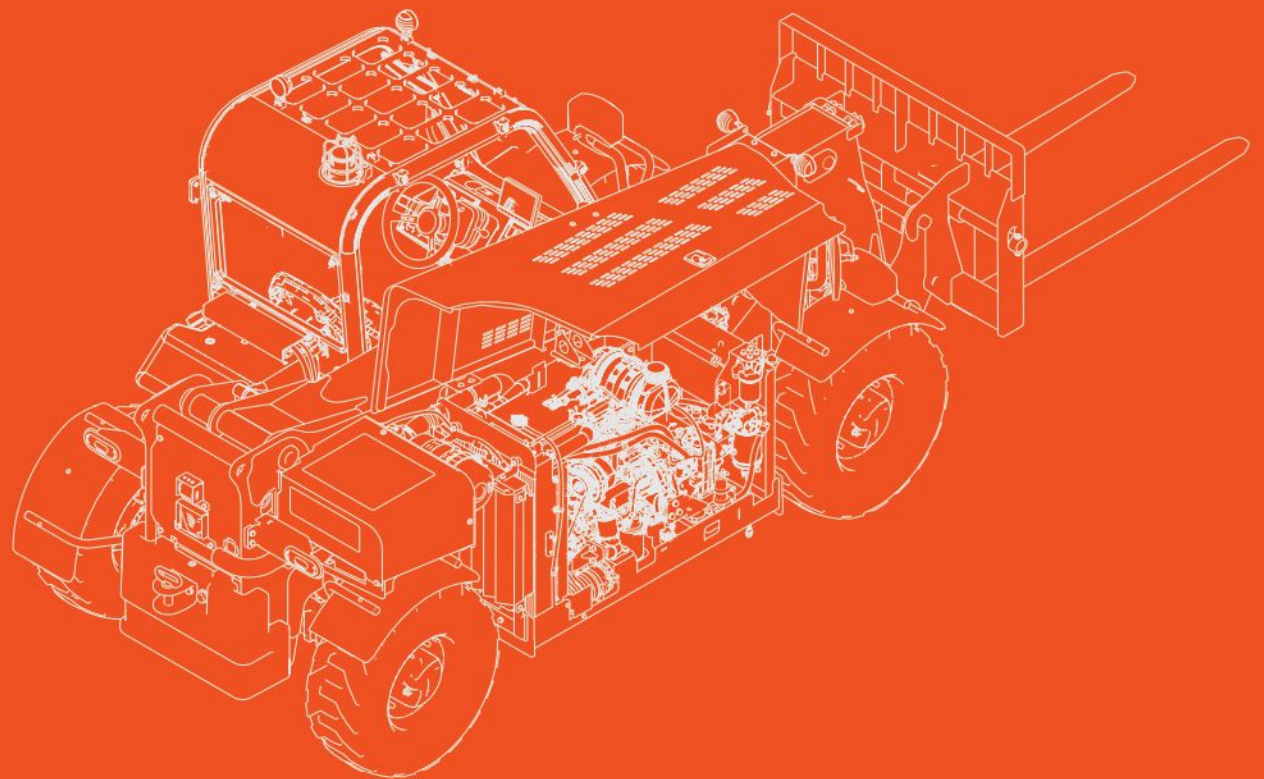




SERVICE MANUAL

SJ519 TH

TELEHANDLERS



216942AD

April 12 2024
ANSI

This manual is for telehandlers with serial numbers:

SJ519 TH: 87 500 000 to 87 599 999

Please refer to the website (www.skyjack.com) for contact information, other serial numbers, the most recent technical manuals, animations, and USB software.

The original instructions are in English.

THIS SAFETY ALERT SYMBOL MEANS ATTENTION!



BECOME ALERT! YOUR SAFETY IS INVOLVED.

The Safety Alert Symbol identifies important safety messages on telehandlers, safety signs in manuals or elsewhere. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

 DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT

IMPORTANT indicates a procedure essential for safe operation and which, if not followed, may result in a malfunction or damage to the telehandler.

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Section 1 – Maintenance

1.1 Read and Heed

Skyjack is continuously improving and expanding product features on its equipment; therefore, specifications and dimensions are subject to change without notice.

1.1-1 Telehandler Definition

A telehandler is a material handler designed primarily as a fork truck with a pivoting telescopic boom, which enables it to pick and place loads at various distances and lift heights.

1.1-2 Purpose of Equipment

The Skyjack telehandlers are designed to lift, handle and transport agricultural or industrial products by means of specific attachments.

1.1-3 Use of Equipment

The telehandler is a highly maneuverable, mobile work station. Lifting, handling and driving must be on a flat, level, compacted surface. It can be driven over uneven terrain only when the boom is fully lowered.

1.1-4 Service Policy and Warranty

Skyjack warrants each new product to be free of defective parts and workmanship for the first 2 years or 3000 hours, whichever occurs first. Your local Skyjack dealer will replace or repair any defective part, with no charge for parts or labour. In addition, all products have a 5-year structural warranty. Contact the Skyjack service department for warranty statement extensions or exclusions.

1.1-5 Ownership of MEWP

Notify Skyjack of telehandler ownership. If you sell or transfer the ownership of a telehandler, promptly notify Skyjack of the new owner's contact information.

Skyjack needs this information to inform the owner of any updates or additional activities that are necessary to keep the machine in proper working condition.

1.1-6 Optional equipment

This telehandler accepts a variety of optional equipment. Refer to the operation manual for a list of the optional accessories. Operating instructions for these options are in the operation manual.

For components or systems that are not standard, speak to the Skyjack service department. Give the model and serial number for each applicable telehandler.

1.2 General information

1.2-1 Replacement parts

Use only original replacement parts. Parts such as batteries, wheels, railings, etc. with weights and dimensions different from the original parts will affect the stability of the telehandler. They must not be used without the manufacturer's consent.

All replacement tires must be of the same size and load rating as the originally supplied tires to maintain the safety and stability of the telehandler.

WARNING

A unit that is damaged or not operating correctly must be immediately tagged and removed from service until repairs are completed.

1.2-2 Maintenance and service safety tips

1. Maintenance and repair should only be done by personnel who are trained and qualified to service this telehandler.
2. Do the maintenance and service procedures in a well-lit and well-ventilated area.
3. Anyone operating or servicing this telehandler must read and fully understand all operating instructions and safety hazards in both this manual and the operation manual.
4. Make sure all tools, supports, and lifting equipment are of the correct rated load and in good working condition.
5. Keep the work area clean and free of debris to avoid component contamination.
6. Make sure personnel are not below unsupported components or systems that are at risk of movement during maintenance.
7. All service personnel must be familiar with the employer and governmental regulations for servicing this type of equipment.
8. Keep sparks and flames away from flammable or combustible materials.
9. Correctly dispose of waste material such as lubricants, rags, and old parts in accordance with national, state/provincial/territorial, and local regulations.
10. Before you do any repair work, disconnect the main power connectors.

1.2-3 Hydraulic system & component maintenance and repair

WARNING

The fluid which escapes from a high-pressure hydraulic leak can damage your eyes, penetrate your skin, and cause serious injury. Wear the correct personal protective equipment at all times.

1. The hydraulic circuits include relief valves which limit pressure to safe operation values. They help to prevent the failure of hydraulic or structural components.
2. Make sure the hydraulic oil is completely clean. Even small amounts of dirt or unwanted materials in the system can damage components and cause unsatisfactory operation of the hydraulic system.
3. Drain and flush the entire system and replace the filter cartridges if you have any reason to believe there is contamination of the hydraulic system, or hydraulic system failure.
4. When you drain the hydraulic system, check the magnets in the hydraulic tank for metal particles. Metal particles can indicate imminent component failure. If metal particles are present, flush the entire system and change the hydraulic oil.
5. All containers and funnels used in handling the hydraulic oil must be completely clean. Use a funnel when necessary and fill the reservoir only through the filter opening. Do not use a cloth to strain the oil, as lint could get into the system.
6. When you remove a hydraulic component, cap and tag all of the hydraulic lines involved. Plug the ports of the removed components.
7. Disassemble hydraulic components in clean surroundings. Carefully identify the parts to make sure you reassemble them correctly. Clean all metal parts in a clean mineral oil solvent. Be sure to clean all internal passages fully. After the parts are dry, lay them on a clean, lint-free surface for inspection.
8. Replace all O-rings and seals when you overhaul a component. Lubricate all parts with clean hydraulic oil before you reassemble them. Use a small amount of petroleum jelly to hold O-rings in place during assembly.

9. Be sure to replace lost hydraulic oil after you install the repaired component. Bleed air from the system when required.
10. Keep all hydraulic connections tight. A loose connection in a pressure line allows the oil to leak or draw air into the system. Air in the system can damage components and cause noisy or erratic system operation.
11. Preventive maintenance is the easiest and least expensive type of maintenance.

1.2-4 Hydraulic oil maintenance

Draw samples of hydraulic oil from the reservoir annually and test them.

- Take these samples when the oil is warmed through normal operation of the system.
- Have the sample analyzed by a qualified lubrication specialist to determine if it is suitable for continued use.

Oil change intervals depend on the care used to keep the oil clean, and the operating conditions.

- Oil must be changed more often when there is dirt or moisture contamination.
- Under normal use and operating conditions, you should change the hydraulic oil every two years.

1.2-5 Hydraulic maintenance tips

1. Change the filters annually. Dirty, dusty, and high-moisture environments can cause the hydraulic system to be contaminated more quickly. You may need to change the filters more often.
2. Keep a sufficient quantity of clean hydraulic oil of the correct type and viscosity in the hydraulic tank.
3. Keep all hydraulic connections tight.

1.3 Scheduled maintenance and inspections

1.3-1 Service bulletins

Before performing any scheduled maintenance inspection procedure, refer to the service bulletins found on our website: www.skyjack.com for updates related to the service and maintenance of this telehandler.

1.3-2 Maintenance and inspections

Death or injury can result if the telehandler is not kept in good working order. Inspection and maintenance should be done by competent personnel who are trained and qualified on maintenance of this telehandler

WARNING

Failure to perform each procedure as presented and scheduled may cause death, serious injury, or substantial damage.

NOTE

Preventive maintenance is the easiest and least expensive type of maintenance.

- Unless otherwise specified, do each maintenance procedure with the telehandler in the following configuration:
 - Park the telehandler on a flat and level surface
 - Disconnect the battery by disconnecting the main power connector.
- Repair damaged or malfunctioning components before operating the telehandler.
- Keep records of all inspections.

1.3-3 Schedule and instructions

The actual operating environment of the telehandler may affect the maintenance schedule.

The inspection points covered in the [1.3-5 Pre-delivery/maintenance and inspection checklist](#) indicate the areas of the telehandler to be maintained or inspected, and at what intervals the maintenance and inspections are to be done.

Inspection schedule frequency:

Daily	A	Do a daily inspection.
Weekly or 50 Hours	B	Do a weekly inspection, or every 50 hours.
Quarterly or 250 Hours	C	Do a quarterly inspection, or every 250 hours.
Annually or 1000 Hours	D	Do an annual inspection, or every 1000 hours.

- Make copies of the maintenance and inspection checklist to be used for each inspection.
- Check the schedule on the checklist for the type of inspection to be done.
- Place a check mark in the appropriate box after each inspection procedure is done.
- Use the maintenance and inspection checklist and the step-by-step procedures in [1.3-6 Inspection points](#).
- If an inspection receives a fail, tag and remove the Telehandler from service.
- If a telehandler component has been repaired, do an inspection again before you remove the tag. Place a check mark in the repair column.

Legend

Pass	P
Not applicable	N/A

1.3-4 Repairs

When repairs are made to a Telehandler, the service technician must complete the full pre-operation inspection and function tests before putting the Telehandler into service.

IMPORTANT

Never use a malfunctioning MEWP. If malfunctions are discovered, tag the MEWP and remove it from service.

1.3-5 Pre-delivery/maintenance and inspection checklist



Table 1.1 MAINTENANCE AND INSPECTION CHECKLIST

Serial Number: _____
 Model: _____
 Hourmeter Reading: _____ Operator's Name (Printed): _____
 Date: _____
 Time: _____ Operator's Signature: _____

Each item shall be inspected using the appropriate section of the Skyjack operating manual. As each item is inspected, write the appropriate grade in the box.

- P** - PASS
- F** - FAIL
- R** - REPAIRED

- INSPECTION FREQUENCY**
- DAILY
 - WEEKLY or 40 HOURS
 - QUARTERLY OR 250 HOURS
 - ANNUALLY or 1000 HOURS

Inspection Schedule	
Daily	A
Weekly or 50 Hours	A + B
Quarterly or 250 Hours	A + B + C
Annually or 1000 Hours	A + B + C + D

Schedule	P	F	R
Schedule Maintenance Inspections			
Labels	A		
Electrical	A		
Mirrors	A		
Hydraulic	A		
Cylinders	A,B,C,D		
Frame			
Wheel/Tire Assembly	A		
Air-filled Tires	A		
Foam-filled Tires	A		
Battery and Cables	A		
Hydraulic Tank	A		
Hydraulic Oil	A,D		
Engine Intake Air Filter	A,B,C		
Tilt Switch	A,B,C,D		
Drive Axles			
Hub Oil	D		
Differential Oil	D		
Pinion Seal	A		
Inner and Outer Shaft Seals	A		
Hub Seals	A		
King Pins	C,D		
Check Drive Shafts and U-Joints	C,D		
Axle Mounting Pins and Bushings	C,D		
Axle Housing	A		
Steer Cylinder Assembly	A		
Steer Linkage	A		
Engine Compartment			
Engine Oil	A,C		
Engine Coolant Level	A		
Fuel Leaks	A		
Belts and Hoses	A		
Fuel Tank	A		
Change Fuel Filter	A,C		
Drain Fuel/Water Separator	C,D		
Change Oil Filters	A,C		
Charge Accumulators (if equipped)	A		
Transmission			
Operate and Check Shifting	A		
Check for Leaks	A		
Change Transmission Oil	D		
Change Oil Filter	D		
Hydraulic Pump	A		

Schedule	P	F	R
Boom			
Main pins and bushings	C,D		
subcarriage pins and bushings	C,D		
Rollers and Tracks	C,D		
Slide Pads	B,C,D		
Chain(s)	A,C		
Boom Angle Indicator	A		
Proximity Sensors	A		
Lifting Attachment(s)	A		
Forks	A		
Fork Bars and Locks	A		
Quick Attach apron	A		
Grease Fittings			
Grease Fittings on Frame	C		
Grease Fittings on Boom Assembly	C		
Operator's Cab			
Seat	A		
Pedals	A		
Manual	A		
Operator's Cab Controls	A		
Function Tests			
Operator's Cab Controls			
Test Starter Operation	A		
Test Horn	A		
Test Lights (If Equipped)	A		
Test Boom and Attachment Functions	A		
Test Frame Leveling and Level Indicator	A		
Test Frame Leveling and Boom Interlock	A		
Test Accelerator Pedal	A		
Test Reverse Alarm, Driving & Service Brake	A		
Test Steering	A		
Test Positive Shut-off Valve (if equipped)	A		
Test Parking Brake	A		
Test Outriggers (If Equipped)	A		

2560

- A** - Perform Visual and Daily Maintenance Inspections & Functions Test. Refer to Section 2.8 of the Operating Manual.
- B** - Perform Scheduled Maintenance Inspection every week or 40 hrs. Refer to Section 1 of this manual.
- C** - Perform Scheduled Maintenance Inspection every 3 months or 250 hours. Refer to Section 1 of this manual.
- D** - Perform Scheduled Maintenance Inspection every year or 1000 hours. Refer to Section 1 of this manual.

Note: Make a copy of this page or visit the Skyjack web site: www.skyjack.com for a printable copy.

1.3-6 Inspection points

Refer to [1.3 Scheduled maintenance and inspections](#) for more information and the inspection schedule.

WARNING

Environmental hazard. Immediately remove gasoline, diesel fuel, engine oil, and hydraulic fluid spills and leaks with rags. Discard these rags in accordance with national, state/provincial/territorial, and local regulations. Spilled fluids can damage the environment. When spilled fluids go into the water (for example, a sewage system, streams, rivers, or other surface water), they can kill aquatic life.

Legend



Visual inspection



Action required



Filters



Fluids



Grease



Inspection frequency



Procedure available in Section 5



Return to the PDI form

Use the [1.3-5 Pre-delivery/maintenance and inspection checklist](#) and do the inspections that follow:

Labels



- Refer to the operation manual. Make sure all labels are present and in the correct location, in good condition, and are legible. **A**

Electrical components



- Do a check of all electrical components and harnesses for chafed, corroded, loose, or damaged wires and connectors. Make sure the connections are tight.
- Make sure all switches and buttons rotate or move to all positions, are in good condition, and return to the neutral position. Make sure the switches haven't been tampered with or disabled.

Fluids and Filters



- Make sure all fittings and hoses are correctly tightened.



- Make sure the hydraulic tank cap, fuel tank cap, DEF tank cap, and radiator cap are tightly closed.
- Make sure the air, hydraulic oil, fuel, and engine oil filter housings are tight.
- If the filters have service indicators on them, replace the filter element if indicated.
- Look for hydraulic oil, engine oil, fuel, DEF, and coolant leaks.
- Do a check of the fuel, DEF, engine oil, coolant, and hydraulic oil levels. Add more fluid if necessary. Refer to [2.8 Recommended Fluids/Lubrications](#).

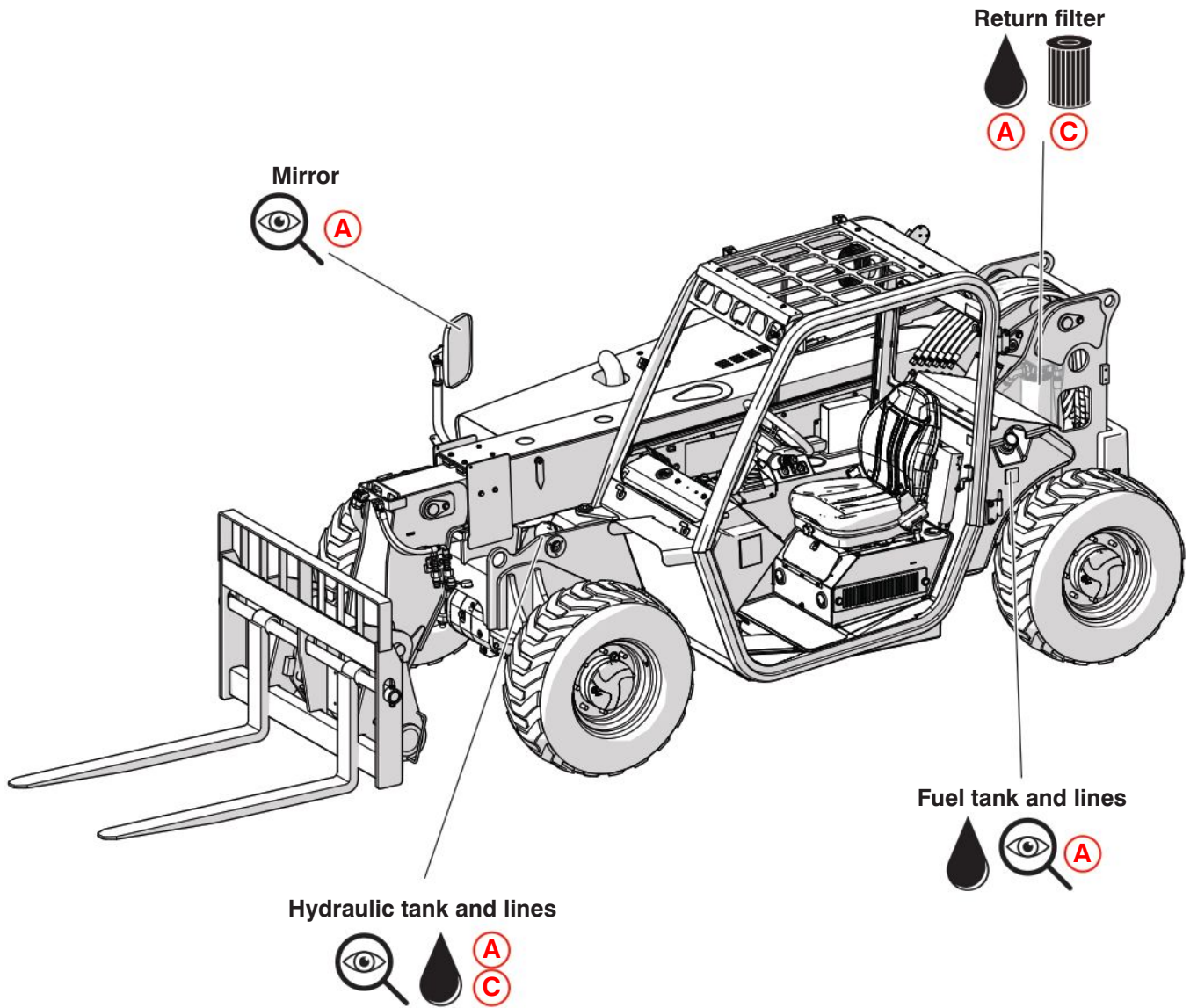
All components

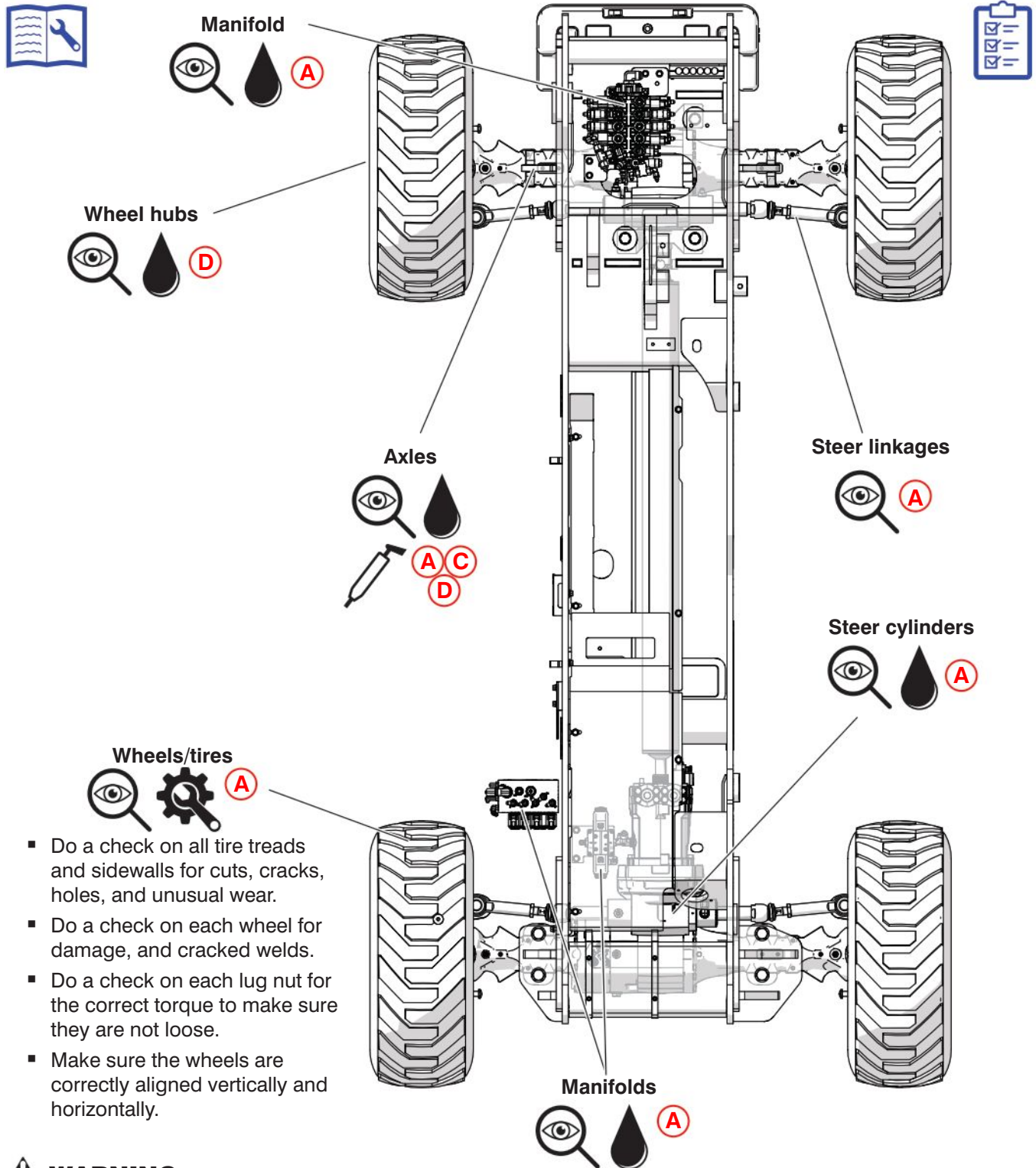


- Make sure there are no loose or missing parts.



- Make sure there is no visible damage, including cracks or deformities in welded parts.
- Make sure all hardware is present and the fasteners are tight.
- Make sure all pins are present and the fasteners are tight.
- Additional inspection items are listed on the following pages.
- Refer to [Section 5](#) for the inspection details.

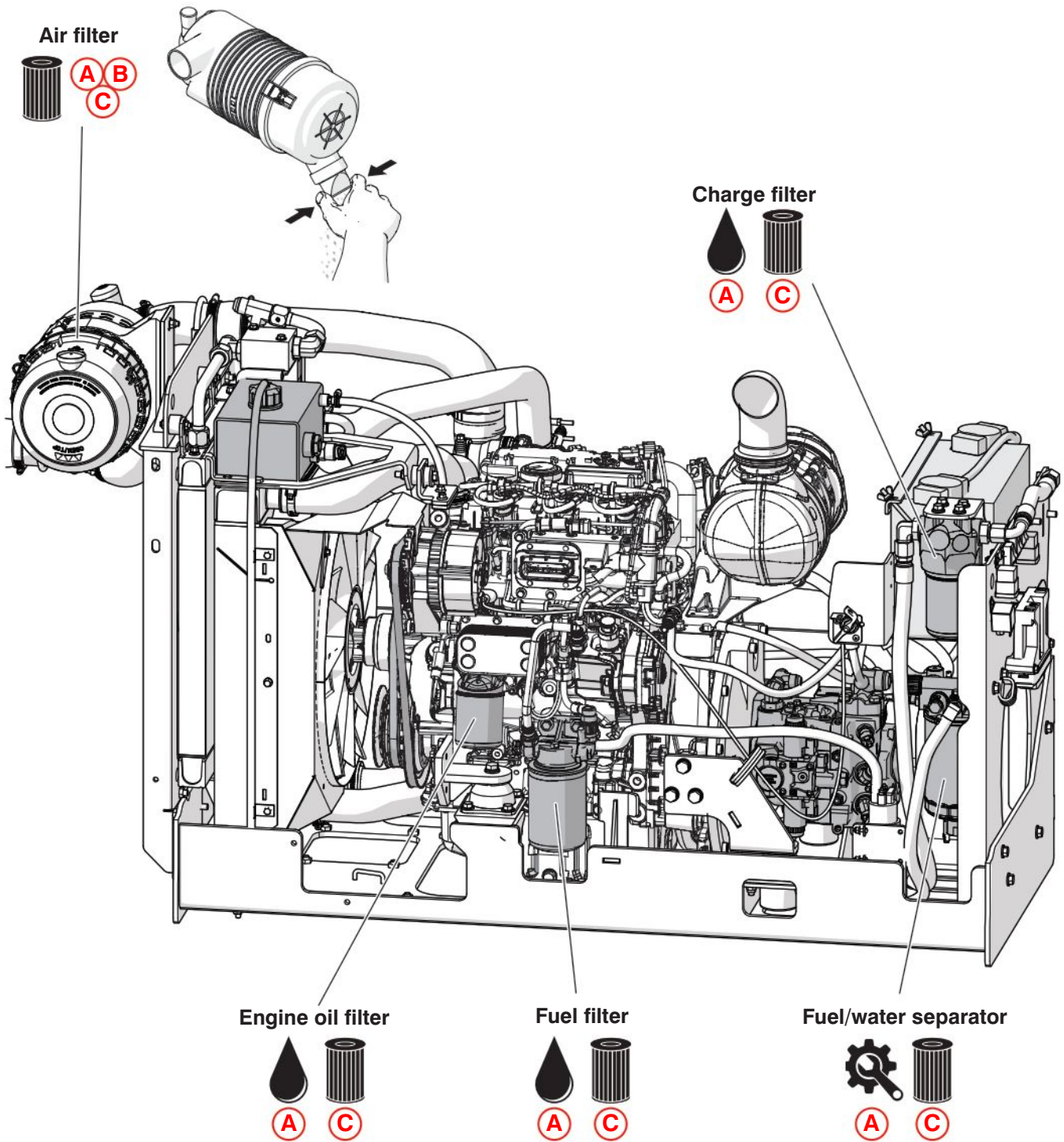


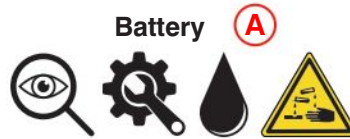


- Do a check on all tire treads and sidewalls for cuts, cracks, holes, and unusual wear.
- Do a check on each wheel for damage, and cracked welds.
- Do a check on each lug nut for the correct torque to make sure they are not loose.
- Make sure the wheels are correctly aligned vertically and horizontally.

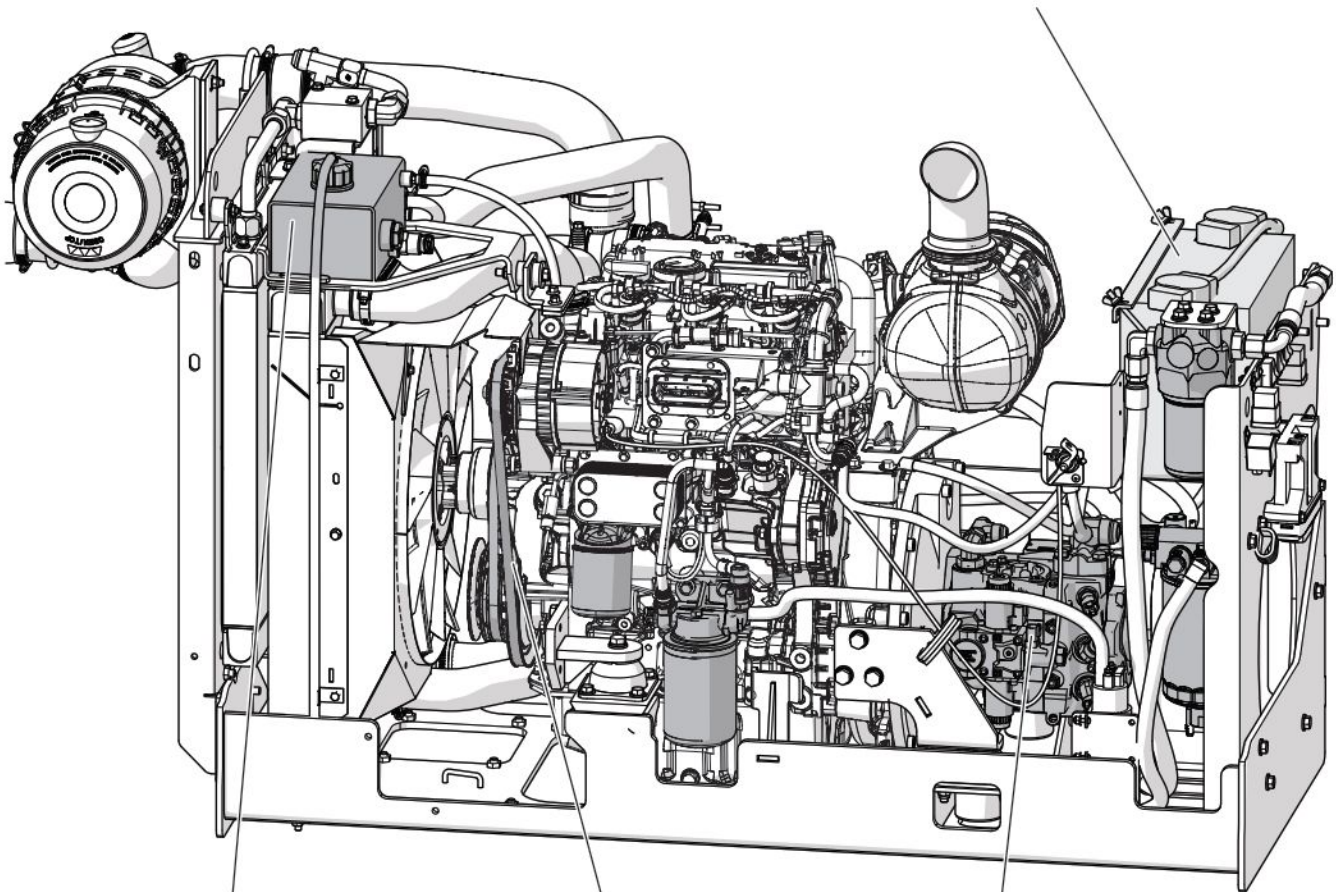
⚠ WARNING

Do not use tires other than those that Skyjack specifies for this MEWP. Do not mix different sizes or types of tires, or use tires that are not in good condition. Only replace the tires with the same types that are approved by Skyjack. The use of other tires can make the MEWP less stable. If you do not obey, there is a risk of death or serious injury.

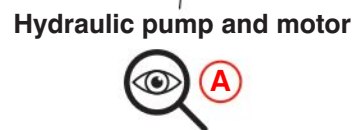


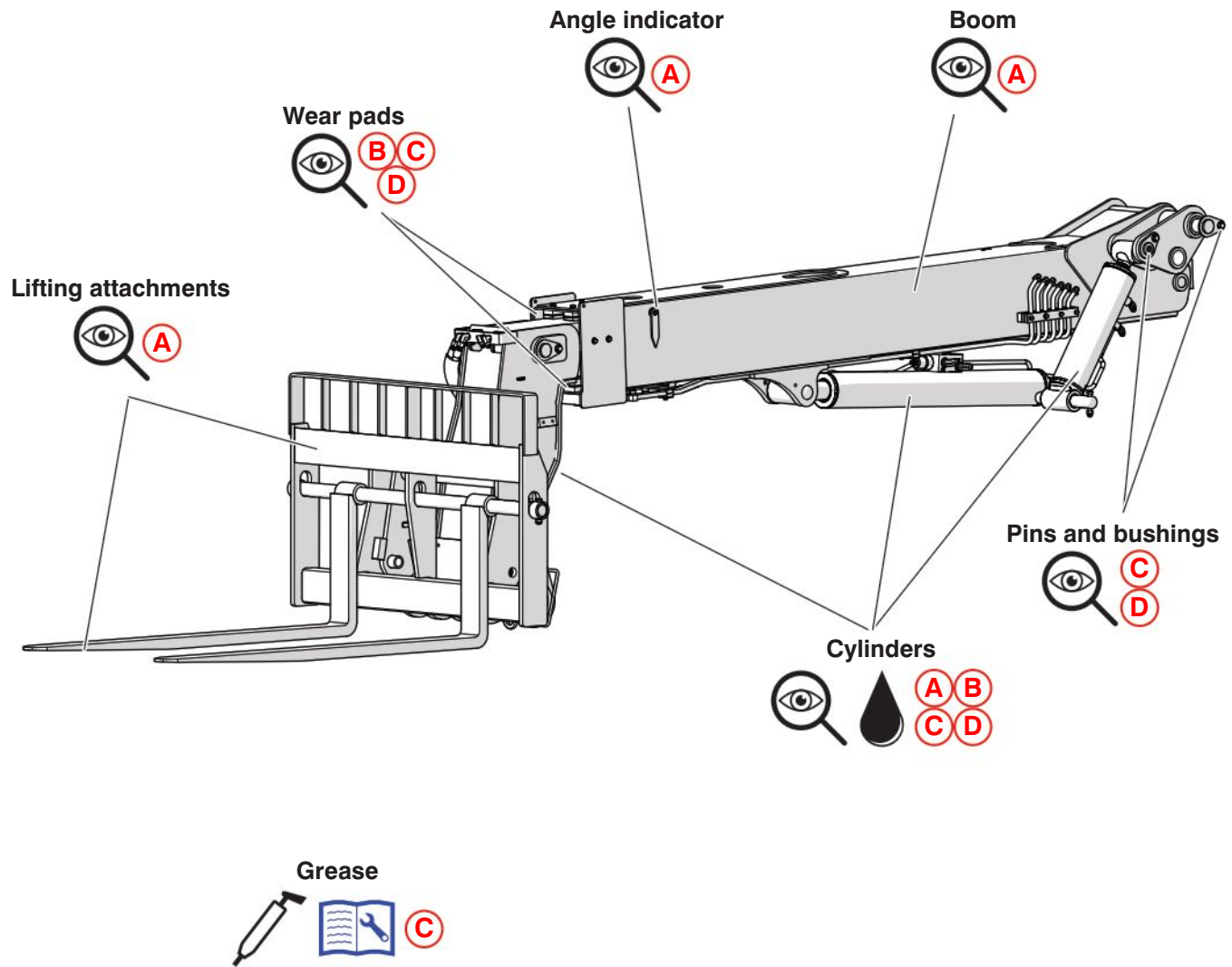


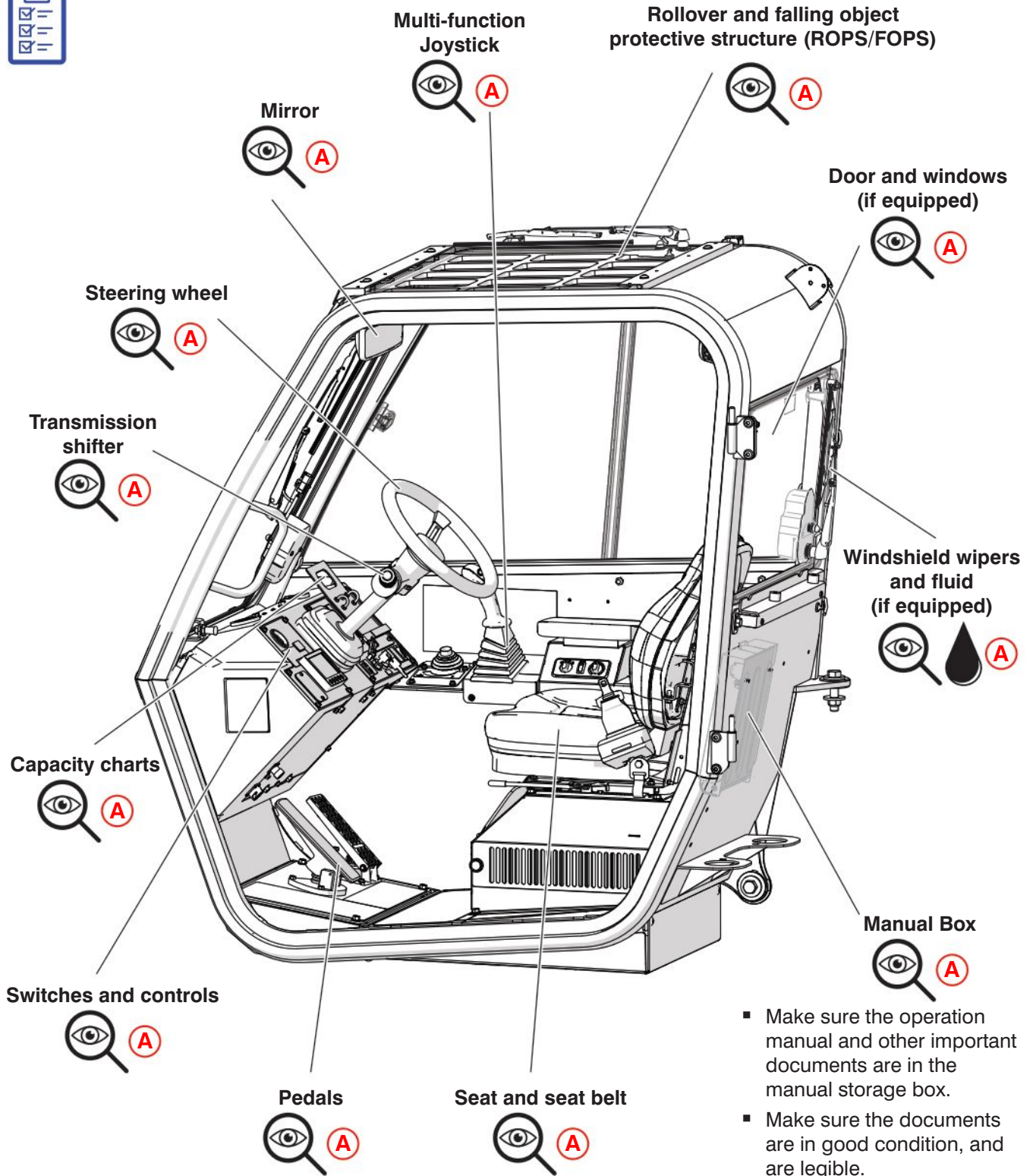
1. Do an inspection of the battery case for damage.
2. Clean the battery terminals and cable ends thoroughly with a terminal cleaning tool or wire brush.
3. Make sure all the battery connections are tight.
4. If applicable, check the battery fluid level.
 - If the plates do not have a minimum 13 mm (1/2 inch) of solution above them, add distilled or demineralized water.
5. Replace the battery if it is damaged or cannot hold a lasting charge.



- Check the coolant level.







- Make sure the operation manual and other important documents are in the manual storage box.
- Make sure the documents are in good condition, and are legible.
- Always put the manuals and other documents back in the storage box after use.



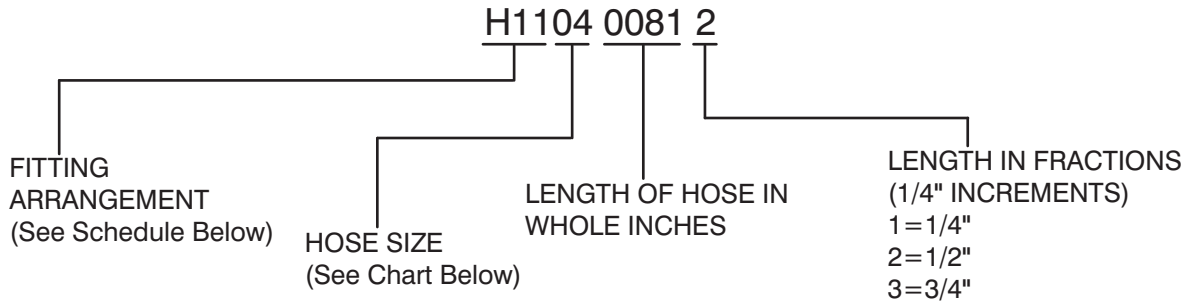
1.3-7 Function tests

Do the function tests after you complete the inspections.

Refer to the “Function Tests” section of the operation manual for detailed instructions on how to do the function tests.

Section 2 – Maintenance Tables

2.1 Standard Hose Numbering System



Using the number above as an example, H1104 0081 2, this hose requires a 37° JIC female swivel fitting on one end, and a medium length 90° JIC female swivel fitting for the other end. The hose must meet or exceed the S.A.E. 100R13 hose specification, and be a total of 81-1/2" long.



NOTE

Hose ends and hose must be from same manufacturer per S.A.E. J1273 Nov. '91, Sections 3.10 and 4.2. Hose ends and hose must be of the same size i.e. #4 size fittings must be used with #4 size hose.

Hose Size Chart														
Size	03	04	06	08	10	12	16	20	24	32	40	48	56	64
ID	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"

Fitting Arrangement Schedule			
Hose Prefix	Hose End Fitting	Hose End Fitting	S.A.E. Hose Specification
H01	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H02	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R13
H03	FEMALE, 37° JIC, SWIVEL	45°, FEMALE, 37° JIC, SWIVEL	100R17
H04	FEMALE, 37° JIC, SWIVEL	45°, FEMALE, 37° JIC, SWIVEL	100R13
H05	FEMALE, 37° JIC, SWIVEL	LONG 90°, FEMALE, 37° JIC, SWIVEL	100R17
H06	FEMALE, 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R17
H07	LONG 90°, FEMALE, 37° JIC, SWIVEL	LONG 90°, FEMALE, 37° JIC, SWIVEL	100R17
H08	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R4
H09	FEMALE, 37° JIC, SWIVEL	45°, FEMALE, 37° JIC, SWIVEL	100R4
H10	FEMALE, 37° JIC, SWIVEL	MALE PIPE THREAD FITTING	100R17
H11	FEMALE, 37° JIC, SWIVEL	MEDIUM 90°, FEMALE, 37° JIC, SWIVEL	100R13
H12	SHORT 90°, FEMALE, 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R17
H13	FEMALE, 37° JIC, SWIVEL	REUSABLE MALE PIPE THREAD FITTING	300 PSI
H14	REUSABLE MALE PIPE THREAD FITTING	NO FITTING	300 PSI

Hose Prefix	Hose End Fitting	Hose End Fitting	S.A.E. Hose Specification
H15	REUSABLE FEMALE, 37° JIC, SWIVEL	REUSABLE FEMALE, 37° JIC, SWIVEL	300 PSI
H16	NO FITTING	NO FITTING	100R4
H17	NO FITTING	NO FITTING	300 PSI
H18	REUSABLE, FEMALE, 37° JIC, SWIVEL	NO FITTING	300 PSI
H19	LONG 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R13
H20	FEMALE, SHORT 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R4
H21	FEMALE, SHORT 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R2AT
H22	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R2AT
H23	FEMALE, LONG 37° JIC, SWIVEL	LONG 90°, FEMALE, 37° JIC, SWIVEL	100R2AT
H24	FEMALE, SHORT 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R13
H25	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R4
H30	MEDIUM 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H31	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H32	SHORT 45°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H33	MEDIUM 45°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H34	SHORT 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H35	MEDIUM 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H36	LONG 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H37	SHORT 45°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R4
H38	SHORT 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R4
H39	LONG 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R4
H40	SHORT 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R16
H43	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R16
H51	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H52	SHORT 45°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H53	MEDIUM 45°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H54	SHORT 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H55	MEDIUM 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H56	LONG 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H57	SHORT 45°, FEMALE, SAE ORFS, SWIVEL	FEMALE, SAE ORFS, SWIVEL	100R13
H58	FEMALE, SAE ORFS, SWIVEL	FEMALE, SAE ORFS, SWIVEL	100R13
H59	MEDIUM 90°, FEMALE, SAE ORFS, SWIVEL	FEMALE, SAE ORFS, SWIVEL	100R13
H60	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H61	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R16
H62	SHORT 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R16
H63	MEDIUM 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R16
H64	LONG 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R16
H65	MEDIUM 67°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R12
H66	FEMALE, 37° JIC, SWIVEL	NO FITTING	100R4
H67	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R19
H68	SHORT 45°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R19
H69	MEDIUM 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R19
H70	LONG 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R19
H71	LONG 90°, FEMALE, SAE ORFS, SWIVEL	FEMALE, SAE ORFS, SWIVEL	100R15

Table 2.2 Torque Specifications for Fasteners (Metric)

When specific torque values are not provided within this manual for a task, use the torque values given in the table below.

Size	Torque Type	8.8		10.9	
		Dry	Lubed	Dry	Lubed
M5 x 0.80	(in-lb)	(54)	(41)	(78)	(59)
	Nm	6.1	4.6	8.8	6.7
M6 x 1.00	(in-lb)	(92)	(69)	(133)	(99)
	Nm	10.4	7.8	15	11.2
M7 x 1.00	(in-lb)	(156)	(116)	(222)	(167)
	Nm	17.6	13.1	25.1	18.9
M8 x 1.25	(in-lb)	(225)	(169)	(333)	(242)
	Nm	25.4	19.1	37.6	27.3
M10 x 1.50	ft-lb	37	28	53	40
	Nm	50	38	72	54
M12 x 1.75	ft-lb	65	49	93	69
	Nm	88	66	126	94
M14 x 2.00	ft-lb	104	78	148	111
	Nm	141	106	201	150
M16 x 2.00	ft-lb	161	121	230	172
	Nm	218	164	312	233
M18 x 2.50	ft-lb	222	167	318	238
	Nm	301	226	431	323
M20 x 2.50	ft-lb	314	235	449	337
	Nm	426	319	609	457
M22 x 2.50	ft-lb	428	321	613	460
	Nm	580	435	831	624
M24 x 3.00	ft-lb	543	407	776	582
	Nm	736	552	1052	789
M27 x 3.00	ft-lb	796	597	1139	854
	Nm	1079	809	1544	1158
M30 x 3.50	ft-lb	1079	809	1543	1158
	Nm	1463	1097	2092	1570
M33 x 3.50	ft-lb	1468	1101	2101	1576
	Nm	1990	1493	2849	2137
M36 x 4.00	ft-lb	1886	1415	2699	2024
	Nm	2557	1918	3659	2744

NOTE: Lubed includes lubricants such as lubrizing, oil, grease, and some uncured thread lockers. Refer to the specific thread locker manufacturer's instructions for specific torque adjustments.

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Table 2.3 Torque Specifications for Fasteners (US)

Size	Torque Type	SAE 2		SAE 5		SAE 8	
		Dry	Lubed	Dry	Lubed	Dry	Lubed
4-40	(in-lb)	(5)	(4)	(8)	(6)	(12)	(9)
	Nm	0.6	0.5	0.9	0.7	1.4	1.0
4-48	(in-lb)	(6)	(5)	(9)	(7)	(13)	(10)
	Nm	0.7	0.6	1.0	0.8	1.5	1.1
6-32	(in-lb)	(10)	(8)	(16)	(12)	(23)	(17)
	Nm	1.1	0.9	1.8	1.4	2.6	1.9
6-40	(in-lb)	(12)	(9)	(18)	(13)	(25)	(19)
	Nm	1.4	1.0	2.0	1.5	2.8	2.1
8-32	(in-lb)	(19)	(14)	(30)	(22)	(41)	(31)
	Nm	2.1	1.6	3.4	2.5	4.6	3.5
8-36	(in-lb)	(20)	(15)	(31)	(23)	(43)	(32)
	Nm	2.3	1.7	3.5	2.6	4.9	3.6
10-24	(in-lb)	(27)	(21)	(43)	(32)	(60)	(45)
	Nm	3.1	2.4	4.9	3.6	6.8	5.1
10-32	(in-lb)	(31)	(23)	(49)	(36)	(68)	(51)
	Nm	3.5	2.6	5.5	4.1	7.7	5.8
1/4-20	(in-lb) ft-lb	(66)	(50)	8	(75)	12	9
	Nm	7.5	5.6	11	8.5	16	12
1/4-28	(in-lb) ft-lb	(76)	(56)	10	(86)	14	10
	Nm	8.6	6.3	14	9.7	19	14
5/16-18	ft-lb	11	8	17	13	25	18
	Nm	15	11	23	18	34	24
5/16-24	ft-lb	12	9	19	14	25	20
	Nm	16	12	26	19	34	27
3/8-16	ft-lb	20	15	30	23	45	35
	Nm	27	20	41	31	61	47
3/8-24	ft-lb	23	17	35	25	50	35
	Nm	31	23	47	34	68	47
7/16-14	ft-lb	32	24	50	35	70	55
	Nm	43	33	68	47	95	75
7/16-20	ft-lb	36	27	55	40	80	60
	Nm	49	37	75	54	108	81
1/2-13	ft-lb	50	35	75	55	110	80
	Nm	68	47	102	75	149	108
1/2-20	ft-lb	55	40	90	65	120	90
	Nm	75	54	122	88	163	122

Size	Torque Type	SAE 2		SAE 5		SAE 8	
		Dry	Lubed	Dry	Lubed	Dry	Lubed
9/16-12	ft-lb	70	55	110	80	150	110
	Nm	95	75	149	108	203	149
9/16-18	ft-lb	80	60	120	90	170	130
	Nm	108	81	163	122	230	176
5/8-11	ft-lb	100	75	150	110	220	170
	Nm	136	102	203	149	298	230
5/8-18	ft-lb	110	85	180	130	240	180
	Nm	149	115	244	176	325	244
3/4-10	ft-lb	175	130	260	200	380	280
	Nm	237	176	353	271	515	380
3/4-16	ft-lb	200	150	300	220	420	320
	Nm	271	203	407	298	569	434
7/8-9	ft-lb	170	125	430	320	600	460
	Nm	230	169	583	434	813	624
7/8-14	ft-lb	180	140	470	360	660	500
	Nm	244	190	637	488	895	678
1-8	ft-lb	250	190	640	480	900	680
	Nm	339	258	868	651	1220	922
1-12	ft-lb	270	210	710	530	1000	740
	Nm	366	285	963	719	1356	1003
1-14	ft-lb	280	210	730	540	1020	760
	Nm	380	285	990	732	1383	1030
1 1/8-7	ft-lb	350	270	800	600	1280	960
	Nm	475	366	1085	813	1735	1302
1 1/8-12	ft-lb	400	300	880	660	1440	1080
	Nm	542	407	1193	895	1952	1464
1 1/4-7	ft-lb	500	380	1120	840	1820	1360
	Nm	678	515	1519	1139	2468	1844
1 1/4-12	ft-lb	550	420	1240	920	2000	1500
	Nm	746	569	1681	1247	2712	2034
1 3/8-6	ft-lb	670	490	1460	1100	2380	1780
	Nm	908	664	1979	1491	3227	2413
1 3/8-12	ft-lb	750	560	1680	1260	2720	2040
	Nm	1017	759	2278	1708	3688	2766
1 1/2-6	ft-lb	870	650	1940	1460	3160	2360
	Nm	1180	881	2630	1979	4284	3200
1 1/2-12	ft-lb	980	730	2200	1640	3560	2660
	Nm	1329	990	2983	2224	4827	3606

NOTE: Lubed includes lubricants such as lubrizing, oil, grease, and some uncured thread lockers. Refer to the specific thread locker manufacturer's instructions for specific torque adjustments.

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Table 2.4 Torque Specifications for Hydraulic Couplings & Hoses

Hydraulic Coupling Torque Chart O-Ring Port Connectors				
SAE Size	Steel Ports		Non-ferrous Ports	
	ft-lb	Nm	ft-lb	Nm
4	14-16	20-22	9-10	12-13
6	24-26	33-35	15-16	20-21
8	50-60	68-78	30-36	41-47
10	72-80	98-110	43-48	60-66
12	125-135	170-183	75-81	102-110
16	200-220	270-300	120-132	162-180
20	210-280	285-380	126-168	171-228
24	270-360	370-490	162-216	222-294
32	-	-	-	-

Hose End Torque Chart for JIC									
Size		Steel				Brass			
Dash	Frac.	ft-lb		Nm		ft-lb		Nm	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
-4	1/4"	10	11	13	15	5	6	6.75	9
-6	3/8"	17	19	23	26	12	15	17	20
-8	1/2"	34	38	47	52	20	24	27.66	33
-10	5/8"	50	56	69	76	34	40	46.33	55
-12	3/4"	70	78	96	106	53	60	72.33	82
-16	1"	94	104	127	141	74	82	100.5	111
-20	1 1/4"	124	138	169	188	75	83	101.5	113
-24	1 1/2"	156	173	212	235	79	87	107	118
-32	2"	219	243	296	329	158	175	214	237

Hose End Torque Chart for Flat-Face O-Ring Seal (Steel)					
Size		Torque Specification			
Dash	Frac.	ft-lb		Nm	
		Min.	Max.	Min.	Max.
-4	1/4"	10	12	14	16
-6	3/8"	18	20	24	27
-8	1/2"	32	40	43	54
-10	5/8"	46	56	60	75
-12	3/4"	65	80	90	110
-14	1"	65	80	90	110
-16	1 1/4"	92	105	125	240
-20	1 1/2"	125	140	170	190
-24	2"	150	180	200	245

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2.5 Axle Torque Specifications

Size of Bolt		Type of Bolt					
		8.8		10.9		12.9	
		Normali Loctite 242 (Nm)	Loctite 270 (Nm)	Normali Loctite 242 (Nm)	Loctite 270 (Nm)	Normali Loctite 242 (Nm)	Loctite 270 (Nm)
Coarse Pitch	M6 x 1	9.5-10.5	10.5-11.5	14.3-15.7	15.2-16.8	16.2-17.8	18.1-20.0
	M8 x 1.25	23.8-26.2	25.6-28.4	34.2-37.8	36.7-40.5	39.0-43.0	43.7-48.3
	M10 x 1.5	48-53	52-58	68-75	73-81	80-88	88-97
	M12 x 1.75	82-91	90-100	116-128	126-139	139-153	152-168
	M14 x 2	129-143	143-158	182-202	200-221	221-244	238-263
	M16 x 2	200-221	219-242	283-312	309-341	337-373	371-410
	M18 x 2.5	276-305	299-331	390-431	428-473	466-515	509-562
	M20 x 2.5	390-431	428-473	553-611	603-667	660-730	722-798
	M22 x 2.5	523-578	575-635	746-824	817-903	893-987	974-1076
	M24 x 3	675-746	732-809	950-1050	1040-1150	1140-1260	1240-1370
	M27 x 3	998-1103	1088-1202	1411-1559	1539-1701	1710-1890	1838-2032
M30 x 3.5	1378-1523	1473-1628	1914-2115	2085-2305	2280-2520	2494-2757	
Fine Pitch	M8 x 1	25.7-28.3	27.5-30.5	36.2-39.8	40.0-44.0	42.8-47.2	47.5-52.5
	M10 x 1.25	49.4-54.6	55.2-61.0	71.5-78.5	78.0-86.0	86.0-94.0	93.0-103.0
	M12 x 1.25	90-100	98-109	128-142	139-154	152-168	166-184
	M12 x 1.5	86-95	94-104	120-132	133-147	143-158	159-175
	M14 x 1.5	143-158	157-173	200-222	219-242	238-263	261-289
	M16 x 1.5	214-236	233-257	302-334	333-368	361-399	394-436
	M18 x 1.5	312-345	342-378	442-489	485-536	527-583	580-641
	M20 x 1.5	437-483	475-525	613-677	674-745	736-814	808-893
	M22 x 1.5	581-642	637-704	822-908	903-998	998-1103	1078-1191
	M24 x 2	741-819	808-893	1045-1155	1140-1260	1235-1365	1363-1507
	M27 x 2	1083-1197	1178-1302	1520-1680	1672-1848	1834-2027	2000-2210
M30 x 2	1511-1670	1648-1822	2138-2363	2332-2577	2565-2835	2788-3082	

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Note: 1 Nm = 0.7376 ft-lb

Screw-locking, Sealing and Lubricating Materials

Loctite 242

- Anaerobic product apt to prevent the loosening of screws, nuts and plugs. Used for medium-strength locking. Before using it, completely remove any lubricant by using the specific activator.

Loctite 270

- Anaerobic product apt to prevent the loosening of screws, nuts and plugs. Used for medium-strength locking. Before using it, completely remove any lubricant by using the specific activator. To remove parts, it may be necessary to heat them at 80°C approx.

2.6 Axle Maintenance Intervals

Operation	Component	Frequency	Lubricants
Check Levels	Differential	monthly	SAE 80W-90 API GL-5
	Planetary reduction	every 200 hours	
	Gear box	monthly	
Oil Change	Differential	every 800 hours *	SAE 80W-90 API GL-5
	Planetary reduction	every 1000 hours *	
	Self-locking differential gear	every 700 hours * &	
	Gear box	once at 50 hours after every 1000 hours	
Tighten	Gear box screws/bolts	every 200 hours	N/A
	Wheel Nuts	every 200 hours	

Operation	Member	Conditions	Frequency	Lubricants
Grease	Articulations	Normal work	monthly+	MOLIKOTE

Gear Oil	Gear Box	Central Housing	Hubs (each)
Maximum Oil Capacities	13.5 L (14.2 qt)	13 L (13.7 qt)	1.8 L (1.9 qt)

*Initially after 100 working hours

& when it starts sounding noisy

+ Frequency may vary based on working conditions including high dust environments and heavy lifting.

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Table 2.7 Specifications and Features

MODEL		SJ519 TH
Standard Engine		
Type	Deutz TCD 2.2 L T4	
Cylinders	3	
Horsepower @ 2600 RPM	74 HP	
Capacity	2.2 L	
Torque @ 1600 RPM	280 N•m (206.5 lbf•ft)	
Idle Speed*	1200 rpm	
Fuel type	Diesel	
Transmission		
Hydrostatic	Speed forward / Reverse	Hydrostatic (Variable)
Travel Speed		
Hydrostatic	23 km/h (14.5 mph)	
Electrical		
Negative ground	12 Volts	
Alternator	120 Amps	
Battery	925 CCA	
Backup Alarm	107 DBA	
Dimensions		
Wheelbase	245.11 cm (8 ft 0.5 in)	
Overall width	182.88 cm (6 ft)	
Overall height (stowed)	193.04 cm (6 ft 4 in)	
Overall length (stowed, less forks)	408.94 cm (13 ft 5 in)	
Ground clearance	24.13 cm (9.5 in)	
Maximum weight without attachment	10,255 lb	
Turn radius (inside) (4WS)	134.62 cm (53 in)	
Turn radius (outside) (4WS)	317.50 cm (125 in)	
Boom		
Number of sections	2	
Maximum lift height	5.82 m (19 ft 1 in)	
Maximum forward reach	3.38 m (11 ft 1 in)	
Standard Forks (Standard Tapered Forks)	4 cm x 10 cm x 122 cm (1.57 in x 3.94 in x 48 in)	
Carriage rollback @ Maximum Boom Angle (Top)	88°	
Carriage forward tilt @ Maximum Boom Angle (Bottom)	40°	
Towing Capacity		
Towing Weight (MAX)	2,268 kg (5,000 lb)	
Towing Tongue Weight (MAX)	340 kg (750 lb)	

* Engine Idle Speed is measured with 5% droop when in gear.

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Table 2.8 Recommended Fluids/Lubrications

Model SJ519 TH		
Engine		
Fuel Type	Ultra Low Sulfur Diesel (EN 590, ASTM D975) or Biodiesel B20	
Fuel Tank Capacity	57 L (15.1 gal)	
Recommended Oil Type	SAE 15W40	
Engine Oil Capacity	8.5 L (9 Quart)	
Coolant Type (Standard)	COOLANT-ANTIFREEZE 50/50 PREMIX *	
Coolant Type (Cold Weather Option)	COOLANT-ANTIFREEZE 60/40 PREMIX *	
Coolant Tank Capacity	12 L (3.2 gal)	
Transmission		
Hydrostatic	Oil Type	ATF Dexron 3
Axles		
Differential	API GL5 LS	
Front Gear Box Capacity	0.72 L (0.76 Quart)	
Front Central House Capacity	5.0 L (5.3 Quart)	
Rear Central House Capacity	4.6 L (4.9 Quart)	
Front Wheel Hub Capacity	0.9 L (0.95 Quart) per hub	
Rear Wheel Hub Capacity	0.9 L (0.95 Quart) per hub	
Hydraulic Oil		
Standard Factory Fill	ATF Dexron III	
Type	ATF Dexron III or equivalent	
Hydraulic Tank Capacity	70 L (18.5 gal)	
Grease Points		
Type	EP2 Grease	

* Refer to engine manufacturer's manual

1693AC

⚠ WARNING

Do not mix hydraulic oil of different types or use oils of types other than those originally supplied with this equipment. Doing so can severely damage hydraulic components. A full hydraulic oil system flush must be performed prior to adding a new type of hydraulic oil. Consult Skyjack service department.

Table 2.9 Pressure Setting

Model SJ519 TH		
System Component	Test Port	Pressure Valve
Pilot Oil Pressure	GP1	Item
Tilt Comp./ Carriage Tilt Port Relief	GP3	3500 psi
System		
Maximum Pressure	GP3	3900 psi
Steering & Brakes		
Steering Maximum	GP2	2000 psi
Brakes Maximum	GP2	1000 psi

1721AA

**NOTE**

All pressures to be checked with engine running at idle unless specified otherwise.

**NOTE**

Service brake pressure is variable. The value provided above is the maximum nominal value.

2.10 Air Conditioner Temperature & Pressures

R-134a Temperature/Pressure Chart		
Ambient Temperature °F (°C)	Low Pressure Gauge	High Pressure Gauge
65 °F (18 °C)	25-35 psi (172-241 kPa)	135-155 psi (931-1069 kPa)
70 °F (21 °C)	35-40 psi (241-276 kPa)	145-160 psi (1000-1103 kPa)
75 °F (24 °C)	35-45 psi (241-310 kPa)	150-170 psi (1034-1172 kPa)
80 °F (27 °C)	40-50 psi (276-345 kPa)	175-210 psi (1207-1448 kPa)
85 °F (29 °C)	45-55 psi (310-379 kPa)	225-250 psi (1551-1724 kPa)
90 °F (32 °C)	45-55 psi (310-379 kPa)	250-270 psi (1724-1862 kPa)
95 °F (35 °C)	50-55 psi (345-379 kPa)	275-300 psi (1896-2068 kPa)
100 °F (38 °C)	50-55 psi (345-379 kPa)	315-325 psi (2172-2241 kPa)
105 °F (41 °C)	50-55 psi (345-379 kPa)	330-335 psi (2275-2310 kPa)
110 °F (43 °C)	50-55 psi (345-379 kPa)	340-345 psi (2344-2379 kPa)

Interpreting Pressure Readings		
Low Pressure Gauge	High Pressure Gauge	Action Required
In Range	In Range	A/C working properly
Low	Low	Add refrigerant
Low	High	Need service, possibly blockage of the expansion valve or orifice tube
High	Low	Need service, possibly faulty compressor
High	High	System overcharged.*

*It is illegal to vent R-134a refrigerant into the atmosphere.

Section 3 – System Component Identification and Schematics

Table 3.1 Electrical Symbol Chart


























































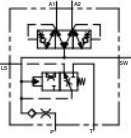



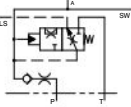



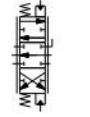



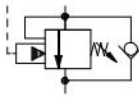









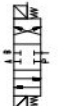
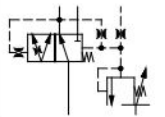
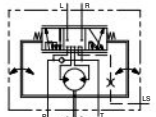
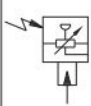
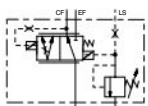
 CIRCUITS CROSSING NO CONNECTION	 HOURMETER	 KEY SWITCH	 LIMIT SWITCH N.O.
 CIRCUITS CONNECTED	 LIGHT	 FOOT SWITCH	 LIMIT SWITCH N.O. HELD CLOSED
 BATTERY	 HYDRAULIC VALVE COIL	 TOGGLE SWITCH	 LIMIT SWITCH N.C.
 GROUND	 PROPORTIONAL HYDRAULIC VALVE COIL	 PUSH BUTTON	 LIMIT SWITCH N.C. HELD OPEN
 FUSE	 ELECTRIC MOTOR	 ROTARY SWITCH	 SILICON CONTROLLED RECTIFIER
 CIRCUIT BREAKER	 HORN	 LIMIT SWITCH	 PROXIMITY SWITCH
 VOLT METER	 EMERGENCY STOP BUTTON	 CAM OPERATED LIMIT SWITCH	 PNP TRANSISTOR
 CAPACITOR	 RESISTOR	 TILT SWITCH	 NPN TRANSISTOR
 POTENTIOMETER	 LEVEL SENSOR	 SINGLE POLE SINGLE THROW RELAY	 PRESSURE/ VACUUM SWITCH
 SINGLE POLE DOUBLE THROW RELAY	 DOUBLE POLE SINGLE THROW RELAY	 DOUBLE POLE DOUBLE THROW RELAY	 TEMPERATURE SWITCH
 TRIPLE POLE DOUBLE THROW RELAY	 DIODE	 RHEOSTAT	

Table 3.2 Hydraulic Symbol Chart

	LINE CROSSING		HAND PUMP		ACCUMULATOR, GAS CHARGED		SINGLE ACTING CYLINDER
	LINE JOINED		RELIEF VALVE		PRESSURE SWITCH		DOUBLE ACTING CYLINDER
	HYDRAULIC TANK		PRESSURE REDUCING VALVE		SHUTTLE VALVE		DOUBLE ACTING DOUBLE RODDED CYLINDER
	HYDRAULIC FILTER WITH BYPASS		FIXED ORIFICE		CHARGE VALVE DUAL		SPRING APPLIED HYDRAULIC RELEASED BRAKE
	ELECTRIC MOTOR		ADJUSTABLE FLOW CONTROL		CHARGE VALVE SINGLE		BRAKE CYLINDER
	ENGINE		CHECK VALVE		THREE POSITION SIX WAY OPEN CENTER CLOSED PORT		TWO POSITION TWO WAY NORMALLY OPEN VALVE
	FIXED DISPLACEMENT PUMP		OIL COOLER		COUNTER BALANCE VALVE		MAIN LINES Solid
	VARIABLE DISPLACEMENT PUMP		TWO POSITION THREE WAY VALVE		VALVE COIL		PILOT LINES Dashed
	VARIABLE DISPLACEMENT HYDRAULIC MOTOR		TWO POSITION TWO WAY NORMALLY CLOSED VALVE		THREE POSITION FOUR WAY CLOSED CENTER OPEN PORT		
	BI DIRECTIONAL HYDRAULIC MOTOR		THREE POSITION FOUR WAY CLOSED CENTER CLOSED PORT		DYNAMIC SIGNAL PRIORITY VALVE		
	ORBITAL STEERING MOTOR		PRESSURE TRANSDUCER		STATIC SIGNAL PRIORITY VALVE		

3.3 Electrical Schematic Parts List

Index No.	Skyjack Part No.	Qty.	Description
05CR	9-931298	1	RELAY, Park brake release
11CR	9-165029	1	RELAY, Glow plug
224CR	9-931298	1	RELAY, Carriage enable
237CR	9-931298	1	RELAY, Aux hydraulic
245ACR	9-931298	1	RELAY, Quick coupler enable
250ACR	9-931298	1	RELAY, Left turn signal
251ACR	9-931298	1	RELAY, Right turn signal
255CR	9-931298	1	RELAY, Rear wiper
258CR	9-931298	1	RELAY, Front wiper
258ACR	9-931298	1	RELAY, Top wiper
272CR	9-931298	1	RELAY, Quick coupler/aux hyd disconnect
403ACR	9-931298	1	RELAY, Positive shutoff
5JCR	9-931298	1	RELAY, Brake lamp
56ACR	9-156200	1	RELAY, FUEL PUMP
57CCR	9-931298	1	RELAY, NEUTRAL ENABLE
60CR	9-921734	1	RELAY, POWER
77CR	9-931298	1	RELAY, ENGINE RUNNING
86CR	9-931298	1	RELAY, OIL COOLER FAN
26DCR	9-931298	1	RELAY, BRAKE
86BCR			RELAY, DRIVE OIL COOLER FAN
15CR	9-931298		RELAY, BACKUP ALARM
57BCR	9-931298	1	RELAY, STARTER INTERRUPT
F1	9-156203	1	FUSE, IGNITION/POWER RELAY - 10 A
F2	9-156203	1	FUSE, TRANS/B-U ALARM/PARK BRAKE - 10 A
F3	9-156202	1	FUSE, STEER SELECT/GAUGE - 5 A
F4	9-156202	1	FUSE, FRAME/CARRIAGE ENABLE - 5 A
F5	9-156203	1	FUSE, AUXILIARY HYDRAULICS/QUICK COUPLER - 10 A
F6	9-156202	1	FUSE, CONTINUOUS AUXILIARY HYDRAULICS - 5 A
F7	9-156203	1	FUSE, HORN/BEACON LIGHT - 10 A
F8	9-156204	1	FUSE, POWER PORT - 15 A
F9	9-206850	1	FUSE, OIL COOLER FAN - 40 A
F10	9-156202	1	FUSE, REAR WIPER - 5 A
F11	9-156203	1	FUSE, WORK LIGHTS 10 A
F12	9-156204	1	FUSE, ROAD LIGHTS 15 A
F13	9-156202	1	FUSE, TURN/HARZARD/BRAKE LIGHTS 5 A
F14	9-156203	1	FUSE, BOOM LIGHTS 10 A
F15	9-156203	1	FUSE, FRONT AND TOP WIPER - 10 A
F16	9-156164	1	FUSE, BLOWER - 30 A
F17	9-156202	1	FUSE, FAN/INT. LIGHT 5 A
F20	9-156203	1	FUSE, HEATER VALVE, A/C - 10 A
F25	9-156164	1	FUSE, ECM - 30 A
F26	9-121504	1	FUSE, FUEL PUMP
F27	9-165031	1	FUSE, GLOW PLUG
F28	9-206096	1	FUSE, HFX12M
F29	9-121504	1	LOAD PWR +

3.3 Electrical Schematic Parts List

Index No.	Skyjack Part No.	Qty.	Description
SW1	9-119725	1	SWITCH, DISCONNECT
SW2	9-926721	1	SWITCH, IGNITION SWITCH
SW3	9-191454	1	SWITCH, PARK BRAKE
SW4	9-191457	1	SWITCH, STEER MODE
SW5		1	SWITCH, JOYSTICK, AUXILIARY HYDRAULICS
SW6	9-405339	1	SWITCH, HORN
SW7		1	SWITCH, CARRIAGE TILT
SW8		1	SWITCH, CAB FAN
SW9	9-191455	1	SWITCH, POSITIVE AIR SHUTOFF
SW10	9-191455	1	SWITCH, BOOM LIGHTS
SW11	9-191457	1	SWITCH, WORK LIGHTS
SW12	9-191457	1	SWITCH, TURN SIGNALS
SW13		1	SWITCH, CAB INTERIOR LIGHT
SW14	9-191459	1	SWITCH, WINDSHIELD WASHER WIPER
SW15		1	SWITCH, QUICK COUPLER
SW16		1	
SW17	9-191491	1	SWITCH, BLOWER
SW18	9-191491	1	SWITCH, AIR CONDITIONING
SW19	9-191457	1	SWITCH, ROAD LIGHTS
SW20		1	
SW21		1	
SW22		1	
SW23	9-191455	1	SWITCH, HAZARD LIGHTS
SW24		1	SWITCH, WASHER/WIPER
SW25	9-191457	1	SWITCH, CONTINUOUS FLOW FORWARD/REVERSE
SW26	9-206757	1	SWITCH, LOCK/UNLOCK QUICK COUPLER

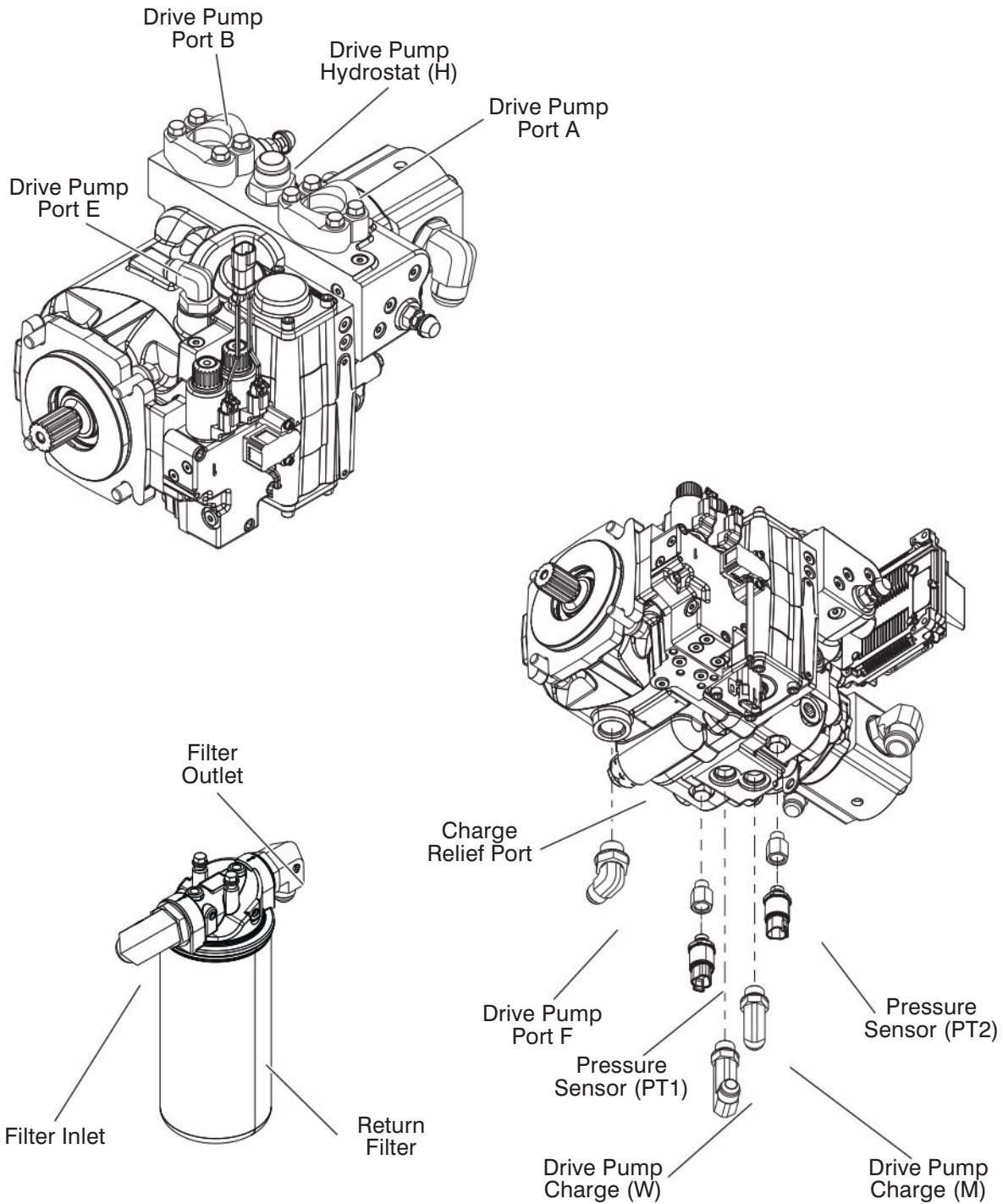
3.4 Hydraulic Schematic Parts List

Index No.	Skyjack Part No.	Qty.	Description
C1	9-206943	1	LIFT CYLINDER
C2	9-206945	1	FORK TILT CYLINDER
C3	9-205961	1	TILT COMPENSATION CYLINDER
C4	9-206944	1	EXTENSION CYLINDER
C5		1	FRONT STEER CYLINDER
C6		1	REAR STEER CYLINDER
C9	9-205964	1	QUICK COUPLER CYLINDER
C12		1	PARK BRAKE CYLINDER
CB1	9-224026	1	COUNTERBALANCE VALVE 5000 PSI
CB2	9-224027	1	COUNTERBALANCE VALVE 3000 PSI
CB3	9-224014	1	COUNTERBALANCE VALVE 5000 PSI
CB4	9-224026	1	COUNTERBALANCE VALVE 5000 PSI
CB5	9-224027	1	COUNTERBALANCE VALVE 3000 PSI
EC1	9-224042	1	PRESSURE COMPENSATOR
F1	9-206998	1	RETURN FILTER
F2	9-191484	1	TANK FILLER FILTER
F3	9-206887	1	CHARGE FILTER
JS1	9-190356	1	JOYSTICK
M1	9-206918	1	DRIVE MOTOR
MB1	9-206311	1	MAIN MANIFOLD
MB2	9-206310	1	PILOT MANIFOLD
OR1		1	ORIFICE 0.062"
OR2		1	ORIFICE 0.035"
OR3		1	ORIFICE 0.047"
ORB1	9-205277	1	ORBITAL STEERING MOTOR
P1	9-205852	1	DRIVE PUMP
P1A	9-205852	1	CHARGE PUMP
P2	9-206718	1	SYSTEM PUMP
PC1		1	PILOT OPERATED CHECK VALVE
PC2		1	PILOT OPERATED CHECK VALVE
PRV1		1	PRESSURE REDUCING VALVE 320 psi
PS1	9-205893	1	BRAKE SWITCH AND ROAD LIGHT OPTION
PT1		1	PRESSURE TRANSDUCER
PT2		1	PRESSURE TRANSDUCER
RV1	9-224050	1	RELIEF VALVE 3900 psi
RV2	9-224048	1	RELIEF VALVE 3000 psi
RV3	9-224048	1	RELIEF VALVE 3000 psi
RV4	9-224049	1	RELIEF VALVE 3500 psi
RV5	9-224049	1	RELIEF VALVE 3500 psi
RV6	9-223682	1	RELIEF VALVE 348 psi
RV7		1	RELIEF VALVE 6500 psi
RV8		1	RELIEF VALVE 6500 psi
RV9		1	RELIEF VALVE 7000 psi
RV10		1	RELIEF VALVE 7000 psi
RV11		1	RELIEF VALVE 600 psi
RV12		1	RELIEF VALVE 600 psi
RV14		1	RELIEF VALVE 2000 psi

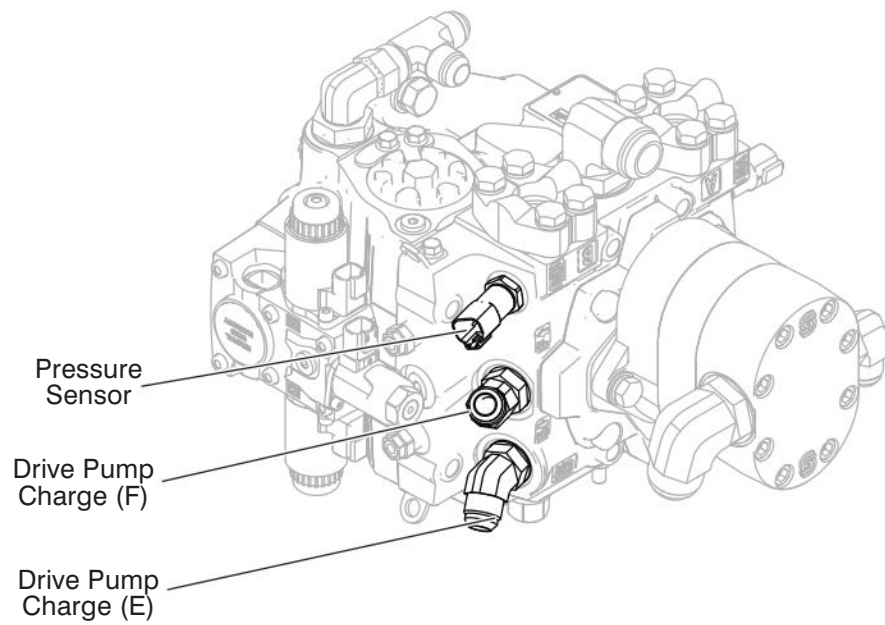
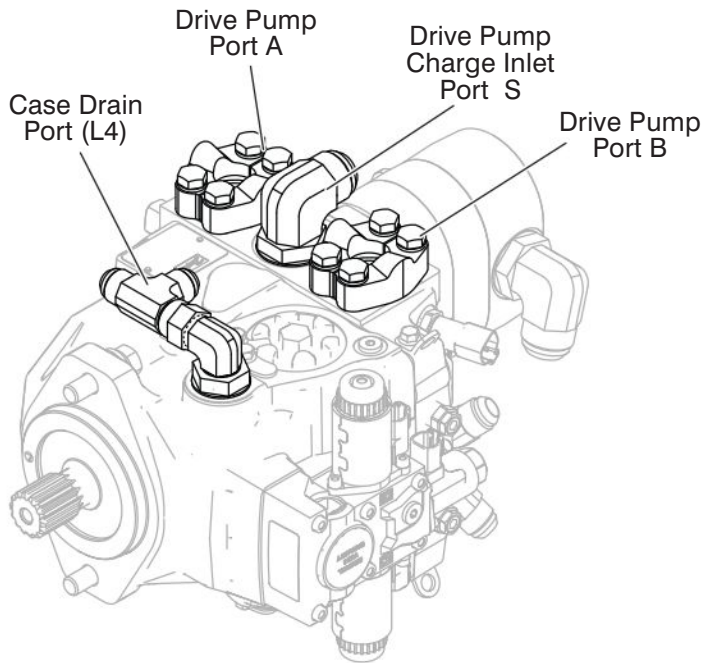
3.4 Hydraulic Schematic Parts List

Index No.	Skyjack Part No.	Qty.	Description
RV15		1	RELIEF VALVE 2900 psi
RV16		1	RELIEF VALVE 2900 psi
V12		1	SERVICE BRAKE ACTUATOR
V5		1	VALVE SOLENOID
3H-26	9-224051	1	VALVE, SOLENOID - PARK BRAKE
3H-233	9-224051	1	VALVE, SOLENOID - CONT AUX FWD
3H-234	9-224051	1	VALVE, SOLENOID - CONT AUX REV
4H-47	9-224052	1	VALVE, SOLENOID - CARRIAGE UP
4H-47-1	9-224052	1	VALVE, SOLENOID - CARRIAGE DOWN
4H-237A	9-224052	1	VALVE, SOLENOID - AUX LEFT
4H-237A-1	9-224052	1	VALVE, SOLENOID - AUX RIGHT

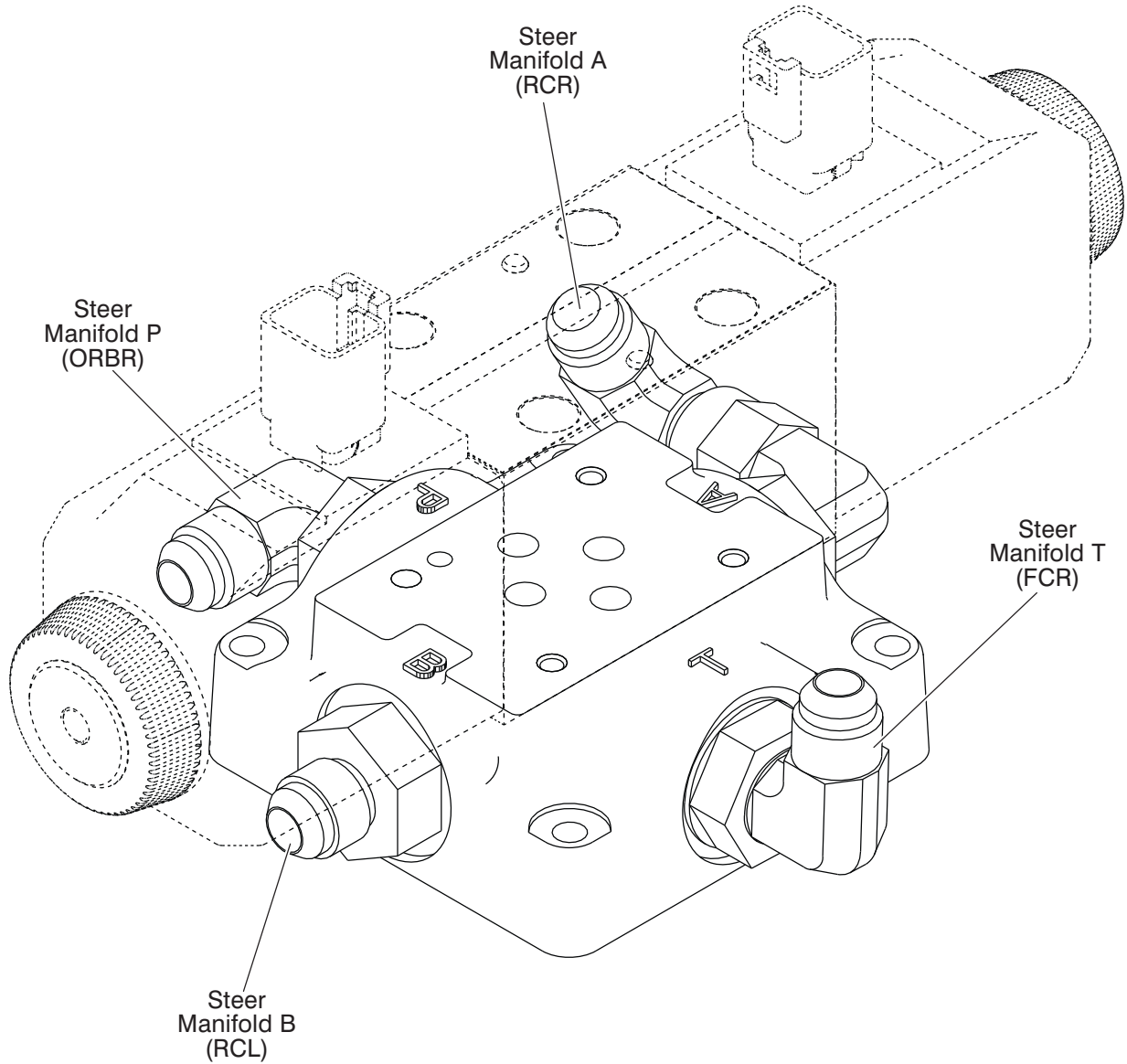
3.5 Eaton Hydraulic Pump and Return Filter Ports Identification, S/N 87 501 291 and below



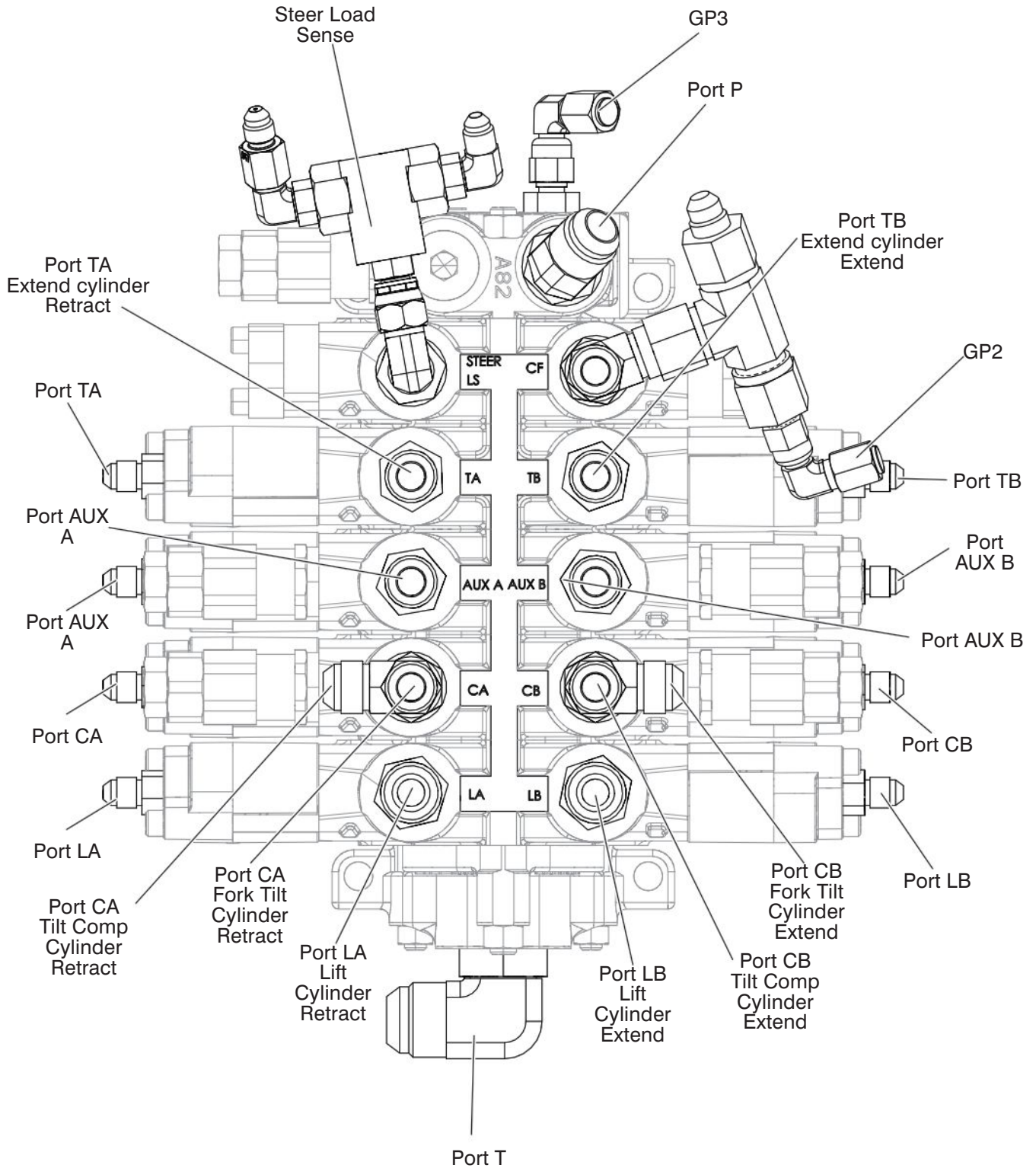
3.6 Danfoss Hydraulic Pump Identification, S/N 87 501 292 and above



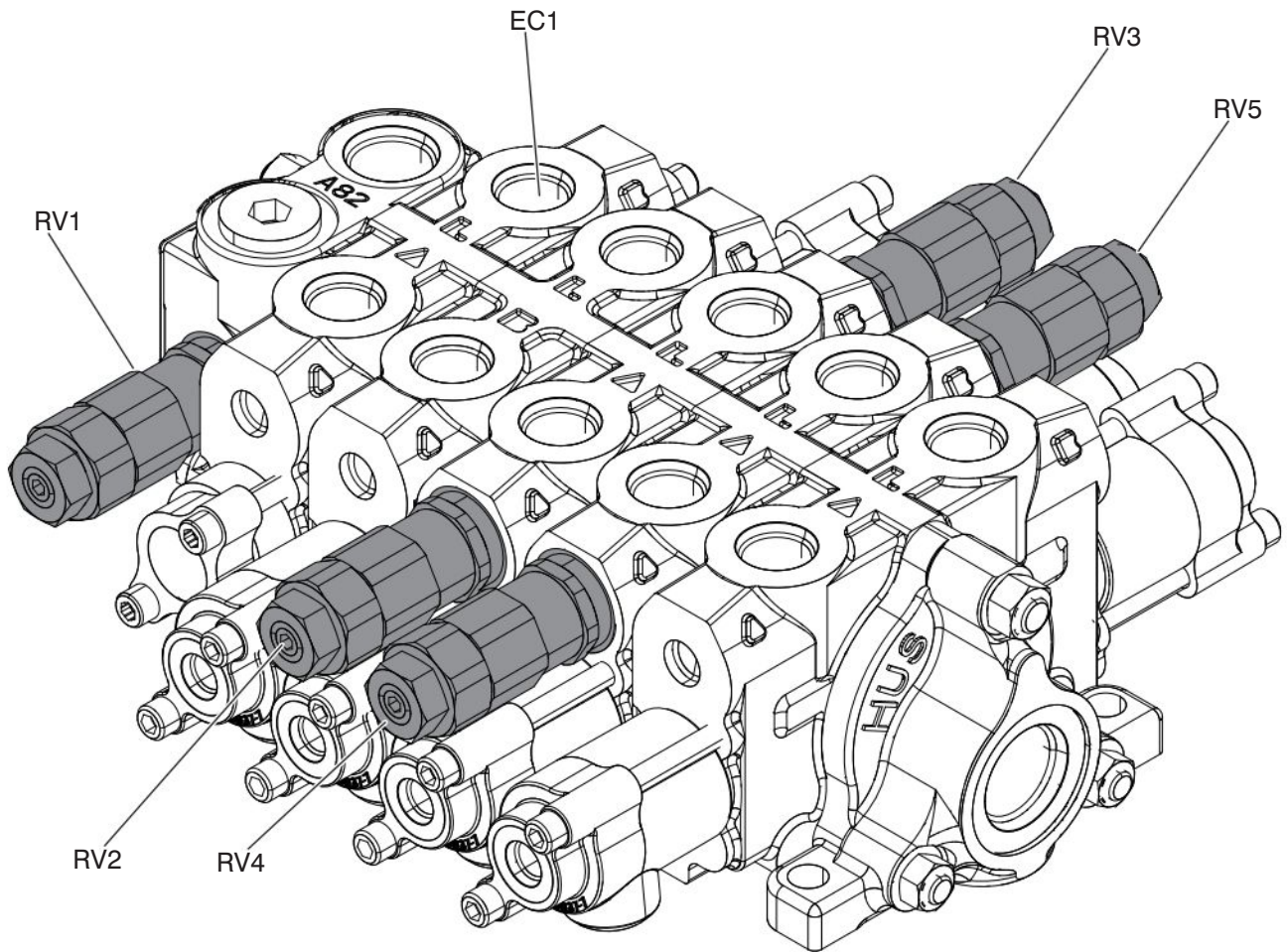
3.7 Steer Manifold



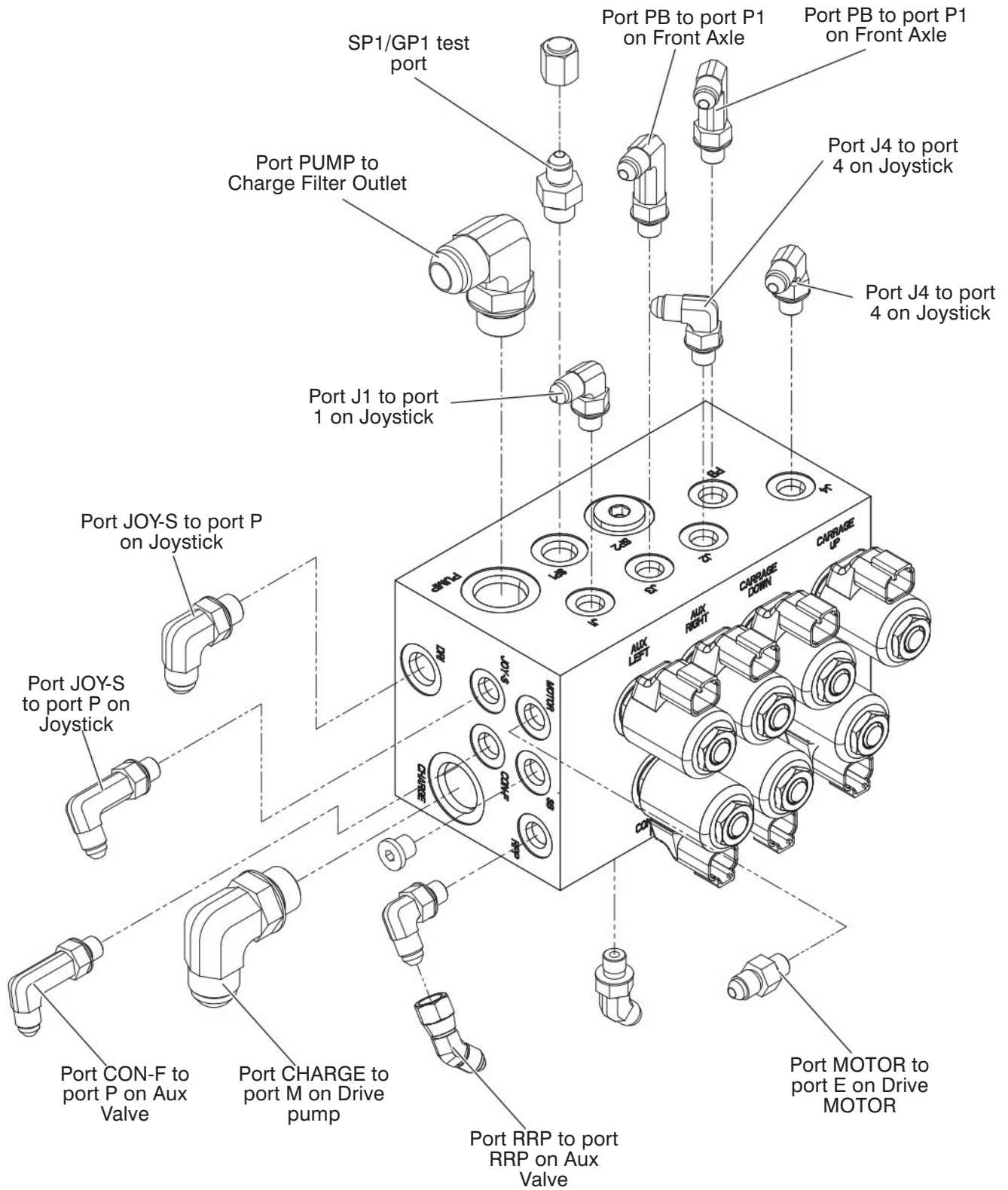
3.8 Main Manifold



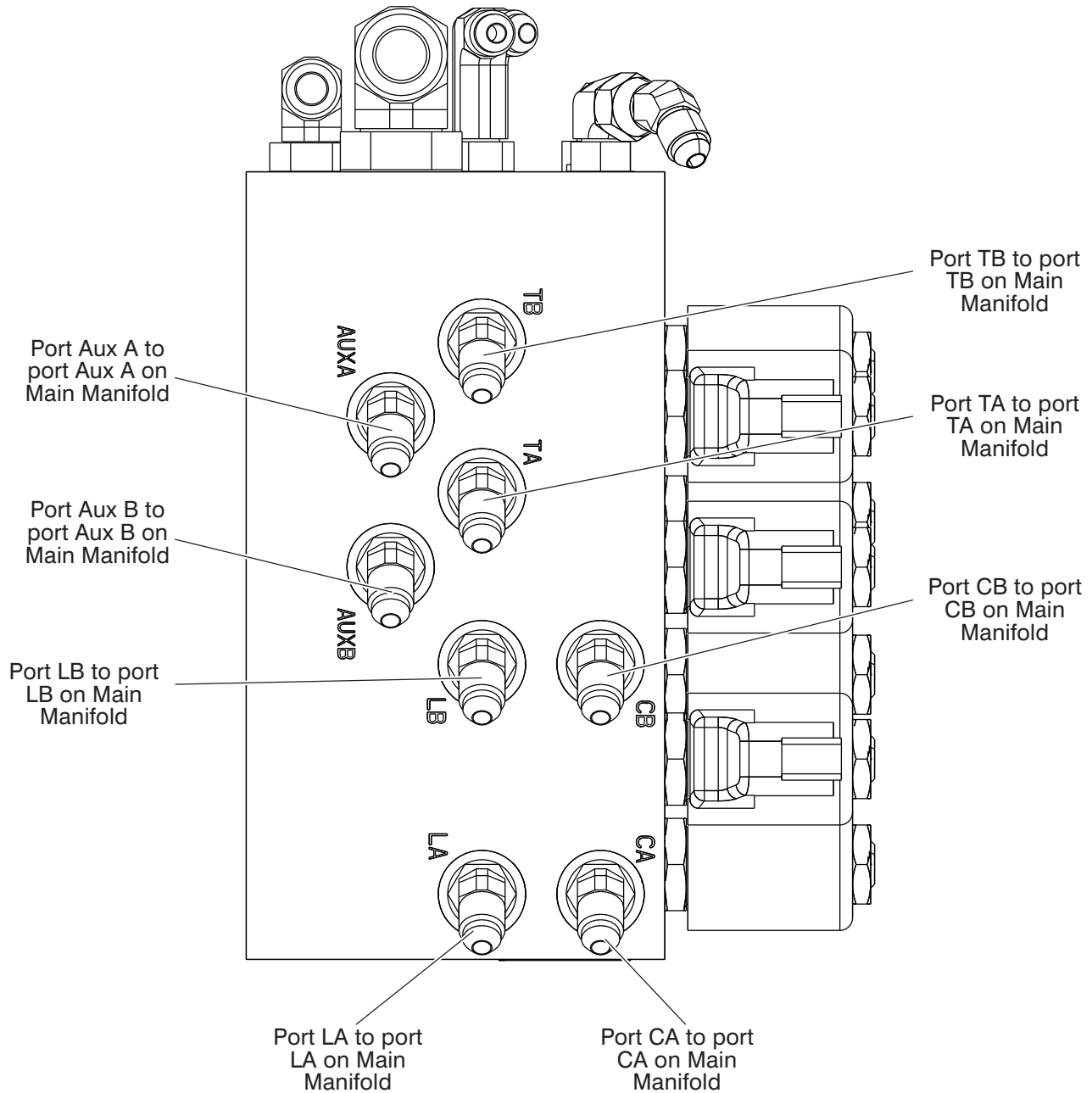
3.8 Main Manifold



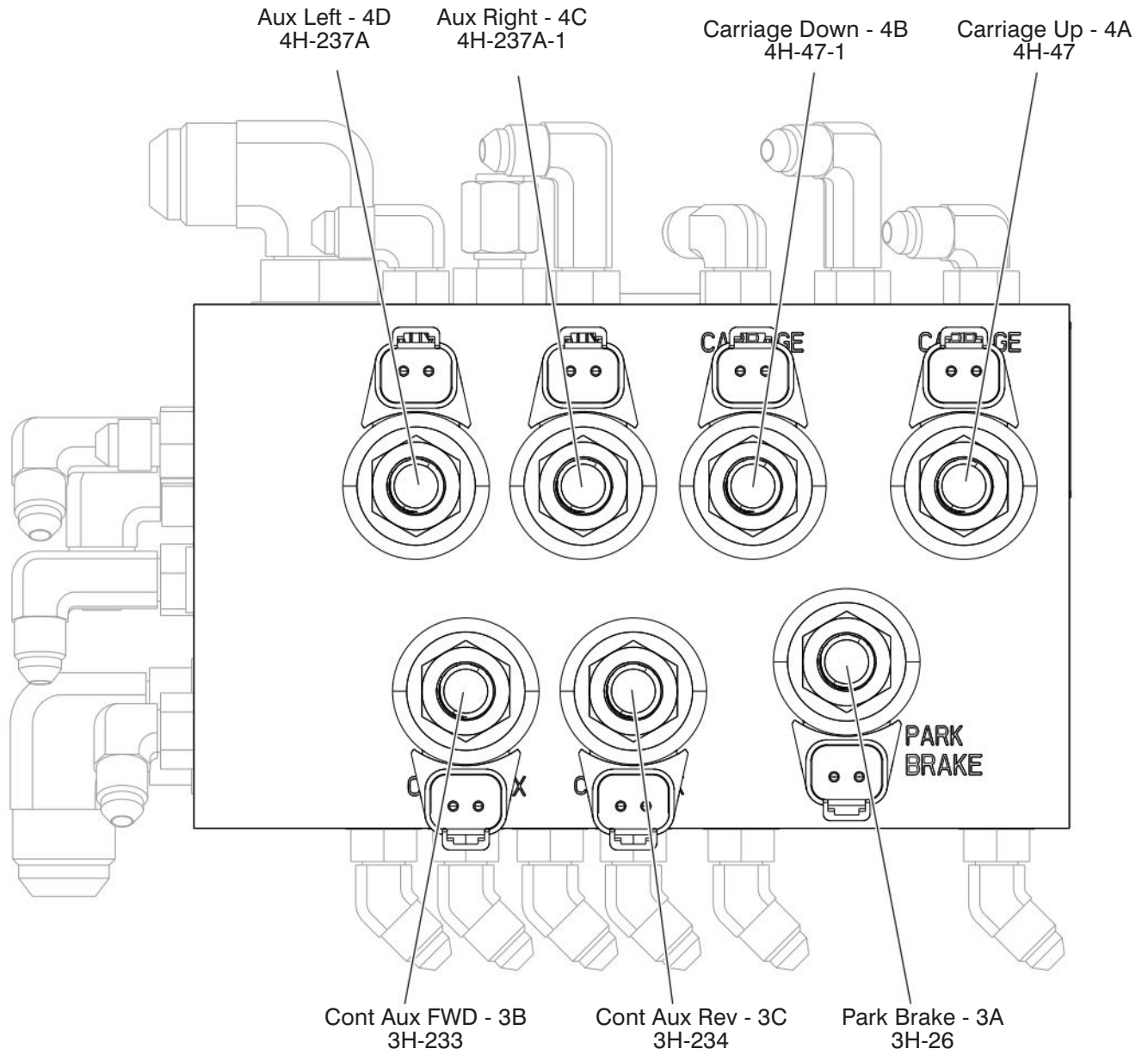
3.9 Pilot Manifold



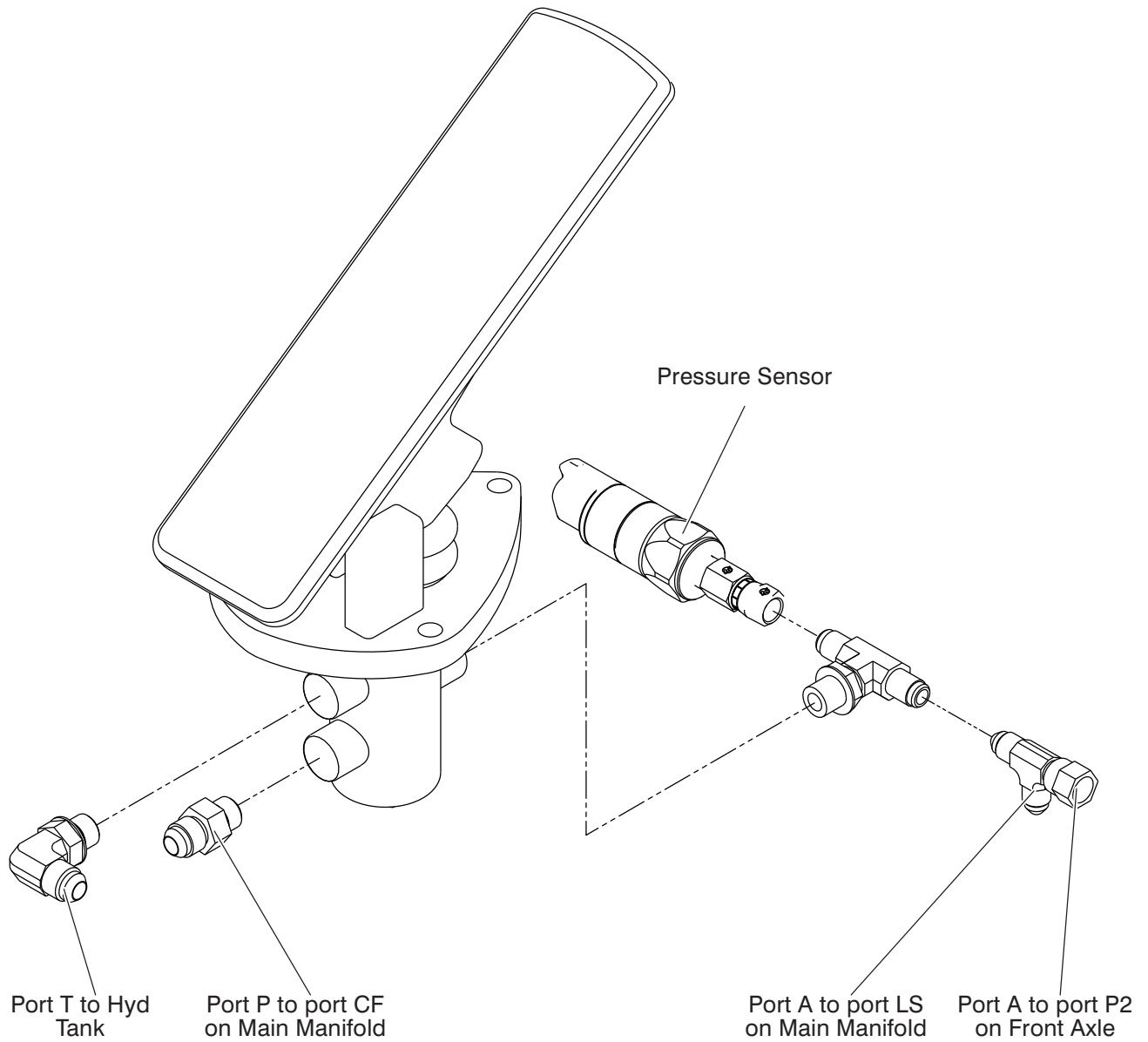
3.9 Pilot Manifold



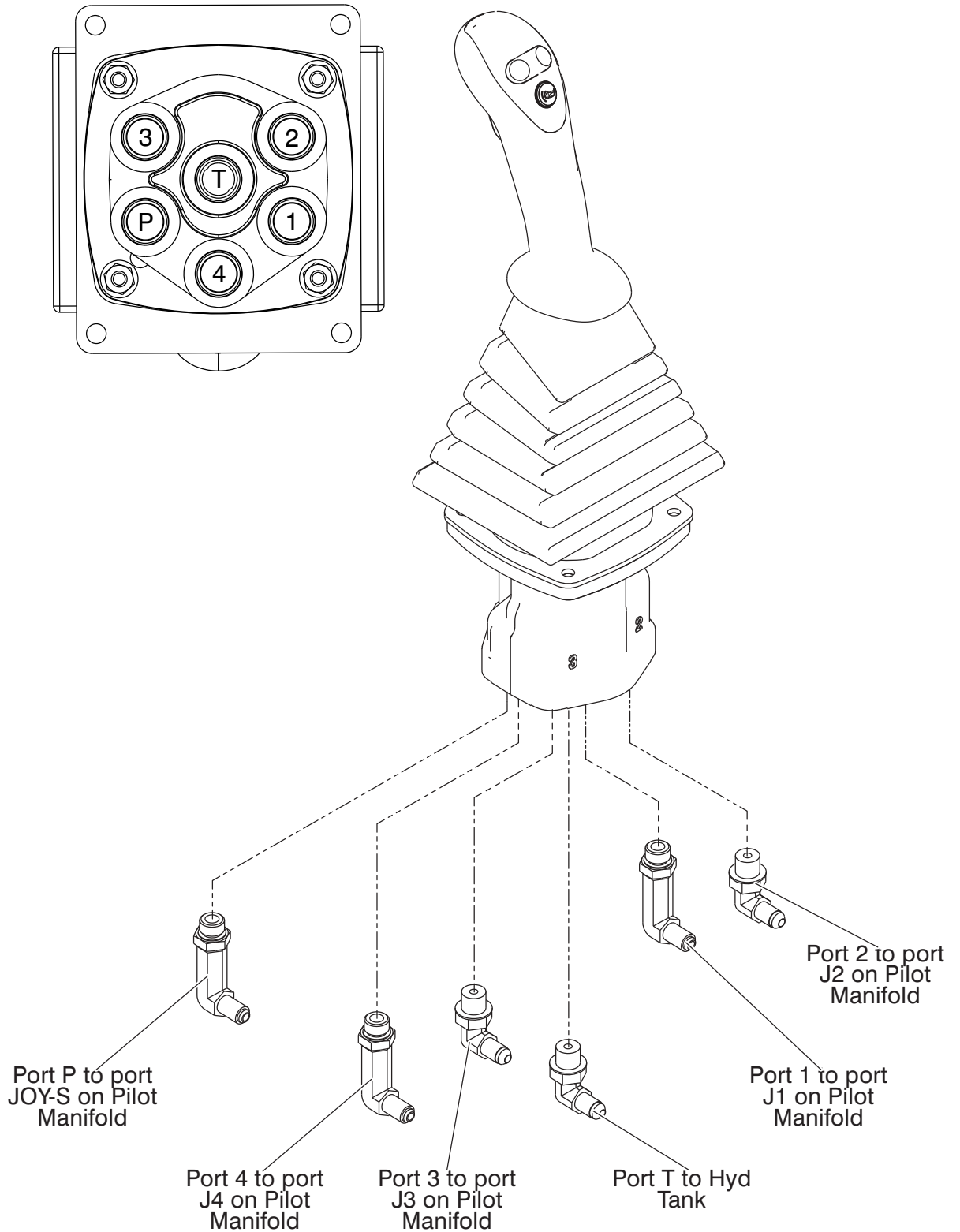
3.9 Pilot Manifold



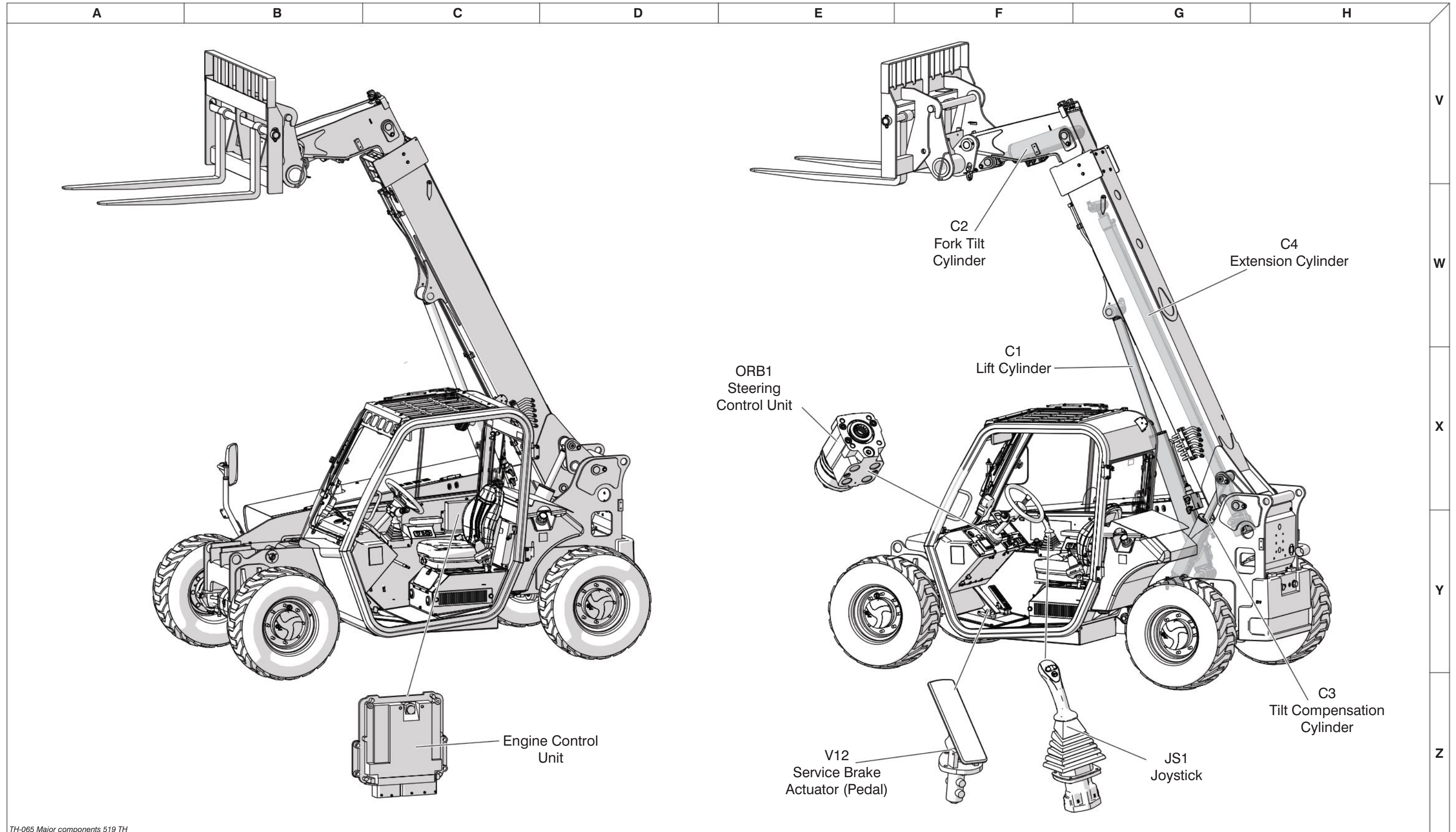
3.10 Pedal Ports Identification



3.11 Joystick Ports Identification

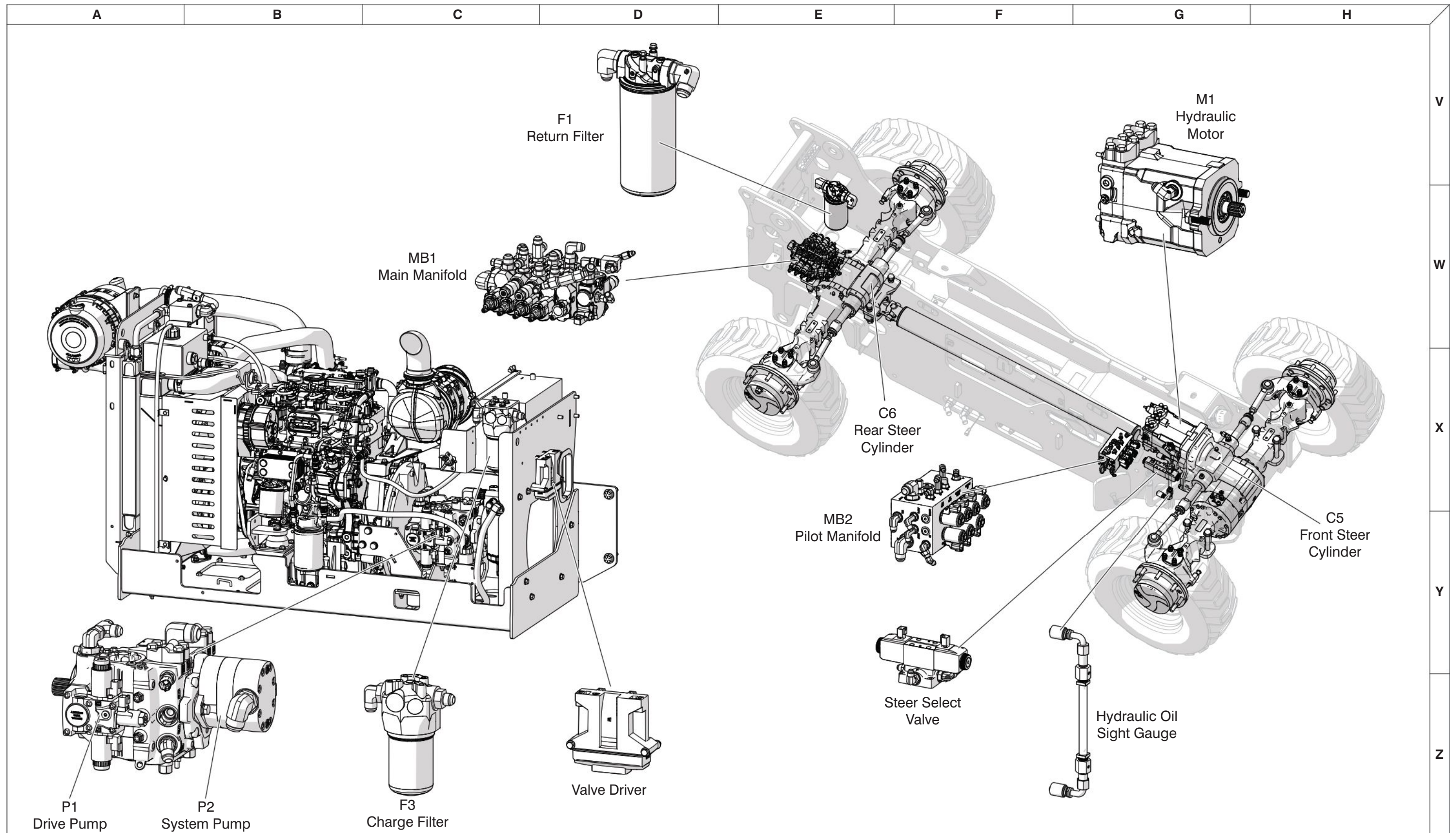


3.12 Major Components Identification and Location - Boom and Cab

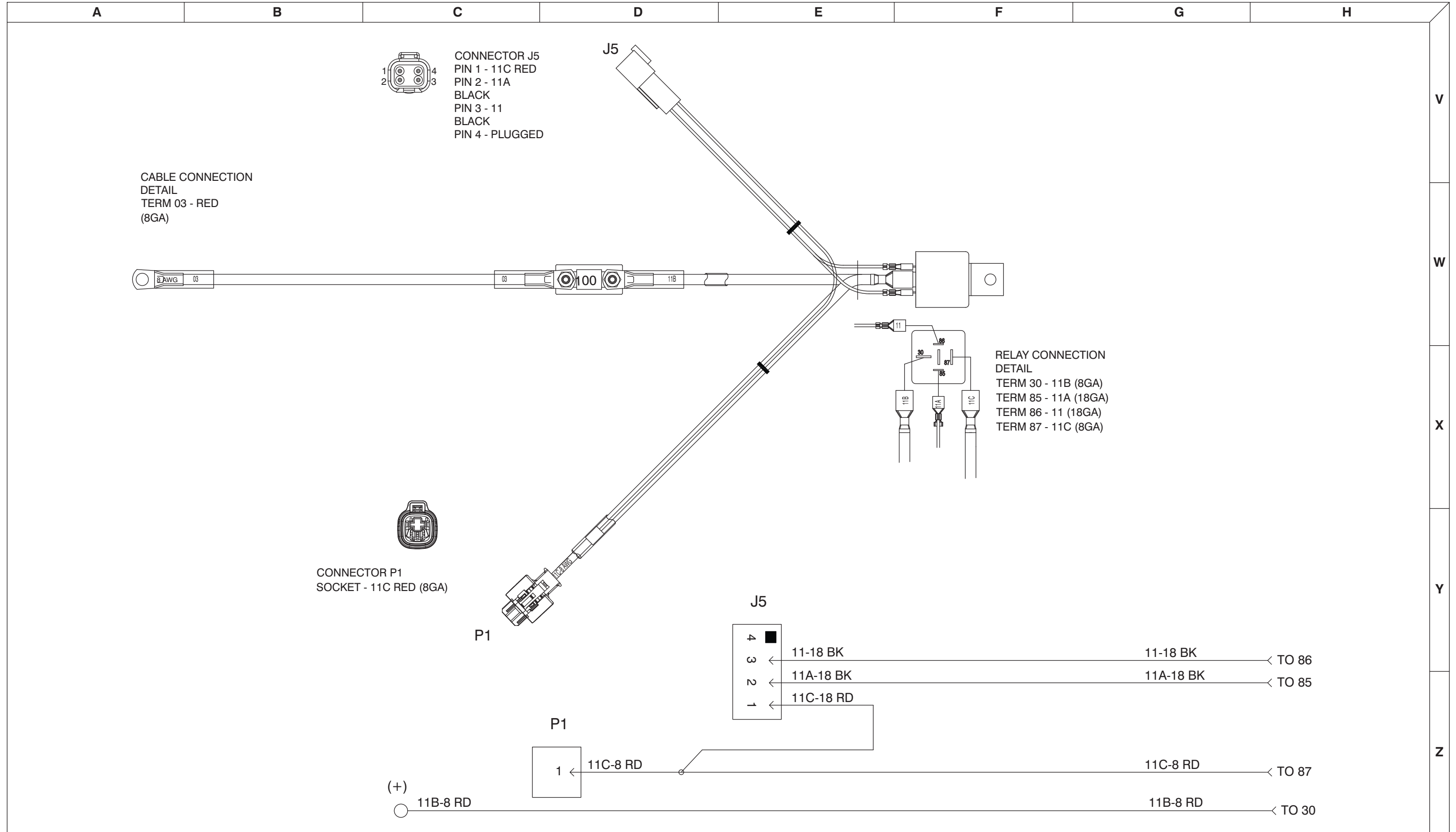


TH-065 Major components 519 TH

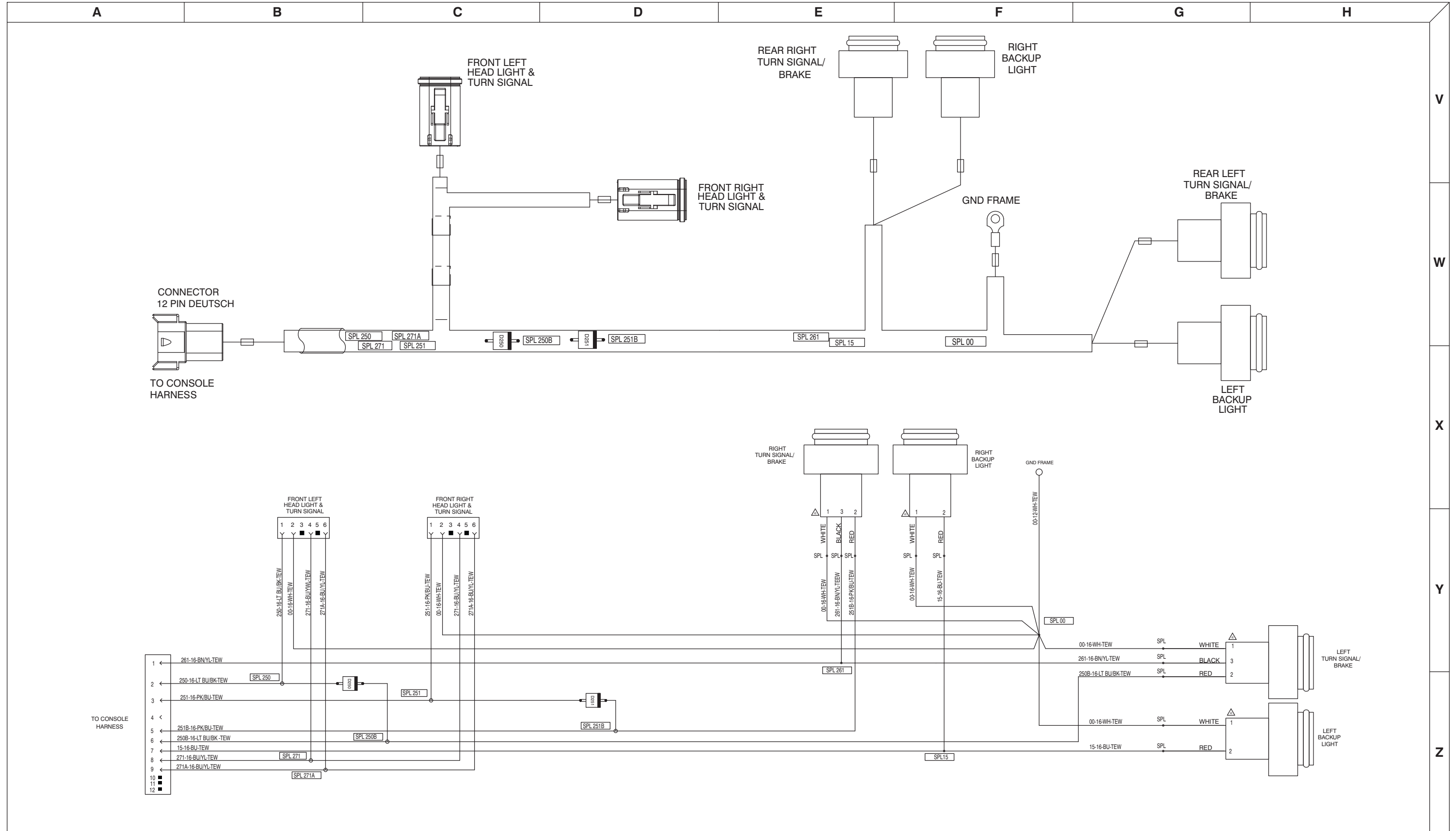
3.13 Major Components Identification and Location - Engine Compartment and Frame



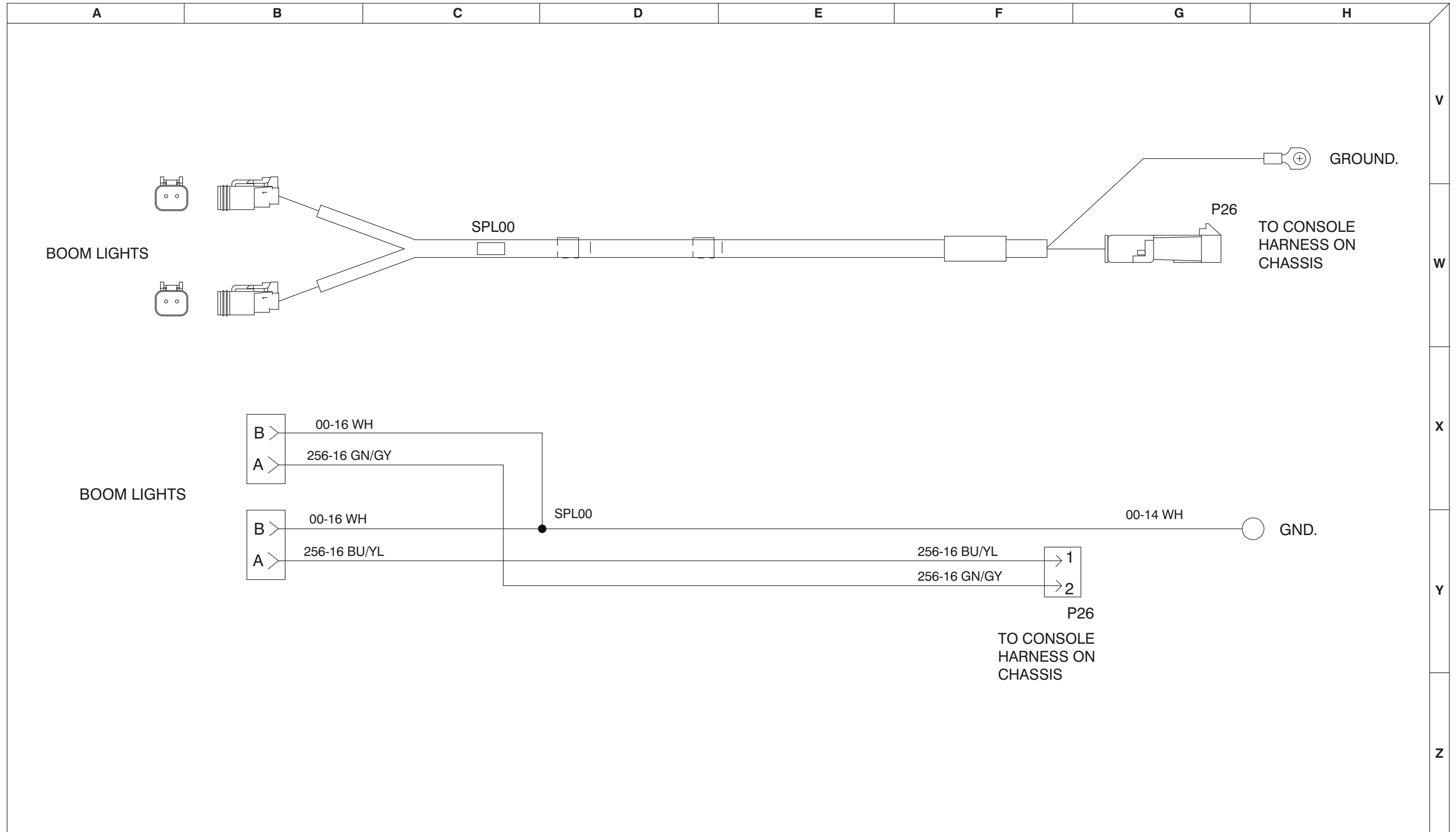
3.14 Glow Plug Harness



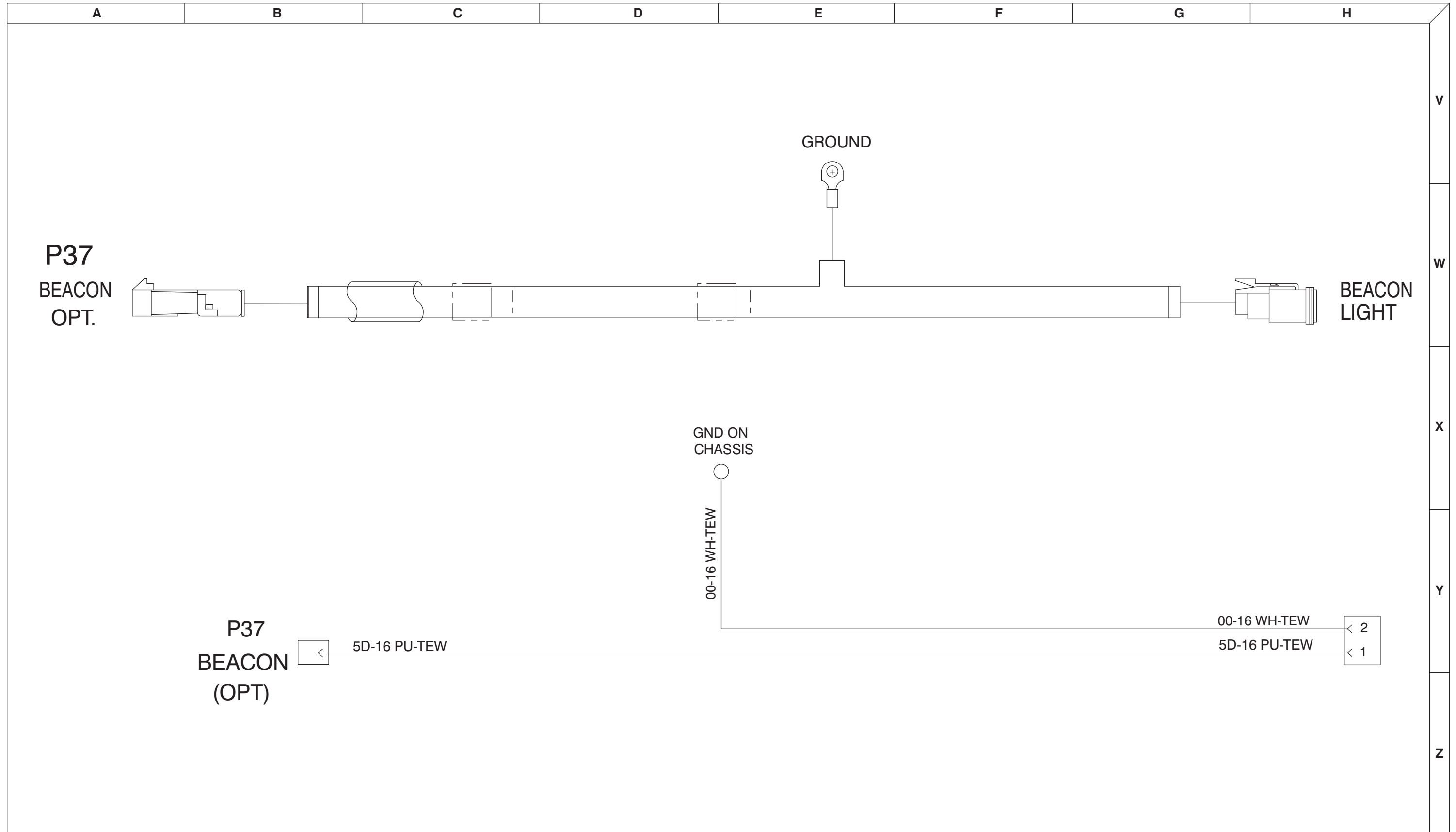
3.15 Road Lights Harness



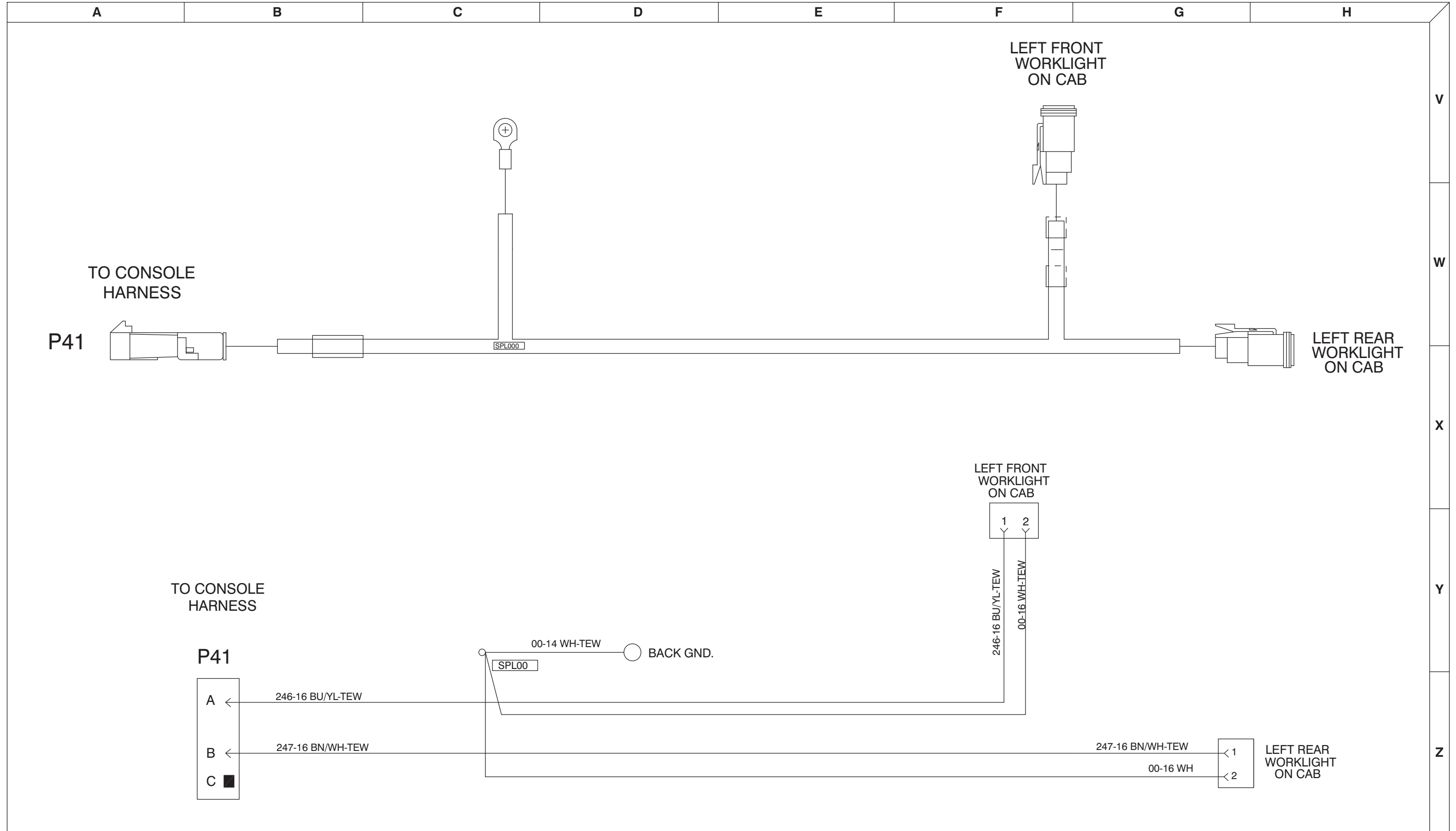
3.16 Boom Lights Harness



3.17 Beacon Light Harness



3.18 Work Lights Harness



A	B	C	D	E	F	G	H
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V

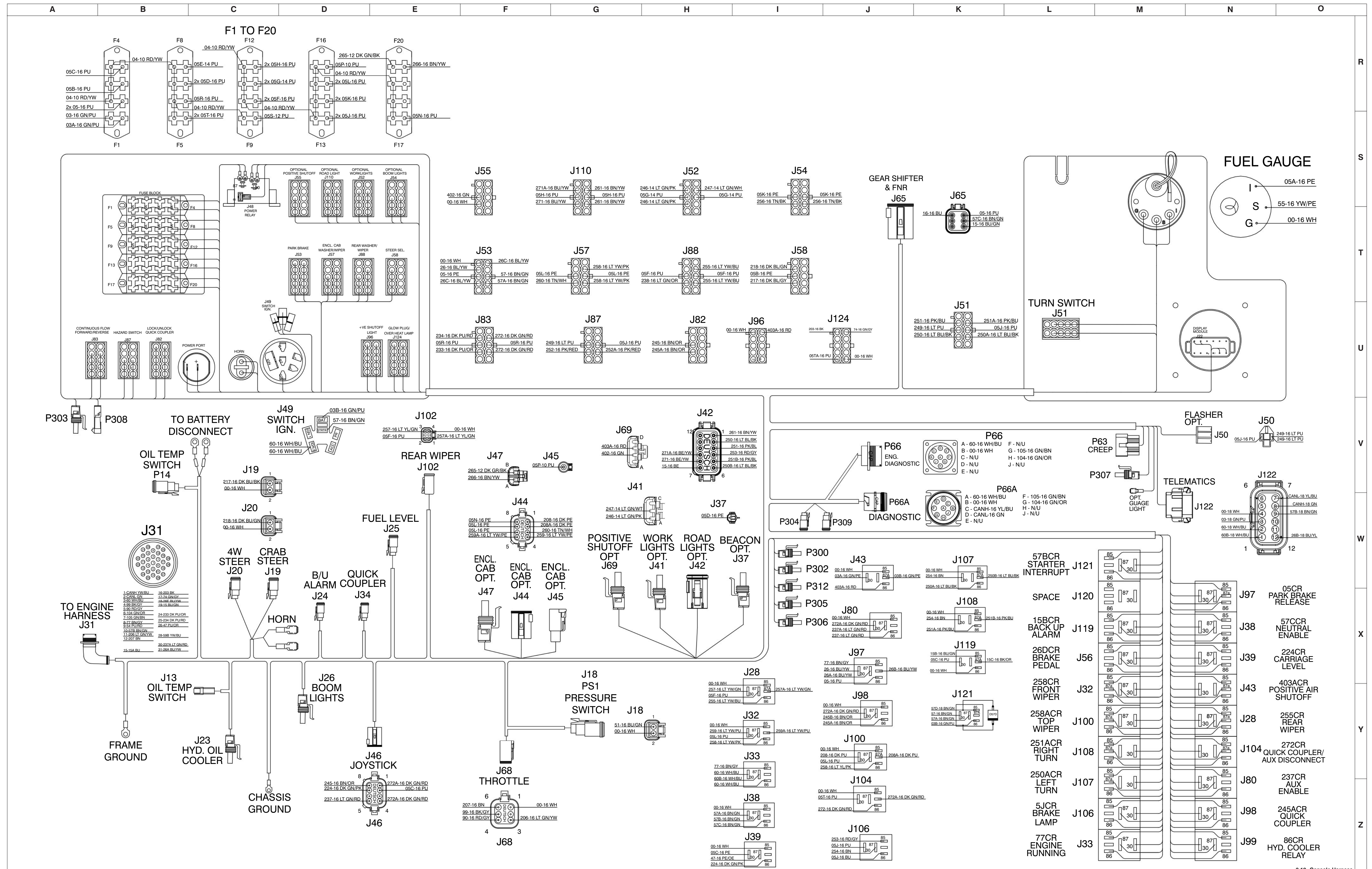
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X

Y

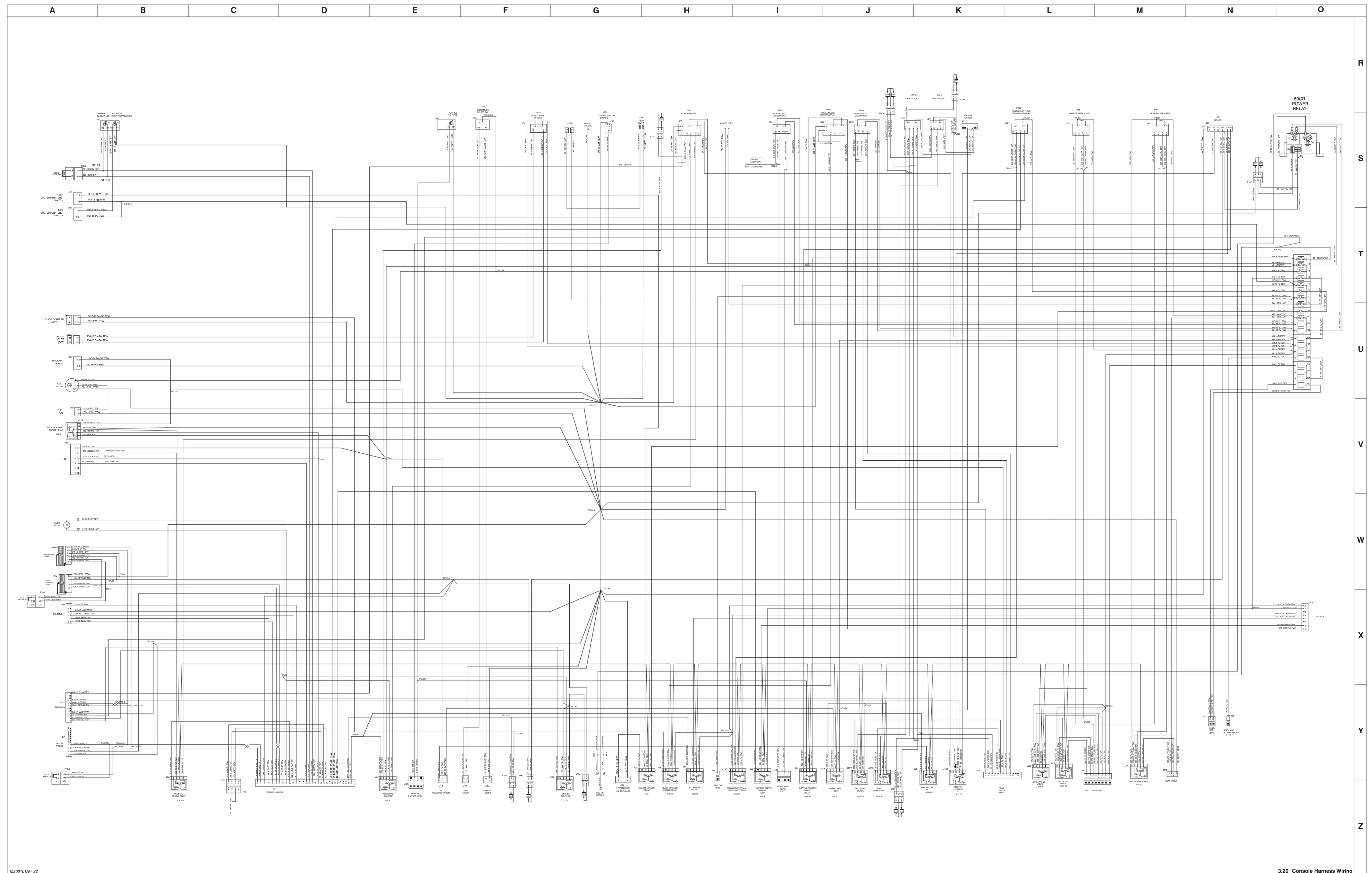
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3.19 Console Harness

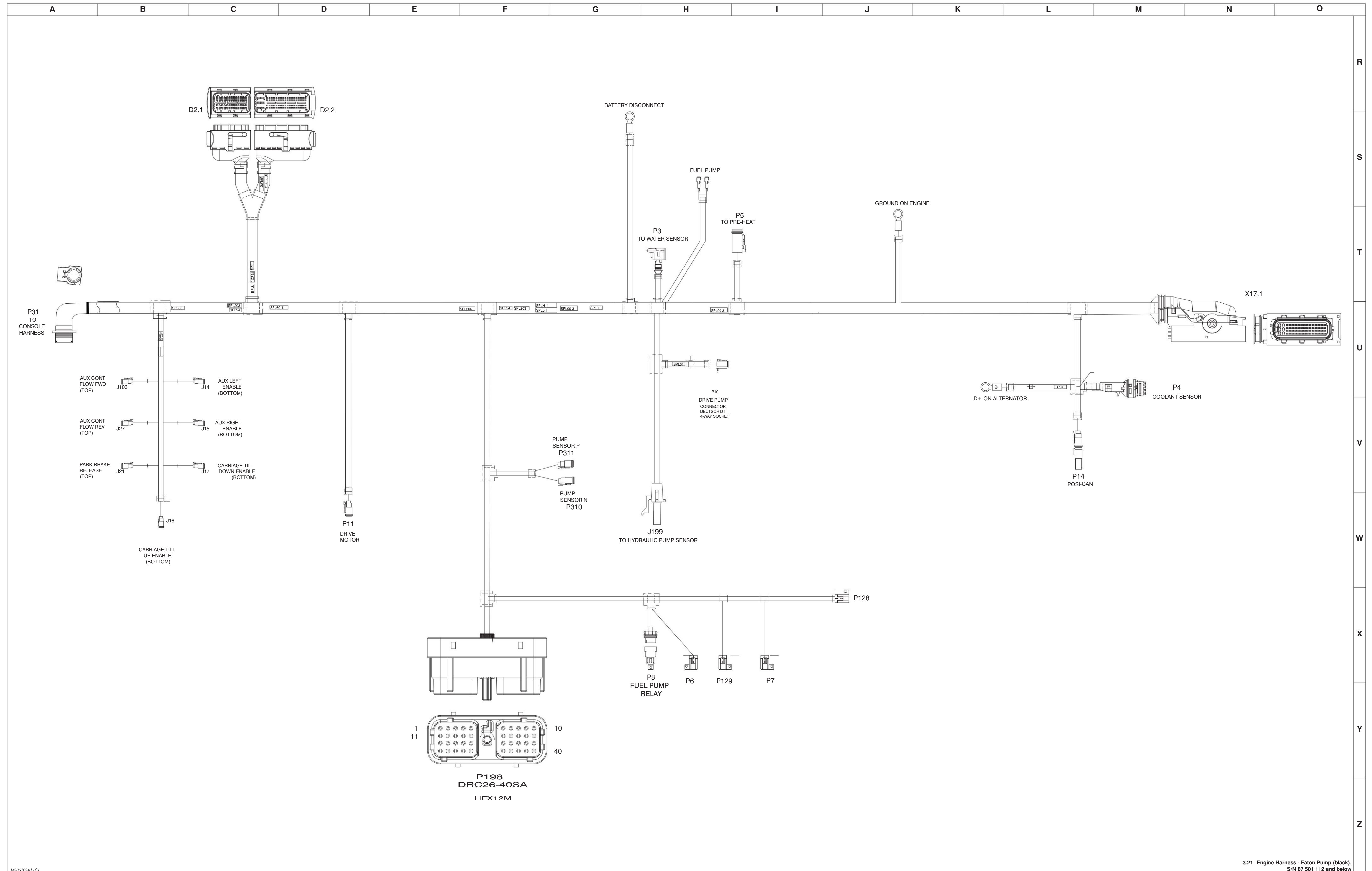


M206101AK - S7

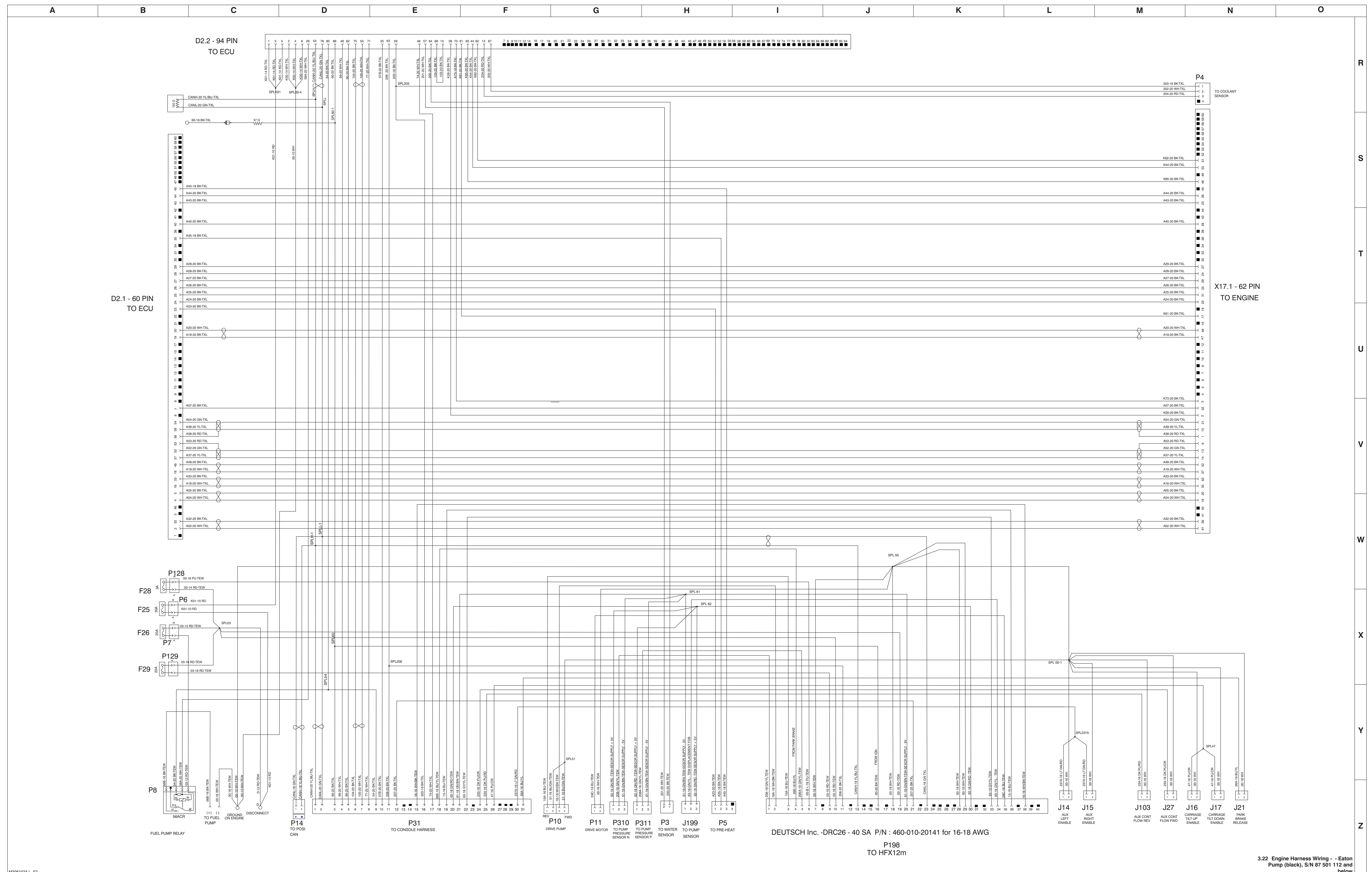
3.20 Console Harness Wiring



3.21 Engine Harness - Eaton Pump (black), S/N 87 501 112 and below

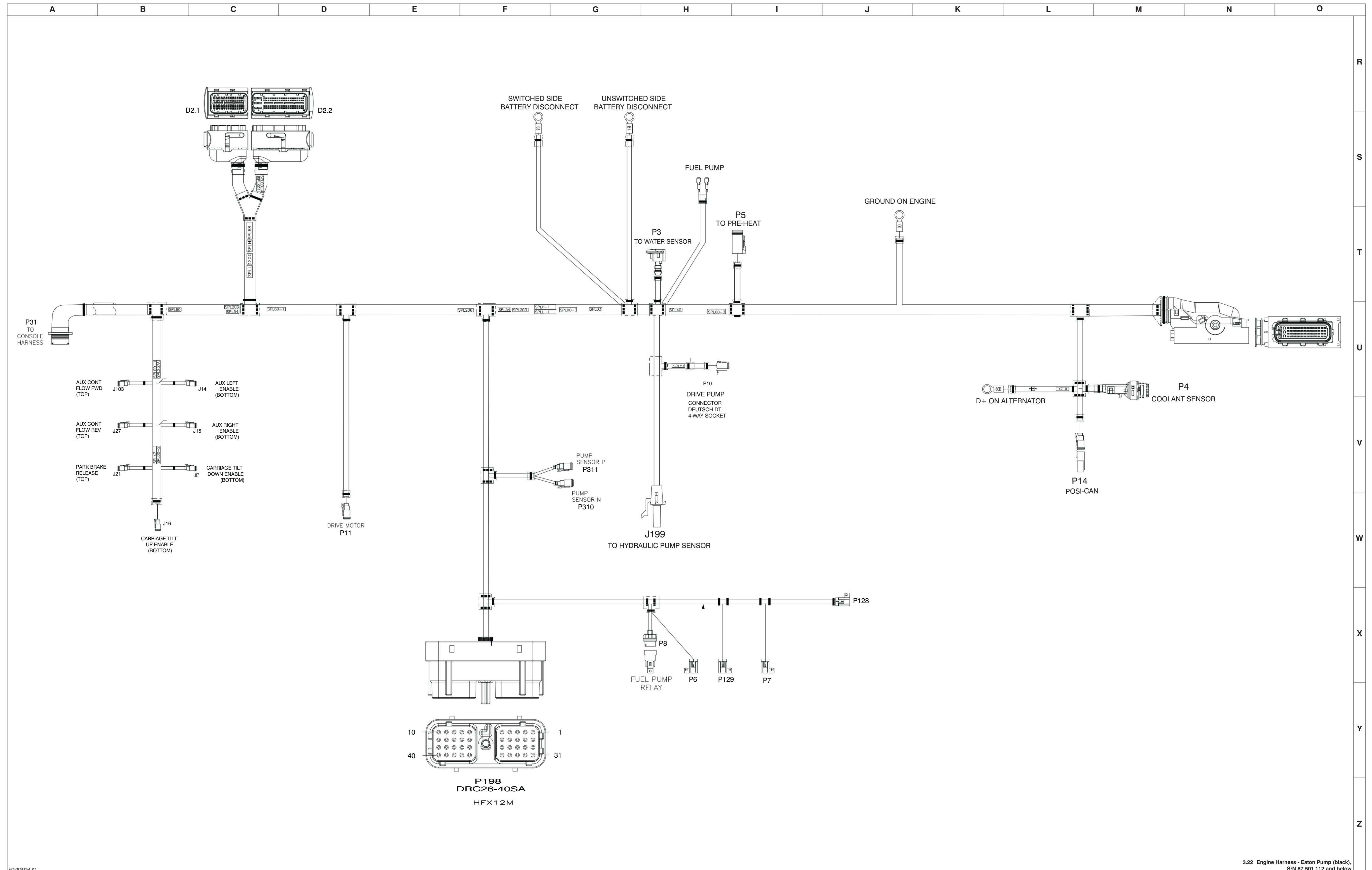


3.22 Engine Harness Wiring - Eaton Pump (black), S/N 87 501 112 and below



M206102AJ - S2

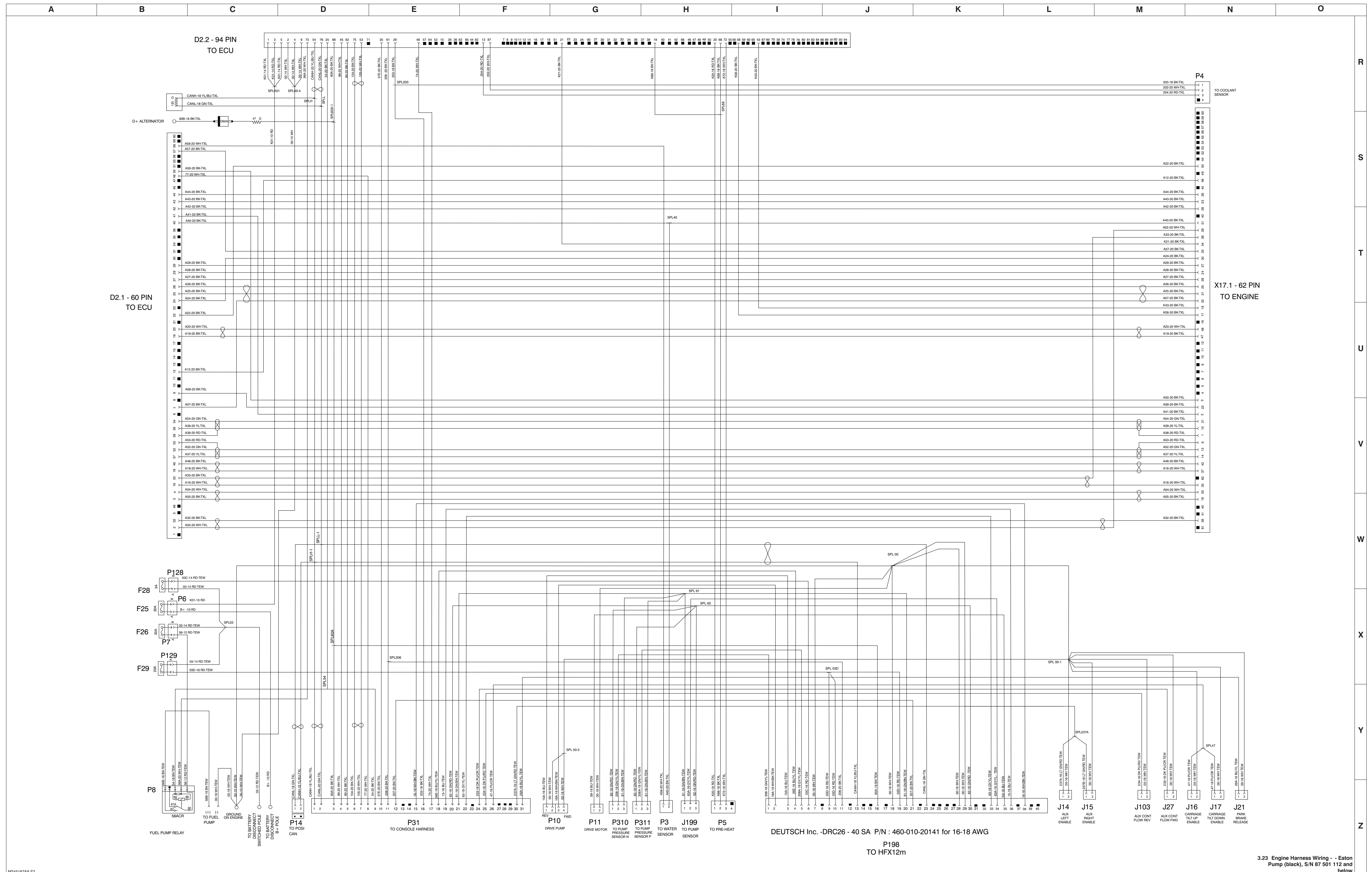
3.23 Engine Harness - Eaton Pump with HXF Controller (black), S/N 87 501 113 to 87 501 292



M245187AA-S1

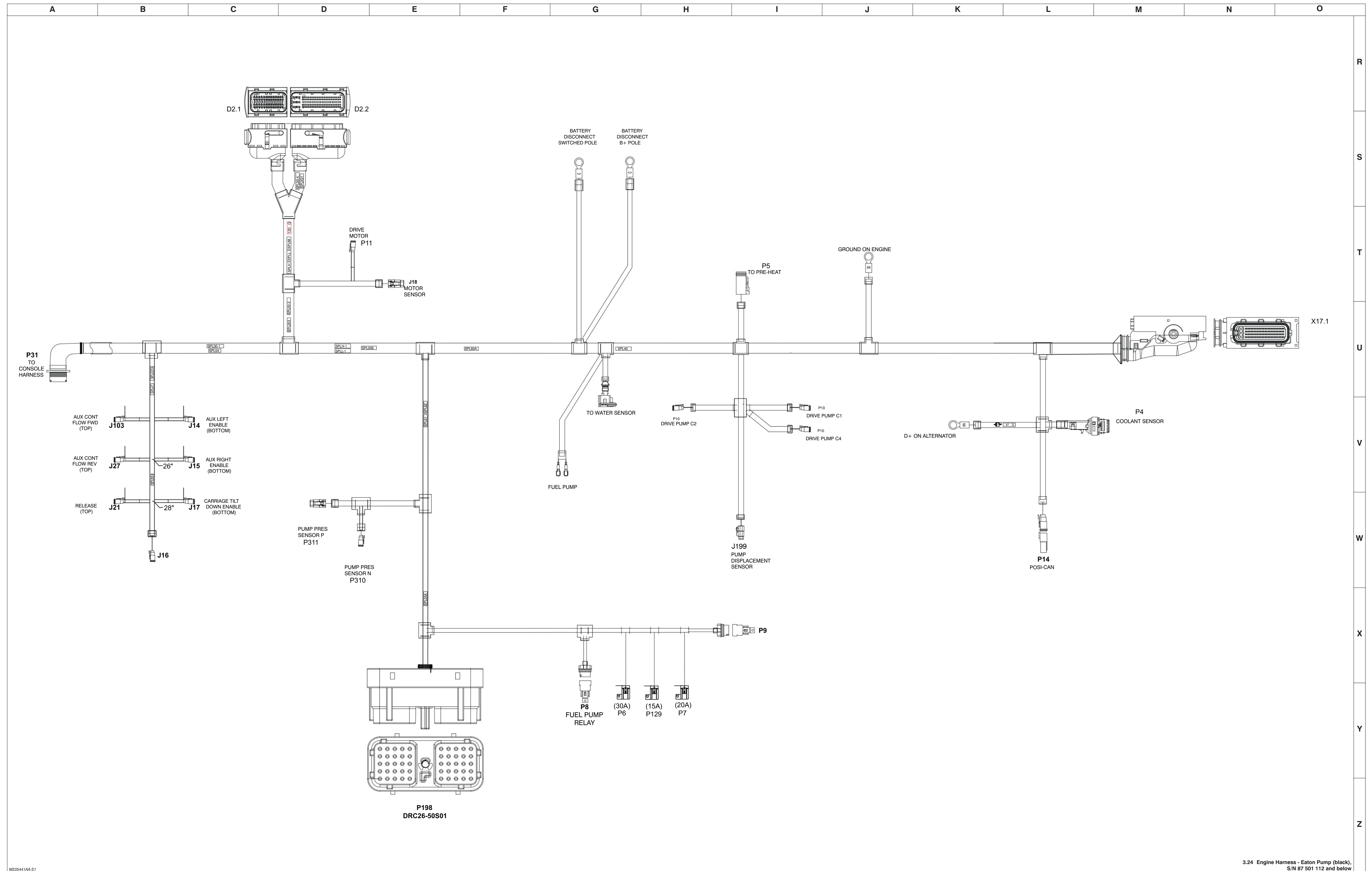
3.22 Engine Harness - Eaton Pump (black), S/N 87 501 112 and below

3.24 Engine Harness Wiring - Eaton Pump with HXF Controller (black), S/N 87 501 113 to 87 501 292



M245187AA-S2

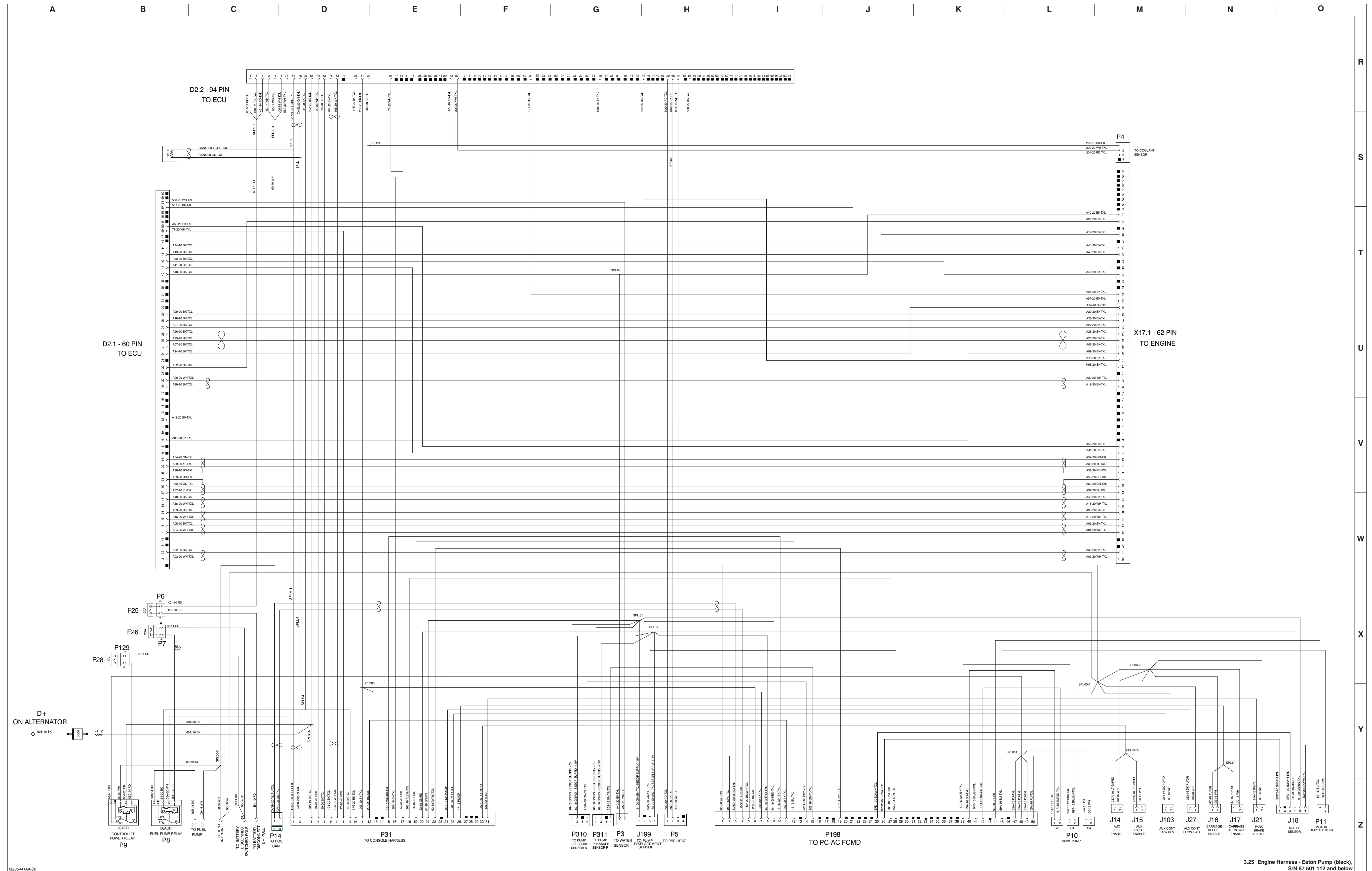
3.25 Engine Harness - Danfoss Plus 1 Pump, S/N 87 501 292 and above



M235411AA-S1

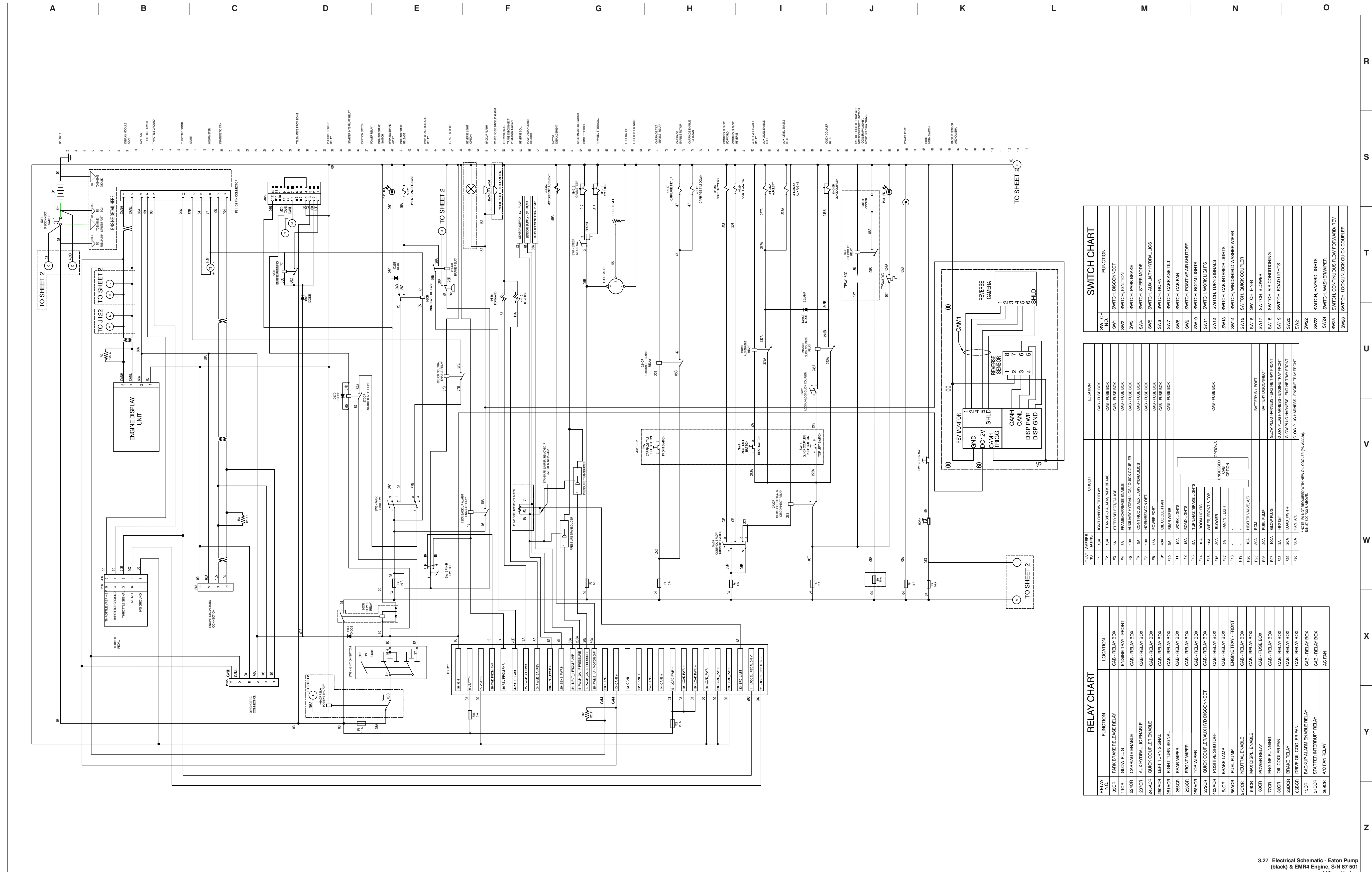
3.24 Engine Harness - Eaton Pump (black), S/N 87 501 112 and below

3.26 Engine Harness Wiring - Danfoss Plus 1 Pump, S/N 87 501 292 and above



M25541AA-S2

3.27 Electrical Schematic - Eaton Pump (black) & EMR4 Engine, S/N 87 501 112 and below



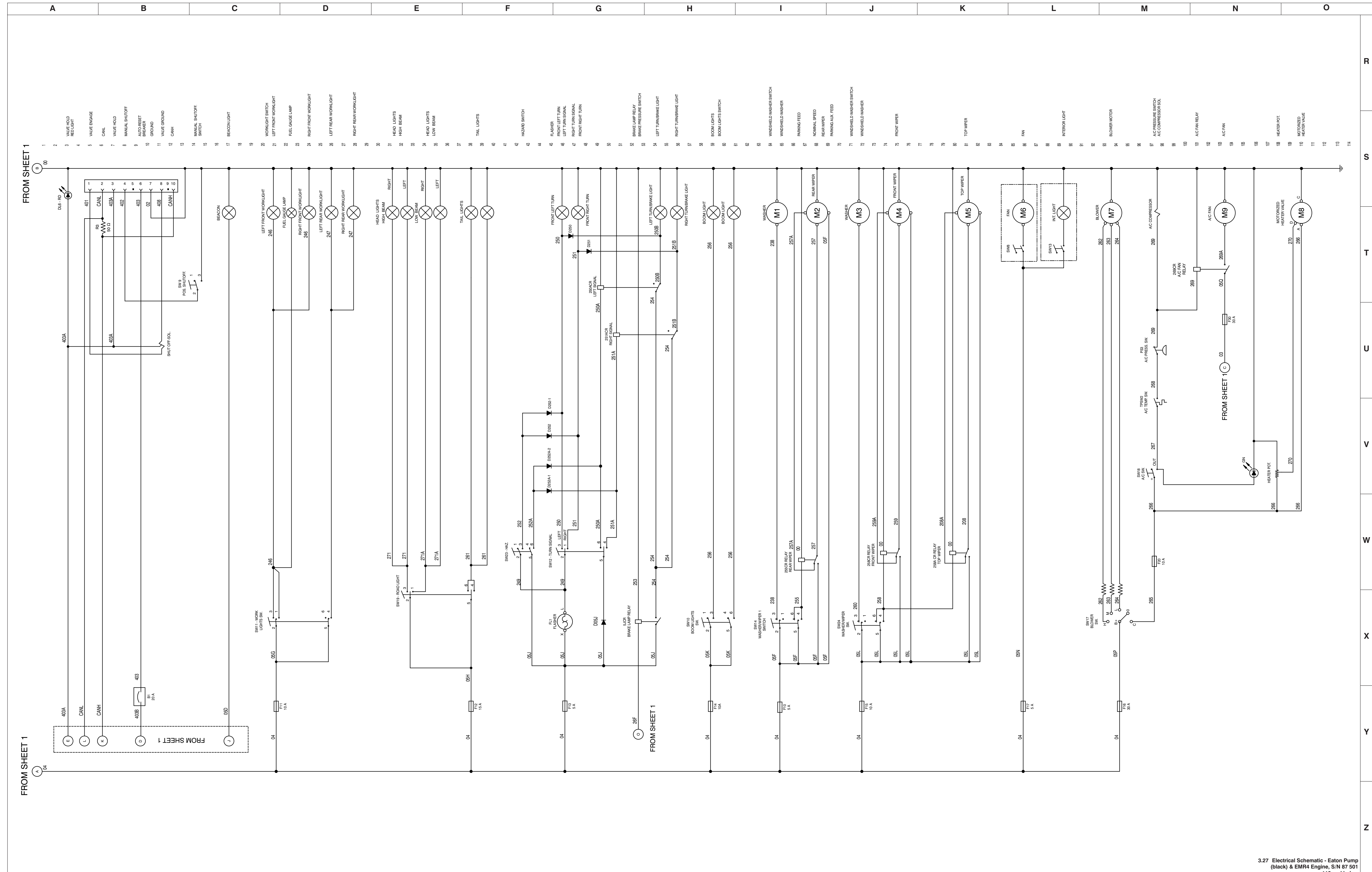
SWITCH NO.	FUNCTION
SW1	SWITCH, DISCONNECT
SW2	SWITCH, IGNITION
SW3	SWITCH, PARK BRAKE
SW4	SWITCH, STEER MODE
SW5	SWITCH, AUXILIARY HYDRAULICS
SW6	SWITCH, HORN
SW7	SWITCH, CARRIAGE TILT
SW8	SWITCH, CAB FAN
SW9	SWITCH, POSITIVE AIR SHUTOFF
SW10	SWITCH, ROOM LIGHTS
SW11	SWITCH, WORK LIGHTS
SW12	SWITCH, TURN SIGNALS
SW13	SWITCH, CAB INTERIOR LIGHTS
SW14	SWITCH, WINDSHIELD WASHER WIPER
SW15	SWITCH, QUICK COUPLER
SW16	SWITCH, FNR
SW17	SWITCH, BLOWER
SW18	SWITCH, AIR CONDITIONING
SW19	SWITCH, ROAD LIGHTS
SW20	SW20
SW21	SW21
SW22	SW22
SW23	SW23
SW24	SW24
SW25	SW25
SW26	SW26

FUSE AMPERE RATING	CIRCUIT	LOCATION
F1	IGNITION/POWER RELAY	CAB - FUSE BOX
F2	TRANS 12V ALARM/PARK BRAKE	CAB - FUSE BOX
F3	STEER SELECT GAUGE	CAB - FUSE BOX
F4	5A	CAB - FUSE BOX
F5	10A	CAB - FUSE BOX
F6	10A	CAB - FUSE BOX
F7	10A	CAB - FUSE BOX
F8	15A	CAB - FUSE BOX
F9	40A	CAB - FUSE BOX
F10	5A	CAB - FUSE BOX
F11	5A	CAB - FUSE BOX
F12	10A	CAB - FUSE BOX
F13	5A	CAB - FUSE BOX
F14	10A	CAB - FUSE BOX
F15	10A	CAB - FUSE BOX
F16	30A	CAB - FUSE BOX
F17	30A	CAB - FUSE BOX
F18	-	CAB - FUSE BOX
F19	-	CAB - FUSE BOX
F20	10A	CAB - FUSE BOX
F21	5A	CAB - FUSE BOX
F22	20A	CAB - FUSE BOX
F23	100A	CAB - FUSE BOX
F24	30A	CAB - FUSE BOX
F25	30A	CAB - FUSE BOX
F26	30A	CAB - FUSE BOX
F27	30A	CAB - FUSE BOX

RELAY NO.	FUNCTION	LOCATION
15CR	PARK BRAKE RELEASE RELAY	CAB - RELAY BOX
22CR	GLOW PLUG	ENGINE TRAY - FRONT
23CR	CARRIAGE ENABLE	CAB - RELAY BOX
24CR	AUX HYDRAULIC ENABLE	CAB - RELAY BOX
25CR	QUICK COUPLER ENABLE	CAB - RELAY BOX
26CR	LEFT TURN SIGNAL	CAB - RELAY BOX
27CR	RIGHT TURN SIGNAL	CAB - RELAY BOX
28CR	REAR WIPER	CAB - RELAY BOX
29CR	FRONT WIPER	CAB - RELAY BOX
30CR	TOP WIPER	CAB - RELAY BOX
31CR	QUICK COUPLER/AUX HYD DISCONNECT	CAB - RELAY BOX
32CR	POSITIVE SHUTOFF	CAB - RELAY BOX
33CR	BRAKE LAMP	CAB - RELAY BOX
34CR	FUEL PUMP	ENGINE TRAY - FRONT
35CR	NEUTRAL ENABLE	CAB - RELAY BOX
36CR	MAX DISPL. ENABLE	CAB - RELAY BOX
37CR	POWER RELAY	CAB - FUSE BOX
38CR	ENGINE RUNNING	CAB - RELAY BOX
39CR	OIL COOLER FAN	CAB - RELAY BOX
40CR	BRAKE RELAY	CAB - RELAY BOX
41CR	DRIVE OIL COOLER FAN	CAB - RELAY BOX
42CR	BACKUP ALARM ENABLE RELAY	CAB - RELAY BOX
43CR	STARTER INTERRUPT RELAY	CAB - RELAY BOX
44CR	AC FAN RELAY	AC FAN

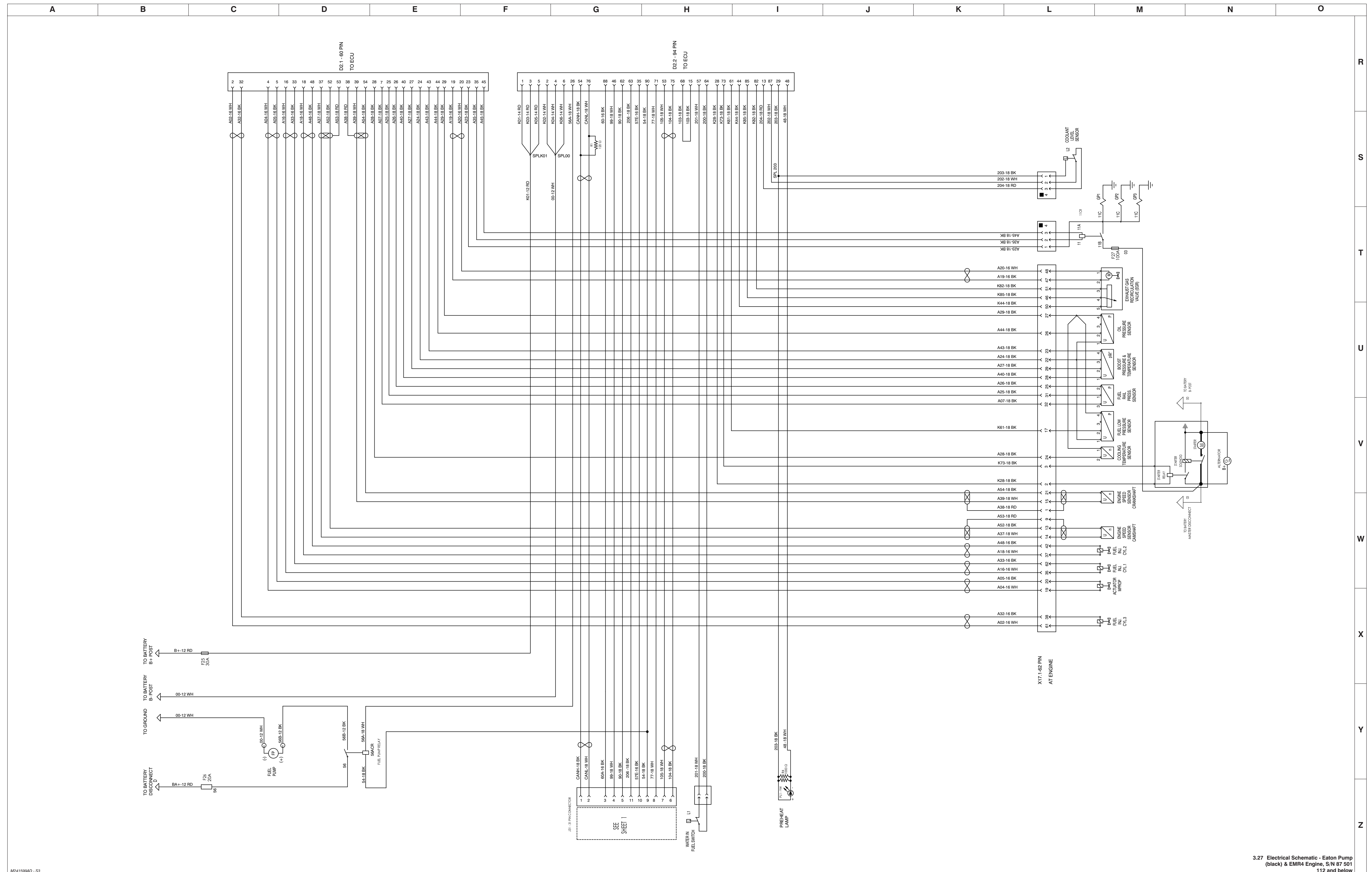
3.27 Electrical Schematic - Eaton Pump (black) & EMR4 Engine, S/N 87 501 112 and below

3.27 Electrical Schematic - Eaton Pump (black) & EMR4 Engine, S/N 87 501 112 and below



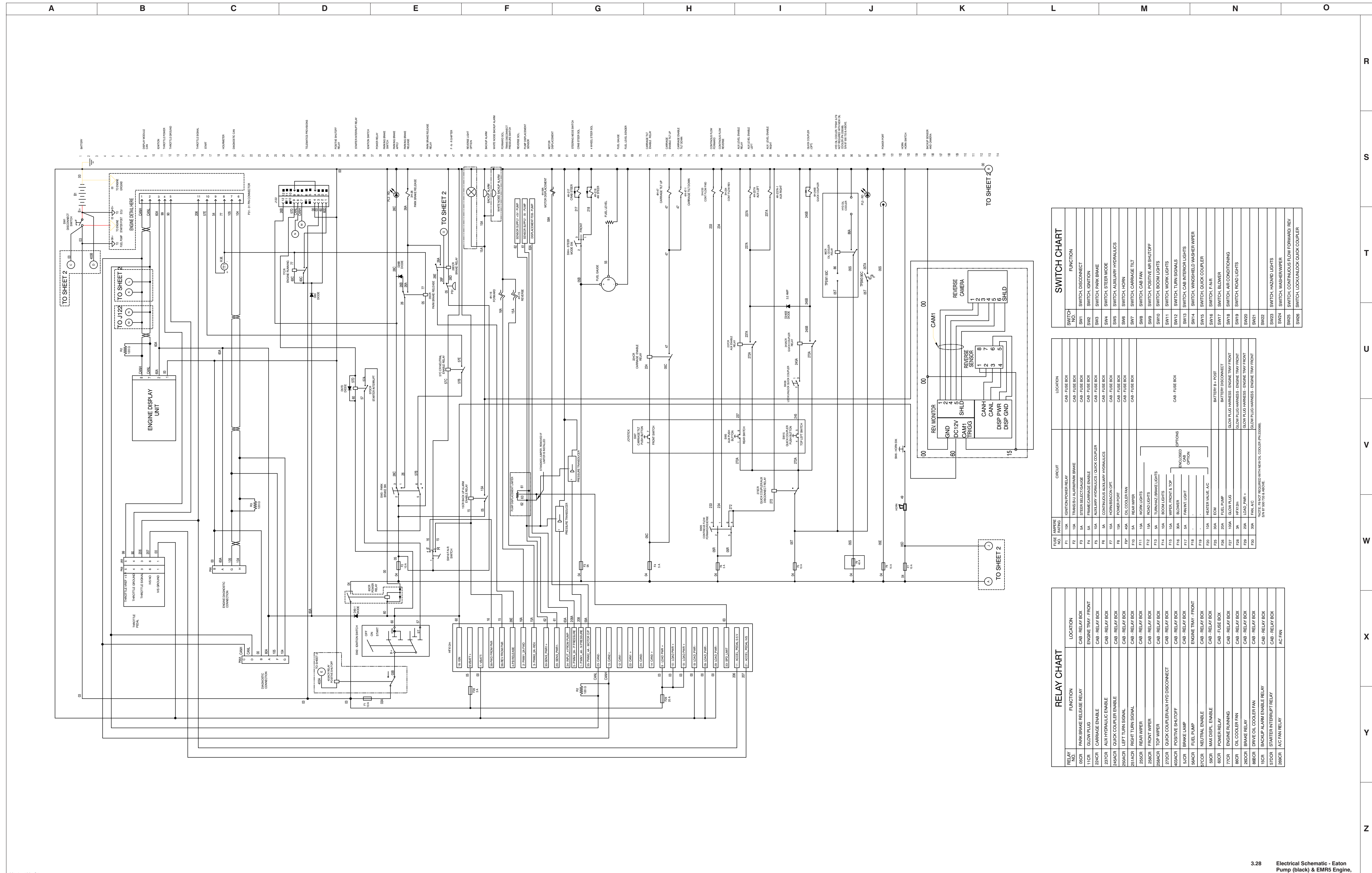
M241599AD - S2

3.27 Electrical Schematic - Eaton Pump (black) & EMR4 Engine, S/N 87 501 112 and below



3.27 Electrical Schematic - Eaton Pump (black) & EMR4 Engine, S/N 87 501 112 and below

3.28 Electrical Schematic - Eaton Pump (black) & EMR5 Engine, S/N 87 501 113 to 87 501 291

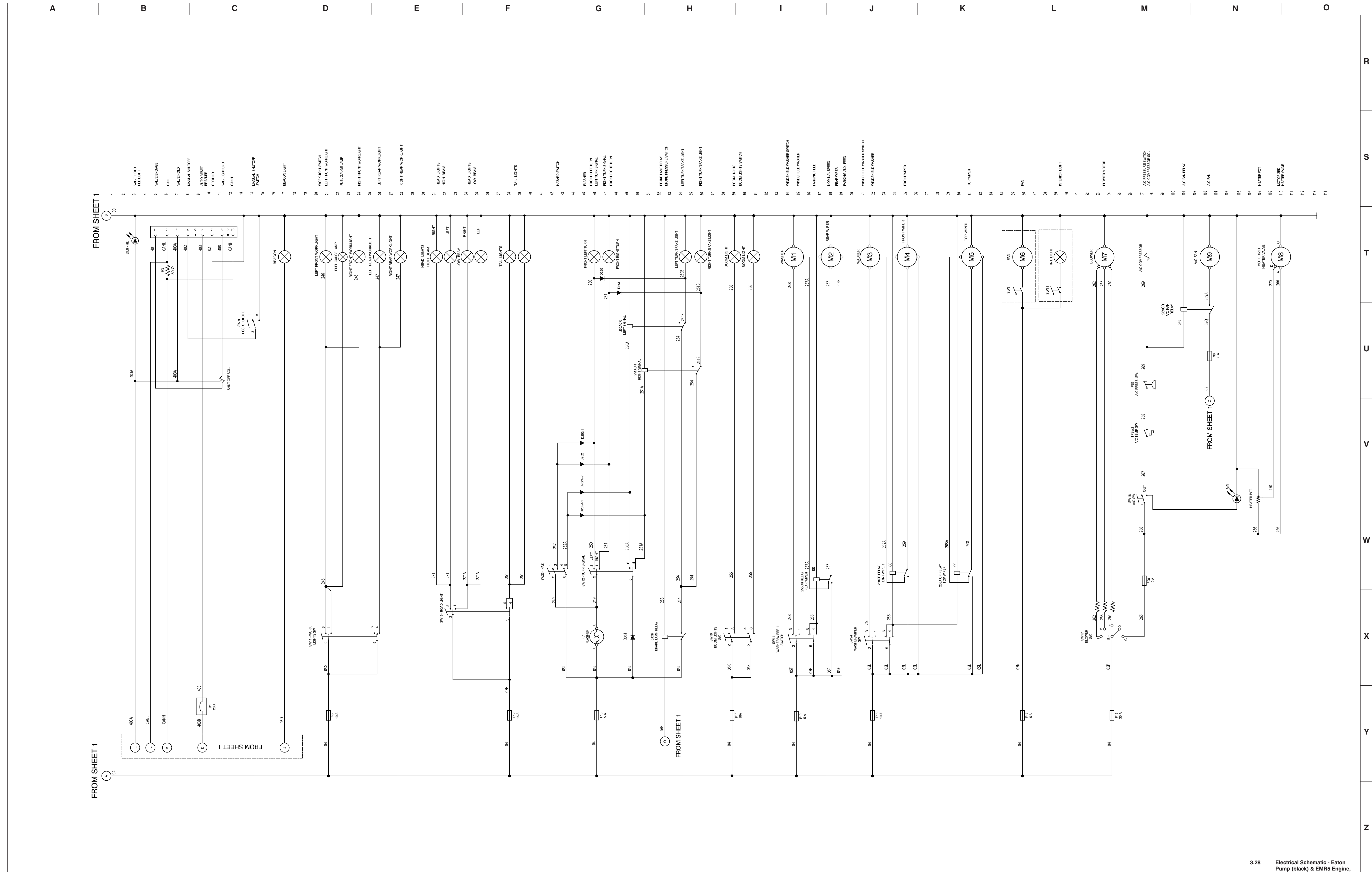


SWITCH NO.	FUNCTION
SW1	SWITCH DISCONNECT
SW2	SWITCH LIGHT ON
SW3	SWITCH PARK BRAKE
SW4	SWITCH STEERING
SW5	SWITCH AUXILIARY HYDRAULICS
SW6	SWITCH HORN
SW7	SWITCH CARRIAGE TILT
SW8	SWITCH CAB FAN
SW9	SWITCH POSITIVE AIR SHUTOFF
SW10	SWITCH BOOM LIGHTS
SW11	SWITCH TURN SIGNALS
SW12	SWITCH WINDSHIELD WASHER WIPER
SW13	SWITCH CAB INTERIOR LIGHTS
SW14	SWITCH WINDSHIELD WASHER WIPER
SW15	SWITCH QUICK COUPLER
SW16	SWITCH FAN
SW17	SWITCH BLOWER
SW18	SWITCH AIR CONDITIONING
SW19	SWITCH ROAD LIGHTS
SW20	SW1
SW21	SW2
SW22	SWITCH HAZARD LIGHTS
SW23	SWITCH WASHER WIPER
SW24	SWITCH CONTINUOUS FLOW FORWARD REV
SW25	SWITCH LOCK/UNLOCK QUICK COUPLER

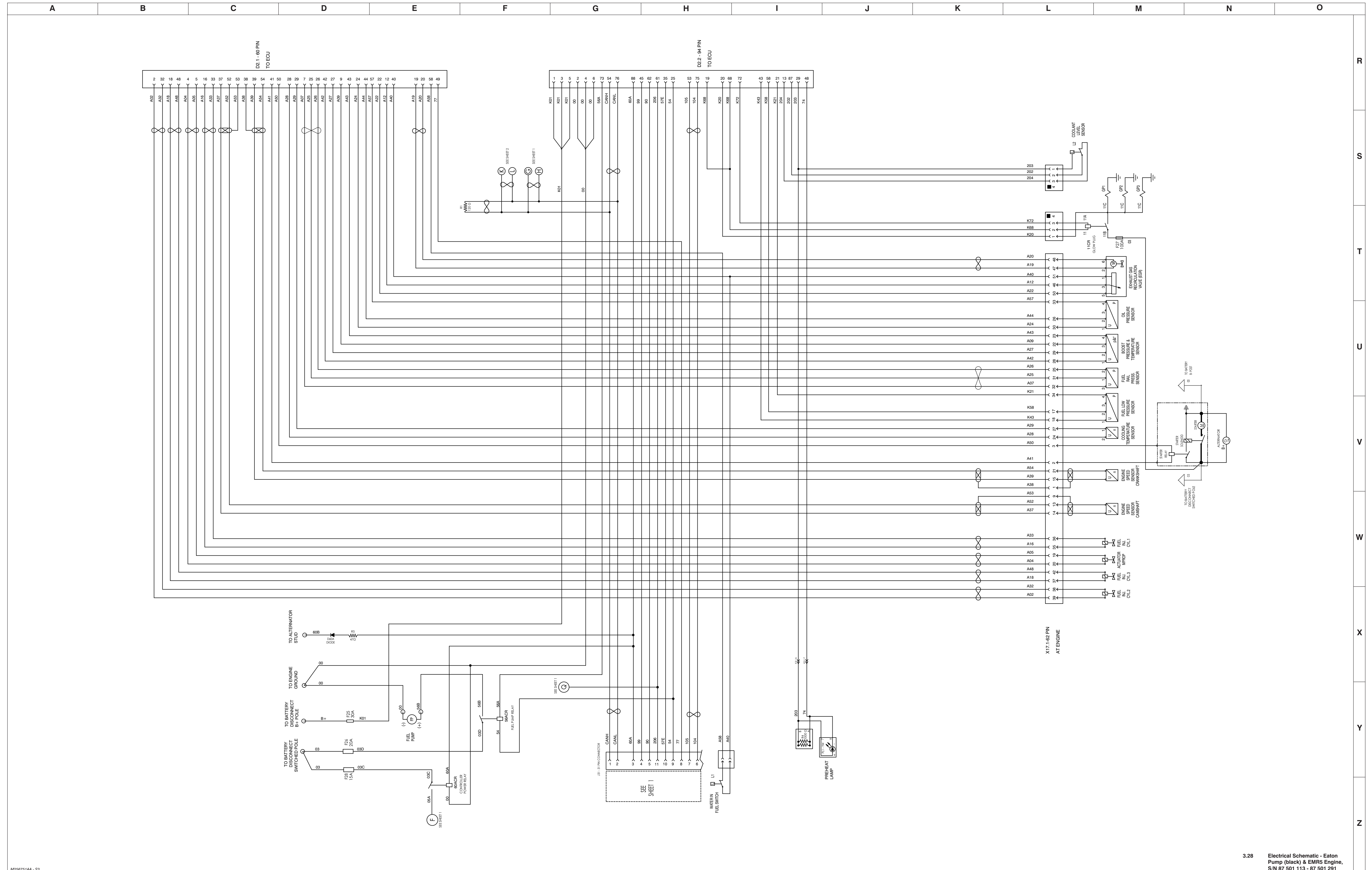
FUSE AMPERE	CIRCUIT	LOCATION
F1	IGNITION/POWER RELAY	CAB - FUSE BOX
F2	IGNITION/POWER RELAY	CAB - FUSE BOX
F3	STEER SELECT GAUGE	CAB - FUSE BOX
F4	FRAME/CARRIAGE ENABLE	CAB - FUSE BOX
F5	AUXILIARY HYDRAULICS/ QUICK COUPLER	CAB - FUSE BOX
F6	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F7	HORN/BACKUP OPT.	CAB - FUSE BOX
F8	POWER PORT	CAB - FUSE BOX
F9	OIL COOLER FAN	CAB - FUSE BOX
F10	REAR WIPER	CAB - FUSE BOX
F11	WORK LIGHTS	CAB - FUSE BOX
F12	ROAD LIGHTS	CAB - FUSE BOX
F13	TURNHAZ BRAKE LIGHTS	CAB - FUSE BOX
F14	BOOK LIGHTS	CAB - FUSE BOX
F15	WIPER FRONT & TOP	CAB - FUSE BOX
F16	BLOWER	CAB - FUSE BOX
F17	FAN/INT. LIGHT	CAB - FUSE BOX
F18	HEATER VALVE, A/C	CAB - FUSE BOX
F19	HEATER VALVE, A/C	CAB - FUSE BOX
F20	HEATER VALVE, A/C	CAB - FUSE BOX
F21	HEATER VALVE, A/C	CAB - FUSE BOX
F22	FUEL PUMP	BATTERY B - PORT
F23	FUEL PUMP	BATTERY DISCONNECT
F24	FUEL PUMP	BATTERY DISCONNECT
F25	FUEL PUMP	BATTERY DISCONNECT
F26	FUEL PUMP	BATTERY DISCONNECT
F27	FUEL PUMP	BATTERY DISCONNECT
F28	FUEL PUMP	BATTERY DISCONNECT
F29	FUEL PUMP	BATTERY DISCONNECT
F30	FUEL PUMP	BATTERY DISCONNECT
F31	FUEL PUMP	BATTERY DISCONNECT
F32	FUEL PUMP	BATTERY DISCONNECT
F33	FUEL PUMP	BATTERY DISCONNECT
F34	FUEL PUMP	BATTERY DISCONNECT
F35	FUEL PUMP	BATTERY DISCONNECT
F36	FUEL PUMP	BATTERY DISCONNECT
F37	FUEL PUMP	BATTERY DISCONNECT
F38	FUEL PUMP	BATTERY DISCONNECT
F39	FUEL PUMP	BATTERY DISCONNECT
F40	FUEL PUMP	BATTERY DISCONNECT
F41	FUEL PUMP	BATTERY DISCONNECT
F42	FUEL PUMP	BATTERY DISCONNECT
F43	FUEL PUMP	BATTERY DISCONNECT
F44	FUEL PUMP	BATTERY DISCONNECT
F45	FUEL PUMP	BATTERY DISCONNECT
F46	FUEL PUMP	BATTERY DISCONNECT
F47	FUEL PUMP	BATTERY DISCONNECT
F48	FUEL PUMP	BATTERY DISCONNECT
F49	FUEL PUMP	BATTERY DISCONNECT
F50	FUEL PUMP	BATTERY DISCONNECT
F51	FUEL PUMP	BATTERY DISCONNECT
F52	FUEL PUMP	BATTERY DISCONNECT
F53	FUEL PUMP	BATTERY DISCONNECT
F54	FUEL PUMP	BATTERY DISCONNECT
F55	FUEL PUMP	BATTERY DISCONNECT
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F59	FUEL PUMP	BATTERY DISCONNECT
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F83	FUEL PUMP	BATTERY DISCONNECT
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F88	FUEL PUMP	BATTERY DISCONNECT
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F90	FUEL PUMP	BATTERY DISCONNECT
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F96	FUEL PUMP	BATTERY DISCONNECT
F97	FUEL PUMP	BATTERY DISCONNECT
F98	FUEL PUMP	BATTERY DISCONNECT
F99	FUEL PUMP	BATTERY DISCONNECT
F100	FUEL PUMP	BATTERY DISCONNECT

RELAY NO.	FUNCTION	LOCATION
00CR	PARK BRAKE RELEASE RELAY	CAB - RELAY BOX
11CR	GLOW PLUG	ENGINE TRAY - FRONT
20CR	CARRIAGE ENABLE	CAB - RELAY BOX
21CR	AUX HYDRAULIC ENABLE	CAB - RELAY BOX
22CR	QUICK COUPLER ENABLE	CAB - RELAY BOX
23CR	LEFT TURN SIGNAL	CAB - RELAY BOX
24CR	RIGHT TURN SIGNAL	CAB - RELAY BOX
25CR	REAR WIPER	CAB - RELAY BOX
26CR	FRONT WIPER	CAB - RELAY BOX
27CR	TOP WIPER	CAB - RELAY BOX
28CR	QUICK COUPLER/AUX HYD DISCONNECT	CAB - RELAY BOX
29CR	POSITIVE SHUTOFF	CAB - RELAY BOX
30CR	FUEL PUMP	ENGINE TRAY - FRONT
31CR	NEUTRAL ENABLE	CAB - RELAY BOX
32CR	POWER RELAY	CAB - RELAY BOX
33CR	OIL COOLER FAN	CAB - RELAY BOX
34CR	ENGINE RUNNING	CAB - RELAY BOX
35CR	DRIVE OIL COOLER FAN	CAB - RELAY BOX
36CR	BACKUP ALARM ENABLE RELAY	CAB - RELAY BOX
37CR	STARTER INTERRUPT RELAY	CAB - RELAY BOX
38CR	A/C FAN RELAY	A/C FAN

3.28 Electrical Schematic - Eaton Pump (black) & EMR5 Engine, S/N 87 501 113 to 87 501 291

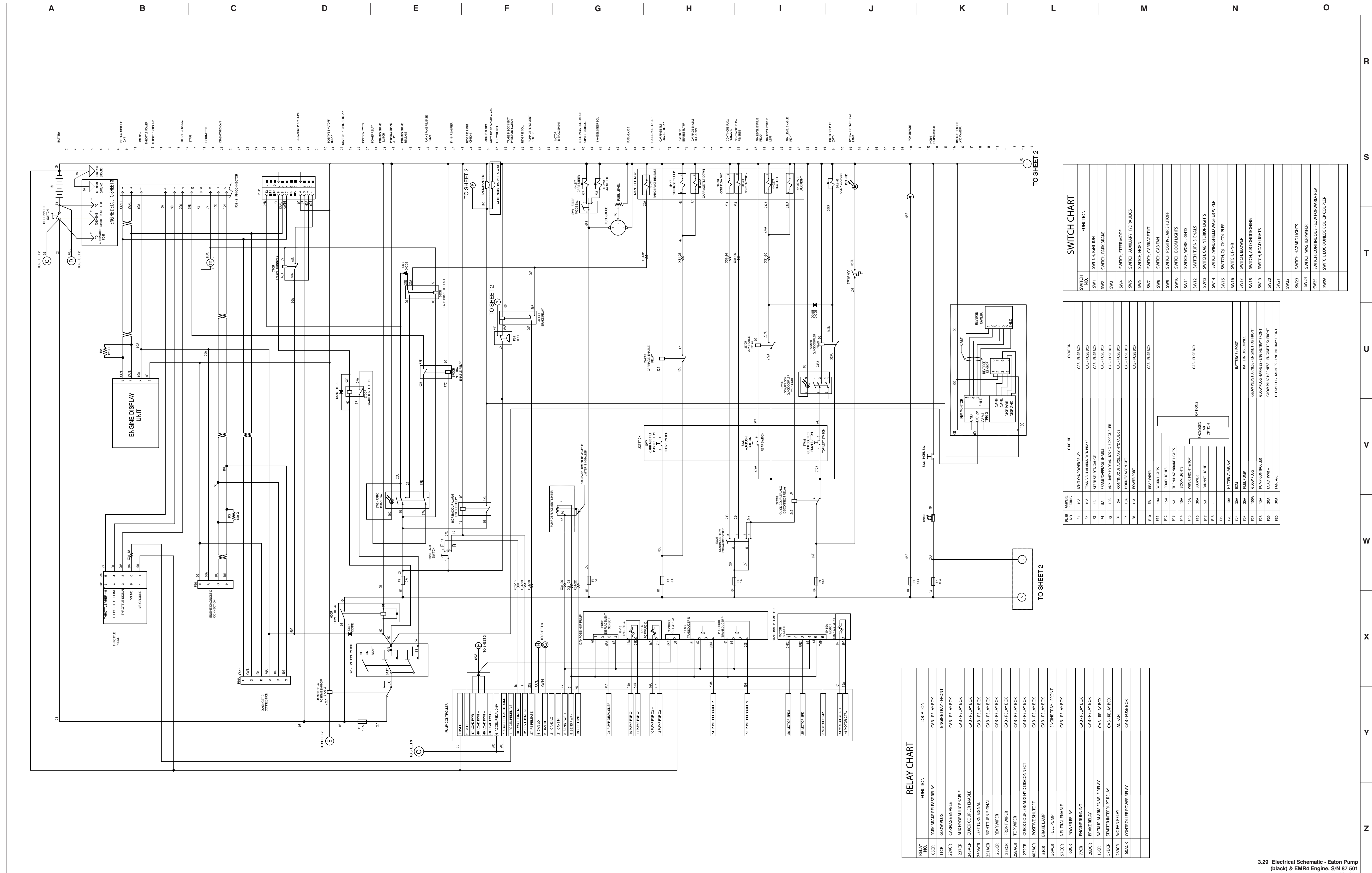


3.28 Electrical Schematic - Eaton Pump (black) & EMR5 Engine, S/N 87 501 113 to 87 501 291



M256751AA - S3

3.29 Electrical Schematic - Danfoss Plus 1 Pump (blue) & EMR5 Engine , S/N 87 501 292 and above

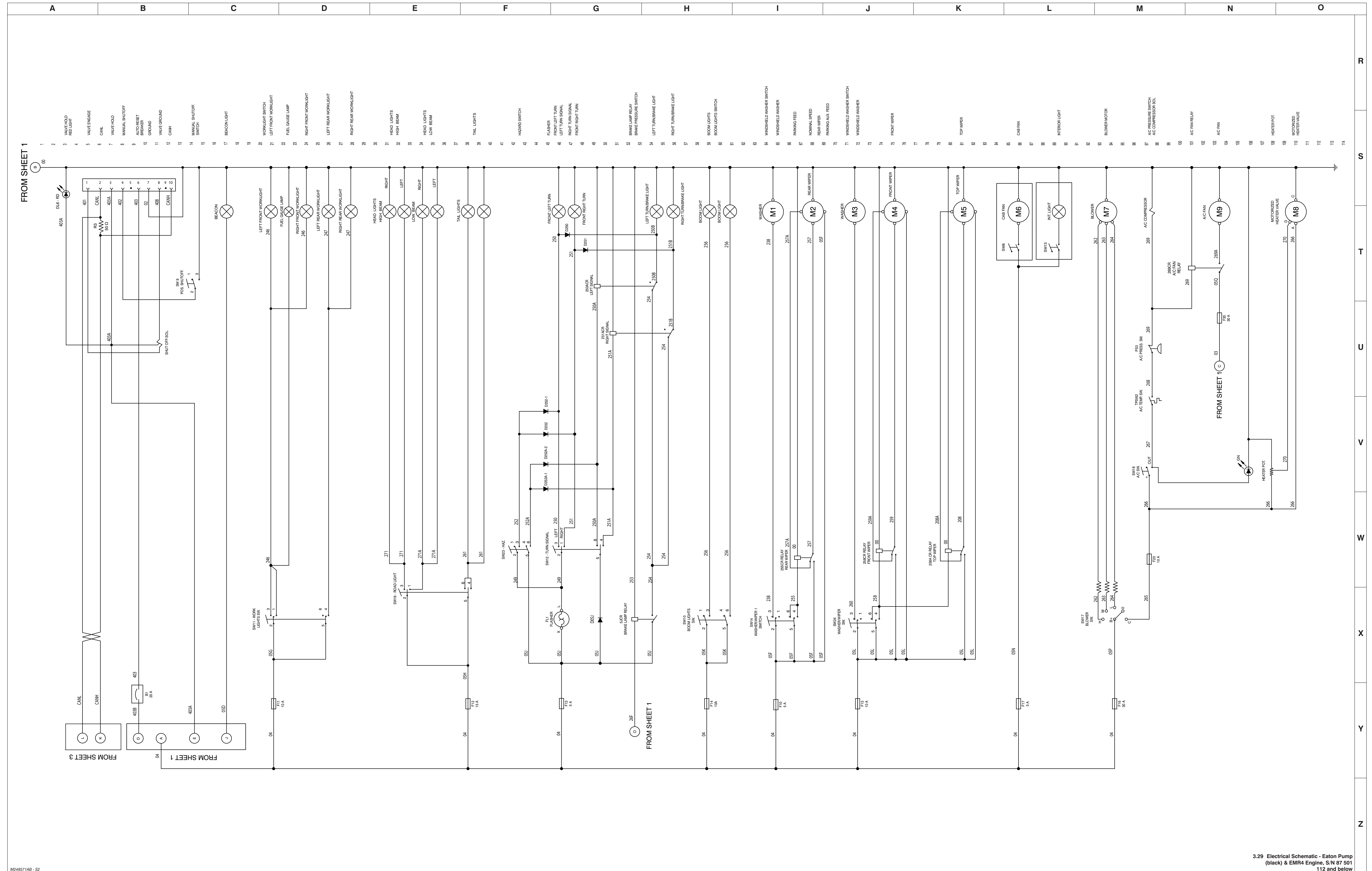


RELAY NO.	FUNCTION	LOCATION
05CR	PARK BRAKE RELEASE RELAY	CAB - RELAY BOX
11CR	GLOW PLUG	ENGINE TRAY - FRONT
21CR	CARRIAGE ENABLE	CAB - RELAY BOX
23CR	AUX HYDRAULIC ENABLE	CAB - RELAY BOX
24CR	QUICK COUPLER ENABLE	CAB - RELAY BOX
25CR	LEFT TURN SIGNAL	CAB - RELAY BOX
25JCR	RIGHT TURN SIGNAL	CAB - RELAY BOX
25KCR	REAR WIPER	CAB - RELAY BOX
25LCR	FRONT WIPER	CAB - RELAY BOX
25MCR	TOP WIPER	CAB - RELAY BOX
27CR	QUICK COUPLER/AUX HYD DISCONNECT	CAB - RELAY BOX
403CR	POSITIVE SHUTOFF	CAB - RELAY BOX
51CR	BRAKE LAMP	CAB - RELAY BOX
56CR	FUEL PUMP	ENGINE TRAY - FRONT
57CR	NEUTRAL ENABLE	CAB - RELAY BOX
60CR	POWER RELAY	CAB - RELAY BOX
71CR	ENGINE RUNNING	CAB - RELAY BOX
76CR	ENGINE STOP	CAB - RELAY BOX
78CR	BACKUP ALARM ENABLE RELAY	CAB - RELAY BOX
79CR	STARTER INTERRUPT RELAY	CAB - RELAY BOX
25CR	AC FAN RELAY	AC FAN
60CR	CONTROLLER POWER RELAY	CAB - FUSE BOX

SWITCH NO.	FUNCTION	LOCATION
SW1	SWITCH, LIGHTON	CAB - FUSE BOX
SW2	SWITCH, PARK BRAKE	CAB - FUSE BOX
SW3	SWITCH, STEER MODE	CAB - FUSE BOX
SW4	SWITCH, AUXILIARY HYDRAULICS	CAB - FUSE BOX
SW5	SWITCH, HORNS	CAB - FUSE BOX
SW6	SWITCH, CARRIAGE TILT	CAB - FUSE BOX
SW7	SWITCH, CAB FAN	CAB - FUSE BOX
SW8	SWITCH, POSITIVE AIR SHUTOFF	CAB - FUSE BOX
SW9	SWITCH, ROOM LIGHTS	CAB - FUSE BOX
SW10	SWITCH, WORK LIGHTS	CAB - FUSE BOX
SW11	SWITCH, TURN SIGNALS	CAB - FUSE BOX
SW12	SWITCH, CAB INTERIOR LIGHTS	CAB - FUSE BOX
SW13	SWITCH, WINDSHIELD WASHER WIPER	CAB - FUSE BOX
SW14	SWITCH, QUICK COUPLER	CAB - FUSE BOX
SW15	SWITCH, P-N-R	BATTERY B+ POST
SW16	SWITCH, BLOWER	BATTERY DISCONNECT
SW17	SWITCH, AIR CONDITIONING	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW18	SWITCH, ROAD LIGHTS	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW19	SWITCH, HAZARD LIGHTS	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW20	SWITCH, WIPER WIPER	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW21	SWITCH, LOCK/UNLOCK QUICK COUPLER	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW22	SWITCH, WIPER WIPER	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW23	SWITCH, WIPER WIPER	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW24	SWITCH, WIPER WIPER	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW25	SWITCH, WIPER WIPER	GLOW PLUG HARNESS - ENGINE TRAY FRONT
SW26	SWITCH, WIPER WIPER	GLOW PLUG HARNESS - ENGINE TRAY FRONT

FUSE NO.	AMPERE RATING	CIRCUIT	LOCATION
F1	10A	IGNITION/POWER RELAY	CAB - FUSE BOX
F2	10A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F3	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F4	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F5	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F6	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F7	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F8	15A	POWER POINT	CAB - FUSE BOX
F9	5A	REAR WIPER	CAB - FUSE BOX
F10	10A	WORK LIGHTS	CAB - FUSE BOX
F11	10A	ROOM LIGHTS	CAB - FUSE BOX
F12	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F13	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F14	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F15	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F16	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F17	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F18	15A	POWER POINT	CAB - FUSE BOX
F19	5A	REAR WIPER	CAB - FUSE BOX
F20	10A	WORK LIGHTS	CAB - FUSE BOX
F21	10A	ROOM LIGHTS	CAB - FUSE BOX
F22	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F23	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F24	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F25	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F26	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F27	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F28	15A	POWER POINT	CAB - FUSE BOX
F29	5A	REAR WIPER	CAB - FUSE BOX
F30	10A	WORK LIGHTS	CAB - FUSE BOX
F31	10A	ROOM LIGHTS	CAB - FUSE BOX
F32	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F33	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F34	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F35	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F36	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F37	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F38	15A	POWER POINT	CAB - FUSE BOX
F39	5A	REAR WIPER	CAB - FUSE BOX
F40	10A	WORK LIGHTS	CAB - FUSE BOX
F41	10A	ROOM LIGHTS	CAB - FUSE BOX
F42	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F43	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F44	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F45	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F46	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F47	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F48	15A	POWER POINT	CAB - FUSE BOX
F49	5A	REAR WIPER	CAB - FUSE BOX
F50	10A	WORK LIGHTS	CAB - FUSE BOX
F51	10A	ROOM LIGHTS	CAB - FUSE BOX
F52	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F53	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F54	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F55	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F56	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F57	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F58	15A	POWER POINT	CAB - FUSE BOX
F59	5A	REAR WIPER	CAB - FUSE BOX
F60	10A	WORK LIGHTS	CAB - FUSE BOX
F61	10A	ROOM LIGHTS	CAB - FUSE BOX
F62	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F63	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F64	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F65	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F66	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F67	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F68	15A	POWER POINT	CAB - FUSE BOX
F69	5A	REAR WIPER	CAB - FUSE BOX
F70	10A	WORK LIGHTS	CAB - FUSE BOX
F71	10A	ROOM LIGHTS	CAB - FUSE BOX
F72	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F73	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F74	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F75	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F76	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F77	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F78	15A	POWER POINT	CAB - FUSE BOX
F79	5A	REAR WIPER	CAB - FUSE BOX
F80	10A	WORK LIGHTS	CAB - FUSE BOX
F81	10A	ROOM LIGHTS	CAB - FUSE BOX
F82	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F83	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F84	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F85	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F86	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F87	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F88	15A	POWER POINT	CAB - FUSE BOX
F89	5A	REAR WIPER	CAB - FUSE BOX
F90	10A	WORK LIGHTS	CAB - FUSE BOX
F91	10A	ROOM LIGHTS	CAB - FUSE BOX
F92	15A	TRANSFERRAL/ALARM/BRAKE	CAB - FUSE BOX
F93	5A	STEER SELECT/GAUGE	CAB - FUSE BOX
F94	5A	FRAME CARRIAGE ENABLE	CAB - FUSE BOX
F95	10A	AUXILIARY HYDRAULICS/QUICK COUPLER	CAB - FUSE BOX
F96	5A	CONTINUOUS AUXILIARY HYDRAULICS	CAB - FUSE BOX
F97	10A	HORN/REAR HORN OPT.	CAB - FUSE BOX
F98	15A	POWER POINT	CAB - FUSE BOX
F99	5A	REAR WIPER	CAB - FUSE BOX
F100	10A	WORK LIGHTS	CAB - FUSE BOX

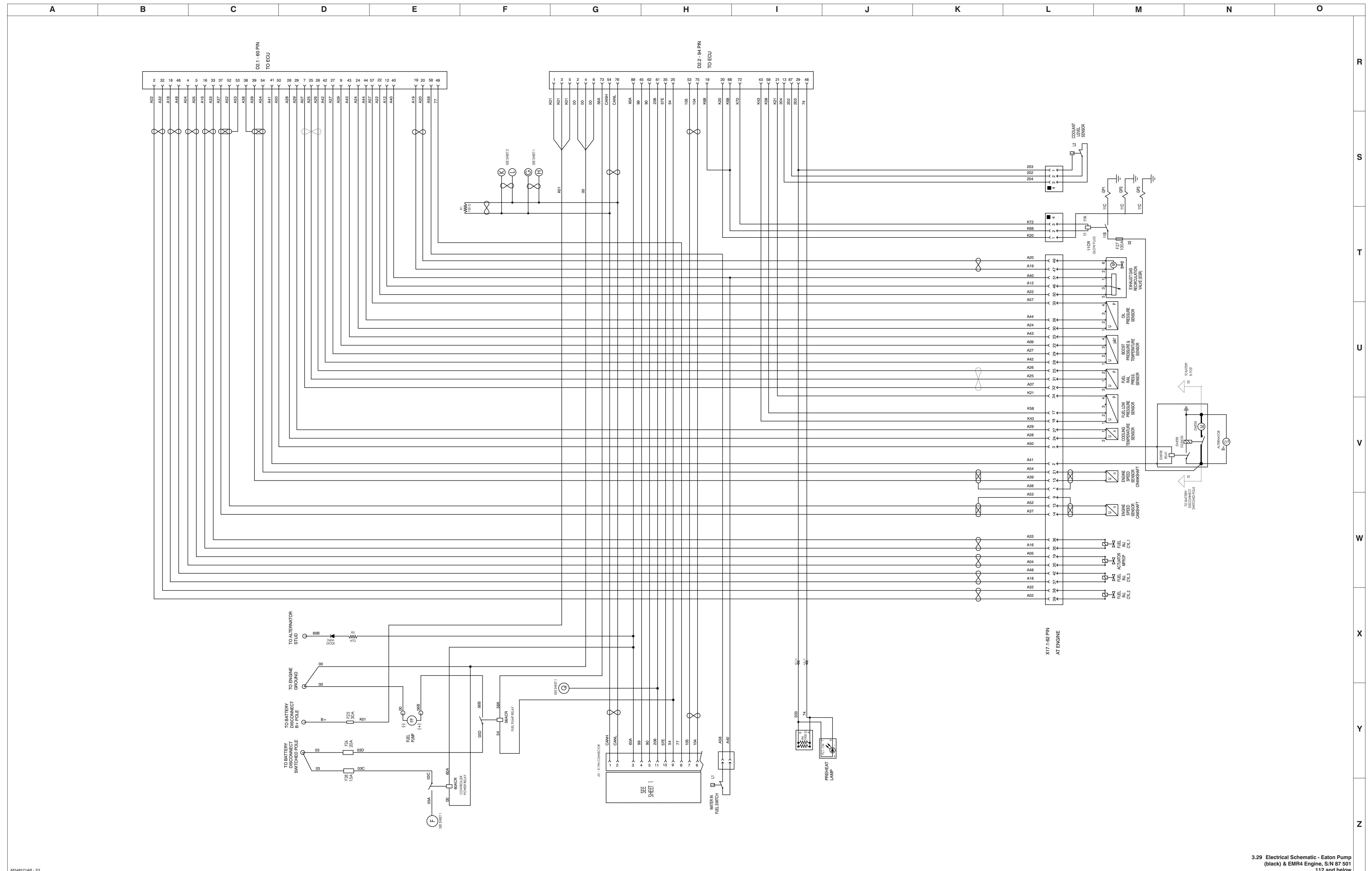
3.29 Electrical Schematic - Danfoss Plus 1 Pump (blue) & EMR5 Engine, S/N 87 501 292 and above



M248571AB - S2

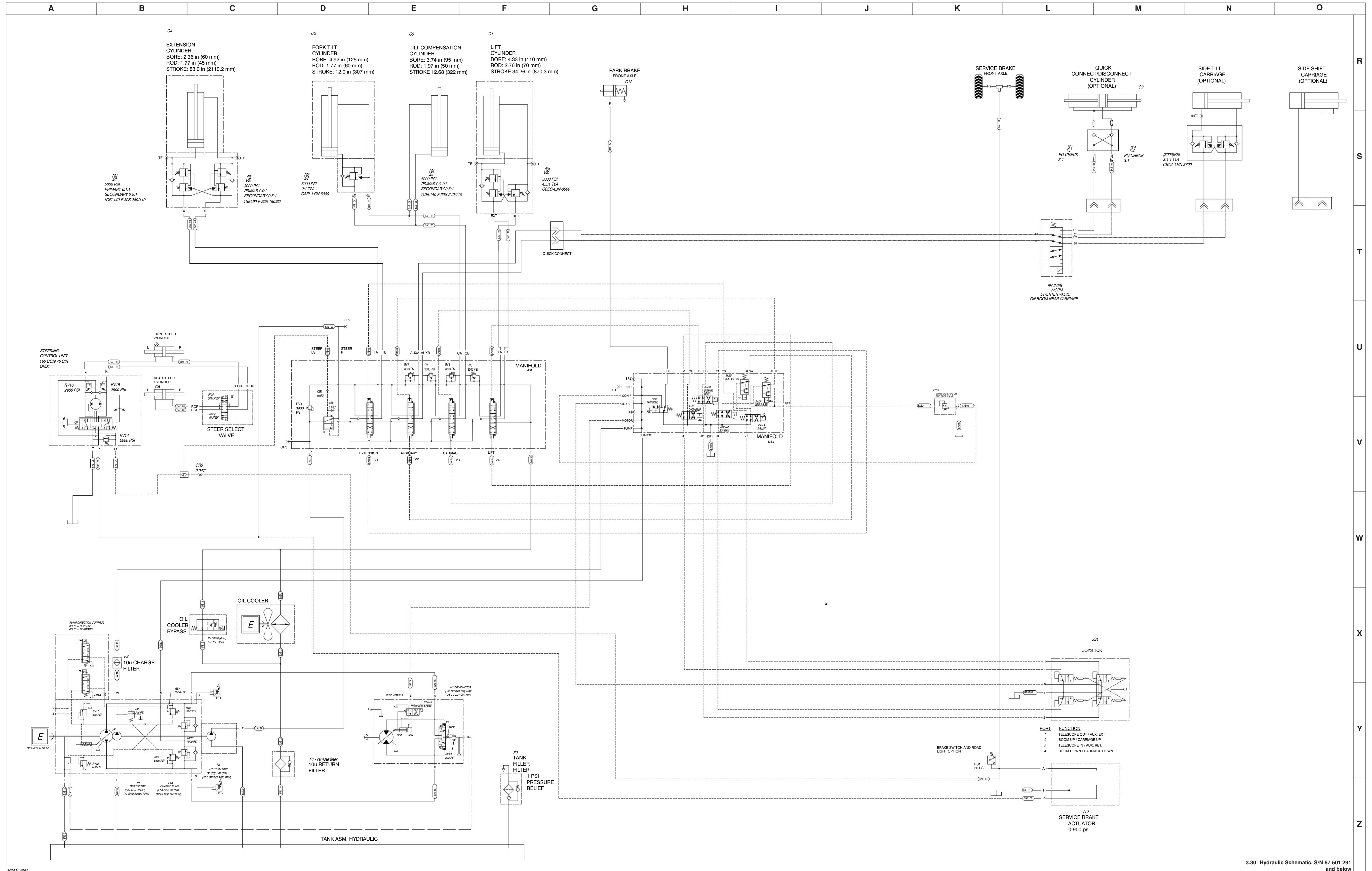
3.29 Electrical Schematic - Eaton Pump (black) & EMR4 Engine, S/N 87 501 112 and below

3.29 Electrical Schematic - Danfoss Plus 1 Pump (blue) & EMR5 Engine, S/N 87 501 292 and above



M248571AB - S3

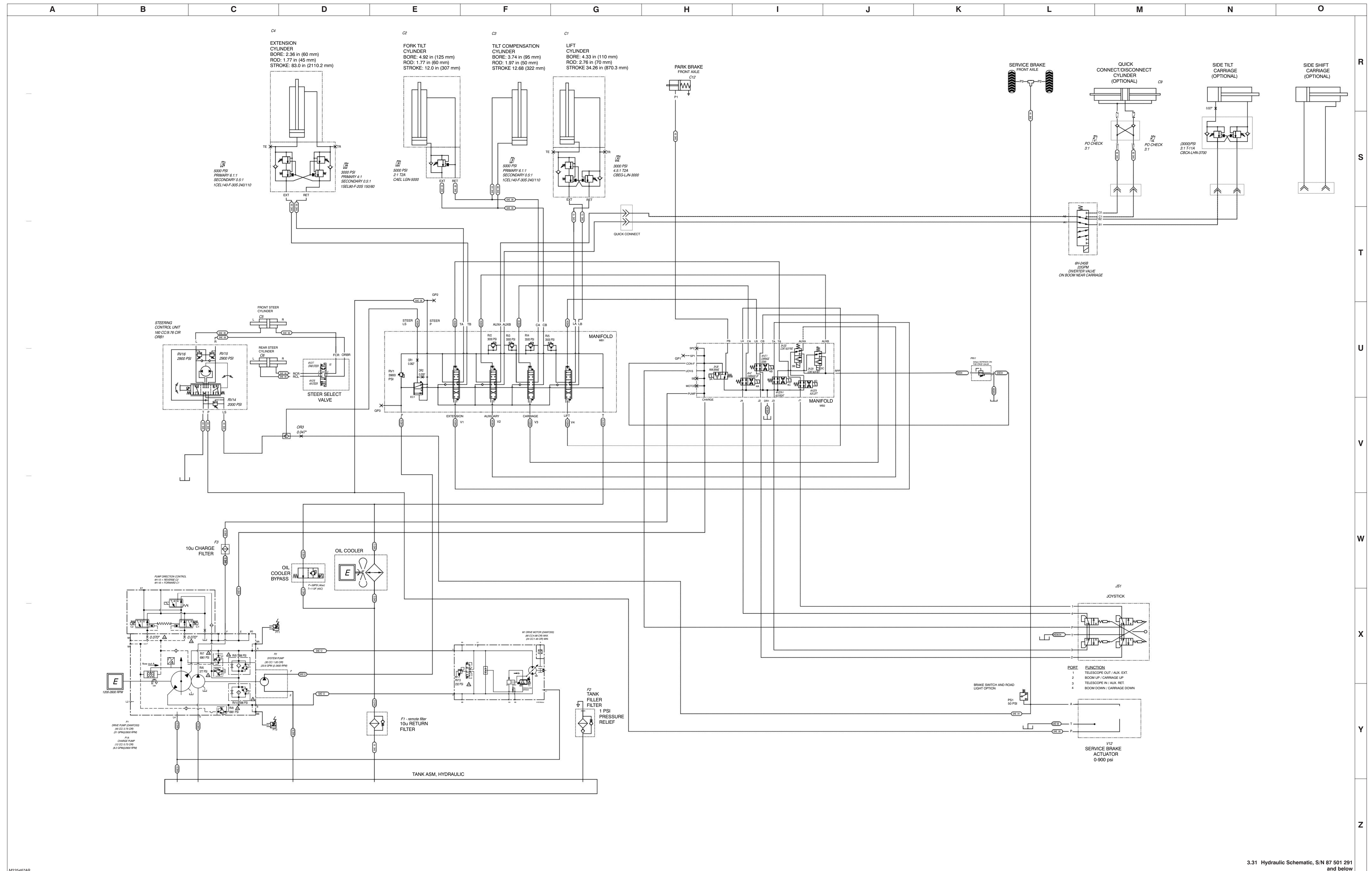
3.30 Hydraulic Schematic, S/N 87 501 291 and below



PORT	FUNCTION
1	TELESCOPE OUT / AUX. EXT
2	BOOM UP / CARRIAGE UP
3	TELESCOPE IN / AUX. RET.
4	BOOM DOWN / CARRIAGE DOWN

3.30 Hydraulic Schematic, S/N 87 501 291 and below

3.31 Hydraulic Schematic, S/N 87 501 292 and above



3.31 Hydraulic Schematic, S/N 87 501 291 and below

Section 4 – Troubleshooting Information

4.1 Introduction

The following pages contain a table of Troubleshooting for locating and correcting most service trouble which can develop. Careful and accurate analysis of the systems listed in the table of Troubleshooting will localize the trouble more quickly than any other method. This manual cannot cover all possible troubles and deficiencies that may occur. If a specific trouble is not listed, isolate the major component in which the trouble occurs, isolate whether the problem is electrical or hydraulic, and then isolate and correct the specific problem.

The content of this section is separated into “probable cause” and “remedy.” The information in the left-hand column, preceded by a number, represents the “probable cause.” The information in the right-hand column, in bold text, represents the “remedy” to the “probable cause” directly beside it. See the example below for clarification.

1. Probable cause

Remedy

4.2 Electrical System

4.2-1 Engine Will Not Crank



NOTE

Park brake switch must be on and transmission lever must be in neutral

1. Battery cables loose/disconnected	Tighten or connect battery cables
2. Battery Discharged or Defective	Charge battery or replace if defective
3. Open or defective battery disconnect switch S1	Close switch. Replace if defective
4. Loose or broken wire #54 from 94 pin ECU connector (D2.2), pin90 to relay 56ACR	Check continuity. Replace if defective
5. Loose or broken wire #03 to fuse F26	Check continuity. Replace if defective
6. Fuse F26 open	Check for defective wiring. Replace fuse
7. Loose or broken wire #56 from F26 to relay 56ACR	Check continuity. Replace if defective
8. Loose or broken wire #56A from relay 56ACR to 94 pin ECU connector, pin 26	Check continuity. Replace if defective
9. Loose or broken wire #56B from relay 56ACR to fuel pump	Check continuity. Replace if defective
10. Defective relay 56ACR	Check continuity through contacts of relay. Replace if defective
11. Loose or broken ground wire #00 from fuel pump to battery B-	Check continuity. Replace if defective
12. Defective Fuel Pump	Replace if defective
13. Loose or broken B+ wire from battery B+ to ECU fuse F25	Check continuity. Replace if defective
14. ECU 30A fuse F25 open	Check for defective wiring. Replace/repair if defective. Replace fuse
15. Loose or broken wire #K01 from ECU fuse F25 to 94 pin ECU connector 3 places pins 1, 3, and 5	Check continuity. Replace if defective
16. Loose or broken ground wire #00 from battery B- to 94 pin ECU connector 3 places pins 2, 4, and 6	Check continuity. Replace if defective
17. Loose or broken 03 wire from B+ to fuse F1	Check continuity. Replace if defective
18. Fuse F1 open	Check for defective wiring. Replace/repair if defective. Replace fuse
19. Loose or broken 03A wire from fuse F1 to ignition switch SW1	Check continuity. Replace if defective

20. Defective ignition switch SW2	Check for voltage at ST terminal (wire 57) while in start position. Replace if defective
21. Loose or broken 57 wire from ignition switch SW1 to 57DCR starter interrupt relay, pin 30	Check continuity. Replace if defective
22. Loose or broken 60 wire from ignition switch SW1 to 57DCR starter interrupt relay, pin 86	Check continuity. Replace if defective
23. Loose or broken 57D wire from 57DCR starter interrupt relay, pin 85 to Telematics connector pin 9	Check continuity. Replace if defective
24. Without telematics option: Loose or broken jumper at Telematics connector pin 9 to pin 4	Check continuity. Replace if defective
25. With telematics option: Access code may be required, or access may be otherwise limited by machine owner	Input Access code, Contact machine owner
26. Loose or broken ground wire 00 from Telematics 4 to Battery B-	Check continuity. Replace if defective
27. Loose or broken 57A wire from 57DCR starter interrupt relay, pin 87 to park brake switch SW2, pin 5	Check continuity. Replace if defective
28. Defective park brake switch SW2	Check for voltage at pin 6 of switch SW2 (wire 57B) while in start position. Replace if defective
29. Loose or broken 57B wire from park brake switch SW2 pin 6 to 57CCR Neutral enable relay pin 30	Check continuity. Replace if defective
30. Defective ignition switch SW1	Check for voltage at IGN terminal (wire 60) while in run position. Replace if defective
31. Loose or broken wire 60 from ignition switch SW1 to power relay 60CR	Check continuity. Replace if defective
32. Loose or broken wire 03 from B+ to power relay 60CR	Check continuity. Replace if defective
33. Loose or broken wire 00 from power relay 60CR to ground	Check continuity. Replace if defective
34. Defective relay 60CR	Check for voltage at NO contacts of relay (wire 04) with ignition switch SW1 in run position. Replace if defective
35. Loose or broken wire 04 from power relay 60CR to fuse block	Check continuity. Replace if defective
36. Fuse F2 open	Check for defective wiring. Replace fuse
37. Loose or broken 05 wire from fuse F2 to shifter pin 9	Check continuity. Replace if defective
38. Loose or broken 57B wire from park brake switch SW2, pin 6 to transmission shift lever pin 5	Check continuity. Replace if defective

39. Defective transmission shift lever	Check shifter, Replace if defective
40. Loose or broken 57C wire from transmission shift lever pin 2 to 57CCR relay pin 86	Check continuity. Replace if defective
41. Loose or broken 00 wire from 57CCR relay pin 85 to ground	Check continuity. Replace if defective
42. Defective relay 57CCR	Check for voltage at NO contacts of relay with ignition switch SW1 in run position. Replace if defective
43. Loose or broken 57E wire from 57CCR relay pin 87 to engine harness connector (J1) pin 8	Check continuity. Replace if defective
44. Loose or broken 57E wire from engine harness connector (P1) pin 8 to 94 pin ECU connector (D2.2) pin 35	Check continuity. Replace if defective

4.2-2 Engine Cranks But Will Not Run

1. Engine pre-heat circuit inoperative	Refer to Engine manufacturer's manual to diagnose
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4.2-3 Park Brake Will Not Release

1. Fuse F2 open	Check for defective wiring. Replace fuse
2. Loose or broken 05 wire from fuse F2 to park brake switch SW2 pin 2	Check continuity. Replace if defective
3. Defective park brake switch SW2	Check for voltage at pin 1 (wire 26) of park brake switch SW2 with switch in the off position. Replace if defective
4. Loose or broken wire 26 from park brake switch SW2 pin 1 to park brake release relay 05CR pin 30	Check continuity. Replace if defective
5. Loose or broken 05 wire from fuse F2 to park brake release relay 05CR pin 85	Check continuity. Replace if defective
6. Loose or broken 77 wire from park brake release relay 05CR pin 86 to engine harness connector J1 pin 10	Check continuity. Replace if defective
7. Loose or broken 77 wire engine harness connector P1 pin 10 to 94 pin ECU connector D2.2 pin 71	Check continuity. Replace if defective
8. Defective relay 05CR	Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective
9. Loose or broken 26A wire from park brake release relay 05CR pin 87 to chassis harness connector J31 pin 13	Check continuity. Replace if defective

10. Loose or broken 26A wire from harness connector P31 pin 13 to park brake solenoid 3H-26A	Check continuity. Replace if defective
11. Loose or broken 00 wire from park brake solenoid to ground	Check continuity. Replace if defective
12. Defective brake valve coil 3H-26	Check continuity and resistance through coil. Replace if defective

4.2-4 Forward or Reverse Will Not Engage

1. Loose or broken wire 26A from park brake release relay 05CR pin 87 to 26DCR pin 87	Check continuity. Replace if defective
2. Loose or broken 05 wire from fuse F2 to PS1 common	Check continuity. Replace if defective
3. Loose or broken wire 26D from PSI normally closed contact to 26DCR relay pin 86	Check continuity. Replace if defective.
4. Defective pressure switch PS1	Check that switch is closed normally and opens with 50 PSI. Replace if Defective
5. Loose or broken wire 00 from 26DCR relay pin 85 to ground	Check continuity. Replace if defective.
6. Defective relay 26DCR	Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective
7. Loose or broken 26E wire from 26DCR relay pin 30 to drive controller pin 4	Check continuity. Replace if defective
8. Loose or broken 207 wire from throttle pedal pin 6 to drive controller pin 21	Check continuity. Replace if defective
9. Loose or broken 00 wire from throttle pedal pin 1 to ground	Check continuity. Replace if defective
10. Loose or broken 03 wire from SW1 to fuse F28	Check continuity. Replace if defective
11. Fuse F28 open	Check for defective wiring. Replace fuse
12. Loose or broken wire from fuse F28 to drive controller pin 6	Check continuity. Replace if defective
13. Loose or broken 03 wire from SW1 to fuse F29	Check continuity. Replace if defective
14. Fuse F29 open	Check for defective wiring. Replace fuse
15. Loose or broken wire from fuse F29 to drive controller pins 9, 10, and/or 19	Check continuity. Replace if defective
16. Loose or broken 00 wire from drive controller pins 7, 18, 28, and/or 29	Check continuity. Replace if defective
17. Defective drive controller	Replace if defective

18. Defective transmission shifter	Replace if defective
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4.2-5 No Forward Drive

1. Loose or broken wire 15A from shifter pin 4 to shift controller pin 36	Check continuity. Replace if defective
2. Loose or broken wire 15 from shift controller pin 36 to 4H-15 reverse solenoid	Check continuity. Replace if defective
3. Loose or broken wire 00 from reverse solenoid to ground.	Check continuity. Replace if defective
4. Defective reverse solenoid.	Replace solenoid
5. Defective drive controller.	Replace if defective
6. Defective transmission shifter.	Replace shifter

4.2-6 No Reverse Drive

1. Loose or broken wire 15A from shifter pin 4 to shift controller pin 36	Check continuity. Replace if defective
2. Loose or broken wire 15 from shift controller pin 36 to 4H-15 reverse solenoid	Check continuity. Replace if defective
3. Loose or broken wire 00 from reverse solenoid to ground	Check continuity. Replace if defective
4. Defective reverse solenoid	Replace solenoid
5. Defective drive controller	Replace if defective
6. Defective transmission shifter	Replace shifter

4.2-7 Front Steer Mode Only, Fuel gauge inoperative

1. Fuse F3 open	Check for defective wiring. Replace fuse
2. Loose or broken 05B wire from fuse F3 to fuel gauge B+ post, and steer mode select switch SW4 pin 2	Check continuity. Replace if defective

4.2-8 Front Steer Mode Only

1. Loose or broken 05B wire from fuse F3 to steer mode select switch SW4 pin 2	Check continuity. Replace if defective
2. Defective Steer mode switch SW4	Replace if Defective

4.2-9 No 4W (Round) Steer Mode

1. Defective Steer mode switch SW4	Replace if Defective
2. Loose or broken wire 218 from SW4 pin 1 to 4H-218 solenoid	Check continuity. Replace if defective
3. Loose or broken 00 wire from 4H-218 solenoid to ground	Check continuity. Replace if defective
4. Defective 4H-218 solenoid	Replace if Defective

4.2-10 No Crab Steer Mode

1. Defective Steer mode switch SW4	Replace if Defective
2. Loose or broken wire 217 from SW4 pin 3 to 4H-217 solenoid	Check continuity. Replace if defective
3. Loose or broken 00 wire from 4H-217 solenoid to ground	Check continuity. Replace if defective
4. Defective 4H-217 solenoid	Replace if Defective

4.2-11 Function Does Not Switch from Boom Raise/Lower To Carriage Tilt Up/Down With Carriage Tilt Switch SW6 Depressed

5. Fuse F4 open	Check for defective wiring. Replace fuse
6. Loose or broken wire 05C to joystick connector pin 2 and/or frame level enable relay 224CR pin 20	Check continuity
7. Loose or broken wire 224 from connector pin 7 to relay 224CR pin 86	Check continuity. Replace if defective
8. Loose or broken wire 00 from 224CR pin 85 to ground	Check continuity. Replace if defective
9. Relay 224CR defective	Check continuity through contacts of relay (pin 30 to 87a with coil de-energized). Replace if defective
10. Loose or broken wire 47 from 224CR relay pin 87 to carriage tilt enable up and/or down solenoids 4H-47 and/or 4H-47-1	Check continuity. Replace if defective
11. Loose or broken wire 00 from carriage tilt enable up and/or down solenoids 4H-47 and/or 4H-47-1	Check continuity. Replace if defective
12. Carriage tilt up enable solenoid 4H-47 and/or carriage tilt down enable solenoid 4H-47-1 defective	Replace if defective

4.3 Hydraulic System

4.3-1 All Controls inoperative

1. Worn or defective pump shaft or coupling	Check pump shaft and coupling. Replace if defective
2. Hydraulic oil level low	Check oil level. Fill to proper level
3. Charge pump P1A is defective	Repair or replace if defective
4. RV6 misadjusted or defective	Adjust pressure, replace if defective

4.3-2 All Boom Functions Inoperative

1. System pump P2 is defective	Repair or replace if defective
2. RV1 misadjusted or defective	Adjust pressure, replace if defective
3. EC1 defective	Replace if defective

4.3-3 No Boom Raise

1. Stuck or defective joystick JS1	Clean valve. Check operation of valve. Repair or replace valve as required
2. Stuck or defective lift valve V4	Clean valve. Check operation of valve. Repair or replace valve as required
3. Stuck or defective lift counterbalance valves CB1	Clean valve. Check O-rings on valve. Repair or replace valve as required
4. Stuck or defective lift counterbalance valves CB2	Clean valves. Check O-rings on valve. Repair or replace valve as required
5. Defective lift cylinder C1	Check seals on cylinder. Replace as necessary. Replace cylinder if defective

4.3-4 No Boom Lower

1. Stuck or defective joystick JS1	Clean valve. Check operation of valve. Repair or replace valve as required
2. Stuck or defective lift valve V4	Clean valve. Check operation of valve. Repair or replace valve as required
3. Stuck or defective lift counterbalance valves CB2	Clean valve. Check O-rings on valve. Repair or replace valve as required

4. Stuck or defective lift counterbalance valves CB1	Clean valves. Check O-rings on valve. Repair or replace valve as required
5. Defective lift cylinder C1	Check seals on cylinder. Replace as necessary. Replace cylinder if defective

4.3-5 No Telescope Extend

1. Stuck or defective joystick JS1	Clean valve. Check operation of valve. Repair or replace valve as required
2. Stuck or defective extension valve V1	Clean valve. Check operation of valve. Repair or replace valve as required
3. Stuck or defective extension counterbalance valves CB4	Clean valve. Check O-rings on valve. Repair or replace valve as required
4. Stuck or defective lift counterbalance valves CB5	Clean valves. Check O-rings on valve. Repair or replace valve as required
5. Defective telescope cylinder C4	Check seals on cylinder. Replace as necessary. Replace cylinder if defective

4.3-6 No Telescope Retract

1. Stuck or defective joystick JS1	Clean valve. Check operation of valve. Repair or replace valve as required
2. Stuck or defective telescope valve V1	Clean valve. Check operation of valve. Repair or replace valve as required
3. Stuck or defective lift counterbalance valves CB5	Clean valve. Check O-rings on valve. Repair or replace valve as required
4. Stuck or defective lift counterbalance valves CB4	Clean valves. Check O-rings on valve. Repair or replace valve as required
5. Defective telescope cylinder C4	Check seals on cylinder. Replace as necessary. Replace cylinder if defective

4.3-7 No Carriage Tilt Up

1. Stuck or defective joystick JS1	Clean valve. Check operation of valve. Repair or replace valve as required
2. 4H-47 stuck or defective	Clean valve. Check operation of valve. Repair or replace valve as required
3. Stuck or defective carriage tilt valve V3	Clean valve. Check operation of valve. Repair or replace valve as required
4. RV5 misadjusted or defective	Adjust pressure, replace if defective

5. Stuck or defective lift counterbalance valves CB3	Clean valve. Check O-rings on valve. Repair or replace valve as required
6. Defective carriage tilt cylinder C2	Check seals on cylinder. Replace as necessary. Replace cylinder if defective
7. Defective tilt compensation cylinder C3	Check seals on cylinder. Replace as necessary. Replace cylinder if defective

4.3-8 No carriage Tilt Down

1. Stuck or defective joystick JS1	Clean valve. Check operation of valve. Repair or replace valve as required
2. 4H-47-1 stuck or defective	Clean valve. Check operation of valve. Repair or replace valve as required
3. Stuck or defective carriage tilt valve V3	Clean valve. Check operation of valve. Repair or replace valve as required
4. RV4 misadjusted or defective	Adjust pressure, replace if defective
5. Stuck or defective lift counterbalance valves CB3	Clean valve. Check O-rings on valve. Repair or replace valve as required
6. Defective carriage tilt cylinder C2	Check seals on cylinder. Replace as necessary. Replace cylinder if defective
7. Defective tilt compensation cylinder C3	Check seals on cylinder. Replace as necessary. Replace cylinder if defective

4.3-9 No Aux. Functions

1. 4H-237A/4H-237A-1 stuck or defective	Clean valve. Check operation of valve. Repair or replace valve as required
2. Stuck or defective Aux. valve V2	Clean valve. Check operation of valve. Repair or replace valve as required
3. RV2 and/or RV3 misadjusted or defective	Adjust pressure, replace if defective
4. Stuck or defective Auxiliary counterbalance valve (if equipped)	Clean valve. Check O-rings on valve. Repair or replace valve as required
5. Defective Auxiliary/Optional cylinder(s)	Check seals on cylinder. Replace as necessary. Replace cylinder if defective

4.3-10 Hard or No Steering

1. Stuck or defective EC1 valve	Clean valve. Check operation of valve. Repair or replace valve as required
2. Stuck or defective shuttle valve SV1	Clean valve. Repair or replace valve as required
3. Stuck or defective steering motor OSM1	Check O-rings and clean valve. Repair or replace orbit motor as required

4. Defective steer cylinder C5 and/or C6	Check seals on cylinder. Replace as necessary. Replace cylinder if defective
5. Orifice OR1 plugged	Remove and inspect, clean or replace as required
6. Relief valve RV14 valve defective	Check O-rings and clean valve. Repair or replace orbit motor as required
7. Orifice OR2 plugged	Remove and inspect, clean or replace as required

4.3-11 Park Brake will not Release

1. Stuck or defective park brake valve 3H-26	Clean valve. Check O-rings on valve. Repair or replace valve as required
2. Bypassing or defective parking brake seals in axle	Check seals, replace as necessary. Replace if defective

4.3-12 Park Brake Will Not Engage

1. Defective park brake C11	Repair or replace as necessary
2. Park brake valve SV3 stuck in shifted position	Check valve. Replace if defective

4.3-13 Service Brake Will Not Engage

1. Service brake actuator stuck or defective	Clean valve. Check operation of valve. Repair or replace valve as required
2. Stuck or defective shuttle valve SV1	Clean valve. Repair or replace valve as required
3. Bypassing or defective brake seals in axle	Check seals, replace as necessary. Replace if defective

4.3-14 No Drive Function Forward or Reverse

1. Defective pump displacement control 4H-15 and 4H-16	Check control. Replace if defective
2. Worn or defective drive pump P1	Check pump. Replace if defective
3. Worn or defective drive motor M1	Check motor. Replace if defective
4. Service brake V12 not releasing	Check brake pedal is returning to up (off) position. Clean, repair or replace valve as required
5. Park brake not releasing	See “park brake will not release” in this section

4.3-15 No Forward Drive

1. Defective pump displacement control 4H-16	Check control. Replace if defective
2. Defective or misadjusted drive relief valves RV11, RV7, or RV9	See section 5 for drive pump set up procedures. Adjust, repair, or replace as required
3. Worn or defective drive motor M1	Check motor. Replace if defective

4.3-16 No Reverse Drive

1. Defective pump displacement control 4H-15.	Check control. Replace if defective
2. Defective or misadjusted drive relief valves RV12, RV8, or RV10	See section 5 for drive pump set up procedures. Adjust, repair, or replace as required
3. Worn or defective drive motor M1	Check motor. Replace if defective

Section 5 – Procedures

5.1 General Information

NOTE

The illustrations in this manual are for instructional purposes only. The models and components shown may appear somewhat different from those on your actual telehandler

5.1-1 Safety and Workmanship

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of weight. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

5.1-2 Engine and Transmission

The engine used on the SJ519 TH telehandler models is a Deutz TCD 2.2L Tier 4 Final.

Engine service information can be found in the Deutz Engine Manuals. It should be noted that engine warranty service work is to be directed to and administered by your nearest authorized Deutz dealer/distributor.

Skyjack cannot enter into any warranty service work requirements.

The basic Deutz engine warranty covers the entire engine from the fan to the fly wheel including all internal parts as well as the following list of parts supplied with the engine as original:

- Electronic Data Display Module
- Starter
- Alternator
- Injectors
- Fuel Pump
- Fuel Solenoid
- Water Pump
- Radiator

The air cleaner and exhaust system, cooling system including radiator and hoses are not part of the engine package, and are covered later in this manual.

5.2 10 Hour or Daily Routine Maintenance

Perform maintenance inspections for the items described in this section on a daily basis or at the start of each work shift.

5.2-1 Check Engine Oil Level

1. Park telehandler on a firm level surface with boom fully retracted and lowered.
2. Shut off engine then release latch and lift engine cover to open.
3. Wait approximately 15 minutes after engine has been shut off.
4. Pull out dipstick and wipe it off with a clean, dry, lint-free cloth; then place it back in the hole until it stops.

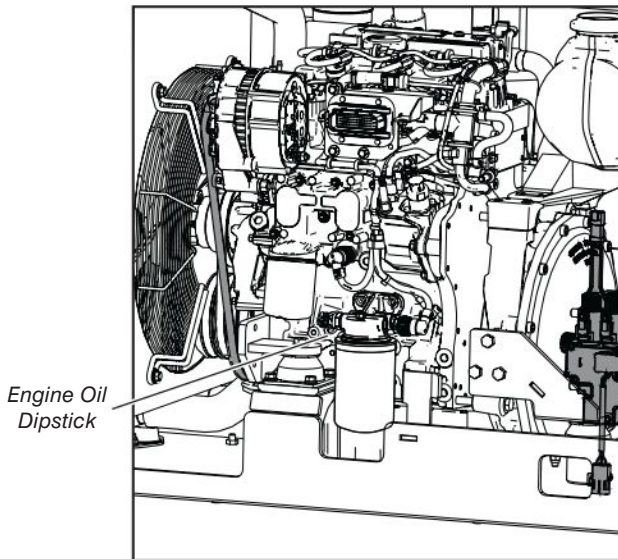


Figure 01 Engine Oil Dipstick

5. Pull the dipstick out again and check the oil level on the dipstick. The oil level must be between the “Full” and “Low” marks.
6. If oil level is below the “Low” mark, refer to [5.4-4 Replace Engine Oil and Filter](#) for engine oil and filter replacement procedure.

5.2-2 Check Coolant Level, Radiator and Hoses

WARNING

Pressurized fluid present in radiator. Never open radiator cap when hot.

NOTE

Do not intermix different brands of coolant. If the existing coolant cannot be identified, drain and flush the remaining coolant and refill with new coolant. Refer to [5.5-5 Change Engine Coolant](#) for instructions on changing engine coolant.

1. Remove radiator cap.
2. Fill radiator completely through the radiator neck, until coolant is visible. See figure below.

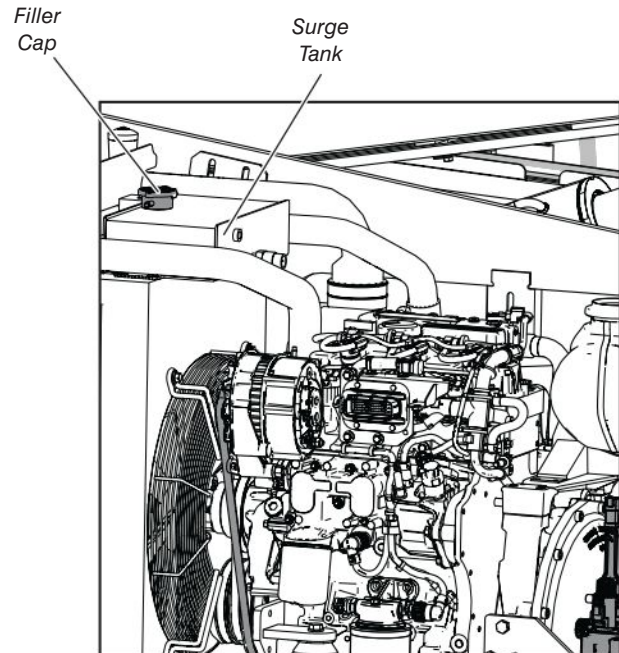


Figure 02 Surge Tank Location

3. Run the engine for 25 minutes without radiator cap to achieve operating temperature. Shut down the engine.
4. Check coolant level in the radiator. Refill until coolant is visible.
5. Install radiator cap.

5.2-3 Check Air Cleaner Restriction and Filter Elements

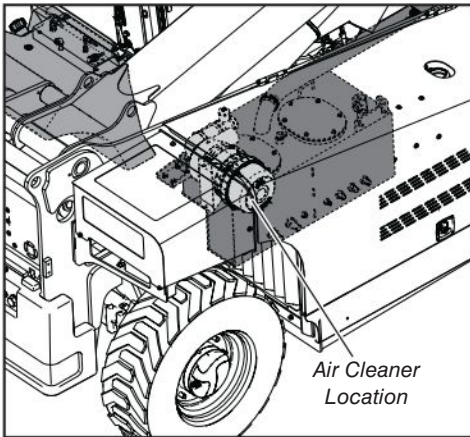


Figure 03 Air Cleaner Location

1. Service the air cleaner when a red band appears on the service indicator. After servicing, press the indicator to reset it.
2. Check the air cleaner vaccuator valve to see that it is clean and that the rubber is not cracked. Squeeze the valve lips and remove any dirt or dust. It should expel dust and dirt continuously when the engine is running. See figure below.

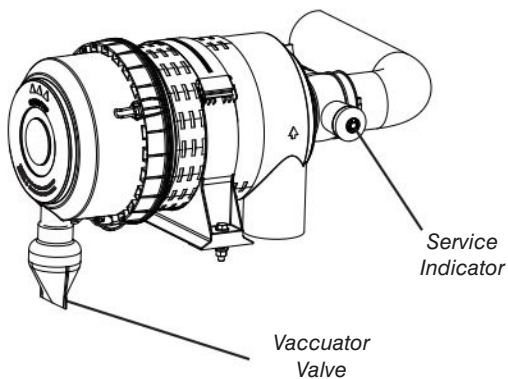


Figure 04 Air Cleaner Vaccuator Valve



NOTE

SJ519 TH telehandlers are equipped with a two-stage air filter system; which consists of a primary filter element & a secondary safety element. Inspect the condition of both the primary and safety elements.



IMPORTANT

The primary element can be replaced or cleaned. The secondary element cannot be cleaned and must be replaced only.



NOTE

For maximum engine protection, replace the secondary element after every third cleaning of the primary element or annually.

1. Undo latches and pull cover outward to remove.

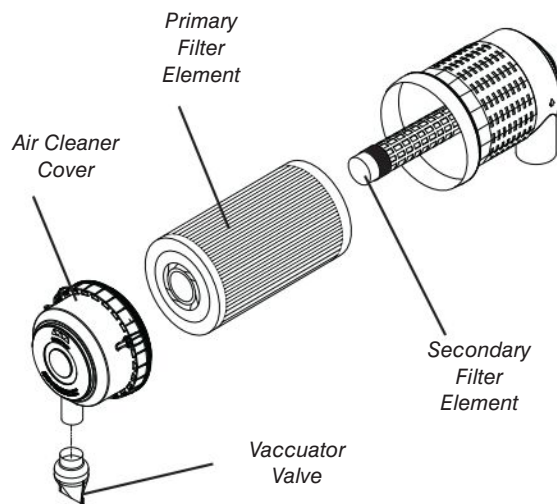


Figure 05 Engine Air Cleaner

2. Remove the primary air cleaner element. Clean or replace as required.
3. With the Secondary element in place, clean inside the housing and the cover with a damp cloth.



CAUTION

Never use compressed air on an air filter. Paper elements should not be “washed”.

**NOTE**

Secondary or safety element should not be removed unless it is being replaced.

Replace the secondary element if:

- Examination reveals tears or perforations in the safety element.
- The primary element has been replaced three times or the element has been in service one year.

5.2-4 Check Hydraulic Oil Level

Maintaining the hydraulic components and hydraulic oil at the proper level are essential to good performance and service life of the telehandler.

The telehandler must be on level ground and all cylinders retracted when checking oil level.

Refer to oil sight gauge at the right side of the inner frame and check that the hydraulic fluid is between MAX and MIN.

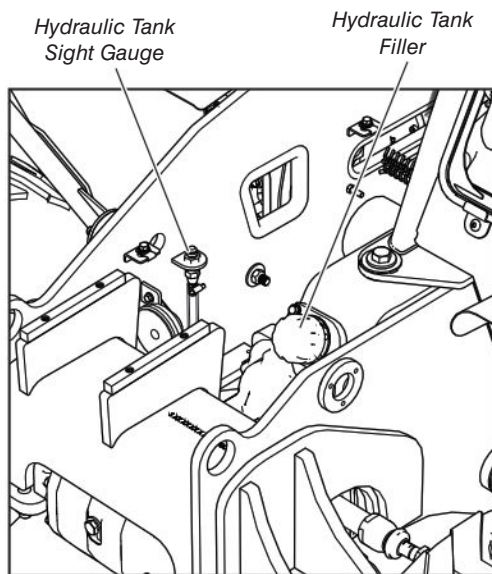


Figure 06 Hydraulic Oil Tank Sight Gauge

1. Check hydraulic Oil Tank Sight Gauge.
2. Add clean hydraulic oil through the tank filler as required. Refer to [2.8 Recommended Fluids/Lubrications](#) for hydraulic oil specifications.

5.2-5 Drain Fuel/Water Separator**WARNING**

Diesel fuel is flammable and may cause death or serious injury. Shut down engine and do not smoke while draining fuel/water separator.

1. Ensure engine is shut down & telehandler is parked on a firm level surface.
2. Prepare a container for draining the fuel/water separator and place it under the separator.
3. Open drain reservoir and allow approximately one cup of fuel and any collected sediment to drain into the container. Refer to the Figure below.
4. Close the drain then dispose of the collected liquid in an environmentally safe manner.

**NOTE**

Refer to your local/national environmental regulations on how to dispose of used fuels and other dangerous liquids.

5.2-6 Fuel Tank**WARNING**

Do not allow fuel tank to become completely empty. If tank is allowed to empty completely, the entire fuel system will require bleeding.

1. Check fuel gauge inside operator's cab.
2. Ensure fuel is at an appropriate level before the start of each work shift.
3. Add diesel fuel as required.

**NOTE**

Refer to Operating Manual for refueling procedure.

5.2-7 Check Parking Brake

1. Check the park brake operation daily or every 10 hours of service.



NOTE

Refer to “Park Brake Test Procedure” in Section 2 of Operating Manual.

5.2-8 Check Tire Pressure and Condition

1. Check the tire pressure when cold and inflate to the recommended pressure. Refer to Operating Manual for tires and tire pressure specifications.



WARNING

Do not over-inflate. Tire may explode causing death or severe injury.

2. Remove wheel from telehandler to fill the tire whenever pressure is below 80% of the recommended pressure.
3. Place tire in a cage and inflate using a clip-on chuck and a remote tire pressure gauge.
4. If tire must be removed for repairs, remove the air pressure from the tire before removing the wheel from the telehandler.

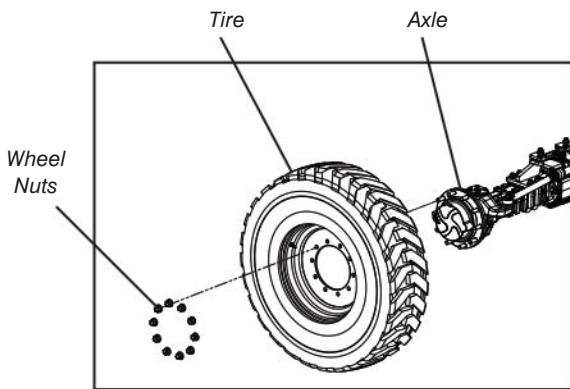


Figure 07 Telehandler Wheel

5. Check tire tread for damage. Check for bent or damaged rims and loose or missing hardware.
6. Tighten and torque wheel nuts.

5.2-9 Check Seat Belt and Mounting Hardware

1. Check seat belt for wear or damage. Check that mounting hardware is tight.

2. Inspect the belt hardware and fabric. Replace if hardware is damaged, frayed or loose stitching is found.



Figure 08 Seat Assembly



NOTE

Replace seat belt assemblies every three (3) years, regardless of appearance. Seat belt strength degrades over time and use due to exposure to weather conditions.

5.2-10 Check Windshield Washer Fluid Level and Wiper Condition

1. Check fluid level in washer bottle. Add as required.
2. Check the condition of the windshield wiper and replace if necessary.

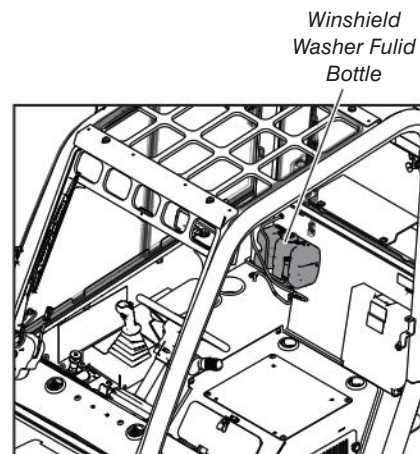


Figure 09 Windshield Washer Fluid.

5.3 50 Hour or Weekly Routine Maintenance

5.3-1 Check Fork Pins

1. Check the condition of the fork pin.
2. Inspect for cracks and other deformations.
3. Replace if required.

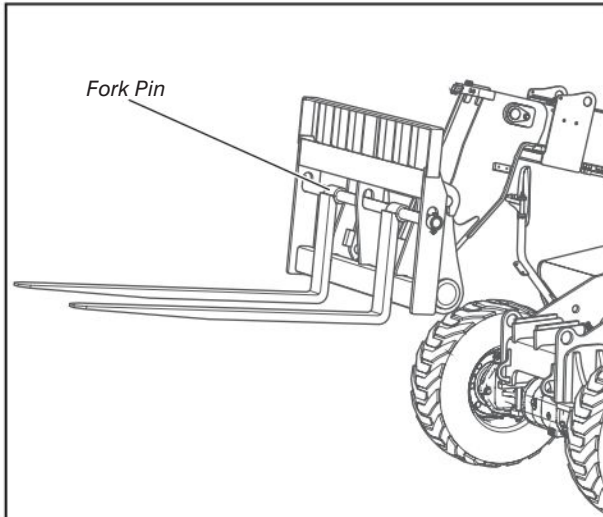


Figure 10 Fork Pin

5.4 250 Hour or Quarterly Routine Maintenance

5.4-1 Check Lug Nut Torque

1. Ensure wheel nuts are tight on all wheels.
2. Tighten wheel nuts to a torque of 325 ft-lb (441 N·m) using the cross pattern shown in figure below.

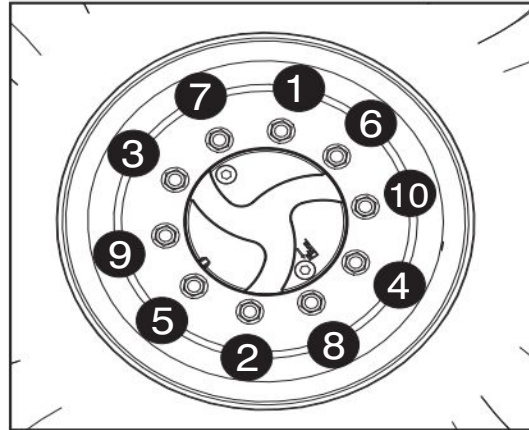


Figure 11 Wheel Nuts Torque Procedure

3. When the wheels are removed and reinstalled, check the nuts after eight (8) hours of operation.
4. If nuts are tight after the eight hour check, the interval for checking with a torque wrench can be extended to 250 hours.

5.4-2 Check Oil Level in Axle Differential Planetary wheel Ends

WARNING

Hot oil or components can burn. Oil must be at normal operating temperature when draining. Avoid contact with hot oil or components.



NOTE

Each axle has two independent planetary assemblies that require gear oil lubricant.

1. Park telehandler on a firm level surface with the fill plug in the vertical position as shown in figure below.

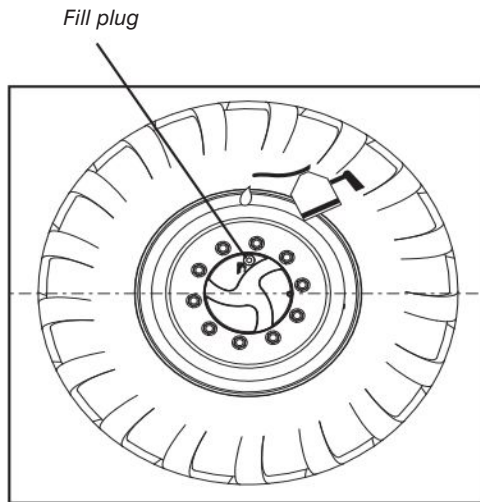


Figure 12 Planetary Wheel Plug

2. Apply park brake and shut off engine and allow telehandler to sit for a minimum of two minutes.
3. Wipe the fill plug clean and remove.
4. Check oil level at the bottom of the fill hole. If required, add oil.



NOTE

Refer to [2.8 Recommended Fluids/Lubrications](#) in this manual for oil type and capacity.

5. Re-install plug and repeat steps above for the three (3) remaining planetary wheel ends.

5.4-3 Check Oil level in Axle differentials



NOTE

Each axle assembly requires gear lubricant independent of the planetary assemblies.

1. Ensure telehandler is parked on a firm level surface.
2. Apply park brake and turn off engine, then allow it to sit for a minimum of two minutes.
3. Wipe Level/Fill plug clean and remove. See figure below.

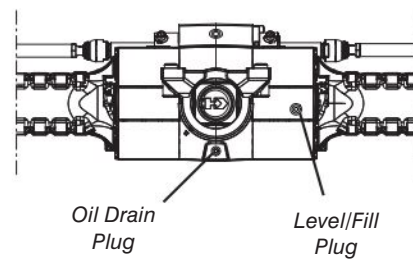


Figure 13 Axle Plugs

4. Check oil level at the bottom of the fill hole. Add oil as needed.



NOTE

Refer to [2.8 Recommended Fluids/Lubrications](#) in this manual for oil type and capacity.

5. Re-install plug and repeat steps above for the other axle.

5.4-4 Replace Engine Oil and Filter

Maintaining the engine components is essential to good performance and service life of the telehandler.

Periodic replacement of the engine oil and filter is essential to good engine performance.



NOTE

Shut off engine and allow it to cool down prior to performing this procedure.



CAUTION

Beware of hot engine components. Contact with hot engine components may cause severe burns.



CAUTION

When draining hot oil, there is a risk of scalding. Do not let used oil run into the soil, rather collect it in a container. Dispose of this in accordance with environmental regulations.

1. Ensure telehandler is parked on a firm level surface.
2. Apply park brake and remove key from ignition switch.
3. Allow engine to cool down.
4. Unlatch engine cover and lift it to gain access to engine compartment.
5. Place a container capable of holding approximately 7 quarts (7.4 litres) under engine oil drain plug.

6. Remove oil drain plug and allow all engine oil to drain into container. See figure below.

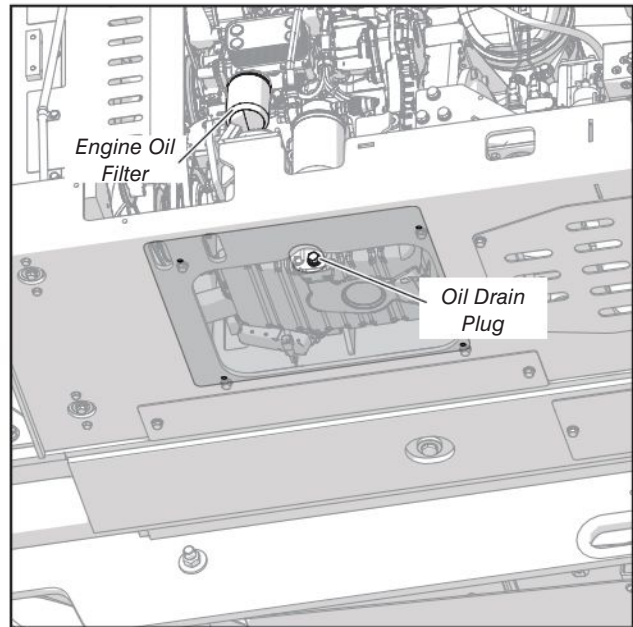


Figure 14 Engine Oil Draining

7. Install oil drain plug with a new seal ring and tighten firmly.
8. Remove oil filter and catch any escaping oil.
9. Clean inside the filter head.
10. Apply a thin layer of engine oil to the new oil filter gasket.
11. Screw on new filter by hand until the gasket is touching then tighten to a torque of 7-9 ft.-lb. (10-12 Nm).
12. Clean up any oil that may have spilled during this procedure.

13. Refill engine with new oil through the fill area.
Refer to [2.8 Recommended Fluids/Lubrications](#).

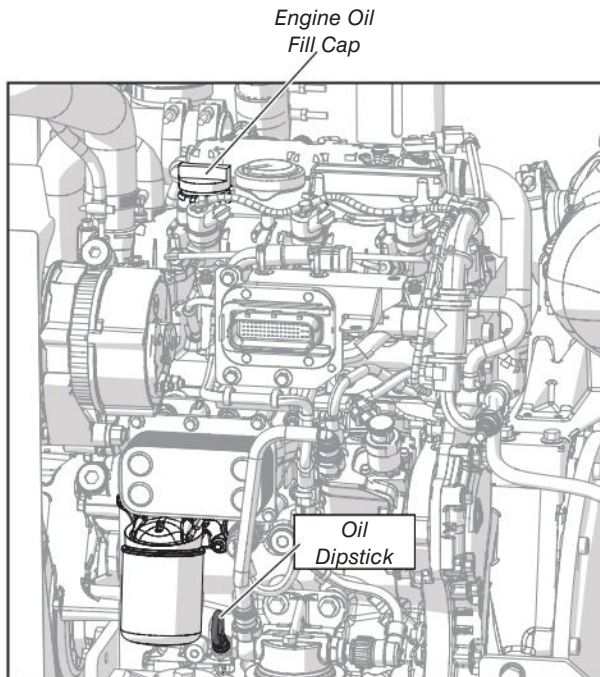


Figure 15 Engine Oil Fill Cap

14. Start engine and allow it to run for 30 seconds then stop the engine.
15. Check for oil leakage.
16. Check engine oil level on dipstick and add oil if needed.
17. Close the engine compartment cover then latch to secure in place.

 **NOTE**

Refer to your local/national regulations on how to dispose of used filter and oil.

5.4-5 Change Engine Fuel filter and Fuel/Water Separator

The engine has both a fuel filter and a fuel/water separator to filter water, rust particles, dust and other particles from the fuel. See figure below.

WARNING

The fuel pump high-pressure fuel lines and fuel rail contain very high pressure fuel. Never loosen any fittings while the engine is running. Personal injury and property damage can result.

1. Ensure telehandler is on firm level surface.
2. Apply parking brake, shut down the engine and remove key from ignition switch.
3. Unlatch engine compartment cover and lift it up.
4. Clean area around fuel filter and fuel/water separator.
5. Place a container under filter and separator to collect any escaping fuel when removing them.
6. Disconnect the water level sensor harness from fuel/water separator.
7. Unscrew the drain plug assembly from bottom of water separator.
8. Unscrew used fuel filter and separator. Discard used filter and separator and any captured spilled fuel.

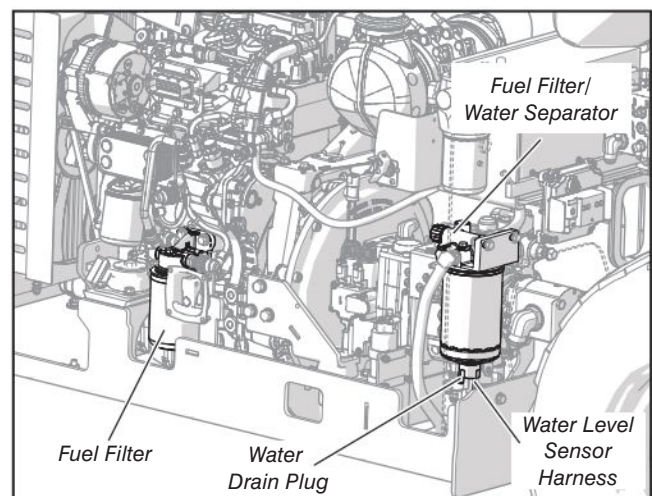


Figure 16 Fuel Filter & Water Separator

**NOTE**

Refer to your local/national regulations on how to dispose of used filter and separator.

9. Clean the sealing surface of the new filter cartridge and opposite side of filter head. If necessary, replace O-ring on the filter head.
10. Lubricate O-ring seal and the sealing surface slightly with fuel.
11. Install replacement filter and separator as specified by manufacturer. Most filters have instructions printed on the side. Torque to 13 ft.-lb. (17-18 Nm)
12. Mount the drain plug on bottom of water separator. Torque to 1 ft.-lb. (1.6 ± 0.3 Nm)
13. Check area around filter and separator for any leaks.
14. Connect water level sensor harness to fuel/water separator.
15. Prime fuel system after fuel filters have been reinstalled as follows: Refer to figure below.

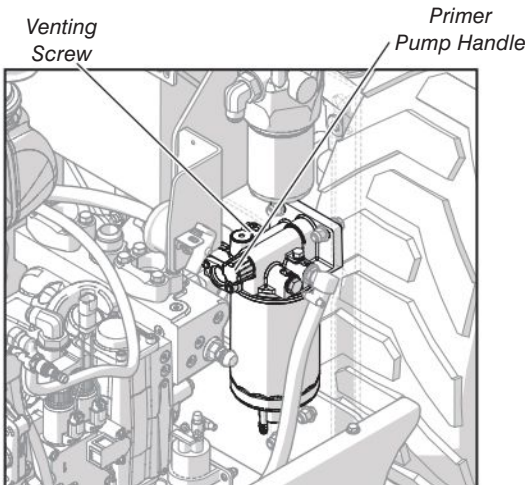


Figure 17 Priming the Fuel System

**WARNING**

Do not attempt to start the engine while the fuel system is venting to ensure no error messages are generated.

- Loosen venting screw.
 - Turn the primer pump handle counter clockwise (CCW) to release.
 - Pump the handle in and out until pressure builds in the fuel system (handle will gradually become firm and fuel will come out of venting plug).
 - Retighten venting screw and primer handle.
16. Check area for any leaks.
 17. Close engine cover back and latch it in place.

5.4-6 Clean Hydraulic Tank Breather

1. Clean area around hydraulic breather. Do not allow dirt to enter the hydraulic tank.

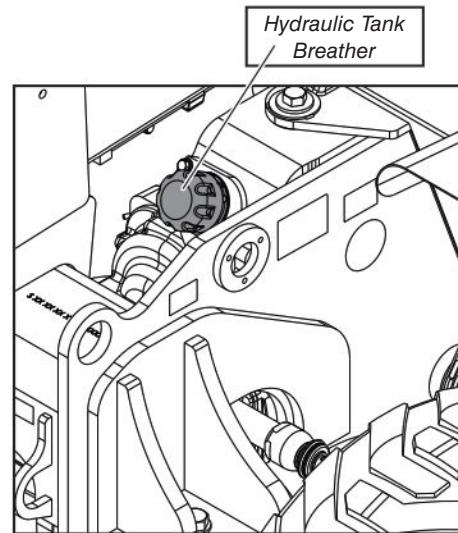


Figure 18 Hydraulic Tank Breather

2. Remove the breather and clean with solvent. Blow dry with compressed air.
3. Install the cleaned breather on the tank.

5.4-7 Torque Axle Mounting Bolts

The axles are secured to the frame by an axle pivot assembly on each side of the axle. The pivot assemblies are bolted to the machine frame with axle mounting bolts. See figure below.

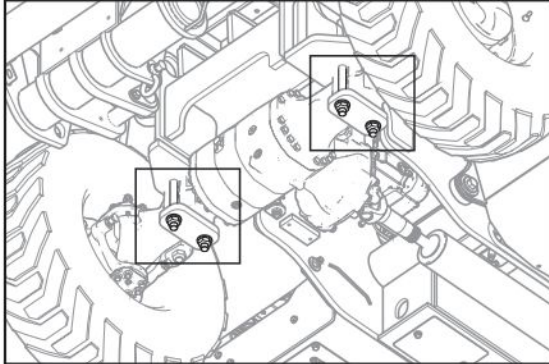


Figure 19 Axle Mounting Bolts

1. Torque front axle mounting bolts to 320 ft-lb. (434 N·m.).
2. Torque rear axle mounting bolts to 320 ft-lb (434 N·m.).

5.4-8 Check Boom Wear Pad Clearances

Wear pads support the boom components as the boom is extended and retracted. The wear pads must maintain clearance between the contact surface of the pad and the adjacent sliding surface. This clearance ranges between 0.031 – 0.062 in. (0.79 – 1.58 mm) TOTAL for both sides of the boom. When clearances exceed this amount, shims need to be added or the pads must be replaced.

The wear pads are chamfered on the corner of the wear surface. This serves as a wear indicator. When the chamfer is no longer visible, replace the pads. Additional wear will allow interference with inserts in the pads. Refer to [5.6-1 Wear Pads Replacement Procedure](#) for slide pads replacement procedure.

Lubrication of the pads require application of grease on the boom surfaces which come in contact with the pads.

1. Park telehandler on a firm level surface.
2. Extend the boom and rest the forks on a level surface.
3. Apply park brake then shutdown the engine and remove key from ignition switch.
4. Measure the clearance between the bottom surfaces of the inner boom and the wear pads.

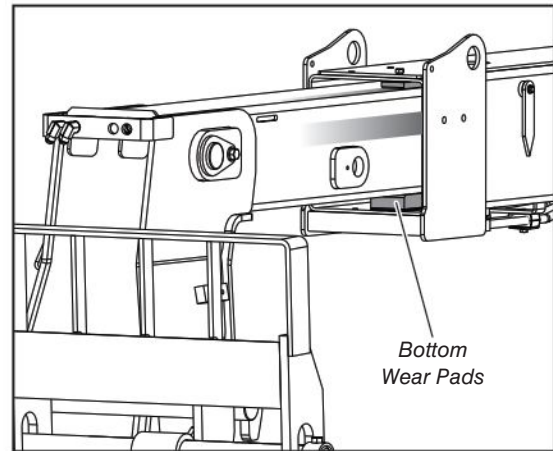


Figure 20 Bottom Slide pads

5. Clearance should not exceed 0.08 in. (2 mm). When clearances exceed this amount, add shims or replace the pads.
6. Start the engine and raise the boom off the level surface ensuring there is no upward force applied to the boom.
7. With park brake applied, shut down engine and remove key from ignition switch.
8. Measure the clearance between each side wear pad and the boom at each section as follows:
 - Place a bar against the side of the boom section and pry the section sideways as far as possible.
 - Measure the clearance between the side of the boom and the side wear pads. Clearance should not exceed 0.08 in. (2 mm).

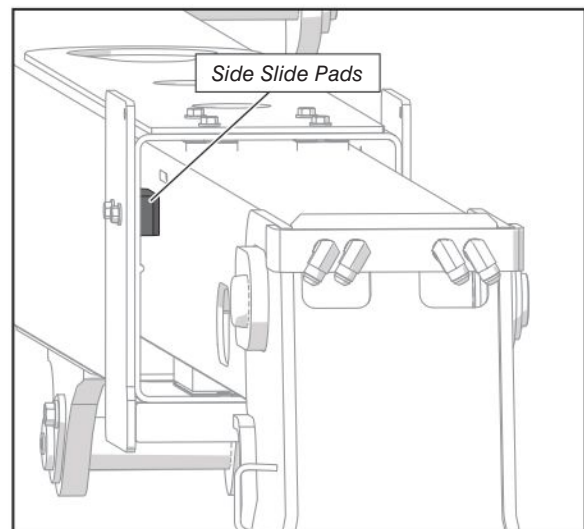


Figure 21 Side Slide Pads Clearance

9. Remove rear access cover so that rear of the boom is visible.
10. Start the engine and fully retract the boom so that upper and side slide pads on each boom section are visible. See figure below.

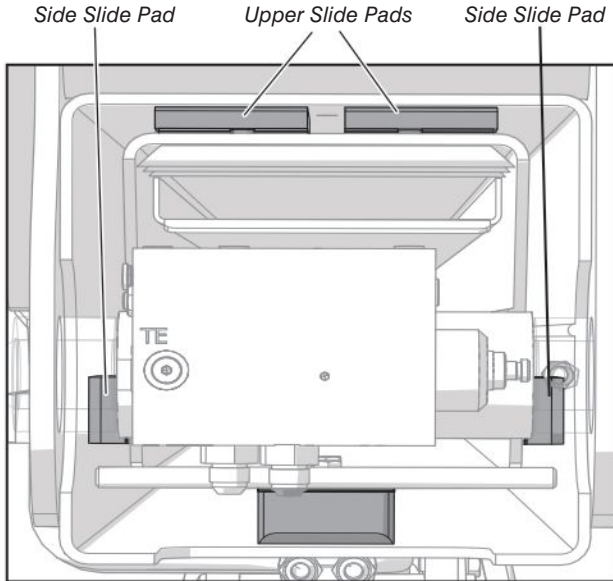


Figure 22 Rear Upper and Side Slide Pads

11. Lower the boom until the forks are resting on the ground and an upward force is being applied to the boom sections.
12. Shut off the engine and remove key.
13. Measure the slide shoe clearance at the top of each boom section. Clearance should range not exceed 0.025 in. (0.63 mm).
14. Start the machine and raise the boom high enough to lift the forks off the ground.
15. Shut off the engine.
16. Measure the side slide pads clearance using the same procedure as outlined in step 8 for the side slide pads at the front of the boom.
17. If clearances are within 0.08 in. (2 mm), install the rear boom cover.

5.4-9 Grease Axle Pivot Bearings and King Pins

Each axle has two integral pivot assemblies which attach the axle to the frame. Each of the four pivot assemblies requires independent lubrication.

▪ Axle Pivot Bearings

There are remote grease fittings for pivot bearing lubrication..

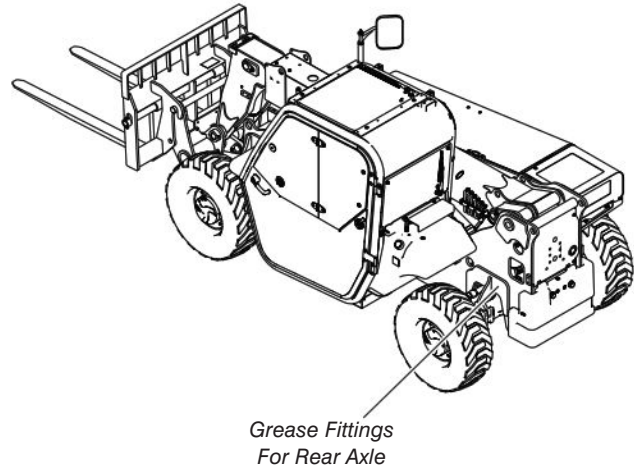


Figure 23 Front Axle Pivot Bearing Grease Fittings

The rear axle remote grease fittings are located beside the tilt compensation cylinder. See figure above.

1. Wipe dirt and grease from each remote grease fitting.
2. Remove cap and apply 4 shots of grease to each fitting.

▪ Axle King Pins

Each axle has two king pins. Each king pin has an upper and a lower grease fitting (total of 4 king pins on each axle). Follow the steps below to lubricate the king pins.

1. Wipe each fitting clean.
2. Apply 4 shots of grease to each fitting. See figure below.

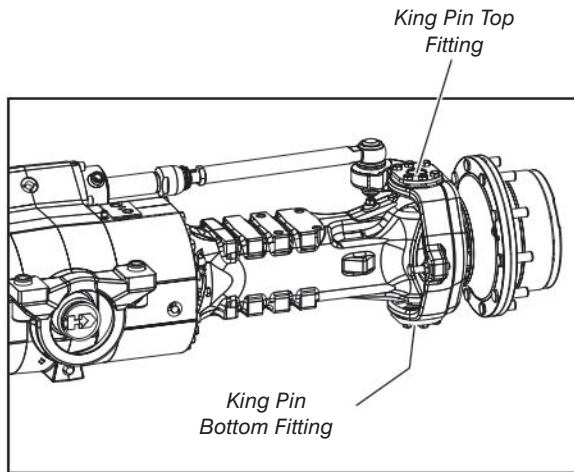


Figure 24 Axle King Pins

5.4-10 Grease Drive Shaft U-joints and slip joints

1. Wipe each fitting clean.
2. Apply 4 shots of grease to each fitting. See figure below.

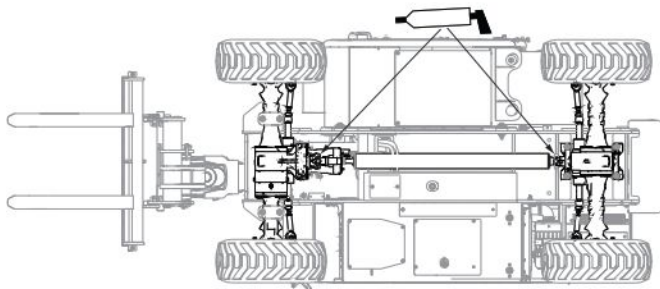


Figure 25 Drive Shaft Grease Points

5.4-11 Wear Pads Greasing

1. Ensure telehandler is parked on a firm level surface.
2. Move the shift lever to neutral and engage park brake.
3. Fully extend the boom to gain access to front bottom wear pads.
4. Shut down the engine and dismount from cab.
5. With boom fully extended, smear grease along the path of front wear pads.

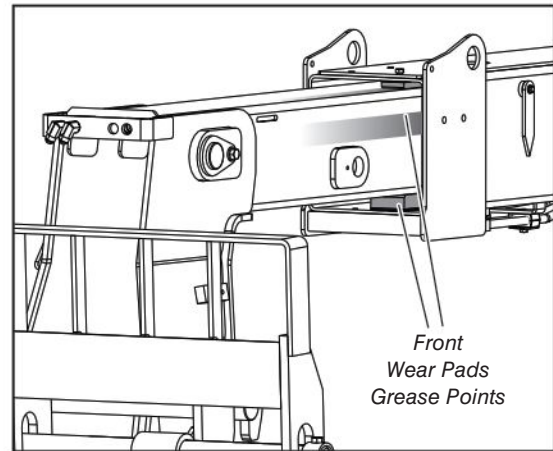


Figure 26 Front Wear Pads

6. With boom fully extended, remove rear cover to gain access to top rear slide pads.
7. Smear grease along the path of rear top slide pads.
8. Fully retract the boom then fully extend it a few times to ensure the path of slide pads is covered with grease for maximum protection.

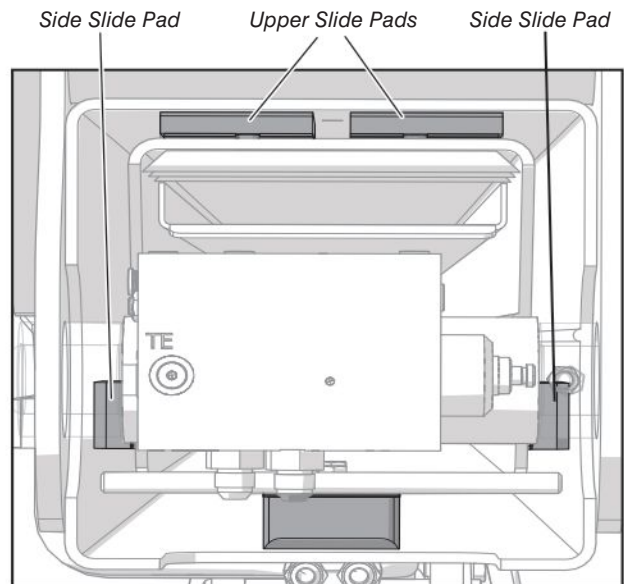


Figure 27 Rear Wear Pads

9. Shut down the engine and remove key.

5.5 1000 Hour or Annual Routine Maintenance

5.5-1 Change Hydraulic Oil Filter

1. Ensure telehandler is on a firm level surface, apply the park brake and shut down the engine.
2. Unlatch engine compartment cover and lift up to gain access to Hydraulic Oil Filter.
3. Place suitable container under filter to catch any spilled oil.
4. Unscrew and discard old filter. Be sure all traces of the old filter gasket are removed from the filter head.

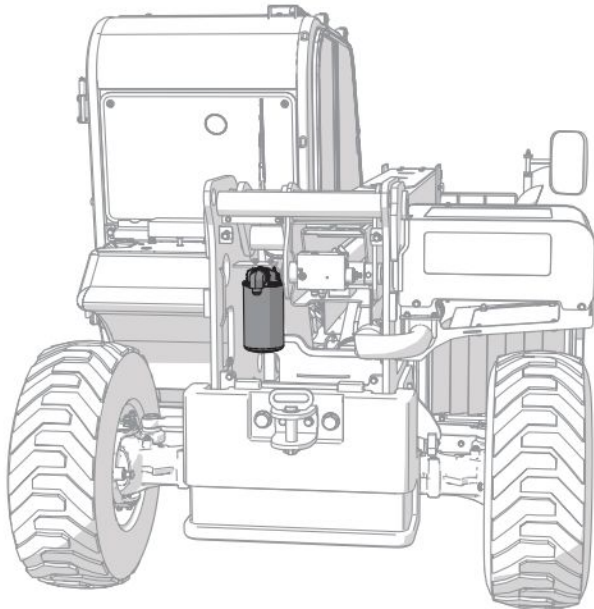


Figure 28 Hydraulic Oil Filter Location



NOTE

Refer to your local/national regulations on how to dispose of used hydraulic oil filter.

5. Apply a light coating of clean oil to the gasket on the new filter.
6. Install the new filter and turn until the gasket contacts the filter head.
7. Tighten an additional 1/2 to 3/4 turn by hand to compress the gasket.

5.5-2 Change Hydraulic Oil and Clean Hydraulic Tank



NOTE

Dirt in the hydraulic system will lead to premature component failure. A clean, contaminant-free system is extremely important to the telehandler's proper function. Take extra care when working around or on the hydraulic system to ensure its complete cleanliness.

1. Park telehandler on a firm level surface.
2. Fully retract and lower the boom to the stowed position.
3. Apply parking brake and shutdown the engine.
4. Place a container under the hydraulic oil tank capable of holding approximately 45 gallons (170 Litres).
5. Remove hydraulic tank drain plug from under hydraulic oil tank and allow all hydraulic oil to drain into container.

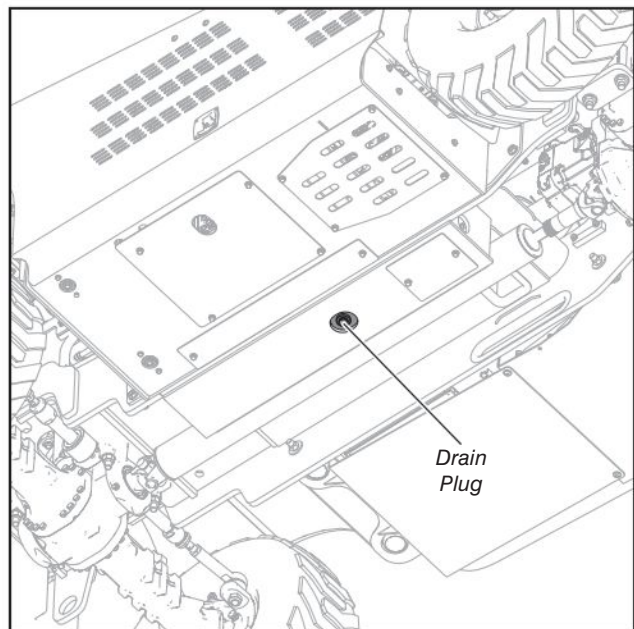


Figure 29 Hydraulic Tank Drain Plug

NOTE

Refer to your local/national regulations on how to dispose of used hydraulic oil.

6. Remove tank filler breather and set aside.
7. Remove 12 screws holding the access cover plate from top of tank.
8. Remove rubber gaskets under the access cover plates and set aside.

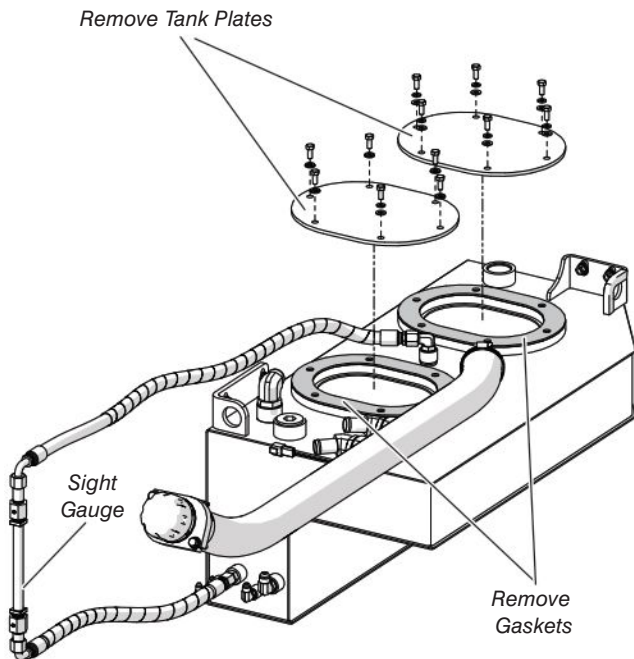


Figure 30 Tank Gasket Removal

9. Clean the tank with a lint-free cloth or a similar shop rag ensuring all dirt and dust particles are removed.

NOTE

Follow shop practice standards for flushing and cleaning of hydraulic oil tank.

10. Install drain plug back into tank. Replace O-ring seal if needed.

NOTE

Refer to [2.8 Recommended Fluids/Lubrications](#) for hydraulic oil specifications and tank capacity.

11. Refill the hydraulic tank with new oil from unopened container.
12. Check for leakage.
13. Install cover plate and tank filler breather.
14. Clean up any oil that may have spilled during this procedure.
15. Check hydraulic oil level. (The hydraulic oil level should be at or slightly above the top mark on the sight gage)
16. Start engine and work hydraulic functions.
17. Check hydraulic oil level again through the sight gauge. Add additional oil as required.

5.5-3 Change Axle Differential Oil

Each axle assembly requires gear lubricant independent of the planetary assemblies.

WARNING

Hot oil or components can burn. Oil must be at normal operating temperature when draining. Avoid contact with hot oil or components. Do not allow oil to drain into the ground.

1. Ensure that the axle differential oil is at normal operating temperature.
2. Park the machine on a firm level surface, apply parking brake, shut off the machine, and allow it to sit for two minutes.
3. Place a container capable of holding approximately 10 quarts (9.5 liters) under axle drain plugs.

4. Clean the areas around the three (3) drain plugs and level/fill plug, and remove the level/fill plug.

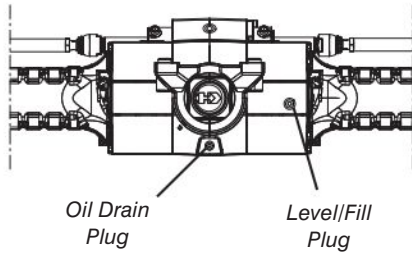


Figure 31 Axle Plugs

5. Remove all three (3) drain plugs and drain the oil from the differential. Dispose of used oil in accordance with local regulations.



NOTE

Refer to your local/national regulations on how to dispose of used oil.

6. Wipe off the magnetic drain plugs with a clean rag and install them in the axle.
7. Slowly fill the axle with 7 quarts (6.6 liters) of gear oil until oil begins to overflow from the level/fill hole. Refer to [2.8 Recommended Fluids/Lubrications](#) for axle differential oil specifications.
8. Clean and replace the level fill plug.
9. Repeat procedure for the second axle

5.5-4 Change Axle Planetary Oil

Each axle assembly requires planetary gear lubricant independent of the differential assemblies.

1. Ensure that the axle planetary oil is at operating temperature.
2. Park the telehandler on a firm level surface with the level/fill/drain plug at the 6 o'clock position.
3. Shut down the engine, apply parking brake, and allow it to sit for a minimum of two minutes.

4. Clean the area around the plug and remove it, then drain the axle oil into a container.



Figure 32 Draining Planetary Gear Oil



NOTE

Refer to your local/national regulations on how to dispose of used oil.

5. Wipe off the magnetic drain plug with a clean rag and install it in the planetary.
6. Reposition the plug to the 3 o'clock or 9 o'clock position then remove plug again.
7. Slowly fill the planetary with 1 quart (0.95 liters) of gear oil until oil begins to overflow from the level/fill hole. Refer to [2.8 Recommended Fluids/Lubrications](#) for oil specifications.

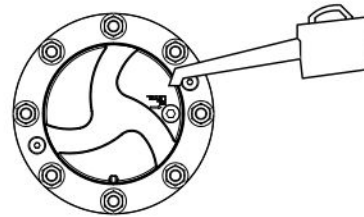


Figure 33 Filling Planetary Gear Oil

8. Clean the level/fill plug and install it in the planetary.
9. Repeat procedure for the remaining three planetary ends.

5.5-5 Change Engine Coolant

⚠ WARNING

Always shut off the engine and allow it to cool down before removing the radiator cap. Steam or fluid escaping from the radiator may cause severe injury. Remove cap slowly to relieve pressure. Avoid contact with steam or escaping fluid.



NOTE

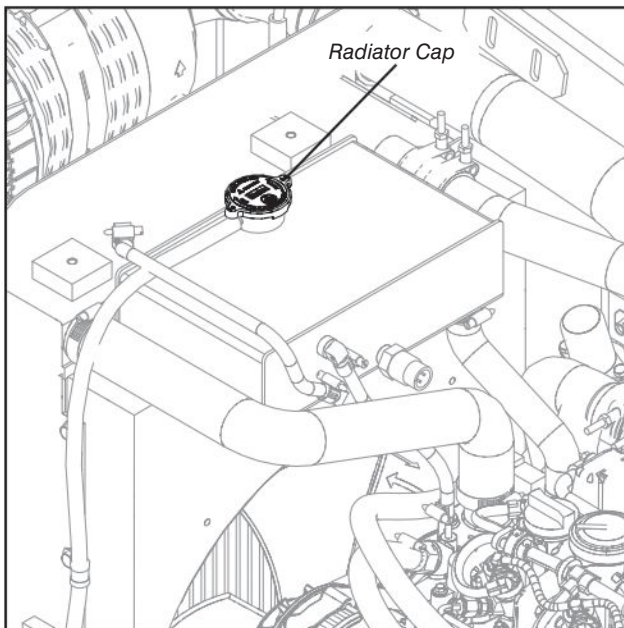
Machines with an enclosed cab have a heater unit that needs to be flushed separately.



NOTE

Place the heat select switch in the full hot position if equipped.

1. Open the radiator cap to ensure proper draining.

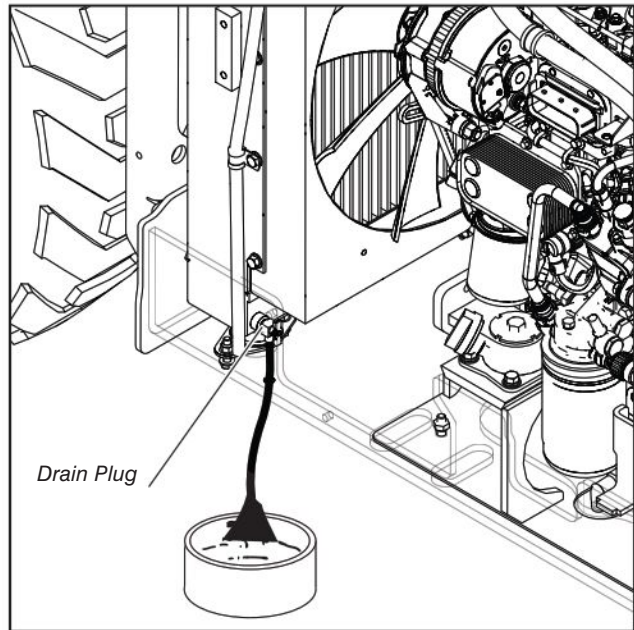


2. Place a container capable of holding 5 gallons (17 liters) under the radiator drain plug.
3. Open the drain plug and allow radiator and coolant bottle to drain.



NOTE

Refer to your local/national regulations on how to dispose of used coolant fluid.



4. Close the drain plug.
5. Refill the radiator using a mixture of antifreeze and distilled water ([2.8 Recommended Fluids/Lubrications](#)). Refer to engine manufacturer's manual.



NOTE

If heater is equipped remove the plugged hose at the motorized heater valve and install the heater hose. Open manual heater valve.

6. Fill radiator completely through the radiator neck, until coolant is visible. See figure below.
7. Run the engine until the module display indicates 85° to 90° without radiator cap. Shut down the engine.
8. Check coolant level and coolant strength in the radiator. Adjust mixture as required. Refill until coolant is visible.
9. Tighten radiator cap, start the engine, and check for leaks.

5.6 Non-Routine Maintenance

5.6-1 Wear Pads Replacement Procedure

Wear pads are designed to protect the structural integrity of the boom sections. In addition, wear pads partially carry the weight of the boom sections and will wear out over time and based on daily operation. Ensure to check slide pads quarterly. Refer to [5.4-8 Check Boom Wear Pad Clearances](#) for wear pads inspection procedure.



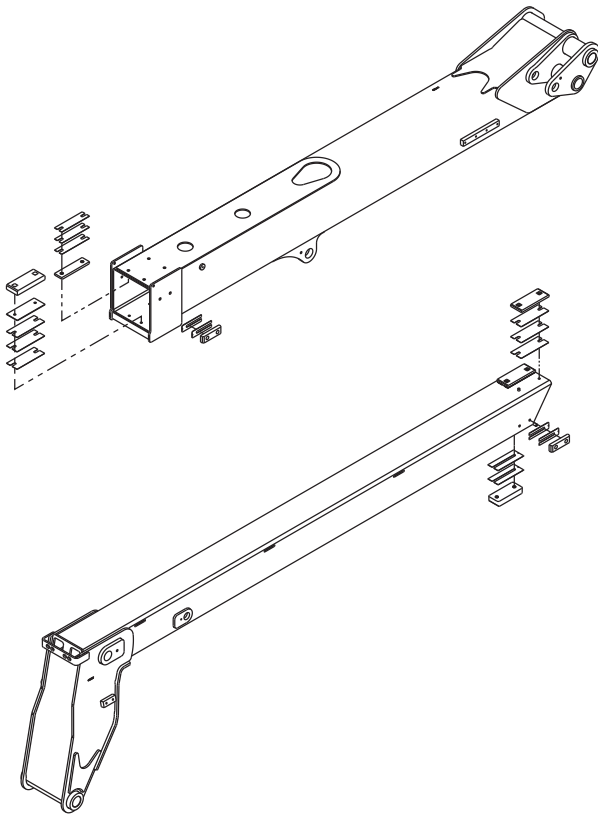
NOTE

The wear pads located at the rear-top and bottom-front of the boom sections wear faster than the other wear pads. The basic procedure for removing wear pads is the same regardless of their location in the boom assembly.



IMPORTANT

Pay attention to high-load slide pads (Front-Lower & Rear-Upper of boom) as most of the weight is exerted on them.



Remove Wear Pads

1. Fully retract the boom.
2. Remove the rear cover.
3. Remove screw, wear pad, shims, and spacer from the boom. For ease of installation, keep all parts that were removed together as an assembly.

For the rear sides:

4. Before removing the screws from the wear pads, use a pry bar under the shims of the side wear pads. The bar prevents the shims from falling when the screws are removed.
5. Remove the screws, shims, and wear pads while holding the bar under the shim. For easier installation, keep all parts removed together as an assembly.

For the top boom:

6. The weight of the boom must be removed from the rear wear pads to allow removal. Use the boom control lever to lower the boom until the carriage is on the floor or surface. This action changes the load forces on the boom sections so that there is clearance between the wear pads and the outer boom.
7. Remove the screws, shims, and wear pads. For easier installation, keep all parts removed together as an assembly.

Install Wear Pads**NOTE**

To keep the boom section centered, make sure that the number of shims on the top wear pads are approximately equal to the number on the bottom wear pads. The number of shims on each side of the boom must also be approximately equal.

**NOTE**

Shims are 0.015, 0.030, and 0.060 inch thick. Add or subtract shims as required to obtain a clearance on the side between the middle and outer boom sections of 0.59" maximum. When the correct clearance is achieved, remove the screws and apply red thread locking compound to the threads of both the screws and wear pads.

1. Clean installation area to remove any residual grease. Ensure threads are free of grease, dirt.
2. With the carriage lowered to the floor, install the top wear pads.
3. Apply blue loctite and tighten the screws to 37 ft-lb.
4. Start the engine and raise the carriage from the floor.
5. Install the bottom wear pad assemblies.
6. Apply blue loctite red and tighten the screws to 37 ft-lb.

For installation of the side wear pads:**NOTE**

Use a pry bar to hold the wear pads and shims in position.

7. Clean installation area to remove any residual grease. Ensure threads are free of grease, dirt.
8. Install the side wear pad assemblies.
9. Apply blue loctite and tighten the screws to 37 ft-lb. Ensure there is approximately an equal number of shims under each wear pad.
10. Lubricate all wear pads with MPG-EP2 grease.
11. Extend and retract the boom and check for smooth operation.
12. Install the rear cover.

5.6-2 Engine Display Fault Codes

The display recognizes error messages that are sent from the engine via the data link. If a new error message is received, the display will begin to beep, and a flashing pop-up window will open with the latest error messages and details.

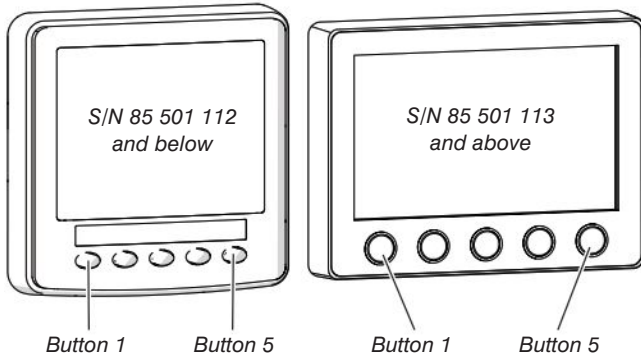


Figure 34 Engine Data Display Module

If a new error message is received, the display will beep and a flashing popup window will open with the latest error messages and details.

NOTE

The engine display for S/N 85 501 113 and above does not display transmission codes. To view those codes you can either temporarily plug in a display from the lower serial range, or connect to a J1939 harness, if equipped.

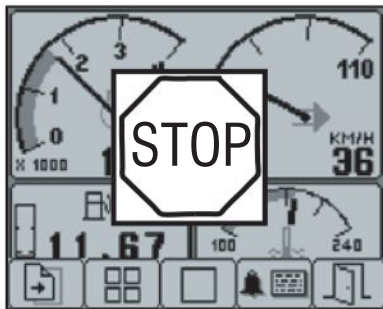


Figure 35 Error Message Popup

The error list is displayed by pressing any button. The errors already viewed appear in black text on a grey background. New messages that have not been read yet appear as emphasized grey text on a black background. The alarm last received is automatically displayed the first time the error list is called up.

If the list is longer than the screen section, you can browse through the list using buttons 1 and 2.



Figure 36 Error Message

The display cannot be quit until all alarms have been acknowledged by pressing button 3. The error list display can be activated at any time by pressing button 4.

The following pages contain information regarding the display Fault Codes; including the SPN code, FMI code, description of the fault code, as well as the recommended action to take.

5.6-3 Engine Error Codes, S/N 85 501 112 and below

J1939		Description	Recommended Action
SPN	FMI		
898	9	Timeout Error of CAN-Receive	Check CAN Bus wiring (Bus scheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range, check actuator.
520	9	Timeout Error of CAN-Receive	Check CAN Bus wiring (Bus scheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range, check actuator.
105	11	Charge air temperature sensor: the voltage of sensor measured by ECU is out of the target range	Check wiring, CAC-sensor not working, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it.
523613	0, 1, or 2	Rail pressure: the fuel pressure in rail calculated by ECU is either below or above the target range which is dependant on the engine speed	Check for leakage. Check fuel level in tank and low pressure system. Check fuel-primary pressure. Check backflow pressure check sensor. Check pressure relief valve. Check metering unit. Check Injector function (metering unit, injector). If necessary replace components as required.
523165	3, 4, 5, or 12	Fuel metering unit: the ECU detects no load, or the current drain measured by ECU is above the target range, (Open, Short to B+, Short to B-)	Check wiring, if necessary check FCU, check fuel metering unit and if necessary replace it, check connection cable and if necessary repair or replace it
107	0, 3	Air filter differential pressure: the pressure difference of the intake air between the filter inlet and outlet calculated by ECU is above the target range	Check airfilter and if necessary clean or renew it, check wiring, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it
1237	2	Override switch: the ECU receives a permanent signal	Check wiring, if sensor is not working, check switch and if necessary replace it, check connection cable and if necessary repair or replace it
523470	2, 7, 11, 12, or 14	Rail pressure: Pressure Relief Valve (PRV) error.	Check error memory for other additional errors and eliminate them first. Check working voltage and if necessary correct it, check PRV opening counter and if necessary replace it, check rail-pressure sensor and if necessary replace it, check FCU and if necessary replace it, check rail pressure relief valve and if
157	3, or 4	Rail pressure sensor: the voltage of sensor measured by ECU is out of the target range or shorted to B+ or B-.	Check wiring, check rail pressure sensor and if necessary replace it, check connection cable and if necessary repair or replace it
523350	4	Injector cylinder bank 1: the current drop measured by ECU is above the target range	Check wiring, check injectors and if necessary replace them, check connection cable and if necessary repair or replace it
523352	4	Injector cylinder bank 2: the current drop measured by ECU is above the target range	Check wiring, check injectors and if necessary replace them, check connection cable and if necessary repair or replace it
523354	12	Internal hardware monitoring: the ECU detects an error of its injector high current output	If error is not removable, change ECU
651	3, or 5	Injector cyl. 1: interruption of electrical connection or the current drop measured by ECU is above the target range	Check wiring and counter plugs, check injector and if necessary replace them, check connection cable and if necessary repair or replace it.
652	3, or 5	Injector cyl 3.: interruption of electrical connection or the current drop measured by ECU is above the target range	Check wiring, check injector and if necessary replace them, check connection cable and if necessary repair or replace it.
653	3, or 5	Injector cyl. 4: interruption of electrical connection or the current drop measured by ECU is above the target range	Check wiring, check injector and if necessary replace them, check connection cable and if necessary repair or replace it.
654	3, or 5	Injector cyl. 2: interruption of electrical connection or the current drop measured by ECU is above the target range	Check wiring, check injector and if necessary replace them, check connection cable and if necessary repair or replace it.
190	8, 12, or 14	Camshaft or Crankshaft speed sensor: out of range, signal disrupted, missing signal, or erratic signal	Check wiring of camshaft/crankshaft sensor, check camshaft/crankshaft sensor and if necessary replace it, check connection cable and if necessary repair or replace it
190	2	ECU measures a deviation between camshaft and crankshaft angle	Check increment wheel position, clean and adjust if necessary, check sensor position, reflash dataset
190	0, 11, or 14	Engine speed: the engine speed calculated by ECU is above the target range	check powertrain settings regarding overspeed
94	1, 3, or 4	Low fuel pressure sensor: the voltage of sensor measured by ECU is out of the target range	Check wiring, if sensor not working, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it. Check low fuel pressure system (fuel feed pump, relay, fuse, wiring, sensor) and if necessary repair or replace it
102	1, 2, 3, or 4	Charge air pressure sensor: the measured voltage of sensor by ECU is out of the target range, either too high or too low.	Check wiring, if charge air pressure/temperature sensor is not working, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it. Check waste gate system if necessary replace TC, check CAC if all channels are clean, check charge air piping if necessary clean or
100	3, 4	Oil pressure sensor: the voltage of sensor measured by ECU is out of the target range, either too high or too low.	Check sensor and if necessary replace it, check connection cable and if necessary repair or replace it
110	0, 1, 3, or 4	Coolant temperature sensor: the voltage of the sensor measured by ECU is out of the target range; either high or low.	Check wiring, sensor defect, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it

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5.6-3 Engine Error Codes, S/N 85 501 112 and below

J1939		Description	Recommended Action
SPN	FMI		
91	3, 4, or 11	Sensor error accelerator pedal	Check wiring, check accelerator pedal sensor and if necessary replace it, check connection cable and if necessary repair or replace it
97	3, 4, or 12	Fuel filter water level sensor: the voltage of sensor measured by ECU is out of the target range high or low.	Drain water out from pre-filter. Check wiring, if sensor is not working, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it
100	0, or 1	Oil pressure is either above or below the target range	Check oil level, check engine for oil leakage, measure oil pressure external to evaluate sensor value, clean suction pipe inlet mesh in oilsump
110	0	Coolant temperature: the coolant temperature calculated by ECU is above the target range.	Clean radiator, check fan drive, check coolant level, check cooling system in general, check thermostat function.
105	0	Charge air temperature downstream calculated by ECU is above the target range	Check CAC system and clean it. Check fan functionality. Check cooling performance with temperature measurement.
111	1	Coolant level: the coolant level calculated by ECU is underneath the allowed minimum	Check coolant level, inspect cooling system for leakage and if necessary repair it, check sensor and wiring
523009	9, or 10	Rail pressure relief valve: is open more frequently, or longer than what the technical specification allows	Change rail pressure relief valve
639, 1231, or 1235	14	CAN bus 0, 1, or 2: the ECU is not allowed to send messages, because the status "BusOff" is detected	Check wiring of CAN bus and if necessary repair it, check connection cable and if necessary repair or replace it, check resistance in CAN lines (60 Ohm)
630	12	Access error: the ECU finds an error during the access to its EEPROM memory or works with an alternative value	ECU not programmed, EEPROM is defective, ECU is defective: reprogram ECU and if necessary replace it
1079, 1080, or 523601	13	Sensor supply voltage monitor error (ECU), Error in sensor voltage.	Check wiring of external components, check working voltage and if necessary correct it, check connection cable and if necessary repair or replace it, if error is not removable, change ECU
168	0, 1, 2, 3, or 4	Battery voltage: the voltage measured by ECU is out of the target range; either too high, too low, or erratic.	Check alternator, contact resistance, safety fuses, too high load in energy system, check battery and connections, check cables and if necessary clean, repair or replace component as required.
1109	2	Engine Shut Off demand has been ignored by the user	Warranty relevant, Additional error must be set
677	3, 4, 5, or 12	Starter relay; short circuit to B+ or B-, Open circuit, or powerstage over temperature	Check wiring and start relay and if necessary replace it, check connection cable and if necessary repair or replace it
523550	12	Start information to Starter (T50-switch) erratic, on too long.	Check wiring, if sensor not working, check start switch and if necessary replace it, check connection cable and if necessary repair or replace it
523612	3, 4, 12, or 14	ECU reported internal software error	Check error memory for other errors. Check wiring, check connected sensors and actuators. Re-flash the ECU. If error is still active replace ECU.
523698	11	Shut off request from supervisory monitoring function, Engine Shut Off due to supervisory function	Warranty relevant, Additional error must be set
5763	0, 1, 3, 4, 5, 6, 7, or 11	Actuator error EGR-Valve; signal out of range	Check wiring and repair or replace if necessary, check actuator/EGR and if necessary replace it
523982	0, 1	Powerstage diagnosis disabled; low or high battery voltage	Check wiring, check alternator, check cables and repair or replace if necessary
523906	3, 4, 5, or 12	ECU detects open load on the electric fuel feed pump output, too high temperature in powerstage of fuel pump circuit, or short to B+ or B-	Check wiring of the fuel feed pump circuit including relay, if necessary repair or replace wiring
524057	2	Electric fuel pump; fuel pressure build up error	Check low fuel pressure system (fuel feed pump, relay, fuse, wiring, sensor) and if necessary repair or replace it
524108	9	Missing CAN message of EGR throttle valve	Check CAN Bus wiring (Bus scheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range, check actuator
524109	9	Missing CAN message of EGR throttle valve	Check CAN Bus wiring (Bus scheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range, check actuator
3520	1	The DEF fluid located in the tank is diluted.	Replace the DEF.
524190	14	Inducement level 1 active.	Check the DEF level in the tank. If there is no DEF, refill the tank to the volume above the warning threshold. Check the DEF quality in the tank. If the wrong fluid is filled, refill with proper DEF. Check other errors based on hardware malfunctions.
523470	2	The Pressure relief valve is forced to open.	The threshold for error detection is an internal ECU threshold. Reset the fault, and at reappearance, check the injection system.
523615	3,4	3: Short to battery high side metering unit. 4: Short to battery low side metering unit.	Check the wiring harness and metering unit and, if necessary, repair or replace it. The threshold for error detection is an internal ECU threshold.
3520	8	DEF quality sensor; measurement conditions not fulfilled.	Clean DEF quality sensor.
524267	14	The announcement triggers the inducement level 2.	No action required.

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5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P000F	F0	5571	15	Fuel pressure relief valve: data is above the normal operational range (least severe level)
P000F	F1	5571	16	Fuel pressure relief valve: data is above the normal operational range (moderately severe level)
P006D	64	1209	2	TC exhaust pressure sensor: data erratic, intermittent or incorrect
P0072	11	171	4	Ambient air temperature sensor: voltage is below the normal range or is shorted to a low source.
P0073	12	171	3	Ambient air temperature sensor: voltage is below the normal range or is shorted to a high source.
P007A	F0,F1	105	0	Charge air temperature sensor: data is above the normal operational range (most severe level)
P0087	21	7103	0	Rail pressure pump: data is below the normal operational range (most severe level)
P0088	22	7103	1	Rail pressure pump: data is above the normal operational range (most severe level)
P008A	F0,F1	94	1	Fuel low pressure sensor: data is below the normal operational range (most severe level)
P008B	22	94	15	Fuel low pressure sensor: data is above the normal operational range (least severe level)
P00C6	92	94	1	Charge air temperature sensor: data is below the normal operational range (most severe level)
P00E8	21	105	0	Fuel low pressure sensor: data is above the normal operational range (least severe level)
P00E8	22	105	0	Fuel low pressure sensor: data is below the normal operational range (most severe level)
P00FA	11	1209	4	TC exhaust pressure sensor: voltage is below the normal range or is shorted to a low source
P00FB	12	1209	3	TC exhaust pressure sensor: voltage is below the normal range or is shorted to a high source
P0106	2A	102	2	Charge air pressure sensor: data erratic, intermittent or incorrect
P0107	11	102	4	Charge air pressure sensor: voltage is below the normal range or is shorted to a low source
P0108	12	102	3	Charge air pressure sensor: voltage is below the normal range or is shorted to a high source
P0111	64	105	2	Charge air temperature sensor: data erratic, intermittent or incorrect
P0112	11	105	4	Charge air temperature sensor: voltage is below the normal range or is shorted to a low source
P0113	12	105	3	Charge air temperature sensor: voltage is below the normal range or is shorted to a high source
P0116	64	110	2	Coolant air temperature sensor: data erratic, intermittent or incorrect
P0117	11	110	4	Coolant air temperature sensor: voltage is below the normal range or is shorted to a low source
P0118	12	110	3	Coolant air temperature sensor: voltage is below the normal range or is shorted to a high source
P012B	21	1209	1	TC exhaust pressure sensor: Data is below the normal operational range (most severe level)

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P012B	22	1209	15	TC exhaust pressure sensor: Data is above the normal operational range (least severe level)
P012B	2A	1209	2	TC exhaust pressure sensor: data erratic, intermittent or incorrect
P018F	F3	5571	16	Fuel pressure relief valve: data is above the normal operational range (most severe level)
P0190	11	157	4	Rail pressure metering unit: voltage is below the normal value or is shorted to a low source.
P0190	12	157	3	Rail pressure metering unit: voltage is above the normal value or is shorted to a high source.
P0201	01,11	5358	6	Fuel injection quantity injector 1: current is above the normal range or grounded circuit.
P0201	13	5358	5	Fuel injection quantity injector 1: current is below the normal range or open circuit.
P0202	01,11	5359	6	Fuel injection quantity injector 2: current is above the normal range or grounded circuit.
P0202	13	5359	5	Fuel injection quantity injector 2: current is below the normal range or open circuit.
P0203	01,11	5360	6	Fuel injection quantity injector 3: current is above the normal range or grounded circuit.
P0203	13	5360	5	Fuel injection quantity injector 3: current is below the normal range or open circuit.
P0204	01,11	5361	6	Fuel injection quantity injector 4: current is above the normal range or grounded circuit.
P0204	13	5361	6	Fuel injection quantity injector 4: current is below the normal range or open circuit.
P0205	01,11	5362	6	Fuel injection quantity injector 5: current is above the normal range or grounded circuit.
P0205	13	5362	5	Fuel injection quantity injector 5: current is below the normal range or open circuit.
P0206	01,11	5363	6	Fuel injection quantity injector 6: current is above the normal range or grounded circuit.
P0206	13	5363	5	Fuel injection quantity injector 6: current is below the normal range or open circuit.
P0207	01,11	5364	6	Fuel injection quantity injector 7: current is above the normal range or grounded circuit.
P0207	13	5364	5	Fuel injection quantity injector 7: current is below the normal range or open circuit.
P0208	01,11	5365	6	Fuel injection quantity injector 8: current is above the normal range or grounded circuit.
P0208	13	5365	5	Fuel injection quantity injector 8: current is below the normal range or open circuit.
P0217	F0,F1	110	0	Coolant temperature sensor: data is above the normal operational range (most severe level)
P0219	F0	190	0	Rotation speed: data is above the normal operational range (most severe level)
P0243	01	1188	12	TC wastegate: bad intelligent device or component
P0243	49	1188	9	TC wastegate: abnormal update rate timeout
P0243	71	1188	7	TC wastegate: mechanical system not responding or out of adjustment
P0251	01	7103	6	Rail pressure pump: current above normal range or grounded circuit
P0251	11	7103	4	Rail pressure pump: voltage below normal range or is shorted to a low source
P0251	12	7103	3	Rail pressure pump: voltage above normal range or is shorted to a low source
P0251	13	7103	5	Rail pressure pump: current below normal range or open circuit
P02E7	00	132	2	EGR differential pressure: data erratic, intermittent or incorrect
P0336	2F	4201	8	Crankshaft rotation speed sensor: abnormal frequency or pulse width or period
P0336	31	4201	14	Crankshaft rotation speed sensor: special instructions
P033F	00	723	13	Camshaft rotation speed sensor: out of calibration
P0341	2F	723	8	Camshaft rotation speed sensor: abnormal frequency or pulse width or period
P0341	31	723	14	Camshaft rotation speed sensor: special instructions

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P0405	11	411	4	EGR differential pressure: voltage below the normal range or is shorted to a low source.
P0406	12	411	3	EGR differential pressure: voltage above the normal range or is shorted to a high source.
P040A	11	412	4	EGR temperature pressure: voltage below the normal range or is shorted to a low source.
P040A	12	412	3	EGR temperature pressure: voltage above the normal range or is shorted to a high source.
P040A	21	412	17	EGR temperature pressure: Data below normal operational range (least severe level)
P040A	22	412	15	EGR temperature pressure: Data above normal operational range (least severe level)
P040A	64	412	2	EGR temperature pressure: data erratic, intermittent or incorrect
P0425	11	4765	4	Exhaust aftertreatment: Temperature before DOC - voltage below the normal range or short to a low source
P0425	12	4765	3	Exhaust aftertreatment: Temperature before DOC - voltage above the normal range or is shorted to a high source.
P0425	2A,64	4765	2	Exhaust aftertreatment: Temperature before DOC - data erratic, intermittent or incorrect
P0425	F0	4765	15	Exhaust aftertreatment: Temperature before DOC - Data above the normal operational range (least severe level)
P042A	11	4766	4	Exhaust aftertreatment: Temperature after DOC - voltage below the normal range or short to a low source
P042A	12	4766	3	Exhaust aftertreatment: Temperature after DOC - voltage above the normal range or is shorted to a high source.
P042A	F0	4766	15	Exhaust aftertreatment: Temperature after DOC - Data above the normal operational range (least severe level)
P042E P042F	72	27	7	Position EGR valve: Mechanical system not responding or is not adjusted
P046C	2A,64	411	2	EGR differential pressure: data erratic, intermittent or incorrect
P046D	00	411	2	EGR differential pressure: data erratic, intermittent or incorrect
P0480	13	1071	5	Fan drive output: current below the normal range or open circuit
P0489	11	27	4	EGR temperature sensor: data is below the operational range (least severe level)
P0490	12	27	3	Position EGR valve: voltage above the normal range or is shorted to a high source
P0522	11	100	4	Oil pressure sensor: voltage is below the normal range or is shorted to a low source
P0523	12	100	3	Oil pressure sensor: voltage is above the normal range or is shorted to a high source
P0524	F4	100	18	Oil pressure sensor: data is below the normal operational range (moderately severe level)
P0524	F5	100	1	Oil pressure sensor: data is below the normal operational range (most severe level)
P0541	11	729	4	Preheating relay: voltage is below the normal range or is shorted to a low source
P0542	12	729	3	Preheating relay: voltage is above the normal range or is shorted to a high source
P0543	13	729	5	Preheating relay: current is below the normal range or open circuit
P0616	11	677	4	Starter relay: voltage is below the normal range or is shorted to a low source
P0617	12	677	3	Starter relay: voltage is above the normal range or is shorted to a high source
P0627	11	1347	4	Fuel supply pump: voltage is below the normal range or is shorted to a low source
P0627	12	1347	3	Fuel supply pump: voltage is above the normal range or is shorted to a high source
P0627	13	1347	5	Fuel supply pump: current is below the normal range or open circuit

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P062A	4B	1347	11	Fuel supply pump: the root cause is not known
P062B	04	3055	14	Fuel system monitoring: special instructions
P0638	01	51	6	Throttle valve position: current is above the normal range or grounded circuit
P0638	11	51	4	Throttle valve position: voltage is below the normal range or is shorted to a low source
P0638	12	51	3	Throttle valve position: voltage is above the normal range or is shorted to a high source
P0638	13	51	5	Throttle valve position: current is below the normal range or open circuit
P0667	11	1136	17	ECU temperature: data is below the normal operational range (least severe level)
P0667	12	1136	15	ECU temperature: data is above the normal operational range (least severe level)
P0667	21	1136	1	ECU temperature: data is below the normal operational range (most severe level)
P0667	22	1136	0	ECU temperature: data is above the normal operational range (most severe level)
P0667	64	1136	2	ECU temperature: data erratic, intermittent or incorrect
P0686	11	1485	4	ECU main relay: voltage is below the normal range or is shorted to a low source
P0687	12	1485	3	ECU main relay: voltage is above the normal range or is shorted to a high source
P0691	11	1071	4	Fan drive output: voltage is below the normal range or is shorted to a low source
P0692	12	1071	3	Fan drive output: voltage is above the normal range or is shorted to a high source
P06B0	01	3509	14	ECU sensor supply voltage: special instructions
P06B1	11	3509	6	ECU sensor supply voltage: current above the normal range or open circuit
P06B1	16	3509	1	ECU sensor supply voltage: data is below the normal operational range (most severe level)
P06B2	17	3509	0	ECU sensor supply voltage: data is above the normal operational range (most severe level)
P06B3	01	3510	14	ECU sensor supply voltage 2: special instructions
P06B4	11	3510	6	ECU sensor supply voltage 2: current is above the normal range or grounded circuit
P06B4	16	3510	1	ECU sensor supply voltage 2: data is below the normal operational range (most severe level)
P06B5	17	3510	0	ECU sensor supply voltage 2: data is above the normal operational range (most severe level)
P06E6	01	3511	14	ECU sensor supply voltage 3: special instructions
P06E6	4B	3511	11	ECU sensor supply voltage 3: root cause not known
P06E7	11	3511	6	ECU sensor supply voltage 3: current above the normal or grounded circuit
P06E7	16	3511	1	ECU sensor supply voltage 3: data is below the normal operational range (most severe level)
P06E8	17	3511	0	ECU sensor supply voltage 2: data is above the normal operational range (most severe level)
P1001	00	2797	14	Injector group: special instructions
P1002	00	164	2	Rail pressure: data erratic, intermittent or incorrect
P1003	00	2797	6	Injector group 1: current is above the normal range or grounded circuit
P1004	00	2798	6	Injector group 2: current is above the normal range or grounded circuit
P1005	00	520280	11	Injector driver metering unit: root cause not known
P1006	00	7103	3	Rail pressure pump: voltage is above the normal range or is shorted to a high source
P1007	00	7103	4	Rail pressure pump: voltage is below the normal range or is shorted to a low source

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P1008, P1009	00	5571	2	Fuel pressure relief valve: data erratic, intermittent or incorrect
P100A	00	5571	0	Fuel pressure relief valve: Data is above the normal operational range (most severe level)
P100B, P100C	00	5571	2	Fuel pressure relief valve: data erratic, intermittent or incorrect
P100D	00	5571	13	Fuel pressure relief valve: out of calibration
P100E	00	5571	16	Fuel pressure relief valve: Data is above the normal operational range (moderately severe level)
P1010	54	652	13	Injector 2: out of calibration
P1011	54	653	13	Injector 3: out of calibration
P1012	54	654	13	Injector 4: out of calibration
P1013	54	655	13	Injector 5: out of calibration
P1014	54	656	13	Injector 6: out of calibration
P1015, P1016, P1017	00	7103	13	Rail pressure pump: out of calibration
P1018	00	5357	14	Rail pressure pump: data erratic, intermittent or incorrect
P1019	54	652	13	Fuel injection quantity multiple cylinder: special instructions
P101A	00	157	0	Rail pressure metering unit: Data is above the normal operational range (most severe level)
P101D	00	2797	4	Injector group: voltage is below the normal range or is shorted to a low source
P101E	00	520426	6	Injection valve bank secondary 0: current is above the normal range or grounded circuit
P101F	00	520427	6	Injection valve bank secondary 1: current is above the normal range or grounded circuit
P1020	00	3509	3	ECU sensor supply voltage: voltage is above the normal range or is shorted to a high source
P1021	00	3509	4	ECU sensor supply voltage: voltage is below the normal range or is shorted to a low source
P1022	00	520279	7	HMI return button: the mechanical system is not responding or not adjusted
P1023	00	91	3	Position accelerator pedal: voltage is above the normal range or shorted to a high source
P1024	00	2623	3	Accelerator pedal channel 2: voltage is above the normal range or is shorted to a high source
P1025	00	29	3	Position accelerator pedal 2: voltage is above the normal range or shorted to a high
P1026	00	2625	3	Accelerator pedal 2 channel 2: voltage is above the normal range or is shorted to a high source
P1027	00	91	4	Position accelerator pedal: voltage is below the normal range or shorted to a low source.
P1028	00	2623	4	Accelerator pedal channel 2: voltage is below the normal range or shorted to a low source.
P1029	00	29	4	Position accelerator pedal 2: voltage is below the normal range or shorted to a low source.
P102B	00	677	5	Starter relay: current is below the normal range or open circuit.

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P102C	00	677	3	Starter relay: voltage is above the normal range or is shorted to a high source
P102D	00	677	4	Starter relay: voltage is below the normal range or is shorted to a low source
P102E	00	91	11	Position accelerator pedal: root cause not known
P102F	00	29	11	Position accelerator pedal 2: root cause not known
P1030	00	1041	14	Starter signal KL. 50: special instructions
P1031	00	3510	3	ECU sensor supply voltage 2: voltage is above the normal range or is shorted to a high source
P1032	00	3510	4	ECU sensor supply voltage 2: voltage is below the normal range or is shorted to a low source
P1035	00	0	0	
P1036	00	520417	31	Dummy element: condition exists
P103D	00	520424	31	Controller access failed: condition exists
P103E	00	5099	11	Oil pressure lamp: root cause not known
P103F	00	5099	3	Oil pressure lamp: voltage is above the normal range or is shorted to a high source
P1040	00	5099	4	Oil pressure lamp: voltage is below the normal range or is shorted to a low source
P1041	00	3697	11	Particle filter lamp: root cause not known
P1042	00	624	11	Amber warning lamp: root cause not known
P1043	00	624	3	Amber warning lamp: voltage is above the normal range or is shorted to a high source
P1044	00	624	4	Amber warning lamp: voltage is below the normal range or is shorted to a low source
P1045	00	520458	11	Engine running lamp: root cause not known
P1046	00	520458	3	Engine running lamp: voltage is above the normal range or is shorted to a high source
P1047	00	520458	4	Engine running lamp: voltage is below the normal range or is shorted to a low source
P1048	00	520459	11	Multi purpose lamp: root cause not known
P1049	00	520459	4	Multi purpose lamp: voltage is below the normal range or is shorted to low source
P104F	00	51	4	Throttle valve position: voltage is below the normal range or is shorted to a low source
P1050, P1052, P1058	00	27	3	Position EGR valve: voltage is above the normal range or is shorted to a high source
P1051, P1053, P1059	00	27	4	Position EGR valve: voltage is below the normal range or is shorted to a low source
P1054	00	27	6	Position EGR valve: current is above the normal range or grounded circuit
P1055, P1056	00	27	5	Position EGR valve: current is below the normal range or open circuit
P1057, P105A	00	27	11	Position EGR valve: root cause not known
P105B, P105C	00	27	2	Position EGR valve: data erratic, intermittent or incorrect
P105D P105F	00	51	6	Throttle valve position: current above the normal range or grounded circuit
P105E	00	51	11	Throttle valve position: root cause is not known

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P1060, P1061, P1062	00	190	0	Rotation speed: data is above the normal operational range (most severe level)
P1063	00	520435	11	Output torque: root cause not known
P1064	64	1237	2	Shutdown override switch: data erratic, intermittent or incorrect
P1067	00	520491	2	Exhaust aftertreatment: too many engine starts in a short amount of time - data erratic, intermittent or incorrect
P1068	00	520433	5	Resv lamp: current is below the normal range or open circuit
P1069	00	520433	11	Resv lamp: root cause is not known
P106A	00	520433	3	Resv lamp: voltage is above the normal range is shorted to a high source
P106B	00	520433	4	Resv lamp: voltage is below the normal range is shorted to a low source
P106C	00	5100	11	Coolant temperature lamp: the root cause is not known
P106D	00	5100	3	Coolant temperature lamp: voltage is above the normal range or is shorted to a high source
P106E	00	5100	4	Coolant temperature lamp: voltage is below the normal range or is shorted to a low source
P1070	00	598	10	Clutch signal: abnormal rate of change
P1071	00	1109	2	Protection system requested shutdown: data erratic, intermittent or incorrect
P1072	00	1109	14	Protection system requested shutdown: special instructions
P1075	00	171	2	Ambient air temperature sensor: data erratic, intermittent or incorrect
P1076	00	110	2	Coolant temperature sensor: data erratic, intermittent or incorrect
P1077	00	4766	2	Exhaust aftertreatment: temperature after DOC - data erratic, intermittent or incorrect
P1078, P1079	00	4765	2	Exhaust aftertreatment: temperature before DOC - data erratic, intermittent or incorrect
P107A	00	1081	11	Cold start lamp: Root cause is not known
P107B	00	1081	3	Cold start lamp: voltage is above the normal range or is shorted to a high source
P107C	00	1081	4	Cold start lamp: voltage is below the normal range is shorted to a low source
P107D	00	520444	11	Vehicle speed control lamp: the root cause is not known
P107E	00	520416	5	Disc separator: the current is below the normal range or open circuit
P107F	00	520416	11	Disc separator: root cause is not known
P1080	00	520416	3	Disc separator: voltage is above the normal range or is shorted to a high source
P1081	00	520416	4	Disc separator: voltage is below the normal range or is shorted to a low source
P1082	00	520429	2	Main and secondary ECU identification: data erratic, intermittent or incorrect
P1083	00	520430	11	Exhaust flap failure: the root cause is not known
P1085	00	677	11	Starter relay: root cause is not known
P1086	00	6655	11	ECU power off lamp: root cause is not known
P1087	00	6655	3	ECU power off lamp: voltage is above the normal range or is shorted to a high source
P1088	00	6655	4	ECU power off lamp: voltage is below the normal range or is shorted to a low source
P1089	00	520259	15	Temperature before engine inlet valve: data is above the normal operational range (least severe level)
P108A	00	520259	16	Temperature before engine inlet valve: data is above the normal operational range (moderately severe level)

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P108B	00	520259	1	Temperature before engine inlet valve: data is below the normal operational range (most severe level)
P108C	00	107	0	Air filter differential pressure sensor: data is above the normal operational range (most severe level)
P108F, P1090	00	102	0	Change air pressure sensor: data erratic, intermittent or incorrect
P1091	00	102	1	Change is pressure sensor: data is below the normal operational range (most severe level)
P1092	00	51	3	Throttle valve position: voltage is above the normal range or is shorted to a high source.
P1093	00	51	4	Throttle valve position: voltage is below the normal range or is shorted to a low source.
P1094	00	51	11	Throttle valve position: root cause is not known
P1095	00	520304	2	Status throttle valve: data erratic, intermittent or incorrect
P1906	00	520305	2	Signal error throttle valve: data erratic, intermittent or incorrect
P1907	00	520296	31	Torque reduction TC protection active: condition exists
P1099	00	171	16	Ambient air temperature sensor: data is above the normal operational range (moderately severe level)
P109A	00	171	18	Ambient air temperature sensor: data is below the operational range (moderately severe level)
P109B	00	520442	31	Intake air temperature sensor: condition exists
P109C	00	520443	31	intake air temperature sensor not available: condition exists
P10E0	54	657	13	Injector 7: out of calibration
P10E1	54	658	13	Injector 8: out of calibration
P1100, P1101, P1104	12	1485	3	ECU main relay: voltage is above the normal range or is shorted to a high source
P1102, P1103, P1105	12	1485	4	ECU main relay: voltage is below the normal range or is shorted to a low source
P1106, P1107, P1108, P1109, P110A, P110B, P110C, P110D, P110E, P110F, P1110, P1111, P1112, P1113	49	629	12	ECU: bad intelligent device or component

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P1114, P1115, P1116, P1117, P1118, P1119, P111A, P111B, P111C, P111D, P111E, P111F, P1120, P1121, P1122, P1123, P1124, P1125, P1126, P1127, P1128, P1129, P112A, P112B, P112C, P112D, P112E, P112F, P1130, P1131, P1132, P1133, P1134, P1135, P1136, P1137, P1138, P1139, P113A, P113B, P113C, P113D,	49	629	12	ECU: bad intelligent device or component
P113E	00	520370	2	Not waiting for ECU after run: data erratic, intermittent, or incorrect
P113F	00	520371	2	Not waiting for ECU after run (often): data erratic, intermittent, or incorrect
P1140	00	520372	2	Not waiting for ECU after run (often): data erratic, intermittent, or incorrect
P1141, P1143, P1145, P1147, P1149, P114B, P114D	12	1485	3	ECU main relay: voltage is above the normal range or is shorted to a high source

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P1142, P1144, P1146, P1148, P114A, P114C, P114E	11	1485	4	ECU main relay: voltage is below the normal range or is shorted to a low source
P115A	01	3513	14	ECU sensor supply voltage 5: special instructions
P115A	4B	3513	11	ECU sensor supply voltage 5: the root cause is not known
P115B	17	3513	0	ECU sensor supply voltage 5: data is above the normal operational range (most severe level)
P115C	11	3513	6	ECU sensor supply voltage 5: current is above the normal range or grounded circuit
P115C	16	3513	1	ECU sensor supply voltage 5: data is below the normal operational range (most severe level)
P115D	01	3514	14	ECU sensor supply voltage 6: special instructions
P115D	4B	3514	11	ECU sensor supply voltage 6: the root cause is not known
P115E	17	3514	0	ECU sensor supply voltage 6: data is above the normal operational range (most severe level)
P115F	11	3514	6	ECU sensor supply voltage 6: current is above the normal range or grounded circuit
P115F	16	3514	1	ECU sensor supply voltage 6: data is below the normal operational range (most severe level)
P1168	00	520378	11	MCAN not enough memory: the root cause is not known
P1169	00	520379	11	MCANR not enough memory: the root cause is not known
P116A	11	520425	4	Powerstage on CJ945: voltage is below the normal range or is shorted to a low source
P116A	12	520425	3	Powerstage on CJ945: voltage is above the normal range or is shorted to a high source
P116A	13	520425	5	Powerstage on CJ945: current is below the normal range or open circuit
P116A	4B	520425	12	Powerstage on CJ945: bad intelligent device or component
P1173	00	520437	31	Replacement fault code triggered by FID UVMDSM04/V-engine: main secondary ECU swapped - condition exists
P1174	00	520438	31	Replacement fault code triggered by FID UVMDSM04 - condition exists
P1175	00	520439	31	Replacement fault code triggered by FID UVMDSM10 - condition exists
P1176	00	520439	31	Replacement fault code triggered by FID UVMDSM12 - condition exists
P1177	00	520441	31	Replacement fault code triggered by FID UVMDSM13 - condition exists
P119A, P119B, P119C,	00	629	12	ECU: bad intelligent device or component
P119D	00	91	14	Position accelerator pedal: special instructions
P119E	00	190	2	Rotation speed: data erratic, intermittent or incorrect
P119F, P11A2	00	5357	2	Fuel injection quantity multiple cylinders: data erratic, intermittent or incorrect
P11A0	00	5441	2	Fuel injection timing error multiple cylinders: data erratic, intermittent or incorrect
P11A1	00	520281	2	Injection temperature compensation: data erratic, intermittent or incorrect

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P11A3, P11A4, P11A5	00	523612	12	ECU: bad intelligent device or component
P1186, P11A7	00	5357	2	Fuel injection quantity multiple cylinders: data erratic, intermittent or incorrect
P11A8	00	5442	2	Fuel injection pressure error multiple cylinders: data erratic, intermittent or incorrect
P11A9	00	29	2	Position accelerator pedal 2: data erratic, intermittent or incorrect
P11AA	00	677	2	Starter relay: data erratic, intermittent or incorrect
P11AB, P11AC	00	513	2	Actual percent torque: data erratic, intermittent or incorrect
P11AD	00	520250	2	Function monitoring: data erratic, intermittent or incorrect
P11AE, P11AF, P11B0, P11B1, P11B2, P11B3, P11B4, P11B5, P11B6, P11B7, P11B8, P11B9, P11BA, P11BB, P11BC, P11BD, P11BE, P11BF, P11C0, P11C1, P11C2, P11C3, P11C4, P11C5, P11C6, P11C7, P11C8, P11C9, P11CA, P11CB, P11CC, P11CD, P11CE, P11CF, P11D0, P11D1, P11D2, P11D3, P11D4, P11D5	00	629	12	ECU: bad intelligent device or component

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P11D6, P11D7, P11D8, P11D9, P11DA, P11DB, P11DC, P11DD, P11DE, P11DF, P11E0, P11E1, P11E2, P11E3, P11E4, P11E5, P11E6, P11E7, P11E8, P11E9, P11EB, P11EC, P11ED, P11EE, P11ED, P11F0, P11F1, P11F2, P11F3, P11F4, P11F5, P11F6, P11F7,	00	629	12	ECU: bad intelligent device or component
P11F8	00	520473	31	Wrong engine ECU - condition exists
P1251	00	520282	7	Lines DPF sensor inverted - mechanical system not responding or out of adjustment
P1252	00	520283	14	Oil change request: special instructions
P1253	00	520300	2	Pressure after DPF: data erratic, intermittent or incorrect
P1254	00	4781	14	DEF soot load: special instructions
P1255	00	10156	0	DPF regeneration time: data is above the normal operational range (most severe level)
P1256	00	3735	16	Time stand still: data is above the normal operational range (moderately severe level)
P1257	00	3735	0	Time stand still: data is above the normal operational range (most severe level)
P1258	00	4766	1	Temperature after DOC: data erratic, intermittent or incorrect
P1259, P125A, P125B, P125C	00	3251	14	DPF differential pressure: special instructions
P125F, P1260	00	4766	2	Temperature after DOC: data erratic, intermittent or incorrect

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P1261	00	3734	0	Time stand still: data above the normal operational range (most severe level)
P1262	00	520254	8	Time stand still: abnormal frequency or pulse width or period
P1263	00	520255	2	Lines DPF sensor wrong connection: data erratic, intermittent or incorrect
P1264	00	520434	14	Condition stand still: special instructions
P1265	00	520472	11	ETV actuator light error: the root cause is not known
P1351	00	3226	0	NOx sensor after SCR cat: data is above the normal operational range (most severe level)
P1352	00	3226	2	NOx sensor after SCR cat: data erratic, intermittent or incorrect
P1353	00	3216	2	NOx sensor: data erratic, intermittent or incorrect
P1354	00	520286	2	Calculated lambda value: data erratic, intermittent or incorrect
P1355	00	7351	0	NOx emissions after SCR Cat: data is above the normal operational range (most severe level)
P1356	00	520287	2	NOx conversion SCR cat: data erratic, intermittent or incorrect
P1358	00	520289	14	Emptying DEF supply system: special instructions
P1359	00	6875	31	DEF metering pressure: data is above the normal operational range (most severe level)
P135A	00	520290	14	DEF pressure: special instructions
P135B	00	6875	0	DEF metering pressure: data is above the normal operational range (most severe level)
P135C	00	520291	11	DEF warm up: the root cause is not known
P135D	00	520292	1	DEF metering valve blocked: the root cause is not known
P135E	00	3226	0	NOx sensor after SCR cat: data is above the normal operational range (most severe level)
P135F	00	3226	9	NOx sensor after SCR cat: abnormal update rate timeout
P1360	00	3226	13	NOx sensor after SCR cat: out of calibration
P1361	00	3226	31	NOx sensor after SCR cat: condition exists
P1362	00	3216	0	NOx sensor: data is above the normal operational range (most severe level)
P1363	00	3216	9	NOx sensor: abnormal update rate timeout
P1364	00	3216	13	NOx sensor: out of calibration
P1365	00	3216	31	NOx sensor: condition exists
P1366	00	4360	2	Temperature before SCR cat: data erratic, intermittent or incorrect
P1367	00	4360	3	Temperature before SCR cat: voltage is above the normal range or is shorted to a high source
P1368	00	4360	4	Temperature before SCR cat: voltage is below the normal range or is shorted to a low source
P136A	00	3516	1	DEF concentration: Data is below the normal operational range (most severe level)
P136B	00	524087	11	DEF error lamp: the root cause is not known
P136C	00	524087	3	DEF error lamp: voltage above the normal range or is shorted to a high source
P136D	00	524087	4	DEF error lamp: voltage is below the normal range or is shorted to a low source
P1372	00	5746	5	DEF metering unit heater relay: current is below the normal range or open circuit
P1373	00	5746	3	DEF metering unit heater relay: voltage is above the normal range or is shorted to a high source

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P1374	00	5746	4	DEF metering unit heater relay: voltage is below the normal range or is shorted to a low source
P1375	00	4334	2	DEF pump pressure: data erratic, intermittent or incorrect
P1376	00	520311	11	DEF supply module heater over temperature: the root cause is not known
P1378	00	4376	5	DEF reverse valve: current is below the normal range or open circuit
P1379	00	4376	3	DEF reverse valve: voltage is above the normal range or is shorted to a high source
P137A	00	4376	4	DEF reverse valve: voltage is below the normal range or is shorted to a low source
P137E	00	520284	15	Power reduction step 1 active: data is above the normal operational range (least severe level)
P1380	00	5826	14	Power reduction: special instructions
P1381	00	520285	0	Power reduction step 2 active: data is above the normal operational range (most severe level)
P1383	00	520293	15	Particle diagnostic power reduction step 1 active: data is above the normal operational range (least severe level)
P1384	00	520294	14	Particle diagnostic pretrigger reduction step 2 active: special instructions
P1385	00	520295	0	Particle diagnostic power reduction step21 active: data is above the normal operational range (most severe level)
P1386	00	520301	2	NOx conversion efficiency: data erratic, intermittent or incorrect
P1387	00	520302	2	Voltage for power supply DEF heater: data erratic, intermittent or incorrect
P1388	00	520303	11	Relay DEF heater: the root cause is not known
P1389	0	3226	12	NOx sensor after SCR cat: bad intelligent device or component
P138A	00	3226	31	NOx sensor after SCR cat: condition exists
P138B	00	3216	12	NOx sensor: bad intelligent device or component
P138C	00	3216	31	NOx sensor: condition exists
P138D	00	4360	11	Temperature before SCR cat: the root cause is not known
P138F	F0	520375	15	DEF concentration: data is above the normal operational range (least severe level)
P138F	F1	520375	0	SCR crystallization monitoring: data is above the normal operational range (most severe level)
P1390	00	520373	9	CAN DEF quality sensor: abnormal update rate timeout
P1391	00	520374	9	CAN DEF tank temperature/level sensor: abnormal update rate timeout
P1392	00	3532	3	DEF tank level sensor: voltage is above the normal range or is shorted to a high source
P1393	00	3532	4	DEF tank level sensor: voltage is below the normal range or is shorted to a low source
P1394	00	3031	3	DEF tank temperature: voltage is above the normal range or is shorted to a high source
P1395	00	3031	4	DEF tank temperature: voltage is below the normal range or is shorted to a low source
P1396	00	7540	11	DEF backflow line heater relay: the root cause is not known
P1397	00	5746	11	DEF metering unit heater relay: the root cause is not known
P1398	00	7069	11	DEF pressure line heater relay: the root cause is not known
P1399	00	5491	11	DEF heater relay cable: the root cause is not known
P139A	00	5746	8	Def metering unit heater relay: abnormal frequency or pulse width or period

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P139B	00	520317	8	DEF supply module over temperature: abnormal frequency or pulse width or period
P139C	00	520445	2	DEF pump motor communication: data erratic, intermittent or incorrect
P139D	00	520307	11	DEF heater relay over temperature: the root cause is not known
P139E, P139F, P13A0, P13A1, P13A3	00	3520	2	DEF quality sensor: data erratic, intermittent or incorrect
P13A2	00	3520	13	DEF quality sensor: Out of calibration
P13A4	00	520436	11	DEF quality sensor: the root cause is not known
P13A5	00	520436	3	DEF quality sensor: the voltage is above the normal range or is shorted to a high source
P13A6	00	520436	4	DEF quality sensor: the voltage is below the normal range is shorted to a low source
P13A7, P13A8, P13A9, P13AA	00	3532	2	DEF tank level sensor: data erratic, intermittent or incorrect
P13AB, P13AC, P13AD	00	3031	2	DEF tank temperature: data erratic, intermittent or incorrect
P13AE	00	4360	2	Temperature before SCR cat: data erratic, intermittent or incorrect
P13AF	00	520489	2	DEF pump temperature: data erratic, intermittent or incorrect
P13B0	00	5707	2	DEF pump heater temperature: data erratic, intermittent or incorrect
P13B1	00	520490	2	DEF pump pressure: data erratic, intermittent or incorrect
P1452	00	520321	12	CAN main secondary no communication - bad intelligent device or component
P1453	00	520322	9	Collective fault on the main ECU, triggered bby the fault couple coordinator secondary - abnormal update rate timeout
P1454	00	520323	11	SCR diagnostic disabled on main ECU triggered by fault on secondary - the root cause is not known
P1455	00	520324	11	DEF tank temperature diagnostic disabled on the main ECU triggered by fault on the secondary ECU - the root cause is not known
P1456	00	520325	11	DEF tank level diagnostic disabled on the main ECU triggered by fault on the secondary ECU - the root cause is not known
P1457	00	520326	11	SCR system turned off on the main ECU triggered by fault on the secondary ECU - the root cause is not known
P1458	00	520327	11	SCR system turned off/system on hold on the main ECU triggered by fault on the secondary ECU -the root cause is not known
P1459	00	520328	11	SCR system turned off/system on hold on the main ECU triggered by fault on the secondary ECU - the root cause is not known
P145A	00	520329	11	Standstill forbidden on the main ECU - the root cause is not known
P145B	00	520330	11	Power reduction request by 25% on the main ECU triggered by failure on the secondary ECU - the root cause is not known
P145C	00	520331	11	Power reduction request by 50% on the main ECU triggered by failure on the secondary ECU - the root cause is not known

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P145D	00	520332	11	Collective fault on the main ECU triggered by software-reset failure - the root cause is not known
P145E	00	520333	11	Collective fault on the main ECU triggered by no engine speed signal - the root cause is not known
P145F	00	520334	11	Collective fault on the main ECU triggered by light failure of the ETV - the root cause is not known
P1460	00	520335	11	Collective fault on the main ECU triggered by severe failure of the ETV - the root cause is not known
P1461	00	520336	11	Collective fault on the main ECU triggered by DEF CAN sensor failure - the root cause is not known
P1462	00	520337	11	Collective fault on the main ECU triggered by NOx sensor downstream failure - the root cause is not known
P1463	00	520338	11	ETV safe position: the root cause is not known
P1464	00	520339	11	Collective fault on the main ECU triggered by dosing valve failure - the root cause is not known
P1465	00	520340	11	Collective fault on the main ECU triggered by stand still temperature not being reached - the root cause is not known
P1466	00	520341	11	Collective fault on the main ECU triggered by DEF pressure problems - the root cause is not known
P1467	00	520342	11	Collective fault on the main ECU triggered by reverting valve failure - the root cause is not known
P1468	00	520343	11	Collective fault on the main ECU triggered by DEF backflow line heater - the root cause is not known
P1469	00	520344	11	Collective fault on the main ECU triggered by the NOx-tailpipe emissions being too high - the root cause is not known
P146A	00	520345	11	Collective fault on the main ECU triggered by DEF suction line heater failure - the root cause is not known
P146B	00	520346	11	Collective fault on the main ECU triggered by supply module heater lines failure - the root cause is not known
P146C	00	520347	11	Collective fault on the main ECU triggered by exhaust pressure upstream SCR failure - the root cause is not known
P146D	00	520348	11	Collective fault on the main ECU triggered by exhaust pressure upstream SCR failure - the root cause is not known
P146E	00	520349	11	NCD timer activated on the main ECU triggered by fault on the secondary - the root cause is not known
P146F	00	520350	11	Collective fault on the main ECU triggered by DEF pressure line failure - the root cause is not known
P1470	00	520351	11	Collective fault on the main ECU triggered by DEF pump temperature failure - the root cause is not known
P1471	00	520352	11	Collective fault on the main ECU triggered by DEF heater failure - the root cause is not known
P1472	00	520353	11	PCD timer activated on the main ECU triggered by fault on the secondary - the root cause is not known
P1473	00	520354	11	Collective fault on the main ECU triggered by microcontroller failure- the root cause is not known

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P1474	00	520355	11	Collective fault on the main ECU triggered by sensor supply voltage failure- the root cause is not known
P1475	00	520356	11	Collective fault on the main ECU triggered by data set ID failure- the root cause is not known
P1476	00	520357	11	Power reduction request by 25% on the main ECU triggered by failure on the secondary - the root cause is not known
P1477	00	520358	11	Power reduction request by 50% on the main ECU triggered by failure on the secondary - the root cause is not known
P1478	00	520359	11	Standstill forbidden on the main ECU - the root cause is not known
P1479	00	520360	11	NCD reduction fail timer activated on the main ECU triggered by the fault on the secondary - the root cause is not known
P147A	00	520361	11	Standstill change main to after run phase - the root cause is not known
P147B	00	520362	11	Collective fault on the main ECU triggered by temperature upstream of DOC failure- the root cause is not known
P147C	00	520363	11	Power reduction, stand still inhibited, ETV turned off on the main ECU triggered by fault on the secondary - the root cause is not known
P147D	00	520364	11	Collective fault on the main ECU triggered by KeepAlive error at an external device- the root cause is not known
P147E	00	520365	11	Collective fault on the main ECU triggered by battery voltage failure- the root cause is not known
P147F	00	520366	11	Collective fault on the main ECU triggered by CAN failure- the root cause is not known
P1480	00	520367	11	Collective fault on the main ECU triggered by function monitoring failure- the root cause is not known
P1481	00	520368	11	Collective fault on the main ECU triggered by microcontroller hardware failure- the root cause is not known
P1482	00	520369	11	Collective fault on the main ECU triggered by ECU temperature failure- the root cause is not known
P1483	00	520320	13	Main and secondary ECU software version mismatch - out of calibration
P1484	00	520460	11	Collective fault on the main ECU triggered by differential pressure sensor failure- the root cause is not known
P1485	00	520461	11	Collective fault on the main ECU triggered by environment pressure sensor failure- the root cause is not known
P1486	00	520462	11	Collective fault on the main ECU triggered by DEF supply system failure- the root cause is not known
P1487	00	520463	11	Collective fault on the main ECU triggered by NH3 sensor failure- the root cause is not known
P1488	00	520464	11	Collective fault on the main ECU triggered by camshaft speed signal failure- the root cause is not known
P1489	00	520465	11	Standstill inhibited on the main ECU triggered by failure - the root cause is not known
P148A	00	520466	11	Power reduction request by 50% on the main ECU triggered by failure on the secondary - the root cause is not known
P148B	00	520467	11	Power reduction request by 25% on the main ECU triggered by failure on the secondary - the root cause is not known

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P148C	00	520468	11	Power reduction request by 50% on the main ECU triggered by failure on the secondary ECU - the root cause is not known
P148D	00	520469	11	Collective fault on the main ECU triggered by SCR crystallization failure- the root cause is not known
P148E	00	520470	11	Standstill request from the secondary ECU to the main ECU - the root cause is not known
P148F	00	520475	11	Power reduction request by 25% on the main ECU triggered by failure on the secondary ECU - the root cause is not known
P1490	00	520476	11	Deactivation NOx monitoring - the root cause is not known
P1491	00	520477	11	Activation of the replacement value for ETV - the root cause is not known
P1492	00	520478	11	Deactivation NOx plausibility check secondary - the root cause is not known
P1493	00	520479	11	Standstill forbidden on the main ECU - the root cause is not known
P1494	00	520480	11	Standstill forbidden on the main ECU, execution only possible with service tool - the root cause is not known
P1495	00	520481	11	Set "FID" on the main ECU - the root cause is not known
P1496	00	520482	11	Activation of "performance intervention" on the main ECU - the root cause is not known
P1497	00	520483	11	Forces SCR supply system on the main ECU in status "hold" - the root cause is not known
P1498	00	520484	11	Collective fault on the main ECU triggered by electrical supply module failure- the root cause is not known
P1499	00	520485	11	Deactivation DEF dosing adaption on the main ECU - the root cause is not known
P149A	00	520486	11	Deactivation NOx downstream monitoring on the main ECU - the root cause is not known
P149B	00	520487	13	Inconsistent dataset on the main and secondary ECU - out of calibration
P149C	00	520488	0	SCR crystallization: data is above the normal operational range (most severe level)
P202A	13	4366	5	DEF tank heating valve: the current is below the normal range or open circuit
P202B	11	4366	4	DEF tank heating valve: the voltage is below the normal range or is shorted to a low source
P202C	12	4366	3	DEF tank heating valve: the voltage is above the normal range or is shorted to a high source
P203B	22	1761	0	DEF tank level sensor: data is above the normal operational range (most severe level)
P203B	64	1761	2	DEF tank level sensor: data erratic, intermittent or incorrect
P203C	11	3532	4	DEF tank level sensor: the voltage is below the normal range or is shorted to a low source
P203D	12	3532	3	DEF tank level sensor: the voltage is above the the normal range or is shorted to a high source
P203F	21	3532	1	DEF tank level sensor: data is below the normal operational range (most severe level)
P2047	01	3361	6	DEF metering unit: the current is above the normal range or grounded circuit
P2047	13	3361	5	DEF metering unit: the current is below the normal range or open circuit
P2048	11	3361	4	DEF metering unit: voltage is below the normal range or is shorted to a low source
P2049	12	3361	3	DEF metering unit: the voltage is above the normal range or is shorted to a high source

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P204C	11	4334	4	DEF pump pressure: voltage is below the normal range or is shorted to a low source
P204D	12	4334	3	DEF pump pressure: voltage is above the normal range or is shorted to a high source
P205B	21	3031	1	DEF tank temperature: data below the normal operational range (most severe level)
P205B	22	3031	0	DEF tank temperature: data is above the normal operational range (most severe level)
P205B	4B	520319	11	DEF tank temperature the root cause not known
P205B	64	3031	2	DEF tank temperature: data erratic, intermittent or incorrect
P205C	11	3031	4	DEF tank temperature: voltage is below the normal range or is shorted to a low source
P205D	12	3031	3	DEF tank temperature: voltage is above the normal range or is shorted to a high source
P206A	01	3520	2	DEF quality sensor: data erratic, intermittent or incorrect
P207F	21	3520	1	DEF quality sensor: data below the normal operational range (most severe level)
P208A	13	7107	5	DEF pump: current is below the normal range or open circuit
P208B	4B	520306	11	DEF pump motor over temperature - the root cause is not known
P208C	11	7107	4	DEF pump: voltage is below the normal range or is shorted to a low source
P208D	12	7107	3	DEF pump: voltage is above the normal range or is shorted to a high source
P209F	4B	520312	11	DEF tank heater over temperature: the root cause is not known
P20B9	13	4341	5	Heater DEF supply line: the current is below the normal range or open circuit
P20BA	4B	520310	11	DEF suction line heater over temperature - the root cause is not known
P20BB	11	4341	4	Heater DEF supply line: voltage is below the normal range or shorted to a low source
P20BC	12	4341	3	Heater DEF supply line: voltage is above the normal range or is shorted to a high source
P20BD	13	4343	5	Heater DEF pressure line: current is below the normal range or open circuit
P20BE	4B	520309	11	DEF pressure line heater over temperature - the root cause is not known
P20BF	11	4343	4	Heater DEF pressure line: voltage is below the normal range or is shorted to a low source
P20C0	12	4343	3	Heater DEF pressure line: voltage is above the normal range or is shorted to a high source
P20C1	13	4345	5	Heater DEF return line: current is below the normal range or open circuit
P20C2	4B	420308	11	DEF backflow line heater over temperature - the root cause is not known
P20C3	11	4345	4	Heater DEF return line: voltage is below the normal range or is shorted to a low source
P20C4	12	4345	3	Heater DEF return line: voltage is above the normal range or is shorted to a high source
P20C5	13	520471	5	DEF downstream line heater: the current is below the normal range or open circuit
P20C6	4B	520471	11	DEF downstream line heater: the root cause is not known
P2027	11	520471	4	DEF downstream line: voltage is below the normal range or is shorted to a low source
P2028	12	520471	3	DEF downstream line: voltage is above the normal range or is shorted to a high source

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P20E8	21	4334	1	DEF pump pressure: data is below the normal operational range (most severe level)
P20E9	22	4334	0	DEF pump pressure: data is above the normal operational range (most severe level)
P20EE	00	5304	2	NOx cat efficiency: data erratic, intermittent or incorrect
P2100	13	51	5	Throttle valve position: current is below the normal range or open circuit
P2101	4B	51	11	Throttle valve position: the root cause is not known
P2102	00,11	51	4	Throttle valve position: the voltage is below the normal range or shorted to a low source
P2103	00,12	51	3	Throttle valve position: the voltage is above the normal range or shorted to a high source
P2111	72	51	7	Throttle valve position: the mechanical system is not responding or out of adjustment
P2112	73	51	7	Throttle valve position: the mechanical system is not responding or out of adjustment
P214A	22	4360	0	Temperature before SCR cat - data is above the normal operational range (most severe range)
P21C2	13	5491	5	DEF heater relay cable: current is below the normal range or open circuit
P21C3	11	5491	3	DEF heater relay cable: the voltage is below the normal range or shorted to a low source
P21C4	12	5491	3	DEF heater relay cable: the voltage is above the normal range or is shorted to a high source
P2227	21	108	1	Ambient pressure sensor: data is below the normal operational range (most severe level)
P2227	22	108	0	Ambient pressure sensor: data is above the normal operational range (most severe level)
P2227	64	108	2	Ambient pressure sensor: data erratic, intermittent or incorrect
P2228	11	108	4	Ambient pressure sensor: the voltage is below the normal range or shorted to a low source
P2229	12	108	3	Ambient pressure sensor: the voltage is above the normal range or shorted to a high source
P2264	22	97	0	Water in fuel sensor: data is above the normal operational range (most severe level)
P2266	11	97	4	Water in fuel sensor: voltage is below the normal range or shorted to a low source
P2267	12	97	3	Water in fuel sensor: voltage is above the normal range or shorted to a high source
P226B	F0	102	16	Charge air pressure sensor: data is above the normal operational range (moderately severe level)
P226B	F1	102	0	Charge air pressure sensor: data is above the normal operational range (most severe level)
P229F	64	3226	2	NOx sensor after SCR cat: data erratic, intermittent or incorrect
P22FF	21	4360	1	Temperature before SCR cat: data is below the normal operational range (most severe level)
P242F	F0	3720	16	DPF ash load: data is above the normal operational range (moderately severe level)
P244A	F4	3251	18	DPF differential pressure: data is below the normal operational range (moderately severe level)
P244A	F5	3251	1	DPF differential pressure: data is below the normal operational range (most severe level)
P244B	F0	3251	16	DPF differential pressure: data is above the normal operational range (moderately severe level)

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
P244B	F1	3521	0	DPF differential pressure: data is above the normal operational range (most severe level)
P2454	11	3251	4	DPF differential pressure: voltage is below the normal range or is shorted to a low source
P2455	12	3251	3	DPF differential pressure: voltage is above the normal range or is shorted to a high source
P2456	64	3251	2	DPF differential pressure: data erratic, intermittent or incorrect
P245F	21	520300	18	Pressure after DPF - data is below the normal operational range (moderately severe level)
P245F	22	520300	16	Pressure after DPF - data is above the normal operational range (moderately severe level)
P2463	F0	4781	16	DEF soot load: data is above the normal operational range (moderately severe level)
P2463	F1	4781	0	DEF soot load: data is above the normal operational range (most severe level)
P24E1	01	4377	2	NH3 sensor: data erratic, intermittent or incorrect
P24E9	01	4382	2	NH3 sensor heater: data erratic, intermittent or incorrect
P250A	00,2F	98	2	Oil level: data erratic, intermittent or incorrect
P250A, P250B	1C	98	31	Oil level: condition exists
P250E	13	98	14	Oil level: special instructions
P2541	11	94	4	Fuel low pressure sensor: voltage is below the normal range or is shorted to a low source
P2542	12	94	3	Fuel low pressure sensor: voltage is above the normal range or is shorted to a high source
P2560	7B	111	1	Coolant level sensor: data is below the normal operational range (most severe level)
P2604	02	729	12	Preheating relay: bad intelligent device or component
P2604	13	729	5	Preheating relay: current is below the normal range or open circuit
P2604	4B	729	12	Preheating relay: bad intelligent device or component
P260E	11	3697	4	Particle filler lamp: voltage is below the normal or shorted to a low source
P260E	12	3697	3	Particle filler lamp: voltage is above the normal or shorted to a high source
P268A	54	651	13	Injector 1: out of calibration
P26DF	01	3512	14	ECU sensor supply voltage 4: special instructions
P26DF	4B	3512	11	ECU sensor supply voltage 4: the root cause is not known
P26E0	11	3512	6	ECU sensor supply voltage 4: current is above the normal range or grounded circuit
P26E0	16	3512	1	ECU sensor supply voltage 4: data is below the normal operational range (most severe level)
P26E1	17	3512	0	ECU sensor supply voltage 4: data is above the normal operational range (most severe level)
P2ABD	F0	1188	11	TC wastegate: the root cause is not known
P2D87	4B	1071	11	Fan drive output: the root cause is not known
U0010	88	1231	14	CAN: special instructions
U0028	88	639	14	CAN: special instructions

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
U1700	00	520261	9	CAN communication to NOx sensor before Cat - abnormal update rate timeout
U1704	00	520265	9	CAN communication to NOx sensor before Cat - abnormal update rate timeout
U170C	87	1669	14	CAN: special instructions
U170D	00	520252	2	CAN control message: data erratic, intermittent or incorrect
U170E	00	520269	2	CAN engine start (GeraBox) checksum - data erratic, intermittent or incorrect
U170F	00	520270	2	CAN engine start (Vehicle controller) checksum - data erratic, intermittent or incorrect
U1710, U1711, U1712, U1713,	00	4207	2	CAN torque rotation speed control: data erratic, intermittent or incorrect
U1714	00	523211	9	CAN engine brake: abnormal update rate timeout
U1715	00	523212	9	CAN engine protection: abnormal update rate timeout
U1716	00	523741	14	CAN shut down request from engine - special instructions
U1717	00	523240	9	CAN functional mode control: abnormal update rate timeout
U1718	00	520253	2	CAN control message: data erratic, intermittent or incorrect
U1719	00	520271	2	CAN engine start (GeraBox) rolling counter - data erratic, intermittent or incorrect
U171A	00	520272	2	CAN engine start (Vehicle controller) rolling counter - data erratic, intermittent or incorrect
U171B, U171C, U171D, U171E	00	4206	2	Can torque rotation speed control - data erratic, intermittent or incorrect
U1720	00	520273	2	CAN engine start (GeraBox)- c
U1721	00	520274	9	CAN engine start (GeraBox) - abnormal update rate timeout
U1722	00	520275	2	CAN engine start (Vehicle controller) - data erratic, intermittent or incorrect
U1723	00	520276	9	CAN engine start (Vehicle controller) - abnormal update rate timeout
U1725	00	520278	9	CAN ETV actuator - abnormal update rate timeout
U1726, U1727, U1728, U1729, U172A, U172B, U172C, U172D, U172E, U172F, U1730, U1731	00	3349	0	CAN torque rotation speed control - data above the normal operational range (most severe level)
U1732	00	523982	0	Power stage diagnostic - data is above the normal operational range (most severe level)
U1733	00	523982	1	Power stage diagnostic - data is below the normal operational range (most severe level)

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
U1734	00	520356	9	CAN control message: abnormal update rate timeout
U1737	00	520380	14	Exhaust aftertreatment CAN shortcut - special instructions
U1738	00	520381	14	Main and secondary CAN shortcut - special instructions
U1739	00	520382	14	Engine CAN shortcut - special instructions
U173A	00	520383	9	CAN main secondary - abnormal update rate timeout
U173B	00	520384	9	CAN main secondary - abnormal update rate timeout
U173C	00	520385	9	CAN main secondary - abnormal update rate timeout
U173D	00	520386	9	CAN main secondary - abnormal update rate timeout
U173E	00	520387	9	CAN main secondary - abnormal update rate timeout
U173F	00	520388	9	CAN main secondary - abnormal update rate timeout
U1740	00	520389	9	CAN main secondary - abnormal update rate timeout
U1741	00	520390	9	CAN main secondary - abnormal update rate timeout
U1742	00	520391	9	CAN main secondary - abnormal update rate timeout
U1743	00	520392	9	CAN main secondary - abnormal update rate timeout
U1744	00	520393	9	CAN main secondary - abnormal update rate timeout
U1745	00	520394	9	CAN main secondary - abnormal update rate timeout
U1746	00	520395	9	CAN main secondary - abnormal update rate timeout
U1747	00	520396	9	CAN main secondary - abnormal update rate timeout
U1748	00	520397	9	CAN main secondary - abnormal update rate timeout
U1749	00	520398	9	CAN main secondary - abnormal update rate timeout
U174A	00	520399	9	CAN main secondary - abnormal update rate timeout
U174B	00	520400	9	CAN main secondary - abnormal update rate timeout
U174C	00	520401	9	CAN main secondary - abnormal update rate timeout
U174D	00	520402	9	CAN main secondary - abnormal update rate timeout
U174E	00	520403	9	CAN main secondary - abnormal update rate timeout
U174F	00	520404	9	CAN main secondary - abnormal update rate timeout
U1750	00	520405	9	CAN main secondary - abnormal update rate timeout
U1751	00	520406	9	CAN main secondary - abnormal update rate timeout
U1752	00	520407	9	CAN main secondary - abnormal update rate timeout
U1753	00	520408	9	CAN main secondary - abnormal update rate timeout
U1754	00	520409	9	CAN main secondary - abnormal update rate timeout
U1755	00	520410	9	CAN main secondary - abnormal update rate timeout
U1756	00	520411	9	CAN main secondary - abnormal update rate timeout
U1757	00	520412	9	CAN main secondary - abnormal update rate timeout
U1758	00	520413	2	CAN main secondary, ECU checksum - data erratic, intermittent or incorrect
U1759	00	520414	2	CAN main secondary, time synchronously private CAN - data erratic, intermittent or incorrect
U175A	00	520415	2	CAN main secondary, ECU rolling counter - data erratic, intermittent or incorrect
U175C	00	520431	9	CAN main secondary - abnormal update rate timeout

5.6-4 Engine Error Codes, S/N 85 501 113 and above

DTC #	FTB	SPN	FMI	Fault description
U175D	00	520432	9	CAN main secondary - abnormal update rate timeout
U175E, U175F, U1760, U1761	00	3349	2	CAN torque rotation speed control: data erratic, intermittent or incorrect
U1762	00	520446	9	CAN-Receive-Frame ComMS_SWS10_MRcv - abnormal update rate timeout
U1763	00	520447	9	CAN-Receive-Frame ComMS_SWS13_SRcv - abnormal update rate timeout
U1764	00	520448	9	CAN-Receive-Frame ComMS_SWS14_SRcv - abnormal update rate timeout
U1765	00	520449	9	CAN-Receive-Frame ComMS_SWS15_SRcv - abnormal update rate timeout
U1766	00	520450	9	CAN-Receive-Frame ComMS_SWS16_SRcv - abnormal update rate timeout
U1767	00	520451	9	CAN-Receive-Frame ComMS_SWS17_SRcv - abnormal update rate timeout
U1768	00	520452	9	CAN-Receive-Frame ComMS_SWS18_SRcv - abnormal update rate timeout
U1769	00	520453	9	CAN-Receive-Frame ComMS_SWS19_SRcv - abnormal update rate timeout
U176A	00	520454	9	CAN-Receive-Frame ComMS_SWS20_SRcv - abnormal update rate timeout
U176B	00	520455	9	CAN-Receive-Frame ComMS_SWS7_MRcv - abnormal update rate timeout
U176C	00	520456	9	CAN-Receive-Frame ComMS_SWS8_MRcv - abnormal update rate timeout
U176D	00	520457	9	CAN-Receive-Frame ComMS_SWS9_MRcv - abnormal update rate timeout
U1770	00	520314	9	CAN ETC actuator secondary - abnormal update rate timeout
U1771	00	1638	2	Hydraulic oil temperature: data erratic, intermittent or incorrect
U1772	00	1638	9	Hydraulic oil temperature: abnormal update rate timeout
U1773	00	520313	9	CAN ETV actuator: abnormal update rate timeout
U3003	11	168	4	Battery voltage: voltage is below the normal range or shorted to a low source
U3003	12	168	3	Battery voltage: voltage is above the normal range or shorted to a high source
U3003	A2,F4	168	1	Battery voltage: data is below the normal operational range (most severe level)
U3003	A3,F0	168	0	Battery voltage: data is above the normal operational range (most severe level)

5.6-5 Eaton Drive Controller (Black) Error Codes, S/N 85 501 291 and below

DTC #	SPN	FMI	Description	Fault Conditions	Potential Cause
1	91	12	Accelerator Pedal Position 1 Failure	Pedal voltage greater than 1V and neutral switch reads 'neutral'	Wiring problem, faulty pedal
3	127	0	Transmission Pressure High	Engine running (>500 rpm) and either pressure transducer reading is higher than 7300 psi for 3 seconds	Faulty sensor or hydraulic system failure
4	127	2	Transmission Pressure Sensors Erratic, Intermittent, Or Incorrect	Both pressure sensors reading greater than 1v	Faulty sensor or short in wiring
5	127	7	Transmission Pressure Sensors Not Responding Properly	Engine is running (>500 rpm) and machine is in forward, Pump displacement > 0.9, And P port pressure > (N port pressure+270) psi or machine is in reverse, Pump displacement < -0.9, And N port pressure > (P port pressure + 270)	Pressure sensor connectors are swapped
6	127	18	Transmission Pressure Low	Park brake engaged and engine is running (>500 rpm) and either pressure transducer reading is lower than 200 psi for 5 seconds	Faulty sensor, charge relief valve stuck open
7	639	19	J1939 Network 1 (Engine Comm) Data Error	Loss of communication with engine ecu for greater than 500ms	Canbus wiring, ecu power
8	741	3	Transmission Forward Solenoid Voltage Above Normal	Measured voltage is greater than expected	Solenoid output shorted to power
9	741	5	Transmission Forward Solenoid Current Below Normal	Measured current is less than expected	Open circuit
10	741	6	Transmission Forward Solenoid Current Above Normal	Measured current is greater than expected	Wiring problem, faulty solenoid
11	751	12	Transmission Primary Shift Selector Failure	Forward and reverse signals are both 'on'	Wiring problem, faulty fmr switch
12	761	3	Transmission Forward Pressure Sensor Voltage Above Normal	Measured voltage is greater than expected	Wiring problem, faulty sensor
13	761	4	Transmission Forward Pressure Sensor Voltage Below Normal	Measured voltage is less than expected	Wiring problem, faulty sensor
14	763	3	Transmission Reverse Pressure Sensor Voltage Above Normal	Measured voltage is greater than expected	Wiring problem, faulty sensor
15	763	4	Transmission Reverse Pressure Sensor Voltage Below Normal	Measured voltage is less than expected	Wiring problem, faulty sensor

5.6-5 Eaton (Black) Drive Controller Error Codes, S/N 85 501 291 and below

DTC #	SPN	FMI	Description	Fault Conditions	Potential Cause
16	785	2	Transmission Hydraulic System Feedback Erractic, Intermittent, Or Incorrect	Pump swash traveling the wrong direction	Contamination, mechanical failure
17	785	3	Transmission Hydraulic System Feedback Voltage Above Normal	Pump feedback signal greater than maximum limit	Faulty sensor, out of range neutral calibration
18	785	13	Transmission Hydraulic System Feedback Voltage Out Of Range	Pump feedback voltage out of range	Wiring problem, faulty sensor
19	785	7	Transmission Hydraulic System Feedback Not Responding Properly	Pump swash is on the wrong side of neutral	Solenoid connectors swapped
20	785	11	Transmission Hydraulic System Out Of Calibration	Pump neutral calibrated out of range	Swash sensor out of adjustment, wiring problem
21	785	20	Transmission Neutral Drifting	Pump feedback neutral voltage drifts more than 50 mv from the calibrated neutral after releasing current from the coils for 3 consecutive times	Swash sensor out of adjustment check sensor shaft extension to ensure no binding condition
22	1709	3	Transmission Controller Power Relay Voltage Above Normal	Sensor supply voltage greater than expected	Wiring problem, short to power
23	1709	4	Transmission Controller Power Relay Voltage Below Normal	Sensor supply voltage less than expected	Wiring problem, over current on sensor supply
24	3958	3	Transmission High Range Actuator Voltage Above Normal	Measured voltage is greater than expected	Solenoid output shorted to power
25	3958	5	Transmission High Range Actuator Current Below Normal	Measured current is less than expected	Open circuit
26	3958	6	Transmission High Range Actuator Current Above Normal	Measured current is greater than expected	Wiring problem, faulty solenoid
27	4216	3	Transmission Reverse Solenoid Voltage Above Normal	Measured voltage is greater than expected	Solenoid output shorted to power
28	4216	5	Transmission Reverse Solenoid Current Below Normal	Measured current is less than expected	Open circuit
29	4216	6	Transmission High Range Actuator Current Above Normal	Measured current is greater than expected	Wiring problem, faulty solenoid
30	91	3	Accelerator Pedal Position 1 Voltage Above Normal	Measured voltage is greater than expected	Wiring problem, faulty sensor
31	91	4	Accelerator Pedal Position 1 Voltage Below Normal	Measured voltage is less than expected	Wiring problem, faulty sensor

5.6-6 Danfoss Plus 1 Drive Controller (Blue) Error Codes, S/N 85 501 292 and above

DTC #	SPN	FMI	Fault description
1	29	3	Engine Speed Potentiometer - Voltage too high
2	29	4	Engine Speed Potentiometer - Voltage too low
3	29	11	Engine Speed Potentiometer - Implausible (redundancy error)
4	29	12	Engine Speed Potentiometer - CAN safety protocol error (FF41) (message checksum or counter is incorrect)
5	29	19	Engine Speed Potentiometer - CAN error (FF41) (received data out of operational range or message timeout)
6	70	11	Park Brake - Implausible (plausibility check between feedback and output failed)
7	74	12	Speed Limit - CAN safety protocol error (FF44) (message checksum or counter is incorrect)
8	74	19	Speed Limit - CAN error (FF44) (received data out of operational range or message timeout)
10	91	3	Drive Pedal - Voltage too high
11	91	4	Drive Pedal - Voltage too low
12	91	11	Drive Pedal - Implausible (redundancy error)
13	91	19	Drive Pedal - CAN error (EEC2) (received data out of operational range or message timeout)
15	168	3	Battery - Voltage too high
16	168	4	Battery - Voltage too low
18	177	0	Hydraulic Oil Temperature - High (prevent driving)
19	177	1	Hydraulic Oil Temperature - Low (prevent driving)
20	177	3	Hydraulic Oil Temperature - Voltage too high
21	177	4	Hydraulic Oil Temperature - Voltage too low
23	190	2	Engine Speed - Input signal missing
24	190	2	Engine Speed - Sensor ground missing
25	190	2	Engine Speed - Sensor supply missing
26	190	3	Engine Speed - Voltage too high
27	190	4	Engine Speed - Voltage too low
28	190	8	Engine Speed - Frequency Too High (f > 10 kHz)
29	190	8	Engine Speed - Frequency Too High (f > 10 kHz)
30	190	11	Engine Speed - Implausible (EEC1) (did not change within 50 loops)
31	190	16	Engine overspeed, critical rpm exceeded
32	190	19	Engine Speed - CAN error (EEC1) (received data out of operational range or message timeout)
34	521	3	Inch Pedal - Voltage too high
35	521	4	Inch Pedal - Voltage too low
36	521	11	Inch Pedal - Implausible (redundancy error)
37	521	13	Inch Pedal - Not calibrated
38	521	19	Inch Pedal - CAN error (EBC1) (received data out of operational range or message timeout)

5.6-6 Danfoss Plus 1 Drive Controller (Blue) Error Codes, S/N 85 501 292 and above

DTC #	SPN	FMI	Fault description
39	527	12	Cruise command CAN safety protocol error (FF41) (message checksum or counter is incorrect)
40	527	19	Cruise command CAN error (FF41) (received data out of operational range or message timeout)
41	619	11	Park Brake Valve - Pin status
42	619	14	Park Brake Valve - Automatic engagement impossible (due to hydromotor speed fault)
43	748	5	Retarder - Current too low or open circuit
44	748	6	Retarder - Current too high or grounded circuit
45	748	11	Retarder - Pin status
46	898	12	Engine Requested rpm (Work Function) - CAN Safety Protocol error (message checksum or counter is incorrect)
47	898	19	Engine Requested rpm (Work Function) - CAN error (received data out of operational range or Message Timeout)
48	1619	2	FNR - Open circuit
49	1619	2	FNR - Short circuit
50	1619	12	FNR - CAN safety protocol error (FF49) (message checksum or counter is incorrect)
51	1619	19	FNR - CAN error (ETC5 or FF49) (received data out of operational range or message timeout)
52	1815	11	Brake Light Output - Pin status
53	1852	12	Mode Switch 1 - CAN safety protocol error (FF41) (message checksum or counter is incorrect)
54	1852	19	Mode Switch 1 - CAN error (FF41) (received data out of operational range or message timeout)
55	1853	12	Mode Switch 2 - CAN safety potocol error (FF41) (message checksum or counter is incorrect)
56	1853	19	Mode Switch 2 - CAN error (FF41) (received data out of operational range or message timeout)
57	2392	11	Reverse Alarm Output - Pin status
58	2580	3	Brake Pedal - Voltage too high
59	2580	4	Brake Pedal - Voltage too low
60	2904	2	Operation System - Both memory pages are corrupted
61	2904	2	Operation System - Memory pages are not accessible
62	2904	12	ECU - Safety layer failure
63	4963	2	Operator Presence - Voltage Invalid (between low and high range)
64	4963	3	Operator Presence - Voltage too high
65	4963	4	Operator Presence - Voltage too low
66	4963	7	Operator Presence - Max on time exceeded
67	4963	11	Operator Presence - Implausible (redundancy error)
68	5080	11	Fault Indicator Lamp - Pin status
69	5847	11	Emergency Stop - Implausible (redundancy error)
70	5913	15	Gearbox - Temperature too high (warning level)
71	5913	16	Gearbox - Temperature too high (stop level)
72	516096	5	Pump Forward Valve High Side - Current too low or open circuit
73	516096	6	Pump Forward Valve High Side - Current too high or grounded circuit
74	516096	11	Pump Forward Valve High Side -Pin status

5.6-6 Danfoss Plus 1 Drive Controller (Blue) Error Codes, S/N 85 501 292 and above

DTC #	SPN	FMI	Fault description
75	516096	14	Pump Forward Valve High Side - Current mismatch with low side
76	516097	11	Pump Forward Valve Low Side - Pin status
77	516098	5	Pump Reverse Valve High Side - Current too low or open circuit
78	516098	6	Pump Reverse Valve High Side - Current too high or grounded circuit
79	516098	11	Pump Reverse Valve High Side - Pin status
80	516098	14	Pump Reverse Valve High Side - Current mismatch with low side
81	516099	11	Pump Reverse Valve Low Side - Pin status
82	516100	3	Pressure Sensor FWD - Voltage too high
83	516100	4	Pressure Sensor FWD - Voltage too low
84	516100	11	Pressure Sensor FWD - Implausible pressure
85			
86	516101	3	Pressure Sensor REV - Voltage too high
87	516101	4	Pressure Sensor REV - Voltage too low
88	516101	11	Pressure Sensor REV - Implausible pressure
90	516102	5	Hydromotor M1 Proportional Valve - Current too low or open circuit
91	516102	6	Hydromotor M1 Proportional Valve - Current too high or grounded circuit
92	516102	11	Hydromotor M1 Proportional Valve - Pin status
93	516102	13	Hydromotor M1 not calibrated
94	516102	14	Hydromotor M2 Proportional Valve High Side - Current mismatch with low side
96	516103	11	Hydromotor M1 Proportional Valve Low Side - Pin status
98	516104	5	Hydromotor M2 Proportional Valve High Side - Current too low or open circuit
99	516104	6	Hydromotor M2 Proportional Valve High Side - Current too high or grounded circuit
100	516104	11	Hydromotor M2 Proportional Valve High Side - Pin status
101	516104	13	Hydromotor M2 not calibrated
103	516105	11	Hydromotor M2 Proportional Valve Low Side - Pin status
105	516106	2	Hydromotor 1 Speed - Input signal missing
106	516106	2	Hydromotor 1 Speed - Sensor ground missing
107	516106	2	Hydromotor 1 Speed - Sensor supply missing
108	516106	3	Hydromotor 1 Speed - Voltage too high
109	516106	4	Hydromotor 1 Speed - Voltage too low
110	516106	8	Hydromotor 1 Speed - Frequency too high (f > 10 kHz)
111	516106	11	Hydromotor 1 Speed - Redundant error
112	516106	12	Hydromotor 1 Speed - CAN safety protocol error (FF41) (message checksum or counter is incorrect)
113	516106	14	Hydromotor 1 Speed - Implausible (plausibility check with system pressure and pump current failed)
114	516106	16	Hydromotor 1 overspeed, critical rpm exceeded
115	516106	19	Hydromotor 1 Speed - CAN error (FF41) (received data out of operational range or message timeout)
117	516107	2	Hydromotor 1 Speed Redundant - Input signal missing

5.6-6 Danfoss Plus 1 Drive Controller (Blue) Error Codes, S/N 85 501 292 and above

DTC #	SPN	FMI	Fault description
118	516107	2	Hydromotor 1 Speed Redundant - Sensor ground missing
119	516107	2	Hydromotor 1 Speed Redundant - Sensor supply missing
120	516107	3	Hydromotor 1 Speed Redundant - Voltage too high
121	516107	4	Hydromotor 1 Speed Redundant - Voltage too low
122	516107	8	Hydromotor 1 Speed Redundant- Frequency too high (f > 10 kHz)
123	516110	9	CAN - Rx Message overrun
124	516110	12	CAN - Bus off or driver error
125	516110	19	CAN - Start timeout (one or more required CAN messages have never been received)
126	516112	3	Sensor Supply - Voltage too high
127	516112	4	Sensor Supply - Voltage too low
128	516113	19	Halt Brake Switch - CAN error (EBC1) (received data out of operational range or message timeout)
129	516114	12	Brake Remote Request - CAN safety protocol error (FF30) (message checksum or counter is incorrect)
130	516114	19	Brake Remote Request - CAN error (FF30) (received data out of operational range or message timeout)
131	516115	12	Neutral Remote Request - CAN safety protocol error (FF30) (message checksum or counter is incorrect)
132	516115	19	Neutral Remote Request - CAN error (FF30) (received data out of operational range or message timeout)
133	516116	11	Gearbox Initial Test - Clutch command and clutch feedback are implausible
134	516116	14	Clutch - Slip is detected on clutch
135	516117	11	Clutch Control Valve - Pin status
136	516118	11	Pump forward and reverse valve error
137	516119	2	Pressure Sensors - Plausibility error (when engine running: high pressure must only be on one side and other around charge pressure)
138	516120	2	Operator Presence Redundant - Voltage Invalid (between ON and OFF range)
139	516120	3	Operator Presence Redundant - Voltage too high
140	516120	4	Operator Presence Redundant- Voltage too low
141	516121	14	Secondary Controller - A/D converter mismatch
142	516135	11	Stabilizer Output - Pin Status
143	516150	12	Work Function Status - CAN Safety Protocol error (message checksum or counter is incorrect)
144	516150	19	Work Function Status - CAN error (received data out of operational range or Message Timeout)

5.6-7 Hydraulic Pressure Test Procedure

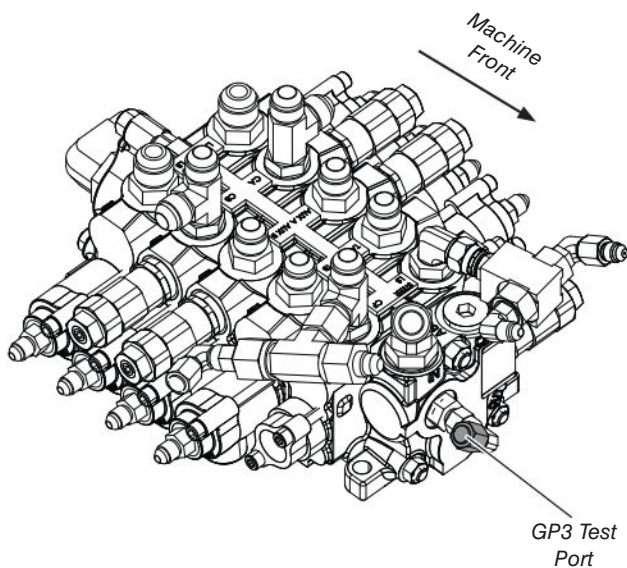
IMPORTANT

All checks and adjustments are to be made with the engine running at low idle, the transmission shifter in Neutral and the parking brake applied.

System Pressure

System Pressure Check:

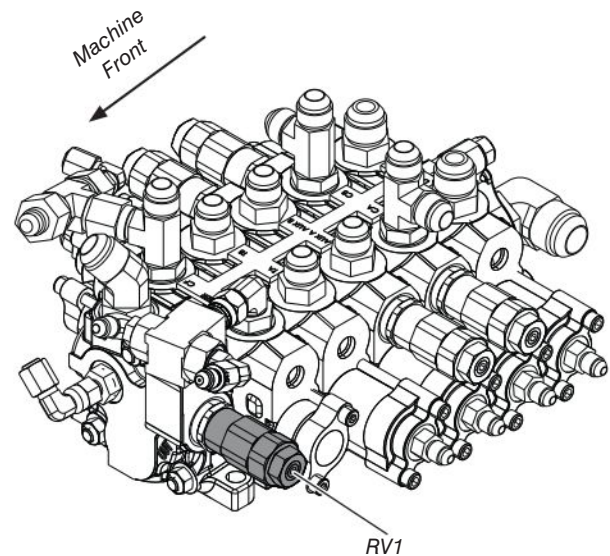
1. Release residual pressure by moving the joystick several times in each direction.
2. Install a 5,000 psi gauge at port GP3 of Main Manifold.



3. With engine running at low idle, dead-head the boom retract function. Indicated system pressure should be 3900 psi.
4. If reading is different than what is mentioned above, adjustment is required.

System Pressure Adjustment:

1. Loosen the lock nut on the pressure reducing valve at port RV1 on the Main Control Valve.

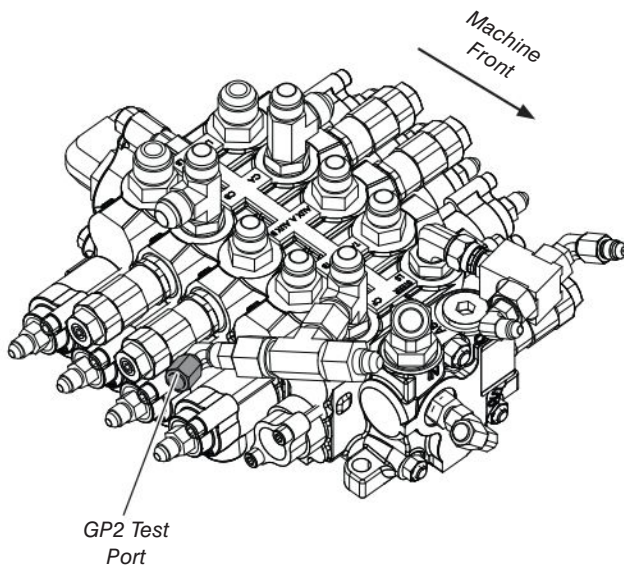


2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.
3. Tighten the lock nut on the valve RV1 and re-check the reading to ensure that the correct pressure is maintained.

Steering Pressure

Steering Pressure Check:

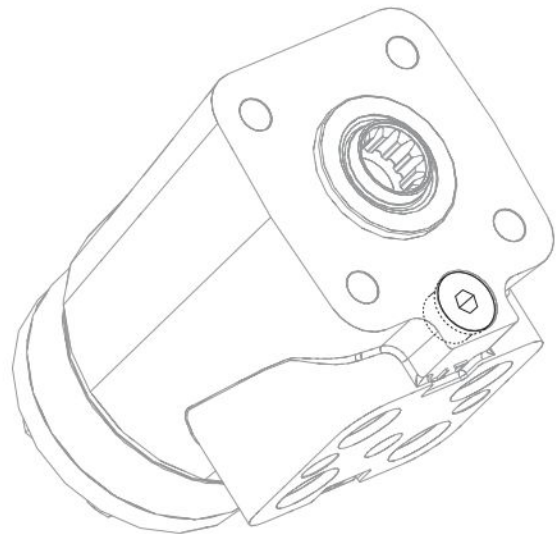
1. Release residual pressure by moving the joystick several times in each direction
2. Install a 5,000 psi gauge into port GP2 at the front of the main manifold as shown in figure below.



3. With engine running at low idle and steering dead-headed in either direction, read the pressure indicated on the gauge. The correct pressure should be 2,000 psi.
4. If reading is other than 2,000 psi, adjust the orbit motor.

Steering Pressure Adjustment:

1. Remove the plug on the top face of the orbital motor.

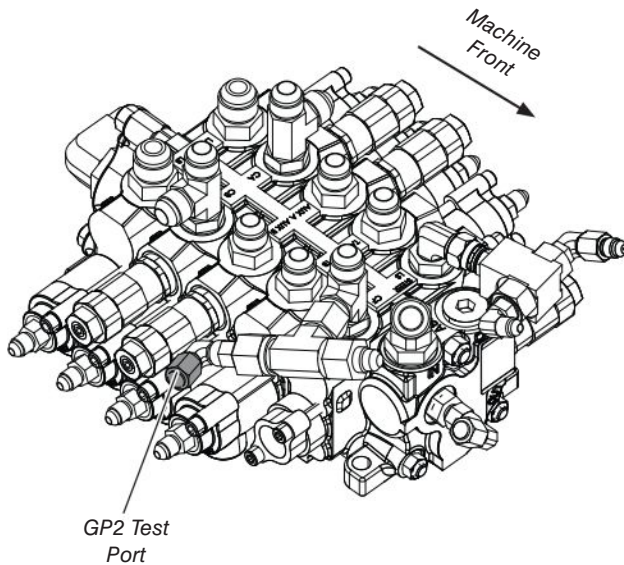


2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.
3. Check the reading to ensure that the correct pressure is maintained.

Service Brake Pressure

▪ Service Brake Pressure Check:

1. Release residual pressure by moving the joystick several times in each direction.
2. Remove plug and install a 1,500 psi gauge into the GP2 port on the main manifold.



3. With engine running at low idle, depress brake pedal fully. Pressure should increase proportionally to 1,000 psi MAX.
4. If maximum pressure is less than 1,000 psi, brake valve must be replaced.

NOTE

The pressure setting value is the nominal maximum value.

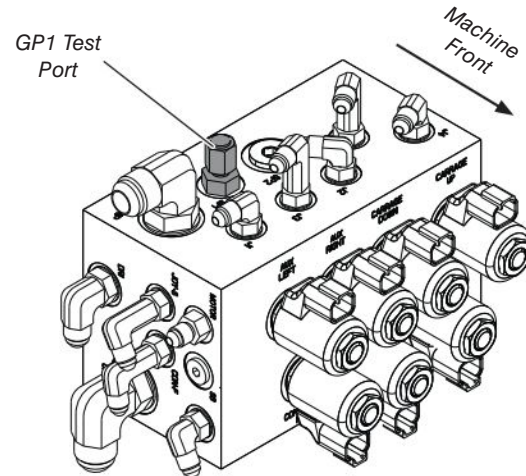
IMPORTANT

There is no adjustment. Replace the brake valve at the service brake pedal.

Pilot Pressure

▪ Pilot Pressure Check:

1. Release residual pressure by moving the joystick several times in each direction.
2. Install a 1,000 psi gauge into the fitting at port SP1 (GP1) of the hydraulic function manifold.
3. With engine running at low idle and NO hydraulic function engaged, pressure should be 350 ± 25 psi.



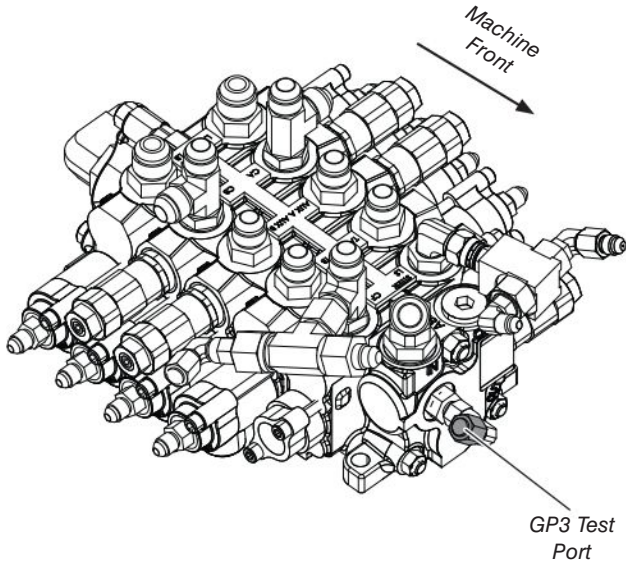
▪ Pilot Pressure Adjustment:

1. Locate RV6 on the drive pump and remove the plug to access the spring and pop it. Hold the relief main body to prevent it from loosening.
2. Inspect the seat area of the poppit for any unusual wear, damage, or debris. If damaged then the complete valve must be replaced

Fork Tilt Pressure

▪ **Fork Tilt Pressure Check:**

1. Install a 5,000 psi gauge at port GP3 of Main Manifold.



2. With engine running at low idle, dead-head in both directions the fork tilt function. Indicated system pressure should be 3,500 psi for both directions.
3. If reading is different than 3,500 psi, adjustment is required.

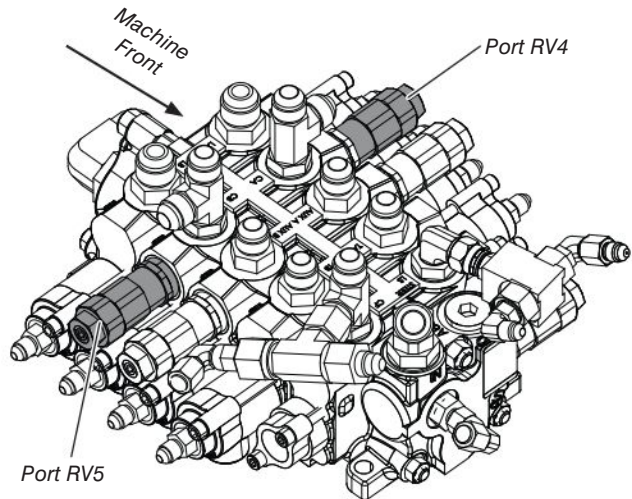
▪ **Fork Tilt Pressure Adjustment:**

▪ **Fork Tilt Cylinder Extend**

1. Loosen the lock nut on the pressure reducing valve at port RV5 on the Main Manifold.
2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.
3. Tighten the lock nut on the valve RV5 and re-check the reading to ensure that the correct pressure is maintained.

▪ **Fork Tilt Cylinder Retract**

1. Loosen the lock nut on the pressure reducing valve at port RV4 on the Main Manifold.
2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.
3. Tighten the lock nut on the valve RV4 and re-check the reading to ensure that the correct pressure is maintained.



Auxiliary Hydraulics Pressure

▪ Auxiliary Hydraulics Pressure Check:

1. Install a 5,000 psi gauge at port GP3 of Main Manifold.

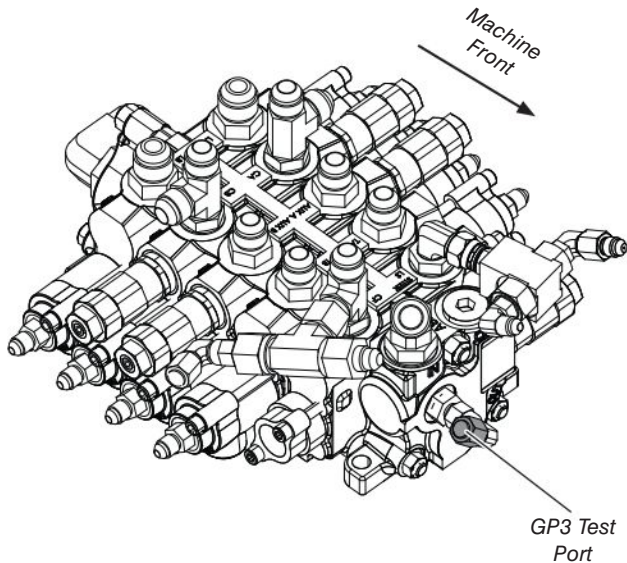


Figure 04 System Pressure Adjustment

2. With engine running at low idle, dead-head in both directions the auxiliary hydraulics functions. Indicated system pressure should be 3000 psi for both directions.
3. If reading is different than 3,000 psi, adjustment is required.

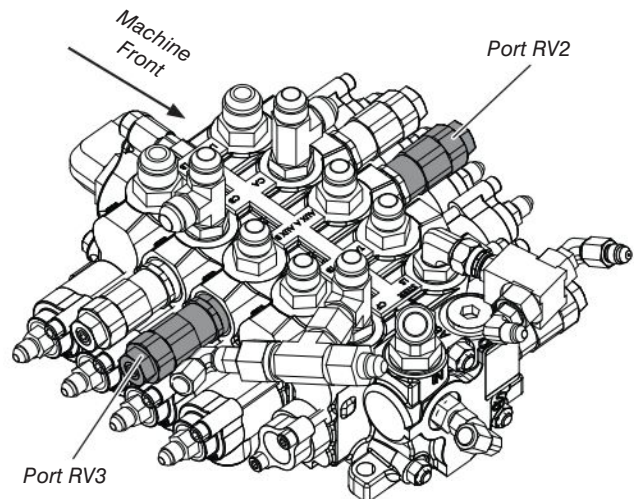
▪ Fork Tilt Pressure Adjustment:

▪ Auxiliary Hydraulics Port B

1. Loosen the lock nut on the pressure reducing valve at port RV3 on the Main Manifold.
2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.
3. Tighten the lock nut on the valve RV3 and re-check the reading to ensure that the correct pressure is maintained.

▪ Auxiliary Hydraulics Port A

1. Loosen the lock nut on the pressure reducing valve at port RV2 on the Main Manifold.
2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.
3. Tighten the lock nut on the valve RV2 and re-check the reading to ensure that the correct pressure is maintained.



5.6-8 Bleeding Hydraulic Circuits



NOTE

Whenever a hydraulic system is opened up, it is necessary to bleed or purge the air from the circuit that was opened.

Bleed Carriage Tilt Circuit

1. Tilt carriage to full forward position.
2. Raise boom fully while extending boom to keep carriage ahead of the front tires.
3. Tilt carriage to full backward position.
4. Lower and retract boom fully.
5. Tilt carriage forward as much as possible and raise boom to facilitate tilting carriage fully forward.
6. Repeat steps 1 through 5, five times
7. Check for air in the system by leveling forks and raising and lowering the boom several times while watching the forks to see if they stay level. If the forks do not stay level repeat above steps and re-check.

Bleed Boom Extend/Retract Circuit

- Fully extend and retract boom several times with boom level.

Bleed Boom Raise/Lower Circuit

- Fully raise and lower the boom several times. Ensure carriage remains ahead of the front tires.

Bleed Frame Level Circuit

- Tilt telehandler fully side to side several times with boom in a low position.

Bleed Auxiliary/Optional Circuits

- Operate function fully in both directions several times.

Bleed Outriggers Circuit

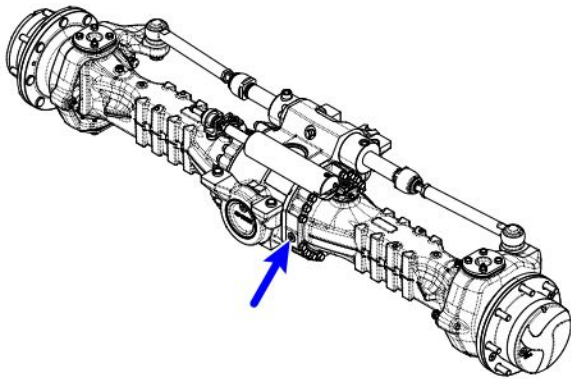
- Fully lower and raise outriggers several times.

Bleed Brake Circuit

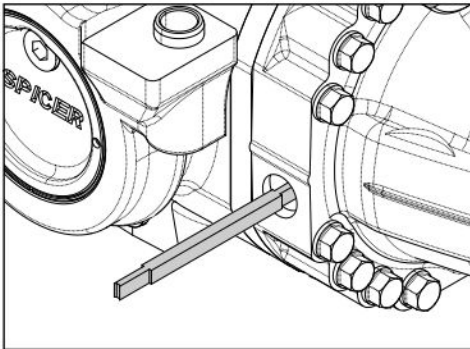
1. With engine running depress and hold brake pedal. The hydraulic pump will constantly supply fluid; there is no need to pump the brake pedal.
 2. Locate bleeder fittings on top of brake calipers at each wheel.
 3. Starting with the fitting furthest from the pedal and working your way to the closest, slightly open each bleeder and close when hydraulic oil comes out clear.
 4. Slowly loosen hose fitting at pressure switch shuttle valve on left frame rail. Tighten when fluid comes out clear.
4. Upper and Lower Guide Brackets
 5. Cable Tracks
 6. Carrier Assembly
 7. Side Access Holes

5.6-9 Brake Inspection

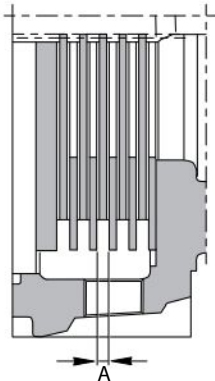
1. Remove the oil level plug from one of the braking axle arms, as shown below.



2. Insert a 4.5 mm feeler gauge into the drain port.



3. Use the gauge to check the gap between the disks (A). The minimum distance allowed is 4.5 mm. Reinstall the oil level plug.



4. Repeat the inspection on the other axle arm. If the gap is smaller than 4.5 mm between the disks of either arm (i.e. the gauge doesn't fit), the brake disks must be replaced on both arms.

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