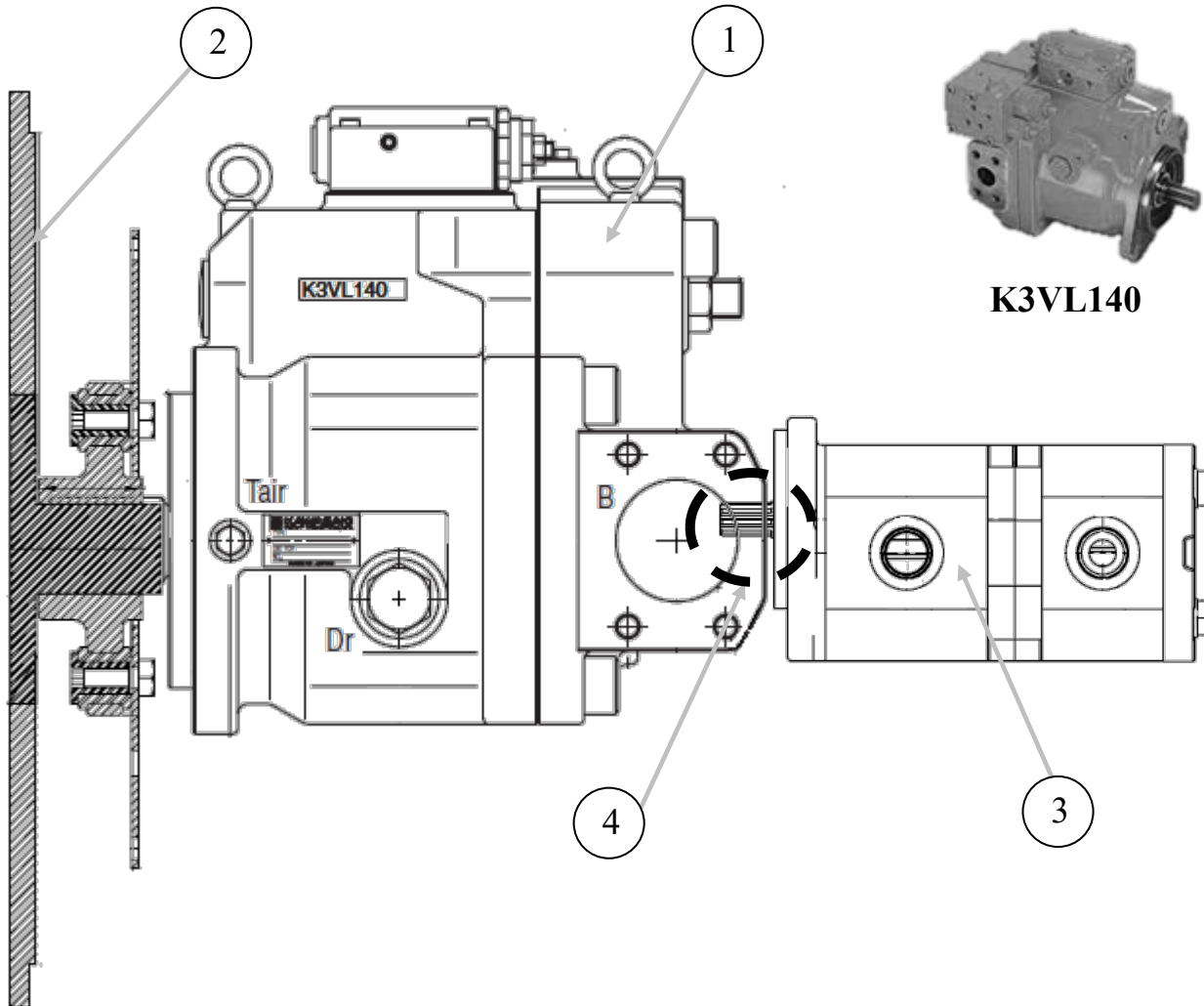
#### ENGINE TIER-4



ID #	PART #	PART DESCRIPTION	QUANTITY	
	89553	POWER TRAIN B50/70 TIER4 140CC KAWAS	REF	
1	88876	ENGINE QSB4.5 130 HP CUMMINS TIER4	1	EA
		ENGINE SPARE PARTS		
	89279	SENSOR, TEMPERTURE COOLANT	REF	
	89279-H	HARNESS FOR 89279	REF	
	88794-010	FAN GUARD QSB4.5 T4	REF	
	88794-021	FAN, T4 ENGINE	REF	
	88794-027	BELT GUARD, QSB4.5 T4	REF	
	88794-025	FAN CLUTCH 4 CLYD T4	REF	
	88794-012	FUEL FILTER	REF	
	87793	MOUNT FUEL FILTER	REF	

### MAIN HYDRAULIC PUMP GEAR PUMP/PUMP DRIVE

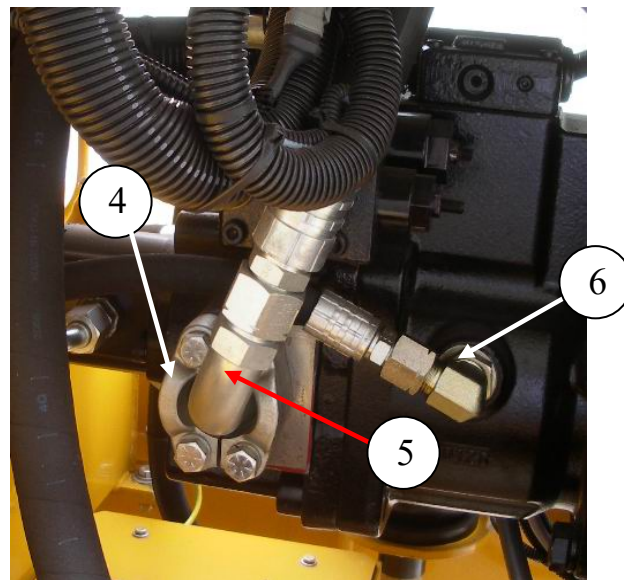
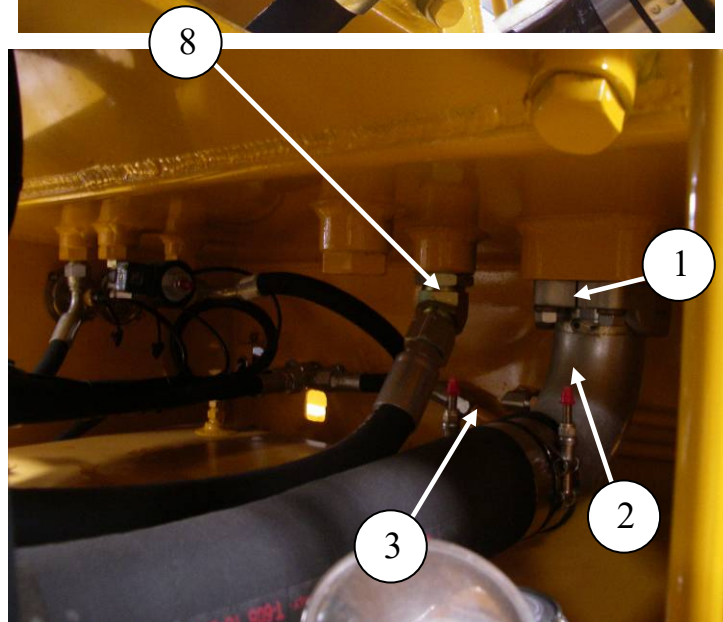
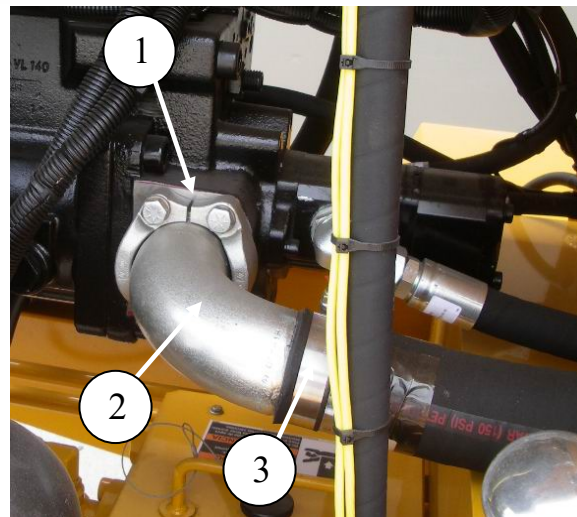
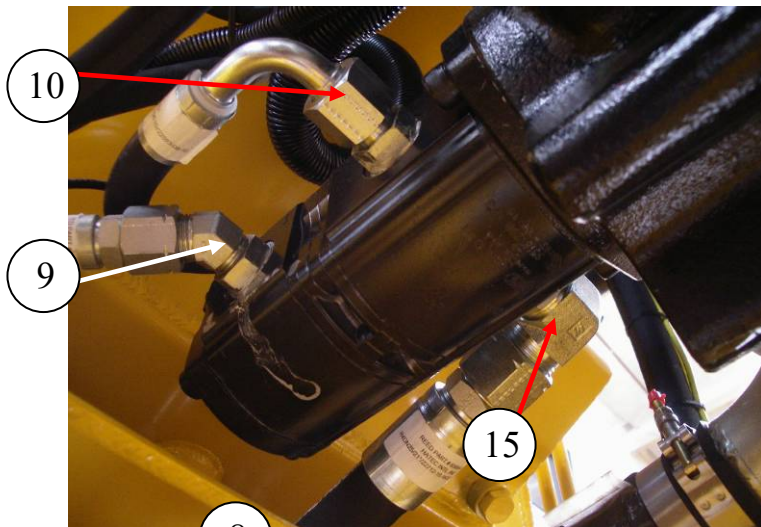
**Kawasaki**  
Hydraulics



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88803	PUMP VARIABLE DISP. AXIAL PISTON K3VL180	1	EA
2	86951	PUMP DRIVE -SAE E SAE 3-SAE10/11.5	1	EA
3	87571-1	GEAR PUMP, 23/11.3 CC RH, A-PAD SPL	1	EA
4	88174	O-RING	1	EA
	89349	METRIC O-RING ELBOW M14X1.5 TO 10L	1	
	89350	METRIC HOSE END 10L TO 3/8" HOSE	1	
	87725-043	PLUG, TREADED M14X1.5		



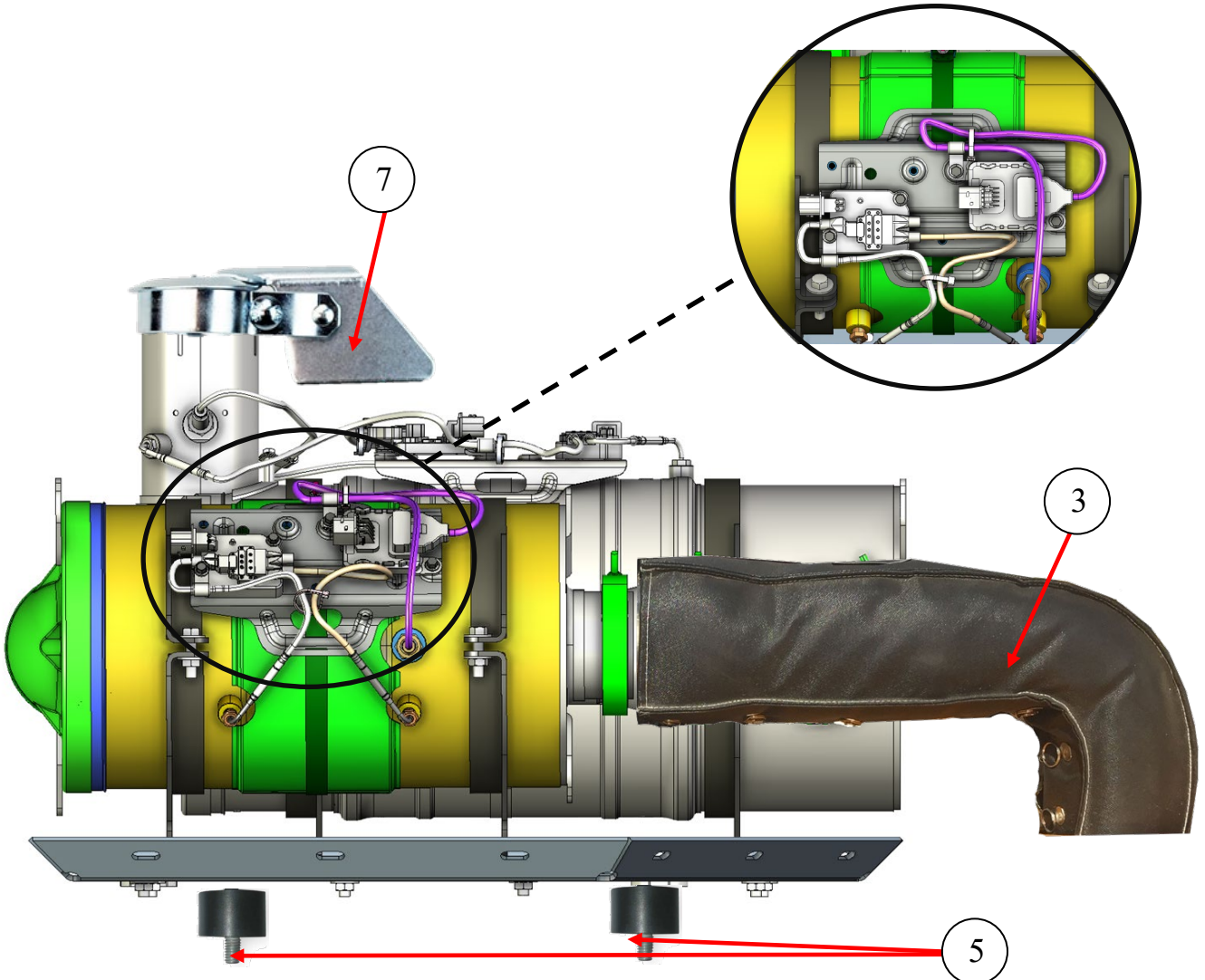
### FITTINGS



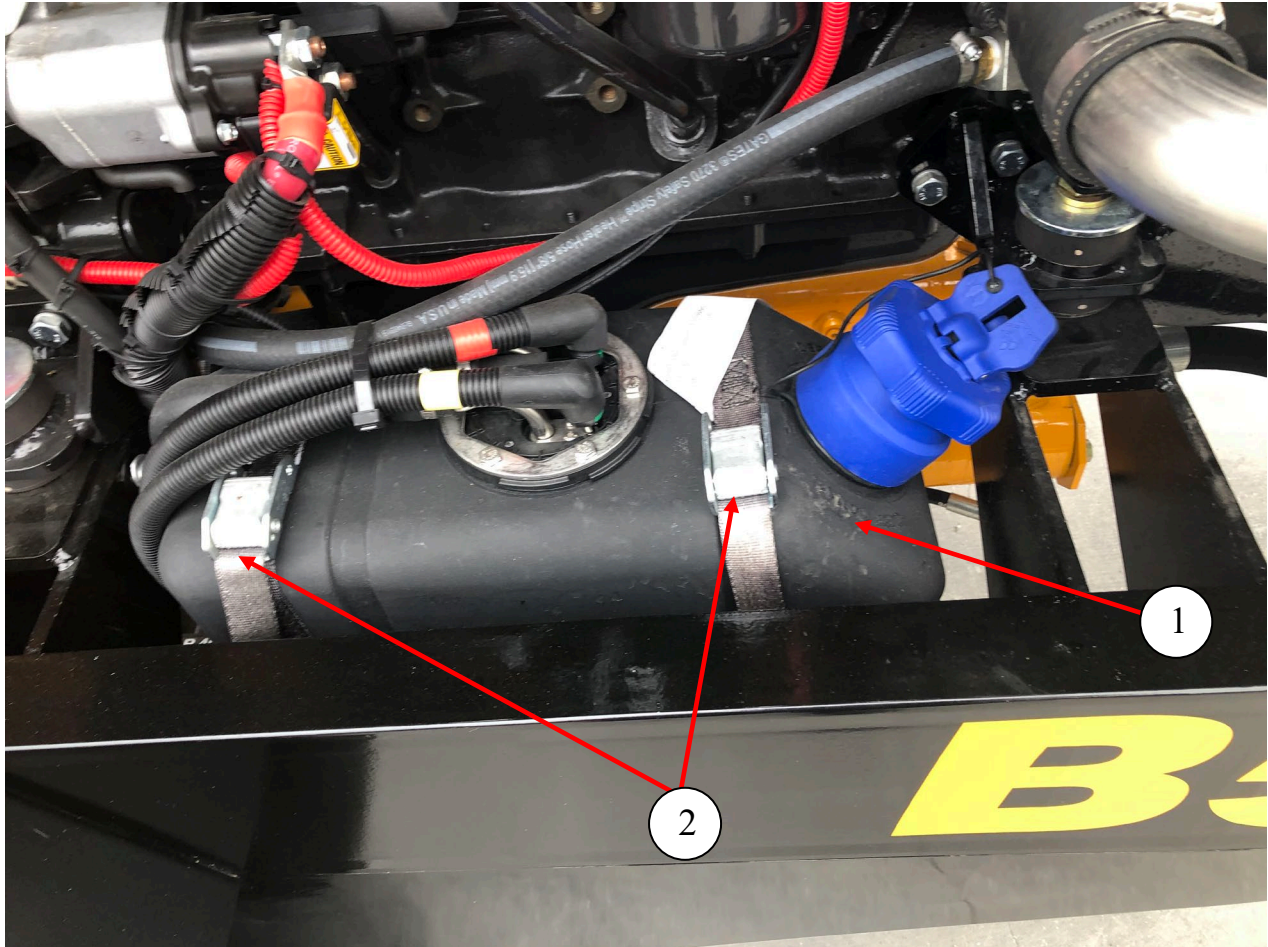
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86264-007	SPLIT FLANGE-CODE 61- 40 SAE	2	EA
2	86911-009	STEM, 2 1/2" 90 DEG, 40GL-40FL90	1	EA
3	79803	CLAMP - T-BOLT - 3.00 DIA	4	EA
4	86265-003	SPLIT FLANGE-CODE 62- 20 SAE	2	EA
5	86912-006	FLANGE, FLH6K-MJ90-20-16	1	EA
6		ADAPTOR, MB-MJ-90-12-10	1	EA
7	86728-023	ADAPTOR, MB-MJ-20-16	1	EA
8	87754-020	ELBOW, MB-MJ45-20-16	1	EA
9		MB-MJ-45-10	1	EA
10	86900-017	MB-MJ0-10-10	1	EA



### EXHAUST AFTERTREATMENT TIER4

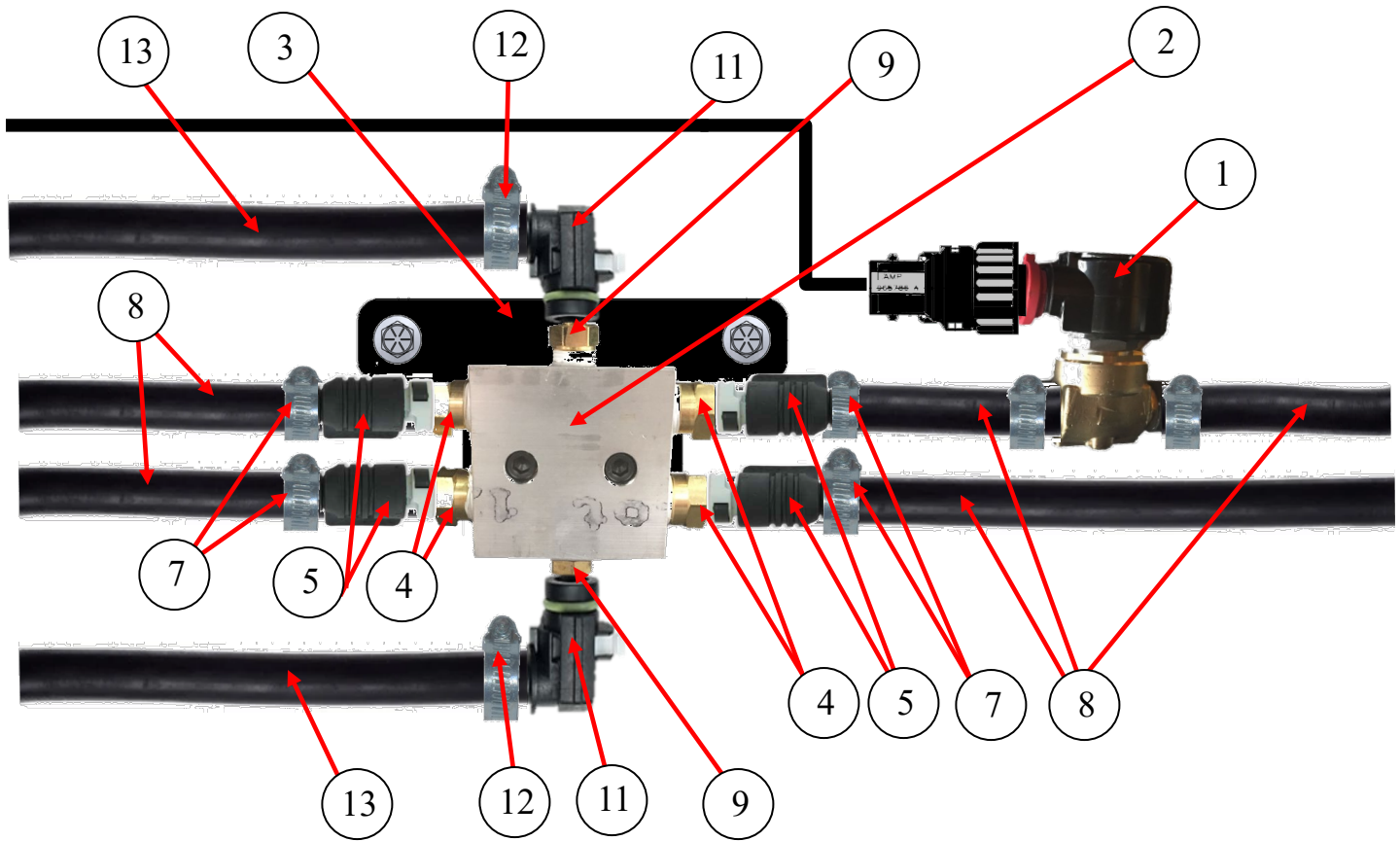


ID #	PART #	PART DESCRIPTION	QUANTITY	
1		BRACKET 4 CYL CUMMINS EXHAUST	1	EA
2	74679	PLUG 1/4" NPT SOCKET HEAD	1	EA
3	89348	HEAT BLANKET	2.5	EA
4	89424	T4 ROOF HARNESS SUPPORT, C-SERIES	1	EA
5	W-114850	RUBBER BUFFER, 65X22.5X26	2	EA
6	89638-1	ROUND SPRING ST. WIRE PROTECTIVE 60MM	2.75	EA
7	77597	RAIN CAP-4" ZINC	1	EA
8	89700	THERMA SHIELD WRAP 1"	1	EA
9	89701	THERMA SHIELD WRAP 2"	1	EA
10	89771	CLAMP, 1.5" ID SINGLE	1	EA
	89425	T4 ROOF HARNESS SUPPORT BRACKET	1	EA
	89638-1	ROUND SPRING STEEL WIRE, 68MM	1.5	FT



ID #	PART #	PART DESCRIPTION	QUANTITY	
	89267	DEF COOLANT GROUP	REF	
1	88794-DT	DEF TANK	1	EA
2	89346	HOLD DOWN STRAP, 1"	2	EA
	88794-022	VALVE, DEF TANK HEATER		

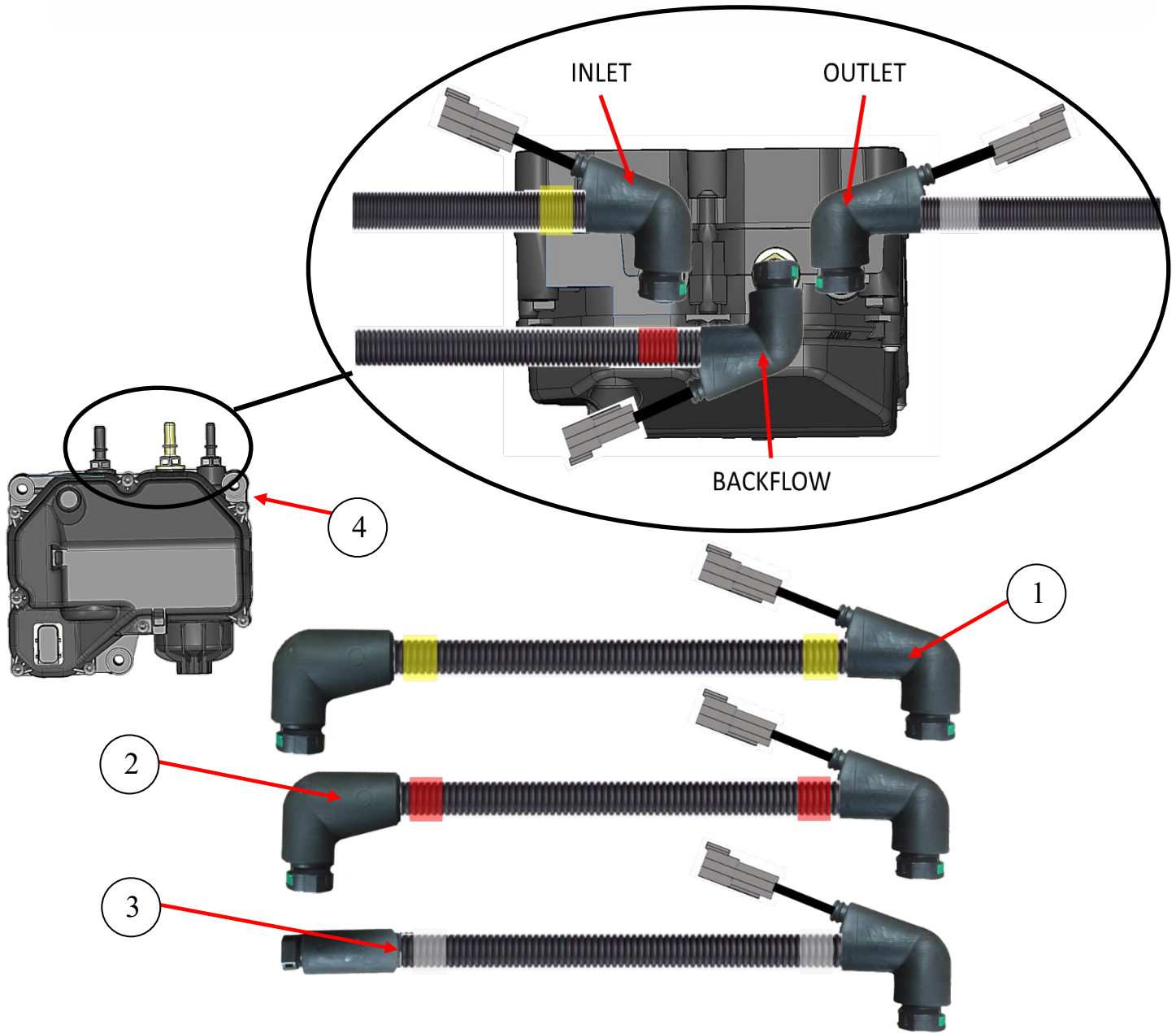
### DEF COOLANT GROUP



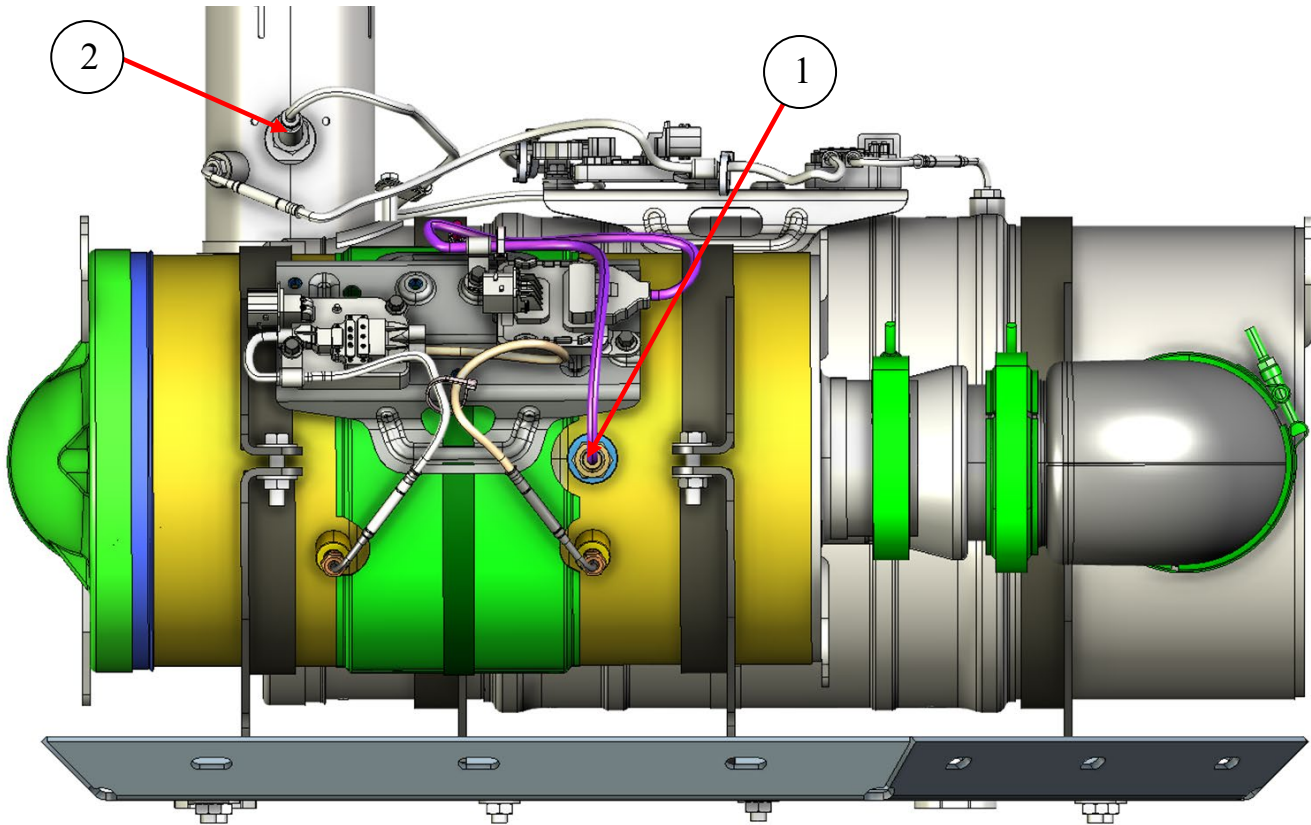
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88794-CCV	VALVE, COOLANT CONTROL, 11EA2V		
2	89268	COOLANT MANIFOLD	1	EA
3	89268-B	MANIFOLD BRACKET	1	EA
4	89269	BRASS FITTING, 1/2" NPT TO 5/8" QC	6	EA
5	89269-1	QUICK CONNECT FITTING, 5/8"	5	EA
6	89269-2	QUICK CONNECT FITTING, 5/8" ELBOW	1	EA
7	89269-C	STEPLESS HOSECLAMP, 5/8"	10	EA
8	89269-H	COOLANT HOSE, 5/8"	12	EA
9	89270	BRASS FITTING, 3/8NPT TO 3/8 QC	2	EA
10	89270-1	QUICK CONNECT FITTING, 3/8"	2	EA
11	89270-2	QUICK CONNECT FITTING, 3/8" ELBOW	2	FT
12	89270-C	STEPLESS HOSECLAMP, 3/8"	4	EA
13	89270-H	COOLANT HOSE, 3/8"	18	EA



### DEF COOLANT GROUP



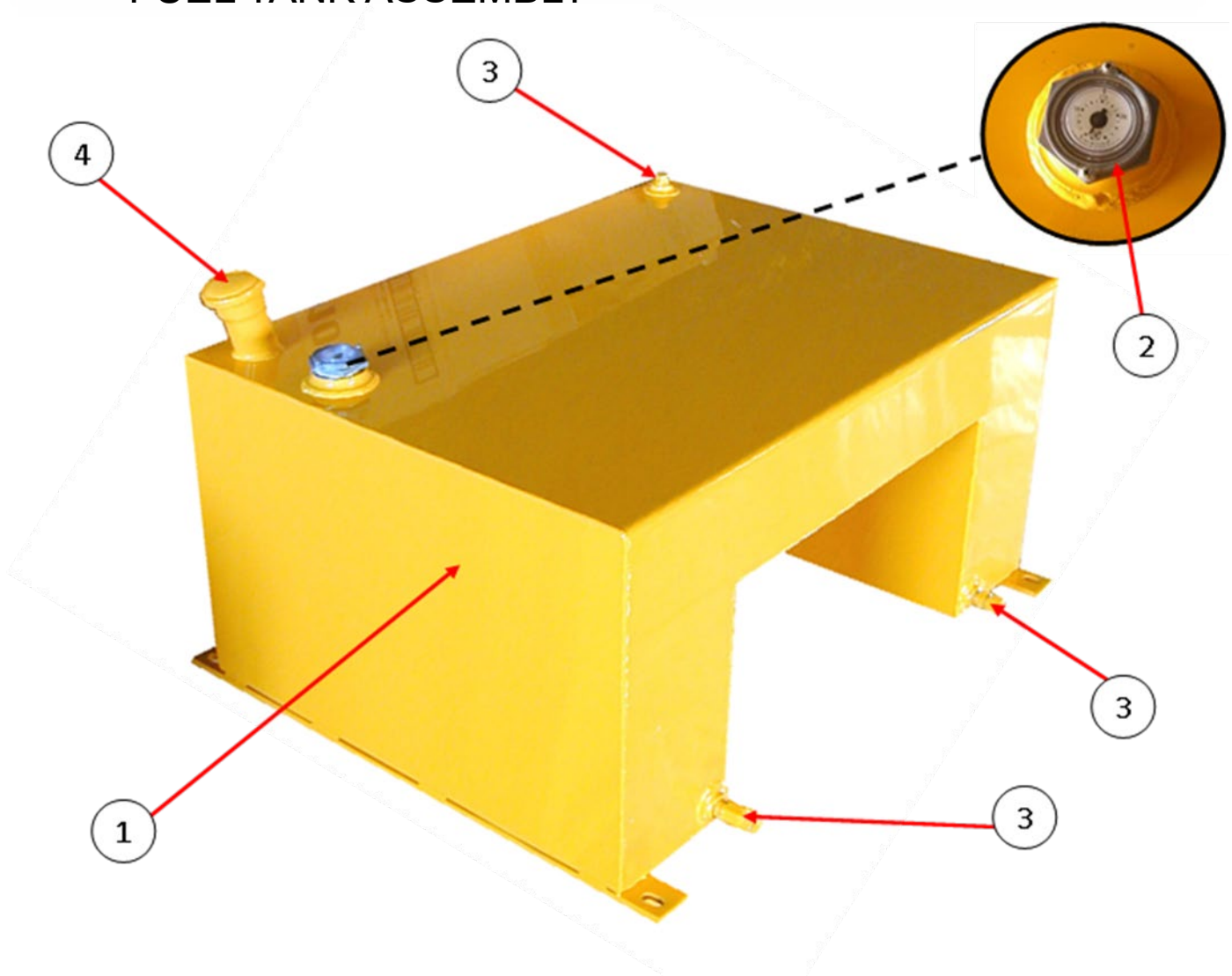
ID #	PART #	PART DESCRIPTION	QUANTITY	
		DEF PUMP		
		FILTER, DEF PUMP		
1	88794-001	DEF HOSE, SUCTION (YELL)	1	EA
2	88794-002	DEF HOSE, RETURN LINE (RED)	1	EA
3	88794-003	DEF HOSE, PRESSURE LINE (WHT)	1	EA
4	73748	BUMPER	3	EA



ID #	PART #	PART DESCRIPTION	QUANTITY
		SPARE PARTS	
	88794-007	AFTERTREATMENT SENSOR, NO <sub>x</sub> INLET	REF
	88794-008	AFTERTREATMENT SENSOR, NO <sub>x</sub> OUTLET	REF

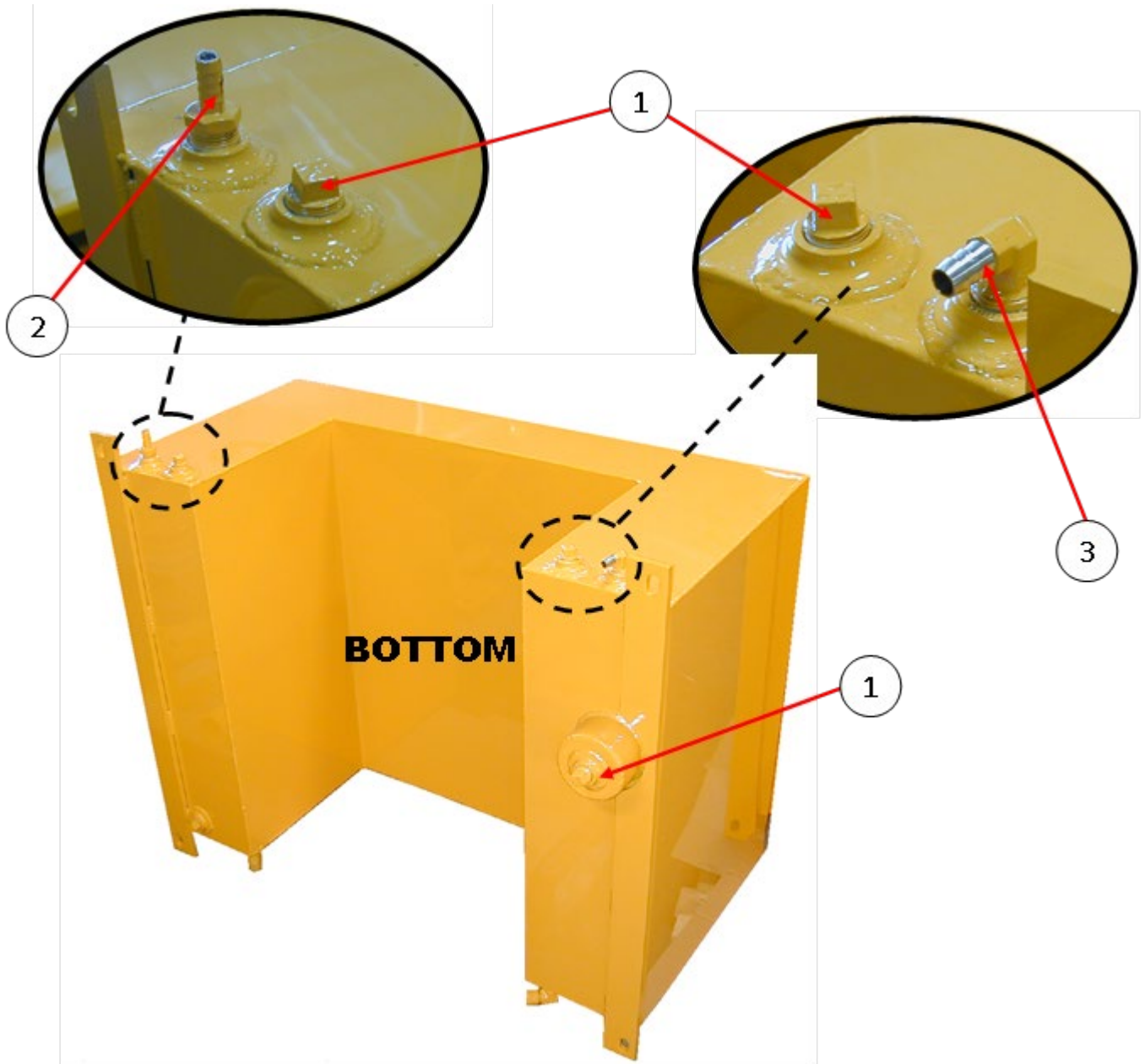
### TANKS

### FUEL TANK ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
	89484	FUEL TANK ASSY B-SERIES TIER-4	REF	
1	89479	FUEL TANK WELDMNT, B-SERIES TIER-4	1	EA
2	85570	FUEL CAP, 1 1/2 IN VENTED	1	EA
3	87545	FITTING BARBED-MPT, HOSE 3/8-1/2 MPT	1	EA
4	87770	FITTING BARBED 3/8 TUBE- 1/2" MPT 1	1	EA
5	77191	FUEL GAUGE,	1	EA
6	10297	PLUG-GALV 1/2"	2	EA
	74716	FUEL HOSE-3/8 SAE 30R7 BLK	A/R	
	10577	CLAMP-HOSE FOR 1/2"	4	EA

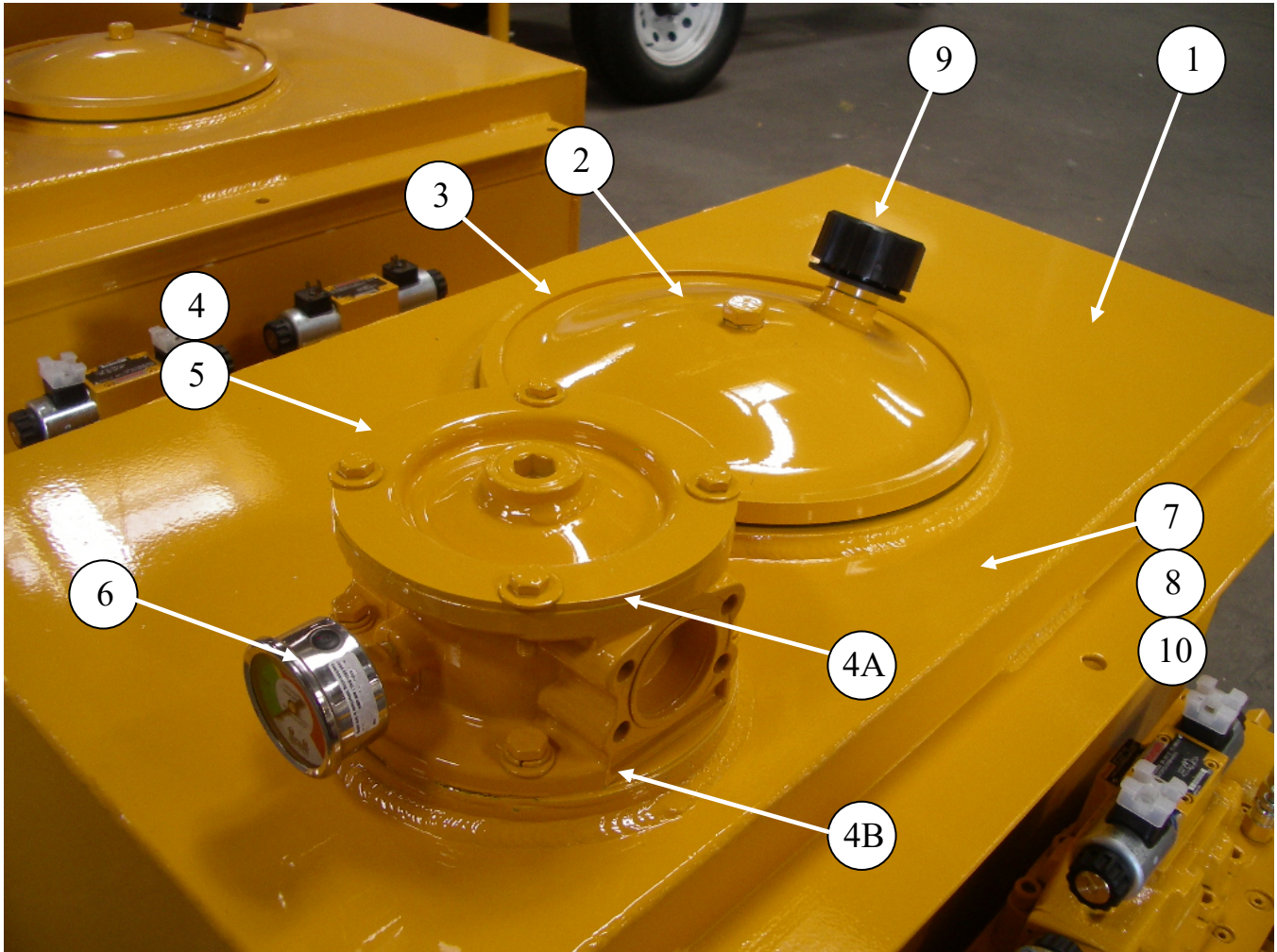
### FUEL TANK ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	10297	PLUG-GALV 1/2" (AS NEEDED)	REF	EA
2	87566	FITTING BARBED-JIC, 3/8-3/8MPT (STRAIGHT)	4	EA
3	87567	FITTING (90 DEG) METRIC TO JIC	4	EA

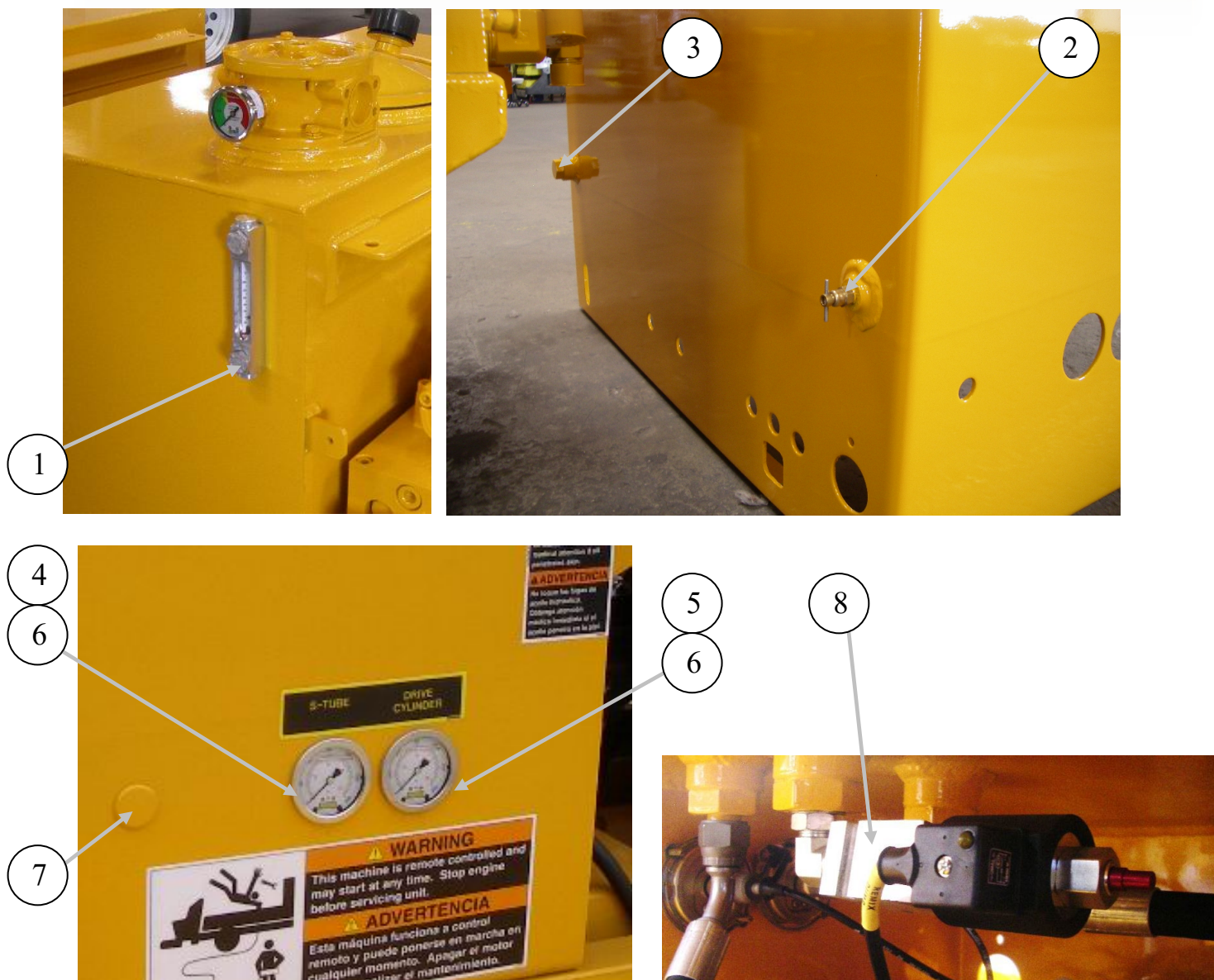


### HYDRAULIC GROUP HYDRAULIC TANK ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
	89554	HYD GR. B SER, TIER4, KAW	REF	
	89199	HYD TANK ASSY B-SERIES	1	EA
1	89195	HYDRAULIC TANK WELDMENT, B-TIER4	1	EA
2	85529	ENDCOVER KIT, 12 IN W/DRAIN	1	EA
3	85867	GASKET- END COVER 12"	1	EA
4	85282	FILTER, RETURN, TANK MOUNTED	1	EA
4A	BW10241	SEAL KIT FOR 85282 FILTER RETURN	1	EA
4B	85282-G	GASKET-CORK	1	EA
5	85283	FILTER ELEMENT, PN 85282 FILTER	1	EA
6	85575	GAUGE, PN 85282 RETURN FILTER	1	EA
7	79247	MAGNETIC SEPERATOR 1 ¼ " NPT	1	EA
8	800230	MAGNETIC SEPARATOR,3"NPT	1	EA
9	85537	FILLER BREATHER, 3/4 NPT	1	EA
10	10265	NIPPLE-CLOSE 1 ¼ NPT SCH 40 GALV	1	EA

### HYDRAULIC TANK ASSEMBLY CONTINUED

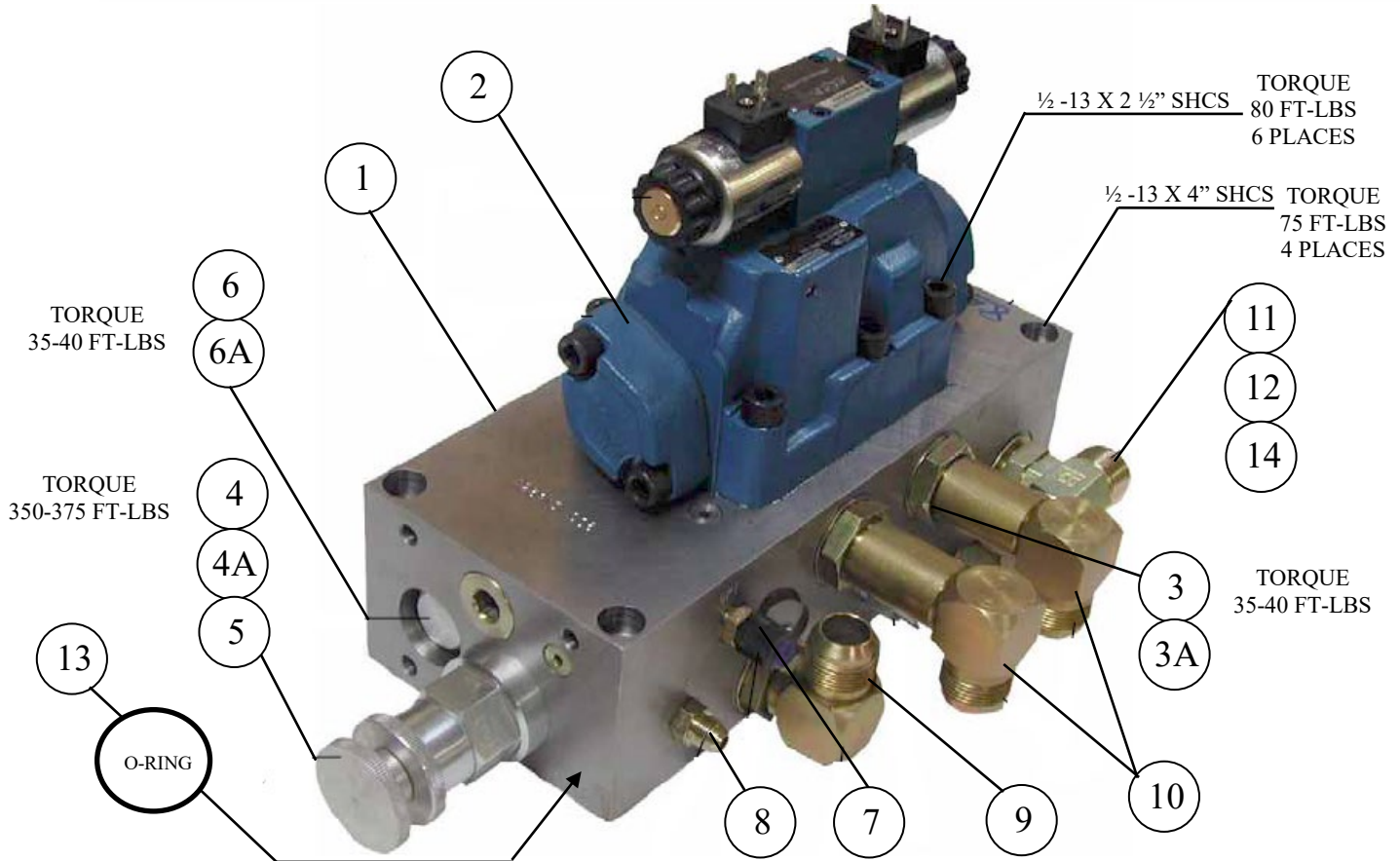


ID #	PART #	PART DESCRIPTION	QUANTITY	
1	74509	GAUGE-SIGHT/TEMPERATURE	1	EA
2	801025	DRAIN COCK, 1/4 NPT	1	EA
3	BG-12	3/4" SAE PLUG	1	EA
4	70366	PRESSURE GAUGE, 3000 PSI/BAR	1	EA
5	74562	PRESSURE GAUGE, 6000 PSI/BAR	1	EA
6	78594	MINICHECK GAUGE ADAPTOR, 1/4 NPT	2	EA
	78608	MINI CHECK HOSE 48"	2	EA
7		HOFFMAN PLUG	1	A/R
8	87154	SOLENOID VALVE ASSY (REMIX-DUMP)	1	EA



### MANIFOLDS

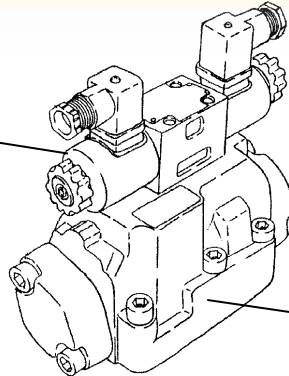
## DRIVE CYLINDER CIRCUIT MANIFOLD ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
	85248	MANIFOLD, CYLINDER CIRCUIT ASSEMBLY	1	EA
1	86820	MANIFOLD, MACHINED CYLINDER CIRCUIT	1	EA
2	85689	SOLENOID VALVE, DRIVE CYLINDER	1	EA
3	85696	RELIEF VALVE CARTRIDGE	1	EA
3A	85696-SK	SEAL KIT		
4	85697	FLOW CONTROL CARTRIDGE W/KNOB	1	EA
4A	85697-SK	SEAL KIT		
5	86947	KNOB KIT, ALUMINUM	1	EA
6	85698	CHECK VALVE CARTRIDGE	1	EA
6A	85698-SK	SEAL KIT		
7	78593	MINICHECK ADAPTOR, SAE 4	1	EA
8	86900-002	ADAPTOR, MB-MJ-4-6	1	EA
9	86728-023	ELBOW, MB-MJ45-16-16	1	EA
10	86900-028	STRAIGHT, MB-MJ-16-16	2	EA
11	86945-001	TEE, MJ-MB-MJT-16	1	EA
12	86905-016	ELBOW, MJ-FJX90-16-16	1	EA
13	86946	O-RING #230 BUNA 90DUR	1	EA
14	86948-001	REDUCER, JIC MJ-FJ-10-16	1	EA

**DRIVE CYLINDER CIRCUIT MANIFOLD ASSEMBLY CONT.**

DRIVE CYLINDER  
PILOT SOLENOID  
VALVE



DRIVE CYLINDER VALVE  
ASSEMBLY COMPLETE  
**85689**

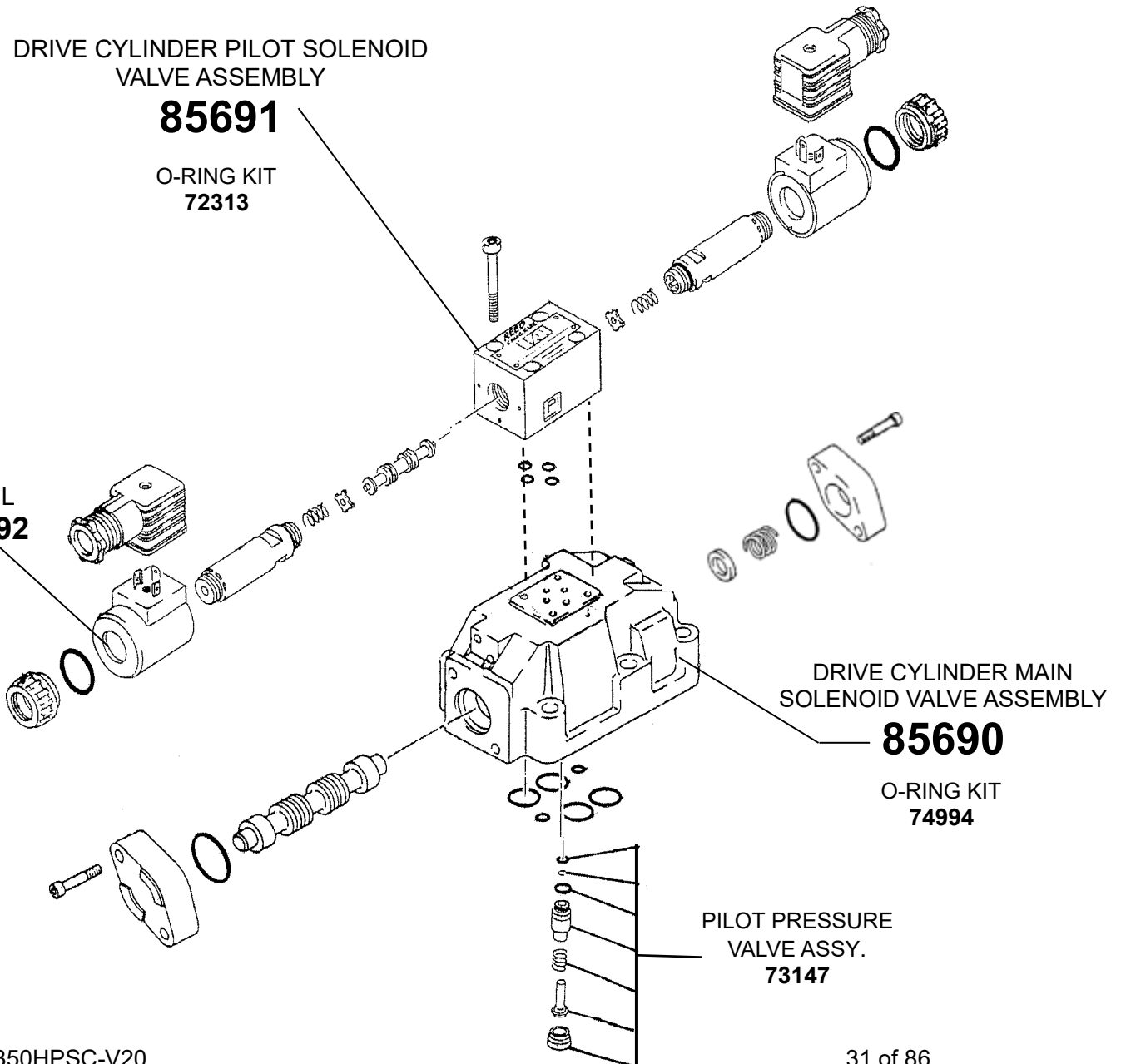
DRIVE CYLINDER  
MAIN VALVE

DRIVE CYLINDER PILOT SOLENOID  
VALVE ASSEMBLY

**85691**

O-RING KIT  
**72313**

COIL  
**85692**

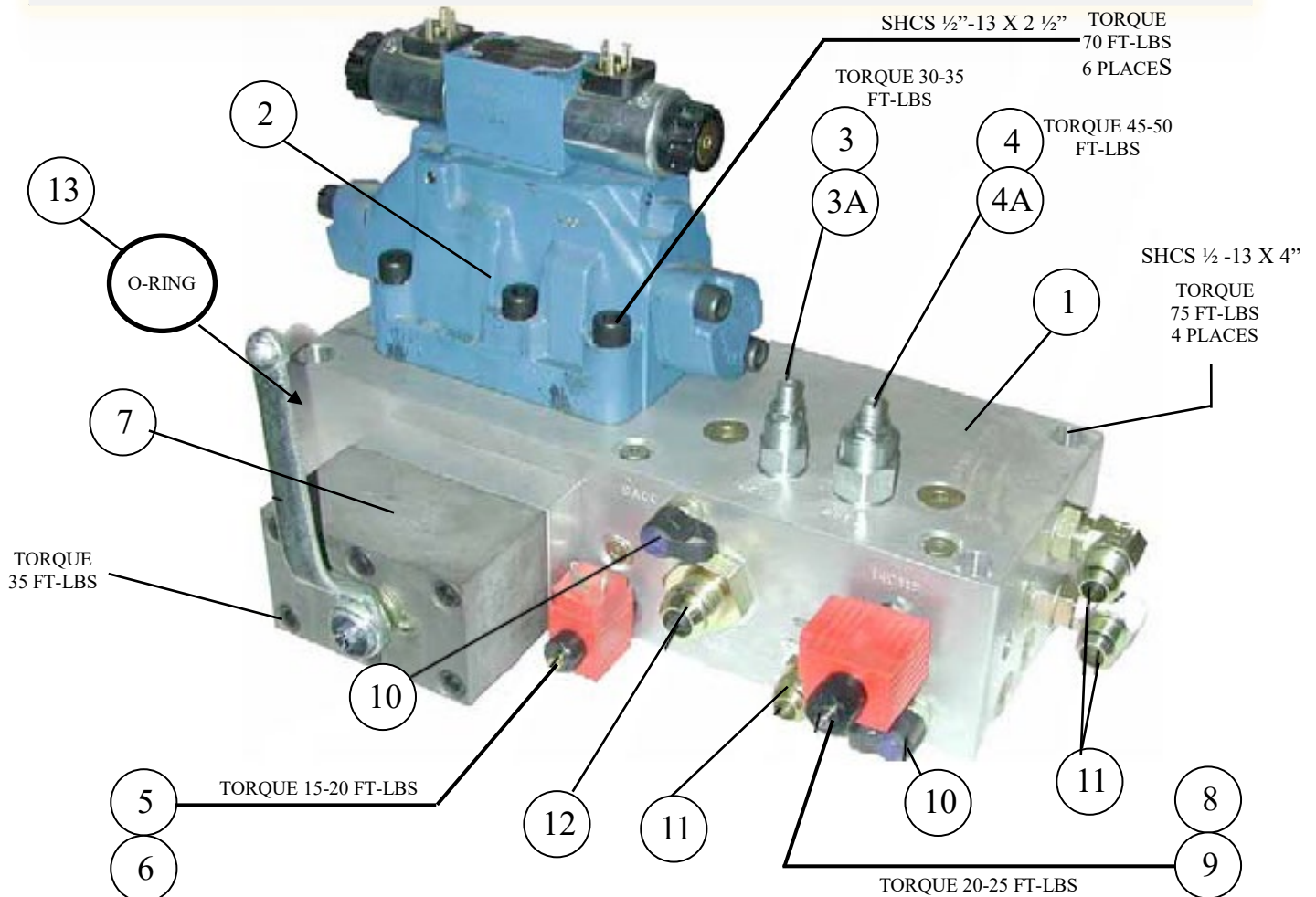


DRIVE CYLINDER MAIN  
SOLENOID VALVE ASSEMBLY  
**85690**

O-RING KIT  
**74994**

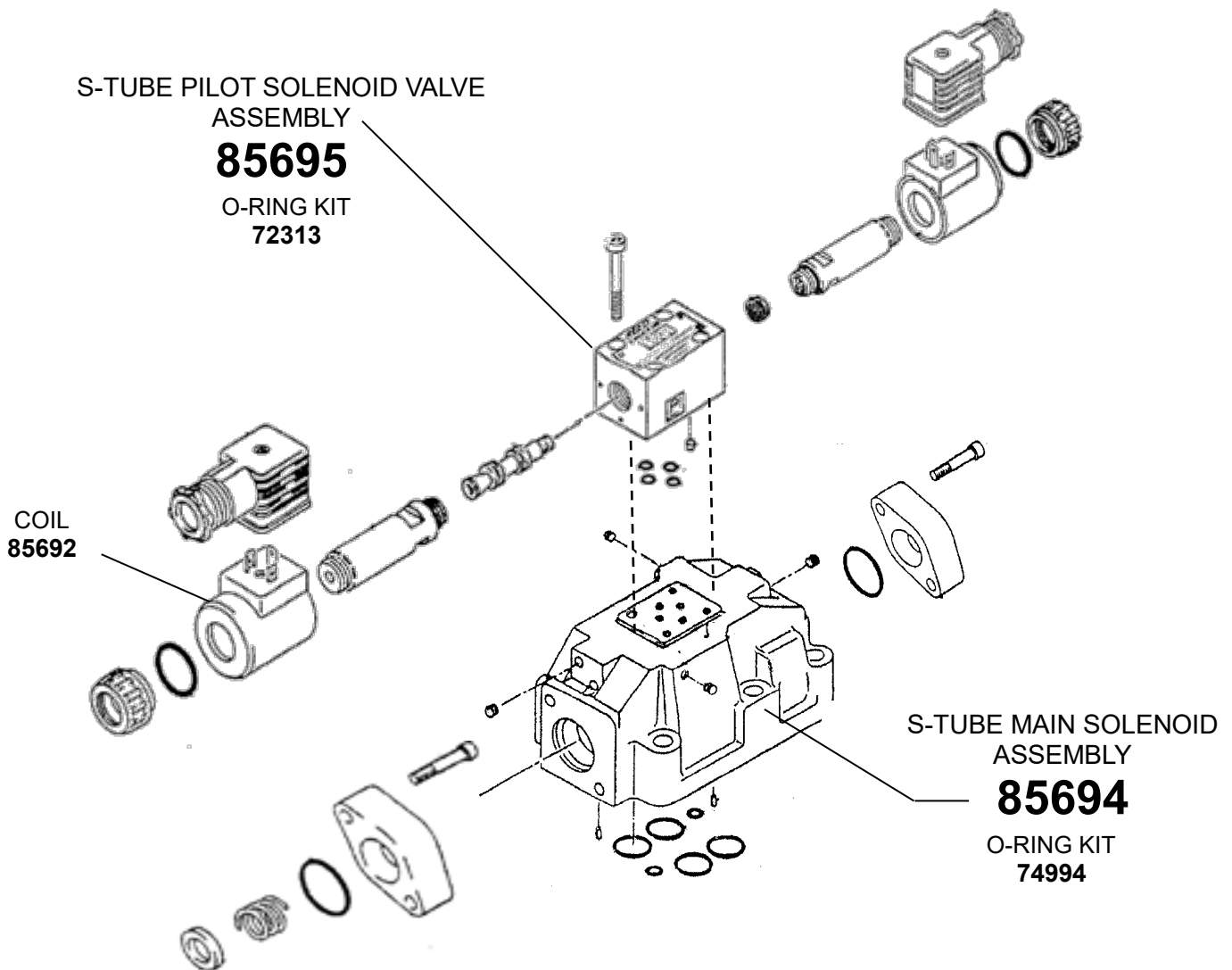
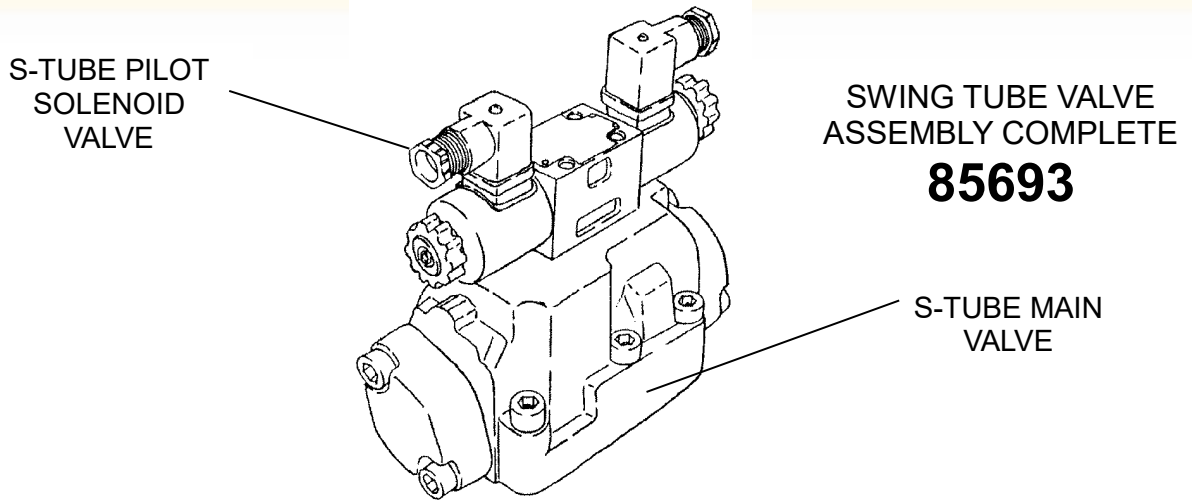
PILOT PRESSURE  
VALVE ASSY.  
**73147**

### S-TUBE CIRCUIT MANIFOLD ASSEMBLY

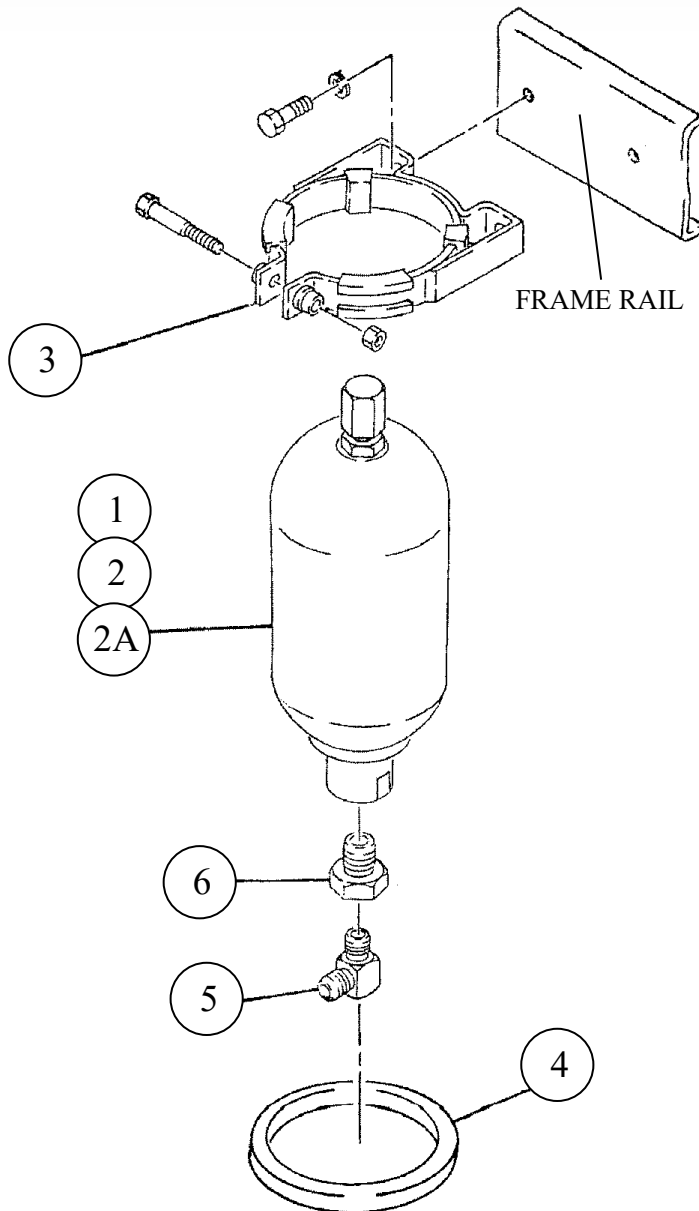


ID #	PART #	PART DESCRIPTION	QUANTITY	
	89631	MANIFOLD, S-TUBE CIRCUIT ASSEMBLY		
1	89602	MANIFOLD, MACHINED S-TUBE CIRCUIT	1	EA
2	85693	SOLENOID VALVE, S-TUBE SHIFT	1	EA
3	85704	UNLOADER VALVE CARTRIDGE, (QCDB)	1	EA
3A	85704-SK	SEAL KIT		
4	85703	RELIEF VALVE CARTRIDGE, (RVEA)	1	EA
4A	85703-SK	SEAL KIT		
5	85699	SOLENOID VALVE CARTRIDGE, (12CHS)	1	EA
6	85700	COIL, 12VDC,	1	EA
7	85705	BALL VALVE,	1	EA
8	85701	SOLENOID VALVE CARTRIDGE, (14CHS)	1	EA
9	85702	COIL, 12V DC FOR PN-87248	1	EA
10	78593	MINICHECK ADAPTOR, SAE	2	EA
11	86728-014	ELBOW, MB-MJ90-10-10	2	EA
12	86900-027	ADAPTOR, MB-MJ-16-12	1	EA
13	86946	O-RING #230 BUNA 90DUR	1	EA

## S-TUBE CIRCUIT MANIFOLD ASSEMBLY CONT.

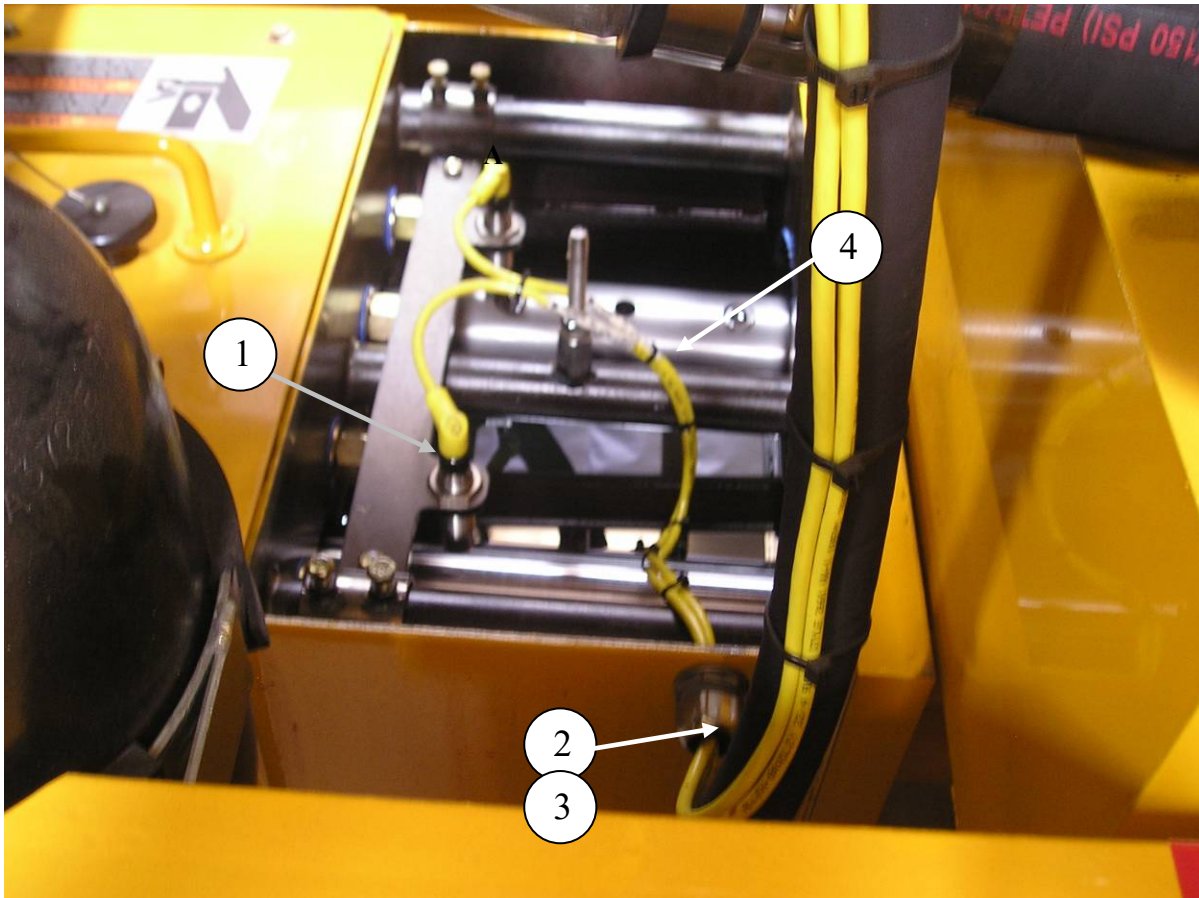


### ACCUMULATOR ASSEMBLY



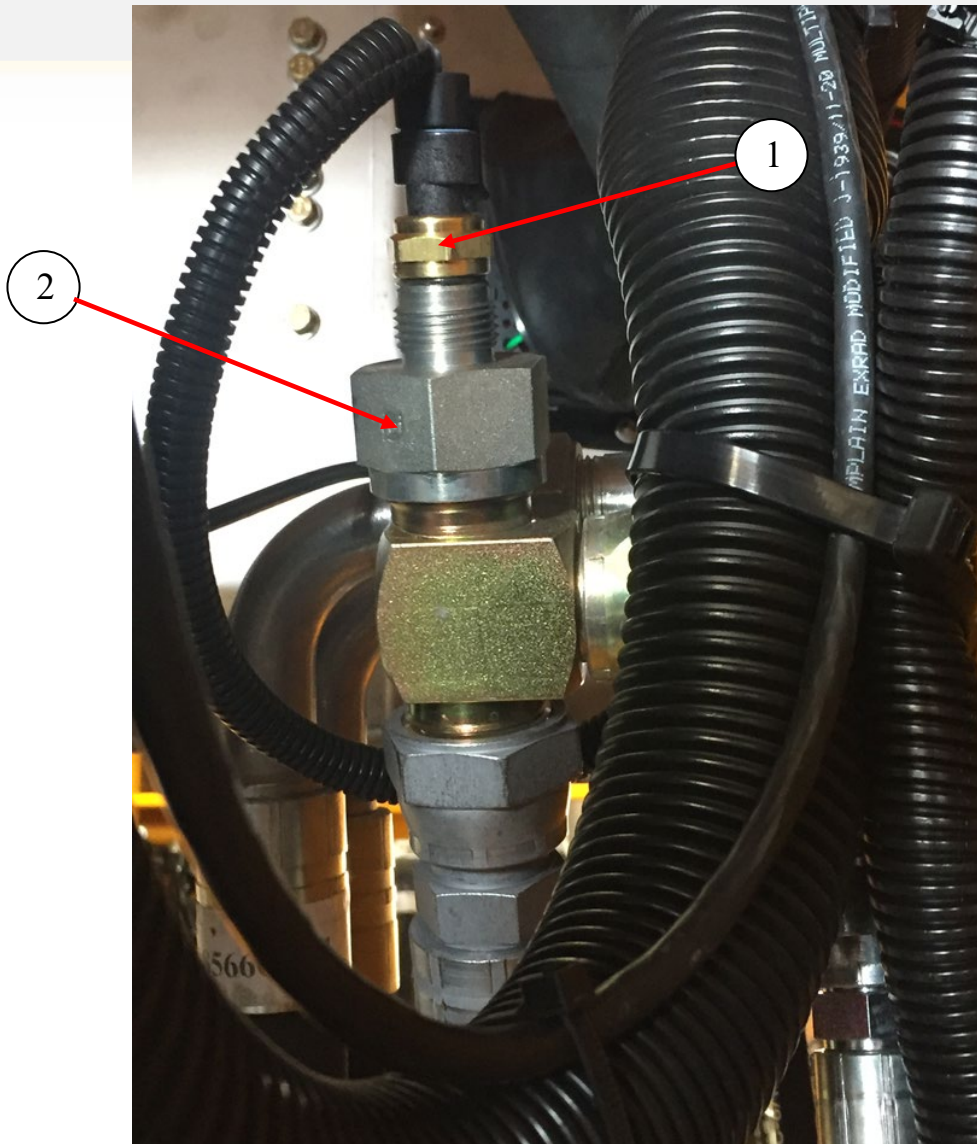
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	74515	ACCUMULATOR-1 GAL 3000PSI	1	EA
2	74516	BLADDER, 1 GAL.	1	EA
2A	85812	BLADDER SEAL KIT	1	EA
3	73171	ACCUMULATOR BKT.W/CLOSING HARDWARE	1	EA
4	801028	GROMMET, ACCUMULATOR	1	EA
5	86728-019	ELBOW, MB-MJ90-12-12	1	EA
6	86920-20	REDUCER MB-FB-20-12	1	EA



**ELECTRICAL GROUP**  
**PROXIMITY SENSOR**

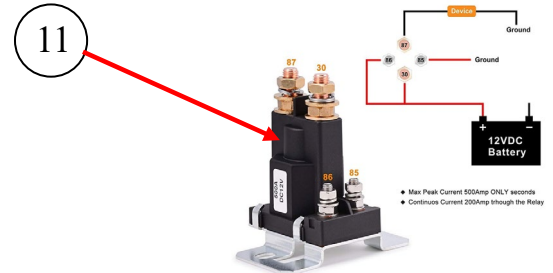
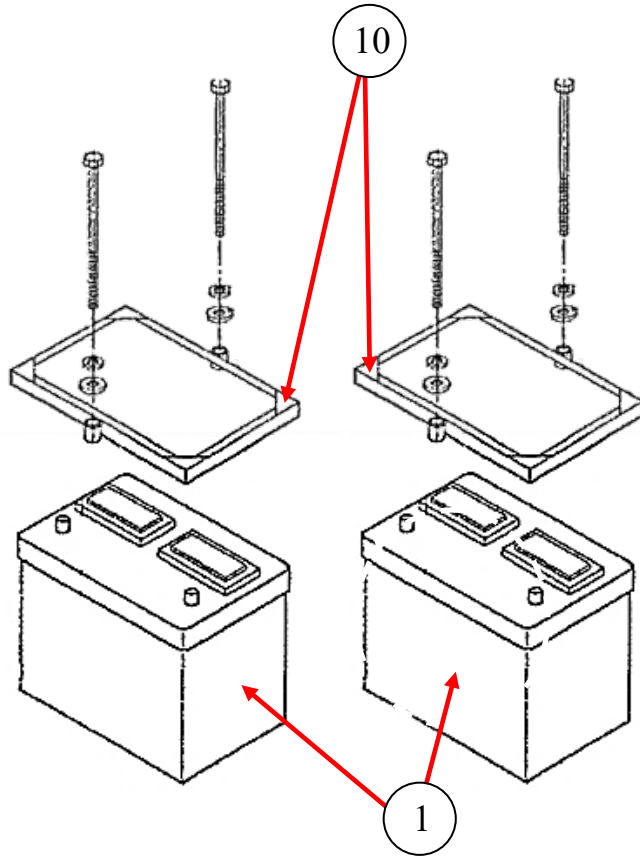
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	77998	PROXIMITY SENSOR NPN FLUSH BOX MOUT	2	EA
2	10522	STRAIN RELIEF	1	EA
3	10528	NUT-1/2" BONDING TYPE LOCK	1	EA
4	77990	CABLE, PROXIMITY SWITCH, 5M	2	EA

## TEMPERTURE SENSOR



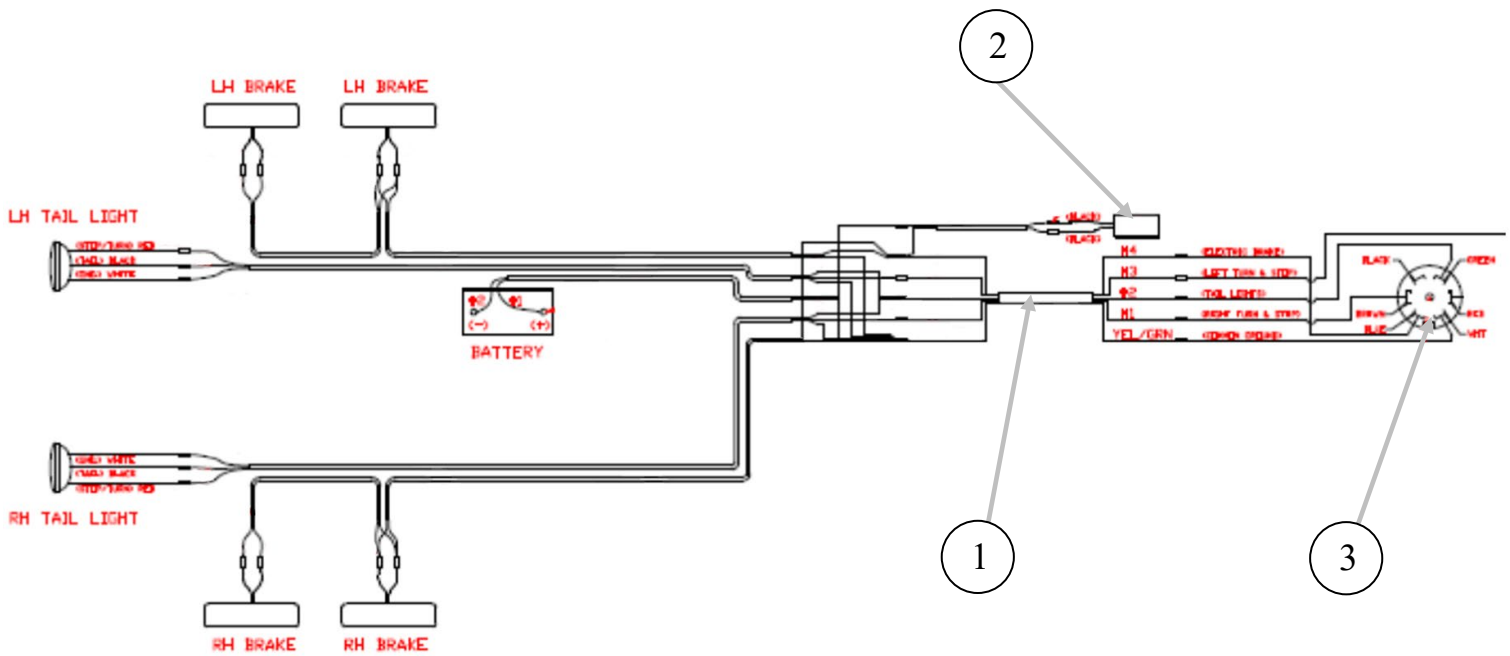
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89279	SENSOR TEMPERTURE FOR TIER4 CUMMINS	1	EA
2	89633	ADAPTER TEMP SENSOR FOR 89279	1	EA

### BATTERY ASSEMBLY



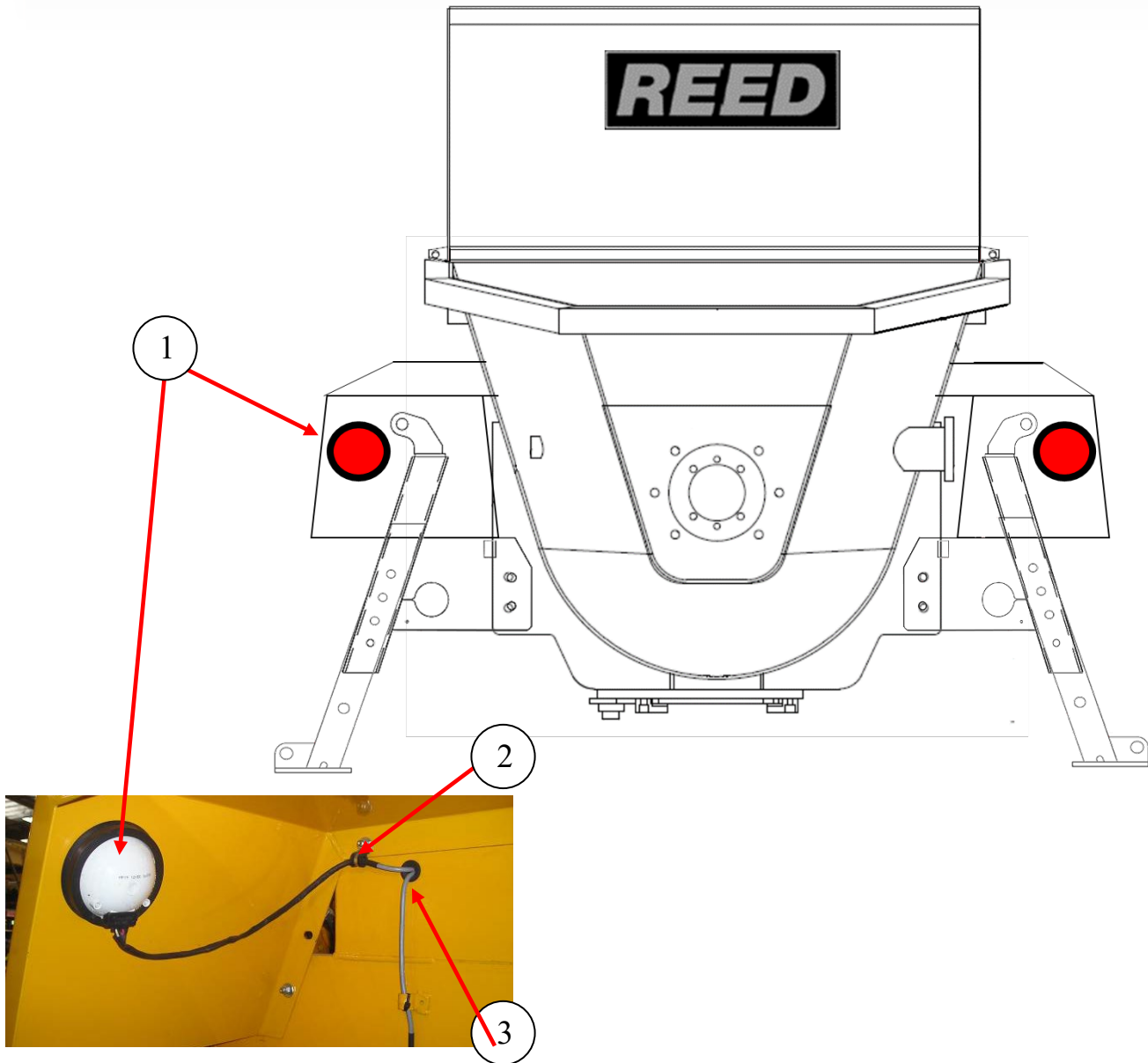
ID #	PART #	PART DESCRIPTION	QUANTITY	
	89477-T4	ELECTRICAL GROUP B-SERIES, PLC TIER-4 CUMM	REF	
1	77075	BATTERY-12V 1000 CCA31	2	EA
2	89524-P	CABLE,46" BATTERY RED 4/0	1	EA
3	89524-N	CABLE, 44" BATTERY BLACK 4/0	1	EA
4	87221	RED LEFT ELBOW TERM PROTECTOR	1	EA
5	87222	INSULATOR LEFT ELBOW-BLACK	1	EA
6	89511-N	BATTERY TERMINAL NEGATIVE	1	EA
7	89511-P	BATTERY TERMINAL POSITIVE	1	EA
8	89525-N	CABLE, 28" BATTERY BLK 4/0	1	EA
9	89525-P	CABLE, 28" BATTERY RED 4/0	1	EA
10	72945	BATTERY HOLD DOWN	2	EA
11	87541	RELAY STARTER 12VDC-SELL W/87544	2	EA
	73269	GROUND STRAP	1	EA
	89511-2	TERMINAL COVER SET, DOUBLE CABLE	1	EA

### TRAILER HARNESS AND BREAKAWAY



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86532	TRAILER HARNESS- C-SERIES	1	EA
2	77705	BREAK-AWAY KIT 5000 SERIES	1	EA
3	86579	TRAILER PLUG 7C FLAT PI	1	EA
4	72949	GROMMET	REF	
5	72813	GROMMET	REF	

## TAIL LIGHTS

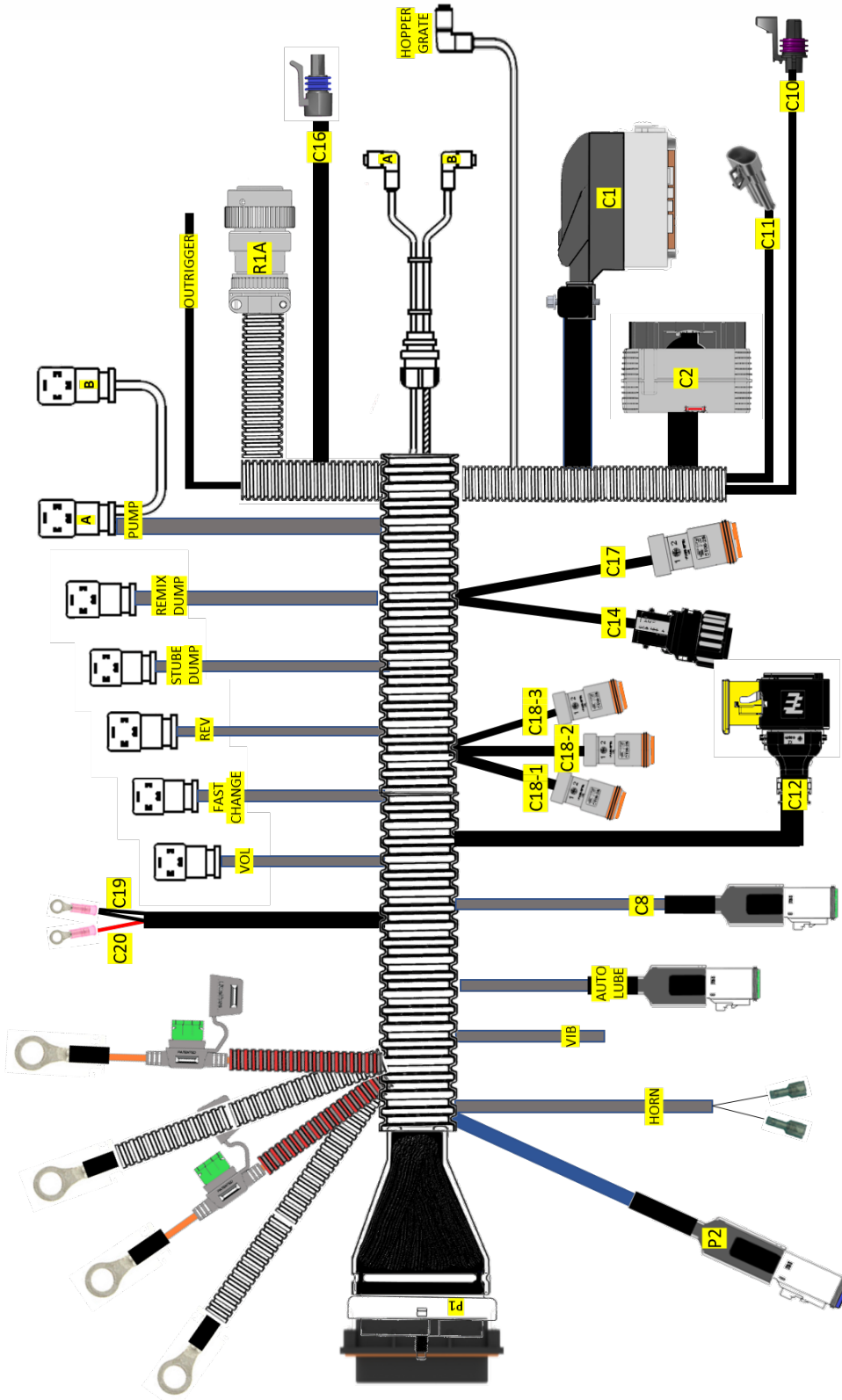


ID #	PART #	PART DESCRIPTION	QUANTITY	
1	72948	TAIL LIGHT	2	EA
2	87665	LOOM, CLAMP 7/8"	2	EA
3	72949	GROMMET	2	EA



### TIER-4 MAIN WIRING HARNESS

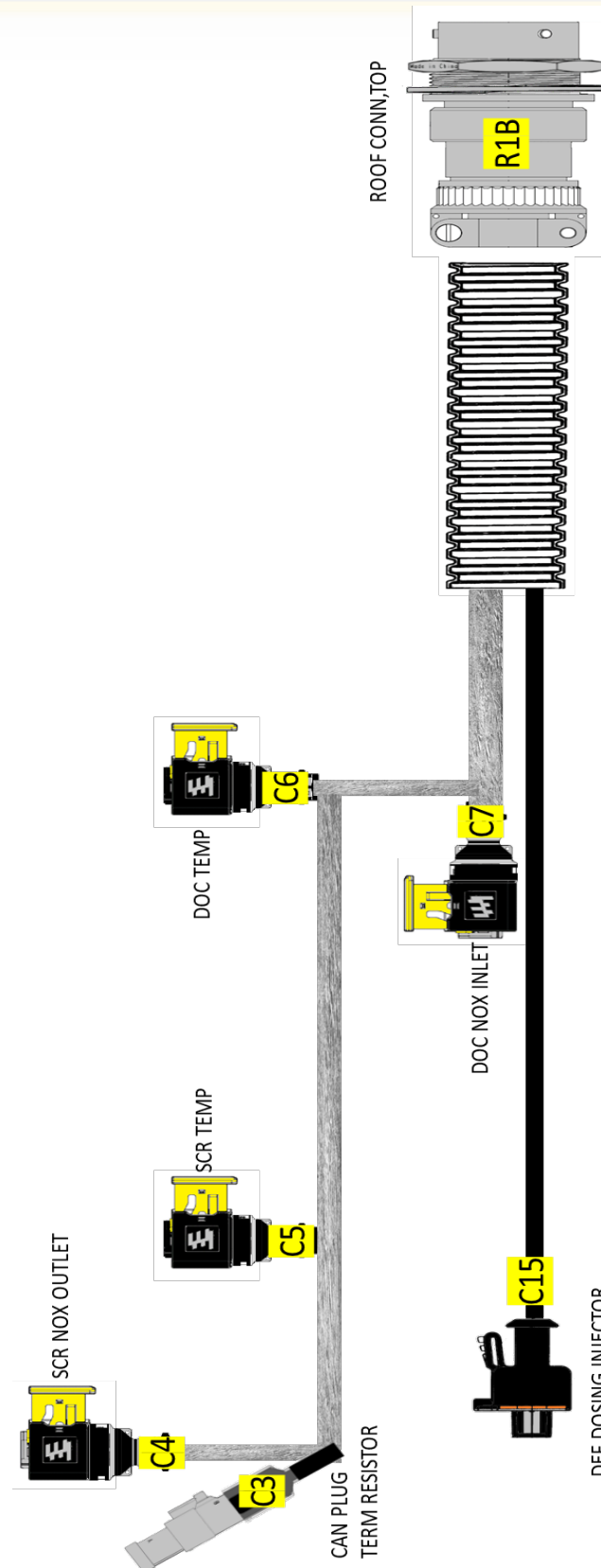
# 89052B-SERIES HARNESS





## TIER-4 ROOF HARNESS

# 89052-R TIER-4 ROOF HARNESS



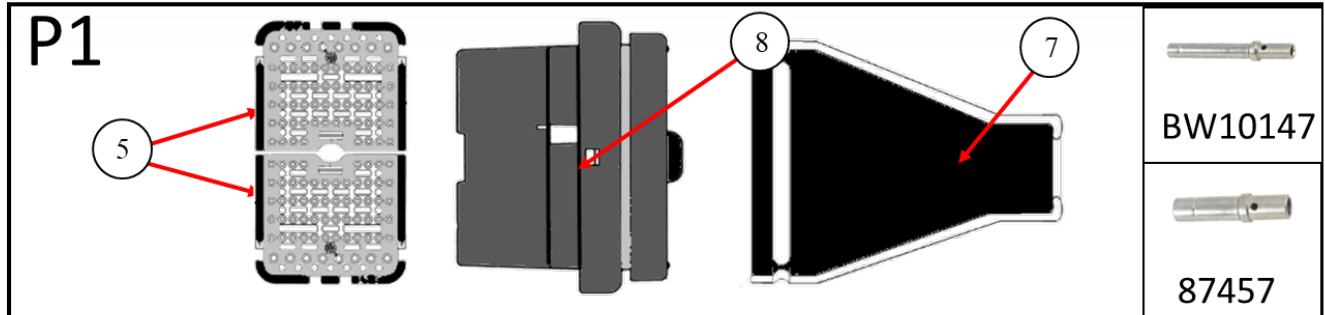


# B50HPSC TIER4

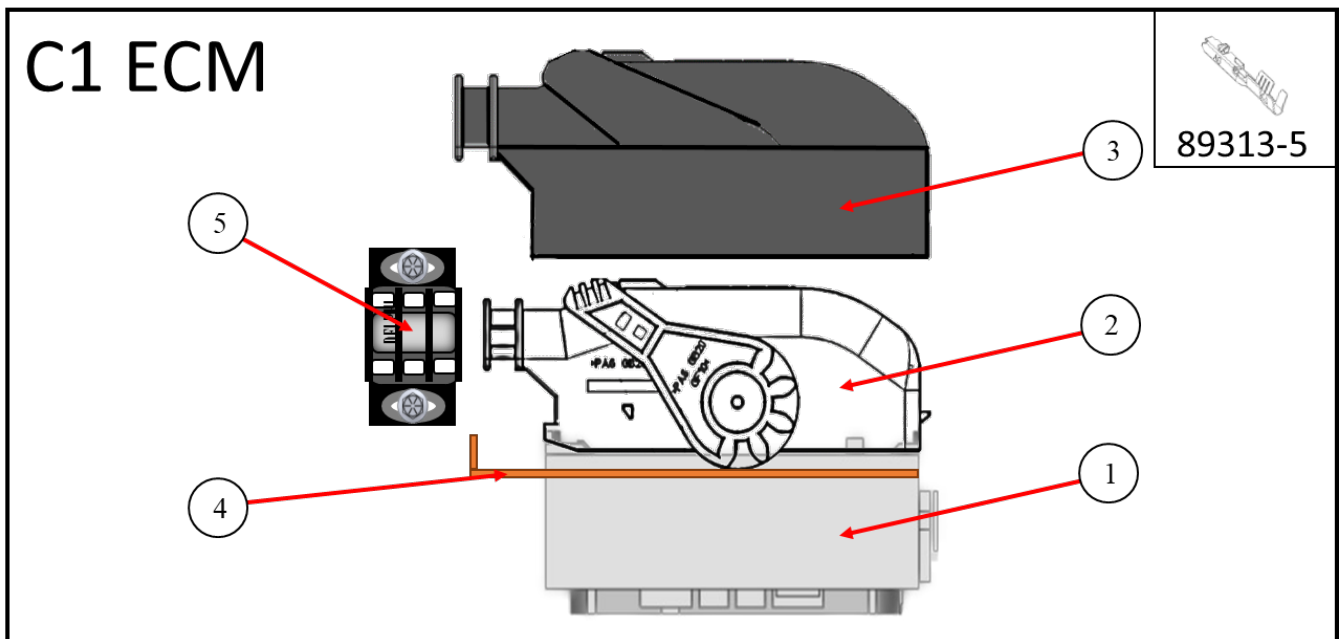
## PARTS

13822 Oaks Avenue  
Chino, CA 91710  
reedpumps.com  
(909) 287 - 2100

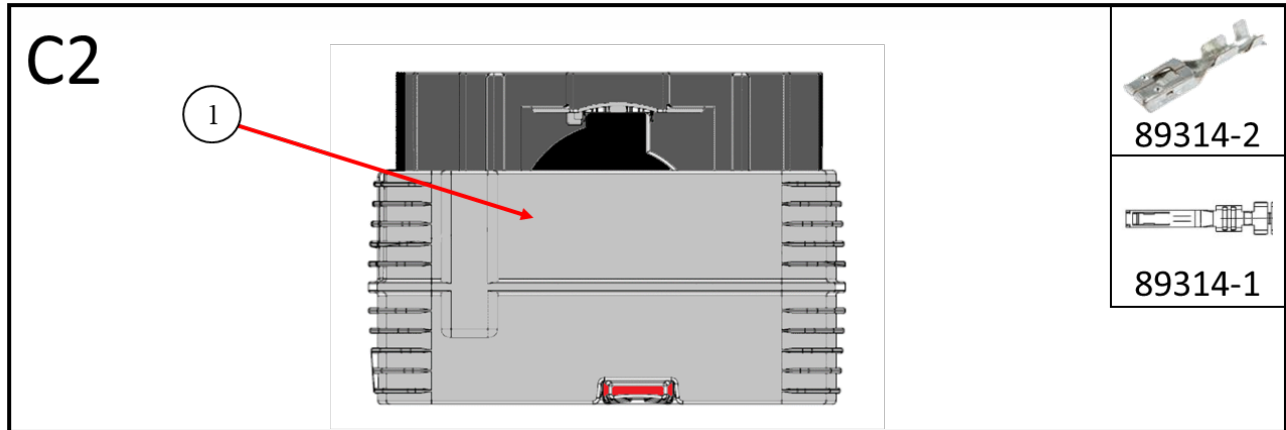
ID #	PART #	PART DESCRIPTION	QUANTITY	
	89052	WIRING HARNESS, B SERIES PLC TIER 4	REF	
	87540	CABLE SOLENOID	3	EA
	88243	CABLE WITH 2 DIN PLUGS 5M	2	EA
	87540-1	CABLE SOL VALVE, W/DIN PLUG	2	EA
	77990	CABLE, PROXIMITY SWITCH	2	EA
	10522	STRAIN RELIEF	1	EA
	10528	NUT 1/2" BONDING TYPE LOCK	1	EA
	30240	GASKET-LIQUID 1/2"	1	EA
	85615	CABLE, 14AWG-2C, PVC-GRY	6.75	FT
	85617	CABLE, 14AWG-4C, PVC-GRY	13	FT
	85619	CABLE, 16AWG-4C, PVC-GRY	11	FT
	20169	CABLE, 18AWG-3C PVC BLACK	6	FT
	88678	HOPPER SAFTY SWITCH CABLE (SHIELDED)	1	EA
	20169	CABLE, 18AWG, BLK	12	FT
	89336	HEAT SLEEVE CABLE, 1/2"	7	FT
	BW10254-025	.25" DIA WIRE LOOM PLASTIC	2	FT
	BW10254-062	.625" DIA WIRE LOOM PLASTIC	12	FT
	BW10254-075	.750" DIA WIRE LOOM PLASTIC	4	FT
	BW10254-125	1.25" DIA WIRE LOOM PLASTIC	7.5	FT
	89127	CABLE, BLACK, GR/YL TWISTED PAIR, 20 AWG	44	FT
	89218	DEUTSH DT04 RECP	2	EA
	89218-1	DEUTSH WEDGE	2	EA



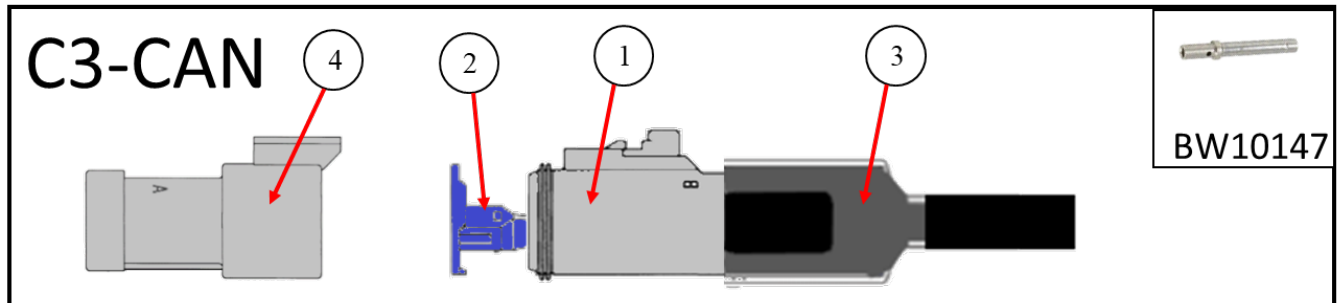
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89156	DEUTSCH RECEPTACLE 128 CONTACT	1	EA
2	89116	DEUTSCH WEDGE LOCK FOR 89109	2	EA
3	87457	PINS, FOR 87456	15	EA
4	BW10147	CONTACT SOCKET SIZE-16, 13 AMP, PIN	76	EA
5	89109-B	BOOT FOR 89109,89157	1	EA



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89313	PLUG, CTS SERIES, 96 CAVITY	1	EA
2	89313-1	COVER, FOR 89313	1	EA
3	89313-2	RUBBER BOOT, FOR 89313	1	EA
4	89313-3	TERMINAL LOCK, FOR 89313	1	EA
5	89313-4	STRAIN RELIEF, FOR 89313	1	EA





ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89314	PLUG, APEX 150 SERIES, 24 CAVITY	1	EA



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88935	3 EAY PLUG DT SER	4	EA
2	88937	WEDGE LOCK, DT 3 PIN PLUG (BLUE)	2	EA
3	88935-B	BOOT FOR 3 WAY DT SERIES PLUG	3	EA
4	88933-1	CAN TERM RESISTOR 120 OHMS, DT RECEPT	1	EA


**C4,C7**


  
89315-1

  
89315-2

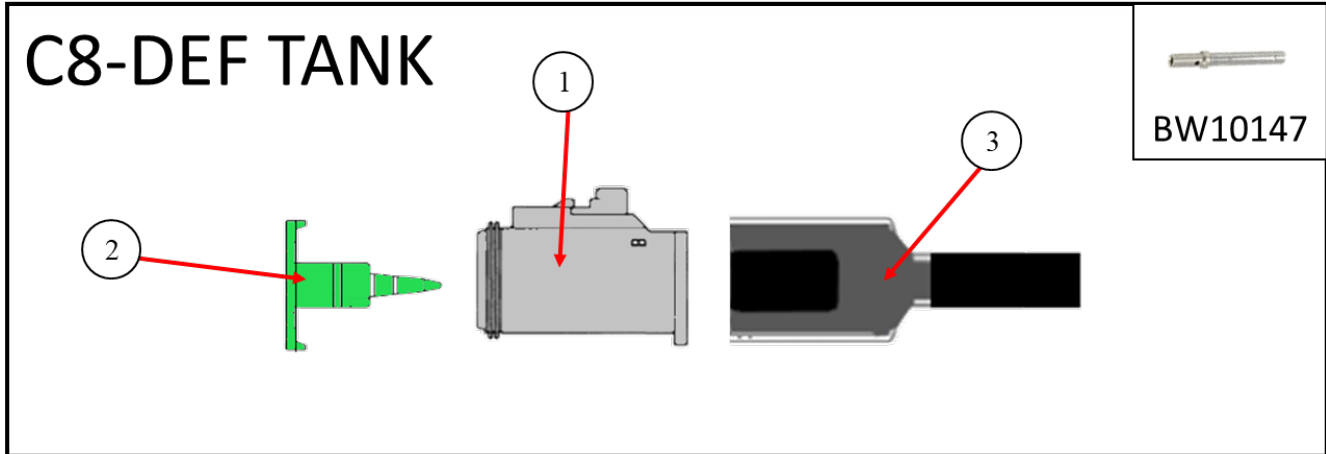
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89316	PLUG. HDSCS SERIES, 4 CAVITY GRAY	3	EA
2	89316-3	BACKSHELL, 89315, 89316	1	EA

**C5,C6**

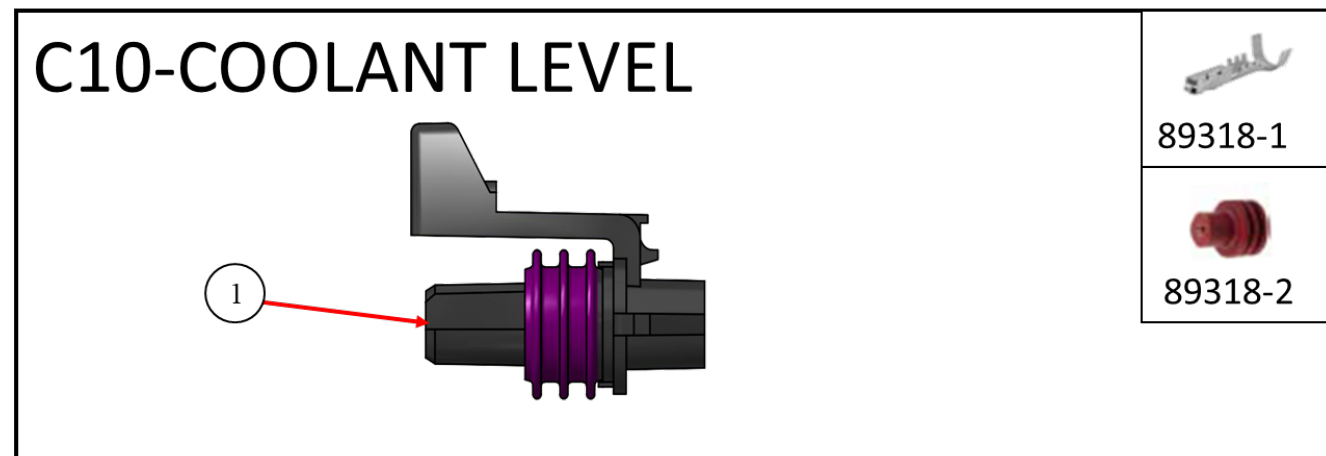
  
89315-1

  
89315-2

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89315	PLUG. HDSCS SERIES, 4 CAVITY BLK	3	EA
2	89315-3	BACKSHELL, 89315, 89316	1	EA



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89102	DEUTSCH DT06 PLUG, 2X2	1	EA
2	89132	WEDGE, DEUTSCH FOR 89102	1	EA
3	89102-B	BOOT FOR 89102, 4 CAVITY SOCKET	1	EA



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89318	PLUG, METRIPAK 150 SERIES, 3 CAVITY	1	EA



### C11-FAN CLUTCH



89319-1



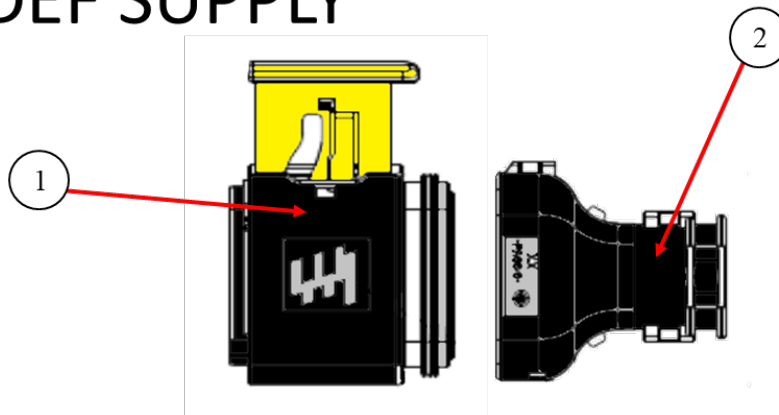
89319-2



89319-4

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89319	RECEPTICAL, METRIPAK 150 SERIES, 6 CAVITY	1	EA
2	89319-3	WEDGE LOCK, METRIPAK 150 CAV, FOR 89319	1	EA

### C12-DEF SUPPLY



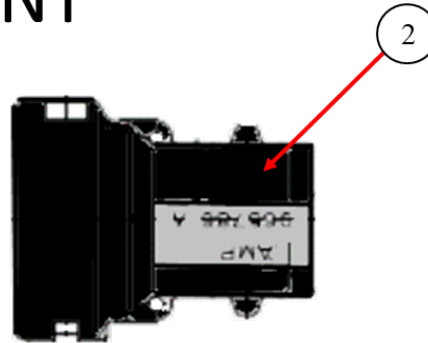
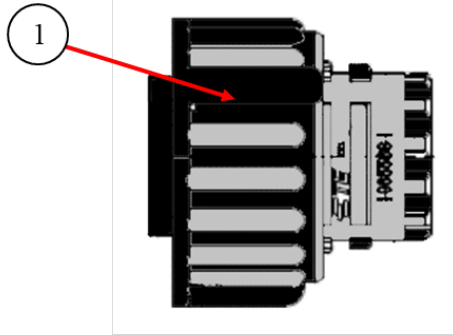
89320-1



89315-2

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89320	PLUG, HDSCS SERIES, 12 CAVITY, BLACK	1	EA
2	89320-3	BACKSHELL FOR 89320	1	EA

### C14-DEF COOLANT



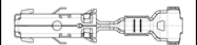
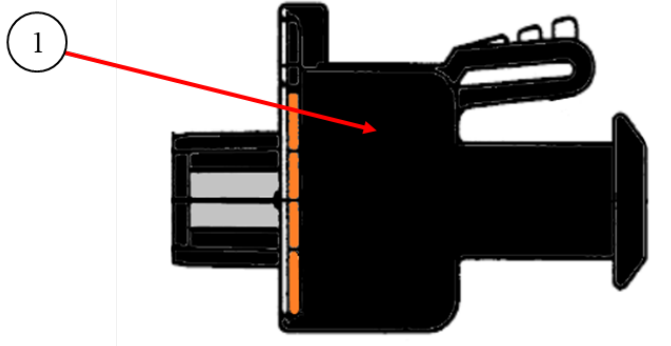
89321-1



89321-2

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89321	PLUG, AMP SERIES, 4 CAVITY	1	EA
2	89321-3	COVER FOR 89321	1	EA

### C15-DEF DOSING INJECTOR



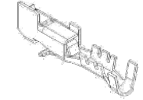
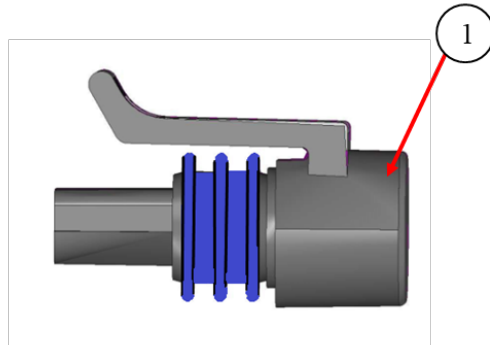
89322-1



89322-2

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89322	PLUG, BOSCH, 2 CAVITY	1	EA

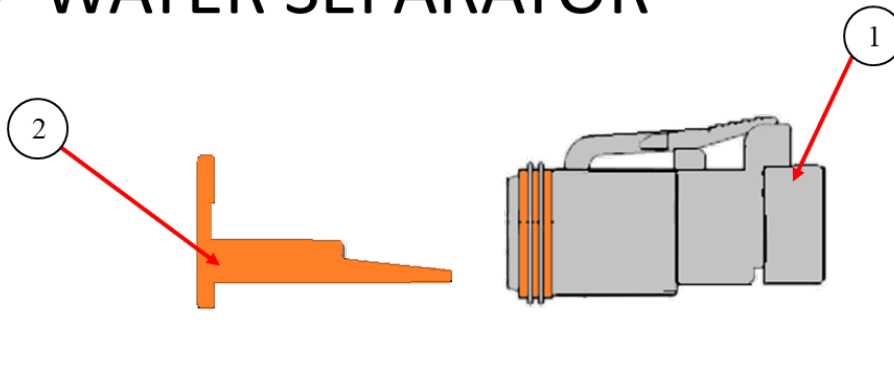
### C16-HYD TEMP



89323-1

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89323	PLUG, METIPAK 150.2 SERIES, 2 CAVITY	1	EA
2	89323-1	TERMINAL, 150 SERIES, 16-18 AWG FOR 89323	2	EA

### C17-WATER SEPARATOR

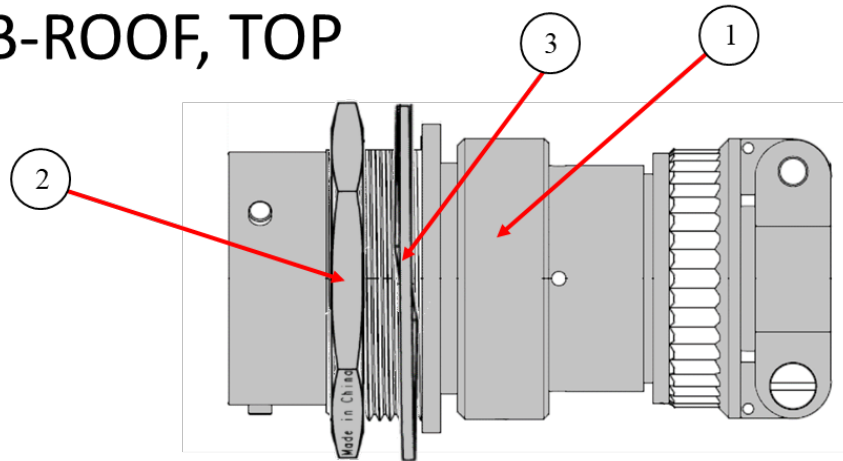


BW10147



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89277	DEUTSCH DT06 PLUG, 2 CAVITY	4	EA
2	89277-1	WEDGE FOR 89277	1	EA

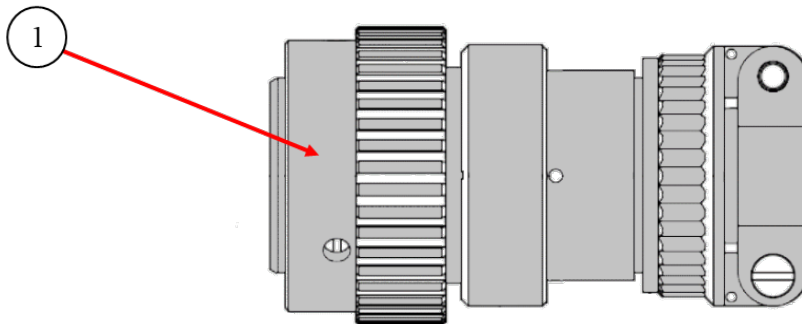
### R1B-ROOF, TOP



87807

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	87456	PLUG SOCKET CONNECTOR, 8PIN	1	EA

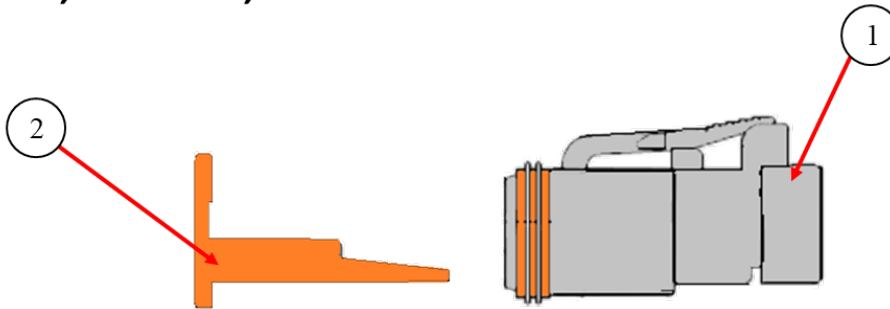
### R1A-ROOF, BOTTOM



87457

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89217	DEUTSCH HD34 RECP, 8 PIN	1	EA
2	88479	NUT FOR 88478 RECEPTAL	1	EA
3	88480	WASHER FOR 88478 RECEPTAL	1	EA

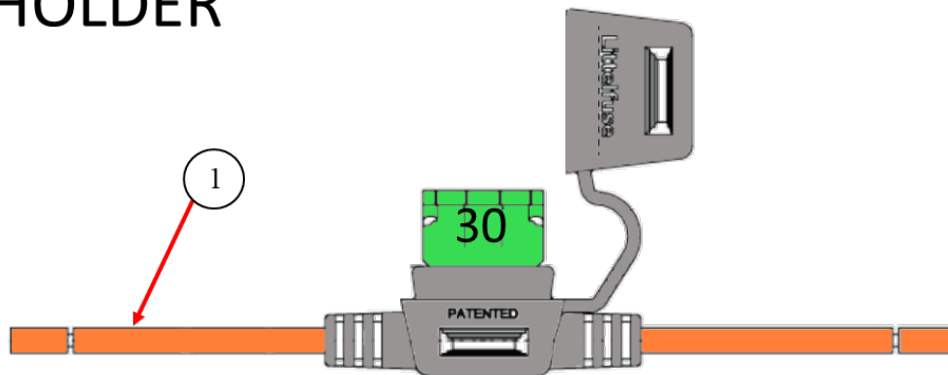
### C18-1,C18-2,C18-3



BW10147

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89277	DEUTSH DT706 PLUG, 2 CAVITY	3	EA
2	89277-A	WEDGE FOR 89277	3	EA

### FUSE HOLDER

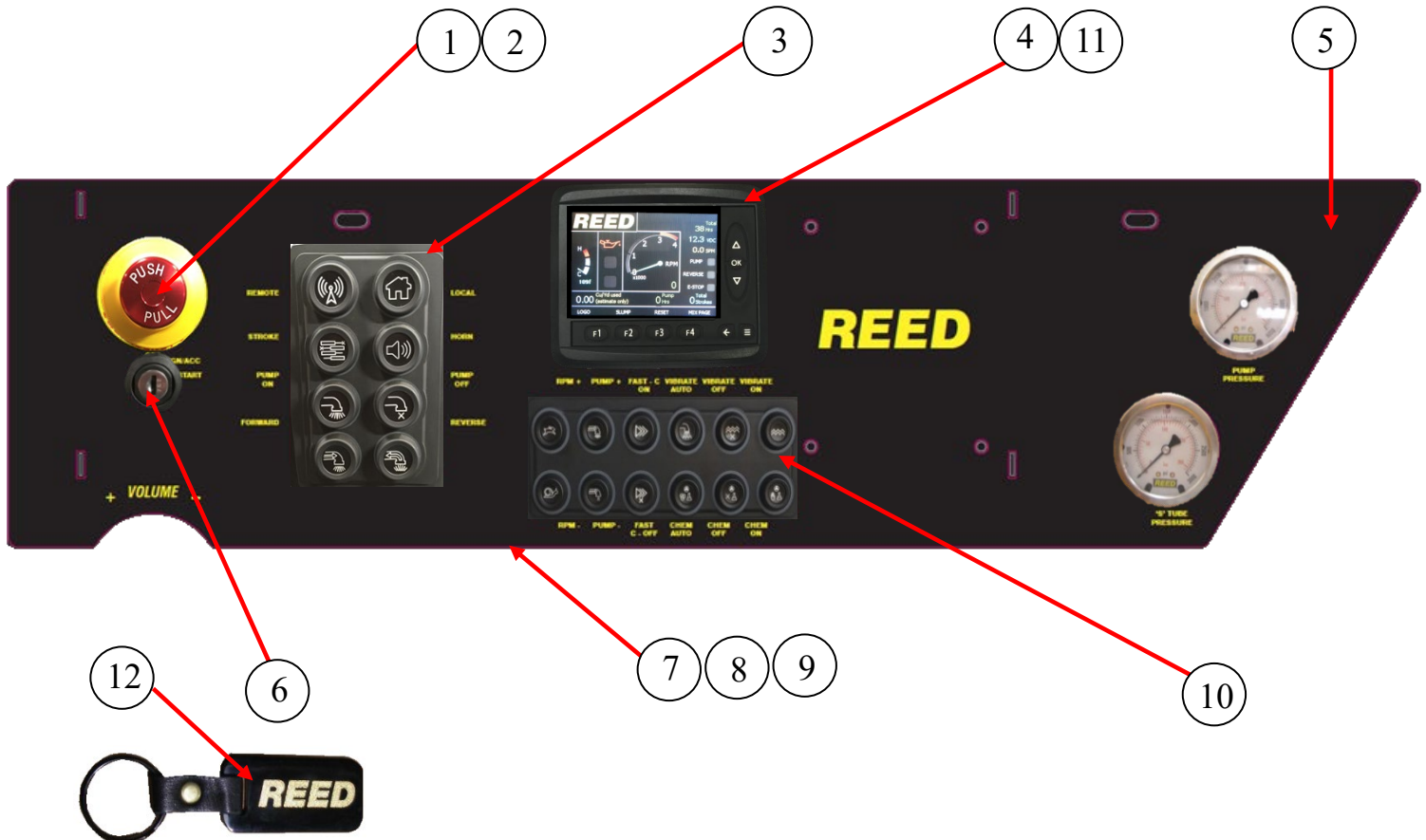


88956

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88733-1	FUSE HOLDER INLINE, BLADE STYLE, 30AMP	1	EA
2	90394	FUSE, ATO 30AMP	1	EA

### PLC CONTROLS

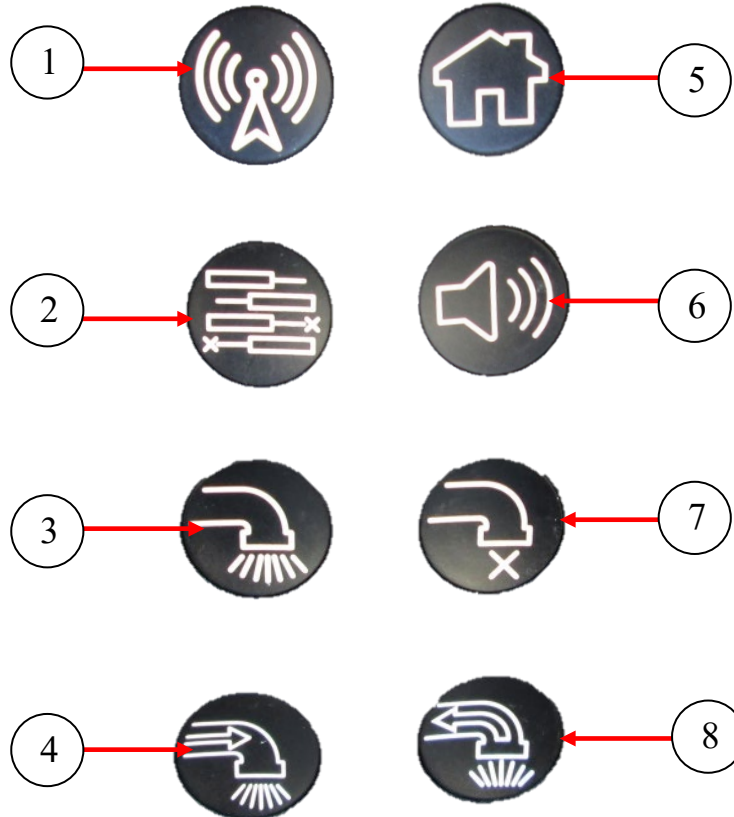
## B-SERIES CONTROL PANEL ASSEMBLY



ID #	PART #	PART DESCRIPTION	QUANTITY	
	89333-T4	B-SERIES CONTROL PANEL ASSY.	REF	
1	89090	EMERGENCY STOP PUSH BUTTON HEAVY DUTY	1	EA
2	89090-L	ILLUMINATED E-STOP RING	1	EA
3	88979-3	KEYPAD 2X4 SWITCH, PROGRAMMABLE	1	EA
4	88918	MD3, PARKER DISPLAY MODULE	1	EA
5	89099-D	DECAL CONTROL PANEL B-SER PLC	1	EA
6	89004	KEY SWITCH SEALED	1	EA
7	89099-P	PANEL FORMED FRONT, PLC B SERIES	1	EA
8	89092-PB	PANEL FORMED BACK, PLC B&C SERIES	1	EA
9	89092-C	PLC PROTECTIVE FRONT COVER	1	EA
10	88978-2	KEYPAD 2X6 SWITCH, PROGRAMMABLE	1	EA
11	89327	DISPLAY PROTECTIVE FILM	1	EA
	89113	PLC WIRING HARNESS (INTERNAL)	1	EA
12	72862	GAUGE FOR PROX. SENSOR SETTING	1	EA

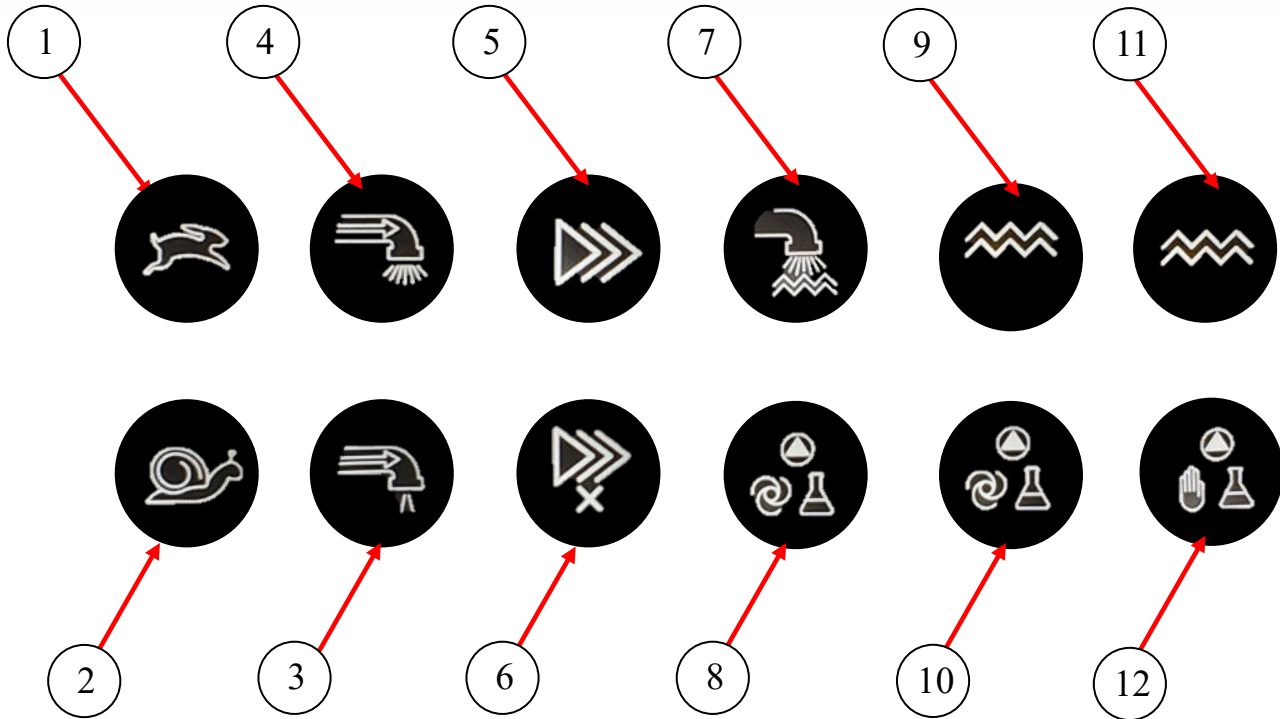


### KEY PAD SWITCHES INSERT KIT



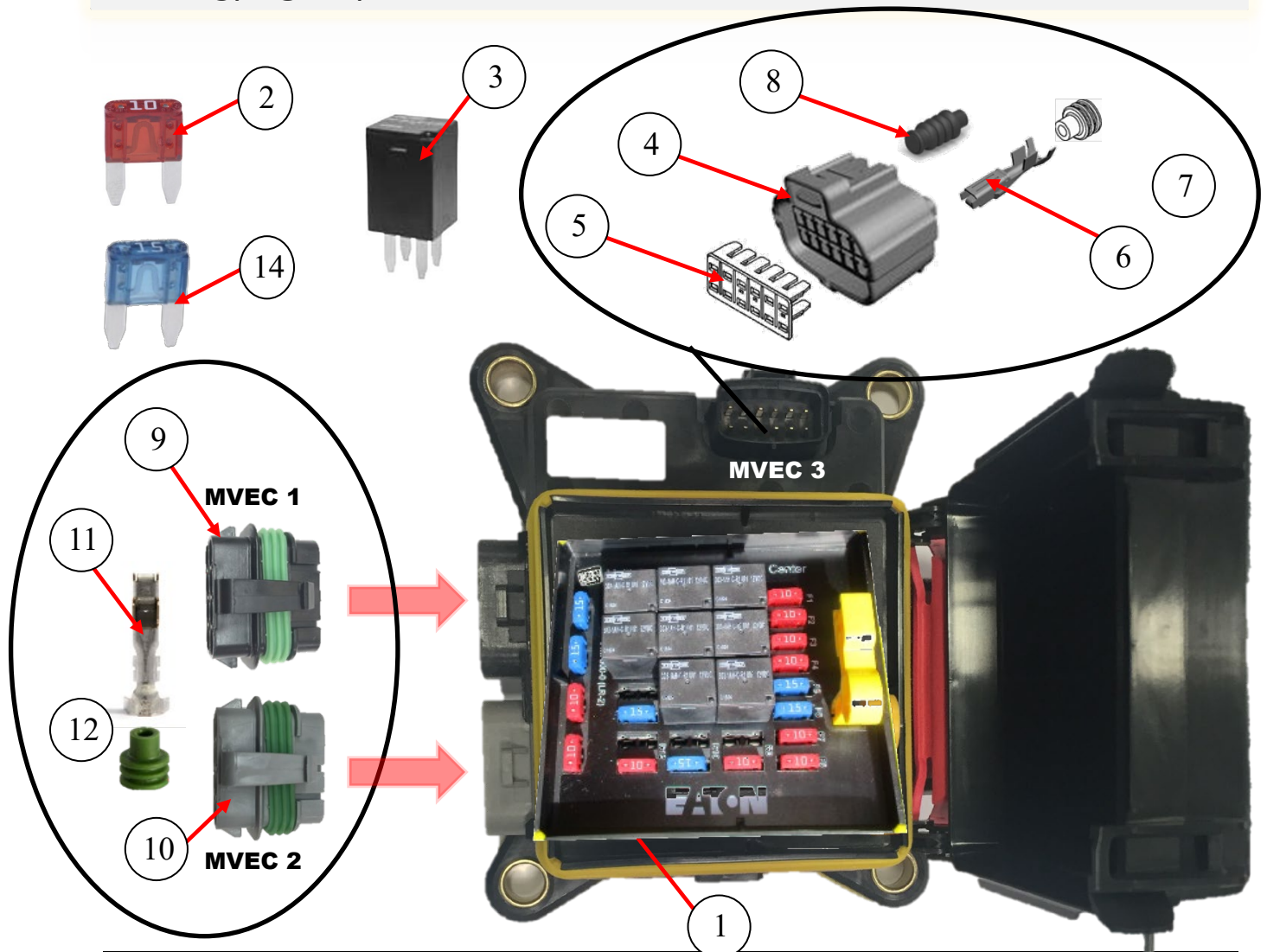
ID #	PART #	PART DESCRIPTION	QUANTITY	
	89412-BC	INSERT KIT FOR PLC SWITCH FUNCTIONS	REF	
1	89412-2L	INSERT, REMOTE ICON (CLEAR)	1	EA
2	89412-4L	INSERT, PRESSURE A/B ICON (CLEAR)	1	EA
3	89412-5L	INSERT, PUMP ON ICON (CLEAR)	1	EA
4	89412-7L	INSERT, PUMP FORWARD ICON (CLEAR)	1	EA
5	89412-1L	INSERT, PUMP LOCAL ICON (CLEAR)	1	EA
6	89412-3L	INSERT, HORN ICON (CLEAR)	1	EA
7	89412-6L	INSERT, PUMP OFF ICON (CLEAR)	1	EA
8	89412-8L	INSERT, PUMP REVERSE ICON (CLEAR)	1	EA

### KEY PAD SWITCHES INSERT KIT CONT.



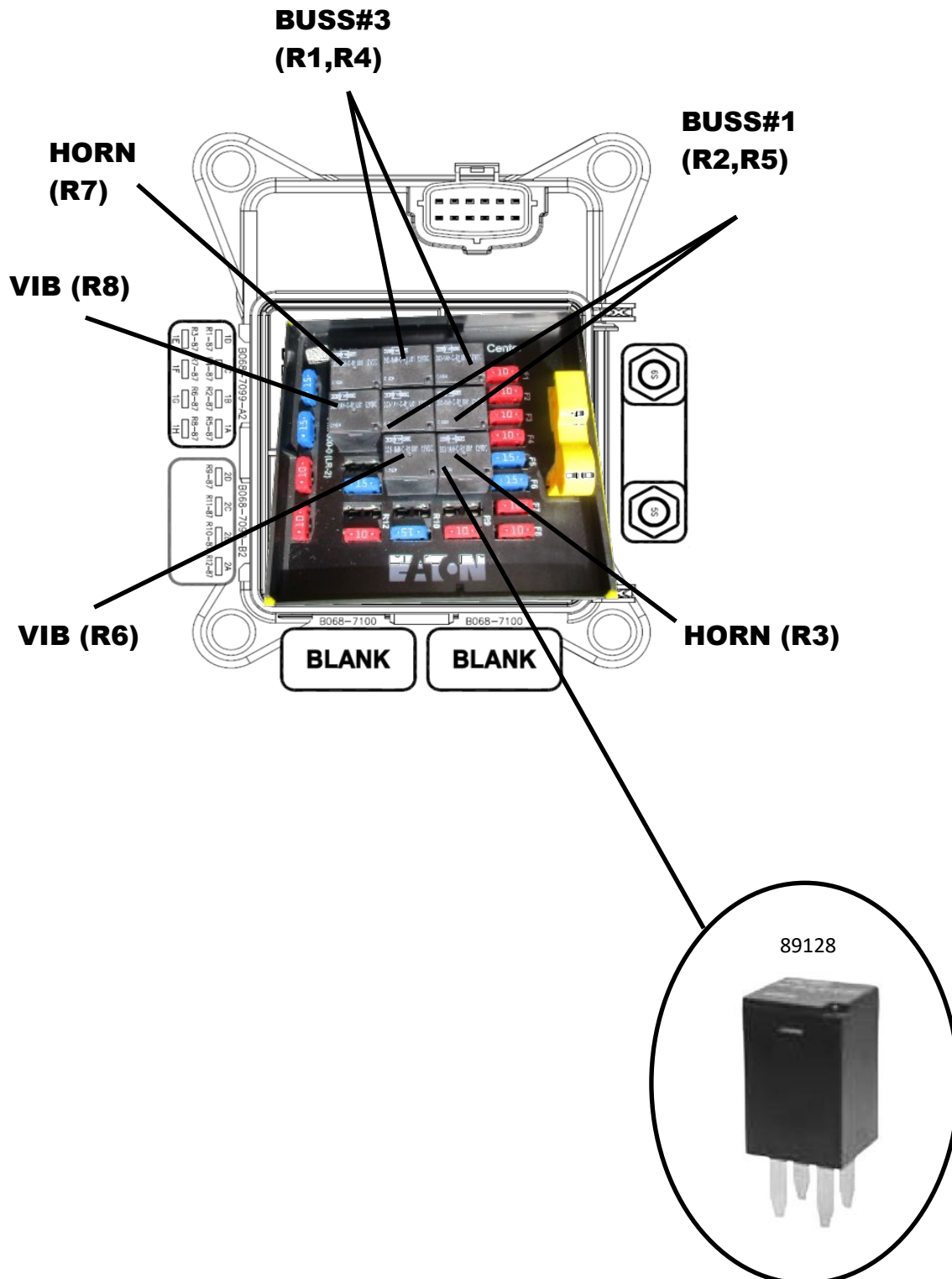
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89412-9S	INSERT, THROTTLE GAIN ICON (CLEAR)	1	EA
2	89412-10S	INSERT, TROTTLE DROP ICON (CLEAR)	1	EA
3	89412-12S	INSERT, PUMP VOLUME (-) (CLEAR)	1	EA
4	89412-11S	INSERT, PUMP VOLUME (+) (CLEAR)	1	EA
5	89412-13S	INSERT, FASTCHANGE ON ICON (CLEAR)	1	EA
6	89412-14S	INSERT, FASTCHANGE OFF ICON (CLEAR)	1	EA
7	89412-15S	INSERT, VIBRATOR AUTO ICON (CLEAR)	1	EA
8	89412-16S	INSERT, CEM AUTO ICON (CLEAR)	1	EA
9	89412-17S	INSERT, VIBRATOR OFF ICON (CLEAR)	1	EA
10	89412-18S	INSERT, CEM OFF ICON (CLEAR)	1	EA
11	89412-19S	INSERT, VIBRATOR ON ICOM (CLEAR)	1	EA
12	89412-20S	INSERT, CEM ON ICOM (CLEAR)	1	EA

### MVEC/FUSE/RELAY

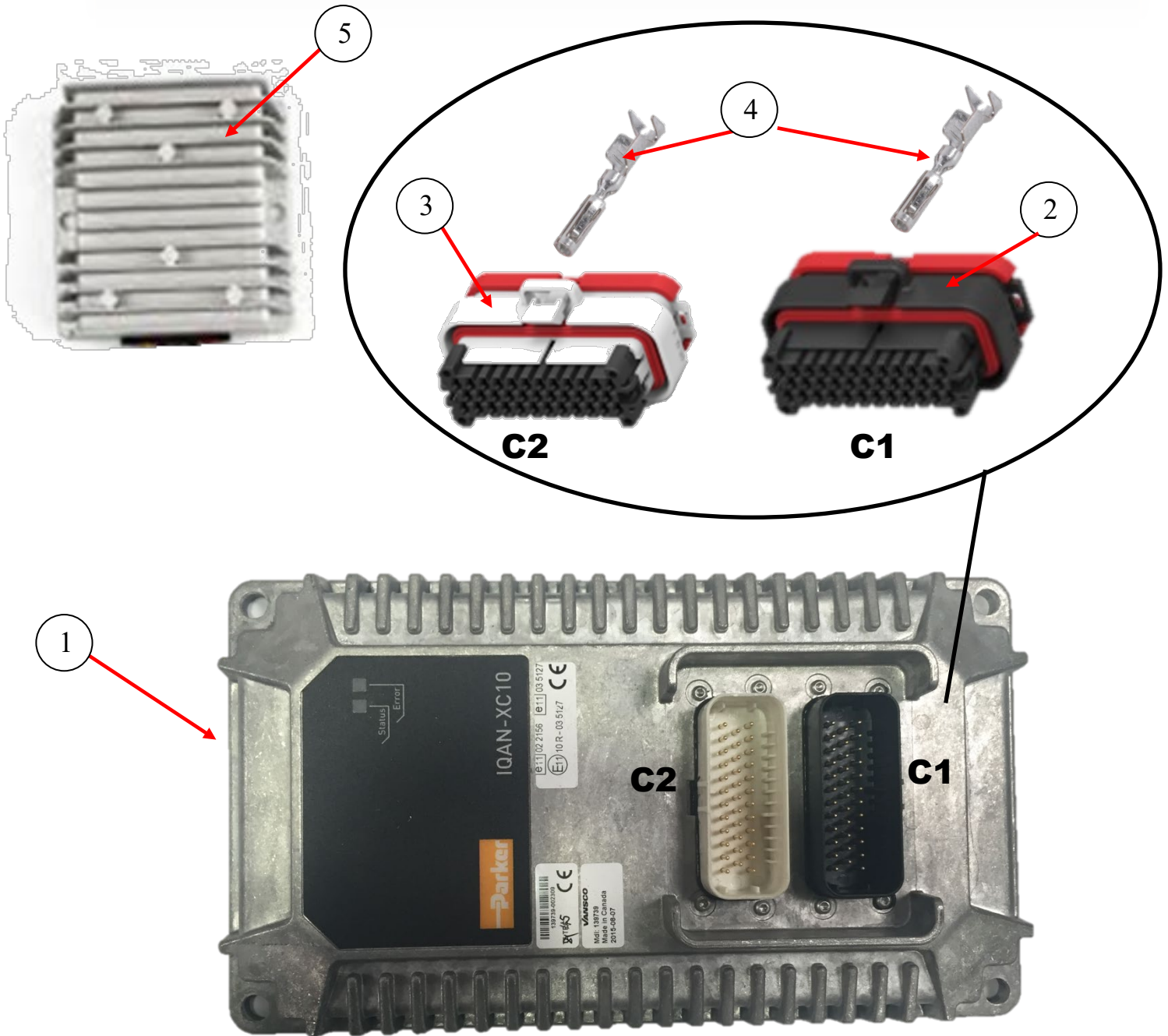


ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88980	MVEC, 12 RELAY, BUSSMAN	1	EA
2	88953	AUTOMOTIVE MINITURE BLADE FUSE 10AMP	10	EA
3	89128	MVEC, RELAY,12V	8	EA
4	89112	AMP, PLUG 2X6, (MVEC 3)	1	EA
5	89112-1	AMP, WEDGE, 89112 (MVEC 3)	1	EA
6	89112-2	AMP, FEMALE, PIN, TERMINAL (MVEC 3)	5	EA
7	89112-3	AMP, WIRE SEAL, ORANGE (MVEC 3)	5	EA
8	89112-4	AMP, CAVITY PLUG (MVEC 3)	7	EA
9	89110	METRIPACK PLUG,2X4 (MVEC 1-BLK)	1	EA
10	89111	METRIPACK PLUG, 2X4 (MVEC 2-GRY)	1	EA
11	88960	TERMINAL PINS FEMALE AUTOMOTIVE	12	EA
12	89110-6	AMP, WIRE SEAL, (MVEC1-2, GREEN)	12	EA
13	89110-1	AMP, CAVITY PLUG, GREEN (MVEC 1)	4	EA
14	88954	AUTOMOTIVE MINITURE BLADE FUSE 15AMP	6	EA

## MVEC/FUSE/RELAY



### EXPANSION MODULE PARKER IQAN-XC10

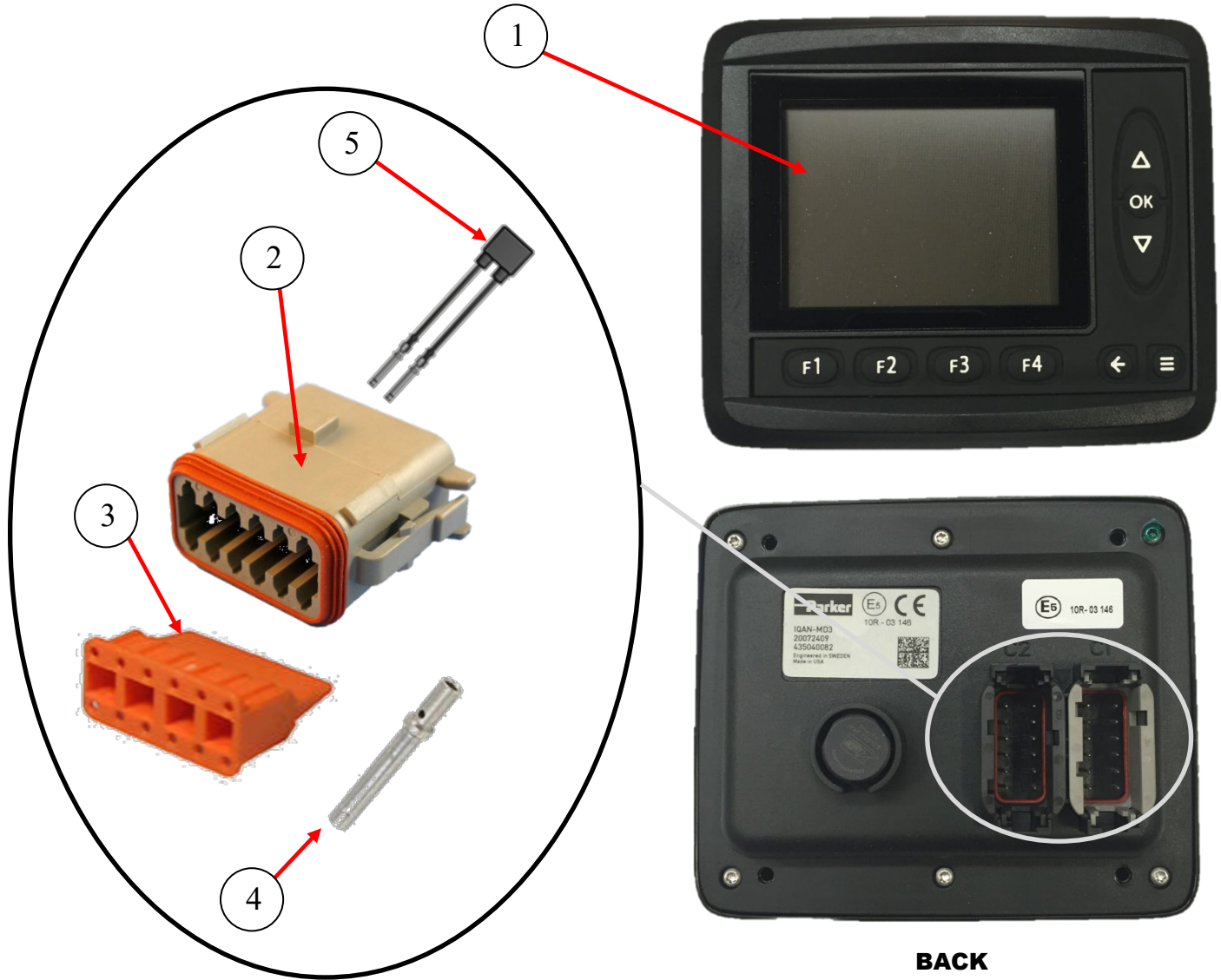


ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88919	XC10, PARKER EXPANTION MODULE	1	EA
2	88945	AMP, 35 POS SEAL PLUG, BLACK (C1)	1	EA
3	88946	AMP, 35 POS SEAL PLUG, WHITE (C2)	1	EA
4	88945-S	AMP, CONTACT PIN (C1,C2)	38	EA
5	89090-C	DC/DC CONVERTER 12VDC TO 24VDC	1	EA



### MD3 DISPLAY MODULE

**FRONT**

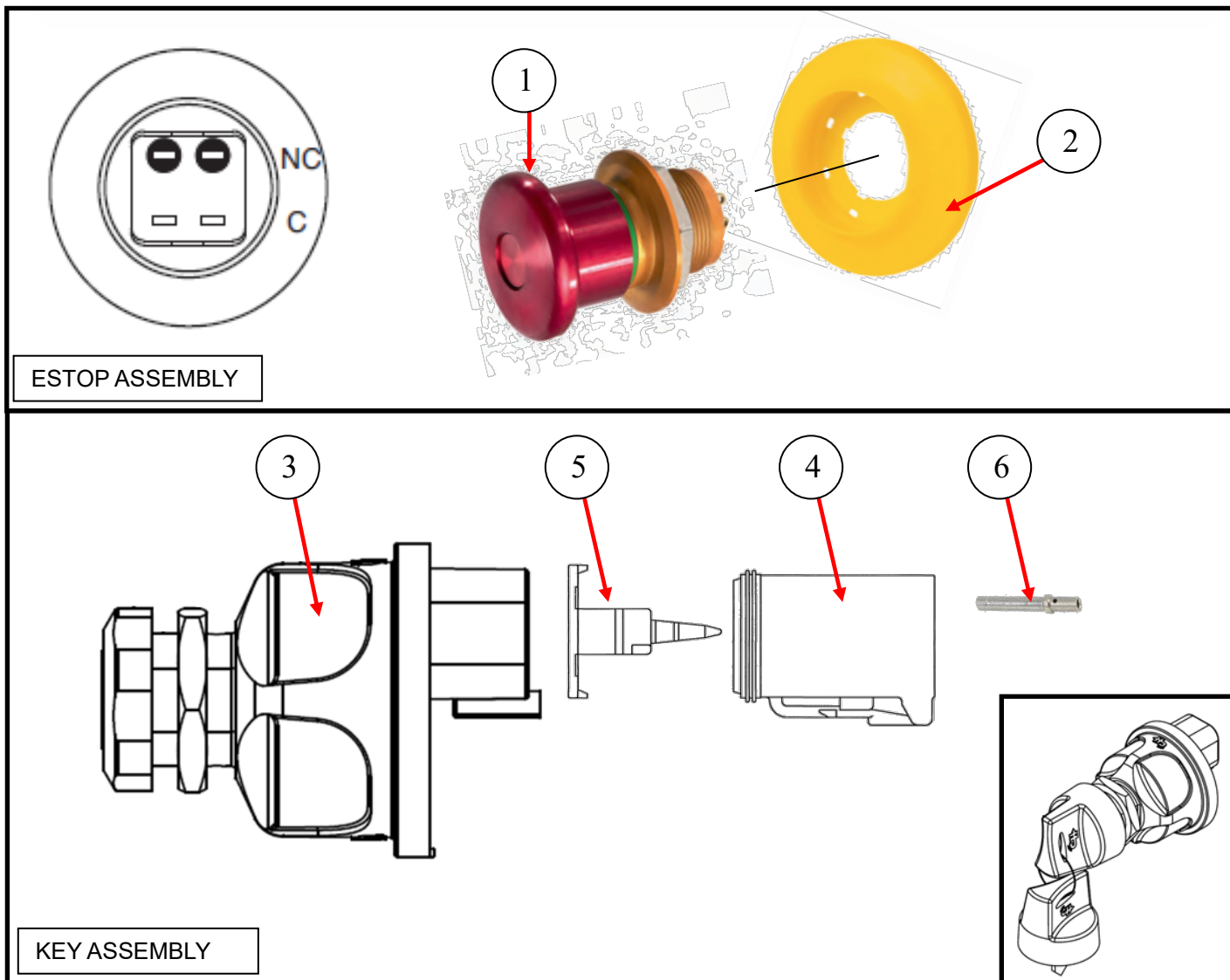


**BACK**

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88918	MD3,PARKER DISPLAY	1	EA
2	88653	PLUG DTM 12 WAY A KEY, GREY (C1)	1	EA
3	88653-2	WEDGELOCK DTM 12 WAY PLUG (C1)	1	EA
4	88959	CONTACT SOCKET SIZE 20 (7.5 AMP) (C1)	9	EA
5	89136	ADDRESS 3 IDTAG WITH DEUTSCH TERMINALS (1K OHM)	1	EA
6	89327	SCREEN PROTECTOR, MD3	1	EA

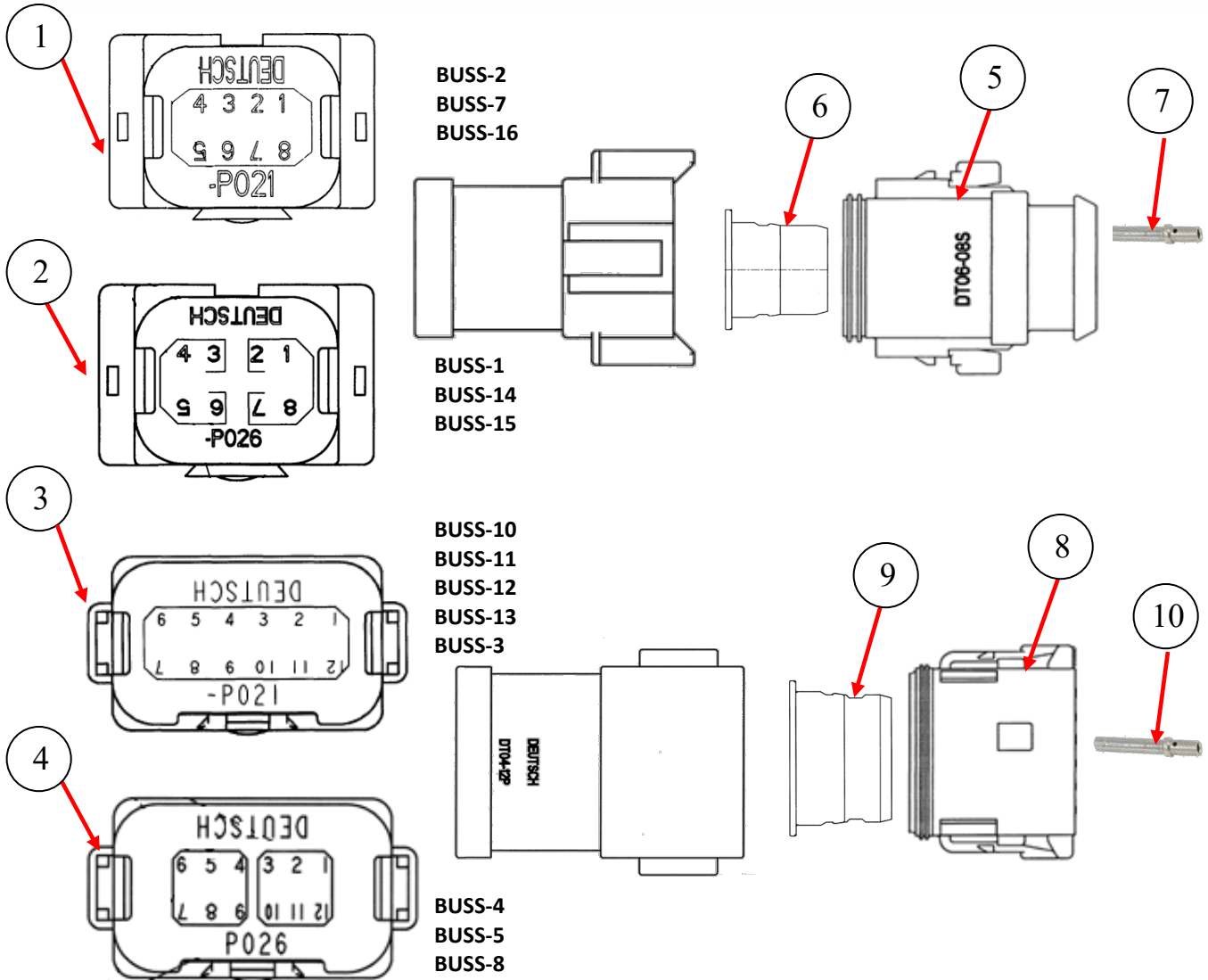


### ESTOP, KEY ASSEMBLY, PLUGS



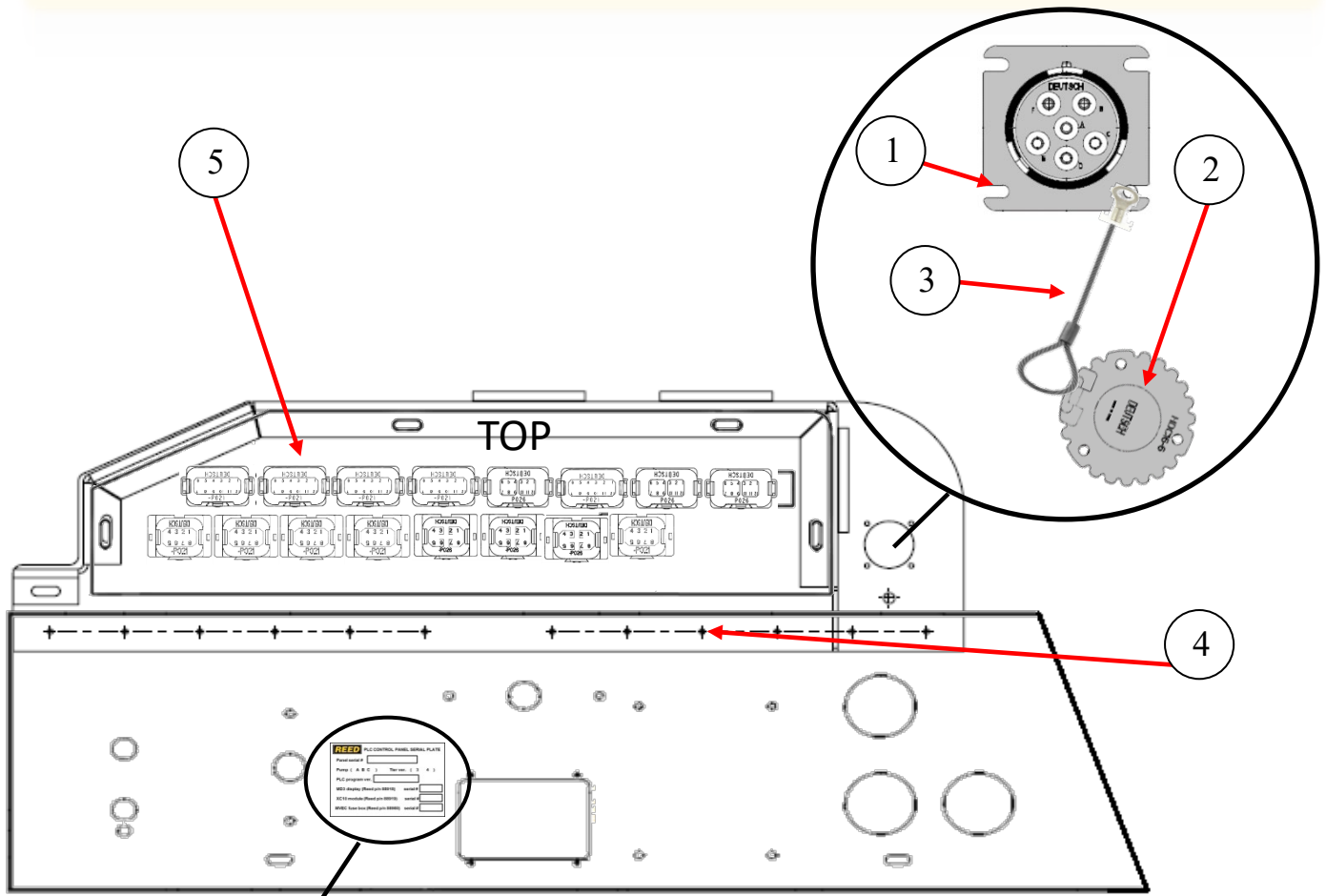
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89090	EMERGENCY STOP BUTTON HEAVY DUTY	1	REF
2	89090-L	ILLUMINATED E-STOP RING	1	REF
3	89004	KEY SWITCH SEALED	1	REF
4	89107	DEUSCH DT06, 1X6	1	QTY
5	89108	DEUTSCH WEDGE LOCK FOR 89107	1	QTY
6	BW10147	DEUTSCH CONTACT SOCKET, 16AWG	6	QTY

### BUSSES, CONNECTORS, PINS

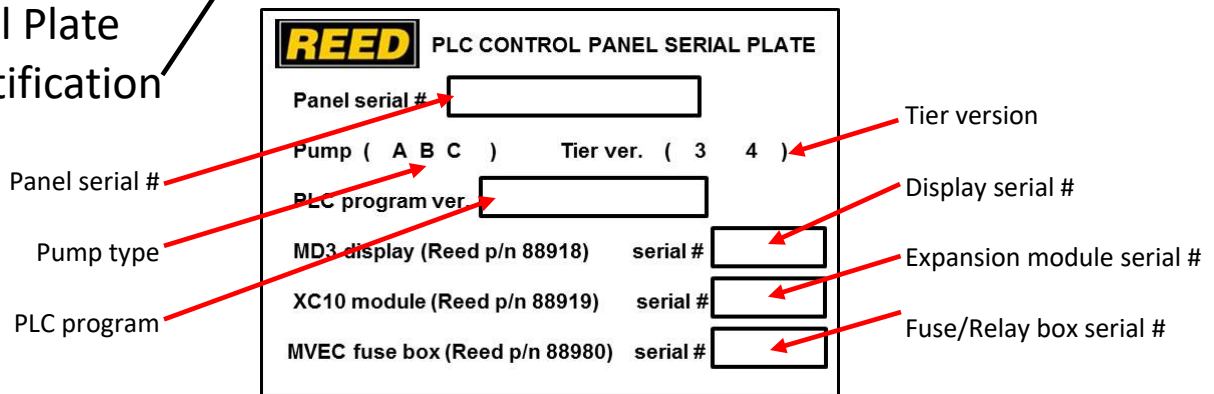


ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89180	DEUTSCH DT04 BUS, 1X8 ( <b>SOLID</b> )	3	EA
2	89181	DEUTSCH DT04 BUS, 2X4 ( <b>SPLIT</b> )	3	EA
3	89106	DEUTSCH DT04 BUS, 1X12 ( <b>SOLID</b> )	5	EA
4	89103	DEUTSCH DT04 BUS, 2X6 ( <b>SPLIT</b> )	3	EA
5	89179	DEUTSCH DT06 PLUG, 2X4	5	EA
6	88542-1	WEDGE LOCK FOR 88542	5	EA
7	BW10147	CONTACT SOCKET PIN, SIZE16, 13 AMP		EA
8	89104	DEUTSCH DT06 PLUG, 2X6	3	EA
9	89105	WEDGE LOCK FOR 89104	8	EA
10	BW10147	CONTACT SOCKET PIN, SIZE16, 13 AMP		EA

### SERIAL PLATE IDENTIFICATION



### Serial Plate Identification



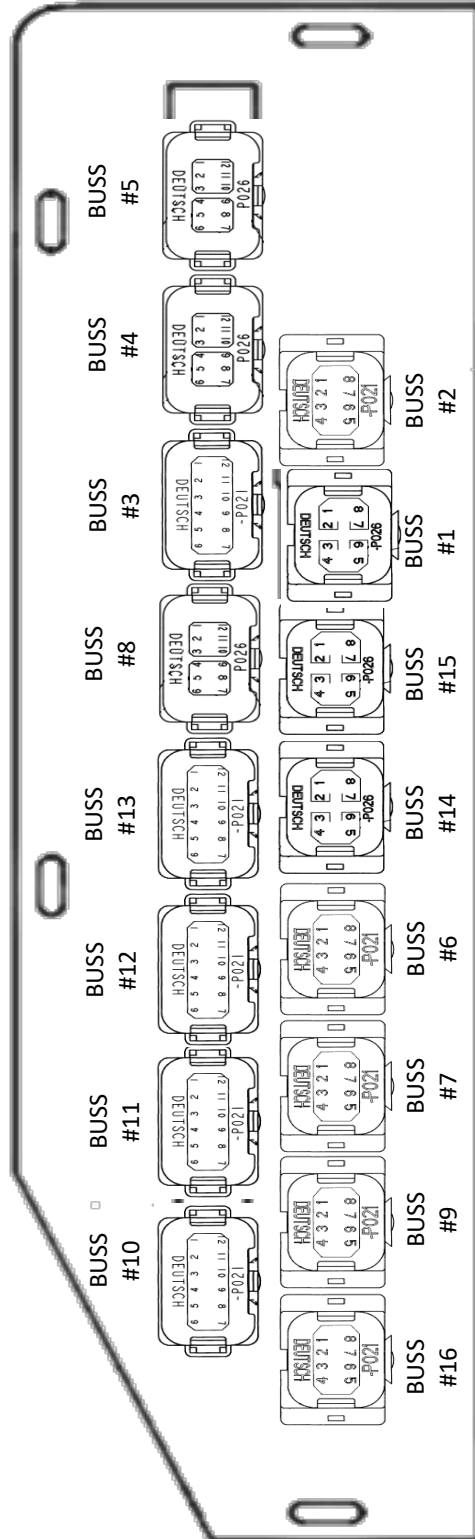
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89223	DEUTSCH HD10 PLUG FALANGED 6 PIN	1	EA
2	89223-C	DUST CAP FOR 89223	1	EA
3	89402	CHAIN SASH LANYARD	1	EA
4	89124	HINGE PIANO 1"X12" LONG	2	EA
5	89237	BUSS PLATE	1	EA



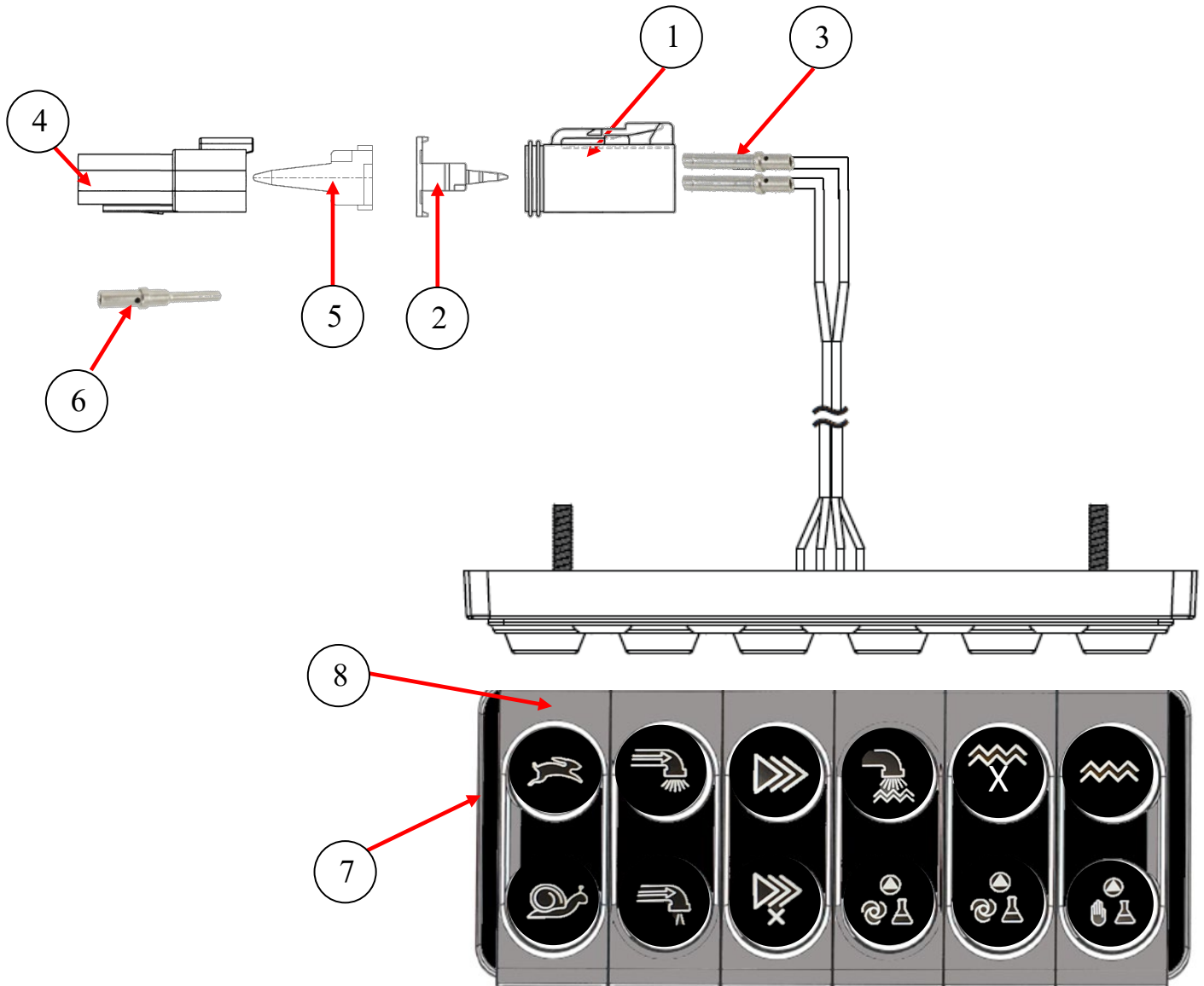
# B50HPSC TIER4 PARTS

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## BUSS BAR SET-UP



### CAN PUSH BUTTON SWITCH PLUG SWITCH A

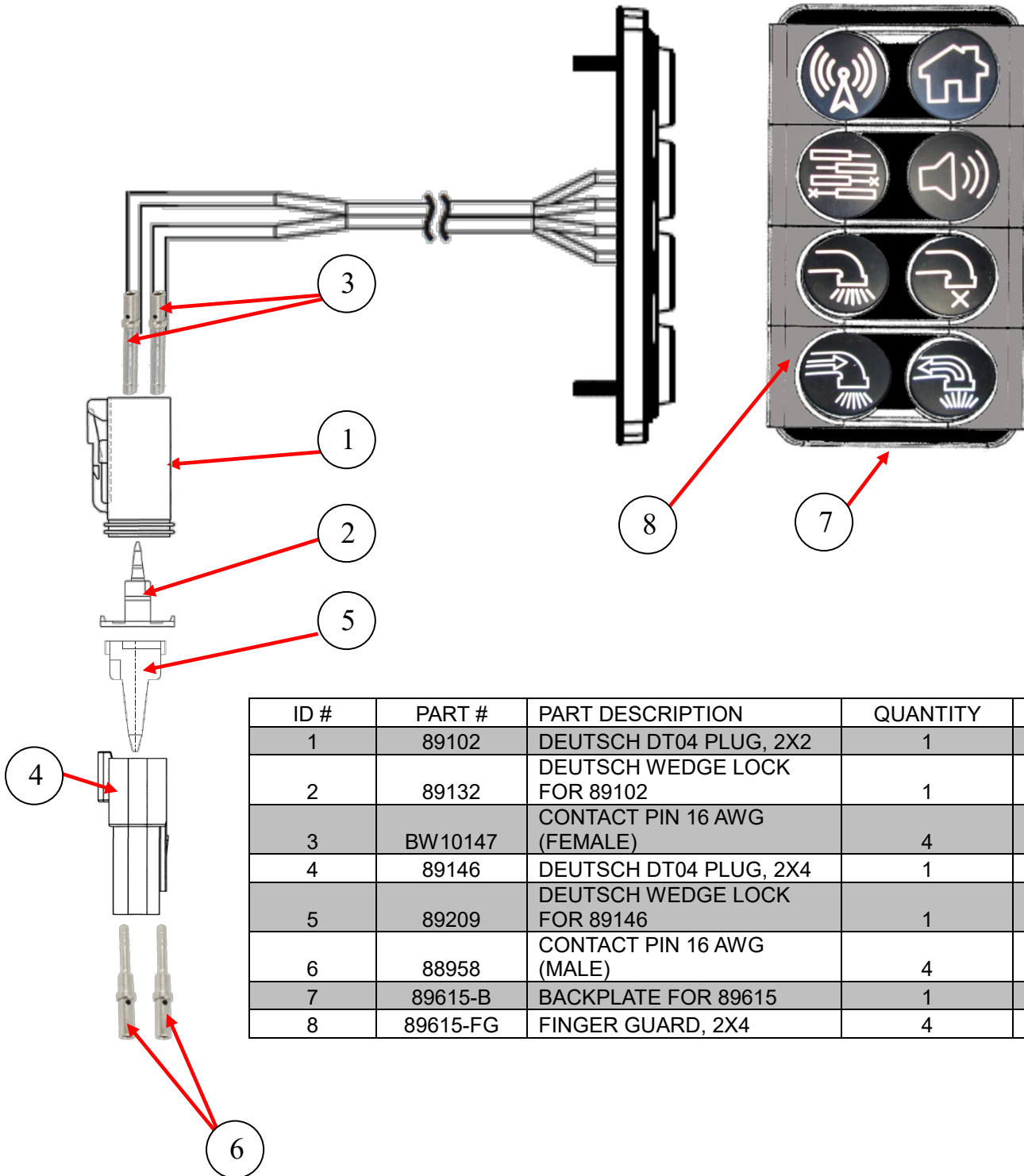


### CAN SWITCH A

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89102	DEUTSCH DT04 PLUG, 2X2	1	EA
2	89132	DEUTSCH WEDGE LOCK FOR 89102	1	EA
3	BW10147	CONTACT PIN 16 AWG (FEMALE)	4	EA
4	89146	DEUTSCH DT04 PLUG, 2X4	1	EA
5	89209	DEUTSCH WEDGE LOCK FOR 89146	1	EA
6	88958	CONTACT PIN 16 AWG (MALE)	4	EA
7	89616-B	BACKPLATE FOR 89616	1	EA
8	89616-FG	FINGER GUARD, 2X6	6	EA

### CAN PUSH BUTTON SWITCH PLUG SWITCH B

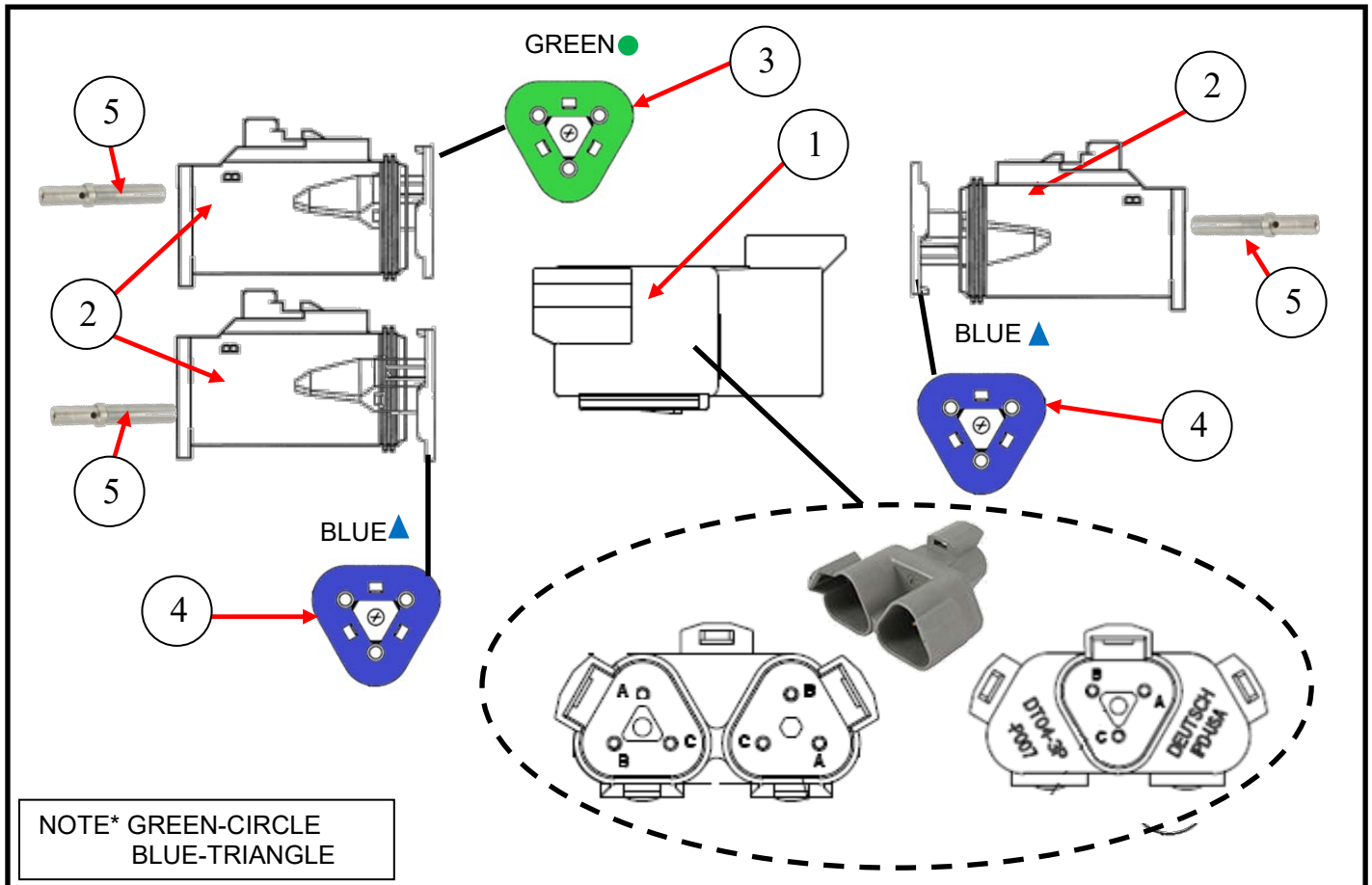
### CAN SWITCH B



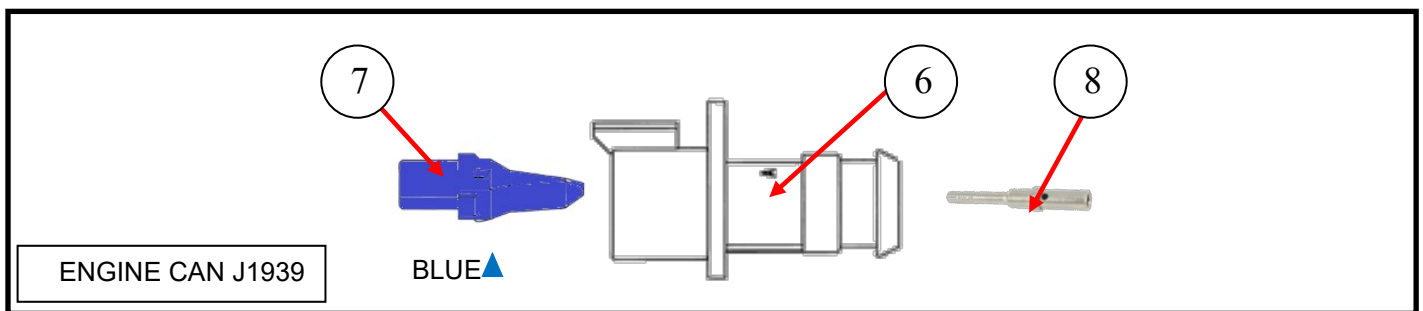
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89102	DEUTSCH DT04 PLUG, 2X2	1	EA
2	89132	DEUTSCH WEDGE LOCK FOR 89102	1	EA
3	BW10147	CONTACT PIN 16 AWG (FEMALE)	4	EA
4	89146	DEUTSCH DT04 PLUG, 2X4	1	EA
5	89209	DEUTSCH WEDGE LOCK FOR 89146	1	
6	88958	CONTACT PIN 16 AWG (MALE)	4	EA
7	89615-B	BACKPLATE FOR 89615	1	EA
8	89615-FG	FINGER GUARD, 2X4	4	EA



### CAN PLUGS, CONNECTORS



NOTE\* GREEN-CIRCLE  
BLUE-TRIANGLE

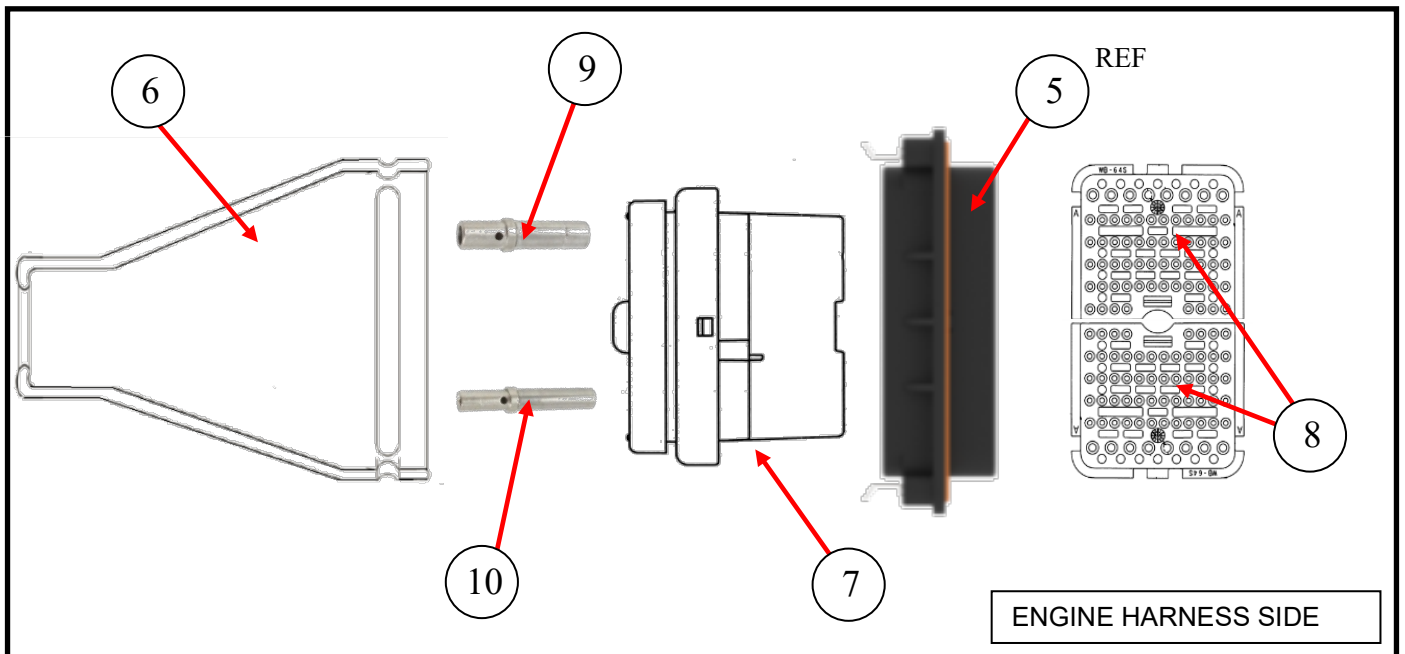
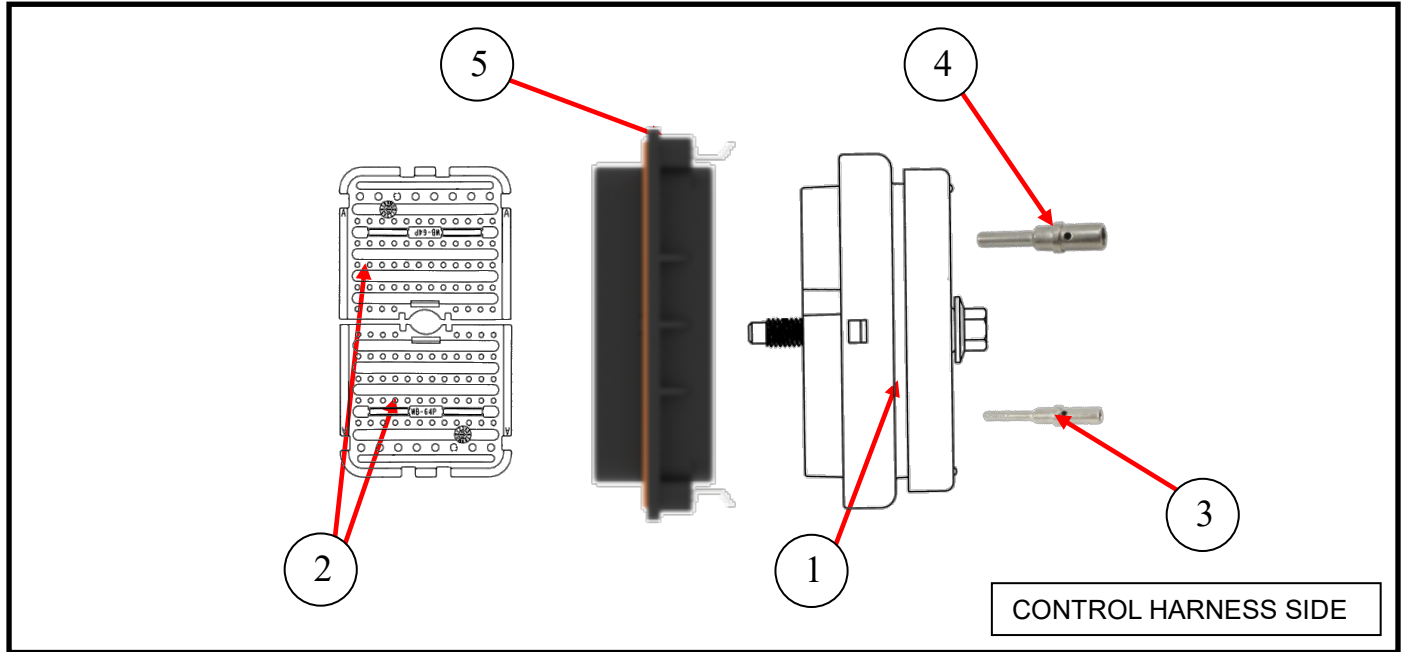


ENGINE CAN J1939

BLUE▲

ID #	PART #	PART DESCRIPTION	QUANTITY	
1	88934	3 WAY T RECEPTICAL, DT SER.	1	EA
2	88935	3 WAY PLUG DT SER.	3	EA
3	88936	WEDGE LOCK FOR 3 WAY PLUG ( <b>GREEN</b> )	2	EA
4	88937	WEDGE LOCK FOR 3 WAY PLUG ( <b>BLUE</b> )	1	EA
5	BW10147	CONTACT SOCKETS, 16 AWG ( <b>FEMALE</b> )	9	EA
6	88932	3 WAY RECEPTACLES, FLANGE MOUNT-LE08 MOD.	1	EA
7	88938	KEYED WEDGE LOCK FOR 3 WAY RECPT. DT SERIES	1	EA
8	88958	CONTACT PIN, 16 AWG ( <b>MALE</b> )	3	EA

DEUTSCH 128 PLUG ASSEMBLY



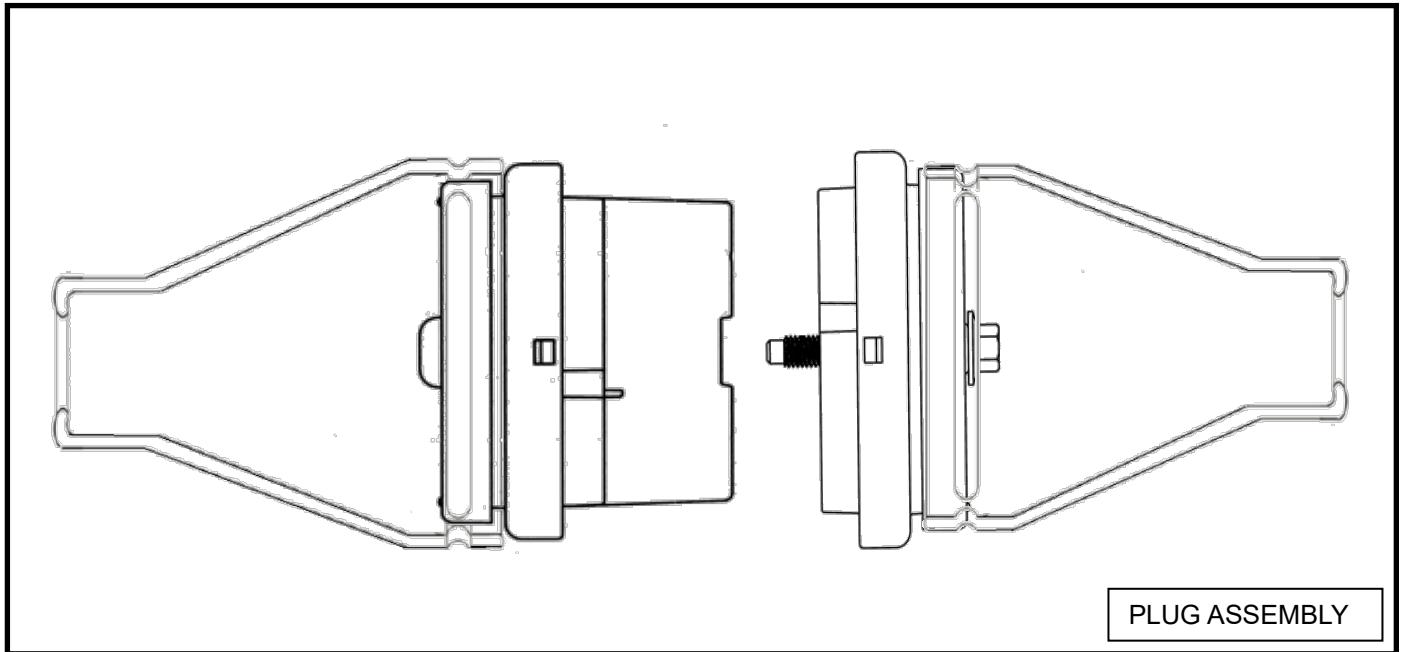


# B50HPSC TIER4

## PARTS

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### DEUTSCH 128 PLUG ASSEMBLY CONT.



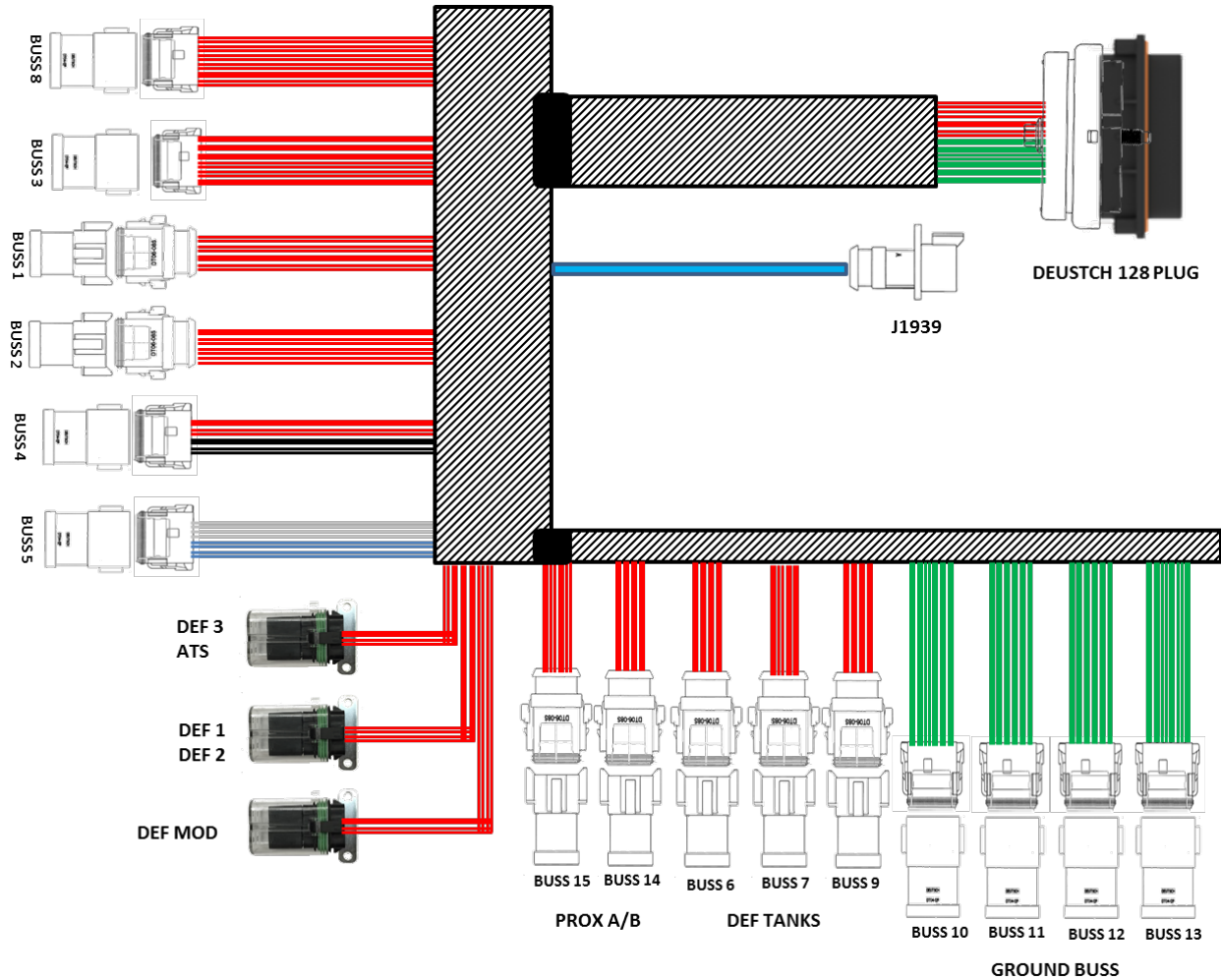
ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89109	DEUTSCH RECEPTACLE 128 CONTACT, PIN	1	EA
2	89159	DEUTSCH WEDGE LOCK FOR 89157	2	EA
3	88958	CONTACT PIN SIZE 16 AWG, (MALE)	72	EA
4	87807	CONTACT PIN SIZE 12 AWG, (MALE)	16	EA
5	89158	DEUTSCH RECEPTACLE, FLANGE	1	EA
6	89109-B	DEUTSCH, BOOT COVER	1	EA
7	89157	DEUTSCH RECEPTACLE 128 CONTACT, SOCKET	1	EA
8	89116	DEUTSCH WEDGE LOCK FOR 89157	2	EA
9	87457	CONTACT SOCKET, SIZE 12 AWG, (FEMALE)	1	EA
10	BW10147	CONTACT SOCKET, SIZE 16 AWG, (FEMALE)	1	EA



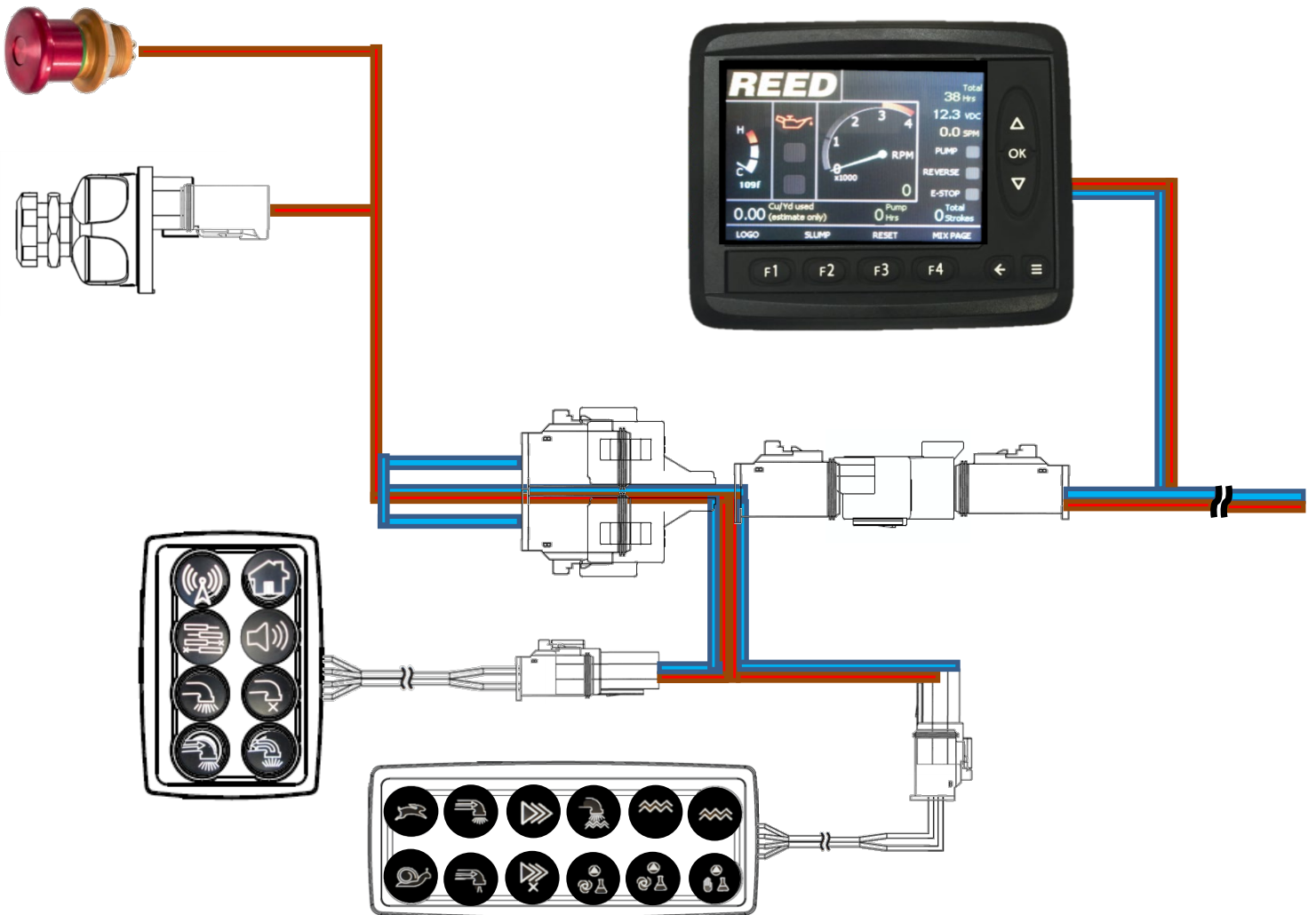
# B50HPSC TIER4 PARTS

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## WIRE HARNESS MAIN LAYOUT



### WIRE HARNESS DOOR LAYOUT





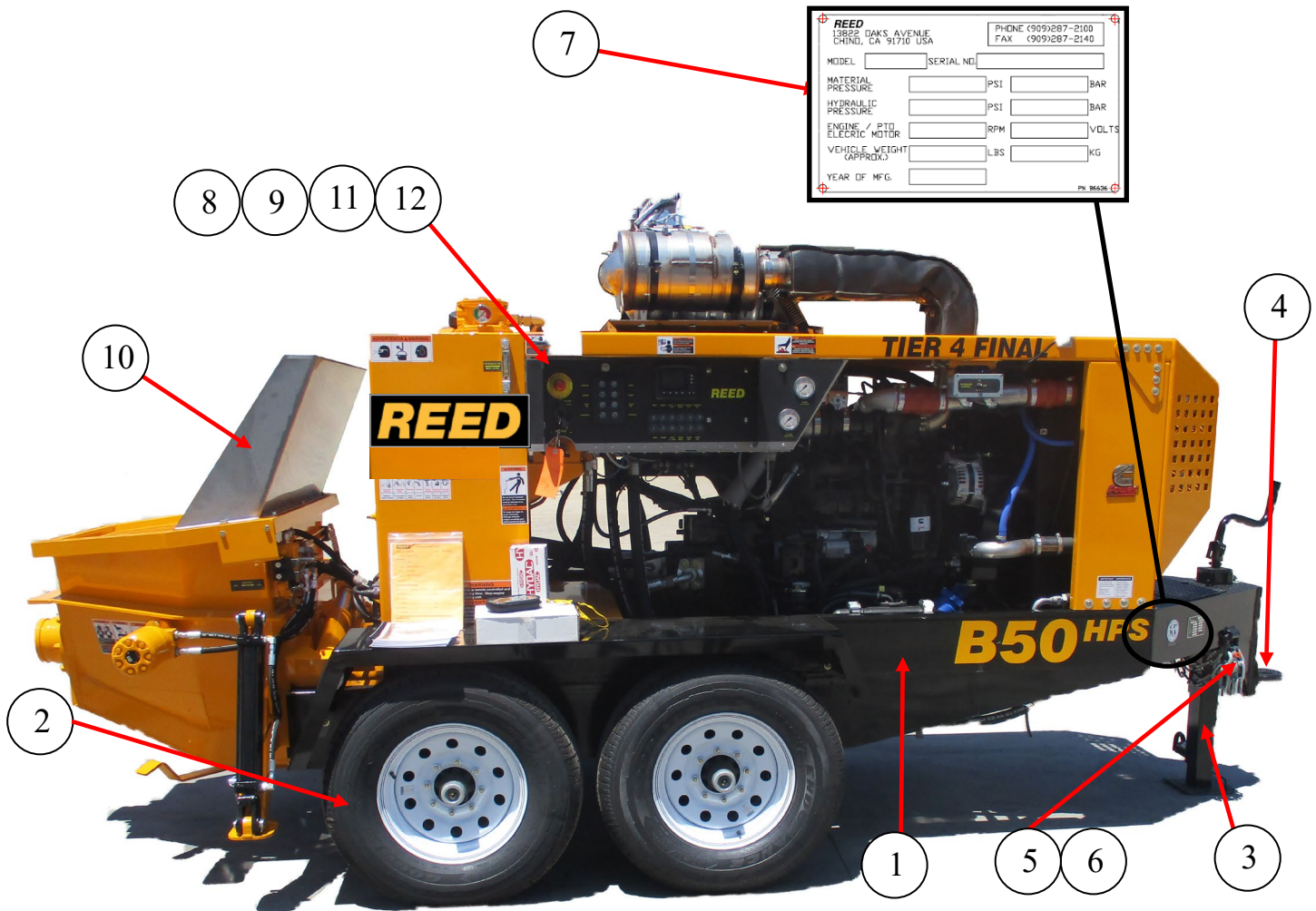
# B50HPSC TIER4

## PARTS

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### FRAME INSTALLATION

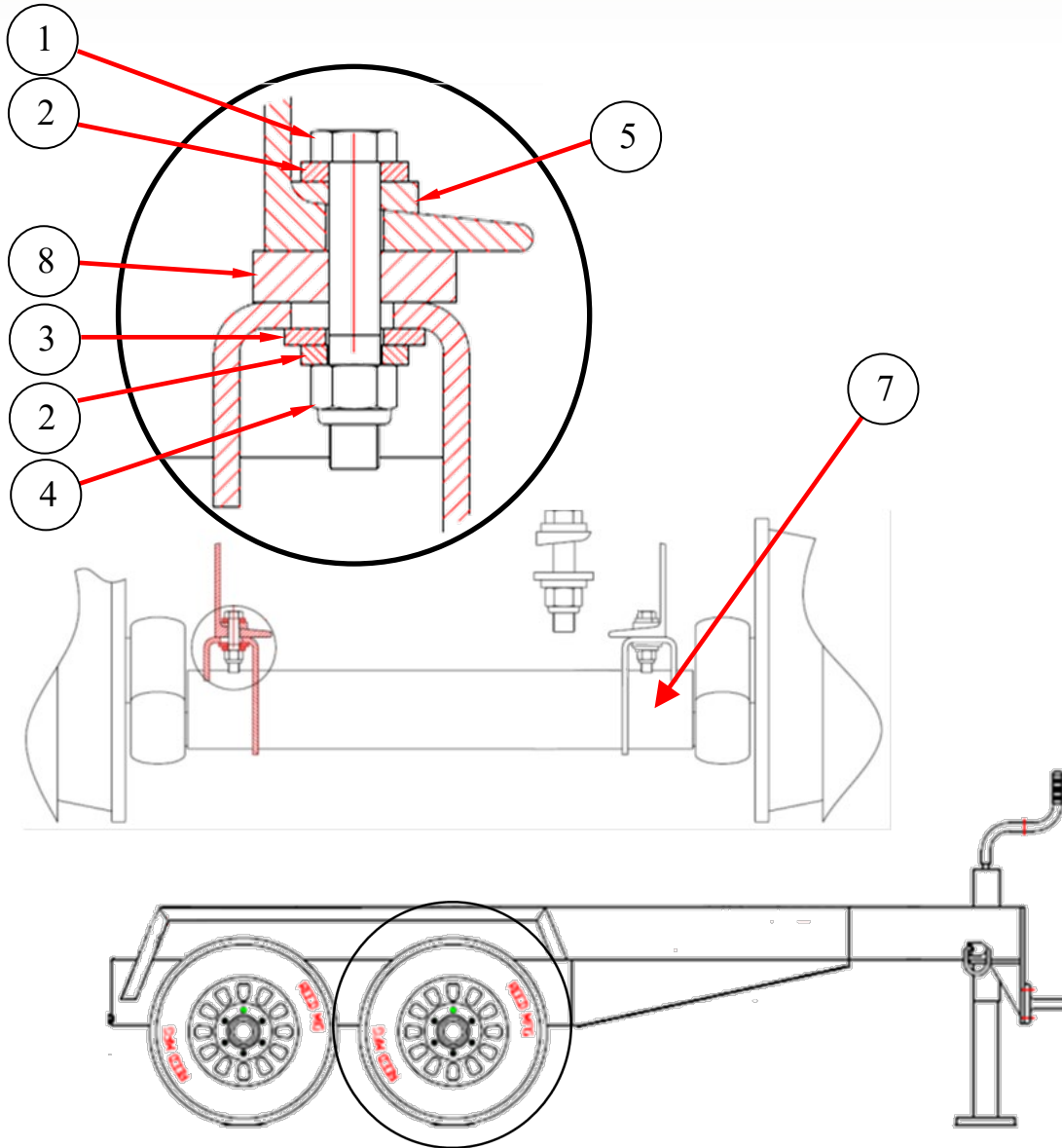
#### FRAME, TIRES, JACK, AND TOW EYE



ID #	PART #	PART DESCRIPTION	QUANTITY	
	89204	FRAME ASSY B SER 42" TIER4	REF	
1	89203	FRAME WELDMENT 42" STROKE, TIER4	1	EA
2	85423	TIRE & WHEEL ASSY ST235/80R/16	4	EA
3	85123	JACK WELDMENT	1	EA
4	87037	DRAW BAR	1	EA
5	87086	CHAIN, ASSY.	2	FT
6	87085	SHACKLE ANCHOR, SCREW PIN, 1/2 6600	4	EA
7	803326	SERIAL NUMBER PLATE (BLANK)	1	EA
8	89333-T4	CONTROL PANEL ASSY PLC, TIER 4	1	EA
9	800347	HORN, 12V	1	EA
10	85390	SPLASH GUARD	1	EA
11	89337	MOUNTING BRACKET, PCL CONTROL PANEL	3	EA
12	89461-1	WASHER, LEATHER, 3/4"X1/4"	2	EA

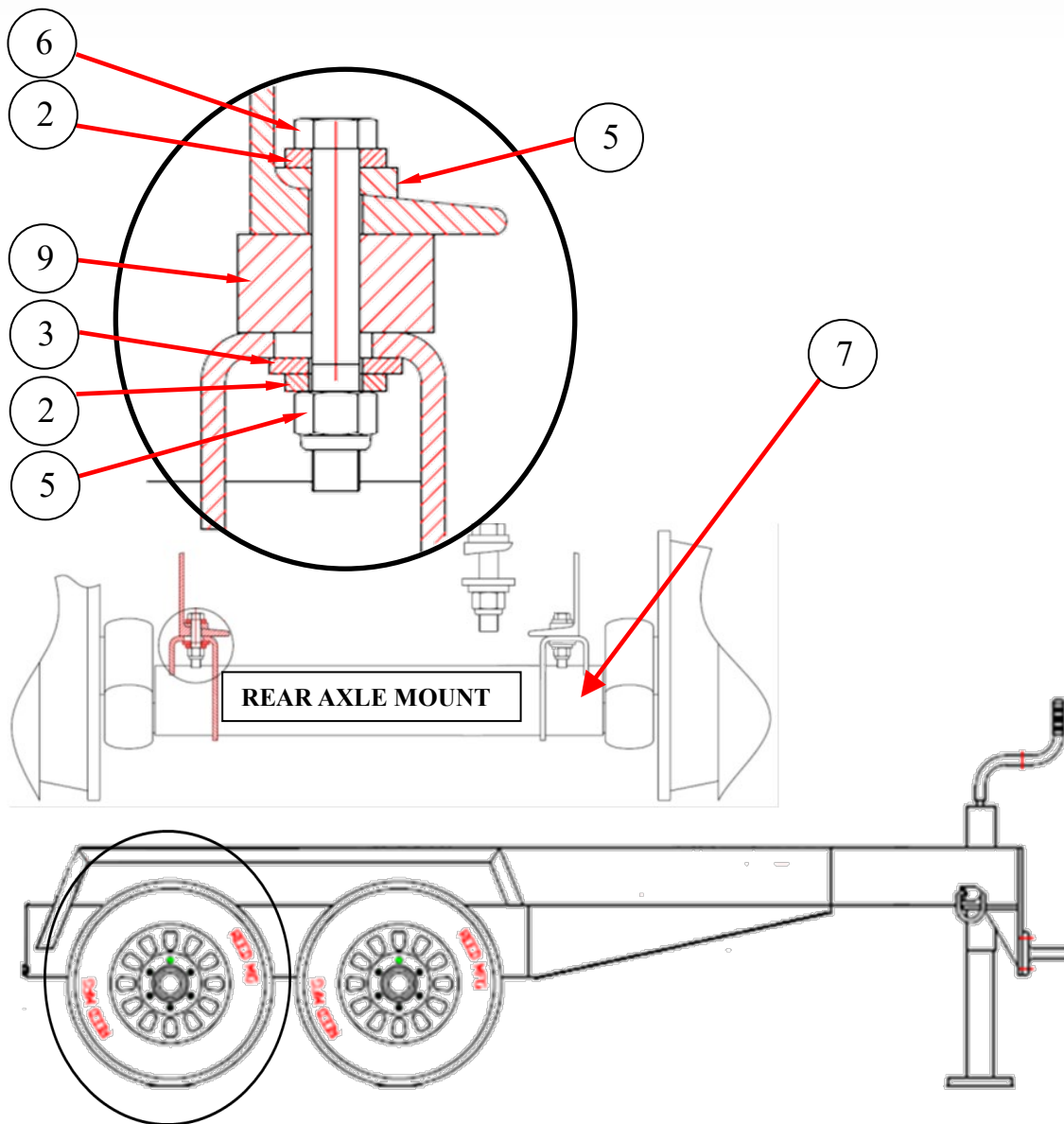


### 7000LB AXLE MOUNTING ASSEMBLY FRONT



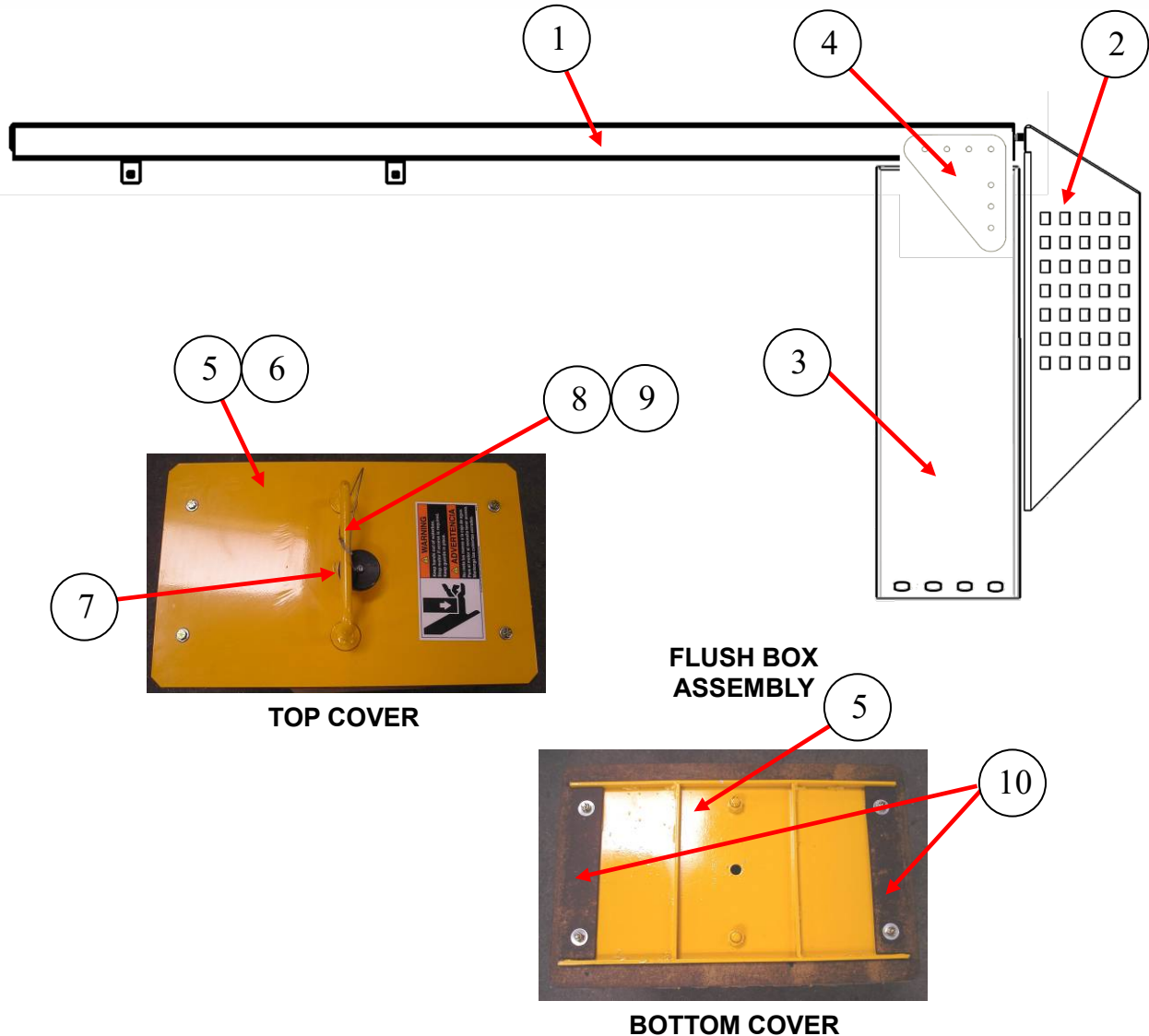
ID #	PART #	PART DESCRIPTION	QUANTITY	
		AXLE MOUNTING HARDWARE KIT	1	EA
1		1/2" -20 X 2.5 HHCS GR8	4	EA
2		1/2" SAE WASHER	8	EA
3		1/2" USE WASHER	4	EA
4		1/2" SAE WASHER	4	EA
5		1/2" - 20 LOCK NUT	4	EA
6		1/2" BEVELED WASHER	4	EA
7	89010	AXLE, TORSION, 7000 LB 8 on 6.50, C-SER	1	EA
8	89011	SPACER AXLE MOUNT FRONT	2	EA

## 7000LB AXLE MOUNTING ASSEMBLY REAR



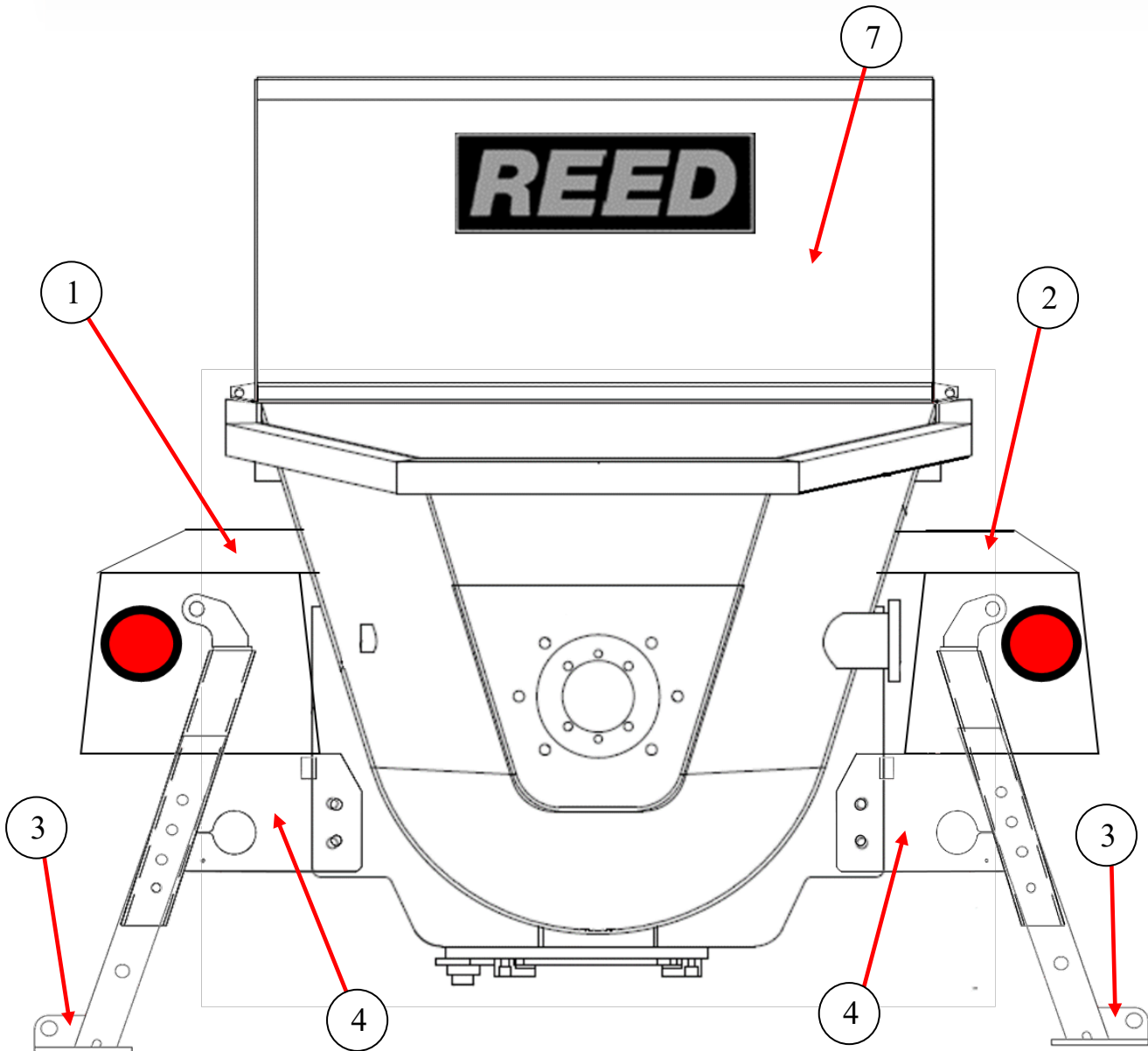
ID #	PART #	PART DESCRIPTION	QUANTITY	
		AXLE MOUNTING HARDWARE KIT	1	EA
2		1/2" SAE WASHER	8	EA
3		1/2" USE WASHER	4	EA
4		1/2" - 20 LOCK NUT	4	EA
5		1/2" BEVELED WASHER	4	EA
6		1/2" -20 X 4.5 HHCS GR8	2	EA
7	89010	AXLE, TORSION, 7000 LB	2	EA
9	89012	SPACER AXLE MOUNT REAR	2	EA

### HOOD AND COVERS



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	89482	COVER TOP, B SER CUMMINS T4 PAINTED	1	EA
2	89712	COVER FRONT, B SER CUM/TIER4 PAINTED	1	EA
3	87592	COVER ENGINE AIR INTAKE	1	EA
4	87647	GUSSET ENGINE COVER PAINTED	2	EA
5	86106	COVER ASSY, FLUSH BOX	1	EA
6	86010	COVER WELDMENT, FLUSH BOX	1	EA
7	86105	KNOB	1	EA
8	79056	HANDLE	1	EA
9	800418	LANYARD, Q/R PIN	2	EA
10	87755	GASKET, FOR FLUSH BOX LID	1	EA

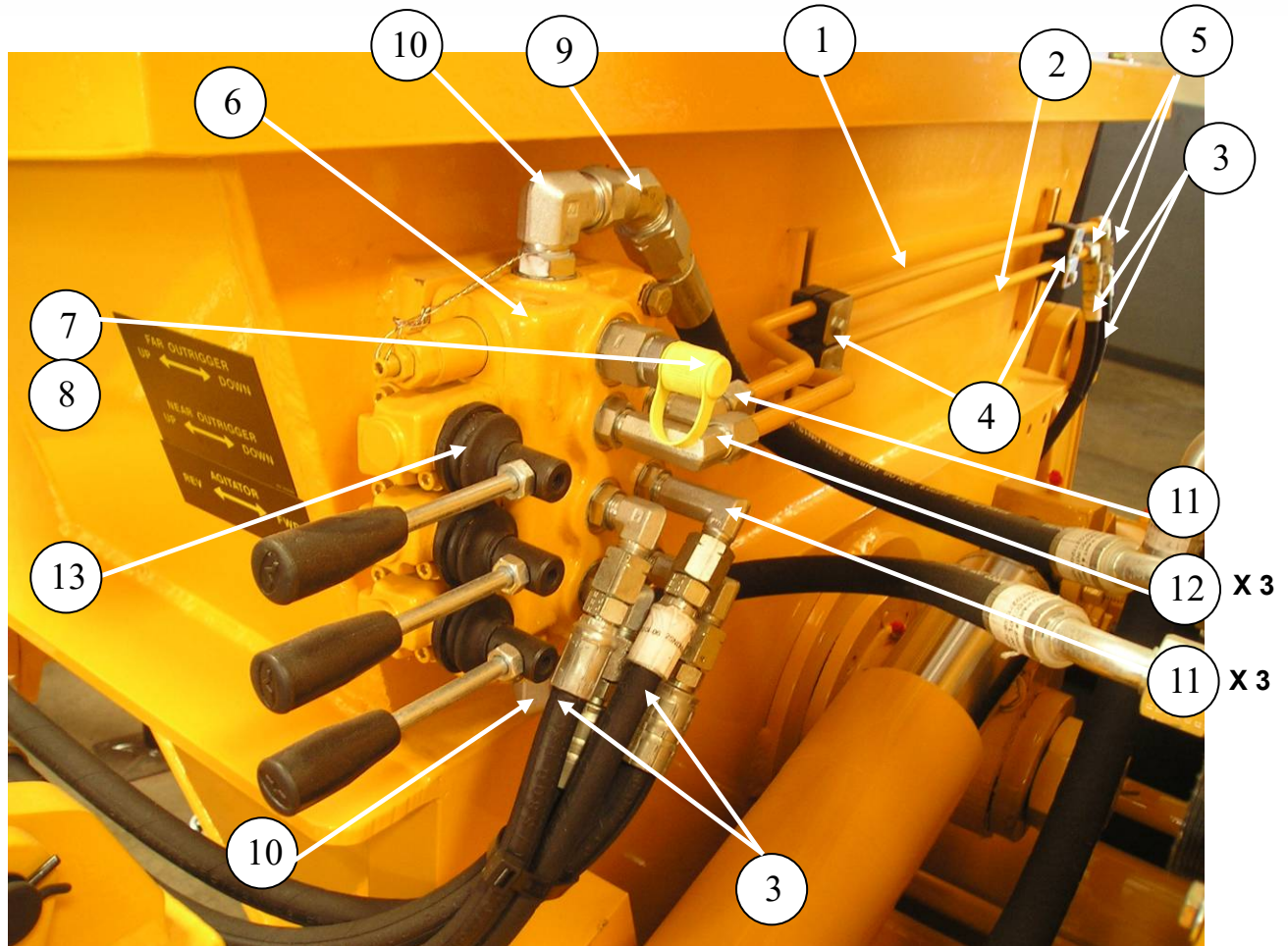
### FENDERS AND OUTRIGGERS



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	85394	FENDER, NON-OPERATOR SIDE, C-SERIES PAINTED	1	EA
2	85395	FENDER, OPERATOR SIDE, C-SERIES PAINTED	1	EA
3	86553	OUTRIGGER WELDMNT, INNER-PAINTED	2	EA
4	86557	OUTERTUBE, O/R B & C - PAINTED	2	EA
5	85595	PIN, Q/R, 5/8 DIA X 3 1/2 L	2	EA
6	800418	LANYARD, Q/R PIN	2	EA
7	85390	SPLASH GUARD	1	EA

### OPTIONS

#### HYDRAULIC OUTRIGGER GROUP

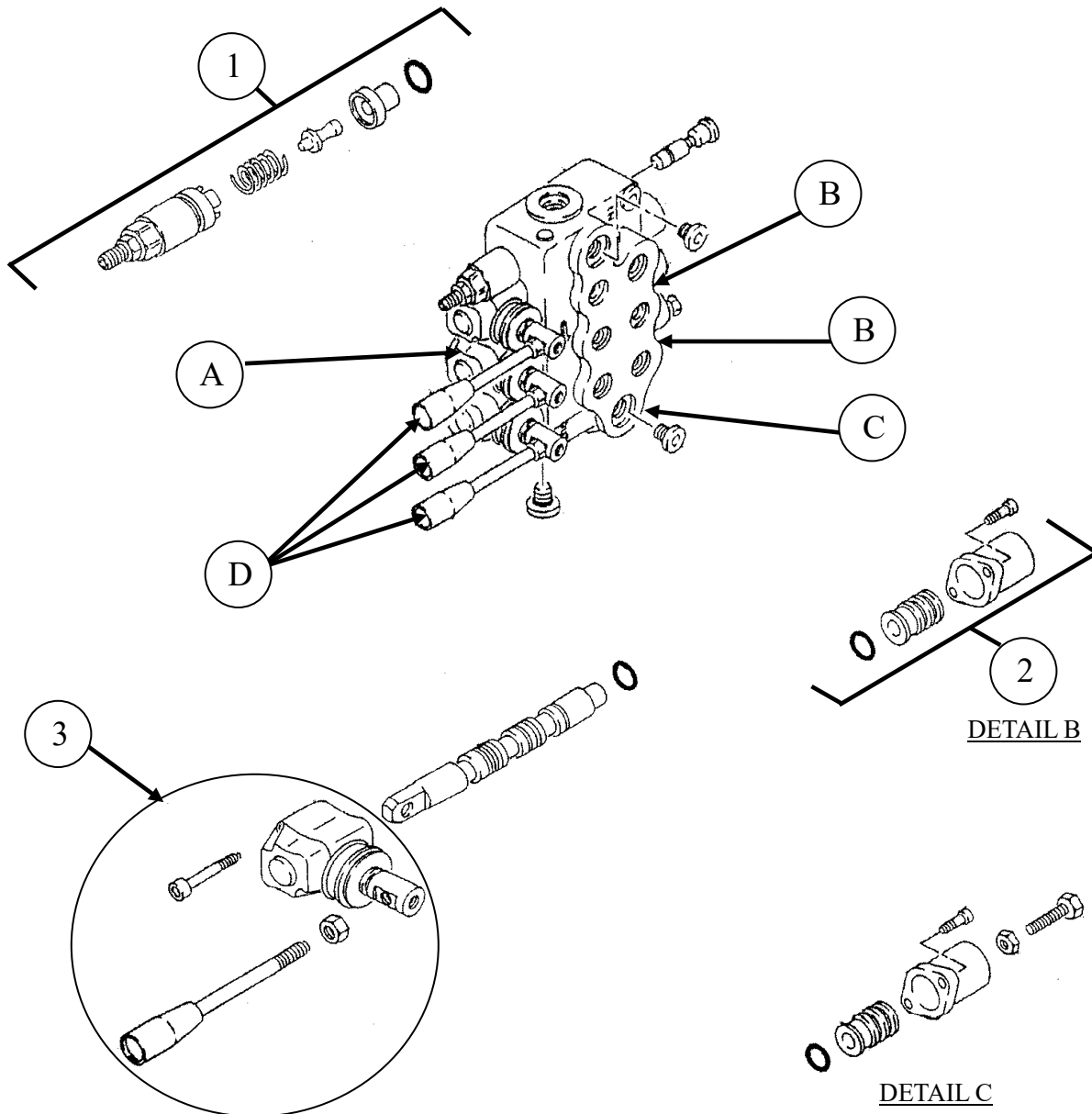


ID #	PART #	PART DESCRIPTION	QUANTITY	
	88041-O	HYD OUTRIGGER GROUP	REF	
	88041-AO	AGITATOR/OUTRIGGER GROUP	REF	
1	85685	TUBE, HYD, OUTRIGGER - PAINTED	1	EA
2	85686	TUBE, HYD, OUTRIGGER - PAINTED	1	EA
3	85659-010	HOSE, 4M2T-6FJX-6FJX-33.00	4	EA
4	801902-020	TUBE CLAMP – 3/8 IN – HALF	4	EA
5		MJ-MJ90-6-6	2	EA
6	74471	VALVE, MAUNAL-3 SPOOL	1	EA
7	800083	FITTING, MINI CHECK (PORT)	1	EA
8	86750	ADAPTER, MB-FB-8-6	1	EA
9	86749	FITTING, MJ-FJX45-10-10	1	EA
10	86746	FITTING, 90° MB-MJ-90-8-10	2	EA
11	86748	FITTING, 90° MB-MJ90-6-6	3	EA
12	86747	FITTING, 90° MB-MJ90LL-6-6	3	EA
13	74471-B	BOOT, COVER	3	EA

### OPTIONS

## 3 SPOOL CONTROL VALVE

DETAIL A

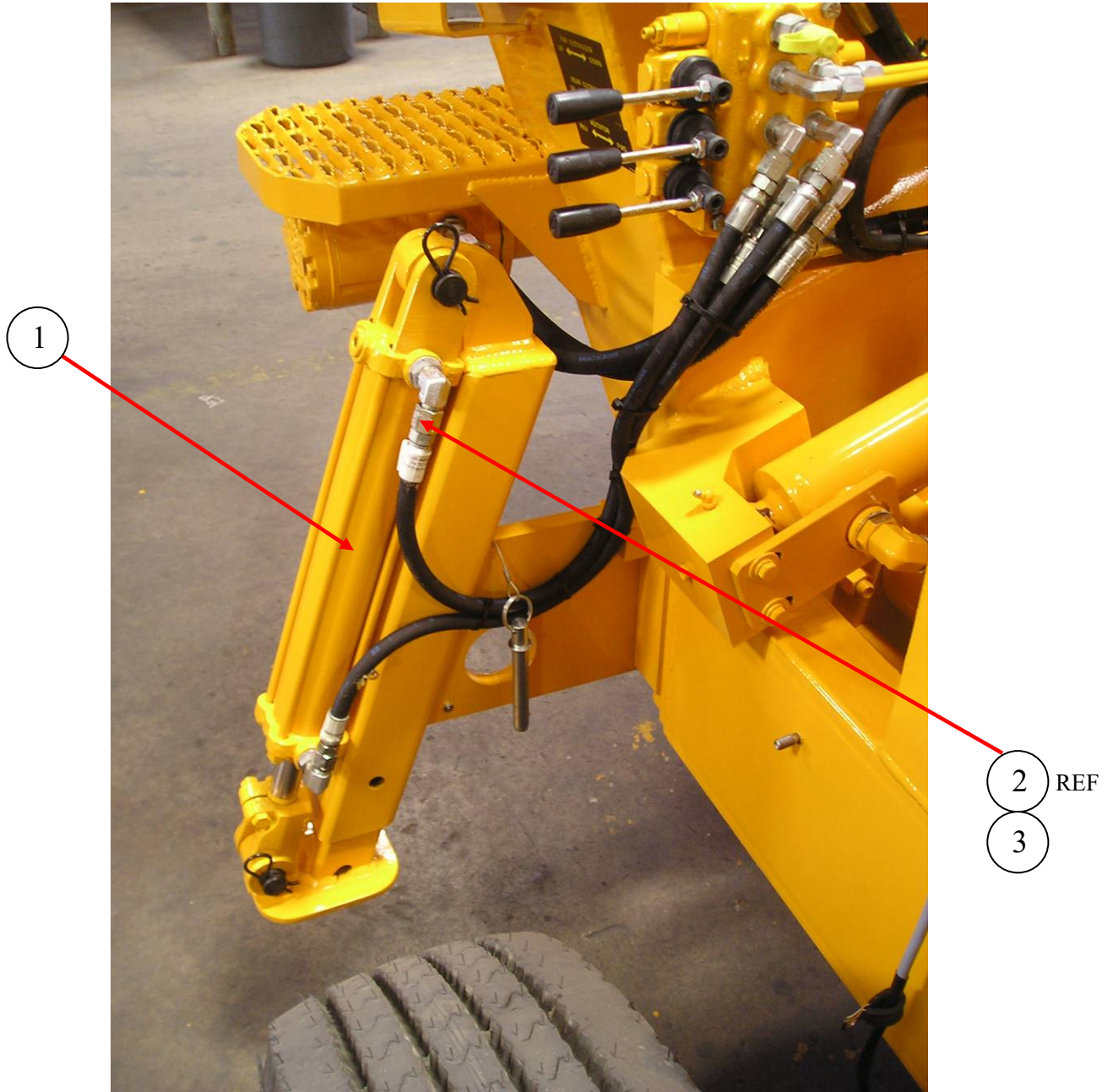


ID #	PART #	PART DESCRIPTION	QUANTITY	
1	85706	RELIEF, CARTRIDGE	1	EA
2	74469	DETENT KIT, #11 WALVOIL VALVE	A/R	EA
3	74471-020	VALVE ACTUATOR FOR 74471, 74585, 74584 VALVES	A/R	EA



### OPTIONS

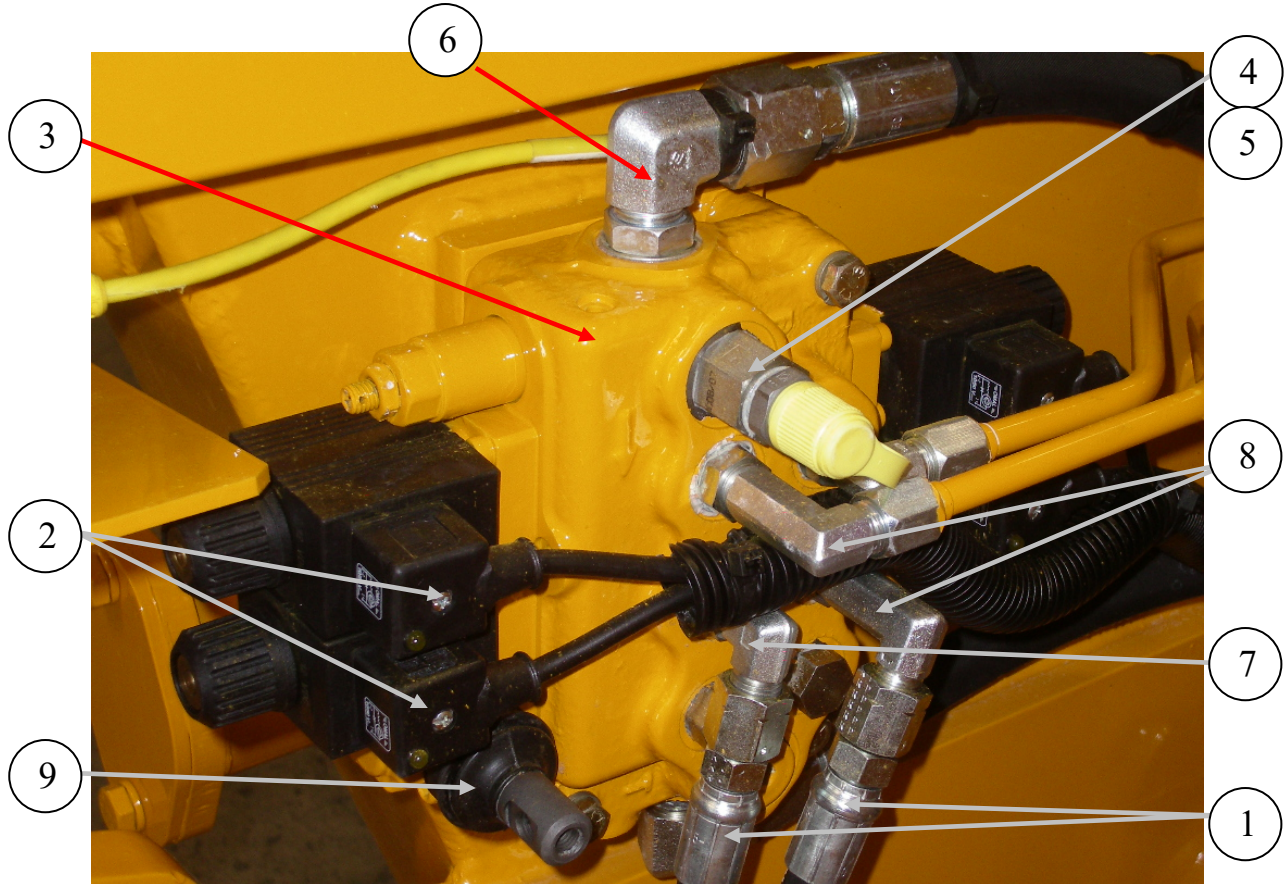
#### HYDRAULIC OUTRIGGER GROUP



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	86574	HYD CYL – 2.00 BORE X 12.00 STR – PAINTED	2	EA
2	85659-010	HOSE, 4M2T-6FJX-6FJX-33.00	REF	EA
3	86728-008	FITTING, 90° MB-MJ90-8-6	4	EA

### OPTIONS

### ELECTRIC HYDRAULIC OUTRIGGER

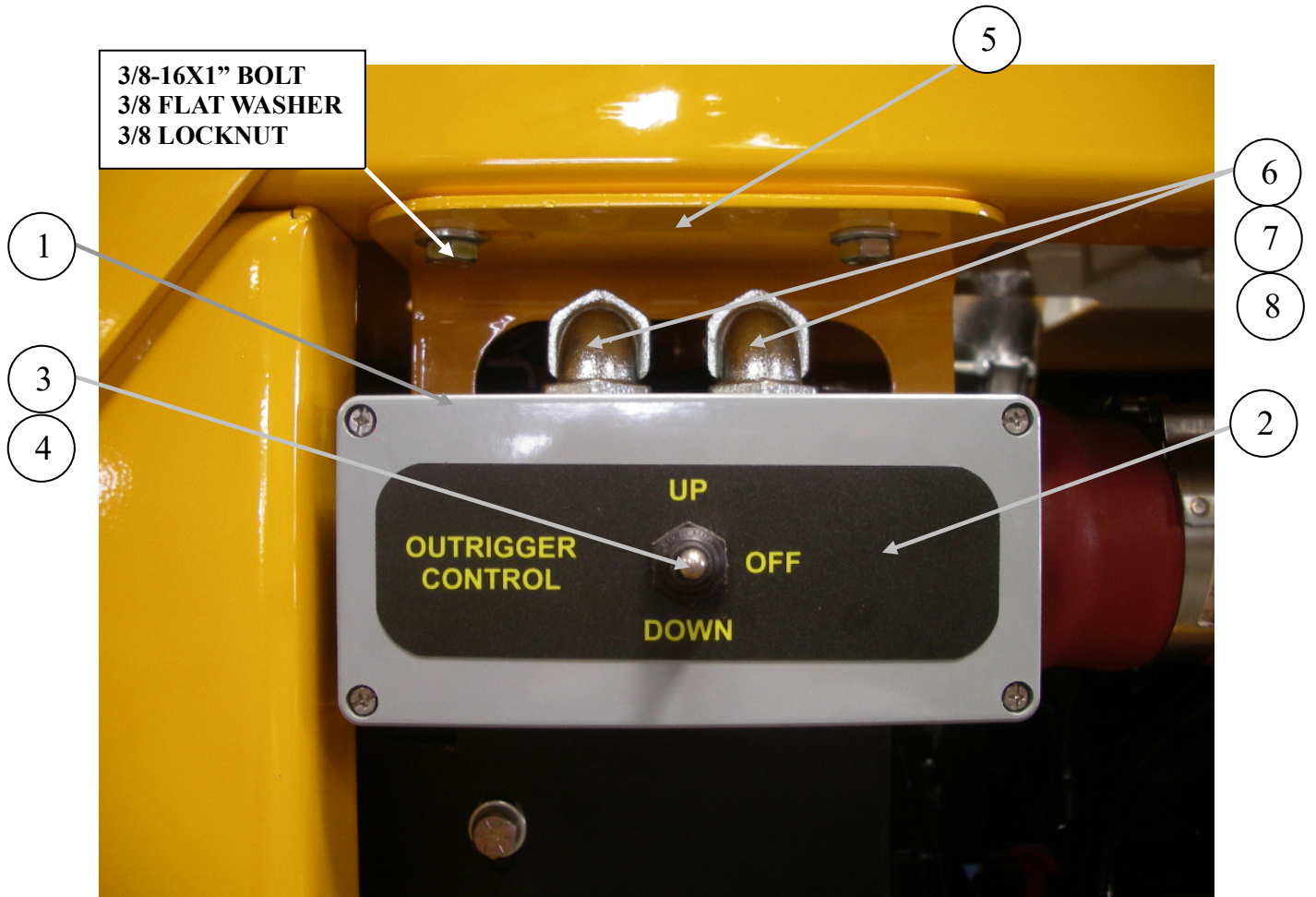


ID #	PART #	PART DESCRIPTION	QUANTITY	
	88041-AO1	HYD OUTRIGGER ASSEMBLY, REMOTE	REF	EA
1	85659-010	HOSE, 4M2T-6FX-6JX-33.00	2	EA
2	20169	CABLE SOLENIOD VALVE	5	EA
3	88026	VALVE, 3SPOOL, 2EA. VDC SPOOL	1	EA
4	800083	FITTING, MINI CHECK (PORT)	1	EA
5	86750	ADAPTER, MB-FB-8-6	1	EA
6	86749	FITTING, MJ-FJX45-10-10	1	EA
7	86748	FITTING, 90° MB-MJ90-6-6	3	EA
8	86747	FITTING.90° MB-MJ90LL-6-6	3	EA
9	74471-B	BOOT, COVER	3	EA



### OPTIONS

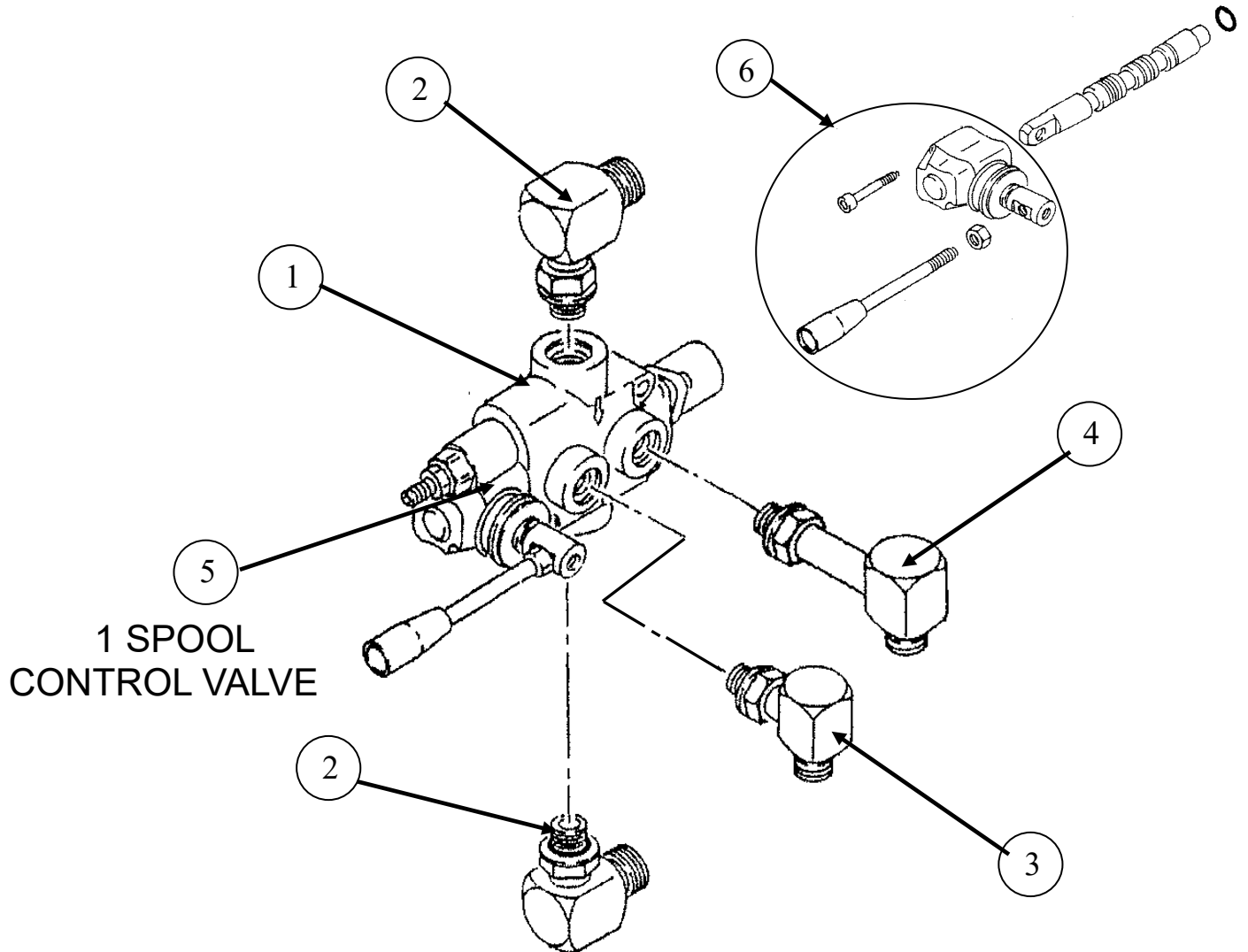
## ELECTRIC HYDRAULIC OUTRIGGER CONTROLS



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	801206	ENCLOSURE 6X3X3, FIBERGLASS	2	EA
2	88163	DECAL OUTRIGGER UP/DOWN	2	EA
3	BW10205	SWITCH, 3 POSITION MOM/SPDT	2	EA
4	BW10361	SW, SEALING BOOT	2	EA
5	88164-A	BRACKET OUTRIGGER CONTROL MOUNT	2	EA
6	10523	STRAIN RELIEF	4	EA
7	10528	NUT 1/2", BONDING TYPE LOCK	4	EA
8	30240	GASKET-LIQUID TITE 1/2"	4	EA

### OPTIONS

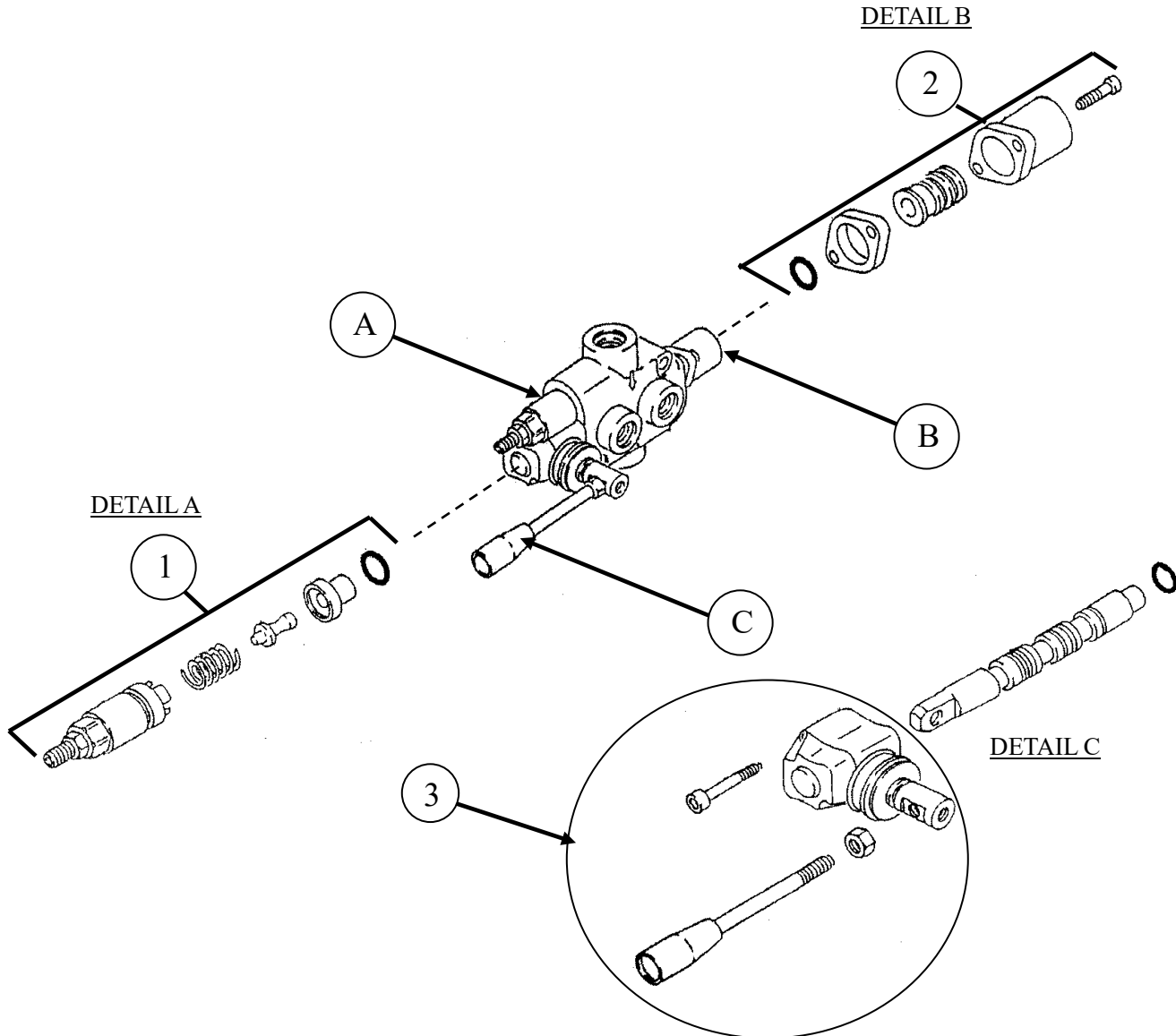
### AGITATOR GROUP



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	74584	VALVE, MAUNAL-1 SPOOL	1	EA
2	86746	FITTING, 90° MB-MJ-90-8-10	2	EA
3	86748	FITTING, 90° MB-MJ90-6-6	1	EA
4	86747	FITTING, 90° MB-MJ90LL-6-6	3	EA
5	74471-B	BOOT, COVER	1	EA
6	74471-020	VALVE ACTUATOR FOR 74471, 74585, 74584 VALVES	A/R	EA

## OPTIONS

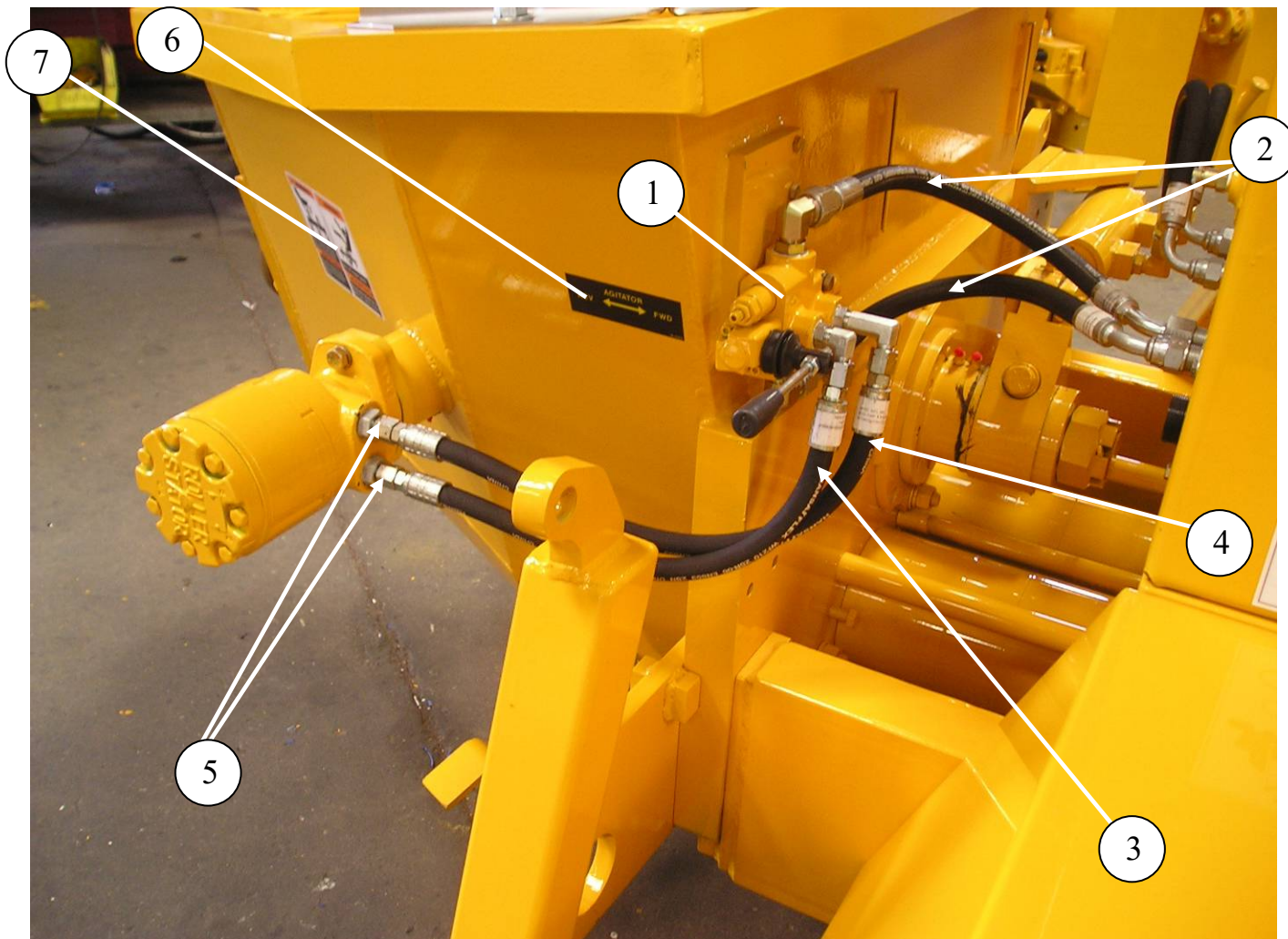
### 1 SPOOL AGITATOR VALVE



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	85706	RELIEF, CARTRIDGE	1	EA
2	74469	DETENT KIT, #11 WALVOIL VALVE	A/R	EA
3	74471-020	VALVE ACTUATOR FOR 74471, 74585, 74584 VALVES	A/R	EA

### OPTIONS

### AGITATOR GROUP CONTINUED



ID #	PART #	PART DESCRIPTION	QUANTITY	
1	74584	VALVE, MANUAL-1 SPOOL	REF	EA
2	85657-016	HOSE, 8M2T-10FJX-10FJX45-20.00	2	EA
3	85658-011	HOSE, 6M2T-6FJX-6FJX-21.00	1	EA
4	85658-010	HOSE, 6M2T-6FJX-6FJX-20.00	1	EA
5		FITTING, MB-MJ-10-6	2	EA
6	85845	DECAL, OUTRIGGERS	1	EA
7	800919	DECAL, WARNING, STAND CLEAR	2	EA





# B50HPSC TIER4 PARTS

13822 Oaks Avenue  
Chino, CA 91710  
reedpumps.com  
(909) 287 - 2100

## AVAILABLE OPTIONS

OUTRIGGER GROUP  
HYD OUTRIGGER  
OUTRIGGER/AGITATOR  
ELECTRIC OUTRIGGER



AGITATOR GROUP  
STD/PADDLE  
OPTION/PADDLE  
HYD/AGITATOR/SINGLE  
HYD/AGITATOR/TRIPLE



## RADIO REMOTE

AARCOMM 2-WAY  
RADIO W/STROKE  
COUNTER AND  
VOLUME  
INDICATOR (IF  
EQUIPPED)

50' CABLE REMOTE,  
100' CABLE REMOTE



## LIFTING KIT



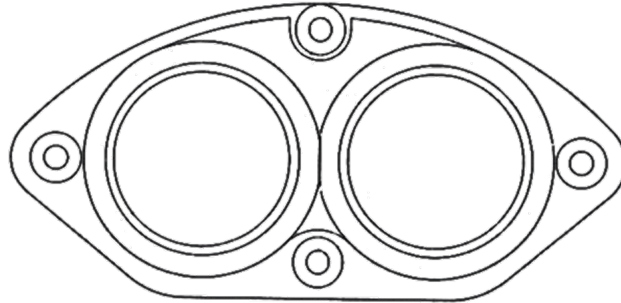


# B50HPSC TIER4

## PARTS

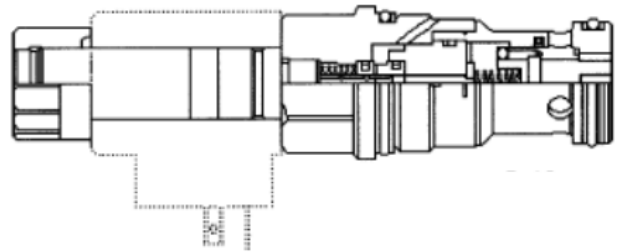
13822 Oaks Avenue  
Chino, CA 91710  
reedpumps.com  
(909) 287 - 2100

CARBIDE WEAR PARTS  
WEAR RING/CARBIDE  
WEAR PLATE/CARBIDE

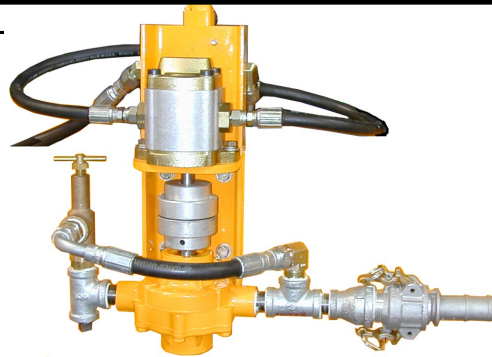


ELECTRIC VOLUME/FLOW CONTROL

RADIO CONTROL OF  
VOLUME  
(IF EQUIPPED)



WATER PUMP WASH PUMP INSTAL  
WASH PUMP ASSY



VIBRATOR KIT  
OLI KIT





# B50HPSC TIER4

PARTS

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TIRE & WHEEL ALUMINUM 9000 LB



AUTO LUBE  
STEEL TUBING 12 PORT  
PLASTIC TUBING 12 PORT



MANUAL LUBE BLOCK

REMOTE EMERGENCY STOP



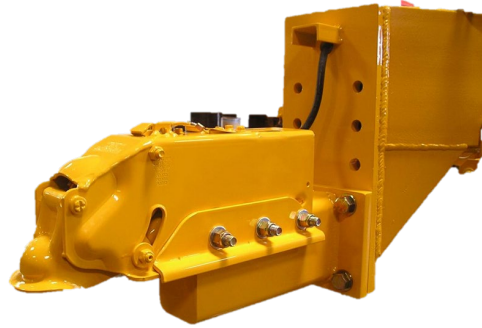


# B50HPSC TIER4

PARTS

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Chino, CA 91710  
reedpumps.com  
(909) 287 - 2100

SURGE BRAKE ASSY 9000LB  
2" BALL



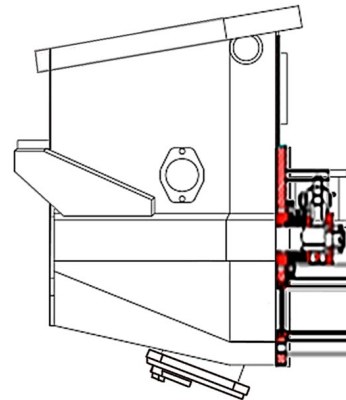
3" PINTLE



HITCH BALL  
2"  
2 5/16"



REINFORCED HOPPER





LINE PUMP

# SAFETY MANUAL 7

VERSION 7.0.1

A guide for the prevention of accidents when driving, operating, cleaning, and maintaining small line concrete pumps and related equipment.



AMERICAN CONCRETE PUMPING ASSOCIATION  
606 Enterprise Drive | Lewis Center, OH 43035  
P: 614.431.5618 | F: 614.431.6944  
[WWW.CONCRETPUMPERS.COM](http://WWW.CONCRETPUMPERS.COM)



**CALIFORNIA**

**Proposition 65 Warning**

**Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**



## SAFETY MANUAL

### A GUIDE FOR THE PREVENTION OF ACCIDENTS WHEN DRIVING, OPERATING, CLEANING, AND MAINTAINING CONCRETE LINE PUMPS AND RELATED EQUIPMENT

#### Introduction

Safety is one of the major concerns of every person involved in the concrete pumping industry. Although much of the responsibility for everyday safety rests upon the pump operator, it is vital that everyone involved makes safety the top priority. This includes the owners, the mechanics, the ready mix drivers, the placing crew, the concrete contractors, and the machine manufacturers.

Although this *Safety Manual* covers a great deal of information regarding the prevention of accidents while operating a concrete pump, it is unlikely that every conceivable circumstance has been covered. Regardless of how thorough a manual like this may be, there is always the unexpected. Please understand that there is no substitute for **common sense** and dedication to the idea that **you are responsible for your own safety**, and affect the safety of those around you. You have to know the rules first, but you

must keep your mind on the job if knowledge of the rules is going to keep you and your coworkers alive and well. No attempt has been made in this *Safety Manual* to provide the highly specialized knowledge of the workings of the individual machines that is also critical for safe and proper operation. For that, you must **read and understand the operation manual for the machine(s) that you operate!**

This *Safety Manual* is a guide for the prevention of accidents and is to be used in conjunction with **professional training**. The ACPA now has an Operator Training Program. Additional information and materials are available through the American Concrete Pumping Association, including, specifically, an Operator Certification Program. Make the commitment to be professional - get your certification!

Version 7.0.1

February 2015

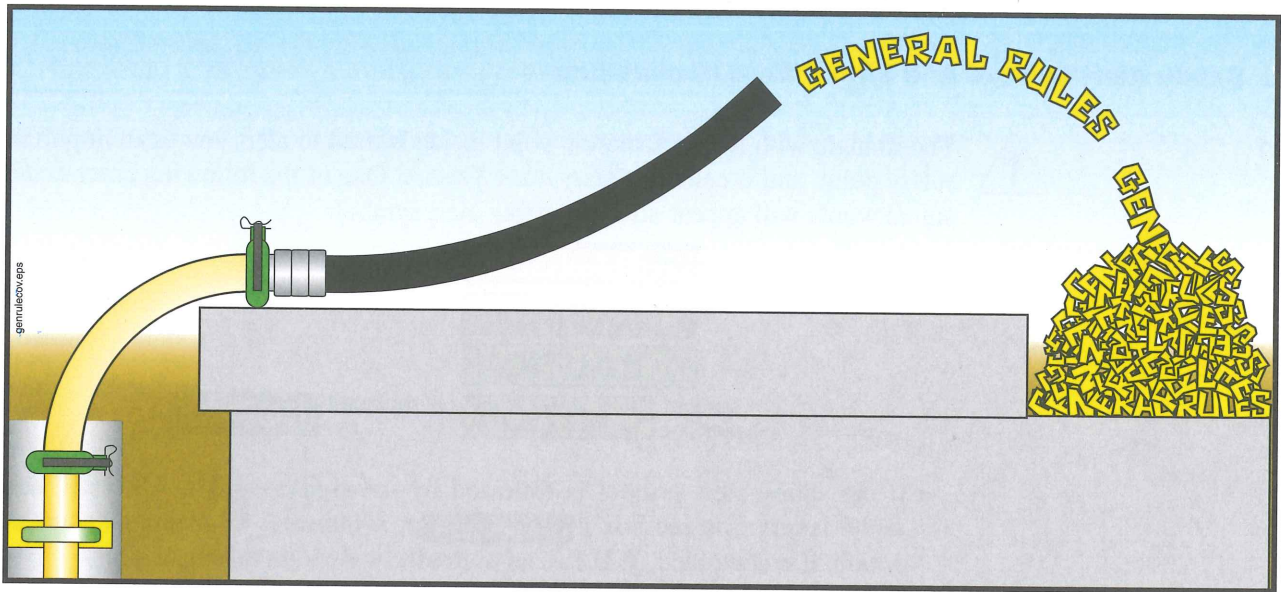
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## I. Before You Leave The Yard

### 1. Safety Alert Symbol And Signal Word Explanation






1.1



The triangle with the exclamation point inside is used to alert you to an important safety point, and is called a *Safety Alert Symbol*. One of the following color-coded signal words will appear after the safety alert symbol:

or - without  
the symbol:

is replaced  
by:

- If the safety alert symbol is followed by the signal word **DANGER** with white letters in a red box (  ), it indicates a hazardous situation which, if not avoided, **WILL** lead to **death or serious injury**.
- If the safety alert symbol is followed by the signal word **WARNING** with black letters in an orange box (  ), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **death or serious injury**.
- If the safety alert symbol is followed by the signal word **CAUTION** with black letters in a yellow box (  ), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **minor to moderate injury**.
- The signal word **CAUTION**, used in a yellow box, but **without the safety alert symbol** (  ), means the point addresses a hazard which, if not avoided, **COULD** cause **damage to equipment or property**.
- The signal word **NOTICE** (  ), now replaces the signal word caution (without the safety alert symbol), above.

### 2. What To Do Before You Arrive At Work

2.1

Get enough sleep to be ready for the day's work. Accidents can happen when the body is on the job, but the mind is not.

2.2

Dress in appropriate apparel and Personal Protective Equipment (P.P.E. or just PPE.) See Figure1. You should always wear these items when pumping concrete:

- hard hat;
- safety glasses or goggles (plus a full face shield, when shotcreting);
- snug-fitting clothes;
- gloves;
- steel-toed shoes;

In addition, you should wear:

- hearing protection if you stand near the pump or any other source of noise;

- breathing mask whenever there is cement dust in the air;
- rubber gloves during cleanout or if you'll be touching wet concrete;
- rubber boots anytime you have to stand in concrete;
- full face-shield when shotcreting, or any time material is rebounding.

\* Full face shield should be used in addition to safety glasses when shotcreting, or any time material is rebounding.

\*\* Breathing mask needed when cement dust (or other toxic dust) is present in the air.



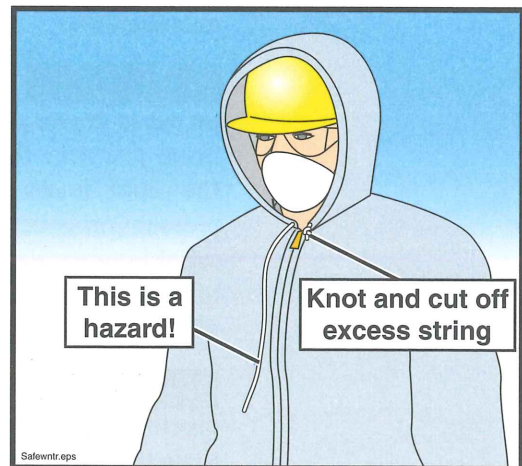
**Figure 1**  
**Personal Protective Equipment (PPE)**

2.3

Jewelry, athletic shoes, sandals, and shorts are examples of clothing that should NOT be worn when pumping.

2.4

**⚠ WARNING** Be sure that any clothing you wear does not have strings, fringes, or other external tightening means that could be caught in moving parts (Figure 2).



**Figure 2**  
**No strings attached**

# SAFETY MANUAL

2.5 Arrive to work on time. Accidents can be caused by hurrying through procedures.

2.6 **⚠ WARNING** Never go to work on a construction site or work on, around or near a piece of machinery when under the influence of drugs or alcohol. Beware of prescription medications or over the counter drugs, many of which have specific warnings about operating machinery after taking the medication (Figure 3).



**Figure 3**  
Your coworkers depend upon you for their safety

2.7 **⚠ WARNING** Don't bring your personal problems to work with you. In an office setting this may be annoying to coworkers, but on a construction site it can be deadly. The workers around you depend on you for their safety.

### 3. What To Check Before You Leave The Yard

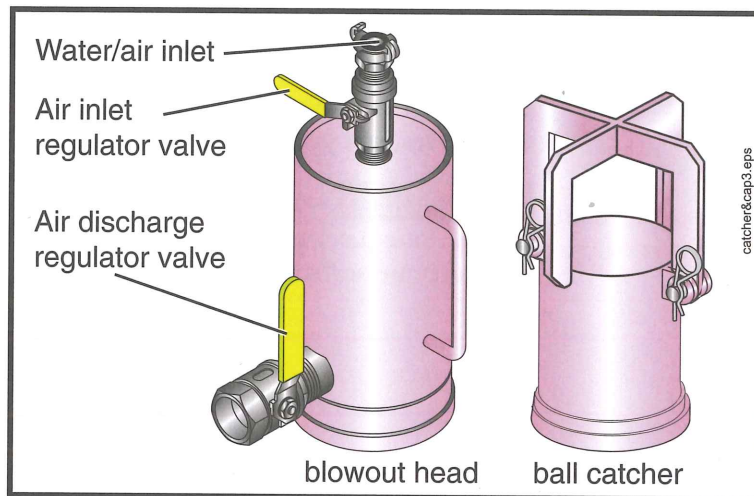
3.1 **⚠ WARNING** Do not operate the machine until you read and understand the unit's operation manual. Lack of understanding of proper operating procedures could result in unsafe operation. Operation manuals are issued with each new unit. If you haven't seen it, ask your supervisor. Replacements are available from the manufacturer.

3.2 **⚠ WARNING** Inspect delivery pipes, concrete delivery hoses, and end hoses for wear. Never use a hose or pipe that is dented or worn out. **Know the maximum pressure that your machine can exert on the concrete, and be sure that the pipes, hoses and clamps are capable of handling the pressure.** Maximum pressure on concrete is stated in operation manuals, service manuals, and on the serial number plate of the machine. A chart showing the minimum wall thickness of pipeline versus maximum pressure is found on page 47 in the Appendix section of this *Safety Manual*.

3.3 **⚠ WARNING** If you will need to use compressed air to clean out the system pipeline, **BE SURE** that you have the proper training, equipment, and attachments to do this procedure safely! Proper attachments include:



- A blowout head with properly sized air discharge regulator valve and separate water/air inlet. The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once.
- A *go-devil*, or a hard sponge ball. Regardless of which is used, it **must** fit into the pipeline tight enough that air cannot escape ahead of it.
- A ball or go-devil catcher that will catch the go-devil or ball when the line has been purged of all concrete, unless another method of controlling the outlet is used. There are two types of catchers (see paragraph 5.24 on page 13).
- A hose that is rated for the pressure of the air compressor you will use and that is able to connect with both the air compressor and the blowout head. The hose must be in good working condition and must be free of cracks, frays, tears or other damage. Do **NOT** improvise on this. **Make sure** you have the right part (Figure 4).



**Figure 4**  
**Compressed air accessories**

- 3.4 **⚠ WARNING** Be sure that the unit is equipped with all the pipes, clamps, gaskets and hoses, blowout adapters, ball catchers, and other accessories that you will need for the day's work. Making do with inappropriate equipment could cause accidents.
- 3.5 On trailer-mounted units, check the oil and cooling system of the pump drive engine. Accidents could occur when lack of maintenance is causing a distraction while operating the equipment.
- 3.6 Be sure the battery has enough charge to start the pump drive engine. You will be rushed on the job if you have to do repair work before you can begin operation.
- 3.7 **⚠ WARNING** The operator is responsible for checking to see that the concrete pump, and delivery system are in safe and proper working condition. If an unsafe condition exists, **work must not begin** until necessary repairs have been completed, or until the machine can be operated safely.

# SAFETY MANUAL

- 3.8** **⚠ WARNING** The operator is responsible for checking that all safety equipment and guards are in place and in good condition. If found to be missing, incomplete, or damaged, **work must not begin** until the situation has been made safe.
- 3.9** **⚠ WARNING** The operator is responsible for checking that all safety decals are in place and are in readable condition. If found to be missing or unreadable for any reason, steps should be taken to obtain replacements.
- 3.10** **⚠ WARNING** Inspect the tires and brakes on the truck. Never drive a truck with bald or cracked tires, or with weak or worn brakes. If you have air brakes, be sure that the air system is free from leaks and will maintain pressure when driving. Loss of air pressure will cause the brakes to be applied while driving. If driving continues after the brakes are applied, the resulting friction could cause enough heat to start a fire.
- 3.11** Drain moisture from the air tanks that supply the unit's brakes (if so equipped). This is especially important if weather conditions could cause the moisture to freeze. If you lose air pressure because of frozen moisture, the brakes will apply themselves, and you will have to stop driving until the unit is repaired.
- 3.12** **⚠ WARNING** (See Figure 5.) Mount or dismount the pump or truck using the *3-point Rule* (i.e. keep two hands and one foot or one hand and two feet in contact with a secure surface at ALL times).

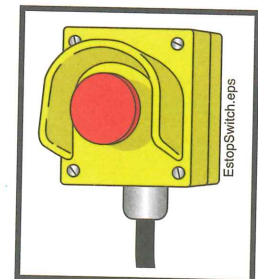


**Figure 5**  
**The 3-point Rule**

- 3.13** **⚠ WARNING** Never mount or dismount the truck or pump while carrying objects that prevent you from using the 3-point Rule. Move the objects separately, if needed.

- 3.14 **⚠ WARNING** If applicable, be sure that outriggers are pinned and locked before traveling. If the locking device is damaged or worn, it should be repaired immediately and the unit **must not be driven until the outriggers can be positively locked** against accidental opening.
- 3.15 **⚠ WARNING** Be sure there is nothing in the cab of the truck (such as empty soda cans, loose tools, etc.) that could interfere with the operation of the vehicle.
- 3.16 Be sure that all road-related safety devices (warning signs, flares, fire extinguisher, etc.) are present and secured for travel.
- 3.17 Be sure all personal protective equipment (hard hat, safety goggles, rubber gloves, etc.) are secured for travel.
- 3.18 **⚠ WARNING** Be sure the windshield and mirrors are clean and free of frost or ice, and that the mirrors are properly adjusted.
- 3.19 **⚠ WARNING** Verify that head lights, tail lights, turn signals, brake lights, backup warning horn, and backup lights are operational.
- 3.20 In some cases you may be asked to operate a machine other than the one with which you are familiar. In these cases, be sure to:
- Know the weight, height, and width of the machine.
  - Have a copy of the operation manual with you.
  - Ask the machine's normal operator, the dispatcher, or your supervisor questions regarding any unusual or unique operational characteristics of the machine.
  - Familiarize yourself with the machine by setting it up in the yard and running the functions, and by familiarizing yourself with the operation manual. This is especially important if the new machine is significantly different than the one you normally operate. Your coworkers depend on you to know the machine.
- 3.21 **⚠ WARNING** Be certain that all loose items on the unit are secured for travel before driving.
- 3.22 **⚠ WARNING** Emergency stop switches (E-stops) should be periodically checked by activating the switch in the yard and confirming that none of the pump functions operate electrically or manually.

**Figure 6**  
Periodically check your emergency stop switches (E-stops) for proper function

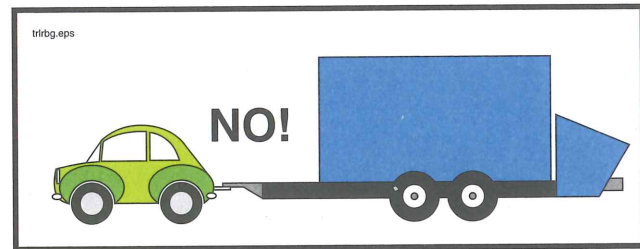




## 4. Safety Rules For Towing Trailer-Mounted Concrete Pumps

- 4.1 **⚠ WARNING** Be sure the towing vehicle is sized appropriately for the trailer. It must be heavy enough and have enough braking ability to maintain control at highway speeds and to stop—even on hills. If the trailer is heavier than the towing vehicle, braking distances will be greatly increased (Figure 7).

**Figure 7**  
Do not under size the  
towing vehicle



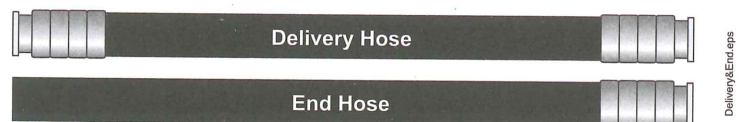
- 4.2 **⚠ WARNING** Never tow a trailer that has concrete in the hopper. The extra weight in the back of the machine will remove weight from the tongue and cause the trailer to fishtail.
- 4.3 **⚠ WARNING** Check the tires, tire pressure, and brakes on the trailer before towing. Never tow a vehicle with cracked or bald tires. A trailer tire blowout can cause loss of control in the towing vehicle.
- 4.4 **⚠ WARNING** Be especially careful on ice or slippery roads when towing a trailer. A skid that would normally be easily correctable can be multiplied by the trailer, causing loss of control.
- 4.5 **⚠ WARNING** Be sure the electrical connections between the towing vehicle and the trailer are sturdy and reliable, and that the lights on the towing vehicle and trailer are working.
- 4.6 **⚠ WARNING** Always use safety chains and break-away protection when towing a trailer.
- 4.7 **⚠ CAUTION** Be aware of local or state regulations regarding mirrors, lights and maximum speed when towing a trailer.
- 4.8 **⚠ WARNING** When towing a trailer, your stopping distance and turning radius are greatly increased. Be aware of this **at all times**.
- 4.9 **⚠ WARNING** When towing a trailer long distances, it is important to frequently check the hitch, hitch pins, couplers, safety clips, towing eyes, wiring, emergency breakaway switch, safety chains, and other accessories, as equipped.
- 4.10 **⚠ WARNING** Be aware of your length when towing a trailer. A common cause of trailer accidents is turning too close to curbs or objects.
- 4.11 **⚠ WARNING** Never back up a trailer without a guide.
- 4.12 **⚠ WARNING** Frequently observe the trailer and watch for unusual swerving or indications of problems, such as a flat tire.

## II. On The Job Site - Safety Rules For Job Setup

### 5. Setting Up A Trailer-Mounted Pump and/or A Separate Pipeline

- 5.1 **The job setup phase sets the stage for most accidents.** Taking a few extra moments to correctly set up the job will improve your chances of having a safe, trouble free day.
- 5.2 **The operator is responsible for the safe operation of the machine.** Notify your employer, the job superintendent, and/or O.S.H.A. if you are being asked to set up in an unsafe manner. **You are never required to take a chance with safety.** You are the **only** person who can determine that the job circumstances under your control are safe.
- 5.3 **⚠ WARNING** Any power connections above 28 volts must be made by a licensed electrician. The supply power and appropriate disconnect boxes are the responsibility of the contractor.
- 5.4 **⚠ WARNING** Electrical power on the job site may be taken only from a fused, grounded disconnect box with a disconnect switch that can be locked against activation. If you will be making repairs to the concrete pump or separate placing boom, first lock out the power at the disconnect box.
- 5.5 **⚠ WARNING** On units equipped with electric motors, **check the power cables every day.** If they are frayed or have open spots in the insulation, replace the wire. If the connectors are worn or loose, have repairs made by a licensed electrician.
- 5.6 **⚠ WARNING** Consider the safe approach and departure of the ready-mix trucks and adjust your setup accordingly. Adjusting your setup position by a few degrees one way or another could mean the difference between a safe approach and an unsafe approach. Some examples of unsafe approaches are: too near an excavation or sticking out into traffic.
- 5.7 **⚠ WARNING** Avoid collisions! Secure the immediate area of the machine from public traffic in accordance with all applicable regulations (warning lights, safety cones, barricades with flashers, etc.).
- 5.8 **⚠ WARNING** Pipelines, end hoses, couplings, and all other material delivery components must be able to withstand the maximum concrete pressure of the pump. Be sure of it! Read and understand the minimum wall thickness chart found in the *Appendix* of this manual. If you don't understand the chart, contact the pipe manufacturer for assistance.
- 5.9 A *concrete delivery hose* is a flexible concrete hose that has two end couplings. An *end hose* is a flexible concrete hose that has one end coupling. See Figure 8.

**Figure 8**  
End hose vs delivery hose





## SAFETY MANUAL

5.10

**⚠ WARNING** Do not use a piece of pipeline, end hose, coupling, or any other material delivery component that is not in good condition. **Replace, do not repair damaged pipes and hoses.** Concrete pipeline system is subject to wear, and the rate of wear is affected by pumping pressure, concrete composition, pipeline material, and other factors. Read and understand the minimum wall thickness chart in the *Appendix* of this manual. **Bursting pipes and concrete escaping under pressure is a serious safety hazard (Figure 9)!**



**Figure 9**  
Delivery system components must be able to withstand maximum pump pressure

5.11

When laying out a pipeline, it is preferable to use an elbow instead of a hose to make direction changes. Elbows have less resistance to flow than hoses, and will therefore reduce the overall pressure required to push the concrete.

5.12

Always use the largest diameter pipeline that is practical, and use steel pipe instead of rubber hose. This will keep the pressure required to push the concrete to a minimum.

5.13

Support the delivery pipeline. Either an "S" transition pipe should be used to bring the pipe to ground level, or **each** section of the pipeline should be supported at the pump outlet level.

5.14

**⚠ WARNING** The sections of pipe nearest the pump are subjected to the highest pressure and the greatest wear. Because of this increase of pressure near the pump, you should install only thick-walled pipe, in like-new condition there. Read and understand the minimum wall thickness chart in the *Appendix* of this manual.

5.15

**⚠ WARNING** The maximum concrete pressure of the pump must be the only factor used to determine what thickness of pipe and what type of ends are needed. In the case of a rock jam or any other type of blockage, the maximum pressure of the pump will be exerted.

5.16

Grooved (Victaulic) ends are **not recommended** for concrete pumping. Read and understand the comparison between heavy duty raised, metric, and grooved ends in the *Appendix* of this manual.

5.17

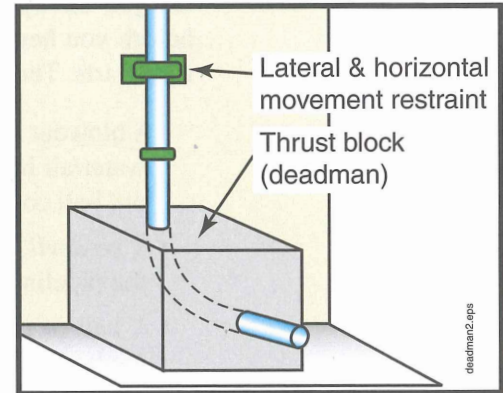
**⚠ WARNING** If the pipeline remains on the job (as is the case when pumping a high-rise building), the operator is responsible for checking the pipeline for



dents, cracks, wear, and continuous connection each day before the pour begins.

5.18

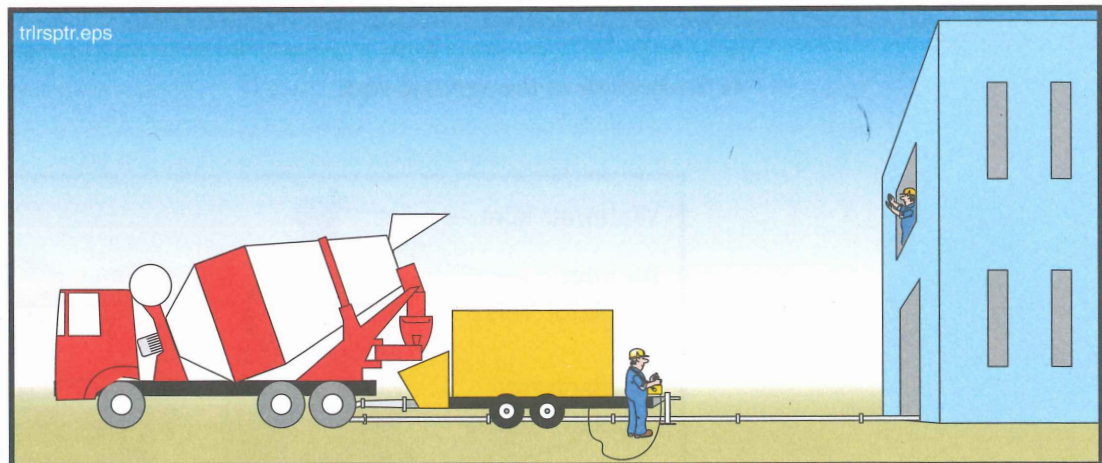
**⚠ WARNING** In vertical runs, the weight of the vertical sections of pipe must be supported by a thrust block (often called a *deadman*, Figure 10) or other load-bearing device. **Each section of pipeline in a vertical run must be secured from lateral and horizontal movement.**



**Figure 10**  
A thrust block (deadman)

5.19

**⚠ WARNING** If you will be unable to see the point of placement, establish a system of communications with the workmen who will be there. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a signalperson (Figure 11). If a signalperson is used, **agree on hand signals before beginning the pour!**



**Figure 11**  
Arrange communications before starting

5.20

**⚠ WARNING** Never leave the machine unattended when it is running or ready to run. If you must leave the area, you must leave someone to monitor the unit. This is especially critical if there are children in the vicinity.

## SAFETY MANUAL

5.21

**⚠ WARNING** Watch for children! It is possible for children to access the machine, but it is not safe for them to do so.

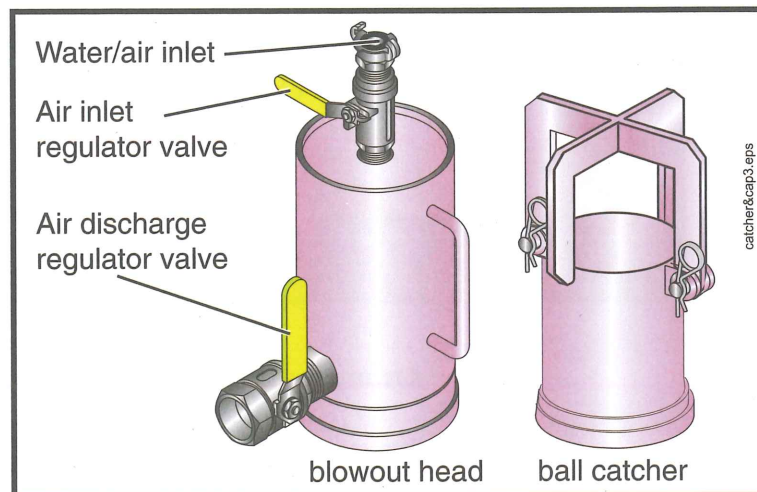
5.22

**⚠ WARNING** If spectators will be near the job, cordon off an area where they will be safe.

5.23

**⚠ WARNING** If you will be cleaning the pipeline with compressed air at the completion of the job, **be sure that you have all the necessary accessories to do the job safely.** If you don't have all of them, make arrangements to get them before you begin to pump. **Do not improvise on this. Make sure** you have the right parts. The minimum accessories include:

- A blowout head with properly sized air discharge regulator valve, and separate water/air inlet. The two openings must be spaced apart far enough that a blow-out ball could not cover both openings at once.
- A *go-devil*, or a hard sponge ball. Regardless of which is used, it **must** fit into the pipeline tight enough that air cannot escape ahead of it.
- A ball or go-devil catcher that will catch the go-devil or ball, or some other method of controlling the discharge while the line is being purged of material. There are two types of catchers (see paragraph 5.24).
- A hose that is rated for the pressure of the air compressor you will use and that is able to connect with both the air compressor and the blowout head. The hose must be in good working condition and must be free of cracks, frays, tears or other damage.
- If you will be cleaning the pipeline with compressed air at the completion of the job, be sure an adequate air compressor is available before starting the job.
- If you will be cleaning a vertical pipeline with compressed air at the completion of the job, you **must have a shutoff valve or switching valve installed at the bottom of the vertical run!**



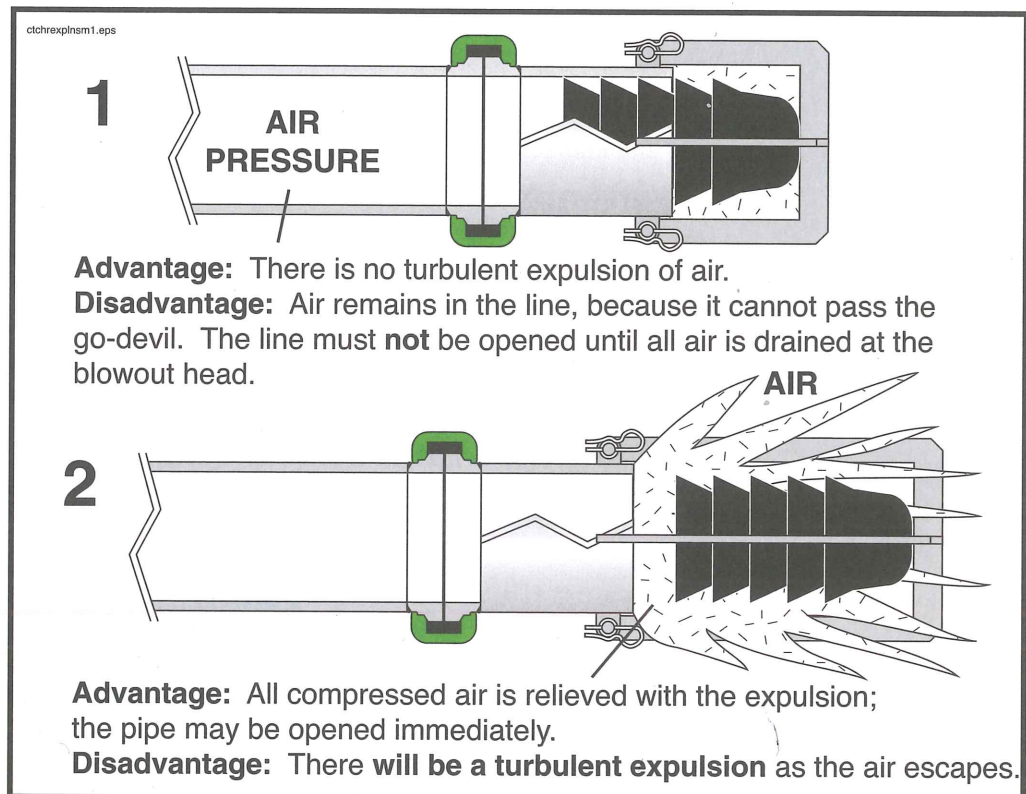
**Figure 12**  
**Ball catcher and blowout head**

5.24

**⚠ WARNING** There are two types of ball catchers. Know which type of catcher you are using. You may need to adjust your cleanout procedure according to which type you have. The two types are as follows:

1. Catchers that stop the ball or go-devil before air can escape, and
2. Catchers that allow the air out of the pipeline after the ball or go-devil has reached the end.

Each type of catcher has advantages and disadvantages (Figure 13).



**Figure 13**  
Types of catchers

With catcher type 1, the go-devil stops, but air is still trapped behind it. The advantage is prevention of the sometimes violent expulsion of air at the end of the pipe. The disadvantage is that the air must be drained from the blowout head before the pipe line is safe to open. The pipeline must be controlled; allow no one to open it until all compressed air is relieved.

Catcher type 2 is long enough that the compressed air escapes behind the go-devil. **Note!** This would happen with either catcher when used with a ball instead of a go-devil. The advantage of this is that once you hear the turbulent expulsion, there is no pressurized air remaining in the line, and the line may be opened immediately. The disadvantage is the expulsion itself. In this case, the end of the line must be controlled because flying concrete and aggregate pose a hazard.

Both catchers can be safely used if care is given to the hazards involved.



## III. Concrete Pump Operation

### 6. Safety Rules For Pump Operators

6.1 **WARNING** Only qualified operators are allowed to operate the pump. A Qualified Operator is defined as someone who:

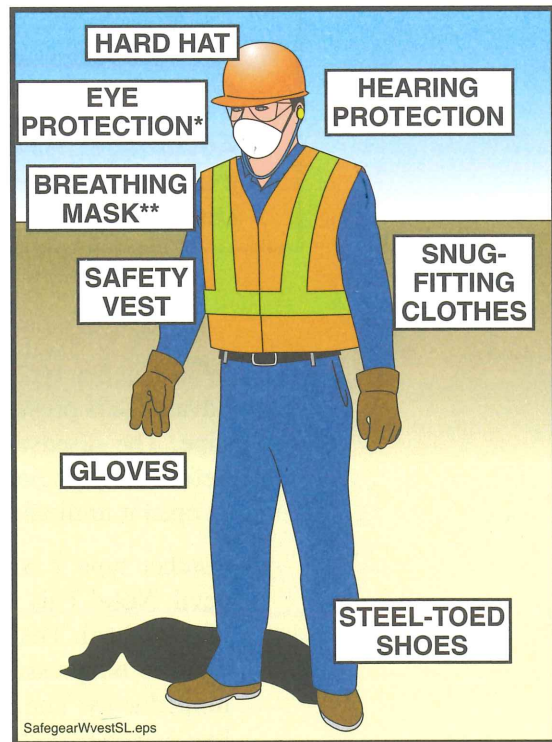
- has reached the age of 18 years (21 for interstate travel);
- is physically and mentally capable;
- has been trained in the operation and maintenance of the pump and the placing boom (if applicable);
- has demonstrated their capabilities to the employer in respect to the operation and maintenance of the pump and placing boom (if applicable); and
- can be expected to perform these duties, as assigned, in a reliable manner.

6.2 **WARNING** Because operators are responsible for the safe operation of the machine, it is crucial that they understand the proper operation of the machine and the safety rules that apply to the job at hand, so the course of action taken in unforeseen circumstances will be a safe one. Only thorough training and supervised job experience can supply the necessary understanding.

6.3 **WARNING** When operating the machine, wear **Personal Protective Equipment** (P.P.E., or just PPE). (Including \*full face shield and/or \*\* breathing mask, when necessary, as shown in Figure 14.)

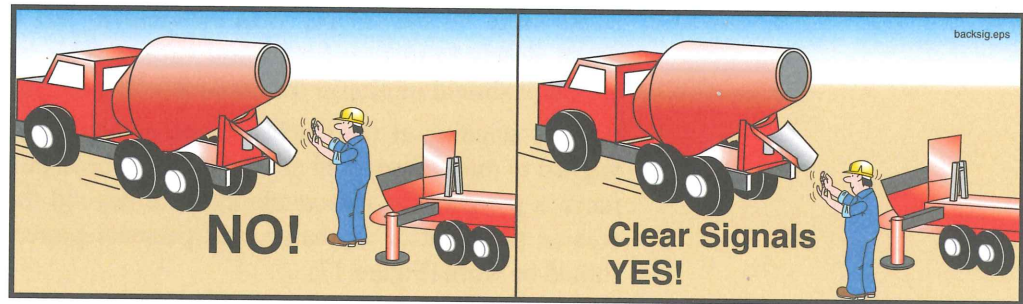
\* Full face shield should be used in addition to safety glasses when shotcreting, or any time material is rebounding.

\*\* Breathing mask needed when cement dust (or other toxic dust) is present in the air.



**Figure 14**  
**Wear Personal Protective Equipment (PPE)**

- 6.4 **⚠ WARNING** All guards, covers, and service flaps must be secured in place during operation.
- 6.5 **⚠ WARNING** **Electrocution hazard!** If you are operating and lightning moves into the area, seek shelter until the lightning is gone.
- 6.6 **⚠ WARNING** **Crushing hazard!** Never, ever position yourself between a ready mix truck and the pump! Stand off to the side, so the ready mix driver can see you at all times (Figure 15).



**Figure 15**  
**Never stand between the ready mix truck and the pump**  
**Use clear and concise hand signals**

- 6.7 **⚠ WARNING** When backing in ready mix trucks, use clear and concise hand signals (Figure 15).
- 6.8 **⚠ WARNING** If the job requires that you work above ground to operate your machine, an approved fall protection plan must be implemented.
- 6.9 **⚠ CAUTION** **Loss of hearing!** While standing near a working concrete pump, sound pressure levels may exceed O.S.H.A. standards for constant exposure (Figure 16).

**PERMISSIBLE NOISE EXPOSURES\***

\*Under part 1910.95 Occupational Noise Exposure, (Dept. of Labor) of the Code of Federal Regulations, Chap. XVII of Title 29 (39 F.R. 7006).

DURATION per DAY in HOURS	Sound level in dB (A) Slow response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or LESS	115



**WEAR HEARING PROTECTION!**

**Figure 16**  
**Noise level and exposure time limits**

## SAFETY MANUAL

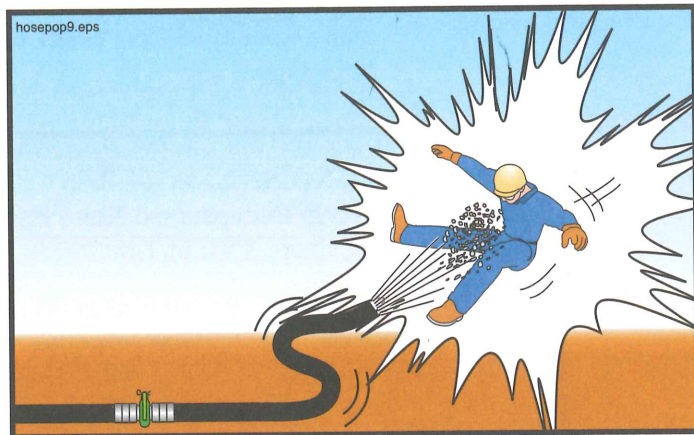
## 6.10

**⚠ WARNING** Do not let the concrete level in the hopper become low! If air is sucked into the material cylinders, the pump will compress the air. Compressed air always poses a hazard as it is expelled from the hopper or the delivery pipeline (Figure 17). If air is taken into the material cylinders, take the following steps to minimize the hazard:

1. Stop the pump immediately. Hit the emergency stop switch (E-Stop) if that is the quickest way to stop the pump. There will be an expulsion of compressed air the next time the concrete valve shifts, which can be safely absorbed by filling the hopper with concrete.
2. If possible, fill the hopper with concrete to just below the grate, then pump slowly in reverse for several strokes. This will not remove all the air, but it should minimize the amount left in the pipeline.
3. Persons standing at the discharge end or near the delivery line must be warned to move away until all of the air has been purged. Personnel should move a prudent and reasonable distance beyond the end-hose movement area or the point of discharge, and personal protective equipment (PPE) should be worn (Figure 17).
4. When the pump is restarted, pump forward slowly until **all** air is removed from the pipeline. Don't assume that the first little air bubble is the end of the compressed air.
5. Do not allow anyone near the discharge until concrete runs steadily from the end and there is no movement of the delivery system.

If workers are positioned in high or precarious places, warn them to expect a loud sound as the air escapes the pipeline. (Warn them even if they are well away from the discharge.) That way, we can prevent the worker from falling as a result of being startled by the noise.

**Figure 17**  
Remove everyone from  
the discharge area  
whenever air is in the line



## 6.11

**⚠ WARNING** Air can be introduced into the delivery system in several ways besides being sucked in through the hopper.

For example:

- when initially priming the delivery system;
- when restarting after moving;



- when restarting after adding or removing delivery system;
- when attempting to remove a blockage by rocking the concrete;
- when opening the system to remove a blockage;
- when pumping is stopped and the pipeline is at a downward angle.

6.12

**⚠ WARNING** When initially priming the delivery system, when restarting after moving, when restarting after adding or removing hoses, when attempting to remove a blockage by rocking the concrete, or whenever air has been introduced into the line, warn everyone to stay away from the discharge until material runs steadily. Personnel should move a prudent and reasonable distance beyond the end-hose movement area or the point of discharge, and personal protective equipment (PPE) should be worn (Figure 17).

6.13

**⚠ WARNING** Blockages in the pump or delivery pipeline can create an unsafe condition. Blockages are caused by many different factors, as outlined below.

#### CAUSES OF BLOCKAGES

- **Faulty concrete mix design.** The concrete being supplied may not be a pumpable mix; for example there may be too much sand or too little cement. There may be bleeding or segregation. Some admixtures adversely affect pumpability (e.g., too much air entrainment). If the mix is not pumpable, no amount of operator expertise will make it so.
- **The line size may be inadequate.** The line size should always be at least 3 times larger than the largest aggregate being pumped, or blockages could occur.
- **Worn concrete valve parts.** Worn parts allow the finest material and water to escape back into the hopper when pressure is applied.
- **Pipeline and joint deficiencies.** This would include: dirty pipes (pipes that have not been cleaned properly); worn and leaking pipe joints that allow loss of concrete fines and water; pipes that haven't been properly primed before starting; and too many sections of rubber hose, which increases friction. These are all causes of blockages that can be controlled by the operator.
- **Pump inadequate for the application.** The pump selected for the job may not have enough pressure or horsepower available for the required duty.
- **Concrete setting up in the pipeline.** This may be caused by delays on site (e.g., repairing a broken form), or by attempting to pump old concrete (concrete that was batched hours before pumping and is being kept alive only by adding water and constant agitation). Weather conditions can also affect how quickly the concrete becomes hard. Companies should establish procedures for these situations. A good rule of thumb is: **If in doubt...wash out.**
- **Foreign matter in the concrete.** Pieces of old concrete that break away from mixer fins, unmixed clumps of cement, mixer fins, hammers, and furry mammals are examples of foreign matter that have caused blockages.
- **An inexperienced operator can cause blockages by setting up the job improperly.** For example, if the placing crew is forced to add hose or pipe to reach a far point after the pour is already in progress, there is a great chance of

## SAFETY MANUAL

creating a blockage due to the dry conditions inside the pipe or hose. It is for this reason that the job should be set up so pipe or hose need only be removed (never added) as the day progresses. If dry pipe or hose must be added, it must be lubricated just like the rest of the pipe was lubricated when you first started.

- **An inexperienced or improperly trained placing crew can cause blockages by kinking the end hose.** This type of blockage can lead to serious accidents because the hose may unkind by the force of the pump.
- **The concrete becomes segregated in the hopper.**
  - a. If the concrete is too wet, the cement and fine material get washed from the stone and coarse sand. This mix will not pump. It is for this reason that you should cover the hopper as you wait out a passing storm, never allow a truck mixer to wash out in your hopper, and never add water to the mix.
  - b. If concrete is over vibrated, it will separate. Turn off the hopper vibrator when not actively pumping.

6.14

**⚠ WARNING** Never try to remove a pipeline blockage by applying high pressure to it, because that will cause the blockage to become a plug. If you have a blockage, immediately stop the pump. Stroke the pump several times in reverse. Slowly stroke the pump in forward, and try to dislodge the blockage. If you are moving the blockage, continue to do so slowly and gently. While attempting to clear the blockage, remove all personnel from the discharge area, as air may be introduced into the placing line during this process. If you are unable to move the blockage after a couple of attempts, stop the pump. Continuing to apply high pressure could create a hazardous condition.

6.15

**⚠ WARNING** If the pump or associated equipment develops a problem that creates an unsafe condition, you must stop pumping immediately! Do not restart until the unsafe condition has been remedied.

6.16

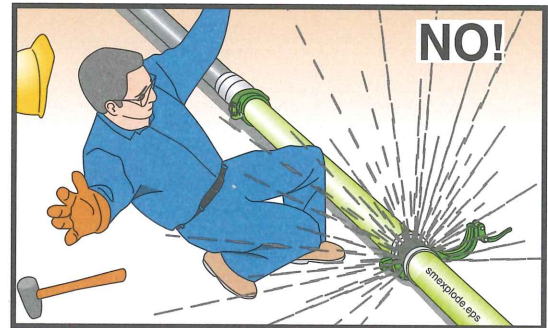
**⚠ WARNING** The following points must be observed when locating a blockage.

- Pump in **reverse** for **at least two strokes**, then stop the pump. In the case of a mechanical pump (which cannot be reversed), it is important to carefully follow the manufacturer's instructions for relieving line pressure before any clamp is opened. **Do not allow anyone to open the pipeline** until the pressure is relieved (Figure 18).
- Wear personal protective equipment (PPE) when opening a blocked pipeline.
- Clear the area of nonessential personnel before opening the line.
- In all cases, the blockage must be removed before pumping again. Remember that air will be introduced when the system is taken apart, and keep personnel away from the discharge when restarting.
- Plugs will be found (in the order of likelihood): reducers, hoses, elbows, and pipe.
- If you are tapping the pipe to find the plug, the sound will be a dull thud (tik-tik) rather than a ringing sound (tong-tong) at the spot of the plug, because the



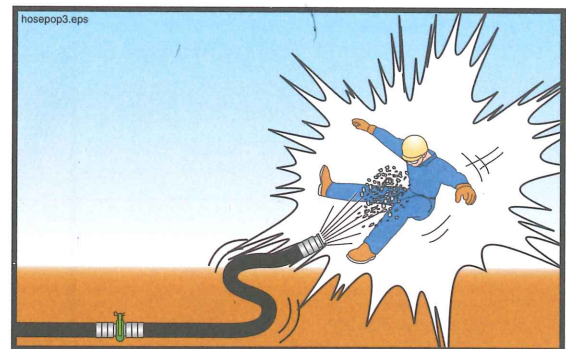
jammed material will keep the pipeline from vibrating. (This method won't find a plug in a hose.)

- To find a plug in a hose: with the pressure relieved, tap or step on the hose to locate the hard spot where the hose is plugged.



**Figure 18**  
Never open a pressurized pipeline

- 6.17 **⚠ WARNING** It is possible that some pressure will remain in the pipeline after reversing the pump. Use a shovel or pry bar to open the clamps on a blocked pipeline. Wear face protection, and turn away from the pipeline when opening the clamp.
- 6.18 **⚠ WARNING** It would be better to let the pipe be ruined by setting concrete than to risk injury by ignoring safe procedures. Always use safe practices when cleaning pipe. Remember, pipeline is replaceable, you are not.
- 6.19 **⚠ WARNING** **Do not kink hoses.** Kinking will cause the pump to create maximum concrete pressure. **The pump may unkink the hose with force!** (See Figure 19.)



**Figure 19**  
Kinking the hose creates a hazard

- 6.20 **⚠ WARNING** Never use compressed air to clear a blockage! It is unsafe and unnecessary. The pump can develop much more pressure than an air compressor. If the pump pressure cannot move it, air pressure won't either.

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6.21

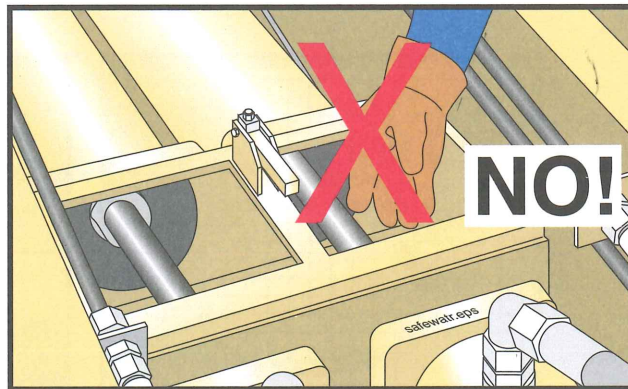
**⚠️ WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized. Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it (Figure 20).



**Figure 20**  
Never straddle or sit on a pressurized pipeline

6.22

**⚠️ WARNING** Crushing/amputation hazard. Do not remove the water box covers or grates when the machine is stroking (Figure 21). If you must remove the water box cover (to add water, for example), and there is not a bolt-down grate over the water box, then stop the pump and activate the emergency stop (E-stop) so the pump cannot be restarted until you are finished and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.



**Figure 21**  
Keep your body out of the water box

6.23

**⚠️ WARNING** Never leave the pump unattended! Before you leave a laborer, ready mix driver, or any other worker alone with the pump for any reason, make sure the worker who you leave with the pump knows:

- the safety rules for a person stationed at the pump (the rules are listed in this *Safety Manual*, beginning on page 35),

- how to stop the pump,
- the location of the emergency stop switches (E-stops),
- how to signal you.

6.24

**⚠ WARNING** To prevent any unintentional movements of the machine, **all** control devices on the operator's panel and the remote control box must be switched off before changing from remote control to local control, or vice-versa. Whenever you are connecting or disconnecting the remote cable, push in the emergency stop switch (E-stop).

6.25

**⚠ WARNING** Crushing/amputation hazard. Never put your hands, feet, or any other body part into the water box, concrete valve, or hopper when the hydraulic system is operational or ready to operate! (See Figure 22.)



**Figure 22**  
**Don't put your body in the machine**

6.26

**⚠ WARNING** Do not work on the hopper, water box, concrete valve, or the hydraulic system unless the drive engine is turned off and the accumulator pressure (if so equipped) has been released! On units with internal combustion engines, the key must be removed. If there is more than one key, you should tag the ignition. On units driven by electric motors, the main disconnect must be locked out according to applicable standards.

6.27

**⚠ WARNING** Never operate the pump blind. If you can't see the point of placement, you must establish a system of communications with the workmen who can see the point of placement. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a signalperson. If a signalperson is used, **agree on hand signals before beginning the pour!** (Use of the ACPA standardized hand signals is highly recommended.)

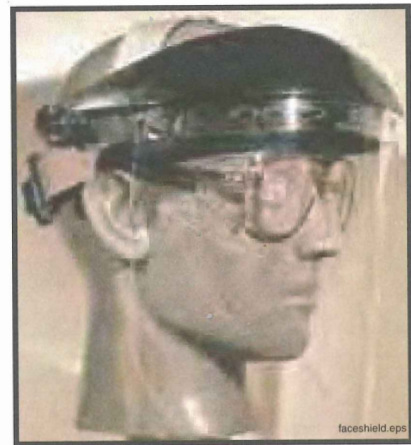


# SAFETY MANUAL

## 7. Safety Rules For Shotcreting

7.1 Keep the pump clean. A clean machine runs more efficiently. To enhance the cleaning of your pump, it will help to spray some type of bond breaker on the entire unit before each use (form oil or equivalent). Do not put oil on surfaces that will become hot, such as exhaust manifolds.

7.2 **WARNING** The nozzle person and nearby personnel should protect themselves by wearing appropriate safety gear, including a full face shield to prevent rebounding concrete from injuring their face and eyes (Figure 23).



**Figure 23**  
Wear a full face shield for rebound protection

7.3 **WARNING** Direct the reducers away from the operator and the concrete mixer driver. The line pressures can be quite high during the shotcrete process (Figure 24).



**Figure 24**  
Point reducers away from the operator and driver

7.4 **WARNING** When practical, the nozzle man and the pump operator should use radios to communicate to facilitate a fast shut-down in the event of a line plug.

7.5 **WARNING** If setting up on a city street or some other obstacle prevents you from directing the reducers away from your work station, it can be helpful to use rubber matting and bungee cords to cover the reducers and act as a protective cover to protect you and the mixer driver in the event of a line rupture (Figure 25).

**Figure 25**  
Cover reducers and use  
containment boxes for cleanout



7.6

**⚠ WARNING** Crushing/amputation hazard! Always keep the hopper grate in place (Figure 26). Never put your hands, feet, or any other body part into the concrete valve, hopper, or water box when the hydraulic system is operational or ready to operate! Never stand on the hopper grate! In addition, the grate can keep many items from entering the hopper that would become blockages in the line.



**Figure 26**  
Never remove the hopper grate  
while the pump is operating

7.7

**⚠ CAUTION** Overspray always presents a problem during the shotcrete process. Protect personnel and equipment in the area by providing overspray protection, even when you are shooting on the inside. The most commonly used protection is plastic sheeting. It is easy to work with and can be nailed or fastened to almost any surface. Canvas tarps can be used in the same manner, but need to be cleaned frequently. Masonite and plywood also work well in some instances. It can help to over-form the area where shotcrete is to be applied. For example, if a wall is to be six feet high, you can form it to eight feet creating a two-foot area of protection. The same would apply to the end of a wall.

7.8

**⚠ WARNING** Check forms and rebar for stability—both backward and forward—before shotcreting. The rebar cage needs to be tied to something—usually the back form. When the shotcrete wall is being built up, the placed shotcrete wants to sag forward, bringing the rebar with it. If the rebar moves, the form may also move.

## IV. Cleaning The Pump And System

### 8. Safety Rules For Cleaning The Concrete Valve And Hopper

- 8.1 **⚠ WARNING** Wear protective clothing and equipment when cleaning the concrete pump because the lime in concrete can burn your skin. Protect against concrete burns and concrete poisoning by wearing rubber boots and gloves during cleanout or any other time that you will be in contact with the concrete.
- 8.2 **⚠ WARNING** Crushing and amputation hazard! **Never put your hands or any other body part into the concrete valve.** Instead, use water jets and the supplied rake (Figure 27).



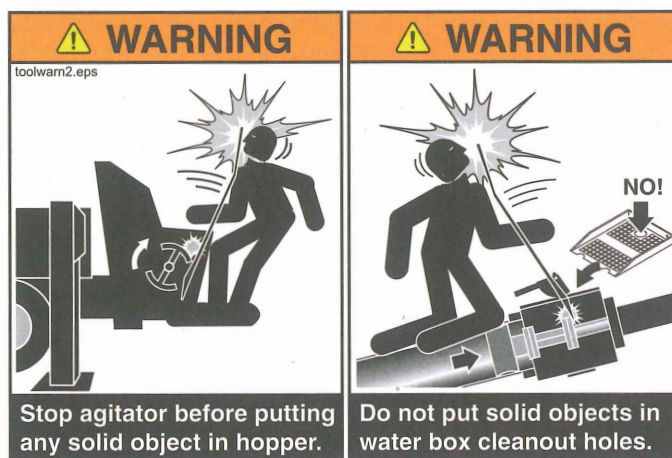
**Figure 27**  
Keep your body parts  
out of the machine

- 8.3 **⚠ WARNING** Never put your hands or any other body part into the machine when the hydraulic system is operational. If you must remove the grate to chip at hardened concrete, you must first disable the system by taking the transmission out of gear and locking the cab door, or stopping the engine, relieving pressure in the accumulator circuit (if so equipped) and securing the controls against unintended operation. Reinstall the grate before restarting the engine (Figure 27).
- 8.4 **⚠ WARNING** Never put a bar or other solid tool into the hopper, water box, or other working system while the hydraulics are operational (Figure 28).

### 9. Safety Rules For Cleaning The Water Box

- 9.1 **⚠ WARNING** Crushing and amputation hazard! Stop the concrete pump before removing the water box covers. If your unit has bolt-down guards, do not remove them for cleaning. If there is not a bolt-down guard over the water box, then stop the pump and activate the emergency stop (E-stop) so the pump cannot



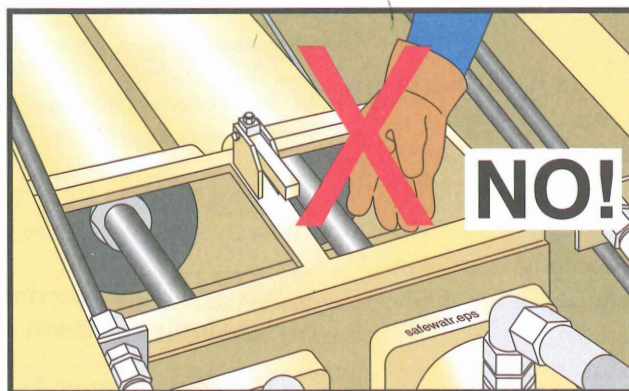


**Figure 28**  
Don't put solid objects into working systems

be restarted until you are finished cleaning and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.

9.2 **WARNING** Falling hazard! Be sure of your footing when cleaning the water box.

9.3 **WARNING** Crushing and amputation hazard! Do not remove the water box guards for cleaning. Clean the water box with water jets only. **Do not put your hands or any other body part into the water box for cleaning or at any other time when the hydraulic system is operational (Figure 29).**



**Figure 29**  
Keep your hands out of the water box

## 10. Safety Rules For Cleaning A Separately Laid Pipeline

10.1 **WARNING** Flying particle hazard! Clear the discharge area of personnel and equipment before forcing a ball or go-devil through the pipeline, even if you are cleaning with water. Some air will be trapped in the pipeline, and the trapped air will become compressed before discharge.

## SAFETY MANUAL

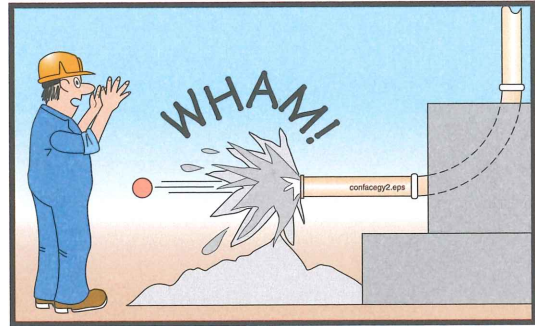
10.2

**⚠ WARNING** Using compressed air to clean the delivery system should only be done when no other method is practical, or as recommended by the manufacturer.

10.3

**⚠ WARNING** The point of discharge must be controlled. Use a ball catcher or some other containment device at the point of discharge, even when cleaning with water.

**Figure 30**  
Cleaning with compressed air can be extremely hazardous if you don't follow the safety rules



10.4

**⚠ WARNING** If you have to use compressed air for cleaning the line you **must** have all of the necessary accessories. Read and understand the complete safety rules regarding cleaning out with compressed air in this section of this *Safety Manual* starting at paragraph 10.8 on page 26. Cleaning with compressed air should only be done by qualified people. See Figure 30.

10.5

**⚠ WARNING** If the ball or go-devil doesn't come out of the delivery system after applying compressed air, you **must relieve the pipe of air pressure before opening it**. If the bleed-off valve plugs when you are draining the air, the only safe way to proceed is to drill small holes into the pipeline, which will then allow the air to escape. Wear a full face shield when drilling the holes. Pipe you have drilled into is ruined and must be replaced. Drill the holes to relieve the air pressure even if the concrete has set up in the pipe. The pipe is hazardous until the pressure is relieved.

10.6

**⚠ WARNING** Exercise care when tapping on the pipeline to find the location of the cleanout ball. Applying too much force will dent a single wall pipe (making it weak and unsafe) and could break the carbide insert of double wall pipe.

10.7

**⚠ WARNING** It is better to let the pipe be ruined by setting concrete than to risk injury by ignoring safe procedures. Remember, pipeline is replaceable, you are not.

10.8

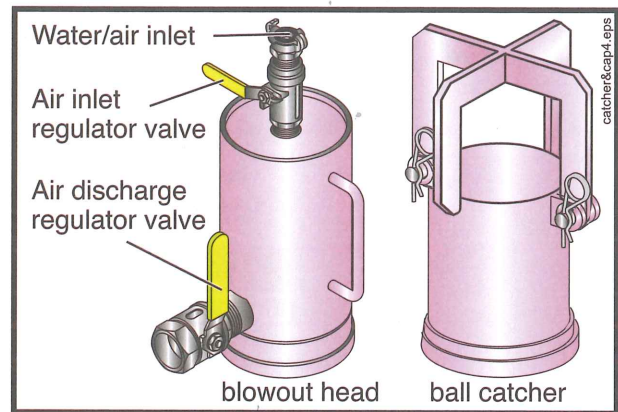
**⚠ WARNING** **Blowing out with compressed air creates potential hazards! Serious injury or death could result if you do not adhere to these safety points.**

- **Blowing out must be performed under the supervision of a qualified person.** (See the glossary for the definition of *qualified person*.)
- **Blowing out requires two people!** One trained person must be at the inlet end to operate the air insertion, and the other trained person must be near (but safely back from) the discharge point to monitor the discharge and to make sure that no one enters the hazard area.
- **No pipe bends or flexible delivery hoses may be connected to the end of the pipeline during the blowing out process,** unless there is a pre-planned



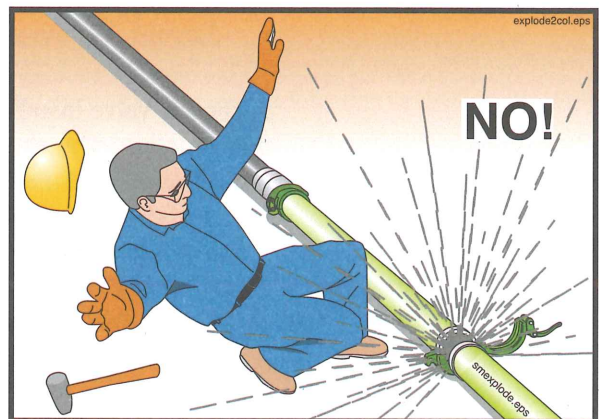
cleanout station erected to route the discharge into the ready mix truck.

- **The point of discharge must be controlled. Clear the discharge area of personnel and equipment** before beginning the blowing out process. Do not allow anyone to enter the area during the blowout process. If a ball catcher is used, be aware of which type you have, and adjust your procedure accordingly. Ball catcher types are described in paragraph 5.24 on page 13.
- **The concrete outlet must be positioned high enough to permit easy discharge of the material.**
- If you are going to divert the discharge into a discharge pipe system, you must lubricate the discharge line with slurry, or a plug could occur.
- **The pipe cleaning blowout head must be equipped with a properly sized air discharge regulator valve and a separate water/air inlet.** The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once (Figure 31).



**Figure 31**  
Ball catcher and  
blowout head

- The ball or go-devil must be large enough to prevent compressed air flow around and into the concrete.
- **The pipeline must not be disassembled until it has been completely relieved of air.** Be sure of this! (See Figure 32.)



**Figure 32**  
Never open a  
pressurized  
pipeline

- **Do not use compressed air to blow out concrete delivery hose, single pipe sections and short pipelines up to a length of 40 feet.** Hoses will jump and

## SAFETY MANUAL

move unpredictably; short pipelines don't have enough concrete to resist the force of the air, causing it to discharge too quickly, like a cannon (Figure 33).



**Figure 33**  
Never use air to blow out hoses or short pipelines

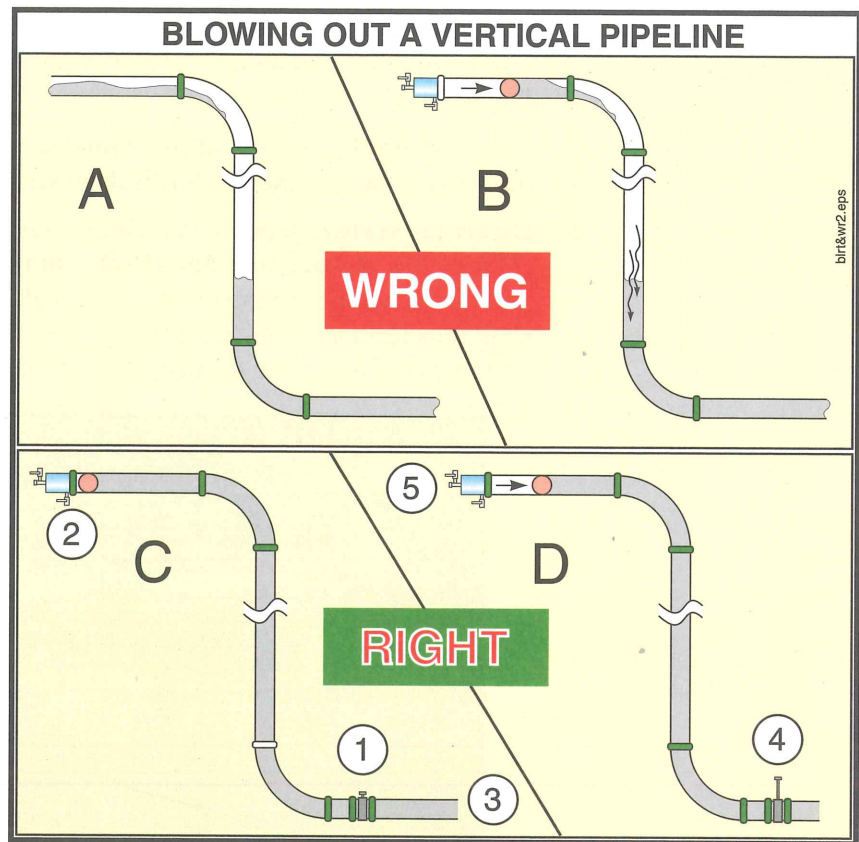
- When air pressure begins to drop rapidly, shut off the air supply from the compressor, and immediately begin bleeding air out of the pipeline. (The drop in pressure signifies that the pipeline is almost empty of concrete.)

## 10.9

**WARNING** When blowing out a vertical line, a shutoff valve is required to prevent the following scenario.

1. (See diagram A in Figure 34.) Without a shutoff valve installed, the pipeline is disconnected from the pump. Immediately, the concrete drains out of the vertical sections of pipe, leaving concrete in both horizontal sections, and air trapped in between.
2. (See diagram B in Figure 34.) The ball is inserted, and pushed with compressed air. This also compresses the air that is trapped in the vertical sections of pipe. The trapped air will be violently expelled when it reaches the end of the pipe, but the pipe will not yet be empty.

A shutoff valve installed at the bottom of the vertical run will prevent this hazardous situation. The shutoff valve must be capable of handling the maximum concrete pressure of the pump and, of course, must be installed before the pour begins. Several different styles are available, ranging from a manually operated flat gate that is put into place with a hammer to fully hydraulic types that will also divert the concrete to a different pipeline. With a shutoff valve installed, you can proceed as indicated below.



**Figure 34**  
Blowout of a vertical line

10.10

**⚠ WARNING** Blowing out vertical sections of pipe (for example on a high-rise building) requires additional safety precautions.

1. **Know where the discharge area for blowing out will be before the pour begins.** Ready the area and accessories before the pour begins so you will not waste time when pumping is completed.
2. **Blowing out with compressed air requires two qualified persons.**
3. **The persons at both ends of the pipeline must be able to communicate without delays,** which means you must establish communications (for example, with a radio).
4. **When pumping is complete, close the shutoff valve before disconnecting the pipeline from the pump** (Item 1, Figure 34). Failure to do this will cause the concrete to fall out of the vertical sections of pipe, leaving concrete in the horizontal sections of pipe and an air pocket in the vertical sections. This does not apply if you are using a switching (diversion) valve.
5. **Install the ball(s) in the pipeline, secure the blowout head and hook up the air compressor. Do not apply the air yet!** (Item 2, Figure 34.)



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6. If you will be diverting the discharge to a cleanout area, lubricate the discharge line with slurry, or a plug could occur.
7. **Position the ready mix truck at the cleanout standpipe**, or install the ball catcher or other containment device at the end of the discharge line. (Item 3, Figure 34.)
8. **Clear the discharge area of personnel.** You must allow no one to enter the discharge area until the pipeline is depressurized.
9. **Divert the vertical pipe line to the cleanout area and secure the discharge (Figure 35), or open the shutoff valve in the delivery pipe line now.** Allow gravity to start the concrete moving through the discharge line. As the concrete falls from the vertical sections, it will take the ball with it, making it impossible to trap air in the line. (Item 4, Figure 34.)



**Figure 35**  
**Divert vertical pipeline to the cleanout area and be sure to secure the discharge before continuing**

10. **Apply the compressed air to the pipeline.** Close communications must be maintained at this time. Add only enough air to keep the concrete moving. Do not allow the concrete to accelerate. (Item 5, Figure 34.)
11. **When concrete starts to accelerate, shut off the air supply from the compressor, and open the air regulator to bleed air from the line.** Rapidly accelerating concrete indicates that the pipeline is almost empty. After the ball has been expelled from the pipeline, leave the air regulator open to be sure that all air is removed from the system.
12. All the rules for blowing out found in Point 10.8 on page 26 also apply to blowing out a vertical pipe line. These rules are in addition to the general cleaning a pipeline with compressed air rules.

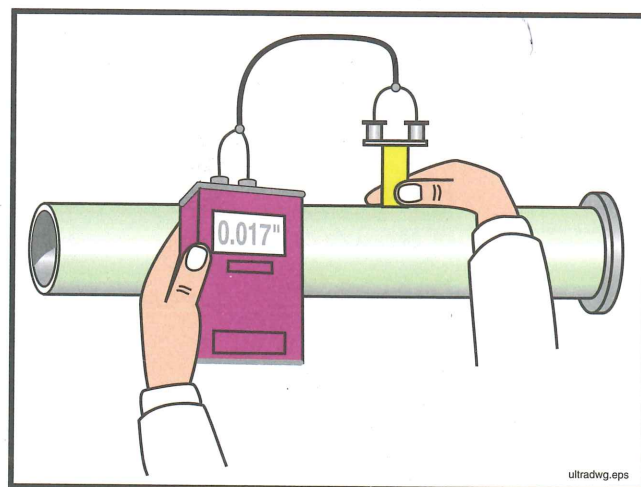
10.11

**⚠ WARNING** Never use compressed air to attempt to clear a blockage! It is unsafe and unnecessary. If the pump pressure can't move it, air pressure won't either.

## V. Maintenance Of The Machinery

### 11. Safety Rules Regarding Inspection

- 11.1 **⚠ WARNING** Visually inspect your unit each day before it is put into operation. If any problem is found that will affect the safe operation of the pump, don't use the pump until it is repaired!
- 11.2 **⚠ WARNING** If safety decals are faded, missing, damaged, or otherwise unreadable, they must be replaced immediately. Contact the manufacturer of your unit to obtain replacements.
- 11.3 **⚠ WARNING** If safety devices or guards are removed for inspection purposes, they must be replaced before someone uses the machine.
- 11.4 **⚠ WARNING** Pay attention to the operation manual and manufacturers service bulletins regarding maintenance and inspection procedures and intervals.
- 11.5 **⚠ WARNING** If inspection reveals something that looks wrong, or even suspicious, report it to the manufacturer for consideration. Don't just assume that it's okay.
- 11.6 **⚠ WARNING** Visual inspection of the concrete pump circuits and safety devices should be done daily. Hands-on inspection and documentation of results should be done weekly, or at least when preventive maintenance is scheduled.
- 11.7 **⚠ WARNING** Do not neglect the delivery pipeline, clamps, or hoses. Check them often for wear, dents, and frays. Never send a unit to a job with a worn or damaged delivery system. For single wall pipes, ultrasonic thickness testers are more accurate than the tap method.



††

**Figure 36**  
Check delivery system wall thickness with  
an ultrasonic thickness tester

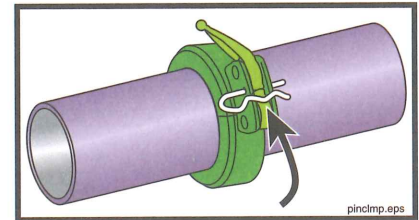


## 12. Safety Rules Regarding Scheduled Maintenance

**12.1** **⚠ WARNING** Proper and timely maintenance is important to the safe operation of a concrete pump. The proper procedures are outlined in the operation manual supplied with the pump. Do not put it off. Do not treat it lightly. Do not fudge results. The lives of the operator, oiler, and workers on the job are depending on it.

**12.2** **⚠ WARNING** Keep the machine clean! Oil spills, grease, loose tools, and displaced accessories are hazards.

**12.3** **⚠ WARNING** Pins should be used on all delivery system clamps. Clamps that will hang over workers, and clamps used on system that will be dragged shall be pinned (Figure 37).



**Figure 37**  
Pin the clamps

**12.4** **⚠ WARNING** Be sure that you are installing the correct clamps for the types of pipe ends used. Never try to mate dissimilar pipe ends unless using a clamp specifically made for this purpose. See the comparison regarding weld-on ends on page 46 in the *Appendix* of this manual.

**12.5** **⚠ WARNING** When using new pipe and/or hose on the machine, be sure that it is capable of handling the maximum concrete pressure of the pump.

**12.6** **⚠ WARNING** If safety devices or guards are removed for servicing, they must be replaced before the machine is put back in service.

**12.7** **⚠ WARNING** Do not change the maximum relief valve setting on any hydraulic circuit without permission from the manufacturer. **Never** change an accumulator circuit pressure setting without specific instructions from the manufacturer.

**12.8** **⚠ WARNING** Never make unauthorized modifications to structural members or pressure circuits.

**12.9** **⚠ WARNING** You must **replace, not repair** damaged hydraulic or concrete hoses or pipes.

**12.10** **⚠ WARNING** Never try to repair a machine using worn, damaged, or defective components.

**12.11** **NOTICE** Never allow welding current to travel through bearings or hydraulic cylinders. Keep the ground cable on the component that is being welded.

12.12

**NOTICE** Electronic components can be destroyed by welding current. Before welding on the unit, you must disconnect the battery cables, and unplug all radio remote control power wires. If in doubt, contact the Service Department of the manufacturer for instructions **before** proceeding.

### 13. Safety Rules When Servicing The Machinery

13.1

**WARNING** Repairs should be carried out by qualified workshop personnel. (See the glossary for the definition of *qualified personnel*.)

13.2

**WARNING** Read and understand the maintenance procedures in the operation manual **of the machine before attempting any repairs**. If in doubt, call the manufacturer. Incorrectly done repairs affect the safe use of the machine.

13.3

**WARNING** Burn hazard! **Never work on a hot hydraulic system.**

13.4

**WARNING** Falling hazard! If you cannot work at ground level, you must find and use a suitable work platform, a tie-off harness system, or otherwise secure yourself from falling.

13.5

**WARNING** If maintenance work requires that you use a crane, hoist, fork truck, or similar machine, read and understand the safety regulations for that equipment.

13.6

**WARNING** Only operators should operate the unit. If work on the machine requires that it be operated and you are not qualified as an operator, you must get someone who is qualified to assist you.

13.7

**DANGER** Electrocuting hazard! **Repair work on electrical systems over 28 volts must be done by qualified electricians.**

13.8

**WARNING** Explosion hazard! **Be sure that you understand the potential danger of spring-loaded or compressed-gas components before you service them.** (Examples: nitrogen accumulators, gas springs for toolbox doors, tires, brake chambers.) If you don't know the dangers, call the manufacturer **before** beginning work!

13.9

**WARNING** If you will be working in a hidden area inside the machine, lock it out as follows.

- With a gas or diesel engine, remove the ignition key and place a *Do Not Operate* sign on the controls. Carry the key with you.
- With an electrically driven pump, lock out the main breaker and tag the controls.

The above rules are one simple Lock Out-Tag Out procedure. A procedure may also be provided in the operation manual for the unit and there may be state or local regulations that require a more advanced or stringent Lock Out-Tag Out program. Be aware of the regulations in your area.

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- 13.10** **⚠ WARNING** Never activate the system hydraulics without checking if another workman is in a hidden position. Always yell “clear” before starting the engine or electric motor, and allow time for response.
- 13.11** **⚠ WARNING** Never work on a pressurized hydraulic system. Stop the engine or electric motor, relieve the accumulator circuit and verify zero pressure on the gauge (if so equipped), and be sure that no hydraulic components are loaded, (i.e., outrigger supporting the unit) before you open the hydraulic system.
- 13.12** **⚠ WARNING** Never use gasoline or diesel fuel as a cleaning solvent. This is critical to remember when cleaning hydraulic oil reservoirs, because gas and diesel fuels are highly explosive and traces left in the oil may ignite when compressed!
- 13.13** **⚠ WARNING** Remember to mount and dismount the unit using the 3-point Rule. One hand and two feet or two hands and one foot are to be in contact with a secure surface at all times (Figure 38).



**Figure 38**  
**The 3-point Rule**

- 13.14** **⚠ WARNING** Always use the correct tools for the job. Tools should be kept clean and in good condition.
- 13.15** **⚠ WARNING** If you see a coworker engaging in an unsafe practice, warn him about the dangers. Safety is always in the hands of those on the job!
- 13.16** **⚠ WARNING** After any repair is completed, test the function of the repaired part to be sure that repairs were done correctly.

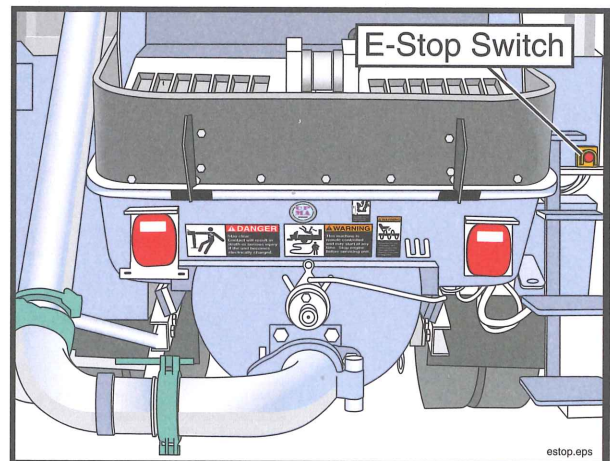


## VI. Coworker Safety

### 14. Safety Rules For Workers Assigned To The Pump.

14.1

**⚠ WARNING** You must know how to stop the pump. Have the operator show you the locations of the emergency stop switches (E-stops) (Figure 39).



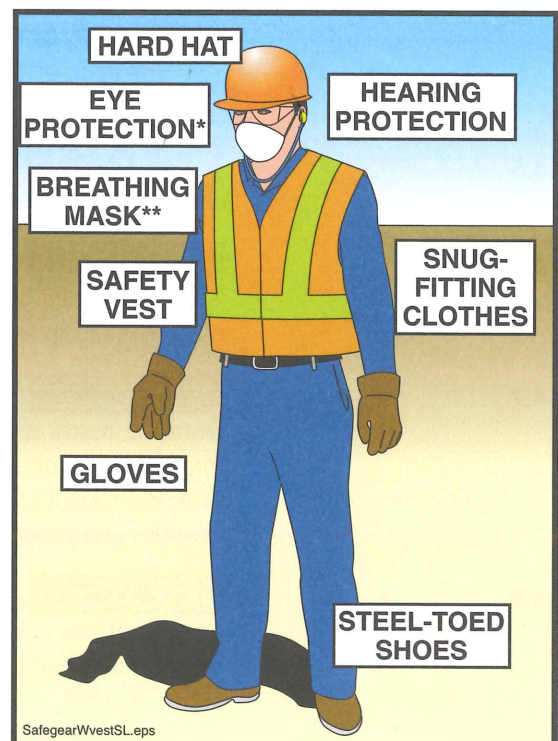
**Figure 39**  
Know how to stop the unit in an emergency

14.2

**⚠ DANGER** You should wear the same personal protective equipment as the operator. Goggles, hard hat, ear protection, and rubber gloves are especially important when working near the hopper, (including \*full face shield and/or \*\* breathing mask, when necessary, as shown in Figure 40).

\* Full face shield should be used in addition to safety glasses when shotcreting, or any time material is rebounding.

\*\* Breathing mask needed when cement dust (or other toxic dust) is present in the air.



**Figure 40**  
Wear the same personal protective equipment as the operator

## SAFETY MANUAL

14.3

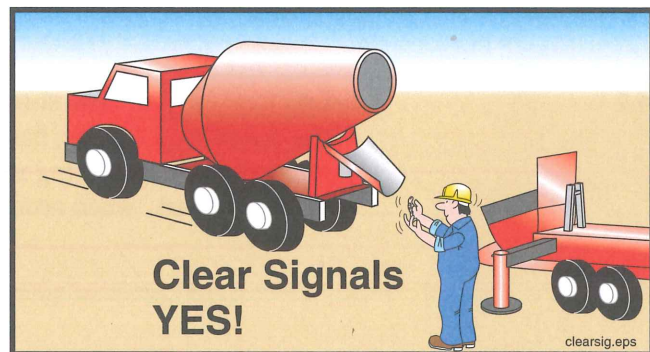
**⚠ WARNING** Crushing hazard. Never, ever position yourself between the ready mix truck and the pump! Stand to the side, where the driver can see you (Figure 41).



**Figure 41**  
Never stand between the ready mix truck and the pump

14.4

**⚠ WARNING** When backing in ready mix trucks, use clear and concise hand signals (Figure 42).



**Figure 42**  
Use clear, concise  
hand signals

14.5

**⚠ WARNING** If handling the chutes of a ready mix truck, keep your hands clear of the hinged areas.

14.6

**⚠ WARNING** Do not allow the ready mix driver to put concrete in the pump hopper until the pump operator gives him the 'okay.' Filling the hopper early can cause the pump to plug.

14.7

**⚠ WARNING** If you see foreign material that could create a blockage coming from the ready mix truck, alert the operator to stop the pump. Do not attempt to remove the material from the hopper or grate while the hydraulic system is ready to work. (See Point 14.16 on page 39.) If necessary, depress the E-stop button to stop the pump and alert the operator.

14.8

**⚠ WARNING** Never allow the ready mix driver to clean out in the hopper, because it can create a blockage. (Water will wash the cement and fine sand from the course aggregate causing segregation.)



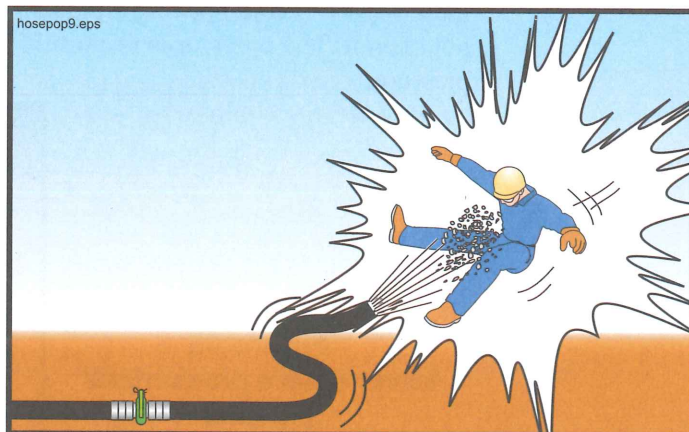
14.9

**⚠ WARNING** Do not operate the pump unless you are also a trained operator and the regular operator has released the controls to you. **There must not be more than one operator at a time.** This does not apply to stopping the pump or boom if there is a need to do so.

14.10

**⚠ WARNING** Do not let the concrete level in the hopper become low! If air is sucked into the material cylinders, the pump will compress the air. Compressed air always poses a hazard as it is expelled from the hopper or the delivery pipeline (Figure 43). If air is taken into the material cylinders, take the following steps to minimize the hazard:

1. Stop the pump immediately. Hit the emergency stop switch (E-stop) if that is the quickest way to stop the pump. There will be an expulsion of compressed air the next time the concrete valve shifts. If possible, fill the hopper with concrete to help contain the expulsion. Do not put your face directly over the hopper.
  2. Alert the operator of the problem. It is the operator's job to know the procedures for safe removal of air from the pump and delivery system. These procedures include pumping in reverse for a couple of strokes.
  3. Persons standing at the discharge end or near the delivery line must be warned to move away until all of the air has been purged. Warn them to stay a reasonable and prudent distance beyond the reach of the end hose or point of discharge (Figure 43).
  4. When the pump is restarted, don't assume that the first little air bubble is the end of the compressed air.
  5. Do not allow anyone near the discharge until concrete runs steadily from the end and there is no movement of the delivery system.
- If workers are positioned in high or precarious places, warn them to expect a loud sound as the air escapes the pipeline. (Warn them even if they are well away from the discharge.) That way, we can prevent the worker from falling as a result of being startled by the noise.



**Figure 43**  
**Remove everyone from the discharge area**  
**whenever air has been introduced into the line**

## SAFETY MANUAL

14.11

**⚠ WARNING** When initially priming the delivery system, when restarting after moving, when restarting after adding or removing hoses, or whenever air has been introduced into the line, warn everyone to stay away from the discharge until concrete runs steadily and there is no movement of the delivery system. Personnel should stay back a reasonable and prudent distance beyond the reach of the end hose or point of discharge (Figure 43). Air will be in the line when first starting, when restarting after moving, when a blockage has been successfully removed by rocking the concrete, and after the line has been taken apart or opened for any reason.

14.12

**⚠ WARNING** Never use compressed air to clear a blockage! The operator is responsible for knowing the safe blockage removal procedures. It is unsafe and unnecessary to use compressed air. If the pump pressure cannot move it, air pressure won't either.

14.13

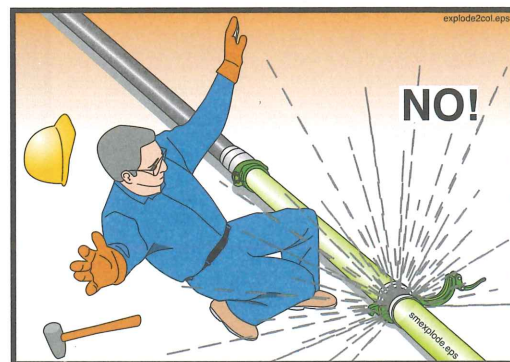
**⚠ WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized. Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it (Figure 44).



**Figure 44**  
Never straddle or sit on  
a pressurized pipeline

14.14

**⚠ WARNING** Expulsion hazard! Never open a pipeline that is under pressure (Figure 45). The pump must be run in reverse for at least two strokes and then stopped before opening a pipeline. If the pipeline is pressurized with air, do not open it. The operator is responsible for knowing how to safely release the air pressure.



**Figure 45**  
Never open a pressurized  
pipeline

14.15

**⚠ WARNING** Be careful when handling pipeline or any other heavy object. Learn how to lift without using your back. Get assistance if needed.

14.16

**⚠ WARNING** Crushing/amputation hazard! Never put your hands, feet, or any other body part into the water box, concrete valve, or hopper when the hydraulic system is operational or ready to operate! Never stand on the hopper grate! (See Figure 46.)



**Figure 46**  
Never put your body in the machine!

14.17

**⚠ WARNING** Never lift or remove the hopper grate for any reason (Figure 47).



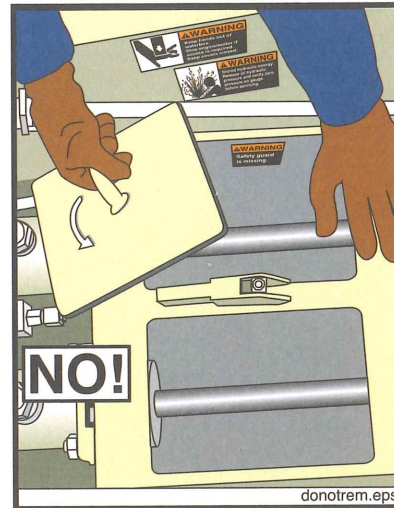
**Figure 47**  
Lifting hopper grate exposes the agitator and the concrete valve



# SAFETY MANUAL

14.18

**⚠ WARNING** Do not remove the water box covers or grates when the machine is stroking (Figure 48). Do not remove the water box cover (to add water, for example), until the operator has disabled the machine. Replace the covers before the operator restarts the pump.



**Figure 48**  
Do not remove the water box covers when the machine is stroking

14.19

**⚠ WARNING** Mount or dismount the pump or truck using the *3-point Rule*. One hand and two feet or two hands and one foot are to be in contact with a secure surface at all times (Figure 49).



**Figure 49**  
The 3-point Rule

14.20

**⚠ WARNING** Keep unauthorized personnel off of the pump.

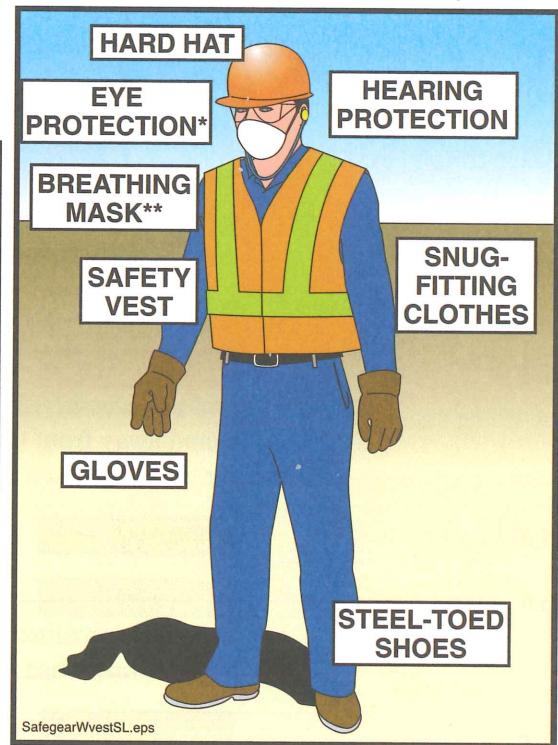
## 15. Safety Rules For The Placing Crew

15.1

**⚠ WARNING** Wear Personal Protective Equipment (P.P.E., or just PPE) when working around a concrete pump (Figure 50). The gloves should resist concrete lime burns. If you will be working **in** the concrete, protect your feet and hands with rubber boots and gloves (including \*full face shield and/or \*\* breathing mask, when necessary, as shown below).

\* Full face shield should be used in addition to safety glasses when shotcreting, or any time material is rebounding.

\*\* Breathing mask needed when cement dust (or other toxic dust) is present in the air.



**Figure 50**  
Wear Personal Protective Equipment (PPE)

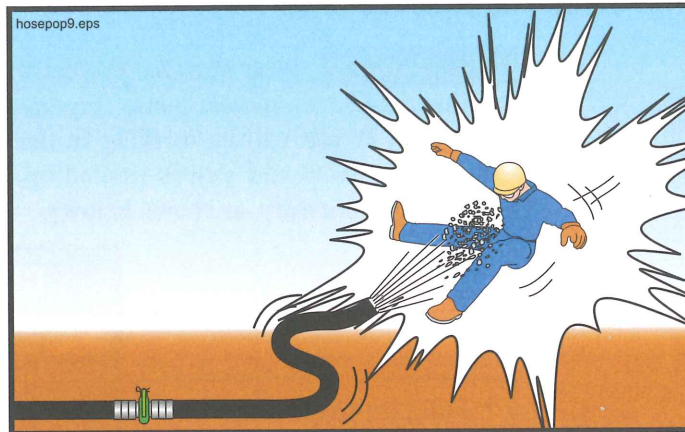
15.2

**⚠ WARNING** When the operator is initially priming the delivery system, restarting after moving, restarting after adding or removing pipes or hoses, or any time that air has been introduced into the delivery system, stand a reasonable and prudent distance away from the tip hose or point of discharge. Do not get near the discharge until material runs steadily and there is no movement of the delivery system. (Figure 51). Compressed air in the line can cause rubber hose to move violently. If the operator tells you that air is coming in the delivery system, proceed as follows:

- Get to ground level (if in a high place) and remain well away from the discharge or at least take cover.
- Stay away from the discharge. Be sure that **all** the air is gone before getting near the point of discharge again. It is the operator's job to know when it's safe to go back to normal pumping.

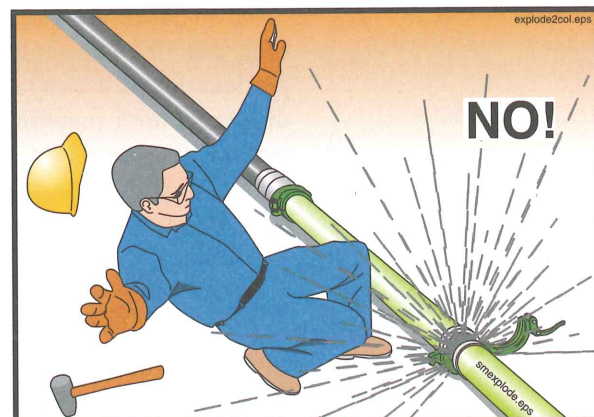


## SAFETY MANUAL



**Figure 51**  
Stay away from the point of discharge when starting or restarting, and when there's air in the pipeline

- 15.3 **⚠ WARNING** Never use compressed air to clear a blockage! It is unsafe and unnecessary. If the pump pressure cannot move it, air pressure won't either. Stand away from the discharge and the line if anyone attempts to use compressed air in this manner.
- 15.4 **⚠ WARNING** Do not look into the end of a plugged hose or pipe!
- 15.5 **⚠ WARNING** When the pump crew is using compressed air to clean the boom or system pipeline, stay away from the discharge area. **Never try to hold down a pipe or hose that is being cleaned with air.**
- 15.6 **⚠ WARNING** Never open a pressurized pipeline (Figure 52). The pump operator must release the pressure before you open the line: If the line is pressurized with compressed air, let the operator release the pressure and verify that the air has escaped before you proceed.

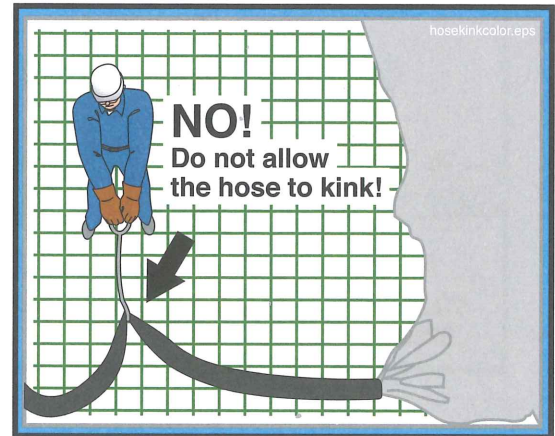


**Figure 52**  
Never open a pressurized pipeline

- 15.7 **⚠ WARNING** After removing pipe sections you must **reassemble using gaskets and clamps**. Pipelines assembled without gaskets will leak cement and water, which can cause a blockage.

15.8 **⚠️ WARNING** Concrete is being moved through the delivery system by pressure. Failure of a pipe, clamp, hose, or elbow is possible. For this reason, spend as little time as possible standing near the pipeline, and wear protective clothing.

15.9 **⚠️ WARNING** Do not kink the end hose. Kinking will cause the pump to create maximum concrete pressure. The pump may unkink the hose by force! (See Figure 53.)



**Figure 53**  
Never kink the hose;  
Never hold the hose with your shoulder

15.10 **⚠️ CAUTION** Be careful when handling pipeline or any other heavy object. Learn how to lift without using your back. Get assistance if needed.

15.11 **⚠️ WARNING** Falling hazard! When pouring columns, slabs, or walls above ground, secure yourself from falling.

15.12 **⚠️ WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized (Figure 54). Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it.



**Figure 54**  
Never straddle or sit on a pressurized pipeline

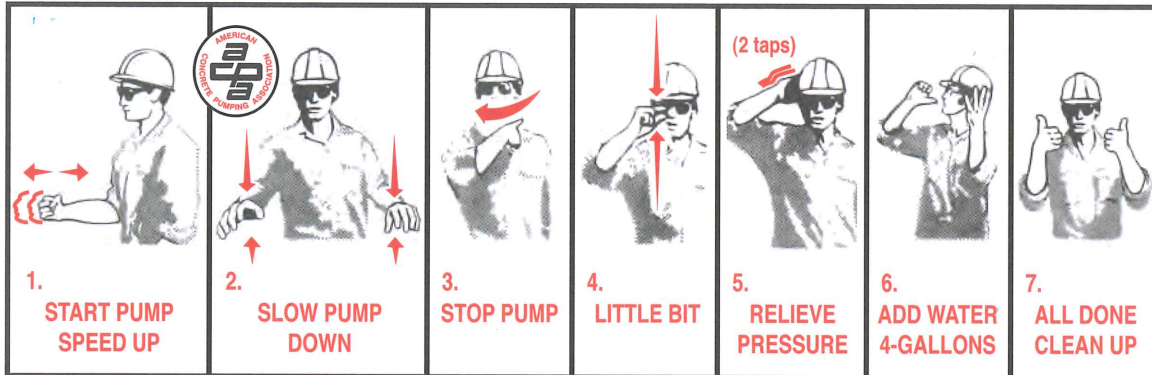
# SAFETY MANUAL

15.13

**⚠ WARNING** To avoid confusion and conflicting signals, only one person should act as a signalperson (give operational signals to the pump operator). However, the operator is trained to obey a stop signal from anyone and everyone.

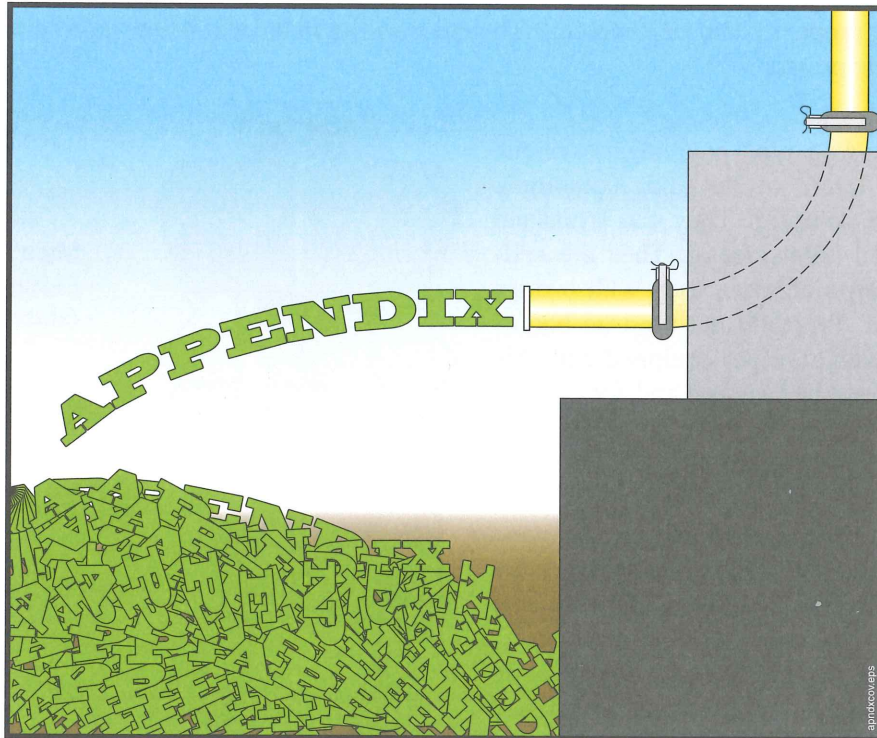
15.14

**⚠ WARNING** Before the pour begins, the hose person, the signalperson, and the operator should agree on the hand signals (Figure 55).



**Figure 55**  
Recommended ACPA hand signals





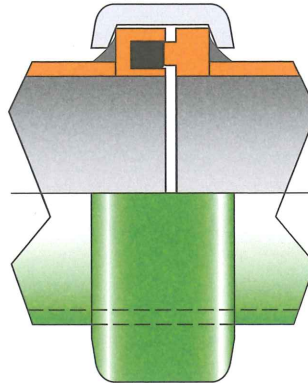
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**VII. Weld-On Ends/Coupling Comparison**

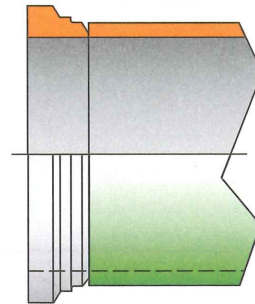
Shown is a comparison among commonly used ends/couplings. No two ends shown can be joined without the use of an adapter pipe or a special adapter clamp. Clamps and pipe strength must also be considered when determining proper system requirements. The ratios shown in the text below represent the safety factor from burst:working pressures.

1. Male/female o-ring type couplings have the highest pressure rating of the ends commonly used for concrete pumping. They can withstand 4350 PSI @ a 2:1 safety factor. They are self-aligning and waterproof when used with o-rings in good condition. Typically not used on booms because of their weight. Pipes equipped with this style coupling cannot be swapped end-for-end.



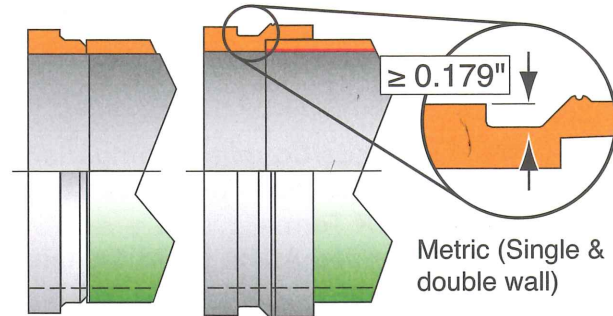
Male / Female  
O-Ring  
(shown with clamp)

2. Heavy-Duty couplings are designed for pressures up to 2250 PSI @ 2:1. They have 20% more contact area than metric couplings, and a tapered face that draws the pipe sections together during assembly. Both the ends and clamps weigh more than metric style, and therefore should not be used on booms without consulting the manufacturer.



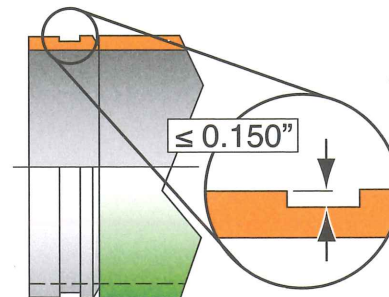
Heavy-Duty

3. Metric couplings are designed for pressures up to 1400 PSI @ 2:1. They have 85% more contact area than grooved couplings. The face is flat and will not draw pipe together. Although they have a raised edge, they are not compatible with Heavy-Duty couplings unless a special clamp or an adapter pipe is used to change from one style to the other. Metric connections are standard equipment on booms because of the weight savings compared with other styles.



Metric (Single & double wall)

4. Grooved (Victaulic) couplings (lip height of 0.15" or less) are designed for pressures only up to 750 PSI @ 2:1. The recessed groove is hard to clean when changing pipe on a job. The weld-on end fails before the pipe because the groove is cut into the pipe thickness, making it the weakest spot. Grooved couplings are not recommended for concrete pumping applications.

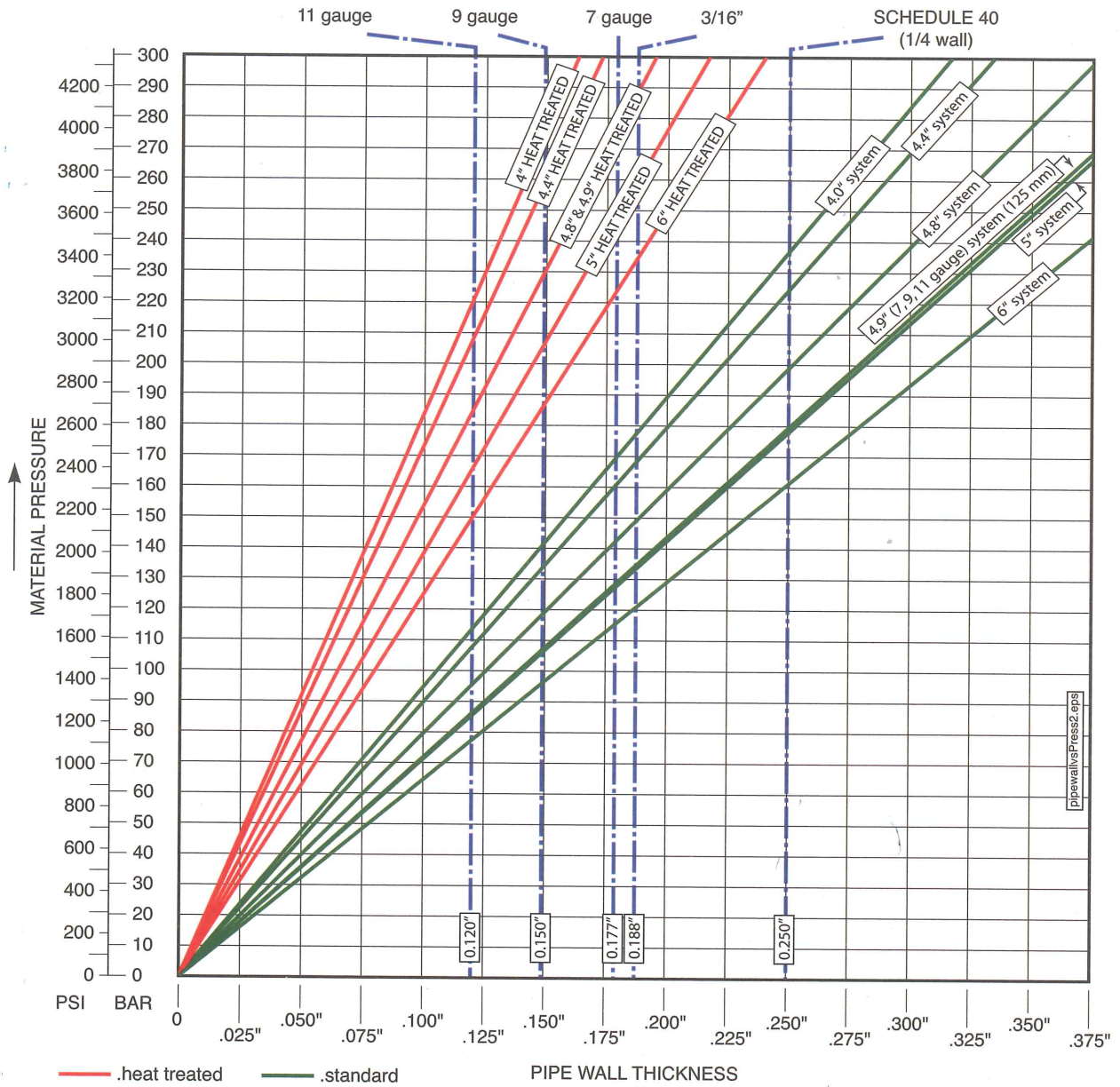


Grooved; flange height equal to or less than 0.150", cut directly into pipe wall. NOT ALLOWED for concrete pumping per ASME B30.27

**NOTE:** All pressure ratings listed refer to 5-inch (125mm) diameters in like-new condition. Other pressures would apply to other diameters.



## VIII. Minimum Pipe Wall Thickness Chart



1. This chart assumes a safety factor of 2:1. Higher safety factors may be required in some circumstances.
2. Wear reduces wall thickness. Thickness must be checked on a regular basis.
3. Pressures may be limited even more by clamp style or pipe end used.
4. The chart is based on 62,000 PSI tensile strength. Heat-treated calculations are based on 120,000 PSI tensile strength.
5. The chart is for pressure calculations ONLY. There is no allowance for mechanical forces other than pressure, and thicker walls may be needed for mechanical strength because of support or restraint considerations.
6. The chart does not take into account metal fatigue caused by pressure cycles.

**Note!** This chart is intended as a guide for concrete pumping applications and is subject to the notes, assumptions, and conditions listed above. Any other use of this chart is not recommended.

This chart does not apply to double-wall pipe. Double-wall pipe can be checked by inspecting the inside of the pipe. If the insert is intact, the pipe is okay. If the insert is worn through, the pipe must be replaced. Contact your pipe supplier for the pressure capacity of your double-wall pipe.

## IX. Glossary Of Terms

### **Accumulator**

A hydraulic device that stores fluid power energy in much the same way that a battery stores electrical energy. Because an accumulator will store energy, it **MUST** be drained and depressurized before work begins on an accumulator-equipped actuator or hydraulic system.

### **Agitator**

A device that sits in the concrete hopper to keep concrete moving, preventing it from setting. It is typically a rotating shaft to which several paddles have been mounted. *See Also:* Hopper Grate

### **ASME B30.27**

A safety standard for material placement systems (concrete pumps and material placement conveyors) that has been accepted by ANSI as an American National Standard.

### **Blanking Plate**

Also known as a blanking plug or end cap. Its purpose is to prevent material from falling out of the delivery system when moving a boom with a full pipeline over personnel or property.

### **Blockage**

Simply put, if the pump is pushing and concrete fails to come out at the point of discharge, it is called a blockage. Blockages can be removed with pump pressure, by rocking the pump between forward and reverse, or some other remedial measure. If the blockage cannot be removed in such a manner, it's called a plug. *See Also:* Plug, Rock Jam. The causes of blockages are detailed in Section 6.12 of this manual. In all cases, blockages create a hazard by causing high concrete pressure, combined with the sometimes uncoordinated efforts of untrained workmen to remedy the problem.

### **Bulk Density**

The mass of a substance per volume. For example, one cubic foot of air weighs much less than one cubic foot of water. One cubic foot of lightweight concrete weighs less than one cubic foot of steel-entrained concrete. We could say that steel-entrained concrete has a higher bulk density than lightweight concrete. All calculations for the operation manuals and specifications of concrete pumps are based upon 150 pounds per cubic foot, which is the approximate mass of hard rock (normal) concrete.

### **Certified Operator**

An operator that has been issued a certification card by the American Concrete Pumping Association. There are several classes of certification, each relating to a different category of pump. For an operator to become certified, he (she) must: pass the written tests regarding operation, setup, and cleanout for each category of pump; pass the safety rules test which is common to all certification categories; meet the experience requirements set forth for each category; and maintain a safe and clean driving record. The certification card only certifies that the operator has passed a written test administered by an ACPA certification proctor and does not attest to their ability to operate a concrete pump. *See Also:* Qualified Person, Qualified Operator.

### **Concrete Delivery Hose**

A flexible concrete hose that has two end couplings.

### **Concrete Pressure**

The force per square area that is exerted on the concrete. The concrete pressure will always be a ratio in direct proportion to the hydraulic oil pressure on the concrete pump circuit. *See Also:* Maximum Pressure



## Decibels

One tenth of a bel. Abbreviated dB. It is a measurement of sound volume. As it applies to concrete pumps, it is a measurement of the sound pressure level one meter away from a noise source. O.S.H.A. has developed guidelines for time limits on exposure to sound at different volume levels. The chart can be found on page 15 of this manual.

## Drive Engine

The primary source of power for a hydraulic system. Typically, the word "engine" denotes an internal combustion device, whereas the word "motor" denotes an electrical device.

## End Hose

A flexible concrete hose that has one end coupling.

## Foreign Material

Material that was never intended to be pumped, which ends up in the concrete hopper. Examples of foreign material include: small animals; hammers; ready mix truck fins; unmixed clumps of cement; hardened concrete that breaks away from ready mix truck fins; and soda pop cans. These items could create a blockage if pumped.

## Go-devil

A plug made from a rubber composite, usually with several fins that expand to seal when pressure is applied. They are intended to be inserted in a steel delivery pipeline and pushed with water or compressed air for the purpose of cleaning the pipe. *See Also:* Sponge Ball

## Guide

An assistant brought in to help in backing up a truck or trailer, or to help in other circumstances where the driver cannot see enough to assure safety. *See Also:* Signaller

## High Voltage

For the purposes of this manual, anything over 28 volts is to be considered high voltage. In the U.S., electrically driven concrete pumps normally operate the motors at 480 volts AC (high voltage) and the controls at 24 volt DC (low voltage).

## Hopper Grate

A meshwork placed over the concrete hopper, typically made from steel bars. It serves the functions of keeping human body parts away from the agitator (when left in its proper position) and keeping large foreign objects from falling into the hopper, which could cause blockages if they were pumped.

## Jacking the Outriggers

Adjustment of the outriggers in the vertical direction.

## Licensed Electrician

A qualified electrician licensed by the state, county or municipality where the connections are to be made. In some locations electricians are not required to be licensed, and in these cases the work should still be carried out by competent professionals. Under no circumstances should high-voltage connections be made by a concrete pump operator or related personnel.

## Maintenance

All procedures for service, inspection, and repair of concrete pumps and related equipment and devices. Maintenance and inspection are methods of *maintaining* the desired state of the equipment. Repair is the method of *restoring* the desired state of the equipment.

## Maximum Pressure

When talking about a hydraulic system, maximum pressure refers to the highest pressure that can be achieved with the settings of the circuit relief valves. When discussing concrete output, maximum pressure refers to the pressure that will be developed if the hydraulic system pressure

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reaches the relief valve setting. Concrete pressure is the force at which the differential cylinders are moving, divided by the cross sectional area of the concrete cylinder. Maximum concrete pressure, then, is developed when the differential cylinders are moving with maximum force, which is determined by the hydraulic system relief valve setting. *See Also:* Concrete Pressure.

## Minimum Safety Distance

In this manual, the term “minimum safety distance” refers to the closest distance that you are allowed to approach an object, electrical wires, etc. and still leave room for errors in human judgement or machine malfunction. With electrical wires in the U.S., this distance is 20 feet from the wires (50 feet above 350 Kv), as recommended by the American Concrete Pumping Association. This distance may have other values in different locations. It is up to the operator to know the value for the place of operation.

## Operational Area

The area around a working piece of equipment or point of discharge where hazards can be encountered due to the nature of the machinery or process in use.

## O.S.H.A.

Occupational Safety and Health Administration. A branch of the United States federal government that deals with job safety. It establishes and enforces safety regulations for industry and business. Among the areas over which it has authority are construction job sites and work shops.

## Personal Protective Equipment (P.P.E. or just PPE)

Things you can wear to protect yourself from potential dangers in a concrete placing environment. Examples are:

- Snug-fitting work clothes
- Steel-toed work boots
- Lime-resistant gloves
- Safety glasses
- Ear muffs or ear plugs
- Rubber boots when you have to stand in concrete
- Hard hat
- Breathing mask when working with cement dust

## Plug

A plug is a blockage that cannot be removed with the pump pressure, or by other remedial measures. A plug must be removed manually. *See Also:* Blockage.

## Point of Discharge

Also known as the point of placement. The location of concrete expulsion from a delivery system. This can be the point of placement (the actual form that is being filled with concrete) or the cleanout area after completion of the job.

## Pour

Used by the concrete pumping industry and in this manual as a noun. It is the specific job for the pump during any given time period. (e.g. “We’ll grab lunch right after the pour.”)

## Qualified Person

As used in this *Safety Manual*, a *qualified person* is defined as: a person who, by possession of a recognized degree of certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work. Other qualified persons may include master mechanics and after-sales service technicians of the manufacturer. *See Also:* Certified Operator



## Qualified Operator

Operators shall be considered qualified when they have completed a program of training and supervised operation of concrete pumps and have passed a practical operating examination of their ability to operate a specific model and type of equipment as well as their understanding of the controls and operating procedures. Furthermore, the operator must meet the knowledge and physical requirement sections of the concrete pumping safety standard.

## Qualified Personnel

A generic term used to describe a person who is qualified in the area of application. For example, having your boom repairs inspected by “qualified personnel” before use would refer to inspection by a certified welder or certified welding inspector. Having repairs to your hydraulic system done by “qualified personnel” would refer to repairs made by qualified workshop personnel.

## Qualified Workshop Personnel

An individual who:

- has reached the age of 18 years,
- is physically and mentally capable,
- has been trained in proper repair, maintenance, and inspection procedures plus the pertinent safety rules for concrete pumps and related equipment,
- has demonstrated their capabilities to their company in regards to the above mentioned procedures and rules, and
- can be expected to perform these duties, as assigned, in a reliable manner.

## Rock Jam

A specific type of blockage caused when the cement and fines of the concrete are not present in sufficient quantity to fully coat the larger aggregates and the walls of the delivery system. In these cases, the rock (larger aggregates of the mix) will form a wedge inside of the pipe. Resistance to movement then becomes overpowering and the concrete stops. *See Also:* Blockage.

## Separate Pipeline

A pipeline that is laid between the concrete pump and the point of discharge, other than the placing boom pipeline.

## Shutoff Valve

In hydraulics: a valve with the ability to stop the flow or pressure of hydraulic oil. It must be able to withstand the maximum pressure of the hydraulic circuit that it controls.

In concrete: A manually or hydraulically operated valve that will prevent the flow of concrete in either direction. The shutoff valve must be able to withstand the maximum pressure on the concrete of which the pump is capable of exerting.

## Signalperson

A person positioned at a vantage point where both the point of discharge and the pump operator can be seen and who relays operational signals to the operator.

## Soil Pressure

The force per square area that is exerted on the ground by the outrigger legs. The amount of pressure that the soil will support varies with the composition and compaction of the soil. To make a determination on the stability of the soil.

## Sponge Ball

A medium to hard sponge formed into a sphere and used to clean the inside of delivery pipelines. *See Also:* Go-devil



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## **Spotter**

A person positioned at a vantage point where the distance between a hazard and the pump can be clearly seen and evaluated and the pump operator can be alerted if a predetermined safety distance is compromised. *See Also:* Guide

## **Sucking Back**

The act of putting the concrete pump into the reverse mode for any of several reasons.

## **Thrust Block**

Also known as a “dead man”. This is a large block of poured concrete, usually with one or more sweep elbows cast inside, placed at the bottom of a vertical run for the purpose of supporting the weight of the vertical run and for lateral stabilization of the pipeline. It stabilizes and supports the vertical run by virtue of its enormous mass (normally one cubic yard or larger).

## **Towing Vehicle**

In this manual, *Towing Vehicle* applies only to vehicles that tow trailer-mounted concrete pumps. It is the vehicle that you will use to tow the trailer on the road, on the job site, or in the yard. See the safety rules regarding this subject on page 8 of this *Safety Manual*.

## **Transport Position**

This relates to the position of the machinery when you will be driving or towing the unit. For example, the travel position of the engine hood is the position of the hood when it is completely lowered and latched into place.

## **Unauthorized**

Without authority, without permission. Examples: Unauthorized operation of the boom could be operation by a passer-by, unauthorized repairs to the boom could be repairs designed without the manufacturer’s knowledge.

## **Unintentional Movement**

Movement of the pump, boom or related equipment without a specific intentional command by the operator. An example of an unintentional movement would be if an operator fell while walking with the remote control box and accidentally hit a joystick, causing a boom movement.

## **Vertical Run**

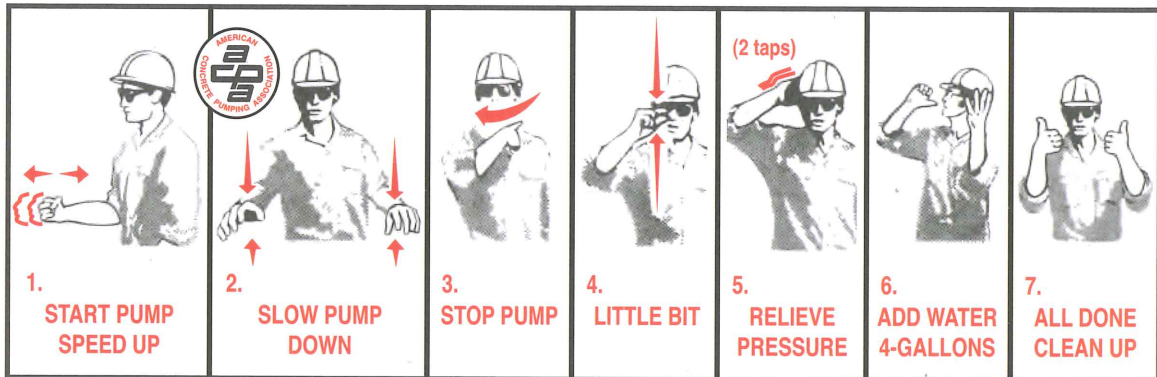
Sections of concrete delivery pipeline that are running in an up (or down) direction. Vertical runs have very specific procedures and rules for installation, support, cleaning, and inspection. Concrete pumping personnel should, therefore, have specific training in these procedures and rules before attempting to use them in a job setting.

## **Water Jet**

The actual stream of water that comes out of the end of a water hose or pressure washer. This is the only part of the water system that needs to go into the hopper, concrete valve, or water box for cleaning.

## X. Recommended ACPA Hand Signals

The American Concrete Pumping Association (ACPA) recommends using the following hand signals as standard procedure.



ACPAhandsigsmallline2.eps

## XI. Bibliography

Further information regarding concrete pumping is available from the sources listed below. Information for this book was gathered from several different sources, including the following books:

PUMPING CONCRETE AND CONCRETE PUMPS © F. W. Schwing, GmbH

CONCRETE PUMP OPERATOR'S GUIDE TO SAFETY © British Concrete Pumping Association

The MANUAL and ADVISORY SAFETY CODE of PRACTICE for CONCRETE PUMPING © British Concrete Pumping Association

SAFETY STANDARD FOR CONCRETE PUMPS, PLACING BOOMS, AND DELIVERY SYSTEM by the Concrete Pump Manufacturers Bureau

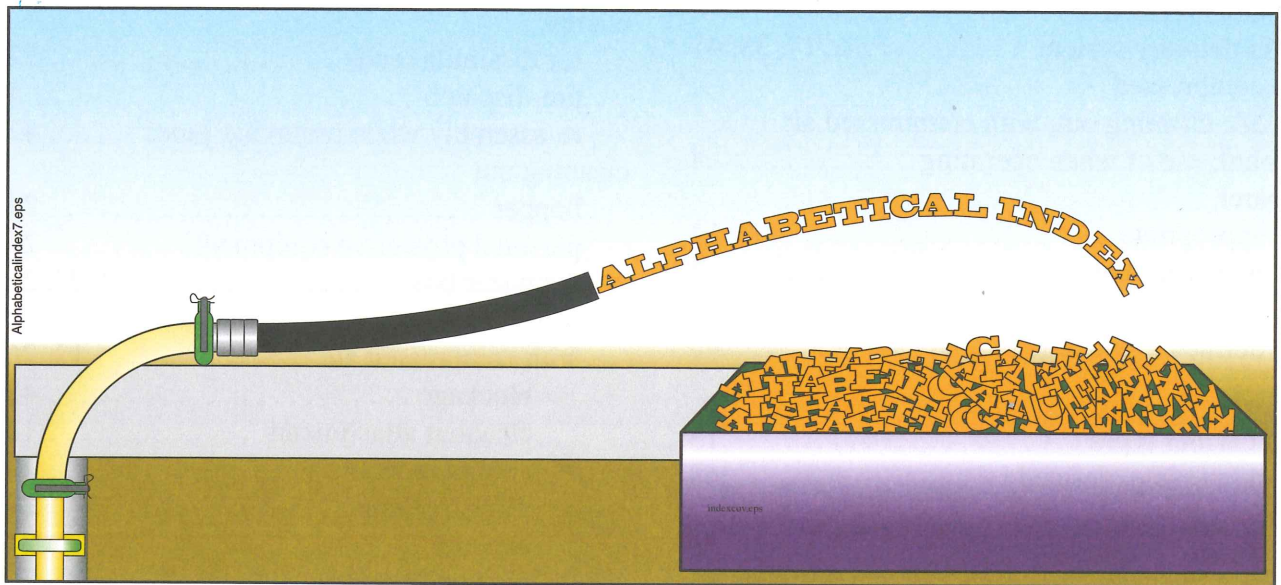
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The American Concrete Pumping Association

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Information contained in this Safety Manual is not intended to supercede the manufacturer's recommendations or company policies.



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