SERVICE MANUAL (ANSI)

TELEHANDLERS

MODEL ZB2044

207053AA July 2016

SKYJACK

This manual is based on Serial Numbers:

ZB 2044 85 800 118 & Above

SERVICE AND MAINTENANCE

Table of Contents

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.

This Safety Alert Symbol means attention!

Become alert! Your safety is involved.

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.

Section 1
SCHEDULED MAINTENANCE

Table of Contents

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

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

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

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.

Manual
The operating manual is considered a fundamental part of the telehandler. It is a very important way to communicate necessary safety information to users and operators. A complete and legible copy of this manual must be kept in the provided weather-resistant storage compartment on the telehandler at all times.

Operator
The operator must read and completely understand both this operating manual and the safety panel label located on the telehandler and all other warnings in this manual and on the telehandler. Compare the labels on the telehandler with the labels found within this manual. If any labels are damaged or missing, replace them immediately.

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. Any defective part will be replaced or repaired by your local SKYJACK dealer at no charge for parts or labor. In addition, all products have a 5 year structural warranty. Contact SKYJACK Service Department for warranty statement extensions or exclusions.

Optional Accessories
The SKYJACK telehandler is designed to accept a variety of optional accessories. These are listed under "Optional Attachments" in Section 2. Operating instructions for these options (if equipped) are located in Section 2 of the operating manual.
For non-standard components or systems, contact the SKYJACK Service Department at

☎ : 800 275-9522
🖷 : 630 262-0006

Include the model and serial number for each applicable telehandler.

Scope of this Manual
a. **This manual applies** to the ANSI/ITSDF and CSA versions of the ZB2044 telehandler.

- **Equipment identified** with "ANSI" meets the ANSI/ITSDF B56.6-2011standard.
- **Equipment identified** with "CSA" meets the CSA B335-15 standard.

b. **CSA (Canada)**
Operators are required to conform to national, territorial/provincial and local health and safety regulations applicable to the operation of this telehandler.

c. **ANSI (United States)**
Operators are required by the current ANSI standards to conform to national, territorial/provincial and local health and safety regulations applicable to the operation of this telehandler.

WARNING

Failure to comply with your required responsibilities in the use and operation of the telehandler could result in death or serious injury!

Operator Safety Reminders

A study conducted by St. Paul Travelers showed that most accidents are caused by the failure of the operator to follow simple and fundamental safety rules and precautions.

You, as a careful operator, are the best insurance against an accident. Therefore, proper usage of this telehandler is mandatory. The following pages of this manual should be read and understood completely before operating the telehandler.

Common sense dictates the use of protective clothing when working on or near machinery. Use appropriate safety devices to protect your eyes, ears, hands, feet and body.

Some attachments may not be approved for use with certain telehandler models. Use only approved attachments.

Any modifications from the original design are strictly forbidden without written permission from Skyjack.

Electrocution Hazard

This telehandler is not electrically insulated. Use extreme caution around high-voltage overhead power lines and maintain a Minimum Safe Approach Distance (MSAD) of 10 feet from source of power. Adhere to all federal/national, state/provincial, or local safety regulations for your own protection.

No part of telehandler or payload should be brought closer to any energized overhead electrical conductor with nominal phase voltage rating as specified below:

Voltage	Distance
750 to 150,000	10 feet
150,000 to 250,000	15 feet
250,000	20 feet

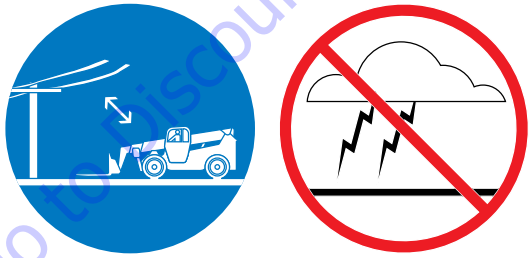
DANGER

Never approach any power line with any part of telehandler. Use extreme caution; serious injury or death can result with contact from any power line.

IMPORTANT

Always assume electrical power sources and overhead lines are energized.

DO NOT USE TELEHANDLER AS A GROUND FOR WELDING.
DO NOT OPERATE TELEHANDLER DURING LIGHTNING OR STORMS.



Safety Precautions

Know and understand all safety precautions before going on to the next section.

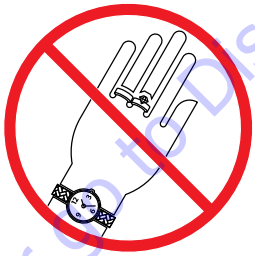
WARNING

DO NOT operate this telehandler without proper authorization and training. Failure to avoid this hazard could result in death or serious injury.

WARNING

Failure to heed the following safety precautions could result in tip over, falling, crushing, or other hazards leading to death or serious injury.

- **MAKE SURE** all DANGER, WARNING, CAUTION and INSTRUCTIONAL DECALS are in place and can be read. Clean or replace decals as required.
- **KNOW** all national, state/provincial and local rules which apply to your telehandler and jobsite.
- **WEAR** all the protective clothing and personal safety devices issued to you or called for by job conditions.
- **DO NOT** wear loose clothing, dangling neckties, scarves, rings, wristwatches or other jewelry while operating this telehandler.



- **DO NOT** climb on this vehicle for any reason.

- **DO NOT** stand on forks. Failure to heed could result in death or serious injury.

- **DO NOT** use carriage or any other portion of the boom for slinging loads

- **DO NOT** elevate the boom in windy or gusty conditions.

- **DO NOT** drive with boom elevated.

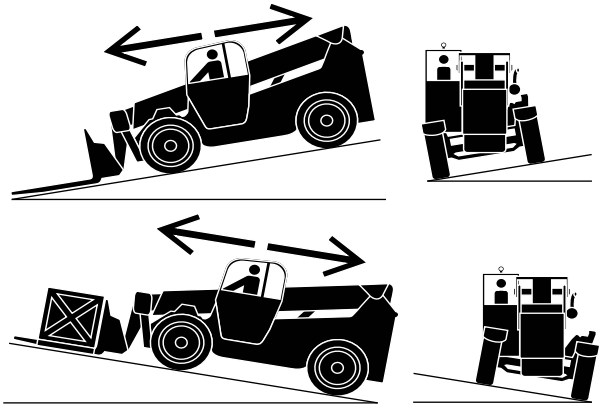
- **DO NOT** operate on surfaces not capable of holding the weight of the telehandler; including the rated load (e.g., covers, drains, and trenches).

- **DO NOT** maneuver a load while moving. This greatly increases the chance of spills and injury.

Safety Precautions (Continued)

Know and understand all safety precautions before going on to the next section.

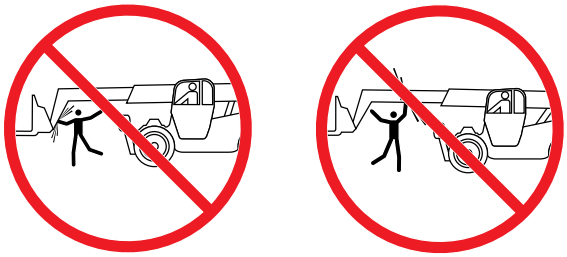
- **DO NOT** exceed the maximum safe operating slope.



- **DO NOT** use frame leveling when boom is elevated. It is recommended that frame leveling be used only when boom is retracted and in the lowered position.

- **DO NOT** use the frame leveling mechanism to compensate for swinging loads.

- **DO NOT** enter the danger area under or around the boom when forks are off the ground or while engine is running.



- **DO NOT** lower the boom unless the area below is clear of personnel and obstruction.

- **DO NOT** elevate the boom while the telehandler is on a truck, forklift or other device or vehicle.

- **ENSURE** that there are no personnel or obstructions in the path of travel, including blind spots.
- **BE AWARE** of blind spots when operating the telehandler.

- **ALWAYS** Keep head, arms, hands, legs and all other body parts inside the operator's cab.

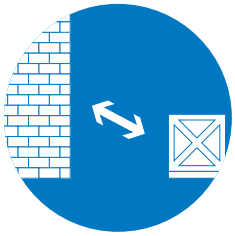
- **AVOID** jerks and sudden stops.

- **AVOID** entanglement with ropes, cords or hoses.

Safety Precautions (Continued)

Know and understand all safety precautions before going on to the next section.

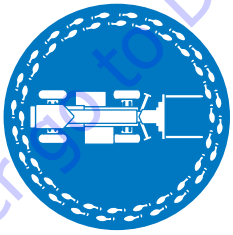
- **BE AWARE** of all obstructions while traveling. Check for clearance before traveling between obstacles.



- **USE CAUTION** when boom is fully extended. The further out the boom is extended, the less load telehandler can support.

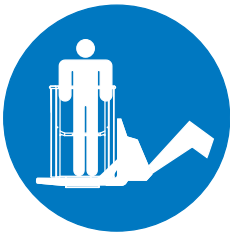
- **USE CAUTION** when placing loads at high elevations and on downhill slopes.

- **WALK AROUND** the telehandler before operation and check for any visible signs of damage or malfunction.



- **ALWAYS** maintain three points of contact when entering vehicle. Use provided hand-holds and steps only.

- **YOU MAY EQUIP** a personnel work platform on the machine, providing it adheres to the standards laid out in Section 2.15-10 of the operating manual.



- **ALWAYS** wear your seat belt when operating this vehicle.

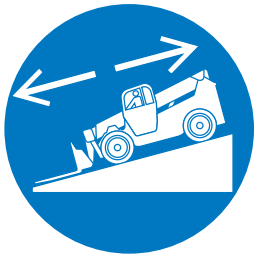
- **KNOW** the weight of the load you are transporting. Never lift more than the lifting capacity at any given extension or elevation of the boom as listed on the capacity charts.

- **CHECK** for cracks and signs of stress.

- **TRAVEL SLOWLY** over rough terrain.

- **If operation in areas with holes or dropoffs is absolutely necessary,** ensure that all 4 wheels or outriggers (if equipped) have contact with firm surface. Then level the frame. Once frame is level the boom can be elevated. After elevation, the drive function must not be activated.

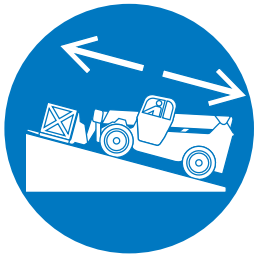
- **DRIVE DOWNHILL UNLOADED**. Without a load, the back end is the heaviest part of the telehandler. Driving downhill decreases potential for tipover.



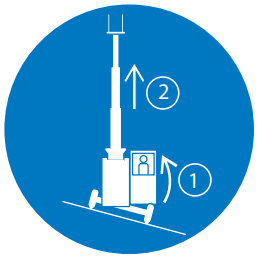
Safety Precautions (Continued)

Know and understand all safety precautions before going on to the next section.

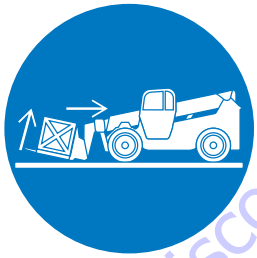
- **DRIVE UPHILL LOADED**. When holding a load, driving uphill decreases potential for load to slip out.



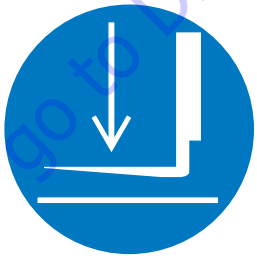
- **ALWAYS LEVEL FRAME** before elevating the boom



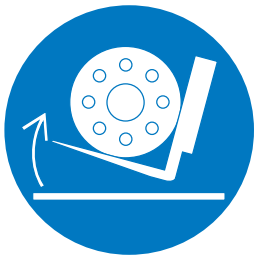
- **WHEN TRANSPORTING LOADS** fully retract the boom, keep the load low to the ground and forks tilted back slightly. This is the most stable position possible for the vehicle.



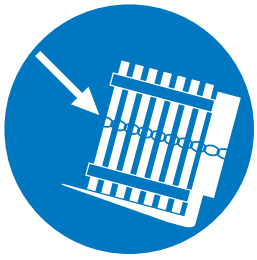
- **KEEP** forks close to the ground when in motion to increase telehandler stability and decrease potential for injury to others. When fully stopped, lower forks completely to the ground.



- **TILT** forks backwards slightly when traveling to decrease potential of load slipping off.



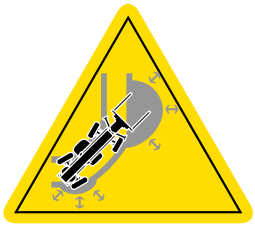
- **SECURE** loose loads with chains or straps to decrease potential of spills or injury to others.



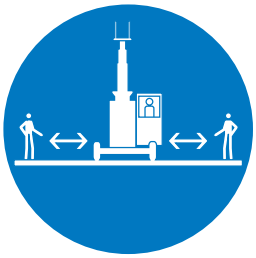
- **TETHER LOADS** that may swing, keeping them close to the ground. Provide ample clearance for personnel to guide the load safely.

- **SLINGING LOADS** is acceptable only when the load is appropriately attached to a jib boom or the throat of a tilted fork, and the precautions outlined in Section 2.14-5 of the operating manual are followed.

- **BE AWARE** of the telehandler's travel envelope, especially when turning. Keep sufficient clearance at all times between the telehandler and any obstacles or people.

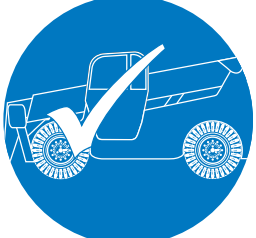


- **KEEP OTHERS AWARE** at all times during operation.



- **CHECK** lights (if equipped) for proper function before operating.

- **ENSURE ALL** tires are in good condition and lug nuts are properly tightened.



Safety Precautions (Continued)

Know and understand the safety precautions before going on to next section.

- **DO NOT** alter or disable safety devices.
- **DO NOT** burn or drill holes in forks. Modifying any part of telehandler or attachment affects its capacity and/or stability.
- **DO NOT** try to start the telehandler by pushing or towing. Such operation may cause severe damage to the transmission - Refer to Section 2 of the Operating Manual.
- **IF DRIVING ON ROADS OPEN TO PUBLIC TRAFFIC** respect the local regulations.
- **THE OPERATOR'S CAB** provides a falling object protection structure (FOPS) and a rollover protection structure (ROPS). **Do not make any modification to this structure.** If damaged, the cab cannot be repaired. It must be replaced.
- **STUNT** driving and horseplay are prohibited.
- **ALWAYS USE FRONT** steering when traveling at high speeds; i.e. on highways or public roads.
- **DO NOT** change steering mode while the telehandler is traveling. Change the steering mode only when telehandler is stopped, and wheels aligned straight ahead.
- **ALWAYS** look in the direction of travel. Reduce speed and be careful especially when traveling in reverse and/or turning. Bring the telehandler to a complete stop before changing the direction of travel.
- **STAY CLEAR** of pinch points and rotating parts on the material handler. Getting caught in a pinch point or a moving part can cause serious injury or death. Before performing any maintenance on telehandler, follow the shutdown procedure in Section 2.10-9 of the Operating Manual.
- **DO NOT** position the telehandler against another object to steady the load.
- **SHUT DOWN** by positioning the telehandler in a safe location. Lower forks to ground, apply the parking brake, move all controls to '**neutral**' and allow engine to run at low idle for 3 to 5 minutes after a full load operation. Stop engine and remove ignition key to prevent unauthorized use. Block tires.

WARNING

Always engage park brake and shut off engine before leaving the operator's cab.

Safety Precautions (Continued)

Know and understand the safety precautions before going on to next section.

WARNING

Operator should not use any telehandler that:

- does not appear to be working properly.
- has been damaged or appears to have worn or missing parts.
- has alterations or modifications not approved by the manufacturer.
- has safety devices which have been altered or disabled.
- has been tagged or locked out for non-use or repair.
- bears an unapproved attachment.

Failure to avoid these hazards could result in death or serious injury.

Maintenance and Inspection Schedule

The actual operating environment of the telehandler governs the use of the maintenance schedule. The inspection points covered in Table 1.1. Maintenance and Inspection Checklist, indicates the areas of the telehandler to be maintained or inspected and at what intervals the maintenance and inspections are to be performed.

Owner's Annual Inspection Record

It is the responsibility of the owner to arrange quarterly and annual inspections of the telehandler. Owner's Annual Inspection Record is to be used for recording the date of the inspection, owner's name, and the person responsible for the inspection of the telehandler.

Replacement Parts

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

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

Replacement attachments must be equivalent to the originals and be associated with manufacturer approved capacity charts.

Consult SKYJACK's Service Department for optional tires specifications and installation.

WARNING

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

Maintenance and Service Safety Tips

Maintenance and repair should only be performed by personnel who are trained and qualified to service this telehandler.

All maintenance and service procedures should be performed in a well lighted and well ventilated area.

Anyone operating or servicing this telehandler must read and completely understand all operating instructions and safety hazards in this manual and operating manual.

All tools, supports and lifting equipment to be used must be of proper rated load and in good working order before any service work begins. Work area should be kept clean and free of debris to avoid contaminating components while servicing.

All service personnel must be familiar with employer and governmental regulations that apply to servicing this type of equipment.

Keep sparks and flames away from all flammable or combustible materials.

Properly dispose of all waste material such as lubricants, rags, and old parts according to the relative law provisions obtaining in the country.

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

Jobsite Inspection

- Do not use in hazardous locations (see NFPA 505).
- Perform a thorough jobsite inspection prior to operating the telehandler, to identify potential hazards in your work area.
- Be aware of moving equipment in the area. Take appropriate actions to avoid possible collision.

Hydraulic System & Component Maintenance and Repair

The following points should be kept in mind when working on the hydraulic system or any component:

WARNING

Escaping fluid from a hydraulic pressure leak can damage your eyes, penetrate the skin and cause serious injury. Use proper personal protection at all times.

1. Any structure has limits of strength and durability. To prevent failure of structural parts of hydraulic components, relief valves which limit pressure to safe operating values are included in the hydraulic circuits.

2. Tolerance of working parts in the hydraulic system is very close. Even small amounts of dirt or foreign materials in the system can cause wear or damage to components, as well as general faulty operation of the hydraulic system. Every precaution must be taken to assure absolute cleanliness of the hydraulic oil.

3. Whenever there is a hydraulic system failure which gives reason to believe that there are metal particles or foreign materials in the system, drain and flush the entire system and replace the filter cartridges. A complete change of oil must be performed under these circumstances.

4. All containers and funnels used in handling hydraulic oil must be absolutely clean. Use a funnel when necessary for filling the hydraulic oil reservoir, and fill the reservoir only through the filter opening. The use of cloth to strain the oil should be avoided to prevent lint from getting into the system.

5. When removing any hydraulic component, be sure to cap and tag all hydraulic lines involved. Also, plug the ports of the removed components.

6. All hydraulic components must be disassembled in spotlessly clean surroundings. During disassembly, pay particular attention to the identification of parts to assure proper reassembly. Clean all metal parts in a clean mineral oil solvent. Be sure to thoroughly clean all internal passages. After the parts have been dried thoroughly, lay them on a clean, lint-free surface for inspection.

7. Replace all O-rings and seals when overhauling any component. Lubricate all parts with clean hydraulic oil before reassembly. Use small amounts of petroleum jelly to hold O-rings in place during assembly.

8. Be sure to replace any lost hydraulic oil when completing the installation of the repaired component, and bleed any air from the system when required.

9. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the oil to leak out or air to be drawn into the system. Air in the system can cause damage to the components and noisy or erratic system operation.

Maintenance Hints

Three simple maintenance procedures have the greatest effect on the hydraulic system performance, efficiency and life. Yet, the very simplicity of them may be the reason they are so often overlooked. What are they? Simply these:

1. Change filters annually. The filters will need to be changed more often depending on the operating conditions. Dirty, dusty, high moisture environments may cause the hydraulic system to be contaminated more quickly.

2. Maintain a sufficient quantity of clean hydraulic oil of the proper type and viscosity in the hydraulic reservoir.

3. Keep all connections tight.

About this Section

This section contains the maintenance and inspection schedule that is to be performed.

References are made to the procedures in Section 5 that outline detailed step-by-step instructions for checks and replacements.

Service Bulletins

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

Maintenance and Inspection

Death or injury can result if the telehandler is not kept in good working order. Inspection and maintenance should be performed 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, perform each maintenance procedure with the telehandler in the following configuration:
  - Telehandler parked on a flat and level surface
  - Engine is turned off.
- Repair any damaged or malfunction components before operating telehandler.
- Keep records on all inspections.

Maintenance Instructions

This manual consists of four schedules to be done for maintaining on a telehandler. Inspection schedule frequency is shown below:

Inspection Schedule

Daily	A
Weekly or 40 hours	A + B
Quarterly or 250 hours	A + B + C
Annually or 1000 hours	A + B + C + D

- 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 performed.
- Place a check in the appropriate box after each inspection procedure is completed.
- Use the maintenance and inspection checklist and step-by-step procedures in Section 5 to perform these inspections.
- If any inspection receives a fail, tag and remove the telehandler from service.
- If any telehandler component(s) has been repaired, an inspection must be performed again before removing the tag. Place a check in the repair column.

Legend

P = Pass
F = Fail
R = Repaired

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

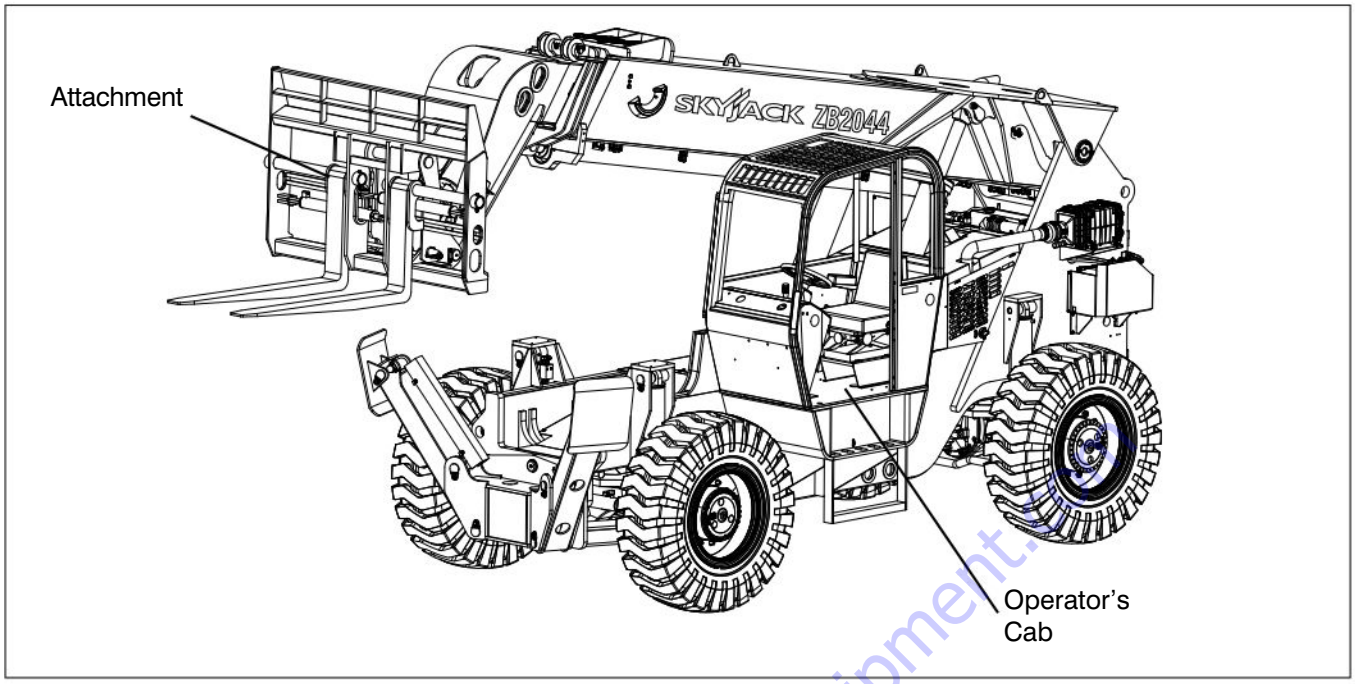
Inspection Schedule	
Daily	A
Weekly or 40 Hours	A + B
Quarterly or 250 Hours*	A + B + C
Annually or 1000 Hours*	A + B + C + D

Schedule		P	F	R
Schedule Maintenance Inspections				
Labels	A			
Electrical	A			
Safety Switches	A			
Mirrors	A			
Hydraulic	A			
Cylinders	A,B,C,D			
Frame				
Wheel/Tire Assembly	A			
Batteries and Cables	A			
Engine Air Filter	A,B,C			
Engine Coolant	A			
Muffler and Exhaust	A			
Drive Axles				
Hub Oil	C			
Change 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			
Fuel Leaks	A			
Hydraulic Pump	A			
Belts and Hoses	A			
Fuel Tank	A			
Change Fuel Filter	A,C			
Drain Water from Fuel Filter	C,D			
Hydraulic Tank	A			
Hydraulic Oil	A,D			
Hydraulic Return Filter	A,C			
Change Oil Filters	A,C			
Charging System	A			
Transmission				
Operate and Check Shifting	A			
Check for Leaks	A			
Check Transmission Disconnect	A			
Change Transmission Filter	D			

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	A,C			
Boom Angle Indicator	A			
Proximity Sensor	A			
Lifting Attachment	A			
Forks	A			
Fork Bars and Locks	A			
Grease Fittings				
Grease Fittings on Frame	B			
Grease Fittings on Boom Assembly	B			
Operator's Cab				
ROPS/FOPS	A			
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 Reverse Alarm	A			
Test Gauges	A			
Test Lights	A			
Test Switches	A			
Test Steering Wheel and Column	A			
Test Boom and Attachment Functions	A			
Test Frame Leveling and Level Indicator	A			
Test Frame Level Lock	A			
Test Accelerator Pedal	A			
Test Driving and Service Brake Functions	A			
Test Steering	A			
Test Parking Brake	A			
Test Outriggers	A			
Test Outrigger Control & Boom Extension Interlock System	A			

202C

A - Perform Visual and Daily Maintenance Inspections & Functions Test. Refer to Section 2.7 of the Operating Manual.
B - Perform Scheduled Maintenance Inspection every week or 40 hrs. Refer to Section 1.0 of this manual.
C - Perform Scheduled Maintenance Inspection every 3 months or 250 hours. Refer to Section 1.0 of this manual.
D - Perform Scheduled Maintenance Inspection every year or 1000 hours. Refer to Section 1.0 of this manual.
***** - Refer to Skyjack's website @ www.skyjack.com for latest service bulletins prior to performing quarterly or yearly inspection.



1.1 Scheduled Maintenance Inspections

Before performing the visual and daily maintenance inspections, ensure that the telehandler is parked on a firm level surface.

Begin the visual and daily maintenance inspections by checking each item in sequence for the conditions listed in this section.

WARNING

To avoid injury, do not operate a telehandler until all malfunctions have been corrected.

WARNING

To avoid possible injury, ensure telehandler power is off during your visual and daily maintenance inspections.

NOTE

While performing visual and daily inspections in different areas, be aware to also inspect all switches, electrical and hydraulic components.

1.1-1 Labels

Refer to the labels section in the parts manual and determine that all labels are in place and are legible.

1.1-2 Electrical

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

- Ensure proper operation of all gauges
- Check charging system Ammeter/Voltmeter
- Inspect the following areas for chafed, corroded and loose wires:
  - boom wiring harnesses
  - frame wiring harnesses
  - cab wiring harnesses

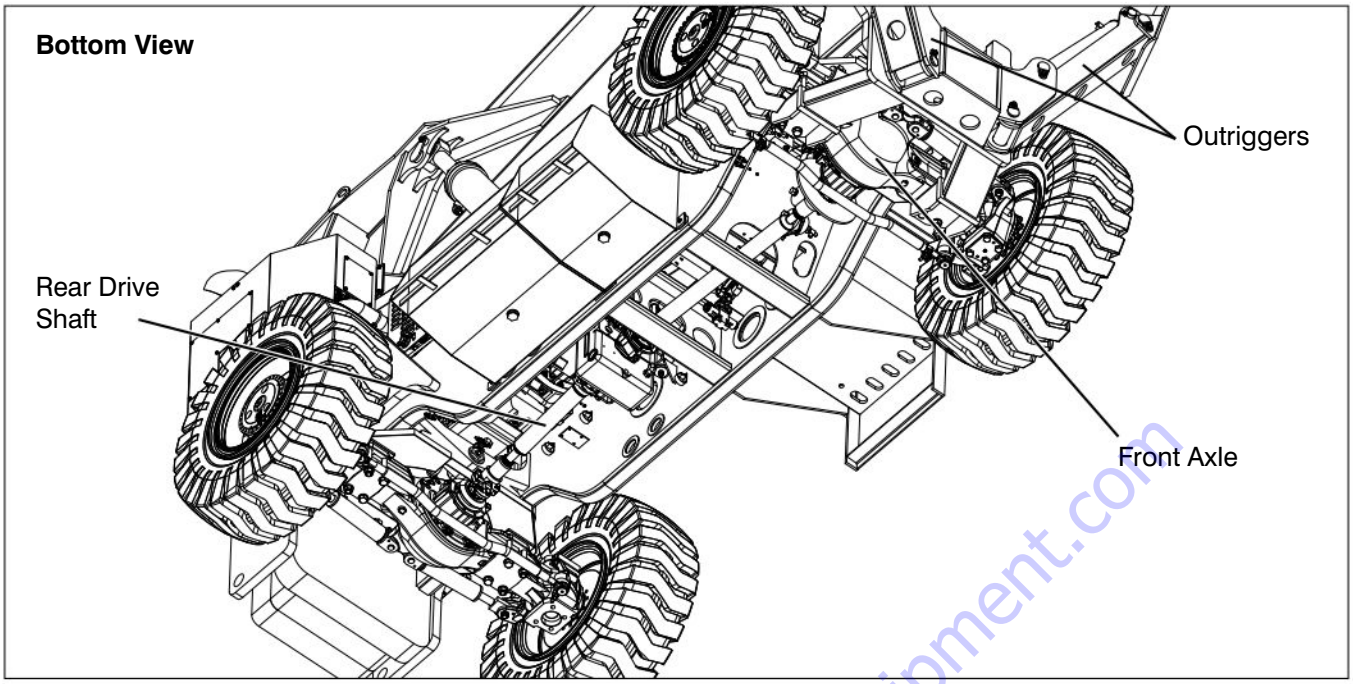
Ensure electrical devices are properly secured with no signs of visible damage. Ensure there are no loose or missing parts.

1.1-3 Safety Switches

Ensure safety switches are properly secured with no signs of visible damage.

1.1-4 Mirrors

Ensure mirrors are properly secured with no signs of visible damage.



1.1-5 Hydraulic

Maintaining the hydraulic components is essential to good performance and service life of the telehandler Perform a visual inspection and check for leaks around the following areas:

- hydraulic tank, filter(s), fittings, hoses, pump, and frame surface
- all hydraulic cylinders
- all hydraulic manifolds
- underside of the frame
- ground area under the telehandler

1.1-6 Cylinders

- Ensure all cylinders are properly secured and there is no evidence of leakage.
- Grease weekly and check pins and bushings to ensure there is no evidence of damage.

1.1-7 Frame

- **Wheel/Tire Assembly**

  Tire and/or wheel failure could result in a telehandler tip-over. Component damage may also result if problems are not discovered and repaired in a timely fashion.

- Check all tire treads and sidewalls for cuts or cracks that expose the cord plies.
- Check for punctures, holes and unusual wear.
- Check each wheel rim for damage and cracked welds.
- Check each lug nut for proper torque to ensure none are loose. Refer to Table 2.3.

WARNING

If any tire does not meet the criteria outlined above, remove telehandler from service and replace wheel/tire immediately.

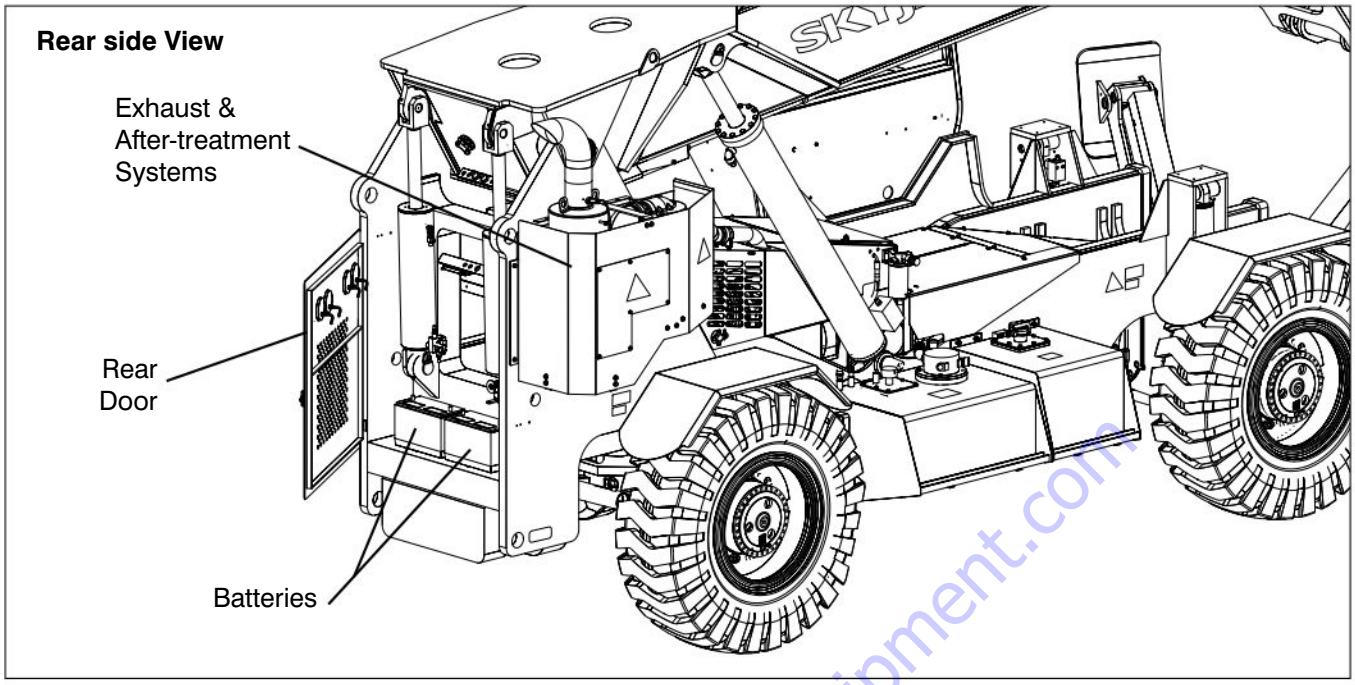
- **Air-filled Tires**

  To safeguard maximum stability, achieve optimum telehandler handling and minimize tire wear, it is essential to maintain proper pressure in all air-filled tires. Refer to tire pressure label.

- Check each tire with an air pressure gauge and add air as needed.

WARNING

An improperly inflated tire may cause death or serious injury.



- **Foam-filled Tires**
  Tire condition can vary significantly depending on telehandler use, job site environment and preventative maintenance measures. Inspect tires periodically and pay extra attention to the following:

- Check for punctures or holes. Ensure they do not exceed 1 inch in diameter.

IMPORTANT

Do not intermix foam-filled and air-filled tires.

- **Drive Axle**
  - Ensure drive axle is properly secured, there are no loose or missing parts.

D - Annual Inspection

  - For differential oil replacement procedure, refer to Section 5.

- **Steer Cylinder Assembly**
  - Ensure steer cylinder assembly is properly secured, there are no loose or missing parts, all fittings and hoses are properly tightened and there is no evidence of hydraulic oil leakage.

- **Steer Linkage**
  - Ensure there are no loose or missing parts, steer linkage studs are locked and there is no visible damage.

- **Batteries**
  Proper battery condition is essential to good engine performance and operational safety. Improper fluid levels or damaged cables and connections can result in engine component damage and hazardous conditions.

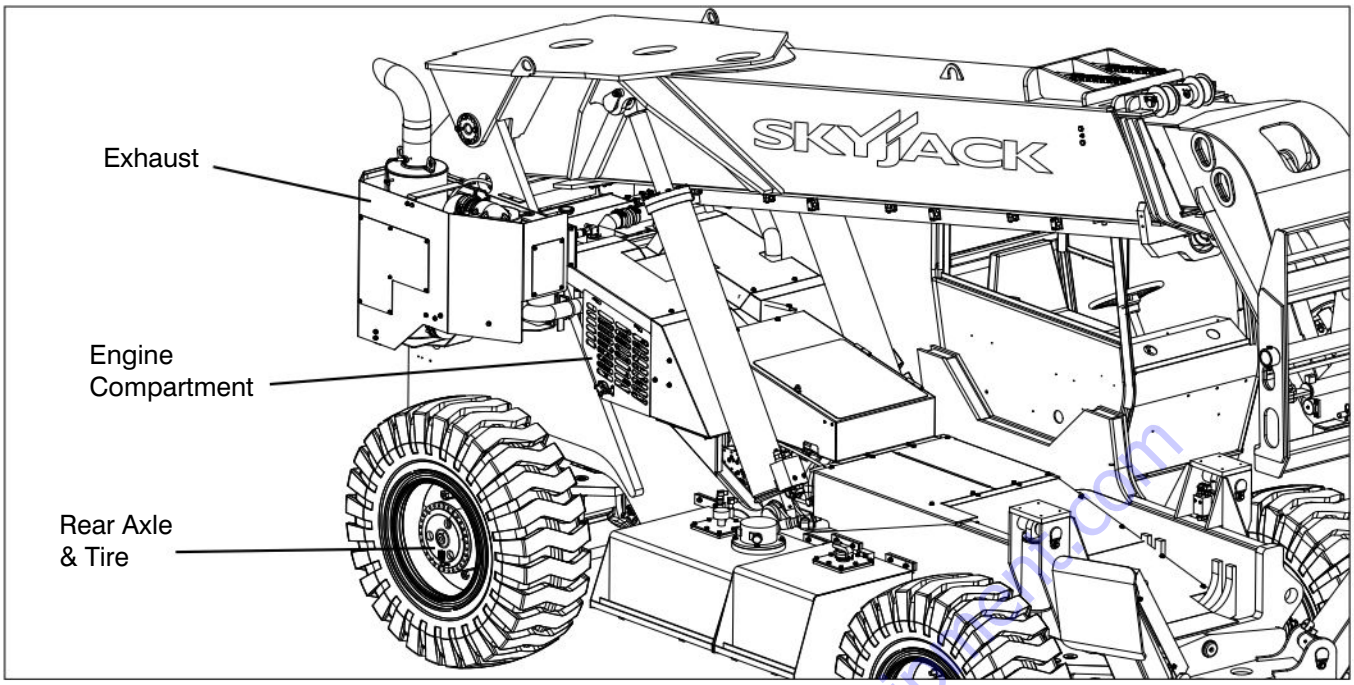
WARNING

Explosion hazard. Keep flames and sparks away. Do not smoke near batteries.

WARNING

Battery acid is extremely corrosive - Wear proper eye and facial protection as well as appropriate protective clothing. If contact occurs, immediately flush with cold water and seek medical attention.

1. Check batteries case for damage.
2. Clean terminals and cable ends thoroughly with a terminal cleaning tool or wire brush.
3. Ensure all connections are tight.



4. If applicable, check battery fluid level. If plates are not covered by at least 1/2" (13 mm) of solution, add distilled or demineralized water.

5. Replace batteries if damaged or incapable of holding a lasting charge.

WARNING

Use original or manufacturer-approved parts and components for the telehandler.

- **Engine Air Filter**
  - Ensure there are no loose or missing parts and there is no visible damage.
  - Ensure air cleaner vaccuator valve (if applicable) is free from dirt or dust by squeezing the valve lips.

B - Weekly Inspection
- For engine air filter inspection procedure, refer to Section 5.

C - Quarterly Inspection
- For engine air filter replacement procedure, refer to Section 5.

- **Engine Coolant**
  - Check coolant level by checking the recovery bottle. Level should be between cold and hot fill (See figure at the top of the next page). Refer to Section 1.2 for coolant level maintenance.

- **Muffler and Exhaust**
  - Ensure muffler and exhaust systems are properly secured, with no evidence of damage.

1.1-8 Engine Compartment

- Ensure compartment cover is secure and in proper working order.

- **Engine Oil Level**
  - Maintaining the engine components is essential to good performance and service life of the telehandler.

WARNING

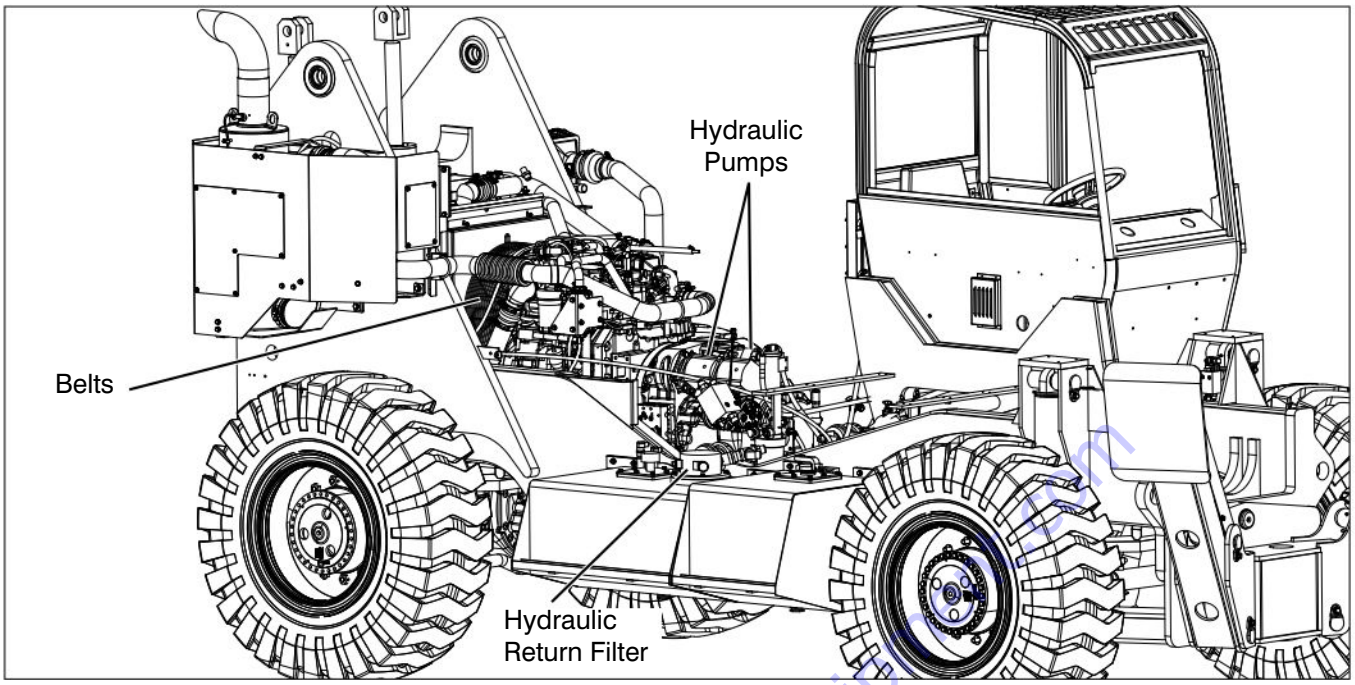
Beware of hot engine components.

Check oil level on dipstick
- Oil level should be in the "safe" zone. Add oil as needed. Refer to Table 2.2 for recommended oil type.

C - Quarterly Inspection
- For engine oil replacement procedure, refer to Section 5.

- **Fuel Leaks**

Failure to detect and correct fuel leaks will result in an unsafe condition. An explosion or fuel fire may cause death or serious injury.



DANGER

Engine fuels are combustible. Inspect the telehandler in an open, well-ventilated area away from heaters, sparks and flames. Always have an approved fire extinguisher within easy reach.

Perform a visual inspection around the following areas:

- hoses and fittings
- fuel pump
- fuel filter
- fuel tank

- **Fuel Filter**
  - Ensure there are no loose or missing parts and there is no visible damage or evidence of leakage.

C - Quarterly Inspection

  - For fuel filter replacement procedure, refer to Section 5.

- **Hydraulic Pumps**
  - Ensure there are no loose or missing parts and there is no visible damage.
  - Ensure all bolts are properly tightened.
  - Ensure all fittings and hoses are properly tightened and there is no evidence of hydraulic oil leakage.

- **Belts**
  - Ensure belts are in good working condition and have correct tension. Replace if belts are cracked, frayed, or have chunks of material missing. Refer to service manual for proper replacement procedure.

- **Fuel Tank**

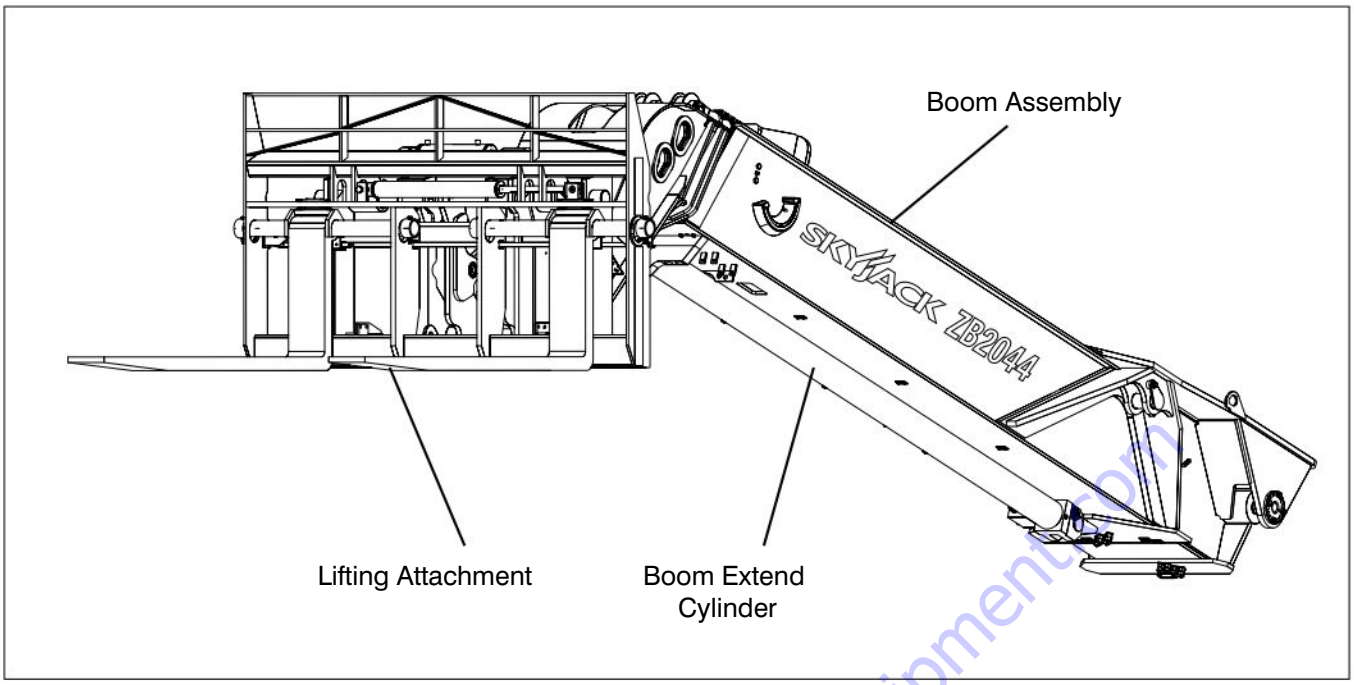
IMPORTANT

Before using your telehandler ensure there is enough fuel for expected use.

  - Ensure fuel filler cap is secure.
  - Ensure tank shows no visible damage and no evidence of fuel leakage.

- **Hydraulic Tank**
  - Ensure hydraulic filler cap is secure.
  - Ensure tank shows no visible damage and no evidence of hydraulic leakage.

- **Hydraulic Oil**
  - Be sure that the boom is in the stowed position, and then visually inspect the sight gauge located on the side of the hydraulic oil tank.
  - The hydraulic oil level should be between the minimum and maximum marks on the sight glass. Add oil as needed. Refer to Table 2.2 for recommended oil type.



D - Annual Inspection
- For hydraulic oil and filter replacement procedures, refer to Section 5.

- **Hydraulic Return Filter**
  - Ensure filter element is secure.
  - Ensure there are no signs of leakage or visible damage.

1.1-9 Transmission
- Ensure transmission shifter is working properly and there is no evidence of damage.

- **Check oil level on dipstick**
  - Oil level should be in the “safe” zone. Add oil as needed. Refer to Table 2.2 for recommended oil type.

D - Annual Inspection
- For hydraulic oil and filter replacement procedures, refer to Section 5.

1.1-10 Boom
- Ensure there are no loose or missing parts and there is no visible damage.
- Ensure all bolts and pins are properly tightened.
- Ensure there are no visible cracks in welds or structure and there are no signs of deformation.
- Ensure all hoses are properly tightened and there is no evidence of hydraulic leakage.

- **Slide Pads**
  - Ensure all bolts are tight, there is no visible damage to the slide pads and that no parts are missing.

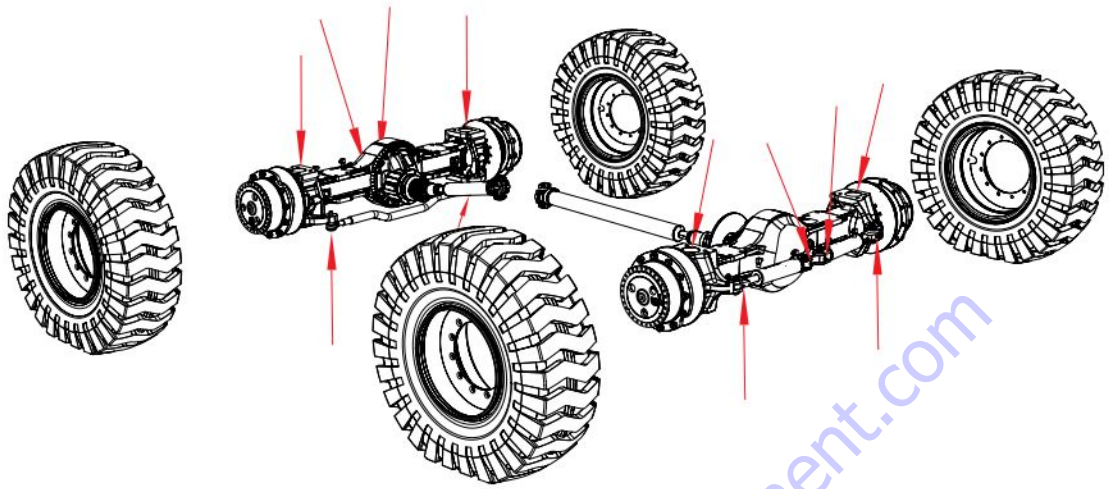
- **Chain**
  - Ensure there are no loose or missing parts and there is no visible damage

C - Quarterly Inspection
- Check chain tension and adjust as required (refer to Section 5).

- **Boom Angle Indicator**
  - Ensure all bolts are tight, and there is no visible damage

1.1-11 Lifting Attachment
- Ensure there are no loose or missing parts and there is no visible damage.
- Ensure attachment is properly positioned and secured. (refer to Section 2.13 of the operating manual for attachments)

Axle Grease Points



1.1-12 Grease Points

Maintaining properly greased components is essential for good performance and service life of the telehandler. If components are improperly greased, it could result in component damage.

WARNING

Ensure that there are no personnel or obstructions in maintenance area.

Greasing intervals are based on telehandler usage of 40 hours. Use of telehandler may vary significantly and greasing frequency must be adjusted to obtain maximum service life.

B - Weekly Inspection

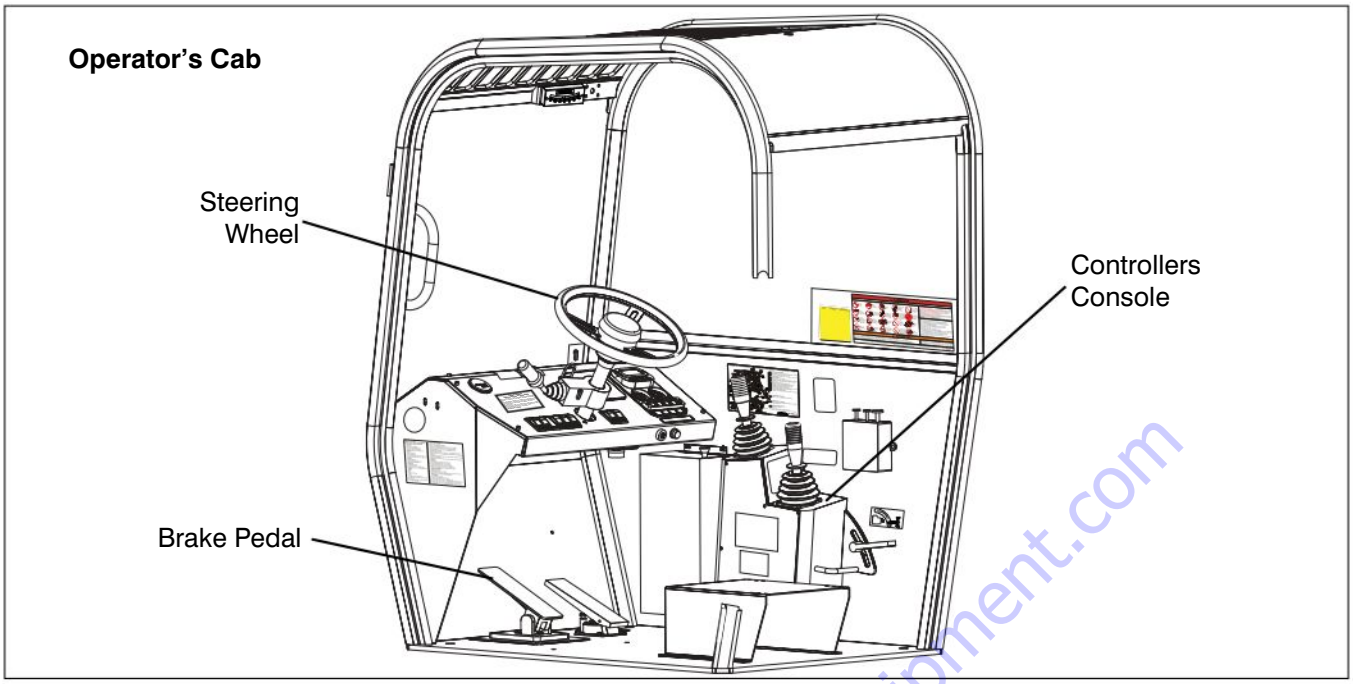
- For greasing procedure, refer to Section 5.

Grease Points on Frame

1. Ensure telehandler is on a firm level surface and is in stowed position.
2. Locate grease fittings (refer to label inside operator's cab) and pump grease in the following:
   - king pins
   - axle lock cylinder (top and bottom)
   - lift cylinder (top and bottom, both sides)
   - frame level cylinders (top and bottom)
   - outrigger pins
   - slave cylinders (top and bottom)
3. Using a creeper, slide under the frame to locate grease fittings and pump grease in the following:
   - axle pivot bearings (front and rear)
   - drive shaft U-joint (front and rear)
   - slip joint on drive shaft (front and rear)

Grease Points on Boom Assembly

1. Ensure telehandler is on a firm level surface and is in stowed position.
2. Locate grease fittings (refer to label inside operator's cab) and pump grease in the following:
   - main boom pivot bearing pins
   - retract chain rollers
   - hose rollers
   - extension chains and rollers
   - slide pads
   - attachment tilt cylinders (top and bottom)
   - attachment pivot bearings



1.1-13 Operator's Cab

- **Rollover and Falling Object Protective Structure (ROPS/FOPS)**
  - Ensure there is no visible damage.

WARNING

Do not modify, drill or alter the operator's cab in any way.

- **Seat**
  - Ensure seat is properly secured with no sign of visible damage.
  - Ensure seat belt is working properly with no sign of visible damage.
- **Pedals**
  - Ensure brake and accelerator pedals are secure, no loose or missing parts, no sign of visible damage and movements are not obstructed.
- **Manual**
  - Check to be sure manual storage box is present and in good condition.
  - Ensure a copy of operating manual, and other important documentation are enclosed in manual storage box.
  - Ensure manual is legible and in good condition.
  - Always return manual to the manual storage box after use.
- **Operator's Cab Controls**

WARNING

Ensure that you maintain three points of contact to mount/dismount the cab.

Use the steps of telehandler to access operator's cab.

- Ensure door and windows (if equipped) are secure and in proper working order.
- Ensure steering wheel is secured with no sign of visible damage.
- Ensure all switches and controls are properly secured with no sign of visible damage.
- Ensure all switches and controls are returned to their neutral positions and movements are not obstructed.
- Ensure capacity charts are in place and are legible.

DANGER

Do not operate the telehandler if capacity charts are missing or not legible.

1.1-14 Slinging Loads

CAUTION

Sling loads from appropriate attachment to the jib boom or a tilted fork ONLY.

1. Slinging of loads must only be performed following a complete risk assessment by a qualified person regarding the rigging and guiding of any such load.

2. The rated capacity of the unit and attachment at the sling position must not be exceeded. The sling must be in good repair and restrained from movement at all times.

1.2 Coolant Level Maintenance

Refer to this section for instructions on maintaining correct coolant levels.

1.2-1 Radiator Fill Maintenance

WARNING

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

1. Open engine vent. Leave vent open during radiator fill. Refer to Figure 1-1.

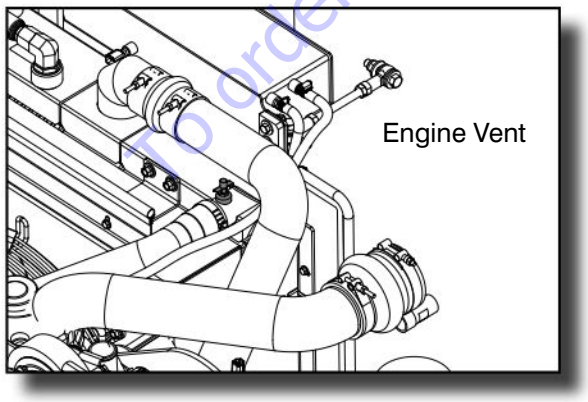


Figure 1-1 Engine Vent Location

2. Remove radiator cap.

3. Fill radiator through the reserve tank filler neck until a solid, airless stream of coolant flows out of the engine vent, then close the engine vent.

NOTE

When filling the radiator, do not exceed 3GPM fill rate.

4. Fill radiator completely through the reserve tank filler neck, until coolant is visible through the sight glass. See Figure 1-2.

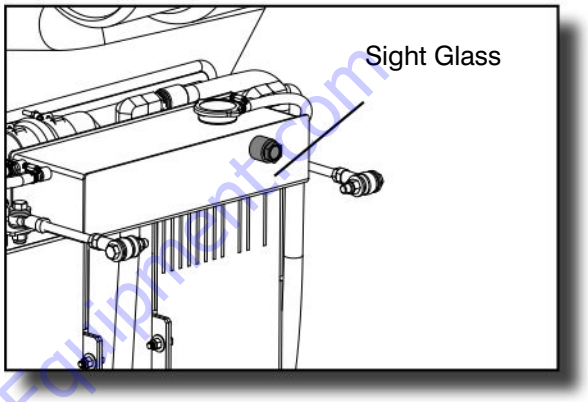


Figure 1-2 Recovery Bottle Location

5. Run the engine for 25 minutes without radiator cap to achieve operating temperature. Shut down the engine.

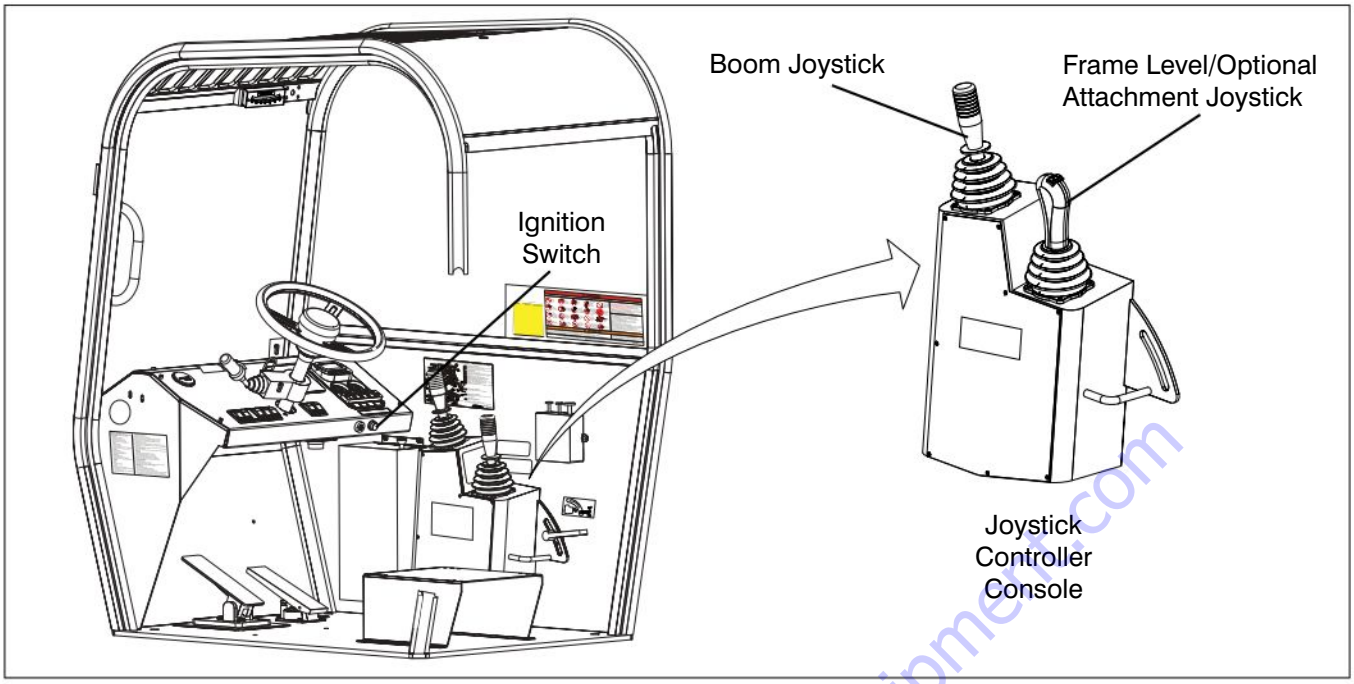
6. Check coolant level at the sight glass. Refill until coolant is visible through the sight glass, if necessary.

7. Install radiator cap.

NOTE

Additional coolant may be required in the top tank after a few operational cycles.

8. Refer to Section 5.8-1 for Radiator Draining Procedure.



1.3 Function Tests

Function tests are designed to discover any malfunctions before telehandler is put into service. The operator must understand and follow step-by-step instructions to test all telehandler functions.

Never use a malfunctioning telehandler. If malfunctions are discovered, telehandler must be tagged and placed out of service. Repairs to telehandler may only be made by a qualified service technician.

After repairs are completed, operator must perform a pre-operation inspection and a series of function tests again before putting telehandler into service.

Prior to performing function tests, be sure to read and understand Section 2.9 of the operating manual - Start Operation.

WARNING

Ensure that there are no personnel or obstructions in test area and that there is sufficient room to test all telehandler functions.

1.3-1 Operator's Cab Controls

WARNING

Ensure that you maintain three points of contact to mount/dismount the cab.

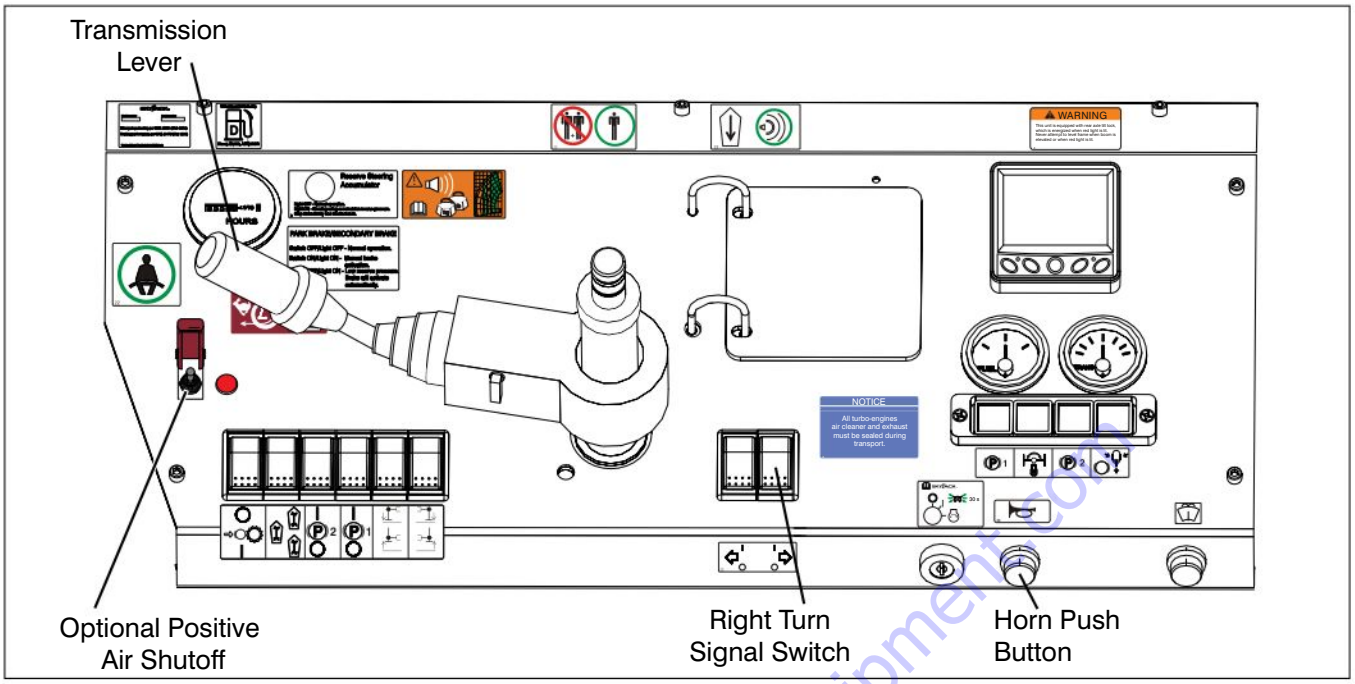
- **Test Starter Operation**

1. Enter cab and close door (if equipped).

WARNING

The seat belt must be worn at all times.

2. Sit in the driver's seat and fasten seat belt.
3. Using a spotter, adjust the mirrors.
4. Ensure parking brake is engaged.
5. Adjust the boom controller console.



6. Insert key into ignition switch and select "|" on position. The red and amber lights at the top of electronic dash display will illuminate. Once red and amber lights are no longer displayed, and the electronic gauges are visible on the display panel; turn the key to start position.

7. Allow engine to idle for 30 seconds until low brake pressure light is off.

- **Test Horn**

1. Push "" horn push-button.
   Result: Horn should sound.

WARNING

If the warning indicator lights illuminate when engine is running, immediately shut down the telehandler and have it serviced.

- **Test Reverse Alarm**

1. Ensure parking brake switch is on.

2. Depress service brake pedal and shift the transmission lever backward.
   Result: The reverse alarm should sound and reverse light (if equipped) should turn on.

- **Test Lights (if equipped)**

1. Use a spotter to check if all the lights are working well. The spotter should maintain a safe distance from telehandler.

2. Turn parking brake switch to off position.
   Result: Rear brake lights should turn off.

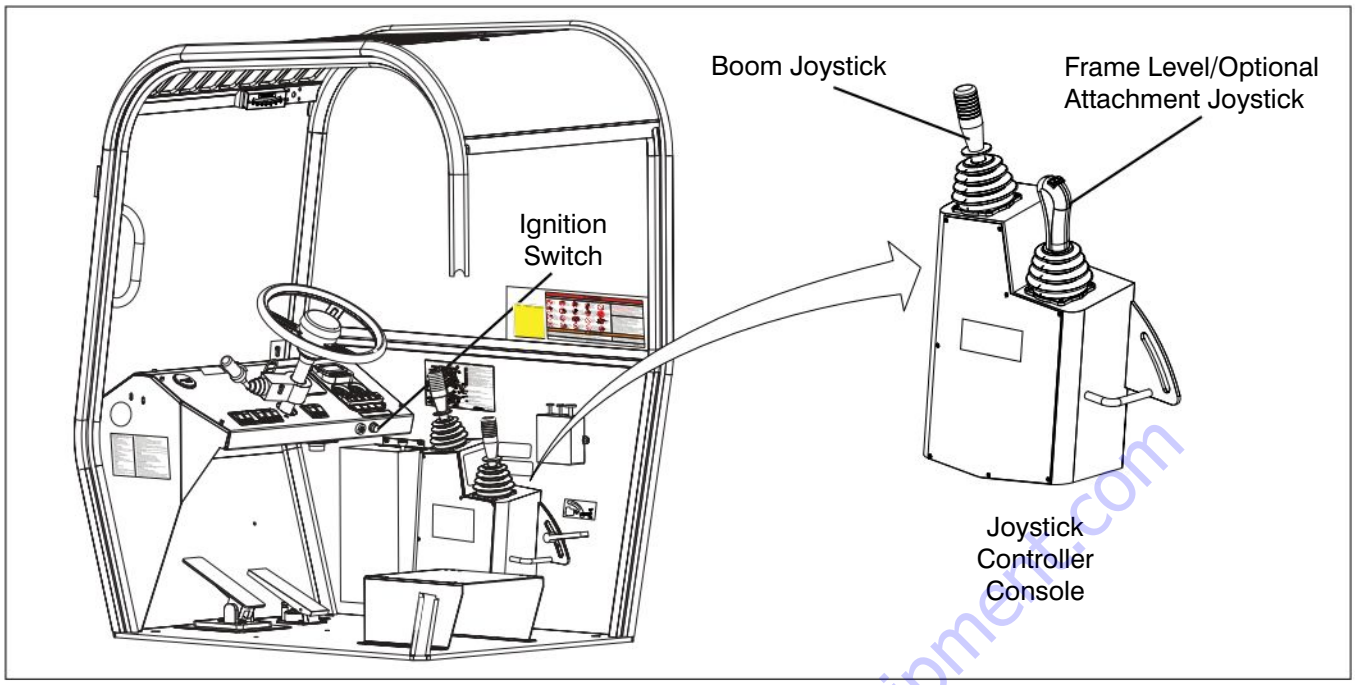
3. Depress service brake pedal.
   Result: Rear brake lights should turn on.

4. Select head/tail light (if equipped) switch to on position.
   Result: Head/tail lights should turn on.

5. Turn parking brake switch to on position.

6. Select left turn signal (if equipped) rocker switch to on position.
   Result: The indicator light and left signal lights should flash.

7. Select right turn signal (if equipped) rocker switch to on position.
   Result: The indicator light and right signal lights should flash.



- **Test Boom and Attachment Functions**

WARNING

Ensure that there are no personnel or obstructions in test area and that there is sufficient room to test all telehandler functions.

1. Ensure the parking brake indicator light is on.

2. Raise the boom by pulling the boom/attachment joystick backward.
   Result: Boom should raise and boom angle indicator should be functioning.

3. Extend the boom by moving the boom/attachment joystick to the right.
   Result: Boom should extend and boom extension indicators are visible.

4. Tilt attachment forward by pressing and holding the thumb button while moving joystick forward.
   Result: Attachment should tilt forward.

5. Tilt attachment backward by pressing and holding the thumb button while moving joystick backward.
   Result: Attachment should tilt backward.

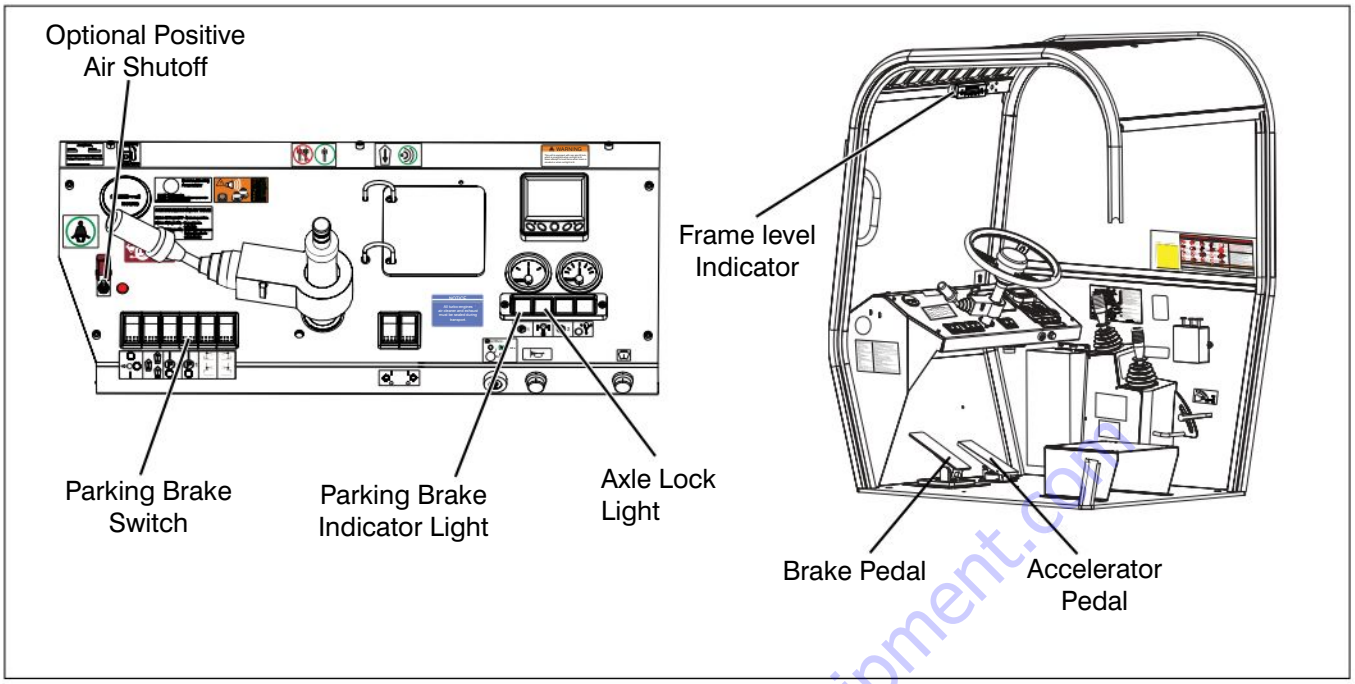
6. Retract the boom by moving the boom/attachment joystick to the left.
   Result: Boom should retract.

7. Lower the boom by moving the boom/attachment joystick forward.
   Result: Boom should lower.

8. Raise the boom until attachment is 2 feet above the ground.

IMPORTANT

Test all attachment functions if telehandler is equipped with optional attachments. Refer to Section 2.14 in the operating manual for optional attachments operation.



- **Test Positive Air Shutoff (If Equipped)**

CAUTION
This function test should not be performed while the engine is running.

1. Lift switch guard and push rocker switch to “on” position.
   Result: Red indicator light should turn on.
2. Push rocker switch to “off” position.
3. Walk to the hydraulic tank side of the machine then open the engine cover. Using a flash light inspect the shutoff solenoid valve.
   Result: After 20 seconds the valve should disengage.
4. Ensure switch is returned to “off” position and switch guard is down. Replace engine cover.

- **Test Frame Leveling and Level Indicator**

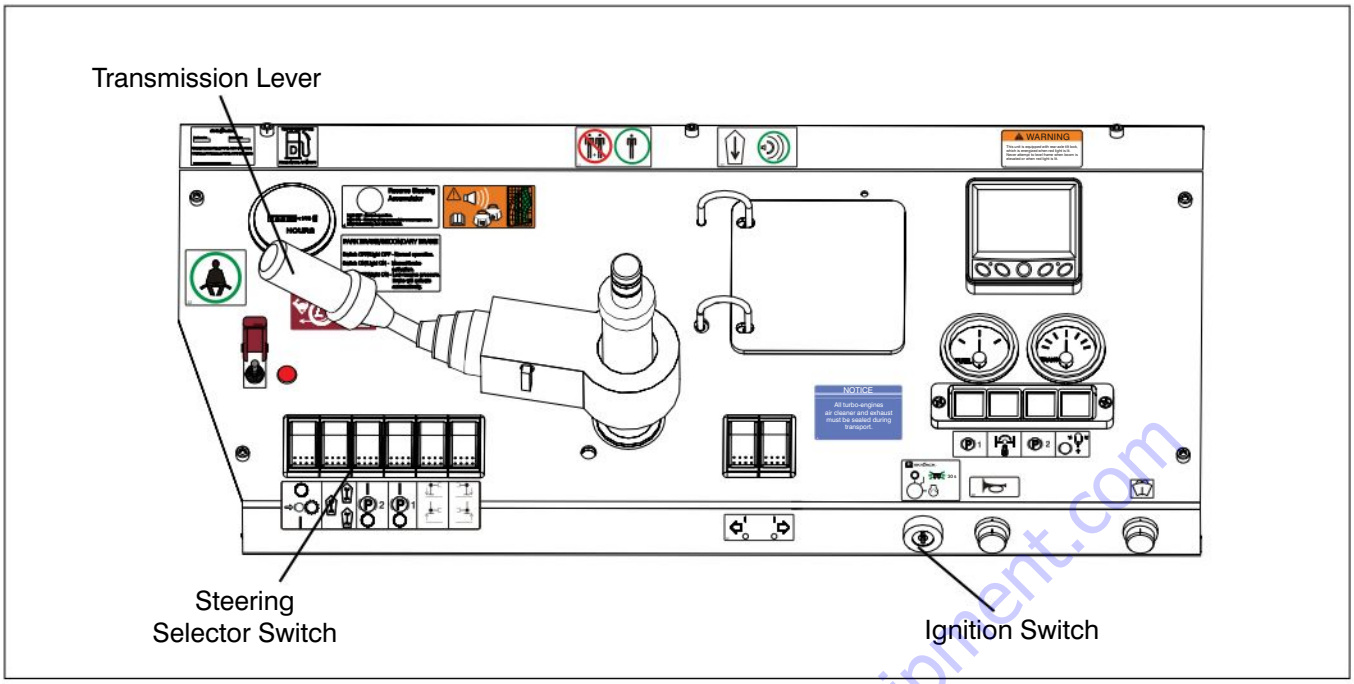
1. Ensure parking brake switch is on.
2. Tilt frame to the right by moving frame level joystick to the right.
   Result: Frame should tilt to the right.
3. Tilt frame to the left by moving frame level joystick to the left.
   Result: Frame should tilt to the left.
4. Use the frame level indicator to ensure frame is level.

- **Test Rear Axle Lock**

1. Ensure parking brake switch is on.
2. Raise boom above 45° - boom angle and attempt leveling the frame to the right or to the left.
   Result: Rear axle lock light should illuminate and frame should not tilt to right or left.
3. Lower the boom until attachment is 2 feet above the ground.

- **Test Accelerator Pedal**

1. Ensure parking brake switch is on.
2. Depress accelerator pedal slowly.
   Result: The engine RPM should increase.
3. Release the accelerator pedal.
   Result: The engine RPM should decrease.



- **Test Driving & Service Brake Functions**

1. Ensure path of intended motion is clear.
2. Ensure all four wheels are aligned straight ahead.
3. Depress service brake pedal.
4. Release parking brake.
   Result: Parking brake indicator light should turn off.
5. Shift transmission lever forward and release the service brake pedal slowly.
   Result: Telehandler should move forward.
6. Depress service brake pedal slowly.
   Result: Telehandler should stop.
7. Shift transmission lever backward and release the service brake pedal slowly.
   Result: Telehandler should move backward.
8. Depress service brake pedal slowly.
   Result: Telehandler should stop.
9. Return transmission lever to neutral position and engage parking brake.

- **Test Steering**

CAUTION

Before changing steering modes, bring all four wheels into alignment (i.e., in the straight-ahead position).

WARNING

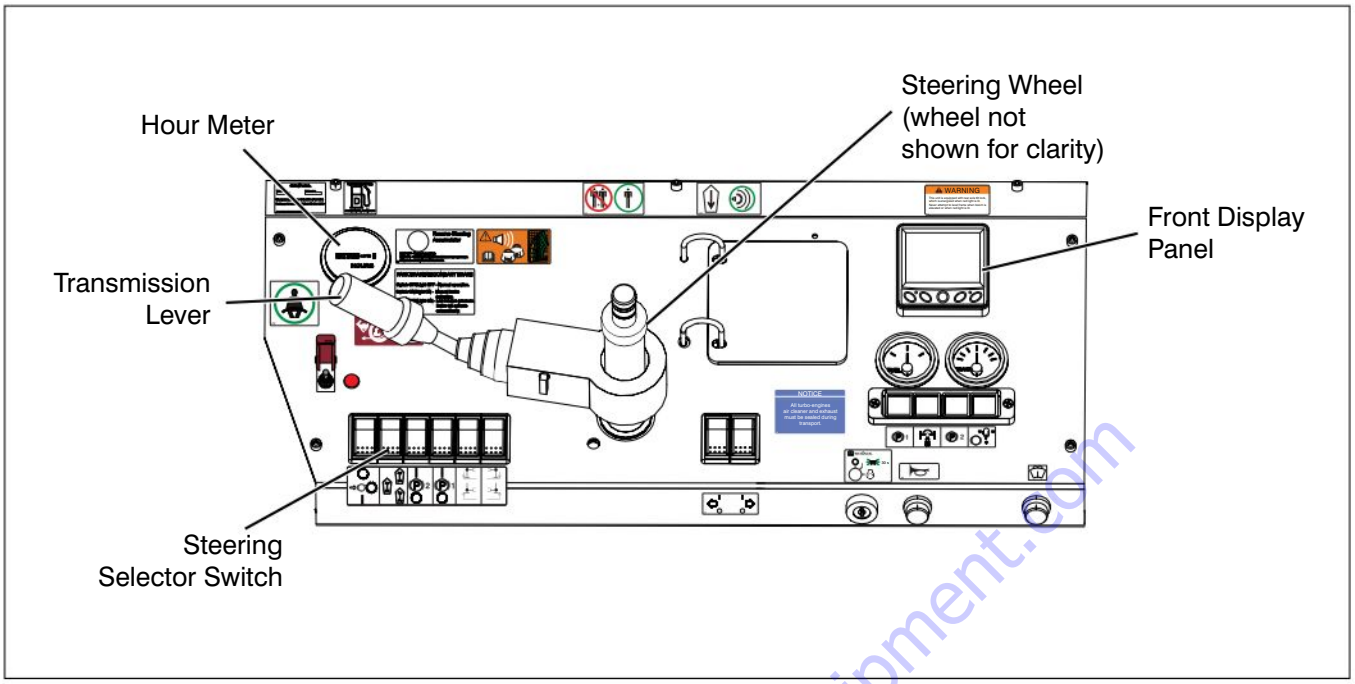
Before driving on public roads and highways check the alignment of the wheels and drive with FRONT steering only.

WARNING

Do not change steer mode while telehandler is traveling.

NOTE

Avoid steering the wheels while telehandler is stationary.



Round Steer

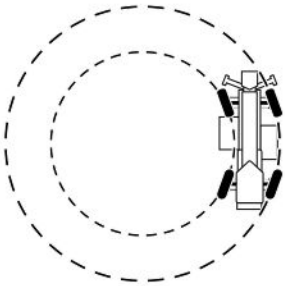


Figure 2-2 Round Steering

1. Ensure path of intended motion is clear.
2. Ensure all four wheels are aligned straight ahead.
3. Select parking brake switch to off position and depress service brake pedal.
4. Select rocker switch to forward "  " position for round steering.
5. Turn the steering wheel to the left or right and drive forward.
   Result: Telehandler should move in the chosen direction, producing a turning circle, with front wheels pointing in the opposite direction to the rear wheels.
6. Steer the telehandler straight ahead until all four wheels are aligned.
7. Depress service brake pedal until the telehandler stops.

Front Steer

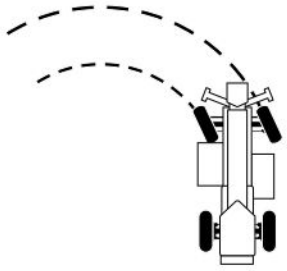
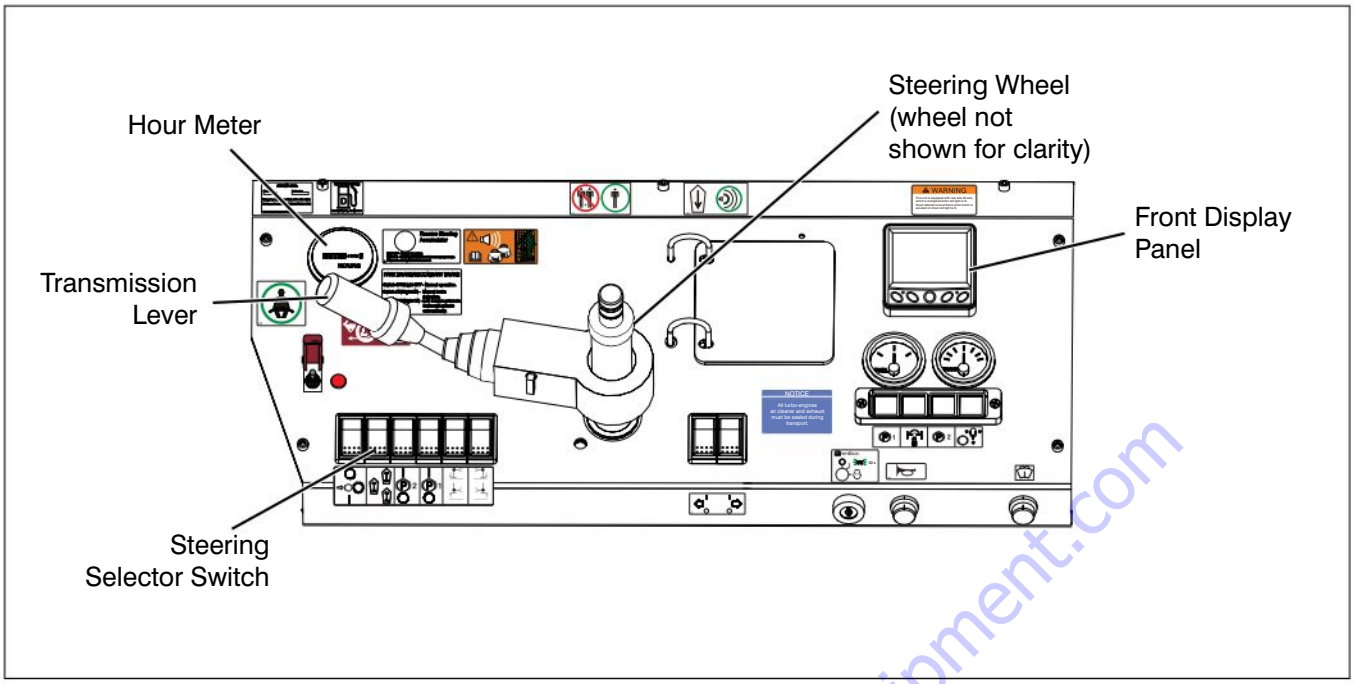


Figure 2-3 Front Steering

8. Select rocker switch to middle "  " position for front steering.
9. Turn the steering wheel to the left or right and drive forward.
   Result: Only front wheels of the telehandler should turn in the chosen direction.



10. Steer the telehandler straight ahead until all four wheels are aligned.

11. Depress service brake pedal until the telehandler stops.

Crab Steer

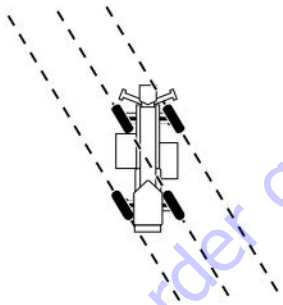


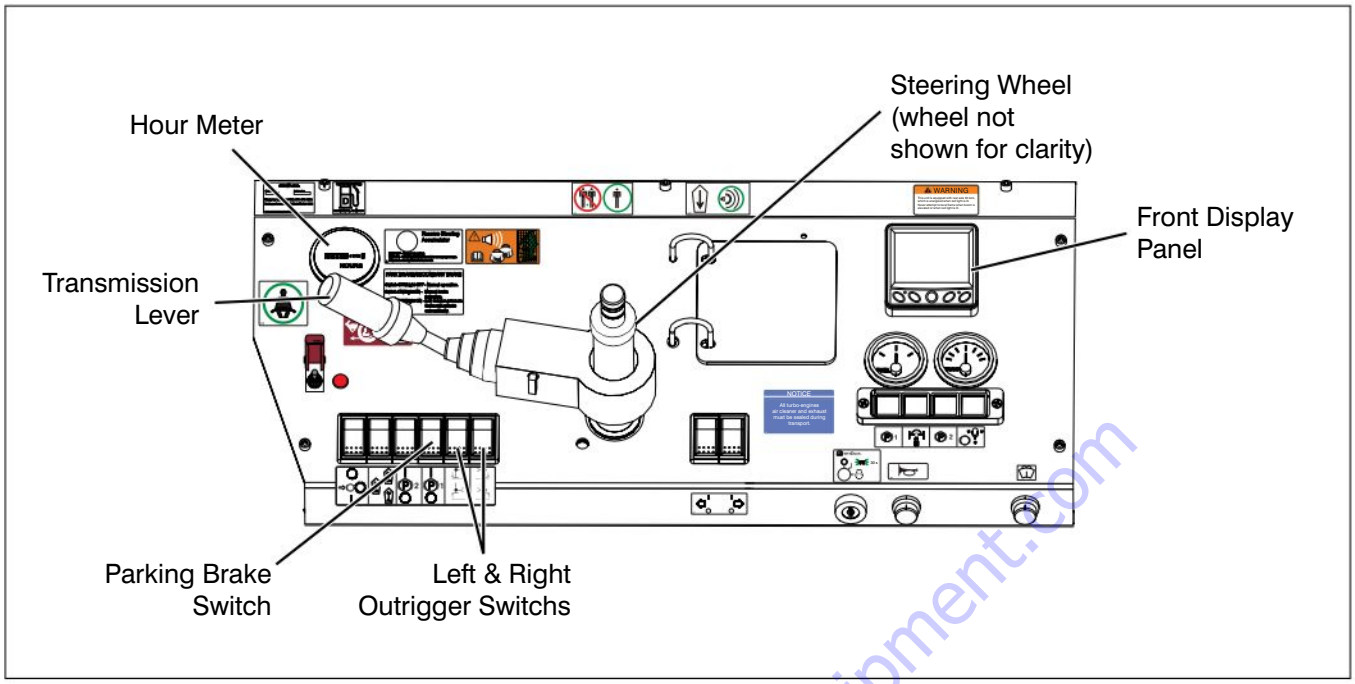
Figure 2-4 Crab Steering

12. Select rocker switch to backward "  " position for crab steering.

13. Turn the steering wheel to the left or right and drive forward.
Result: Telehandler should move in the chosen direction with both front and rear wheels in the same direction.

14. Steer the telehandler straight ahead until all four wheels are aligned.

15. Depress service brake pedal until the telehandler stops.



- **Test Parking Brake**

CAUTION

Refer to Section 2.9-3 for instructions on how to drive on a slope.

1. Ensure path of intended motion is clear.
2. Ensure parking brake switch is off.
3. Drive the telehandler on a slope.
4. Depress service brake pedal slowly until telehandler stops.
5. Select parking brake rocker switch to on position and release service brake pedal.
   Result: Parking brake indicator light should turn on and telehandler should not roll

- **Test Outriggers (If Equipped)**

WARNING

Ensure that there are no personnel or obstructions in test area and that there is sufficient room to test all telehandler functions.

1. Ensure parking brake switch is on.
2. Lower outriggers by depressing and holding rocker switch forward "  " continuously.
   Result: Outriggers should lower.
3. Raise outriggers by depressing and holding rocker switch backward "  " continuously until outriggers are fully raised.
   Result: Outriggers should raise up.

Section 2
MAINTENANCE TABLES AND DIAGRAMS

Table of Contents

Tables

2

Table 2.1 Telehandler Specifications and Features

MODEL	ZB2044
Engine	
Type	Cummins Turbo Diesel QSB4.5
Cylinders	4
Capacity	275 cu. In. (4.5 Liters)
Horsepower @ 2200 RPM	110 HP
Horsepower @ 2500 RPM	173 HP
Torque @ 1500 RPM	305 lb. ft (414 N-m)
Fuel type	Ultra Low Sulfur Diesel (EN 590, ASTM D975)
Transmission	
Type	DANA T32000
Speeds forward	3
Speeds Reverse	3
Top Speed	20.5 mph (33 km/h)
Gear Ratios	
1st Gear	4.64 : 1
2nd Gear	2.23 : 1
3rd Gear	0.82 : 1
Electrical	
System voltage	12 volts negative ground
Standard Batteries	
Type	HP-31E
Quantity	2
Cranking amperes at 0°F (-17°C)	725 A
Total cranking amps at 0°F (-17°C)	1450 A
Cranking amperes at 32°F (0°C)	1100 A
Reserve capacity	180 minutes
Dimensions	
Overall length (less forks)	243 in (617 cm)
Overall width	102 in (259 cm)
Overall Height	108 in (274 cm)
Curb weight (standard machine with open cab)	45,000 lbs. (20,000 kg)
Maximum capacity	20,000 lbs. (9,071 Kg)
Wheelbase	138 in (350 cm)
Round steer turning Radius (inside)	220 in (559 cm)
Boom	
Number of sections	3
Maximum lift height	44 ft. 10 in (1366 cm)
Maximum forward reach	27 ft 5 in (835 cm)
Standard Forks	2¾ x 6 x 60 in (6.9 x 15.2 x 152.4 cm)
Carriage rollback	19°
Carriage forward tilt	80°
Operating Times	
Boom extend (at max. boom angle)	13 seconds
Boom retract (at max. boom angle)	9.5 seconds
Boom raise*	19 seconds
Boom lower*	20 seconds
Carriage roll forward	12 seconds
Carriage roll back	12 seconds
Frame level right (stop to stop) **	15 - 20 seconds
Frame level left (stop to stop) **	15 - 20 seconds

238D

* Measured with boom fully retracted.

** Under no circumstances should the frame level cycle take less than 15 seconds to complete in either direction.

Table 2.2 Recommended Fluids/Lubrication

MODEL		ZB2044
Engine	**Fuel Type**	Ultra Low Sulfur Diesel (EN590, ASTM D975)
	Fuel Tank Capacity	49 gal (185 L)
	Recommended Engine Oil Type	SAE 15W40 CC/SF
	Engine Oil Capacity	4.2 gal (16 L)
	Coolant Type	60/40 Ethylene glycol/distilled water
	Coolant Tank Capcity	9 quarts (8.5 L)
	DEF Type	Diesel Exhaust Fluid (DEF)
	DEF Tank Capacity	5 gal (19 L)
Transmission	**Oil Type**	ATF Dexron III
	Capacity	6.3 gal (24 L)
Axles	**Differential**	SAE 80W-90 GL-5
	Front Axle Capacity	5.5 gal (20.8 L)
	Rear Axle Capacity	
	Planetary Wheel Ends	SAE 80W-90 GL-5
	Capacity	0.82 gal (3.1 L)
Hydraulic Oil	**Type**	Anti-wear ISO Gr. 32
	Tank Capacity	55 gal (208 L)
Grease	**Boom Slide Bearings**	Sunaplex 992 E.P. 2
	General Greasing	Multi Purpose E.P.

240D

Table 2.3 Axles 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)
Course 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

60571AA

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.

Table 2.4 Tire Specifications

Standard Tires	
Tire Size	17.50 - 25
Pressure	90 psi
Tire Ply Rating	16 PR
Wheel Nuts Torque	450 - 500 ft.lb

239A

WARNING

Intermixing tires of different types or using tires of types other than those originally supplied with this equipment can adversely affect stability. Therefore, replace tires only with the exact original Skyjack-approved type. Failure to operate with matched approved tires in good condition may result in death or serious injury.

For proper function of each axle differential, all four wheels must have same tire size installed at all times. Failure to comply with this requirement will reduce the life of the differentials and reduce overall mobility of telehandler.

Table 2.5 Pressure Settings

Models ZB2044			
Maximum Pump Pressure	P1		3150 psi
	P2		3200 psi
Stand-by Pump Pressure	P1		500 psi
	P2		550 psi
Lift	Maximum pump pressure controlled		3200 psi
			3200 psi
Extension	Maximum pump pressure controlled		3200 psi
			3200 psi
Carriage Tilt Cylinder	Port Relief	Rod End	3100 psi
		Base End	1500 psi
	Crossover Relief	Rod End	3400 psi
		Base End	1800 psi
Frame Level Cylinder	Port Relief	Rod End	1500 psi
		Base End	1500 psi
Auxiliary Hydraulics	Port Relief	Rod End	2000 psi
		Base End	2000 psi
Outrigger	Port Relief	Rod End	2500 psi
		Base End	2500 psi
Pressure Reducing Valve	Pilot Pressure		325 psi
Priority Valve Pressure Relief	Steering Pressure		2800 psi

250B

Note: all pressure settings to be checked at idle

Section 3
SYSTEM COMPONENTS IDENTIFICATION AND SCHEMATICS

Table of Contents

Charts

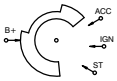
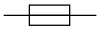
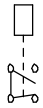
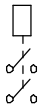
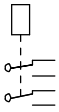
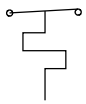
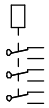
Diagrams and Schematics

3

3.1 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	

3.2 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 THROWN 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	

3.3 Harnesses Color Codes

FUNCTION	WIRE COLOR
GROUND	BLK
FROM ALTERNATOR B+ TO STARTER MOTOR	RED
FROM ACC ON KEY SWITCH TO BREAKER BUS BAR	RED
IGNITION	YEL
OIL TEMPERATURE (TRANSMISSION)	BRN/RED
STARTER SOLENOID	GRN
HORN	PNK
FUEL GAUGE	GRY
BRAKE PRESSURE WARNING LIGHT	BLU
STEERING	
FROM BREAKER TO STEERING SWITCH	GRN/YEL
ROUND STEER	GRN/BLK
CRAB STEER	GRN/WHT
PARK BRAKE	
FROM BREAKER TO PARK BRAKE SOLENOID	LT BLU/RED
FROM SWITCH TO PARK BRAKE SOLENOID	LT BLU
FROM SWITCH TO PARK BRAKE LIGHT	
FROM SWITCH TO DECLUTCH RELAY	LT BLU/BLK
FROM SWITCH TO PARK BRAKE OFF	LT BLU/BLK
TRANSMISSION	
FORWARD SOLENOID	RED
REVERSE SOLENOID	WHT
1st SOLENOID	BRN
2nd SOLENOID	BLK
DIVERTER VALVE	TAN
ALTERNATOR EXCITER	PUR

FUNCTION	WIRE COLOR
DASH POWER	
TO HOUR METER	BLU/YEL
TO HORN	BLU/WHT
TO INSTRUMENT CLUSTER (exclude PV100)	BLU/RED
DIFFERENTIAL LOCK	
FROM BREAKER TO TO DIFF. LOCK SWITCH	LT GRN
FROM SWITCH TO DIFF. LOCK SOLENOID	
FROM DIFF. LOCK SWITCH TO INSTRUMENT CLUSTER	LT GRN/RED
FRAME LEVEL/AXLE LOCK	
FROM BREAKER TO AXLE LOCK RELAY	YEL/BLK
AXLE LOCK LIGHT	YEL/BLU
OUTRIGGERS	
FROM BREAKER TO BOX	WHT
FROM BOX TO OUTRIGGER SWITCHES	WHT/BLU
FROM 400425 BOX TO DUMP VALVE	WHT/GRY
LEFT UP	WHT/BLK
LEFT DOWN	WHT/BLK/RED
RIGHT UP	WHT/RED
RIGHT DOWN	WHT/RED/GRN
FROM 401392 HARNESS TO LIFT CYLINDER PRESS OR PROXIMITY SWITCHES	WHT/ORG
OPTIONAL LIGHTS	
HEADLIGHTS	ORG/GRN
HEADLIGHTS AND TAILLIGHTS	ORG/BLK/WHT
BRAKE LIGHTS	ORG/RED
SIGNAL LIGHTS	ORG
LEFT FRONT & LEFT REAR	ORG/BLK
RIGHT FRONT & RIGHT REAR	ORG/BLU

225A

This table is to be used as a wire function/color reference for all electrical drawings and schematics.

3.4 Hydraulic Schematic Parts List

Index No.	Skyjack Part No.	Qty.	Description
ACC1	400947	1	ACCUMULATOR, Joystick
ACC2	400947	1	ACCUMULATOR, Brake Charge
ACC3	400947	1	ACCUMULATOR, Brake Charge
ACC4	400947	1	ACCUMULATOR, Rear axle lock
C1	409321	1	CYLINDER, Front steer (LH) (Part of axle assembly)
C2	409321	1	CYLINDER, Front steer (RH) (Part of axle assembly)
C3	409321	1	CYLINDER, Rear steer (RH) (Part of axle assembly)
C4	409321	1	CYLINDER, Rear steer (LH) (Part of axle assembly)
C5	401061	1	CYLINDER, Boom lift
C6	401061	1	CYLINDER, Boom lift
C7	409301	1	CYLINDER, Boom extension
C8	409295	1	CYLINDER, Slave
C9	409295	1	CYLINDER, Slave
C10	409295	1	CYLINDER, Carriage Tilt
C11	409295	1	CYLINDER, Carriage Tilt
C12	409299	1	CYLINDER, Frame Level (Right)
C13	409299	1	CYLINDER, Frame Level (Left)
C14	409293	1	CYLINDER, Rear axle lock
C15	409297	1	CYLINDER, Left outrigger
C16	409297	1	CYLINDER, Right outrigger
C17	-	1	CYLINDER, Parking Brake (Part of front axle only)
C18	409237	1	CYLINDER, Carriage shift (Optional)
C19	401401	1	CYLINDER, Fork shift (Optional fork/side shift carriage)
C20	401401	1	CYLINDER, Fork shift (Optional fork/side shift carriage)
C21	-	1	CYLINDER, Clamp (Optional rotating pipe & pole grappler)
C22	-	1	CYLINDER, Clamp (Optional rotating pipe & pole grappler)
C23	-	1	CYLINDER, Rotate (Optional rotating pipe & pole grappler)
C24	-	1	CYLINDER, Clamp (Optional 2 stage pipe & pole grappler)
C25	-	1	CYLINDER, Clamp (Optional 2 stage pipe & pole grappler)
CB1	410204	1	VALVE, Counterbalance (Lift cylinder)
CB2	410204	1	VALVE, Counterbalance (Lift cylinder)
CB3	410204	1	VALVE, Counterbalance (Boom extension cylinder)
CB4	410296	1	VALVE, Counterbalance (Carriage tilt cylinder)
CB5	410250	1	VALVE, Counterbalance (Right, Frame level cylinder)
CB6	410250	1	VALVE, Counterbalance (Left, Frame level cylinder)
CB7	410250	1	VALVE, Counterbalance (Right outrigger)
CB8	410250	1	VALVE, Counterbalance (Left outrigger)
CRV1	404752	1	VALVE, Crossover relief
CV1	407479	1	VALVE, Check
CV2	407479	1	VALVE, Check
F1	404859	1	FILTER, Return line
JS1	401473	1	JOYSTICK, Rear
JS2	401349	1	JOYSTICK, Front
MB1	412831	1	MANIFOLD, Return

Parts list continued on following page.

3.4 Hydraulic Schematic Parts List (Continued)

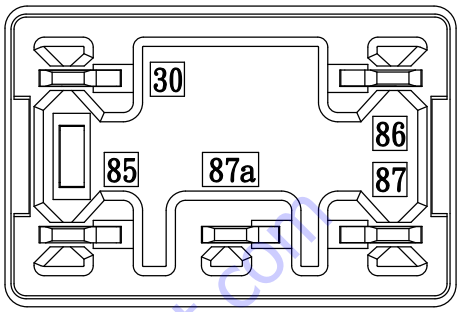
Index No.	Skyjack Part No.	Qty.	Description
			Parts list continued from previous page.
OSM1	406450	1	MOTOR, Steering (load sense, orbital)
P1	408749	1	PUMP, Hydraulic gear (Front)
P2	408749	1	PUMP, Hydraulic gear (Rear)
PRV1	412276	1	VALVE, Pressure reduce
PRT1	402092	1	VALVE, Priority
PS1	410548	1	SWITCH, Pressure
PS2	406228	1	SWITCH, Pressure
PS3	406228	1	SWITCH, Pressure
PS4	406228	1	SWITCH, Pressure
RV1	-	1	VALVE, Relief (Part of priority valve)
RV2 to RV11	-	10	VALVE, Relief (Part of main valve)
QD1	410716	1	QUICK DISCONNECT
QD2	410716	1	QUICK DISCONNECT
QD3	410716	1	QUICK DISCONNECT
QD4	410716	1	QUICK DISCONNECT
QD5	407824	1	QUICK DISCONNECT (half wing nut, male)
QD6	407825	1	QUICK DISCONNECT (half wing nut, female)
QD7	407824	1	QUICK DISCONNECT (half wing nut, male)
QD8	407825	1	QUICK DISCONNECT (half wing nut, female)
QD9	407824	1	QUICK DISCONNECT (half wing nut, male)
QD10	407825	1	QUICK DISCONNECT (half wing nut, female)
STR1	410752	1	SUCTION STRAINER
STR2	410752	1	SUCTION STRAINER
SV1	412740	1	VALVE, Shuttle
SV2	412740	1	VALVE, Shuttle
SV3	412740	1	VALVE, Shuttle
TP1	410717	1	TEST PORT
TP2	410717	1	TEST PORT
TP4	410717	1	TEST PORT
TP6	410717	1	TEST PORT
TP7	410717	1	TEST PORT
TP8	410717	1	TEST PORT
V1	410566	1	VALVE, Steering function
V2	410534	1	VALVE, Diverter
V3	403342	1	VALVE, Dual brake charge
V4	403338	1	VALVE, Dual brake pedal
V5	410565	1	VALVE, Park brake
V6	410534	1	VALVE, Diverter
			Parts list continued on following page.

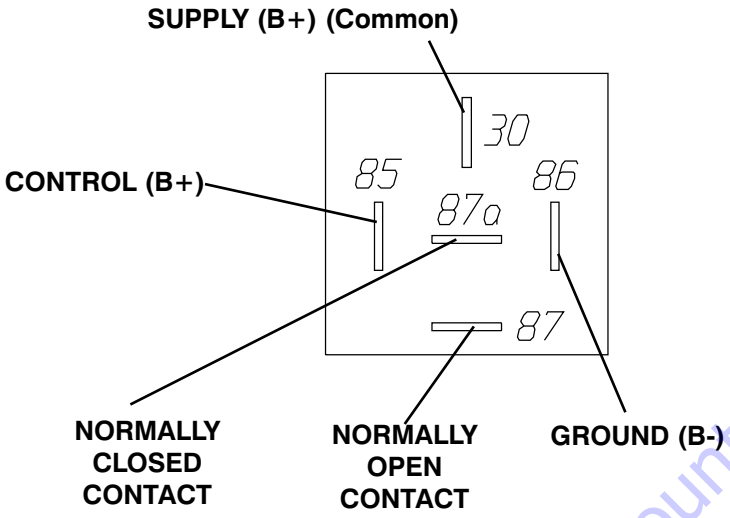
3.4 Hydraulic Schematic Parts List (Continued)

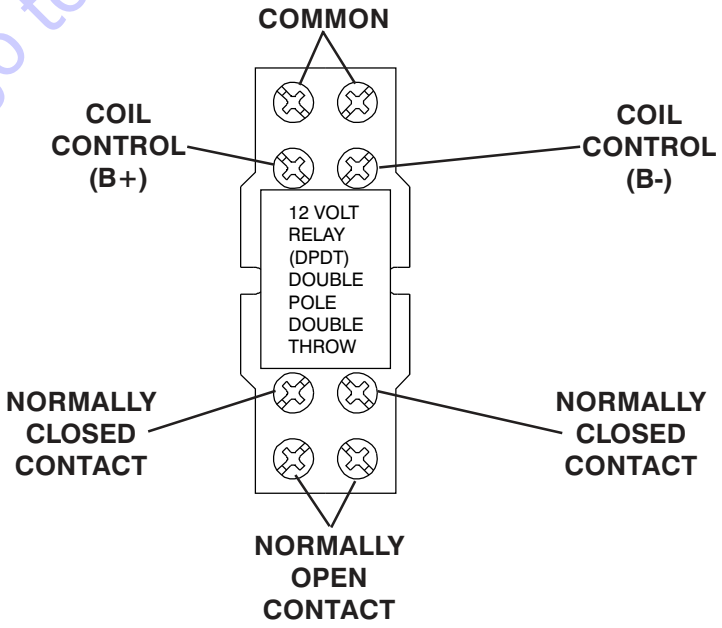
Index No.	Skyjack Part No.	Qty.	Description
			Parts list continued from previous page.
V7 to V10	409625	4	VALVE, Dump, Frame level
V11 to V14	409624	1	VALVE, Axle lock

3.5 Electrical Component Parts List

Micro Relay







3.5 Electrical Component Parts List

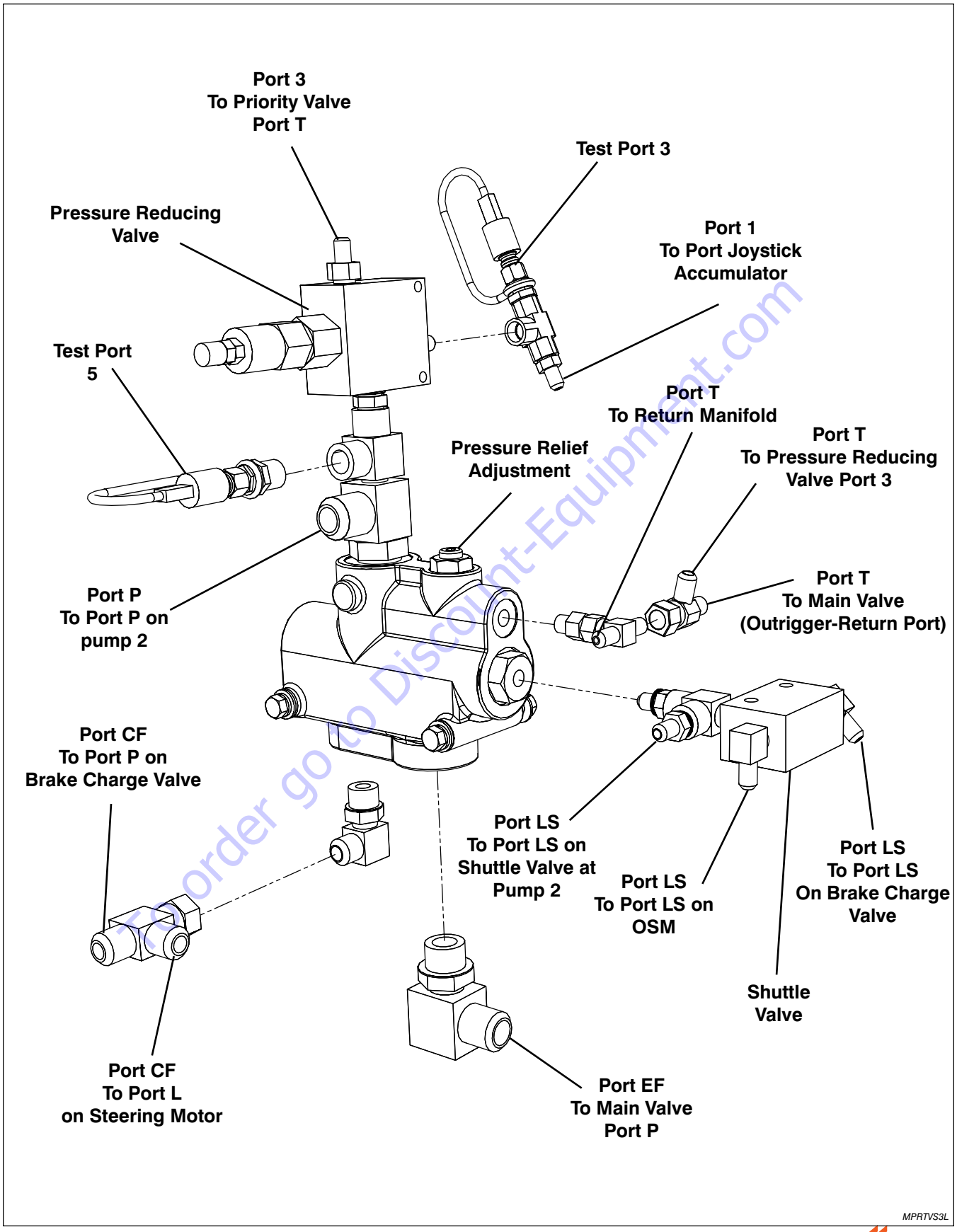
Index No.	Skyjack Part No.	Qty.	Description
CB11	408526	1	CIRCUIT BREAKER, Self resetting (10 A), Diverter Valve power
CB15	408527	1	CIRCUIT BREAKER, Self resetting (20 A), Light power
CB16	408527	1	CIRCUIT BREAKER, Self resetting (20 A), Heater power
CB17	408527	1	CIRCUIT BREAKER, Self resetting (20 A), Fan/Wiper/Cab Lights power
CB18	408527	1	CIRCUIT BREAKER, Self resetting (20 A), Fan/Wiper/Cab Lights power
CB22	408527	1	CIRCUIT BREAKER, Self resetting (20 A), A/C power
CB220	408529	2	CIRCUIT BREAKER, Self resetting (50A), Batteries
D##	102921	AR	DIODE (as required)
F3	156202	1	FUSE, 5 Amp (Keyswitch start)
F27	156202	1	FUSE, 5 Amp (Keyswitch ACC 2)
F28	197236	1	FUSE, 15 Amp (DEF line heater relay)
F29	197236	1	FUSE, 15 Amp (DEF Supply module heater relay)
F30	170626	1	FUSE, 10 Amp (Aftertreatment sensor supply)
F31	197237	1	FUSE, 20 Amp (Signal lights)
F32	170626	1	FUSE, 10 Amp (Outrigger)
F33	156202	1	FUSE, 5 Amp (Diverter valve)
F34	197237	1	FUSE, 20 Amp (Rear axle stabilizer)
F35	170626	1	FUSE, 10 Amp (Dash power)
F36	170626	1	FUSE, 10 Amp (Parking brake/steering)
F37	156202	1	FUSE, 5 Amp (Keyswitch ACC 2)
F38	156202	1	FUSE, 5 Amp
F39	156202	1	FUSE, 5 Amp (Transmission shifter)
F40	156202	1	FUSE, 5 Amp (Ignition switch)
F64	409873	1	FUSE, 4 Amp (Top wiper)
F66	409873	1	FUSE, 4 Amp (Front wiper)
F70	409873	1	FUSE, 4 Amp (Rear wiper)
F279	407087	1	FUSE, 30 Amp
F300	138094	1	FUSE, 250 Amp (Grid Heater)
K1	196618	1	RELAY, Transmission disconnect
K2		1	
K3	196618	1	RELAY, Parking brake holding
K4	196618	1	RELAY, Steering/Park brake/dash power
K5	196618	1	RELAY, Axle lock/ Frame levelling
K6	196618	1	RELAY, Outriggers diverter valve
K7	196618	1	RELAY, Signal lights
K8	196618	1	RELAY, Aftertreatment sensors power

Parts list continued on following page.

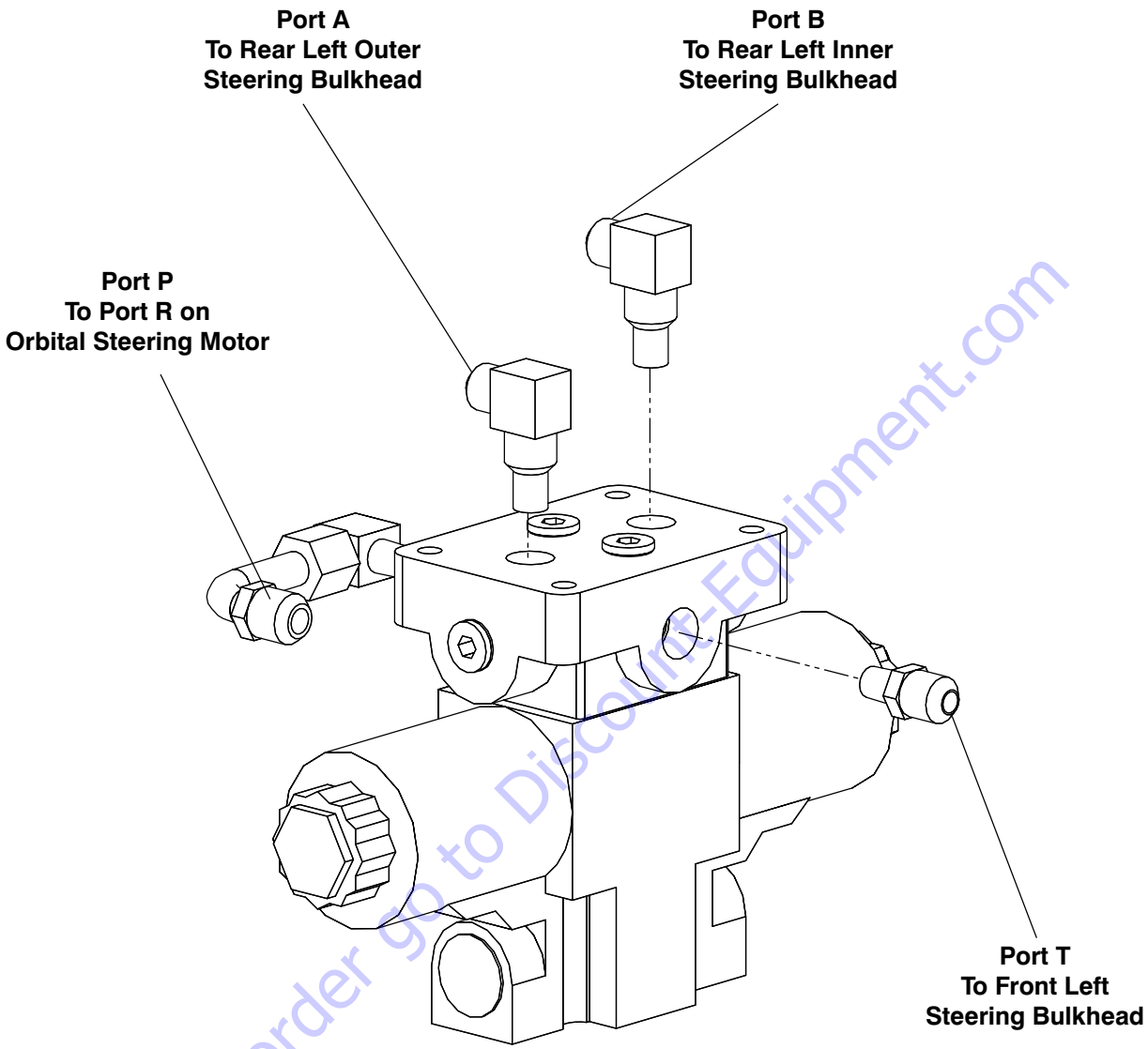
3.5 Electrical Component Parts List (Continued)

Index No.	Skyjack Part No.	Qty.	Description
			Parts list continued from previous page.
K9	196618	1	RELAY, DEF supply module heater
K10	196618	1	RELAY, DEF line heaters
K13	403275	1	RELAY, 3-way diverter valve
K14	403275	1	RELAY, 3-way diverter valve
K15		1	RELAY, Road lights/Turn signals
K16		1	RELAY, Enclosed cab
K17		1	RELAY, Aux Light
K18	-	1	RELAY, Operating light
K20	196618	1	RELAY, Neutral safety lockout
K220		1	RELAY, Starter solenoid
K223		1	RELAY, Starter lockout
K300		1	RELAY, Grid heater
K-PASV		1	RELAY, Positive Air Shutoff
M	409156	1	HEATER, Optional
M1	409107	1	HOUR METER
M2	407726	1	GAUGE, S-W Fuel level
M3	407730	1	GAUGE, 140-320 Transmission oil temperature

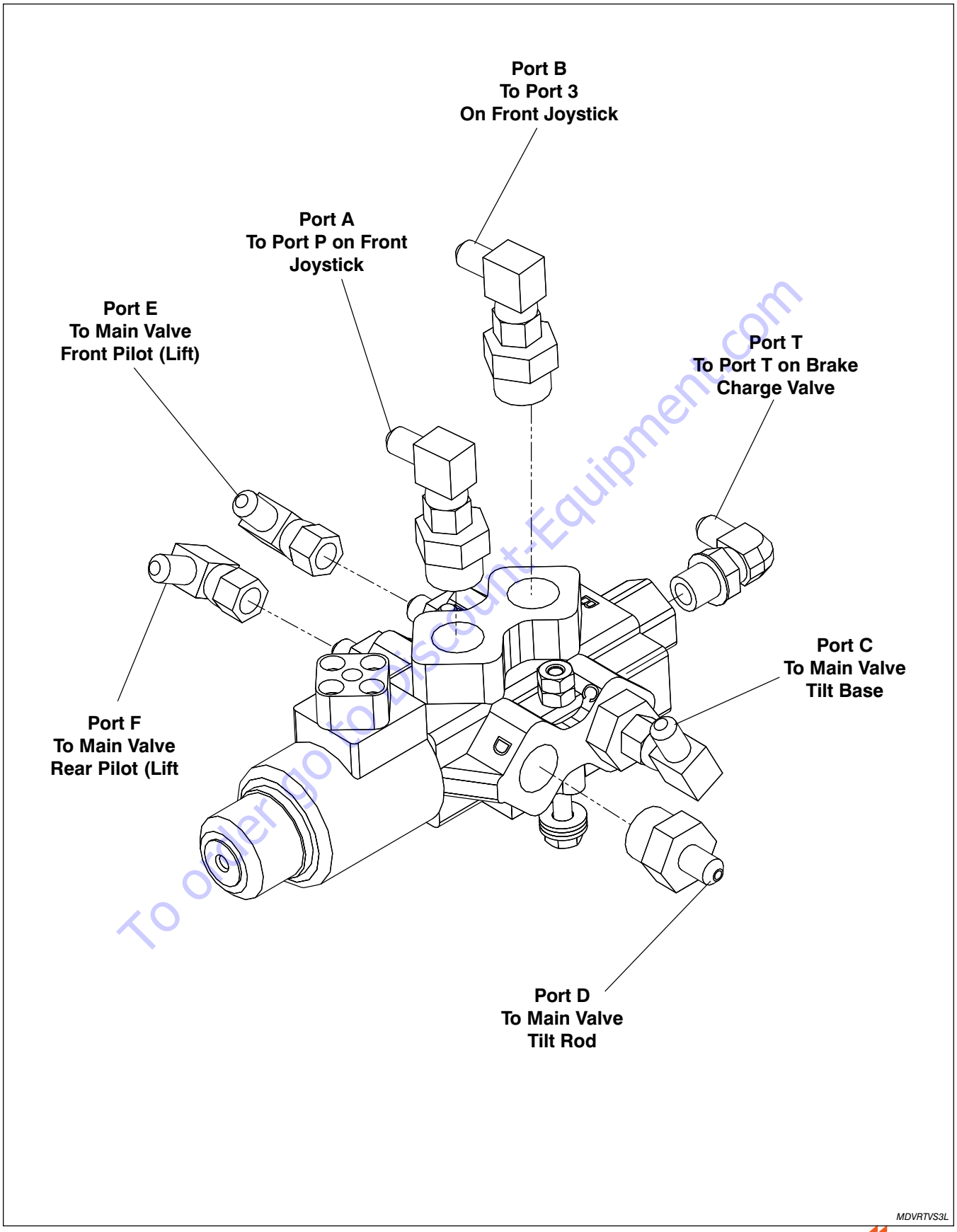
3.6 Priority Valve and Port Identifications



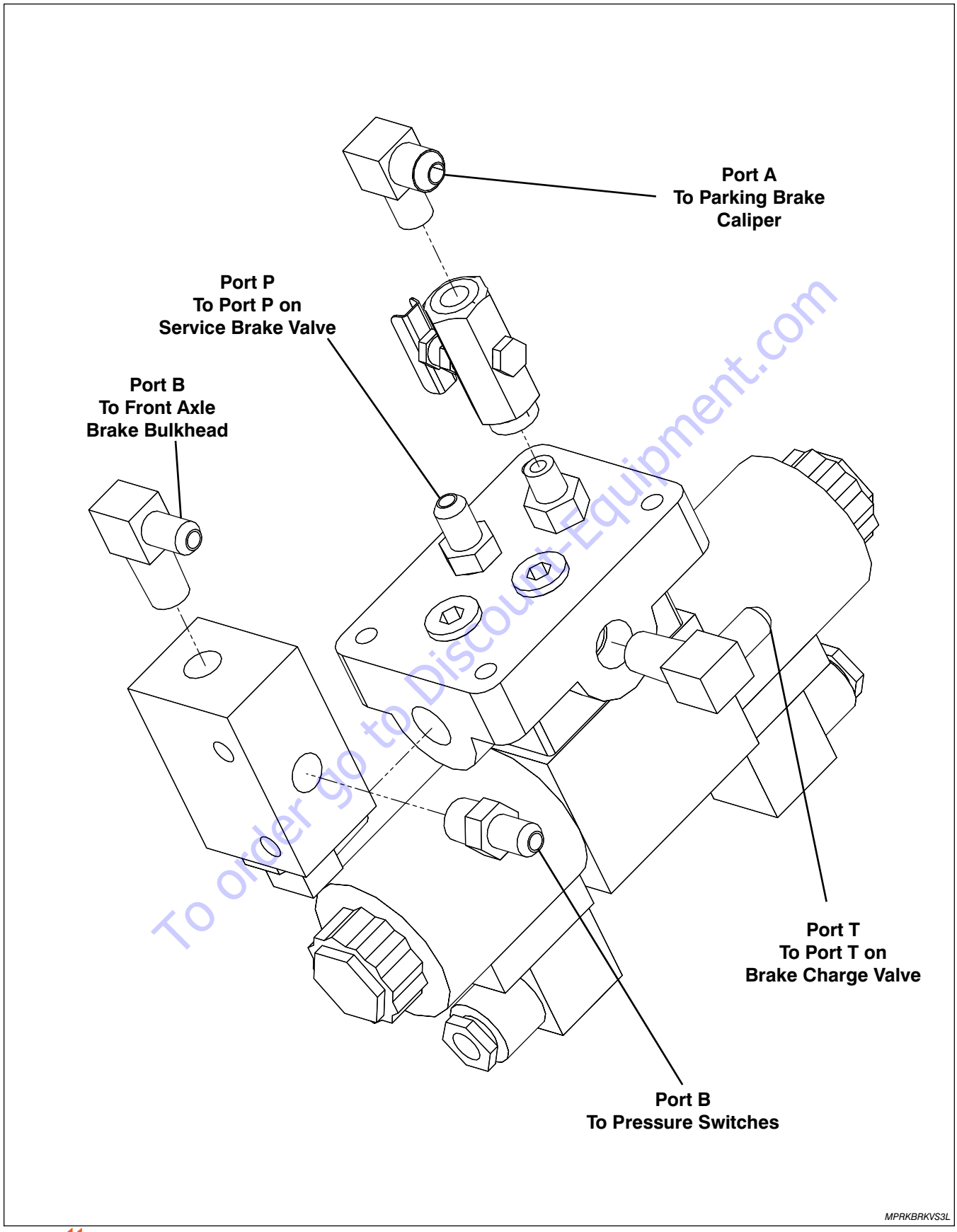
3.7 Steering Valve and Port Identifications



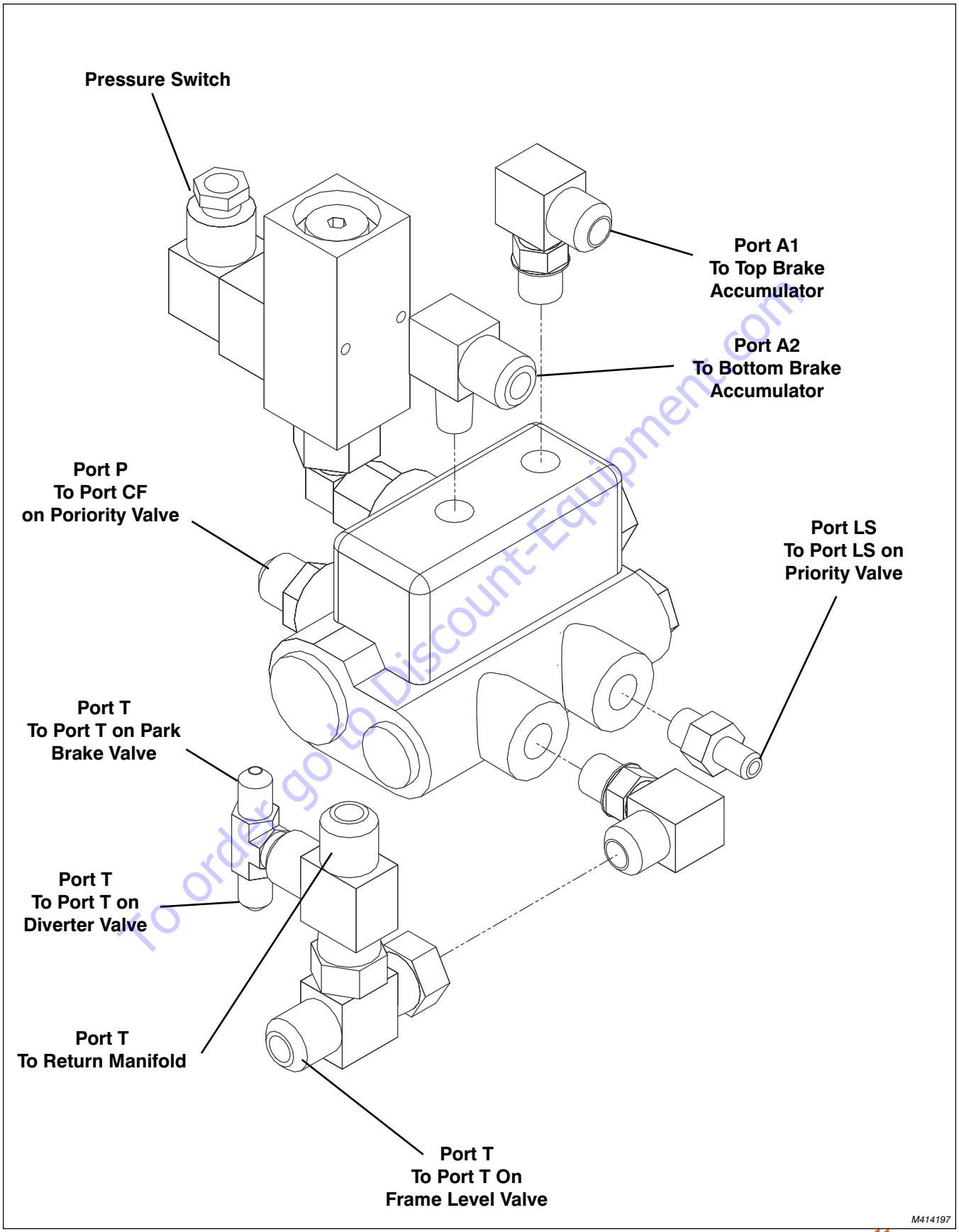
3.8 Diverter Valve and Port Identifications



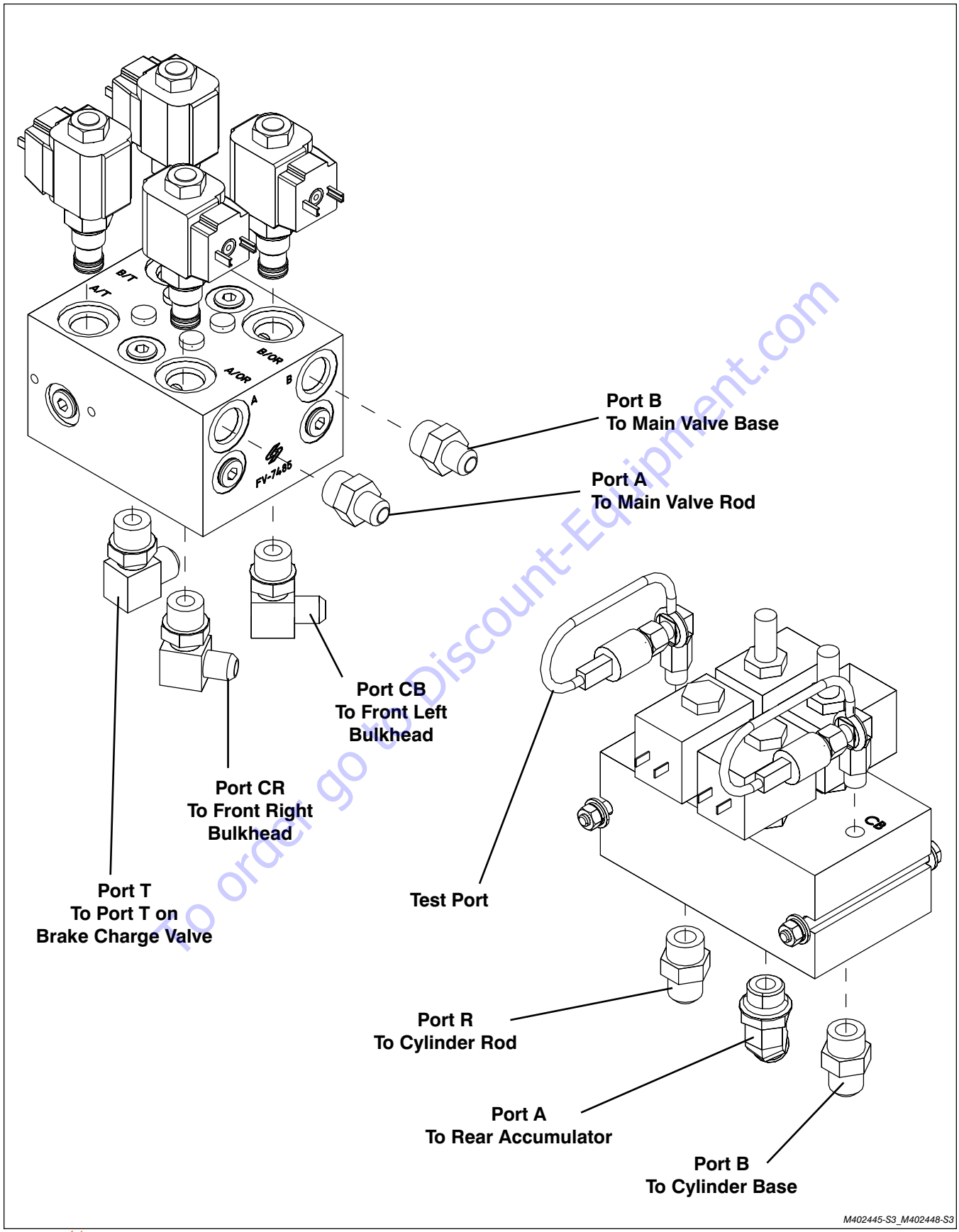
3.9 Parking Brake Valve and Port Identifications



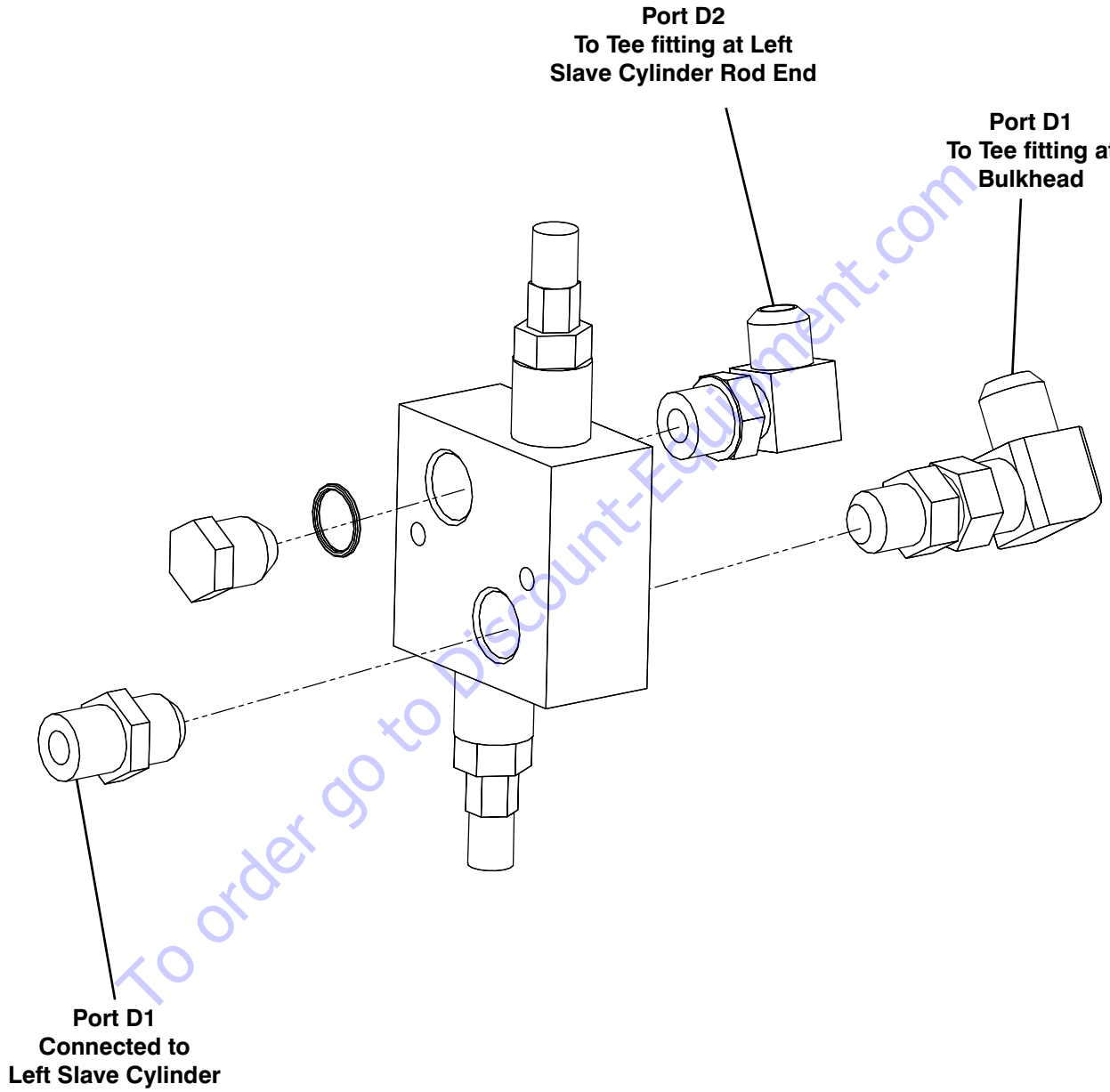
3.10 Brake Charge Valve and Port Identifications



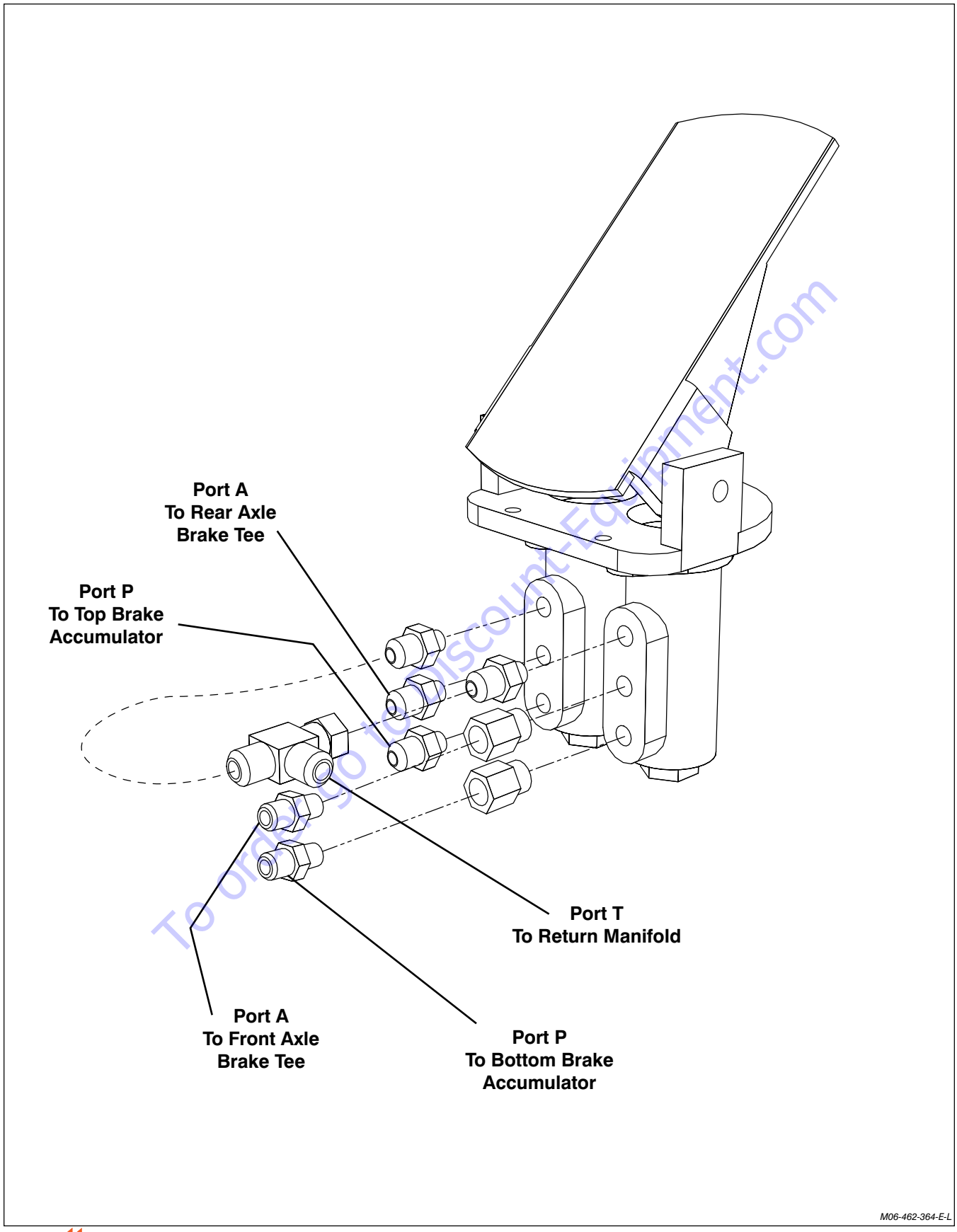
3.11 Frame Level and Axle Lock Valves and Port Identifications



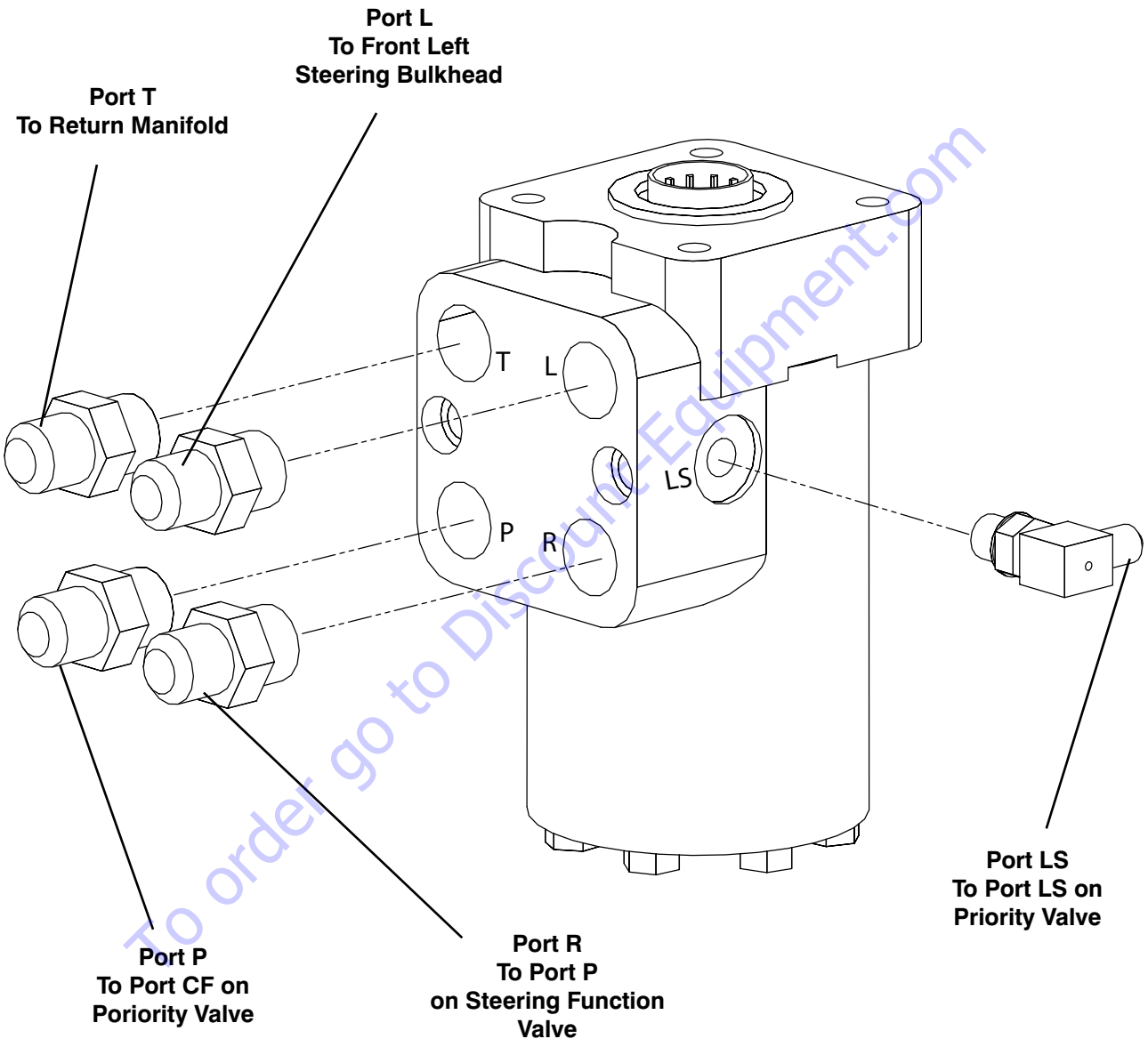
3.12 Cross-Over Relief Valve and Port Identifications



3.13 Dual Charge Brake Pedal and Port Identifications



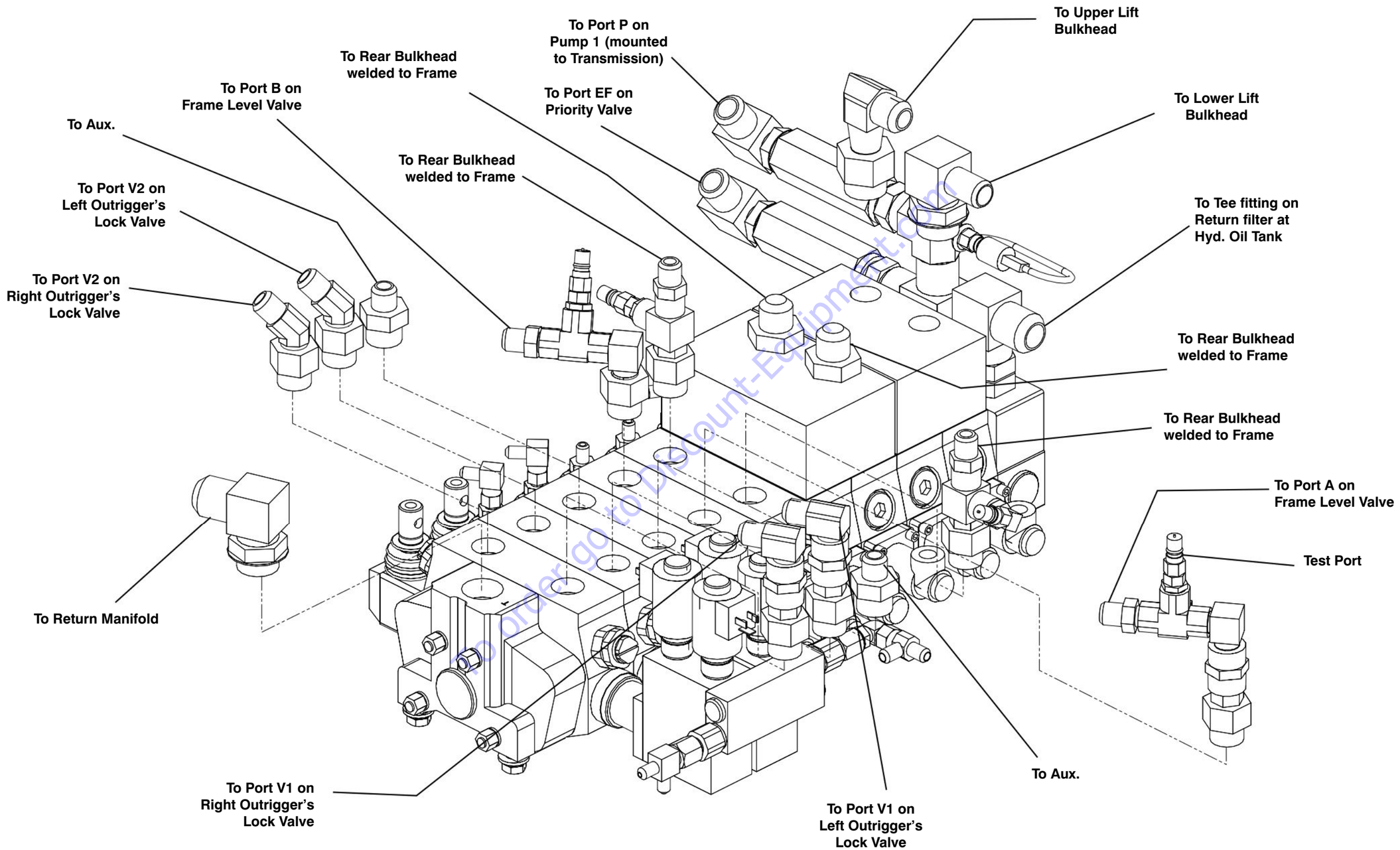
3.14 Orbital Steering Motor and Port Identifications



M213-1085-E-1

3.15a Main Valve and Main Ports Identifications

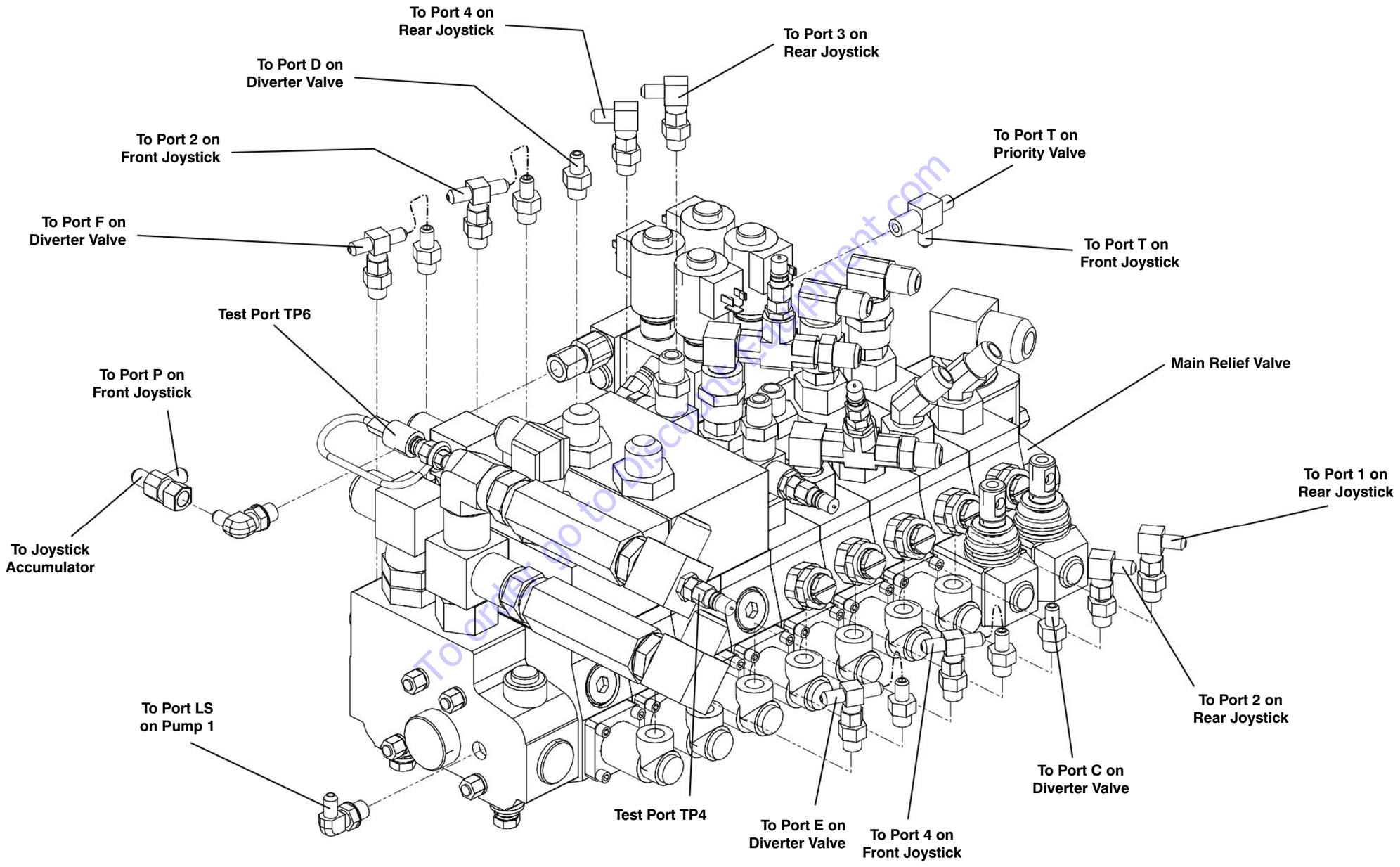
A	B	C	D	E	F	G	H



V W X Y Z

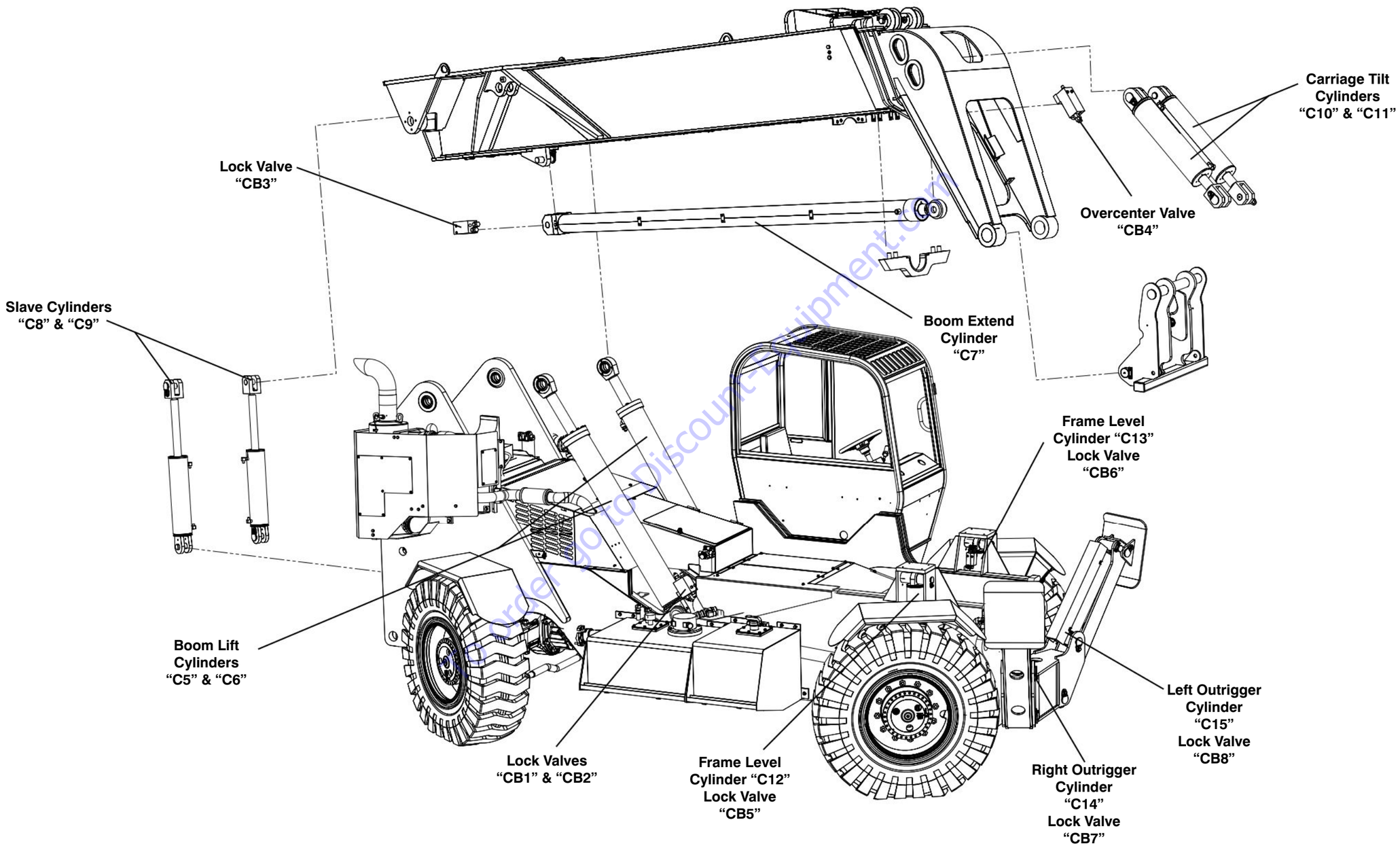
MDS16-S3-2

3.15b Main Valve and Pilot Ports Identifications



3.16 Hydraulic Cylinders Identification

A	B	C	D	E	F	G	H

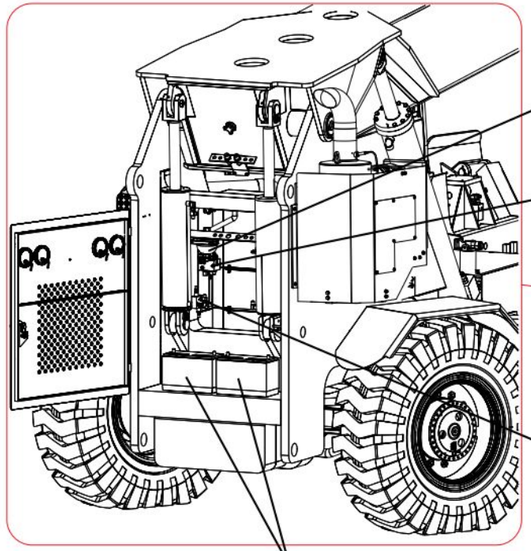


V
W
X
Y
Z

ZB20044_T4F_Hyd_Cyl_ID

3.17 Hydraulic Manifolds Location

A	B	C	D	E	F	G	H

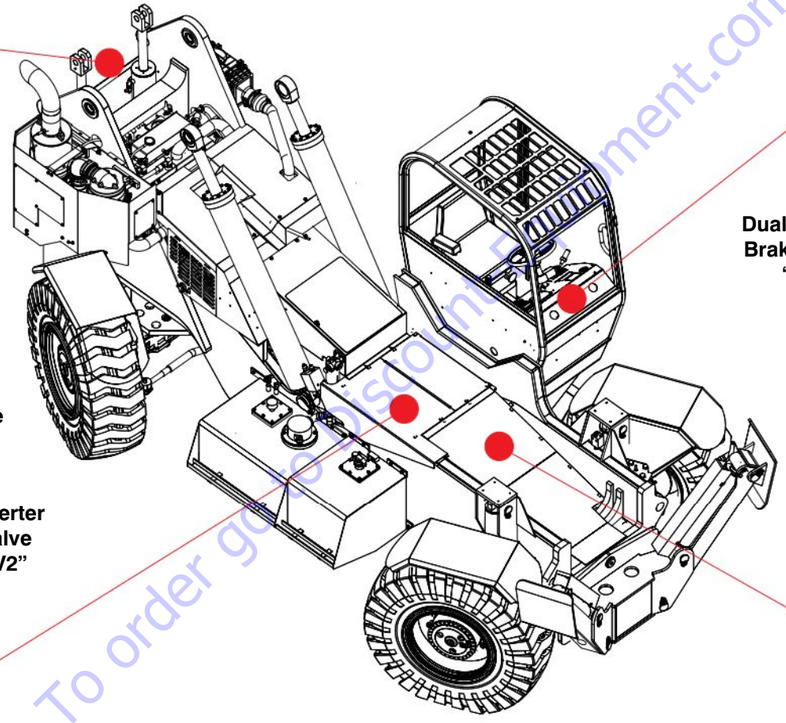


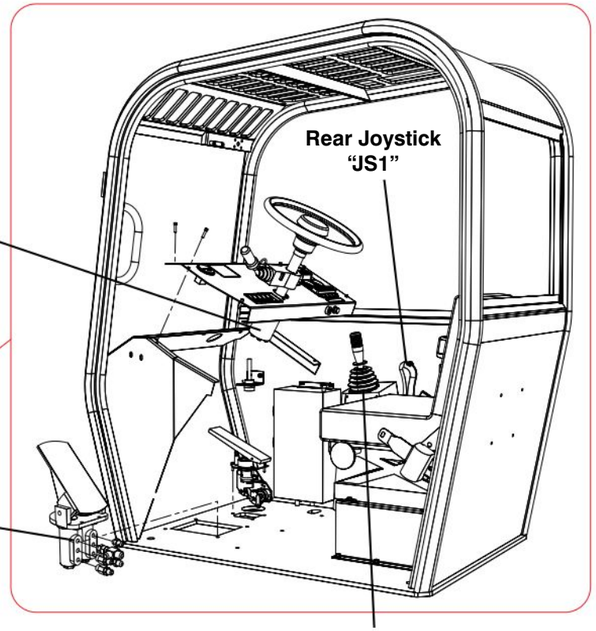
Batteries

Axle Lock Charge Accumulator "ACC4"

Axle Lock Control Vavle

Crossover Relief Valve "CRV1"





Rear Joystick "JS1"

Orbital Steering Motor "OSM1"

Dual Charge Brake Pedal "V4"

Front Joystick "JS2"

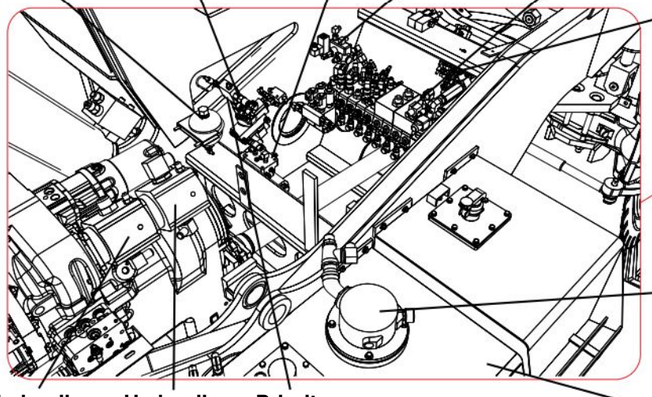
Pilot Pressure Accumulator "ACC1"

Pressure Reducing Valve "PRV1"

Steer Function Valve "V1"

Brake Charge Valve "V3"

Main Valve Assembly



Diverter Valve "V2"

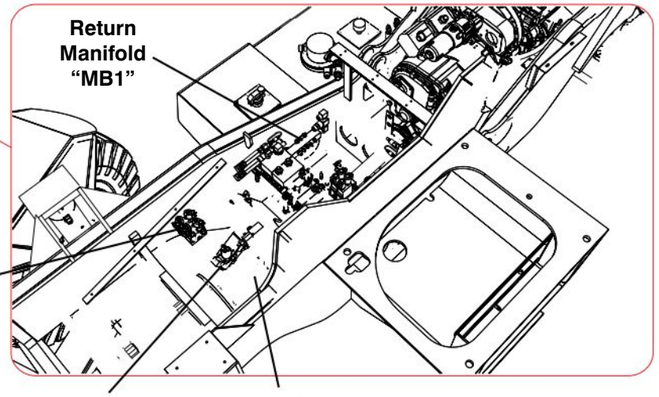
Return Line Filter "F1"

Suction Strainer "STR1"

Hydraulic Pump "P1"

Hydraulic Pump "P2"

Priority Valve "PRT1"



Return Manifold "MB1"

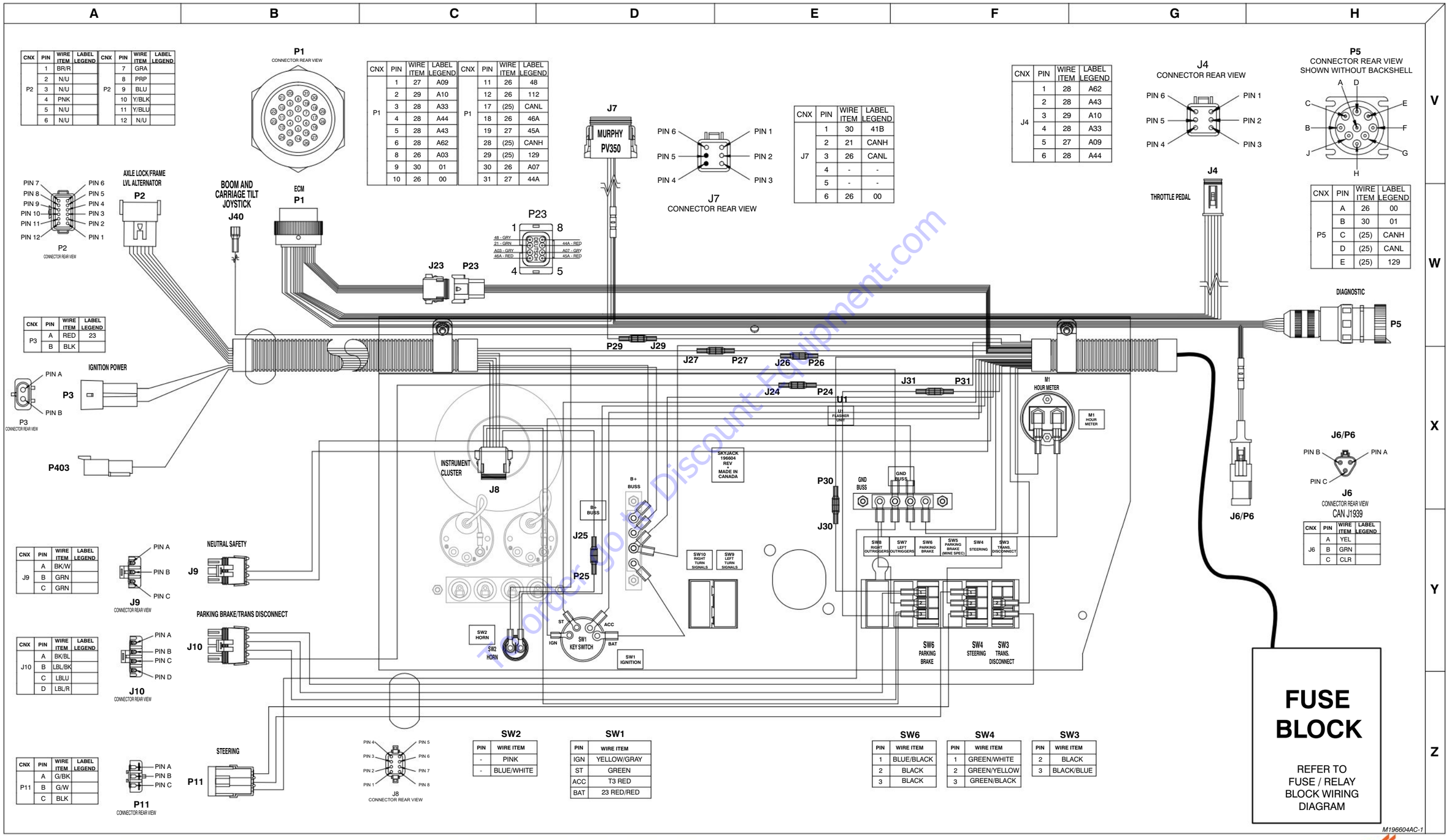
Frame Level Control Manifold

Park Brake Valve "V5"

Brake Charge Accumulators "ACC2" & "ACC3"

ZB2044-T4F-S3-V-1

3.18 Instrument Panel Layout Diagram (Base Model)



CNX	PIN	WIRE ITEM	LABEL LEGEND
P2	1	BR/R	
	2	N/U	
	3	N/U	
	4	PNK	
	5	N/U	
	6	N/U	
P2	7	GRA	
	8	PRP	
	9	BLU	
	10	Y/BLK	
	11	Y/BLU	
	12	N/U	

CNX	PIN	WIRE ITEM	LABEL LEGEND
P1	1	27	A09
	2	29	A10
	3	28	A33
	4	28	A44
	5	28	A43
	6	28	A62
	8	26	A03
	9	30	01
	10	26	00
P1	11	26	48
	12	26	112
	17	(25)	CANL
	18	26	46A
	19	27	45A
	28	(25)	CANH
	29	(25)	129
	30	26	A07
	31	27	44A

CNX	PIN	WIRE ITEM	LABEL LEGEND
J7	1	30	41B
	2	21	CANH
	3	26	CANL
	4	-	-
	5	-	-
	6	26	00

CNX	PIN	WIRE ITEM	LABEL LEGEND
J4	1	28	A62
	2	28	A43
	3	29	A10
	4	28	A33
	5	27	A09
	6	28	A44

CNX	PIN	WIRE ITEM	LABEL LEGEND
P5	A	26	00
	B	30	01
	C	(25)	CANH
	D	(25)	CANL
	E	(25)	129

CNX	PIN	WIRE ITEM	LABEL LEGEND
P3	A	RED	23
	B	BLK	

CNX	PIN	WIRE ITEM	LABEL LEGEND
J9	A	BK/W	
	B	GRN	
	C	GRN	

CNX	PIN	WIRE ITEM	LABEL LEGEND
J10	A	BK/BL	
	B	LBL/BK	
	C	LBLU	
	D	LBL/R	

CNX	PIN	WIRE ITEM	LABEL LEGEND
P11	A	G/BK	
	B	G/W	
	C	BLK	

CNX	PIN	WIRE ITEM	LABEL LEGEND
J6	A	YEL	
	B	GRN	
	C	CLR	

SW2

PIN	WIRE ITEM
-	PINK
-	BLUE/WHITE

SW1

PIN	WIRE ITEM
IGN	YELLOW/GRAY
ST	GREEN
ACC	T3 RED
BAT	23 RED/RED

SW6

PIN	WIRE ITEM
1	BLUE/BLACK
2	BLACK
3	BLACK

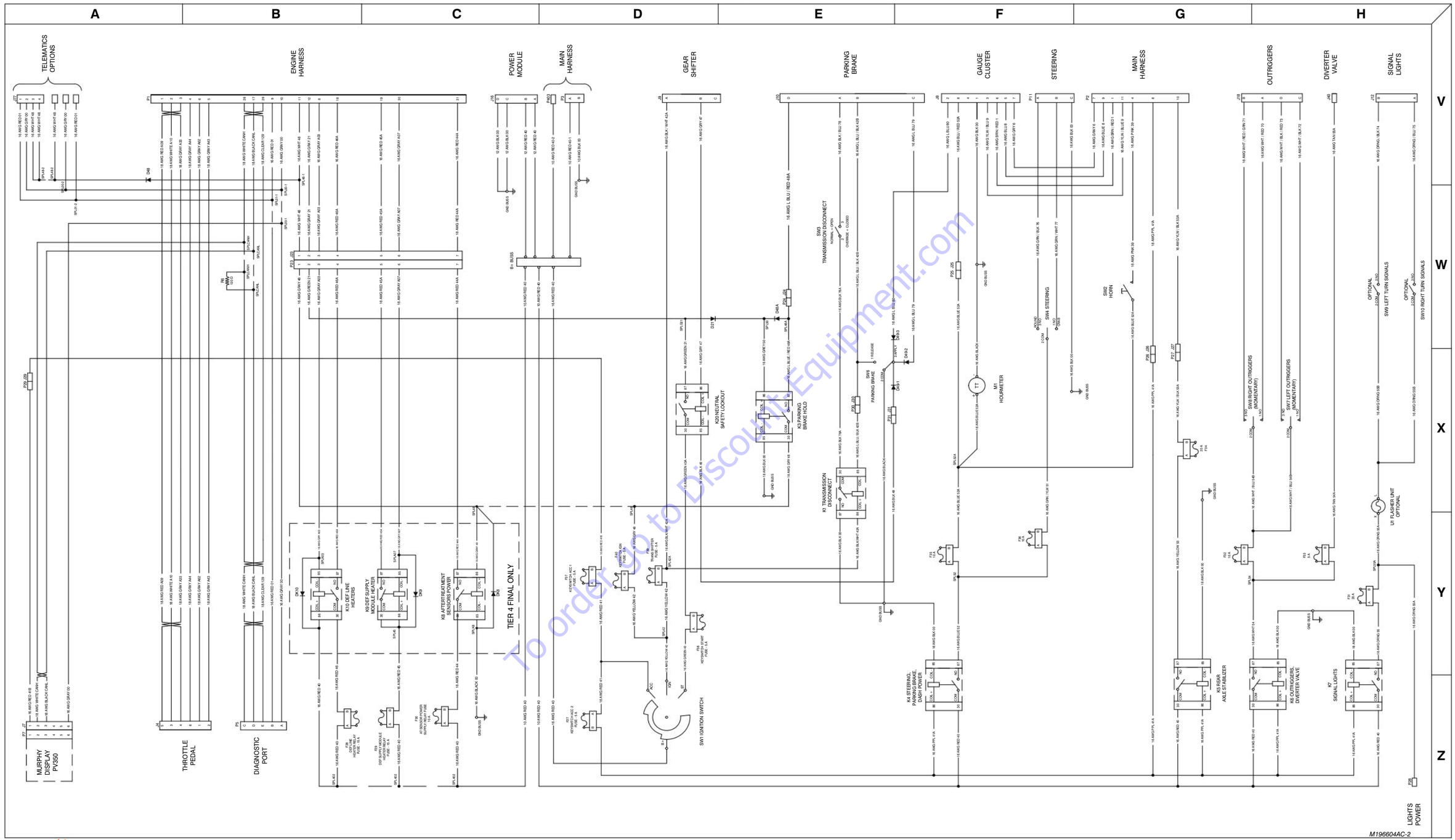
SW4

PIN	WIRE ITEM
1	GREEN/WHITE
2	GREEN/YELLOW
3	GREEN/BLACK

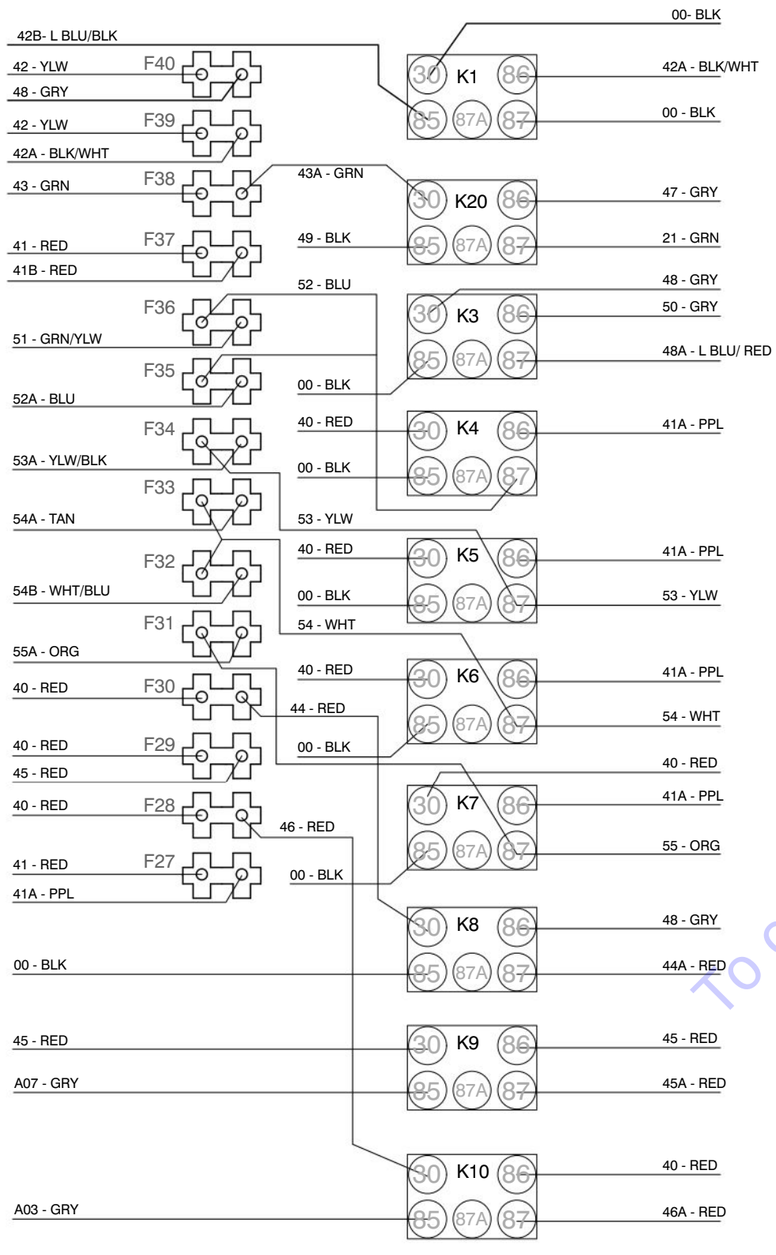
SW3

PIN	WIRE ITEM
2	BLACK
3	BLACK/BLUE

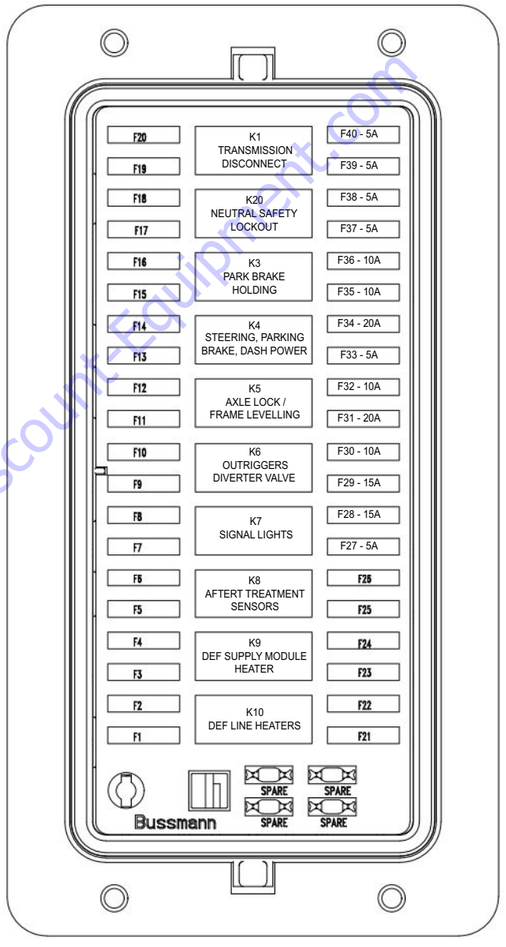
3.19 Instrument Panel Wiring Diagram (Base Model)



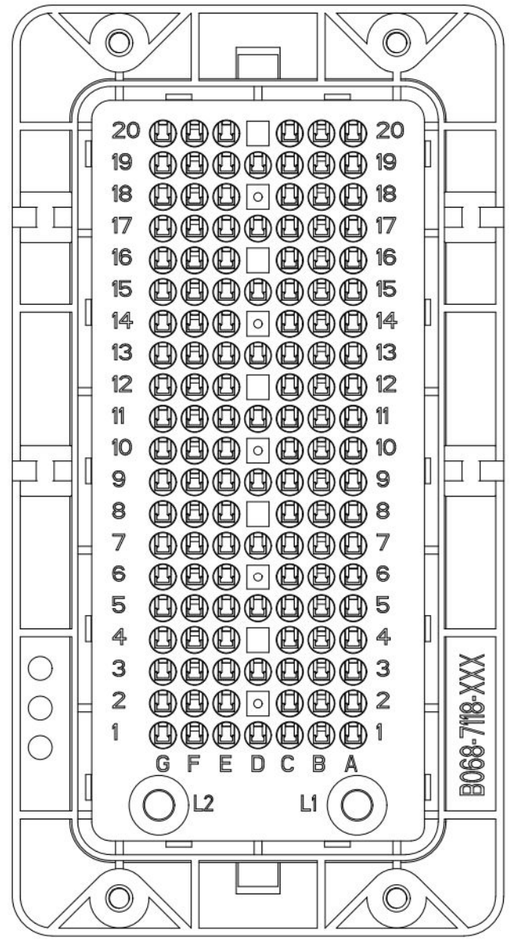
3.20 Fuse & Relay Box Layout Diagram



RELAY/FUSE BLOCK FRONT VIEW

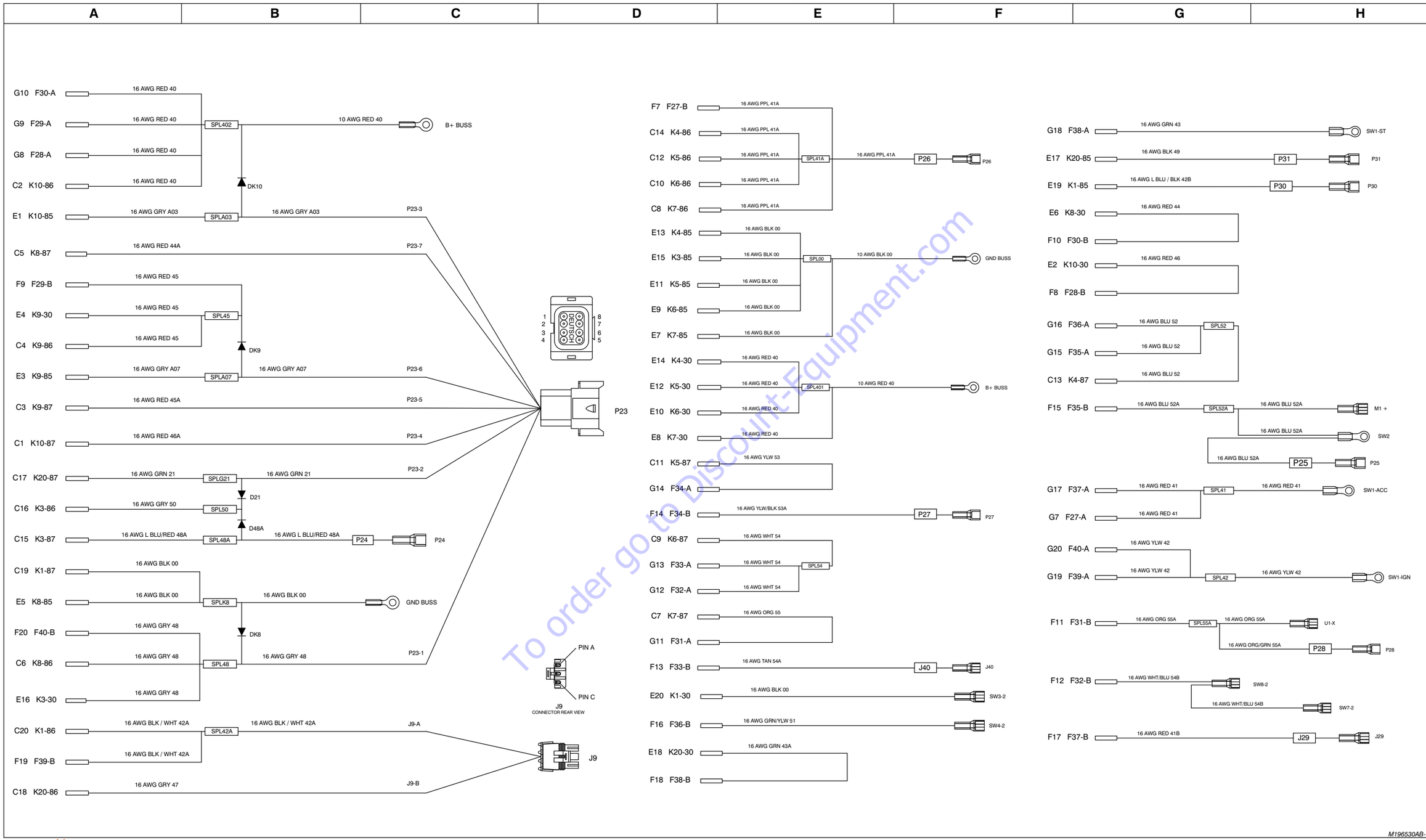


RELAY/FUSE BLOCK REAR VIEW



M196530AB-2

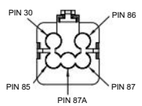
3.21 Fuse & Relay Box Wiring Diagram



3.22 Main Wiring Harness

CNX	PIN	WIRE COLOUR	ITEM	LABEL LEGEND
J225	30	GREEN	33	21
	85	GRN/RED	38	A76
	87A	-	-	-
	87	GREEN	33	21A
	86	GRN/WHITE	39	A83

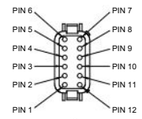
J225



CONNECTOR REAR VIEW

CNX	PIN	WIRE COLOUR	ITEM	LABEL LEGEND
J226	A	GRN/WHITE	39	A83
	B	GRN/RED	38	A76

CONNECTOR REAR VIEW
J226

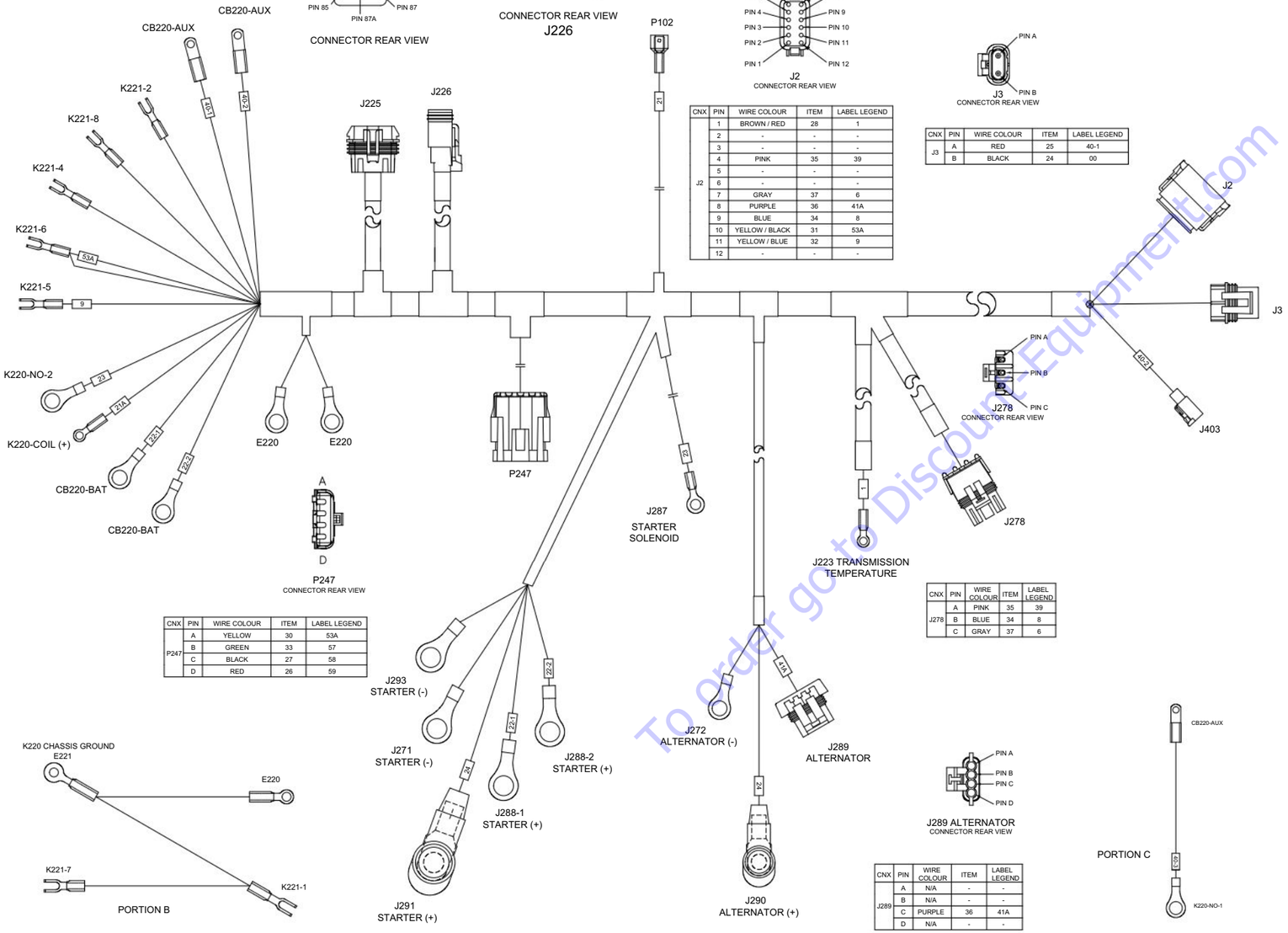


J2
CONNECTOR REAR VIEW

CNX	PIN	WIRE COLOUR	ITEM	LABEL LEGEND
J2	1	BROWN / RED	28	1
	2	-	-	-
	3	-	-	-
	4	PINK	35	39
	5	-	-	-
	6	-	-	-
	7	GRAY	37	6
	8	PURPLE	36	41A
	9	BLUE	34	8
	10	YELLOW / BLACK	31	53A
	11	YELLOW / BLUE	32	9
	12	-	-	-

J3
CONNECTOR REAR VIEW

CNX	PIN	WIRE COLOUR	ITEM	LABEL LEGEND
J3	A	RED	25	40-1
	B	BLACK	24	00



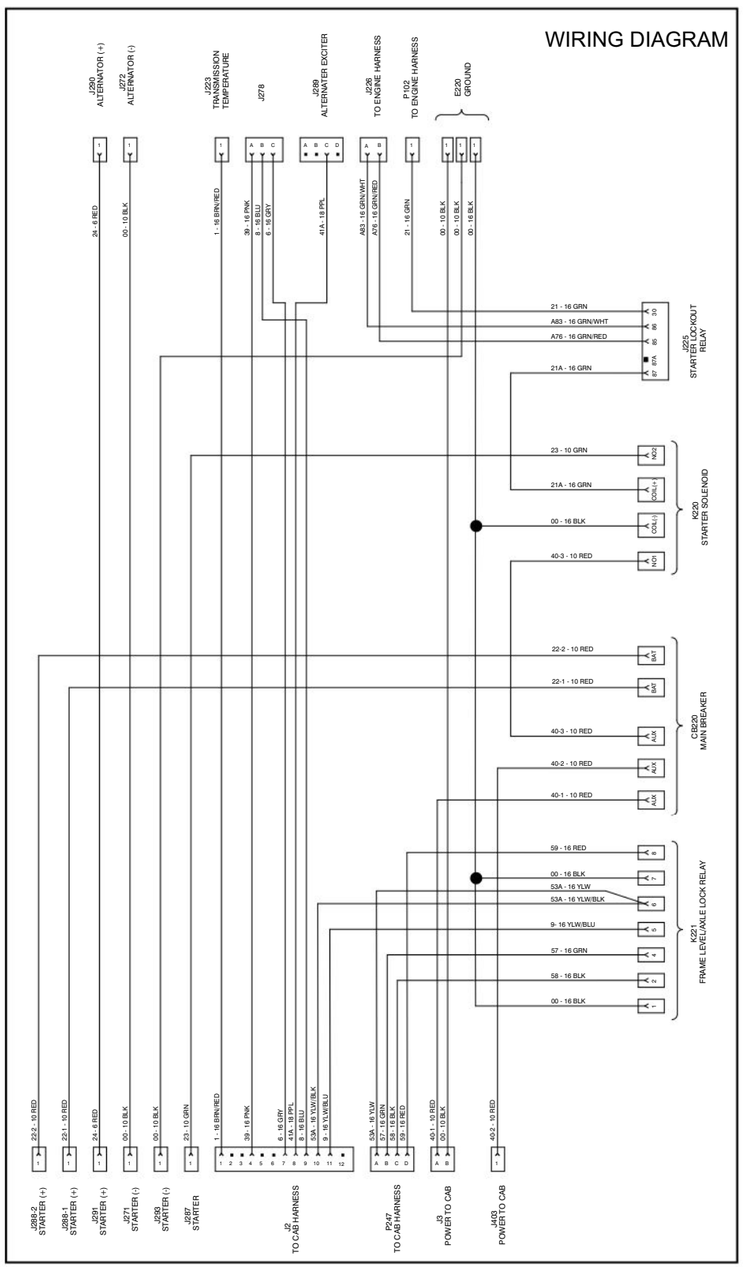
P247
CONNECTOR REAR VIEW

CNX	PIN	WIRE COLOUR	ITEM	LABEL LEGEND
P247	A	YELLOW	30	53A
	B	GREEN	33	57
	C	BLACK	27	58
	D	RED	26	59

CNX	PIN	WIRE COLOUR	ITEM	LABEL LEGEND
J278	A	PINK	35	39
	B	BLUE	34	8
	C	GRAY	37	6

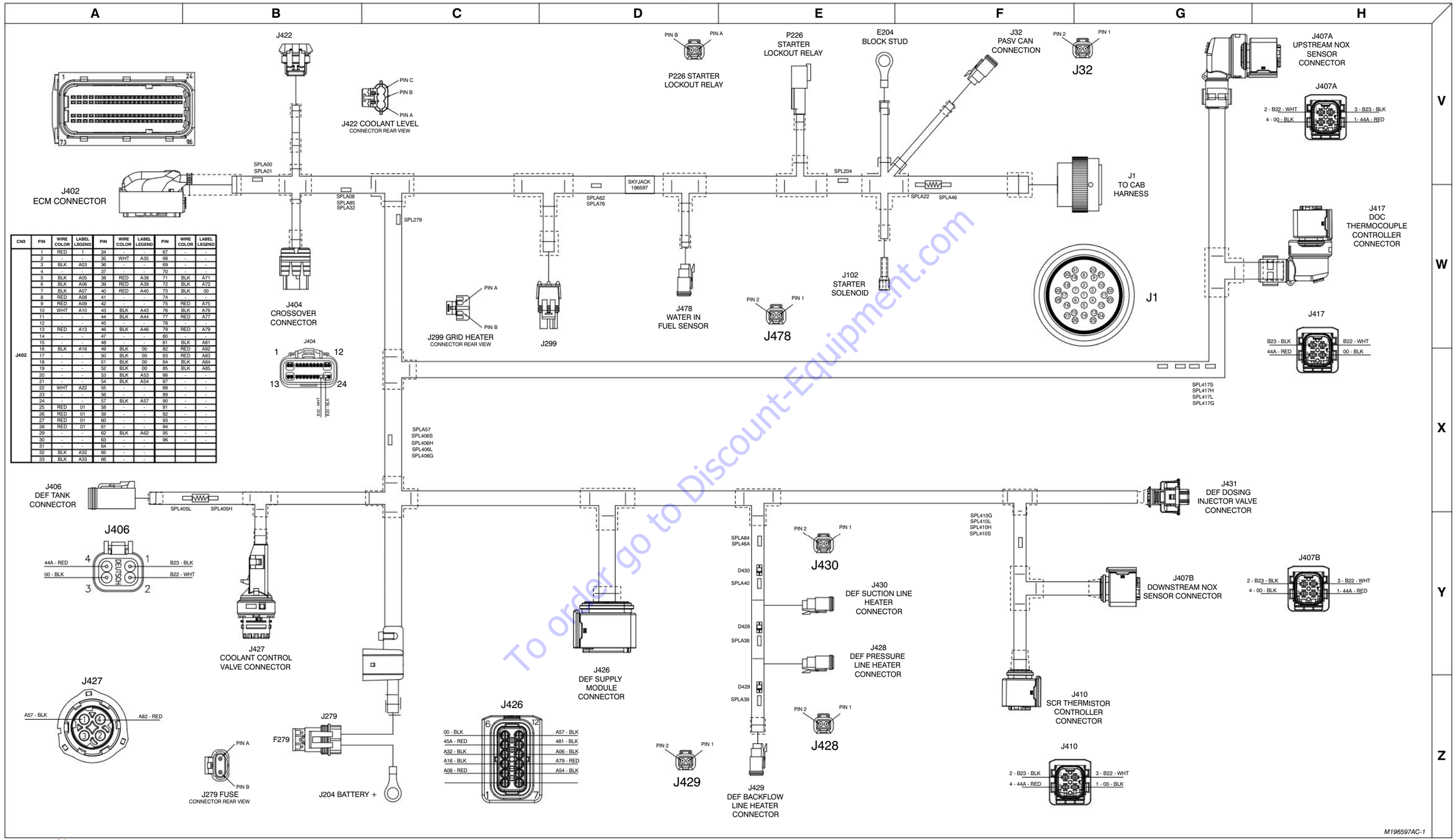
CNX	PIN	WIRE COLOUR	ITEM	LABEL LEGEND
J289	A	N/A	-	-
	B	N/A	-	-
	C	PURPLE	36	41A
	D	N/A	-	-

J289 ALTERNATOR
CONNECTOR REAR VIEW



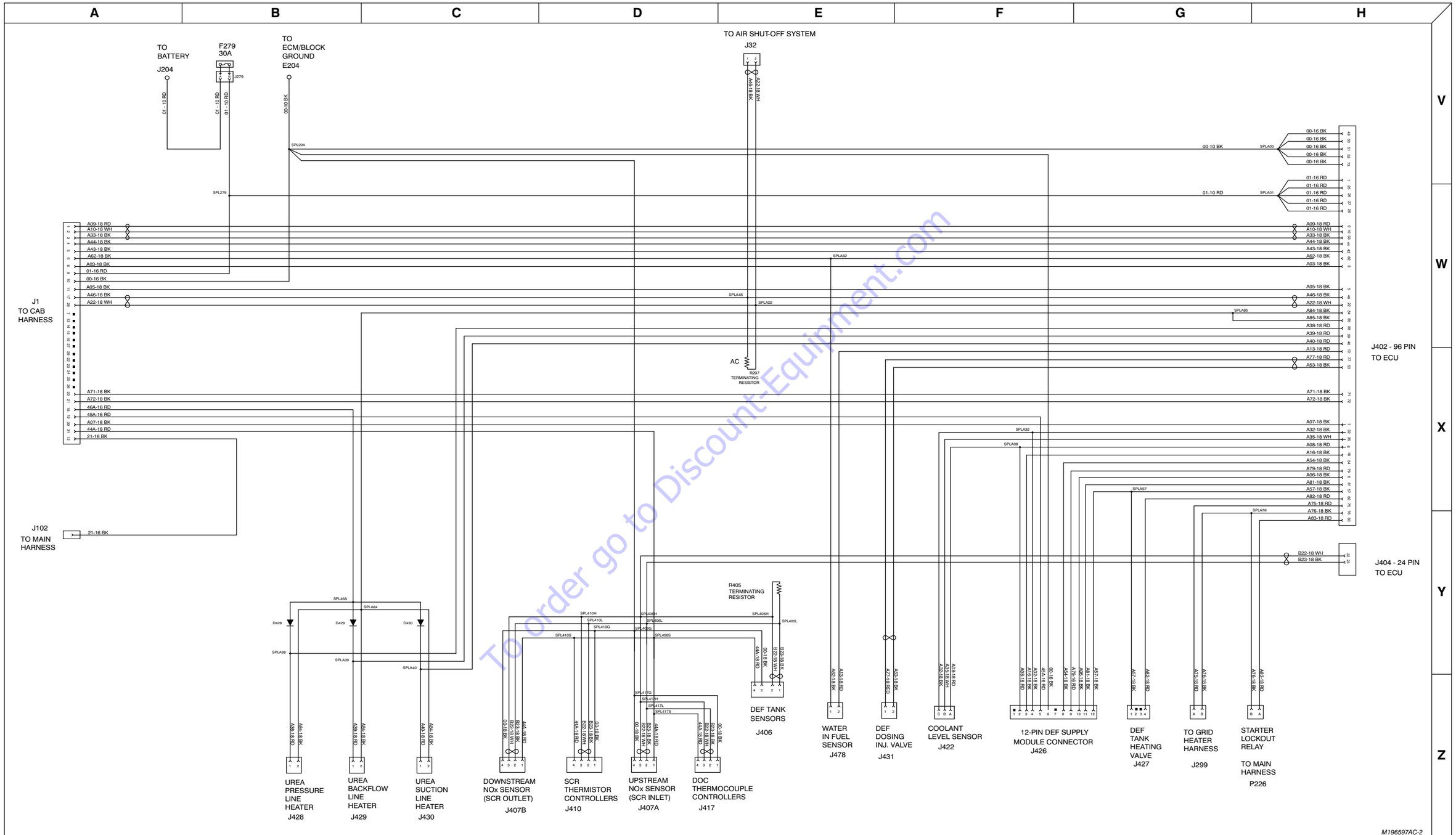
M196450AB-1

3.23 Engine Harness (QSB4.5)

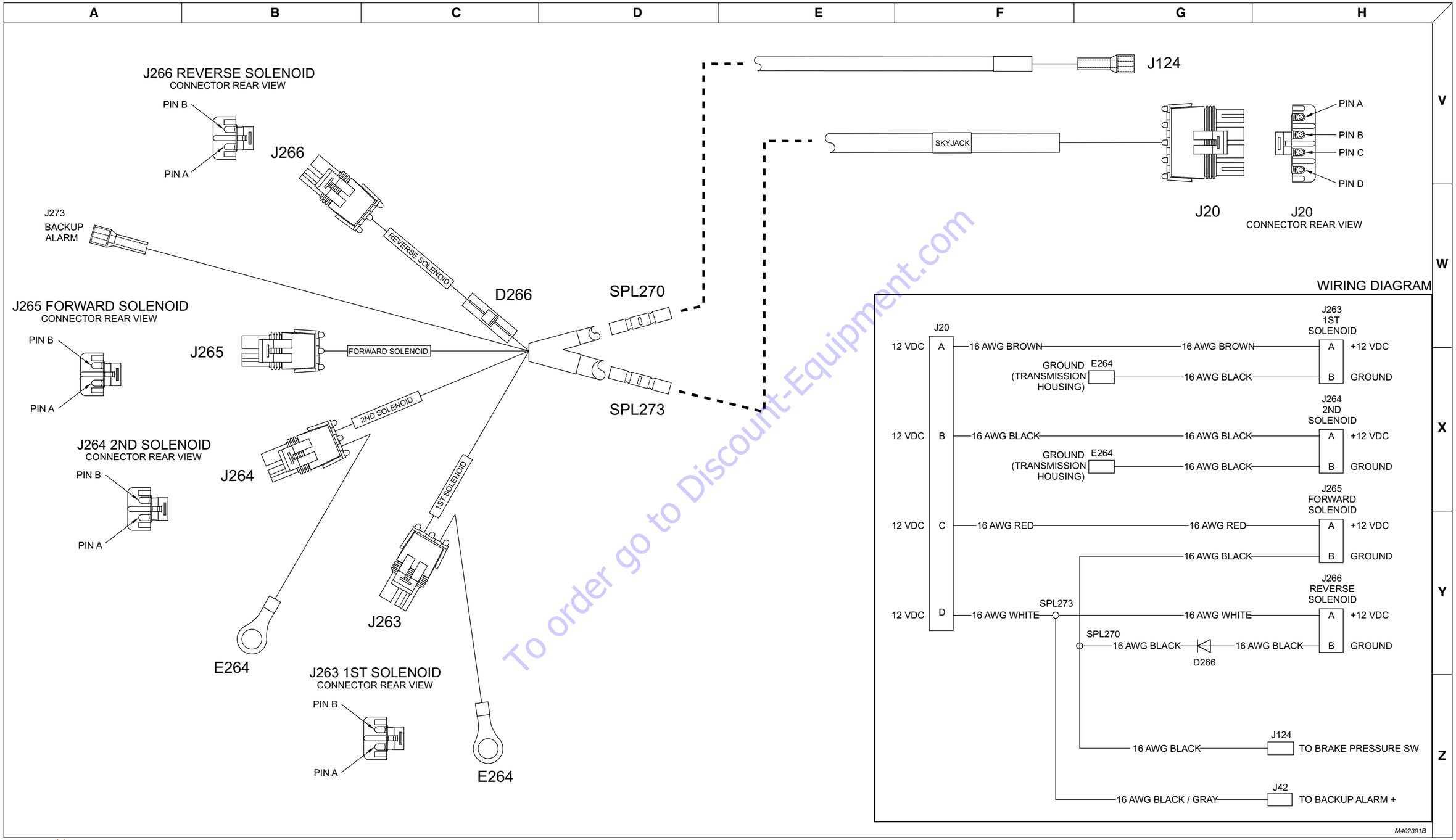


CNX	PIN	WIRE COLOR	LABEL LEGEND	PIN	WIRE COLOR	LABEL LEGEND	PIN	WIRE COLOR	LABEL LEGEND
J402	1	RED	1	34	-	-	67	-	-
	2	-	-	35	WHT	A35	68	-	-
	3	BLK	A03	36	-	-	69	-	-
	4	-	-	37	-	-	70	-	-
	5	BLK	A05	38	RED	A38	71	BLK	A71
	6	BLK	A06	39	RED	A39	72	BLK	A72
	7	BLK	A07	40	RED	A40	73	BLK	00
	8	RED	A08	41	-	-	74	-	-
	9	RED	A09	42	-	-	75	RED	A75
	10	WHT	A10	43	BLK	A43	76	BLK	A76
	11	-	-	44	BLK	A44	77	RED	A77
	12	-	-	45	-	-	78	-	-
	13	RED	A13	46	BLK	A46	79	RED	A79
	14	-	-	47	-	-	80	-	-
	15	-	-	48	-	-	81	BLK	A81
	16	BLK	A16	49	BLK	00	82	RED	A82
	17	-	-	50	BLK	00	83	RED	A83
	18	-	-	51	BLK	00	84	BLK	A84
	19	-	-	52	BLK	00	85	BLK	A85
	20	-	-	53	BLK	A53	86	-	-
	21	-	-	54	BLK	A54	87	-	-
	22	WHT	A22	55	-	-	88	-	-
	23	-	-	56	-	-	89	-	-
	24	-	-	57	BLK	A57	90	-	-
	25	RED	01	58	-	-	91	-	-
	26	RED	01	59	-	-	92	-	-
	27	RED	01	60	-	-	93	-	-
	28	RED	01	61	-	-	94	-	-
	29	-	-	62	BLK	A62	95	-	-
	30	-	-	63	-	-	96	-	-
	31	-	-	64	-	-			
	32	BLK	A32	65	-	-			
	33	BLK	A33	66	-	-			

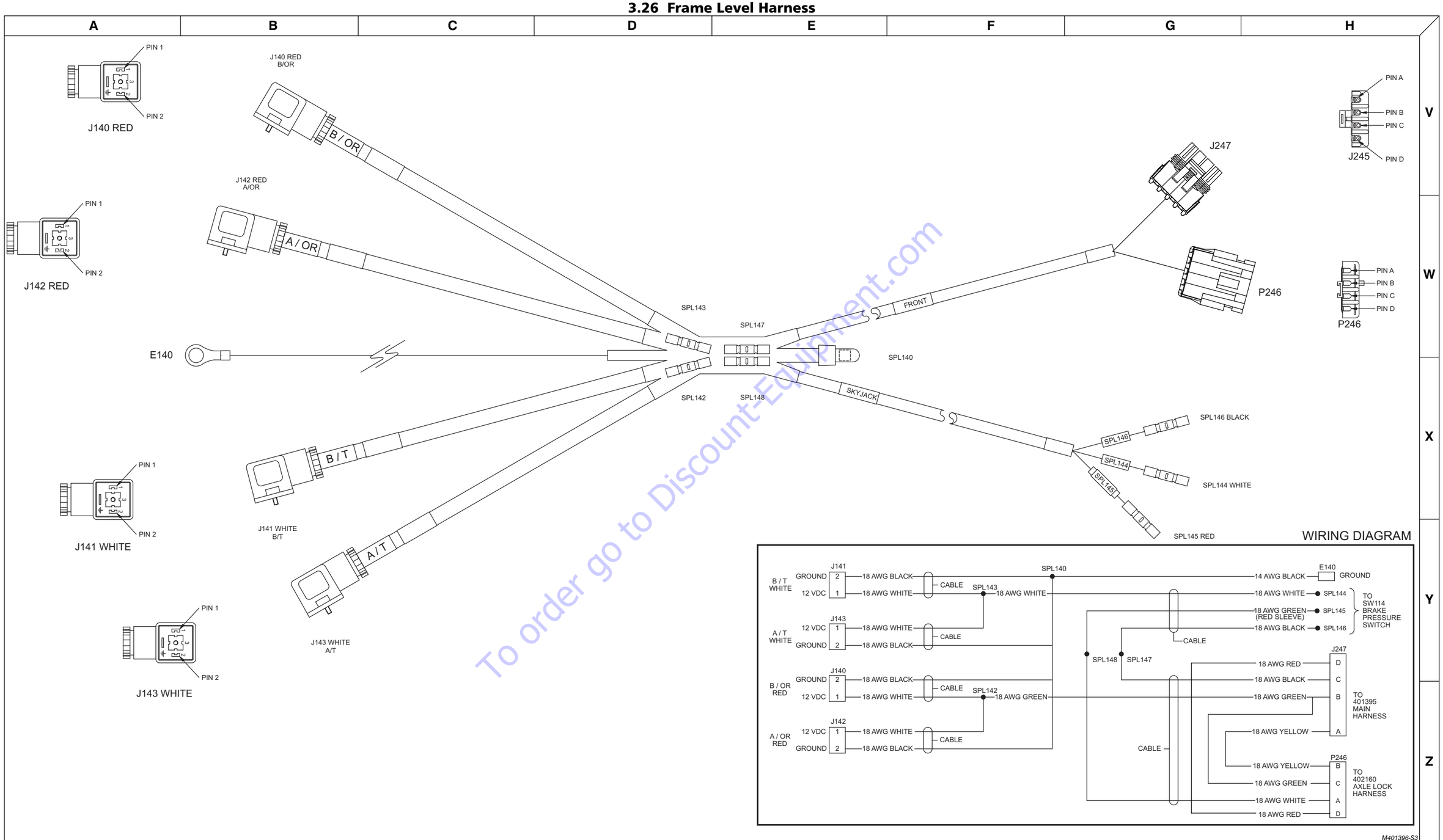
3.24 Engine Harness Wiring Diagram



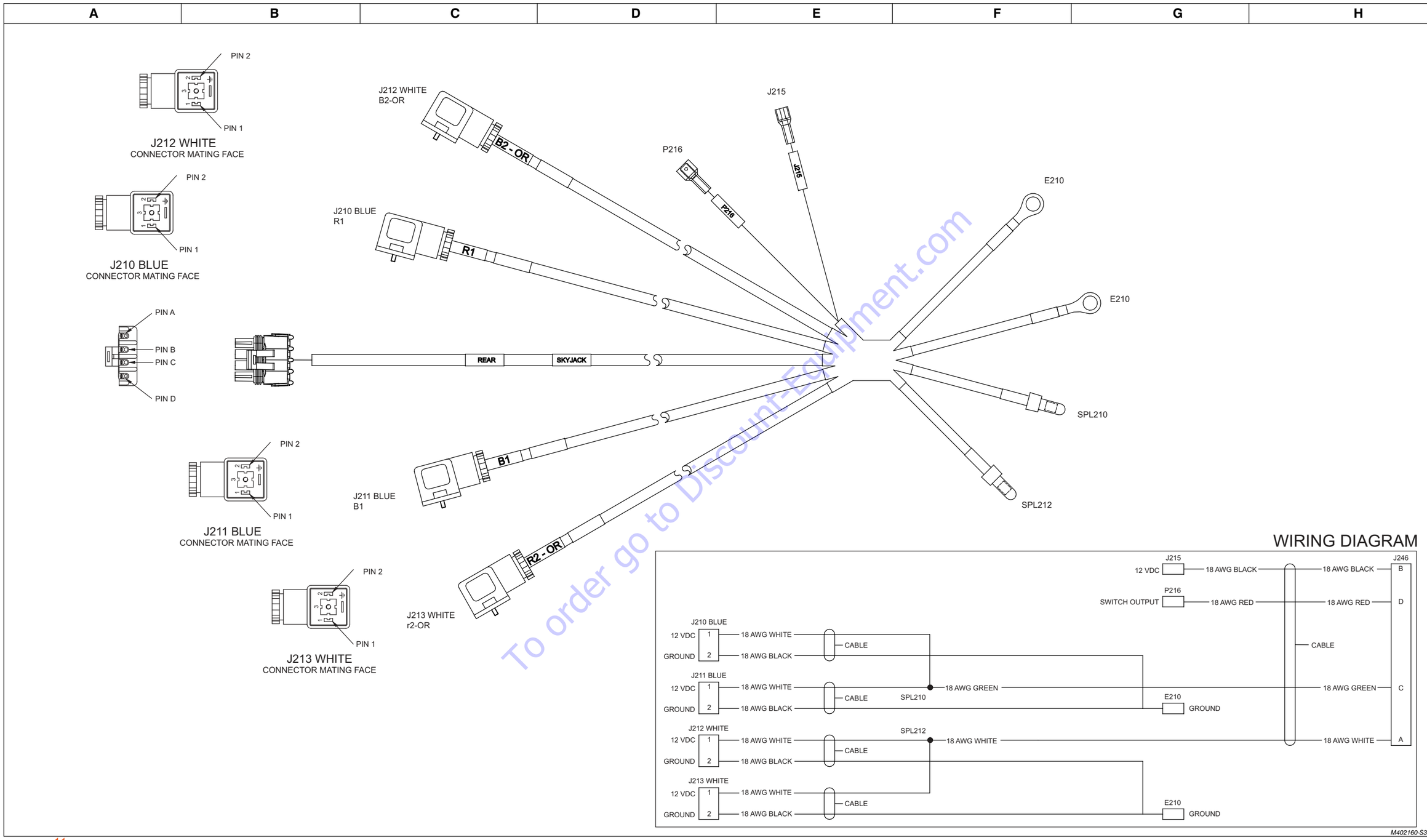
M196597AC-2



3.26 Frame Level Harness

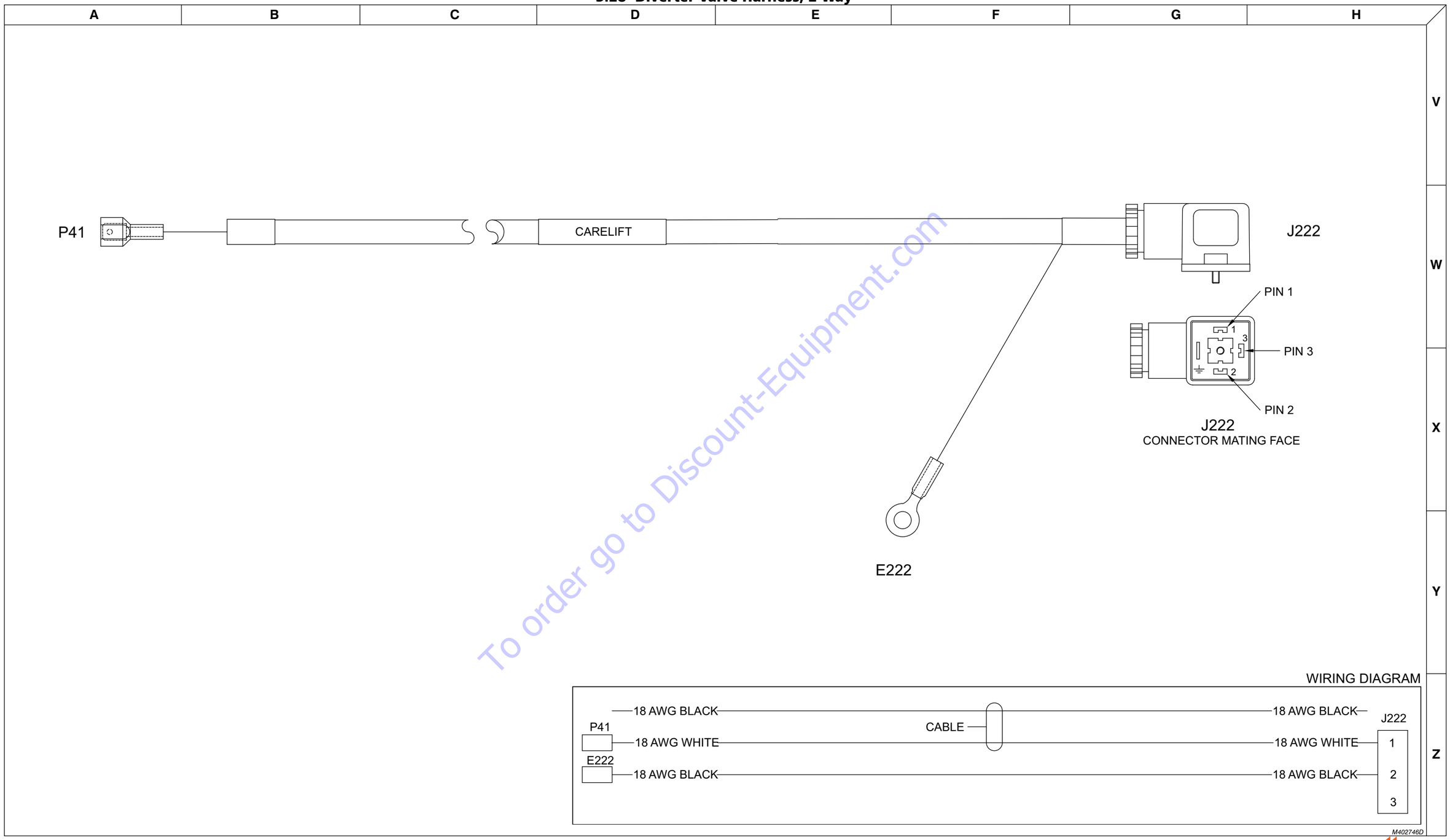


3.27 Axle Lock Harness

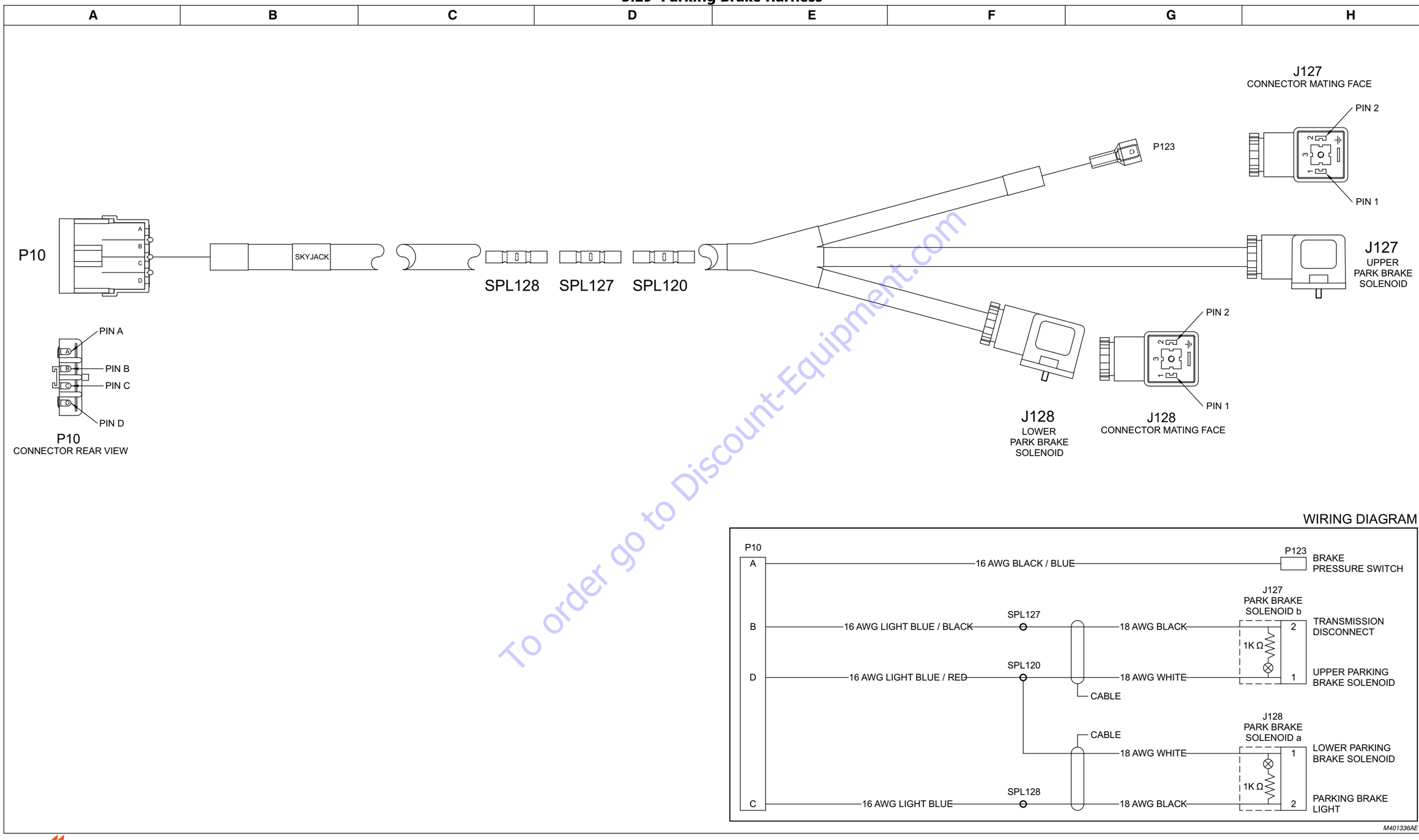


WIRING DIAGRAM

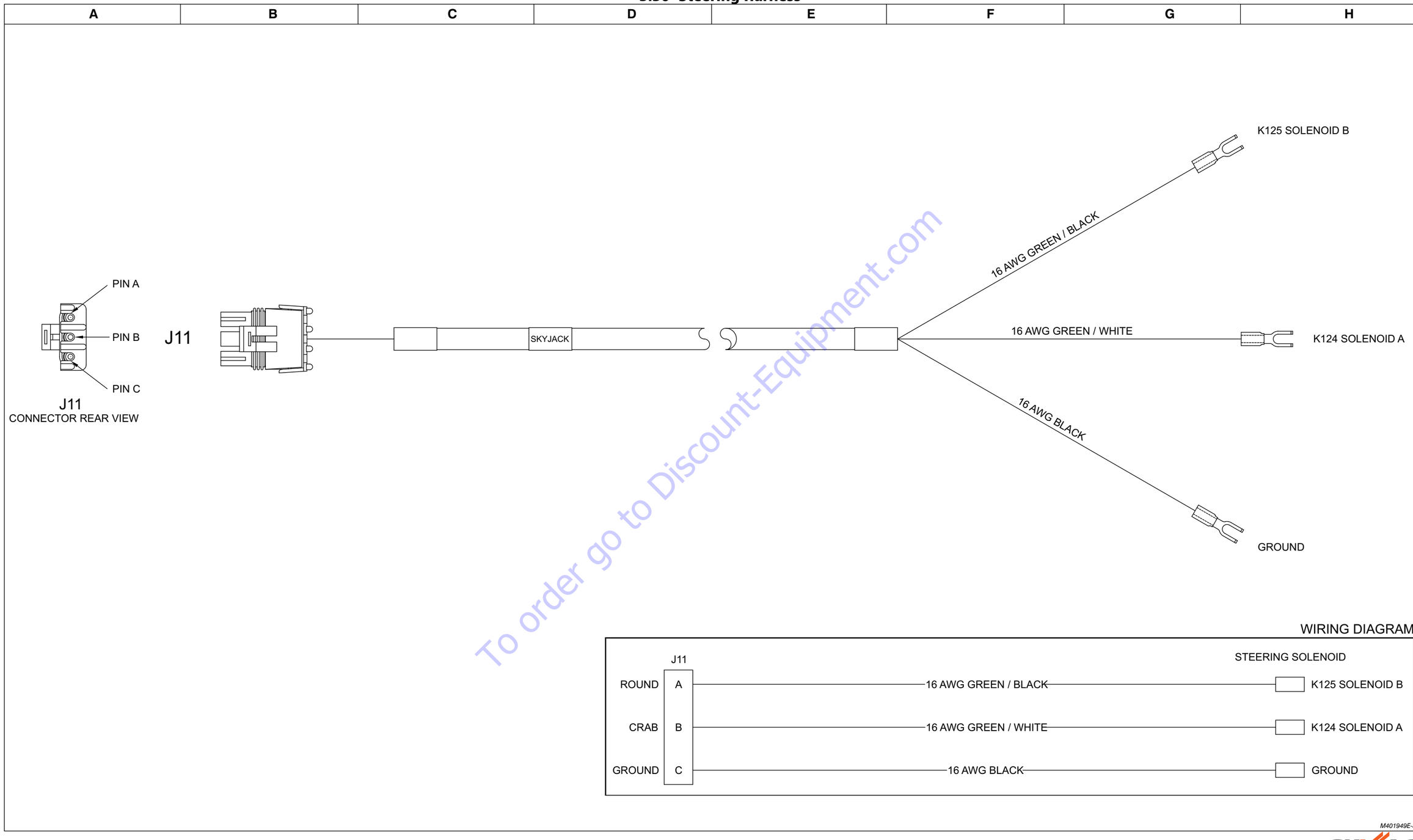
3.28 Diverter Valve Harness, 2-Way



3.29 Parking Brake Harness

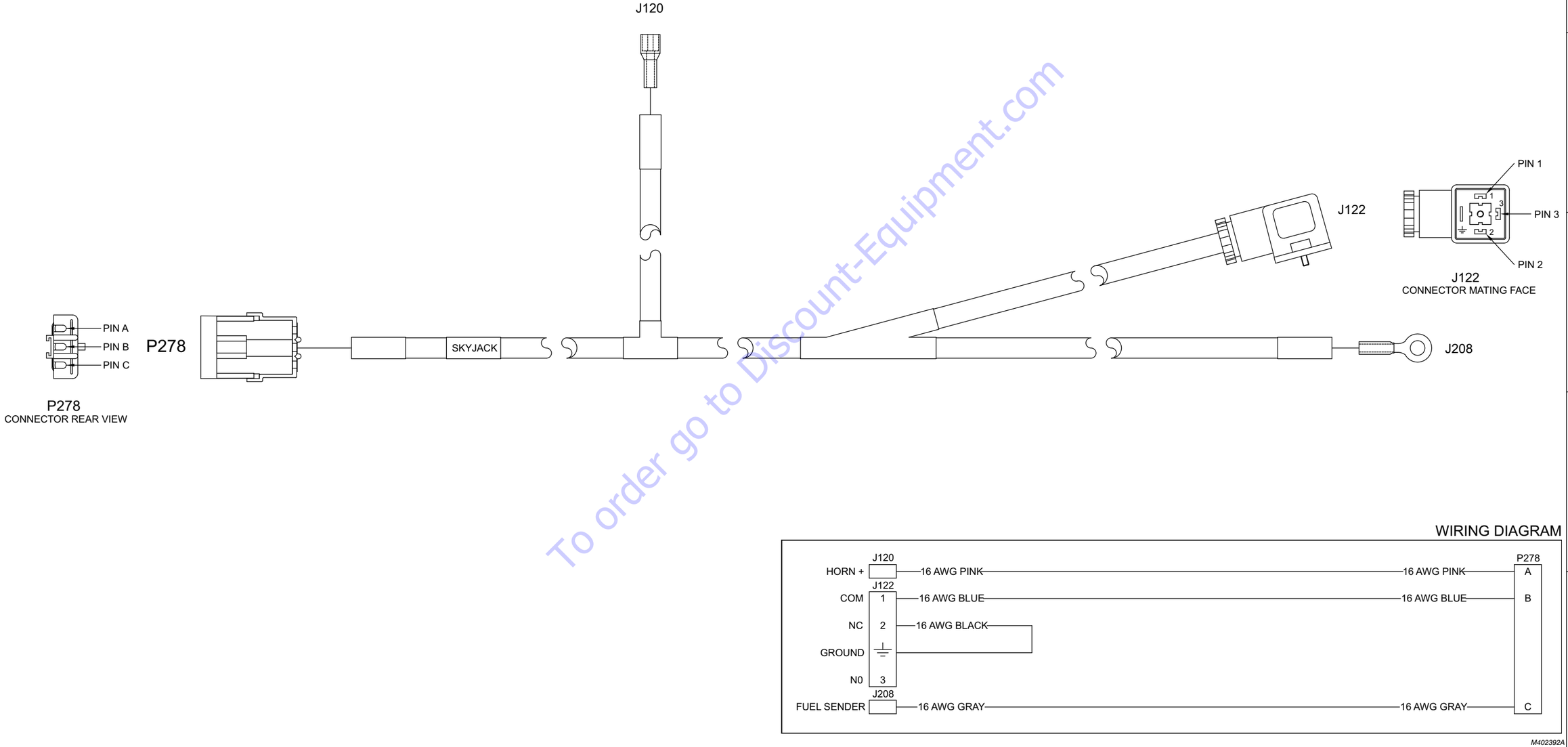


3.30 Steering Harness



M401949E-3

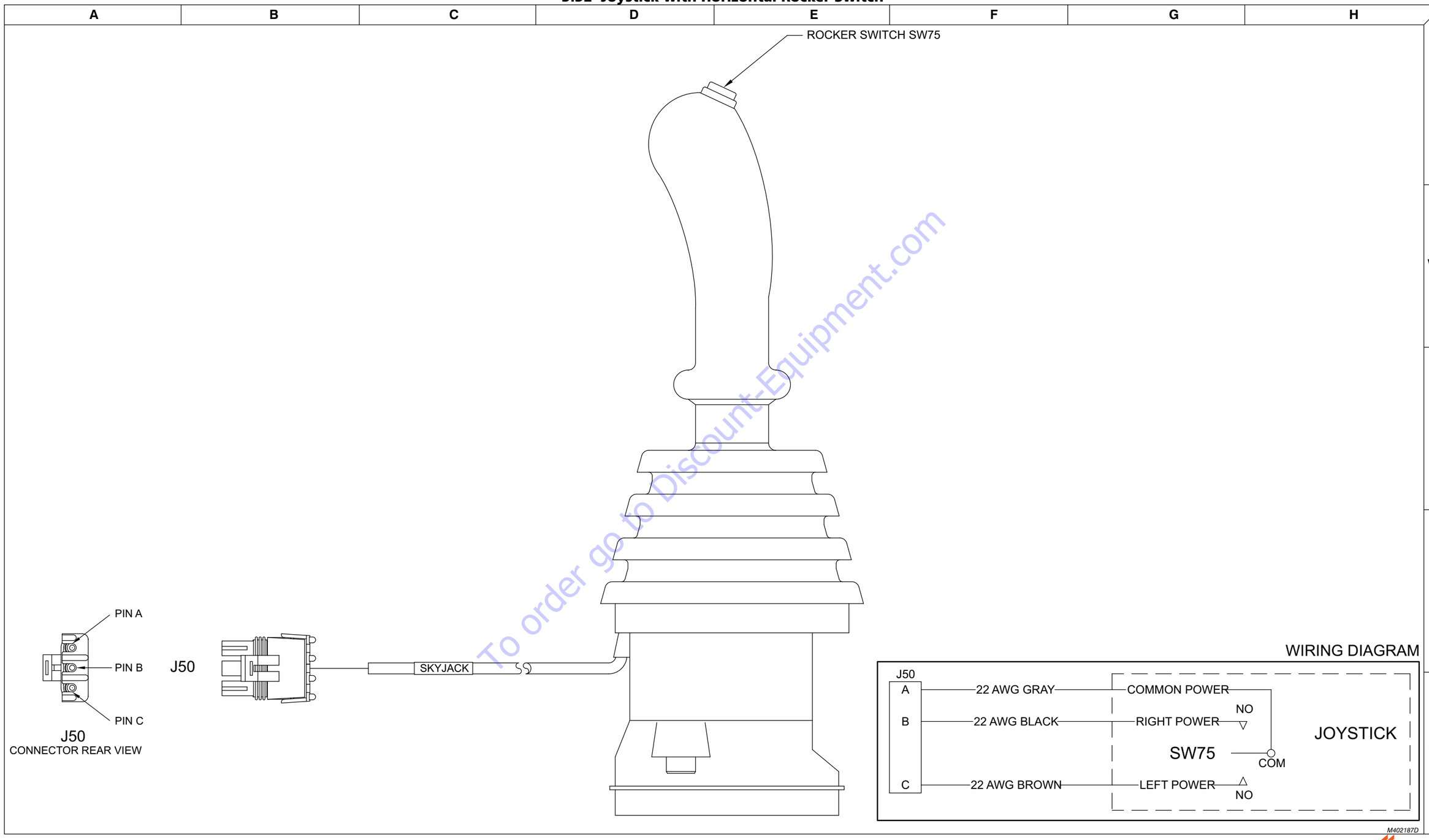
3.31 Horn, Fuel & Brake Pressure Switch Harness

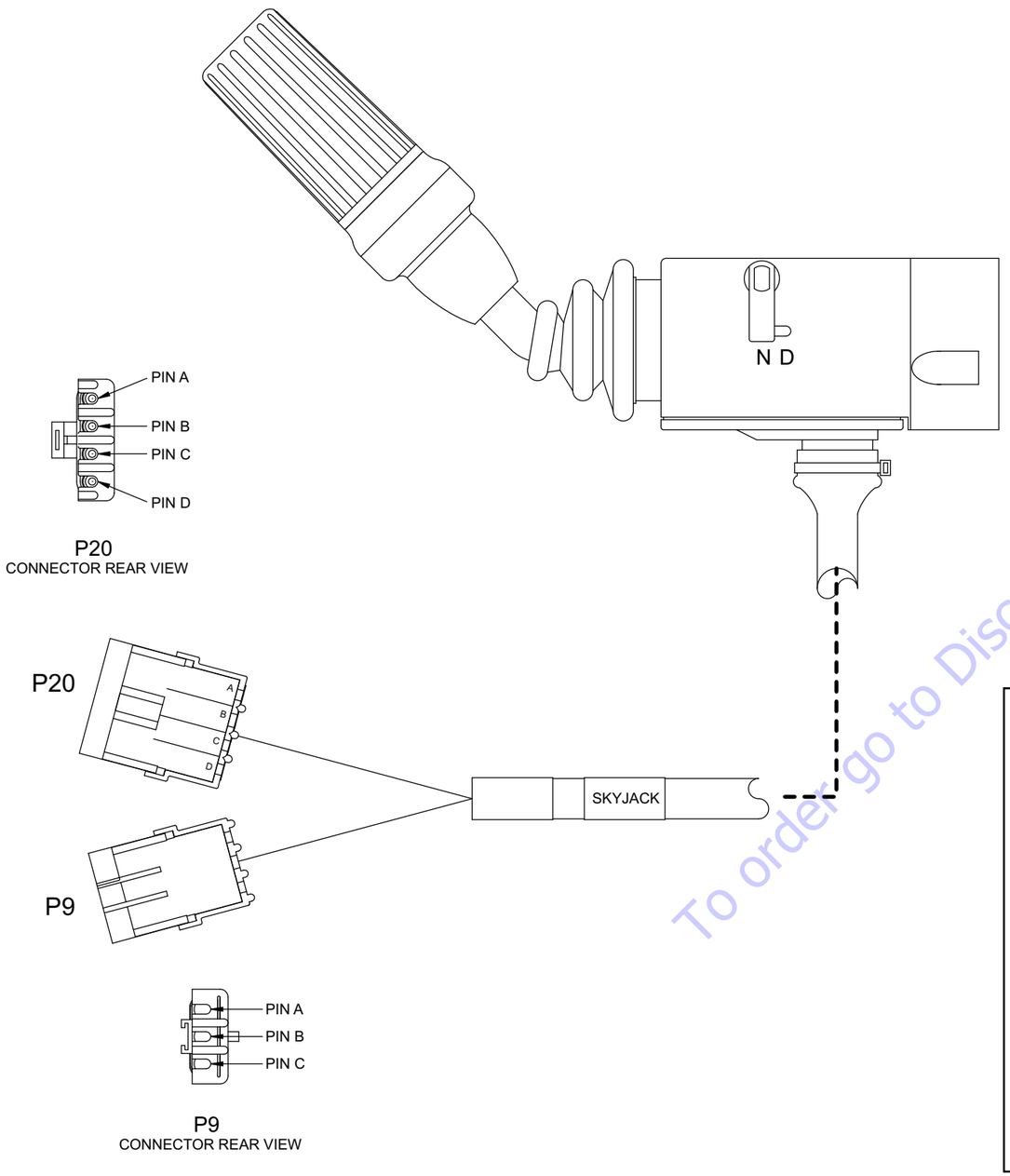


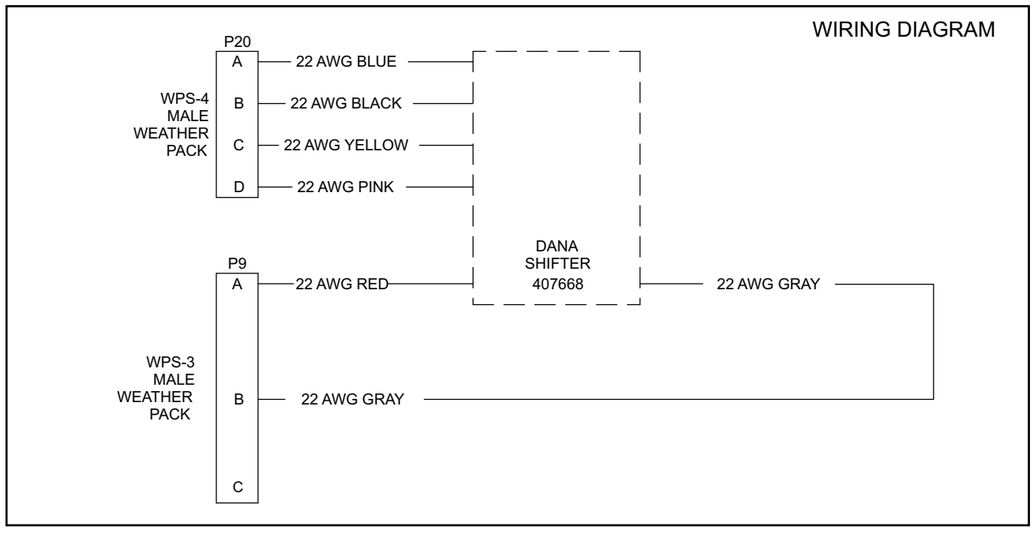
WIRING DIAGRAM

M402392A

3.32 Joystick with Horizontal Rocker Switch

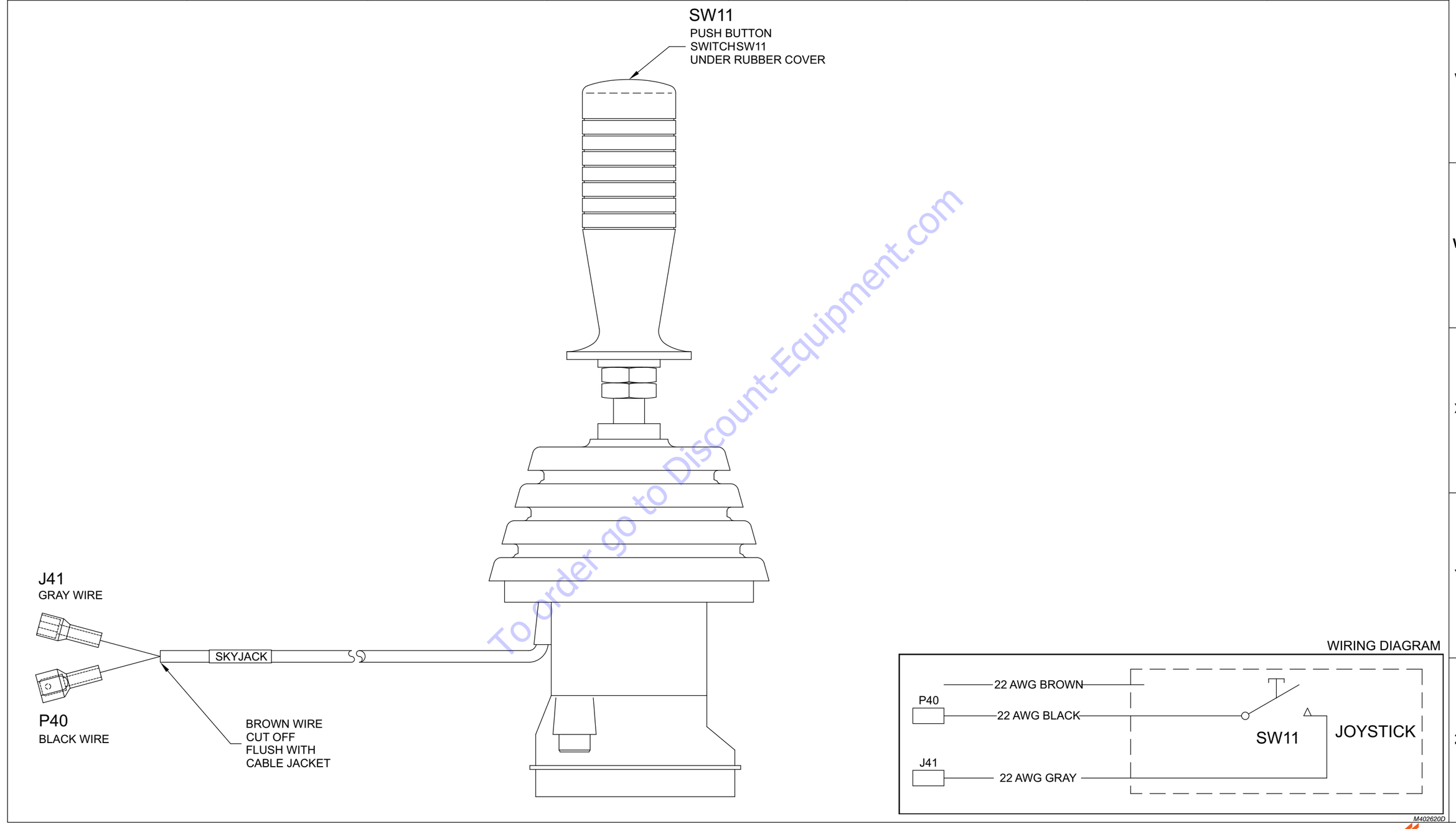




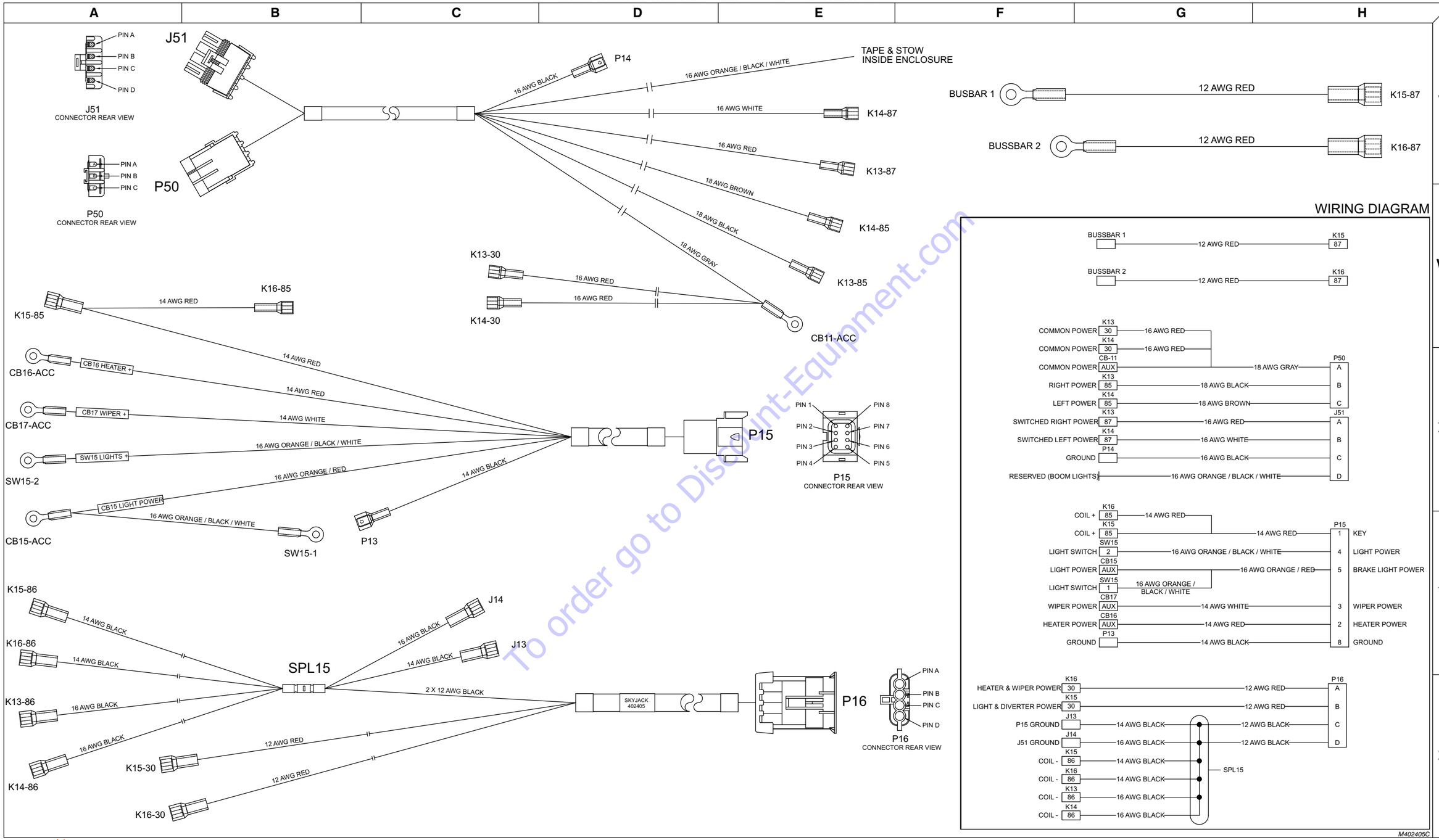


M196469AB-SM-1

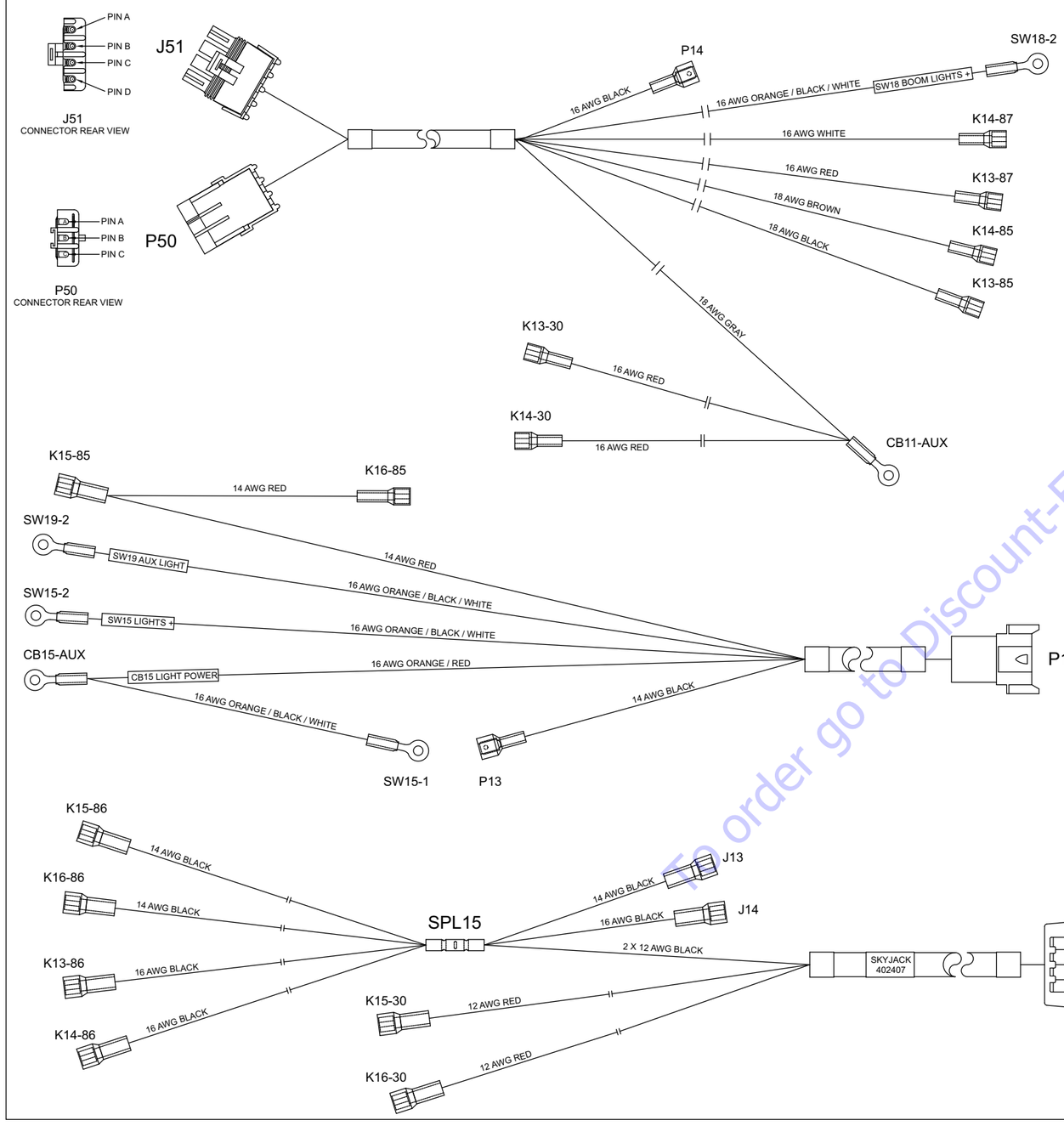
3.34 Joystick, Two-Axis with Microswitch

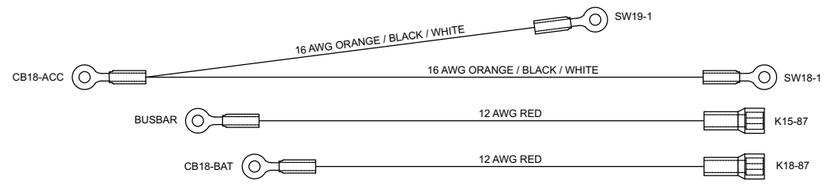


3.35 Power Module - Enclosed Cab Harnesses

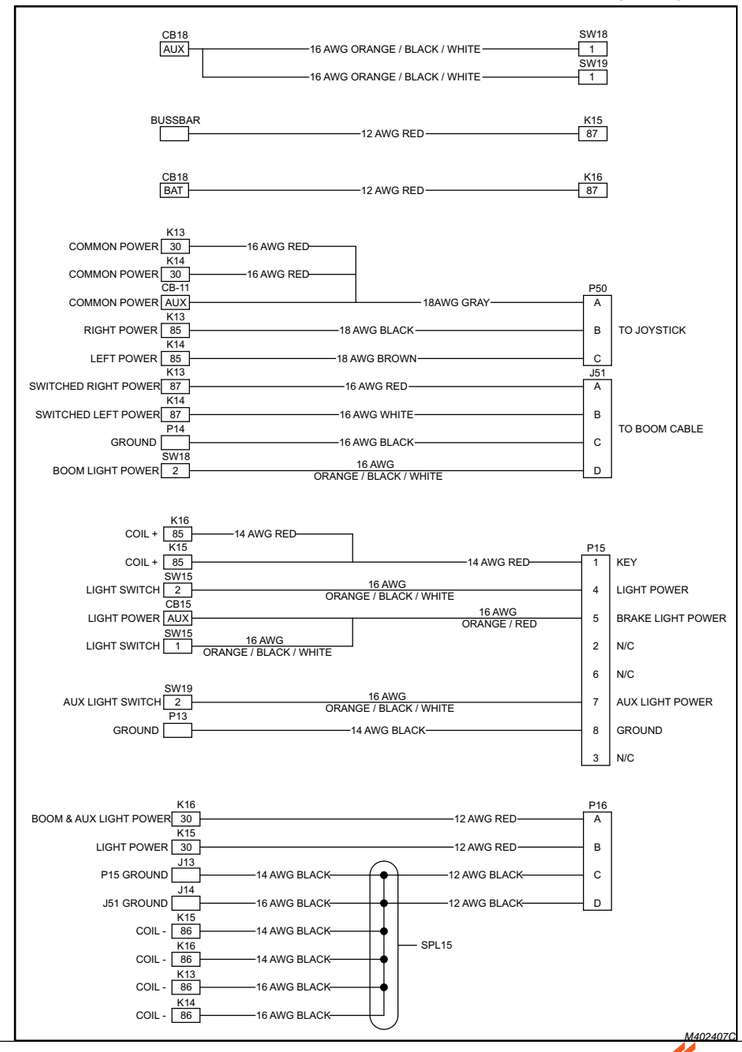


3.36 Power Module - Open Cab Harnesses





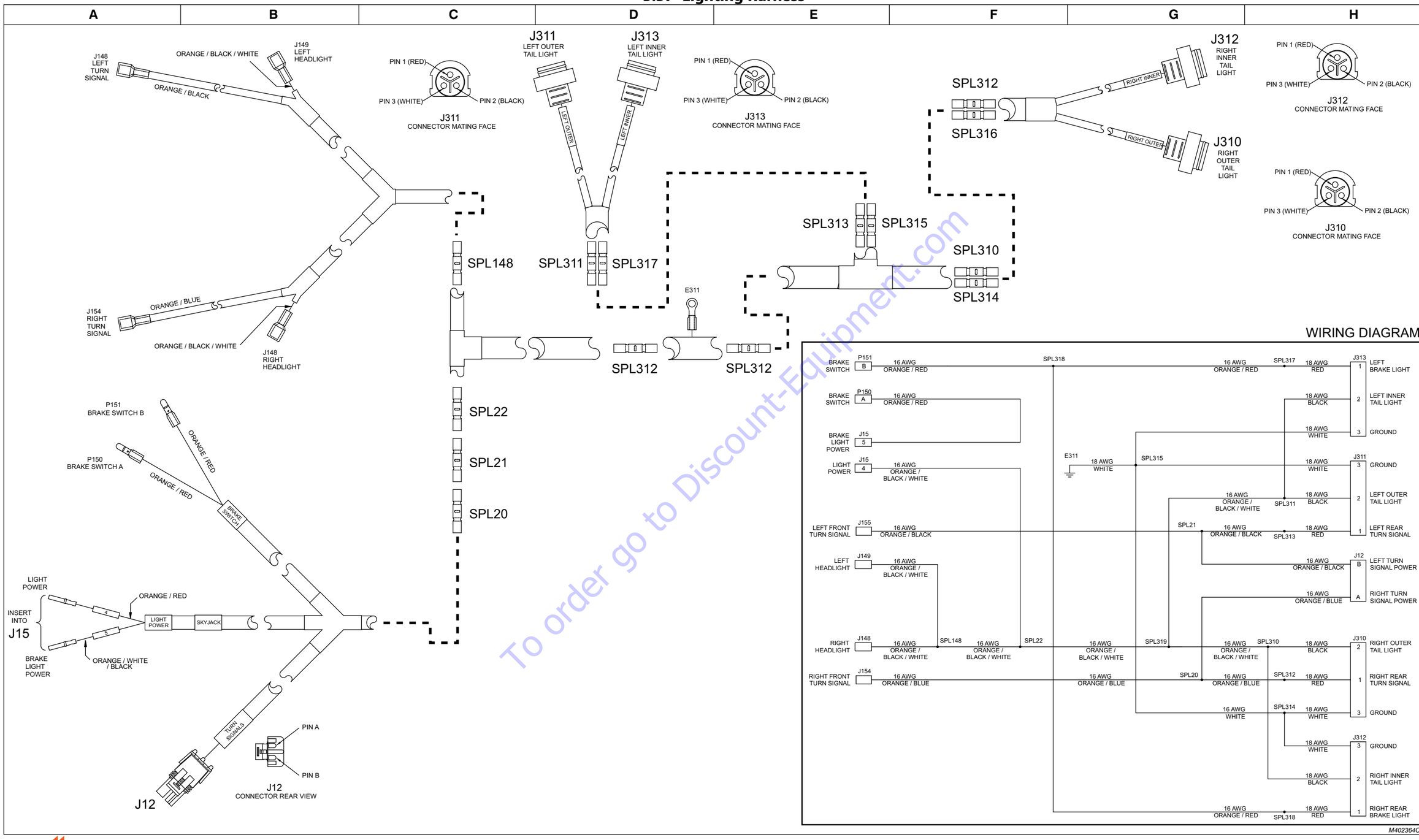
WIRING DIAGRAM



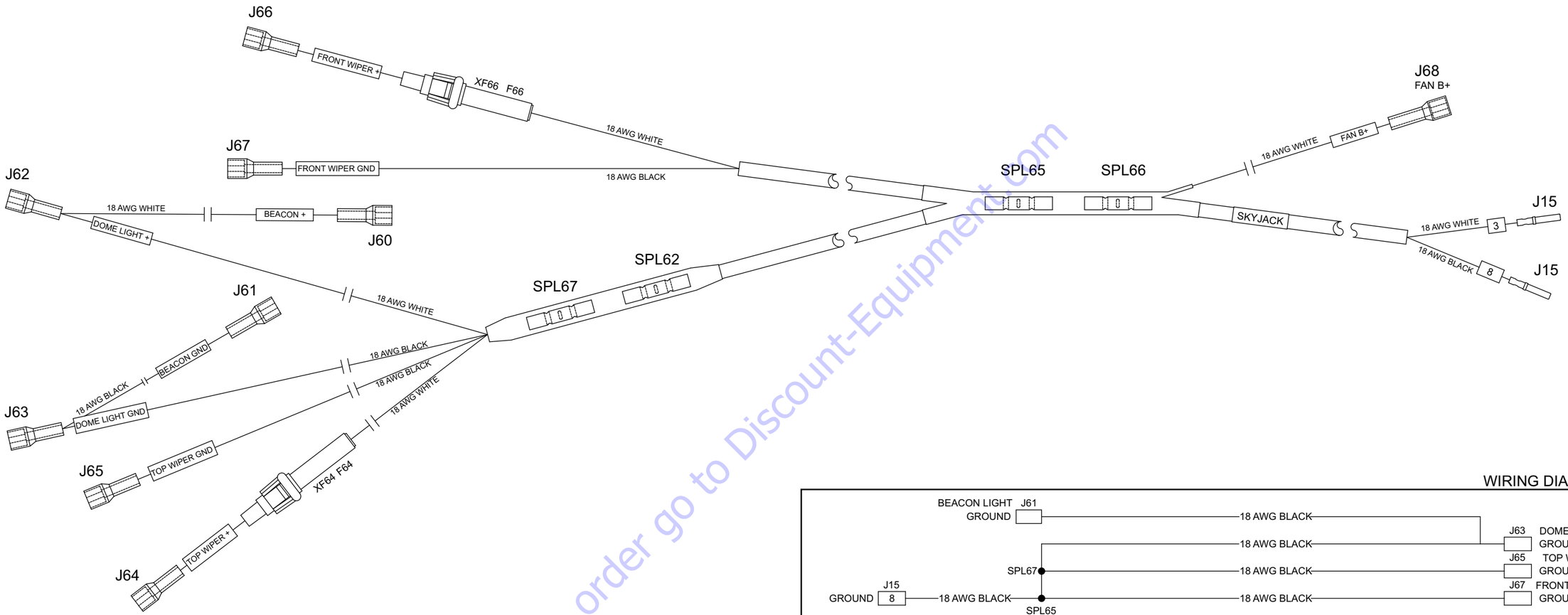
V W X Y Z

M402407C

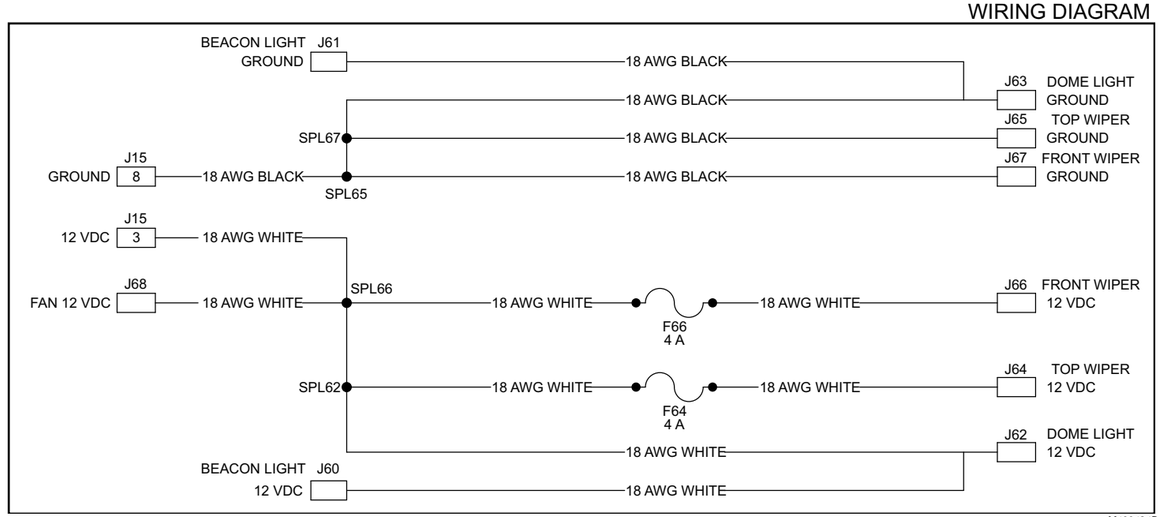
3.37 Lighting Harness



3.38 Wiper Harness

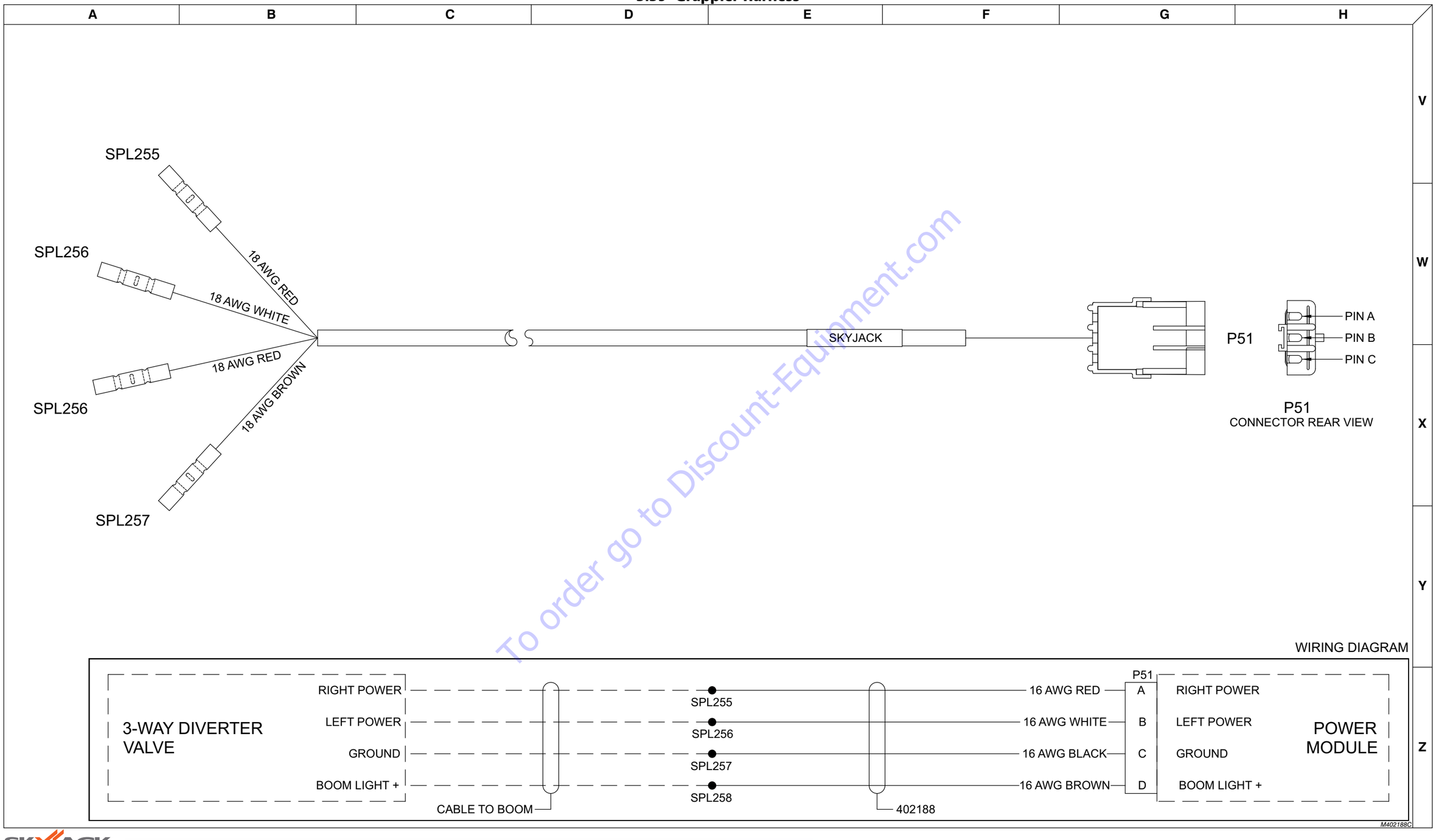


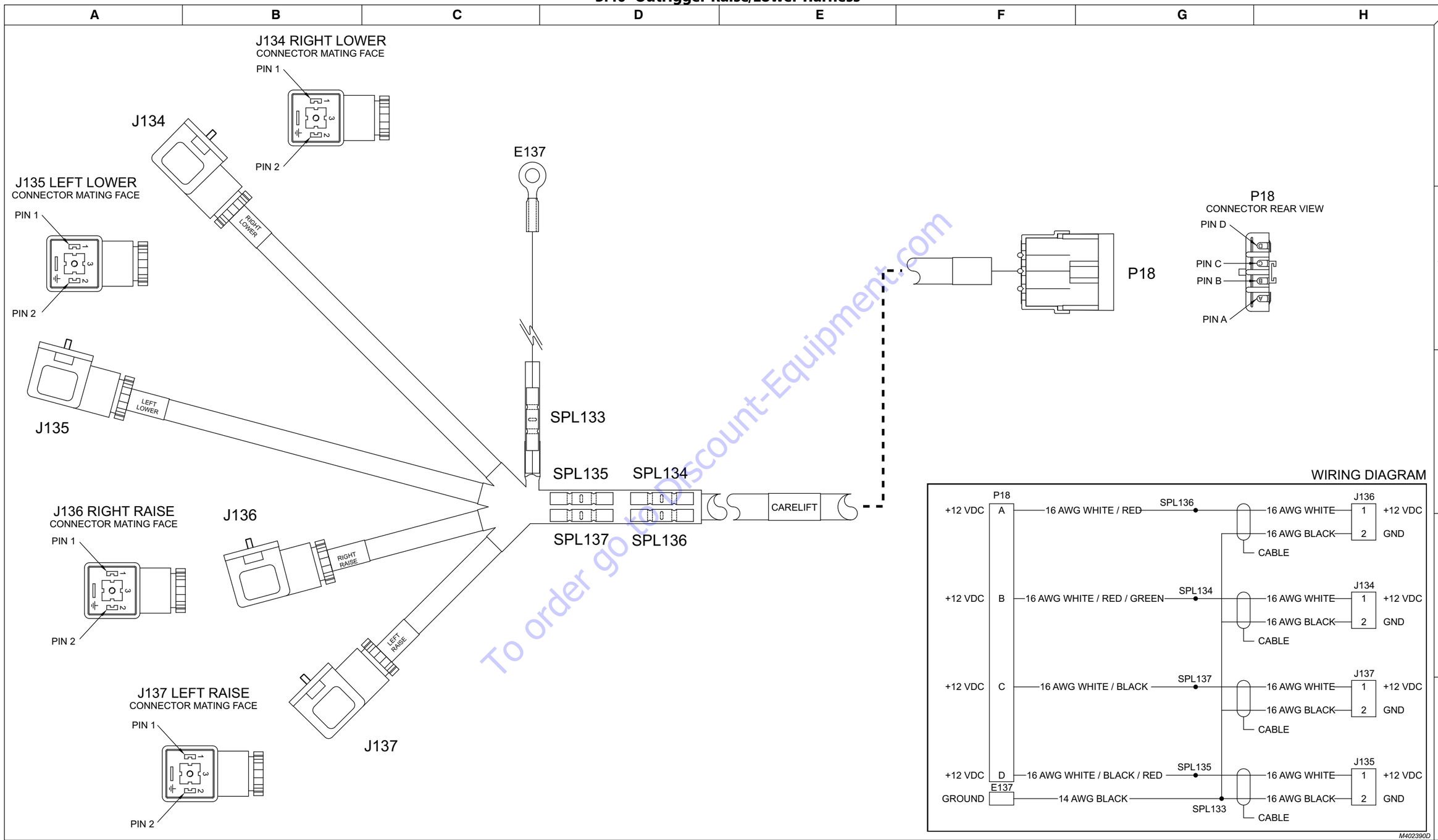
WIRING DIAGRAM



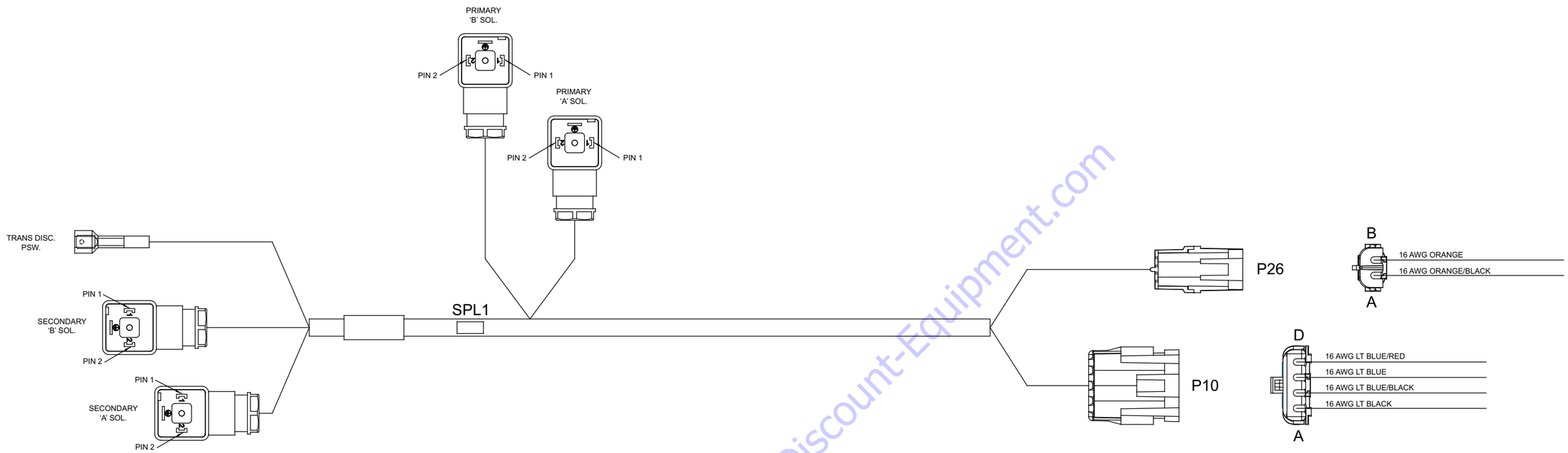
M400424D

3.39 Grappler Harness

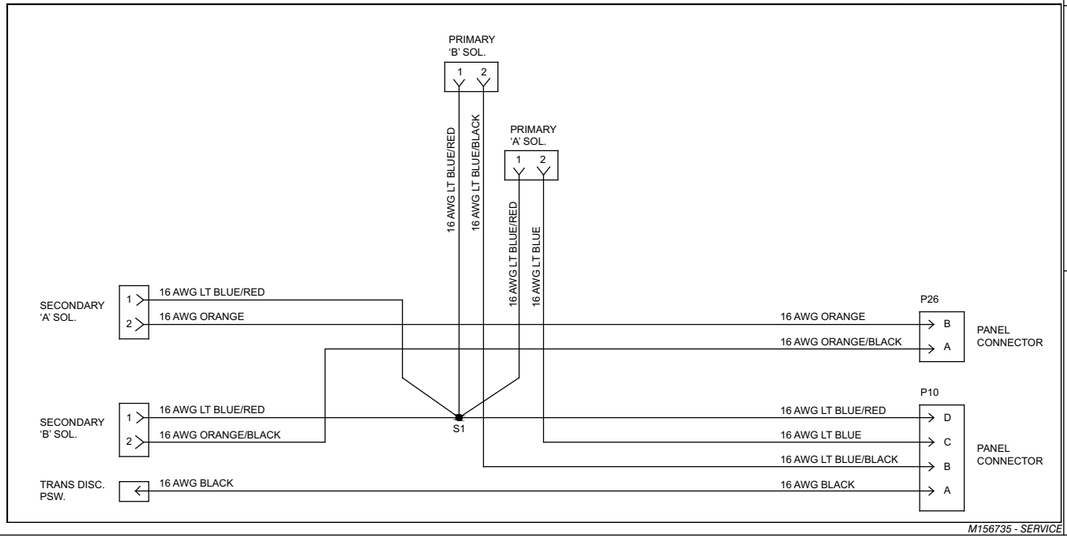




A	B	C	D	E	F	G	H



WIRING DIAGRAM

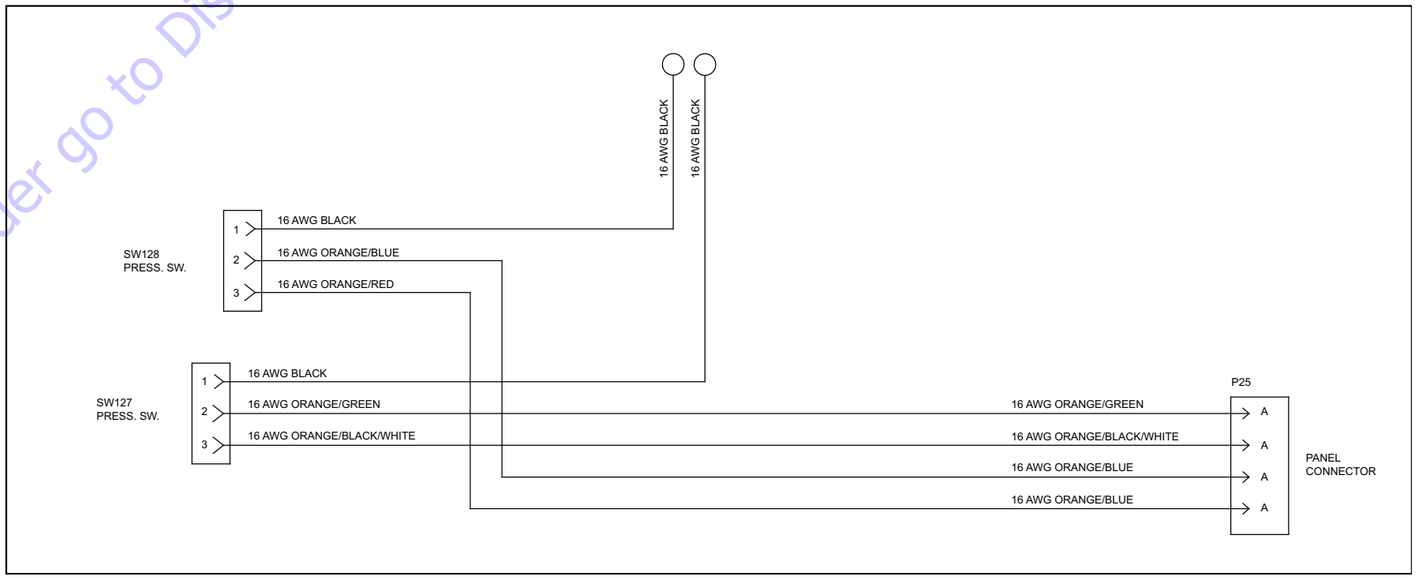


M156735 - SERVICE

V W X Y Z

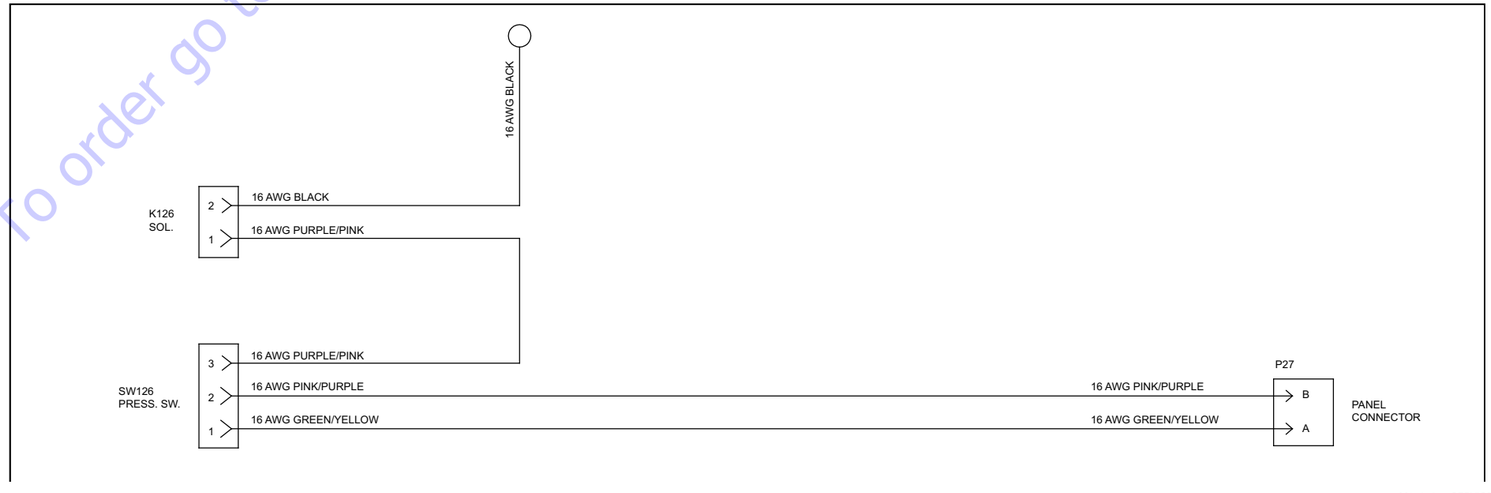
3.42 Mine Spec. - Pressure Switches Harness

WIRING DIAGRAM



M156736 - SERVICE

WIRING DIAGRAM



M156737 - SERVICE

A B C D E F G H I J K L M N O

R S T U V W X Y Z

C5 BOOM LIFT CYLINDER
C6 BOOM LIFT CYLINDER
C7 BOOM EXTEND CYLINDER
C8 SLAVE CYLINDER
C9 SLAVE CYLINDER
C10 CARRIAGE TILT CYLINDER
C11 CARRIAGE TILT CYLINDER
C12 RIGHT FRAME LEVEL CYLINDER
C13 LEFT FRAME LEVEL CYLINDER
C14 REAR AXLE LOCK CYLINDER
C15 LEFT OUTRIGGER CYLINDER
C16 RIGHT OUTRIGGER CYLINDER
C17 PARKING BRAKE (FRONT AXLE ONLY)
C18 CARRIAGE SHIFT CYLINDER
C19 FORK SHIFT CYLINDER
C20 FORK SHIFT CYLINDER
C21 CLAMP CYLINDER
C22 CLAMP CYLINDER
C23 ROTATE CYLINDER
C24 CLAMP CYLINDER
C25 CLAMP CYLINDER

CB1 CB2 CB3 CB4 CB5 CB6 CB7 CB8

TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8

FRAME LEVEL CONTROL VALVE
V7 V8 V9 V10

AXLE LOCK CONTROL VALVE
V11 V12 V13 V14
ACC4 175psi
AXLE LOCK CHARGE ACCUMULATOR

QD1 QD2 QD3 QD4 QD5 QD6 QD7 QD8 QD9 QD10

V6 DIVERTER VALVE
SEE OPTIONAL HYDRAULICS

JS2 FRONT JOYSTICK

PORT	FUNCTION
1	BOOM UP/CARRIAGE TILT BACK
2	BOOM RETRACT
3	BOOM DOWN/CARRIAGE TILT FORW.
4	BOOM EXTEND

JS1 REAR JOYSTICK

PORT	FUNCTION
1	OPT. HYD.
2	FRAME LEVEL LEFT
3	OPT. HYD.
4	FRAME LEVEL RIGHT

V2 DIVERTER VALVE

MAIN VALVE ASSEMBLY

RV2 1500psi
RV3 3100psi
RV4 1500psi
RV5 1500psi
RV6 2000psi
RV7 2000psi
RV8 2500psi
RV9 2500psi
RV10 2500psi
RV11 2500psi

BOOM LIFT | BOOM LIFT | BOOM EXTEND | BOOM EXTEND | CARRIAGE TILT | FRAME LEVEL | OPT HYD | OUTRIGGER LEFT | OUTRIGGER RIGHT

C1 FRONT (LH) STEER CYLINDER
C2 FRONT (RH) STEER CYLINDER
C3 REAR (RH) STEER CYLINDER
C4 REAR (LH) STEER CYLINDER

V1 STEER FUNCTION VALVE
OSM1 ORBITAL STEERING MOTOR

ACC1 325psi
PRV1 PRESSURE REDUCING VALVE 325psi
PRT1 PRIORITY VALVE
RV1 2800psi
CV1 CV2 SV1 SV2 SV3

P1 FRONT PUMP
P2 REAR PUMP

MB1 RETURN MANIFOLD
STR1 SUCTION STRAINER
STR2 SUCTION STRAINER
F1 RETURN LINE FILTER

BRAKE CHARGE ACCUMULATORS
ACC2 650psi
ACC3 650psi
V3 CHARGE VALVE
V4 SERVICE BRAKE VALVE
V5 PARK BRAKE VALVE
PS1 PS2 PS3 PS4
ELECTRICAL CONNECTION TO LOW PRESSURE WARNING LIGHT (INSTRUMENT PANEL)
ELECTRICAL CONNECTION TO FRAME LEVEL DISCONNECT
ELECTRICAL CONNECTION TO TRANSMISSION DISCONNECT
USE WITH OPTIONAL LIGHTS
REAR AXLE
FRONT AXLE
RIGHT
LEFT

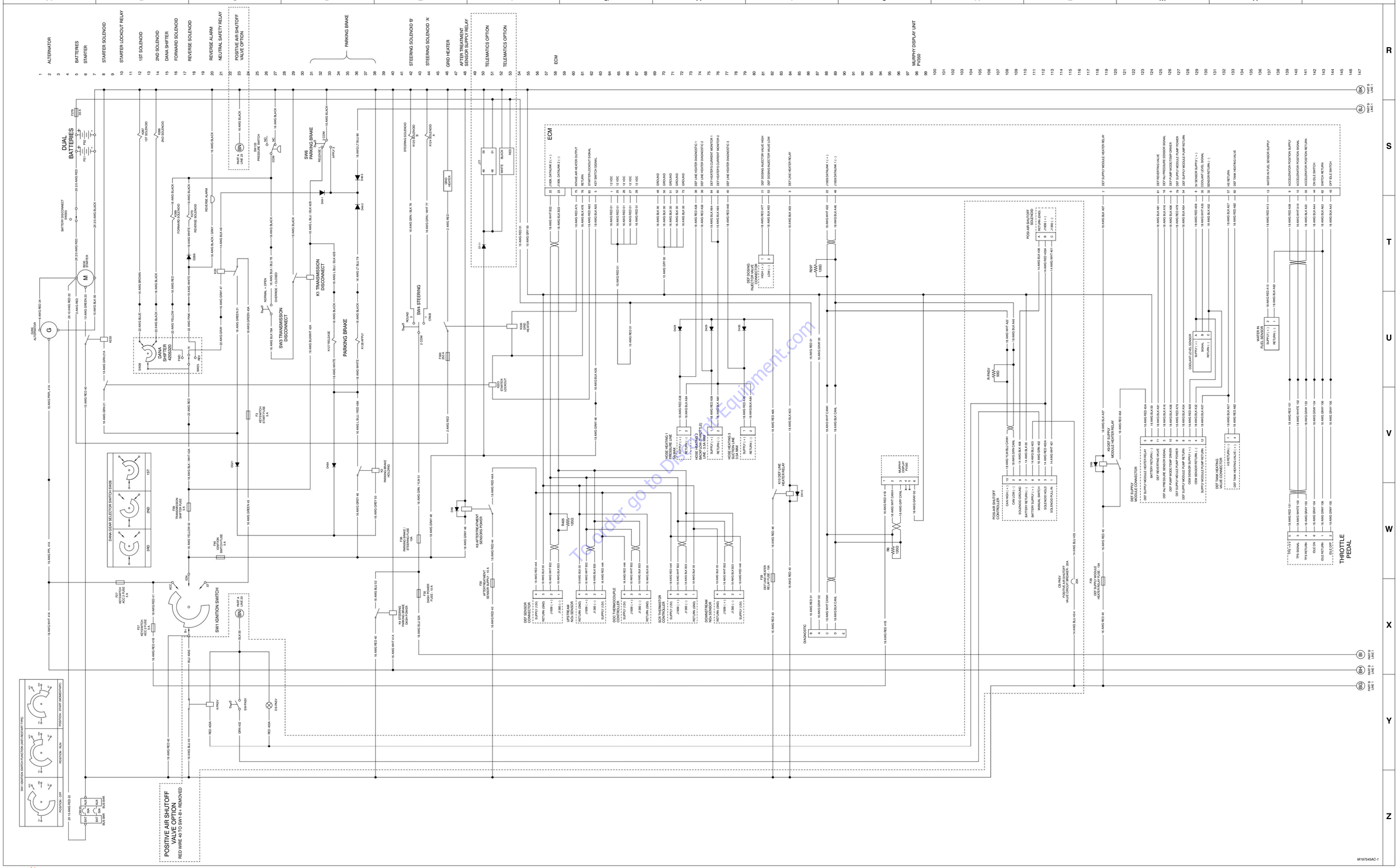
OPTIONAL FORK SHIFT/SIDE SHIFT CARRIAGE
TO "C" PORT ON DIVERTER VALVE
TO "D" PORT ON DIVERTER VALVE
TO "I" PORT ON DIVERTER VALVE
TO "J" PORT ON DIVERTER VALVE
TO "G" PORT ON DIVERTER VALVE
TO "H" PORT ON DIVERTER VALVE

OPTIONAL ROTATING PIPE AND POLE HANDLER
TO "C" PORT ON DIVERTER VALVE
TO "D" PORT ON DIVERTER VALVE
TO "G" PORT ON DIVERTER VALVE
TO "H" PORT ON DIVERTER VALVE

OPTIONAL 2 STAGE PIPE AND POLE GRAPPLER
TO "C" PORT ON DIVERTER VALVE
TO "D" PORT ON DIVERTER VALVE

OPTIONAL WINCH
WINCH MOTOR
WINCH BRAKE
BRAKE VALVE
TO "C" PORT ON DIVERTER VALVE
TO "D" PORT ON DIVERTER VALVE

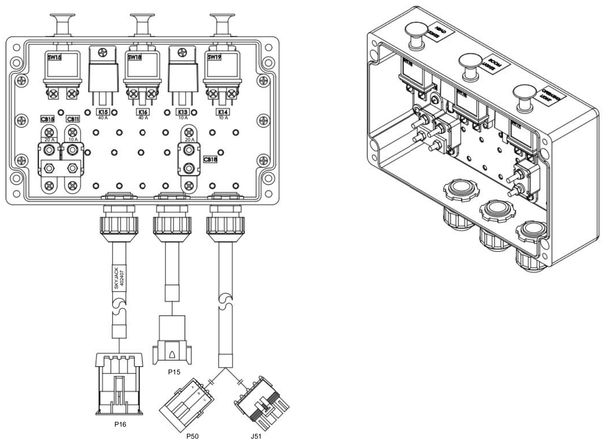
M402796AA

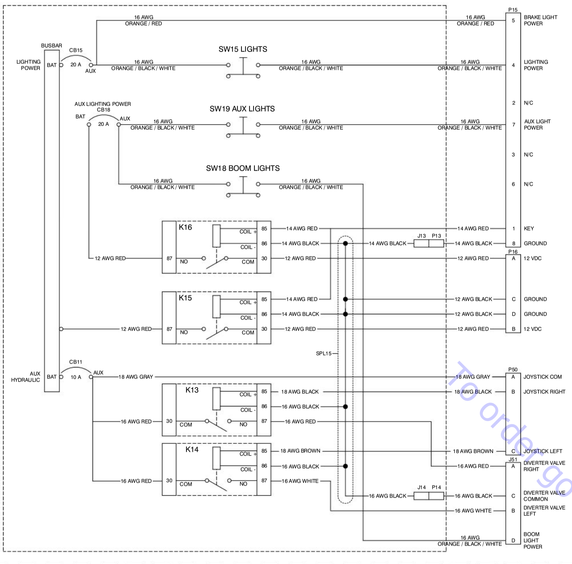


NOTE: To determine the correct hydraulic/electrical schematic that resembles your telehandler, refer to the "Table Of Contents" found at the beginning of this section.

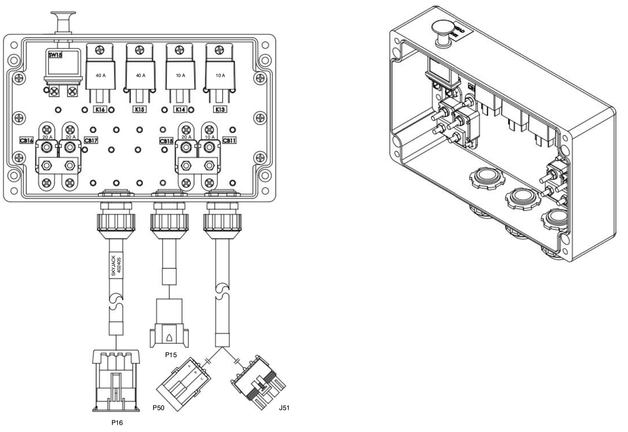
NOTE: To determine the correct hydraulic/electrical schematic that resembles your telehandler, refer to the “Table Of Contents” found at the beginning of this section.

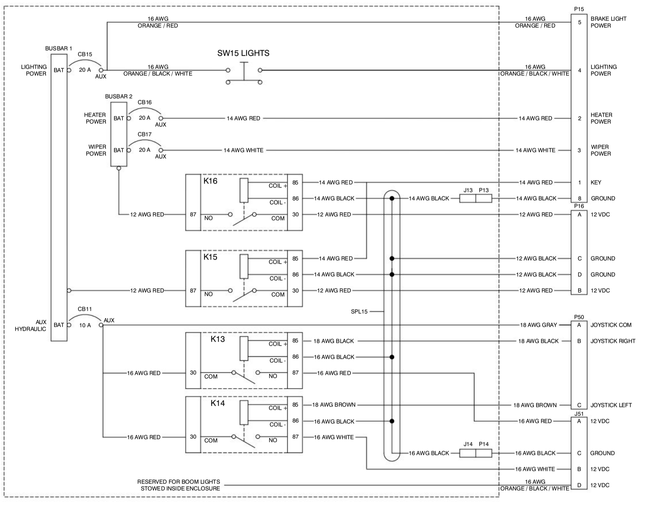
Open Cab Power Module (402407)
(Lights, Boom Lights, Aux Lights)



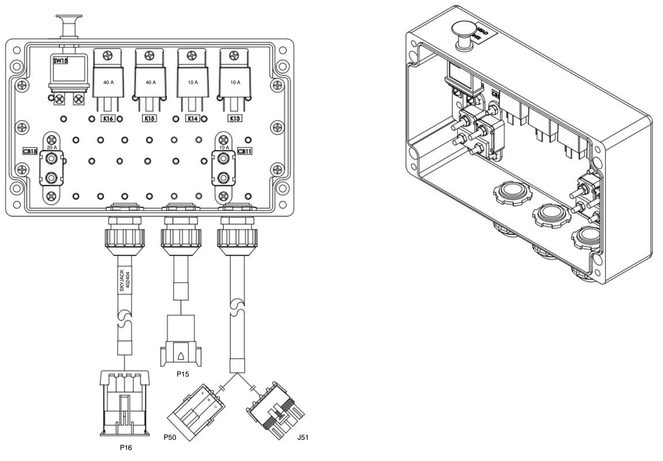


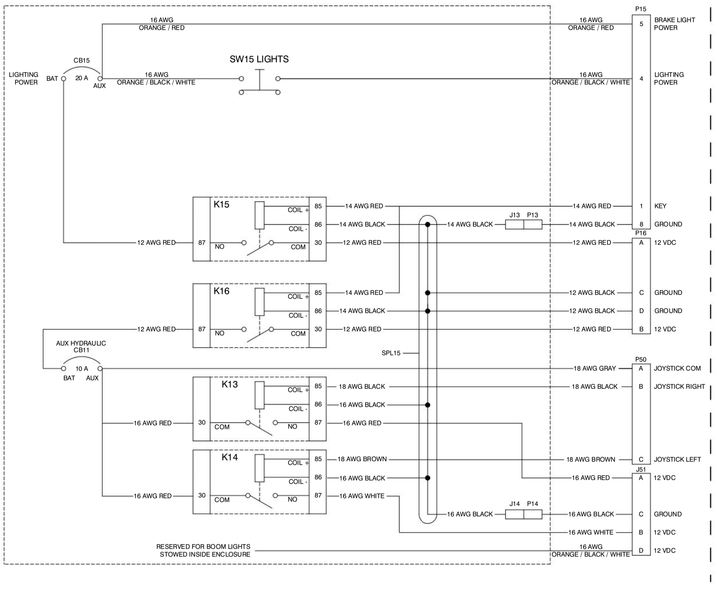
Enclosed Cab Power Module (402405)
(Lights)



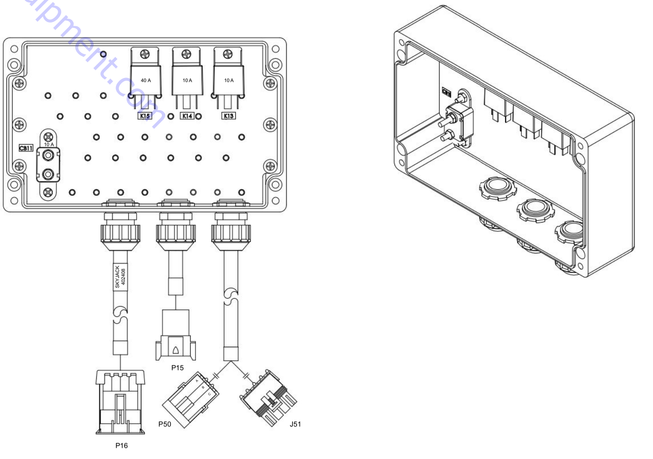


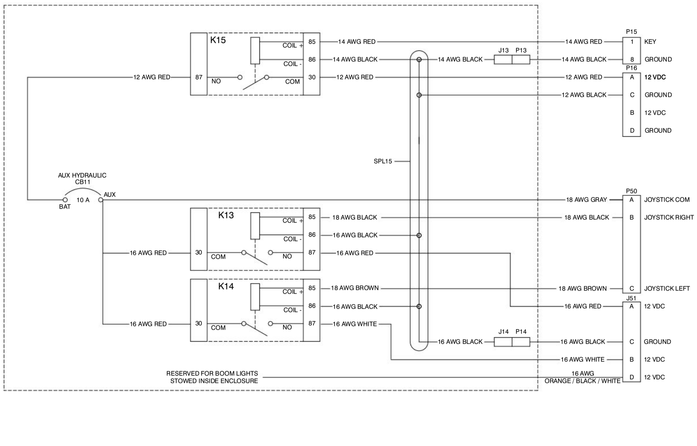
Open Cab Power Module (402404)
(Lights)





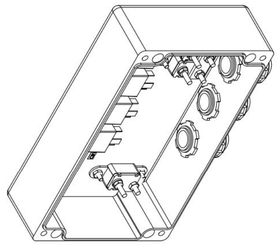
Open Cab Power Module (402408)
(No Lights)

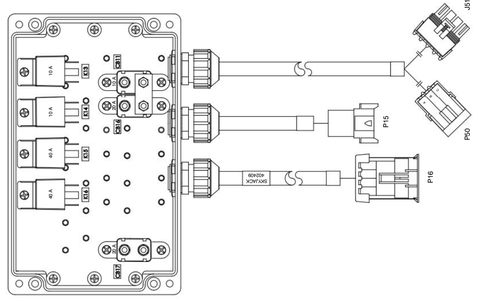


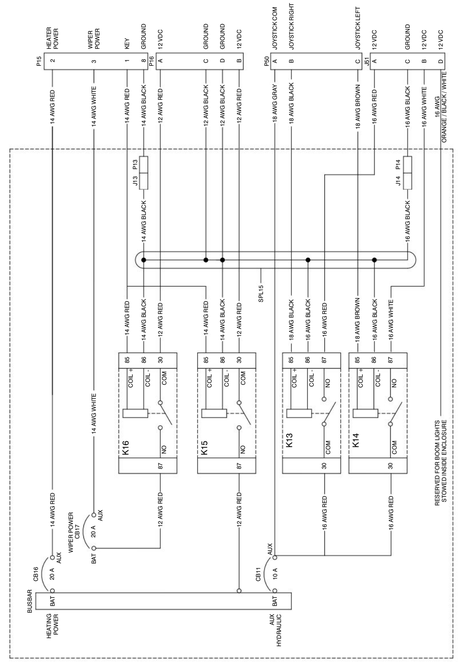


NOTE: To determine the correct hydraulic/electrical schematic that resembles your telehandler, refer to the "Table Of Contents" found at the beginning of this section.

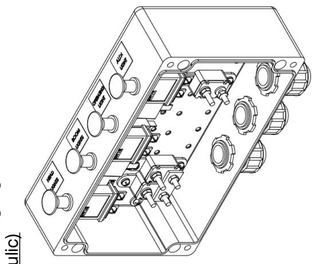
Enclosed Cab Power Mudule (402409)
(Aux Hydraulic)

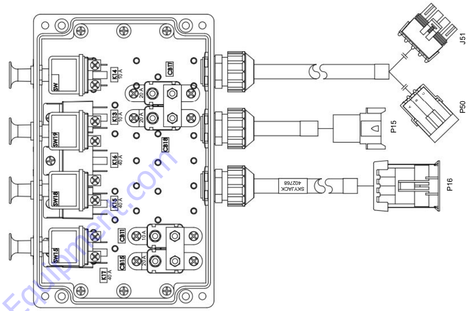


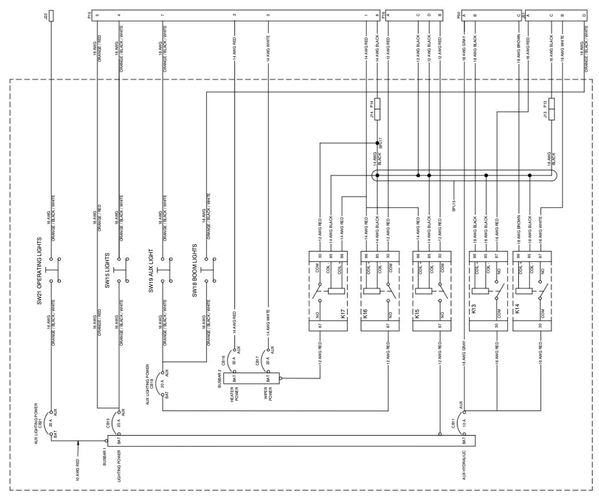




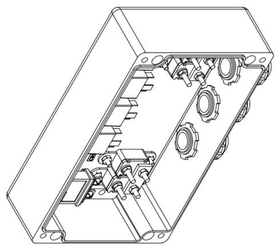
Enclosed Cab Power Mudule (402768)
(Lights, Boom Lights, AUX Lights, Operating Lights, Heater, Wipers, Aux Hydraulic)

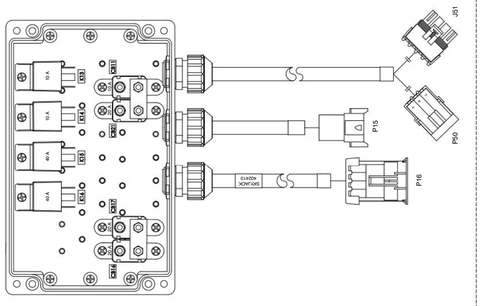


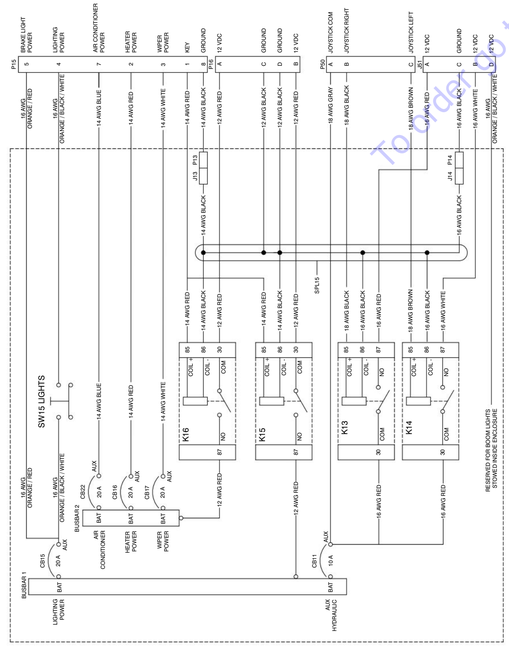




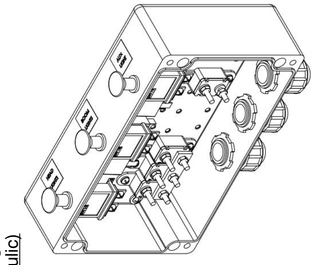
Open Cab Power Mudule (402410)
(Air Conditioning, Aux Hydraulic)

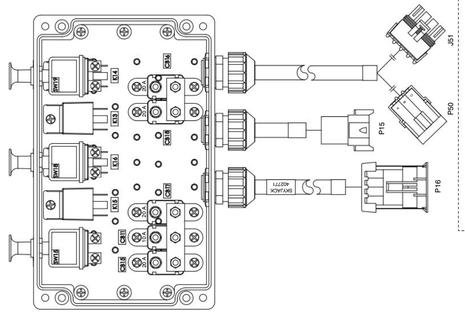


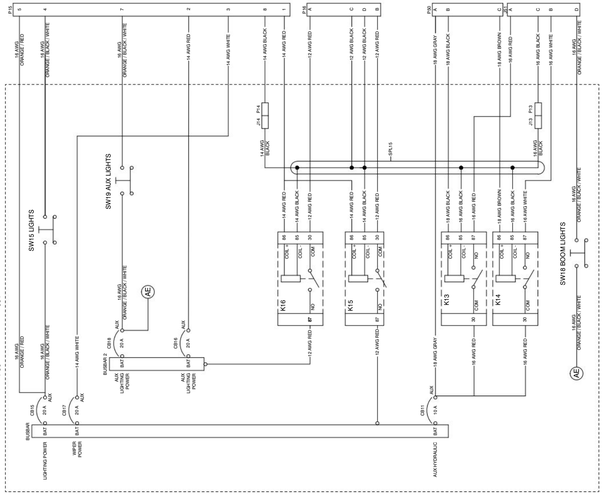




Enclosed Cab Power Mudule (402771)
(Lights, Boom Lights, AUX Lights Heater, Wipers, Aux Hydraulic)







Section 4
TROUBLESHOOTING INFORMATION

Table of Contents

Table of Contents (Continued)

Introduction

The following pages contain the necessary troubleshooting information for locating and correcting electrical and hydraulic malfunctions that may arise. Careful and accurate analysis of the systems listed, will localize the problem more quickly than any other method.

Prior to performing any troubleshooting procedure, observe the following recommendations:

1. Isolate the major component in which the trouble occurs
2. Isolate whether the problem is electrical or hydraulic
3. Isolate and correct the specific problem

NOTE

If a specific problem is not listed, or after performing all necessary steps a problem can not be resolved; consult SKYJACK's service department.

The content of this section is divided into "probable cause" and "remedy." The information preceded by a number represents the "probable cause." The following line, noted by a dash represents the "remedy" to the "probable cause" directly above it. See example below for clarification.

1. Probable Cause
   - Remedy

Electrical System

4.1-1 All Controls Inoperative (No Crank)

1. Battery cable(s) loose or disconnected.
   - Tighten or connect battery cable(s).
2. Battery discharged.
   - Charge battery.
3. Loose or broken wire #22 from starter to circuit breaker CB220.
   - Check continuity. Replace if defective.
4. Circuit breaker CB220 tripped or defective.
   - Check for defective wiring. Replace if defective.
5. Loose or broken wire #40 from circuit breaker CB220 to starter solenoid K220.
   - Check continuity. Replace if defective
6. Loose or broken wire #40 from circuit breaker CB220 to 2 pin connector J3 pin A.
   - Check continuity. Replace if defective.
7. Loose or broken wire #40 from 2 pin connector P3 pin A to Instrument Panel B+ buss bar.
   - Check continuity. Replace if defective.
8. Loose or broken wire #40 from Instrument Panel B+ buss bar to Ignition switch SW1.
   - Check continuity. Replace if defective.
9. Defective ignition switch SW1.
   - Replace if defective.
10. Loose or broken green wire 43 from ignition switch SW1 to fuse F3
    - Check continuity. Replace if defective.
11. Open fuse F3.
    - Check for defective wiring. Replace fuse.
12. Loose or broken green 43A wire from fuse F3 to neutral safety relay K20 (pin30).
    - Check continuity. Replace if defective.
13. Loose or broken green wire 21 from neutral safety relay K20 (pin 87) to 8 pin connector P23 (pin 2).
    - Check continuity. Replace if defective.
14. Loose or broken green wire 21 from 8 pin connector J23 (pin 2) to P1 pin 12.
    - Check continuity. Replace if defective.
15. Loose or broken green wire 21 from P1 pin 12 to single wire connector J102.
    - Check continuity. Replace if defective.
16. Loose or broken green wire 21 single wire connector P102 to starter lockout solenoid K223
    - Check continuity. Replace if defective
17. Loose or broken yellow wire 42 from ignition switch SW1 to transmission shifter fuse F39.
    - Check continuity. Replace if defective.
18. Open fuse F39.
    - Check for defective wiring. Replace fuse.
19. Loose or broken black/white wire 42A from fuse F39 to 3pin connector J9 (pin A).
    - Check continuity. Replace if defective.
20. Loose or broken red wire from 3pin connector P9 (pin A) to transmission shifter.
    - Check continuity. Replace if defective.
21. Defective shifter.
    - Check shifter. Replace if defective.
22. Loose or broken grey wire from shifter to 3 pin connector P9 (pin B).
    - Check continuity. Replace if defective.
23. Loose or broken grey wire from 3 pin connector J9 (pin B) to neutral start relay K20 (pin 85).
    - Check continuity. Replace if defective.
24. Loose or broken black wire 49 from relay K20 (pin 86) to single wire connector P31.
    - Check continuity. Replace if defective.

Electrical System (Continued)

25. Loose or broken black wire 49 single wire connector J31 to D49-1.
    - Check continuity. Replace if defective.
26. Diode D49-1
    - Check diode. Replace if defective.
27. Loose or broken black wire 49 from Diode D49-1 to park brake switch SW5 pin 3.
    - Check continuity. Replace if defective.
28. Loose or broken black wire park brake switch SW5 pin 2 to ground.
    - Check continuity. Replace if defective.
29. Defective park brake switch SW5 pin 3.
    - Check switch. Replace if defective.
30. Defective neutral start relay K20.
    - Replace if defective.
31. Loose or broken red wire A83 from ECM connector J403 pin 83 to 2 pin connector P226 pin A.
    - Check continuity. Replace if defective.
32. Loose or broken green/white wire A83 2 pin connector J226 pin A to starter lockout relay K223 connector J225 pin 86
    - Check continuity. Replace if defective.
33. Loose or broken black wire A76 from ECM connector J403 pin 76 to 2 pin connector P226 pin B.
    - Check continuity. Replace if defective.
34. Loose or broken green/red wire A83 2 pin connector J226 pin B to starter lockout relay K223 connector J225 pin 85
    - Check continuity. Replace if defective.
35. Defective starter lockout relay K223.
    - Replace if defective.
36. Loose or broken green wire 21A from to starter lockout relay K223 connector J225 pin 87 to starter solenoid K220 coil + terminal.
    - Check continuity. Replace if defective.
37. Loose or broken black wire 21A from starter solenoid K220 coil – terminal to ground
    - Check continuity. Replace if defective.
38. Defective starter solenoid K220.
    - Replace if defective.
39. Loose or broken 10 gage green wire 23 from starter solenoid K220 to Starter B200 excite terminal J287
    - Check continuity. Replace if defective.
40. Defective starter B200.
    - Replace if defective.
41. Active Engine diagnostic code(s) or high count of inactive codes.
    - Repair cause of code(s).

4.1-2 Engine Cranks but will not start.

1. Loose or broken ECM battery cable from J204 to fuse F279.
    - Check continuity. Replace if defective.
2. Defective fuse F279.
    - Check for defective wiring, Replace Fuse.
3. Lose or broken red wire from fuse F279 to ECM connector J402 (pins 1, 25, 26, 27, and/or 28).
    - Check continuity. Replace if defective.
4. Loose or broken ECM ground from J402 (pins 49, 50, 51, 52, and/or 73) to ground E204.
    - Check continuity. Replace if defective.

Electrical System (Continued)

5. Loose or broken yellow wire 42 from ignition switch SW1 to ignition switch fuse F40.
   - Check continuity. Replace if defective.
6. Defective fuse F40.
   - Check for defective wiring, Replace fuse.
7. Loose or broken grey wire 48 from fuse F40 to 32 pin connector P1 (Pin 11).
   - Check continuity. Replace if defective.
8. Loose or broken black wire A05 from J1 (pin 11) to ECM connector J402 (Pin 5).
   - Check continuity. Replace if defective.
9. Loose or broken 2AWG red wire from starter + to fuse F300.
   - Check continuity. Replace if defective.
10. Defective fuse F300.
    - Check for defective wiring, Replace fuse.
11. Loose or broken 2AWG red wire from fuse F300 to grid heater solenoid K300.
    - Check continuity. Replace if defective.
12. Loose or broken red wire A75 from ECM connector J402 (Pin 75) to 2 wire connector J299 (pin A).
    - Check continuity. Replace if defective.
13. Loose or broken red wire A75 from 2 wire connector P299 (pin A) to grid heater solenoid K300 coil +.
    - Check continuity. Replace if defective.
14. Loose or broken black wire A76 from ECM connector J402 (Pin 76) to 2 wire connector J299 (pin B).
    - Check continuity. Replace if defective.
15. Loose or broken back wire A76 from 2 wire connector P299 (pin B) to grid heater solenoid K300 coil -.
    - Check continuity. Replace if defective.
16. Defective grid heater solenoid K300.
    - Replace if defective.
17. Loose or broken 6AWG wire from grid heater solenoid K300 to grid heater.
    - Check continuity. Replace if defective.
18. Defective grid heater.
    - Replace if defective.

NOTE

For other engine related problems, consult engine manufacturer's manual.

4.1-3 Can Bus Failure, no data/display on Murphy Powerview.

1. Loose or broken red wire 41 from ignition switch SW1 to fuse F37.
   - Check continuity. Replace if defective.
2. Defective fuse F37.
   - Check for defective wiring, Replace Fuse.
3. Loose or defective red wire 41B from fuse F2 to Connector J7 (pin 1) at Murphy powerview.
   - Check continuity. Replace if defective.
4. Loose or defective grey wire 00 from connector J7 pin (pin 6) to connector P1 (pin 10).
   - Check continuity. Replace if defective.
5. Loose or defective grey wire from connector J1 (pin 10) to ground E204.
   - Check continuity. Replace if defective.

Electrical System (Continued)

6. Loose or defective black wire CANL from connector J7 (pin3) to connector P1 (pin 17).
   - Check continuity. Replace if defective.
7. Loose or defective black wire A46 from connector J1 (pin 17) to connector J402 (pin 46).
   - Check continuity. Replace if defective.
8. Loose or defective white wire CANH from connector J7 (pin 2) to connector P1 (pin 28).
   - Check continuity. Replace if defective.
9. Loose or defective white wire A22 from connector J1 (pin 28) to connector J402 (pin 22).
   - Check continuity. Replace if defective.
10. Open or defective resistors R6 and R297.
    - Replace resistors.
11. Defective Murphy Powerview.
    - Replace Murphy Powerview.

NOTE

For other engine related problems, consult engine manufacturer's manual.

4.1-4 No Throttle.

1. Loose or broken red wire 101 from throttle pedal connector J4 (pin 5) to connector P1 (pin 1)
   - Check continuity. Replace if defective.
2. Loose or broken red wire A09 from J1 (pin 1) to ECM connector J402 (pin 9)
   - Check continuity. Replace if defective.
3. Loose or broken black wire 103 from throttle pedal connector J4 (pin 4) to connector P1 (pin 3)
   - Check continuity. Replace if defective.
4. Loose or broken black wire A33 from J1 (pin 3) to ECM connecter J402 (pin 33)
   - Check continuity. Replace if defective.
5. Loose or broken white wire 102 from throttle pedal connector J4 (pin 3) to connector P1 (pin 2).
   - Check continuity. Replace if defective.
6. Loose or broken white wire A10 from J1 (pin 2) to ECM connector J402 (pin 10)
   - Check continuity. Replace if defective.
7. Defective throttle pedal
   - Replace throttle pedal.

NOTE

For other engine related problems, consult engine manufacturer's manual.

4.1-5 No Drive (park brake releases)

1. Loose or defective black wire from J269 (pin 2) and J270 (pin2) to single wire connector P124.
   - Check continuity. Replace if defective.
2. Loose or broken red wire from connector J124 to brake pressure switch SW125.
   - Check continuity. Replace if defective.
3. Defective pressure switch SW125.
   - Replace pressure switch.
4. Loose or broken black wire from brake pressure switch SW125 to ground E125.
   - Check continuity. Replace if defective.
5. Defective Shifter.
   - Replace shifter.

Electrical System (Continued)

4.1-6 No Forward Drive.

1. Loose or broken red wire from connector J20 (pin C) to connector J269 (pin 1)
   - Check continuity. Replace if defective.
2. Defective forward solenoid K269.
   - Replace solenoid
3. Loose or broken black wire from solenoid connector J269 (pin 2) to ground.
   - Check continuity. Replace if defective.
4. Defective shifter.
   - Replace shifter

4.1-7 No reverse drive

1. Loose or broken white wire from connector J20 (pin D) to diode D266
   - Check continuity. Replace if defective.
2. Open or defective diode D266.
   - Replace Diode.
3. Loose or broken white wire from diode D266 to connector J270 (pin1).
   - Check continuity. Replace if defective.
4. Defective reverse solenoid K270.
   - Replace solenoid
5. Loose or broken black wire from solenoid connector J270 (pin B) to ground.
   - Check continuity. Replace if defective.
6. Defective shifter.
   - Replace shifter

4.1-8 3rd speed range only.

1. Loose or broken black wire from connector J20 (pin B) to connector J268 (pin 1).
   - Check continuity. Replace if defective.
2. Defective 2nd solenoid K268.
   - Replace solenoid.
3. Loose or broken wire from connector J268 (pin B) to connector P264 (pin 2).
   - Check continuity. Replace if defective.
4. Loose or broken black wire from connector J264 (pin 2) to ground E267.
   - Check continuity. Replace if defective.
5. Defective shifter.
   - Replace shifter.

4.1-9 No 1st speed range.

1. Loose or broken brown wire from connector J20 (pin A) to connector J263 (pin 1)
   - Check continuity. Replace if defective.
2. Loose or broken brown wire from connector P263 (pin 1) to 1st solenoid connector J267 (pin A).
   - Check continuity. Replace if defective.
3. Defective 1st solenoid K267.
   - Replace solenoid
4. Loose or broken black wire from solenoid connector J267 (pin B) to connector P263 (pin 2).
   - Check continuity. Replace if defective.
5. Loose or broken black wire from connector J263 (pin 2) to ground E267.
   - Check continuity. Replace if defective.
6. Defective shifter.
   - Replace shifter.

Electrical System (Continued)

4.1-10 No Drive (park brake does not release)

1. Loose or broken red wire 42 from ignition switch SW1 to fuse F40
   - Check continuity. Replace if defective.
2. Defective fuse F40.
   - Check for defective wiring, Replace circuit breaker.
3. Loose or broken light grey wire 48 from fuse F40 to Park Brake Relay K3 pin 30
   - Check continuity. Replace if defective.
4. Defective Diode D21(open).
   - Perform diode check from pin 87 of K20 to pin 86 of K3
5. Defective Diode D48A(open).
   - Perform diode check from pin 87 of K3 to pin 86 of K3
6. Loose or broken black wire 00 from Park Brake Relay K3 pin 85 to ground
   - Check continuity. Replace if defective.
7. Defective park brake relay K3.
   - Replace relay.
8. Loose or broken blue/red wire 48A from Park Brake Relay K3 pin 87 to single wire connector P24
   - Check continuity. Replace if defective.
9. Loose or broken blue/red wire 48A from single wire connector J24 to connector J10 (pin D)
   - Check continuity. Replace if defective.
10. Loose or broken light blue/red wire from connecter P10 (pin D) to Hirschman connecters J127 and J128 (pins 1).
    - Check continuity. Replace if defective.
11. Defective park brake release coil K127.
    - Replace Coil.
12. Loose or broken light blue/black wire from Hirschman connecter J127 (pin 2) to connecter P10 (pin B).
    - Check continuity. Replace if defective.
13. Loose or broken light blue/black wire from connecter J 10 (pin B) to park brake switch SW6.
    - Check continuity. Replace if defective.
14. Defective park brake switch SW6.
    - Replace switch.
15. Loose or broken black wire from park brake switch SW6 to ground E2.
    - Check continuity. Replace if defective.

4.1-11 No Electrical functions (no standard dash power, alternator not charging and no options)

1. Loose or broken red wire 41 from ignition switch SW1 to Key switch Accessory Fuse F27.
   - Check continuity. Replace if defective.
2. Defective fuse F27.
   - Check for defective wiring, Replace Fuse.
3. Loose or broken purple wire 41A from Key switch Accessory Fuse F27 to relays K4, K5, and K7.
   - Check continuity. Replace if defective.

4.1-12 Alternator not charging

1. Loose or broken purple wire 41A from fuse F27 to single wire connector P27.
   - Check continuity. Replace if defective.
2. Loose or broken purple wire 41A from single wire connector J27 to Connecter P2 (pin8).
   - Check continuity. Replace if defective.
3. Loose or broken purple wire 41A from connecter J2 (pin 8) to alternator connecter J289 (pin C).
   - Check continuity. Replace if defective.

Electrical System (Continued)

4. Loose or broken red wire #24 from alternator “BAT” terminal to starter.
   - Check continuity. Replace if defective.
5. Defective alternator.
   - Replace alternator.

4.1-13 Front steer mode only, no dash power (hour meter, horn, gages, or indicator lights)

1. Loose or broken red wire 40 from CB220 to Steer and Dash Power Relay K4 pin 30.
   - Check continuity. Replace if defective.
2. Loose or broken white wire 41A from F27 to Steer and Dash Power Relay K4 pin 86.
   - Check continuity. Replace if defective.
3. Loose or broken black wire 00 from Steer and Dash Power Relay K4 pin 85 to ground.
   - Check continuity. Replace if defective.
4. Loose or broken blue wire 52 from Steer and Dash Power Relay K4 pin 87 to fuses F35 and F36.
   - Check continuity. Replace if defective.
5. Defective Relay K4
   - Check relay. Replace if defective.

4.1-14 Front steer mode only

6. Open or defective fuse F36.
   - Check for defective wiring, Replace fuse.
7. Loose or broken green/yellow wire 51 from F36 to Steer switch SW4.
   - Check continuity. Replace if defective.
8. Defective steer switch SW4.
   - Replace switch
9. Loose or broken black wire from steering solenoid A & B coils K124 and K125 to connecter J11 (pin C).
   - Check continuity. Replace if defective.
10. Loose or broken black wire form connecter P11 (pin C) to ground E1.
    - Check continuity. Replace if defective.

4.1-15 No round steer mode

1. Defective steer switch SW4.
   - Replace switch.
2. Loose or broken green/black wire from steer switch to connecter P11 (pin A).
   - Check continuity. Replace if defective.
3. Loose or broken green/black wire from connecter J11 (pin A) to steering solenoid B coil K125.
   - Check continuity. Replace if defective.
4. Defective steering solenoid K125.
   - Replace solenoid.

4.1-16 No crab steer mode

1. Defective steer switch SW4.
   - Replace switch.
2. Loose or broken green/white wire from steer switch to connector P11 (pin B).
   - Check continuity. Replace if defective.
3. Loose or broken green/white wire from connecter J11 (pin B) to steering solenoid A coil K124.
   - Check continuity. Replace if defective.
4. Defective steering solenoid K124.
   - Replace solenoid.

Electrical System (Continued)

4.1-17 No Carriage tilt and no Outriggers

11. Loose or broken red wire 40 from CB220 to Relay K6 pin 30.
    - Check continuity. Replace if defective.
12. Loose or broken white wire 41A from F27 to Relay K6 pin 86.
    - Check continuity. Replace if defective.
13. Loose or broken black wire 00 from K6 pin 85 to ground.
    - Check continuity. Replace if defective.
14. Loose or broken white wire 54 from Steer and K6 pin 87 to fuses F32 and F33.
    - Check continuity. Replace if defective.
15. Defective Relay K6
    - Check relay. Replace if defective.

4.1-18 No carriage tilt function.

1. Loose or broken red wire from ignition switch SW1 to Accessory Circuit breaker buss bar.
    - Check continuity. Replace if defective.
2. Open or defective fuse F33.
    - Check for defective wiring, Replace fuse.
3. Loose or broken tan wire from fuse F33 to connector J40.
    - Check continuity. Replace if defective.
4. Defective carriage tilt switch SW11.
    - Replace switch.
5. Loose or broken white wire from connecter P41 to Hirschman connector J222 at pilot diverter valve K222.
    - Check continuity. Replace if defective.
6. Defective diverter valve K22.
    - Replace diverter valve.
7. Loose or broken black wire from pilot diverter valve K222 Hirschman connector J222 to ground E222.
    - Check continuity. Replace if defective.4.1-16 No outrigger function

4.1-19 No outrigger function

1. Open or defective fuse F32.
    - Check for defective wiring, Replace fuse.
2. Loose or broken white wire from fuse F32 to connector J17 (pin A).
    - Check continuity. Replace if defective.
3. Loose or broken white jumper wire on connector J17 (pin A to pin B).
    - Check continuity. Replace if defective.
4. Loose or broken white/blue wire from connector J 17 (pin B) to common on outrigger switches SW7 and SW8
    - Check continuity. Replace if defective.
5. Loose or broken black wire from splice S137 to Ground E137 .
    - Check continuity. Replace if defective.

4.1-20 No right outrigger lower function

1. Defective right outrigger switch SW8.
    - Replace switch.
2. Loose or broken white/red/green wire from right outrigger switch to connector J18 (pin B).
    - Check continuity. Replace if defective.

Electrical System (Continued)

3. Loose or broken white/red/green wire from connector P18 (pin B) to right lower solenoid connector J134 (pin 1)
   - Check continuity. Replace if defective.
4. Defective right lower solenoid K134.
   - Replace solenoid.
5. Loose or broken black wire from right lower solenoid connector J134 (pin 2) to ground E137.
   - Check continuity. Replace if defective.

4.1-21 No right outrigger raise function

1. Defective right outrigger switch SW8.
   - Replace switch.
2. Loose or broken white/red wire from right outrigger switch to connector J18 (pin A).
   - Check continuity. Replace if defective.
3. Loose or broken white/red/green wire from connector P18 (pin A) to right raise solenoid connector J136 (pin 1)
   - Check continuity. Replace if defective.
4. Defective right raise solenoid K136.
   - Replace solenoid.
5. Loose or broken black wire from right raise solenoid connector J136 (pin 2) to ground E137.
   - Check continuity. Replace if defective.

4.1-22 No left outrigger lower function

1. Defective left outrigger switch SW7.
   - Replace switch.
2. Loose or broken white/black/red wire from left outrigger switch to connector J18 (pin D).
   - Check continuity. Replace if defective.
3. Loose or broken white/black/red wire from connector P18 (pin D) to left lower solenoid connector J135 (pin 1)
   - Check continuity. Replace if defective.
4. Defective left lower solenoid K135.
   - Replace solenoid.
5. Loose or broken black wire from left lower solenoid connector J135 (pin 2) to ground E137.
   - Check continuity. Replace if defective.

4.1-23 No left outrigger raise function

1. Defective left outrigger switch SW7.
   - Replace switch.
2. Loose or broken white/black wire from left outrigger switch to connector J18 (pin C).
   - Check continuity. Replace if defective.
3. Loose or broken white/black wire from connector P18 (pin C) to left raise solenoid connector J137 (pin 1)
   - Check continuity. Replace if defective.
4. Defective left raise solenoid K137.
   - Replace solenoid.
5. Loose or broken black wire from left raise solenoid connector J137 (pin 2) to ground E137.
   - Check continuity. Replace if defective.

Electrical System (Continued)

4.1-24 Rear axle locked, Front frame level in slow mode, brakes do not lock axle out, Axle lock light on, all boom angles.

1. Loose or broken red wire 40 from CB220 to Relay K5 pin 30.
   - Check continuity. Replace if defective.
2. Loose or broken white wire 41A from F27 to Relay K5 pin 86.
   - Check continuity. Replace if defective.
3. Loose or broken black wire 00 from K5 pin 85 to ground.
   - Check continuity. Replace if defective.
4. Loose or broken yellow/black wire 53 from K5 pin 87 to fuse F34.
   - Check continuity. Replace if defective.
5. Defective Relay K6
   - Check relay. Replace if defective.
6. Open or defective fuse F34.
   - Check for defective wiring, Replace fuse.
7. Loose or defective yellow/black wire from fuse F34 to connector P2 (pin 10).
   - Check continuity. Replace if defective.
8. Loose or defective yellow/black wire #28 from connector J2 (pin 10) to relay K221 (pin 6).
   - Check continuity. Replace if defective.

4.1-25 Rear axle and front frame level in slow mode, brake application locks out both axles, axle lock light on, all boom angles.

1. Loose or broken yellow wire from relay K221 (pin 6) to connector P247 (pin A).
   - Check continuity. Replace if defective.
2. Loose or broken black wire form connector J247 (pin A) to single wire connector J215.
   - Check continuity. Replace if defective.
3. Loose or broken wire from connector P215 to mercury switch SW300.
   - Check continuity. Replace if defective.
4. Defective mercury switch SW360.
   - Replace if defective.
5. Loose or broken wire from mercury switch SW300 to single wire connector J216.
   - Check continuity. Replace if defective.
6. Loose or broken white wire from connector P216 to splice SPL210.
   - Check continuity. Replace if defective.

4.1-26 Rear axle locked and front frame level operates normally, brake application locks out frame level, axle lock light on, all boom angles.

1. Loose or broken green wire from connector P247 (pin B) to relay K221 (pin 8).
   - Check continuity. Replace if defective.
2. Defective relay K221.
   - Replace if defective.
3. Loose or broken black wire from relay K221 (pin 7) to ground E221.
   - Check continuity. Replace if defective.

4.1-27 Rear axle locked, front frame level operates normally, axle lock light off, below 45 degrees.

1. Loose or broken white wires from splice SPL210 to solenoids K210 and K211.
   - Check continuity. Replace if defective.
2. Defective solenoid K210 or K211.
   - Replace if defective.

Electrical System (Continued)

3. Defective black wire from solenoids K210 and K211 to ground E210.
   - Check continuity. Replace if defective.

4.1-28 Rear axle lock works normally, front frame level in slow mode, axle lock, light off, below 45 degrees.

1. Loose or defective green wire from connector J247 (pin B) to solenoids K140 and K142 (pin 1).
   - Check continuity. Replace if defective.
2. Defective solenoid K140 or K142.
   - Replace if defective.
3. Loose or defective black wire from solenoids K140 and K142 (pin 2) to ground E140.
   - Check continuity. Replace if defective.

4.1-29 Front frame level does not lock out with brake application above 45 degrees.

1. Lose or defective black wire from relay K221 (pin2) to connector P247 (pin C).
   - Check continuity. Replace if defective.
2. Loose or defective black wire from connector J247 (pin C) to brake pressure switch SW114 connector (pin 1).
   - Check continuity. Replace if defective.
3. Brake pressure switch SW114 out of adjustment or defective.
   - Adjust switch. Replace if defective.
4. Loose or broken white wire from to brake pressure switch SW114 connector (pin 3) to frame level dump solenoids K141 and K143 (pin 1).
   - Check continuity. Replace if defective.
5. Defective solenoids K141 or K143.
   - Check continuity. Replace if defective.
6. Loose or defective green wire from solenoids K141 and K143 (pin 2) to ground E113.
   - Check continuity. Replace if defective.

Hydraulic System

4.2-1 All controls inoperative

1. Worn or defective pump shaft or coupling.
   - Check pump shaft and coupling. Replace if defective.
2. No PTO rotation.
   - Repair transmission, or flex plate.
3. Hydraulic oil level low.
   - Check oil level. Fill to proper level.
4. System pump P2 is out of adjustment or is defective.
   - Refer to section 5 for pump set up procedure. Repair or replace if defective.

4.2-2 All Boom Functions Inoperative.

1. Stuck or defective pressure reducing valve PRV1.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
2. Stuck or defective priority valve PRT1 .
   - Clean valve. Check operation of valve. Repair or replace valve as required.

4.2-3 No Boom Raise

1. Stuck or defective joystick JS2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective carriage tilt diverter valve V2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective lift valve sections.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
4. Stuck or defective lift counterbalance valves CB1, CB2.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
5. Defective lift cylinder C5 and/or C6.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-4 No Boom Lower

1. Stuck or defective joystick JS2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective carriage tilt diverter valve V2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective lift valve sections.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
4. Stuck or defective lift counterbalance valves CB1, CB2.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
5. Defective lift cylinder C5 and/or C6.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-5 No Boom Extend

1. Stuck or defective joystick JS2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective extension valve sections.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective extension counterbalance valve CB3.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
4. Defective extension cylinder C7.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

Hydraulic System (Continued)

4.2-6 No Boom Retract

1. Stuck or defective joystick JS2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective extension valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective extension counterbalance valve CB3.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
4. Defective extension cylinder C7.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-7 No Carriage Tilt Back

1. Stuck or defective joystick JS2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective carriage tilt diverter valve V2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective carriage tilt valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
4. Stuck or defective port relief valve RV3.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
5. Stuck or defective carriage tilt counterbalance valve CB4.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
6. Defective carriage slave cylinder C8and/or C9.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.
7. Defective carriage tilt cylinder C10 and/or C11.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.
8. Stuck or defective Crossover relief valve CRV1.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.

4.2-8 No Carriage Tilt Forward

1. Stuck or defective joystick JS2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective carriage tilt diverter valve V2.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective carriage tilt valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
4. Stuck or defective port relief valve RV2.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
5. Stuck or defective carriage tilt counterbalance valve CB4.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
6. Defective carriage slave cylinder C8 and/or C9.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.
7. Defective carriage tilt cylinder C10 and/or C11.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.
8. Stuck or defective Crossover relief valve CRV1.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.

Hydraulic System (Continued)

4.2-9 No Frame Level Right.

1. Stuck or defective joystick JS1.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective frame level valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective port relief valve RV4.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
4. Stuck or defective frame level counterbalance valve CB5 and/or CB6.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
5. Stuck or defective frame level dump valve V9.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
6. Defective frame level cylinder C12 and/or C13.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-10 No Frame Level Left.

1. Stuck or defective joystick JS1.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective frame level valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective port relief valve RV5.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
4. Closed or obstructed flow control valve FC1.
   - Clean valve. Check operation of valve. Adjust, repair or replace valve as required.
5. Stuck or defective frame level counterbalance valve CB4 and/or CB6.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
6. Stuck or defective frame level dump valve V10.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
7. Defective frame level cylinder C11 and/or C12.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-11 No Auxiliary/Optional Hydraulic Control

1. Stuck or defective joystick JS1.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective Auxiliary valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective port relief valve RV7 and/or RV8.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
4. Closed or obstructed flow control valve FC3 and/or FC4.
   - Clean valve. Check operation of valve. Adjust, repair or replace valve as required.
5. Stuck or defective Auxiliary counterbalance valve.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
6. Stuck or defective Diverter valve V6.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
7. Defective Auxiliary cylinder(s).
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

Hydraulic System (Continued)

4.2-12 No Right Outrigger Lower

1. Stuck or defective right lower pilot valve.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective right outrigger valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective port relief valve RV10.
   - Clean valve. Check operation of valve. Adjust, repair or replace valve as required.
4. Stuck or defective right outrigger counterbalance valve CB8.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
5. Defective right outrigger cylinderC16.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-13 No Right Outrigger Raise

1. Stuck or defective right raise pilot valve.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective right outrigger valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective port relief valve RV11.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
4. Stuck or defective right outrigger counterbalance valve CB8.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
5. Defective right outrigger cylinder C16.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-14 No Left Outrigger Lower

1. Stuck or defective left lower pilot valve.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective left outrigger valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective port relief valve RV8.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
4. Stuck or defective left outrigger counterbalance valve CB7.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
5. Defective left outrigger cylinder C15.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-15 No Left Outrigger Raise

1. Stuck or defective left raise pilot valve.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Stuck or defective left outrigger valve section.
   - Clean valve. Check operation of valve. Repair or replace valve as required.
3. Stuck or defective port relief valve RV9.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
4. Stuck or defective left outrigger counterbalance valve CB7.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
5. Defective left outrigger cylinder C15.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

Hydraulic System (Continued)

4.2-16 Brake System Charging Constantly or Too Frequently.

1. Stuck or defective priority valve PRT1.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
2. Stuck or defective brake charge valve V3.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
3. Defective accumulators ACC2 and/or ACC3.
   - Charge with nitrogen to specification. Replace if defective.
4. Stuck or defective service brake valve V5.
   - Remove from system, check brake charge cycle time. Replace if defective.

4.2-17 Hard or No Steering

1. Stuck or defective priority valve PRT1.
   - Set valve to specifications. Check o-rings and clean valve. Repair or replace valve as required.
2. Stuck or defective steering motor OSM1.
   - Check o-rings and clean valve. Repair or replace valve as required.
3. Defective steer cylinder C1 and/or C2, C3, C4.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-18 Wheels go out of Synch. When in 4 wheel steer mode

1. Stuck or defective steer function valve V1
   - Clean valve. Check operation of valve. Repair or replace valve as required.
2. Defective steer cylinder C1 and/or C2, C3, C4.
   - Check seals on cylinder. Replace as necessary. Replace cylinder if defective.

4.2-19 Park Brake will not Release

1. Stuck or defective park brake valve V5.
   - Clean valve. Check o-rings on valve. Repair or replace valve as required.
2. Bypassing or defective parking brake C17.
   - Check seals, replace as necessary. Replace if defective.

4.2-20 Park Brake will not Engage

1. Defective park brake C17.
   - Repair or replace as necessary.
2. Park brake valve V5 stuck in shifted position.
   - Check valve. Replace if defective.
3. Park brake out of adjustment.
   - See section 5 for park brake adjustment procedure.

Section 5
PROCEDURES

List of Procedures

List of Procedures (Continued)

General

The following information is provided to assist you in the use and application of servicing and maintenance procedures contained in this chapter.

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 Engine and Transmission

5.1-1 Engine and Components

The engine used on the ZB2044 Zoom Boom model is a Cummins QSB4.5-C163-Tier 4 Final.

Engine service information can be found in the Cummins Engine Manuals. It should be noted that engine warranty service work is to be directed to and administered by your nearest authorized Cummins dealer/distributor. Skyjack cannot enter into any warranty service work requirements.

The basic Cummins 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:

1. Starter
2. Alternator
3. Injectors
4. Fuel Pump
5. Fuel Solenoid
6. Water Pump
7. Air Cleaner
8. Air Filter - Primary Element
9. Air Filter - Safety Element
10. Aftertreatment SCR (Secondary Catalytic Reduction)
11. Aftertreatment DOC (Diesel Oxidation Catalytic Converter)
12. Aftertreatment DRT (Decomposition Reactor Tube)

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

5.1-2 Fault Codes for Quantum Engines

HHP Quantum 45/60/78 Fault Severity Levels		
Fault Severity Level	**Fault Severity Function**	**Action to be taken by operator**
Red	Stop	Stop Engine Now - Damage imminent
Yellow	Warning	Warning - Engine may continue to run, but must be repaired the same day.
No Lamp	Maintenance	Maintenance - Repair at next PM
No Lamp	None - Information only	None - No lamp action

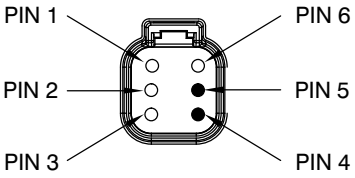
5.1-3 PowerView General Information

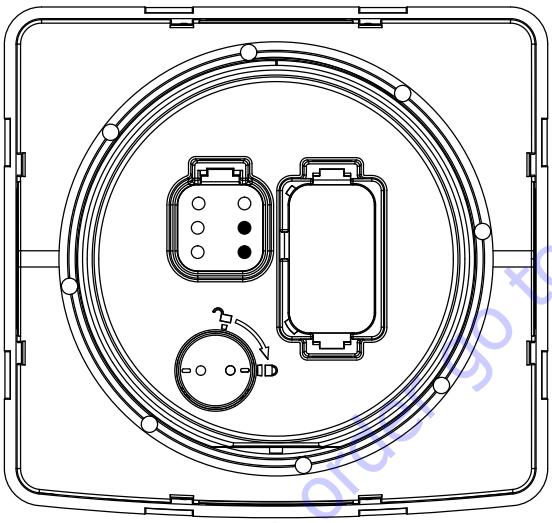
This section is intended to familiarize the operator with the PowerView display, identify navigation basics, and recognize useful options and features.

WARNING

Before beginning installation of this FW Murphy product:

- Disconnect all electrical power to the machine
- Make sure the machine cannot operate during installation
- Follow all safety warnings of the manufacturer
- Read and follow all installation instructions





Operating Voltage: 6-36 VDC

Communications: (2) CAN 2.0B; second CAN port is NMEA 2000 isolated; J1939 & NMEA 2000 protocol.

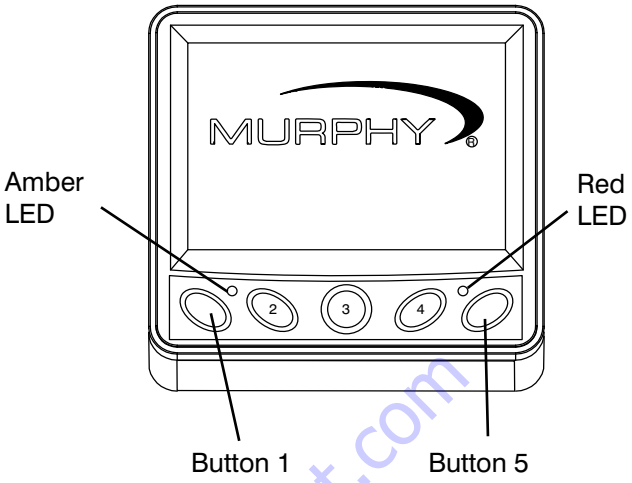
Connectors: Deutsh DT Series 6 pin; M12 for NMEA 2000

Inputs: (1) resistive analog

Outputs: (1) 500 mA; switched low-side

Display Module Rear View

Display Parameters



Engine Data Display Module

LED Indicators

The PV350 features amber (Warning) and red (Shut-down) colored LEDs on the front keypad. These are illuminated according to the J1939 error definition for alarms and shut-down conditions.

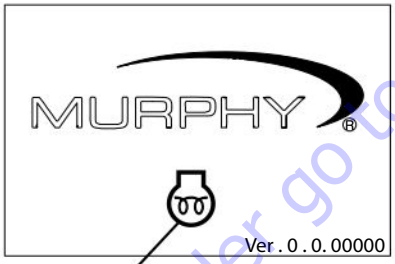
Engine and Transmission Parameters

The following are some of the engine and transmission parameters that can be displayed in imperial or metric units as well as in English, Spanish, and French languages.

- Engine Speed
- Coolant Temperature
- Engine Oil Pressure and Temperature
- Hydraulic Oil Pressure and Temperature
- Transmission Oil Pressure and Temperature
- Fuel Level
- Diesel Exhaust Fluid (DEF) Level
- % Load @ Current RPM
- Active Fault Codes

First Time Startup

- Turn ignition switch to "|" ON position.
- "Wait to Start" message displays below the logo as shown.

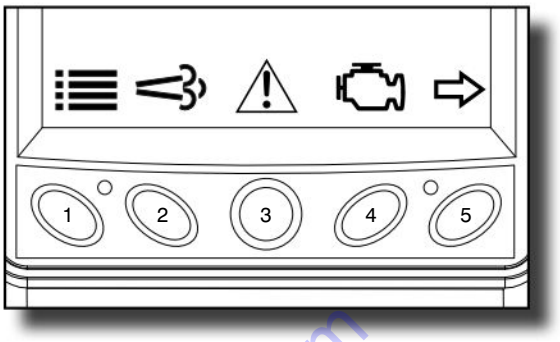


Engine Data Display Module

- Start the engine. The 4-up parameter view displays with the following paramters:
  - Engine RPM,
  - Oil Pressure,
  - Battery Voltage, and
  - Coolant Temperature

Navigation and Keypad Functions

- Pressing any button calls up the context menu.



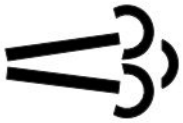
Engine Data Display Module

- The positioning of the symbols above the relevant button allows the button function to be changed.
- **Button 1**: Displays the menu items of

- Brightness
- Contrast
- Units
- Language
- ECU Address

- **Button 2**: Displays the emissions menu

- Request DPF Regen
- Current Regen Mode (Auto or Inhibit)
- Method of changing the Regen Mode



- **Button 3**: Displays the Diagnostic menu

- Active Fualts - ECU
- Stored Fualts - ECU
- Clear Fault Codes

- **Button 4**: Displays the Service Reminders menu

- Engine Oil
- Fuel Filter
- Engine Air Filter
- Hydraulic Oil
- Service Engine
- Service Machine

- **Button 5**: Scrolls through the four available gauge screens

NOTE

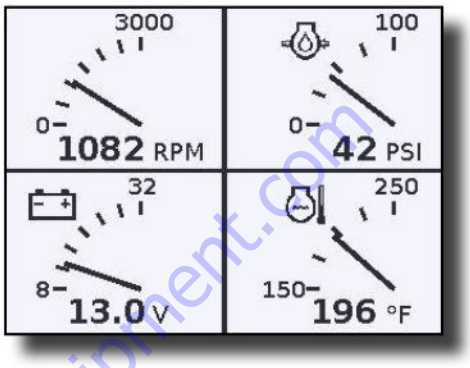
After displaying the context menu, if no button is pressed within 5 seconds, the pop-up context menu will disappear.

Brightness & Contrast Settings

- Press any button to display the context menu.
- Press button 1, then scroll up/down to brightness or contrast.
- Press button 3 (+) or 4 (-) to adjust the brightness or contrast.
- Press button 5 to exit.

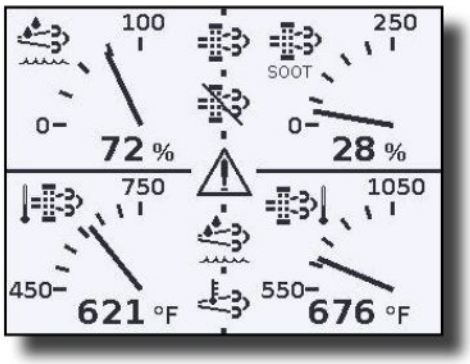
Gauge Displays

- Engine 4-Up:
  1. Engine Speed
  2. Engine Oil Pressure
  3. Battery Voltage
  4. Coolant Temperature



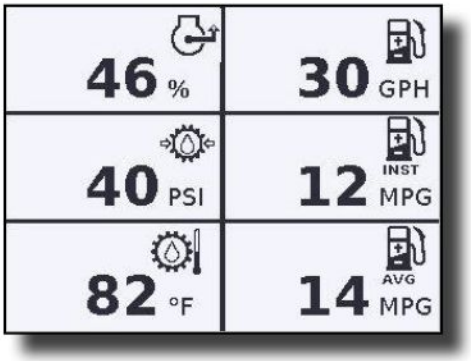
Engine 4-Up Display

- Emissions 4-Up Screen:
  1. DEF Level
  2. Percent Soot Level
  3. Exhaust Filter Inlet Temperature
  4. Exhaust Filter Outlet Temperature



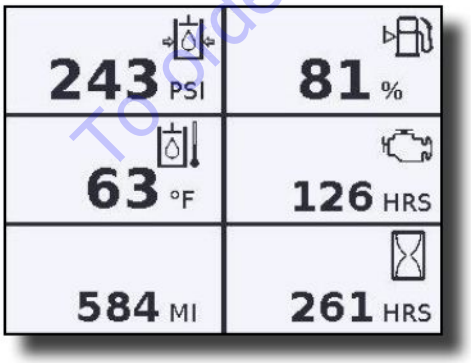
Emission 4-Up Display

- 6-Up #1 Screen:
  1. Percent Engine Load at current RPM
  2. Transmission Oil Pressure
  3. Transmission Oil Temperature
  4. Engine Fuel Rate
  5. Instantaneous Fuel Economy
  6. Average Fuel Economy



Engine & Transmission 6-Up Display

- 6-Up #2 Screen:
  1. Hydraulic Oil Pressure
  2. Hydrualic Oil Temperature
  3. Engine Total Vehicle Distance
  4. Engine Fuel Level
  5. Engine Total Hours of Operation
  6. Machine Hours



Engine & Hydrualic 6-Up Display

Units

- Press any button to display the context menu.
- Press button 1, then scroll up/down to place the arrow beside “Units”.
- Press button 3 (+) or 4 (-) to cycle through the selection of units:

• USA Standard
• Metric kPa
• Metric Bar

- Press button 5 to exit.

Language

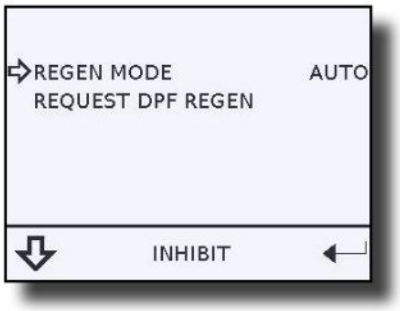
- Press any button to display the context menu.
- Press button 1, then scroll up/down to place the arrow beside “Language”.
- Press button 3 (+) or 4 (-) to cycle through the language choices:

• English
• French
• Spanish
• German
• Italian

- Press button 5 to exit.

DPF Regen

- Press any button to display the context menu.
- Press button 2 (Emissions Menu).
- Press button 1 (up) or 2 (down) to place the arrow beside “Regen Mode”.

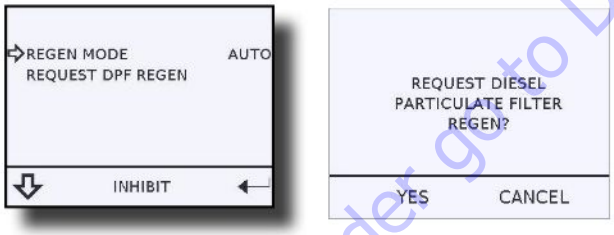


DPF Auto Regen Display

- Press button 3 to change the Regen Mode (INHIBIT when in AUTO mode, AUTO when in INHIBIT mode.

To manually request the ECU to start a DPF Regen:

- Press any button to display the context menu.
- Press button 2 (Emissions Menu).
- Press button 1 (up) or 2 (down) to place the arrow beside “Request DPF Regen”.



Manual DPF Regen Display

- Press button 3 (OK). A confirmation screen will be displayed.
- Pressing button 2 (YES) will request the ECU to begin a DPF Regen. Pressing button 4 (CANCEL) will return to the previous menu.

Diagnostic Menu

The diagnostics menu gives access to active and stored fault codes and allows you to clear fault codes.

- Press any button to display the context menu.
- Press button 3 (Diagnostic Mode) to view the following:

- Active Faults
- Stored Faults
- Clear Fault Codes

- Press button 1 (down) or 2 (up) to scroll through the messages.
- To clear a fault code, press button 1 (down arrow) twice, then press button 3 (OK).
- Quit the display by pressing button 5 (return arrow).

Service Reminders Menu

A number of helpful reminders can be set to aid the operator such as:

- Engine Oil Reminders
- Fuel Filter
- Engine Air Filter
- Hydraulic Oil
- Service Engine
- Service Machine

- Press any button to display the context menu.
- Press button 4 (Service Reminders) to view the type of reminder to be set:
  - Press button 1
  - Press button 3 (+) or 4 (-) to adjust the number of hours.
  - Press button 1 (down arrow) to place the arrow beside “Hour Type”. Choose the appropriate setting of Engine Hours or Machine Hours. The remaining hours will adjust accordingly.
  - To reset the hours, press button 1 to place the arrow beside “Reset”. Press button 3 (OK) and the hours will reset.

NOTE

The interval remaining time may be negative when the service reminder is expired.

Error Messages - Cummins QSB Engines - T4F

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
111	629	12	Red	Controller #1	Engine Control Module Critical Internal Failure - Bad intelligent device or component
115	612	2	Red	System Diagnostic Code #2	Engine Magnetic Speed/Position Lost Both of Two Signals - Data erratic, intermittent or incorrect
122	102	3	Amber	Engine Intake Manifold #1 Pressure	Intake Manifold 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
123	102	4	Amber	Engine Intake Manifold #1 Pressure	Intake Manifold 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
131	91	3	Red	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source
132	91	4	Red	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source
133	974	3	Red	Remote Accelerator Pedal Position	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source
134	974	4	Red	Remote Accelerator Pedal Position	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source
135	100	3	Amber	Engine Oil Pressure	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage above normal, or shorted to high source
141	100	4	Amber	Engine Oil Pressure	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage below normal, or shorted to low source
143	100	18	Amber	Engine Oil Pressure	Engine Oil Rifle Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
144	110	3	Amber	Engine Coolant Temperature	Engine Coolant Temperature 1 Sensor Circuit - Voltage above normal, or shorted to high source
145	110	4	Amber	Engine Coolant Temperature	Engine Coolant Temperature 1 Sensor Circuit - Voltage below normal, or shorted to low source
146	110	16	Amber	Engine Coolant Temperature	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
147	91	1	Red	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position 1 Sensor Circuit Frequency - Data valid but below normal operating Range
148	91	0	Red	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 - Data valid but above normal operational range - Most Severe Level
151	110	0	Red	Engine Coolant Temperature	Engine Coolant Temperature - Data valid but above normal operational range - Most Severe Level
153	105	3	Amber	Engine Intake Manifold 1 Temperature	Intake Manifold 1 Temperature Sensor Circuit - Voltage above normal, or shorted to high source
154	105	4	Amber	Engine Intake Manifold 1 Temperature	Intake Manifold 1 Temperature Sensor Circuit - Voltage below normal, or shorted to low source
155	105	0	Red	Engine Intake Manifold 1 Temperature	Intake Manifold 1 Temperature - Data valid but above normal operational range - Most Severe Level
187	3510	4	Amber	Sensor supply voltage 2	Sensor Supply 2 Circuit - Voltage below normal, or shorted to low source
195	111	3	Amber	Engine Coolant Level	Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source
196	111	4	Amber	Engine Coolant Level	Coolant Level Sensor 1 Circuit - Voltage below normal, or shorted to low source
197	111	18	Amber	Engine Coolant Level	Coolant Level - Data Valid But Below Normal Operating Range - Moderately Severe Level
227	3510	3	Amber	Sensor supply voltage 2	Sensor Supply 2 Circuit - Voltage above normal, or shorted to high source

284A-1

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
234	190	0	Red	Engine Speed	Engine Crankshaft Speed/Position - Data valid but above normal operational range - Most Severe Level
235	111	1	Red	Engine Coolant Level	Coolant Level - Data valid but below normal operational range - Most Severe Level
237	644	2	Amber	Engine External Speed Command Input	External Speed Command Input (Multiple Unit Synchronization) - Data erratic, intermittent or incorrect
238	3511	4	Amber	Sensor supply voltage 3	Sensor Supply 3 Circuit - Voltage below normal, or shorted to low source
239	3511	3	Amber	Sensor supply voltage 3	Sensor Supply 3 Circuit - Voltage above normal, or shorted to high source
241	84	2	Amber	Wheel-Based Vehicle Speed	Wheel-Based Vehicle Speed - Data erratic, intermittent or incorrect
245	647	4	Amber	Engine Fan Clutch 1 Output Device Driver	Fan Control Circuit - Voltage below normal, or shorted to low source
271	1347	4	Amber	Engine Fuel Pump Pressurizing Assembly #1	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage below normal, or shorted to low source
272	1347	3	Amber	Engine Fuel Pump Pressurizing Assembly #2	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage above normal, or shorted to high source
281	1347	7	Amber	Engine Fuel Pump Pressurizing Assembly #3	Engine Fuel Pump Pressurizing Assembly 1 - Mechanical system not responding or out of adjustment
285	639	9	Amber	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate
286	639	13	Amber	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)	SAE J1939 Multiplexing Configuration Error - Out of Calibration
288	974	19	Red	Remote Accelerator Pedal Position	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Position Sensor System - Received Network Data In Error
291	625	9	Red	Proprietary Datalink	Proprietary Datalink Error (OEM/Vehicle Datalink) - Abnormal update rate
292	441	14	Red	Auxiliary Temperature 1	Auxiliary Temperature Sensor Input 1 - Special Instructions
293	441	3	Amber	Auxiliary Temperature 1	Auxiliary Temperature Sensor Input 1 Circuit - Voltage above normal, or shorted to high source
294	441	4	Amber	Auxiliary Temperature 1	Auxiliary Temperature Sensor Input 1 Circuit - Voltage below normal, or shorted to low source
296	1388	14	Red	Auxiliary Pressure #2	Auxiliary Pressure Sensor Input 2 - Special Instructions
297	1388	3	Amber	Auxiliary Pressure #2	Auxiliary Pressure Sensor Input 2 Circuit - Voltage above normal, or shorted to high source
298	1388	4	Amber	Auxiliary Pressure #2	Auxiliary Pressure Sensor Input 2 Circuit - Voltage below normal, or shorted to low source
322	651	5	Amber	Engine Injector Cylinder #01	Injector Solenoid Driver Cylinder 1 Circuit - Current below normal or open circuit
324	653	5	Amber	Engine Injector Cylinder #03	Injector Solenoid Driver Cylinder 3 Circuit - Current below normal or open circuit
331	652	5	Amber	Engine Injector Cylinder #02	Injector Solenoid Driver Cylinder 2 Circuit - Current below normal or open circuit
332	654	5	Amber	Engine Injector Cylinder #04	Injector Solenoid Driver Cylinder 4 Circuit - Current below normal or open circuit

284A-2

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
343	629	12	Amber	Controller #1	Engine Control Module Warning Internal Hardware Failure - Bad intelligent device or component
351	3597	12	Amber	ECU Power Output Supply Voltage #1	Injector Power Supply - Bad intelligent device or component
352	3509	4	Amber	Sensor supply voltage 1	Sensor Supply 1 Circuit - Voltage below normal, or shorted to low source
386	3509	3	Amber	Sensor supply voltage 1	Sensor Supply 1 Circuit - Voltage above normal, or shorted to high source
415	100	1	Red	Engine Oil Pressure	Engine Oil Rifle Pressure - Data valid but below normal operational range - Most Severe Level
418	97	15	Amber/ Blinking	Water In Fuel Indicator	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Least Severe Level
428	97	3	Amber	Water In Fuel Indicator	Water in Fuel Indicator Sensor Circuit - Voltage above normal, or shorted to high source
429	97	4	Amber	Water In Fuel Indicator	Water in Fuel Indicator Sensor Circuit - Voltage below normal, or shorted to low source
431	558	2	Amber	Accelerator Pedal 1 Low Idle Switch	Accelerator Pedal or Lever Idle Validation Switch - Data erratic, intermittent or incorrect
432	558	13	Red	Accelerator Pedal 1 Low Idle Switch	Accelerator Pedal or Lever Idle Validation Switch Circuit - Out of Calibration
435	100	2	Amber	Engine Oil Pressure	Engine Oil Rifle Pressure - Data erratic, intermittent or incorrect
441	168	18	Amber	Battery Potential / Power Input 1	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Moderately Severe Level
442	168	16	Amber	Battery Potential / Power Input 1	Battery 1 Voltage - Data Valid But Above Normal Operating Range - Moderately Severe Level
449	157	0	Red	Engine Injector Metering Rail 1 Pressure	Injector Metering Rail 1 Pressure - Data valid but above normal operational range - Most Severe Level
451	157	3	Amber	Engine Injector Metering Rail 1 Pressure	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
452	157	4	Amber	Engine Injector Metering Rail 1 Pressure	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
483	1349	3	Amber	Engine Injector Metering Rail 2 Pressure	Injector Metering Rail 2 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
488	105	16	Amber	Engine Intake Manifold Temperature	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
515	3514	3	Amber	Sensor supply voltage 6	Sensor Supply 6 Circuit - Voltage above normal, or shorted to high source
516	3514	4	Amber	Sensor supply voltage 6	Sensor Supply 6 Circuit - Voltage below normal, or shorted to low source
546	94	3	Amber	Engine Fuel Delivery Pressure	Fuel Delivery Pressure Sensor Circuit - Voltage above normal, or shorted to high source
547	94	4	Amber	Engine Fuel Delivery Pressure	Fuel Delivery Pressure Sensor Circuit - Voltage below normal, or shorted to low source
553	157	16	Amber	Engine Injector Metering Rail 1 Pressure	Injector Metering Rail 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level

284A-3

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
555	101	16	Amber	Engine Crankcase Pressure	Crankcase Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
556	101	0	Red	Engine Crankcase Pressure	Crankcase Pressure - Data valid but above normal operational range - Most Severe Level
559	157	18	Amber	Engine Injector Metering Rail 1 Pressure	Injector Metering Rail 1 Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level
584	677	3	Amber	Engine Starter Motor Relay	Starter Relay Driver Circuit - Voltage above normal, or shorted to high source
585	677	4	Amber	Engine Starter Motor Relay	Starter Relay Driver Circuit - Voltage below normal, or shorted to low source
595	103	16	Amber	Engine Turbocharger 1 Speed	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Moderately Severe Level
649	1378	31	Amber/ Blinking	Engine Oil Change Interval	Engine Oil Change Interval - Condition Exists
687	103	18	Amber	Engine Turbocharger 1 Speed	Turbocharger 1 Speed - Data Valid But Below Normal Operating Range - Moderately Severe Level
689	190	2	Amber	Engine Speed	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect
691	1172	3	Amber	Engine Turbocharger 1 Compressor Intake Temperature	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal, or shorted to high source
692	1172	4	Amber	Engine Turbocharger 1 Compressor Intake Temperature	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage below normal, or shorted to low source
693	1172	2	Amber	Engine Turbocharger 1 Compressor Intake Temperature	Turbocharger 1 Compressor Intake Temperature - Data erratic, intermittent or incorrect
731	723	7	Amber	Engine Speed 2	Engine Speed / Position Camshaft and Crankshaft Misalignment - Mechanical system not responding or out of adjustment
741	1176	3	Amber	Engine Turbocharger 1 Compressor Intake Pressure	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage above normal, or shorted to high source
742	1176	4	Amber	Engine Turbocharger 1 Compressor Intake Pressure	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage below normal, or shorted to low source
743	1176	2	Amber	Engine Turbocharger 1 Compressor Intake Pressure	Turbocharger 1 Compressor Intake Pressure - Data erratic, intermittent or incorrect
778	723	2	Amber	Engine Speed 2	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect
1117	3597	2	None	ECU Power Output Supply Voltage #1	Power Supply Lost With Ignition On - Data erratic, intermittent or incorrect
1141	652	7	Amber	Engine Injector Cylinder #02	Injector Solenoid Driver Cylinder 2 - Mechanical system not responding or out of adjustment
1142	653	7	Amber	Engine Injector Cylinder #03	Injector Solenoid Driver Cylinder 3 - Mechanical system not responding or out of adjustment
1143	654	7	Amber	Engine Injector Cylinder #04	Injector Solenoid Driver Cylinder 4 - Mechanical system not responding or out of adjustment
1239	2623	3	Amber	Accelerator Pedal #1 Channel 2	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage above normal, or shorted to high source
1241	2623	4	Amber	Accelerator Pedal #1 Channel 2	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage below normal, or shorted to low source
1242	91	2	Red	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 - Data erratic, intermittent or incorrect
1358	91	3	Amber	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source

284A-4

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
1359	91	4	Amber	Accelerator Pedal Position 1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source
1427	4185	31	Amber	Overspeed Shutdown Relay Driver	Overspeed Shutdown Relay Driver Diagnostic has detected an error - Condition Exists
1428	4186	31	Amber	Low Oil Pressure Shutdown Relay Driver	Low Oil Pressure (LOP) Shutdown Relay Driver Diagnostic has detected an error - Condition Exists
1429	4187	31	Amber	High Engine Temperature Shutdown Relay Driver	High Engine Temperature (HET) Shutdown Relay Driver Diagnostic has detected an error - Condition Exists
1431	4188	31	Amber	Pre-Low Oil Pressure Indicator Relay Driver	Pre-Low Oil Pressure Warning Relay Driver Diagnostic has detected an error - Condition Exists
1432	4223	31	Amber	Pre-High Engine Temperature Warning Relay Driver	Pre-High Engine Temperature Warning Relay Driver Diagnostic has detected an error - Condition Exists
1515	91	19	Red	Accelerator Pedal Position 1	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Received Network Data In Error
1539	1387	3	Amber	Auxiliary Pressure #1	Auxiliary Pressure Sensor Input 1 Circuit - Voltage above normal, or shorted to high source
1654	1323	31	Amber	Engine Misfire Cylinder #1	Engine Misfire Cylinder 1 - Condition Exists
1655	1324	31	Amber	Engine Misfire Cylinder #2	Engine Misfire Cylinder 2 - Condition Exists
1656	1325	31	Amber	Engine Misfire Cylinder #3	Engine Misfire Cylinder 3 - Condition Exists
1657	1326	31	Amber	Engine Misfire Cylinder #4	Engine Misfire Cylinder 4 - Condition Exists
1664	4796	31	Amber	Aftertreatment 1 Diesel Oxidation Catalyst Missing	Aftertreatment 1 Diesel Oxidation Catalyst Missing - Condition Exists
1668	1761	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage below normal, or shorted to low source
1669	1761	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage above normal, or shorted to high source
1673	1761	1	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data valid but below normal operational range - Most Severe Level
1677	3031	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage below normal, or shorted to low source
1678	3031	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage above normal, or shorted to high source
1679	3031	2	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature - Data erratic, intermittent or incorrect
1682	3362	31	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Input Lines	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Input Lines - Condition Exists
1683	3363	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage above normal, or shorted to high source
1684	3363	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage below normal, or shorted to low source
1685	3364	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage below normal, or shorted to low source
1686	3364	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage above normal, or shorted to high source
1691	5298	18	Amber	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
1694	3226	2	Amber	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Data erratic, intermittent or incorrect
1695	3513	3	Amber	Sensor supply voltage 5	Sensor Supply 5 - Voltage above normal, or shorted to high source
1696	3513	4	Amber	Sensor supply voltage 5	Sensor Supply 5 - Voltage below normal, or shorted to low source
1712	3363	18	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Data Valid But Below Normal Operating Range - Moderately Severe Level
1713	3363	16	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Data Valid But Above Normal Operating Range - Moderately Severe Level
1714	3364	13	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Out of Calibration
1715	3364	11	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Root Cause Not Known
1843	101	3	Amber	Engine Crankcase Pressure	Crankcase Pressure Circuit - Voltage above normal, or shorted to high source
1844	101	4	Amber	Engine Crankcase Pressure	Crankcase Pressure Circuit - Voltage below normal, or shorted to low source
1852	97	16	Amber	Water In Fuel Indicator	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Moderately Severe Level
1866	411	2	Amber	Engine Exhaust Gas Recirculation 1 Differential Pressure	Exhaust Gas Recirculation Differential Pressure - Data erratic, intermittent or incorrect
1885	3216	4	Amber	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor Circuit - Voltage below normal, or shorted to low source
1887	3226	4	Amber	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor Circuit - Voltage below normal, or shorted to low source
1896	2791	13	Amber	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Controller - Out of Calibration
1898	641	13	Amber	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Controller - Out of Calibration
1921	3251	16	Amber	Aftertreatment 1 Diesel Particulate Filter Differential Pressure	Aftertreatment Diesel Particulate Filter Differential Pressure - Data Valid But Above Normal Operating Range
1938	3597	18	Amber	ECU Power Output Supply Voltage #1	ECU Power Output Supply Voltage 1 - Data Valid But Below Normal Operating Range - Moderately Severe Level
1942	101	2	Amber	Engine Crankcase Pressure	Crankcase Pressure - Data erratic, intermittent or incorrect
1961	2791	15	Amber	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit Over Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
1962	641	15	Amber	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Over Temperature (Calculated) - Data Valid But Above Normal Operating Range - Least Severe Level
1974	101	15	Amber/ Blinking	Engine Crankcase Pressure	Crankcase Pressure - Data Valid But Above Normal Operating Range - Least Severe Level
1976	641	15	None	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Over Temperature (Calculated) - Data Valid But Above Normal Operating Range - Least Severe Level
2185	3512	3	Amber	Sensor supply voltage 4	Sensor Supply 4 Circuit - Voltage above normal, or shorted to high source
2186	3512	4	Amber	Sensor supply voltage 4	Sensor Supply 4 Circuit - Voltage below normal, or shorted to low source
2198	641	11	Amber	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit - Root Cause Not Known

284A-6

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
2272	27	4	Amber	Engine Exhaust Gas Recirculation 1 Valve Position	EGR Valve Position Circuit - Voltage below normal, or shorted to low source
2273	411	3	Amber	Engine Exhaust Gas Recirculation 1 Differential Pressure	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage above normal, or shorted to high source
2274	411	4	Amber	Engine Exhaust Gas Recirculation 1 Differential Pressure	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage below normal, or shorted to low source
2288	103	15	None	Engine Turbocharger 1 Speed	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Least Severe Level
2311	633	31	Amber	Engine Fuel Actuator 1 Control Command	Electronic Fuel Injection Control Valve Circuit - Condition Exists
2321	190	2	None	Engine Speed	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect
2322	723	2	None	Engine Speed 2	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect
2346	2789	15	None	Engine Turbocharger 1 Calculated Turbine Intake Temperature	Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe
2349	2791	5	Amber	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit - Current below normal or open circuit
2353	2791	6	Amber	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit - Current above normal or grounded circuit
2357	2791	7	Amber	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	EGR Valve Control Circuit - Mechanical system not responding or out of adjustment
2363	1073	4	Amber	Engine (Compression) Brake Output #2	Engine Brake Actuator Driver Output 2 Circuit - Voltage below normal, or shorted to low source
2372	95	16	Amber	Engine Fuel Filter Differential Pressure	Fuel Filter Differential Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
2373	1209	3	Amber	Engine Exhaust Gas Pressure 1	Exhaust Gas Pressure Sensor 1 Circuit - Voltage above normal, or shorted to high source
2374	1209	4	Amber	Engine Exhaust Gas Pressure 1	Exhaust Gas Pressure Sensor 1 Circuit - Voltage below normal, or shorted to low source
2375	412	3	Amber	Engine Exhaust Gas Recirculation 1 Temperature	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage above normal, or shorted to high source
2376	412	4	Amber	Engine Exhaust Gas Recirculation 1 Temperature	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage below normal, or shorted to low source
2377	647	3	Amber	Engine Fan Clutch 1 Output Device Driver	Fan Control Circuit - Voltage above normal, or shorted to high source
2387	641	7	Amber	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit (Motor) - Mechanical system not responding or out of adjustment
2448	111	17	Amber/ Blinking	Engine Coolant Level	Coolant Level - Data Valid But Below Normal Operating Range - Least Severe Level
2449	641	13	Red	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Controller - Out of Calibration
2468	190	16	Amber	Engine Speed	Engine Crankshaft Speed/Position - Data Valid But Above Normal Operating Range - Moderately Severe Level
2554	1209	2	Amber	Engine Exhaust Gas Pressure 1	Exhaust Gas Pressure 1 - Data erratic, intermittent or incorrect
2555	729	3	Amber	Engine Intake Air Heater Driver #1	Engine Intake Air Heater 1 Circuit - Voltage above normal, or shorted to high source

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
2556	729	4	Amber	Engine Intake Air Heater Driver #1	Engine Intake Air Heater 1 Circuit - Voltage below normal, or shorted to low source
2557	697	3	Amber	Auxiliary PWM Driver #1	Auxiliary PWM Driver 1 Circuit - Voltage above normal, or shorted to high source
2558	697	4	Amber	Auxiliary PWM Driver #1	Auxiliary PWM Driver 1 Circuit - Voltage below normal, or shorted to low source
2634	641	12	Red	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Controller - Bad intelligent device or component
2635	641	31	Red	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit - Condition Exists
2636	641	9	Red	Engine Variable Geometry Turbocharger Actuator #1	VGT Actuator Driver Circuit - Abnormal update rate
2637	5018	11	None	Aftertreatment Diesel Oxidation Catalyst	Aftertreatment 1 Diesel Oxidation Catalyst Face Plugged - Root Cause Not Known
2638	5298	17	None	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level
2646	110	31	Amber	Engine Coolant Temperature	Engine Coolant Temperature - Condition Exists
2659	110	31	None	Engine Coolant Temperature	Engine Coolant Temperature - Condition Exists
2771	3226	9	Amber	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Abnormal update rate
2961	412	15	None	Engine Exhaust Gas Recirculation 1 Temperature	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
2962	412	16	Amber	Engine Exhaust Gas Recirculation 1 Temperature	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
2964	105	15	None	Engine Intake Manifold #1 Temperature	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
2976	3361	2	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Temperature - Data erratic, intermittent or incorrect
3142	4360	3	Amber	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
3143	4360	4	Amber	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
3144	4360	2	Amber	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature Sensor - Data erratic, intermittent or incorrect
3146	4363	3	Amber	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage above normal, or shorted to high source
3147	4363	4	Amber	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage below normal, or shorted to low source
3148	4363	2	Amber	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor - Data erratic, intermittent or incorrect
3151	4794	31	Amber	Aftertreatment 1 SCR Catalyst System	Aftertreatment 1 SCR Catalyst System Missing - Condition Exists
3164	4360	15	None	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe
3165	4363	0	Red	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature - Data valid but above normal operational range - Most Severe

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
3228	3216	2	Amber	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Data erratic, intermittent or incorrect
3229	4360	0	Red	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature - Data valid but above normal operational range - Most Severe Level
3231	4360	16	Red	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	Aftertreatment 1 SCR Intake Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
3232	3216	9	Amber	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Abnormal update rate
3235	4363	16	Red	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
3237	4340	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage above normal, or shorted to high source
3238	4340	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage below normal, or shorted to low source
3239	4342	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage above normal, or shorted to high source
3241	4342	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage below normal, or shorted to low source
3242	3363	7	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Mechanical system not responding or out of adjustment
3243	3060	18	Amber	Engine Cooling System Monitor	Engine Cooling System Monitor - Data Valid But Below Normal Operating Range - Moderately Severe Level
3251	4765	16	Red	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data Valid But Above Normal Operating Range
3258	4340	5	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Current below normal or open circuit
3261	4342	5	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Current below normal or open circuit
3298	1194	13	Red	Anti-theft Encryption Seed Present Indicator	Anti-theft Encryption Seed - Out of Calibration
3313	4765	4	Amber	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source
3314	4765	3	Amber	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source
3315	4765	2	Amber	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data erratic, intermittent or incorrect
3326	91	9	Red	Accelerator Pedal Position 1	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Abnormal update rate
3329	1231	2	None	J1939 Network #2	J1939 Network #2 - Data erratic, intermittent or incorrect
3331	1235	2	None	J1939 Network #3	J1939 Network #3 - Data erratic, intermittent or incorrect
3341	107	16	Amber	Engine Air Filter 1 Differential Pressure	Engine Air Filter Differential Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level
3419	5125	3	Amber	Sensor supply voltage 7	Sensor Supply 7 Circuit - Voltage above normal, or shorted to high source
3421	5125	4	Amber	Sensor supply voltage 7	Sensor Supply 7 Circuit - Voltage below normal, or shorted to low source
3422	4344	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage above normal, or shorted to high source

284A-9

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
3423	4344	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage below normal, or shorted to low source
3425	4344	5	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Current below normal or open circuit
3488	563	9	Amber	Anti-Lock Braking (ABS) Active	Anti-Lock Braking (ABS) Controller - Abnormal update rate
3497	1761	17	Amber/ Blinking	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Operating Range - Least Severe Level
3498	1761	18	Amber/ Blinking	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Operating Range - Moderately Severe Level
3527	558	19	Red	Accelerator Pedal 1 Low Idle Switch	Accelerator Pedal or Lever Idle Validation Switch - Received Network Data In Error
3528	558	9	Red	Accelerator Pedal 1 Low Idle Switch	Accelerator Pedal or Lever Idle Validation Switch - Abnormal update rate
3545	3226	10	Amber	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Abnormal rate of change
3547	4096	31	Amber	NOx limits exceeded due to Empty Diesel Exhaust Fluid Tank	Aftertreatment Diesel Exhaust Fluid Tank Empty - Condition Exists
3555	1081	9	Amber	Engine Wait to Start Lamp	Engine Wait to Start Lamp - Abnormal update rate
3558	3361	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit - Voltage above normal, or shorted to high source
3559	3361	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit - Voltage below normal, or shorted to low source
3562	5491	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage above normal, or shorted to high source
3563	5491	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage below normal, or shorted to low source
3567	5394	5	Amber	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Current below normal or open circuit
3568	5394	7	Amber	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Mechanical system not responding or out of adjustment
3571	4334	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage above normal, or shorted to high source
3572	4334	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage below normal, or shorted to low source
3574	4334	18	Amber	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data Valid But Below Normal Operating Range
3575	4334	16	Amber	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data Valid But Above Normal Operating Range
3577	4376	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage above normal, or shorted to high source
3578	4376	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage below normal, or shorted to low source
3582	4364	18	Amber	Aftertreatment 1 SCR Conversion Efficiency	Aftertreatment SCR Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level
3583	5031	10	Amber	Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio	Aftertreatment 1 Outlet NOx Sensor Heater - Abnormal rate of change
3596	4334	2	Amber	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data erratic, intermittent or incorrect

284A-10

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
3633	5484	3	Amber	Engine Fan Clutch 2 Output Device Driver	Engine Fan Clutch 2 Control Circuit - Voltage above normal, or shorted to high source
3634	5484	4	Amber	Engine Fan Clutch 2 Output Device Driver	Engine Fan Clutch 2 Control Circuit - Voltage below normal, or shorted to low source
3641	748	9	Amber	Transmission Output Retarder	Transmission Output Retarder - Abnormal update rate
3649	5024	10	Amber	Aftertreatment 1 Intake Gas NOx Sensor Heater Ratio	Aftertreatment 1 Intake NOx Sensor Heater - Abnormal rate of change
3681	3228	2	Amber	Aftertreatment 1 Outlet Gas Sensor Power Status	Aftertreatment 1 Outlet NOx Sensor Power Supply - Data erratic, intermittent or incorrect
3682	3218	2	Amber	Aftertreatment 1 Intake Gas Sensor Power Status	Aftertreatment 1 Intake NOx Sensor Power Supply - Data erratic, intermittent or incorrect
3697	630	12	Red	Engine Control Module Calibration Memory	Engine Control Module Calibration Memory - Bad intelligent device or component
3712	5246	0	Red	Aftertreatment SCR Operator Inducement Severity	Aftertreatment SCR Operator Inducement - Data valid but above normal operational range - Most Severe level
3714	1569	31	Amber	Engine Protection Torque Derate	Engine Protection Torque Derate - Condition Exists
3717	3226	13	Amber	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Out of Calibration
3718	3216	13	Amber	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx - Out of Calibration
3724	168	17	Amber	Battery Potential / Power Input 1	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Least Severe Level
3725	3216	10	Amber	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Abnormal rate of change
3726	3216	16	Amber	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx - Data Valid But Above Normal Operating Range - Moderately Severe Level
3727	5571	7	None	High Pressure Common Rail Fuel Pressure Relief Valve	High Pressure Common Rail Fuel Pressure Relief Valve - Mechanical system not responding or out of adjustment
3737	1675	31	None	Engine Starter Mode	Engine Starter Mode Overcrank Protection - Condition Exists
3741	5571	0	Amber	High Pressure Common Rail Fuel Pressure Relief Valve	High Pressure Common Rail Fuel Pressure Relief Valve - Data valid but above normal operational range
3748	3216	20	Amber	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High
3749	3226	20	Amber	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High
3751	4792	7	None	Aftertreatment SCR Catalyst System	Aftertreatment SCR Catalyst System - Mechanical system not responding or out of adjustment
3755	5394	2	None	Aftertreatment Diesel Exhaust Fluid Dosing Valve	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Data erratic, intermittent or incorrect
3867	3364	18	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Data Valid But Below Normal Operating Range - Moderate Severe Level
3868	3364	9	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal update rate
3876	3364	7	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor - Mechanical system not responding or out of adjustment
3878	3364	2	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Data erratic, intermittent or incorrect

284A-11

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
4152	5743	9	Amber	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Abnormal update rate
4155	5746	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage Above Normal, or Shorted to high source
4156	5746	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage below normal, or shorted to low source
4157	4376	7	Amber	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	Aftertreatment Diesel Exhaust Fluid Return Valve - Mechanical system not responding or out of adjust
4158	5742	12	Amber	Aftertreatment Diesel Particulate Filter Temperature Sensor Module	Aftertreatment Diesel Particulate Filter Temperature Sensor Module - Bad intelligent device or component
4159	5743	12	Amber	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Bad intelligent device or component
4164	5743	3	Amber	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage Above Normal, or Shorted to high source
4165	5743	4	Amber	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage below normal, or Shorted to low source
4166	5743	16	Amber	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Data Valid But Above Normal
4168	5745	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Voltage Above Normal, or Shorted to High
4169	5745	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Voltage below normal, or shorted to low source
4171	5745	18	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Data Valid But Below Normal Operating Range
4213	3695	2	Amber	Aftertreatment Regeneration Inhibit Switch	Aftertreatment Regeneration Inhibit Switch - Data erratic, intermittent or incorrect
4215	563	31	None	Anti-Lock Braking (ABS) Active	Anti-Lock Braking (ABS) Active - Condition Exists
4241	3364	19	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Received Network Data In Error
4243	3515	10	Amber	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 - Abnormal Rate of Change
4249	4337	10	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature - Abnormal Rate of Change
4251	5798	10	Amber	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature - Abnormal Rate of Change
4261	5743	11	Amber	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Root Cause Not Known
4277	3364	10	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal Rate of Change
4437	1668	2	None	J1939 Network #4 - Data erratic	J1939 Network #4 - Data erratic, intermittent or incorrect
4517	237	13	Amber	Vehicle Identification Number	Vehicle Identification Number - Out of Calibration
4533	4766	3	Amber	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit - Voltage above normal, or shorted to high source
4534	4766	4	Amber	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit - Voltage below normal, or shorted to low source
4572	3031	9	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature - Abnormal Update Rate

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
4585	4792	14	Red	Aftertreatment 1 SCR Catalyst System	Aftertreatment 1 SCR Catalyst System - Special Instructions
4677	1761	9	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate
4734	701	14	Red	Auxiliary I/O #01	Auxiliary Input/Output 1 - Special Instructions
4739	1761	11	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Root Cause Not Known
4741	3364	5	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current below normal or open circuit
4742	3364	6	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current above normal or grounded circuit
4743	3515	5	Amber	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current below normal or open circuit
4744	3515	6	Amber	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current above normal or grounded
4745	3515	11	Amber	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 - Root Cause Not Known
4768	3521	11	Amber	Aftertreatment 1 Diesel Exhaust Fluid Property	Aftertreatment 1 Diesel Exhaust Fluid Property - Root Cause Not Known
4769	1761	10	Amber	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Abnormal Rate of Change
4789	1639	0	Amber	Fan Speed	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level
4791	1639	1	Amber	Fan Speed	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level
4842	3364	15	None	Aftertreatment Diesel Exhaust Fluid Quality	Aftertreatment Diesel Exhaust Fluid Quality - Data Valid But Above Normal Operating Range - Least Severe Level
4863	5245	31	Amber	Aftertreatment Selective Catalytic Reduction Operator Inducement Active	Aftertreatment Diesel Exhaust Fluid Tank Low Level Indicator
5183	6799	3	Amber	Engine Fan Blade Pitch	Fan Blade Pitch Position Sensor Circuit - Voltage Above Normal, or Shorted to High Source
5184	6799	4	Amber	Engine Fan Blade Pitch	Fan Blade Pitch Position Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
5185	6799	7	Amber	Engine Fan Blade Pitch	Fan Blade Pitch - Mechanical system not responding or out of adjustment
5278	6802	31	Amber		Aftertreatment 1 Diesel Exhaust Fluid Dosing System Frozen - Condition Exists
5386	4766	2	Amber	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Erratic, Intermittent, or Incorrect
5387	4766	0	Red	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Most Severe Level
5388	4766	16	Red	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level
5389	4766	15	Amber	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Least Severe Level
5391	6882	9	Amber	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Abnormal Update Rate
5392	6882	12	Amber	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Bad Intelligent Device or Component

284A-13

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
5393	6882	3	Amber	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage Above Normal or Shorted to High Source
5394	6882	4	Amber	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage Below Normal or Shorted to Low Source
5395	6882	11	Amber	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Root Cause Not Known
5396	6882	16	Amber	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Data Valid But Above Normal Operating Range - Moderately Severe Level
5576	107	15	Amber	Engine Air Filter 1 Differential Pressure	Engine Air Filter Differential Pressure - Data Valid But Above Normal Operating Range - Least Severe Level
5585	5571	15	Amber	High Pressure Common Rail Fuel Pressure Relief Valve	High Pressure Common Rail Fuel Pressure Relief Valve - Data Valid But Above Normal Operating Range - Least Severe Level
5617	524286	31	Amber	Aftertreatment 1 Diesel Oxidation Catalyst System	Aftertreatment 1 Diesel Oxidation Catalyst System- Special Instruction
5631	6928	31	Amber	SCR System Cleaning Inhibited Due to System Timeout	SCR System Cleaning Inhibited Due to System Timeout - Condition Exists
5632	6918	31	Maintenance	SCR System Cleaning Inhibited Due to Inhibit Switch	SCR System Cleaning Inhibited Due to Inhibit Switch - Condition Exists
5653	6881	9	Amber	SCR Operator Inducement Override Switch	SCR Operator Inducement Override Switch - Abnormal Update Rate
5654	6881	13	Amber	SCR Operator Inducement Override Switch	SCR Operator Inducement Override Switch - Out of Calibration
5866	520953	3	Amber		Aftertreatment Diesel Exhaust Fluid Dosing Unit Relay Feedback- Voltage Above Normal or Shorted to High Source.
5939	520968	9	Amber		Machine Constrained Operation- Abnormal Update Rate. No Communication or an invalid data transfer rate has been detected on the J1939 data link between the ECM and the machine electronic control unit.
5941	520968	19	None		Machine Constrained Operation- Received Network Data in Error. The received J1939 datalink message was not valid.
6256	168	15	None	Battery Potential / Power Input 1	Battery 1 Voltage - Data Valid But Above Normal Operating Range - Moderately Severe Level
6257	168	17	None	Battery Potential / Power Input 1	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Moderately Severe Level
6258	1075	3	None	Engine Electric Lift Pump for Engine Fuel Supply	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage above normal, or shorted to high source
6259	1075	4	None	Engine Electric Lift Pump for Engine Fuel Supply	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage below normal, or shorted to low source
6263	647	3	None	Engine Fan Clutch 1 Output Device Driver	Fan Control Circuit - Voltage above normal, or shorted to high source
6264	647	4	None	Engine Fan Clutch 1 Output Device Driver	Fan Control Circuit - Voltage below normal, or shorted to low source
6336	862	3	None	Crankcase breather Heater Circuit	Crankcase Breather Filter Heater Circuit - Voltage above normal, or shorted to high source
6337	862	4	None	Crankcase breather Heater Circuit	Crankcase Breather Filter Heater Circuit - Voltage below normal, or shorted to low source
6418	1072	3	None	Engine (Compression) Brake Output #1	Engine Brake Actuator Driver 1 Circuit - Voltage above normal, or shorted to high source

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
6419	1072	4	None	Engine (Compression) Brake Output #1	Engine Brake Actuator Driver 1 Circuit - Voltage below normal, or shorted to low source
6421	1073	3	None	Engine (Compression) Brake Output #2	Engine Brake Actuator Driver Output 2 Circuit - Voltage above normal, or shorted to high source
6422	1073	4	None	Engine (Compression) Brake Output #2	Engine Brake Actuator Driver Output 2 Circuit - Voltage below normal, or shorted to low source
6456	5484	3	None	Engine Fan Clutch 2 Output Device Driver	Engine Fan Clutch 2 Control Circuit - Voltage above normal, or shorted to high source
6457	5484	4	None	Engine Fan Clutch 2 Output Device Driver	Engine Fan Clutch 2 Control Circuit - Voltage below normal, or shorted to low source
6458	3216	20	None	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High
6459	3216	21	None	Aftertreatment 1 Intake NOx	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High
6462	3226	20	None	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High
6463	3226	21	None	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High
6464	3226	2	None	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High
6467	1639	15	None	Fan Speed	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level
6468	1639	17	None	Fan Speed	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level
	1639	2	None	Fan Speed	Fan Speed- Data Erratic, Intermittent, or Incorrect
6471	6799	3	None	Engine Fan Blade Pitch	Fan Blade Pitch Position Sensor Circuit - Voltage Above Normal, or Shorted to High Source
6472	6799	4	None	Engine Fan Blade Pitch	Fan Blade Pitch Position Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
6473	6799	2	None	Engine Fan Blade Pitch	Fan Blade Pitch - Mechanical system not responding or out of adjustment
6475	3363	7	None	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Mechanical system not responding or out of adjustment
6476	3363	18	None	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Data Valid But Below Normal Operating Range - Moderately Severe Level
6477	5491	3	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage above normal, or shorted to high source
6478	5491	4	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage below normal, or shorted to low source
6479	3363	3	None	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage above normal, or shorted to high source
6481	3363	4	None	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage below normal, or shorted to low source
6482	4340	5	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Current below normal or open circuit
6483	4342	5	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Current below normal or open circuit
6484	4344	5	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Current below normal or open circuit

284A-15

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
6493	3464	3	None	Electronic Throttle Control Actuator Driver Circuit	Electronic Throttle Control Actuator Driver Circuit-Voltage above normal, or shorted to high source
6494	3464	4	None	Electronic Throttle Control Actuator Driver Circuit	Electronic Throttle Control Actuator Driver Circuit-Voltage above normal, or shorted to low source
6496	3464	5	None	Electronic Throttle Control Actuator Driver Circuit	Electronic Throttle Control Actuator Driver Circuit-Voltage above normal, or shorted to high source
6497	51	3	None	Engine Intake Throttle Actuator Position Sensor Circuit	Engine Intake Throttle Actuator Position Sensor Circuit- Voltage above normal, or shorted to high source
6498	51	4	None	Engine Intake Throttle Actuator Position Sensor Circuit	Engine Intake Throttle Actuator Position Sensor Circuit- Voltage above normal, or shorted to low source
6499	3597	17	None	ECU Power Output Supply Voltage #1	ECU Power Output Supply Voltage 1 - Data Valid But Below Normal Operating Range - Moderately Severe Level
6511	6655	3	None	ECU Power Lamp	Maintain ECU Power Lamp - Voltage Above Normal, or Shorted to High Source
6512	6655	4	None	ECU Power Lamp	Maintain ECU Power Lamp - Voltage Below Normal, or Shorted to Low Source
6513	5745	17	None	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Data Valid But Below Normal Operating Range
6517	4364	17	None	Aftertreatment 1 SCR Conversion Efficiency	Aftertreatment SCR Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level
6521	3226	4	None	Aftertreatment Outlet NOx Sensor Circuits	Aftertreatment Outlet NOx Sensor Circuit- Voltage below normal or shorted to low source
6522	111	3	None	Engine Coolant Level	Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source
6523	111	4	None	Engine Coolant Level	Coolant Level Sensor 1 Circuit - Voltage below normal, or shorted to low source
6524	175	3	None	Engine Oil Temperature 1	Engine Oil Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source
6525	175	4	None	Engine Oil Temperature 1	Engine Oil Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source
6526	1761	13	None	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Out of Calibration
6527	4376	7	None	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	Aftertreatment Diesel Exhaust Fluid Return Valve - Mechanical system not responding or out of adjust
6529	5746	3	None	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage Above Normal, or Shorted to high source
6531	4340	3	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage above normal, or shorted to high source
6532	4340	4	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage below normal, or shorted to low source
6533	4342	3	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage above normal, or shorted to high source
6534	4342	4	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage below normal, or shorted to low source
6535	4344	3	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage above normal, or shorted to high source
6536	4344	4	Amber	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage below normal, or shorted to low source
6537	5491	7	None	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay - Mechanical system not responding or out of adjustment

284A-16

Error Messages - Cummins QSB Engines - T4F - Continued

Fault Code (lamp flash)	J1939 SPN	J1939 FMI	Lamp Color	J1939 SPN Description	Cummins Description
6539	4765	2	None	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data erratic, intermittent or incorrect
6551	3610	3	Amber	Aftertreatment Diesel Particulate Filter Outlet Pressure	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure Sensor Circuit - Voltage above normal, or shorted to high source
6556	729	3	None	Engine Intake Air Heater Driver #1	Engine Intake Air Heater 1 Circuit - Voltage above normal, or shorted to high source
6557	729	4	None	Engine Intake Air Heater Driver #1	Engine Intake Air Heater 1 Circuit - Voltage below normal, or shorted to low source
6559	3031	4	None	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage below normal, or shorted to low source
6562	1761	11	None	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Root Cause Not Known
6563	976	2	None	PTO Governor State	Auxiliary Intermediate (PTO) Speed Switch Validation - Data erratic, intermittent or incorrect
6565	3226	10	None	Aftertreatment 1 Outlet NOx	Aftertreatment 1 Outlet NOx Sensor - Abnormal rate of change
6568	3695	2	None	Aftertreatment Regeneration Inhibit Switch	Aftertreatment Regeneration Inhibit Switch - Data erratic, intermittent or incorrect
6569	4363	3	None	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage above normal, or shorted to high source
6571	4363	4	None	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage below normal, or shorted to low source
6581	5031	10	None	Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio	Aftertreatment 1 Outlet NOx Sensor Heater - Abnormal rate of change
6597	6928	31	Amber	SCR System Cleaning Inhibited Due to System Timeout	SCR System Cleaning Inhibited Due to System Timeout - Condition Exists

5.1-4 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

Perform this operation after warming the engine to normal operating temperature.

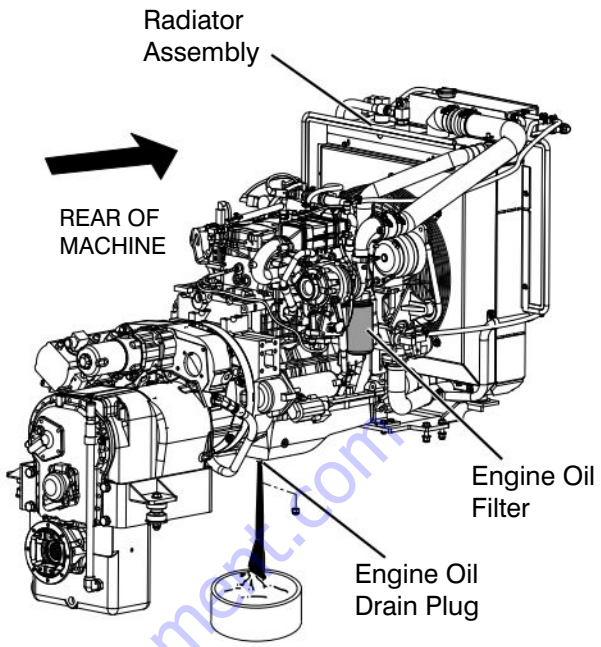
CAUTION

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 on a firm level surface.
2. Allow engine to warm up.
3. Locate engine side door behind operator's cab.
4. Remove locking pins and lift up engine side doors so that engine components are accessible.
5. Place a container under engine oil drain plug.
6. Remove oil drain plug and allow all engine oil to drain into container.
7. Install oil drain plug with new seal ring and tighten firmly.



8. Remove oil filter and catch any escaping oil.
9. Clean inside the filter head.
10. Add clean engine oil to oil filter.
11. Apply a thin layer of engine oil to the new oil filter gasket.
12. Install filter and tighten it by hand.
13. Clean up any oil that may have spilled during this procedure.
14. Refill engine with new oil as per specifications (refer to Table 2.2).
15. Start engine and allow it to run for 30 seconds then stop the engine.
16. Check for oil leakage.
17. Check engine oil level on dipstick and add oil if needed.
18. Close engine side doors and reinstall locking pins.

NOTE

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

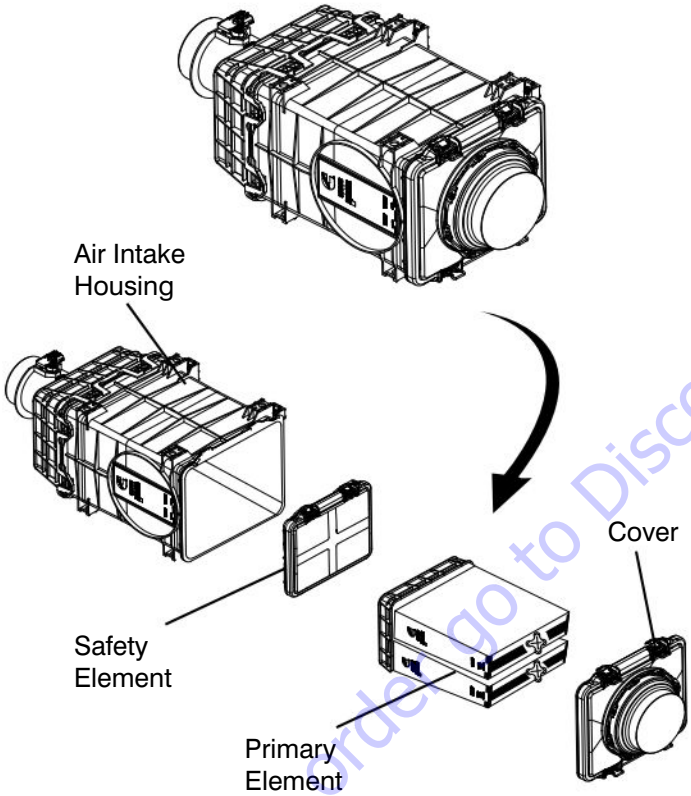
5.1-5 Check Engine Air Filter

Check the air cleaner vaccuator valve if applicable. Squeeze the valve lips and remove any dirt or dust. It should expel dust and dirt continuously when the engine is running.

Inspect the condition of both the primary and safety elements and replace if required.

WARNING

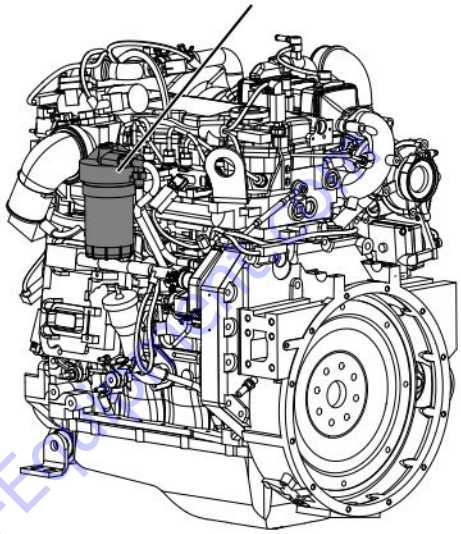
Do not remove the safety element unless it is damaged or dirty.



5.1-6 Replace Fuel Filter

1. Ensure telehandler is on a firm level surface.
2. Remove locking pins on engine side doors and lift them up so that engine components are accessible.
3. Use the filter drain valve to drain fuel out of the filter for approximately 5 seconds.
4. Disconnect the water-in-fuel sensor from the wiring harness
5. Remove fuel filter and catch any escaping fuel.
6. Clean any dirt from filter carrier sealing surface.
7. Apply a thin layer of oil or diesel fuel to rubber gasket of new fuel filter.

Fuel Filter



8. Install fuel filter and tighten it by hand.
9. Connect the water-in-fuel sensor to the wiring harness.
10. Bleed the fuel lines by loosening the bleed screws.
11. Operate the hand lever until the fuel flowing from the fitting is free of air.
12. Tighten the bleed screws.
13. Clean up any fuel that my have spilled during this procedure.
14. Close engine side door and reinstall locking pins.

NOTE

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

5.1-7 Check Fan Drive Belt

Remove the drive belt and check that the automatic tensioner turns freely:

- With no play on bearing.
- Spring in tensioner hasn't become weak or broken.

Transmission

5.1-8 Check Transmission Filter Breather

The transmission and dipstick are accessed underneath the two transmission cover plates at the transmission mount.

Clean the transmission breather and surrounding area.

5.1-9 Change Transmission Fluid and Filter

WARNING

Ensure the following:

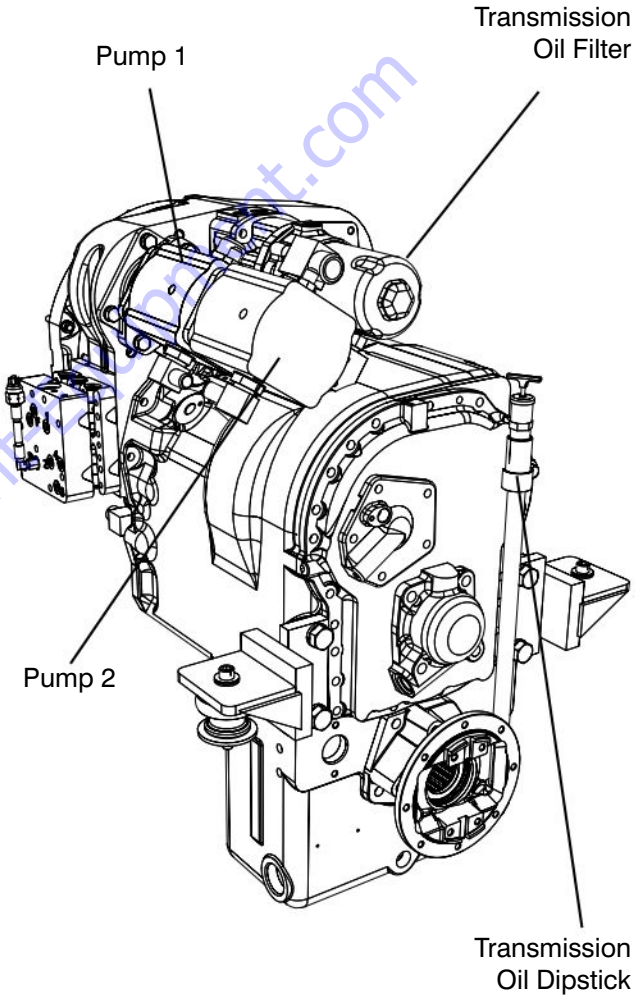
- Telehandler is parked on level ground.
- Engine is turned off.
- Parking brake on
- Wheels are blocked

Raise the boom high enough to allow access and lock out the ignition switch.

1. Remove bolts from two transmission cover plates.
2. Remove transmission cover plates so that Transmission components are accessible.
3. Place a suitable container under transmission.
4. Remove the transmission drain plug and drain the oil.
5. Remove the sump screen and clean with varsol and compressed air.
6. Replace the sump screen gasket.
7. Install the sump screen and replace the oil drain plug
8. Replace the Transmission oil filter.
9. Refill the transmission with the correct fluid and check the level on the dipstick “Full”. (refer to Table 2.2)
10. Check for oil leakage
11. Start the engine and check oil level with the engine running.
12. Add oil as needed to fill up to the required level.
13. Install transmission cover plates and tighten bolts.

NOTE

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



T32000 Transmission

5.2 Hydraulic System

5.2-1 Check Hydraulic Oil

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 on side of tank to check that the hydraulic fluid is within 4 inches below the top of the tank.

5.2-2 Change Hydraulic Tank Filter

NOTE

The filter does not need to be changed unless the service indicator is showing at the top of the filter. If the indicator is past the 3.4 green mark, change the filter. Should the indicator not be showing at 250 hours, check the unit. Check the service indicator daily. Change the return filter when the filter gauge indicates a dirty element.

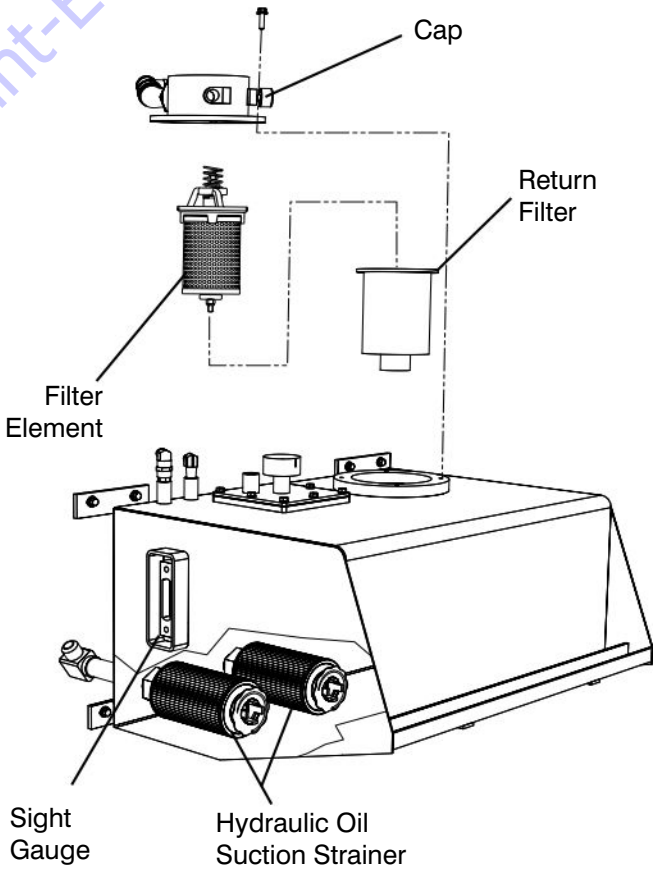
1. Ensure telehandler is on a firm level surface, is in stowed position and engine is off.
2 Place suitable container under the hydraulic tank filter.
3. Remove oil filter and catch any escaping oil.
4. Clean inside the filter head.
5. Apply a thin layer of clean hydraulic oil to the new oil filter gasket.
6. Install filter and tighten firmly.
7. Clean up any oil that may have spilled during this procedure.
8. Start engine.
9. Check for leakage.

NOTE

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

5.2-3 Change Hydraulic Oil

1. Ensure telehandler is on a firm level surface and is in stowed position.
2. Allow hydraulic oil to warm up.
3. Turn off the engine.
4. Place suitable container under the hydraulic tank.
5. Remove oil drain plug and allow all hydraulic oil to drain into container.
6. Install oil drain plug with new seal ring and tighten firmly.
7. Refill hydraulic tank with new oil as per specifications. (refer to Table 2.2 of this manual)
8. Check for leakage.
9. Clean up any oil that may have spilled during this procedure.
10. Check hydraulic oil level. (The hydraulic oil level should be at or slightly above the top mark on the sight gauge)



Hydraulic Oil Tank

NOTE

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

NOTE

Samples of hydraulic oil should be drawn from the reservoir and tested annually. These samples should be taken when the oil is warmed through normal operation of the system. The sample should be analyzed by a qualified lubrication specialist to determine if it is suitable for continued use. Oil change intervals will depend on the care used in keeping the oil clean, and the operating conditions. Dirt and/or moisture contamination will dictate that the oil should be changed more often. Under normal use and operating conditions , the hydraulic oil should be changed every two years. Refer to Table 1.1 of this manual.

5.2-4 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.

5.3 Pressure Adjustment Procedures

NOTE

- All pressure adjustments are to be made at idle with telehandler on a level surface, park brake applied, and wheels chocked.
- Procedures require two persons; one to operate functions and another to check and adjust pressures.

5.3-1 Piston Pump Pressure

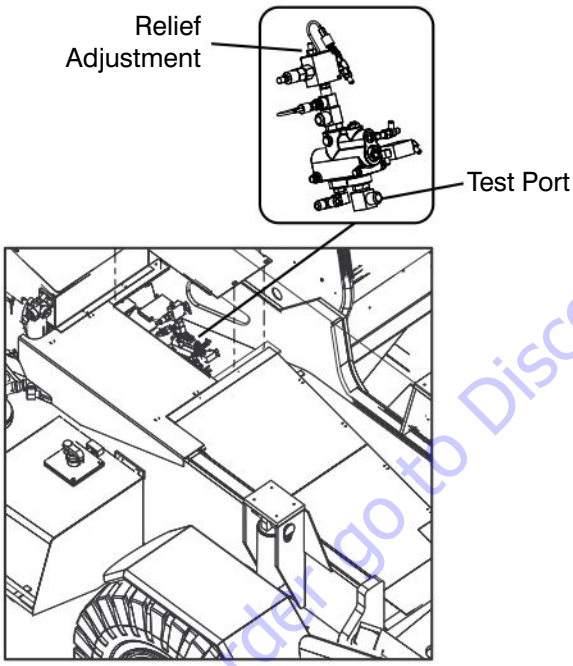
1. Park the machine on a firm level surface, apply the park brake and chock the wheels.
2. Raise and support the boom so the lifting attachment is at lease 7 ft. up.
3. Install a pressure gauge (4000 psi minimum) to test ports TP4 and TP5.
4. Remove and plug load sense lines at both pumps.
5. With engine running check pressure reading; 500 psi for P1 (TP4), 550 psi for P2 (TP5).
6. Adjust as required at front adjuster by loosening jam nut and turning center screw clockwise to increase pressure and counter clockwise to decrease pressure.
7. When correct pressure is obtained, tighten jam nut.
8. Shut engine off and re-install load sense lines at both pumps.
9. With engine running hold the extend function in the retract position and check pressure reading; 3150 psi for P1 (TP4), 3200 psi for P2 (TP5).
10. Adjust as required at rear adjuster by loosening jam nut and turning center screw clockwise to increase pressure and counter-clockwise to decrease pressure.
11. When correct pressure is obtained, tighten jam nut.

5.3-2 Port Relief Pressure

1. Locate the main hydraulic valve mounted between the main frame rails, in the center of the frame.
2. Connect a pressure gauge (4000 psi minimum) to the test port TP6 located on the fitting at the P port of the main control valve.
3. Dead-end the desired function and note pressure reading on gauge.
4. Compare gauge reading to pressure settings chart (refer to Table 2.5) and adjust as necessary at the corresponding port relief valve. Adjust by loosening jam nut and turning center screw clockwise to increase pressure or counter-clockwise to decrease pressure. When correct pressure is achieved tighten jam nut and re-check pressure.

5.3-3 Priority Valve Relief Pressure

1. Locate the priority valve PRT1.
2. Connect a pressure gauge (3000 psi minimum) to test port TP5.
3. Turn the steering wheel to full lock position and note pressure reading on gauge.
4. Compare gauge reading to pressure settings chart (refer to Table 2.5) and adjust as necessary by loosening jam nut and turning center screw clockwise to increase pressure or counter-clockwise to decrease pressure.
5. Repeat steps 3 and 4 until correct pressure is achieved. Tighten jam nut and re-check pressure.



Priority Valve Pressure Adjustment

5.3-4 Pilot Pressure

1. Locate the pressure reducing valve PRV1.
2. Connect a pressure gauge (500 psi minimum) to test port TP6 at the pressure reducing valve by removing acorn nut and brass sealing washer, loosening jam nut and turning center screw clockwise to increase pressure, or counter-clockwise to decrease pressure. When correct pressure is obtained, tighten jam nut and install acorn nut with brass sealing washer.

5.3-5 Check Brake Accumulators

1. Actuate brake pedal until very little pedal resistance is felt.
2. Start engine, brake pressure light on the dash should come on. The engine should have a slight labouring sound. After idling for 30 seconds, the light should go out and there should be a noticeable difference in engine sound when it stops labouring. Accumulators should now be charged and the brake pressure light on the dash should now be off.
3. Depress the brake pedal 2 to 3 times and you should hear the engine again begin to labour for 10 to 15 seconds. The brake charge cycle should occur somewhere in the range between 30 seconds to 5 minutes and more often when brakes or pilot operated functions are used.
4. Turn off engine.
5. Turn ignition key to on position only (do not restart engine).
6. Depress brake pedal and release, repeating the process.

NOTE

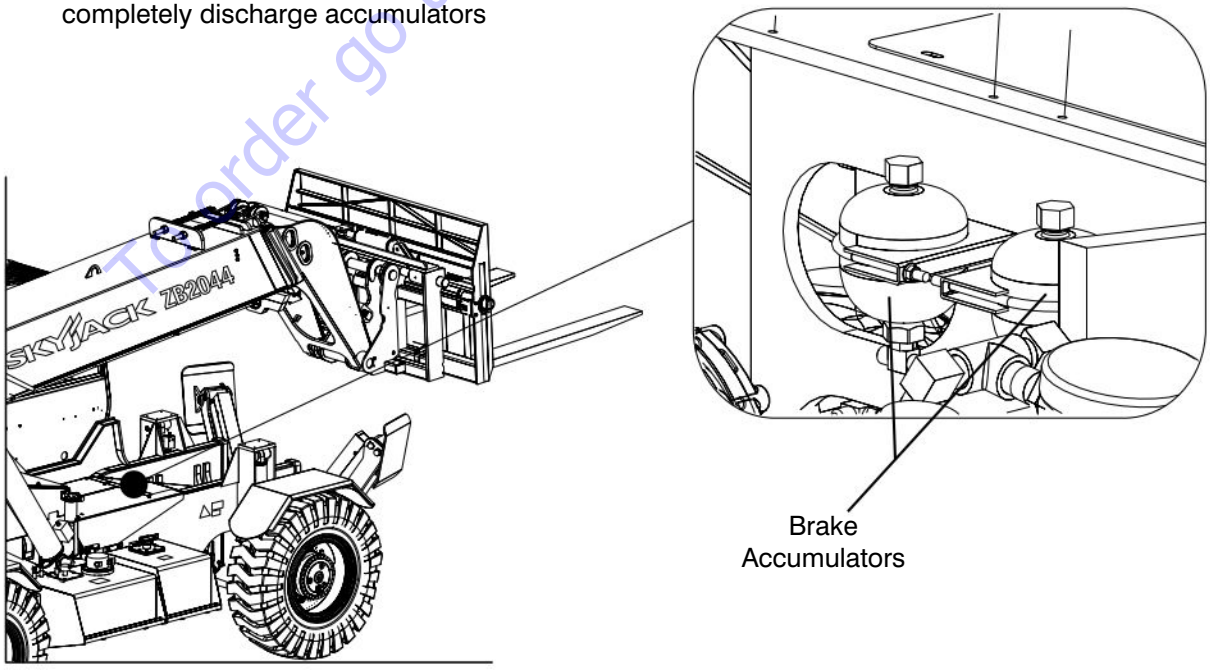
- Keep count of the number of times the pedal is depressed.
- After 5 to 6 depressions, the brake pressure light should come on.
- It may take over 20 depressions to completely discharge accumulators

5.3-6 Charging Brake Accumulators

WARNING

Never try to check accumulators with a tire gauge type tester as it will cause a loss of nitrogen gas; which is very cold when discharged.

1. Ensure engine is turned off and depress brake pedal 10 to 12 times to empty accumulators of any oil pressure.
2. Attach proper gauge and nitrogen charge kit.
3. Charge accumulators to 650 psi.



5.3-7 Charging Rear Axle Lock System

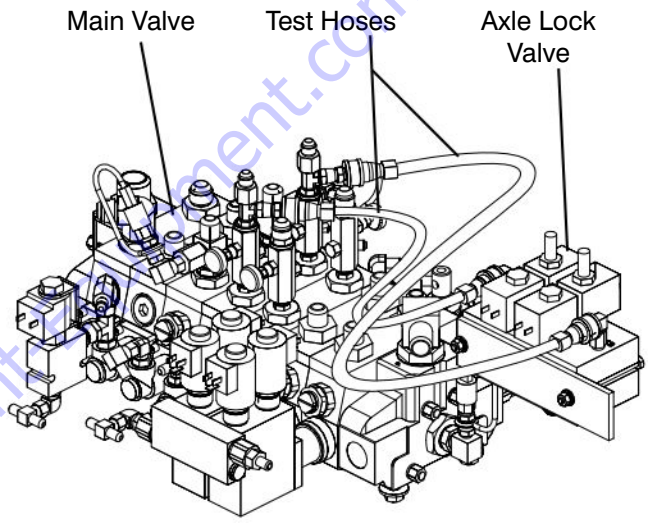
DANGER

- Frame leveling should not be attempted when boom is elevated.
- Boom should be in travel position (24" off the ground).
- Very unstable conditions will result if frame leveling is attempted when rear axle is in the lock position.

NOTE

The accumulator is pre-charged with nitrogen gas to 175 psi.

1. Connect the ends of 2 test hoses supplied with telehandler to the quick disconnect ports at the main valve (Frame level section) and the other ends to the rear axle lock valve ports. (See picture below).
2. Remove the ground cable or the limit switch cable connections
3. Actuate the frame level control valve to tilt the frame from side to side while holding the valve open at end of each cycle for several seconds to fully pressurize the system. This will help eliminate any air in the system.
4. Repeat step 3 four times.
5. Tilt the frame fully to the right.
6. Two of the solenoids in the rear solenoid-mounting block have manual unlocking capabilities. These are unlocked by pulling up on the knob and turning 90° so the point sits on top of the "V" stem. This position allows free flow through the lock valve for charging and will also equalize the pressure between the rod and the base ends of the axle lock cylinder.
7. Relieve the pressure on the axle lock valve by moving the rear joystick controller from left to right 4 to 5 times.
8. Remove the quick disconnect hoses at both ends and leave in frame.
9. The two manual solenoid overrides should now be returned to their closed position.
10. Check system for proper operation by attempting to level frame to the left until the left wheel starts to lift off the ground. Level frame fully to the right.
11. Attach ground cable or limit switch cable connections.
12. Cycle frame level from left to right. (Rear axle cylinder should stroke fully in both directions).



Charging Rear Axle Lock System

5.4 Boom

5.4-1 Boom Hose Replacement

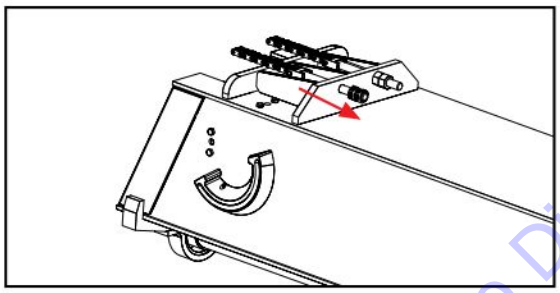
IMPORTANT

If there is evidence of a fluid leak in the boom sections, check first to make sure there are no loose hydraulic fittings before attempting to change the hoses in the boom.

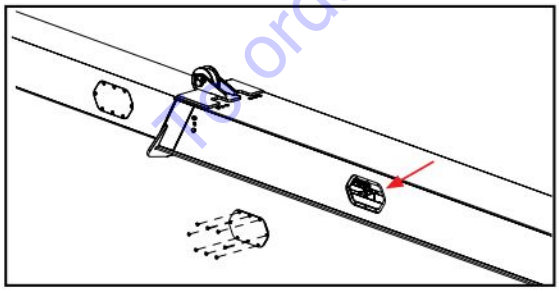
NOTE

The hydraulic hoses inside the boom (carriage tilt, optional hydraulics) are stretched over the roller to prevent sagging and premature wear. Use only the size, spec. and length of hose as specified in the parts manual.

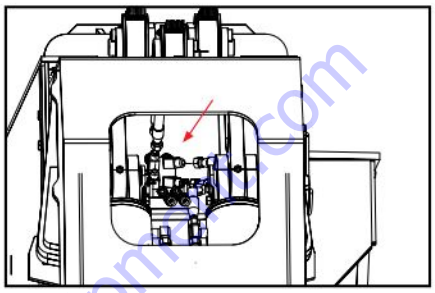
1. Loosen chain adjusting nut to end of adjuster.



2. Extend boom just enough to allow removal of side access plates on secondary section. Then retract slightly to put slack in extend chains



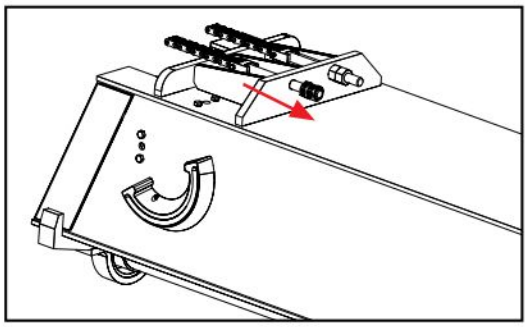
3. With side access plate off, tie a rope around tensioning bracket, loosen hydraulic fittings of hose to be replaced and remove bolts holding bracket to boom.
4. Remove hose from bulkhead on main boom section (bottom of boom) and attach new hose to old hose with a short union.
5. Remove hose from bulkhead on tension bracket and pull hose through front of boom taking care not to pull too far and lose hose inside bottom of boom. It may be necessary to either temporarily remove roller or raise primary section at the rear to get the fittings around the roller.



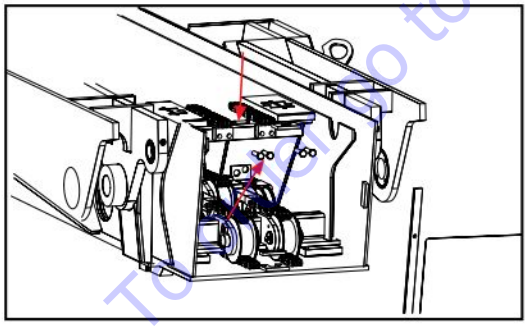
6. Attach new hose at both ends and leave loose.
7. Pull rope attached to tension bracket and bolt bracket to boom.
8. Extend and retract boom several times.
9. Tighten hose fittings 38-42 ft. lb (52-58 Nm) taking care not to twist hose.
10. Install access plate, tension chain, and bleed hydraulic circuit (refer to Section 5.2-4 of this manual).

5.4-2 Boom Chain Replacement and Adjustment

- **Extend Chain**
  1. With boom level loosen extend chain adjustment nut until nut is at the end of the adjuster.

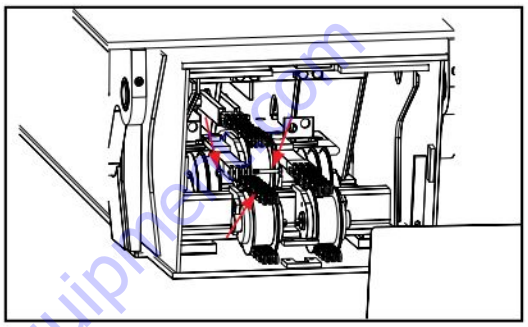


  2. Extend boom 8”.
  3. Retract boom just enough to put slack in extend chain.
  4. Remove access door at rear of boom and remove center bracket.
  5. Remove two bolts holding extend chain anchor to primary boom section.
  6. Remove bolt that attaches extend chain to adjuster.



  7. Attach new chain to existing chain and pull through.
  8. Pull the rest of the chain through and disconnect old chain from new.
  9. Remove chain anchor from old chain and install on new chain with new 5/16” grade 8 bolt and lock nut.
  10. Attach chain anchor to primary boom section with 2 new grade 8 bolts.

- **Retract Chain**
  1. With boom level and retracted remove retract chain anchor nut through access hole at rear bottom sides of boom.
  2. With adjustment nut loose extend boom slightly and secure secondary from moving out.
  3. Remove retract chain anchor bolt at rear where anchor attaches to secondary boom.



  4. Extend boom enough to allow removal of retract chain anchor from main boom section.
  5. Remove rear anchor from chain and attach new chain to existing chain and anchor to new chain.
  6. Remove retract chain anchor from main boom section at front of boom and pull through
  7. Disconnect old chain from new chain and attach anchor from old chain onto new chain
  8. Bolt front anchor to main boom section
  9. Attach chain anchor to secondary section at rear of boom. It may be necessary to retract boom and manually, via ratchet strap, retract secondary section

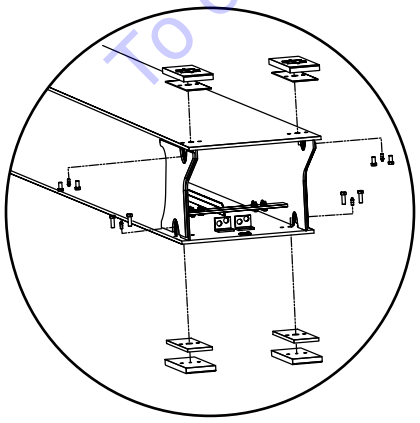
- **Chain Adjustment**
  1. Fully extend boom when level
  2. Retract boom a few inches and tighten adjustment nut on top of main boom until there is no droop in chain
  3. Repeat above step until there is 1/2” droop while retracting boom from full extension

5.4-3 Check Slide Pads

1. With telehandler parked on a level surface and park brake applied remove access door at rear of boom.
2. Measure slide pad thickness (top and bottom of each boom section) inside rear of boom.
3. Raise boom slightly and extend boom approximately 6’ (2M). Measure slide pad thickness (top, bottom and sides of each boom section) at front end of boom.
4. Replace any pads that are less than 3/4” (19mm) thick.
5. Shim all slide pads as required. (more than 1/8” or 3mm gap)

5.4-4 Replacing and Shimming Slide Pads

1. With machine parked on a level surface and park brake applied remove access door at rear of boom.
2. Remove grease fittings and bolts of slide pads to be shimmed/replaced. (Do not use heat)



3. Add shims as required to obtain 0-1/16” (0-1.5mm) clearance with no drag.
4. Apply Loctite® 609 to bolts and torque to 100 ft.lb. Re-torque after 10min. and within 15min. of initial torque.
5. Raise boom slightly and extend boom approximately 6 ft. (2M).
6. Use steps 2 through 4 for slide pads at the front of boom. To remove side front slide pads pry boom section away from slide pad and place a support/hook under pad then remove bolts and pads.

NOTE

Always maintain squareness between the booms outer and inner tube.

5.5 Axles

5.5-1 Change Oil in Axles

1. Ensure telehandler is on a firm level surface and is in stowed position.
2. Turn off engine.
3. Place suitable container under the axle
4. Remove fill plug.
5. Remove drain plug to allow oil to drain into container.
6. Reinstall all drain plugs.
7. Remove check plug.
8. Refill axle with new oil as per specifications. (refer to Table 2.2)

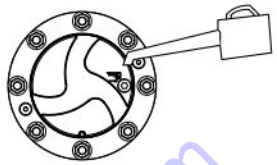
NOTE

Axle is filled when oil is leaking from the check port.

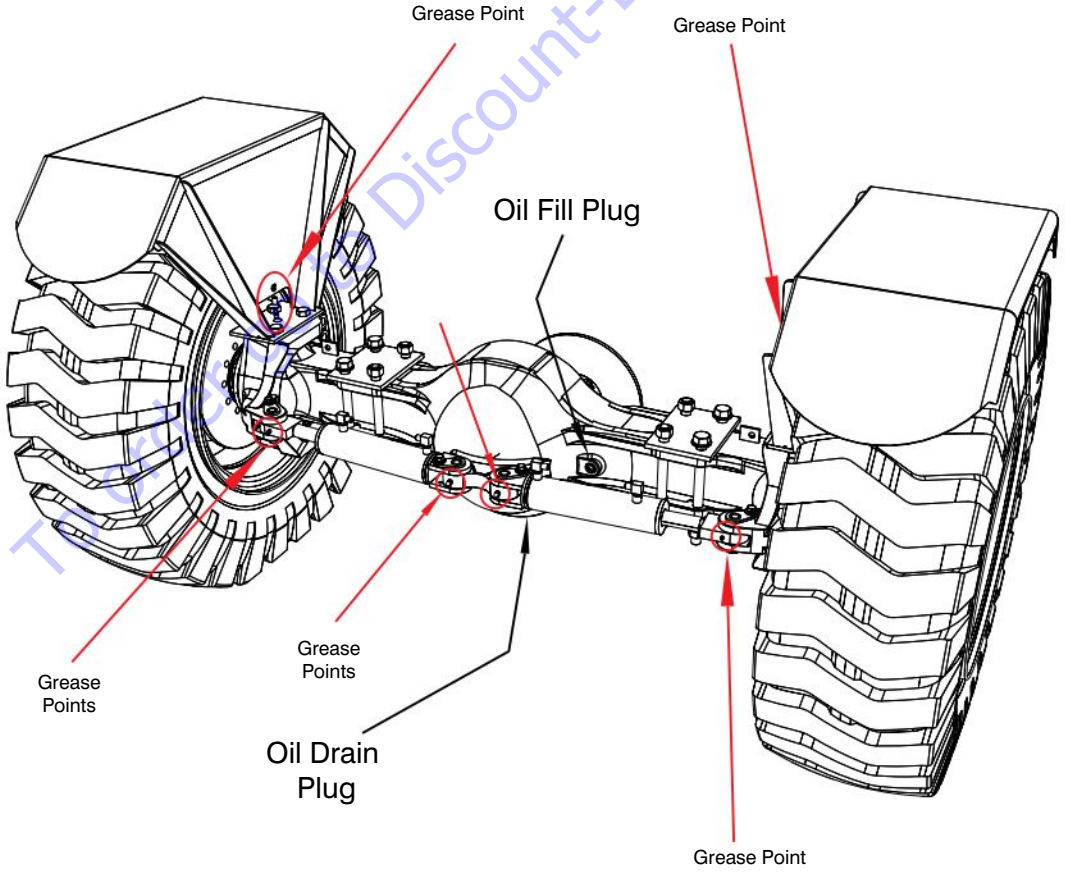
9. Reinstall both fill and check plugs.

5.5-2 Check Oil Level in Torque Hub

1. Drive the telehandler to rotate the hub until the plug is located at 90 degrees.
2. Remove the plug and check the oil level. The oil level should be even with the bottom of the plug hole. Add oil if needed. (refer to Table 2.2 for oil specifications)



Drive Torque Hub



Front or Rear Axle

5.6 Grease Points

NOTE

Brush-on dry lubricant may be applied in the field where greasing is undesirable. This may be the case in extremely sandy conditions, where abrasive particles can become entrapped in the grease. (refer to Table 2.2 for recommended grease and fluid types and greasing intervals).

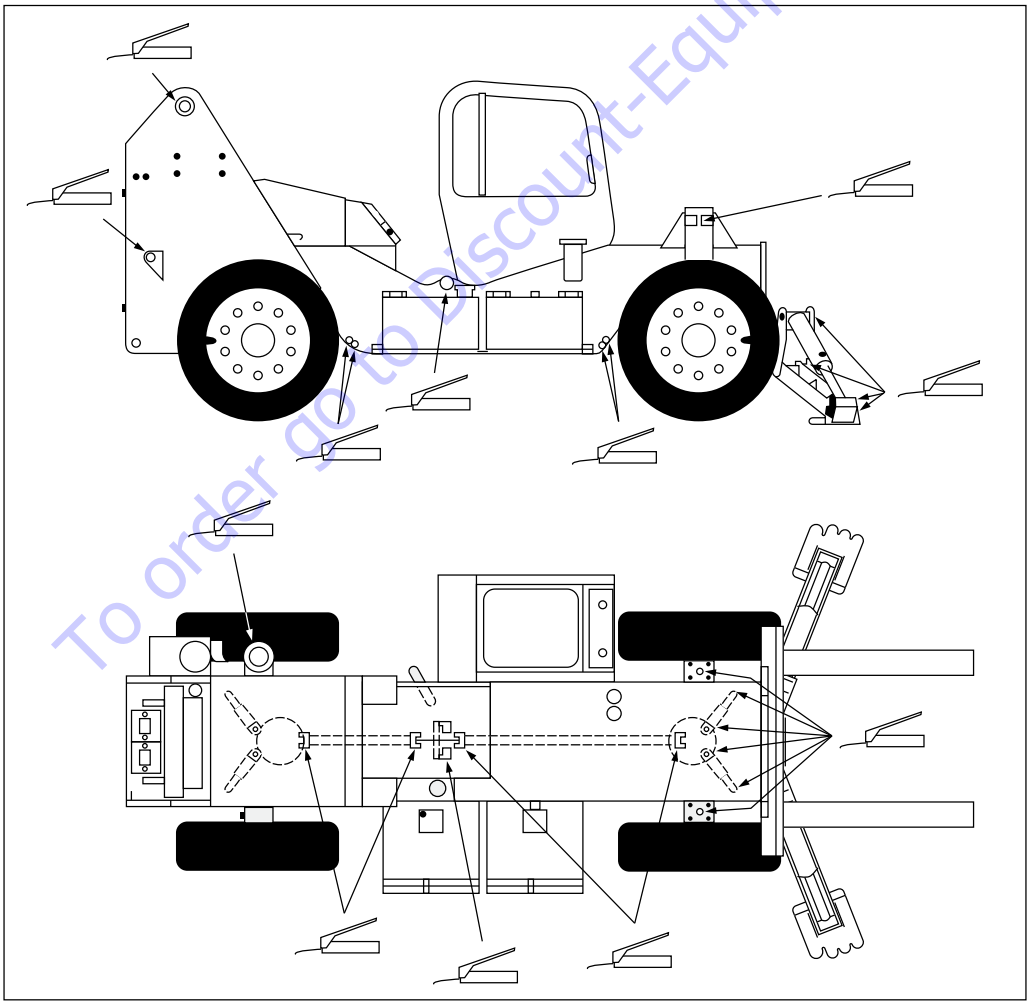
5.6-1 Frame Grease Points

Add grease to the following components. Ensure grease reaches the bearing internals.

- Brake pedal pivot pin
- Lift cylinders
- Axle lock cylinder
- Frame level cylinder
- Slave cylinders
- Outrigger pins

NOTE

When greasing cylinders, pump grease into grease fittings located on both the base end and the rod end of the cylinder.



Frame Grease Points

5.6-2 Boom Grease Points

NOTE

Grease should be applied if any of the following occur:

- Pulsating or erratic boom operation, especially on retract.
- Appreciable loading of the hydraulic system also while retracting the boom in the horizontal position, or
- Noticeable wear of the high-load flange surfaces of the boom

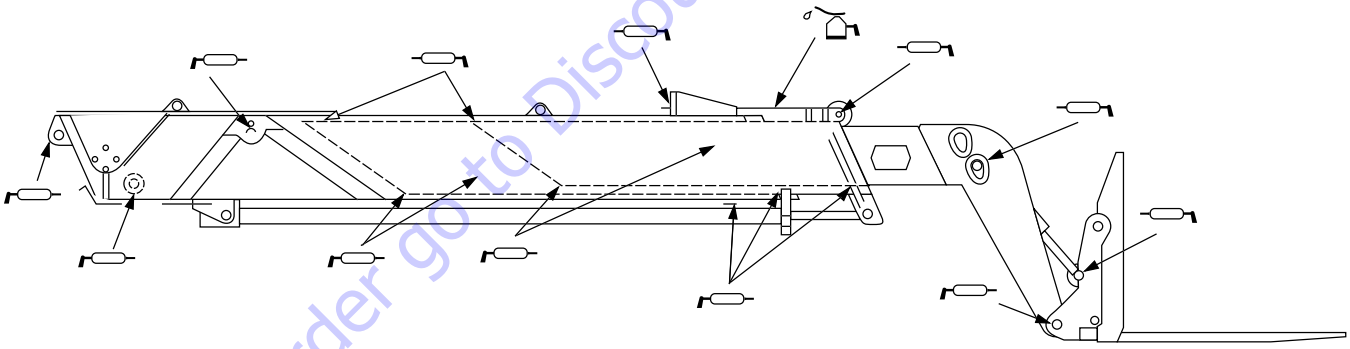
Add grease to the following components. Ensure grease reaches the bearing internals.

- Main boom pivot bearings
- Carriage tilt cylinders
- Carriage pivot bearings
- Extension chain rollers
- High load slide pads *
- Retract chain roller
- Hose rollers
- Oil extension chain

Extend boom and rest it on the ground. Wipe the exposed portion of the extension chain with oil.

* Lubricate the rear top pads (4 places) on the primary and secondary booms through the door at the rear of the boom while the boom is fully retracted.

Lubricate the front bottom pads (4 places) on the main and primary booms while the boom is also fully retracted.



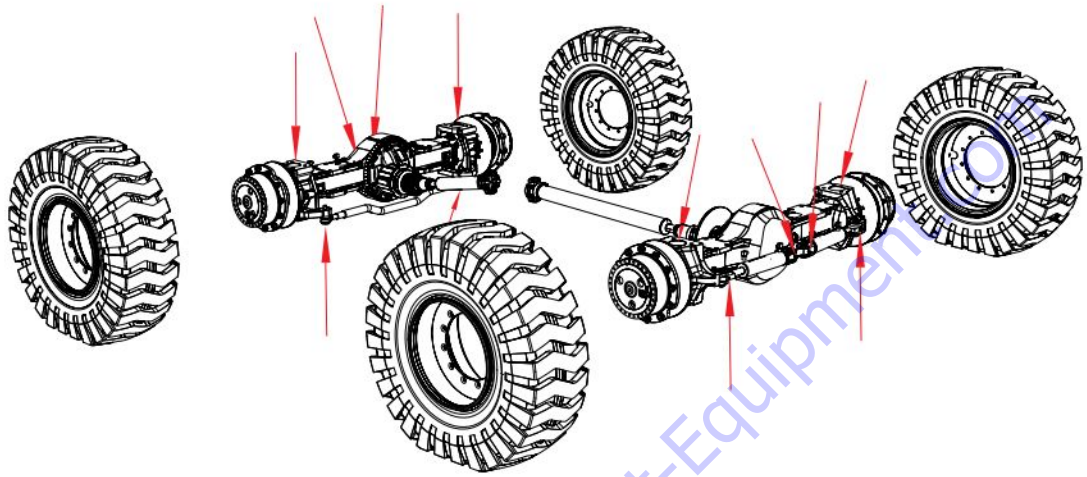
Boom Grease Points

5.6-3 Drive Axle Grease Points

1. Ensure telehandler is on a firm level surface and is in stowed position.
2. Open axle cover plate and locate grease fitting. (See diagram below)
3. Pump grease into the grease fittings.

5.6-4 Drive Shaft Grease Points

1. Locate the grease fittings on the drive shaft and pump grease. (See diagram below)

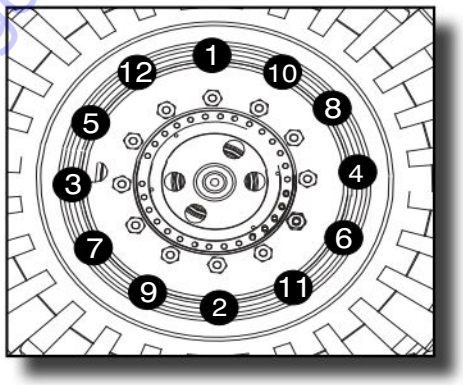


Axles & Drive Shafts Grease Points

5.7 Tires

5.7-1 Check Lug Nut Torque

1. Tighten wheel nuts to an initial torque reading of 50-100 ft-lbs, dry, in the sequence shown below.



2. Re-tighten wheel nuts to a torque of 450-500 ft-lbs, dry, in the sequence shown above.
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.

5.8 Coolant Draining Procedure

Refer to this section for instructions on maintaining correct coolant levels.

5.8-1 Radiator Fill Maintenance

WARNING

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

1. Ensure to make use of an appropriate container when collecting used coolant. Open the radiator drain, and drain engine coolant completely.

2. Open engine vent. Leave vent open during radiator fill. Refer to Figure 5-1.

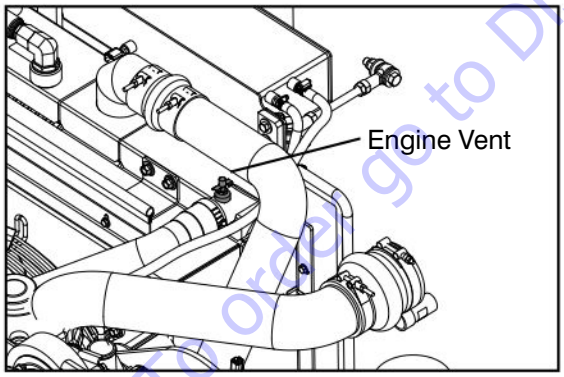


Figure 5-1 Engine Vent Location

3. Remove radiator cap.

4. Fill radiator through the reserve tank filler neck until a solid, airless stream of coolant flows out of the engine vent, then close the engine vent.

NOTE

When filling the radiator, do not exceed 3GPM fill rate.

5. Fill radiator completely through the reserve tank filler neck, until coolant is visible through the sight glass. See Figure 5-2.

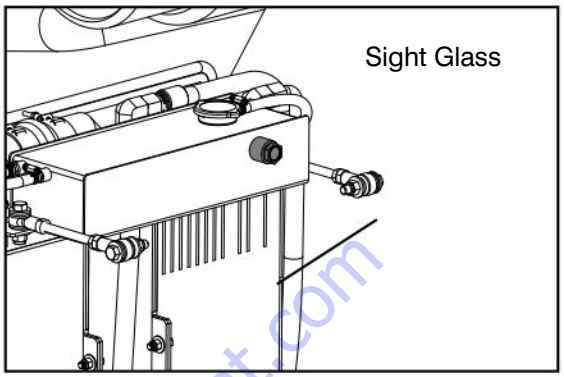


Figure 5-2 Recovery Bottle Location

6. Run the engine for 25 minutes without radiator cap to achieve operating temperature. Shut down the engine.

7. Check coolant level at the sight glass. Refill until coolant is visible through the sight glass, if necessary.

8. Install radiator cap.

NOTE

Additional coolant may be required in the top tank after a few operational cycles.

TO PURCHASE THIS PRODUCT PLEASE CONTACT US

Discount Equipment

Equipment Financing and
Extended Warranties Available

Discount-Equipment.com is your online resource for commercial and industrial quality parts and equipment sales.
561-964-4949
visit us on line @ www.discount-equipment.com

Select an option below to find your Equipment

Search by Manufacturer

Search by Product Type

Request a Quote

We sell worldwide for the brands: Genie, Terex, JLG, MultiQuip, Mikasa, Essick, Whiteman, Mayco, Toro Stone, Diamond Products, Generac Magnum, Airman, Haulotte, Barreto, Power Blanket, Nifty Lift, Atlas Copco, Chicago Pneumatic, Allmand, Miller Curber, Skyjack, Lull, Skytrak, Tsurumi, Husquvarna Target, Stow, Wacker, Sakai, Mi-T-M, Sullair, Basic, Dynapac, MBW, Weber, Bartell, Bennar Newman, Haulotte, Ditch Runner, Menegotti, Morrison, Contec, Buddy, Crown, Edco, Wyco, Bomag, Laymor, EZ Trench, Bil-Jax, F.S. Curtis, Gehl Pavers, Heli, Honda, ICS/PowerGrit, IHI, Partner, Imer, Clipper, MMD, Koshin, Rice, CH&E, General Equipment ,Amida, Coleman, NAC, Gradall, Square Shooter, Kent, Stanley, Tamco, Toku, Hatz, Kohler, Robin, Wisconsin, Northrock, Oztec, Toker TK, Rol-Air, APT, Wylie, Ingersoll Rand / Doosan, Innovatech, Con X, Ammann, Mecalac, Makinex, Smith Surface Prep,Small Line, Wanco, Yanmar