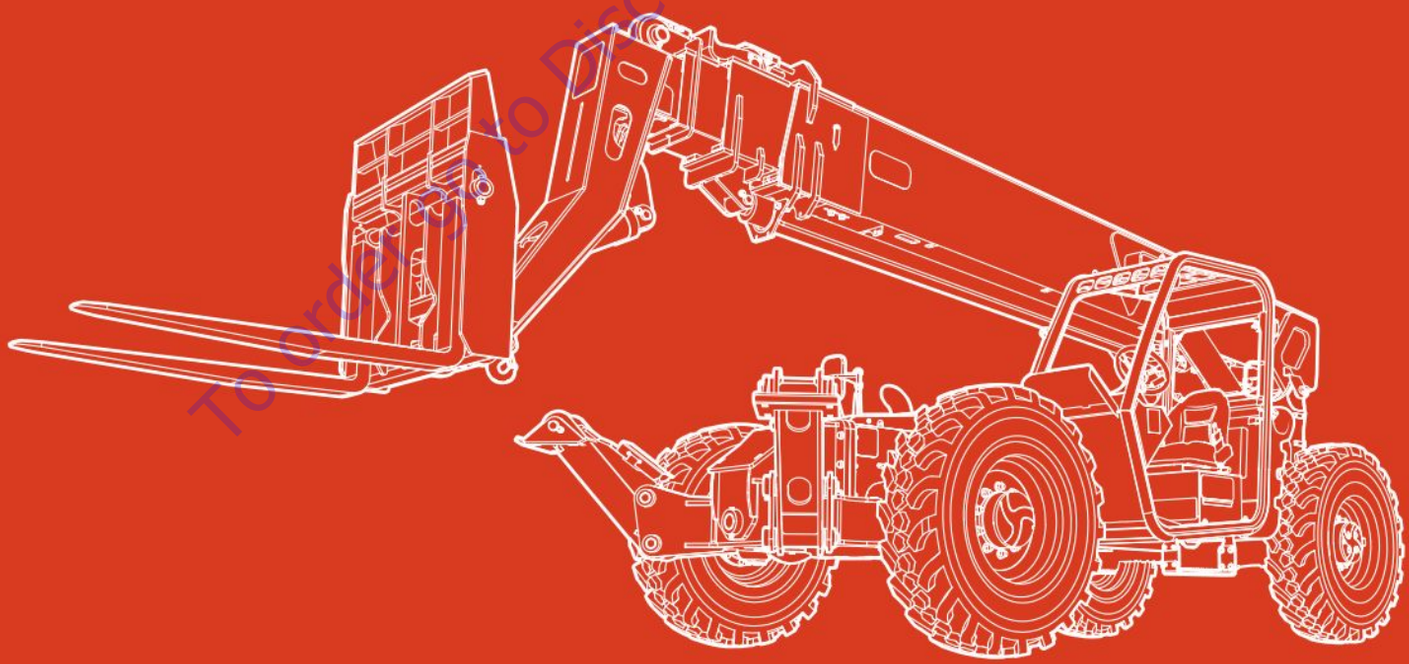
SKYJACK

SERVICE MANUAL

SJ1044 TH, SJ1044 THS, SJ1056 TH, SJ1056 THS, SJ1256 THS

TELEHANDLERS



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This manual is based on Serial Number(s):

SJ1044 TH/THS: 87 210 001 & Above
SJ1056 TH/THS: 87 310 001 & Above
SJ1256 THS: 87 410 001 & Above

THIS SAFETY ALERT SYMBOL MEANS ATTENTION!

BECOME ALERT! YOUR SAFETY IS INVOLVED.

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

IMPORTANT

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

Table of Contents

Section 1 – Scheduled Maintenance

1.1 Read and Heed

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

1.1-1 Telehandler Definition

A 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.

1.1-2 Purpose of Equipment

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

1.1-3 Use of Equipment

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

1.1-4 Manual

Operating 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.

Service & Maintenance: The purpose of this is to provide the customer with the servicing and maintenance procedures essential for the promotion of proper machine operation for its intended purpose.

All information in this manual should be read and understood before any attempt is made to service the machine. The updated copy of the manuals are found on the company's website: www.skyjack.com.

1.1-5 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 the SKYJACK Service Department for warranty statement extensions or exclusions.

1.1-6 Operator Safety Reminders, Warnings and Precautions

Operator safety is SKYJACK's priority. The operator should comply with all applicable safety-related reminders, warnings and precautions found in the Operating Manual. They should be read and understood completely before operating the telehandler.

1.2 Maintenance and Inspection Schedule

The actual operating environment of the work platform governs the use of the maintenance schedule. The inspection points covered in Table 1.2. 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.

1.2-1 Owner's Annual Inspection Record

It is the responsibility of the owner to arrange quarterly and annual inspections of the telehandler. Table 1.1. 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 work platform.

1.2-2 Replacement Parts

Use only original replacement parts. Parts such as batteries, wheels, railings, 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.

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

⚠ WARNING

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

1.2-3 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.

Ensure personnel are clear from under unsupported components/systems that are at risk of movement during maintenance.

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.

Before attempting any repair work, disconnect the main power conenctors.

Keep personnel clear of components, systems or unsupported loads that may move unexpectedly during maintenance procedures.

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

1.3 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 preotection 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. Whenever the hydraulic system is drained, check the magnets in the hydraulic reservoir for metal particles. If metal particles are present, flush the entire system and add a new change of oil. The presence of metal particles also may indicate the possibility of imminent component failure. A very small amount of fine particles is normal.
5. 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.
6. When removing any hydraulic component, be sure to cap and tag all hydraulic lines involved. Also, plug the ports of the removed components.
7. 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.
8. 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.
9. 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.
10. 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.

1.3-1 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. They are 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.

1.4 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.

1.4-1 Service Bulletins

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

1.4-2 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 mantenance 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
  - Disconnect the batteries by disconnecting the main power connectors.
- Repair any damaged or malfunction components before operating Telehandler.
- Keep records on all inspections.

1.4-3 Maintenance Instructions

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

Issue or Symptom		
PDI/Frequent	**B**	Perform PDI prior to each delivery, or Frequent Inspection every 3 months or 150 hours.
Annual	**B + C**	Perform Scheduled Maintenance Inspections every year.
Additional	*	Perform at time sensitive maintenance intervals.

- 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 1 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	
Pass	**P**
Fail	**F**
Repaired	**R**
Not applicable	**N/A**

Table 1.1 MAINTENANCE AND INSPECTION CHECKLIST

Serial Number: _____

Model: _____

Hourmeter Reading: _____ Operator's Name (Printed): _____

Date: _____

Time: _____ Operator's Signature: _____

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

P - PASS
F - FAIL
R - REPAIRED

INSPECTION FREQUENCY

- ❑ DAILY
- ❑ WEEKLY or 40 HOURS
- ❑ QUARTERLY OR 250 HOURS
- ❑ ANNUALLY or 1000 HOURS

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

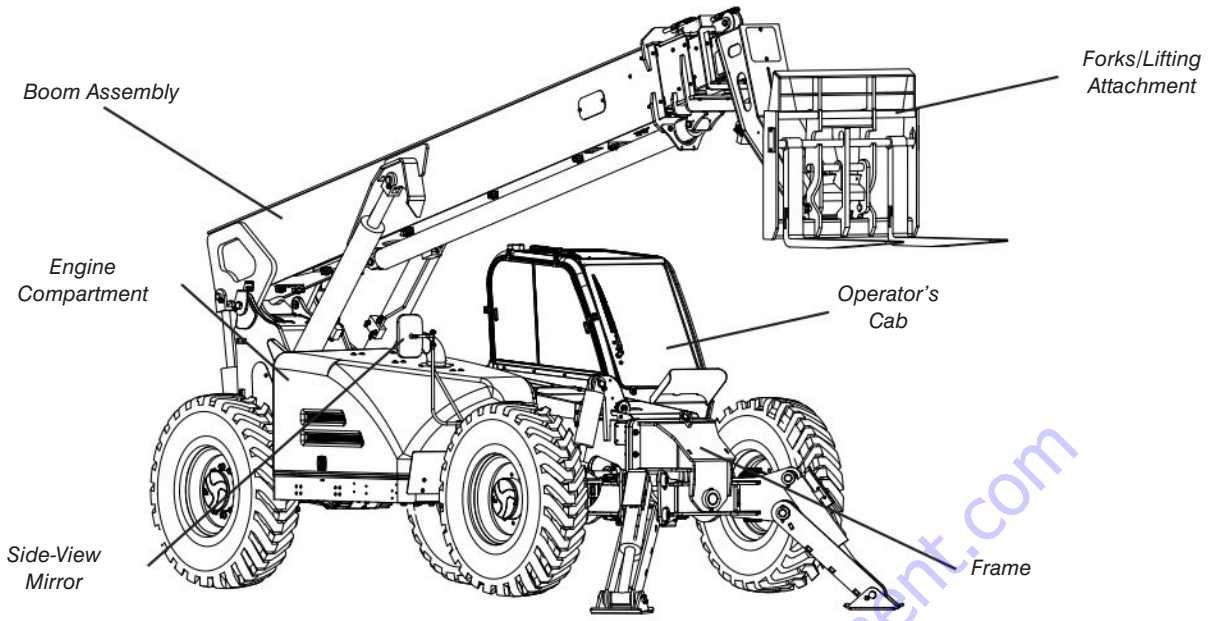
Schedule		P	F	R
Schedule Maintenance Inspections				
Labels	A			
Electrical	A			
Mirrors	A			
Hydraulic	A			
Cylinders	A,B,C,D			
Frame				
Wheel/Tire Assembly	A			
Air-filled Tires	A			
Foam-filled Tires	A			
Battery and Cables	A			
Hydraulic Tank	A			
Hydraulic Oil	A,D			
Engine Intake Air Filter	A,B,C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

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

256C

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

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



1.5 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.

1.5-1 Labels - A

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

1.5-2 Electrical

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

- Ensure proper operation of all gauges.
- Inspect the following areas for chafed, corroded and loose wires:
  - boom wiring harnesses - A
  - frame wiring harnesses - A
  - cab wiring harnesses - A

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

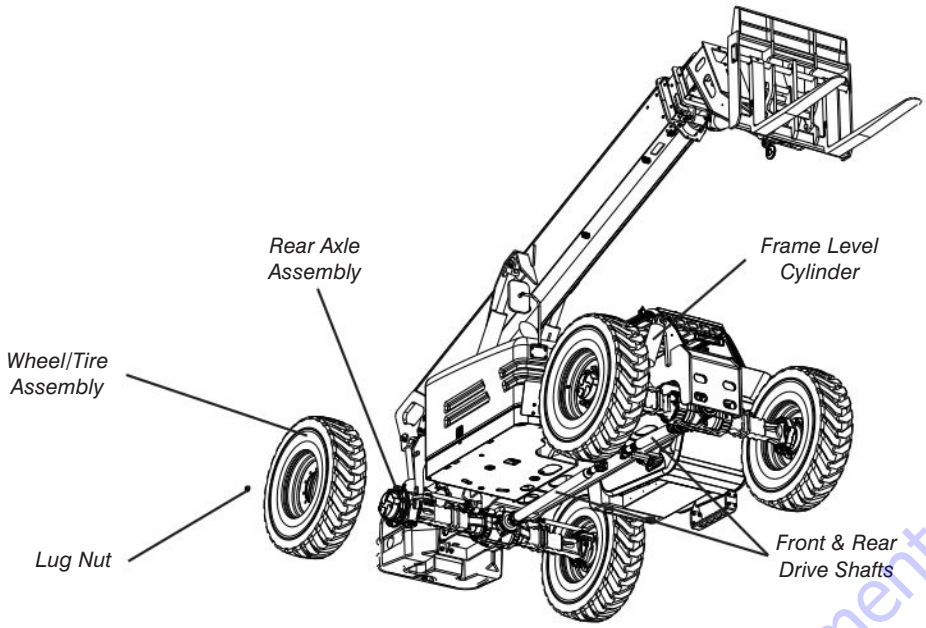
1.5-3 Mirrors - A

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

1.5-4 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 - A
- all hydraulic manifolds - A
- underside of the frame - A
- ground area under the telehandler - A



1.5-5 Cylinders - A

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.

Refer to section 5.3 for greasing procedure.

1.5-6 Frame

- **Wheel/Tire Assembly - A**

Tire and/or wheel failure could result in a telehandler tipover. 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 section 5.4-1 for torque procedure.

⚠ WARNING

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

- **Air-filled Tires - A**

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.

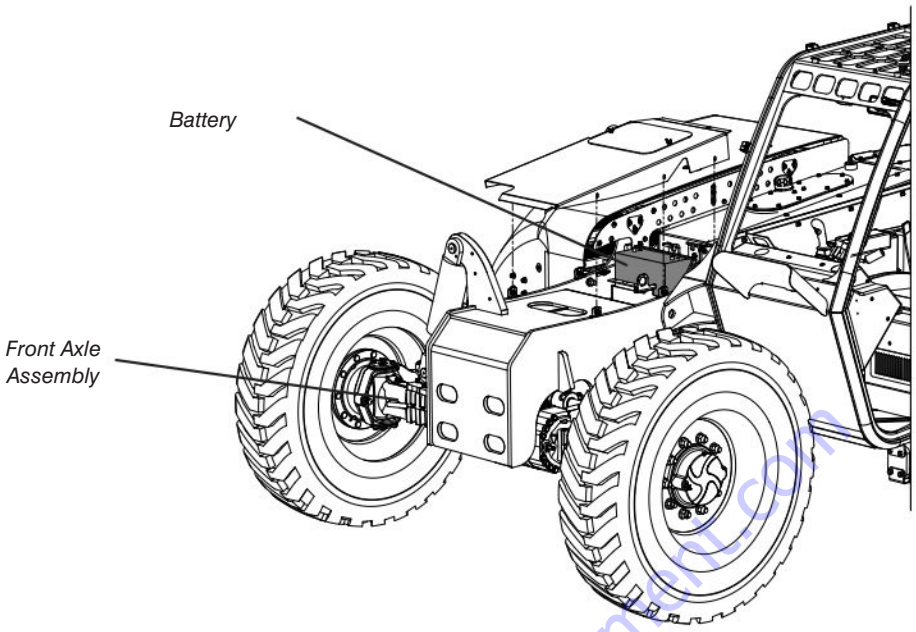
- **Foam-filled Tires - A**

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 Axles - A**

Ensure drive axles are properly secured, there are no loose or missing parts, all fittings and hoses are properly tightened and there is no evidence of oil leakage.

- **Steer Cylinder - A**

Ensure steer cylinders are 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.

- **Planetary Wheel Ends - C**

Check the planetary wheel ends oil level and add as required. Ensure there is no evidence of oil leakage.

- **Axle Differential - C**

Check the axle differential oil level and add as required. Ensure there is no evidence of oil leakage.

- **Battery - A**

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.

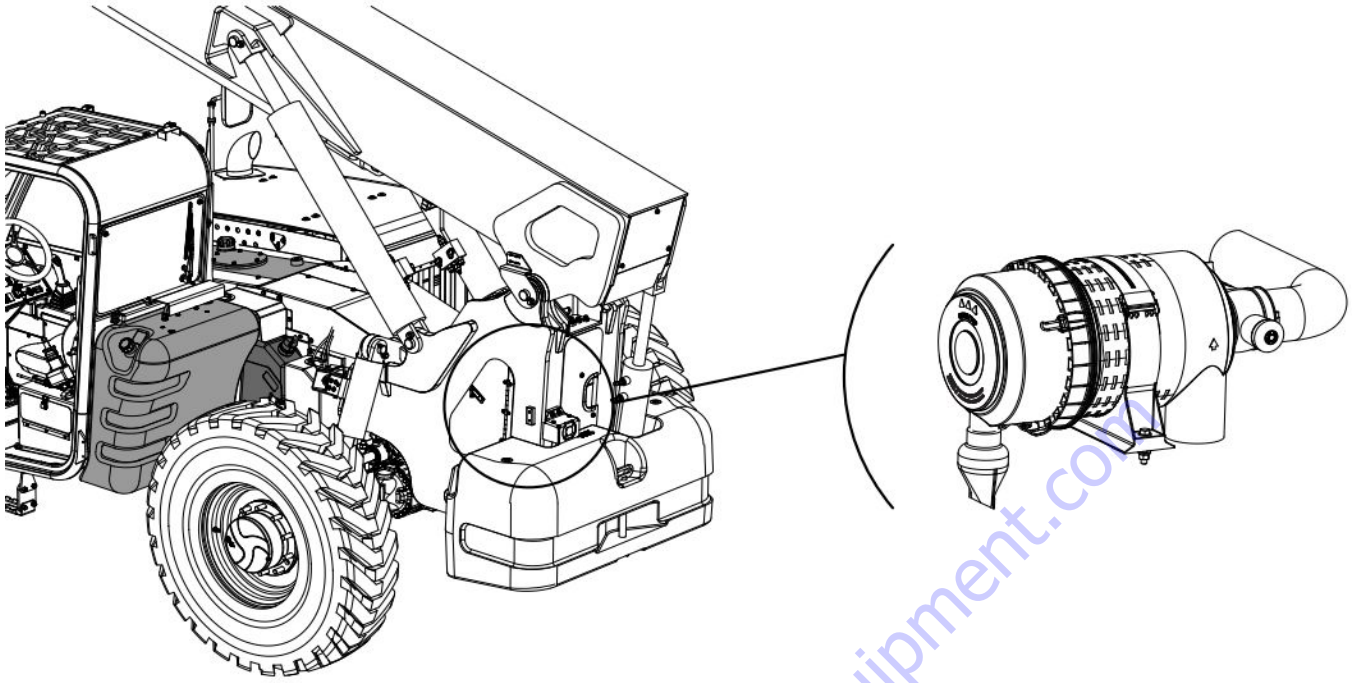
⚠ WARNING

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 battery case for damage.
2. Clean battery terminals and cable ends thoroughly with a terminal cleaning tool or wire brush.
3. Ensure all battery 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 battery if damaged or incapable of holding a lasting charge.

⚠ WARNING

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



- **Engine Intake Air Filter - A**
  - Ensure there are no loose or missing parts and there is no visible damage.
  - Ensure air cleaner vaccuator valve is free from dirt or dust by squeezing the valve lips.
  - Check air cleaner service indicator and replace filter element if needed. Refer to section 5.2-4
- **Fuel Tank - A**

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.

- **Fuel Leaks - A**

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

Perform a visual inspection around the following areas:

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

⚠ WARNING

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.

Refer to section 5.4-5 for fuel filter replacement procedure

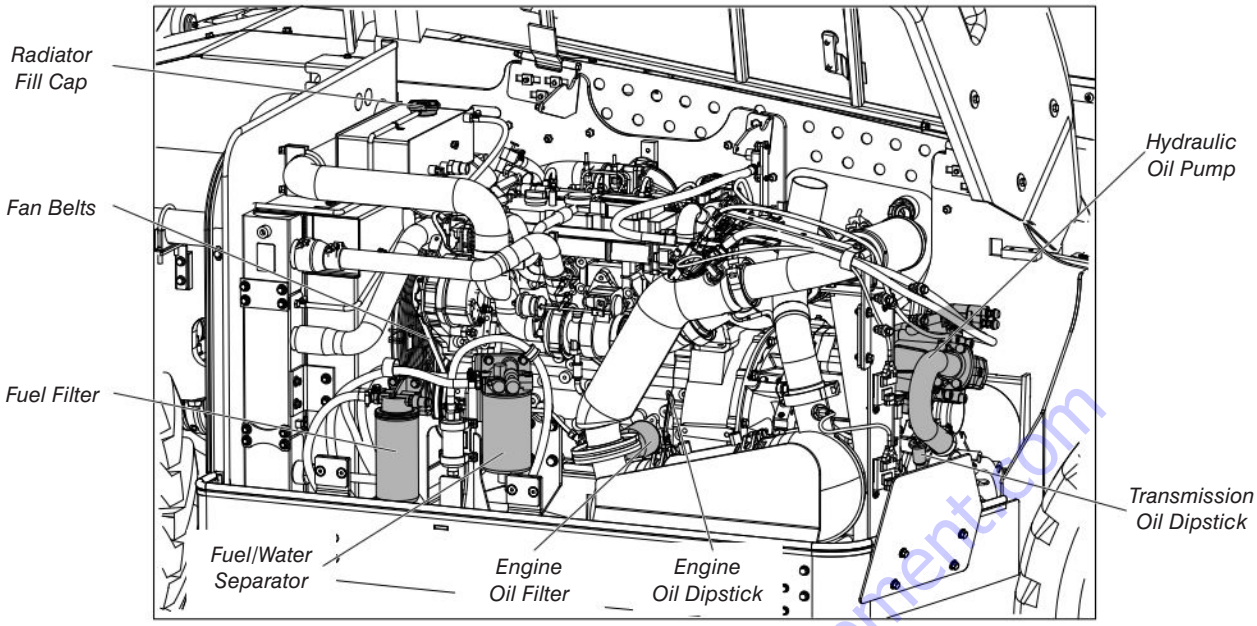
- **DEF Tank (if equipped) - A**

IMPORTANT

Before using your telehandler ensure there is enough Diesel Exhaust Fluid for expected use.

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

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



- **Hydraulic Oil - A, D**
  - Be sure that the boom is in the lowered and stowed position, and then visually inspect the sight gauge located at the rear of the hydraulic oil tank.
  - Add clean hydraulic oil as required. Refer to section 5.5-2 for hydraulic oil change.

1.5-7 Engine Compartment

Ensure compartment cover is secure and in proper working order.

⚠ WARNING

Beware of hot engine components.

- **Engine Oil Level on dipstick - A, C**
  - Maintaining the engine components is essential to good performance and service life of the telehandler.
  - Oil level should be between the “L” low and “H” high marks. Add oil as needed. Refer to section 5.4-4 for oil replacement procedure.
- **Engine Coolant - A**

⚠ WARNING

Pressurized fluid present in radiator. Never open radiator cap when hot. Always open fill cap slowly.

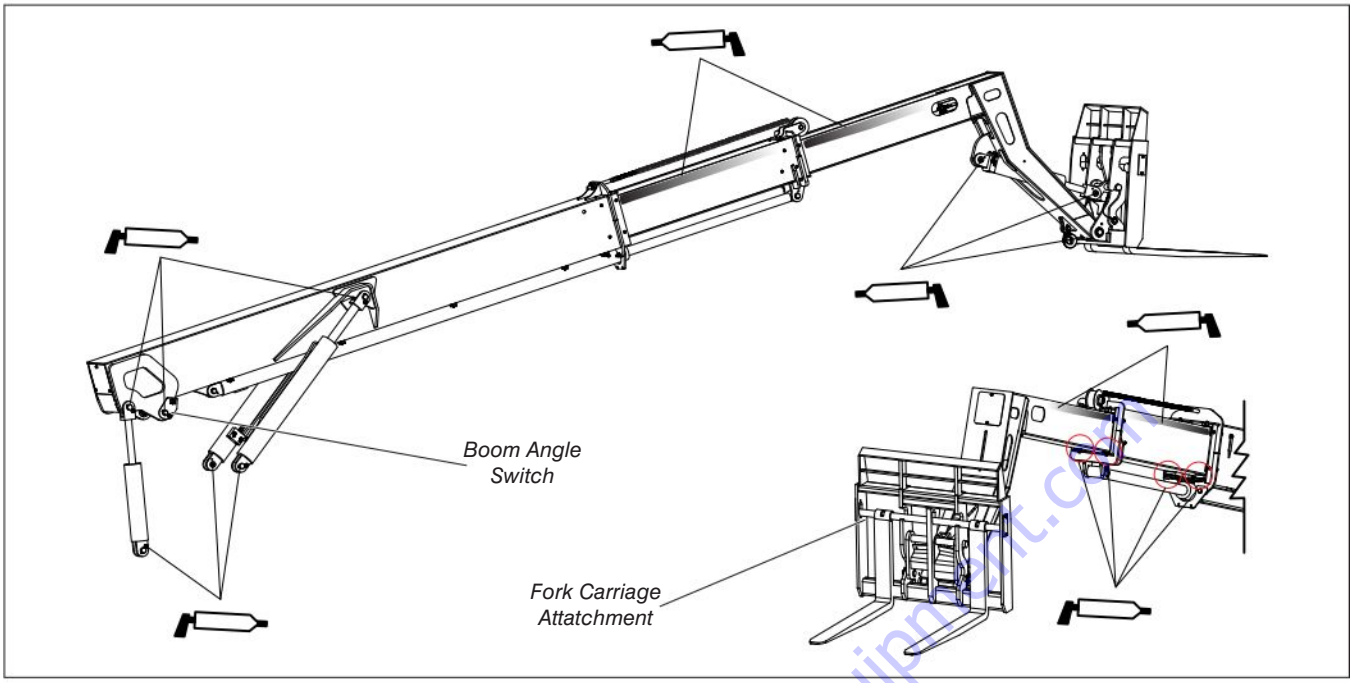
  - Check coolant level on radiator.
  - Add coolant as required.

Refer to section 5.5-5 for engine coolant change procedure.

- **Belts - A**
  - 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.
- **Hydraulic Pump - A**
  - 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.
- **Fuel/Water Separator “” - C, D**

Ensure there are no loose or missing parts and there is no visible damage.

  - Ensure all fittings and hoses are properly tightened and there is no evidence of fuel leaks.



- Drain water by opening water drain plug at bottom of filter. Close tightly after inspection.

Refer to section 5.4-5 for fuel/water separator replacement procedure

1.5-8 Transmission

Ensure transmission shifter is working properly and there is no evidence of damage.

- **Check oil level on dipstick "" - D**
  - With park brake engaged and transmission shifter in "N" Nuetral position, start engine.
  - Oil level should be in the 'safe' zone. Add oil as needed. Refer to section 5.5-6 for transmission oil change procedure.

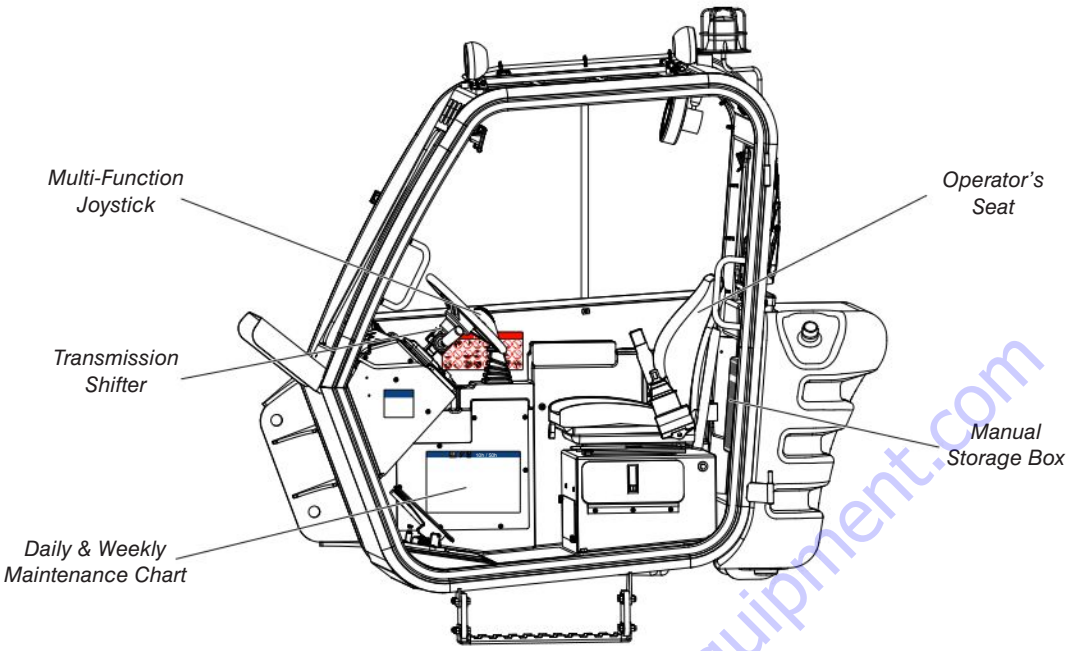
1.5-9 Boom - A

- 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.
- **Boom Angle Switches - A**
  - Ensure boom angle switches are properly secured with no signs of visible damage.
- **Slide Pads - B, C, D**
  - Ensure all bolts are tight, there is no visible damage to the slide pads and that no parts are missing.
- **Chain - A, C**
  - Ensure there are no loose or missing parts and there is no visible damage
- **Boom Angle Indicator - A**
  - Ensure all bolts are tight, and there is no visible damage and indicator swings freely.

1.5-10 Lifting Attachment - A

- 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 for attachments installation and operation).

Operator's Cab



1.5-11 Grease Fittings - B

- 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.

Refer to section 5.2 for greasing procedures.

⚠ WARNING

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

- Greasing intervals are based on average telehandler usage. Use of telehandler may vary significantly and greasing frequency must be adjusted to obtain maximum service life.
- Refer to the Daily and Weekly Maintenance Chart located inside operator's cab for grease points location and service intervals.

1.5-12 Operator's Cab

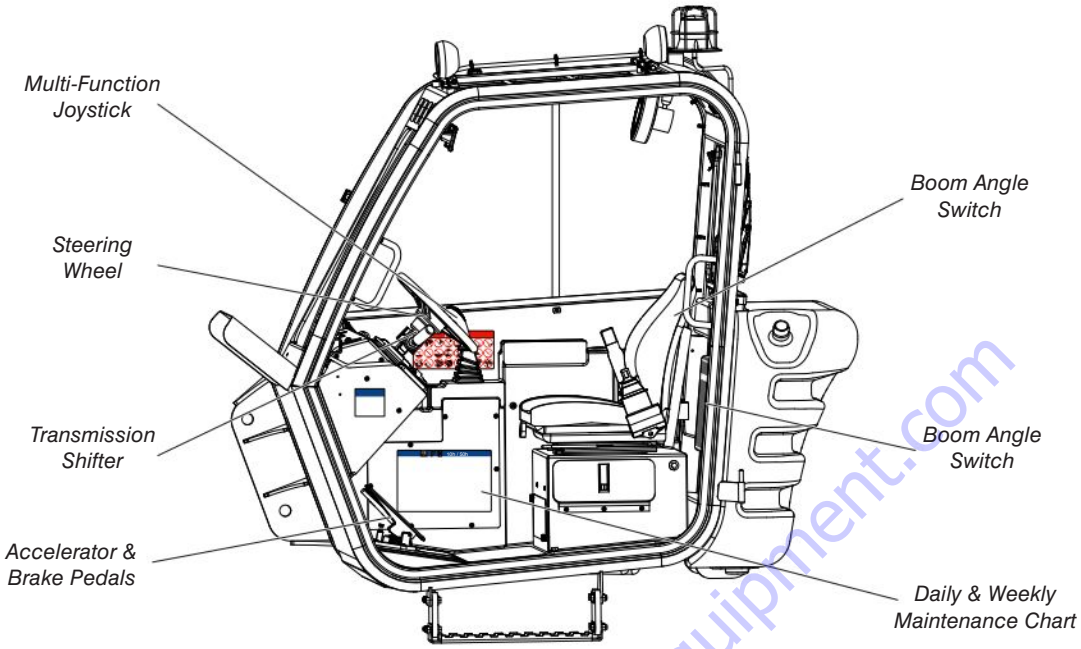
- **Rollover and Falling Object Protective Structure (ROPS/FOPS) - B**
  - Ensure there is no visible damage.

⚠ WARNING

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

- **Seat - A**
  - Ensure seat is properly secured with no sign of visible damage.
  - Ensure seat belt is working properly with no sign of visible damage.
- **Pedals - A**
  - Ensure brake and accelerator pedals are secure, no loose or missing parts, no sign of visible damage and movements are not obstructed.
- **Manual - A**
  - 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



- **Operator's Cab Controls - A**

⚠ 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 position and movements are not obstructed.
- Ensure capacity charts are in place and are legible.

⚠ WARNING

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

1.6 Function Tests

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

IMPORTANT

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 the “Start Operation” section of the operating manual.
- For function test that are to be performed, please refer to the operating manual that corresponds to the correct serial number. Found there will be detailed instructions for which tests to perform, as well as how to properly and successfully perform them.

NOTE

All-function motion alarm should sound while operating any boom and drive function

Section 2 – Maintenance Tables

Table 2.1 Standard and Optional Equipment

MODELS	SJ1044 TH/THS	SJ1056 TH/THS
Standerd Equipment		
Diesel Engine	*	*
Four-wheel drive	*	*
Three-Speed Transmisson	*	*
Three-Mode Steering	*	*
Open Operator's Cab	*	*
Spring-applied Hydraulically Released Parking Brake	*	*
Operator horn	*	*
Reverse/Backup alarm	*	*
Engine Block Heater	*	*
Hydraulic Test Port(s)	*	*
Air Filled Tires	*	*
Rear Axle Stabilization System (RAS)	*	*
Frame Leveling System	*	*
48" / 60" / 72" QA 10K Fork Carriages	*	*
Lifting Hook	*	*
Outriggers	-	*
Optional Equipment		
Outriggers	*	-
SCR System	*	*
Enclosed Operator's Cab	*	*
Enclosed Operator's Cab with A/C	*	*
Flashing Beacon	*	*
Four-Wheel Fenders	*	*
Positive Air Shut-off System	*	*
Foam Filled Tires	*	*
Reserve Brak System	*	*
Road/Work/Boom Lights	*	*
Premium Multi-functional Joystick	*	*
48" / 60" / 72" Side-Tilt Fork Carriages	*	*
72" Swing Carriage	*	*
2 ft. Jib Boom	*	*
1.75 Cu. Yd. Bucket Loader Attachment	*	*
12 ft. Truss Boom	*	*
15 ft. Truss Boom	*	*

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Model	SJ1256 THS
Standard Equipment	
48" / 60" / 72" QA 12K Fork Carriages	*
Air Filled Tires	*
Diesel Engine	*
Engine Block Heater	*
Four-wheel drive	*
Frame Leveling System	*
Lifting Hook	*
Open Operator's Cab	*
Operator horn	*
Outriggers	*
Rear Axle Stabilization System (RAS)	*
Reverse/Backup Alarm	*
SCR System	*
Spring-applied Hydraulically Released Parking Brake	*
Three-Speed Transmisson	*
Three-Mode Steering	*
Optional Equipment	
1.75 Cu. Yd. Bucket Loader Attachment	*
12 ft. Truss Boom	*
15 ft. Truss Boom	*
2 ft. Jib Boom	*
48" / 60" / 72" Side-Tilt Fork Carriages	*
72" Swing Carriage	*
Back-up Sensor/ Back-up Camera and Sensor	*
Enclosed Operator's Cab	*
Enclosed Operator's Cab with A/C	*
Fire Extinguisher	*
Flashing Beacon	*
Foam Filled Tires	*
Four-Wheel Fenders	*
Pintle Hitch	*
Positive Air Shut-off System	*
Premium Multi-function Joystick	*
Reserve Brake System	*
Road/Work/Boom Lights	*

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Table 2.2 Specifications and Features

MODEL		SJ1044 TH/THS	SJ1056 TH/THS
Standard Engine			
Type		Deutz 3.6L Tier 4 Final	
Cylinders		4	
Horsepower @ 2300 RPM		74 HP	
Capacity		219 cu.in. (3600 cm3)	
Torque @ 1300 RPM		286 lb. ft (387 N-m)	
Idle Speed*		1100 - 1150 RPM	
Fuel type		Diesel	
Optional Engine			
Type		Deutz 3.6L Tier 4 Final	
Cylinders		4	
Horsepower @ 2300 RPM		107 HP	
Capacity		219 cu.in. (3600 cm3)	
Torque @ 1300 RPM		288 lb. ft (390 N-m)	
Idle Speed*		1100 - 1150 RPM	
Fuel type		Diesel	
Transmission			
Powershift	Type	Powershift with soft shift	
	Speeds forward	3	
	Speeds reverse	3	
CVT	Type	Continuously Variable Transmission - Two Range Powershift	
	Speeds forward	2	
	Speeds reverse	1	
Travel Speeds			
Powershift	Range 1	0-4 mph (1-7 km/h)	
	Range 2	5-8 mph (8-13 km/h)	
	Range 3	9-15 mph (14-24 km/h)	
CVT	Range	0-14 mph (0-23 km/h)	
Electrical			
Negative ground		12 Volts	
Alternator		60 Amps	
Battery		900 Amps	
Backup Alarm		107 DBM	
Dimensions			
Wheelbase		133 in. (337.82 cm)	
Overall width		8 ft. 6 in. (259.1 cm)	
Overall height		8 ft. 3 in. (246.84 cm)	8 ft. 5 in. (248.8 cm)
Overall length (less forks)		20 ft. 9 in. (632.7 cm)	22 ft. 6 in. (685.6 cm)
Ground clearance		19 in. (48.26 cm)	
Maximum weight without attachment		30,922 lb (14,026 kg)	33,482 lb (15,188 kg)
Turn radius (inside)		73 in. (185.4 cm)	
Turn radius (outside)		173 in (439.4 cm)	
Boom			
Number of sections		3	4
Maximum lift height		44 ft. 3 in. (13.48 m)	56 ft. 3 in. (17.15 m)
Maximum forward reach		29 ft. 4 in. (8.94 m)	42 ft. 2 in. (12.85 m)
Standard Forks (Standard Tapered Forks)		"2.25 in. x 5 in. x 48 in.	
Carriage rollback		20°	
Carriage forward tilt		92.5°	

** Engine Idle Speed is measured with 5% droop when in gear.* *1341AB*

*** Add 400 lb (181.437 kg) to the maximum weight for machines with CVT*

Model	SJ1256 THS
Standard Engine	
Type	Deutz 3.6 L Tier 4 Final
Cylinders	4
Horsepower @ 2300 RPM	107 HP
Capacity	219 cu in (3600 cm^3)
Torque @ 1300 RPM	288 lb ft (390 N-m)
Idle Speed*	1100 – 1150 RPM
Fuel type	Diesel
Transmission	
Type	Powershift with soft shift
Speeds forward	3
Speeds reverse	3
Travel Speeds	
Range 1	0–4 mph (1–7 km/h)
Range 2	5–8 mph (8–13 km/h)
Range 3	9–15 mph (14–24 km/h)
Electrical	
Negative ground	12 Volts
Alternator	60 Amps
Battery	900 Amps
Backup Alarm	107 DBM
Dimensions	
Wheelbase	133 in (337.8 cm)
Overall width	8 ft 6 in (259.1 cm)
Overall height	8 ft 7 in (261.6 cm)
Overall length (less forks)	22 ft 10 in (697 cm)
Ground clearance	19 in (48.3 cm)
Maximum weight without attachment	33,482 lb (15,188 kg)
Turn radius (inside)	73 in (185.4 cm)
Turn radius (outside)	173 in (439.4 cm)
Boom	
Number of sections	4
Maximum lift height	56 ft 3 in (17.15 m)
Maximum forward reach	42 ft 4 in (12.90 m)
Standard Forks	2.25 in x 5 in x 48 in (standard tapered forks)
Carriage rollback	20°
Carriage forward tilt	92.5°

** Engine idle speed is measured with 5% droop when in gear.* *1231AA*

Table 2.3 Recommended Fluids/Lubrications

Models SJ1044 TH/THS & SJ1056 TH/THS			
Engine			
Fuel Type		Ultra Low Sulfur Diesel (EN 590, ASTM D975) or Biodiesel B20	
Fuel Tank Capacity		35 gal (132 L)	
Recommended Oil Type		SAE 15W40	
Engine Oil Capacity		9.5 Quart (9.0 L)	
Coolant Type (Standard)		COOLANT-ANTIFREEZE 50/50 PREMIX *	
Coolant Type(Cold Weather Option)		COOLANT-ANTIFREEZE 60/40 PREMIX *	
Coolant Tank Capacity		4.2 gal (16 L)	
DEF (if equipped)		Diesel Exhaust Fluid (DEF)	
DEF Tank Capacity		2.4 gal (9.4 L)	
Transmission			
Powershift	Oil Type	Multipurpose ATF	
	Capacity	14.2 Quart (13.5 L)	
CVT	Oil Type	**CVT Case:** VALVOLINE INVARITORC 205	**Dropcase:** ATF DEXRON 3
	Capacity	18 L	0.90 L
Axles			
Differential		API GL5 LS	
Front Axle Capacity		13.7 Quart (13 L)	
Rear Axle Capacity		8.2 Quart (7.8 L)	
Planetary Wheel Ends		API GL5 LS	
Capacity		2 Quart (1.89 L)	
Hydraulic Oil			
Standard Factory Fill		ATF Dexron III	
Type		ATF Dexron III or Equivalent	
Tank Capacity		43.85 gal (166 L)	
Grease Points			
Type		EP2 Grease	

** Refer to engine manufacturer's manual*

1348AD

⚠ WARNING

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

Model SJ1256 THS			
Engine			
Fuel Type		Ultra Low Sulfur Diesel (EN 590, ASTM D975) or Biodiesel B20	
Fuel Tank Capacity		35 gal (132 L)	
Recommended Oil Type		SAE 15W40	
Engine Oil Capacity		9.5 quart (9.0 L)	
Coolant Type (Standard)		COOLANT-ANTIFREEZE 50/50 PREMIX *	
Coolant Type (Cold Weather Option)		COOLANT-ANTIFREEZE 60/40 PREMIX *	
Coolant Tank Capacity		4.2 gal (16 L)	
DEF		Diesel Exhaust Fluid (DEF)	
DEF Tank Capacity		2.4 gal (9.4 L)	
Transmission			
Powershift	Oil Type	Multipurpose ATF	
	Capacity	14.2 quart (13.5 L)	
CVT	Oil Type	**CVT Case:** VALVOLINE INVARITORC 205	**Dropcase:** ATF DEXRON 3
	Capacity	18 L	0.90 L
Axles			
Differential		API GL5 LS	
Front Axle Capacity		14.8 quart (14 L)	
Rear Axle Capacity		14.8 quart (14 L)	
Planetary Wheel Ends		API GL5 LS	
Capacity		2 quart (1.89 L)	
Hydraulic Oil			
Standard Factory Fill		ATF Dexron 3	
Type		Multipurpose ATF	
Tank Capacity		43.85 gal (166 L)	
Grease Points			
Type		EP2 Grease	

** Refer to manufacturer's manual.*

1233AD

⚠ WARNING

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

Table 2.4 Tire/Wheel Specifications

Models SJ1044 TH/THS & SJ1056 TH/THS					
	FILL	Size	Pressure	"Ply Rating"	"Wheel Nuts Torque"
PRIMEX G3000	AIR	14.00 X 24 TG G-2	80 PSI (552 Kpa)	16	"442 ft.-lb. (600 Nm)"
	FOAM		-		
GALAXY GIRAFFE XLW	AIR		80 PSI (552 Kpa)		
	FOAM		-		
PRIMEX DNRZ II	AIR		99 PSI (683 Kpa)		
	FOAM		-		
SOLIDAIR	-	50.787 X 8.5 X 13.00 X 24	N/A	-	
SOLIDBOSS	-	50 X 13.00 X 24	N/A	-	
BLACKSTONE	FOAM	14.000 X 24	-	16	

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Model SJ1256 THS					
	Fill	Size	Pressure	Ply Rating	Wheel Nuts Torque
Galaxy Giraffe XLW	Air	14.00 × 24 TG G-2	80 psi (552 kPa)	16	442 ft-lb (600 Nm)
	Foam		-		
SOLIDBOSS	-	14.00 × 24	-	-	
BLACKSTONE	Foam	14.00 × 24	-	16	

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⚠ WARNING

Do not use tires other than those specified for this machine. Do not mix different types of tires. Tires other than those specified can adversely affect stability. Failure to operate with matched, approved tires in good condition can result in death or serious injury. Replace tires with the exact, Skyjack-approved types only.

IMPORTANT

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

SJ1044 TH/THS - SJ1056 TH/THS - SJ1256 THS			
System Component	**Test Port**	**Pressure Value 10K**	**Pressure Value 12K**
Pilot Oil Pressure	GP2	400 PSI	400 PSI
Tilt Comp./Carriage Tilt Port Relief	-	3300 PSI	3900 PSI
System			
Standby Pressure (Load Sense)	GP1	450 PSI	450 PSI
Maximum Pressure	GP1	3250 PSI	3900 PSI
Steering			
Maximum	RV2	2600 PSI	2600 PSI
Brakes			
Service Brake	PS2	900 PSI	900 PSI

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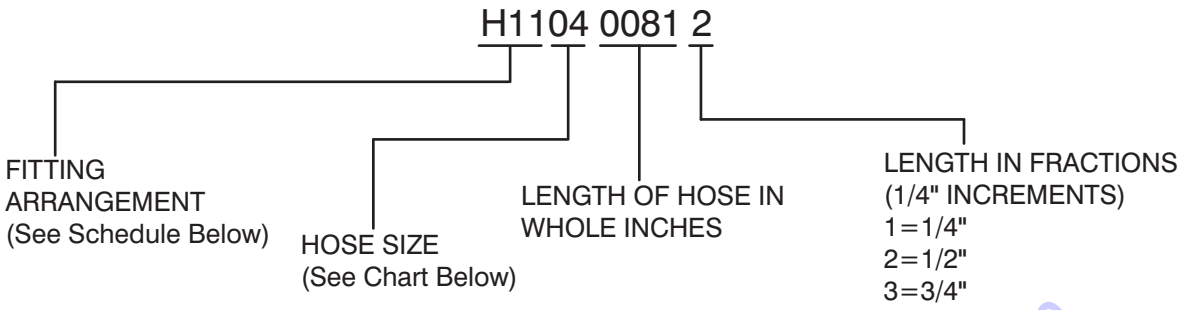
NOTE

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

NOTE

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

Table 2.6 Standard Hose Numbering System



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

NOTE

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

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

Fitting Arrangement Schedule			
Hose Prefix	**Hose End Fitting**	**Hose End Fitting**	**S.A.E. Hose Specification**
H01	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R17
H02	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R13
H03	FEMALE, 37° JIC, SWIVEL	45°, FEMALE, 37° JIC, SWIVEL	100R17
H04	FEMALE, 37° JIC, SWIVEL	45°, FEMALE, 37° JIC, SWIVEL	100R13
H05	FEMALE, 37° JIC, SWIVEL	LONG 90°, FEMALE, 37° JIC, SWIVEL	100R17
H06	FEMALE, 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R17
H07	LONG 90°, FEMALE, 37° JIC, SWIVEL	LONG 90°, FEMALE, 37° JIC, SWIVEL	100R17
H08	FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R4
H09	FEMALE, 37° JIC, SWIVEL	45°, FEMALE, 37° JIC, SWIVEL	100R4
H10	FEMALE, 37° JIC, SWIVEL	MALE PIPE THREAD FITTING	100R17
H11	FEMALE, 37° JIC, SWIVEL	MEDIUM 90°, FEMALE, 37° JIC, SWIVEL	100R13
H12	SHORT 90°, FEMALE, 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R17
H13	FEMALE, 37° JIC, SWIVEL	REUSABLE MALE PIPE THREAD FITTING	300 PSI
H14	REUSABLE MALE PIPE THREAD FITTING	NO FITTING	300 PSI
H15	REUSABLE FEMALE, 37° JIC, SWIVEL	REUSABLE FEMALE, 37° JIC, SWIVEL	300 PSI
H16	NO FITTING	NO FITTING	100R4
H17	NO FITTING	NO FITTING	300 PSI
H18	REUSABLE, FEMALE, 37° JIC, SWIVEL	NO FITTING	300 PSI
H19	LONG 90°, FEMALE, 37° JIC, SWIVEL	FEMALE, 37° JIC, SWIVEL	100R13
H20	FEMALE, SHORT 37° JIC, SWIVEL	SHORT 90°, FEMALE, 37° JIC, SWIVEL	100R4

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

Table 2.7 Torque Specifications for Fasteners (US)

Size	Torque Type	SAE2		SAE 5		SAE 8	
		Dry	Lubed	Dry	Lubed	Dry	Lubed
4-40	(in-lb)	(5)	(4)	(8)	(6)	(12)	(9)
	Nm	0.6	0.5	0.9	0.7	1.4	1.0
4-48	(in-lb)	(6)	(5)	(9)	(7)	(13)	(10)
	Nm	0.7	0.6	1.0	0.8	1.5	1.1
6-32	(in-lb)	(10)	(8)	(16)	(12)	(23)	(17)
	Nm	1.1	0.9	1.8	1.4	2.6	1.9
6-40	(in-lb)	(12)	(9)	(18)	(13)	(25)	(19)
	Nm	1.4	1.0	2.0	1.5	2.8	2.1
8-32	(in-lb)	(19)	(14)	(30)	(22)	(41)	(31)
	Nm	2.1	1.6	3.4	2.5	4.6	3.5
8-36	(in-lb)	(20)	(15)	(31)	(23)	(43)	(32)
	Nm	2.3	1.7	3.5	2.6	4.9	3.6
10-24	(in-lb)	(27)	(21)	(43)	(32)	(60)	(45)
	Nm	3.1	2.4	4.9	3.6	6.8	5.1
10-32	(in-lb)	(31)	(23)	(49)	(36)	(68)	(51)
	Nm	3.5	2.6	5.5	4.1	7.7	5.8
1/4-20	(in-lb) ft-lb	(66)	(50)	8	(75)	12	9
	Nm	7.5	5.6	11	8.5	16	12
1/4-28	(in-lb) ft-lb	(76)	(56)	10	(86)	14	10
	Nm	8.6	6.3	14	9.7	19	14
5/16-18	ft-lb	11	8	17	13	25	18
	Nm	15	11	23	18	34	24
5/16-24	ft-lb	12	9	19	14	25	20
	Nm	16	12	26	19	34	27
3/8-16	ft-lb	20	15	30	23	45	35
	Nm	27	20	41	31	61	47
3/8-24	ft-lb	23	17	35	25	50	35
	Nm	31	23	47	34	68	47
7/16-14	ft-lb	32	24	50	35	70	55
	Nm	43	33	68	47	95	75
7/16-20	ft-lb	36	27	55	40	80	60
	Nm	49	37	75	54	108	81
1/2-13	ft-lb	50	35	75	55	110	80
	Nm	68	47	102	75	149	108
1/2-20	ft-lb	55	40	90	65	120	90
	Nm	75	54	122	88	163	122

Size	Torque Type	SAE2		SAE 5		SAE 8	
		Dry	Lubed	Dry	Lubed	Dry	Lubed
9/16-12	ft-lb	70	55	110	80	150	110
	Nm	95	75	149	108	203	149
9/16-18	ft-lb	80	60	120	90	170	130
	Nm	108	81	163	122	230	176
5/8-11	ft-lb	100	75	150	110	220	170
	Nm	136	102	203	149	298	230
5/8-18	ft-lb	110	85	180	130	240	180
	Nm	149	115	244	176	325	244
3/4-10	ft-lb	175	130	260	200	380	280
	Nm	237	176	353	271	515	380
3/4-16	ft-lb	200	150	300	220	420	320
	Nm	271	203	407	298	569	434
7/8-9	ft-lb	170	125	430	320	600	460
	Nm	230	169	583	434	813	624
7/8-14	ft-lb	180	140	470	360	660	500
	Nm	244	190	637	488	895	678
1-8	ft-lb	250	190	640	480	900	680
	Nm	339	258	868	651	1220	922
1-12	ft-lb	270	210	710	530	1000	740
	Nm	366	285	963	719	1356	1003
1-14	ft-lb	280	210	730	540	1020	760
	Nm	380	285	990	732	1383	1030
1 1/8-7	ft-lb	350	270	800	600	1280	960
	Nm	475	366	1085	813	1735	1302
1 1/8-12	ft-lb	400	300	880	660	1440	1080
	Nm	542	407	1193	895	1952	1464
1 1/4-7	ft-lb	500	380	1120	840	1820	1360
	Nm	678	515	1519	1139	2468	1844
1 1/4-12	ft-lb	550	420	1240	920	2000	1500
	Nm	746	569	1681	1247	2712	2034
1 3/8-6	ft-lb	670	490	1460	1100	2380	1780
	Nm	908	664	1979	1491	3227	2413
1 3/8-12	ft-lb	750	560	1680	1260	2720	2040
	Nm	1017	759	2278	1708	3688	2766
1 1/2-6	ft-lb	870	650	1940	1460	3160	2360
	Nm	1180	881	2630	1979	4284	3200
1 1/2-12	ft-lb	980	730	2200	1640	3560	2660
	Nm	1329	990	2983	2224	4827	3606

NOTE: *Lubed includes lubricants such as lubrizing, oil, grease, or uncured Loctite.*

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Table 2.8 Torque Specifications for Fasteners (Metric)

Size	Torque Type	SAE2		SAE 5		SAE 8	
		Dry	Lubed	Dry	Lubed	Dry	Lubed
M5 x 0.80	(in-lb)	(54)	(41)	(78)	(59)	(12)	(9)
	Nm	6.1	4.6	8.8	6.7	1.4	1.0
M6 x 1.00	(in-lb)	(92)	(69)	(133)	(99)	(13)	(10)
	Nm	10.4	7.8	15	11.2	1.5	1.1
M7 x 1.00	(in-lb)	(156)	(116)	(222)	(167)	(23)	(17)
	Nm	17.6	13.1	25.1	18.9	2.6	1.9
M8 x 1.25	(in-lb)	(225)	(169)	(333)	(242)	(25)	(19)
	Nm	25.4	19.1	37.6	27.3	2.8	2.1
M10 x 1.50	ft-lb	37	28	53	40	(41)	(31)
	Nm	50	38	72	54	4.6	3.5
M12 x 1.75	ft-lb	65	49	93	69	(43)	(32)
	Nm	88	66	126	94	4.9	3.6
M14 x 2.00	ft-lb	104	78	148	111	(60)	(45)
	Nm	141	106	201	150	6.8	5.1
M16 x 2.00	ft-lb	161	121	230	172	(68)	(51)
	Nm	218	164	312	233	7.7	5.8
M18 x 2.50	ft-lb	222	167	318	238	12	9
	Nm	301	226	431	323	16	12
M20 x 2.50	ft-lb	314	235	449	337	14	10
	Nm	426	319	609	457	19	14
M22 x 2.50	ft-lb	428	321	613	460	25	18
	Nm	580	435	831	624	34	24
M24 x 3.00	ft-lb	543	407	776	582	25	20
	Nm	736	552	1052	789	34	27
M27 x 3.00	ft-lb	796	597	1139	854	45	35
	Nm	1079	809	1544	1158	61	47
M30 x 3.50	ft-lb	1079	809	1543	1158	50	35
	Nm	1463	1097	2092	1570	68	47
M33 x 3.50	ft-lb	1468	1101	2101	1576	70	55
	Nm	1990	1493	2849	2137	95	75
M36 x 4.00	ft-lb	1886	1415	2699	2024	80	60
	Nm	2557	1918	3659	2744	108	81

NOTE: *Lubed includes lubricants such as lubrizing, oil, grease, or uncured Loctite.* *1375AA*

Table 2.9 Torque Specifications for Hydraulic Couplings & Hoses

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

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

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

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2.10 Air Conditioner Temperature/Pressure Chart

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

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

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

Section 3 – System Component Identification and Schematics

Table 3.1 Electrical Symbol Chart

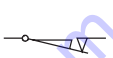
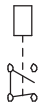
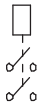
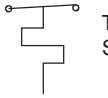
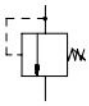
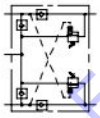
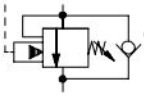
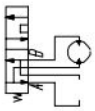
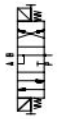
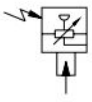
 CIRCUITS CROSSING NO CONNECTION	 HOURMETER	 KEY SWITCH	 LIMIT SWITCH N.O.
 CIRCUITS CONNECTED	 LIGHT	 FOOT SWITCH	 LIMIT SWITCH N.O. HELD CLOSED
 BATTERY	 HYDRAULIC VALVE COIL	 TOGGLE SWITCH	 LIMIT SWITCH N.C.
 GROUND	 PROPORTIONAL HYDRAULIC VALVE COIL	 PUSH BUTTON	 LIMIT SWITCH N.C. HELD OPEN
 FUSE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

Table 3.2 Hydraulic Symbol Chart

 LINE CROSSING	 VARIABLE DISPLACEMENT PUMP	 SHUTTLE VALVE	 VELOCITY FUSE
 LINE JOINED	 HAND PUMP	 ACCUMULATOR, GAS CHARGED	 SINGLE ACTING CYLINDER
 HYDRAULIC TANK	 RELIEF VALVE	 CUSHION CYLINDER	 DOUBLE ACTING CYLINDER
 HYDRAULIC FILTER WITH BYPASS	 PRESSURE REDUCING VALVE	 PRESSURE SWITCH	 DOUBLE ACTING DOUBLE RODDED CYLINDER
 ELECTRIC MOTOR	 FIXED ORIFICE	 MOTION CONTROL VALVE	 SPRING APPLIED HYDRAULIC RELEASED BRAKE
 ENGINE	 ADJUSTABLE FLOW CONTROL	 FLOW DIVIDER COMBINER	 BRAKE CYLINDER
 FIXED DISPLACEMENT PUMP	 CHECK VALVE	 COUNTER BALANCE VALVE	 ROTARY ACTUATOR
 VARIABLE DISPLACEMENT HYDRAULIC MOTOR	 OIL COOLER	 VALVE COIL	 BI DIRECTIONAL HYDRAULIC MOTOR
 SERIES PARALLEL HYDRAULIC MOTOR	 TWO POSITION TWO WAY NORMALLY CLOSED VALVE	 TWO POSITION THREE WAY VALVE	 THREE POSITION FOUR WAY CLOSED CENTER OPEN PORT
 TWO POSITION TWO WAY NORMALLY OPEN VALVE	 TWO POSITION THREE WAY VALVE	 THREE POSITION FOUR WAY CLOSED CENTER CLOSED PORT	
 PRESSURE TRANSDUCER	MAIN LINES Solid	PILOT LINES Dashed	
SERVO			

3.3 Electrical Components Parts List

Index No.	Skyjack Part No.	Qty.	Description
60CR	9-921734	1	RELAY, Power Relay
11CR	9-165029	1	RELAY, Glow Plug
56ACR	9-156200	1	RELAY, Fuel Pump
403ACR	9-931298	1	RELAY, Positive Air Shutoff
19CR	9-931298	1	RELAY, Boom Up
222CR	9-931298	1	RELAY, Frame Level Enable
224CR	9-931298	1	RELAY, Carriage Tilt Enable
5JCR	9-931298	1	RELAY, Brake Lamp
77CR	9-931298	1	RELAY, Engine Running
212CR	9-931298	1	RELAY, Boom Angle
65CR	9-931298	1	RELAY, Frame Level Disable
28CR	9-931298	1	RELAY, Boom Raise Disable
28LCR	9-931298	1	RELAY, Frame Left Enable
28RCR	9-931298	1	RELAY, Frame Right Enable
05CR	9-931298	1	RELAY, Park Brake Release
255CR	9-931298	1	RELAY, Rear Wiper
258CR	9-931298	1	RELAY, Front Wiper
258ACR	9-931298	1	RELAY, Top Wiper
250ACR	9-931298	1	RELAY, Left Turn Signal
251ACR	9-931298	1	RELAY, Right Turn Signal
223ACR	9-931298	1	RELAY, RAS Restric Mode Enable
220CR	9-931298	1	RELAY, RAS Drive/Brake
F1	9-156203	1	FUSE, Ignition/ Power (10A)
F2	9-156203	1	FUSE, Transmission/Back-up Alar/ Park Brake (10A)
F3	9-156203	1	FUSE, Steer Select/Gauge/Transmission Temp (10A)
F4	9-156203	1	FUSE, Frame/Carriage Enable (10A)
F5	9-156203	1	FUSE, Rear Axle Lock (10A)
F6	9-156202	1	FUSE, Auxilliary Hydraulics (5A)
F7	9-156203	1	FUSE, Horn/Beacon Option (10A)
F8	9-156204	1	FUSE, Power port (15A)
F9	9-156202	1	FUSE, Rear wiper (5A)
F10	9-156203	1	FUSE, Outriggers (10A)
F11	9-156203	1	FUSE, Work lights (10A)
F12	9-156204	1	FUSE, Road lights (15A)
F13	9-156202	1	FUSE, Turn/Hazard/Brake lights (5A)
F14	9-156203	1	FUSE, Boom lights (10A)
F15	9-156203	1	FUSE, Front & Top Wiper (10A)
F16	-	-	Not used.

Index No.	Skyjack Part No.	Qty.	Description
F17	9-156202	1	FUSE, Fan/Interior Light (5A)
F18	9-156164	1	FUSE, Blower motor (30A)
F20	9-156203	1	FUSE, Heater Valve & A/C (10A)
F19	9-156203	1	FUSE, Frame Level Interlock (10A)
F21	9-156164	1	FUSE, SCR Control (30A)
F22	9-156204	1	FUSE, After SCR CAT (15A)
F23	9-156202	1	FUSE, Prior SCR CAT (5A)
F24	9-156204	1	FUSE, DEF Level (5A)
F25	9-156164	1	FUSE, ECM (30A)
F26	9-121504	1	FUSE, Fuel Pump (20A)
F27	9-165031	1	FUSE, Glow Plug (100A)
SW1	9-926721	1	SWITCH, Ignition
SW2	9-191454	1	SWITCH, Park brake
SW3	-	-	Not used.
SW4	9-191457	1	SWITCH, Steer mode
SW5	9-196995	1	SWITCH, Frame level (Joystick)
SW6	9-405339	1	SWITCH, Horn switch (button)
SW7	9-196995	1	SWITCH, Carriage Tilt (Joystick)
SW8	9-191680	1	SWITCH, Fan
SW9	9-191455	1	SWITCH, positive shutoff
SW10	9-191455	1	SWITCH, boom lights
SW11	9-191457	1	SWITCH, work lights+
SW12	9-191457	1	SWITCH, turn signal
SW13	9-191658	1	SWITCH, Interior light
SW14	9-191459	1	SWITCH, rear washer/wiper
SW15	9-197031	1	SWITCH, Auxiliary Extend
SW16	9-197031	1	SWITCH, Auxiliary Retract
SW17	-	-	Not used.
SW18	9-191491	1	SWITCH, A/C
SW19	9-191457	1	SWITCH, Road lights
SW20	-	-	Not used.
SW21	9-191458	1	SWITCH, LH outrigger
SW22	9-191458	1	SWITCH, RH Outrigger
SW23	9-191455	1	SWITCH, Hazard lights
SW24	9-191459	1	SWITCH, Washer/wiper front/top
D05J	9-102921	1	DIODE, Console harness
D26B	9-102921	1	DIODE, Console harness
D60	9-102921	1	DIODE, Console harness
D252	9-102921	1	DIODE, Console harness
D252-1	9-102921	1	DIODE, Console harness
D252A-1	9-102921	1	DIODE, Console harness
D252A-2	9-102921	1	DIODE, Console harness

Index No.	Skyjack Part No.	Qty.	Description
D221	9-102921	1	DIODE, Chassis Harness
D15	9-102921	1	DIODE, Engine Harness
D250	9-102921	1	DIODE, Road light Harness
D251	9-102921	1	DIODE, Road light Harness
D60-1	9-102921	1	DIODE, Console harness
D15A	9-102921	1	DIODE, Console harness
D16	9-102921	1	DIODE, Console harness
-	9-190547	2	SENSOR, Inductive proxi - mm
-	9-166700	2	SENSOR, Pressure
2H-19A	9-159821	1	COIL, #8
2H-57	9-159821	1	COIL, #8
2H-221	9-159821	1	COIL, #8
2H-28	9-159821	1	COIL, #8
2H-28A	9-159821	1	COIL, #8
4H-223	9-159821	1	COIL, #8
4H-223-1	9-159821	1	COIL, #8
4H-47	9-159821	1	COIL, #8
4H-47-1	9-159821	1	COIL, #8
3H-26	9-168057	1	COIL, #10
4H-217	9-168057	1	COIL, #10
4H-218	9-168057	1	COIL, #10

3.4 Hydraulic Components Parts List

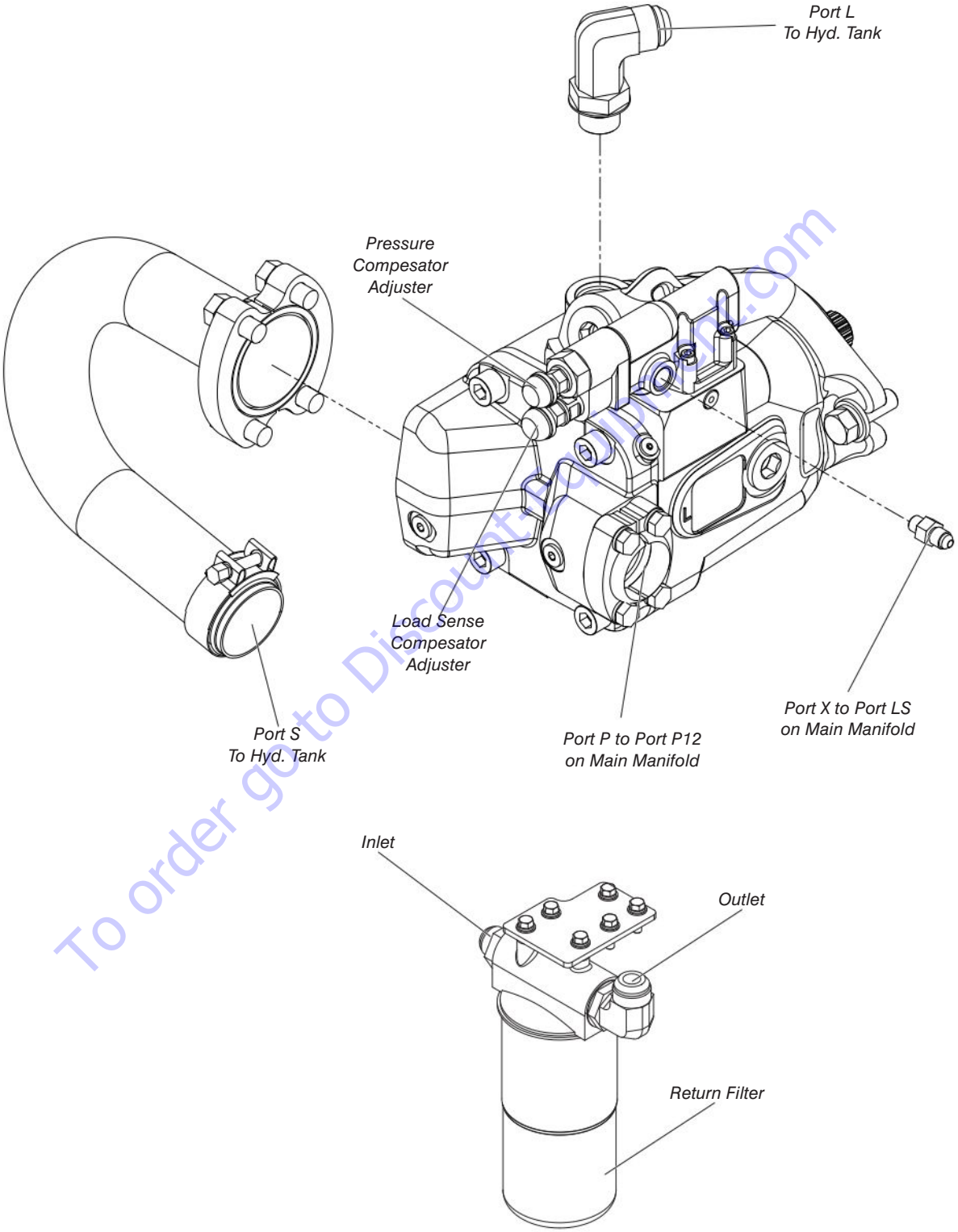
Index No.	Skyjack Part No.	Qty.	Description
ACC1	9-400947	1	ACCUMULATOR, Diaphragm (if equipped)
ACC2	9-400947	1	ACCUMULATOR, Diaphragm (if equipped)
C1	9-190027	1	CYLINDER, Front steer
C1	9-205013	1	CYLINDER, Front steer **- SJ1256 THS**
C2	9-190028	1	CYLINDER, Rear steer
C2	9-205032	1	CYLINDER, Rear steer **- SJ1256 THS**
C3	9-190039	1	CYLINDER, Lift - 130B
C3	9-205058	1	CYLINDER, Lift 150B **- SJ1256 THS**
C4	9-190039	1	CYLINDER, Lift - 130B
C4	9-205058	1	CYLINDER, Lift 150B **- SJ1256 THS**
C5	9-190045	1	CYLINDER, Extend - 115B
C5	9-205061	1	CYLINDER, Extend 130B - TH1056 **- SJ1256 THS**
C6	9-190040	1	CYLINDER, Tilt comp - 120B
C6	9-205789	1	CYLINDER, Tilt comp 120B **- SJ1256 THS**
C7	9-190043	1	CYLINDER, Fork tilt - 120B
C7	9-205788	1	CYLINDER, Fork tilt - 120B **- SJ1256 THS**
C8	9-191832	1	CYLINDER, RAS
C9	9-190041	1	CYLINDER, Frame level - 115B
C9	9-205063	1	CYLINDER, Frame level - 115B **- SJ1256 THS**
C10	9-191123	1	CYLINDER, TH Outriggers
C10	9-205064	1	CYLINDER, TH Outriggers **- SJ1256 THS**
C11	9-191123	1	CYLINDER, TH Outriggers
C11	9-205064	1	CYLINDER, TH Outriggers **- SJ1256 THS**
C12	9-190025	1	CYLINDER, Front Axle
C12	9-205013	1	CYLINDER, Front Axle **- SJ1256 THS**
CB1	9-199472	1	VALVE, Counter-balance - 4200PSI
CB1	9-206179	1	VALVE, Counter-balance -230/120 **- SJ1256 THS**
CB2	9-191812	1	VALVE, Counter-balance - 1800PSI
CB2	9-206180	1	VALVE, Counter-balance -150 **- SJ1256 THS**
CB3	9-191813	1	VALVE, Counter-balance - 4000PSI - SJ1056 TH/THS
CB3	9-199473	1	VALVE, Counter-balance - 3900PSI - SJ1044 TH/THS
CB3	9-206182	1	VALVE, Counter-balance -310/70 **- SJ1256 THS**
CB4	9-191814	1	VALVE, Counter-balance - 4000PSI
CB4	9-206233	1	VALVE, Counter-balance - 290 **- SJ1256 THS**
CB5	9-191815	1	VALVE, Counter-balance - 6000PSI
CB6	9-191816	1	VALVE, Counter-balance - 3000PSI
CB6	9-206181	1	VALVE, Counter-balance -350 **- SJ1256 THS**
CB7	9-191816	1	VALVE, Counter-balance - 3000PSI
CB7	9-206181	1	VALVE, Counter-balance -350 **- SJ1256 THS**
CB8	9-149366	1	VALVE, Counter-balance - 4000PSI
CB8	9-206229	1	VALVE, Counter-balance -225 **- SJ1256 THS**
CB9	9-149366	1	VALVE, Counter-balance - 4000PSI
CB9	9-206181	1	VALVE, Counter-balance -350 **- SJ1256 THS**
CB10	9-149366	1	VALVE, Counter-balance - 4000PSI

Index No.	Skyjack Part No.	Qty.	Description
CB10	9-206181	1	VALVE, Counter-balance -350 **- SJ1256 THS**
CB11	9-149366	1	VALVE, Counter-balance - 4000PSI
CB11	9-206229	1	VALVE, Counter-balance -225 **- SJ1256 THS**
CB12	9-191816	1	VALVE, Counter-balance -3700 PSI **- SJ1256 THS**
CB13	9-191816	1	VALVE, Counter-balance -3700 PSI **- SJ1256 THS**
CV1	9-166066	1	VALVE, Check
CV1	9-171412	1	VALVE, Check
CV2	9-166066	1	VALVE, Check
CV2	9-171412	1	VALVE, Check **- SJ1256 THS**
CV3	9-166066	1	VALVE, Check
CV3	9-171412	1	VALVE, Check **- SJ1256 THS**
CV4	9-166066	1	VALVE, Check
CV4	9-171412	1	VALVE, Check **- SJ1256 THS**
CV5	9-166066	1	VALVE, Check
CV5	9-171412	1	VALVE, Check **- SJ1256 THS**
CV6	9-166066	1	VALVE, Check
CV6	9-171412	1	VALVE, Check **- SJ1256 THS**
CV7	9-166066	1	VALVE, Check
CV7	9-171412	1	VALVE, Check **- SJ1256 THS**
CV8	9-166066	1	VALVE, Check
CV8	9-171412	1	VALVE, Check **- SJ1256 THS**
CV9	9-166066	1	VALVE, Check
CV9	9-171412	1	VALVE, Check **- SJ1256 THS**
CV10	9-166066	1	VALVE, Check
CV10	9-171412	1	VALVE, Check **- SJ1256 THS**
CV11	9-191805	1	VALVE, Check
CV11	9-206177	1	VALVE, Check **- SJ1256 THS**
CV12	9-191805	1	VALVE, Check
CV12	9-206177	1	VALVE, Check **- SJ1256 THS**
CV13	9-191806	1	VALVE, Check disc
CV14	9-199470	1	VALVE, Check
CV15	9-199471	1	VALVE, Check
CV16	9-171412	1	VALVE, Check
CV17	9-171412	1	VALVE, Check
CV18	9-191806	1	VALVE, Check
CV19	9-191806	1	VALVE, Check
EC1	9-191799	1	PRESSURE COMPENSATOR
EC1	9-206188	1	PRESSURE COMPENSATOR **- SJ1256 THS**
F1	9-157907	1	FILTER ELEMENT, Hydraulic spin-on
F2	9-191484	1	FILLER BREATHER, 1PSI
JS1	9-190356	1	JOYSTICK, Hydraulic
JS1	9-922265	1	JOYSTICK, Hydraulic
MB1	9-169031	1	MANIFOLD, Main
MB1	9-205190	1	MANIFOLD, Main **- SJ1256 THS**
MB2	9-169033	1	MANIFOLD, Auxiliary
MB2	9-205202	1	MANIFOLD, Auxiliary **- SJ1256 THS**
MB3	9-190357	1	MANIFOLD, Reserve brake
MB4	9-198734	1	MANIFOLD, RAS

Index No.	Skyjack Part No.	Qty.	Description
MB5	9-169034	1	MANIFOLD, Outrigger
MB5	9-205191	1	MANIFOLD, Outrigger **- SJ1256 THS**
MB6	9-206115	1	MANIFOLD, RV4-1 **- SJ1256 THS**
MB7	9-213232	1	MANIFOLD, Premium Joystick (Option)
OR1	9-191807	1	PLUG, Orifice
OR2	9-191808	1	PLUG, Orifice
OR3	9-191809	1	PLUG, Orifice
OR3	9-206178	1	PLUG, Orifice **- SJ1256 THS**
OR4	9-191829	1	PLUG, Orifice
OR4	9-199033	1	PLUG, Orifice **- SJ1256 THS**
OR5	9-199474	1	PLUG, Orifice
OR5	9-191809	1	PLUG, Orifice **- SJ1256 THS**
OR6	9-197300	1	PLUG, Orifice
OR7	9-199032	1	PLUG, Orifice
OR8	9-199475	1	PLUG, Orifice
OR9	9-199475	1	PLUG, Orifice **- SJ1256 THS**
OR10	9-199475	1	PLUG, Orifice **- SJ1256 THS**
OR11	9-206224	1	PLUG, Orifice **- SJ1256 THS**
OR12	9-206224	1	PLUG, Orifice **- SJ1256 THS**
OSM1	9-406450	1	MOTOR, Steering wheel
P1	9-190263	1	PUMP, Hydraulic
P1	9-205221	1	PUMP, Hydraulic **- SJ1256 THS**
PR1	9-191798	1	SWITCH, Pressure reducing/relieving
PR2	9-220518	1	SWITCH, Pressure reducing/relieving **- SJ1256 THS**
PS1	9-191810	1	SWITCH, Pressure 450 PSI
PS2	9-927724	1	SWITCH, Pressure brake light
PS3	9-191800	1	SWITCH, Pressure 350 PSI **- SJ1256 THS**
RV1	9-191802	1	VALVE, Relief
RV2	9-191803	1	VALVE, Relief
RV2	9-206185	1	VALVE, RELIEF **- SJ1256 THS**
RV3	9-221887	1	VALVE, Relief anti-cavitation
RV4	9-191804	1	VALVE, Relief anti-cavitation
RV4-1	9-206093	1	VALVE, Relief anti-cavitation **- SJ1256 THS**
RV5	9-199468	1	VALVE, Relief
RV6	9-169408	1	VALVE, Relief
RV7	9-199469	1	VALVE, Relief
SV1	9-197301	1	VALVE, Shuttle
SW	9-197304	1	SWITCH, Pressure 1500 PSI
V1	9-191794	1	VALVE, Proportional-pilot operated
V1	9-206190	1	VALVE, Proportional-pilot operated **- SJ1256 THS**
V2	9-191793	1	VALVE, Proportional, pilot operated
V2	9-206191	1	VALVE, Proportional-pilot operated **- SJ1256 THS**
V3	9-191794	1	VALVE, Proportional, pilot operated
V3	9-206190	1	VALVE, Proportional-pilot operated **- SJ1256 THS**
V4	9-191793	1	VALVE, Proportional, pilot operated
V4	9-206191	1	VALVE, Proportional-pilot operated **- SJ1256 THS**
V5	9-191795	1	VALVE, Solenoid 4W3P
V6	9-191796	1	VALVE, Solenoid 4W2P

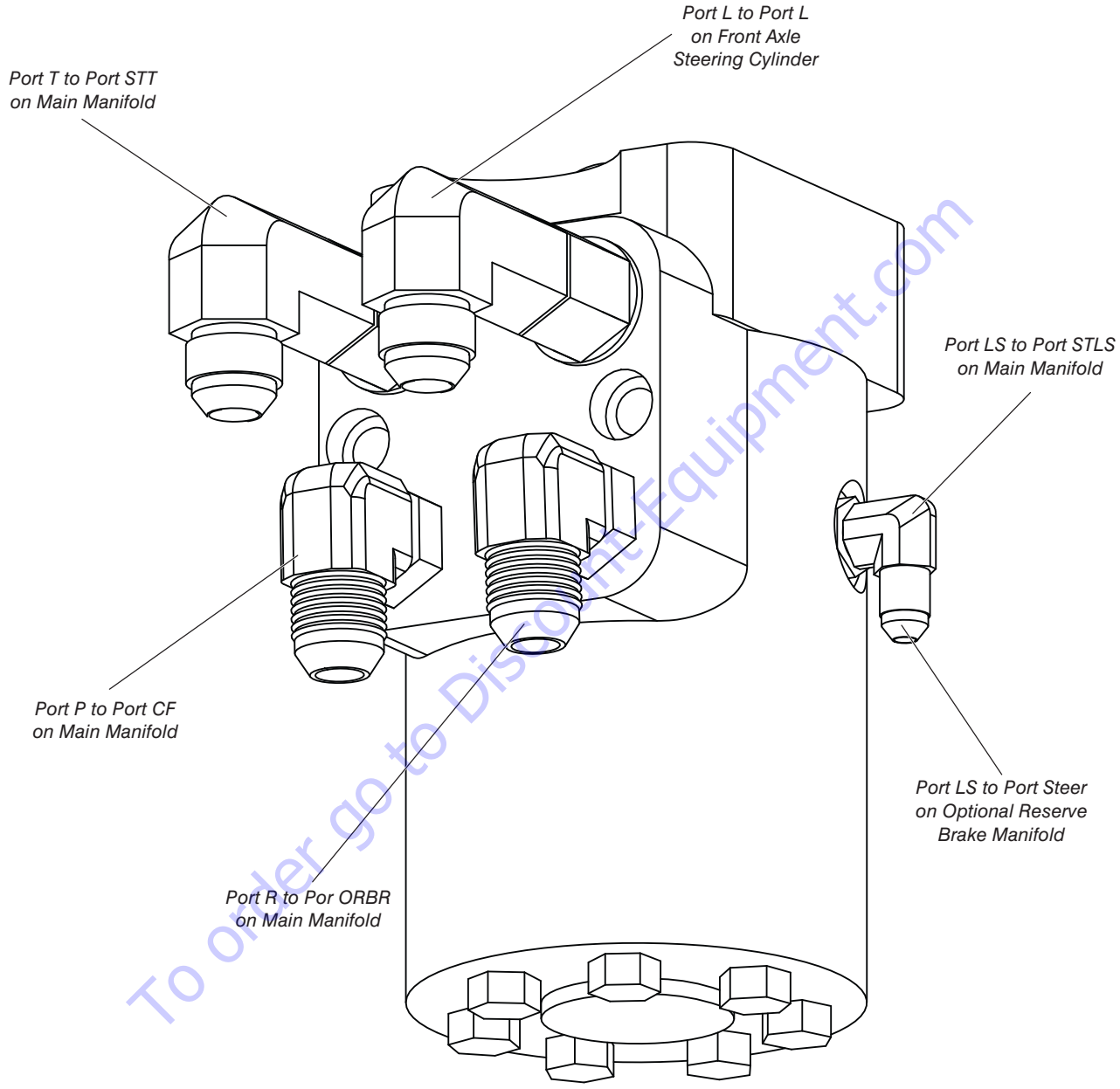
Index No.	Skyjack Part No.	Qty.	Description
V7	9-191796	1	VALVE, Solenoid 4W2P
V8	9-191796	1	VALVE, Solenoid 4W2P
V9	9-191796	1	VALVE, Solenoid 4W2P
V10	9-171796	1	VALVE, Solenoid cartridge
V11	9-102626	1	VALVE, Solenoid cartridge spool
V12	9-926370	1	VALVE, Brake
V13	9-191801	1	VALVE, Piloted 2W N.O.
V13	9-206192	1	VALVE, PILOTED 2-WAY SPOOL. **- SJ1256 THS**
V14	9-191797	1	VALVE, Solenoid 5W3P
V14	9-205813	1	VALVE PROPORTIONAL AUX. 12K **- SJ1256 THS**
V15	9-166038	1	VALVE, 2 way, normally closed spool
V15	9-206194	1	VALVE, SOLENOID CARTRIDGE, 2-WAY **- SJ1256 THS**
V16	9-102626	1	VALVE, Solenoid cartridge spool
V17	9-102626	1	VALVE, Solenoid cartridge spool
V18	9-197302	1	VALVE, Pressure unloading
V19	9-197303	1	VALVE, Low flow 2 way, normally closed
V20	9-168056	1	VALVE, 2W2P **- SJ1256 THS**
V21	9-199466	1	VALVE, SOLENOID POPPET 2W N.C. **- SJ1256 THS**
V22	9-168056	1	VALVE, 2W2P **- SJ1256 THS**
V23	9-199467	1	VALVE, SOLENOID POPPET 2W N.C. **- SJ1256 THS**
V24	9-199467	1	VALVE, SOLENOID POPPET 2W N.C. **- SJ1256 THS**
V25	9-205813	1	VALVE PROPORTIONAL AUX. 12K **- SJ1256 THS**
V26	9-205813	1	VALVE PROPORTIONAL AUX. 12K **- SJ1256 THS**
V27	9-213997		COIL, DROP IN -EHPR98-T33 12VDC (Option)
V28	9-213997		COIL, DROP IN -EHPR98-T33 12VDC (Option)`

3.5 Hydraulic Pump and Return Filter Ports Identification



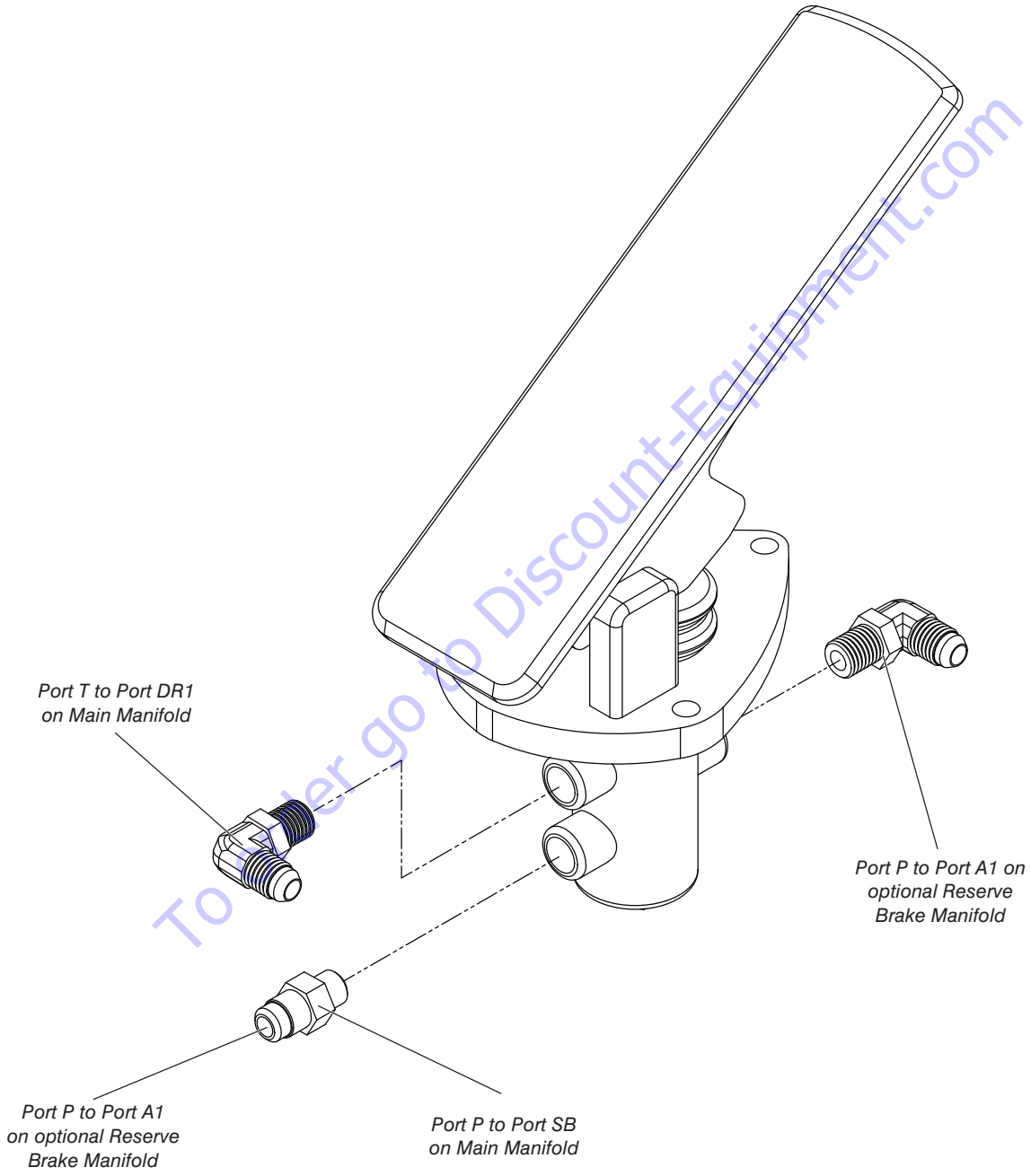
M190807-1 M191415AA-S1

3.6 Steering Control Unit Ports Identification



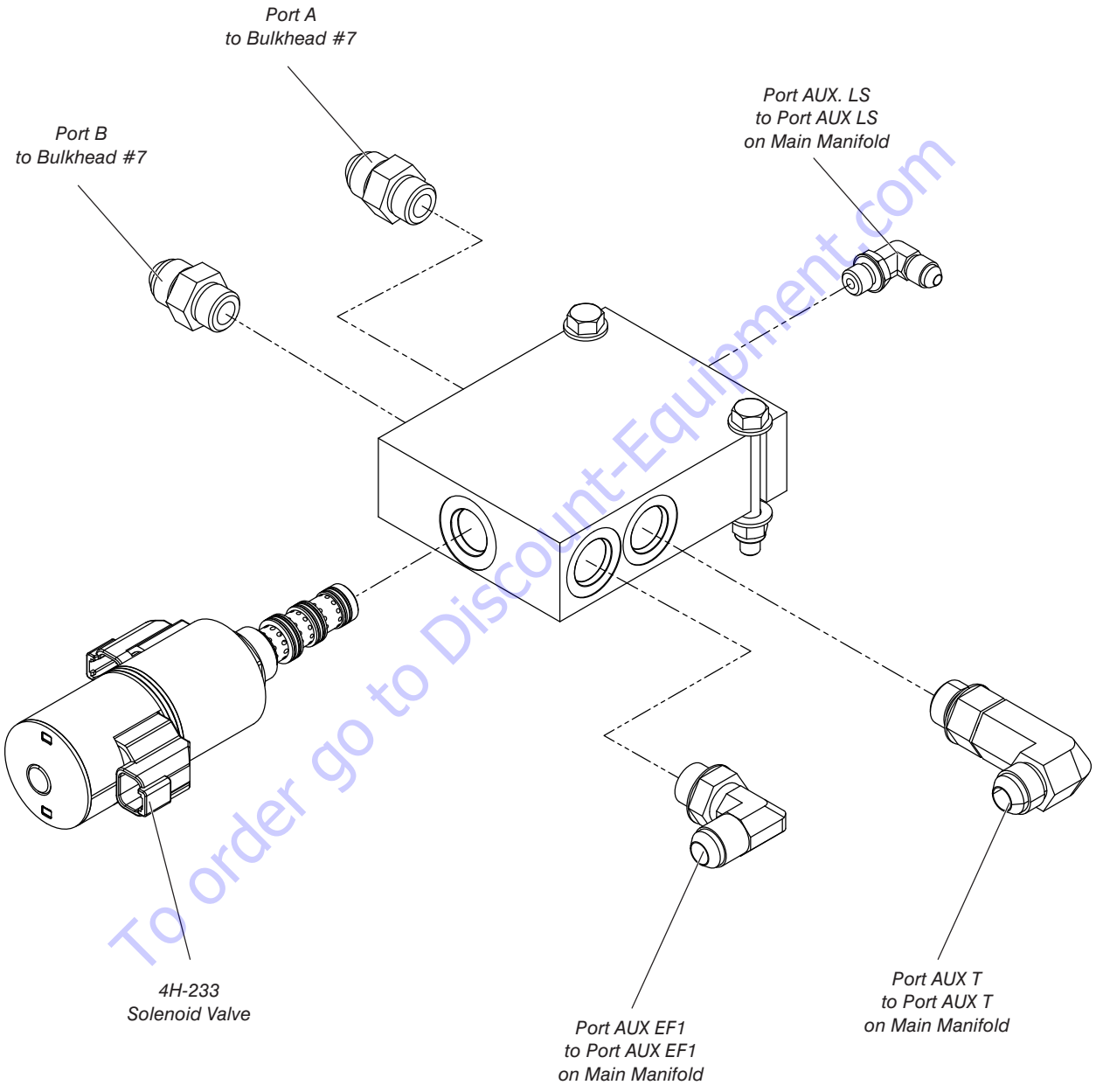
M191585-SM

3.7 Service Brake Actuator (Brake Pedal) Ports Identification



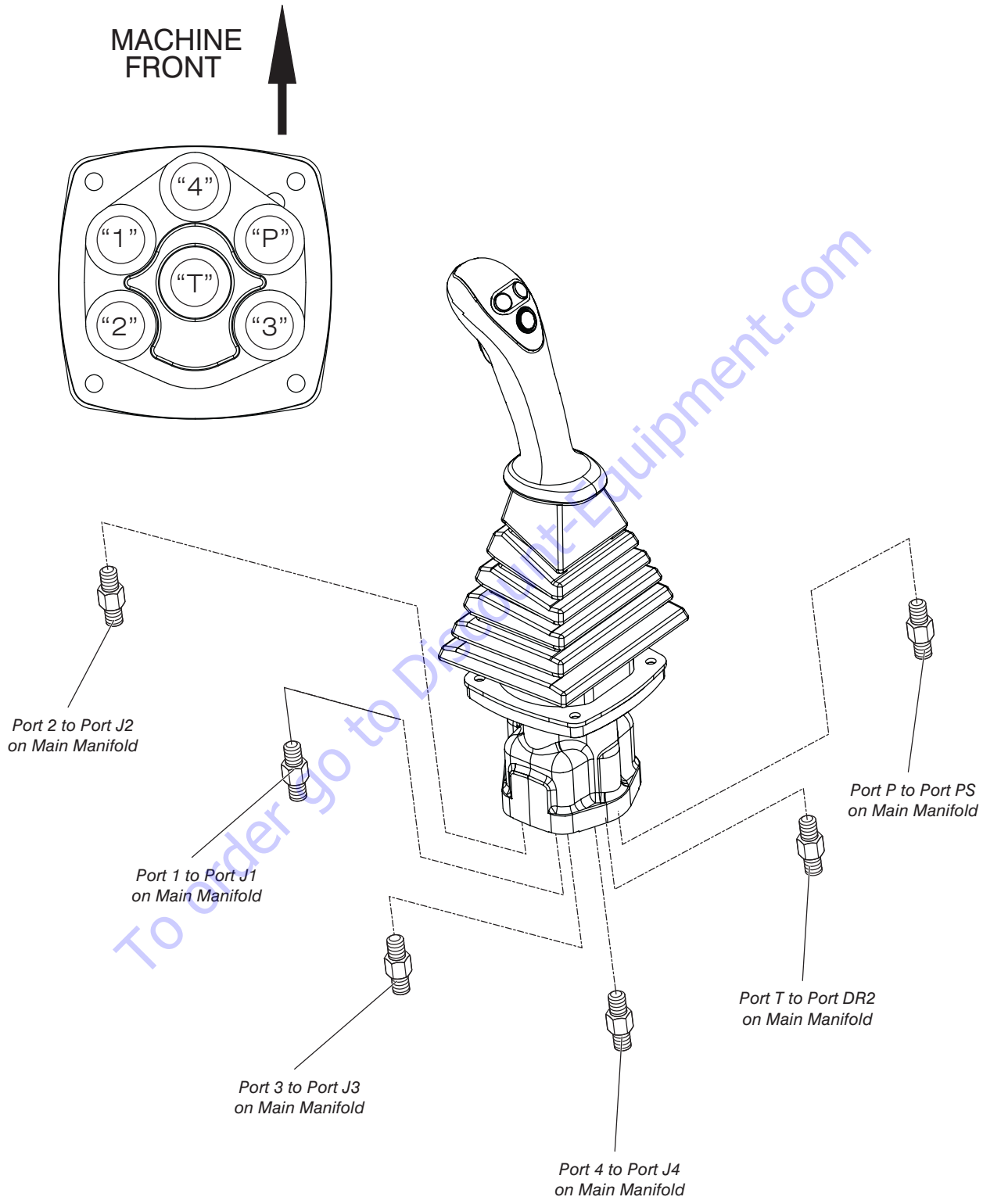
M191582-SM

3.8 Auxiliary Block Ports Identification



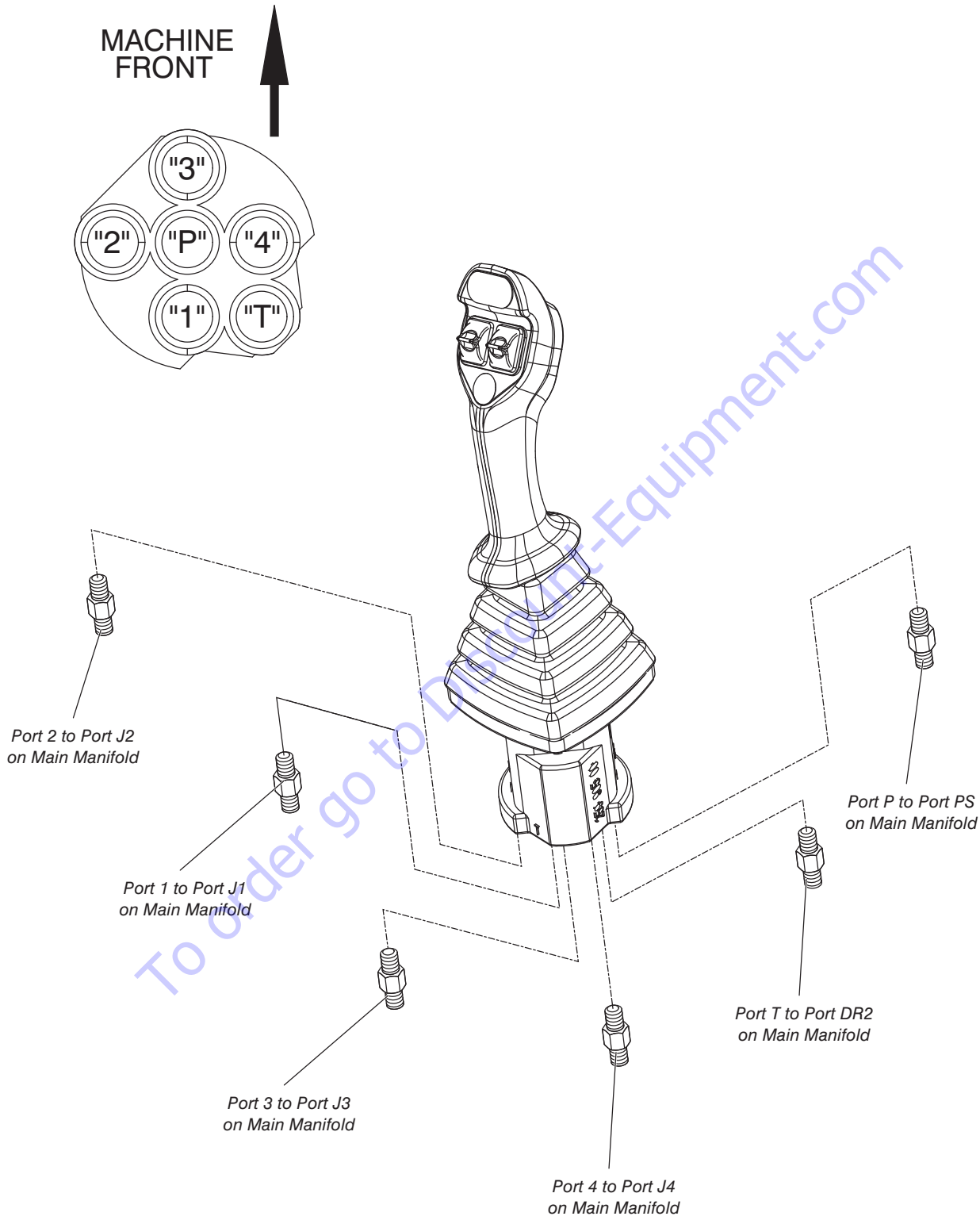
M190791AB-S1

3.9 Joystick Port Identifications



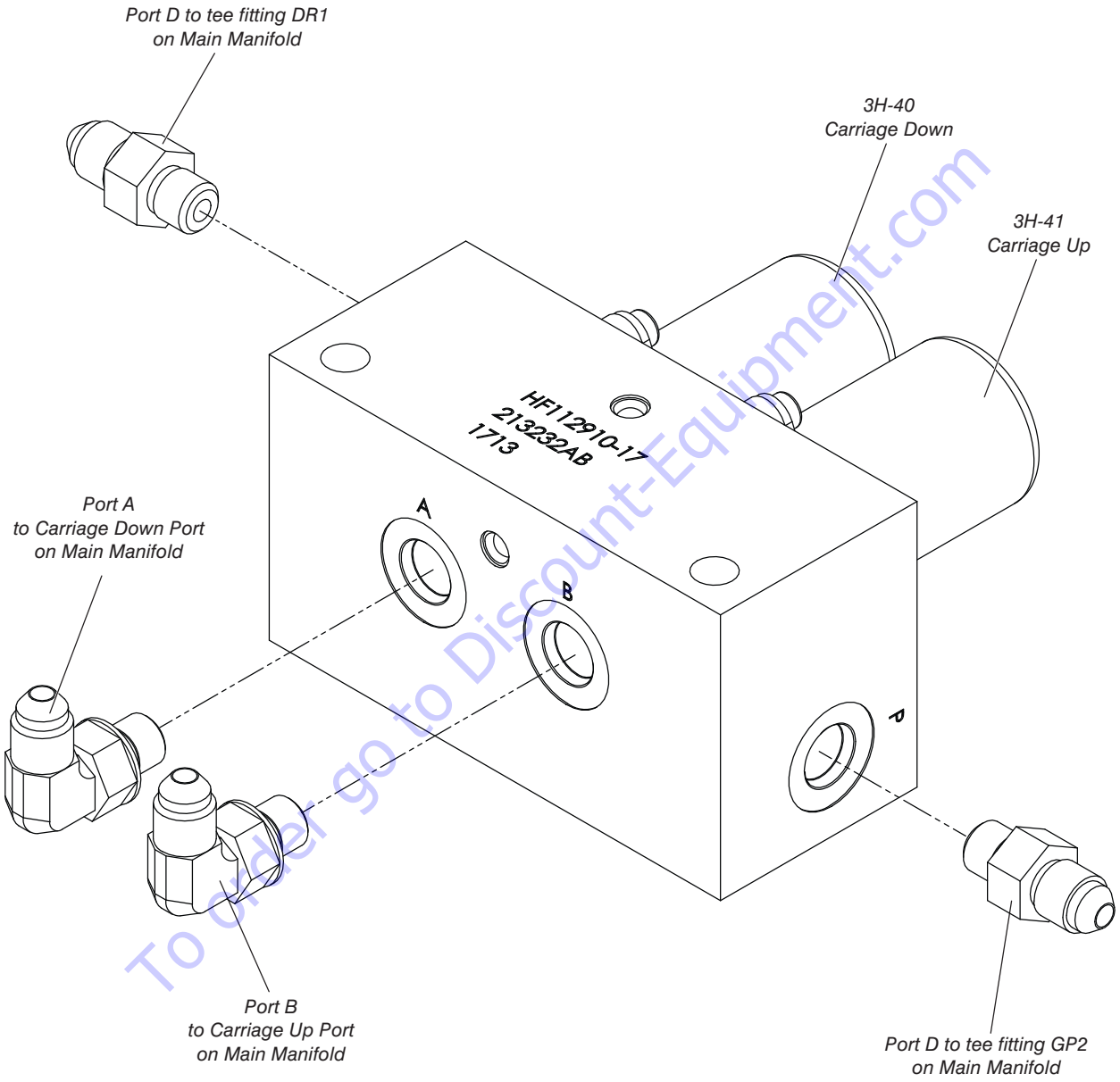
M190356-1

3.10 Premium Joystick Port Identifications



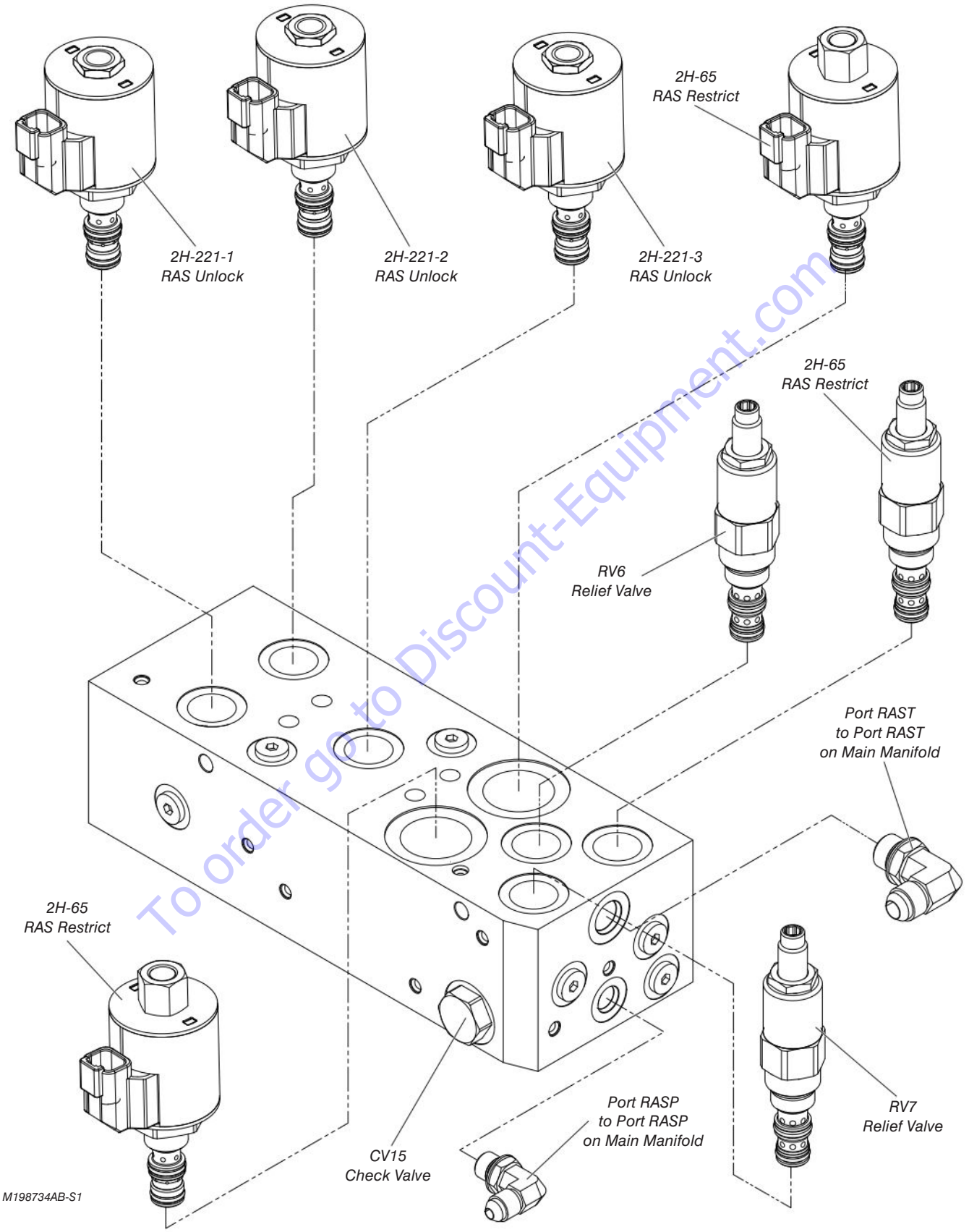
M1344040201_JS

3.11 Premium Joystick Manifold Port Identifications

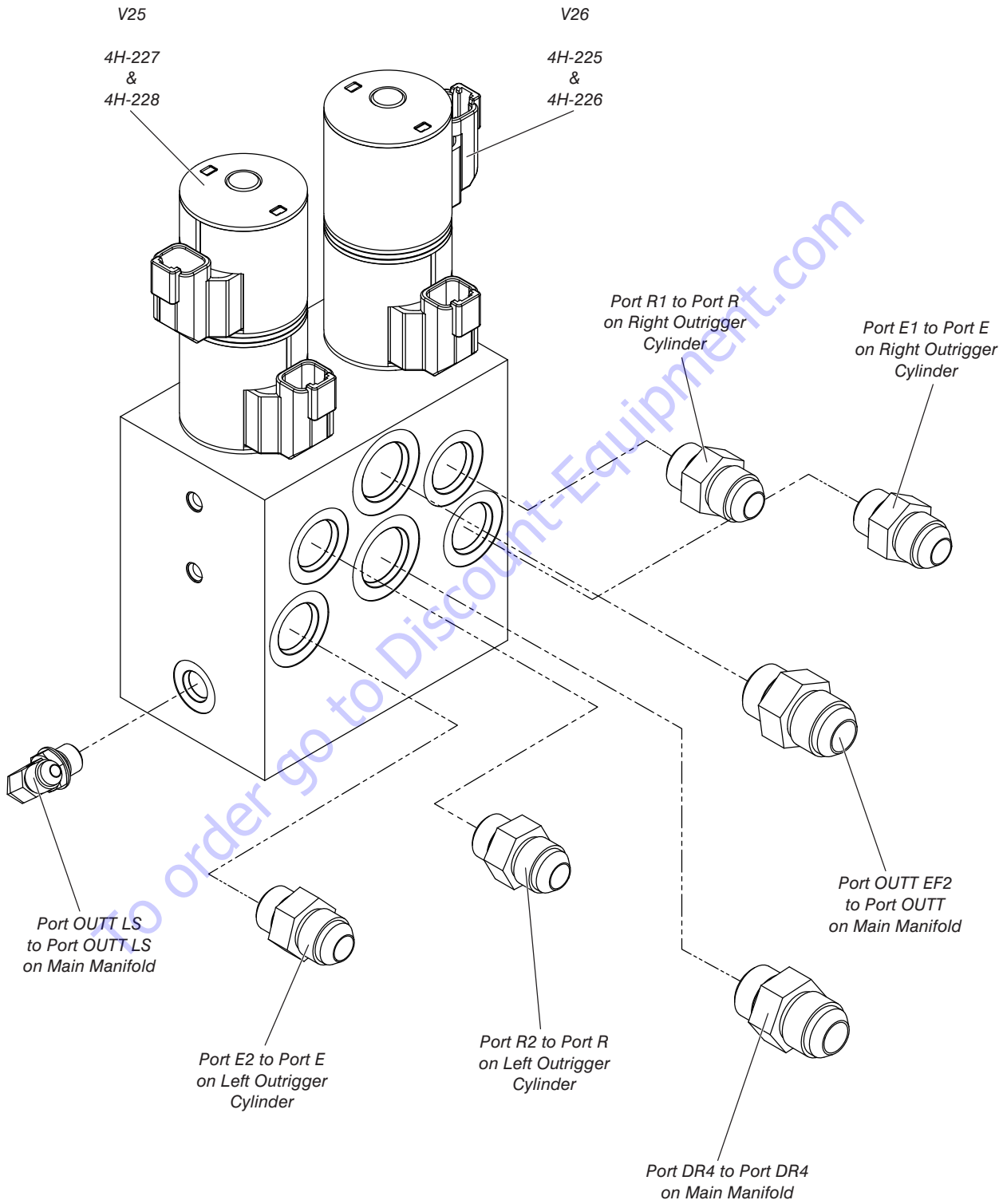


213749AA-SM

3.12 Rear Axle Stabilization Manifold Port Identification

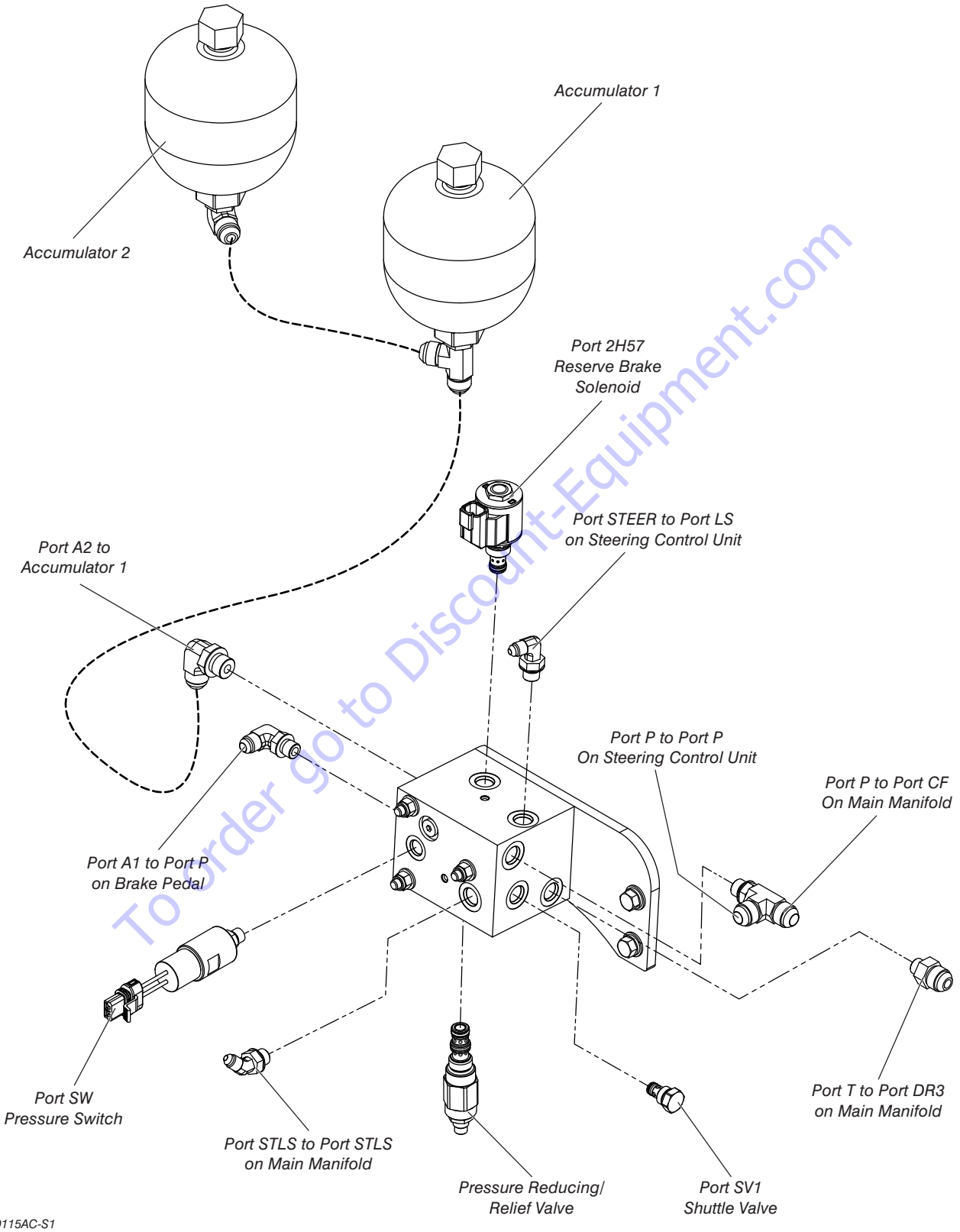


3.13 Outrigger Manifold Port Identifications



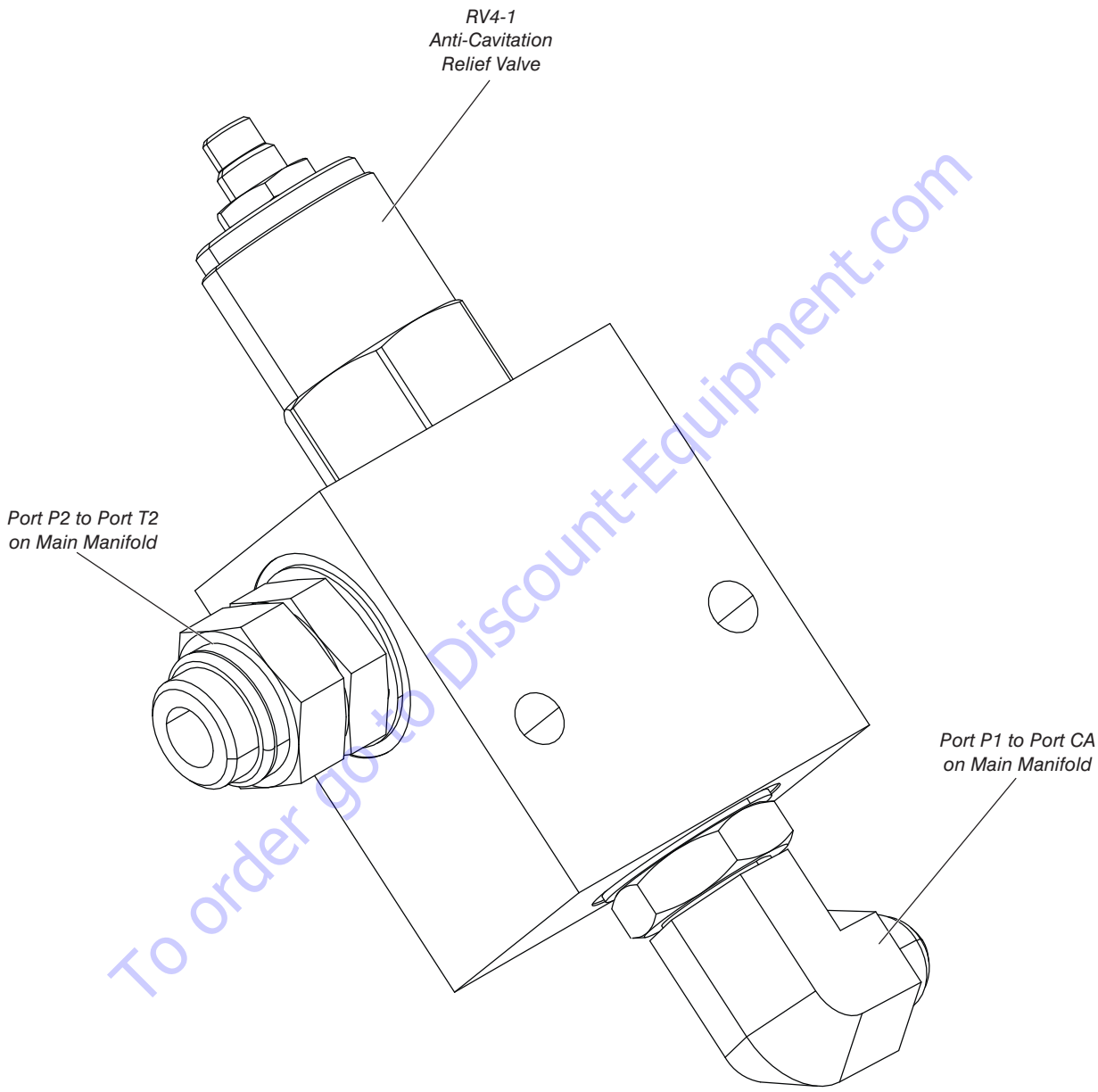
M191835-S

3.14 Reserve Brake Manifold Port Identifications (Option)



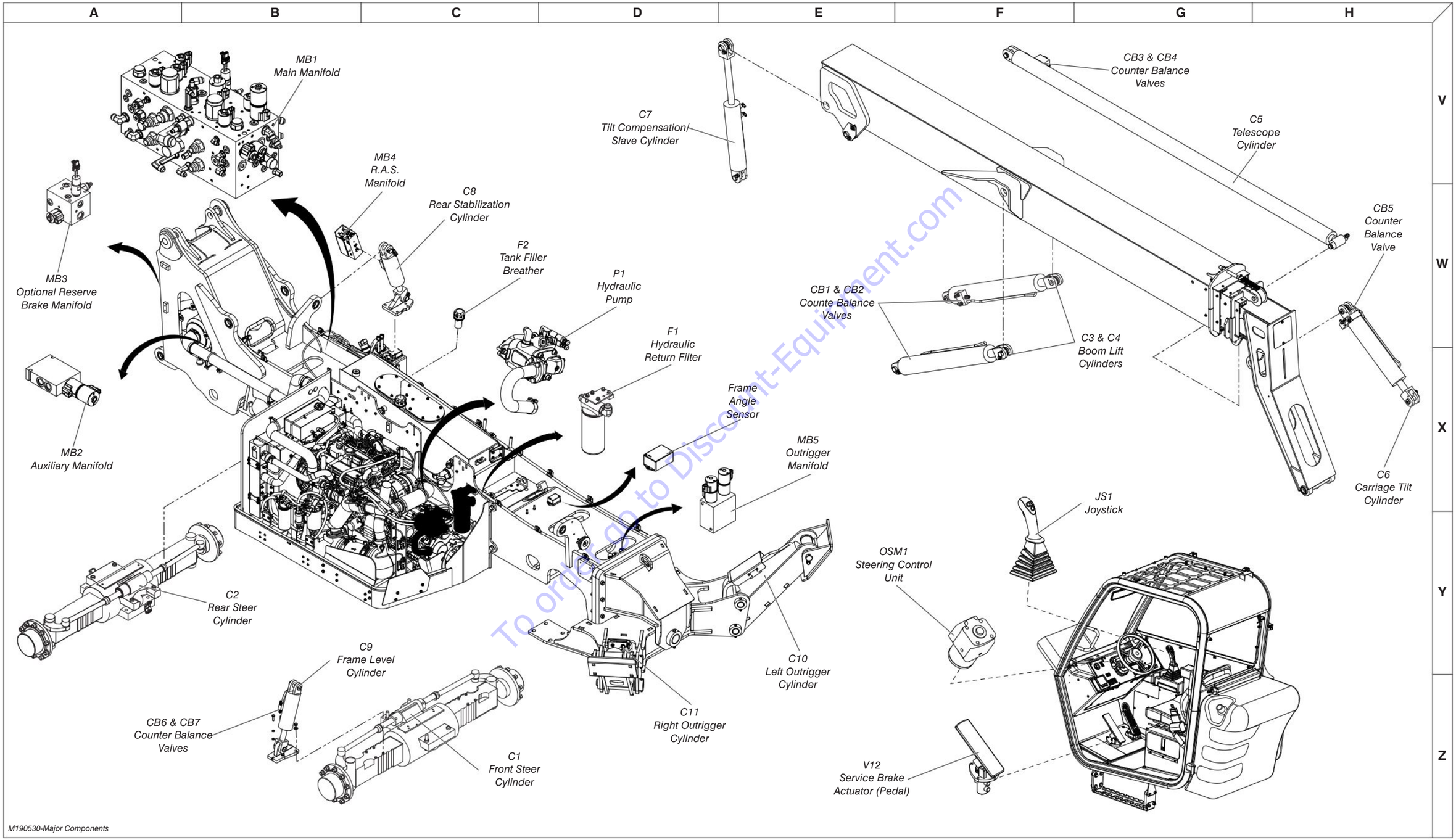
M190115AC-S1

3.15 Anti-Cavitation Relief Valve (SJ1256 THS Only)



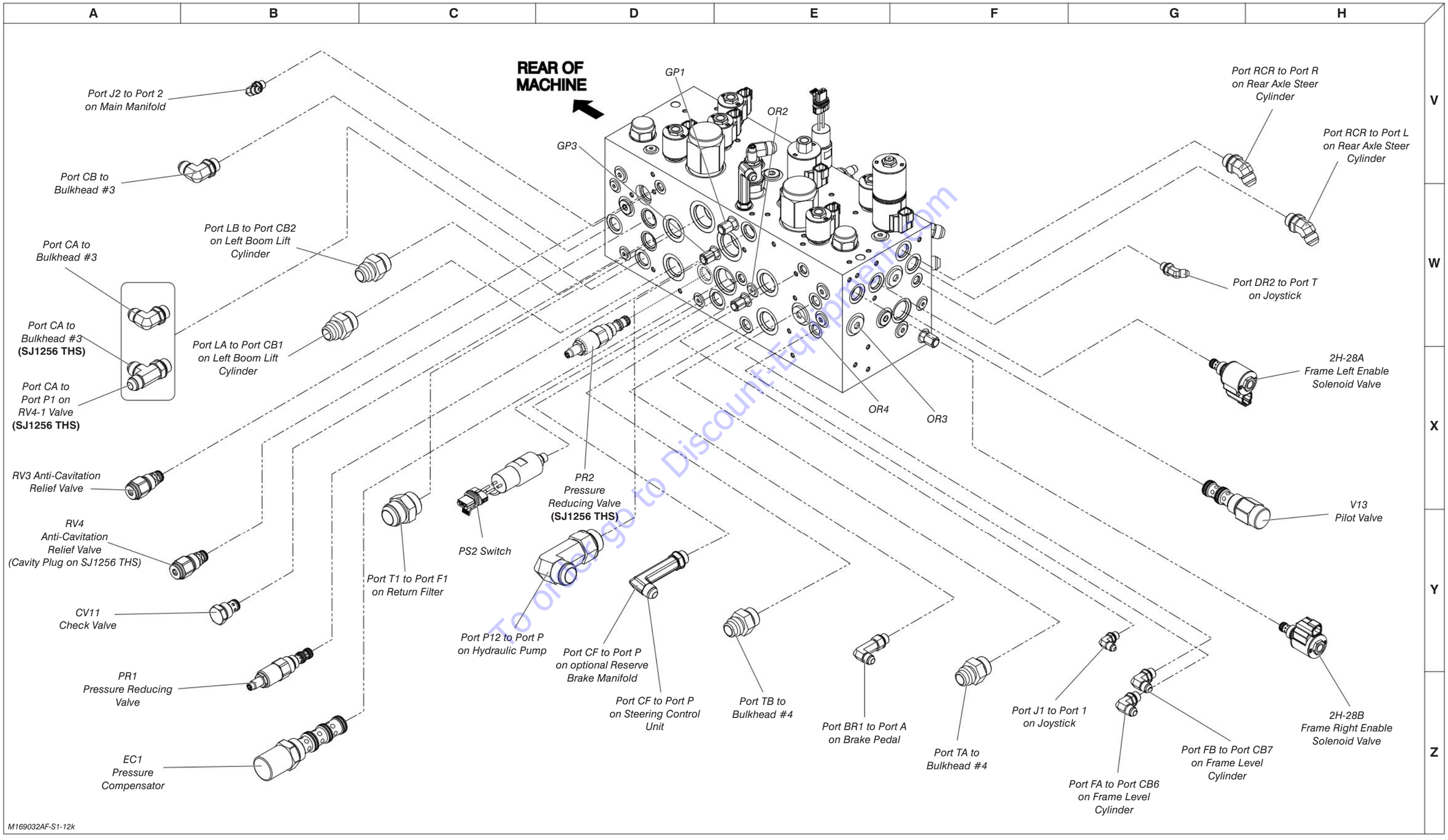
M206115AA

3.16 Major Components Identification and Location

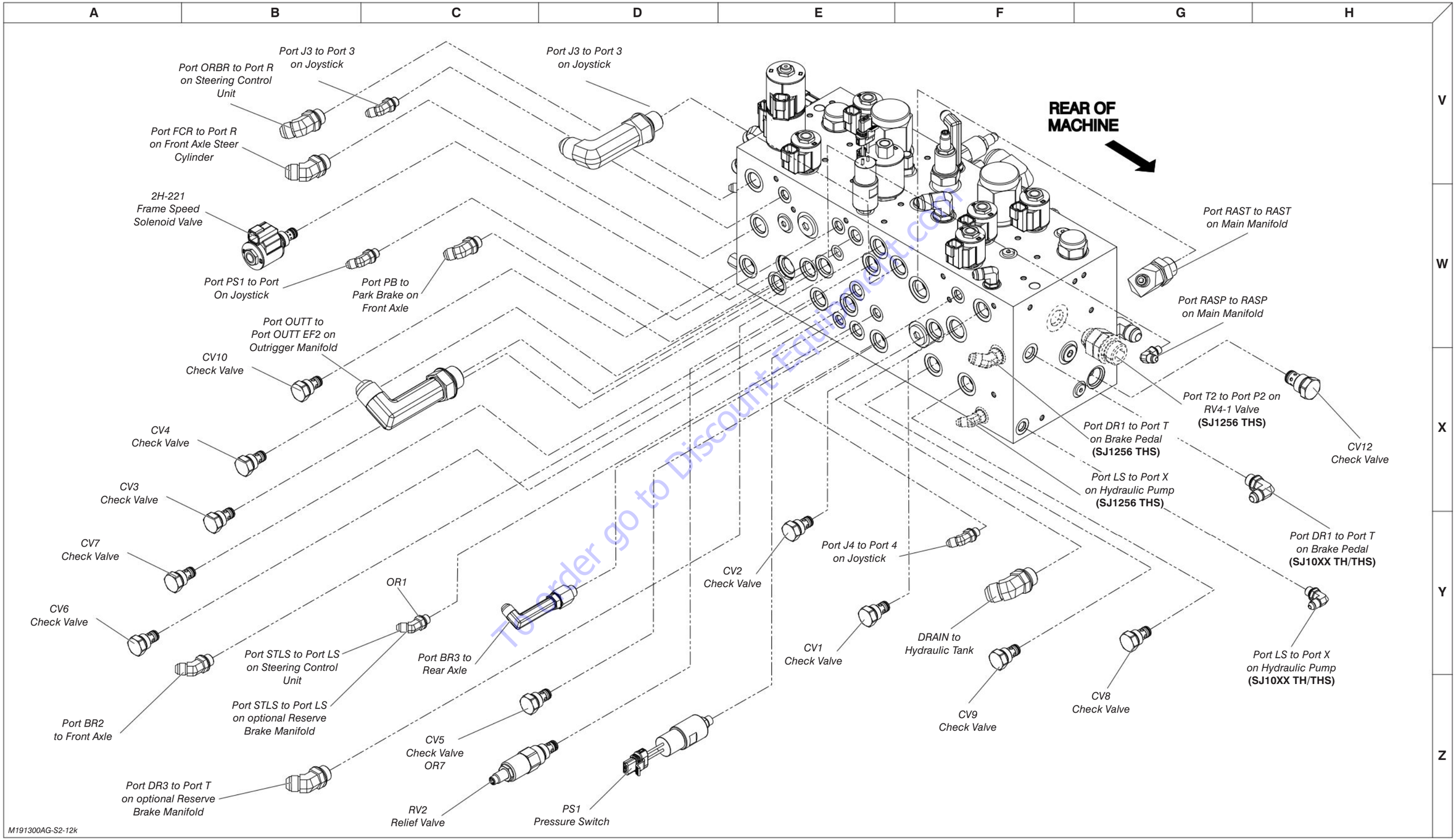


M190530-Major Components

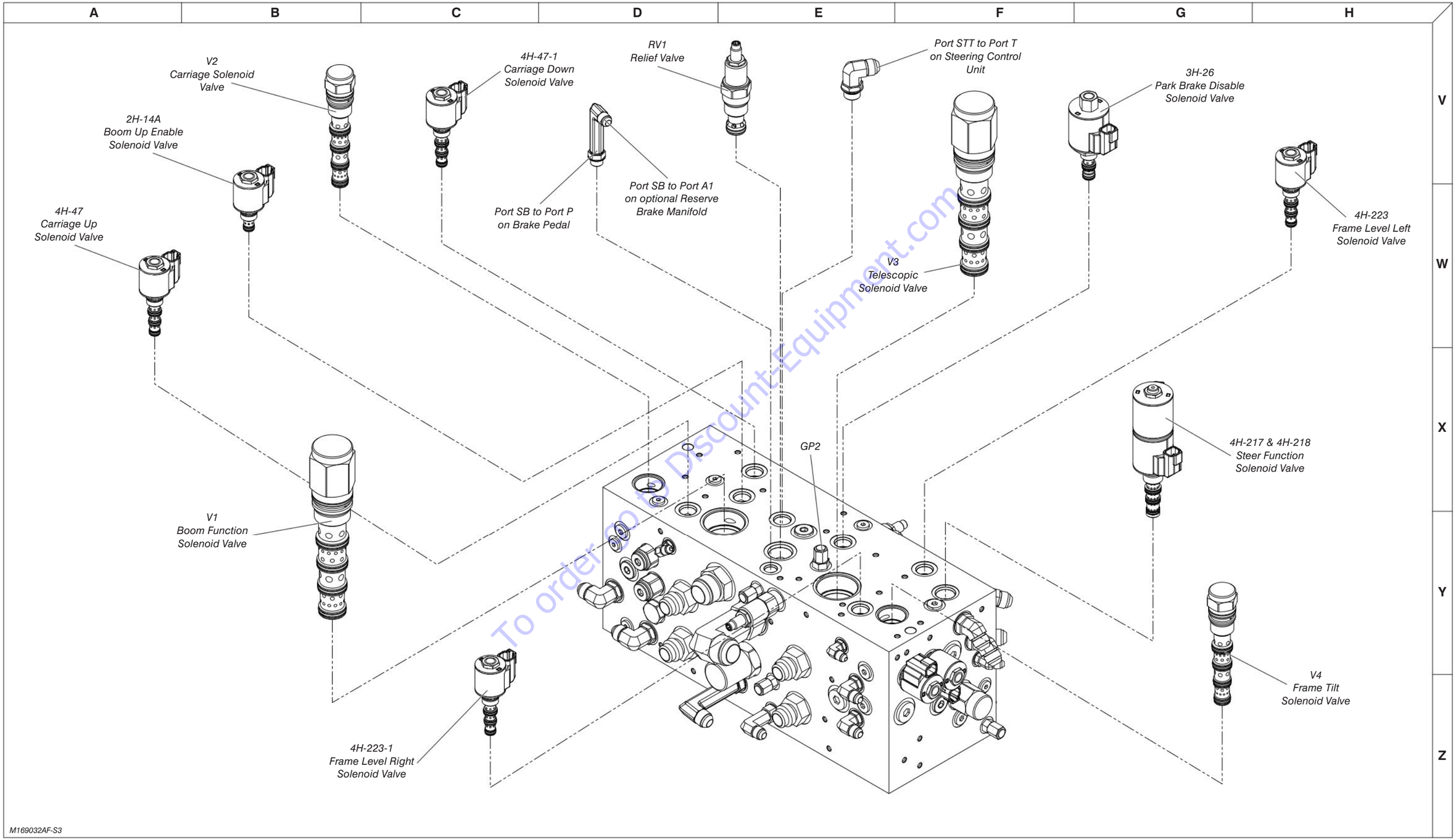
3.17 Main Manifold Port Identification



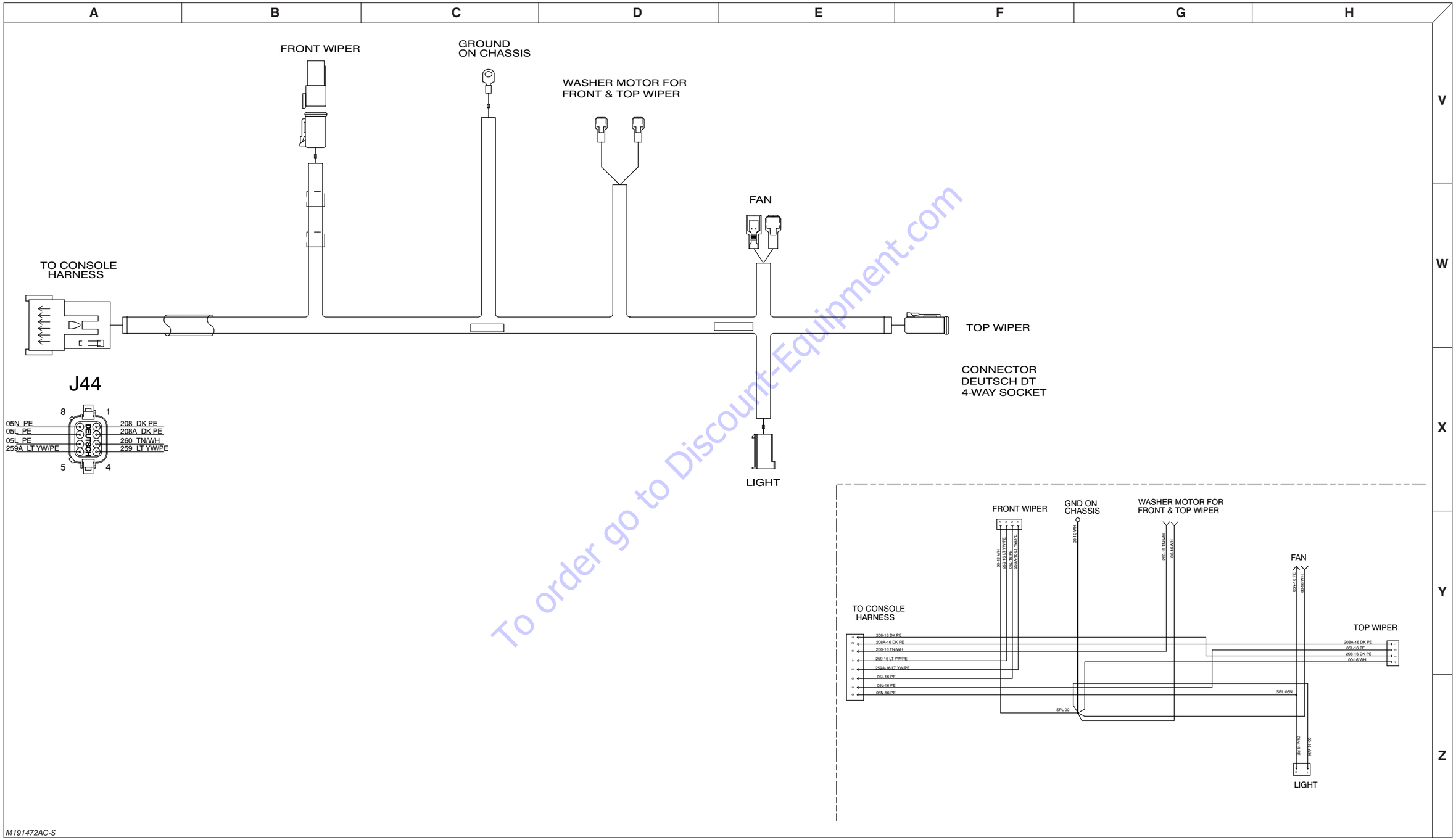
3.17 Main Manifold Port Identification



3.17 Main Manifold Port Identification

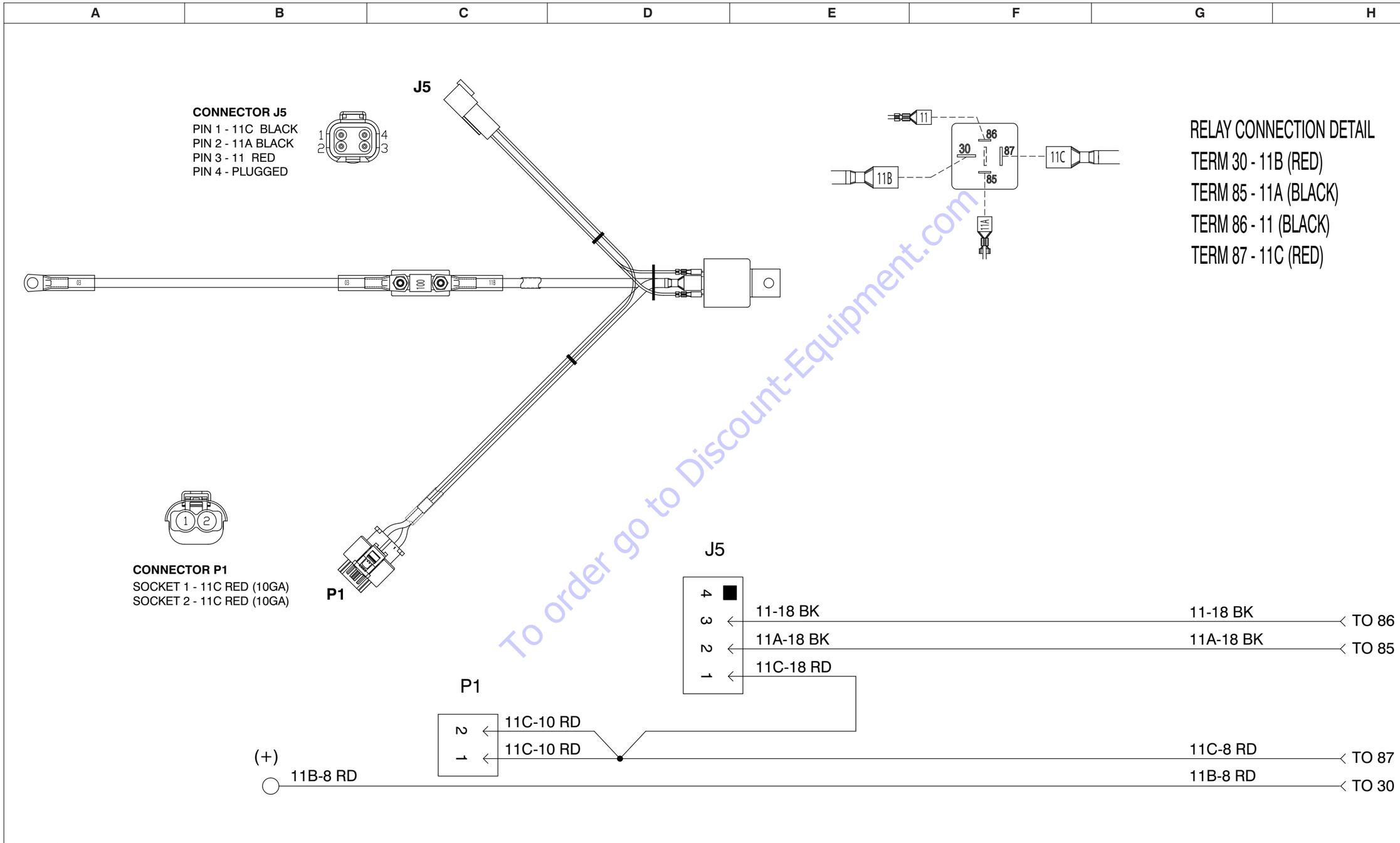


3.18 Enclosed Cab Harness & Wiring Diagram

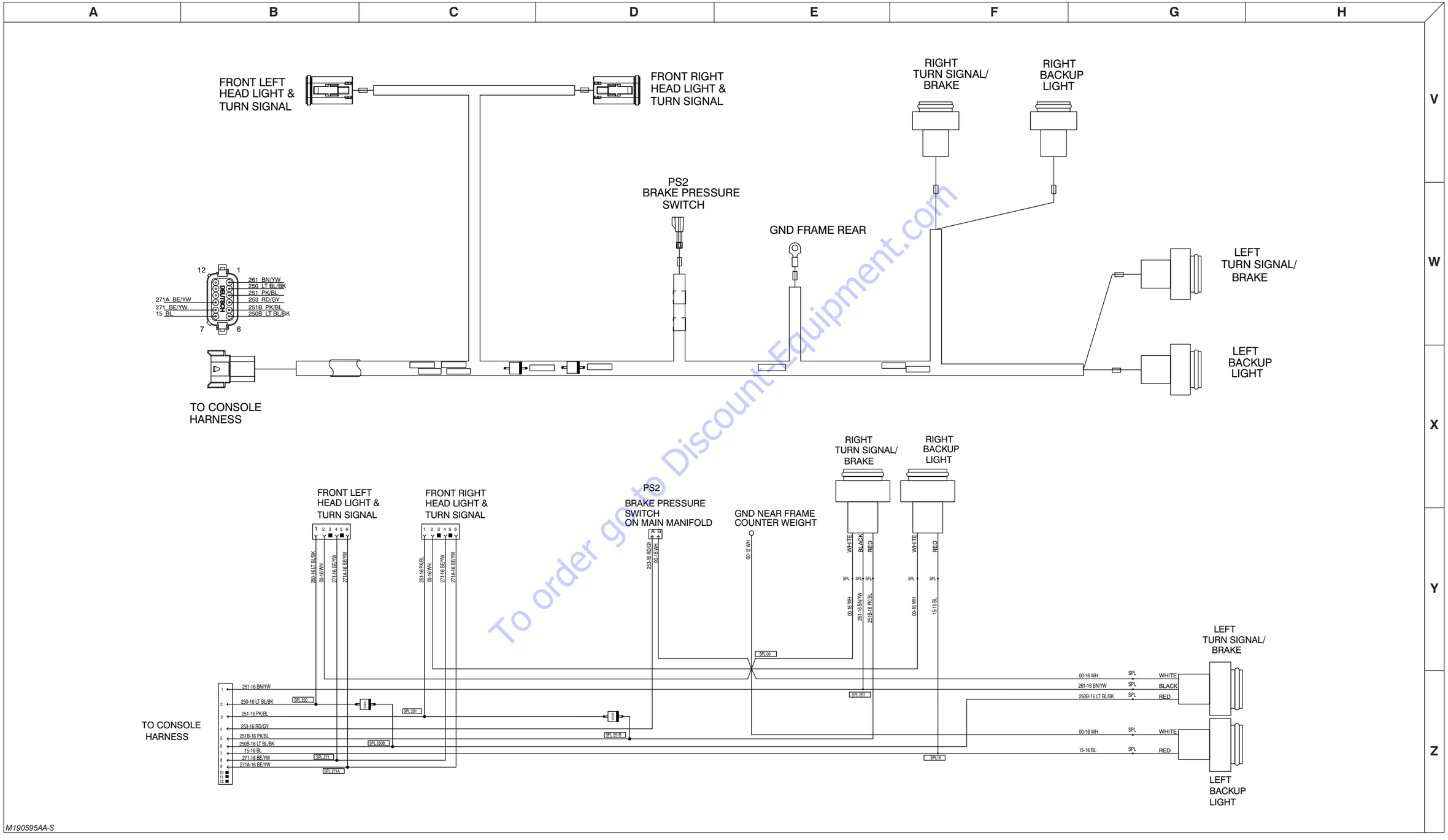


M191472AC-S

3.19 Glow Plug Harness & Wiring Diagram

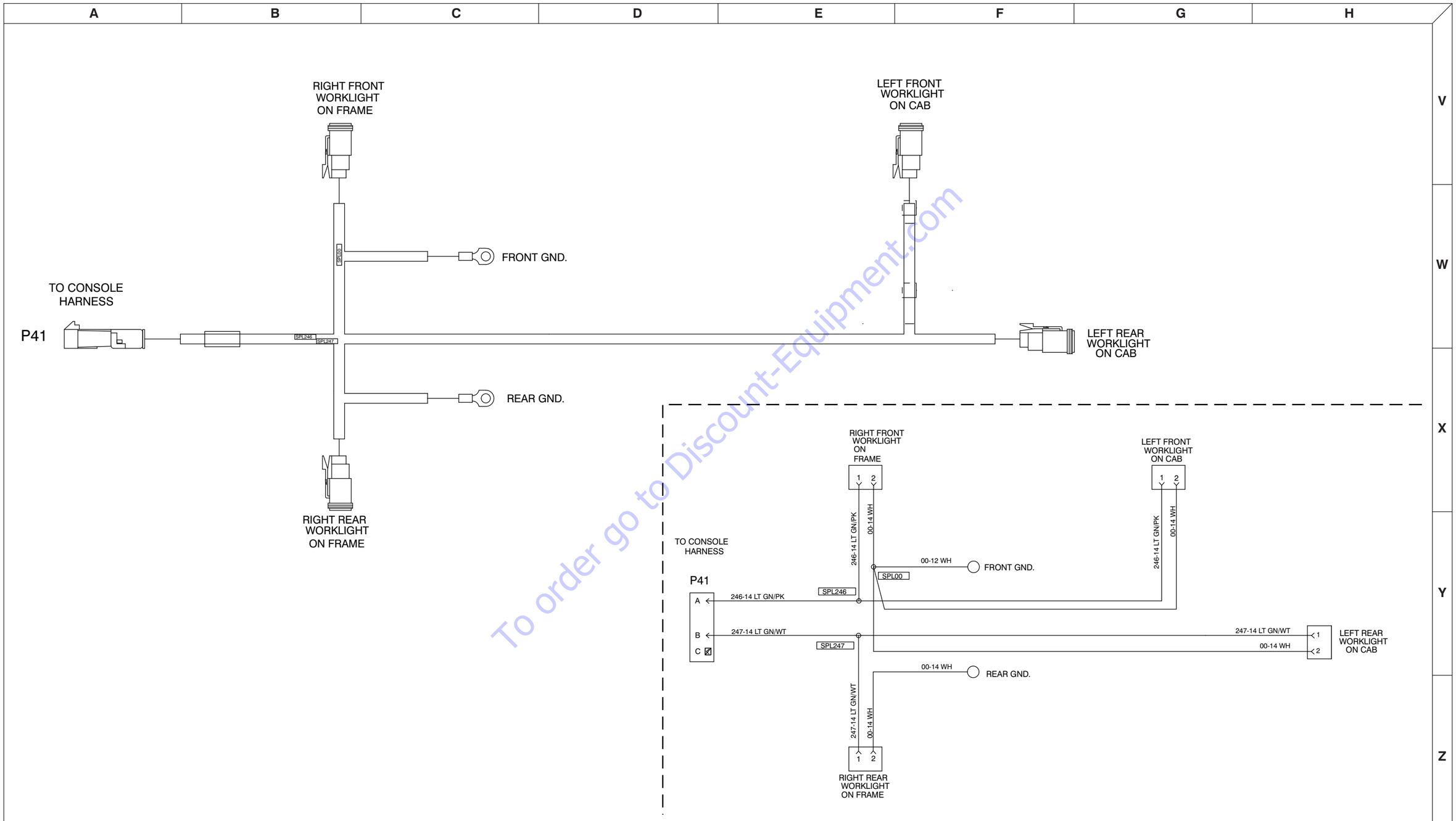


3.20 Road Lights Harness & Wiring Diagram



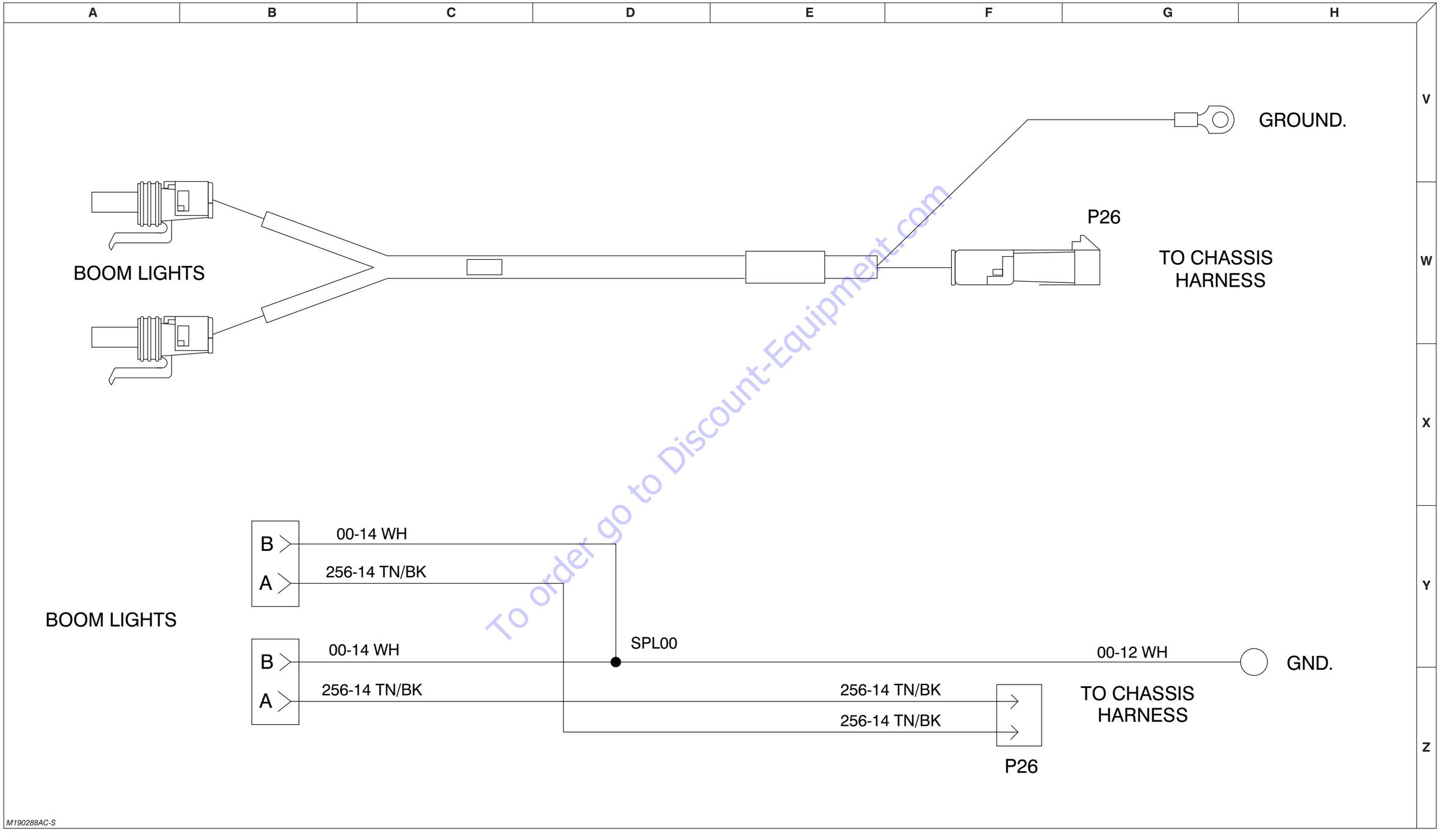
M190595AA-S

3.21 Work Lights Harness & Wiring Diagram

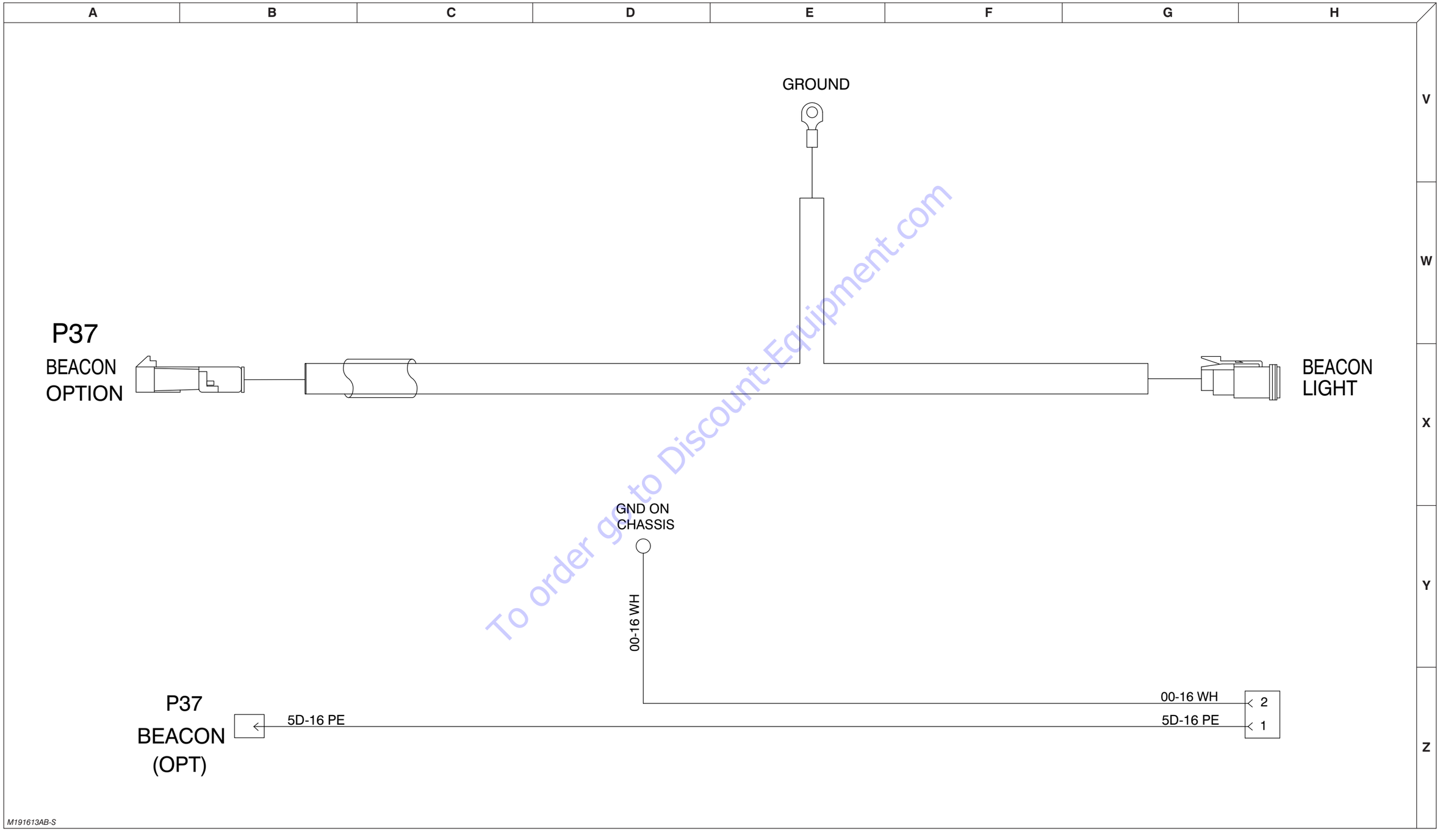


M190231AB-S

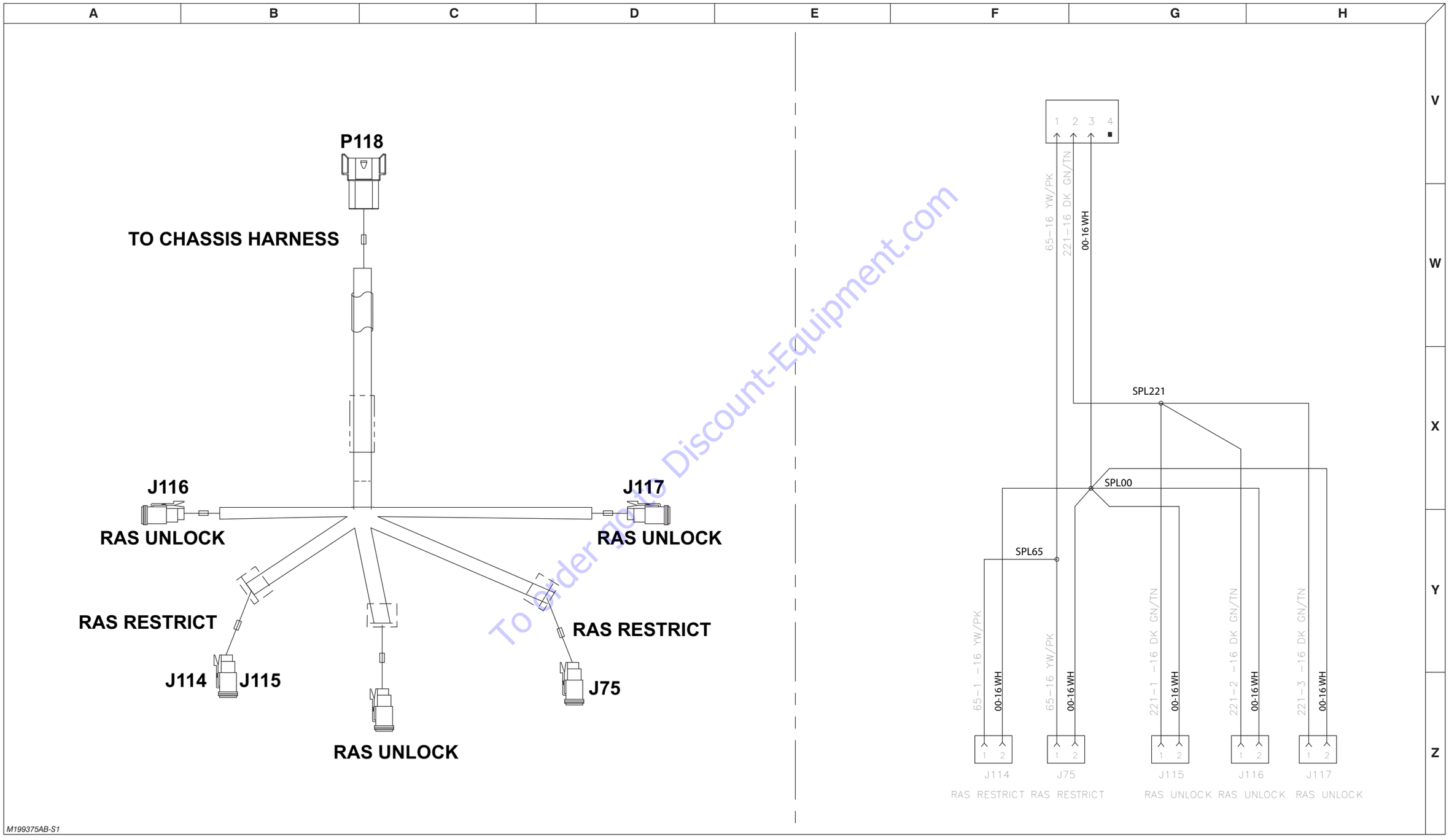
3.22 Boom Lights Harness & Wiring Diagram



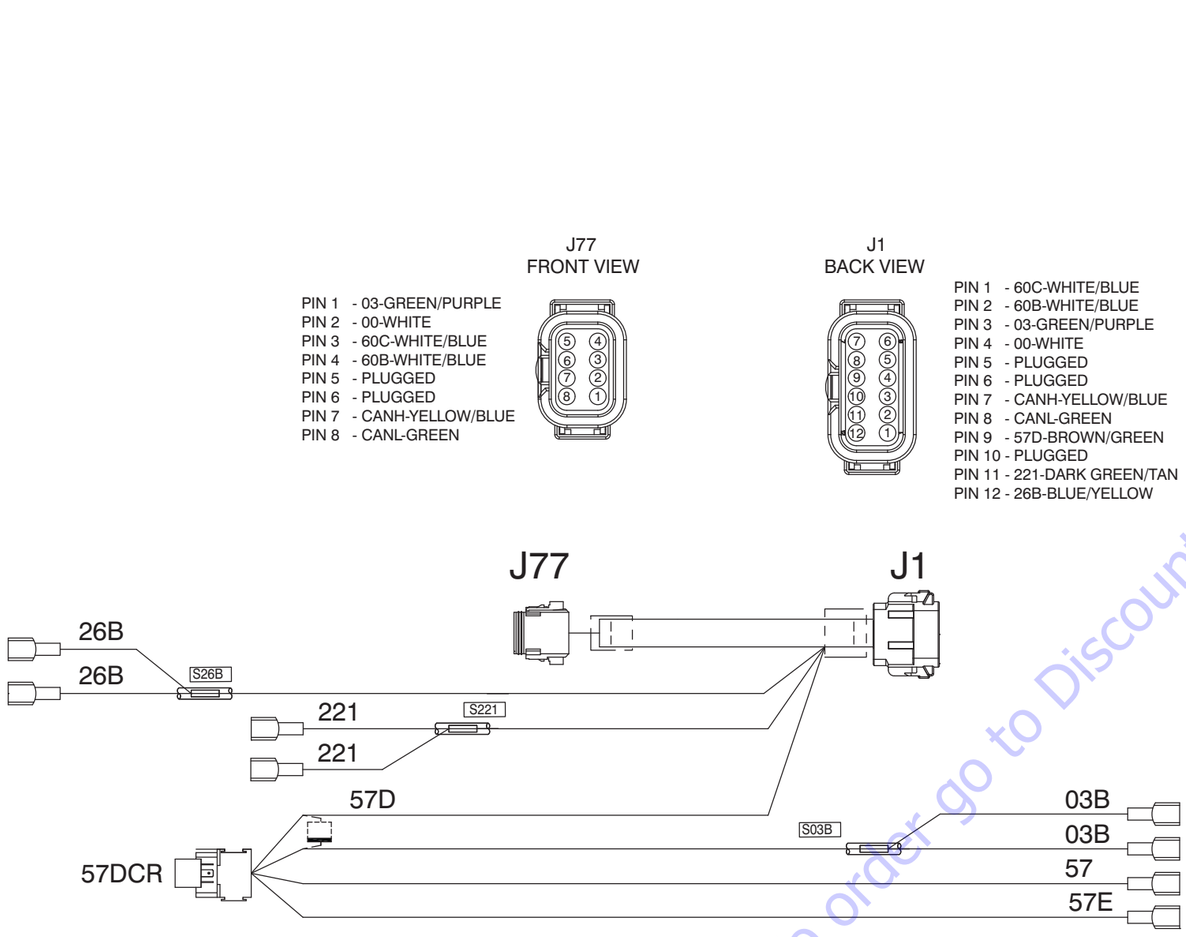
3.23 Beacon Light Harness & Wiring Diagram

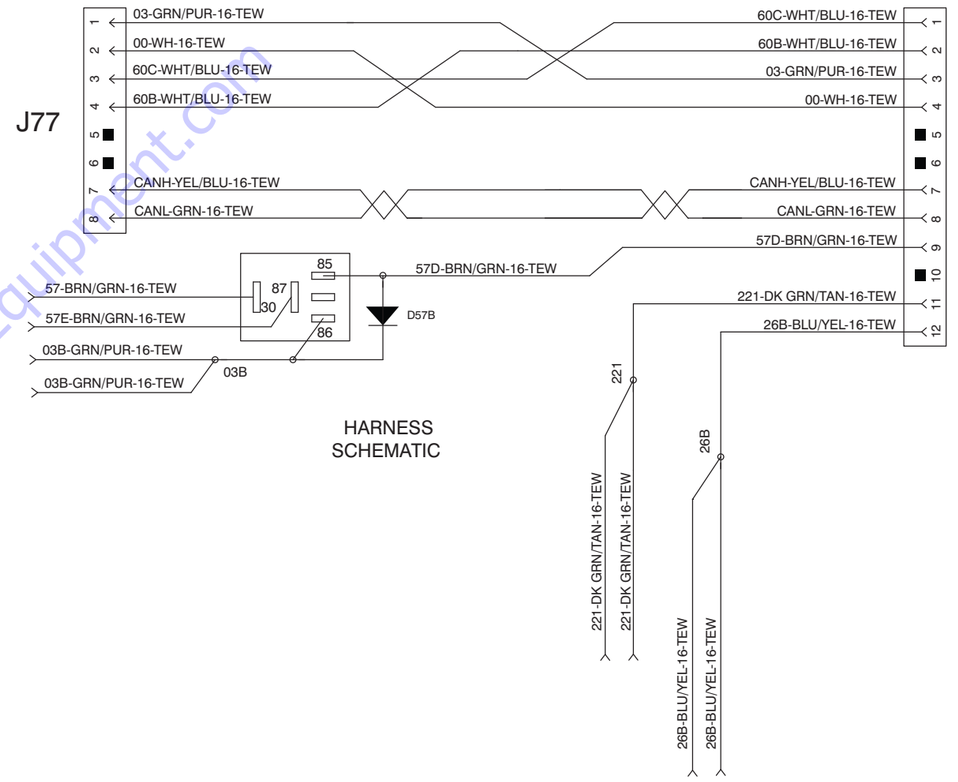


3.24 RAS System Schematic and Wiring



3.25 Elevate Telematics Harness

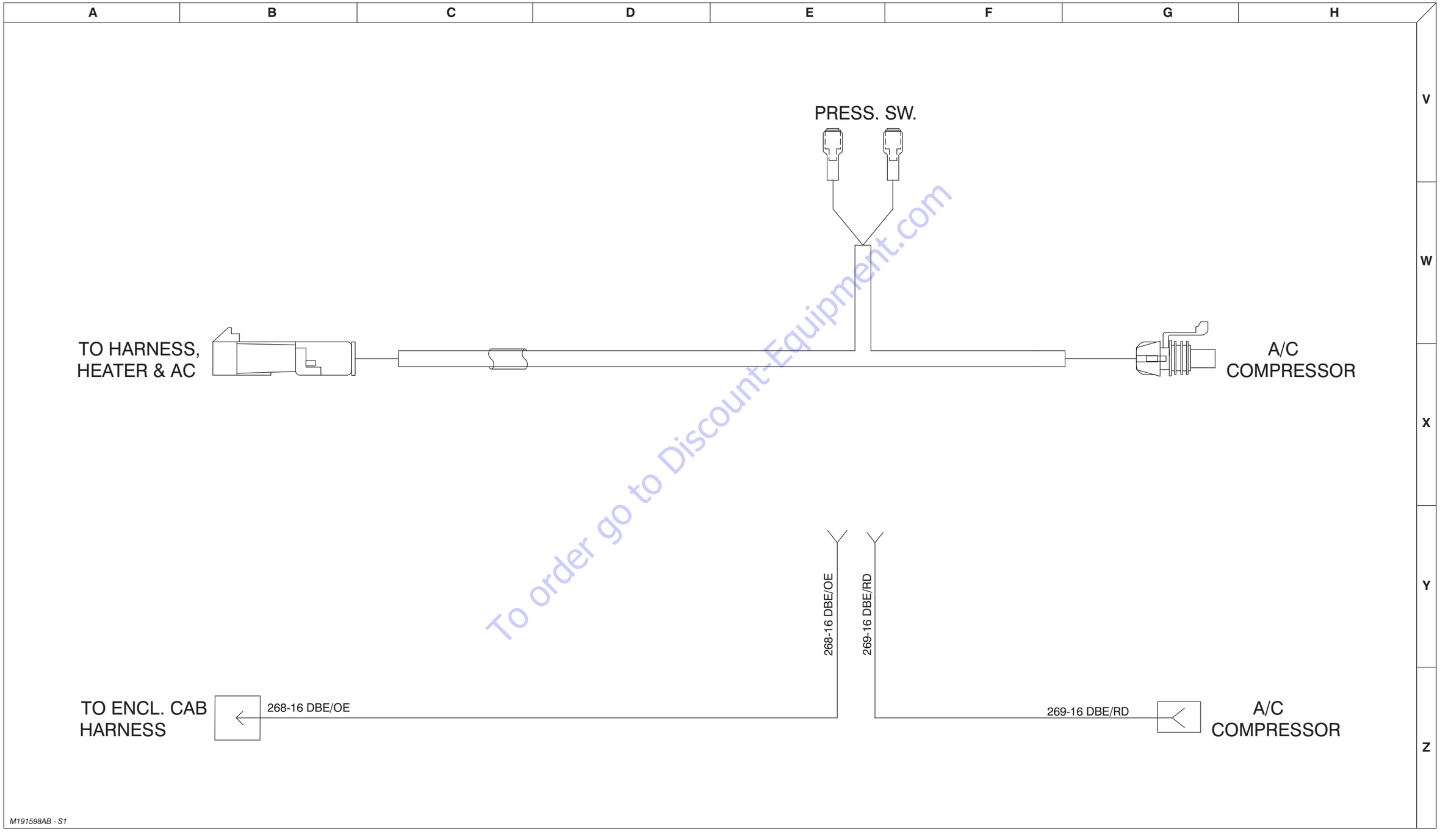




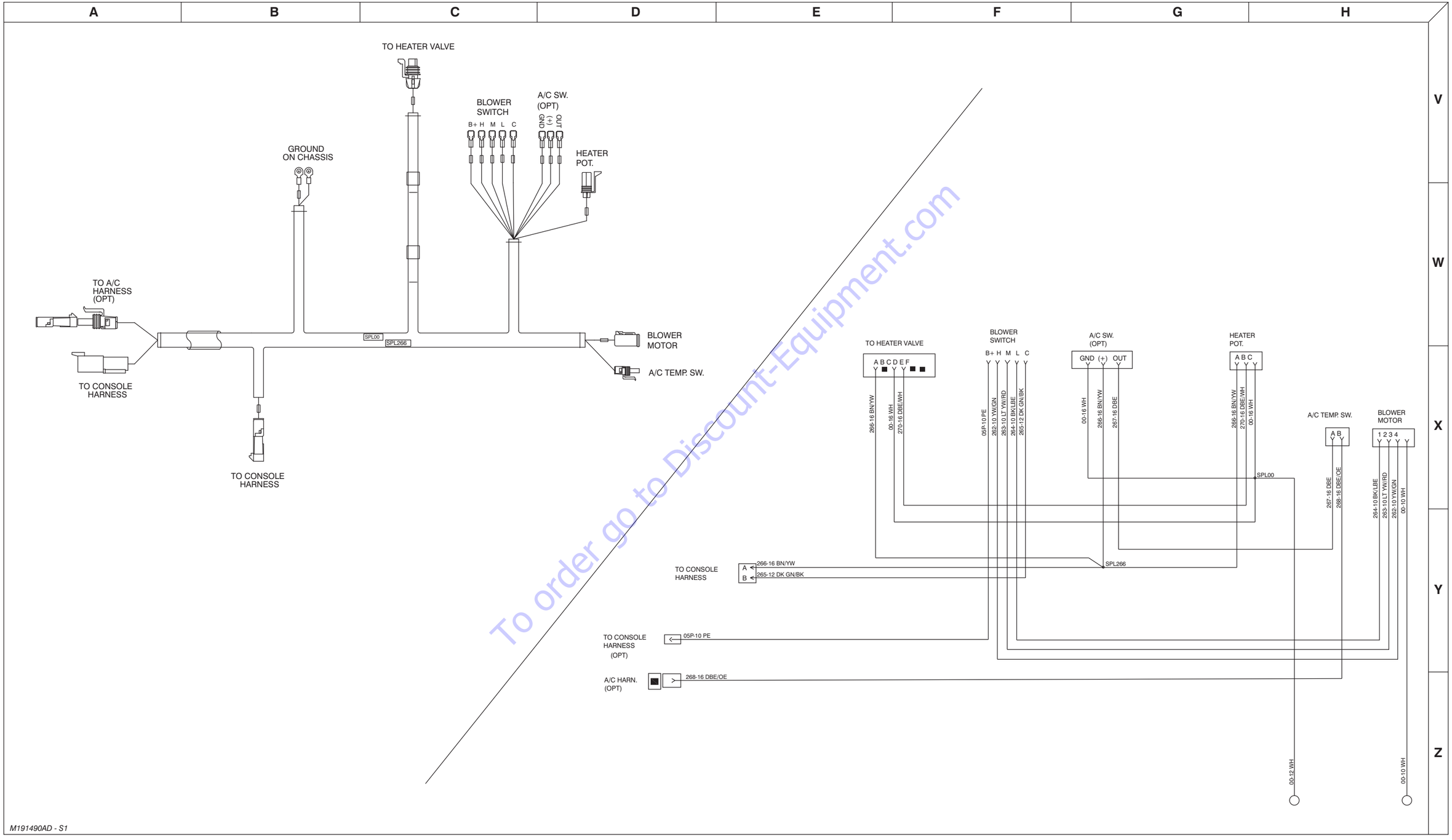
HARNESS
SCHEMATIC

M221451AC-S1

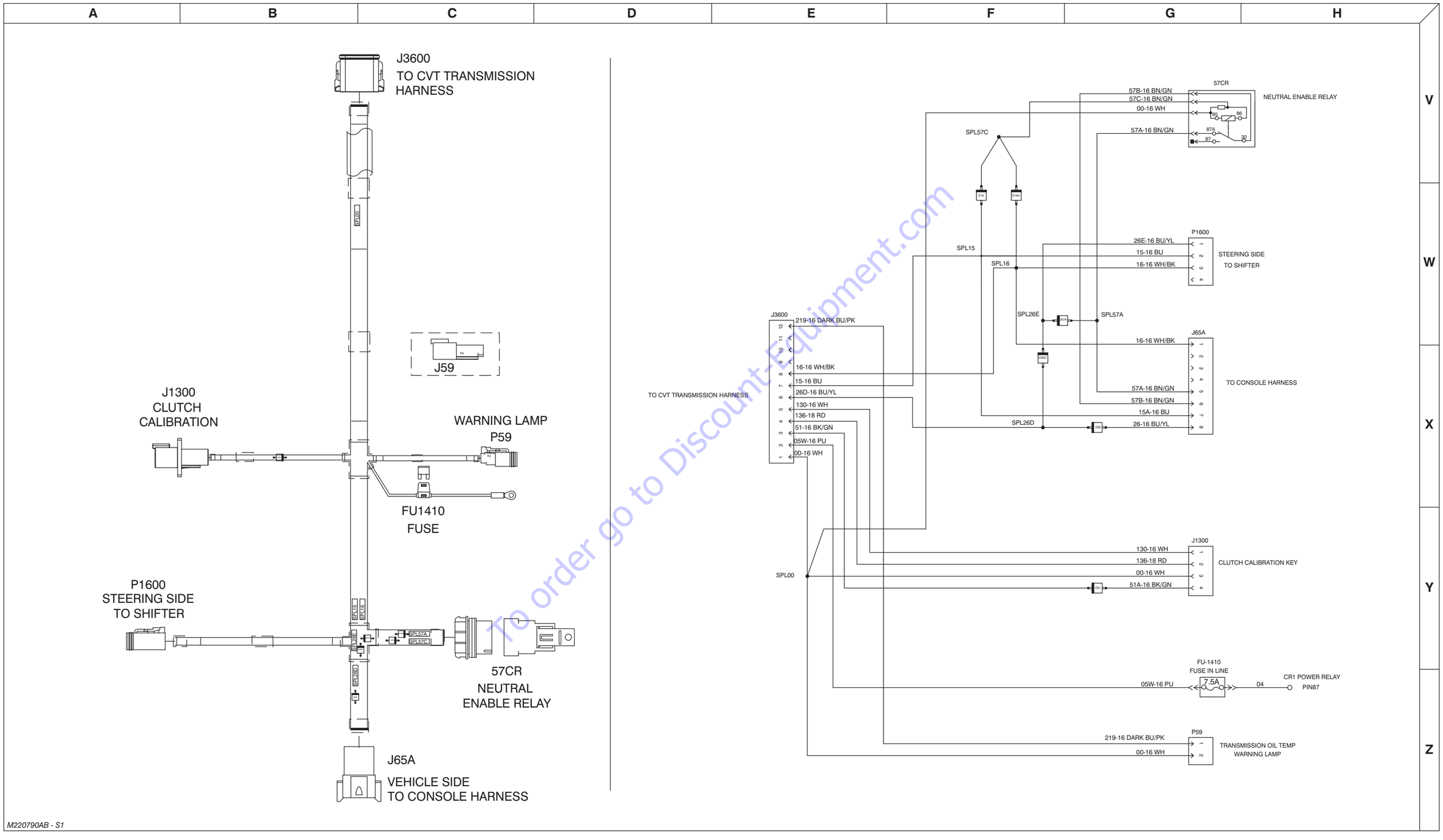
3.26 A/C Harness



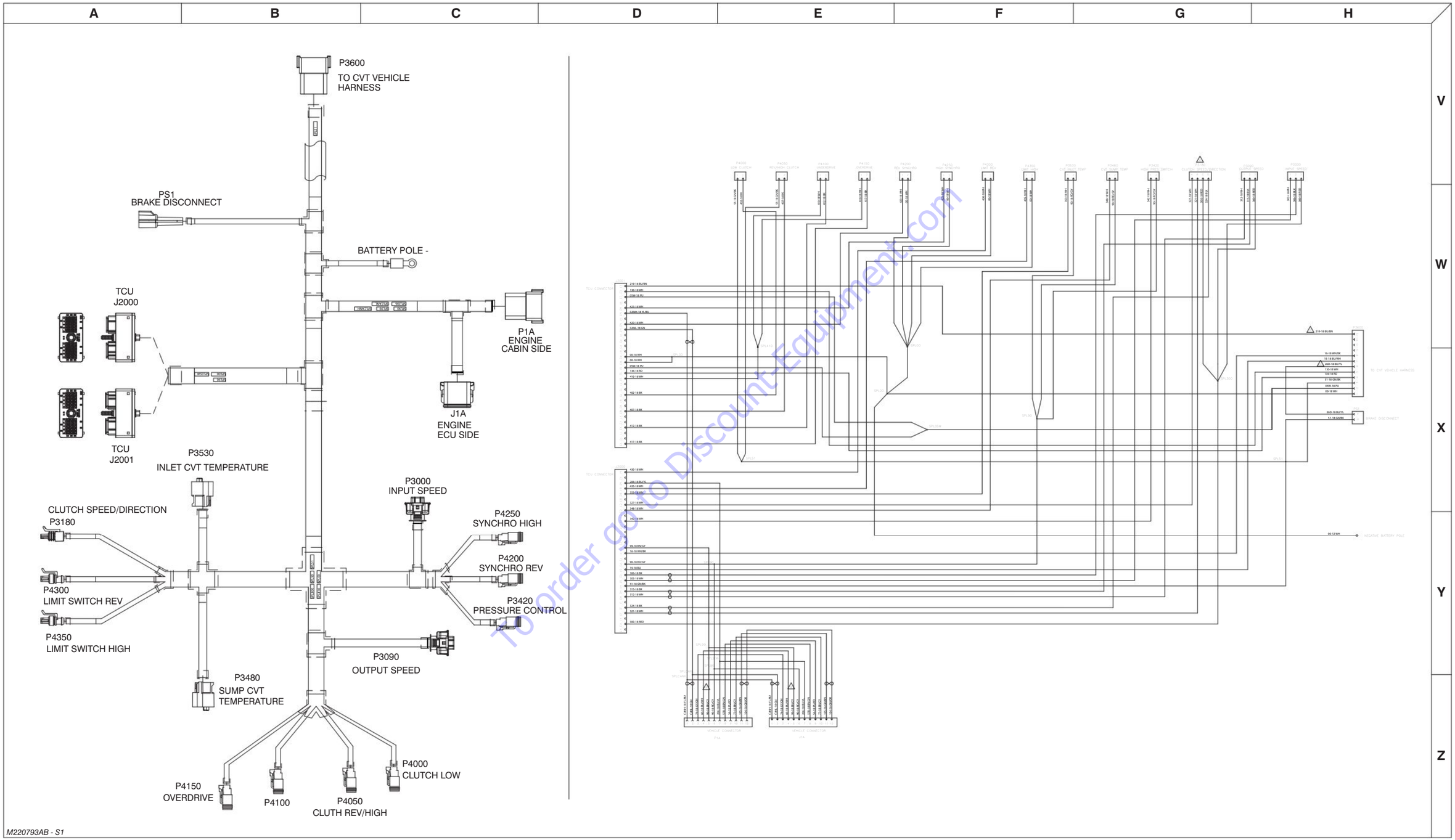
3.27 Heater & A/C Harness

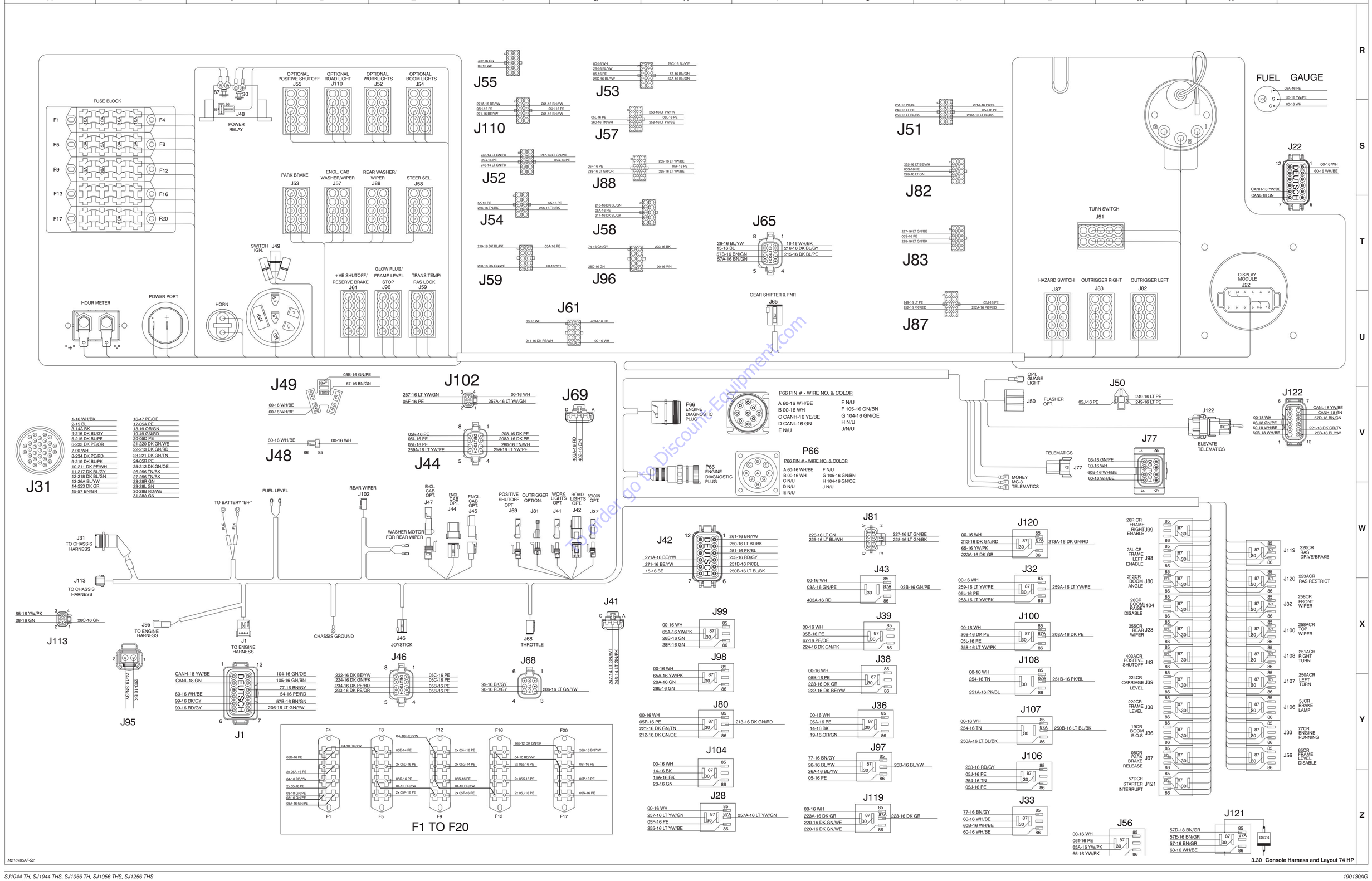


3.28 CVT Vehicle Harness



3.29 CVT Transmission Harness

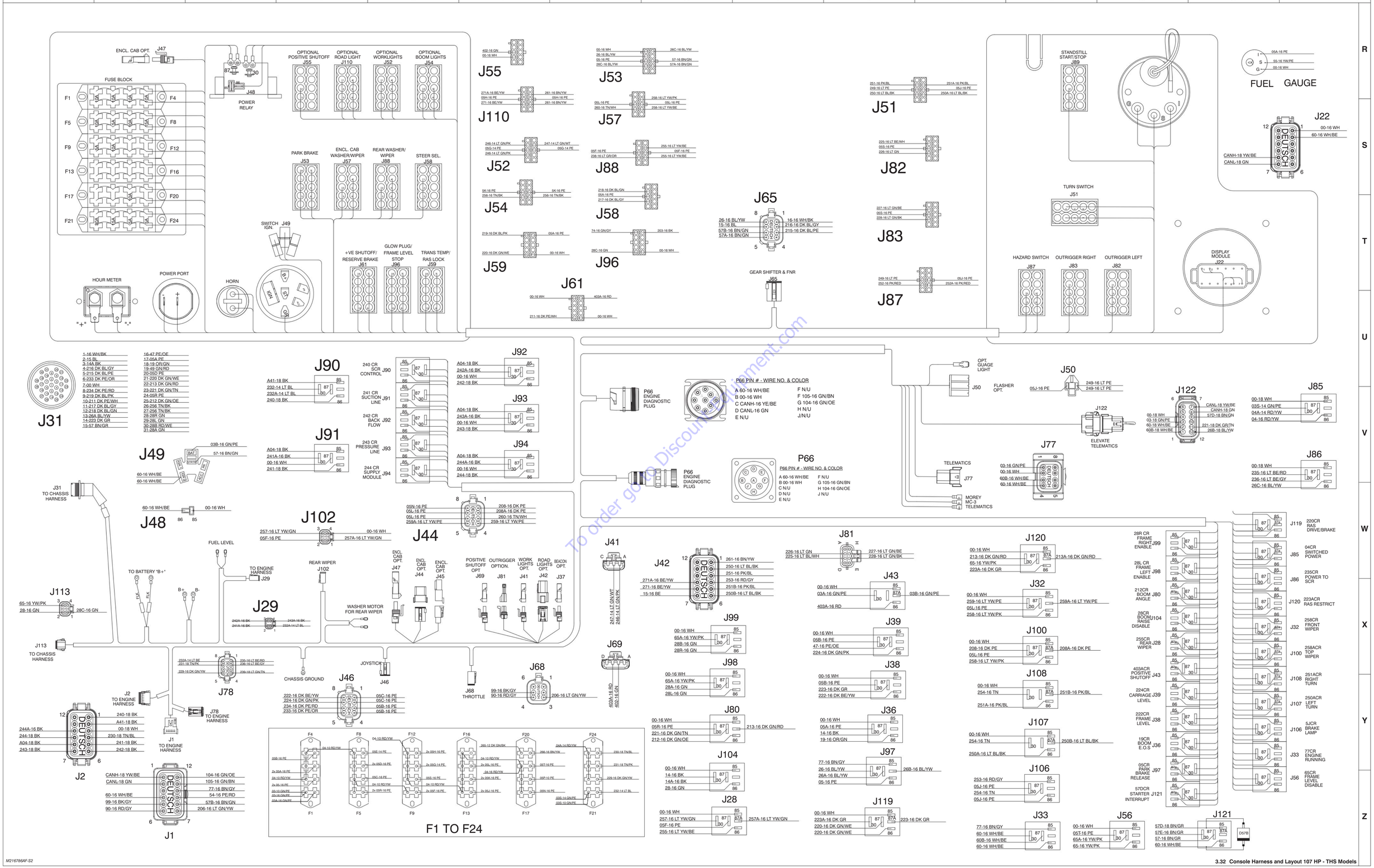




M21678SAF-S2

3.31 Console Harness Wiring Diagram 74HP

3.32 Console Harness and Layout 107 HP - THS Models

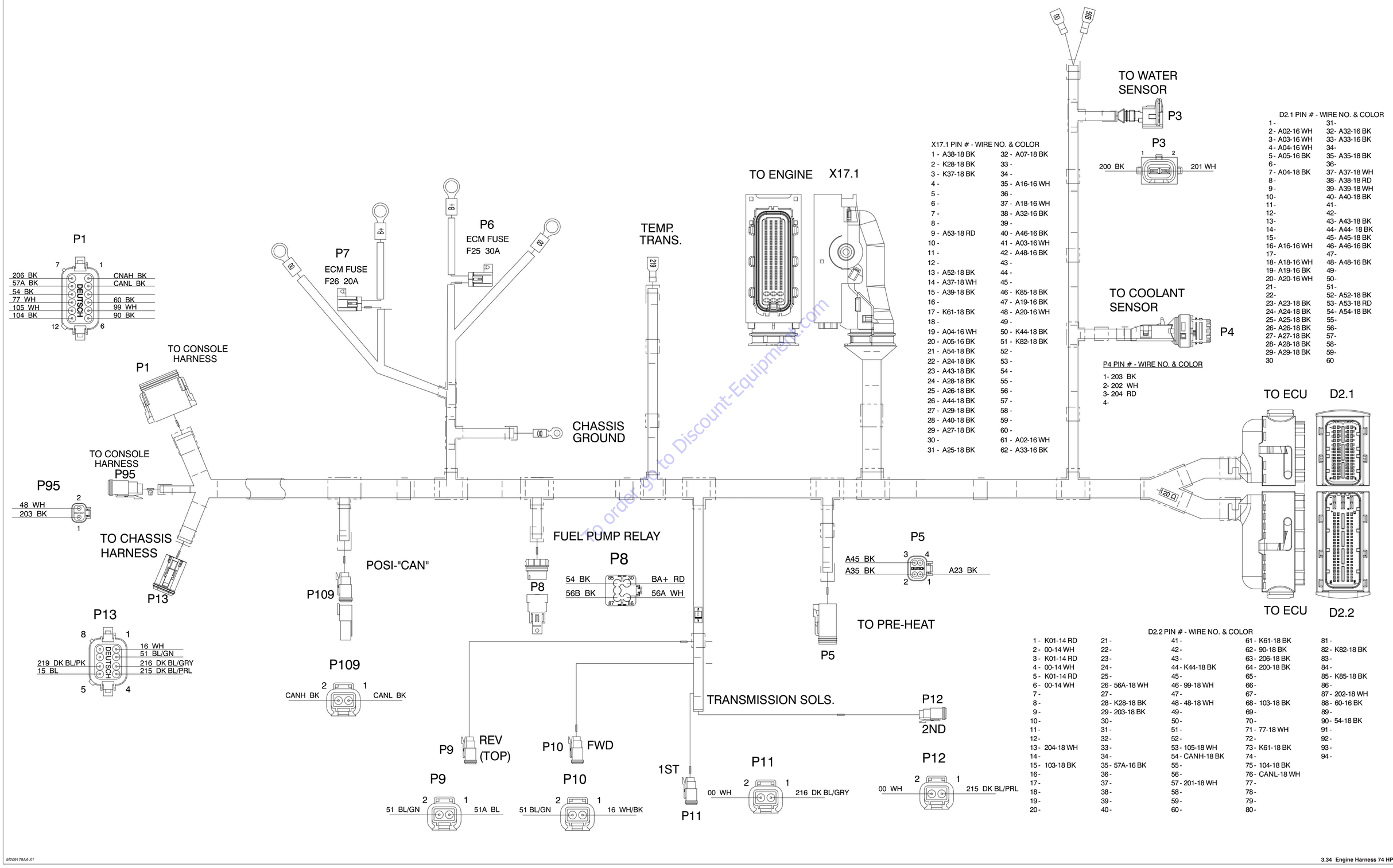


M216786AF-S2

3.33 Console Harness Wiring Diagram 107 HP - THS Models

M216786AF-S1

3.33 Console Harness Wiring Diagram 107 HP - THS Models



X17.1 PIN # - WIRE NO. & COLOR

1 -	A38-18 BK	32 -	A07-18 BK
2 -	K28-18 BK	33 -	
3 -	K37-18 BK	34 -	
4 -		35 -	A16-16 WH
5 -		36 -	
6 -		37 -	A18-16 WH
7 -		38 -	A32-16 BK
8 -		39 -	
9 -	A53-18 RD	40 -	A46-16 BK
10 -		41 -	A03-16 WH
11 -		42 -	A48-16 BK
12 -		43 -	
13 -	A52-18 BK	44 -	
14 -	A37-18 WH	45 -	
15 -	A39-18 BK	46 -	K85-18 BK
16 -		47 -	A19-16 BK
17 -	K61-18 BK	48 -	A20-16 WH
18 -		49 -	
19 -	A04-16 WH	50 -	K44-18 BK
20 -	A05-16 BK	51 -	K82-18 BK
21 -	A54-18 BK	52 -	
22 -	A24-18 BK	53 -	
23 -	A43-18 BK	54 -	
24 -	A28-18 BK	55 -	
25 -	A26-18 BK	56 -	
26 -	A44-18 BK	57 -	
27 -	A29-18 BK	58 -	
28 -	A40-18 BK	59 -	
29 -	A27-18 BK	60 -	
30 -		61 -	A02-16 WH
31 -	A25-18 BK	62 -	A33-16 BK

D2.1 PIN # - WIRE NO. & COLOR

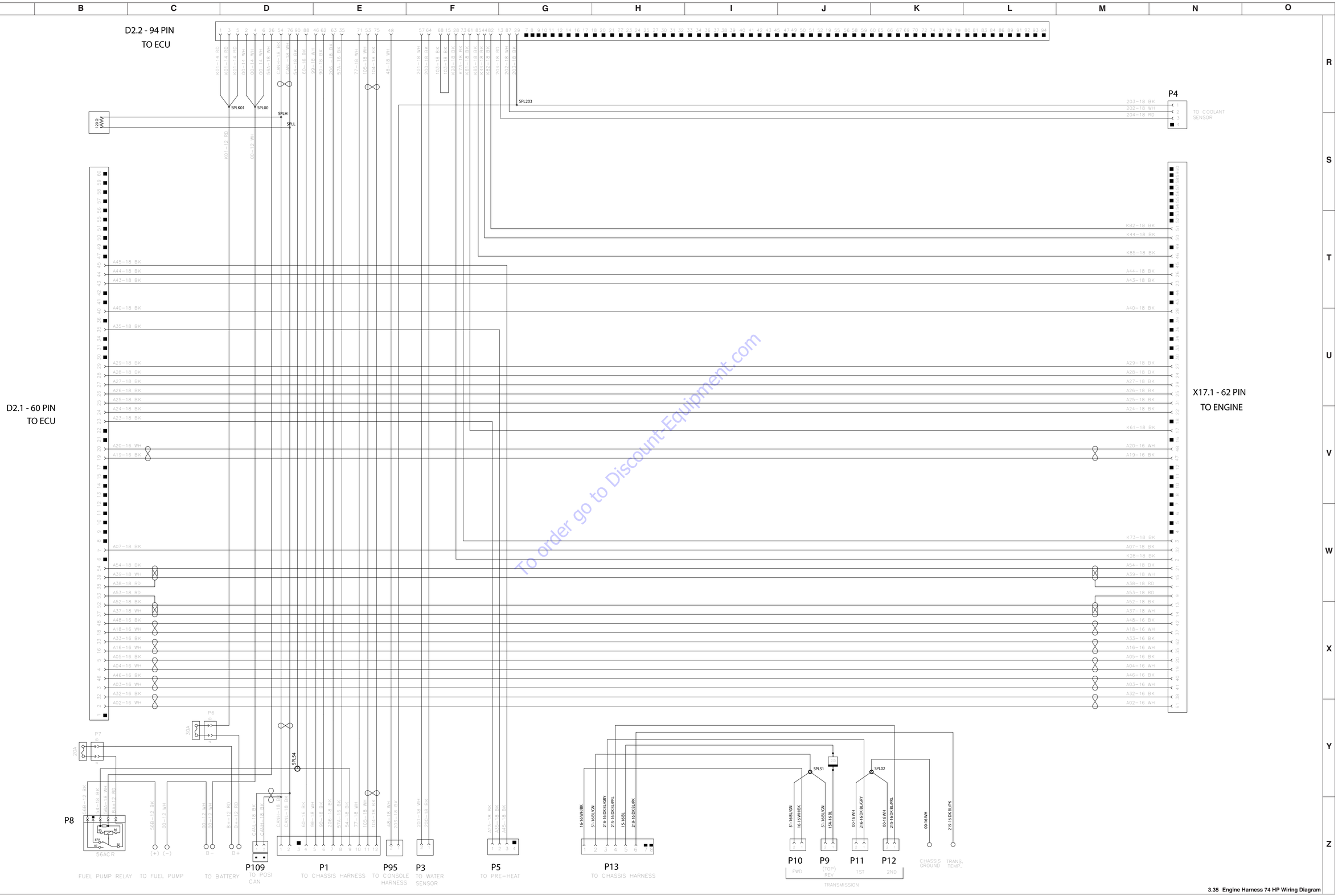
1 -		31 -	
2 -	A02-16 WH	32 -	A32-16 BK
3 -	A03-16 WH	33 -	A33-16 BK
4 -	A04-16 WH	34 -	
5 -	A05-16 BK	35 -	A35-18 BK
6 -		36 -	
7 -	A04-18 BK	37 -	A37-18 WH
8 -		38 -	A38-18 RD
9 -		39 -	A39-18 WH
10 -		40 -	A40-18 BK
11 -		41 -	
12 -		42 -	
13 -		43 -	A43-18 BK
14 -		44 -	A44- 18 BK
15 -		45 -	A45-18 BK
16 -	A16-16 WH	46 -	A46-16 BK
17 -		47 -	
18 -	A18-16 WH	48 -	A48-16 BK
19 -	A19-16 BK	49 -	
20 -	A20-16 WH	50 -	
21 -		51 -	
22 -		52 -	A52-18 BK
23 -	A23-18 BK	53 -	A53-18 RD
24 -	A24-18 BK	54 -	A54-18 BK
25 -	A25-18 BK	55 -	
26 -	A26-18 BK	56 -	
27 -	A27-18 BK	57 -	
28 -	A28-18 BK	58 -	
29 -	A29-18 BK	59 -	
30		60	

D2.2 PIN # - WIRE NO. & COLOR

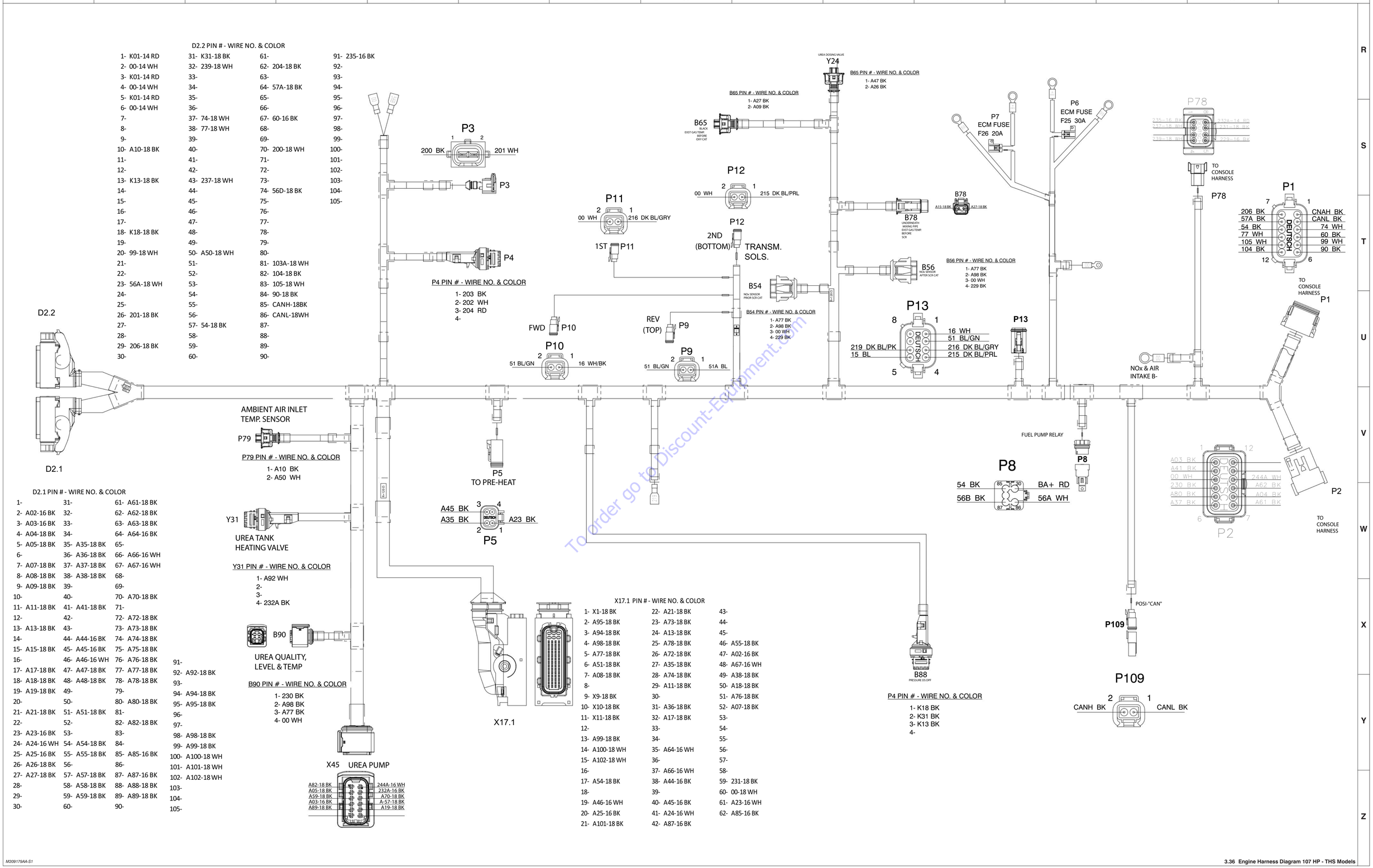
1 -	K01-14 RD	21 -	41 -	61 - K61-18 BK	81 -
2 -	00-14 WH	22 -	42 -	62 - 90-18 BK	82 - K82-18 BK
3 -	K01-14 RD	23 -	43 -	63 - 206-18 BK	83 -
4 -	00-14 WH	24 -	44 - K44-18 BK	64 - 200-18 BK	84 -
5 -	K01-14 RD	25 -	45 -	65 -	85 - K85-18 BK
6 -	00-14 WH	26 - 56A-18 WH	46 - 99-18 WH	66 -	86 -
7 -		27 -	47 -	67 -	87 - 202-18 WH
8 -		28 - K28-18 BK	48 - 48-18 WH	68 - 103-18 BK	88 - 60-16 BK
9 -		29 - 203-18 BK	49 -	69 -	89 -
10 -		30 -	50 -	70 -	90 - 54-18 BK
11 -		31 -	51 -	71 - 77-18 WH	91 -
12 -		32 -	52 -	72 -	92 -
13 -	204-18 WH	33 -	53 - 105-18 WH	73 - K61-18 BK	93 -
14 -		34 -	54 - CANH-18 BK	74 -	94 -
15 -	103-18 BK	35 - 57A-16 BK	55 -	75 - 104-18 BK	
16 -		36 -	56 -	76 - CANL-18 WH	
17 -		37 -	57 - 201-18 WH	77 -	
18 -		38 -	58 -	78 -	
19 -		39 -	59 -	79 -	
20 -		40 -	60 -	80 -	

M209178AA-S1

3.35 Engine Harness 74 HP Wiring Diagram

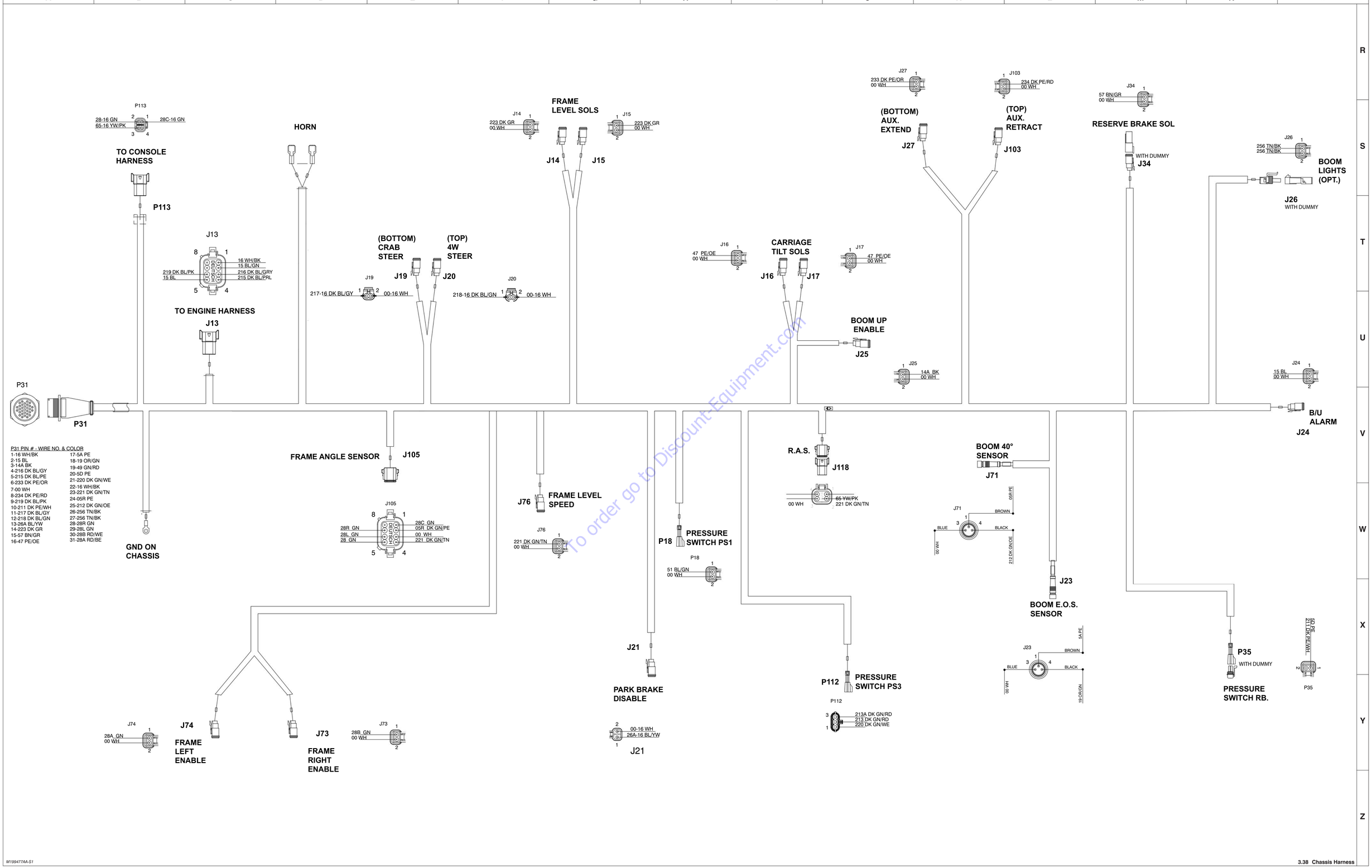


3.36 Engine Harness Diagram 107 HP - THS Models



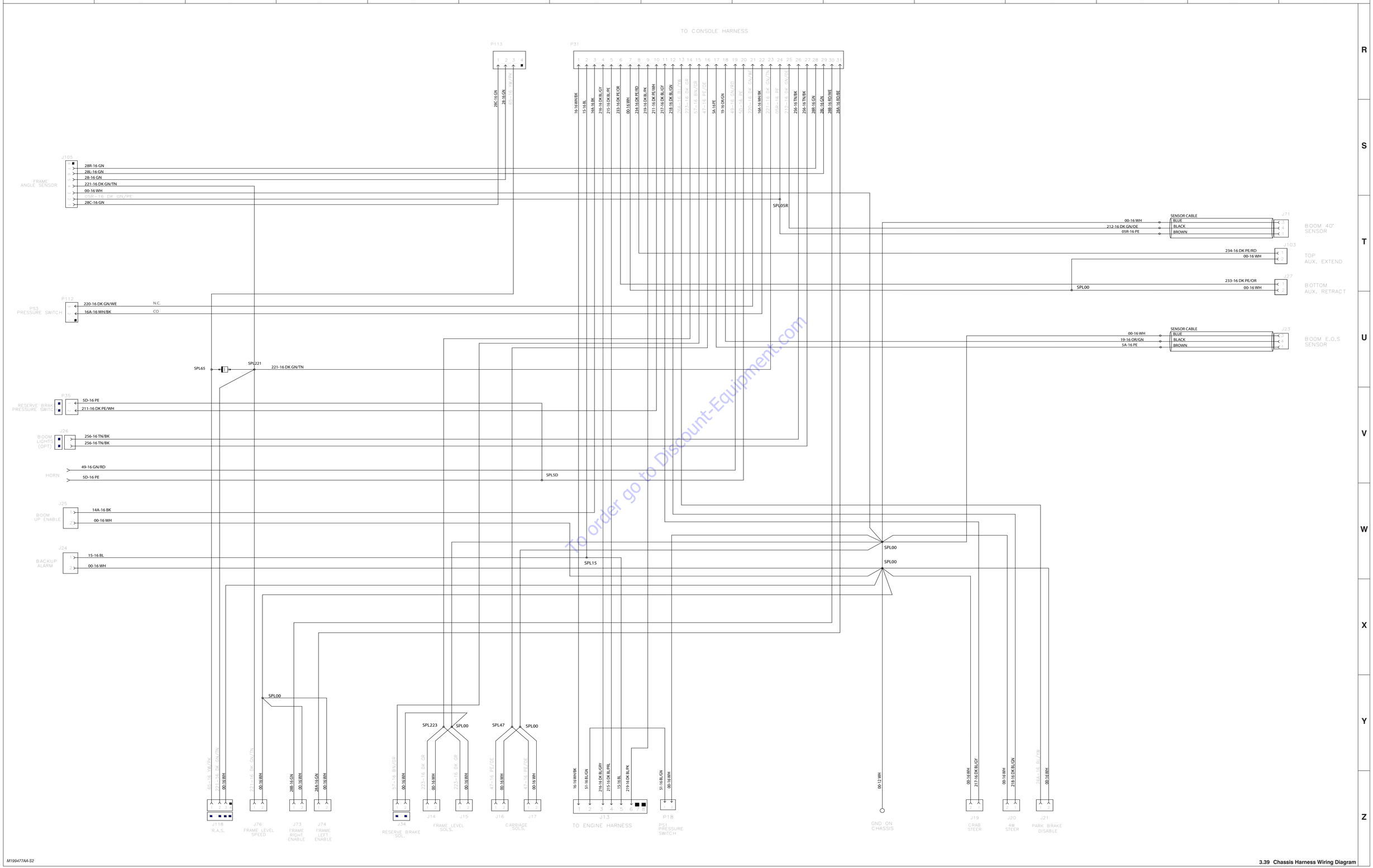
M209179AA-S1


FUEL PUMP RELAY
TO FUEL PUMP
TO BATTERY
P3 TO WATER SENSOR
P109 TO POSI CAN
P1 TO CONSOLE HARNESS
P78 TO CONSOLE HARNESS
P2 TO CONSOLE HARNESS
X45 TO UREA PUMP
UREA TANK HEATG VALVE Y31
EXST GAS TEMP. BEFORE OXY CAT B65
EXST GAS TEMP. BEFORE SCR B78
UREA DOSING VALVE Y24
PRESSURE DS DPF B88
NOx & AIR INTAKE B-
NOx SENSOR AFTER SCR CAT WHITE B56
NOx SENSOR PRIOR SCR CAT BLACK B54
UREA QUALITY, LEVEL & TEMP B90
X17.1-62 PIN
TO PRE-HEAT P5
TO COOLANT SENSOR P4
TO AMBIENT AIR TEMPERATURE AIR INLET SENSOR P79
TO CHASSIS HARNESS P13
P10 FWD
P9 (TOP) REV
P11 1ST
P12 2ND
TRANSMISSION
CHASSIS GROUND
TRANS. TEMP.
D2.1 - 105 PIN TO ECU
D2.2 - 91 PIN TO ECU
M209179AA-S2

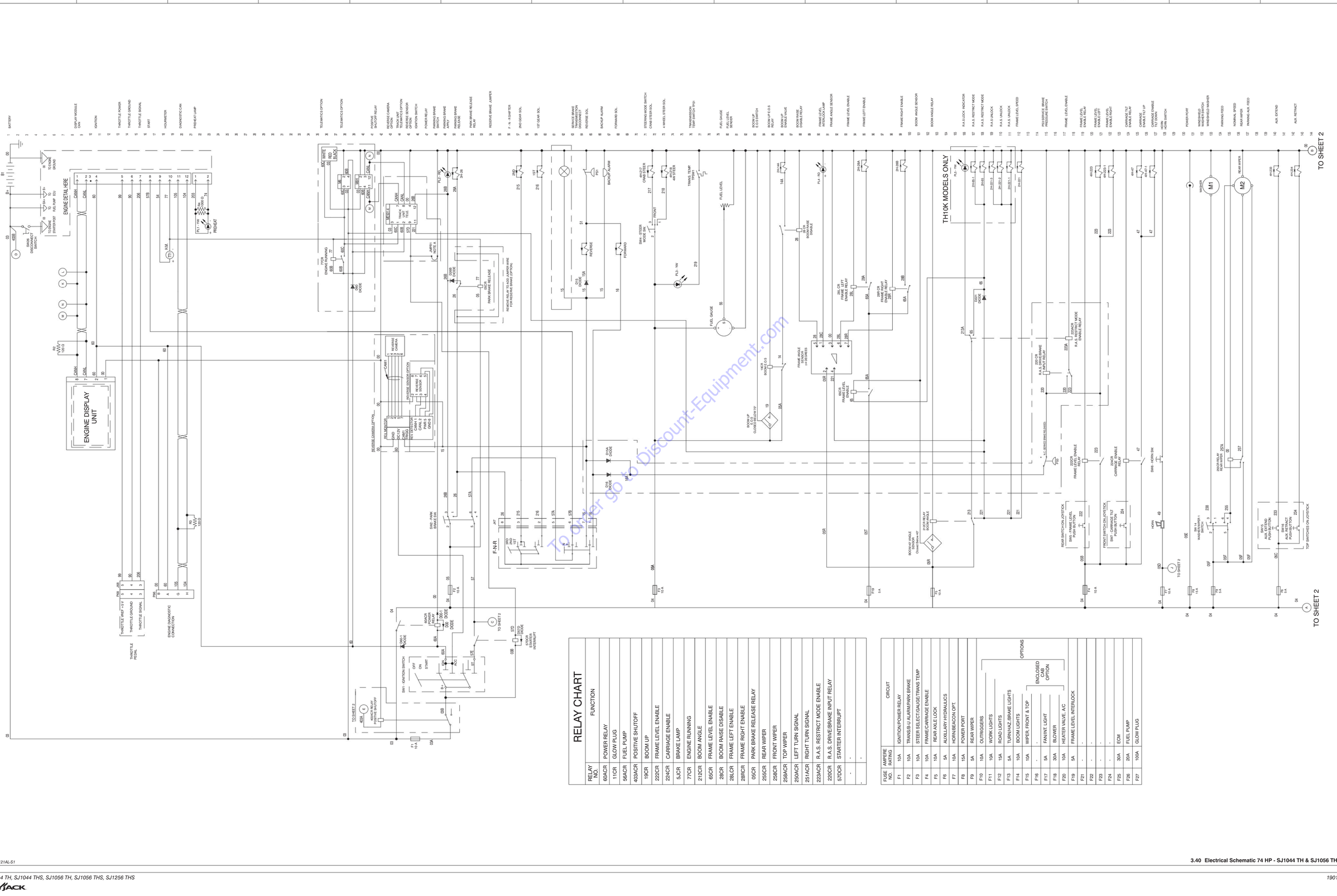


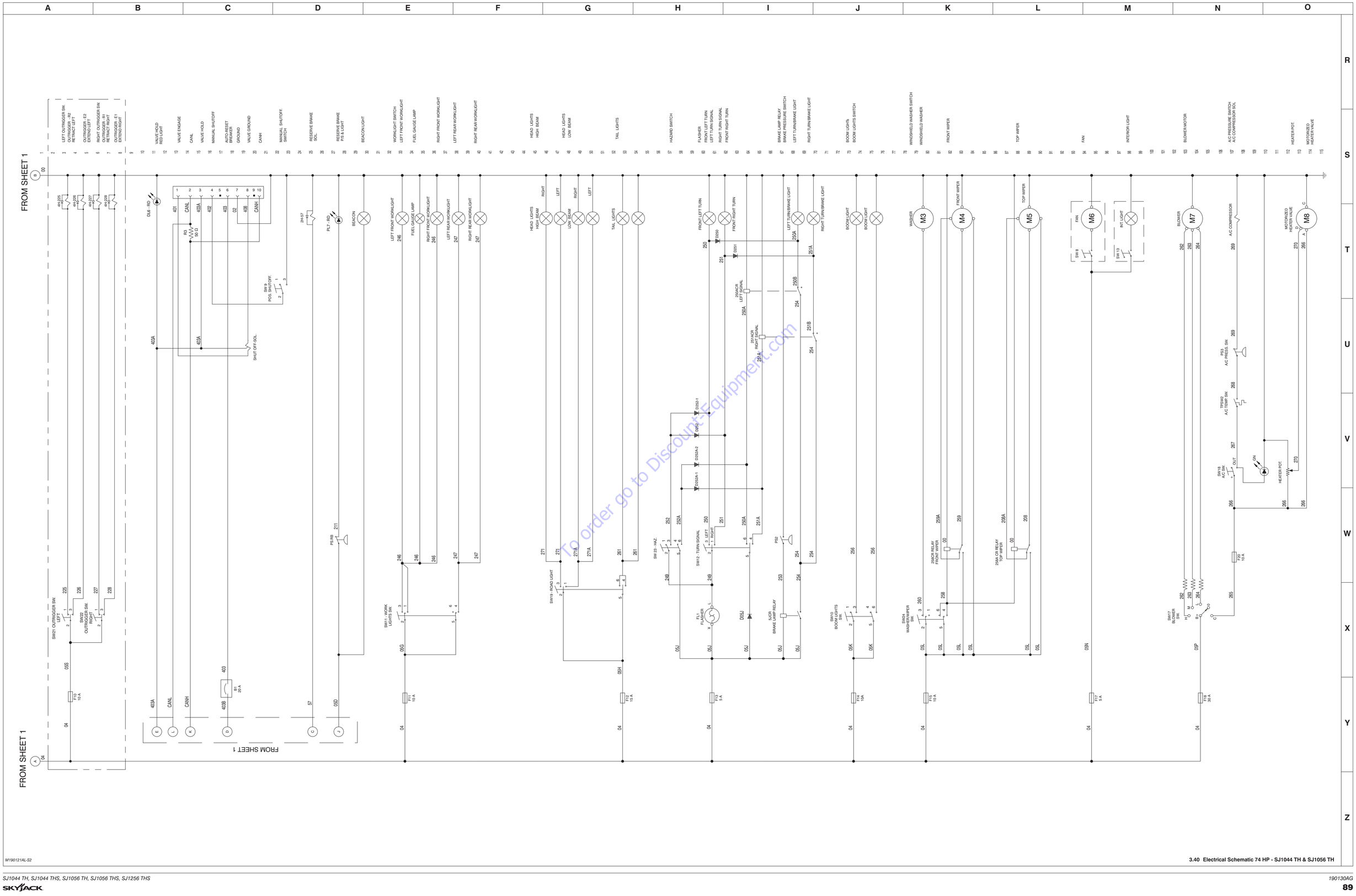
M199477AA-S1

3.39 Chassis Harness Wiring Diagram

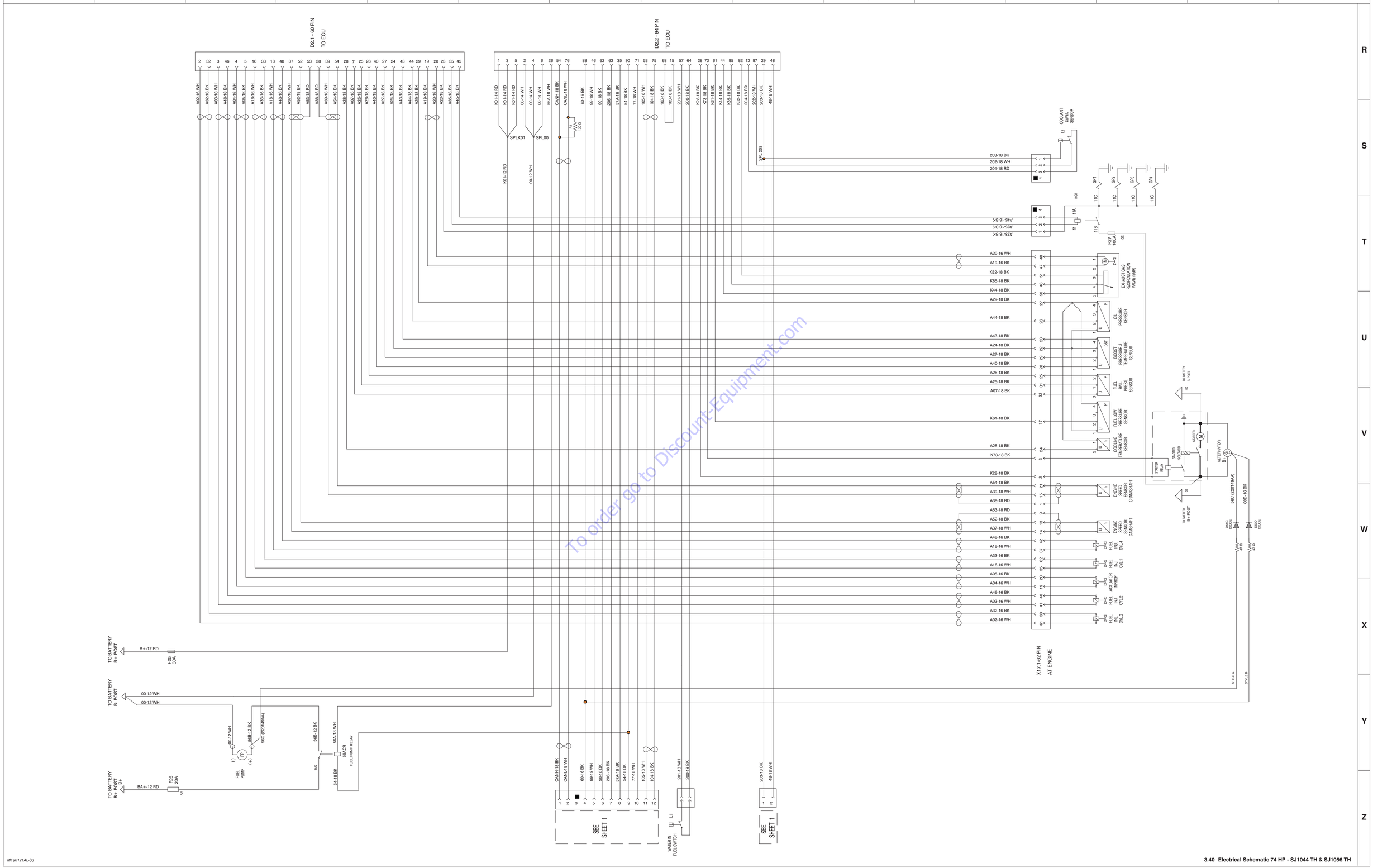


M1994774A-S2





3.40 Electrical Schematic 74 HP - SJ1044 TH & SJ1056 TH



M190121AL-S3

3.40 Electrical Schematic 74 HP - SJ1044 TH & SJ1056 TH

3.41 Electrical Schematic 74 HP Premium Joystick - SJ1044 TH & SJ1056 TH

RELAY CHART

RELAY NO.	FUNCTION
60ACR	POWER RELAY
11CR	GLOW PLUG
56ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	NOT USED
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
28LCR	FRAME LEFT ENABLE
28RCR	FRAME RIGHT ENABLE
05CR	PARK BRAKE RELEASE RELAY
255CR	REAR WIPER
258CR	FRONT WIPER
258ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
57DCR	STARTER INTERRUPT
-	-
-	-

FUSE NO.	AMPERE RATING	CIRCUIT
F1	10A	IGNITION/POWER RELAY
F2	10A	TRANS/B-U ALARM/PARK BRAKE
F3	10A	STEER SELECT/GAUGE/TRANS TEMP
F4	10A	FRAME/CARRIAGE ENABLE
F5	10A	REAR AXLE LOCK
F6	5A	NOT USED
F7	10A	HORN/BEACON OPT.
F8	15A	POWER PORT
F9	5A	REAR WIPER
F10	10A	OUTRIGGERS (OPTIONS)
F11	10A	WORK LIGHTS (OPTIONS)
F12	15A	ROAD LIGHTS (OPTIONS)
F13	5A	TURN/HAZ./BRAKE LIGHTS (OPTIONS)
F14	10A	BOOM LIGHTS (OPTIONS)
F15	10A	WIPER, FRONT & TOP (OPTIONS; ENCLOSED CAB OPTION)
F16	10A	PREMIUM JOYSTICK (OPTIONS)
F17	5A	FAN/INT. LIGHT (OPTIONS; ENCLOSED CAB OPTION)
F18	30A	BLOWER (OPTIONS; ENCLOSED CAB OPTION)
F20	10A	HEATER VALVE, A/C (OPTIONS; ENCLOSED CAB OPTION)
F19	5A	FRAME LEVEL INTERLOCK
F21	-	-
F22	-	-
F23	-	-
F24	-	-
F25	30A	ECM
F26	20A	FUEL PUMP
F27	100A	GLOW PLUG

M213409AD-S1

3.41 Electrical Schematic 74 HP Premium Joystick - SJ1044 TH & SJ1056 TH

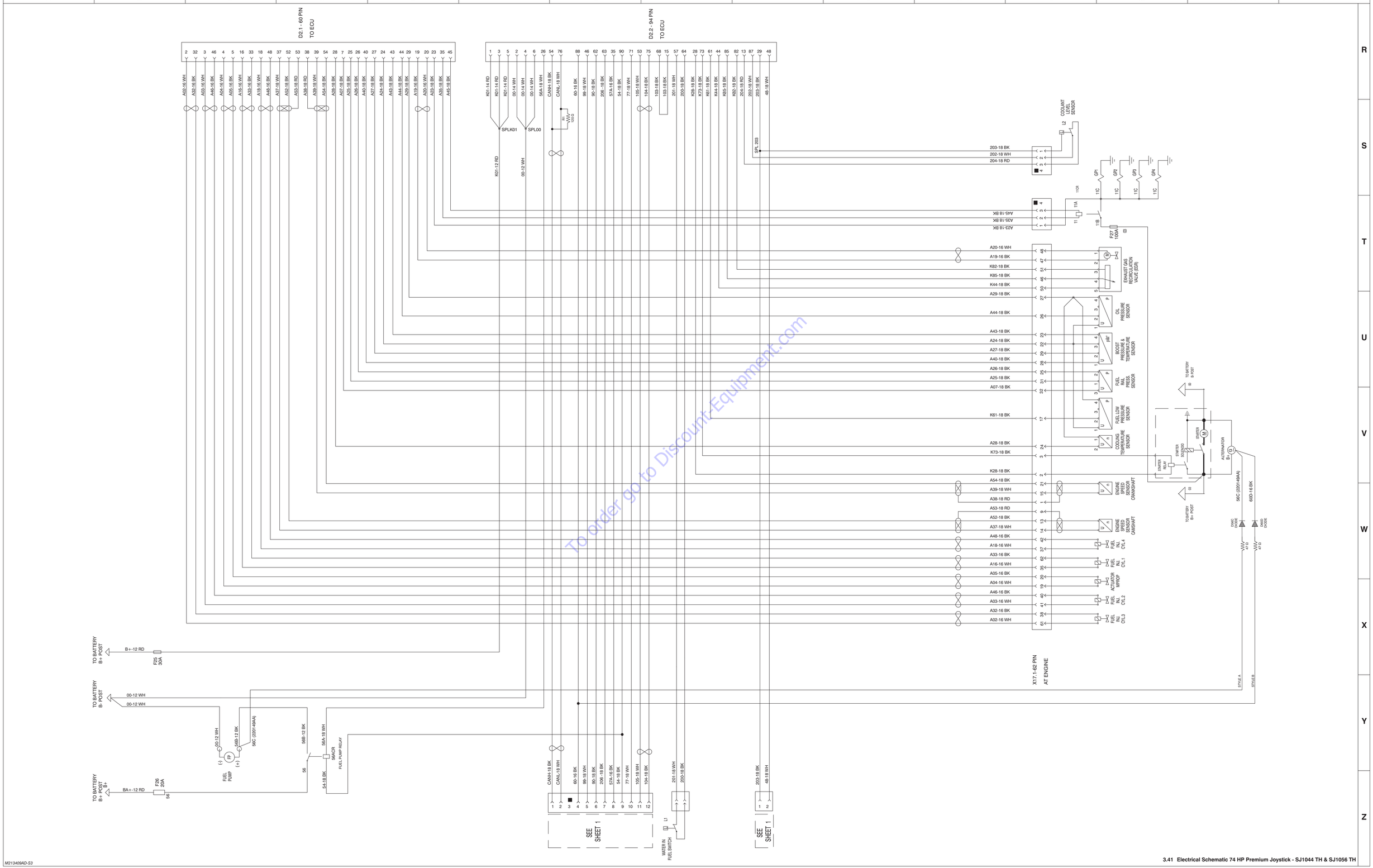
RELAY CHART

RELAY NO.	FUNCTION
60CR	POWER RELAY
11CR	GLOW PLUG
56ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	NOT USED
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
28LCR	FRAME LEFT ENABLE
28RCR	FRAME RIGHT ENABLE
05CR	PARK BRAKE RELEASE RELAY
255CR	REAR WIPER
258CR	FRONT WIPER
258ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
57DCR	STARTER INTERRUPT
-	-
-	-

FUSE NO.	AMPERE RATING	CIRCUIT	
F1	10A	IGNITION/POWER RELAY	
F2	10A	TRANS/B-U ALARM/PARK BRAKE	
F3	10A	STEER SELECT/GAUGE/TRANS TEMP	
F4	10A	FRAME/CARRIAGE ENABLE	
F5	10A	REAR AXLE LOCK	
F6	5A	NOT USED	
F7	10A	HORN/BEACON OPT.	
F8	15A	POWER PORT	
F9	5A	REAR WIPER	
F10	10A	OUTRIGGERS	OPTIONS
F11	10A	WORK LIGHTS	OPTIONS
F12	15A	ROAD LIGHTS	OPTIONS
F13	5A	TURN/HAZ./BRAKE LIGHTS	OPTIONS
F14	10A	BOOM LIGHTS	OPTIONS
F15	10A	WIPER, FRONT & TOP	OPTIONS / ENCLOSED CAB OPTION
F16	10A	PREMIUM JOYSTICK	OPTIONS / ENCLOSED CAB OPTION
F17	5A	FAN/INT. LIGHT	OPTIONS / ENCLOSED CAB OPTION
F18	30A	BLOWER	OPTIONS / ENCLOSED CAB OPTION
F20	10A	HEATER VALVE, A/C	OPTIONS / ENCLOSED CAB OPTION
F19	5A	FRAME LEVEL INTERLOCK	
F21	-	-	
F22	-	-	
F23	-	-	
F24	-	-	
F25	30A	ECM	
F26	20A	FUEL PUMP	
F27	100A	GLOW PLUG	

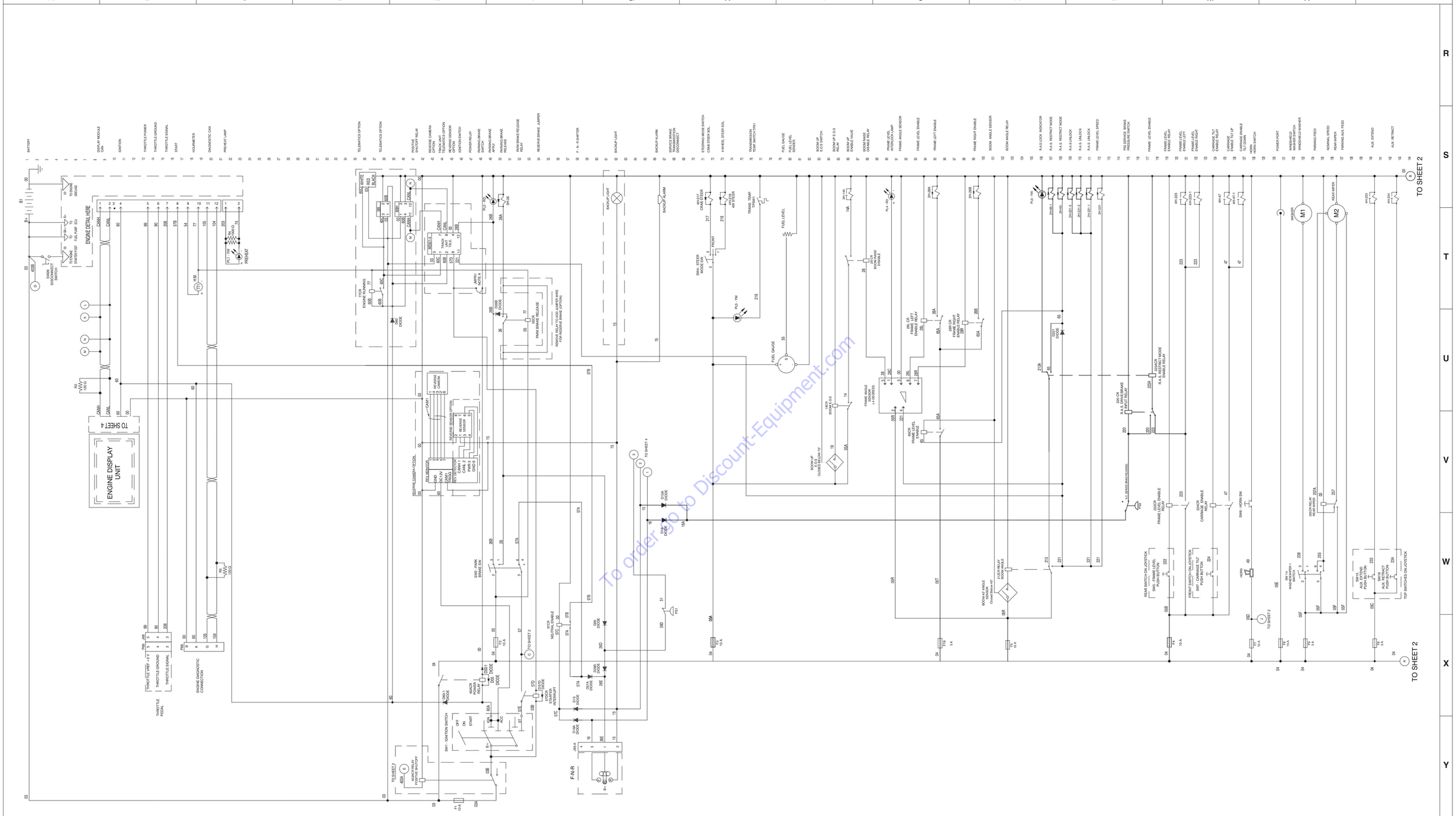
M213409AD-S2

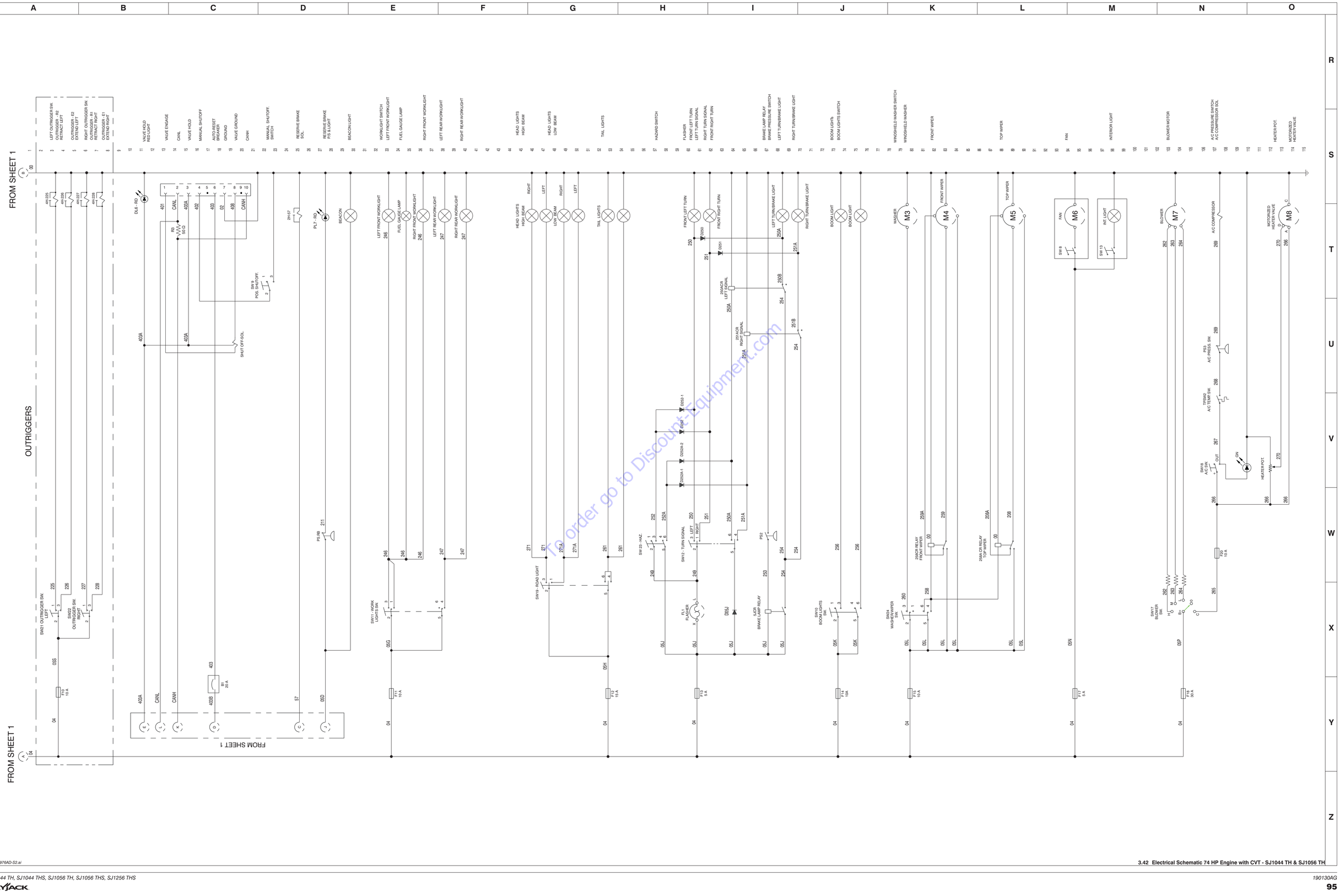
3.41 Electrical Schematic 74 HP Premium Joystick - SJ1044 TH & SJ1056 TH



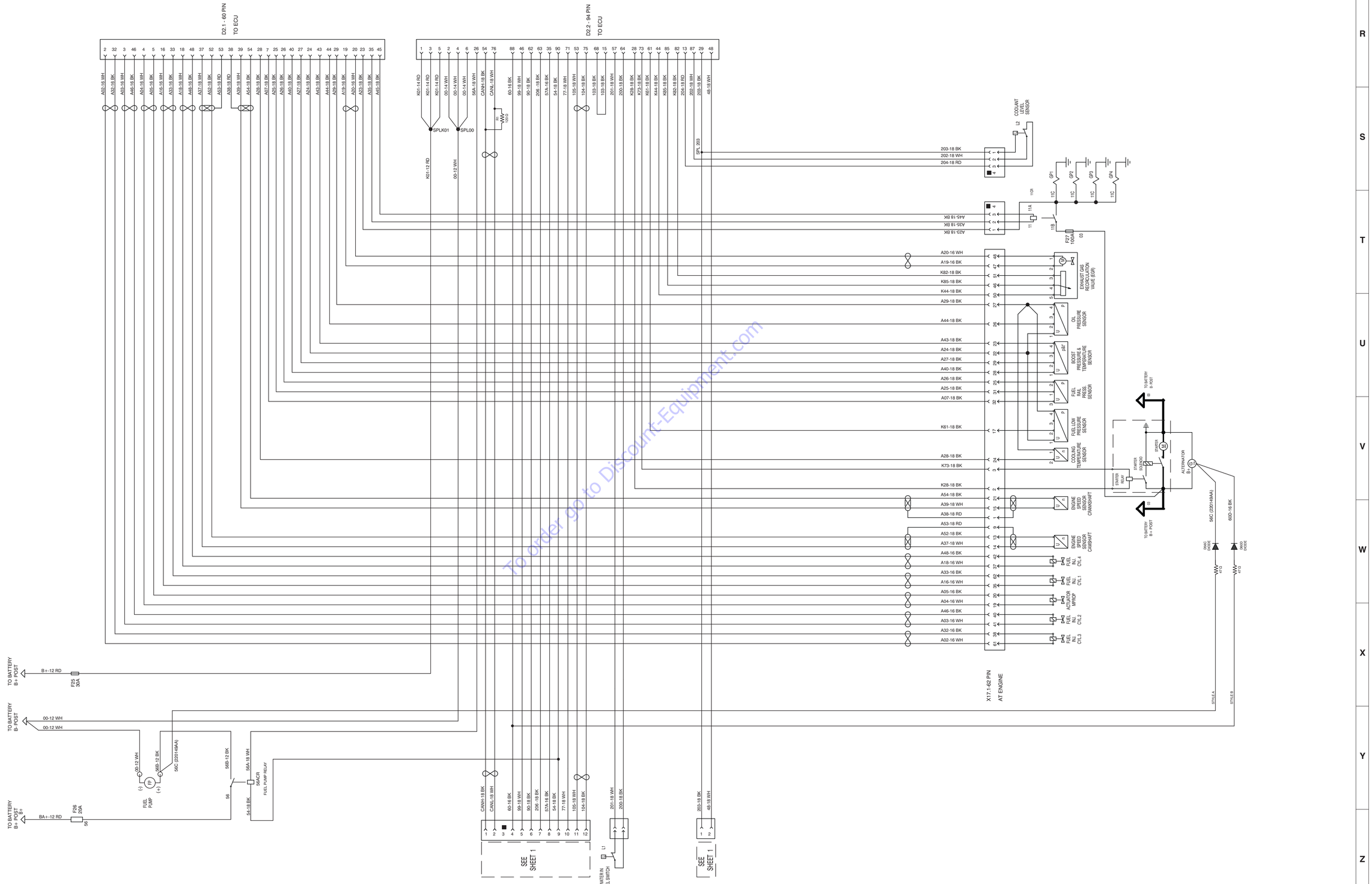
M213409AD-S3

3.42 Electrical Schematic 74 HP Engine with CVT - SJ1044 TH & SJ1056 TH



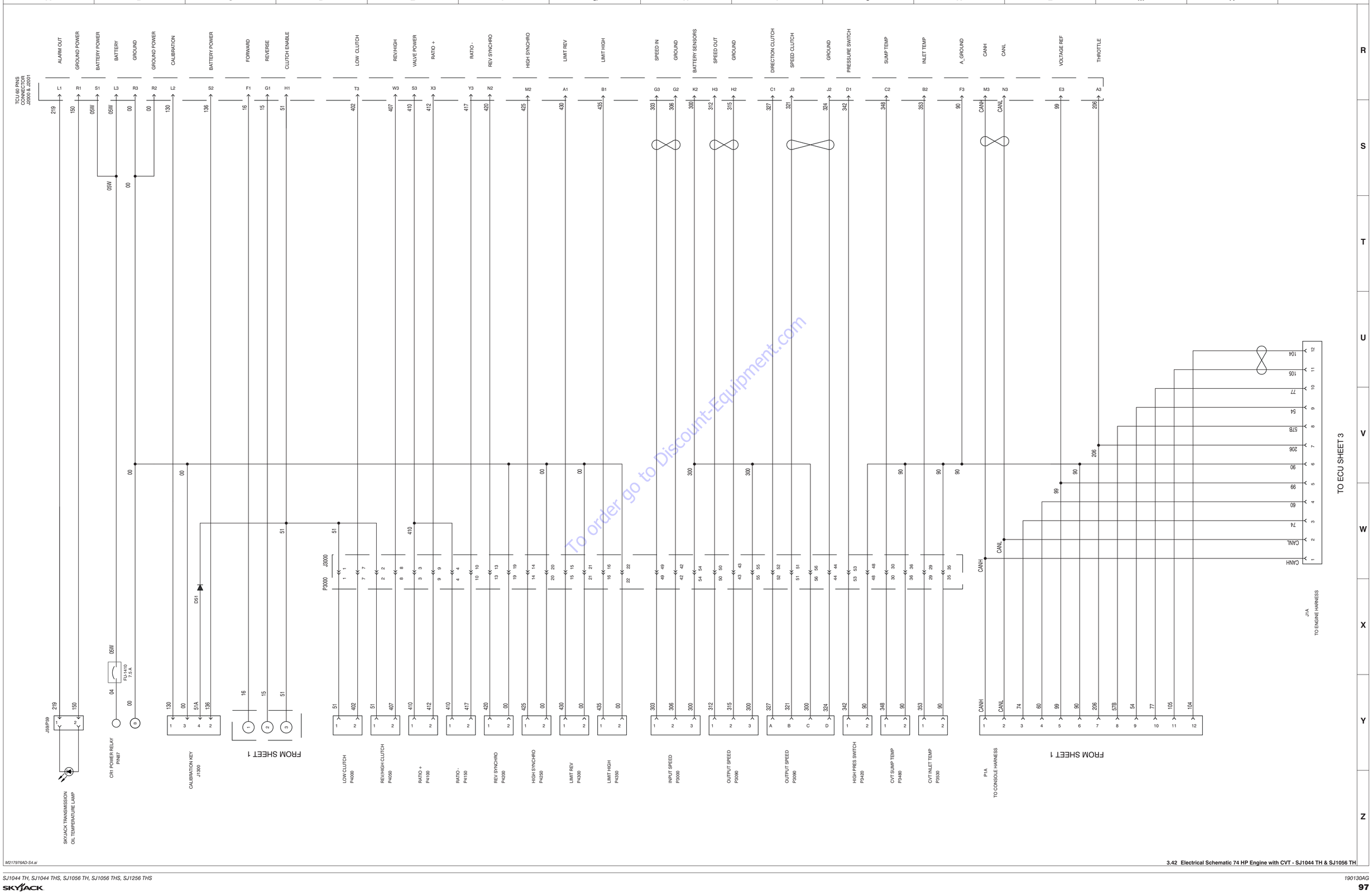


3.42 Electrical Schematic 74 HP Engine with CVT - SJ1044 TH & SJ1056 TH



M2179764AD-S3.ai

3.42 Electrical Schematic 74 HP Engine with CVT - SJ1044 TH & SJ1056 TH

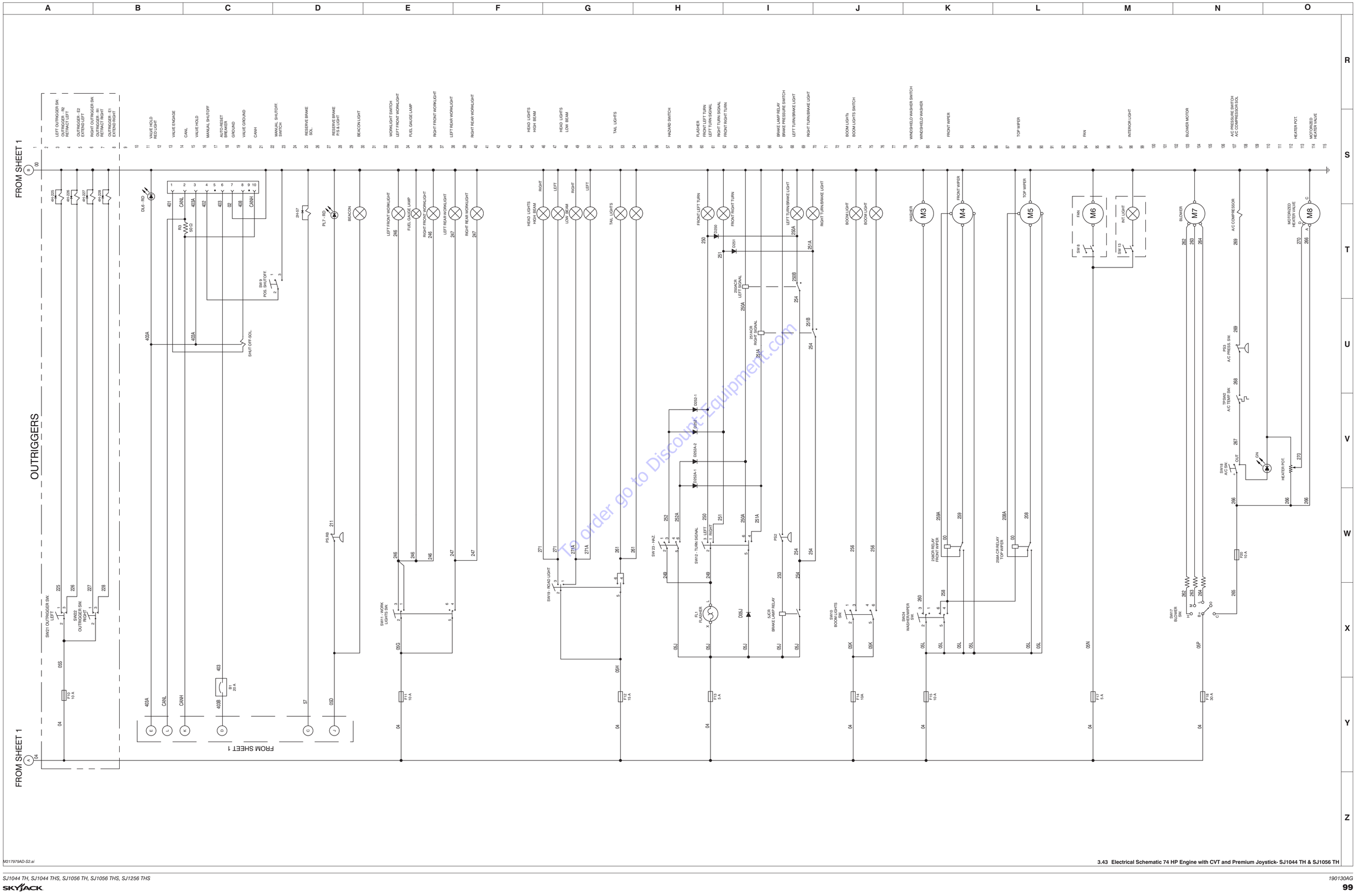


M217976AD-S4.ai

3.42 Electrical Schematic 74 HP Engine with CVT - SJ1044 TH & SJ1056 TH

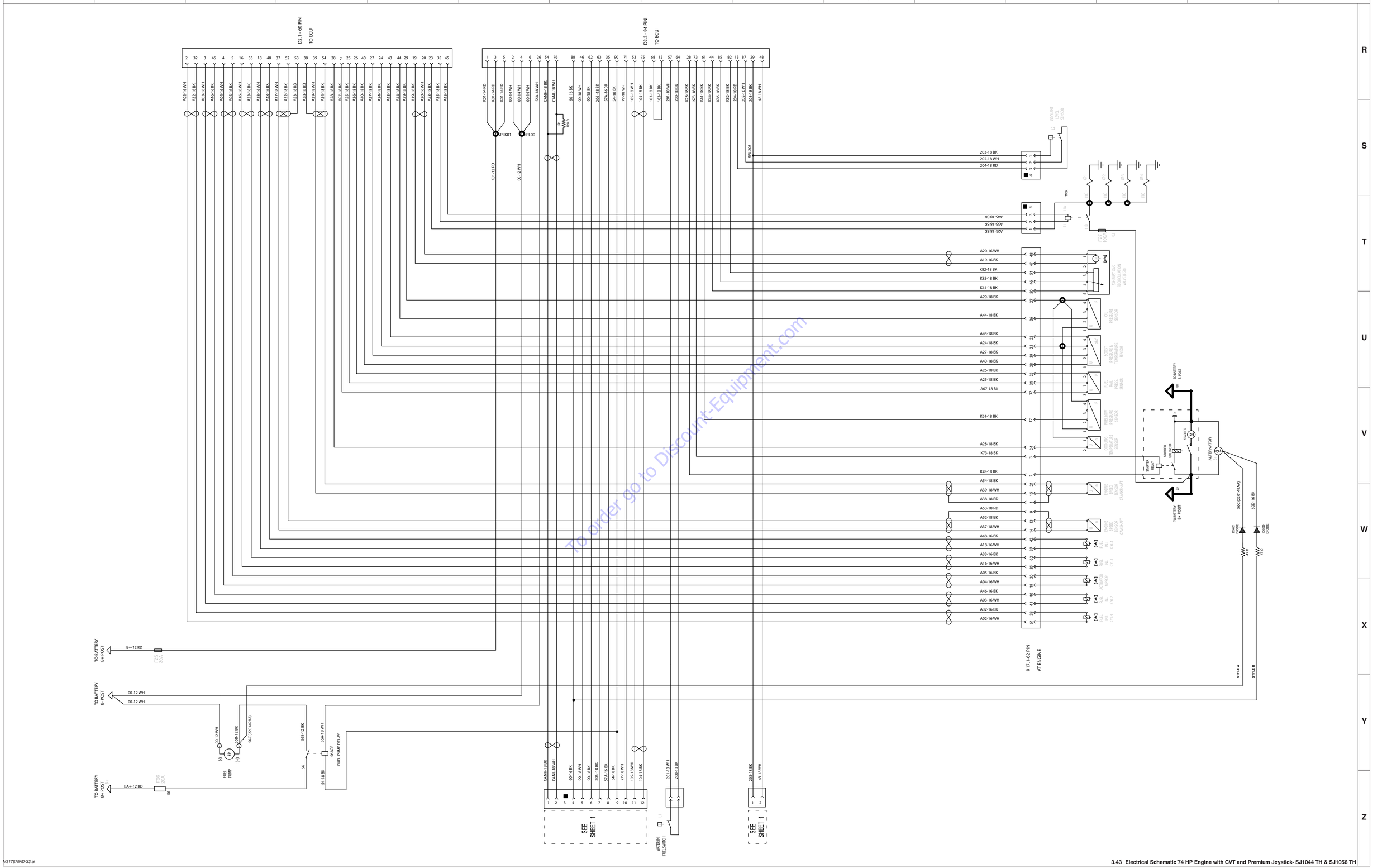
3.43 Electrical Schematic 74 HP Engine with CVT and Premium Joystick- SJ1044 TH & SJ1056 TH

3.43 Electrical Schematic 74 HP Engine with CVT and Premium Joystick- SJ1044 TH & SJ1056 TH



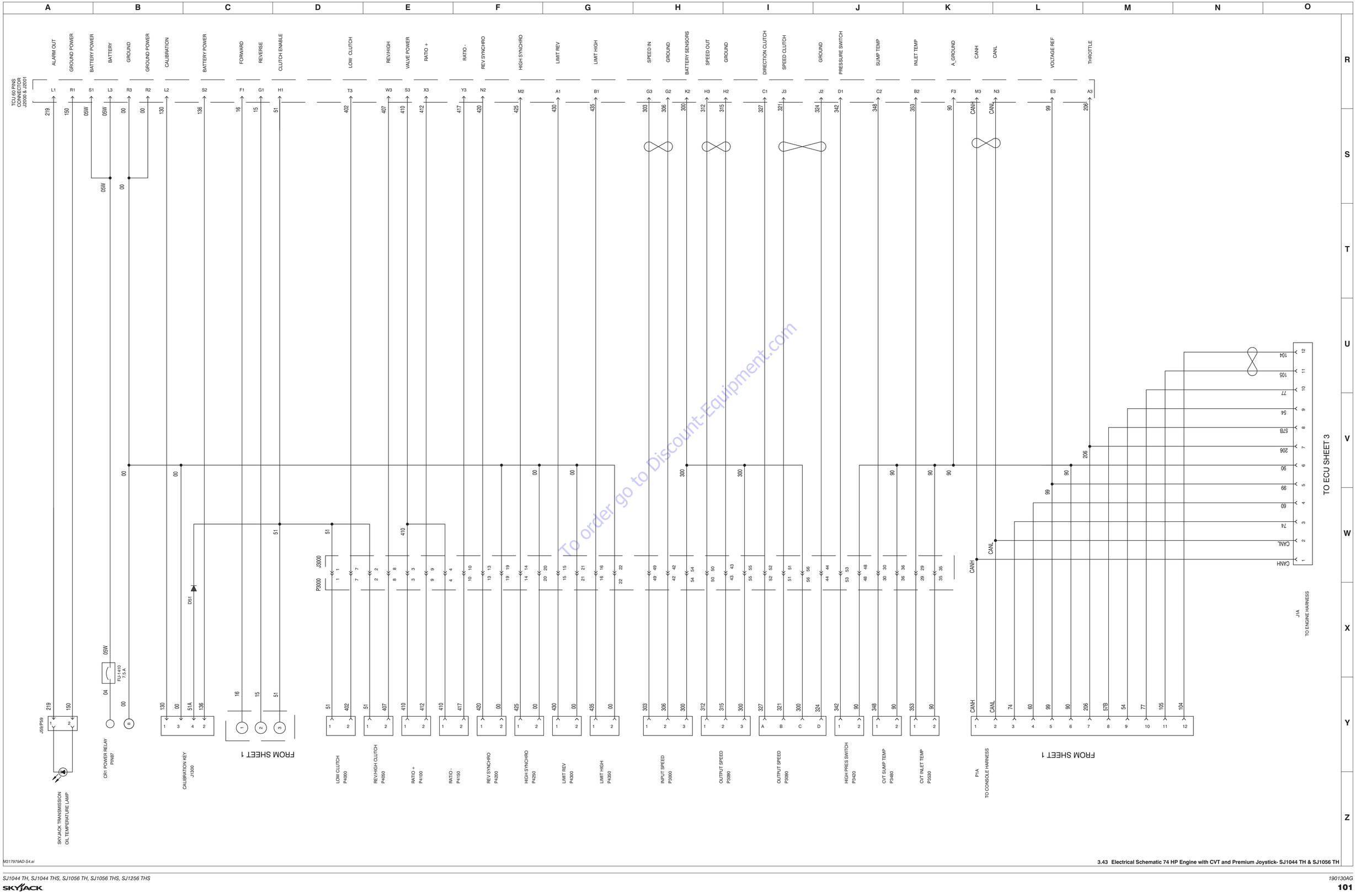
M217979AD-S2.ai

3.43 Electrical Schematic 74 HP Engine with CVT and Premium Joystick- SJ1044 TH & SJ1056 TH



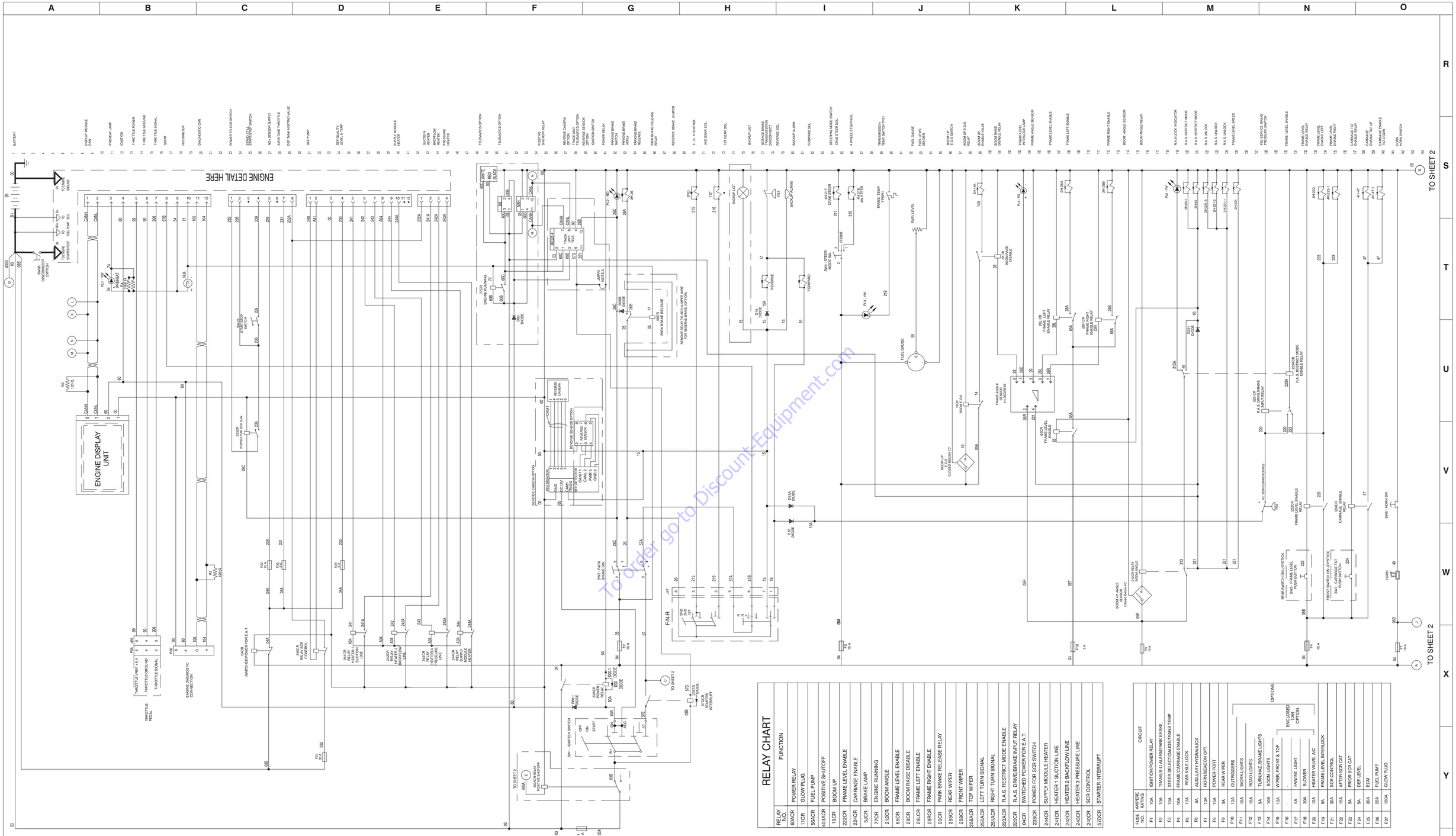
3.43 Electrical Schematic 74 HP Engine with CVT and Premium Joystick- SJ1044 TH & SJ1056 TH

3.43 Electrical Schematic 74 HP Engine with CVT and Premium Joystick- SJ1044 TH & SJ1056 TH



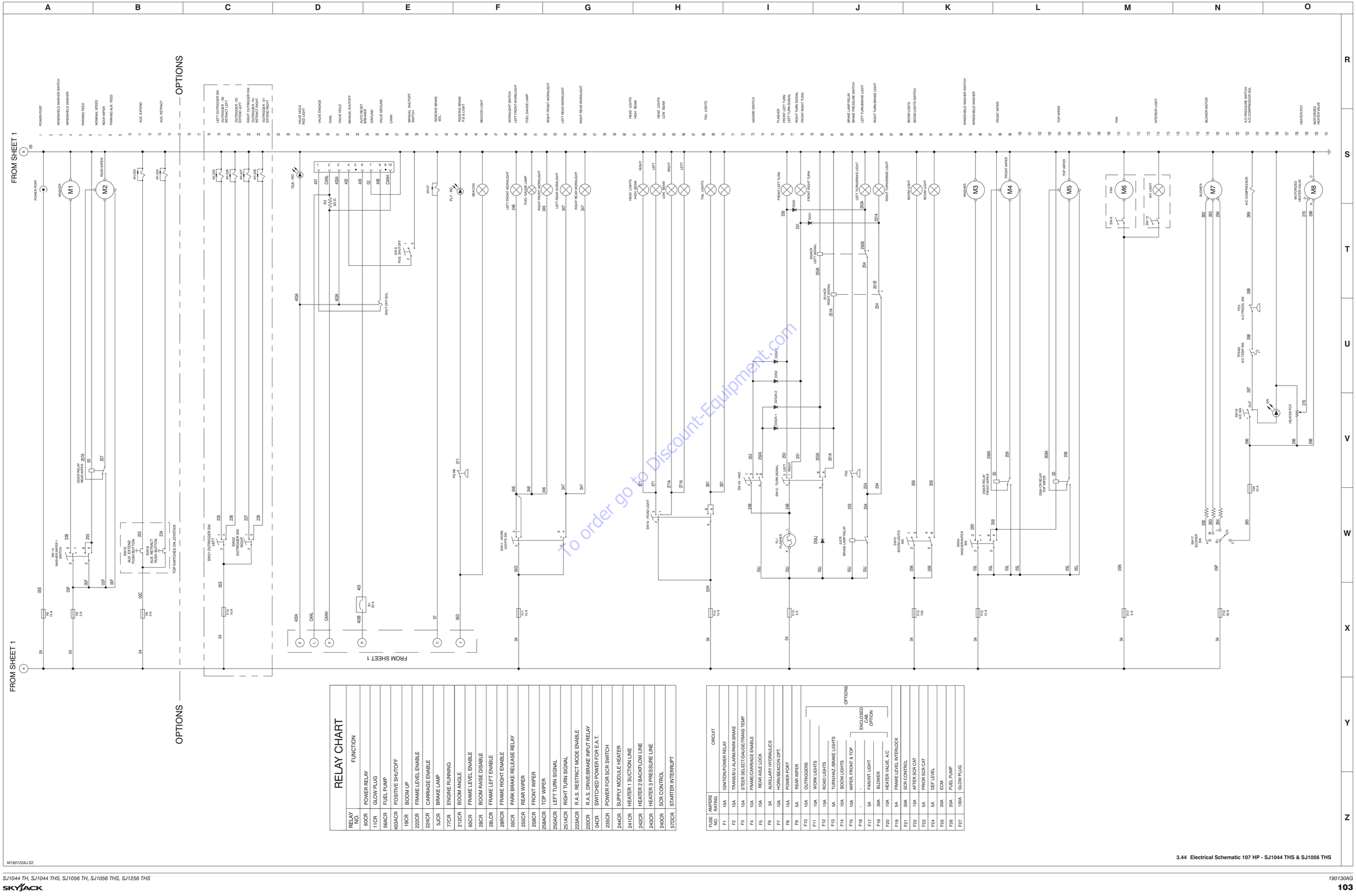
M217979AD-S4.ai

3.43 Electrical Schematic 74 HP Engine with CVT and Premium Joystick- SJ1044 TH & SJ1056 TH



RELAY NO.	FUNCTION
60ACR	POWER RELAY
11CR	GLOW PLUG
56ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	CARRIAGE ENABLE
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
28LCR	FRAME LEFT ENABLE
28RCR	FRAME RIGHT ENABLE
05CR	PARK BRAKE RELEASE RELAY
255CR	REAR WIPER
256CR	FRONT WIPER
258ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
04CR	SWITCHED POWER FOR E.A.T.
235CR	POWER FOR SCR SWITCH
244CR	SUPPLY MODULE HEATER
241CR	HEATER 1 SUCTION LINE
242CR	HEATER 2 BACKFLOW LINE
243CR	HEATER 3 PRESSURE LINE
240CR	SCR CONTROL
57DCR	STARTER INTERRUPT

FUSE NO.	AMPERE RATING	CIRCUIT
F1	10A	IGNITION/POWER RELAY
F2	10A	TRANS/B-U ALARM/PARK BRAKE
F3	10A	STEER SELECT/GAUGE/TRANS TEMP
F4	10A	FRAME/CARRIAGE ENABLE
F5	10A	REAR AXLE LOCK
F6	5A	AUXILLARY HYDRAULICS
F7	10A	HORN/BEACON OPT.
F8	15A	POWER PORT
F9	5A	REAR WIPER
F10	10A	OUTRIGGERS
F11	10A	WORK LIGHTS
F12	15A	ROAD LIGHTS
F13	5A	TURN/HAZ.BRAKE LIGHTS
F14	10A	BOOM LIGHTS
F15	10A	WIPER, FRONT & TOP
F16	-	-
F17	5A	FAN/INT. LIGHT
F18	30A	BLOWER
F20	10A	HEATER VALVE, A/C
F19	5A	FRAME LEVEL INTERLOCK
F21	30A	SCR CONTROL
F22	15A	AFTER SCR CAT
F23	5A	PRIOR SCR CAT
F24	5A	DEF LEVEL
F25	30A	ECM
F26	20A	FUEL PUMP
F27	100A	GLOW PLUG



RELAY CHART

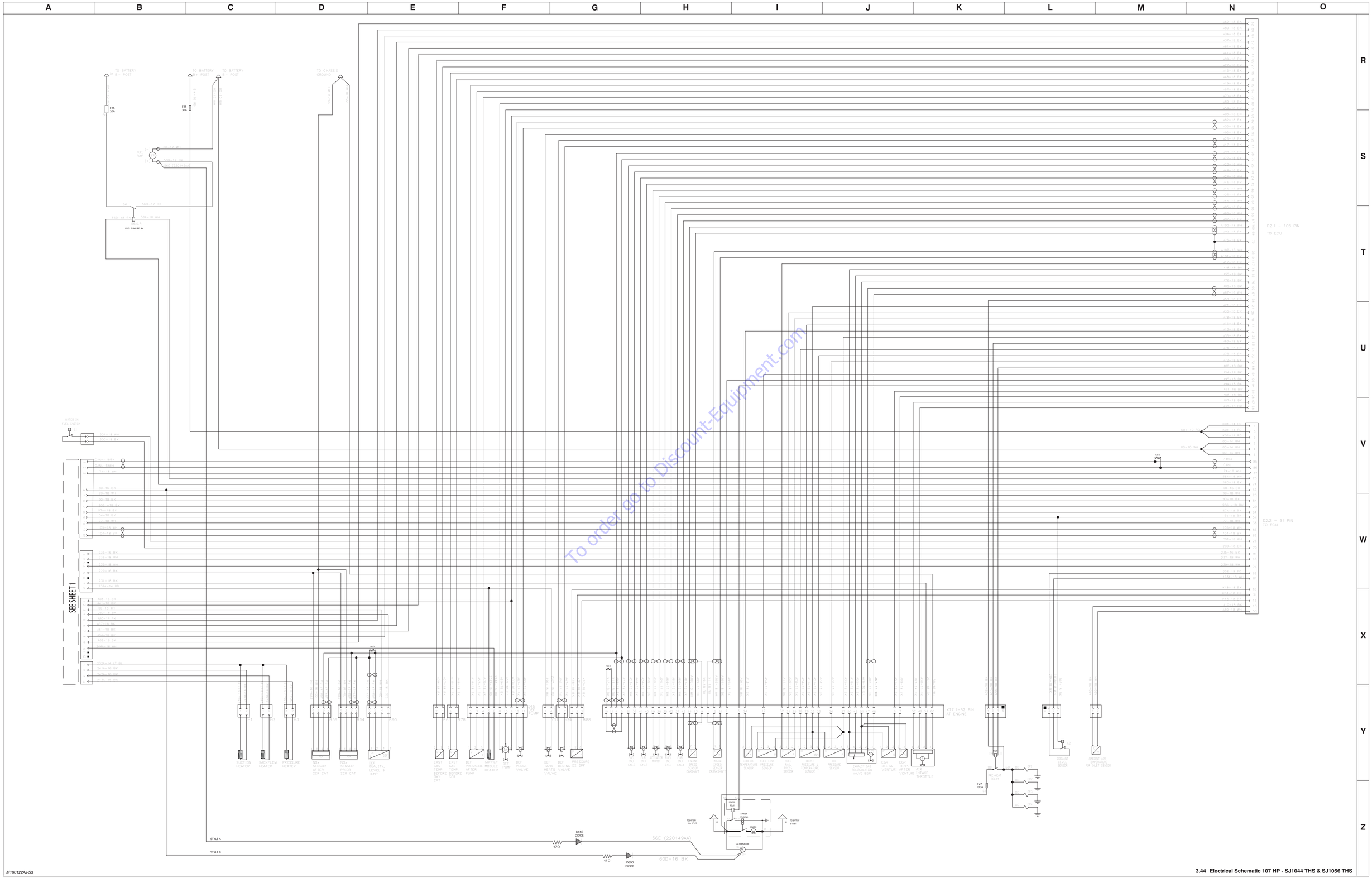
RELAY NO.	FUNCTION
60CR	POWER RELAY
11CR	GLOW PLUG
96ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	CARRIAGE ENABLE
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
28LCR	FRAME LEFT ENABLE
28RCR	FRAME RIGHT ENABLE
05CR	PARK BRAKE RELEASE RELAY
256CR	REAR WIPER
238CR	FRONT WIPER
259ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
04CR	SWITCHED POWER FOR E.A.T.
235CR	POWER FOR SCR SWITCH
244CR	SUPPLY MODULE HEATER
241CR	HEATER 1 SUCTION LINE
242CR	HEATER 2 BACKFLOW LINE
243CR	HEATER 3 PRESSURE LINE
240CR	SCR CONTROL
57DCR	STARTER INTERRUPT

FUSE NO.	AMPERE RATING	CIRCUIT
F1	10A	IGNITION/POWER RELAY
F2	10A	TRANS/B-U ALARM/PARK BRAKE
F3	10A	STEER SELECT/GAUGE/TRANS TEMP
F4	10A	FRAME/CARRIAGE ENABLE
F5	10A	REAR AXLE LOCK
F6	5A	AUXILIARY HYDRAULICS
F7	10A	HORN/BEACON OPT.
F8	15A	POWER PORT
F9	5A	REAR WIPER
F10	10A	OUTRIGGERS
F11	10A	WORK LIGHTS
F12	15A	ROAD LIGHTS
F13	5A	TURN/HAZ.,BRAKE LIGHTS
F14	10A	BOOM LIGHTS
F15	10A	WIPER, FRONT & TOP
F16	-	-
F17	5A	FAN/INT. LIGHT
F18	30A	BLOWER
F20	10A	HEATER VALVE, A/C
F19	5A	FRAME LEVEL INTERLOCK
F21	30A	SCR CONTROL
F22	15A	AFTER SCR CAT
F23	5A	PRIOR SCR CAT
F24	5A	DEF LEVEL
F25	30A	ECM
F26	20A	FUEL PUMP
F27	100A	GLOW PLUG

OPTIONS: ENCLOSED CAB OPTION

M190122AJ-S2

3.44 Electrical Schematic 107 HP - SJ1044 THS & SJ1056 THS



3.45 Electrical Schematic 107 HP, Premium Joystick- SJ1044 TH & SJ1056 TH

RELAY CHART

RELAY NO.	FUNCTION
60ACR	POWER RELAY
11CR	GLOW PLUG
56ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	NOT USED
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
28LCR	FRAME LEFT ENABLE
28RCR	FRAME RIGHT ENABLE
05CR	PARK BRAKE RELEASE RELAY
255CR	REAR WIPER
258CR	FRONT WIPER
258ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
04CR	SWITCHED POWER FOR E.A.T.
235CR	POWER FOR SCR SWITCH
244CR	SUPPLY MODULE HEATER
241CR	HEATER 1 SUCTION LINE
242CR	HEATER 2 BACKFLOW LINE
243CR	HEATER 3 PRESSURE LINE
240CR	SCR CONTROL
57DCR	STARTER INTERRUPT

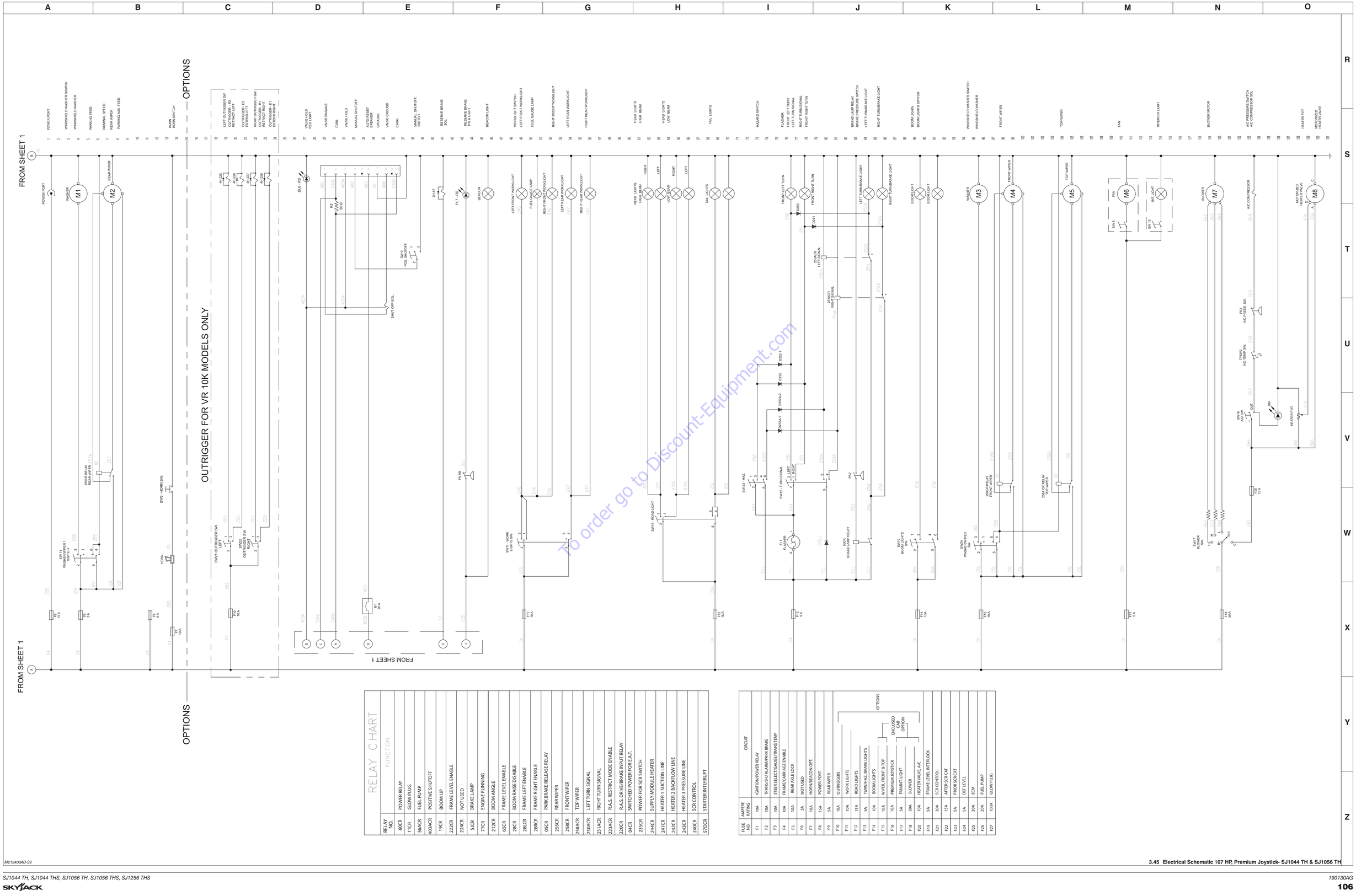
FUSE NO.	AMPERE RATING	CIRCUIT
F1	10A	IGNITION/POWER RELAY
F2	10A	TRANS/B-U ALARM/PARK BRAKE
F3	10A	STEER SELECT/GAUGE/TRANS TEMP
F4	10A	FRAME/CARRIAGE ENABLE
F5	10A	REAR AXLE LOCK
F6	5A	NOT USED
F7	10A	HORN/BEACON OPT.
F8	15A	POWER PORT
F9	5A	REAR WIPER
F10	10A	OUTRIGGERS
F11	10A	WORK LIGHTS
F12	15A	ROAD LIGHTS
F13	5A	TURN/HAZ./BRAKE LIGHTS
F14	10A	BOOM LIGHTS
F15	10A	WIPER, FRONT & TOP
F16	10A	PREMIUM JOYSTICK
F17	5A	FAN/INT. LIGHT
F18	30A	BLOWER
F20	10A	HEATER VALVE, A/C
F19	5A	FRAME LEVEL INTERLOCK
F21	30A	SCR CONTROL
F22	15A	AFTER SCR CAT
F23	5A	PRIOR SCR CAT
F24	5A	DEF LEVEL
F25	30A	ECM
F26	20A	FUEL PUMP
F27	100A	GLOW PLUG

OPTIONS

ENCLOSED CAB OPTION

M213408AD-S1

3.45 Electrical Schematic 107 HP, Premium Joystick- SJ1044 TH & SJ1056 TH

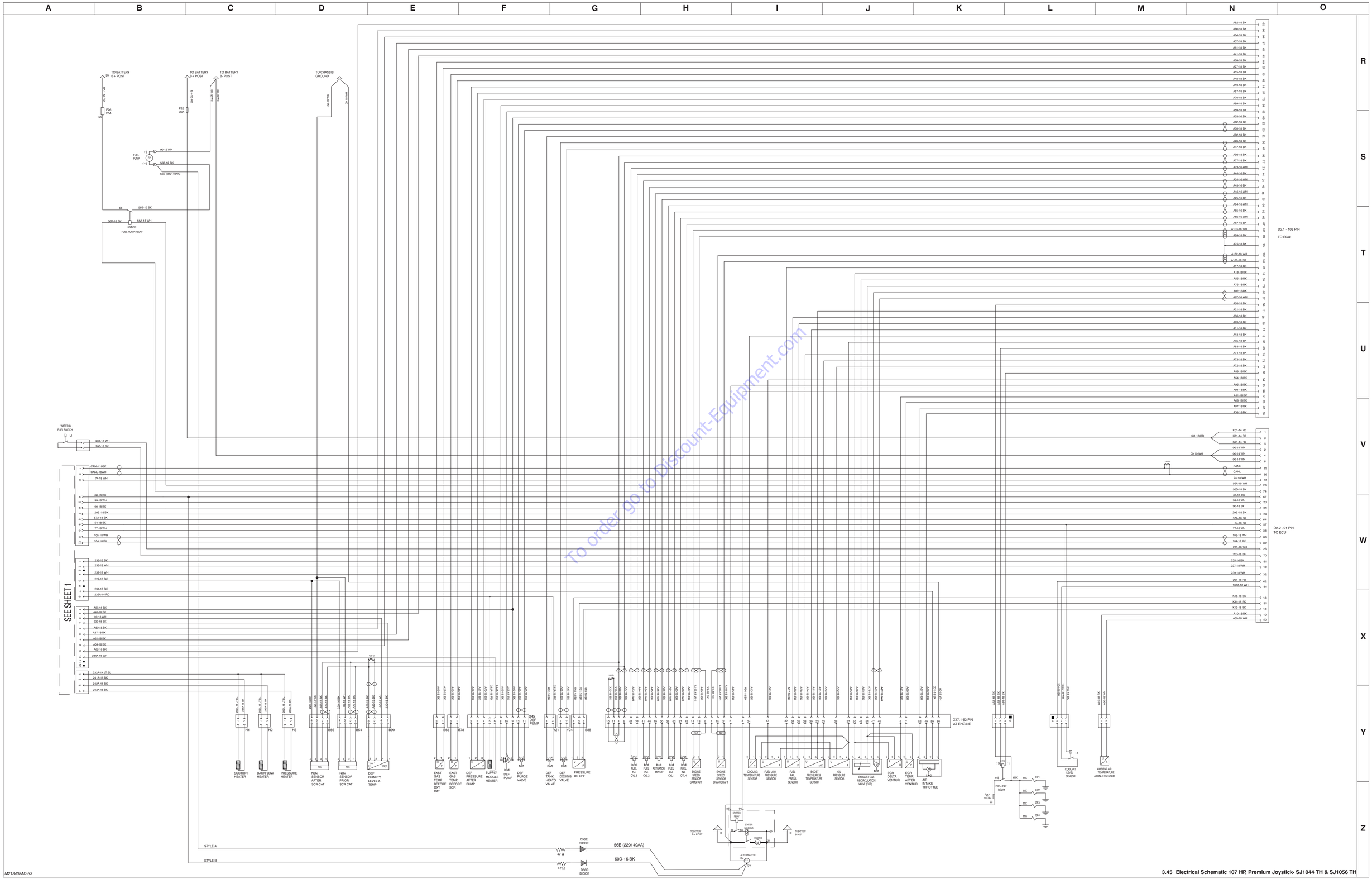


RELAY CHART

RELAY NO.	FUNCTION
60CR	POWER RELAY
11CR	GLOW PLUG
56ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	NOT USED
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
286CR	FRAME LEFT ENABLE
288CR	FRAME RIGHT ENABLE
09CR	PARK BRAKE RELEASE RELAY
255CR	REAR WIPER
258CR	FRONT WIPER
258ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
04CR	SWITCHED POWER FOR E.A.T.
235CR	POWER FOR SCR SWITCH
244CR	SUPPLY MODULE HEATER
241CR	HEATER 1 SUCTION LINE
242CR	HEATER 2 BACKFLOW LINE
243CR	HEATER 3 PRESSURE LINE
240CR	SCR CONTROL
57DCR	STARTER INTERRUPT

FUSE NO.	AMPERE RATING	CIRCUIT	
F1	10A	IGNITION/POWER RELAY	
F2	10A	TRANS./B-U ALARM/PARK BRAKE	
F3	10A	STEER SELECT/GAUGE/TRANS TEMP	
F4	10A	FRAME/CARRIAGE ENABLE	
F5	10A	REAR AXLE LOCK	
F6	5A	NOT USED	
F7	10A	HORN/BEACON OPT.	
F8	15A	POWER PORT	
F9	5A	REAR WIPER	
F10	10A	OUTRIGGERS	
F11	10A	WORK LIGHTS	OPTIONS
F12	15A	ROAD LIGHTS	
F13	5A	TURN/HAZ./BRAKE LIGHTS	
F14	10A	BOOM LIGHTS	
F15	10A	WIPER, FRONT & TOP	ENCLOSED CAB OPTION
F16	10A	PREMIUM JOYSTICK	
F17	5A	FAN/INT. LIGHT	
F18	30A	BLOWER	
F20	10A	HEATER VALVE, A/C	
F19	5A	FRAME LEVEL INTERLOCK	
F21	30A	SCR CONTROL	
F22	15A	AFTER SCR CAT	
F23	5A	PRIOR SCR CAT	
F24	5A	DEF LEVEL	
F25	30A	ECM	
F26	20A	FUEL PUMP	
F27	100A	GLOW PLUG	

3.45 Electrical Schematic 107 HP, Premium Joystick- SJ1044 TH & SJ1056 TH

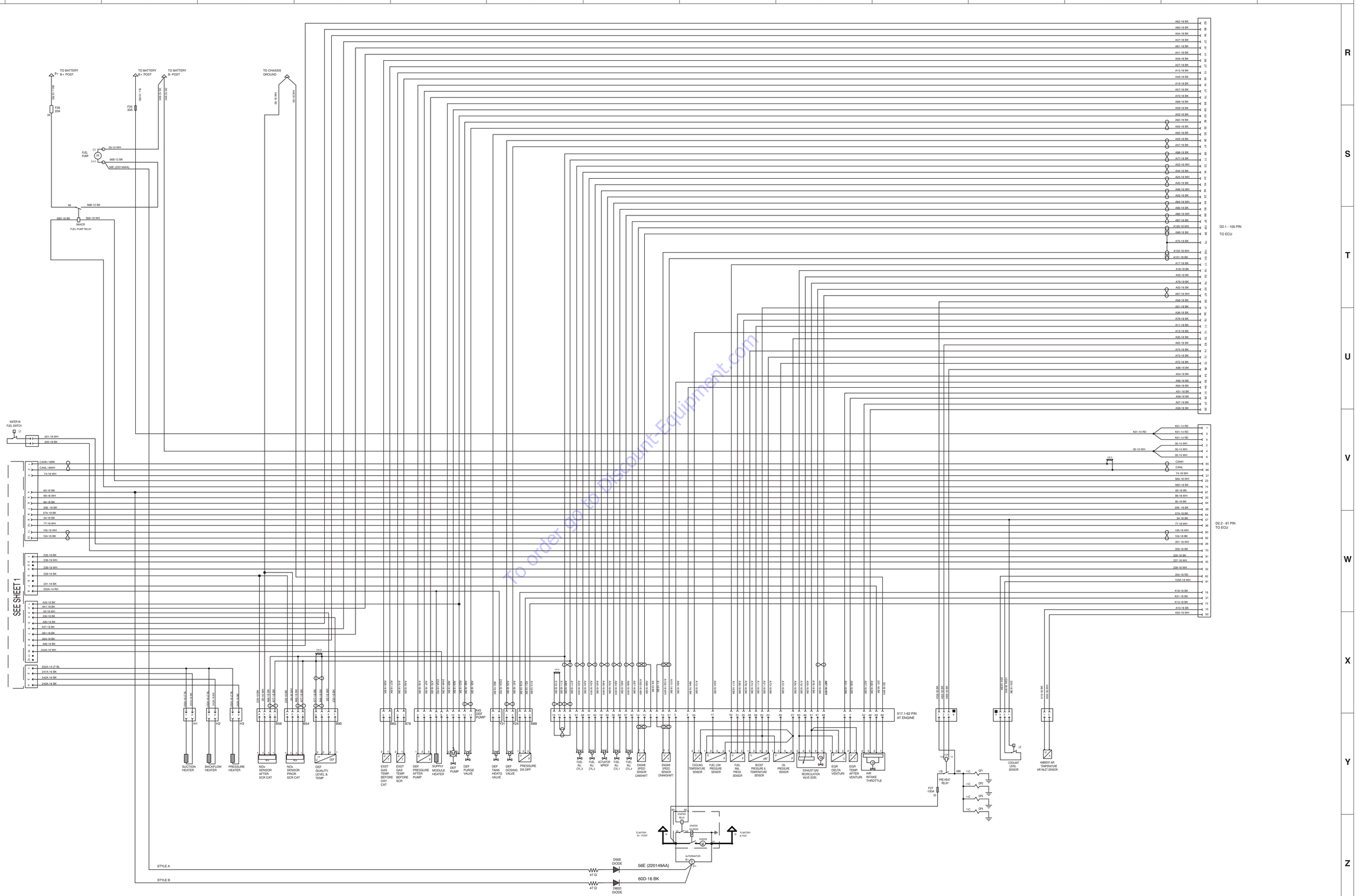


M213408AD-S3

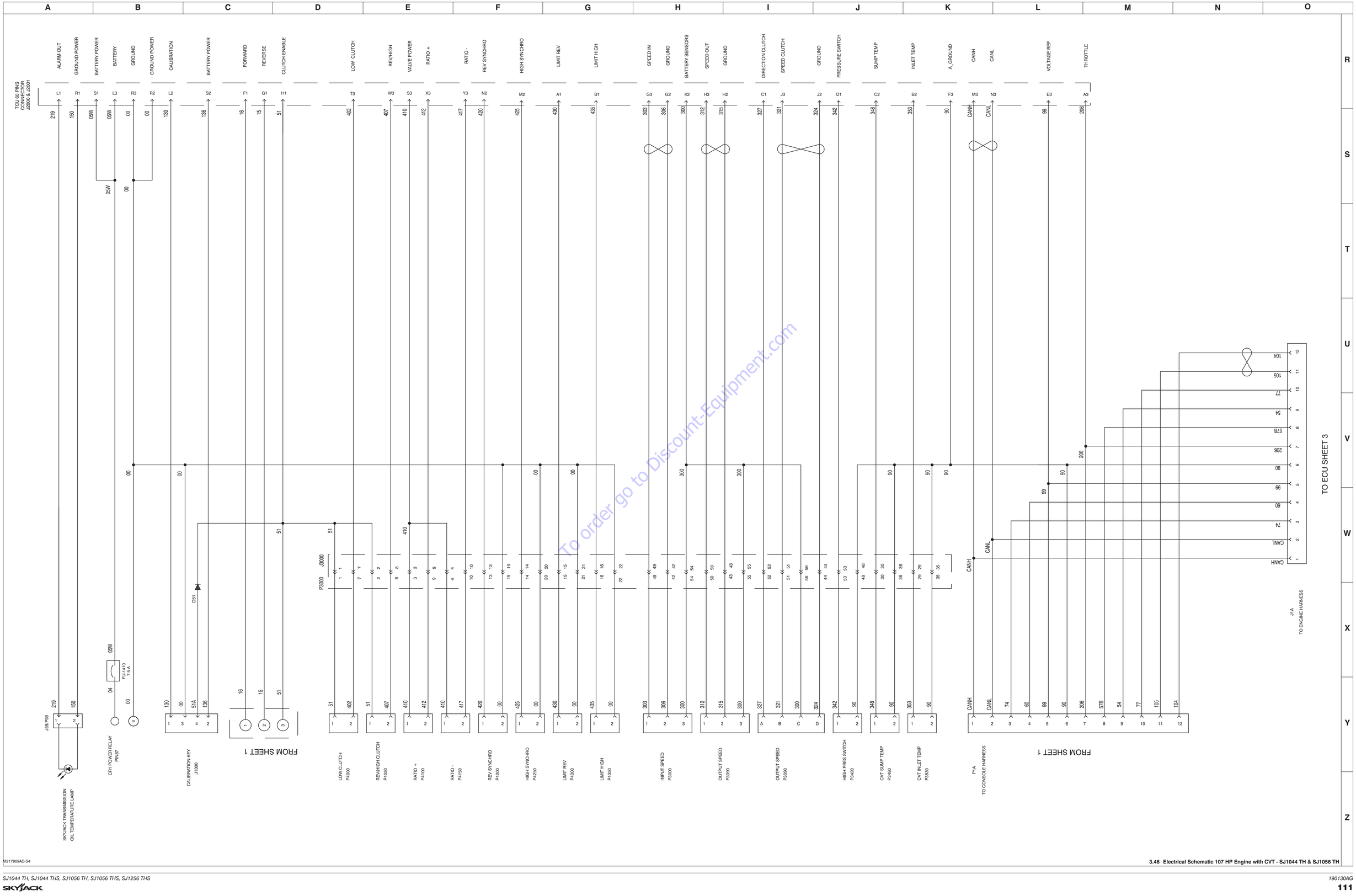
3.46 Electrical Schematic 107 HP Engine with CVT - SJ1044 TH & SJ1056 TH


FROM SHEET 1
OPTIONS
OUTRIGGERS
POWER PORT
WINDSHIELD WASHER SWITCH
WINDSHIELD WASHER
PARKING FEED
NOMINAL SPEED
REAR WIPER
PARKING AUX. FEED
AUX. EXTEND
AUX. RETRACT
LEFT OUTRIGGER SW.
RIGHT OUTRIGGER SW.
VALVE HOLD RED LIGHT
VALVE ENGAGE
CANL
VALVE HOLD
MANUAL SHUTOFF
AUTO-RESET BREAKER
GROUND
VALVE GROUND
CANH
MANUAL SHUTOFF. SWITCH
RESERVE BRAKE SOL.
RESERVE BRAKE P/S & LIGHT
BEACON LIGHT
WORKLIGHT SWITCH
LEFT FRONT WORKLIGHT
FUEL GAUGE LAMP
RIGHT FRONT WORKLIGHT
LEFT REAR WORKLIGHT
RIGHT REAR WORKLIGHT
HEAD LIGHTS HIGH BEAM
HEAD LIGHTS LOW BEAM
TAIL LIGHTS
HAZARD SWITCH
FLASHER
FRONT LEFT TURN
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
FRONT RIGHT TURN
BRAKE LAMP RELAY
BRAKE PRESSURE SWITCH
LEFT TURN/BRAKE LIGHT
RIGHT TURN/BRAKE LIGHT
BOOM LIGHTs
BOOM LIGHTS SWITCH
FRONT WIPER
TOP WIPER
FAN
INTERIOR LIGHT
BLOWER MOTOR
A/C PRESSURE SWITCH
A/C COMPRESSOR SOL
HEATER POT.
MOTORIZED HEATER VALVE
SW 14 WASHER/WIPER 1 SWITCH
255CR RELAY REAR WIPER
SW15 AUX. EXTEND PUSH BUTTON
SW16 AUX. RETRACT PUSH BUTTON
TOP SWITCHES ON JOYSTICK
SW21 OUTRIGGER SW. LEFT
SW22 OUTRIGGER SW. RIGHT
SW 9 POS. SHUTOFF.
SHUT OFF-SOL.
R3 50 Ω
B1 20 A
SW11 - WORK LIGHTS SW.
SW19 - ROAD LIGHT
SW 23 - HAZ.
SW12 - TURN SIGNAL
FL1 FLASHER
5JCR BRAKE LAMP RELAY
250ACR LEFT SIGNAL
251ACR RIGHT SIGNAL
SW10 BOOM LIGHTS SW.
SW24 WASHER/WIPER SW.
258CR RELAY FRONT WIPER
258A CR RELAY TOP WIPER
SW17 BLOWER SW.
SW18 A/C SW.
PS3 A/C PRESS. SW.
TPSW2 A/C TEMP. SW.
F8 15 A
F9 5 A
F6 5 A
F10 10 A
F11 10 A
F12 15 A
F13 5 A
F14 10A
F15 10 A
F17 5 A
F18 30 A
F20 10 A
M217969AD-S2

3.46 Electrical Schematic 107 HP Engine with CVT - SJ1044 TH & SJ1056 TH



3.46 Electrical Schematic 107 HP Engine with CVT - SJ1044 TH & SJ1056 TH



3.47 Electrical Schematic - SJ1256 THS

RELAY CHART

RELAY NO.	FUNCTION
60ACR	POWER RELAY
11CR	GLOW PLUG
56ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	CARRIAGE ENABLE
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
28LCR	FRAME LEFT ENABLE
28RCR	FRAME RIGHT ENABLE
05CR	PARK BRAKE RELEASE RELAY
255CR	REAR WIPER
258CR	FRONT WIPER
258ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
04CR	SWITCHED POWER FOR E.A.T.
235CR	POWER FOR SCR SWITCH
244CR	SUPPLY MODULE HEATER
241CR	HEATER 1 SUCTION LINE
242CR	HEATER 2 BACKFLOW LINE
243CR	HEATER 3 PRESSURE LINE
240CR	SCR CONTROL
57DCR	STARTER INTERRUPT

FUSE NO.	AMPERE RATING	CIRCUIT	
F1	10A	IGNITION/POWER RELAY	
F2	10A	TRANS/B-U ALARM/PARK BRAKE	
F3	10A	STEER SELECT/GAUGE/TRANS TEMP	
F4	10A	FRAME/CARRIAGE ENABLE	
F5	10A	REAR AXLE LOCK	
F6	5A	AUXILLARY HYDRAULICS	
F7	10A	HORN/BEACON OPT.	
F8	15A	POWER PORT	
F9	5A	REAR WIPER	
F10	10A	OUTRIGGERS	OPTIONS
F11	10A	WORK LIGHTS	OPTIONS
F12	15A	ROAD LIGHTS	OPTIONS
F13	5A	TURN/HAZ./BRAKE LIGHTS	OPTIONS
F14	10A	BOOM LIGHTS	OPTIONS
F15	10A	WIPER, FRONT & TOP	OPTIONS – ENCLOSED CAB OPTION
F16	-	-	OPTIONS – ENCLOSED CAB OPTION
F17	5A	FAN/INT. LIGHT	OPTIONS – ENCLOSED CAB OPTION
F18	30A	BLOWER	OPTIONS – ENCLOSED CAB OPTION
F20	10A	HEATER VALVE, A/C	OPTIONS – ENCLOSED CAB OPTION
F19	5A	FRAME LEVEL INTERLOCK	
F21	30A	SCR CONTROL	
F22	15A	AFTER SCR CAT	
F23	5A	PRIOR SCR CAT	
F24	5A	DEF LEVEL	
F25	30A	ECM	
F26	20A	FUEL PUMP	
F27	100A	GLOW PLUG	

3.47 Electrical Schematic 107 HP - SJ1256 THS

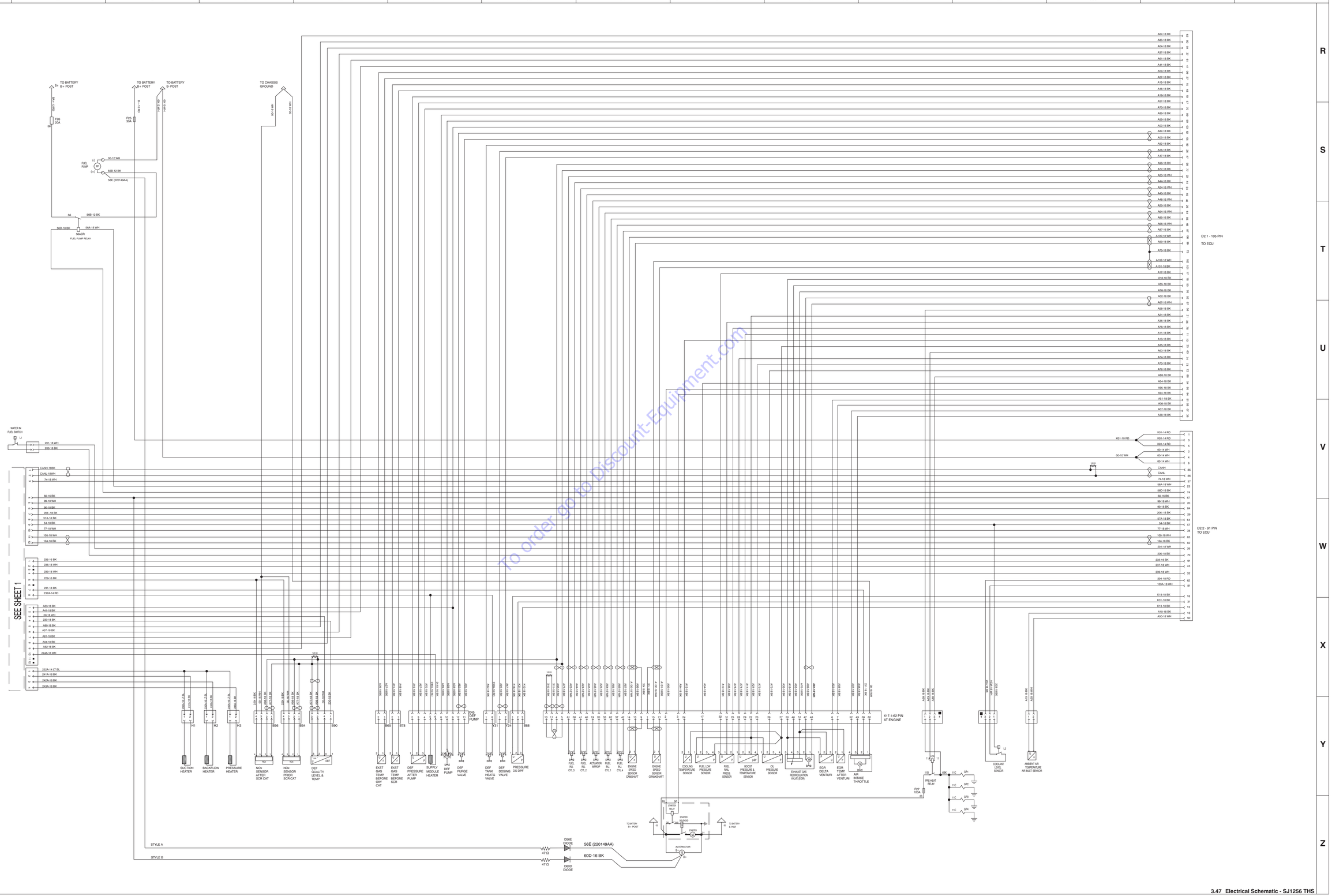
RELAY NO.	FUNCTION
60CR	POWER RELAY
11CR	GLOW PLUG
56ACR	FUEL PUMP
403ACR	POSITIVE SHUTOFF
19CR	BOOM UP
222CR	FRAME LEVEL ENABLE
224CR	CARRIAGE ENABLE
5JCR	BRAKE LAMP
77CR	ENGINE RUNNING
212CR	BOOM ANGLE
65CR	FRAME LEVEL ENABLE
28CR	BOOM RAISE DISABLE
28LCR	FRAME LEFT ENABLE
28RCR	FRAME RIGHT ENABLE
05CR	PARK BRAKE RELEASE RELAY
255CR	REAR WIPER
258CR	FRONT WIPER
258ACR	TOP WIPER
250ACR	LEFT TURN SIGNAL
251ACR	RIGHT TURN SIGNAL
223ACR	R.A.S. RESTRICT MODE ENABLE
220CR	R.A.S. DRIVE/BRAKE INPUT RELAY
04CR	SWITCHED POWER FOR E.A.T.
235CR	POWER FOR SCR SWITCH
244CR	SUPPLY MODULE HEATER
241CR	HEATER 1 SUCTION LINE
242CR	HEATER 2 BACKFLOW LINE
243CR	HEATER 3 PRESSURE LINE
240CR	SCR CONTROL
57DCR	STARTER INTERRUPT

FUSE NO.	AMPERE RATING	CIRCUIT	
F1	10A	IGNITION/POWER RELAY	
F2	10A	TRANS/B-U ALARM/PARK BRAKE	
F3	10A	STEER SELECT/GAUGE/TRANS TEMP	
F4	10A	FRAME/CARRIAGE ENABLE	
F5	10A	REAR AXLE LOCK	
F6	5A	AUXILLARY HYDRAULICS	
F7	10A	HORN/BEACON OPT.	
F8	15A	POWER PORT	
F9	5A	REAR WIPER	
F10	10A	OUTRIGGERS	OPTIONS
F11	10A	WORK LIGHTS	OPTIONS
F12	15A	ROAD LIGHTS	OPTIONS
F13	5A	TURN/HAZ./BRAKE LIGHTS	OPTIONS
F14	10A	BOOM LIGHTS	OPTIONS
F15	10A	WIPER, FRONT & TOP	OPTIONS – ENCLOSED CAB OPTION
F16	-	-	OPTIONS – ENCLOSED CAB OPTION
F17	5A	FAN/INT. LIGHT	OPTIONS – ENCLOSED CAB OPTION
F18	30A	BLOWER	OPTIONS – ENCLOSED CAB OPTION
F20	10A	HEATER VALVE, A/C	OPTIONS – ENCLOSED CAB OPTION
F19	5A	FRAME LEVEL INTERLOCK	
F21	30A	SCR CONTROL	
F22	15A	AFTER SCR CAT	
F23	5A	PRIOR SCR CAT	
F24	5A	DEF LEVEL	
F25	30A	ECM	
F26	20A	FUEL PUMP	
F27	100A	GLOW PLUG	

M206090AD-S2

3.47 Electrical Schematic - SJ1256 THS

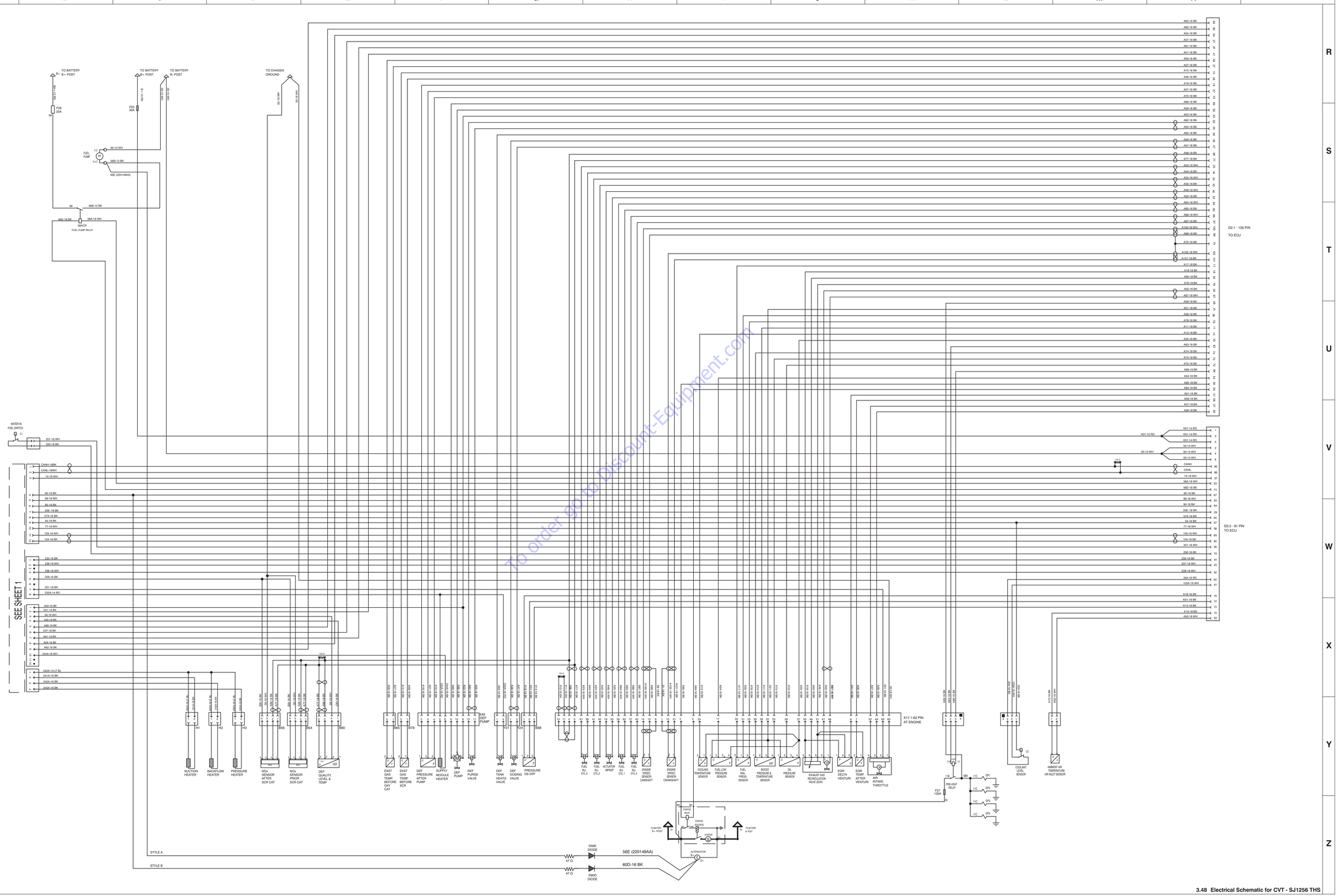
3.47 Electrical Schematic - SJ1256 THS



3.48 Electrical Schematic for CVT - SJ1256 THS

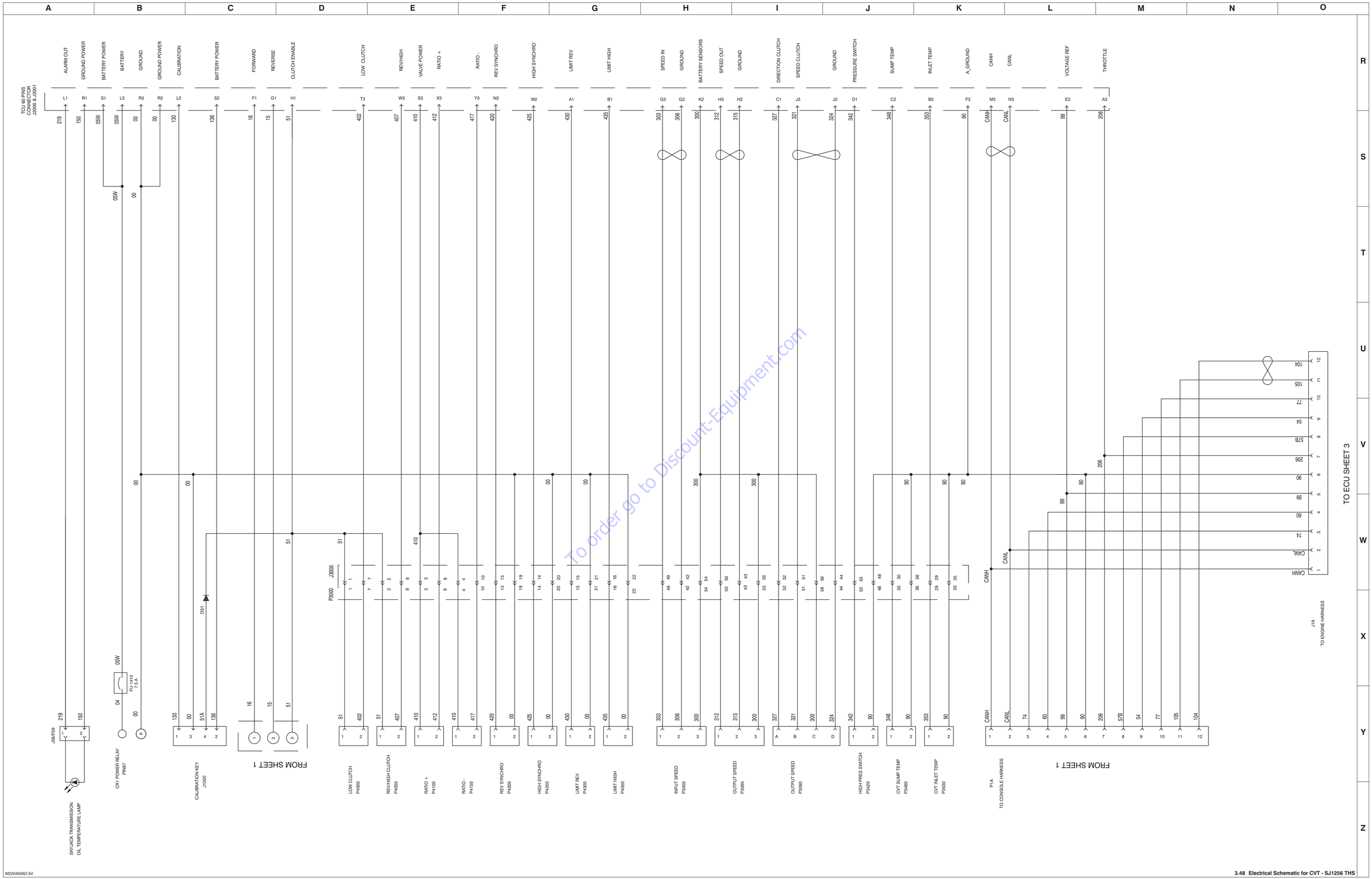
3.48 Electrical Schematic for CVT - SJ1256 THS

3.48 Electrical Schematic for CVT - SJ1256 THS



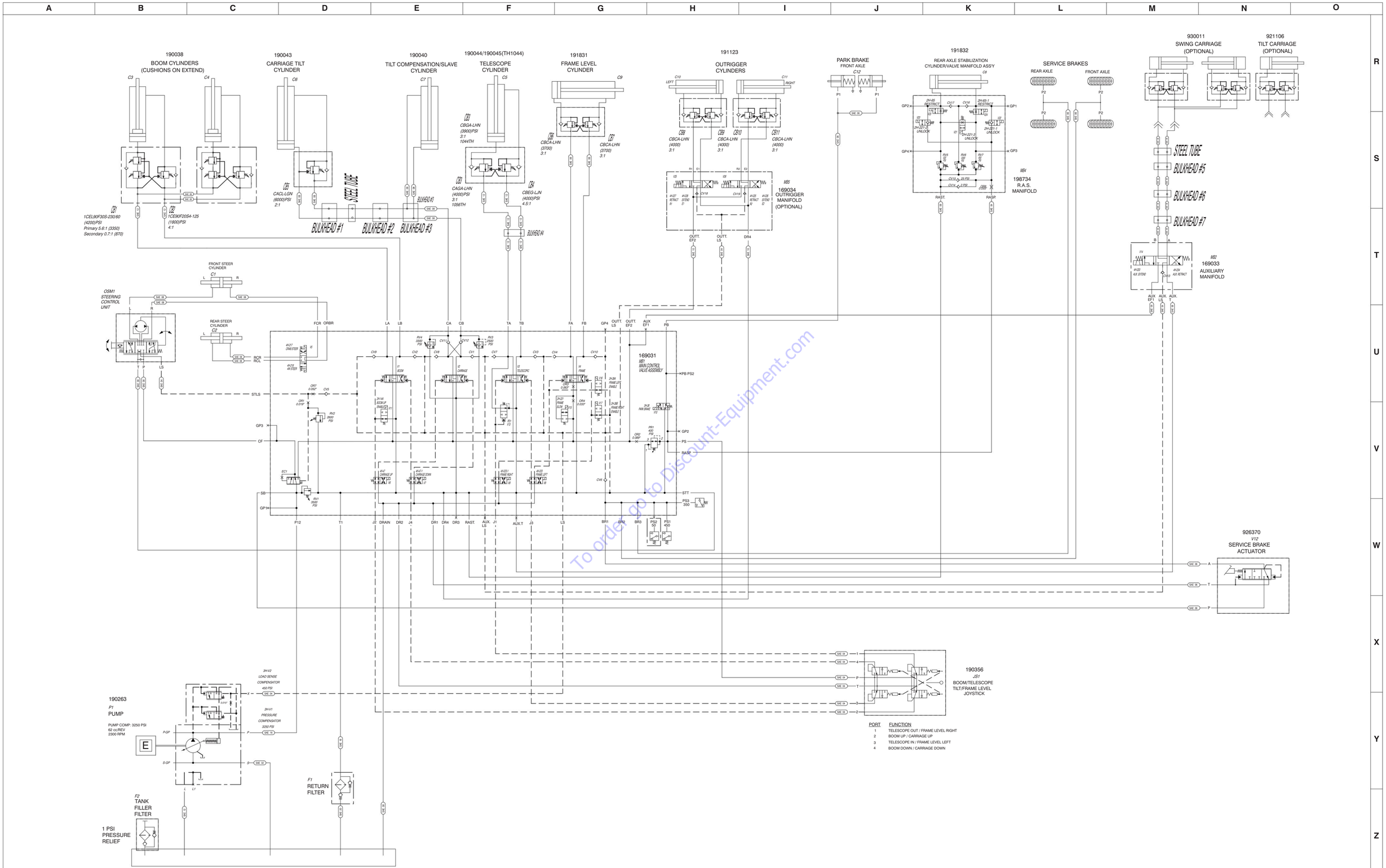
M220493AD-S3

3.48 Electrical Schematic for CVT - SJ1256 THS



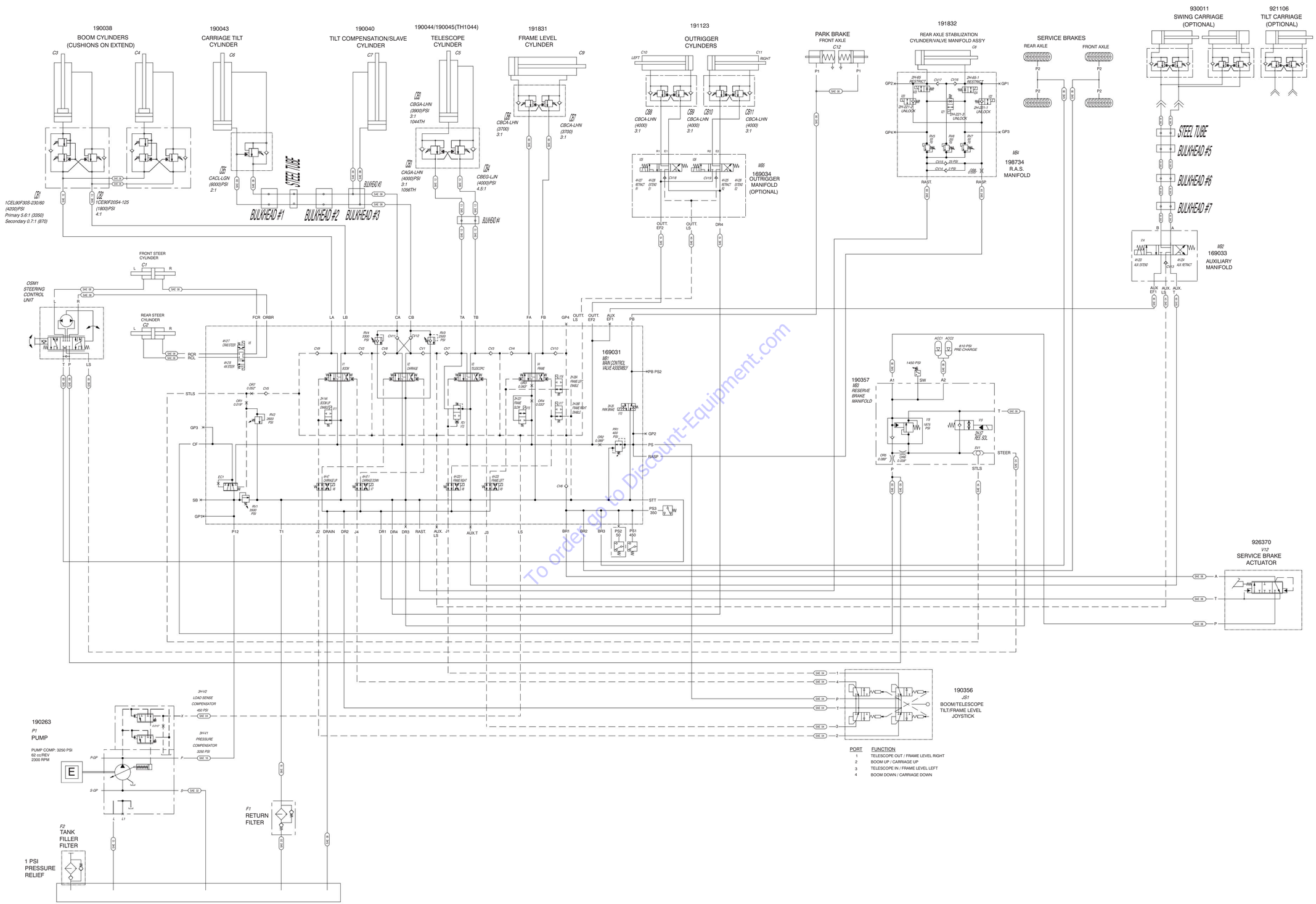
M220493AD-S4

3.49 Hydraulic Schematic - SJ1044 TH/THS & SJ1056 TH/THS



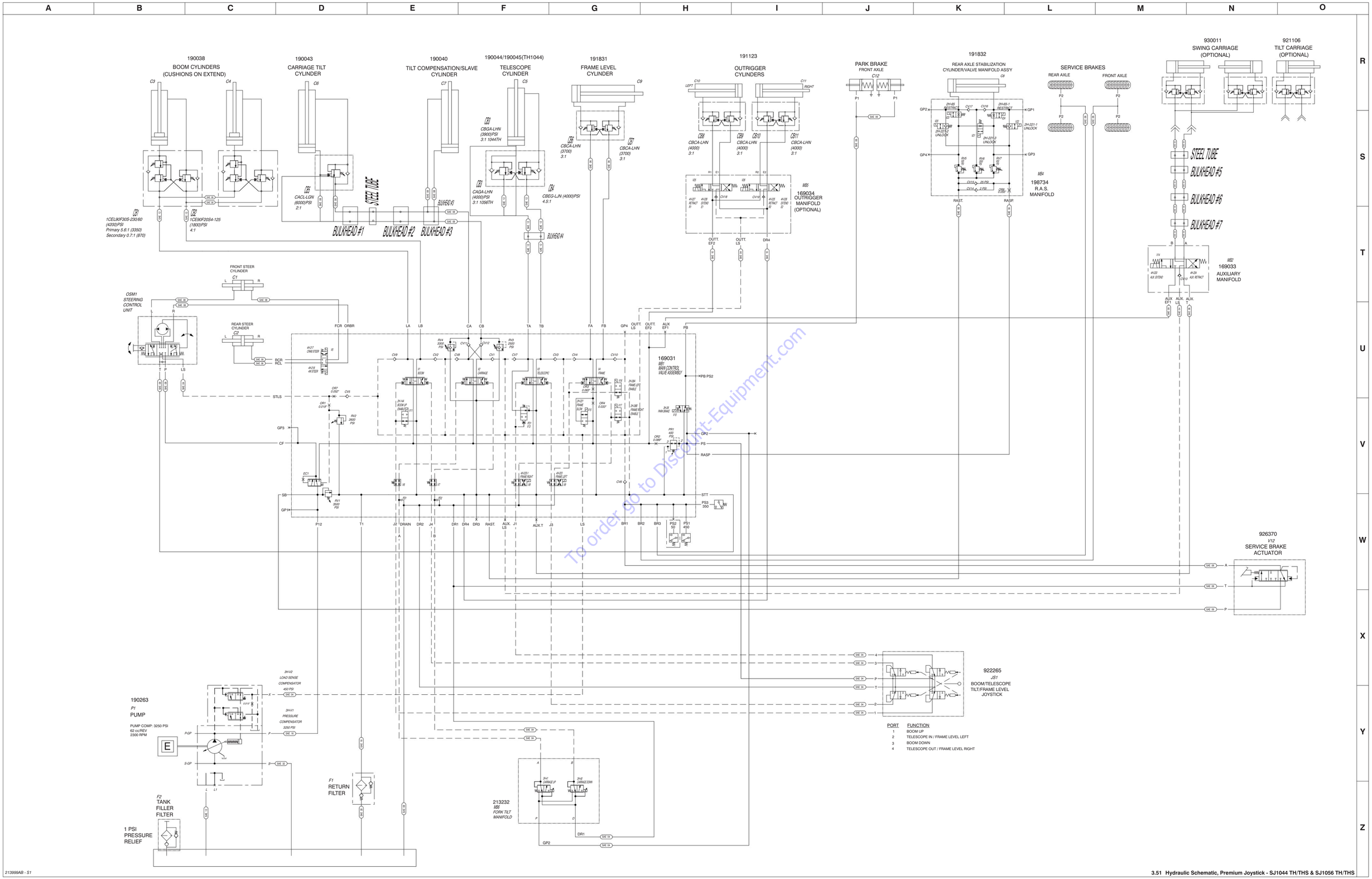
M190120AE-S1

3.50 Hydraulic Schematic (Reserve Brake Option) - SJ1044 TH/THS & SJ1056 TH/THS



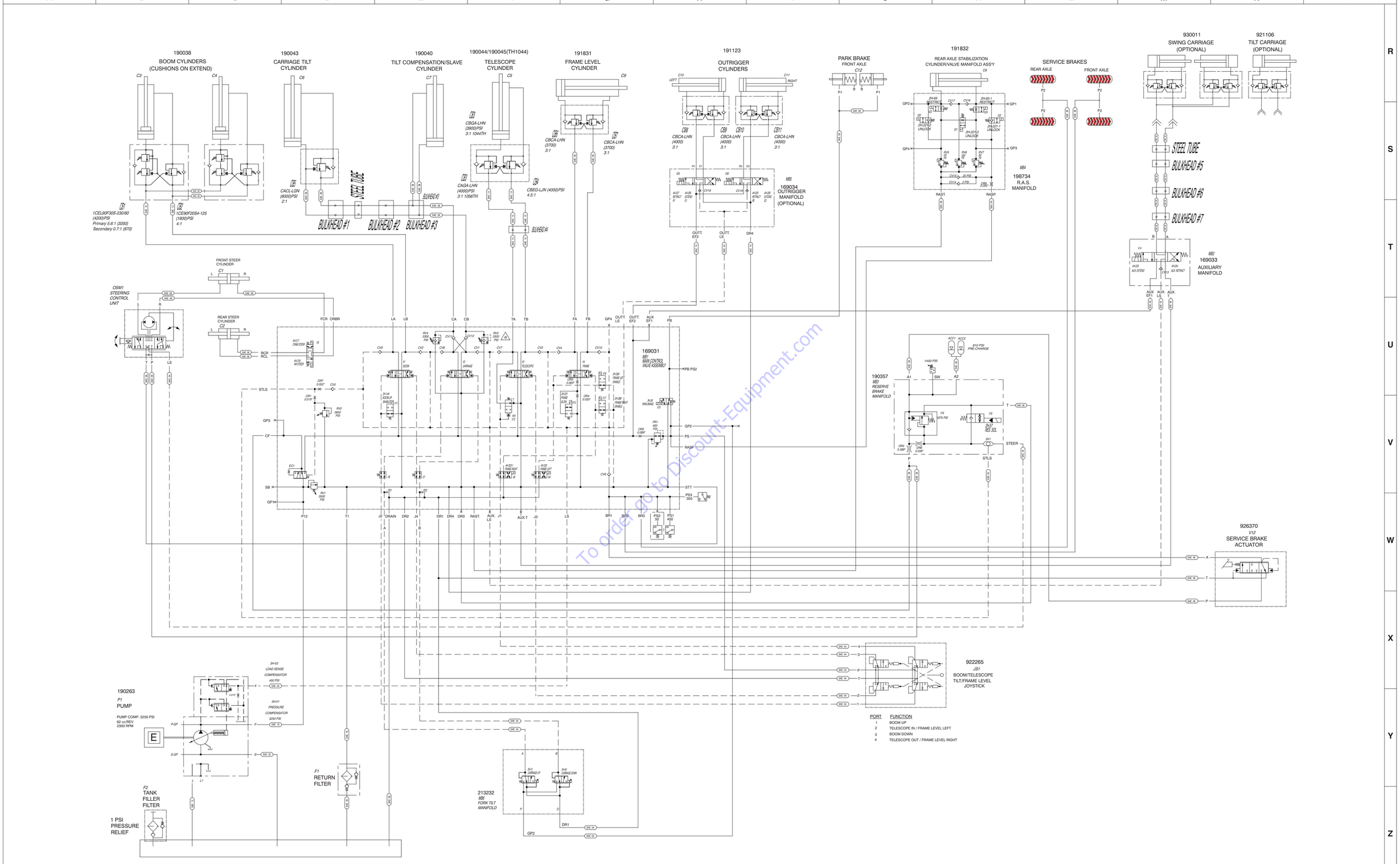
M190120AE-S2

3.51 Hydraulic Schematic, Premium Joystick - SJ1044 TH/THS & SJ1056 TH/THS



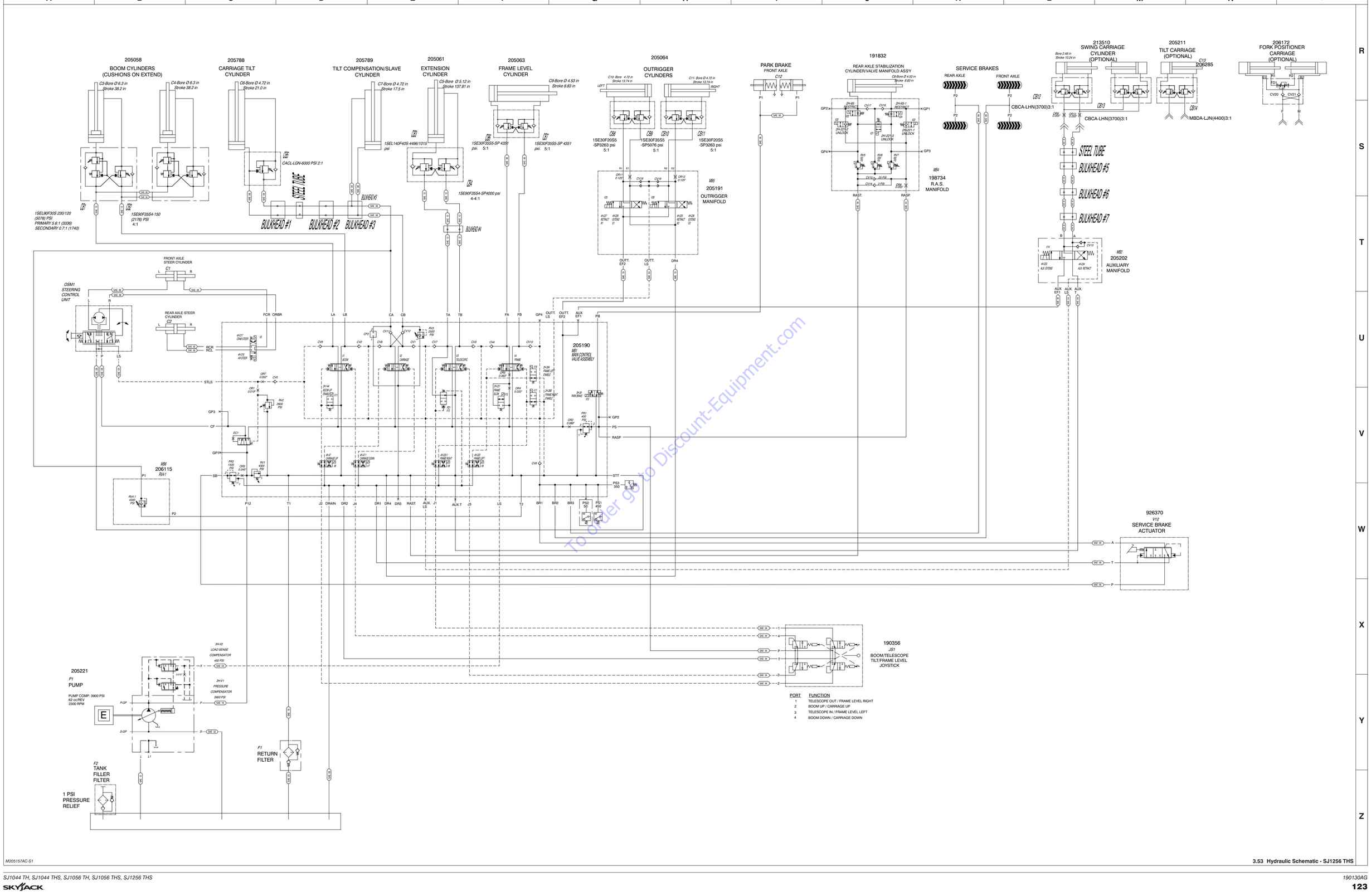
213999AB - S1

3.52 Hydraulic Schematic Premium Joystick (Reserve Brake Option) - SJ1044 TH/THS & SJ1056 TH/THS



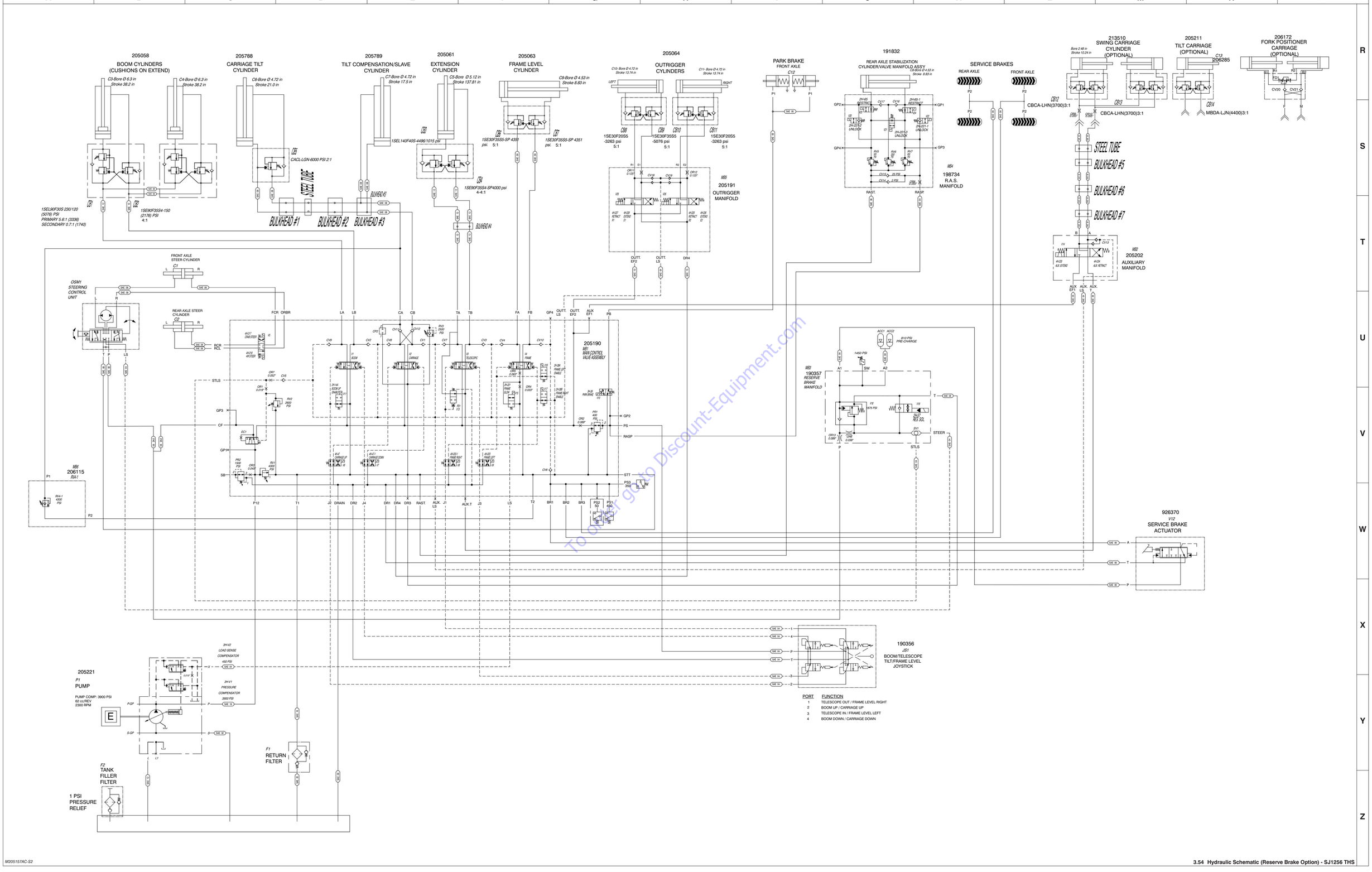
213999AB - S2

3.53 Hydraulic Schematic - SJ1256 THS



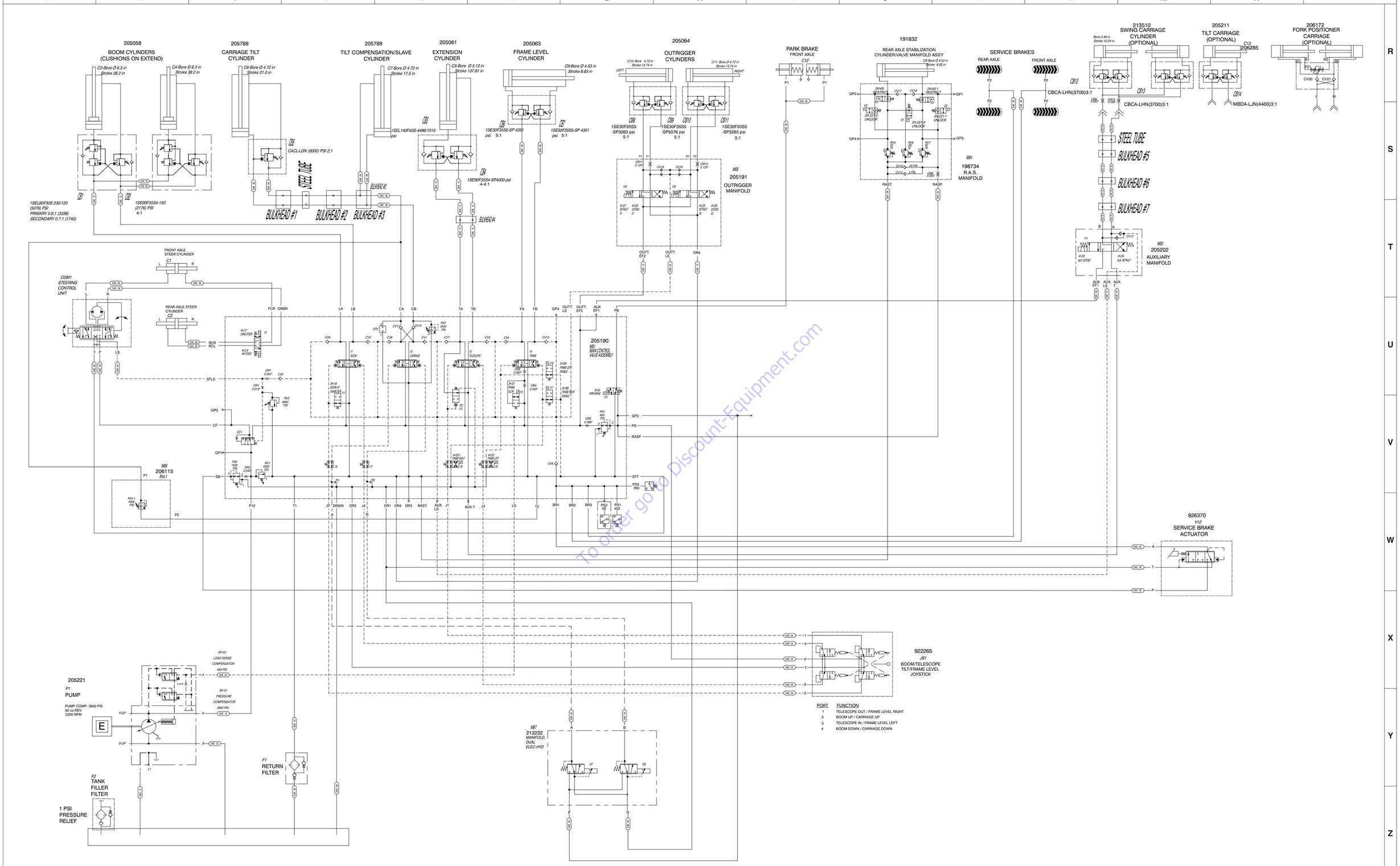
M205157AC-S1

3.54 Hydraulic Schematic (Reserve Brake Option) - SJ1256 THS



M205157AC-S2

3.55 Hydraulic Schematic for Premium Joystick- SJ1256 THS



M205157AC-S3

Section 4 – Troubleshooting Information

4.1 Introduction

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

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

1. Probable cause	**Remedy**

4.2 Electrical System

4.2-1 Engine Will Not Crank

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

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

19. Defective ignition switch SW1.	**Check for voltage at ST terminal (wire 57) while in start position. Replace if defective.**
20. Loose or broken 57 wire from ignition switch SW1 to park brake switch SW2, pin 5	**Check continuity. Replace if defective.**
21. Defective park brake switch SW2.	**Check for voltage at pin 6 of switch SW2 (wire 57A) while in start position. Replace if defective.**
22. Loose or broken 57A wire from park brake switch SW2, pin 6 to transmission shift lever pin 5	**Check continuity. Replace if defective.**
23. Defective transmission shift lever	**Check for voltage at shift lever pin 5 while in start position. Replace if defective**
24. Loose or broken 57B wire from transmission shift lever pin 6 to engine harness connector (J1) pin 8	**Check continuity. Replace if defective.**
25. Loose or broken 57B wire from engine harness connector (P1) pin 8 to 94 pin ECU connector (D2.2) pin 35	**Check continuity. Replace if defective.**

4.2-2 Engine Cranks But Will Not Run

26. Engine pre-heat circuit inoperative.	**Refer to Engine manufacturer's manual to diagnose**

NOTE

For other engine related problems, consult engine manufacturers' manual.

4.2-3 All Electrical Controls Inoperative

With following conditions:

- Park brake will not release, all other dash switches and lights inoperative, joystick electrical switches inoperative, etc.

27. Defective ignition switch SW1.	**Check for voltage at IGN terminal (wire 60) while in run position. Replace if defective**
28. Loose or broken wire 60 from ignition switch SW1 to power relay 60CR	**Check continuity. Replace if defective.**
29. Loose or broken wire 03 from B+ to power relay 60CR	**Check continuity. Replace if defective**
30. Loose or broken wire 00 from power relay 60CR to ground	**Check continuity. Replace if defective**

31. Defective relay 60CR.	**Check for voltage at NO contacts of relay (wire 04) with ignition switch SW1 in run position. Replace if defective**
32. Loose or broken wire 04 from power relay 60CR to fuse block	**Check continuity. Replace if defective**

4.2-4 Park Brake Will Not Release

With following conditions:

- Transmission remains in neutral regardless of shift lever position

1. Fuse F2 open	**Check for defective wiring. Replace fuse**
2. Loose or broken 05 wire from fuse F2 to park brake switch SW2 pin 2	**Check continuity. Replace if defective**
3. Defective park brake switch SW2	**Check for voltage at pin 1 (wire 26) of park brake switch SW2 with switch in the off position. Replace if defective**

With following conditions:

- Transmission will engage

1. Loose or broken wire 26 from park brake switch SW2 pin 1 to park brake release relay 05CR pin 30.	**Check continuity. Replace if defective**
2. Loose or broken 05 wire from fuse F2 to park brake release relay 05CR pin 85	**Check continuity. Replace if defective**
3. Loose or broken 77 wire from park brake release relay 05CR pin 86 to engine harness connector J1 pin 10.	**Check continuity. Replace if defective**
4. Loose or broken 77 wire engine harness connector P1 pin 10 to 94 pin ECU connector D2.2 pin 71	**Check continuity. Replace if defective**
5. Defective relay 05CR.	**Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective.**
6. Loose or broken 26A wire from park brake release relay 05CR pin 87 to chassis harness connector J31 pin 13.	**Check continuity. Replace if defective**
7. Loose or broken 26A wire from harness connector P31 pin 13 to park brake solenoid 3H-26A.	**Check continuity. Replace if defective**

8. Loose or broken 00 wire from park brake solenoid to ground.	**Check continuity. Replace if defective**
9. Defective brake valve coil 3H-26.	**Check continuity and resistance through coil. Replace if defective.**

4.2-5 Transmission Will Not Engage

With following conditions:

- Park brake will release

1. Loose or broken wire 26 from park brake switch SW2 pin 1 to Transmission shift lever pin 8	**Check continuity. Replace if defective**
2. Loose or broken wire 51 from forward and reverse solenoids to chassis harness connector P13 pin 2.	**Check continuity. Replace if defective.**
3. Loose or broken wire 51 from connector J13 pin 2 to brake pressure switch PS1 connector P18 pin 1.	**Check continuity. Replace if defective.**
4. Loose or broken 00 wire from brake pressure switch PS1 connector P18 pin 2 to ground.	**Check continuity. Replace if defective.**
5. Defective pressure switch PS1	**Check that switch is closed normally and opens with 450 PSI. Replace if Defective**
6. Defective transmission shifter.	**Replace if defective.**

4.2-6 No Forward Drive.

1. Loose or broken wire 16 from shifter connector J47 pin 1 to chassis harness 31 pin connector J31 pin 1	**Check continuity. Replace if defective.**
2. Loose or broken wire 16 from 31 pin connector P31 pin 1 to engine harness connector J13 pin 1.	**Check continuity. Replace if defective.**
3. Loose or broken wire 16 from connector P13 pin 1 to forward solenoid.	**Check continuity. Replace if defective.**
4. Loose or broken wire 51 from forward solenoid to chassis harness P13 pin 2.	**Check continuity. Replace if defective.**
5. Defective forward solenoid.	**Replace solenoid.**
6. Defective transmission shifter.	**Replace shifter**

4.2-7 No Reverse Drive

1. Loose or broken wire 15 from shifter connector J47 pin 7 to chassis harness 31 pin connector J31 pin 2	**Check continuity. Replace if defective.**
2. Loose or broken wire 15 from 31 pin connector P31 pin 2 to engine harness connector J13 pin 5.	**Check continuity. Replace if defective.**
3. Loose or broken wire 15 from connector P13 pin 5 to reverse diode D15.	**Check continuity. Replace if defective.**
4. Loose or broken wire 15A from reverse diode to reverse solenoid Connector P9 pin 1.	**Check continuity. Replace if defective.**
5. Defective reverse diode D15.	**Check for continuity with positive lead on connector P13 pin 5 and negative lead on reverse solenoid connector P9 pin 1. Replace if defective.**
6. Loose or broken wire 51 from reverse solenoid connector P9 pin 2 to chassis harness P13 pin 2.	**Check continuity. Replace if defective.**
7. Defective reverse solenoid.	**Replace solenoid.**
8. Defective transmission shifter.	**Replace shifter**

4.2-8 No 1st Speed Range

1. Loose or broken wire 216 from shifter connector J47 pin 2 to chassis harness 31 pin connector J31 pin 4	**Check continuity. Replace if defective.**
2. Loose or broken wire 216 from 31 pin connector P31 pin 3 to engine harness connector J13 pin 4.	**Check continuity. Replace if defective.**
3. Loose or broken wire 216 from connector P13 pin 3 to 1st solenoid connector P11 pin 1.	**Check continuity. Replace if defective.**
4. Loose or broken wire 00 from 1st solenoid connector P11 pin 2 to ground.	**Check continuity. Replace if defective.**
5. Defective 1st solenoid.	**Replace solenoid.**
6. Defective transmission shifter.	**Replace shifter**

4.2-9 No 2nd Speed Range

1. Loose or broken wire 215 from shifter connector J47 pin 3 to chassis harness 31 pin connector J31 pin 5	**Check continuity. Replace if defective.**
2. Loose or broken wire 215 from 31 pin connector P31 pin 5 to engine harness connector J13 pin 4.	**Check continuity. Replace if defective.**

3. Loose or broken wire 216 from connector P13 pin 4 to 2nd solenoid connector P12 pin 1.	**Check continuity. Replace if defective.**
4. Loose or broken wire 00 from 1st solenoid connector P12 pin 2 to ground.	**Check continuity. Replace if defective.**
5. Defective 2nd solenoid.	**Replace solenoid.**
6. Defective transmission shifter.	**Replace shifter**

4.2-10 No Boom Up, Front Steer Mode Only.

1. Fuse F3 open	**Check for defective wiring. Replace fuse**
2. Loose or broken 05A wire from fuse F3 to 31 pin Chassis harness connector J31 pin 17, boom up end of stroke relay 19CR pin 30, and steer mode select switch SW3 pin 2.	**Check continuity. Replace if defective.**

4.2-11 Front Steer Mode Only

1. Loose or broken 05A wire from fuse F3 to steer mode select switch SW3 pin 2.	**Check continuity. Replace if defective.**
2. Defective Steer mode switch SW3	**Replace if Defective**

4.2-12 No 4W (Round) Steer Mode

1. Defective Steer mode switch SW3	**Replace if Defective**
2. Loose or broken wire 218 from SW3 pin 3 to 31 pin chassis harness connector J31 pin 12	**Check continuity. Replace if defective.**
3. Loose or broken wire 218 from connector P31 pin 12 to 4W solenoid connector J20 pin 1	**Check continuity. Replace if defective.**
4. Loose or broken 00 wire from 4W solenoid connector J20 pin 2 to ground.	**Check continuity. Replace if defective.**
5. Defective 4W solenoid	**Replace if Defective**

4.2-13 No Crab Steer Mode

1. Defective Steer mode switch SW3	**Replace if Defective**

2. Loose or broken wire 217 from SW3 pin 1 to 31 pin chassis harness connector J31 pin 11	**Check continuity. Replace if defective.**
3. Loose or broken wire 217 from connector P31 pin 11 to Crab Steer solenoid connector J19 pin 1	**Check continuity. Replace if defective.**
4. Loose or broken 00 wire from Crab Steer solenoid connector J19 pin 2 to ground.	**Check continuity. Replace if defective.**
5. Defective Crab Steer solenoid	**Replace if Defective**

4.2-14 No Boom Up

With following conditions:

- Frame Level Operates Normally

1. Loose or broken 05A wire from fuse F3 to 31 pin Chassis harness connector J31 pin 17, and/or boom up end of stroke relay 19CR pin 30.	**Check continuity. Replace if defective.**
2. Loose or broken 05A wire from connector P31 pin 17 to Boom End Of Stroke proximity switch connector J23 pin 1	**Check continuity. Replace if defective.**
3. Loose or broken 00 wire from Boom E.O.S. proximity switch connector J23 pin 3 to ground	**Check continuity. Replace if defective.**
4. Boom E.O.S. proximity switch misadjusted or defective.	**Check adjustment (set to 70°) , replace if defective**
5. Loose or broken 19 wire from Boom E.O.S. proximity switch connector J23 pin 2 to connector P31 pin 18	**Check continuity. Replace if defective.**
6. Loose or broken 19 wire from connector P31 pin 18 to Boom E.O.S. relay 19CR pin 86	**Check continuity. Replace if defective.**
7. Loose or broken 00 wire from Boom E.O.S. relay 19CR pin 85 to ground	**Check continuity. Replace if defective.**
8. Defective relay 19CR.	**Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective.**
9. Loose or broken 14 wire from Boom E.O.S. relay 19CR pin 87 to boom up enable relay 28CR pin 30.	**Check continuity. Replace if defective.**
10. Loose or broken 14 wire from connector P31 pin 18 to boom up enable relay 28CR pin 30.	**Check continuity. Replace if defective.**
11. Frame angle sensor defective.	**With boom below 40° and frame level check for voltage on wire 28 (pin 5). Replace if defective**
12. Loose or broken wire 28 from frame angle sensor pin 5 to 4 pin connector P113 pin 2.	**Check continuity. Replace if defective**
13. Loose or broken wire 28 from 4 pin connector J113 pin 2 to boom up enable relay 28CR pin 86	**Check continuity. Replace if defective**

14. Loose or broken wire 00 from boom up enable relay 28CR pin 85 to ground	**Check continuity. Replace if defective**
15. Defective relay 28CR.	**Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective.**
16. Loose or broken wire 14A from 28CR relay to 31 pin chassis harness connector J31 pin 3	**Check continuity. Replace if defective**
17. Loose or broken wire 14A from connector P31 pin 3 to boom up enable solenoid 2H-14A connector J25 pin 1.	**Check continuity. Replace if defective**
18. Loose or broken 00 wire from boom up enable solenoid 2H-14A connector J25 pin 2 to ground	**Check continuity. Replace if defective**
19. Defective boom up enable solenoid 2H-14A	**Replace if defective.**

With following conditions:

- No Frame Level

1. Fuse F5 open	**Check for defective wiring. Replace fuse**
2. Loose or broken 05R wire from fuse F5 to 31 pin Chassis harness connector J31 pin 24	**Check continuity. Replace if defective.**
3. Loose or broken 05R wire from connector P31 pin 24 to frame angle sensor connector J105 pin 2	**Check continuity. Replace if defective.**
4. Loose or broken 00 wire from frame angle sensor connector J105 pin 3 to ground.	**Check continuity. Replace if defective.**
5. Frame angle sensor defective.	**With boom below 40° and frame level check for voltage on wires 28 (pin 5), 28R (pin 7), and 28L (pin 6). Replace if defective.**

4.2-15 Frame Will Not Tilt Over 40° With Boom Below 40°

1. Loose or broken 05R wire from connector P31 pin 24 to boom 40° angle proximity switch connector J71 pin 1	**Check continuity. Replace if defective**
2. Loose or broken 00 wire from boom 40° angle proximity switch connector J71 pin 3 to ground.	**Check continuity. Replace if defective.**
3. Boom 40° angle proximity switch misadjusted or defective.	**Check adjustment (set to 40°) , replace if defective**
4. Loose or broken 212 wire from boom 40° angle proximity switch connector J71 pin 2 to 31 pin Console harness connector P31 pin 25	**Check continuity. Replace if defective**
5. Loose or broken 212 wire from connector J31 pin 25 to boom angle relay 212CR pin 86.	**Check continuity. Replace if defective**

6. Loose or broken 00 wire from con boom angle relay 212CR pin 85 to ground.	**Check continuity. Replace if defective**
7. Defective relay 212CR.	**Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective.**
8. Loose or broken wire 221 from 31 pin connector P31 pin 23 to frame angle sensor connector J105 pin 4	**Check continuity. Replace if defective**
9. Frame angle sensor defective.	**Replace if defective**

4.2-16 No Frame Level

1. Fuse F19 open	**Check for defective wiring. Replace fuse**
2. Loose or broken 05T wire from F19 to frame level enable relay 65CR pin 30	**Check continuity. Replace if defective**
3. Loose or broken 05R wire from F5 fuse to boom angle relay 212CR pin 30	**Check continuity. Replace if defective**
4. Loose or broken wire 65 from chassis harness splice 65 (D213B & D221 to wire 65 junction) to 4 pin connector P113 pin 3	**Check continuity between unused RAS unlock connector J75 pin 1 and 4 pin connector P113 pin 3. Replace if defective**
5. Loose or broken wire 65 from 4 pin connector J113 pin 3 to frame level enable relay 65CR pin 86	**Check continuity. Replace if defective**
6. Loose or broken 00 wire 65 from frame level enable relay 65CR pin 85 to ground	**Check continuity. Replace if defective**
7. Defective relay 65CR.	**Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective.**
8. Loose or defective wire 65A from 65CR relay pin 87 to 28RCR and 28LCR relays pins 30.	**Check continuity. Replace if defective**

With following conditions:

- Boom Angle Below 40°
- Works Above 40°

1. Defective relay 212CR.	**Check continuity through contacts of relay (pin 30 to 87 with coil energized). Replace if defective**

2. Loose or broken wire 221 from 221CR pin 87 to 31 pin connector J31 pin23	**Check continuity. Replace if defective**
3. Loose or broken wire 221 from 31 pin connector P31 pin23 to diode D221	**Check continuity. Replace if defective**
4. Defective diode D221	**Check for continuity with positive lead on p31 pin 23 and negative lead on P113 pin 3 Replace if defective**

With following conditions:

- Boom Angle Below 40°
- Works Above 40°
- RAS indicator does not illuminate above 40°

1. Defective relay 212CR.	**Check continuity through contacts of relay (pin 30 to 87a with coil de-energized).Replace if defective**
2. Loose or broken wire 213 from 221CR pin 87a to 223ACR pin 30	**Check continuity. Replace if defective**

With following conditions:

- Boom Angle Below 40°
- Works Above 40°
- RAS indicator does illuminate above 40°

1. Loose or broken wire 223A from 220CR pin 30 to 223ACR pin 86	**Check continuity. Replace if defective**
2. Loose or broken wire 00 from 223ACR pin 85 to ground	**Check continuity. Replace if defective**
3. Defective relay 223ACR.	**Check continuity through contacts of relay (pin 30 to 87 with coil energized).Replace if defective**
4. Loose or broken wire 65 from 223ACR pin 87 through spice SPL65 to 65CR relay pin 86	**Check continuity. Replace if defective**

With following conditions:

- No Frame Level with Boom angle above 40°, Park brake on, and/or transmission in neutral, and/or service brake depressed.
- Works Below 40°, and above 40° with park brake off, transmission in neutral, and no service brake input.
- RAS indicator illuminates above 40°

1. Loose or broken wire 223 from 223CR relay pin 87 through splice 223 to 220CR pin 87a	**Check continuity. Replace if defective**

2. Defective relay 220CR.	**Check continuity through contacts of relay (pin 30 to 87a with coil de-energized).Replace if defective**

With following conditions:

- No Frame Level Left

3. Loose or broken wire 65A from relay 65CR pin87 to relay 28LCR pin 30	**Check continuity. Replace if defective**
4. Frame angle sensor defective.	**With boom below 40° and frame level check for voltage on wire 28L (pin 6). Replace if defective**
5. Loose or broken wire 28L to connector P31 pin 29	**Check continuity. Replace if defective**
6. Loose or broken wire 28L from connector J31 pin 29 to relay 28LCR pin 86	**Check continuity. Replace if defective**
7. Loose or broken wire 00 from 28LCR pin 85	**Check continuity. Replace if defective**
8. Relay 28LCR defective	**Check continuity through contacts of relay (pin 30 to 87a with coil de-energized). Replace if defective**
9. Loose or broken wire 28A from 28LCR pin 87 to J31connector pin 31	**Check continuity. Replace if defective**
10. Loose or broken wire 28A from P31 connector pin 31 to frame level left enable solenoid J74 pin 1	**Check continuity. Replace if defective**
11. Loose or broken wire 00 from frame level left enable solenoid J74 pin 2 to ground	**Check continuity. Replace if defective**
12. Defective frame level left solenoid 2H-28A	**Replace if defective**

With following conditions:

- No Frame Level Right

13. Loose or broken wire 65A from relay 65CR pin87 to relay 28RCR pin 30	**Check continuity. Replace if defective**
14. Frame angle sensor defective.	**With boom below 40° and frame level check for voltage on wire 28R (pin 6). Replace if defective**
15. Loose or broken wire 28R to connector P31 pin 28	**Check continuity. Replace if defective**
16. Loose or broken wire 28R from connector J31 pin 28 to relay 28LCR pin 86	**Check continuity. Replace if defective**
17. Loose or broken wire 00 from 28RCR pin 85	**Check continuity. Replace if defective**
18. Relay 28RCR defective	**Check continuity through contacts of relay (pin 30 to 87a with coil de-energized). Replace if defective**
19. Loose or broken wire 28B from 28RCR pin 87 to J31connector pin 31	**Check continuity. Replace if defective**

20. Loose or broken wire 28B from P31 connector pin 30 to frame level left enable solenoid J73 pin 1	**Check continuity. Replace if defective**
21. Loose or broken wire 00 from frame level left enable solenoid J73 pin 2 to ground	**Check continuity. Replace if defective**
22. Defective frame level right solenoid 2H-28B	**Replace if defective**

4.2-17 RAS remains fully locked (RAS indicator remains illuminated)

With following conditions:

- Boom angle above 40°, park brake off, transmission in FWD, service brake not depressed.
- RAS goes into restrict mode (RAS indicator not illuminated) above 40° with park brake off, transmission in REV.

1. Diode D16 open/defective.	**Check for continuity with positive lead on J47 pin 1 and negative lead on J31 pin 22. Replace if defective**

With following conditions:

- Boom angle above 40°, park brake off, transmission in REV, service brake not depressed.
- RAS goes into restrict mode (RAS indicator not illuminated) above 40° with park brake off, transmission in FWD.

2. Diode D15a open/defective.	**Check for continuity with positive lead on J47 pin 7 and negative lead on J31 pin 22. Replace if defective**

With following conditions:

- Boom angle above 40°, park brake off, transmission in FWD or REV, and service brake not depressed.

1. Diode D16 and D15a open or defective, and/or wire 16a loose or broken from shifter to J31 connector pin 22.	**Check for continuity with positive lead on J47 pin 1 and/or pin 7 and negative lead on J31 pin 22. Repair or replace as required if defective.**
2. Loose or broken wire 16a from connector P31 pin 22 to PS3 brake pressure switch connector J105 pin 2.	**Check continuity. Replace if defective**
3. Brake pressure switch stuck in open position or otherwise defective.	**Check switch operation. Replace if defective**
4. Loose or broken wire 220 from PS3 brake pressure switch connector J105 pin 3 to connector P31 pin 21.	**Check continuity. Replace if defective**
5. Loose or broken wire 220 from connector J31 pin 21 to relay 220CR pin 86 and/or pin 87.	**Check continuity. Replace if defective**

6. Loose or broken wire 220 from relay 220CR pin 85 to ground.	**Check continuity. Replace if defective**
7. Defective relay 220CR	**Check relay operation. Replace if defective**

4.2-18 RAS remains locked

With following conditions:

- Boom above 40° when restricted mode should be enabled during drive or frame level functions (RAS indicator not illuminated) Frame level and RAS indicator works normally, all wheels do not maintain contact with ground.
- RAS unlocks below 40°.

1. Loose or broken wire 65 from diode 65 through slice 65 to connector J118 pin 1.	**Check continuity. Replace if defective**

With following conditions:

- Locked at all times, Frame level and RAS indicator works normally, all wheels do not maintain contact with ground while using frame level function.

1. Loose or broke wire 221 from relay 212CR pin 87 to connector J31 pin 23.	**Check continuity. Replace if defective**
2. Loose or broke wire 221 from connector P31 pin 23 to connector J118 pin 2.	**Check continuity. Replace if defective**

4.2-19 Function Does Not Switch

With following conditions:

- From Telescope In/Out To Frame Level Left/Right With Frame Level Switch SW5 Depressed or from Boom Raise To Carriage Tilt Up With Carriage Tilt Switch SW6 Depressed

1. Fuse F4 open	**Check for defective wiring. Replace fuse**
2. Loose or broken wire 05B to joystick connector J46 pin 3 & 4 and/or Carriage tilt relay 224CR pin 86 and frame level enable relay 222CR pin 86	**Check for defective wiring. Replace fuse**

With following conditions:

- From Telescope In/Out To Frame Level Left/Right With Frame Level Switch SW5 Depressed

1. Loose or broken wire 05B to joystick connector J46 pin 3 and/or frame level enable relay 222CR pin 86	**Check for defective wiring. Replace fuse**
2. Loose or broken wire 222 from connector J46 pin8 to relay 222CR pin 86	**Check continuity. Replace if defective**
3. Loose or broken wire 00 from 222CR to ground	**Check continuity. Replace if defective**

4. Relay 222CR defective	**Check continuity through contacts of relay (pin 30 to 87a with coil de-energized). Replace if defective**
5. Loose or broken wire 223 from 223CR relay pin 87 to frame level left and/or right solenoids 223 and/ or 223-1	**Check continuity. Replace if defective**
6. Loose or broken wire 00 from frame level left and/ or right solenoids 223 and/or 223-1 to ground	**Check continuity. Replace if defective**
7. Frame Level left enable solenoid 4H-223 and/ or frame level right enable solenoid 4H-223-1 defective.	**Replace if defective.**

With following conditions:

- From Boom Raise/Lower To Carriage Tilt Up/Down With Carriage Tilt Switch SW6 Depressed

1. Loose or broken wire 05B to joystick connector J46 pin 4 and/or frame level enable relay 224CR pin 86	**Check for defective wiring. Replace fuse**
2. Loose or broken wire 224 from connector J46 pin7 to relay 224CR pin 86	**Check continuity. Replace if defective**
3. Loose or broken wire 00 from 224CR to ground	**Check continuity. Replace if defective**
4. Relay 224CR defective	**Check continuity through contacts of relay (pin 30 to 87a with coil de-energized). Replace if defective**
5. Loose or broken wire 47 from 224CR relay pin 87 to carriage tilt enable up and/or down solenoids 4-H47 and/or 4-H47-1	**Check continuity. Replace if defective**
6. Loose or broken wire 00 from carriage tilt enable up and/or down solenoids 4-H-47 and/or 4-H47-1	**Check continuity. Replace if defective**
7. Carriage tilt up enable solenoid 4H-47 and/ or carriage tilt down enable solenoid 4H-47-1 defective.	**Replace if defective.**

4.2-20 Outriggers inoperative

1. Fuse F10 open	**Check for defective wiring. Replace fuse**
2. Loose or broken wire 05S to outrigger switches SW21 and SW22 pins 2	**Check continuity. Replace if defective**

With following conditions:

- Right outrigger down inoperative

1. Loose or broken wire 228 from outrigger switch SW22 to connector J81 pin F	**Check continuity. Replace if defective**

2. Loose or broken wire 228 from connector P81 pin F to valve 4H-228.	**Check continuity. Replace if defective**
3. Loose or broken wire 00 from valve 4H-228 to ground.	**Check continuity. Replace if defective**
4. Right outrigger down solenoid 4H-228 defective.	**Replace if defective.**

With following conditions:

- Right outrigger up inoperative

1. Loose or broken wire 227 from outrigger switch SW22 to connector J81 pin G	**Check continuity. Replace if defective**
2. Loose or broken wire 227 from connector P81 pin G to valve 4H-227	**Check continuity. Replace if defective**
3. Loose or broken wire 00 from valve 4H-227 to ground.	**Check continuity. Replace if defective**
4. Right outrigger up solenoid 4H-227 defective.	**Replace if defective.**

With following conditions:

- Left outrigger down inoperative

1. Loose or broken wire 226 from outrigger switch SW21 to connector J81 pin B	**Check continuity. Replace if defective**
2. Loose or broken wire 226 from connector P81 pin B to valve 4H-226	**Check continuity. Replace if defective**
3. Loose or broken wire 00 from valve 4H-226 to ground.	**Check continuity. Replace if defective**
4. Left outrigger down solenoid 4H-226 defective.	**Replace if defective.**

With following conditions:

- Left outrigger up inoperative

1. Loose or broken wire 225 from outrigger switch SW21 to connector J81 pin C	**Check continuity. Replace if defective**
2. Loose or broken wire 225 from connector P81 pin C to valve 4H-225	**Check continuity. Replace if defective**
3. Loose or broken wire 00 from valve 4H-225 to ground.	**Check continuity. Replace if defective**
4. Left outrigger up solenoid 4H-225 defective.	**Replace if defective.**

4.3 Hydraulic System

4.3-1 All Controls inoperative

1. Worn or defective pump shaft or coupling.	**Check pump shaft and coupling. Replace if defective**
2. No PTO rotation	**Repair transmission, or flex plate.**
3. Hydraulic oil level low	**Check oil level. Fill to proper level.**
4. System pump P1 is out of adjustment or is defective.	**Refer to section 5 for pump set up/test procedure. Repair or replace if defective**
5. RV1 misadjusted or defective	**Adjust pressure, replace if defective**

4.3-2 No Boom Functions

With following conditions:

- All Boom Functions Inoperative.

1. EC1 defective	**Replace if defective**
2. Orifice OR2 plugged	**Remove and inspect, clean or replace as required.**
3. PR1 pressure reducing valve misadjusted or defective	**Adjust pressure, replace if defective**

With following conditions:

- No Boom Raise

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. Boom up enable valve 2H-19A stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. Stuck or defective lift valve V1.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
4. LS check valve CV9 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
5. Stuck or defective lift counterbalance valves CB1, CB1-1.	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
6. Stuck or defective lift counterbalance valves CB2, CB2-1.	**Clean valves. Check O-rings on valve. Repair or replace valve as required.**
7. Defective lift cylinder C3 and/or C4.	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

With following conditions:

- No Boom Lower

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. Stuck or defective lift valve V1.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. LS check valve CV2 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
4. Stuck or defective lift counterbalance valves CB2, CB2-1.	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
5. Stuck or defective lift counterbalance valves CB1, CB1-1.	**Clean valves. Check O-rings on valve. Repair or replace valve as required.**
6. Defective lift cylinder C3 and/or C4.	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

With following conditions:

- No Telescope Out

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. PD1 V13 stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. Stuck or defective lift valve V3.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
4. LS check valve CV7 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
5. Stuck or defective lift counterbalance valves CB3	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
6. Stuck or defective lift counterbalance valves CB4	**Clean valves. Check O-rings on valve. Repair or replace valve as required.**
7. Defective telescope cylinder C5	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

With following conditions:

- No Telescope Retract

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. Stuck or defective telescope valve V3.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. LS check valve CV3 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**

4. Stuck or defective lift counterbalance valves CB4	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
5. Stuck or defective lift counterbalance valves CB3	**Clean valves. Check O-rings on valve. Repair or replace valve as required.**
6. Defective telescope cylinder C5.	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

4.3-3 No Carriage Tilt

With following conditions:

- No Carriage Tilt Up

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. 4H-47 stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. Stuck or defective carriage tilt valve V2.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
4. LS check valve CV8 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
5. Pilot operated check valve CV11 and or CV12 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
6. RV4 misadjusted or defective	**Adjust pressure, replace if defective**
7. Stuck or defective lift counterbalance valves CB5	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
8. Defective carriage tilt cylinder C6	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**
9. Defective tilt compensation cylinder C7	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

With following conditions:

- No carriage Tilt Down

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. 4H-47-1 stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. Stuck or defective carriage tilt valve V2.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
4. LS check valve CV1 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
5. Pilot operated check valve CV11 and or CV12 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**

6. RV3 misadjusted or defective	**Adjust pressure, replace if defective**
7. Stuck or defective lift counterbalance valves CB5	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
8. Defective carriage tilt cylinder C6	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**
9. Defective tilt compensation cylinder C7	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

4.3-4 No Frame Level

With following conditions:

- No Frame Level Right

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. 4H-223-1 stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. Frame right enable valve 2H-28 stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required**
4. Orifice OR3 and/or OR4 plugged	**Remove and inspect, clean or replace as required**
5. Stuck or defective frame level valve V4.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
6. LS check valve CV10 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
7. Stuck or defective frame level counterbalance valve CB7	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
8. Stuck or defective frame level counterbalance valve CB6	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
9. Defective frame level cylinder C9	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

With following conditions:

- No Frame Level Left

1. Stuck or defective joystick JS1	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. 4H-223 stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
3. Frame right enable valve 2H-28A stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required**
4. Orifice OR3 and/or OR4 plugged	**Remove and inspect, clean or replace as required**

5. Stuck or defective frame level valve V4.	**Clean valve. Check operation of valve. Repair or replace valve as required.**
6. LS check valve CV4 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
7. Stuck or defective frame level counterbalance valve CB6	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
8. Stuck or defective frame level counterbalance valve CB7	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
9. Defective frame level cylinder C9	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

4.3-5 No Aux. functions

1. 4H-233/4H-234 stuck or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required**
2. Stuck or defective Auxiliary counterbalance valve (if equipped)	**Clean valve. Check O-rings on valve. Repair or replace valve as required**
3. Defective Auxiliary/Optional cylinder(s).	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective.**
4. LS check valve CV13 blocked or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required**

4.3-6 Hard or No Steering

1. Stuck or defective EC1 valve	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. Stuck or defective steering motor OSM1.	**Check O-rings and clean valve. Repair or replace valve as required.**
3. Defective steer cylinder C1 and/or C2.	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective.**
4. LS check valve CV5 blocked or defective.	**Clean valve. Check operation of valve. Repair or replace valve as required**
5. Orifice OR1 plugged	**Remove and inspect, clean or replace as required**
6. Relief valve RV2 valve misadjusted or defective	**Adjust pressure, replace if defective**

4.3-7 Park Brake will not Release

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

4.3-8 Park Brake Will Not Engage

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

4.3-9 Service Brake Will Not Engage

1. Service brake actuator stuck or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
2. Load sense check valve CV6 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
3. Bypassing or defective brake seals in axle.	**Check seals, replace as necessary. Replace if defective**
4. PR2 pressure reducing valve misadjusted or defective **(SJ1256 THS only)**	**Adjust pressure, replace if defective**

4.3-10 Outriggers Inoperative

With following conditions:

- Right outriggers up and/or down Inoperative

1. Stuck or defective right outrigger valve V28 (4H-225 and 4H-226).	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. LS check valve CV19 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
3. Stuck or defective counterbalance valves CB10	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
4. Stuck or defective lift counterbalance valves CB11	**Clean valves. Check O-rings on valve. Repair or replace valve as required.**
5. Defective telescope cylinder C11.	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

With following conditions:

- Left outriggers up and/or down inoperative

1. Stuck or defective left outrigger valve V25 (4H-227 and 4H-228).	**Clean valve. Check operation of valve. Repair or replace valve as required.**
2. LS check valve CV18 blocked or defective	**Clean valve. Check operation of valve. Repair or replace valve as required**
3. Stuck or defective counterbalance valves CB8	**Clean valve. Check O-rings on valve. Repair or replace valve as required.**
4. Stuck or defective lift counterbalance valves CB9	**Clean valves. Check O-rings on valve. Repair or replace valve as required.**
5. Defective telescope cylinder C10.	**Check seals on cylinder. Replace as necessary. Replace cylinder if defective**

Section 5 – Procedures

5.1 General

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

5.1-1 Safety and Workmanship

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

5.1-2 Engine and Transmission

The engine used on the SJ1044 TH/THS & SJ1056 TH/THS telehandler models is a Deutz TCD 3.6L Tier 4 Final.

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

Skyjack cannot enter into any warranty service work requirements.

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

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

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

5.2 10 Hour or Daily Routine Maintenance

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

5.2-1 Check Engine Oil Level

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

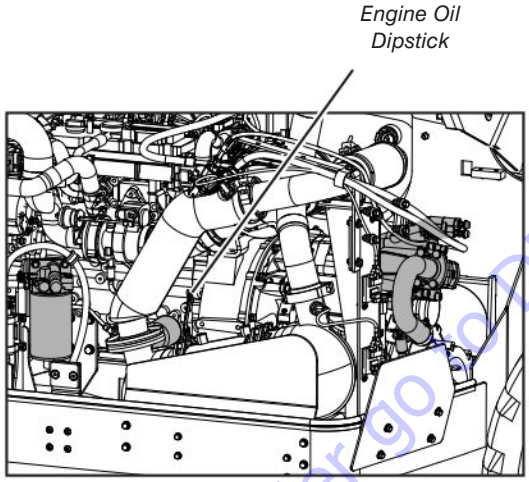


Figure 01 **Engine Oil Dipstick**

5. Pull the dipstick out again and check the oil level on the dipstick. The oil level must be between the “Full” and “Low” marks.
6. If oil level is below the “Low” mark, refer to Section 5.4-4 for engine oil and filter replacement procedure.

5.2-2 Check Coolant Level, Radiator and Hoses

⚠ WARNING

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

NOTE

Do not intermix different brands of coolant. If the existing coolant cannot be identified, drain and flush the remaining coolant and refill with new coolant. Refer to section 5.4-5 for instructions on changing engine coolant.

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

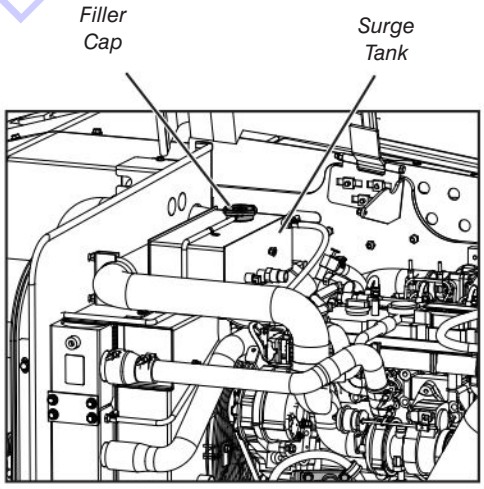


Figure 02 *Surge Tank Location*

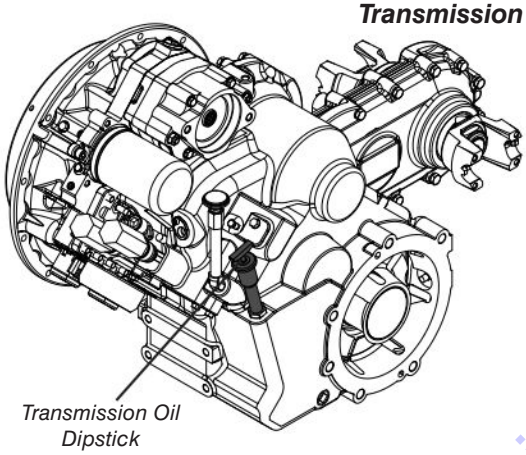
3. Run the engine for 25 minutes without radiator cap to achieve operating temperature. Shut down the engine.
4. Check coolant level and coolant strenght in the radiator. Adjust mixture as requiered. Refill until coolant is visible.
5. Tighten radiator cap, start the engine, and check for leaks.

5.2-3 Check Transmission Fluid Level

1. Park telehandler on a firm level surface, move transmission gear selector to Neutral and apply park brakes.
2. Release latch and lift engine cover to access engine compartment.
3. Start engine and allow the transmission to reach normal operating temperature.

Pull out dipstick and wipe with a clean, dry, lint-free cloth. Fully insert dipstick back into the tube and then pull it out and check the oil leve

Powershift Transmission



Continuously Variable Transmission

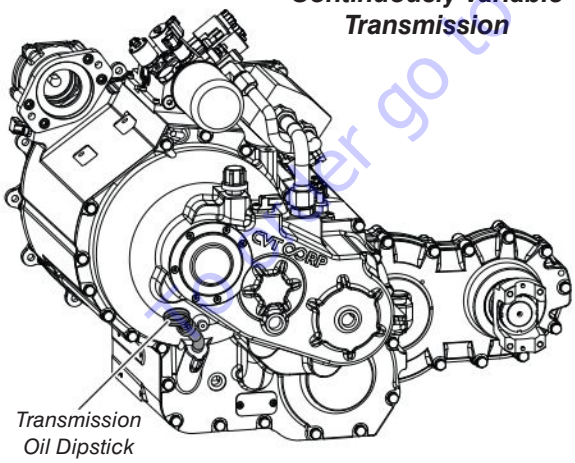


Figure 03 *Transmission Oil Dipstick*

4. The oil level should be between the “Full” and “Low” marks.
5. If transmission oil level is low, refer to section 5.5-6 for transmission oil and filter replacement.

5.2-4 Check Air Cleaner Restriction and Filter Elements

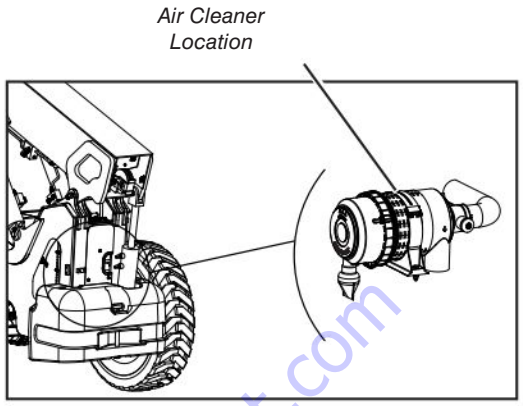


Figure 04 *Air Cleaner Location*

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

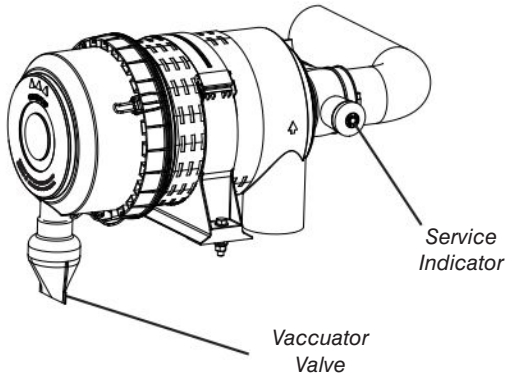


Figure 05 *Air Cleaner Vaccuator Valve*

NOTE

SJ1044 TH/THS, SJ1056 TH/THS and SJ1256 THS telehandlers are equipped with a two-stage air filter system; which consists of a primary filter element & a secondary safety element. Inspect the condition of both the primary and safety elements.

IMPORTANT

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

NOTE

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

1. Undo latches and pull cover outward to remove.

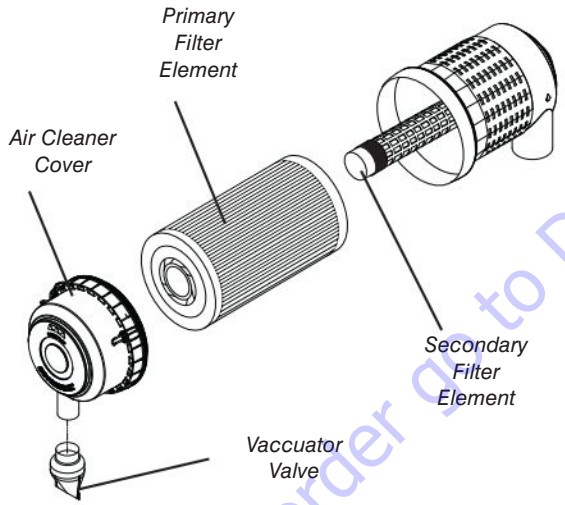


Figure 06 *Engine Air Cleaner*

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

CAUTION

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

NOTE

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

Replace the secondary element if:

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

5.2-5 Check Hydraulic Oil Level

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

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

Refer to oil sight gauge at rear of tank to check that the hydraulic fluid is between MAX and MIN.

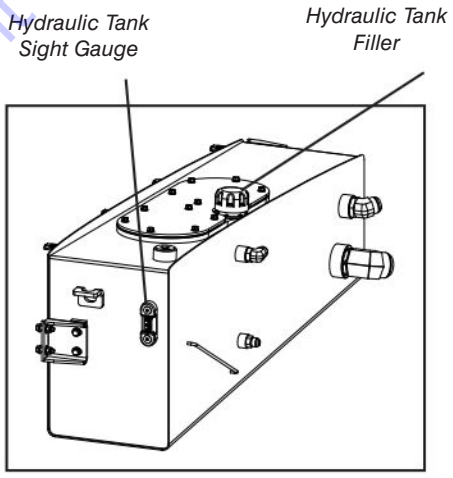


Figure 07 *Hydraulic Oil Tank Sight Gauge*

1. Check hydraulic Oil Tank Sight Gauge.
2. Add clean hydraulic oil through the tank filler as required. Refer to Table 2.3 for hydraulic oil specifications.

5.2-6 Drain Fuel/Water Separator

⚠ WARNING

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

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

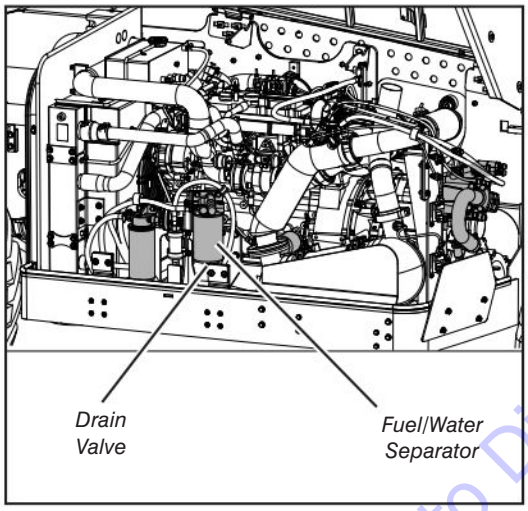


Figure 08 *Fuel/Water Separator*

4. Close the drain then dispose of the collected liquid in an environmentally safe manner.

NOTE

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

5.2-7 Fuel Tank

⚠ WARNING

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

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

NOTE

Refer to Operating Manual for refueling procedure.

5.2-8 Check Parking Brake

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

NOTE

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

5.2-9 Check Tire Pressure and Condition

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

⚠ WARNING

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

2. Remove wheel from telehandler to fill the tire whenever pressure is below 80% of the recommended pressure.
3. Place tire in a cage and inflate using a clip-on chuck and a remote tire pressure gauge.

4. If tire must be removed for repairs, remove the air pressure from the tire before removing the wheel from the telehandler.

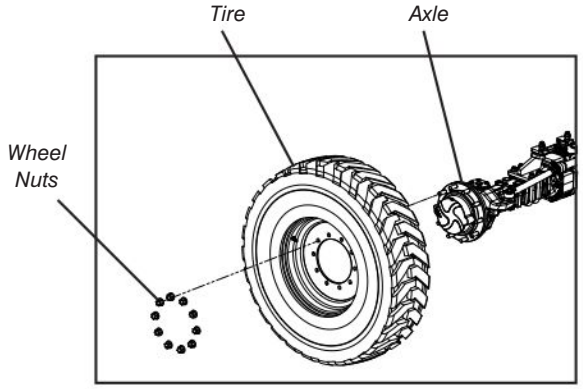


Figure 09 *Telehandler Wheel*

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

5.2-10 Check Seat Belt and Mounting Hardware

1. Check seat belt for wear or damage. Check that mounting hardware is tight.
2. Inspect the belt hardware and fabric. Replace if hardware is damaged, frayed or loose stitching is found.

Figure 10 *Seat Assembly*

NOTE

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

5.2-11 Check Windshield Washer Fluid Level and Wiper Condition

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

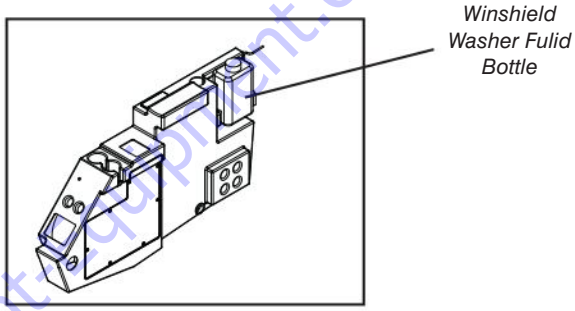


Figure 11 *Windshield Washer Fluid.*

5.3 50 Hour or Weekly Routine Maintenance

5.3-1 Grease Axle Pivot Bearings and King Pins

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

- **Axle Pivot Bearings**

There are remote grease fittings for pivot bearing lubrication. The front axle grease fittings are located on the right front frame rail next to the frame level cylinder. See Figure below.

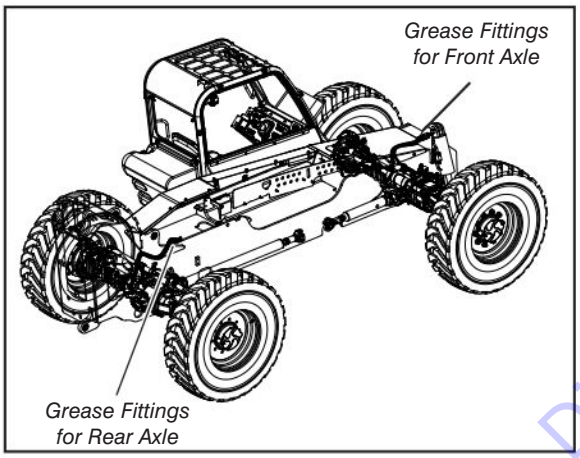


Figure 12 *Front Axle Pivot Bearing Grease Fittings*

The rear axle remote grease fittings are located beside the right boom lift cylinder. See figure below.

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

- **Axle King Pins**

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

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

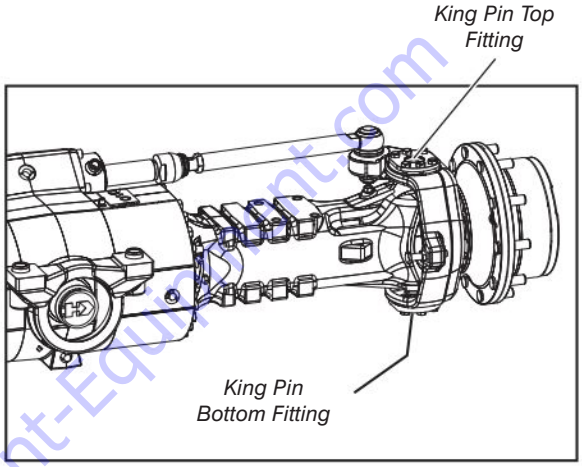


Figure 13 *Axle King Pins*

5.3-2 Grease Drive Shaft U-joints and slip joints

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

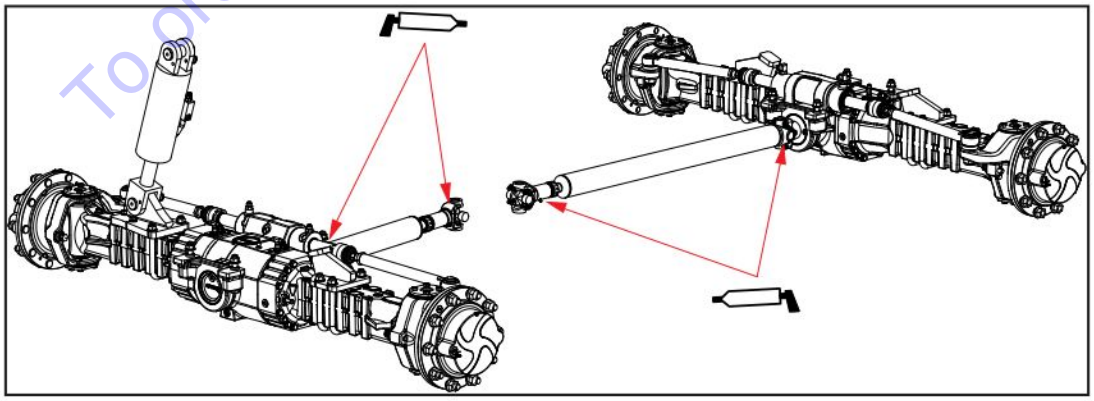


Figure 14 *Drive Shaft Grease Points*

5.3-3 Check Fork Pins

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

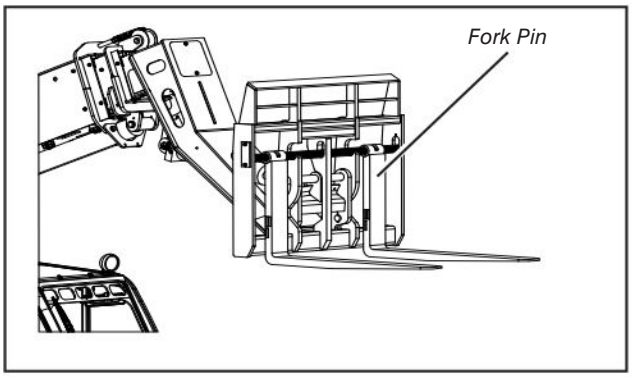


Figure 15 *Fork Pin*

5.3-4 Grease Frame Level Pivot Bushings and Axle Lock Cylinder

1. Apply grease to the grease fittings at each end of the frame level cylinder. See figure below.

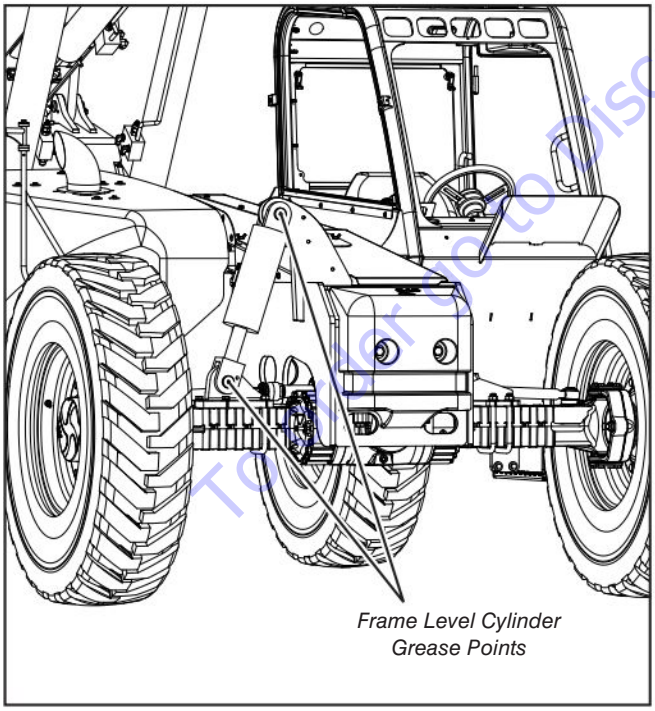


Figure 16 *Stabilizer Grease Points*

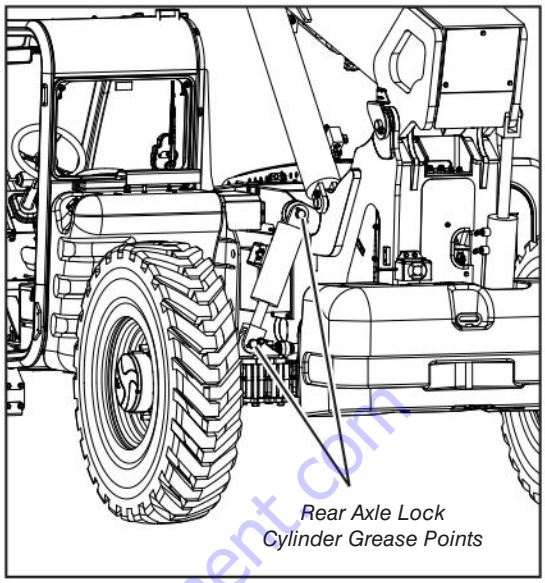


Figure 17 *Rear Axle Lock Cylinder Grease Points*

5.3-5 Grease Boom Pivot and Boom Cylinders

1. Apply grease to the following grease points on boom pivot and boom cylinders.

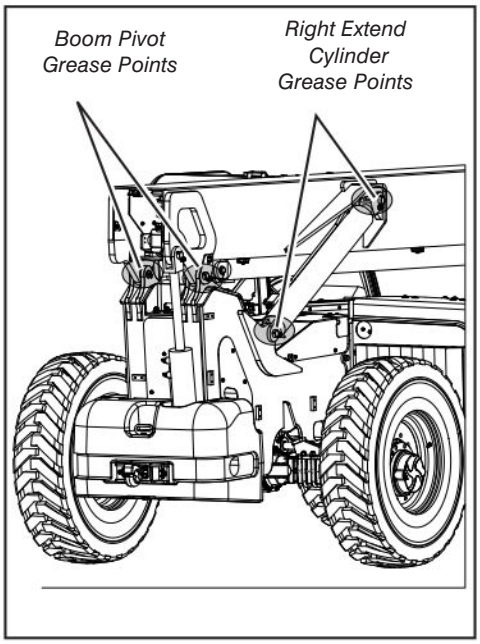


Figure 18 *Boom Grease Points*

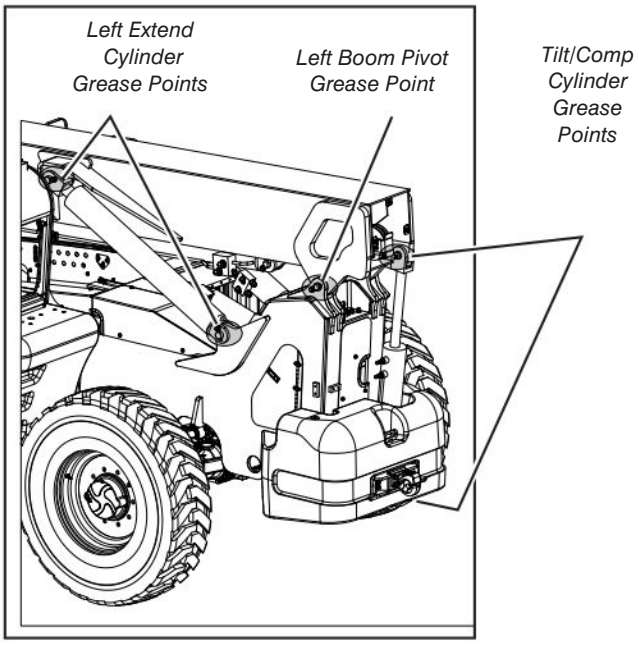


Figure 19 *Boom Grease Points*

5.3-6 Grease Bottom Front & Top Rear Slide Pads

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

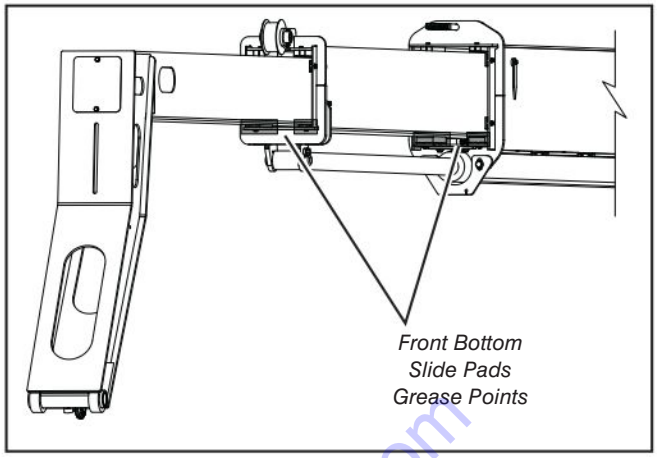


Figure 20 *Front Bottom Slide Pads*

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

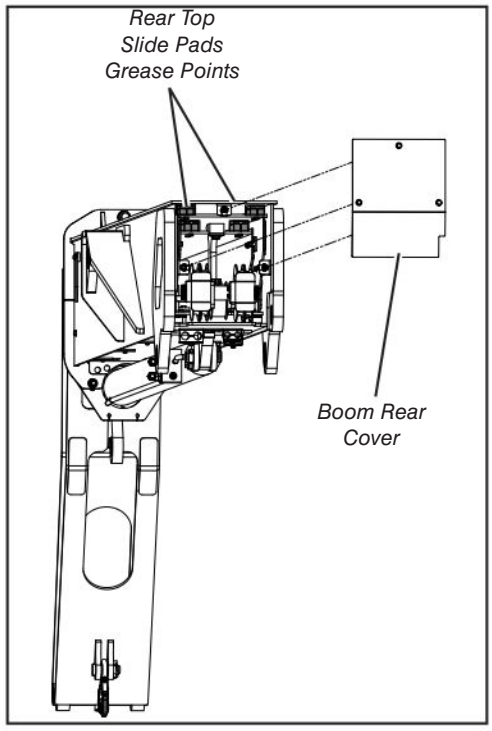


Figure 21 *Front Bottom Slide Pads*

9. Shut down the engine and remove key.

5.4 250 Hour or Quarterly Routine Maintenance

5.4-1 Check Lug Nut Torque

1. Ensure wheel nuts are tight on all wheels.
2. Tighten wheel nuts to a torque of 442 lb. ft. (599 N.m) using the cross pattern shown in figure below.

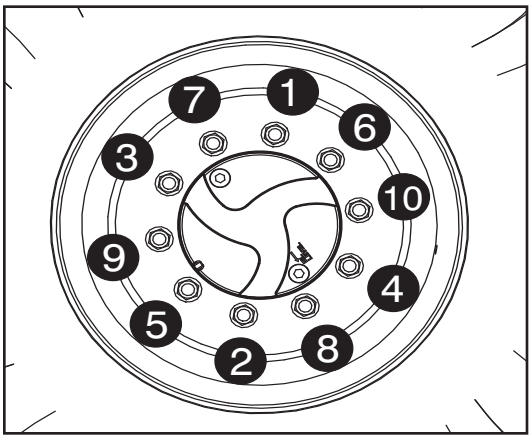


Figure 22 *Wheel Nuts Torque Procedure*

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

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

⚠ WARNING

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

NOTE

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

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

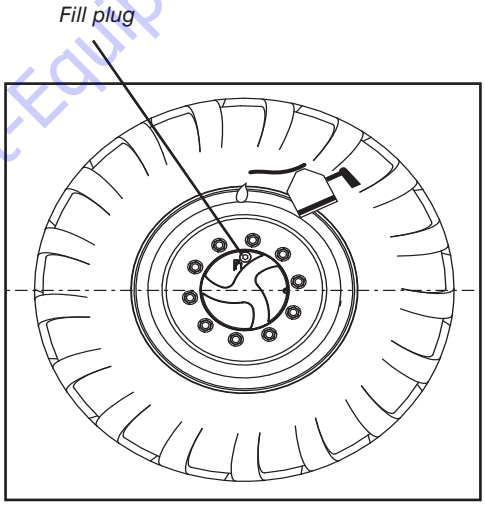


Figure 23 *Planetary Wheel Plug*

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

NOTE

Refer to Table 2.3 of Section 2 in this manual for oil type and capacity.

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

5.4-3 Check Oil level in Axle differentials

NOTE

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

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

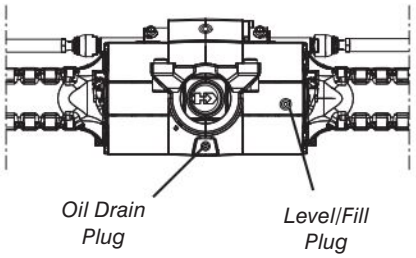


***Figure 24** Axle Plugs*

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

NOTE

Refer to Table 2.3 of Section 2 in this manual for oil type and capacity.

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

5.4-4 Replace Engine Oil and Filter

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

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

NOTE

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

CAUTION

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

CAUTION

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

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

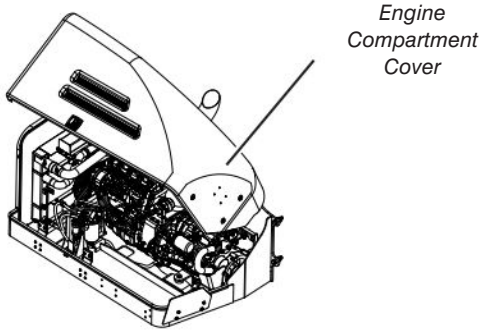


***Figure 25** Engine Cover*

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

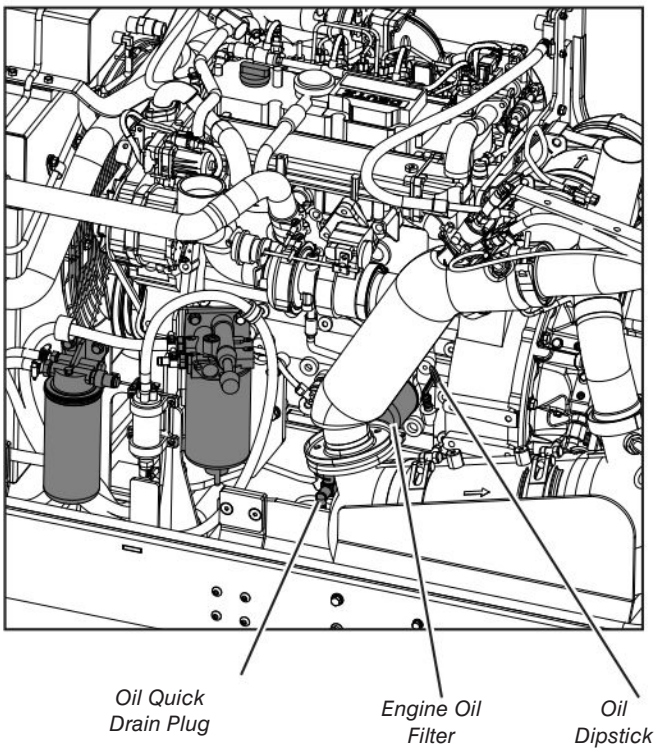


Figure 26 *Engine Oil Draining*

1. Install oil drain plug with a new seal ring and tighten firmly.
2. Remove oil filter and catch any escaping oil.

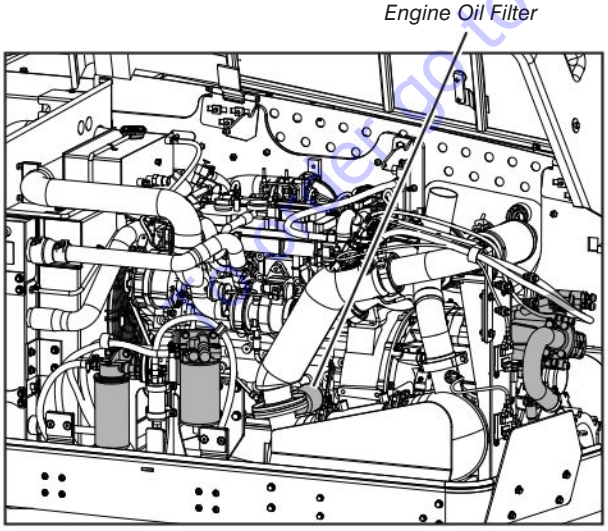


Figure 27 *Engine Oil Filter Location*

3. Clean inside the filter head.
4. Apply a thin layer of engine oil to the new oil filter gasket.
5. Screw on new filter by hand until the gasket is touching then tighten to a torque of 7-9 ft.-lb. (10-12 Nm).
6. Clean up any oil that may have spilled during this procedure.
7. Refill engine with new oil through the fill area. Refer to Table 2.3 for engine oil specifications.

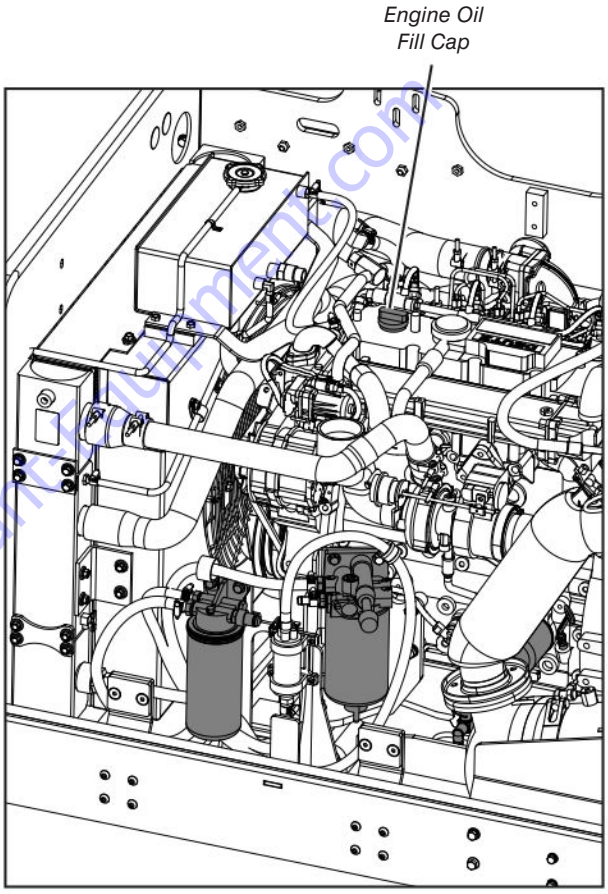


Figure 28 *Engine Oil Fill Cap*

8. Start engine and allow it to run for 30 seconds then stop the engine.
9. Check for oil leakage.
10. Check engine oil level on dipstick and add oil if needed.

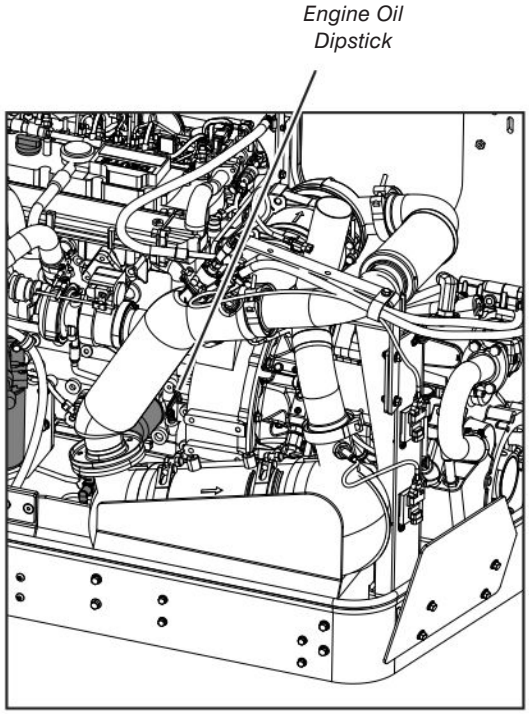


Figure 29 *Engine Oil Dipstick Location*

11. Close the engine compartment cover then latch to secure in place.

NOTE

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

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

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

WARNING

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

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

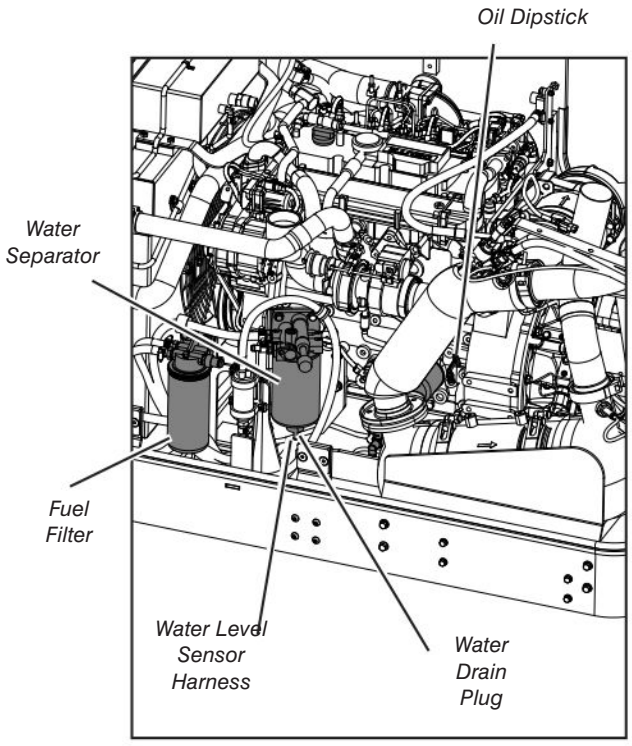


Figure 30 *Fuel Filter & Water Separator*

NOTE

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

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

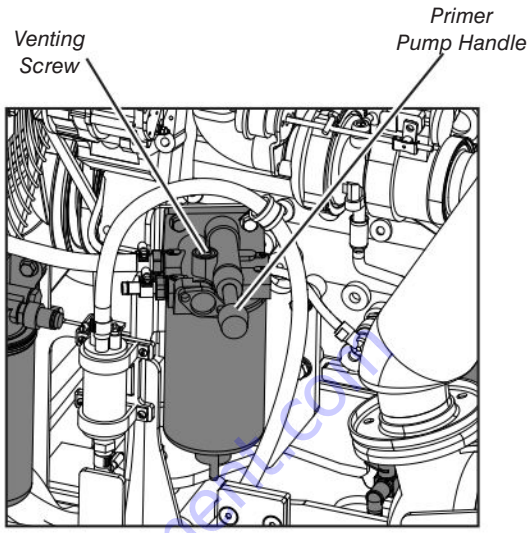


Figure 31 *Priming the Fuel System*

WARNING

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

- Loosen venting screw.
- Turn the primer pump handle counter clockwise (CCW) to release.
- Pump the handle in and out until pressure builds in the fuel system (handle will gradually become firm and fuel will come out of venting plug).
- Retighten venting scerew and primer handle.

16. Check area for any leaks.
17. Close engine cover back and latch it in place.

5.4-6 Clean Hydraulic Tank Breather

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

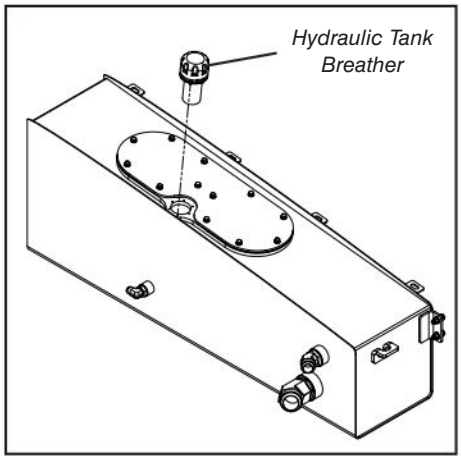


Figure 32 *Hydraulic Tank Breather*

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

5.4-7 Torque Axle Mounting Bolts

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

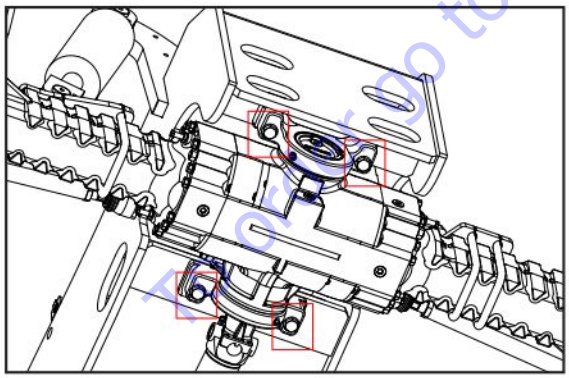


Figure 33 *Axle Mounting Bolts*

1. Torque front axle mounting bolts to 660 lb.ft. (895 N·m).
2. Torque rear axle mounting bolts to 380 lb.ft. (895 N·m).

5.4-8 Inspect Boom Chains

⚠ WARNING

Do not enter the danger area under or around the boom when forks are off the ground or while engine is running.

⚠ WARNING

Before making any repairs, use blocks and chains on the boom sections and forks to ensure that they cannot move. Make sure the moveable parts are attached to non-moveable parts.

1. Park telehandler on a firm level surface.
2. Apply parking brake then fully retract and lower the boom.
3. Shut down engine and remove key from ignition switch.
4. Remove cover on rear of boom structure.

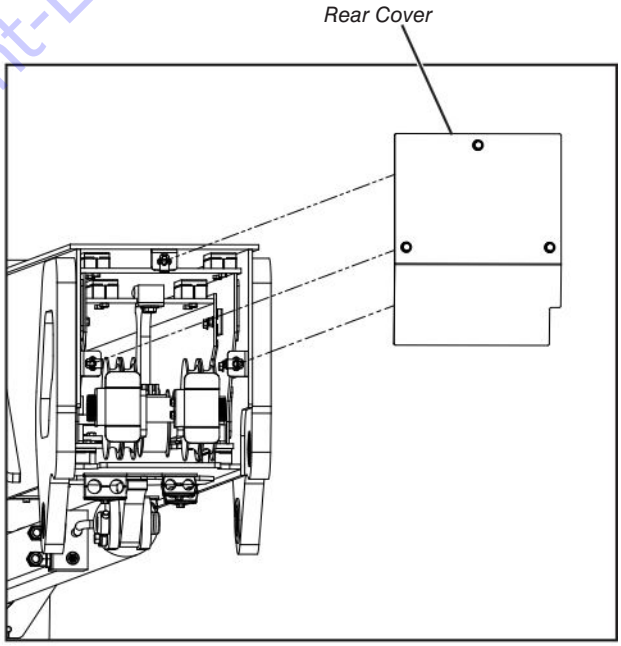


Figure 34 *Boom Cover Removal*

5. Inspect the retract chain(s) inside the rear of the boom.

NOTE
The chains should appear well lubricated, with no signs of wear or rust.

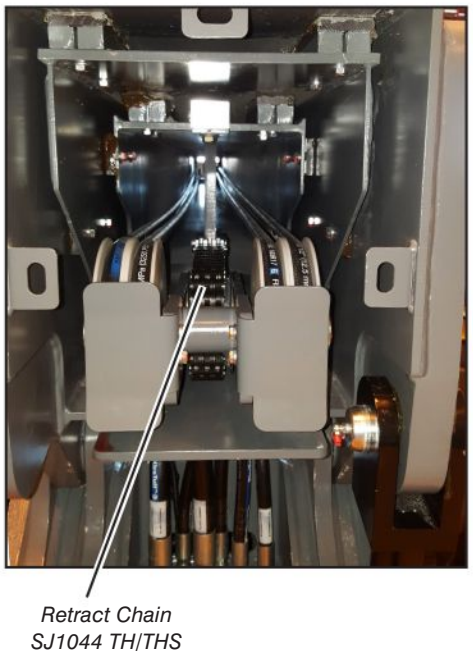


Figure 35 *Retract Chain SJ1044 TH/THS*

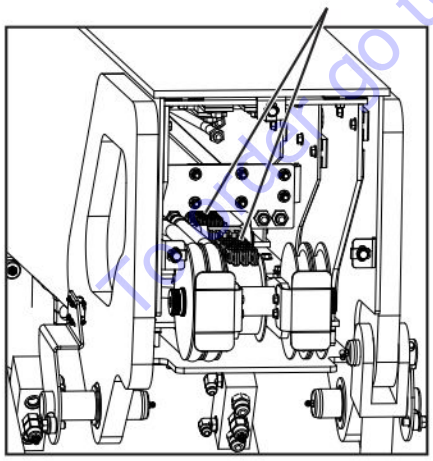


Figure 36 *Retract Chain SJ1X56 TH/THS*

6. If chain appears dry, rusty, or worn, the chains must be removed for a complete inspection and lubrication. Refer to Section 5.6-2 for boom chains replacement procedure.

7. When the chains are well lubricated, reinstall the cover.
8. Start the engine and fully extend the boom.
9. Shut down engine and remove key from ignition switch.
10. Inspect the extend chain(s). See figures below.

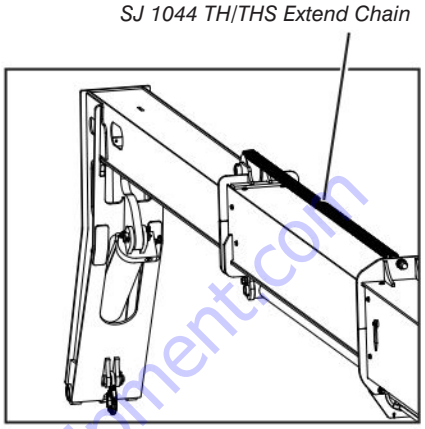


Figure 37 *SJ1044 TH/THS Boom Extend Chain*

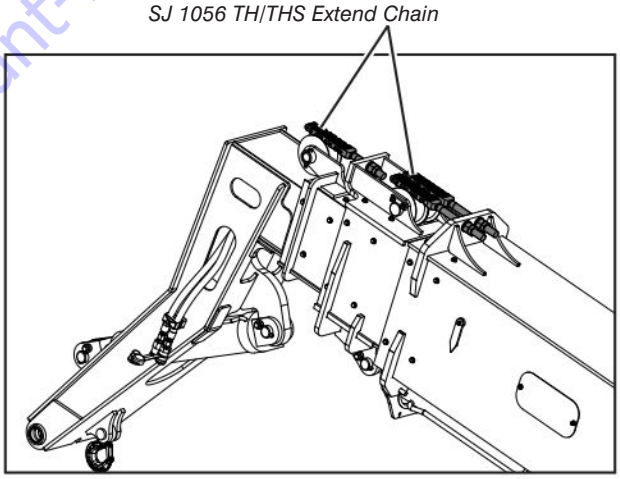


Figure 38 *SJ1056 TH/THS and SJ1256 THS Boom Extend Chains*

NOTE
The chain(s) should appear well lubricated, with no signs of wear or rust.

11. If chain appears dry, rusty, or worn, the chains must be removed for a complete inspection and lubrication. Refer to Section 5.6-2 for boom chains replacement procedure.

5.4-9 Check Boom Slide Pad Clearances

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

The slide pads are chamfered on the corner of the wear surface. This serves as a wear indicator. When the chamfer is no longer visible, replace the pads. Additional wear will allow interference with inserts in the pads. Refer to Section 5.6-3 for slide pads replacement procedure.

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

1. Park telehandler on a firm level surface.
2. Extend the boom and rest the forks on a level surface.
3. Apply park brake then shutdown the engine and remove key from ignition switch.
4. Measure the clearance between the bottom surfaces of the boom and slide pads at each section. Clearance should not exceed 0.08 in. (2 mm).

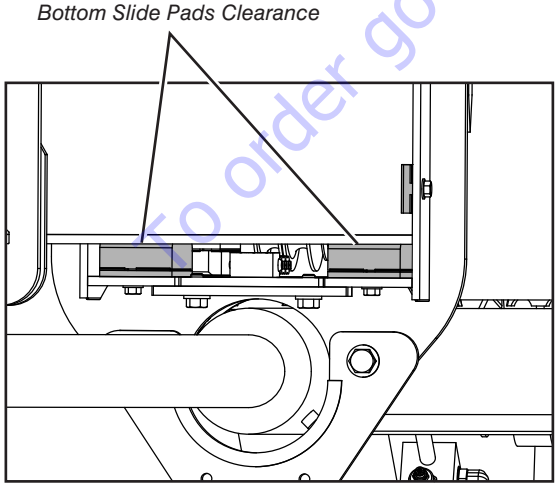


Figure 39 *Bottom Slide pads*

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

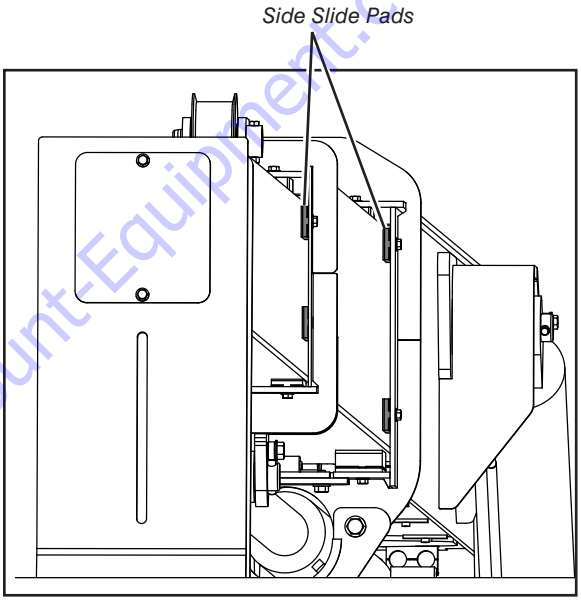


Figure 40 *Side Slide Pads Clearance*

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

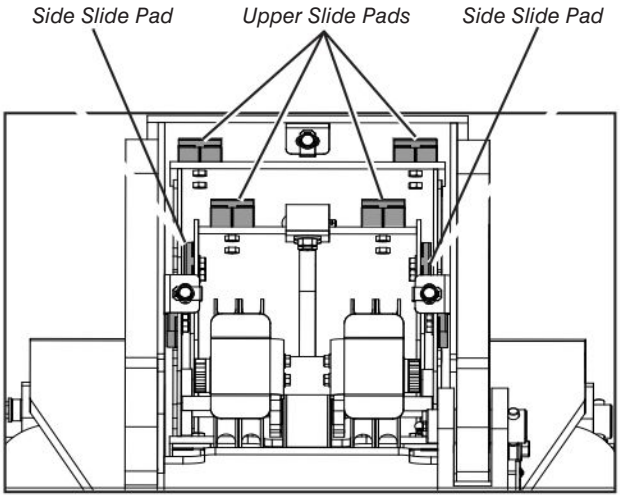


Figure 41 *Rear Upper and Side Slide Pads (SJ1044 TH/THS)*

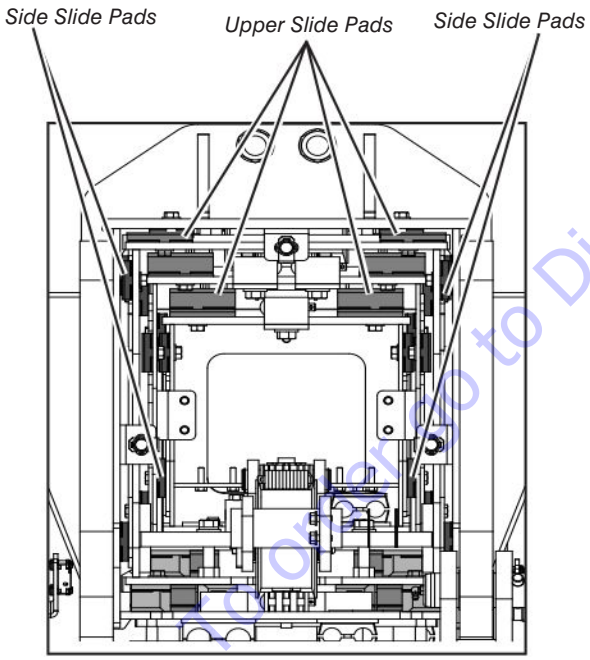


Figure 42 *Rear Upper and Side Slide Pads (SJ1X56 TH/THS)*

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

NOTE

If any of the clearances are greater than 0.08 in. (2 mm), shim adjustment or replacement of the slide pads may be required. Refer to Section 5.5-3.

5.4-10 Check Boom Chains Tension

Proper adjustment of the chains at this interval minimizes the risk of chain failure which could cause extensive damage to other boom components and require extensive labor hours to repair.

NOTE

If the chains make noise such as banging on the interior boom parts, or the chain slack identified below is more than the maximum acceptable value, adjustment is necessary.

1. Park telehandler on firm level ground and apply parking brake.
2. Fully extend the boom making sure the extend chain on top of boom assembly is visible.
3. As you retract the boom slowly, watch for sagging parts or loose links. See figure below.

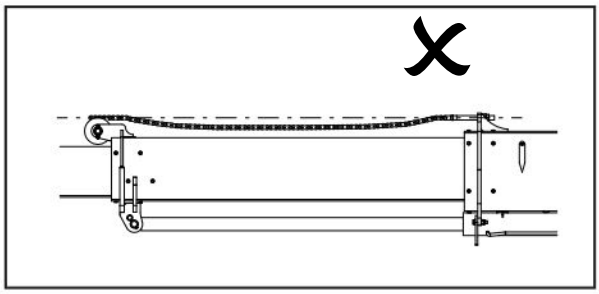


Figure 43 *Extend Chain Slack*

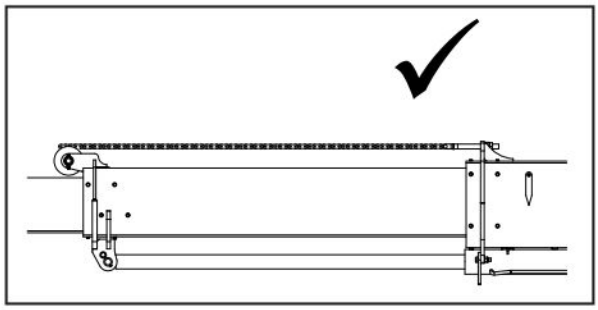


Figure 44 *Extend Chain*

NOTE

Chain slack should not exceed 1 inch. See Figure below.

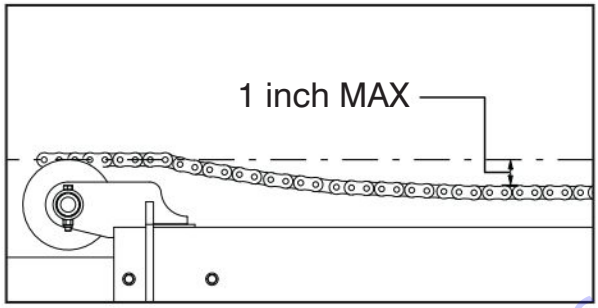


Figure 45 *Chain Maximum Slack*

IMPORTANT

If the slack is more than 1.00 in., an adjustment is required. Refer to Section 5.3-8 for chain tension adjustment procedure.

5.4-11 Chain Tension Adjustment

The boom chains should be adjusted when the following conditions occur:

- Every 250 hours
- When the chains are making noise (i.e. banging on interior boom parts)

WARNING

Before performing chain adjustment, complete the steps outlined in Section 5.3-7.

1. Partially extend the boom.
2. Using a 1-1/4” wrench, loosen jam nut at the chain anchor.

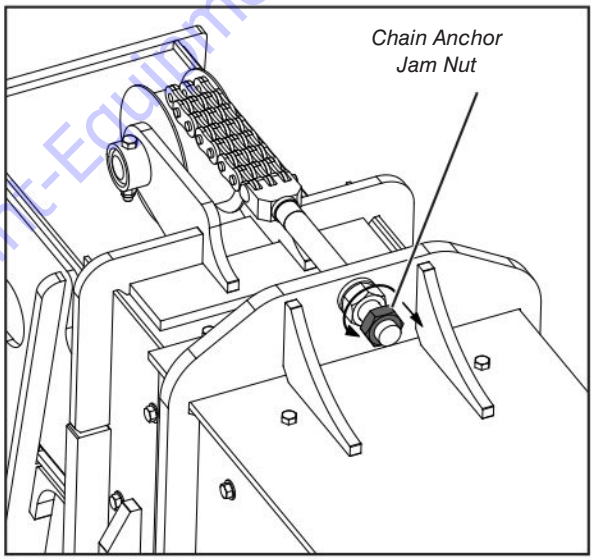


Figure 46 *Extend Chain Jam Nut (SJ1044 TH/THS)*

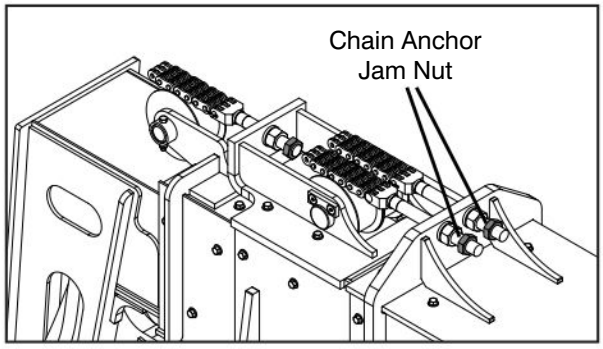


Figure 47 *Extend Chain Jam Nut (SJ1X56 TH/THS)*

3. Using a 1-1/4” wrench, tighten hex nut to achieve the desired chain tension .

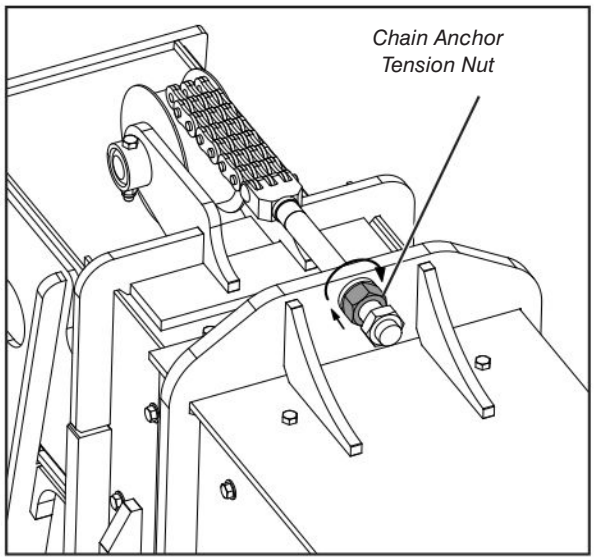


Figure 48 *Chain Anchor Tension Nut*

4. After reaching the satisfactory tension on the chain, tighten jam nut back in place and torque to 80 ft.-lb.

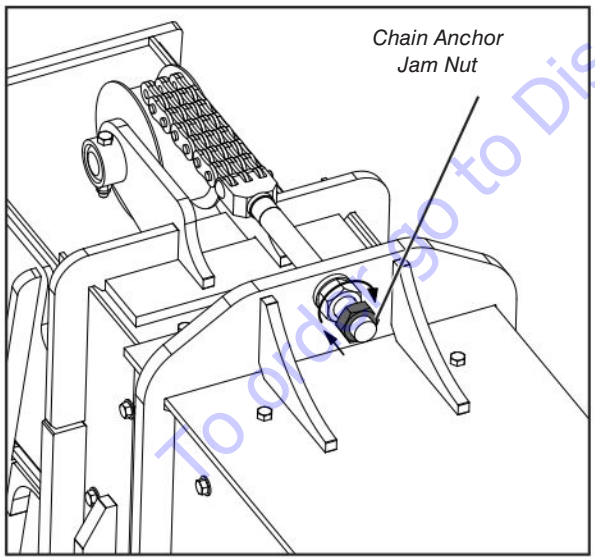
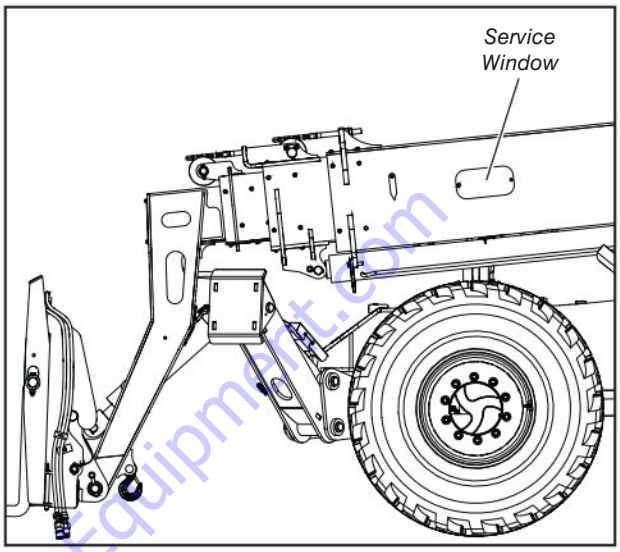


Figure 49 *Chain Anchor Jam Nut*

5.4-12 E-chain and Hoses Inspection

1. Fully retract the boom.
2.
3. Find the servicing windows on the sides of the boom and remove the covers.



4. Examine the e-chain and hoses for damage or wear.
5. If maintenance is necessary, refer to section 5.6-10 Cable Track Replacement on page 208

5.5 1000 Hour or Annual Routine Maintenance

5.5-1 Change Hydraulic Oil Filter

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

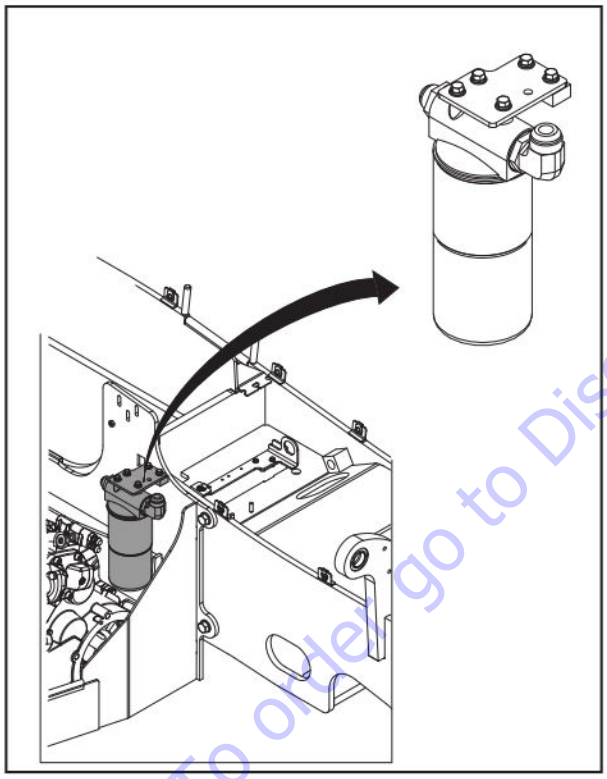


Figure 50 *Hydraulic Oil Filter Location*

NOTE

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

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

5.5-2 Change Hydraulic Oil and Clean Hydraulic Tank

NOTE

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

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

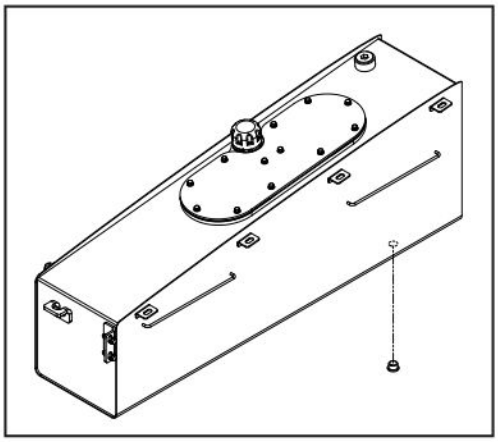


Figure 51 *Hydraulic Tank Drain Plug*

NOTE

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

6. Remove tank filler breather and set asisde.
7. Remove 12 screws holding the access cover plate from top of tank using a 5/16” wrench.
8. Remove rubber gaskets under access cover plate and set aside.

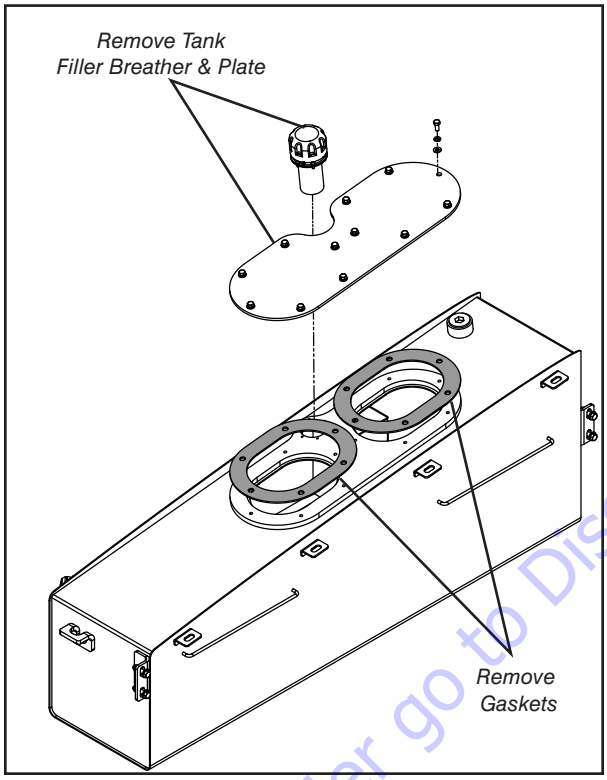


Figure 52 *Tank Hose Removal*

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

NOTE

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

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

NOTE

Refer to Table 2.3 for hydraulic oil specifications and tank capacity.

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

5.5-3 Change Axle Differential Oil

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

WARNING

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

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

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

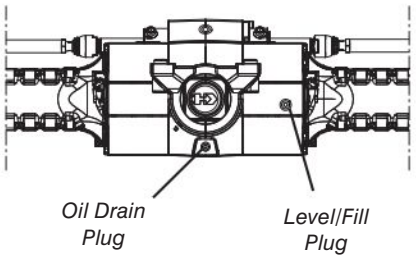


Figure 53 *Axle Plugs*

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

NOTE

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

6. Wipe off the magnetic drain plugs with a clean rag and install them in the axle.
7. Slowly fill the axle with 7 quarts (6.6 liters) of gear oil until oil begins to overflow from the level/fill hole. Refer to Table 2.3 for axle differential oil specifications.
8. Clean and replace the level fill plug.
9. Repeat procedure for the second axle

5.5-4 Change Axle Planetary Oil

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

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

Figure 54 *Draining Planetary Gear Oil*

NOTE

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

5. Wipe off the magnetic drain plug with a clean rag and install it in the planetary.
6. Reposition the plug to the 3 o'clock or 9 o'clock position then remove plug again.
7. Slowly fill the planetary with 1 quart (0.95 liters) of gear oil until oil begins to overflow from the level/fill hole. Refer to Table 2.4 for oil specifications.

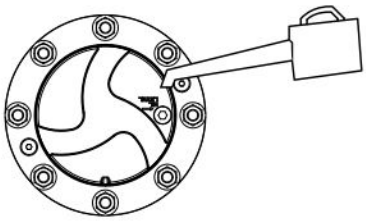


Figure 55 *Filling Planetary Gear Oil*

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

5.5-5 Change Engine Coolant

⚠ WARNING

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

NOTE

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

NOTE

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

1. Open the radiator cap to ensure proper draining.

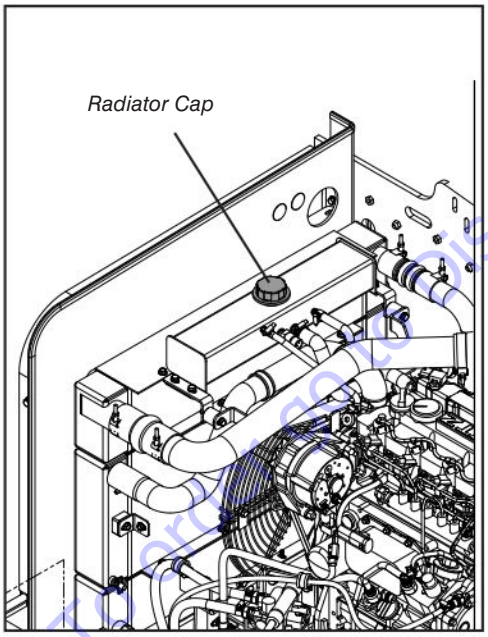


Figure 56 *Radiator Cap*

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

NOTE

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

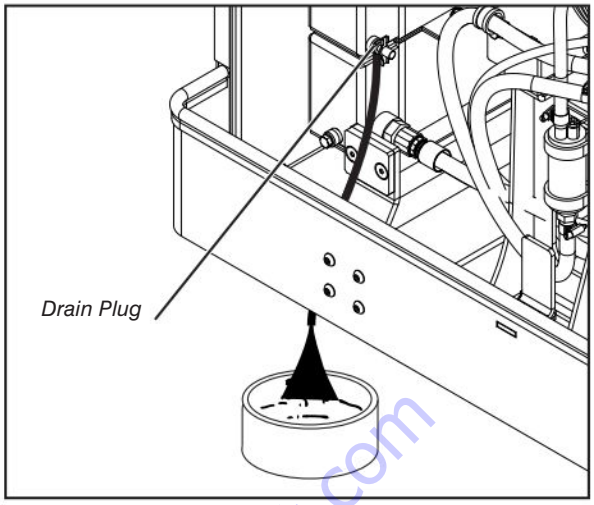


Figure 57 *Radiator Draining*

4. Close the drain plug.

NOTE

For machines without an enclosed cab continue from step 10.

5. Close manual heater valve located near the radiator cap/surge tank then disconnect the heater hose connected to it.
6. Locate the motorized heater valve and disconnect the heater hose going to the heater unit.

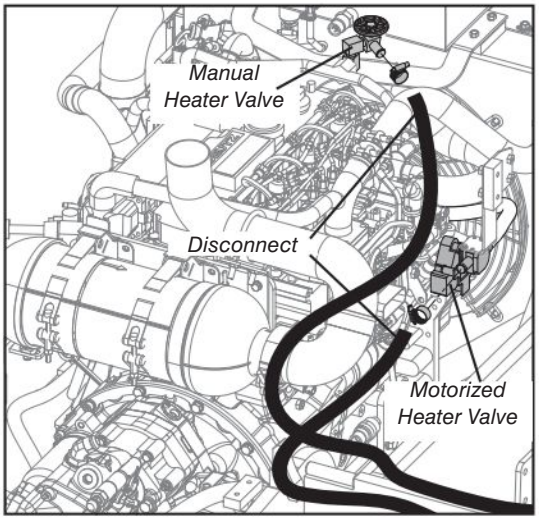


Figure 58 *Hoses Disconnection*

7. Run distilled water/clean tap water into the heater system through the manual valve hose until clean water comes out of the heater valve hose.

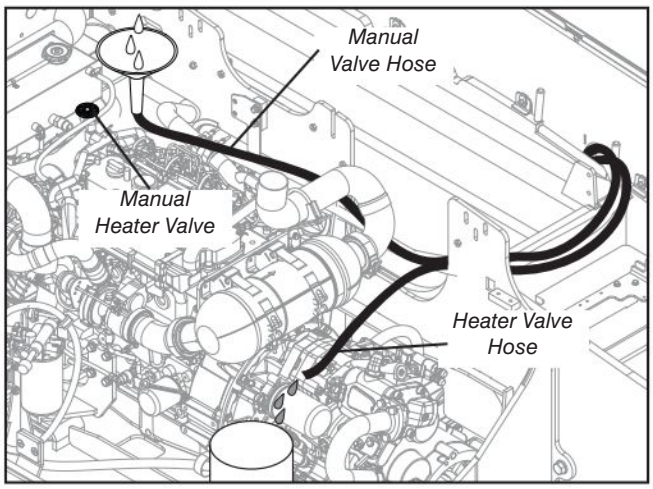


Figure 59 *Heater Unit Flushing*

8. Reinstall the heater hose into the manual heater valve. Keep valve closed.
9. Place a section of a 5/8” hose with a plugged end on the motorized heater valve as shown.

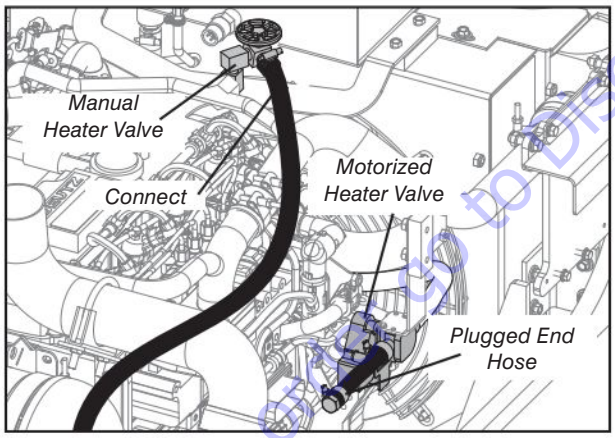


Figure 60 *Plugged Hose Installation*

10. Fill the cooling system with distilled water through the radiator neck until water is visible.
11. Run the engine until the module display indicates 75° to 80° without radiator cap. Check for leaks. Shut down the engine.
12. Place a container capable of holding 5 gallons (17 liters) under the radiator drain plug.
13. Let the engine cool down and open the radiator drain plug and allow radiator and coolant bottle to drain.

NOTE

If heater is equipped, remove the plugged hose at the motorized heater valve for proper draining. Must be reinstalled if another flush is needed.

14. Close the drain plug.

NOTE

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

15. Repeat steps 10 to 14 until clean water came out of the system.
16. After cleaning and flushing operations are completed refill the radiator using a mixture of antifreeze and distilled water (Table 2.3). Refer to engine manufacturer’s manual.

NOTE

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

17. Fill radiator completely through the radiator neck, until coolant is visible. See figure below.

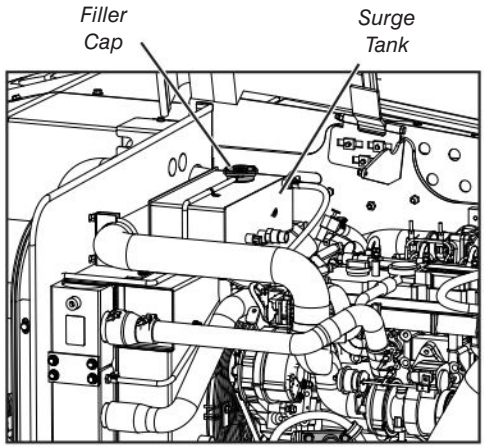
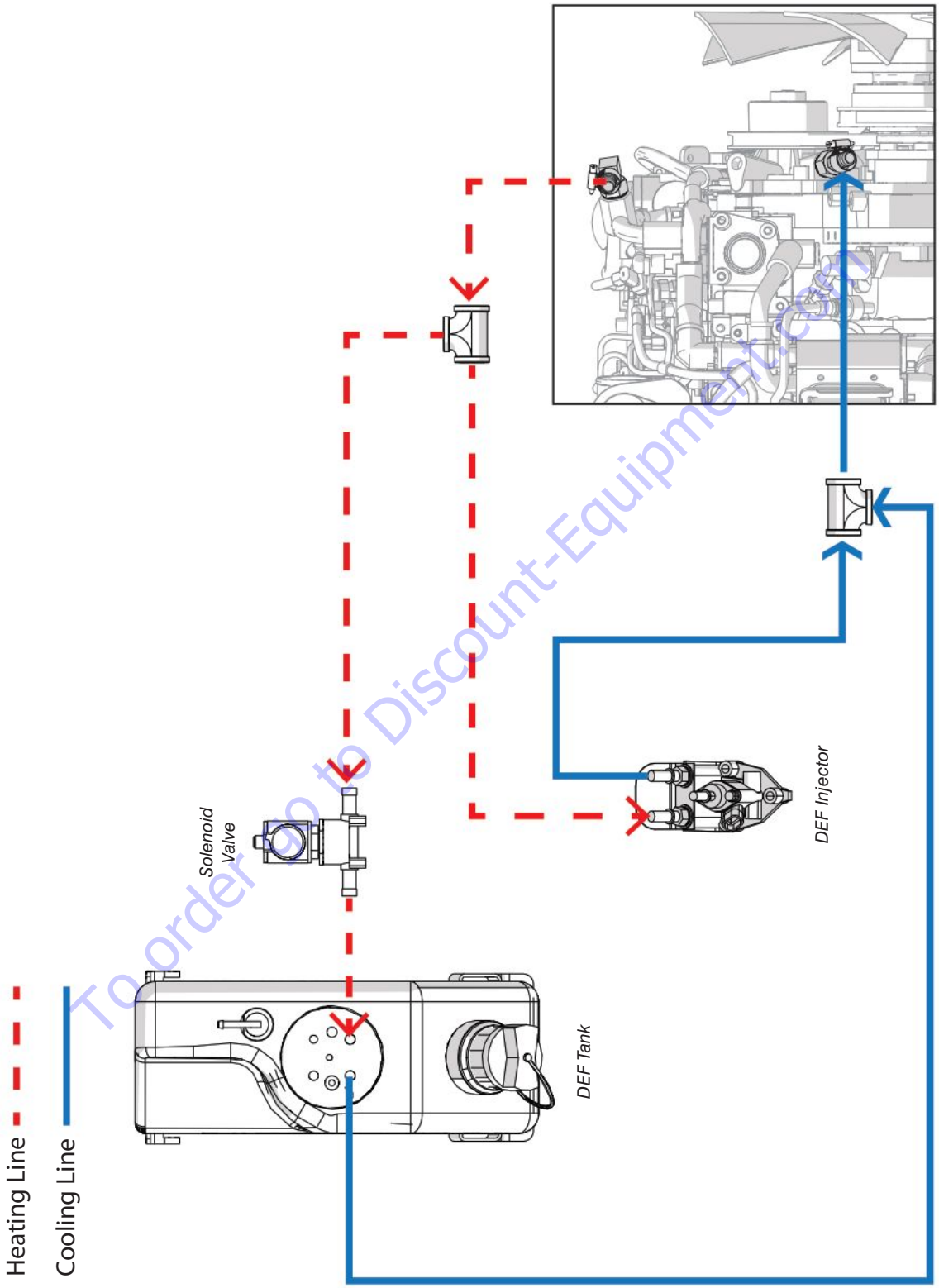


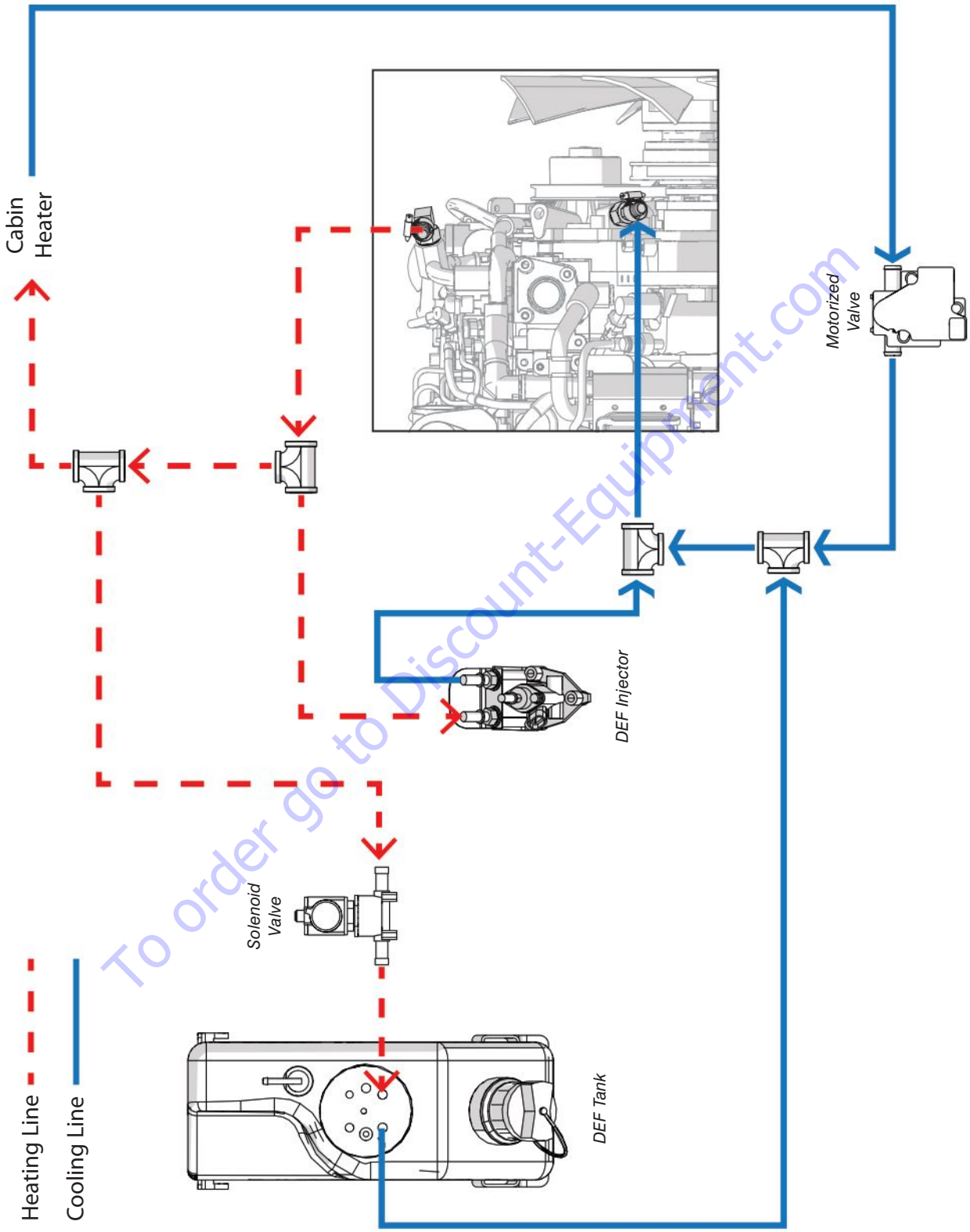
Figure 61 *Surge Tank Location*

18. Run the engine until the module display indicates 85° to 90° without radiator cap. Shut down the engine.
19. Check coolant level and coolant strength in the radiator. Adjust mixture as required. Refill until coolant is visible.
20. Tighten radiator cap, start the engine, and check for leaks.

Open Cab Plumbing



Enclosed Cab Plumbing



5.5-6 Change Transmission Oil and Filter

1. Allow engine to run until the transmission oil temperature reaches operating temperature.
2. Park telehandler on a firm level surface, apply park brake and shut down the engine.
3. Place a container with a capacity of at least 15 quarts (14 liters) under the transmission drain point.

⚠ WARNING

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

4. Remove drain plugs A and B to drain transmission oil.

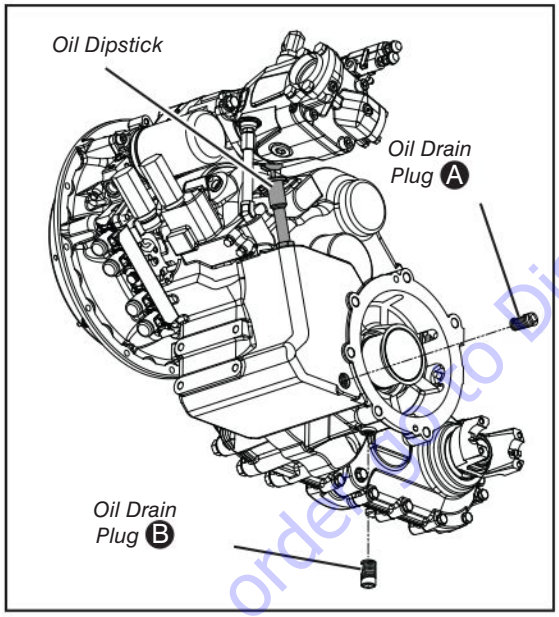


Figure 62 *Transmission Oil Drain Plugs*

5. Place a suitable container with enough capacity under drop box to catch drained oil.
6. Remove the drop box drain plug and drain the oil.

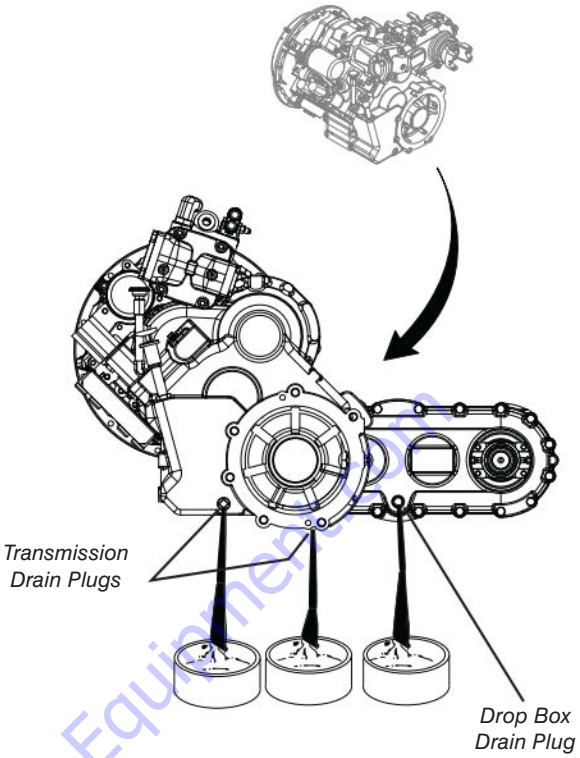


Figure 63 *Drop Box Drain Plug*

NOTE

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

7. Install all 3 fittings on transmission and drop box after draining all oil.
8. Remove drop box fill plug and fill transmission drop box with fresh clean transmission.

9. Check oil level on sight gauge. See figure below.

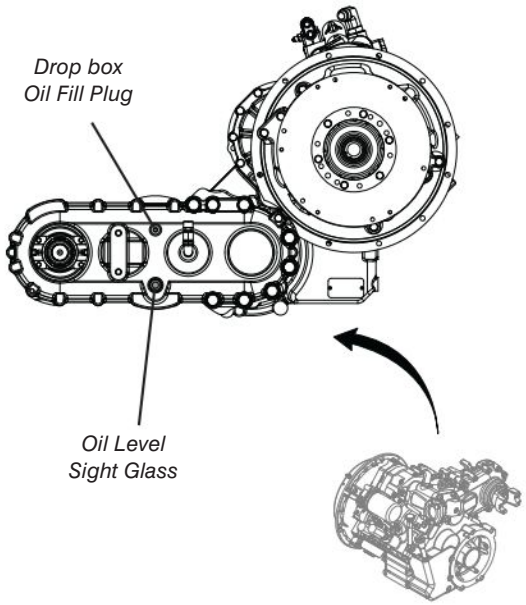


Figure 64 *Transmission Oil Filter Removal*

10. Clean the area around the transmission filter.
11. Remove the used filter and discard in accordance with local guidelines.

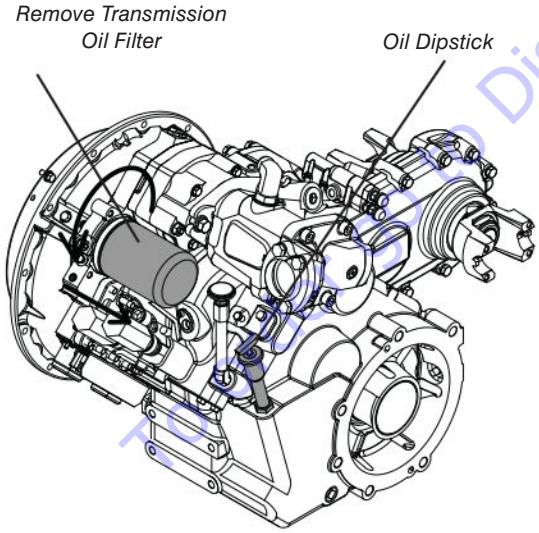


Figure 65 *Transmission Oil Filter Removal*

NOTE

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

12. Apply a light coating of oil to the new filter gasket and install it on the transmission.
13. Hand tighten the new filter until it touches the base then tighten an additional 1/2 to 3/4 turn.
14. Remove the dipstick and fill the transmission with 14.2 quarts (13.5 liters) of fresh clean transmission oil through the dipstick tube. Refer to Table 2.3 for transmission oil specifications.
15. Install the dipstick and screw on tightly.
16. Start engine and allow it to run until the transmission oil is at normal operating temperature.
17. Move the Direction Control Lever to ‘Neutral’, and shut down engine.
18. Remove the transmission oil dipstick then check the transmission oil level. Add as required.

5.5-7 Change Continuously Variable Transmission (CVT) Oil and Filter

1. Allow engine to run until the transmission oil temperature reaches operating temperature.
2. Park telehandler on a firm level surface, apply park brake and shut down the engine.
3. Place a container with a capacity of at least 15 quarts (14 liters) under the transmission drain point.

⚠ WARNING

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

4. Remove the transmission drain plug to drain transmission oil.

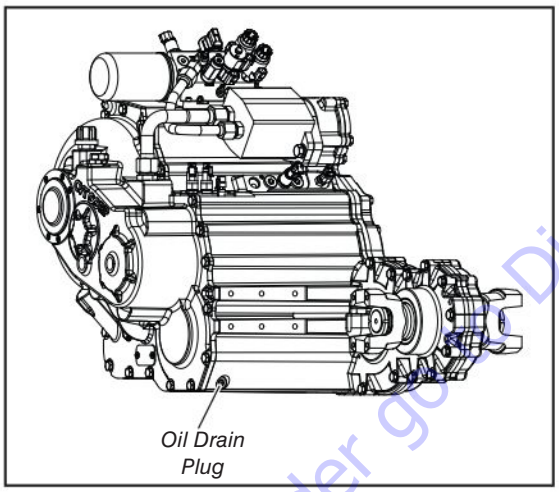


Figure 66 *Transmission Oil Drain Plugs*

5. Place a suitable container with enough capacity under drop box to catch drained oil.
6. Remove the drop box drain plug and drain the oil.

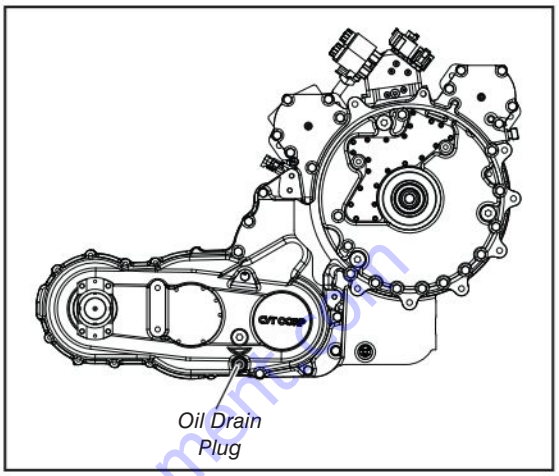


Figure 67 *Drop Box Drain Plug*

NOTE

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

7. Install the plugs on the transmission and the drop box after draining all the oil.
8. Remove drop box fill plug and fill transmission drop box with clean transmission oil until it starts to come out of the fill plug hole.

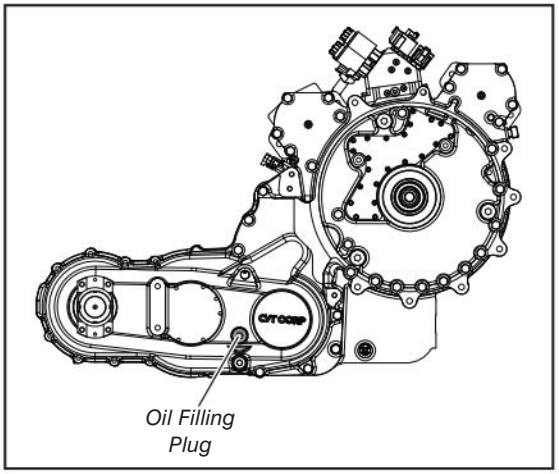


Figure 68 *Transmission Oil Filter Removal*

9. Clean the area around the transmission filter.
10. Remove the used filter and discard in accordance with local guidelines.

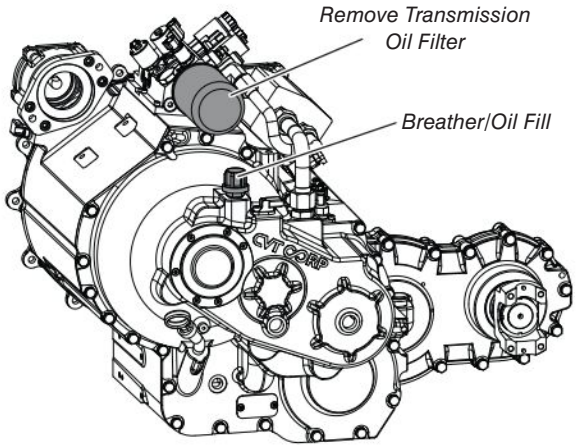


Figure 69 *Transmission Oil Filter Removal*

NOTE

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

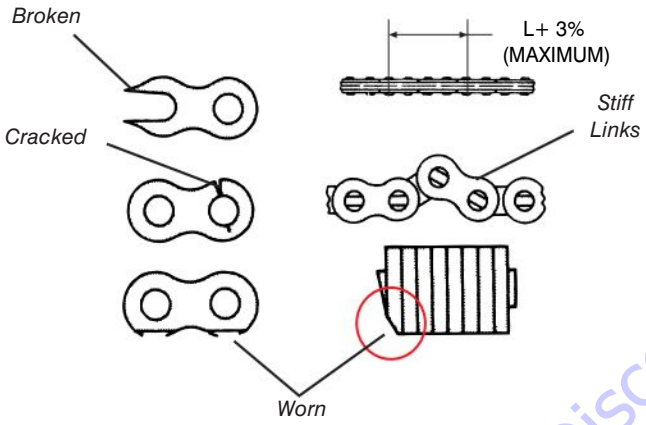
11. Apply a light coating of oil to the new filter gasket and install it on the transmission.
12. Hand tighten the new filter until it touches the base then tighten an additional 1/2 to 3/4 turn.
13. Remove the dipstick and fill the transmission with ~19 quarts (~18 liters) of clean Valvoline I-205 traction transmission oil through the Breather/Oil fill port. Refer to Table 2.3 for transmission oil specifications.
14. Install the dipstick and screw on tightly.
15. Start engine and allow it to run until the transmission oil is at normal operating temperature.
16. Move the Direction Control Lever to 'Neutral', and shut down engine.
17. Remove the transmission oil dipstick then check the transmission oil level. Add as required.

5.5-8 Inspect Boom Chains

NOTE

Refer to Section 5.6-2 for chain replacement procedure.

1. Inspect the chains annually for the following items, replace the chains as necessary:
   - worn, cracked or broken plates
   - wear of plate and pin head
   - stiff links or enlarged plate holes
   - worn or rusted connecting pins



Chain Plate Deformations

2. Measure chain elongation. Measurement should be MAXIMUM of new chain length plus 3%.
3. If chain replacement is not necessary; clean the chain in solvent, and dry using low pressure compressed air.
4. Prior to installation, soak the chain in a pan of SAE 40 engine oil or chain and cable lubricant for a MINIMUM of 8 hours to ensure correct lubrication of the pins and links.

5.5-9 Inspect RAS System (Rear Axle Stabilization) Functionality

Warning

This procedure must be performed by a qualified service personnel only. Failure to adhere to the steps outlined below could result in serious injury.

1. Ensure park brake is engaged, transmission shifter in neutral, boom fully retracted and above ground.
2. Remove the cover form the RAS manifold and set aside.

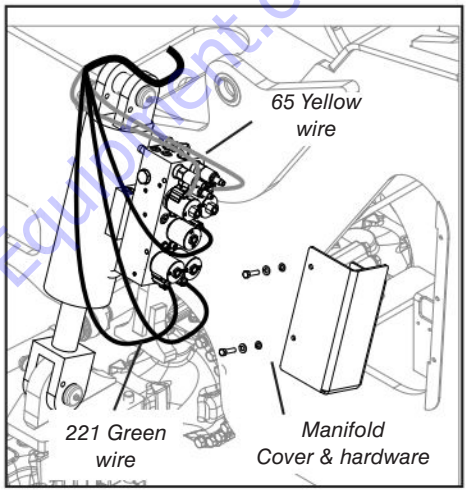


Figure 70 *RAS Manifold Location*

3. Unplug all harness connectors from RAS manifold.
4. Sit in the driver's seat and fasten seat belt.
5. Frame level left and observe the front left wheel lifting off the ground.
6. Observe the front left wheel while it is off the ground for 30 seconds. Ensure that it holds in position.
7. Level the frame to the right until front left tire fully rests on the ground.
8. Shutdown engine and remove key from ignition switch.
9. Plug all harness connectors on RAS manifold as shown in the figure above.
10. Install the RAS manifold cover back in place.
11. Perform boom interlock and RAS system test. Refer to Section 1.2 of this manual.

RAS System Logic Truth Table								
Service Brake Fully Depressed	Park Brake	Driving	Frame Leveling	Boom up >=40		Axle		
						Free	Limited	Locked
0	0	0	0	0		1	0	0
0	0	0	0	1		0	0	1
0	0	0	1	0		1	0	0
0	0	0	1	1		0	1	0
0	0	1	0	0		1	0	0
0	0	1	0	1		0	1	0
0	0	1	1	0		1	0	0
0	0	1	1	1		0	1	0
0	1	0	0	0		1	0	0
0	1	0	0	1		0	0	1
0	1	0	1	0		1	0	0
0	1	0	1	1		0	1	0
0	1	1	0	0		1	0	0
0	1	1	0	1		0	0	1
0	1	1	1	0		1	0	0
0	1	1	1	1		0	1	0
1	0	0	0	0		1	0	0
1	0	0	0	1		0	0	1
1	0	0	1	0		1	0	0
1	0	0	1	1		0	1	0
1	0	1	0	0		1	0	0
1	0	1	0	1		0	0	1
1	0	1	1	0		1	0	0
1	0	1	1	1		0	1	0
1	1	0	0	0		1	0	0
1	1	0	0	1		0	0	1
1	1	0	1	0		1	0	0
1	1	0	1	1		0	1	0
1	1	1	0	0		1	0	0
1	1	1	0	1		0	0	1
1	1	1	1	0		1	0	0
1	1	1	1	1		0	1	0

5.6 Non-Routine Maintenance

5.6-1 Boom Hoses and Sheaves Replacement

Remove Hose Sheaves

1. Park telehandler on a firm level surface, apply park brake.
2. Fully retract and lower the boom then shutdown engine and remove key from ignition switch.
3. Remove the rear boom cover.

NOTE

Right side sheaves are for Fork Tilt hoses. Left side sheaves are for Auxiliary Functions hoses.

4. Remove the 2 bolts holding each sheave guard bracket to the finger weldment.

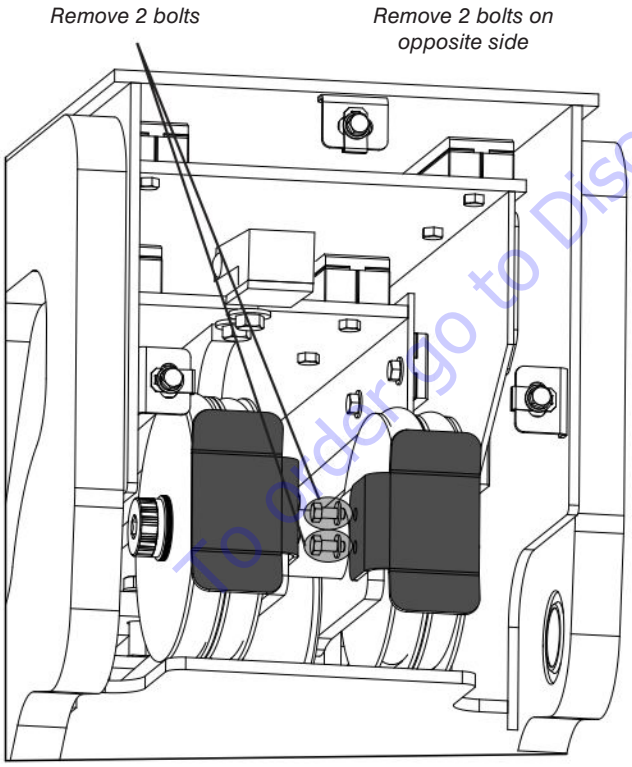


Figure 71 *Sheave Guards Removal.*

5. Remove 2 bolts on opposite sheave guards as shown in figure below.

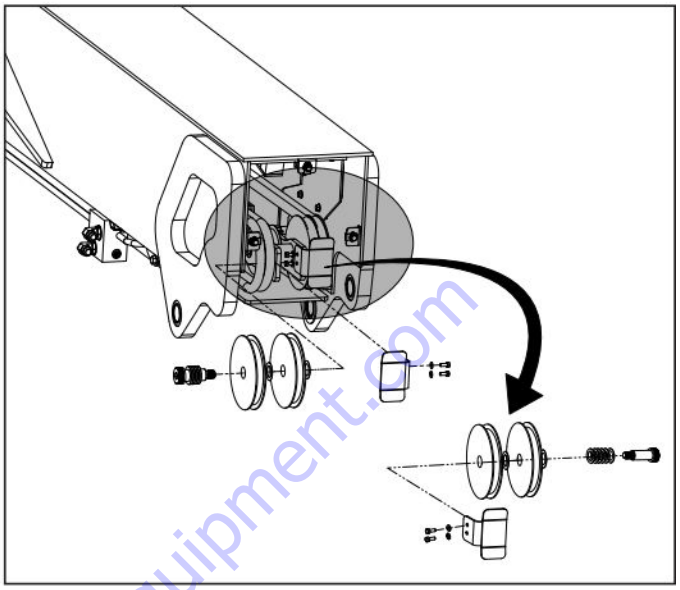


Figure 72 *Boom Hose Sheaves*

6. Using a allen key or pipe-wrench remove shoulder screw holding the rollers in place.
7. Slowly remove hose sheaves (rollers) and keep thrust washers intact in the same order.

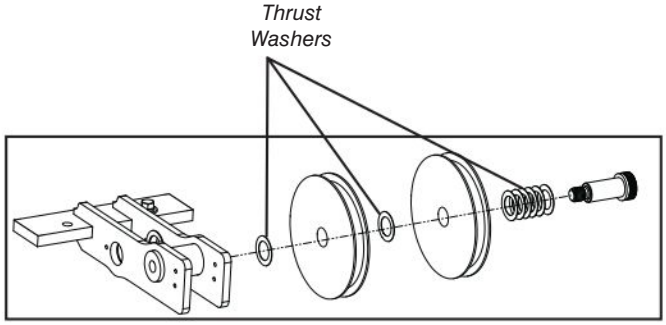


Figure 73 *Thrust Washers on Hose Sheaves*

Remove Boom Hoses

1. Remove end of Fork Tilt hoses at front bulkheads on main boom assembly.

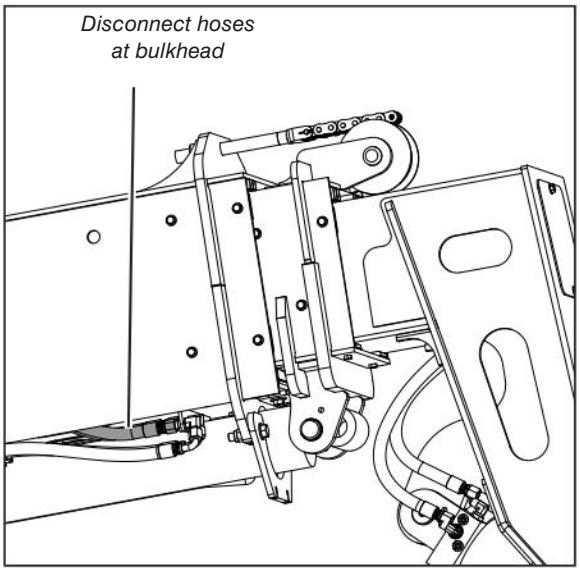


Figure 74 *Fork Tilt Hoses Removal at Bulkhead*

2. Cap/plug all open lines and fittings.
3. Remove other end of Auxilliary Hydraulics hoses at front bulkheads on main boom assembly.

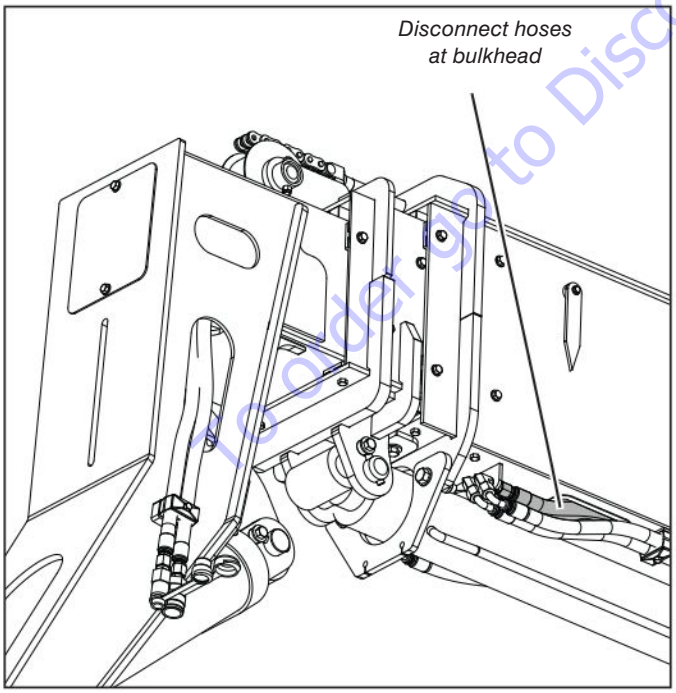


Figure 75 *Aux. Hydraulics Hoses Removal at Bulkhead*

4. Cap/plug all open lines and fittings.

For SJ1044 TH/THS Only

5. Start engine and extend the boom approximately 3 feet to gain acces to side acces hole on fly boom section.

Figure 76 *Boom Side Access Hole*

6. Shutdown engine and remove key from ignition switch.
7. Disconnect hoses at the rear of bulkhead as shown below.

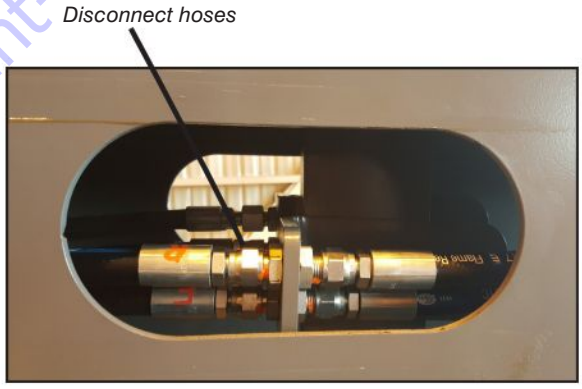


Figure 77 *Fork Tilt Hoses Removal*

8. Cap/plug all open lines and fittings.
9. Remove the hoses at the rear of bulkhead fittings on the other side of the boom.
10. Cap/plug all open lines and fittings.
11. Start the engine and fully retract the boom.
12. Shutdown engine and remove key from ignition switch.
13. With rear access cover plate removed, pull the hoses out of boom assembly and thoroughly inspect all hoses. Replace hoses if needed.

For SJ1056 TH/THS Only

5. Remove the rear boom cover.
6. Disconnect hoses at the rear of bulkhead fittings as shown below.

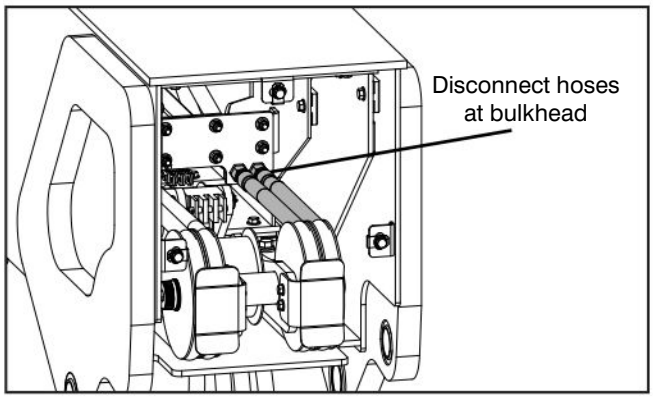


Figure 78 *Fork Tilt hoses removal*

7. Cap/plug all open lines and fittings.
8. Remove the hoses at the rear of bulkhead fittings on the other side of the plate.
9. Cap/plug all open lines and fittings.
10. With rear access cover plate removed, pull the hoses out of boom assembly and thoroughly inspect all hoses. Replace hoses if needed.

Inspect Boom Hydraulic Hoses

14. Inspect hoses for damage such as cuts, blisters and/or soft spots along their length. Inspect hoses for damage at the fittings. Inspect the pulleys for face and edge damage. Replace damaged parts as required.
15. Ensure that all wire ties or tags used to mark the long hose during removal are transferred to the new long hose prior to beginning the assembly process. Ensure to wire tie/tag both ends of the hose.

Install Hose Sheaves

1. With rear access cover plate removed, install right-side hose sheaves as shown in the figure below.
2. Ensure thrust washers are set in place.

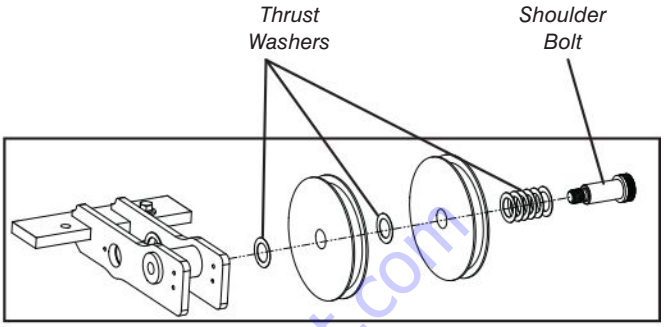


Figure 79 *Thrust Washers on Hose Sheaves*

3. Using a allen key or pipe-wrench tighten shoulder screw to hold the rollers in place.
4. Repeat Steps 1 to 3 for the left-side hose sheaves.
5. Install sheave guard bracket to the finger weldment using 2 bolts as shown in the figure.

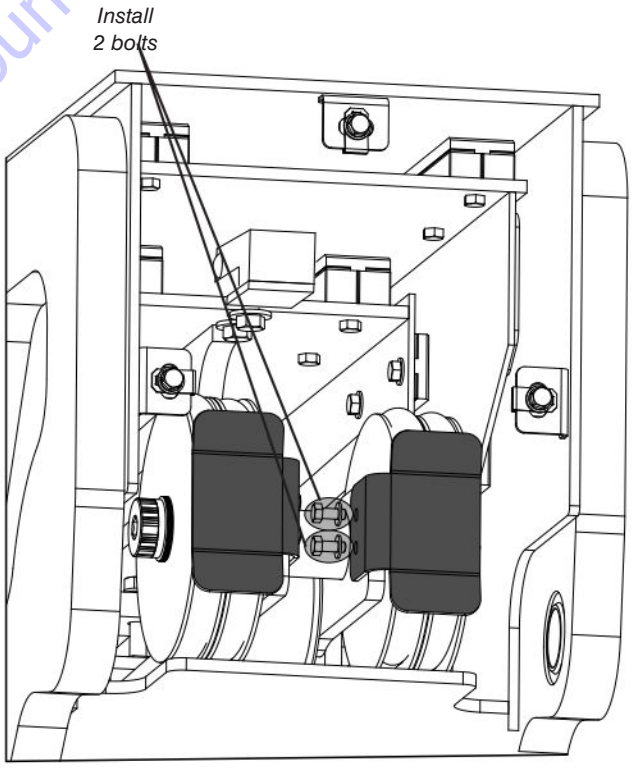


Figure 80 *Sheave Guards Removal.*

6. Repeat step 5 for the opposite side sheave guard bracket.

Install Boom Hydraulic Hoses

1. With rear access cover plate removed, insert right side hoses & left side hoses and rest half-way on the rollers.
2. Connect auxilliary hoses (cab side) to bulkhead under front of boom assembly as shown in figure below.
3. Connect carriage tilt hoses (tank side) to bulkhead as shown in figure below.
4. Fully loosen off the extend chain anchor jam nut and tension nut.

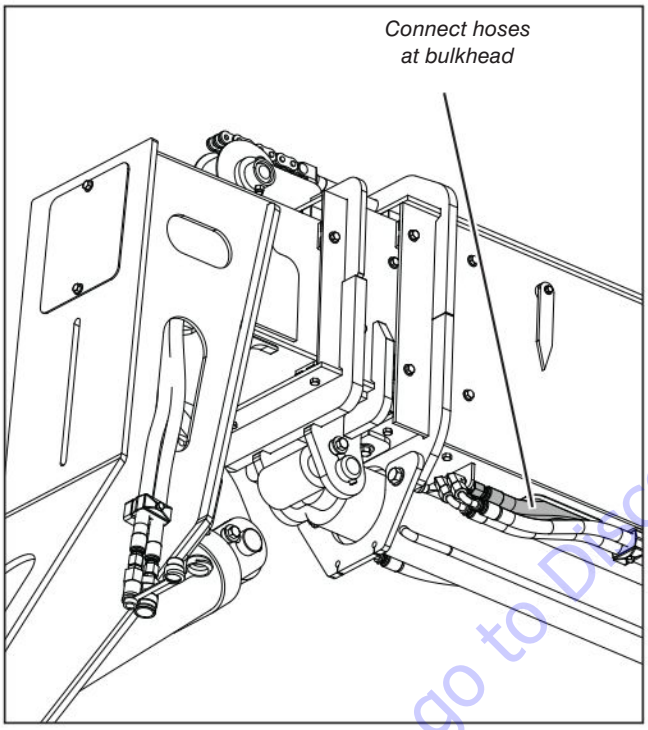


Figure 81 *Auxilliary Hydraulics Hoses Connection at Bulkhead*

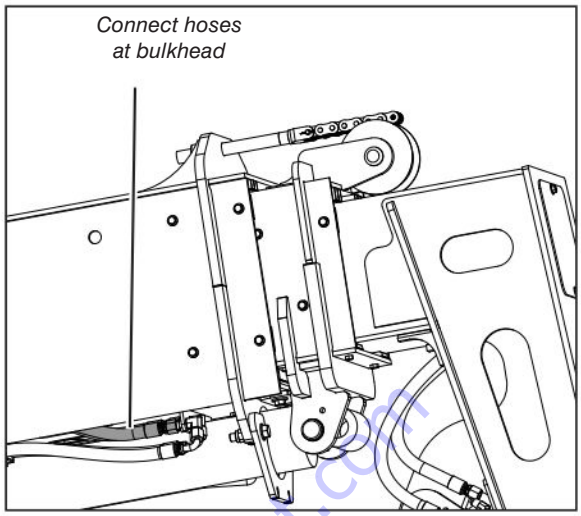


Figure 82 *Fork Tilt Hoses Connection at Bulkhead*

For SJ1044 TH/THS Only

5. Start engine and extend the boom approximately 3 feet to gain acces to side acces hole on fly boom section.

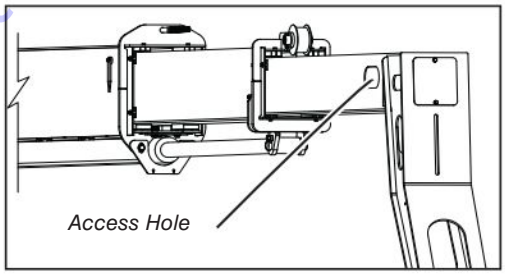


Figure 83 *Boom Side Access Hole*

6. Shutdown engine and remove key from ignition switch.
7. Connect hoses at the rear of bulkhead as shown below.

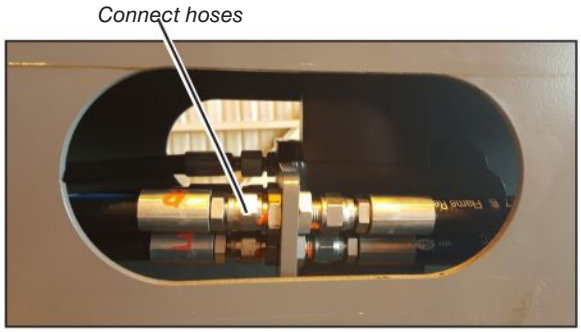


Figure 84 *Fork Tilt Hoses Connection*

8. Connect the hoses at the rear of bulkhead fittings on the other side of the boom.
9. Start the engine and fully retract the boom.
10. Re-tighten extend chain. Refer to section 5.4-11.
11. Shutdown engine and remove key from ignition switch.
12. Install auxiliary attachment, start engine and check for proper operation of the attachment. Repair as required.
13. Check hydraulic oil level and top-up as required.

For SJ1056 TH/THS Only

5. Connect hoses at the rear of bulkhead fittings as shown below.

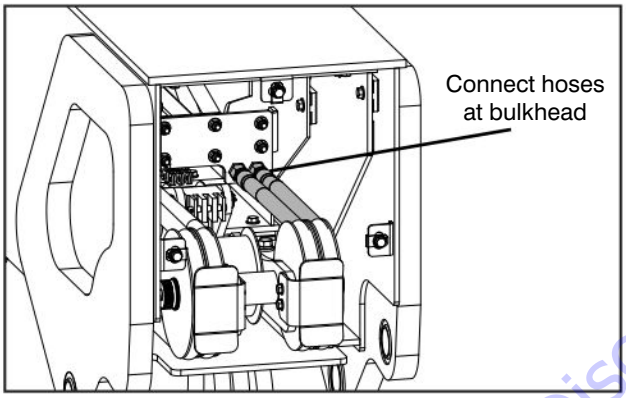


Figure 85 *Fork Tilt hoses Connection*

6. Connect the auxiliary hydraulics hoses at the rear of bulkhead fittings on the other side of the plate.
7. Check hydraulic oil level and top-up as required.

5.6-2 Boom Chains Replacement

Remove Extend Chain

1. Partially extend the boom.
2. Using a 1-1/4” wrench, remove jam nut at the chain anchor as shown below.

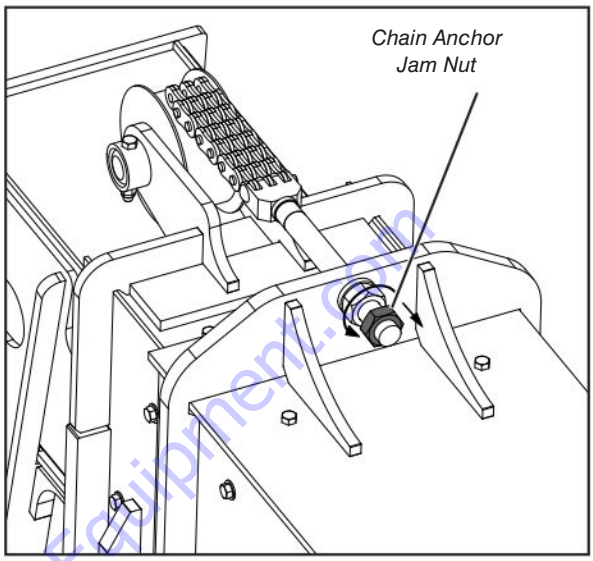


Figure 86 *Extend Chain Jam Nut*

3. Using a 1-1/4” wrench, Remove hex nut as shown below.
4. Remove and discard washer.

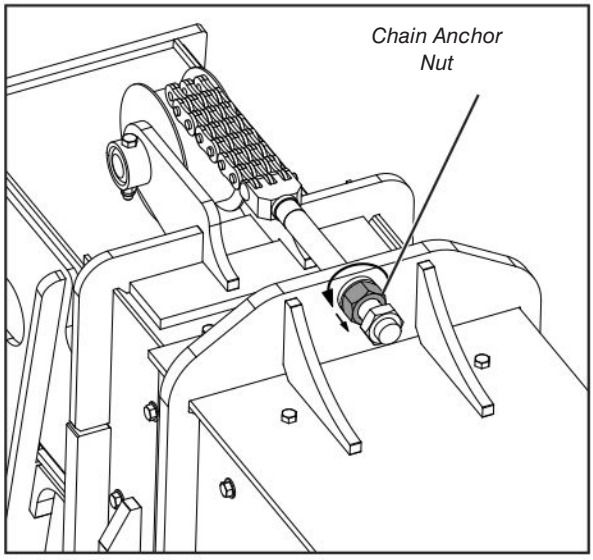


Figure 87 *Chain Anchor Nut & Washer Removal*

5. Slide chain anchor through hole on main boom then lay chain with anchor on top of boom as shown.

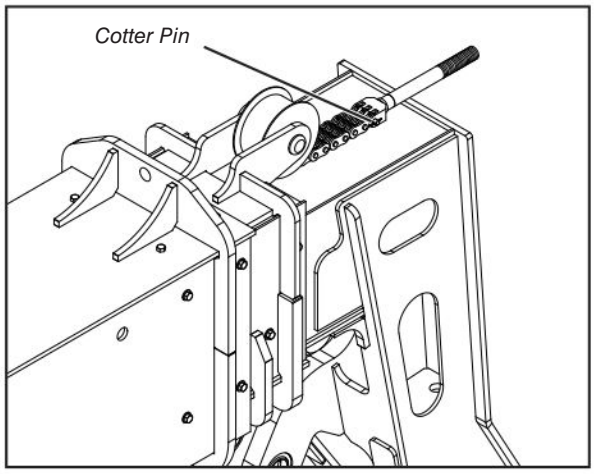


Figure 88 *Chain Removal*

6. Remove cotter pin and anchor pin then disonnect chain from anchor.
7. Remove rear access cover plate then remove the rear anchor mount on 3rd boom section and/or fourth boom section for SJ1056 TH/THS / SJ1256 THS.

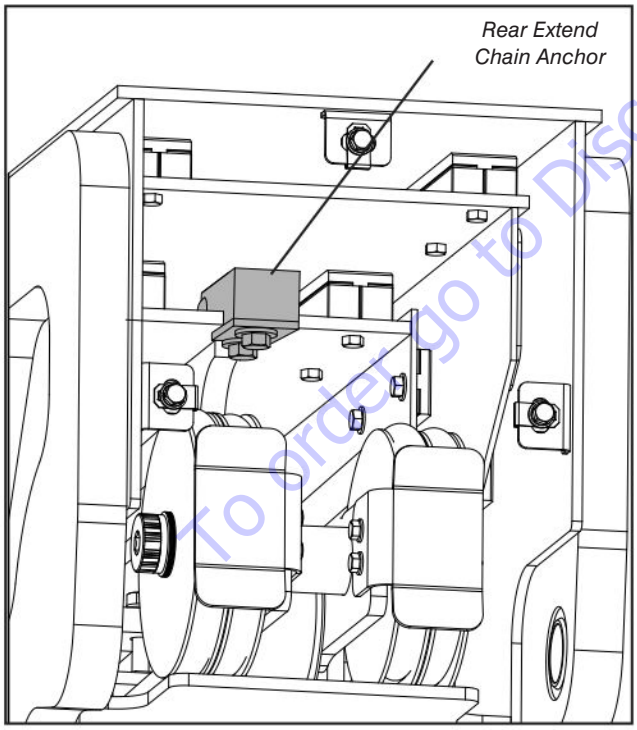


Figure 89 *Rear Extend Chain Anchor.*

8. Remove cotter pin and anchor pin then disonncet chain from anchor.
9. Pull out chain completely from boom and thoroughly inspect.

NOTE

Refer to section 5.4-8 for detailed procedure on how to inspect boom chains.

Install Extend Chain

1. At the front of the boom, link the new extend chain to the end of the old extend chain using a link pin and new cotter pin.
2. From the rear of the boom, pull the old extend chain through the boom until the link to the new chain is visible.

NOTE

Leave a about 2 ft. of slack to loop around chain sheave on 2nd boom and connect to it to the chain anchor as shown.

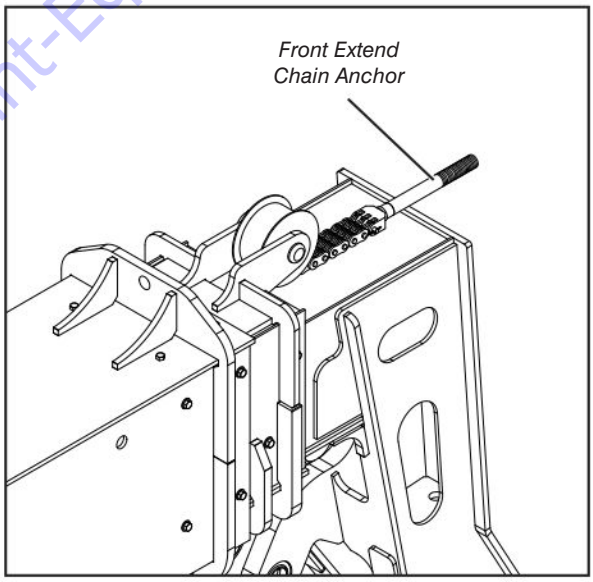


Figure 90 *Front Extend Chain Anchor*

3. Remove the cotter pin and link pin that secures the old extend chain to the new extend chain. Remove and discard the old extend chain. Discard the cotter pin.
4. From the rear of the boom, secure the chain to the anchor by installing the link pin and a new cotter pin

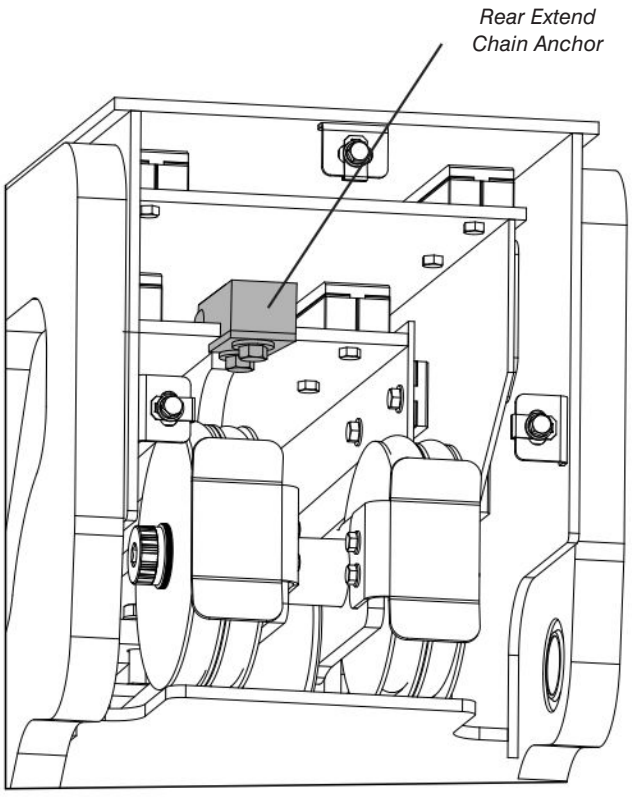


Figure 91 *Rear Extend Chain Anchor.*

5. Install the rear anchor mount to the top of the 3rd boom section and/or fourth boom section for SJ1056 TH with 1/2” bolts and washers.
6. Torque bolts to 80 lb.-ft. using a 3/4” socket.

NOTE

Ensure the chain anchor remains square to the 3rd boom top plate.

7. On front of boom, apply SKF Antifret grease to threadded end of chain anchor then feed it through the mounting hole.

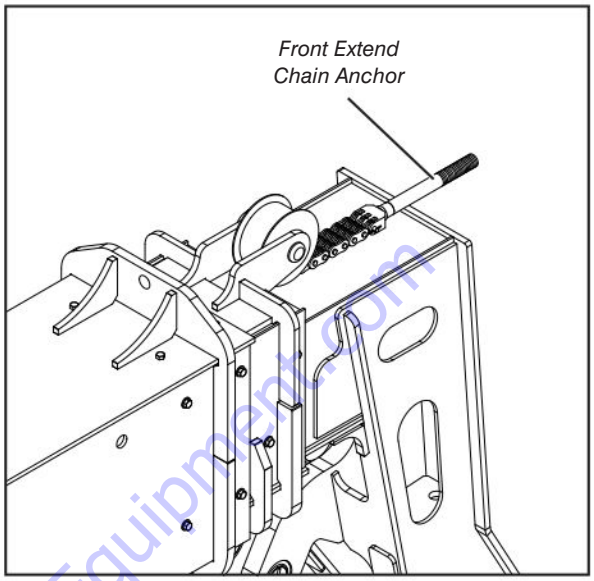


Figure 92 *Front Extend Chain Anchor*

8. Install new washer then insert nut and tighten to 80 lb.-ft. of torque.
9. After reaching the satisfactory tension on the chain, tighten jam nut in place and torque to 80 ft.-lb.

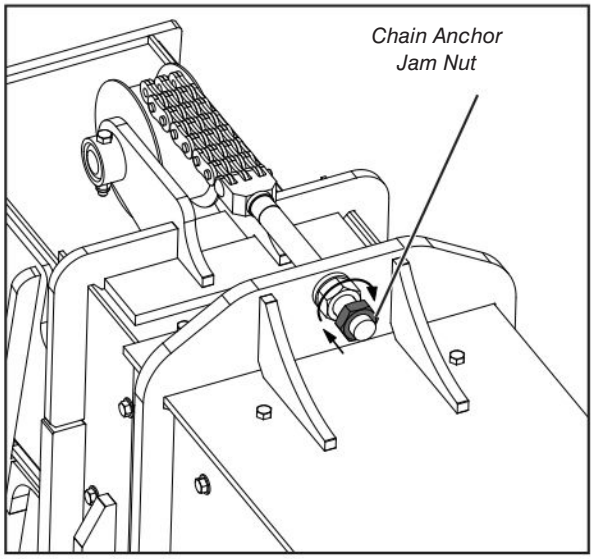


Figure 93 *Chain Anchor Jam Nut*

10. Start the engine and operate extend/retract function through several cycles to assure proper operation. Repair as required.
11. To adjust boom chain tension. Refer to Section 5.4-11 for Chain Tension adjustment procedure.

Remove Retract Chain

- **For SJ1044 TH/THS Only**

1. With boom fully lowered and retracted, remove rear access cover plate.
2. Using snap ring pliers, remove the 2 snap rings from both sides of anchor pin on 3rd boom section.
3. Remove chain with anchor from rear of boom and set aside.

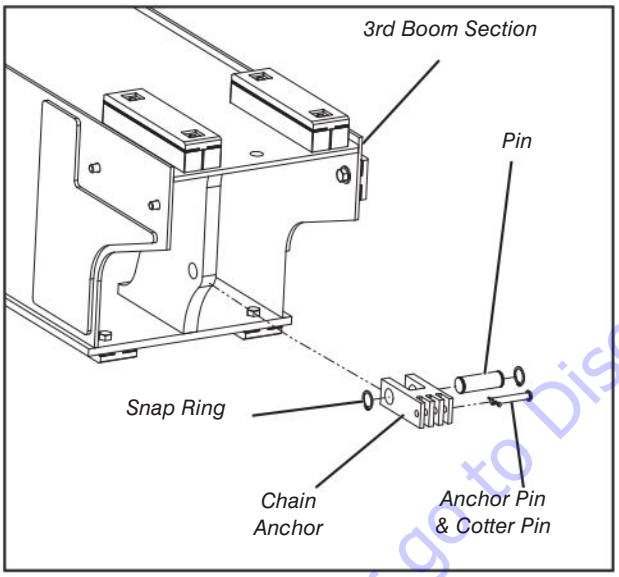


Figure 94 *Rear Retract Chain Anchor*

4. On front of boom assembly, remove 2 bolts from retract anchor weldment.

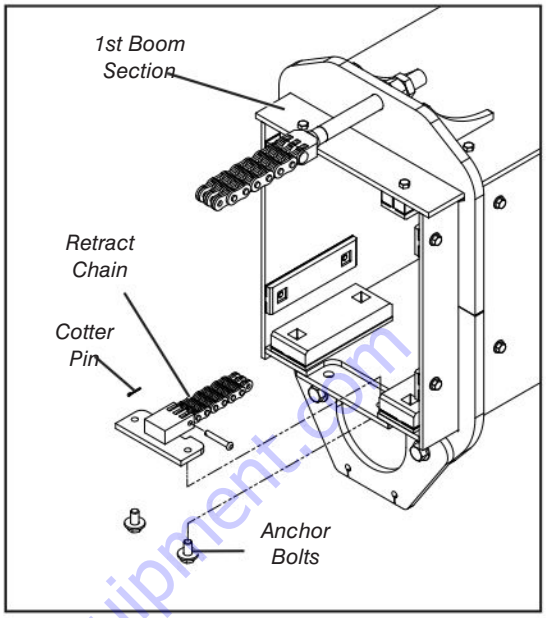


Figure 95 *Front Retract Chain Anchor*

5. Pull retract chain from front of boom and thoroughly inspect.

NOTE

Refer to section 5.4-8 for detailed procedure on how to inspect boom chains.

Install Retract Chain SJ1044 TH/THS

1. Working at the rear of the boom, attach the new retract chain to the old retract chain by installing the link pin and a new cotter pin.
2. From the front of the boom, pull the old retract chain from the front of the boom until the new retract chain is exposed long enough to attach to the chain anchor.
3. Remove the cotter pin and link pin that attached the old chain to the new chain. Discard the cotter pin and old chain.
4. Position the chain anchor to the retract chain and secure by installing the link pin and a new cotter pin.

5. Position the chain anchor to its mounting location at the underside of the outer boom section and secure by installing scerwing 2 anchor bolts.
6. Torque the bolts to 80 lb.-ft.
7. Start the engine and operate extend/retract function through several cycles to assure proper operation. Repair as required.
8. Adjust boom chain tension. Refer to Section 5.4-11 for Chain Tension adjustment procedure.

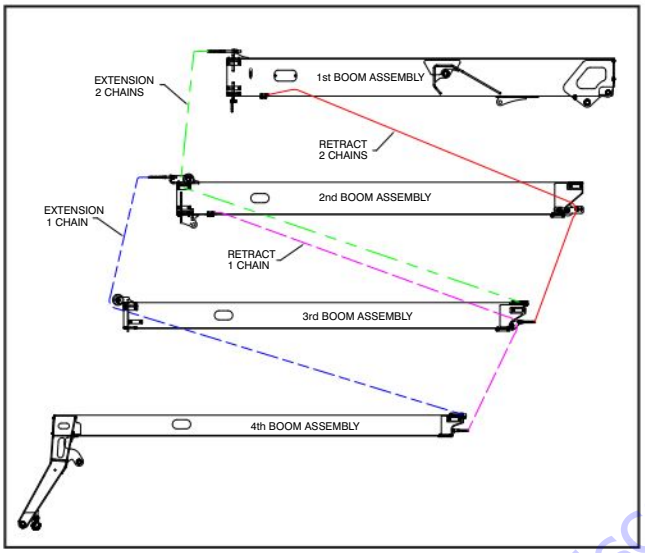


Figure 96 *SJ1056 TH/THS / / SJ1256 THS Boom Chains*

For SJ1056 TH/THS Only

- **Retract Chain Removal (1st to 3rd Boom Section)**

1. With boom on the ground and extended enough to access the anchor plate bolts on 2nd boom section, remove rear access cover plate.
2. Using snap ring pliers, remove the 2 snap rings from both sides of anchor pin on 3rd boom section.
3. Remove chain with anchor from rear of boom and set aside.

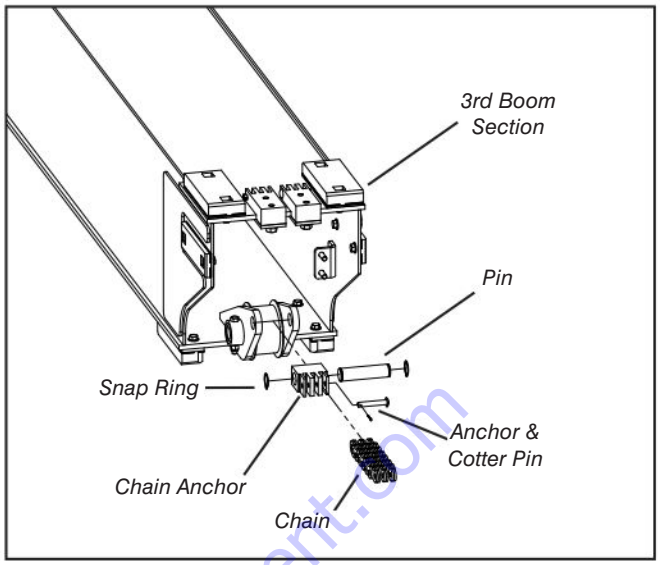


Figure 97 *Rear Retract Chain Anchor 3rd boom section SJ1056 TH/THS / / SJ1256 THS*

4. On front of 1st boom assembly, remove bolts from retract anchor plate.

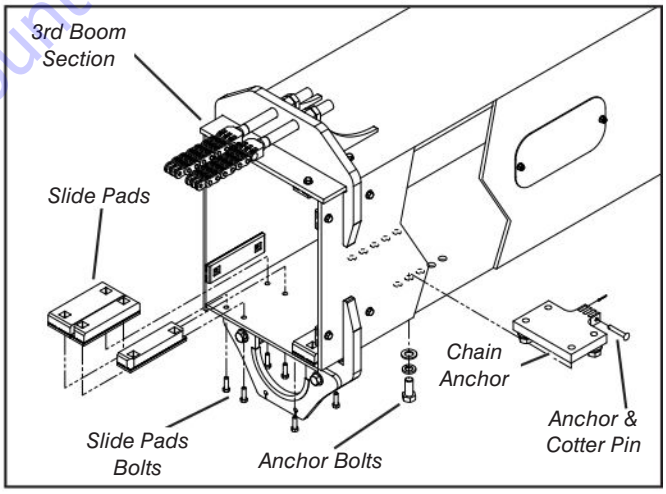


Figure 98 *Front Retract Chain Anchor*

5. Remove bottom slide pads to reach retract chain anchor. Refer to section 5.6-3 for slide pads removal procedure.
6. Pull retract chain from front of boom and thoroughly inspect.

NOTE

Refer to section 5.4-8 for detailed procedure on how to inspect boom chains.

Retract Chain Removal (2nd to 4th Boom Section)

1. Disconnect hoses attached to the plate. Refer to section 5.6-1 boom hoses removal.
2. From the rear of the boom locate and remove the 4 bolts (2 on right side, 2 on left side) holding the carrier back plate to the walls of the 3rd section of the boom.

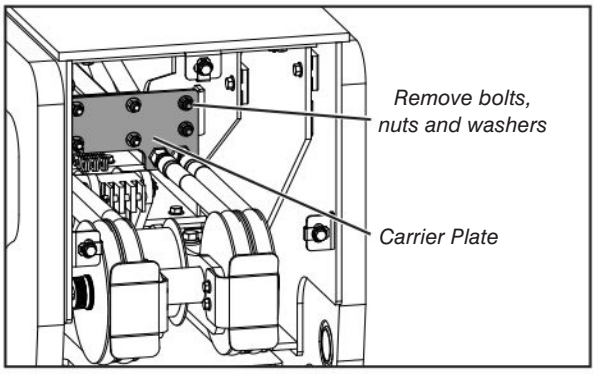


Figure 99 *Carrier Plate Bolts Removal*

3. Lift the carrier plate as much as possible to gain access to retract chain anchor.
4. Remove chain with anchor from rear of boom and set aside.

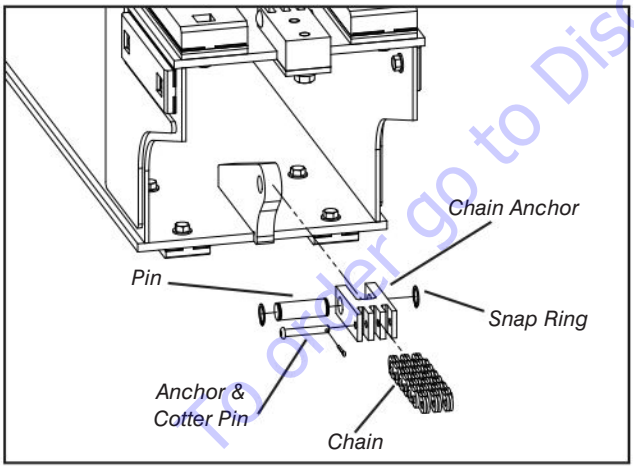


Figure 100 *Rear Retract Chain Anchor 4th boom section, SJ1056 TH/THS / SJ1256 THS*

5. On front of 2nd boom assembly, remove bolts from retract anchor plate.

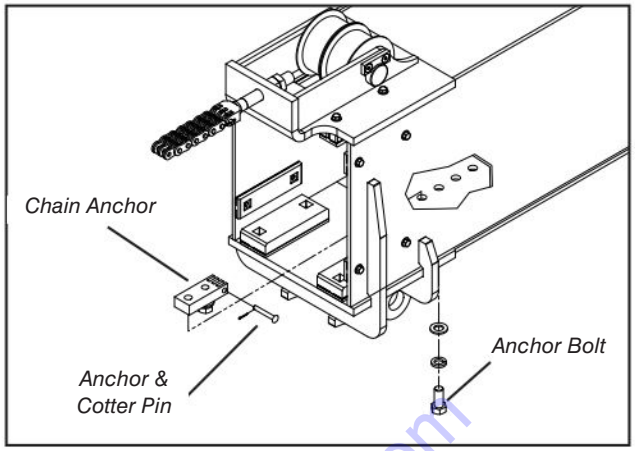


Figure 101 *Front Retract Chain Anchor 2nd Boom Section, SJ1056 TH/THS / SJ1256 THS*

6. Pull retract chain from front of boom and thoroughly inspect

NOTE

Refer to section 5.4-8 for detailed procedure on how to inspect boom chains.

Install Retract Chain SJ1056 TH/THS

1. Working at the rear of the boom, attach the new retract chain to the old retract chain by installing the link pin and a new cotter pin.
2. From the front of the boom, pull the old retract chain from the front of the boom until the new retract chain is exposed long enough to attach to the chain anchor.
3. Remove the cotter pin and link pin that attached the old chain to the new chain. Discard the cotter pin and old chain.
4. Position the chain anchor to the retract chain and secure by installing the link pin and a new cotter pin.
5. Position the chain anchor to its mounting location inside of the boom section and secure by installing screwing 2 anchor bolts.
6. Install slide pads back to their possition. Refer to section 5.6-3.
7. Torque the bolts to 80 lb.-ft.
8. Start the engine and operate extend/retract function through several cycles to assure proper operation. Repair as required.
9. Adjust boom chain tension. Refer to Section 5.4-11 for Chain Tension adjustment procedure.

5.6-3 Slide Pads Replacement Procedure

Slide pads are designed to protect the structural integrity of the boom sections. In addition, slide pads partially carry the weight of the boom sections and will wear out over time and based on daily operation. Ensure to check slide pads quarterly. Refer to Section 5.4-9 for slide pads inspection procedure.

NOTE

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

IMPORTANT

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

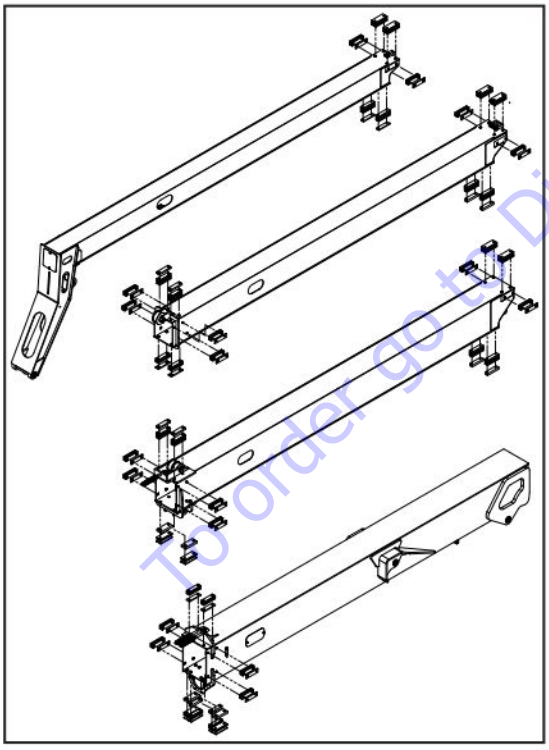


Figure 102 *Slide Pads Locations SJ1056 TH/THS and SJ1256 THS*

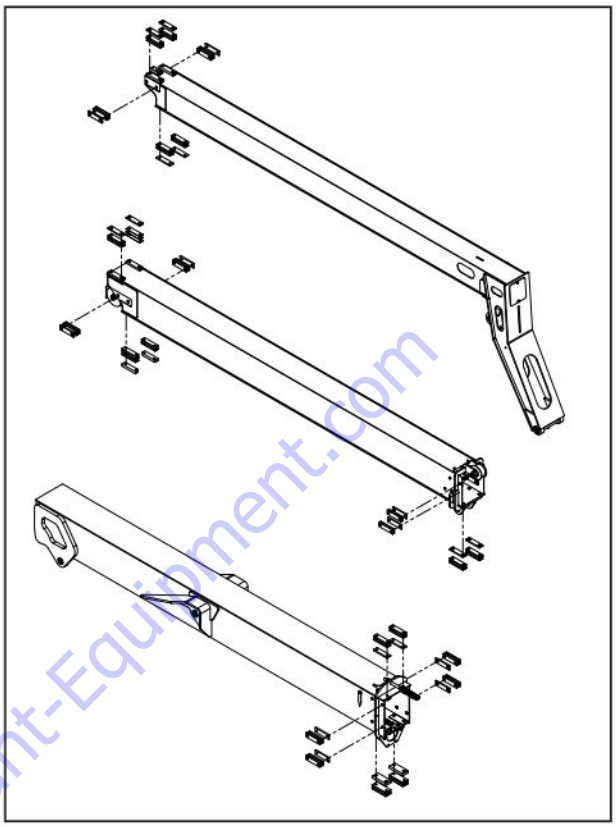


Figure 103 *Slide Pad Locations SJ1044 TH/THS*

Remove Slide Pads

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

For the rear sides of the 2nd and 3rd boom:

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

For the top of the 2nd and 3rd boom:

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

Install Slide Pads

NOTE

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

NOTE

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

1. Clean installation area to remove any residual grease. Ensure threads are free of grease, dirt.
2. With the carriage lowered to the floor, install the top wear pads on the 2nd boom. Install the top wear pad assemblies consisting of the wear pad, shims and spacer, securing the assemblies by installing screws on the front of the 2nd boom.
3. Apply loctite 271 red and tighten the screws to 37 ft-lb.
4. Start the engine and use the joystick to raise the carriage from the floor.
5. Install the bottom wear pad assemblies consisting of the wear pad, shims and spacer, securing the assemblies by installing screws on the 2nd boom.
6. Apply loctite 271 red and tighten the screws to 37 ft-lb.

For installation of the side wear pads:

NOTE

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

7. Clean installation area to remove any residual grease. Ensure threads are free of grease, dirt.
8. Install the side wear pad assemblies consisting of the wear pad, shims and spacer, securing the assemblies by installing screws on the sides of the 2nd boom.
9. Apply loctite 271 red and tighten the screws to 37 ft-lb. Ensure there is approximately an equal number of shims under each wear pad.
10. Lubricate all wear pads with MPG-EP2 grease.
11. Extend and retract the boom and check for smooth operation.
12. Install the rear cover on the outer boom.

5.6-4 Hydraulic Pressure Test Procedure

IMPORTANT

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

⚠ CAUTION

The addition of a hydraulic accumulator on this system causes residual pressure to be present AFTER the engine has been turned OFF. Prior to opening any hydraulic fitting in this system, move the joystick several times in each direction to relieve this residual pressure. Failure to do so may result in personal injury.

Load Sense Compensator Pressure

- **Load Sense Compensator Pressure Check:**

1. Release residual pressure by moving the joystick several times in each direction
2. Install a 5,000 psi gauge into port GP1 of the main manifold.

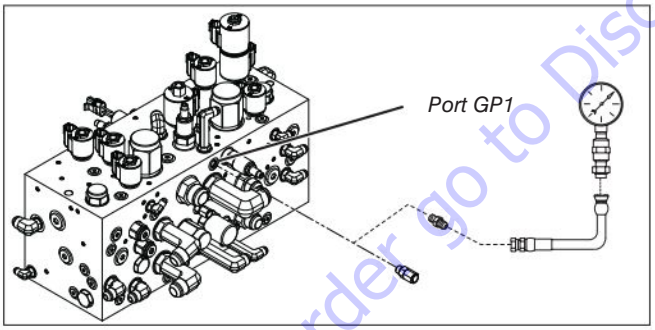


Figure 104 *Compensator Pressure*

3. With engine running at low idle, read the pressure indicated on the gauge. The correct pressure should be 450 psi.
4. If reading is other than 450 psi, adjustment is required.

- **Load Sense Compensator Adjustment:**

1. Loosen the lock nut on the load sense compensator.

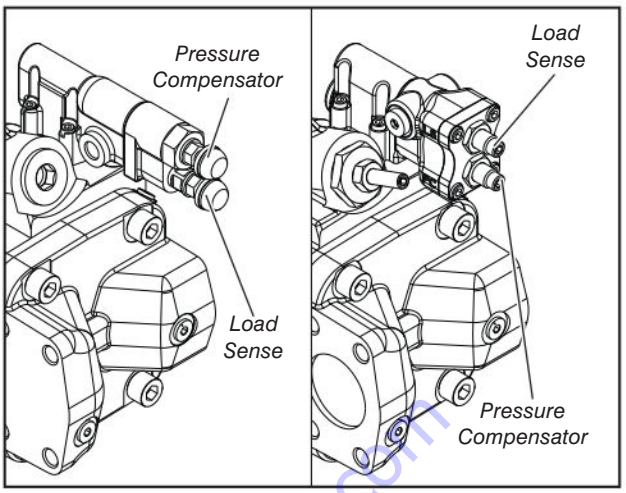


Figure 105 *Load Sense Compensator Adjustment*

2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until a reading of 450 psi is achieved.

System Pressure (Compensator Pressure)

- **System Pressure (Compensator Pressure) Check:**

1. Release residual pressure by moving the joystick several times in each direction
2. Install a 5,000 psi gauge into port GP1 of the main manifold.

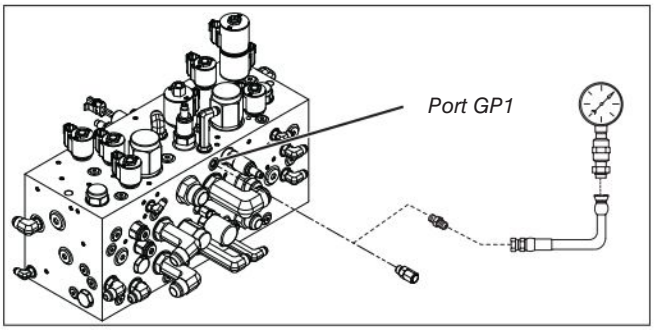


Figure 106 *Pressure Compensator Pressure*

3. With engine running at low idle, dead-head the boom retract function. Indicated system pressure should be:
   - 3250 psi for SJ1044/1056 TH/THS
   - 3900 psi for SJ1256 THS.

- **System Pressure (Compensator Pressure) Adjustment:**

1. Loosen the lock nut on the pressure compensator.

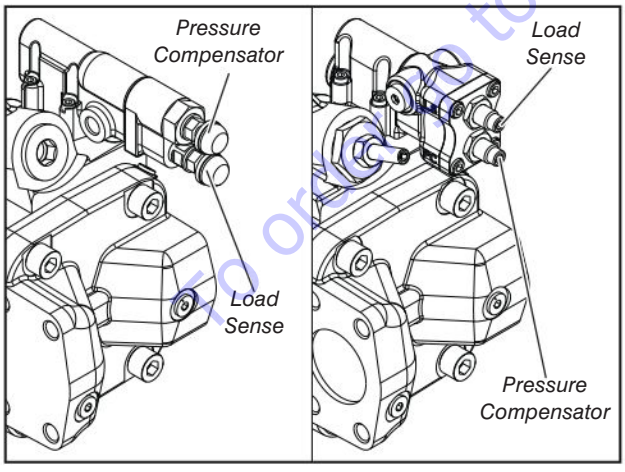


Figure 107 *Pressure Compensator Adjustment*

2. With engine running at low idle, dead-head the boom retract function, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.

Steering Pressure

- **Steering Pressure Check:**

1. Release residual pressure by moving the joystick several times in each direction
2. Install a 5,000 psi gauge into port GP3 at the front of the main control valve as shown in figure below.

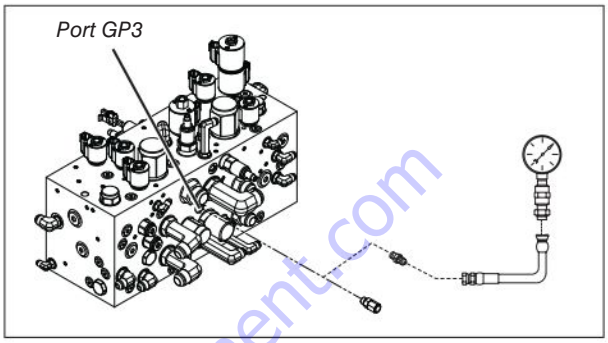


Figure 108 *Maximum Steering Pressure*

3. With engine running at low idle and steering dead-headed in either direction, read the pressure indicated on the gauge. The correct pressure should be 2,600 psi.
4. If reading is other than 2,600 psi, adjustment is required.

- **Steering Pressure Adjustment:**

1. Loosen the lock nut on the maximum steering pressure reducing valve at port RV2 on the Main Control Valve.

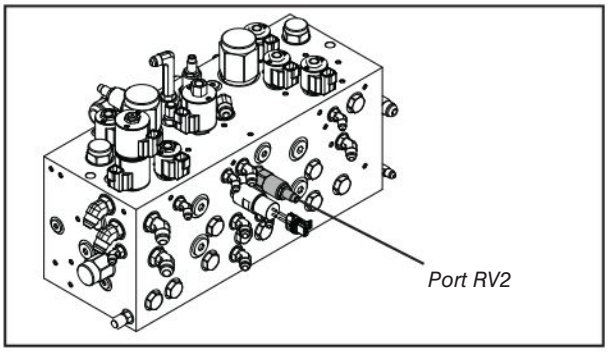


Figure 109 *Maximum Steering Pressure Adjustment*

2. With engine running at low idle and the steering dead-headed to one side, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until a reading of 2,600 psi is achieved.

3. Tighten the lock nut on the valve RV2 and re-check the reading to ensure that the correct pressure is maintained.

Service Brake Pressure

- **Service Brake Pressure Check:**

1. Release residual pressure by moving the joystick several times in each direction.
2. Remove plug and install a 1,000 psi gauge into the PS2 port on the main control valve.

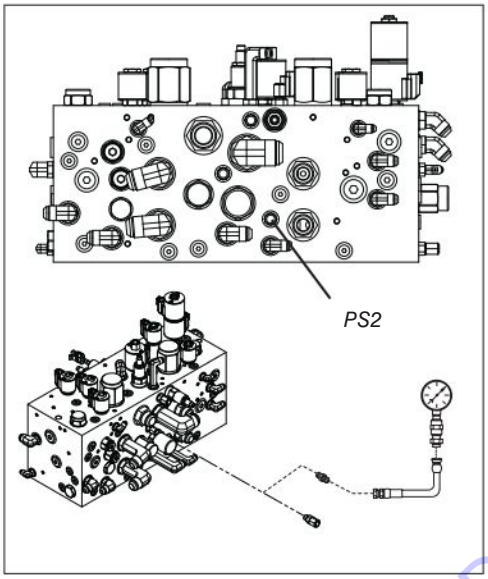


Figure 110 *Service Brake Pressure*

3. With engine running at low idle, depress brake pedal fully. Pressure should increase proportionally to 900 psi MAX.
4. If maximum pressure is less than 900 psi, brake valve must be replaced.
5. note
6. The pressure setting value is the nominal maximum value.

IMPORTANT

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

Pilot Pressure

- **Pilot Pressure Check:**

1. Release residual pressure by moving the joystick several times in each direction.
2. Install a 1,000 psi gauge into the tee fitting at port GP2 of the hydraulic function manifold.
3. With engine running at low idle and NO hydraulic function engaged, pressure should be 400 psi.

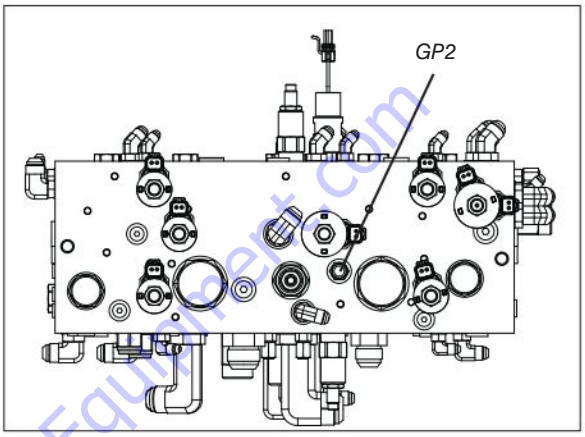


Figure 111 *Pilot Pressure Check*

- **Pilot Pressure Adjustment:**

1. Loosen the lock nut on the pressure reducing valve at port PR1 on the Main Control Valve.

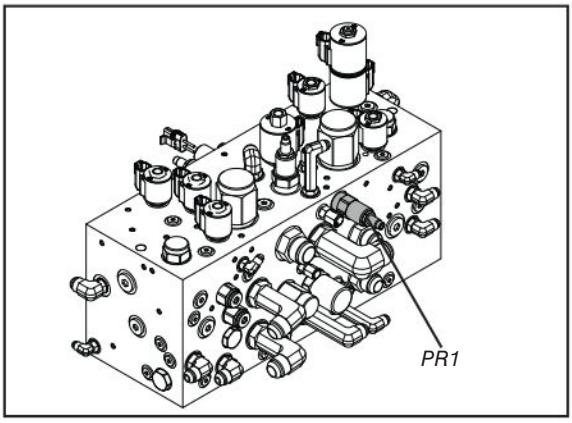


Figure 112 *Pilot Pressure Adjustment*

2. With engine running at low idle, turn the adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until a reading of 400 psi is achieved.
3. Tighten the lock nut on valve PR1 and re-check the reading to ensure that the correct pressure is maintained.

RV1 Safety Relief Pressure

- **RV1 Safety Relief Check:**

1. Release residual pressure by moving the joystick several times in each direction.
2. Install a 5,000 psi gauge at port GP1 of Main Control Valve.

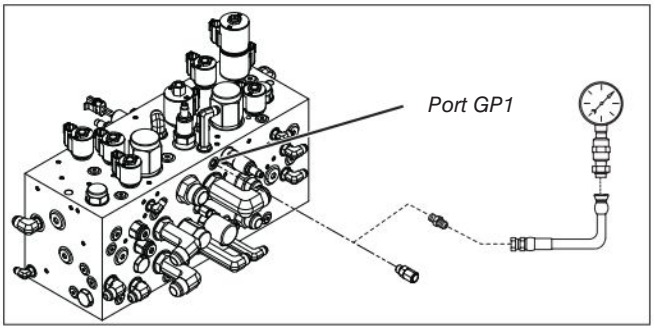


Figure 113 *System Pressure Adjustment*

3. Loosen the pressure compensator nut and turn the pressure compensator clockwise one full turn.
4. With engine running at low idle, dead-head the boom retract function. Indicated system pressure should be:
   - 3500 psi for SJ1044/1056 TH/THS
   - 4300 psi for SJ1256 THS.
   - If reading is different than what is mentioned above, adjustment is required.

RV1 Safety Relief Adjustment:

1. Loosen the pressure compensator nut and turn the pressure compensator clockwise one full turn.
2. With engine running at low idle, loosen the lock nut on the maximum steering pressure reducing valve at port RV1 on the main manifold valve.

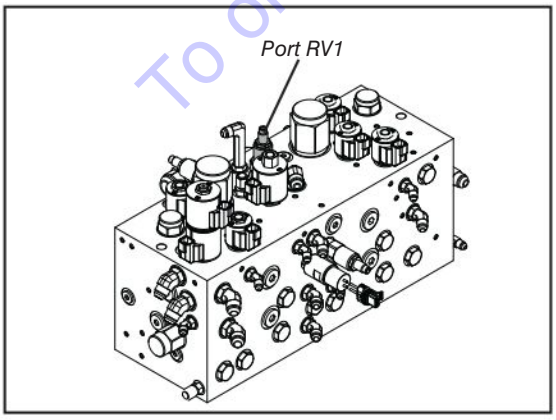


Figure 114 *Maximum Steering Pressure Adjustment*

3. Dead-head the boom retract function, turn the RV1 adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved.
   - 3500 psi for SJ1044/1056 TH/THS
   - 4300 psi for SJ1256 THS.
4. Tighten the lock nut on the valve RV1 and re-check the reading to ensure that the correct pressure is maintained.
5. With engine running at low idle, dead-head the boom retract function, turn the pressure compensator adjustment screw clockwise (CW) to increase the pressure reading and counter-clockwise (CCW) to reduce the pressure reading until desired reading is achieved. Indicated compensator pressure should be:
   - 3250 psi for SJ1044/1056 TH/THS
   - 3900 psi for SJ1256 THS.

5.6-5 Hydraulic Pump Testing Procedure

If the hydraulic pump is suspected to be bad, the following test will quickly determine if the hydraulic pump requires replacement.

1. Release residual pressure by moving the joystick several times in each direction
2. Remove LS hose on the main manifold and cap the fitting on the manifold.
3. Install a 5,000 psi gauge with a tee fitting on the GP1 port of the main manifold.
4. Install the LS hose to the tee fitting on the GP1.

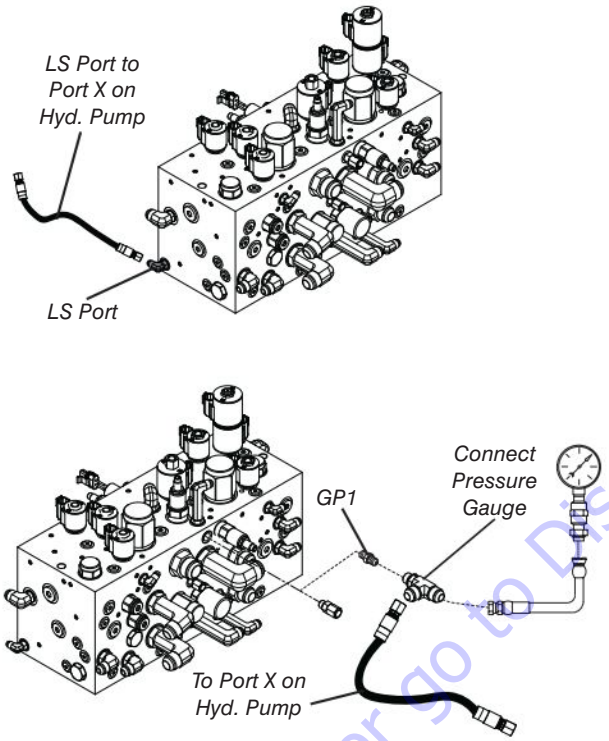


Figure 115 *Pump Pressure Adjustment*

5. Start the engine and check the gauge. Maximum system pressure should immediately be present (3,250 psi).
6. If the pressure reading is different than the required pressure, use the pressure adjustment screw on the pump to adjust the pressure to the proper level.
7. If the required pressure cannot be set, the pump must be replaced.

5.6-6 T12000 Modulation

1. Remove modulator valve housing as shown in figure below.

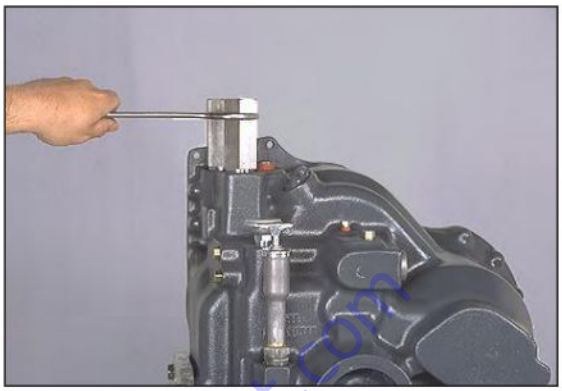


Figure 116 *Remove Modulator Valve Housing*

2. Remove inner, middle and outer springs, valve stop pin and accumulator spool and regulator spool and sleeve assembly as shown in figure below.

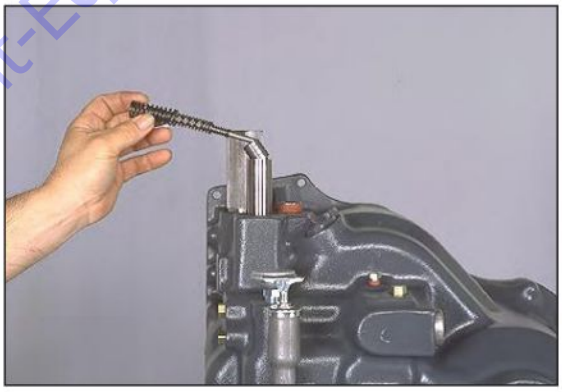


Figure 117 *Remove Modulator Valve Components*

NOTE

Some units will have two cross pins the same length. Some units will have two pins of different lengths. The longest pin goes in the bottom hole.

3. Remove cross pin from sleeve as shown in figure below.

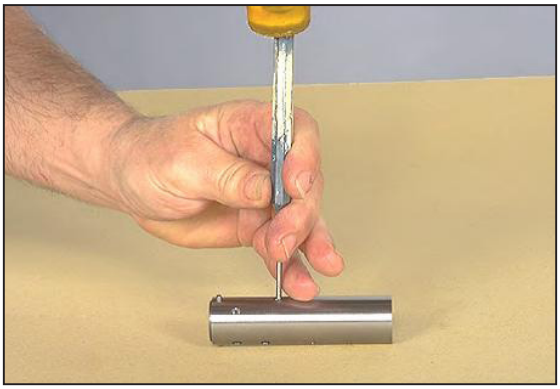


Figure 118 *Remove Cross Pin*

4. Remove regulator spool, spring, retainer spring and spacer spring from housing sleeve as shown in figure below.

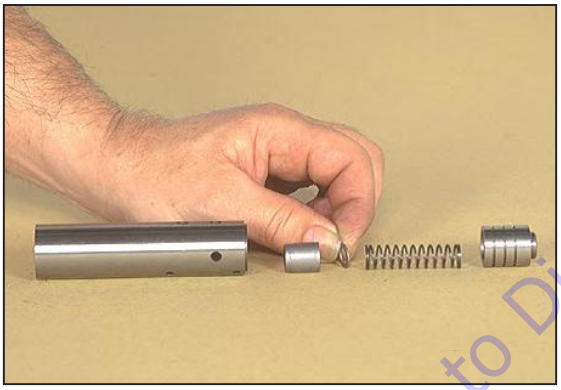


Figure 119 *Remove Components from Housing Sleeve*

5. Install spring spacer in spring retainer as shown in figure below.

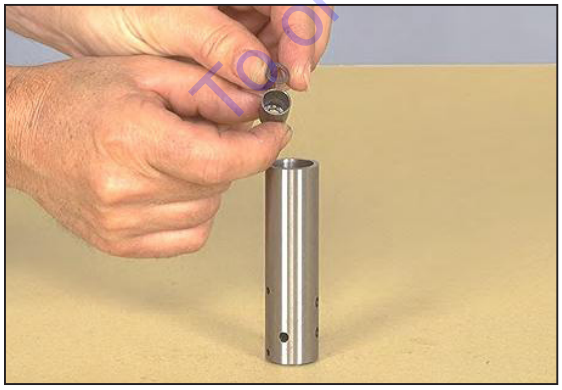


Figure 120 *Install Spring Spacer*

6. Install spring in spring retainer as shown in figure below.

Figure 121 *Install Spring in Retainer*

7. Check orifice in regulator spool to be free and clear of any foreign material as shown in figure below.

Figure 122 *Verify Orifice is Clear of Debris*

8. Install spring retainer, spring and regulator valve in sleeve against inner cross pin as shown in figure below.

Figure 123 *Install Component in Sleeve*

9. Compress regulator spool and spring in sleeve far enough to install cross pin as shown in figure below.

Figure 124 *Compress Components in Sleeve*

10. Install cross pin as show in figure below.

Figure 125 *Install Cross Pin*

11. From opposite end, position accumulator spool in sleeve as shown in figure below.

Figure 126 *Position Accumulator Coil*

12. Install outer accumulator spring as shown in figure below.

Figure 127 *Install Outer Accumulator Spring*

13. Install middle spring as shown in figure below.

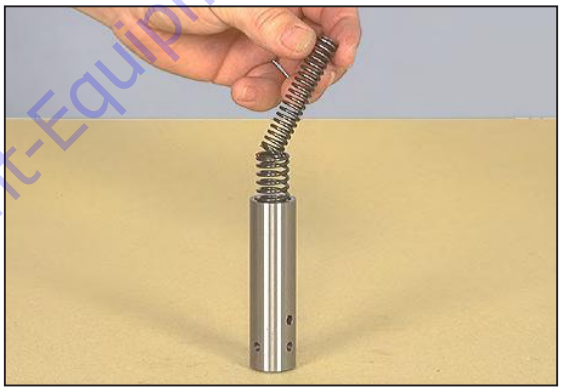


Figure 128 *Install Middle Spring*

14. Install inner spring as shown in figure below.

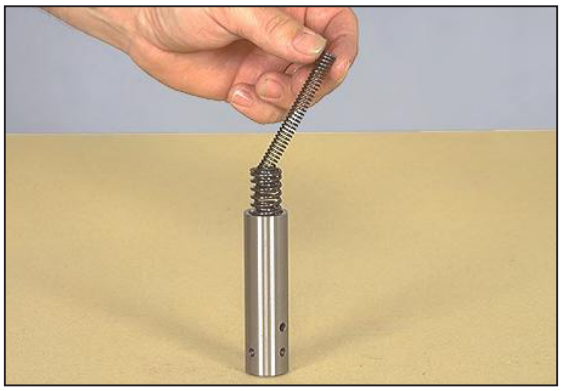


Figure 129 *Install Inner Spring*

15. Install stop pin in inner spring as shown in figure below.

Figure 130 *Install Stop Pin*

16. Position a new O-ring on lower end of the modulation valve sleeve and spring assembly as shown in figure below.

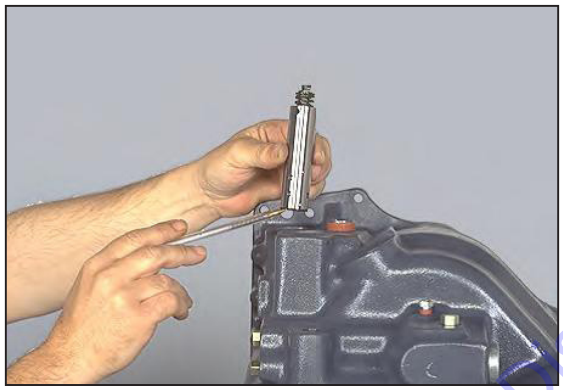


Figure 131 *Install O-ring*

17. Install O-ring on other valve sleeve.

18. Install valve or valves in transmission case as shown in figure below.

Figure 132 *Install Valve(s)*

19. Position a new O-ring on modulator valve housing as shown in figure below.

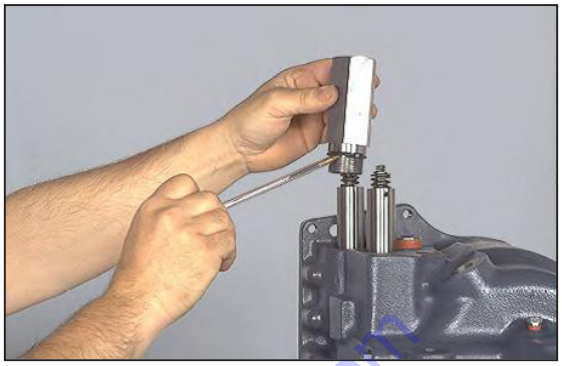


Figure 133 *Install Valve(s)*

20. Install housing over sleeve and spring assembly and tighten to 60-65 LBF-FT [81-88 N.m] as shown in figure below.

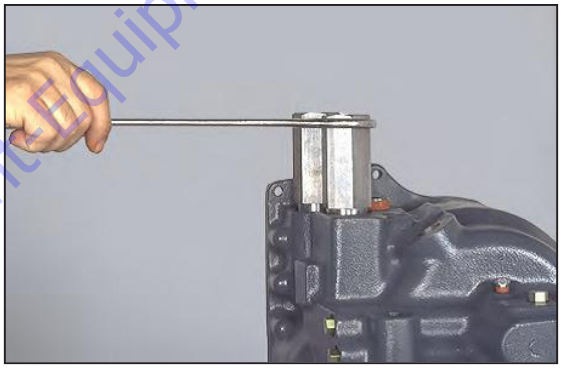


Figure 134 *Install and Torque Housing*

5.6-7 Deutz Fault Codes

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

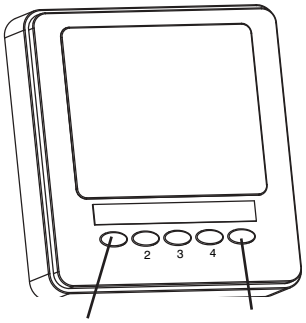


Figure 135 *Engine Data Display Module*

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

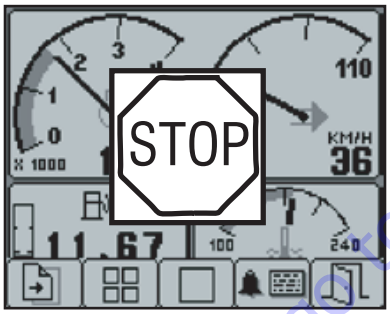


Figure 136 *Error Message Popup*

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

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

Figure 137 *Error Message*

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

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

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

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J1939		Description	Recommended Action
SPN	FMI		
91	3, 4, or 11	Sensor error accelerator pedal	Check wiring, check accelator pedal sensor and if necessary replace it, check connection cable and if necessary repair or replace it
97	3, 4, or 12	Fuel filter water level sensor: the voltage of sensor measured by ECU is out of the target range high or low.	Drain water out from pre-filter. Check wiring, if sensor is not working, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it
100	0, or 1	Oil pressure is either above or below the target range	Check oil level, check engine for oil leckage, measure oil pressure external to evaluate sensor value, clean suction pipe inlet mesh in oilsump
110	0	Coolant temperature: the coolant temperature calculated by ECU is above the target range.	Clean radiator, check fan drive, check coolant level, check cooling system in general, check thermostat function.
105	0	Charge air temperature downstream calculated by ECU is above the target range	Check CAC system and clean it. Check fan functionality. Check cooling perfomance with temperature measurement.
111	1	Coolant level: the coolant level calculated by ECU is underneath the allowed minimum	Check coolant level, inspect cooling system for leakage and if necessary repair it, check sensor and wiring
523009	9, or 10	Rail pressure relief valve: is open more frequently, or longer than what the technical specification allows	Change rail pressure relief valve
639, 1231, or 1235	14	CAN bus 0, 1, or 2: the ECU is not allowed to send messages, because the status "BusOff" is detected	Check wiring of CAN bus and if necessary repair it, check connection cable and if necessary repair or replace it, check resistance in CAN lines (60 Ohm)
630	12	Access error: the ECU finds an error during the access to its EEPROM memory or works with an alternative value	ECU not programmed, EEPROM is defective, ECU is defective: reprogram ECU and if necessary replace it
1079, 1080, or 523601	13	Sensor supply voltage monitor error (ECU), Error in sensor voltage.	Check wiring of external components, check working voltage and if necessary correct it, check connection cable and if necessary repair or replace it, if error is not removable, change ECU
168	0, 1, 2, 3, or 4	Battery voltage: the voltage measured by ECU is out of the target range; either too high, too low, or eratic.	Check alternator, contact resistance, safety fuses, too high load in energy system, check battery and connections, check cables and if necessary clean, repair or replace component as required.
1109	2	Engine Shut Off demand has been ignored by the user	Warranty relevant, Additional error must be set
677	3, 4, 5, or 12	Starter relay; short circuit to B+ or B-, Open circuit, or powerstage over temperature	Check wiring and start relay and if necessary replace it, check connection cable and if necessary repair or replace it
523550	12	Start information to Starter (T50-switch) erratic, on too long.	Check wiring, if sensor not working, check start switch and if necessary replace it, check connection cable and if necessary repair or replace it
523612	3, 4, 12, or 14	ECU reported internal software error	Check error memory for other errors. Check wiring, check connected sensors and actuators. Re-flash the ECU. If error is still active replace ECU.
523698	11	Shut off request from supervisory monitoring function, Engine Shut Off due to supervisory function	Warranty relevant,Additional error must be set
5763	0, 1, 3, 4, 5, 6, 7, or 11	Actuator error EGR-Valve; signal out of range	Check wiring and repair or replace if necessary, check actuator/EGR and if necessary replace it
523982	0, 1	Powerstage diagnosis disabled; low or high battery voltage	Check wiring, check alternator, check cables and repair or replace if necessary
523906	3, 4, 5, or 12	ECU detects open load on the electric fuel feed pump output, too high temperature in powerstage of fuel pump circuit, or short to B+ or B-	Check wiring of the fuel feed pump circuit including relay, if necessary repair or replace wirirng
524057	2	Electric fuel pump; fuel pressure build up error	Check low fuel pressure system (fuel feed pump, relay , fuse, wiring, sensor) and if necessary repair or replace it
524108	9	Missing CAN message of EGR throttle valve	Check CAN Bus wiring (Bus sheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range, check actuator
524109	9	Missing CAN message of EGR throttle valve	Check CAN Bus wiring (Bus scheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range, check actuator

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5.6-8 Starter Replacement Procedure

1. Turn main power disconnect to the "○" off position (of equipped) then disconnect battery terminals negative, then positive.
2. Locate starter at the left side of the engine between the engine and the frame.

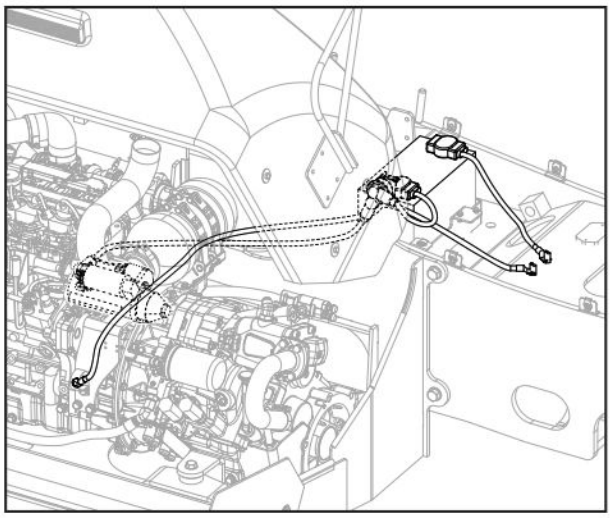


Figure 138

⚠ WARNING

A second person to assist will be required to complete this procedure.

3. Locate the upper and lower bolts securing the starter motor unit. Using a 13 mm socket remove upper bolt then remove the lower bolt.

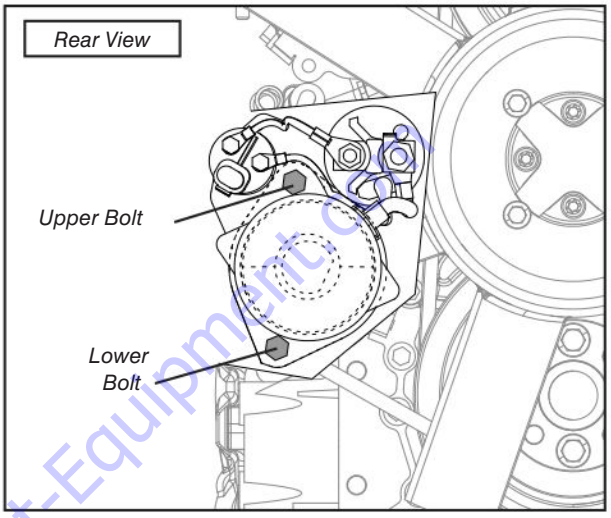


***Figure 139** Bolts Location.*

4. Remove the existing starter from the side of the engine.

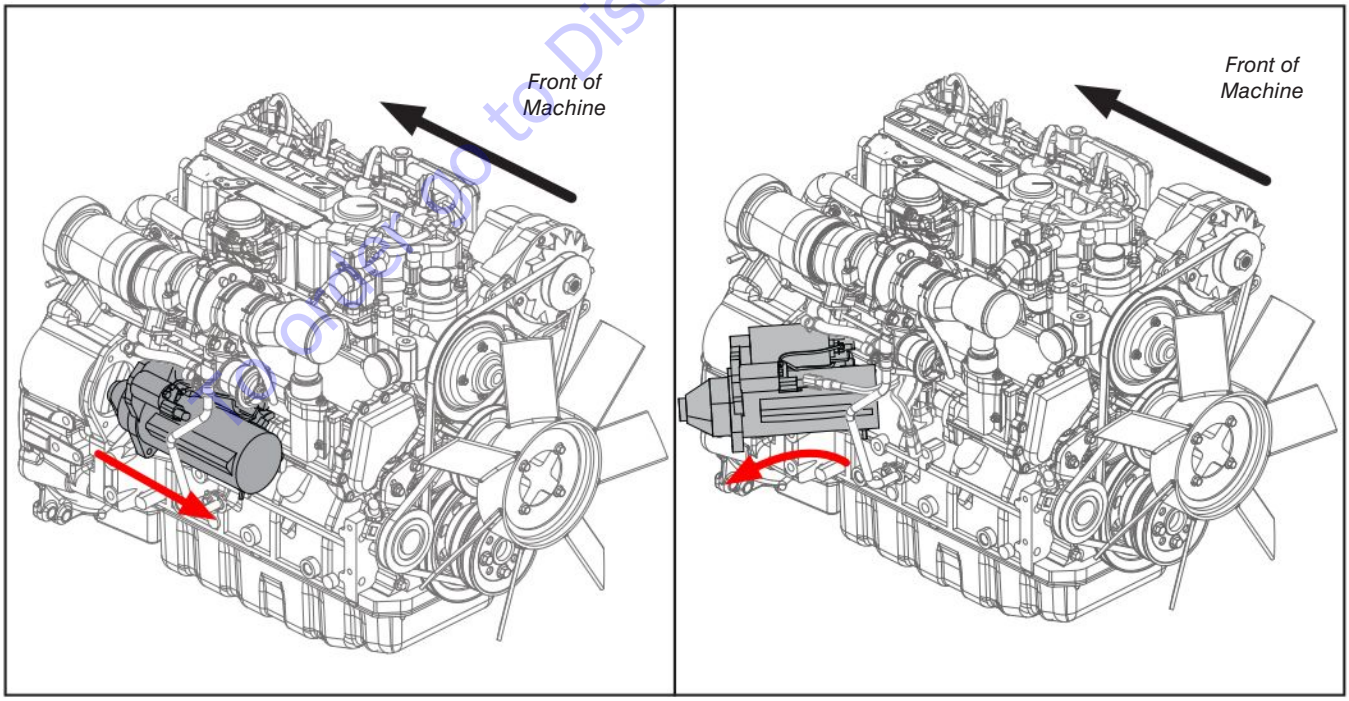


***Figure 140** Starter Removal.*

5. Position the starter so the pinion is facing down.
6. Remove the nut and retaining washer securing the harnesses with a 17 mm socket 24” long extension, and then disconnect the harnesses from the starter.

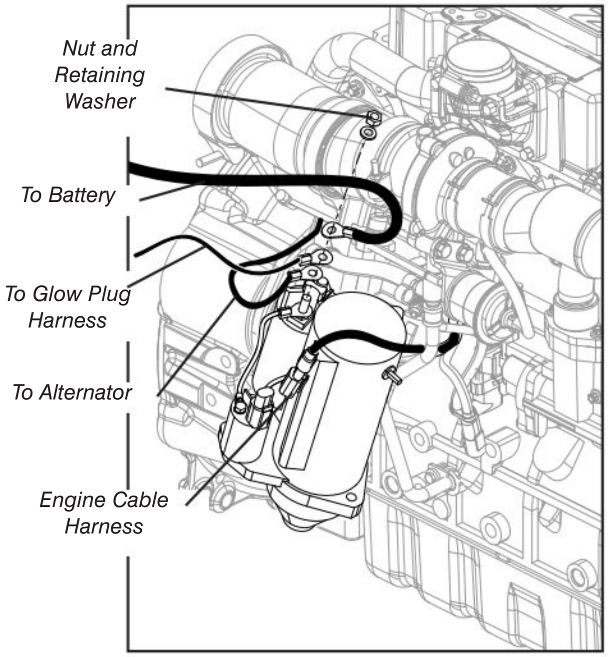


Figure 141 *Harnesses Removal.*

7. Discard defective/existing starter.
8. Connect all harnesses to the new starter stud and secure them with the nut and washer (do not tighten the nut).

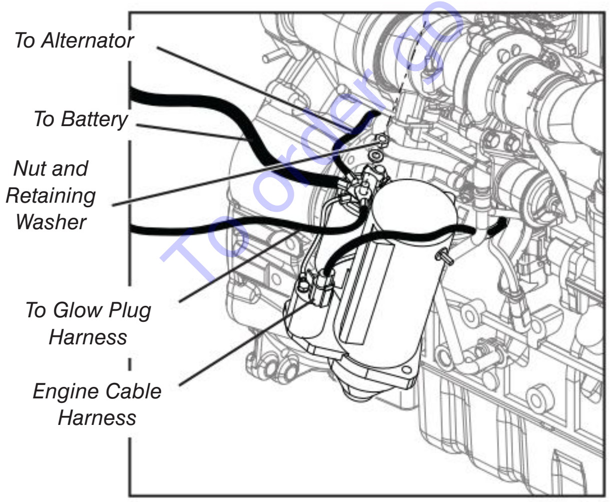


Figure 142 *Harnesses Installation.*

9. Place starter on the engine flywheel/connection housing.

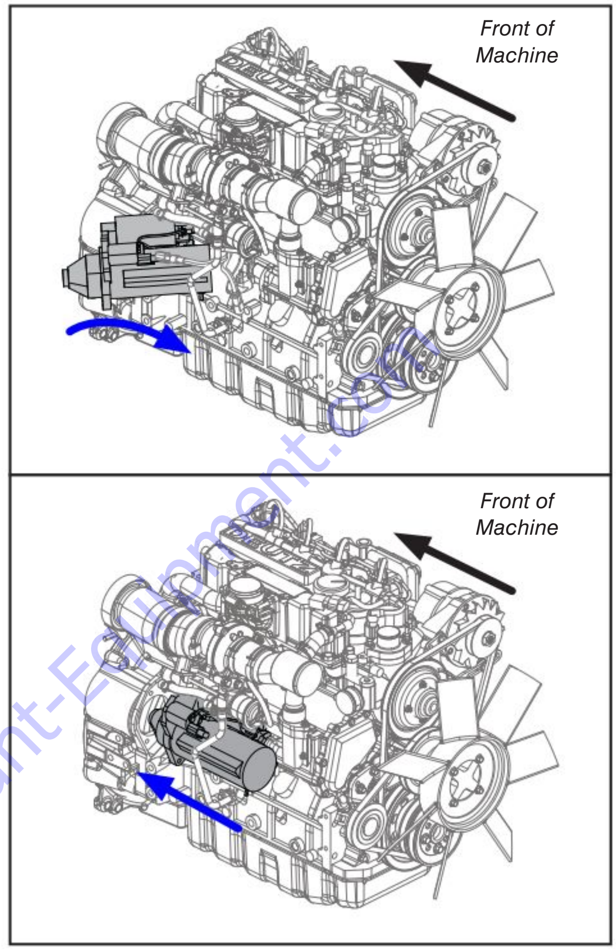


Figure 143 *Starter Installation.*

10. Secure starter to the engine with the upper and lower bolts.
11. Tighten nut securing the harnesses.
12. Connect battery.
13. Perform a full function test as outlined in Section ‘Function Tests’ of the operating manual.

5.6-9 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.

5.6-10 Cable Track Replacement

If the cable track (5) or one of its hydraulic hoses require replacement, the cable track assembly must be removed from inside the boom. The cable tracks are removed through the front access hole (3).

If removal of the carrier assembly is necessary, the cable tracks should be removed first.

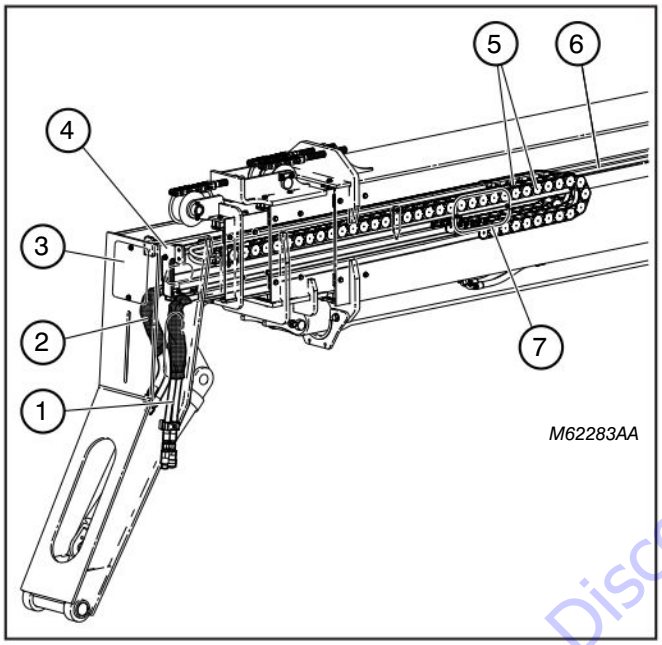


Figure 144 *Cable Track General Assembly*

1. Auxiliary Hydraulic Hoses
2. Tilt Cylinder Hydraulic Hoses
3. Front Access Hole
4. Upper and Lower Guide Brackets
5. Cable Tracks
6. Carrier Assembly
7. Side Access Holes

Preparation:

1. Place the boom in a horizontal (0°) position.
2. Shut down the machine.
3. Turn the main power disconnect switch off. Lock out the switch.

Cable Track Removal

The right-hand cable track carries the fork tilt hydraulic hoses. The left-hand cable track carries the auxiliary hydraulic hoses.

Both cable tracks are removed in the same manner.

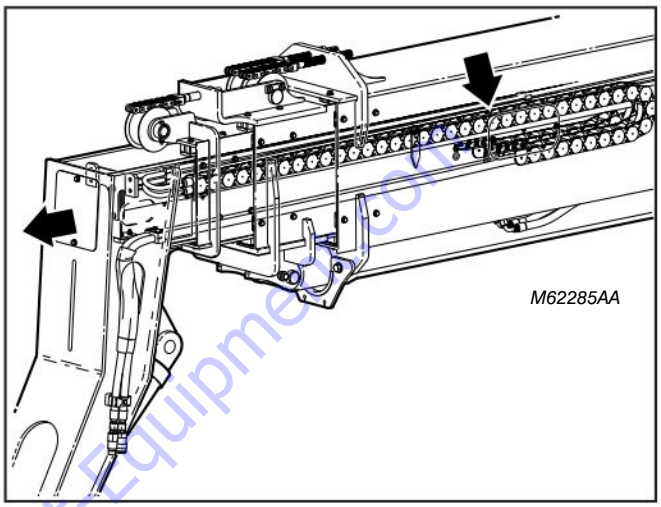


Figure 145 *Cable Track Removal*

Procedure:

⚠ WARNING

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

1. Mark and disconnect the fork tilt hydraulic hoses or remove auxiliary hoses from the clamps from the side of the boom (depending on which cable track is being removed). Be aware there could be residual pressure in the hoses.
2. Remove the protective hose sleeve. If disconnecting the auxiliary hoses, remove the quick-disconnect ends.

3. Cap ports and plug hoses to prevent dirt contamination. Provide a suitable container or rags to catch any oil spillage.

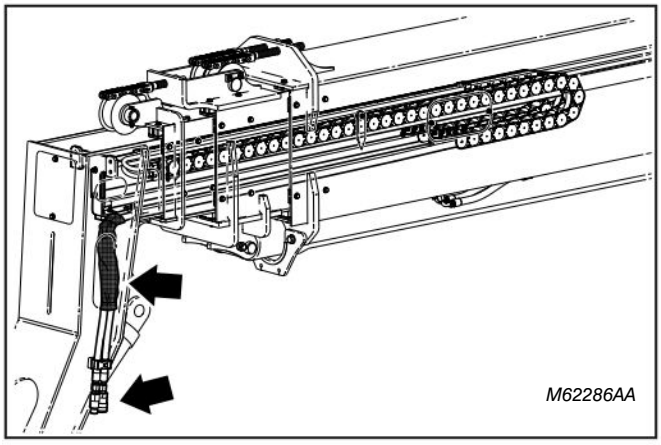


Figure 146

4. Remove the boom front and side access covers.
5. Start up the machine and extend the boom outward until the side access holes in the innermost boom section are visible. Stop extending when the hydraulic tube connections are visible in the holes. (The approximate position is when the middle indicator mark is visible between E and F boom extension letters.)

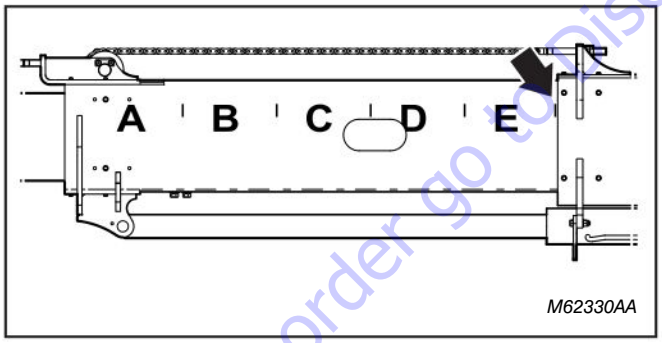


Figure 147

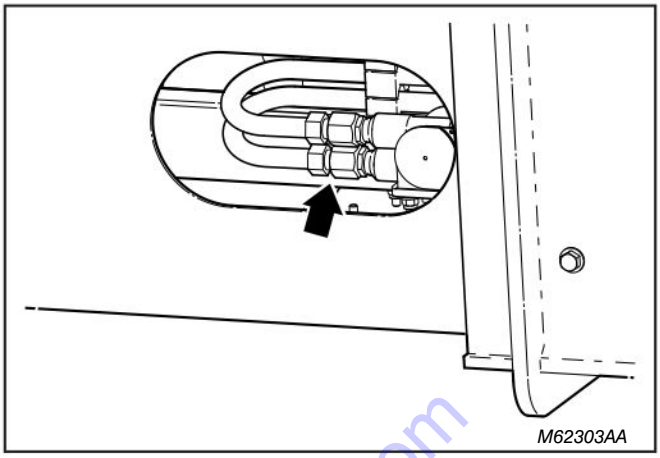


Figure 148

6. Turn the main power disconnect switch off. Lock out the switch.
7. From the side access hole, mark and disconnect the hoses from the tubes mounted to the carrier assembly. Provide a suitable container or rags to catch any oil spillage. Cap tubes and plug hoses to prevent dirt contamination.
8. Remove the hex nuts and screws that connect the cable track to the carrier assembly mount.
9. Place tie-wraps around the cable track to temporarily hold it in place on the mount.

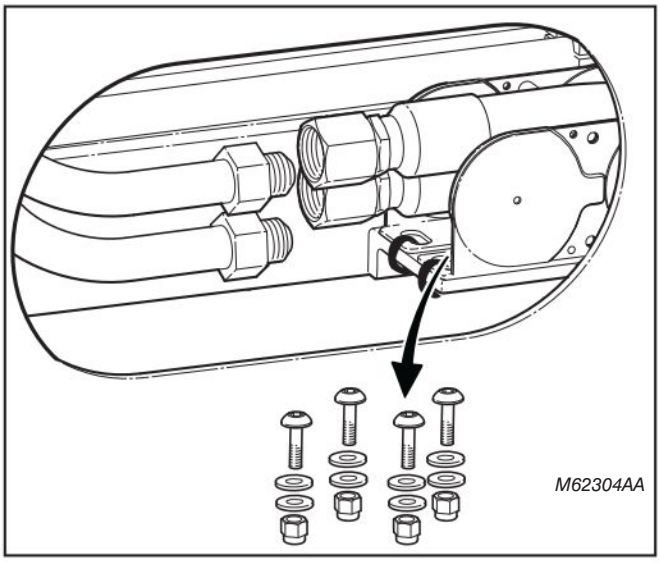


Figure 149

10. Once everything is disconnected, fully retract the boom assembly.
11. Turn the main power disconnect switch off. Lock out the switch.

12. Inside the front access hole, remove the upper guide bracket on the (T-shaped) support. Put the hex nuts back on to keep the lower support in place.

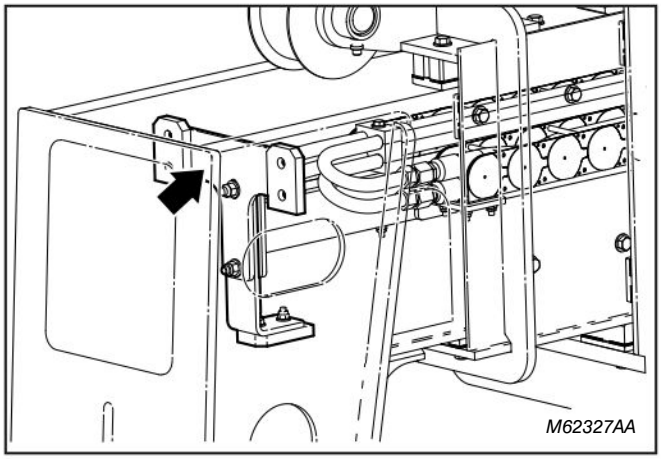


Figure 150 *Upper Guide Bracket*

13. Depending on which side is being removed, take the hose clamps off the hoses inside the front access hole.

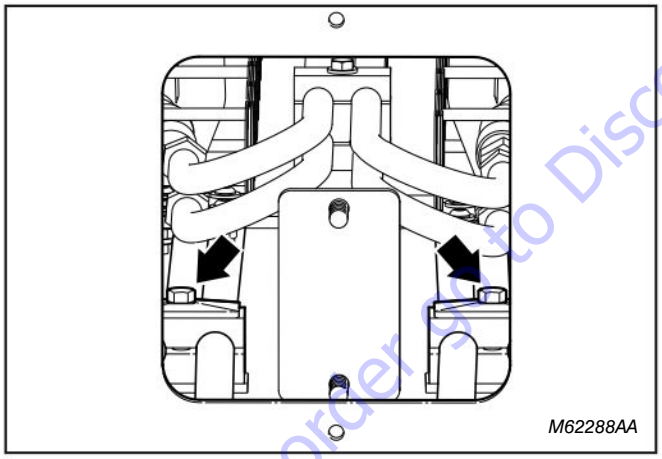


Figure 151

14. At the side access hole, remove the hex nuts from the four bolt studs that secure the cable track bracket to the mount inside the frame.

15. Remove the eyebolt from the cable track bracket.

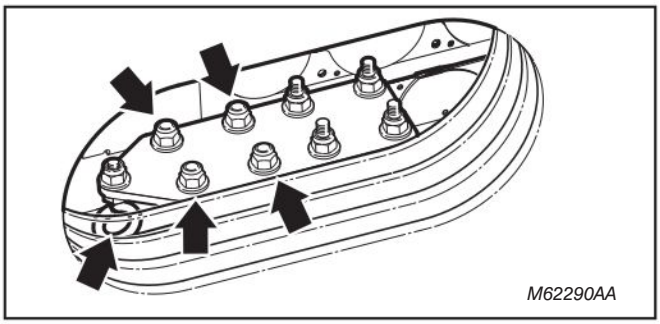


Figure 152 *Side Access Hole*

16. From the side access hole, lift the mounting bracket up and off of the bolt studs, pushing it towards the rear of the machine.

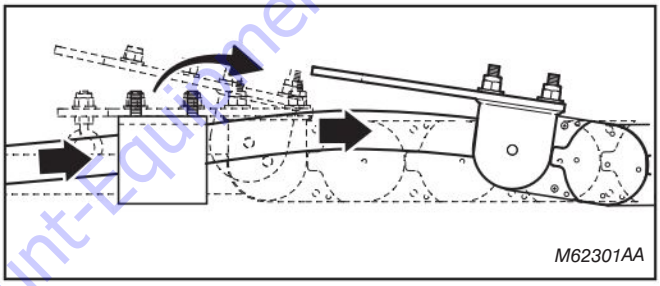


Figure 153

17. Roll the end of the cable track over while pulling the hoses out through the mount bracket inside the boom. Once through the mount, push them down inside the boom towards the back of the machine.

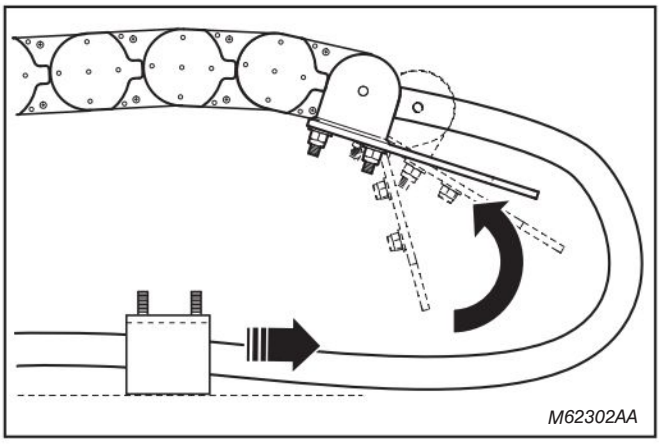


Figure 154

18. Support the end of the carrier assembly and remove the lower support bracket. After removing it, lower the carrier carefully.

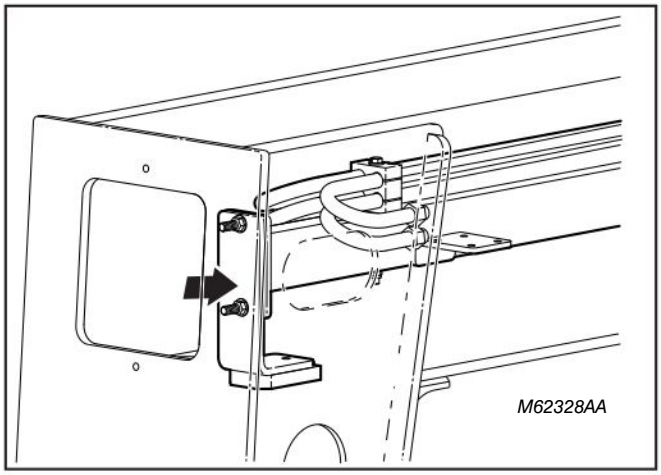


Figure 155

19. Pull the cable track out through the front access hole above the carrier assembly. Guide it as it is removed. Have an assistant push the hoses towards the front from the side access hole.

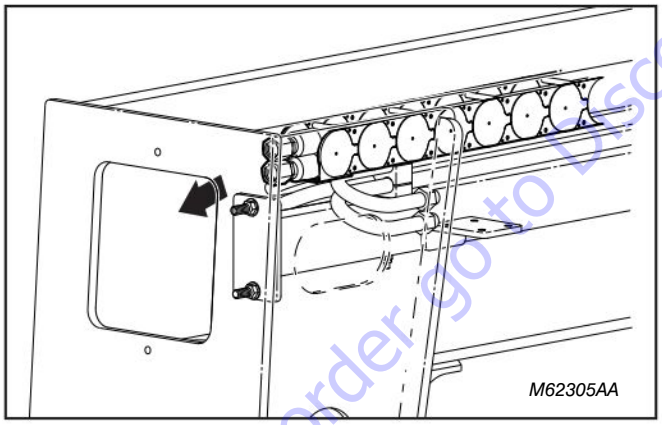


Figure 156

If replacing a hydraulic hose inside the cable track:

- With the cable track removed, thread the hose through it before installing. Make sure the new hose is marked in the same manner as the one removed.

If replacing the cable track itself:

- Remove the mounting bracket from the old cable track and install it on the new one. Make sure the bracket is straight before tightening the screws.

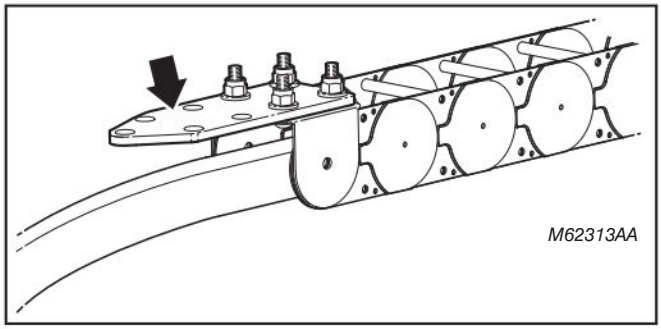


Figure 157

If removing the Carrier Assembly from the boom, continue to “Carrier Assembly Replacement” on page 215.

Cable Track Installation

Procedure:

1. Tie-wrap the hose ends to the end of the cable track so they stay in place when installed.

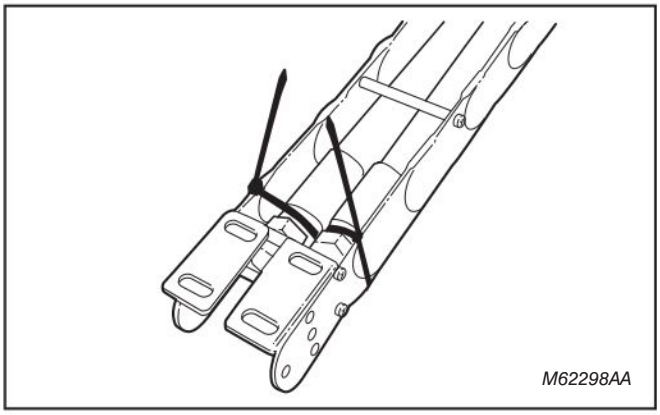


Figure 158 *Tie-wrap Hoses to Cable track*

2. Install the slack hose ends of the cable track into the front access hole first, mounting-bracket side down. Make sure it is inserted above the carrier assembly.

NOTE

Make sure the hoses are installed into the boom above the carrier assembly / hydraulic tubes.

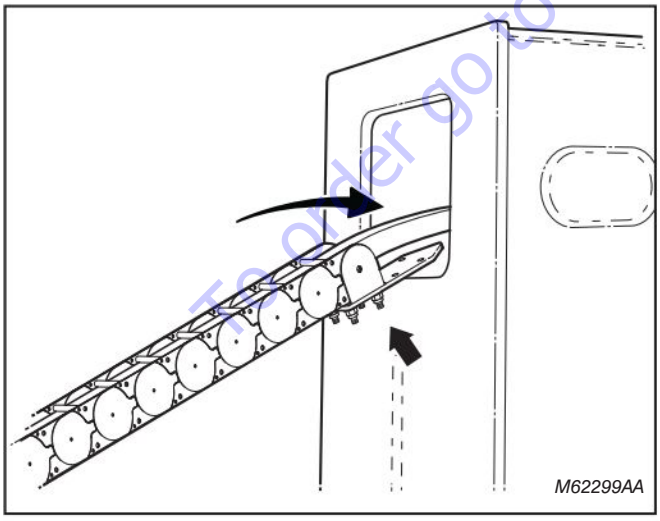


Figure 159 *Install with Mounting Bracket Down*

3. Slide the hose ends into the boom making sure they stay above the cable track mount (visible through the side access hole). They must be above it before rolling the cable track over. Slide them in until the mounting bracket is about 1 ft (30 cm) past the mount inside the boom.
4. Roll the hoses and the end of the cable track over so now the slack hose ends can be pushed back through the mount towards the front of the machine.

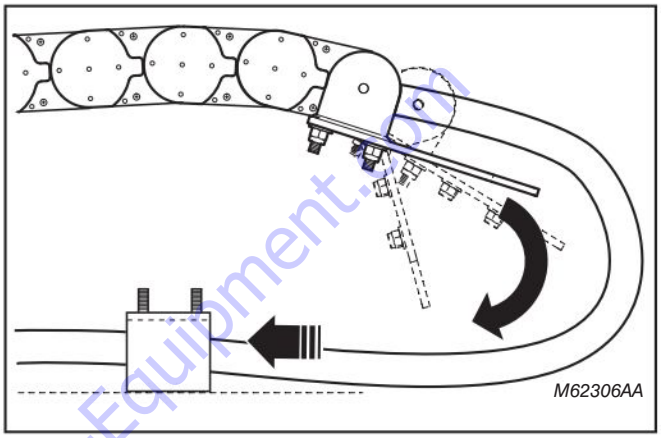


Figure 160

5. Push the hoses through the mount as far as possible, then roll the cable track mounting bracket over and onto the studs.
6. Install the hex nuts and the eyebolt onto the bracket. Remove any tie-wraps on the hose ends.

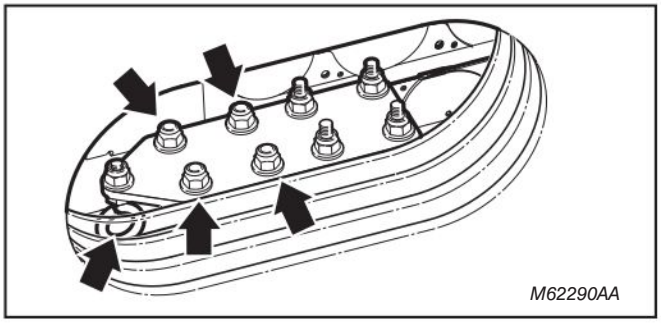


Figure 161 *Side Access Hole*

7. Inside the front access hole, set the end of the cable track onto the mount on the carrier assembly. Tie wrap the end of the cable track to the carrier assembly.

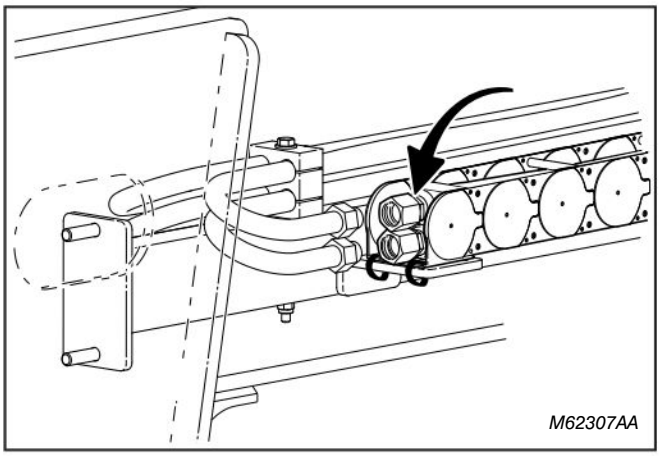


Figure 162

8. Route the hose ends out through the end of the boom to their respective connections. Gently pull out any slack in the hoses. Do not pull too tight.
9. Connect hoses (tilt / auxiliary as applicable) and install protective hose sleeve. Tie-wrap both ends of the sleeve. If installing auxiliary hoses, install the quick-disconnect fittings and hose clamp. Do not tighten the clamp.

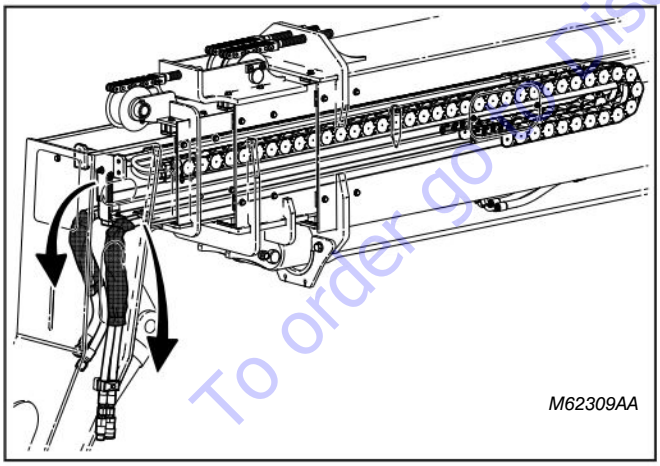


Figure 163

10. Install both (T-shaped) upper and lower support brackets.

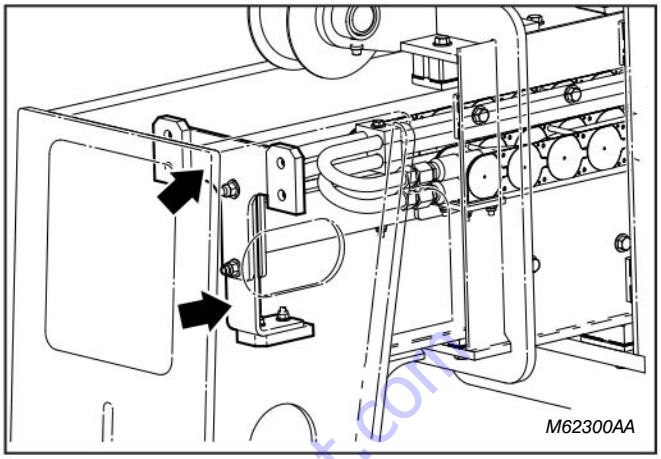


Figure 164

11. Start up the machine and extend the boom outward. Extend until the side access hole in the innermost boom section and the hose/tube connection are visible.

IMPORTANT

Operate boom extend function only. Using other functions can unnecessarily pressurize hoses.

12. Turn the main power disconnect switch off. Lock out the switch.
13. Remove any tie-wraps and install the cable track fasteners to secure it to the carrier assembly.

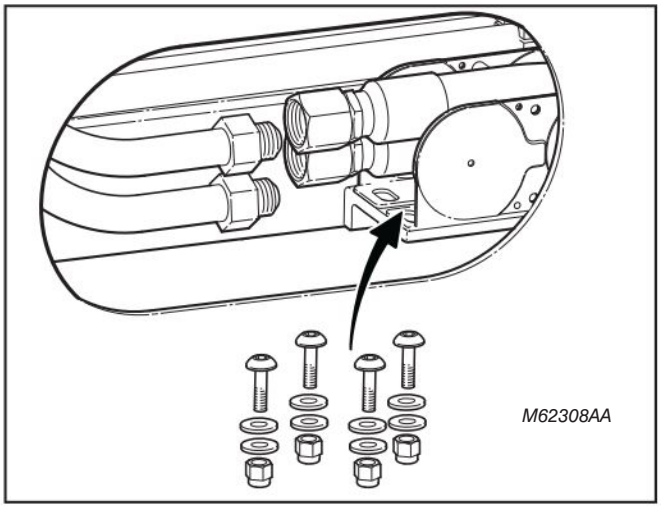


Figure 165

14. Connect the hoses to the tubes as previously marked.

Adjusting Tension in Hoses

1. Through the front access hole, place a 2X4 cut to 7 in (18 cm) long inside the boom section underneath the two hoses. Reach in as far as possible to place it.

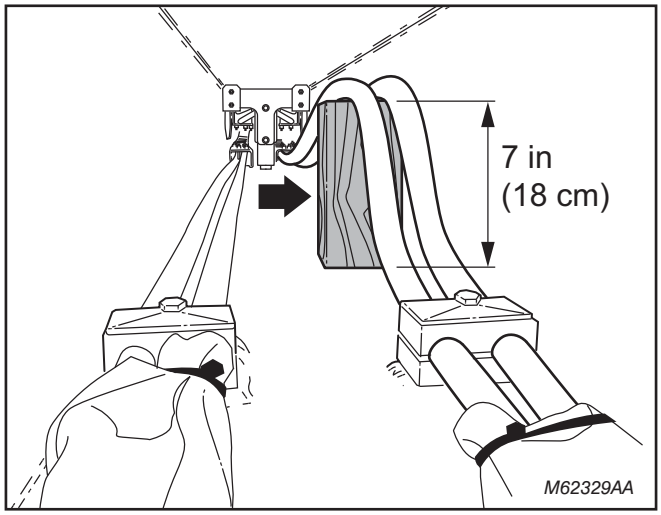


Figure 166 *View Inside Front Access Hole*

2. Pull the hoses tight over the block from the front. Before tightening, ensure the bolts are 5/16'' x 1-3/4'', then tighten the hose clamp inside the front access hole. Remove the wood block.

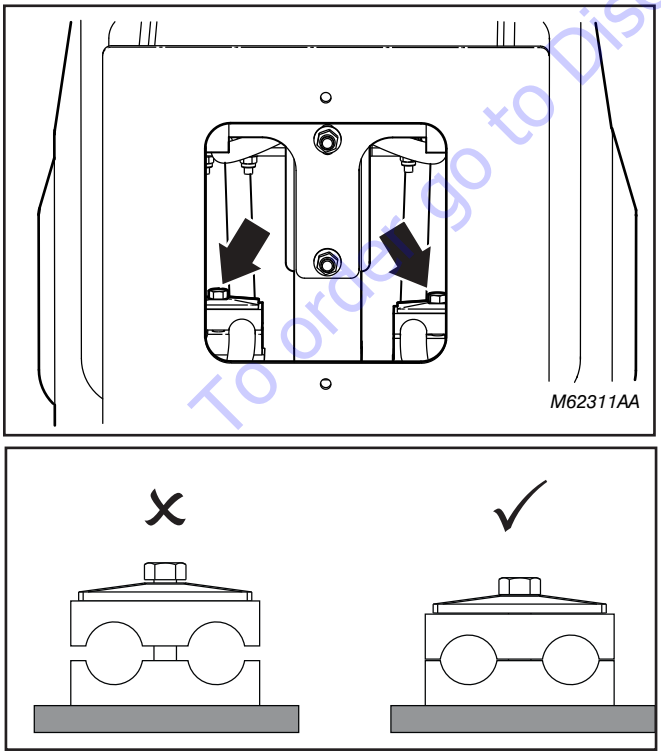


Figure 167

3. Start the machine and dead-head the auxiliary or tilt function (depending which side is being installed).

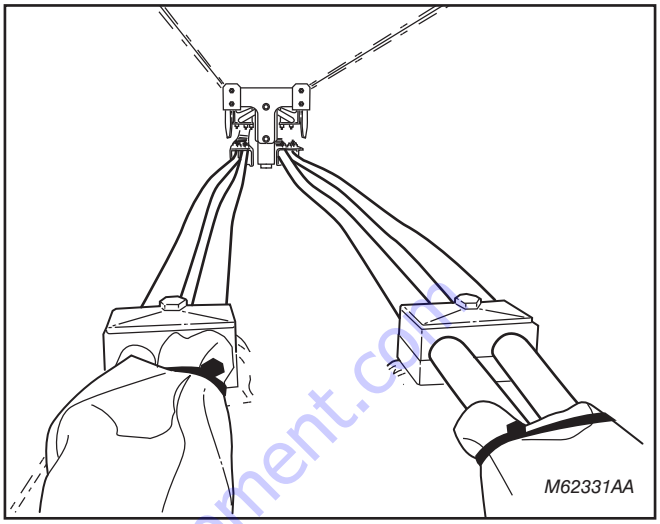


Figure 168 *Install all access covers.*

5.6-11 Carrier Assembly Replacement

To remove the carrier assembly (4) from the inside boom section, provide enough clear space behind the machine at least the length of the boom assembly.

Before the carrier assembly can be removed, both cable track assemblies attached to it must be removed. Cable tracks are removed out through the access hole in the front of the boom. See “Cable Track Installation” on page 212.

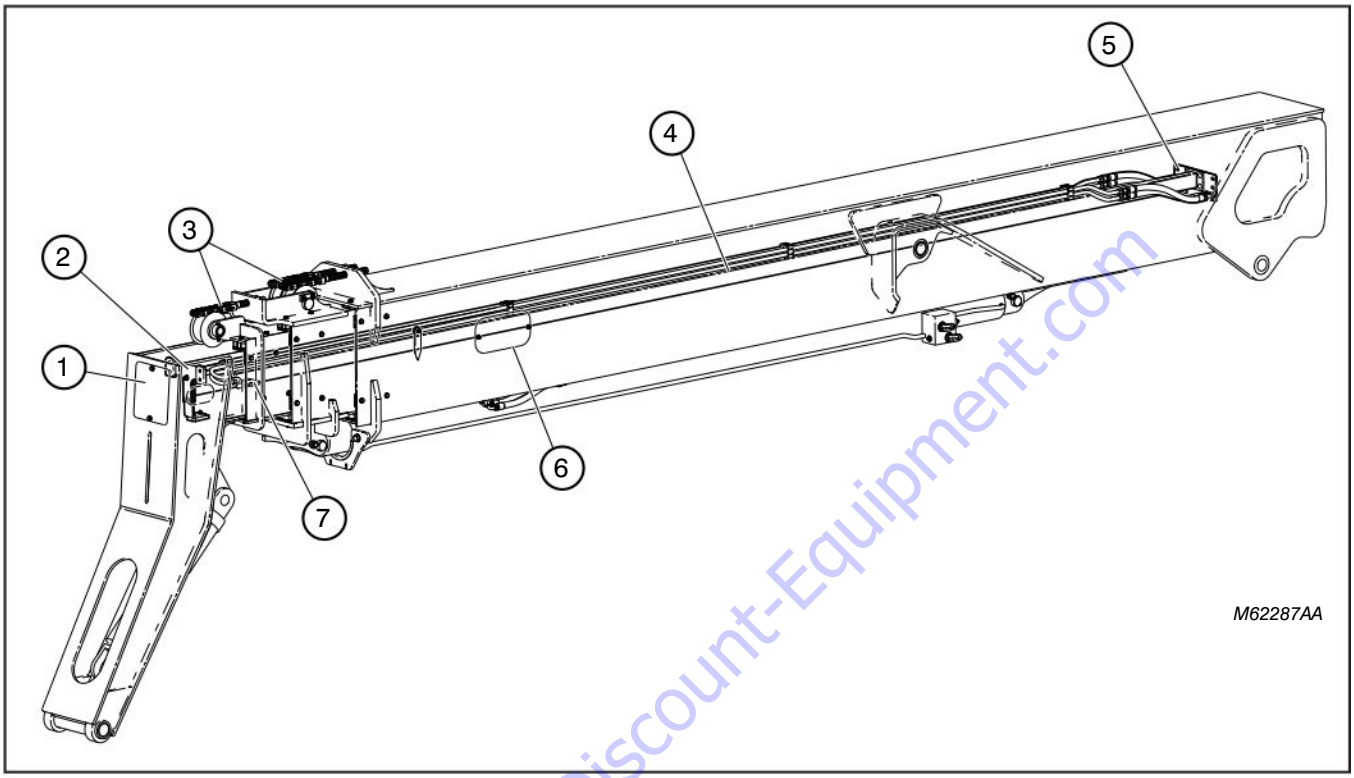


Figure 169 *Carrier General Assembly*

1. Front Access Hole
2. Upper and Lower Guide Brackets
3. Chain Anchors
4. Carrier Assembly
5. Bulkhead Plate
6. Side Access Holes
7. Cable Track Mounts

NOTE

Remove both cable track assemblies from inside the boom before removing the carrier assembly.

NOTE

Place a support stand at the back of the machine so the carrier assembly can be set down to re-sling as required

Preparation:

1. Place the boom in a horizontal (0°) position.
2. Shut down the machine.
3. Turn the main power disconnect switch off. Lock out the switch.

Carrier Assembly Removal

1. If previously removed, support the end of the carrier assembly, then install the (T-shaped) upper and lower the guide brackets. Installing the brackets helps guide the carrier past the mounts inside the side access holes.

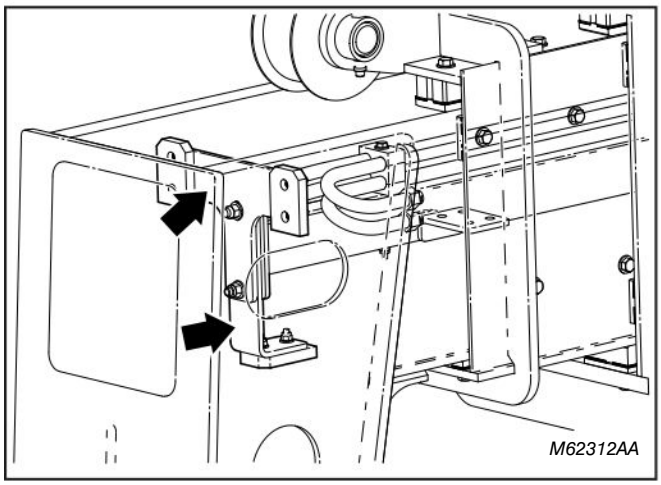


Figure 170

2. Slacken off both chain anchors on the top of the boom assembly. Remove the jam nuts, then back off the main nuts until slack is observed in the chains (anchors are loose). If the chain anchors are not loosened, the hoses inside the boom at the back of the machine would be under too much tension to remove.

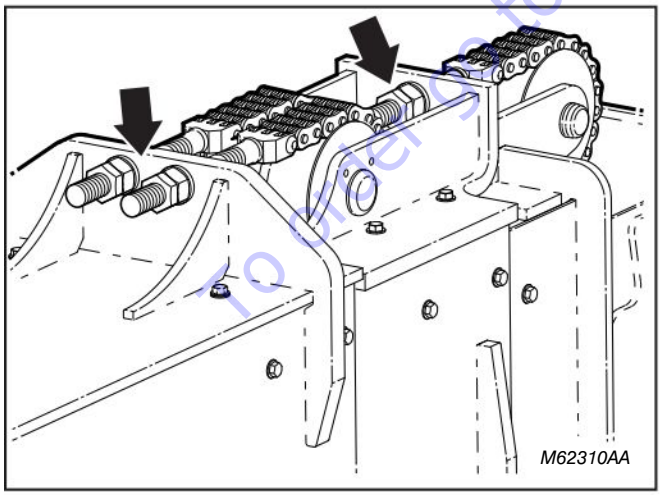


Figure 171

3. At the back of the machine, remove the cover plate from the end of the boom assembly.

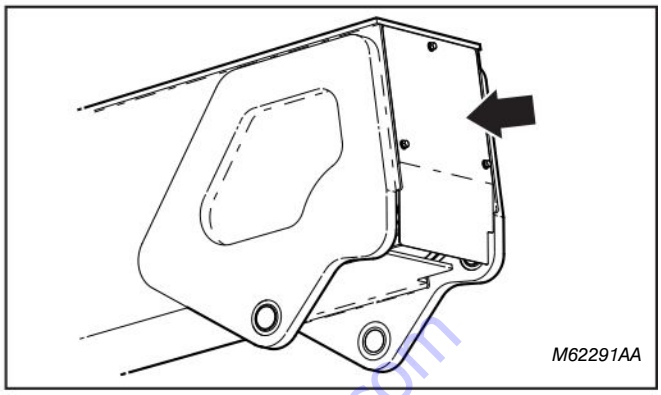


Figure 172

4. Remove the 2 sheave guards.

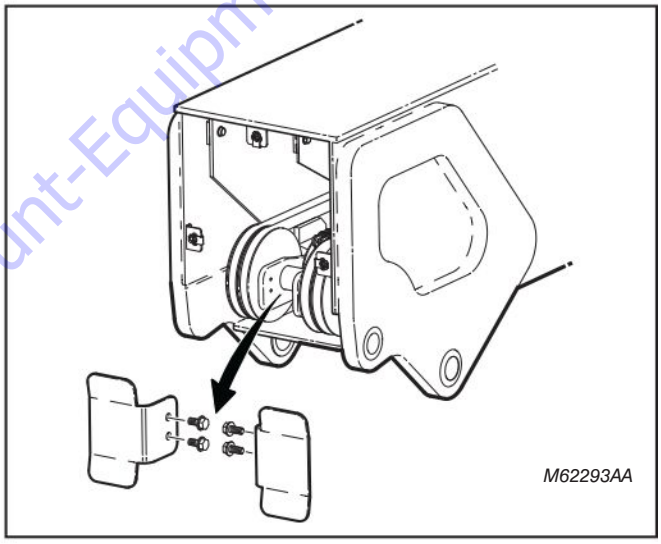


Figure 173 *Sheave Guards*

⚠ WARNING

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

5. Mark and disconnect the four hoses from the bulkhead plate inside the boom section. Crack the fittings slowly to relieve pressure. Provide a suitable container to catch any oil spillage. Cap the hose ends and plug ports to prevent dirt contamination. The hoses may be under slight tension when rolled over the sheaves.

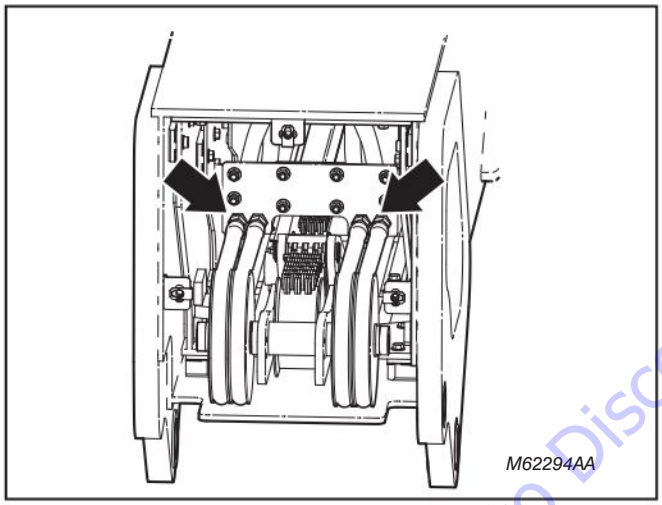


Figure 174 *Hoses Connected to Bulkhead Plate*

6. Remove the 4 bolts securing the carrier bulkhead plate to the inside of the inner boom.

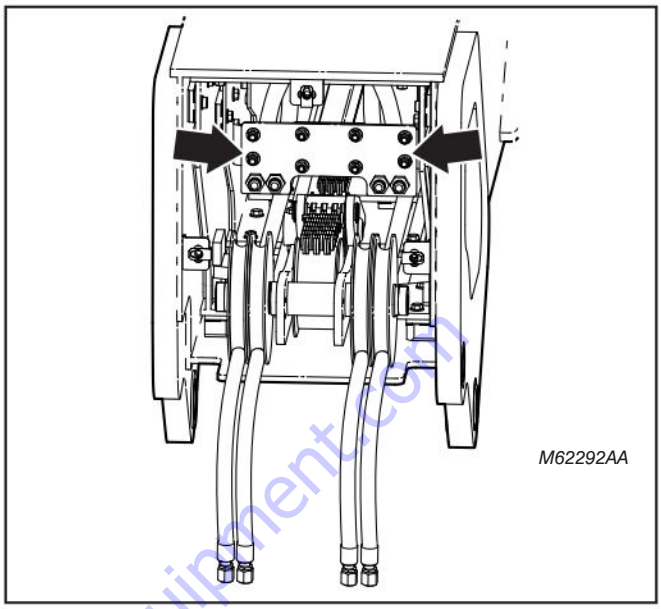


Figure 175 *Carrier Bulkhead Plate*

7. With the aid of an overhead lifting device, begin pulling the carrier assembly out of the boom. Pry the bulkhead plate on the carrier assembly up and over the sheaves. Carefully maneuver it when pulling outward. Set the carrier assembly down on the support stand to re-sling as required.

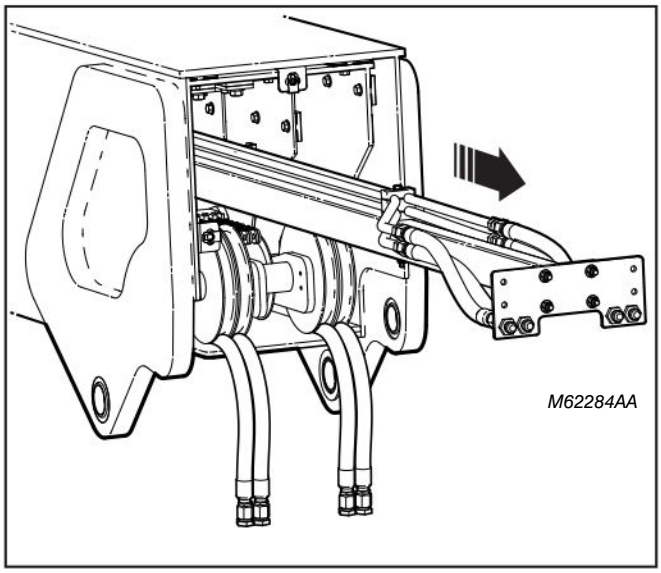


Figure 176

8. Monitor the side access holes in the boom. When the end of the carrier assembly passes the cable track mounts inside the boom, support the end of the carrier assembly and remove the upper and lower guide brackets.

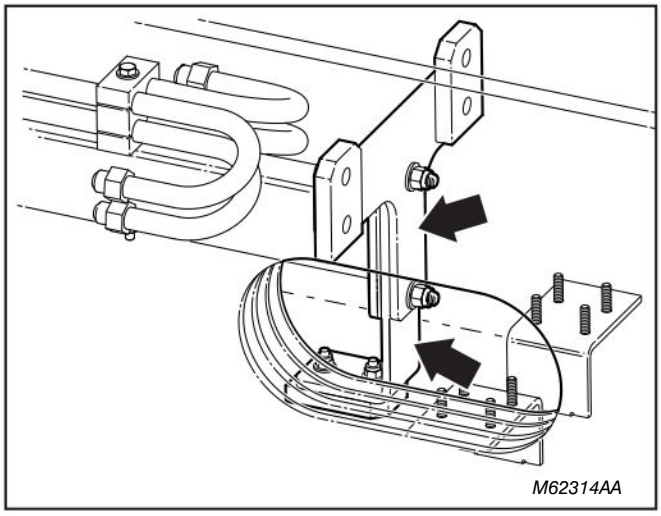


Figure 177

9. Carefully guide the front end of the carrier assembly when passing the bulkhead plate mounts. Continue to lift/slide the assembly out of the boom.

Carrier Assembly Installation

1. Using an over head lifting device, begin sliding the carrier assembly into the boom. Lift/slide the assembly inward.
2. Rotate the carrier assembly to one side or the other so the cable track mounts can pass the bulkhead plates.
3. Set the carrier assembly down on a stand to re-sling as necessary. Carefully maneuver it so it is not damaged as it is pushed in.

NOTE

The tube clamp bolts on the bottom of the carrier can hang up as it is being slid into the boom. It may be necessary to lift the carrier assembly as it is sliding in.

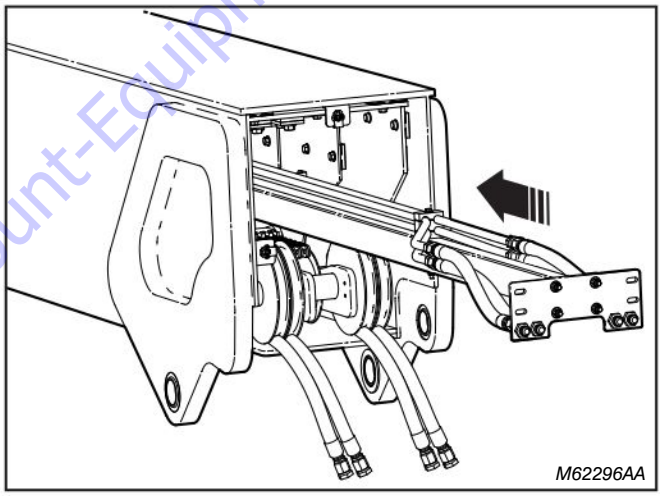


Figure 178

4. Slide the carrier assembly in until the cable track mounts on the side of the carrier hit the mounts inside the boom.

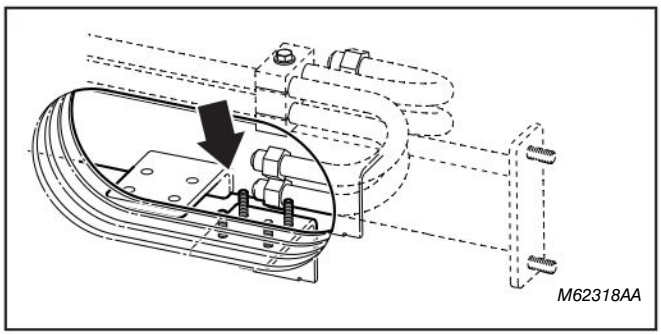


Figure 179

5. Pull the carrier assembly back slightly. Support the end of it, then install both (T-shaped) upper and lower guide brackets.

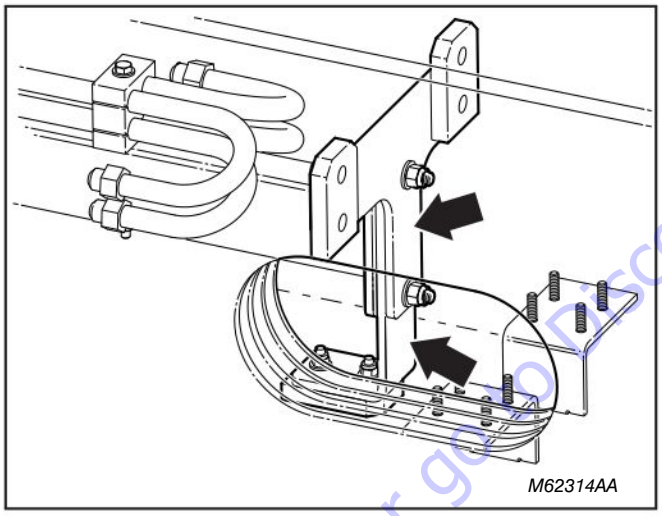


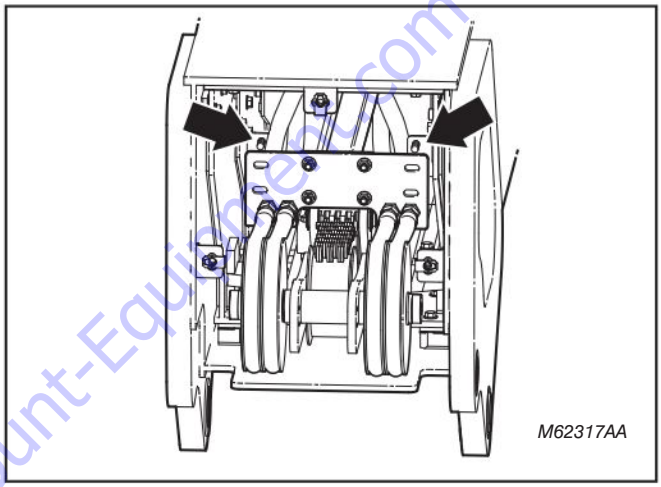
Figure 180

6. Push the carrier assembly the rest of the way in.

7. At the back of the machine, attach the hydraulic hoses to the bulkhead plate. Make sure the hoses are not twisted or crossed.

NOTE

Once connected, the hoses tend to pull the carrier assembly towards the back of the machine. In order to bolt the carrier bulkhead plate to the mounts inside the boom, the carrier assembly must be pulled forward.



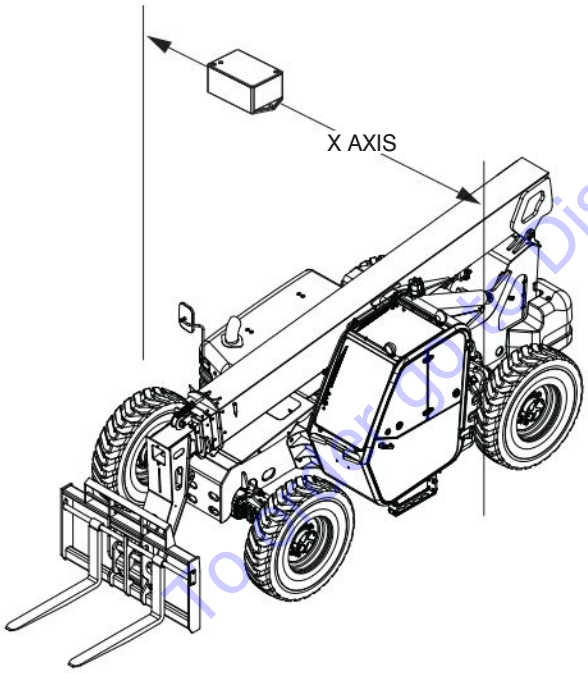
5.7 Electronic Tilt Switch Setup Procedure

The electronic tilt sensor measures telehandler tilt from side to side. It also monitors the boom proximity switch, and drives the digital outputs whenever the system is powered.

NOTE
Tilt is always measured relative to the programmed zero point.

The following information is supplied for replacement or reprogramming of the electronic tilt switch. Also included are test and verification instructions. Follow the appropriate procedures below.

5.7-1 Tilt Switch Replacement



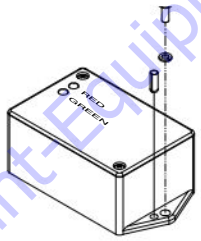
1. Ensure telehandler is parked on a firm level surface.

IMPORTANT
Ensure frame level indicator is at 0°.

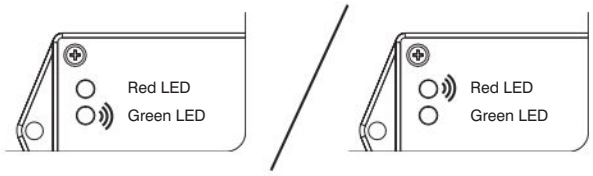
2. Apply park brake and move transmission shifter to neutral.
3. Fully retract and lower the boom just enough to gain access to tilt sensor.
4. Chock or block wheels to prevent the telehandler from rolling forward or backward.
5. Shut down the engine and remove key from ignition switch.
6. Remove access cover plate to gain access to tilt sensor.
7. Disconnect tilt switch harness from connector.

NOTE
Ensure part number of old and new tilt switch are the same.

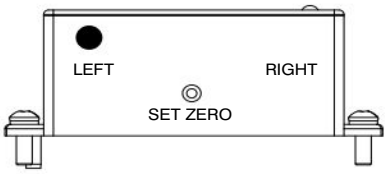
8. Remove old tilt switch from mount.



9. Install new switch to mount and connect switch plug to connector.
10. Turn ignition switch to "|" ON position.
11. Verify switch is powered. (Red or green LEDs are illuminated and blinking).

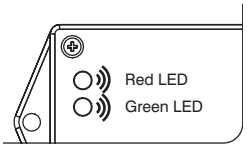


12. Program the sensor zero point.
    1. Press and release the set zero button 3 times. Observe LED flash codes as shown below.

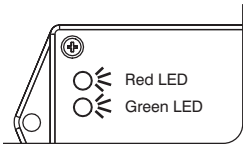


    2. Only the red LED will blink for 4 seconds.

3. Both LEDs will flash for 1 second. **Results**: The switch is learning the new zero position.



4. Both LEDs will turn on solid for 1 - 2 seconds. **Results**: The new zero position has been learned.

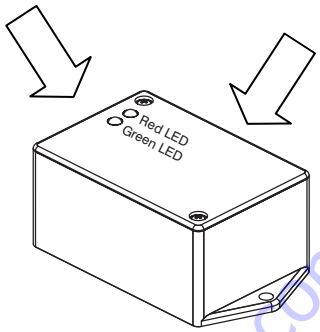


13. Turn ignition switch to "O" off position.
14. Remove chock or wheel blocks.
15. Proceed to Test and Verify Tilt Circuit.

5.7-2 Reprogramming Existing Tilt Switch

Light Indicators

Set up button is located on this face next to harness



1. Ensure telehandler is parked on a firm level surface.

IMPORTANT

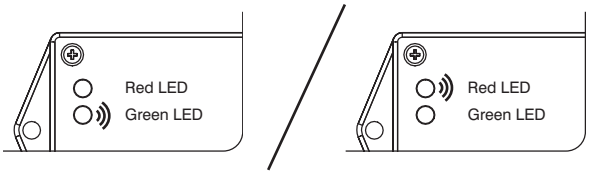
Use a digital level to ensure frame is level.

2. Apply park brake and move transmission shifter to neutral.
3. Fully lower and retract the boom.
4. Chock or block wheels to prevent the telehandler from rolling forward or backward.
5. Shut down the engine and turn ignition switch to "|" ON position.

NOTE

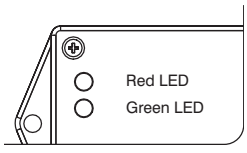
The tilt circuit is only powered when controls are powered up.

6. Verify switch is powered. (Red or green LEDs are illuminated and blinking).

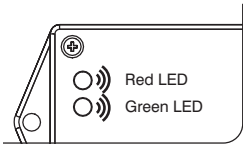


7. Reprogram the Tilt Switch

    1. Press and hold the set zero button for 3 seconds. Results: Both LEDs will be OFF.



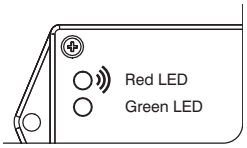
2. Red and greed LEDs will flash alternatly.



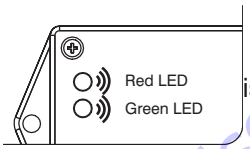
IMPORTANT

Step 3 must be completed within a 5 second period or the switch will automatically exit program mode and return to normal operation using previously stored data.

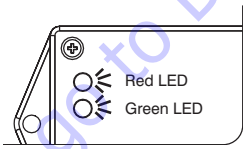
3. Press and release set zero button 3 times.
4. If 5 second period has expired prior completion, repeat Step “a”, “b” and “c”.
5. Observe program delay / stabilization time. (Only the red LED will blink for 4 seconds)



6. Both LEDs will flash alternately for 1 second. **Results**: The switch is learning the new zero position.



7. Both LEDs will turn on solid for 1 -2 seconds. Results: The new zero position has been learned.

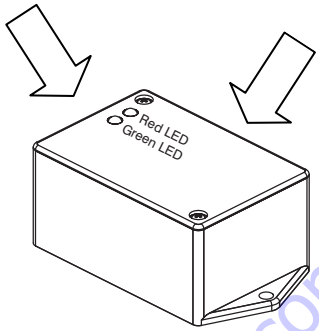


8. Turn ignition switch to “O” off position and remove key from ignition switch.
9. Remove chocks or wheel blocks.
10. Proceed to Test and Verify Tilt Circuit/Boom Interlock.

5.7-3 Test and Verify Tilt Circuit

Light Indicators

Set up button is located on this face next to harness



Operations of Tilt Switch

The following describes the LED’s and what they indicate.

Green LED	Red LED	Meaning
ON	OFF	Tilt is within the specified angle limits.
ON	BLINKING	Transitioning from un-tilted to tilted state.
OFF	ON	Tilt is outside of the specified angle limits.
BLINKING	ON	Transitioning from tilted to un-tilted state.
ON	ON	Output fault detected.

NOTE

Observe program delay / stabilization time.

Tilt Circuit Test

Refer to Section 2 - Function Tests of the operating manual to Test Frame Leveling and Boom Interlock.

Logic Truth Table

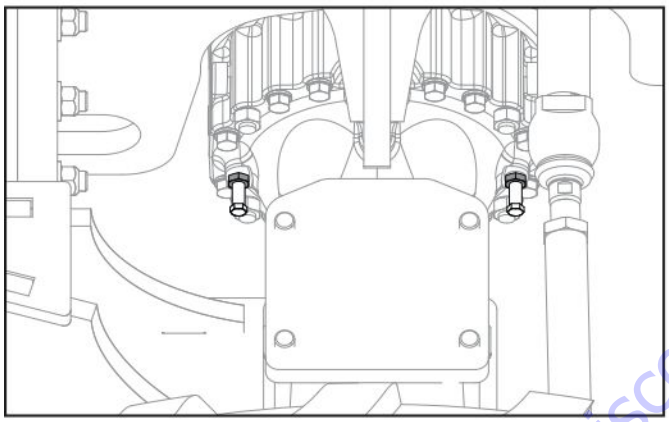
INPUT		Boom Proxy Switch (Wire 221) (Pin 4)	OUTPUTS			Lamp (Wire 28C) (Pin 1)
Frame Level >4° Left	Frame Level >4° Right		Frame Level Right (Wire 28R) (Pin 7)	Frame Level Left (Wire 28L) (Pin 6)	Boom UP Enable (Wire 28) (Pin 5)	
0	0	0	1	1	1	0
0	0	1	1	1	1	0
0	1	0	1	0	0	1
0	1	1	1	1	1	0
1	0	0	0	1	0	1
1	0	1	1	1	1	0
1	1	0	0	0	0	FLASH
1	1	1	0	0	0	FLASH
		0 = Switch Open 1 = Switch Closed to 12V	0 = Output Open 1 = output 12V	0 = Output Open 1 = output 12V	0 = Output Open 1 = output 12V	0 = Output Open 1 = output 12V

5.8 Park Brake Release

⚠ WARNING

Always chock the wheels of the disabled machine to prevent accidental movement when the park brake is released. This is especially important if machine failure occurs on an incline.

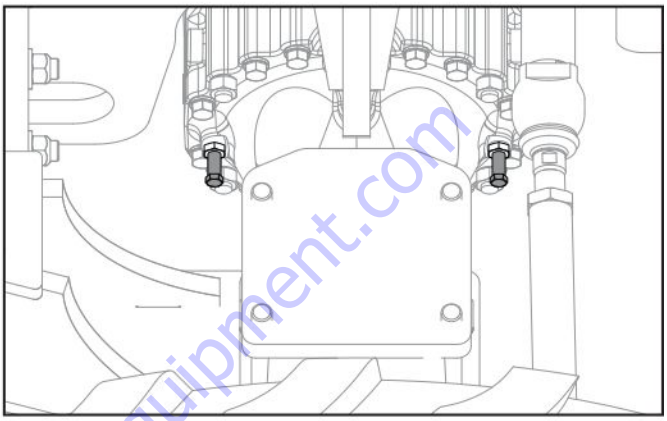
1. Turn off engine and remove key from ignition switch.
2. Chock or block telehandler wheels.
3. Loosen the lock nuts on each side of the axle housing.



4. Tighten the screws on both sides of the axle housing on an alternate sequence by 1/4 turn at a time until the park brake releases.

⚠ CAUTION

Tighten maximum by one turn.



5. Repeat steps 3 and 4 on right side of front axle.

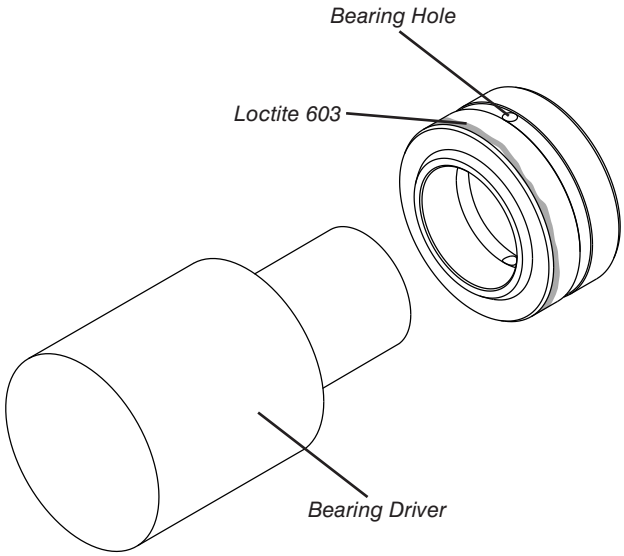
⚠ WARNING

Before removing the chocks of the wheels ensure there is no personnel on or close to the machine.

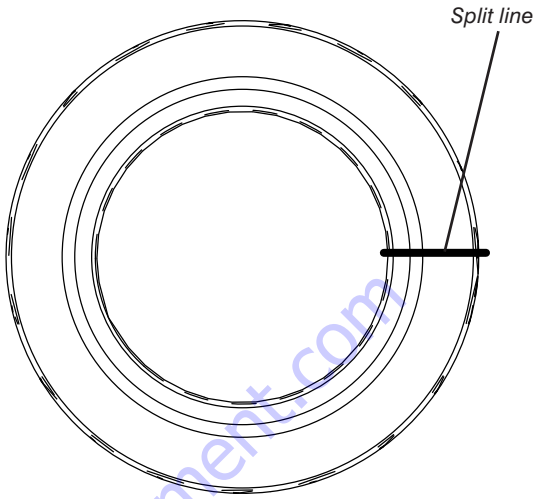
6. Remove the chocks from the wheels to move the machine.
7. Ensure to engage the park brake after the machine has been moved to the desired location.
8. To engage the park brake, back out the two set screws on both the left and right sides of the front axle housing and tighten all four locknuts.

5.9 Bearing Installation

1. Apply Loctite 603 around the outer edge of the outer bearing race. Be careful not to apply any Loctite to the inner bearing ring.
2. If applicable, apply grease to the holes on the outer race of the bearing to prevent Loctite from entering the holes.



3. Identify the split line in the outer race of the bearing. Refer to Figure 181 to install the bearing in the correct orientation.



4. To install the bearings, use a bearing driver or a press that fully contacts the outer race of the bearing.
5. If applicable, apply grease to the inner ring of the bearing.

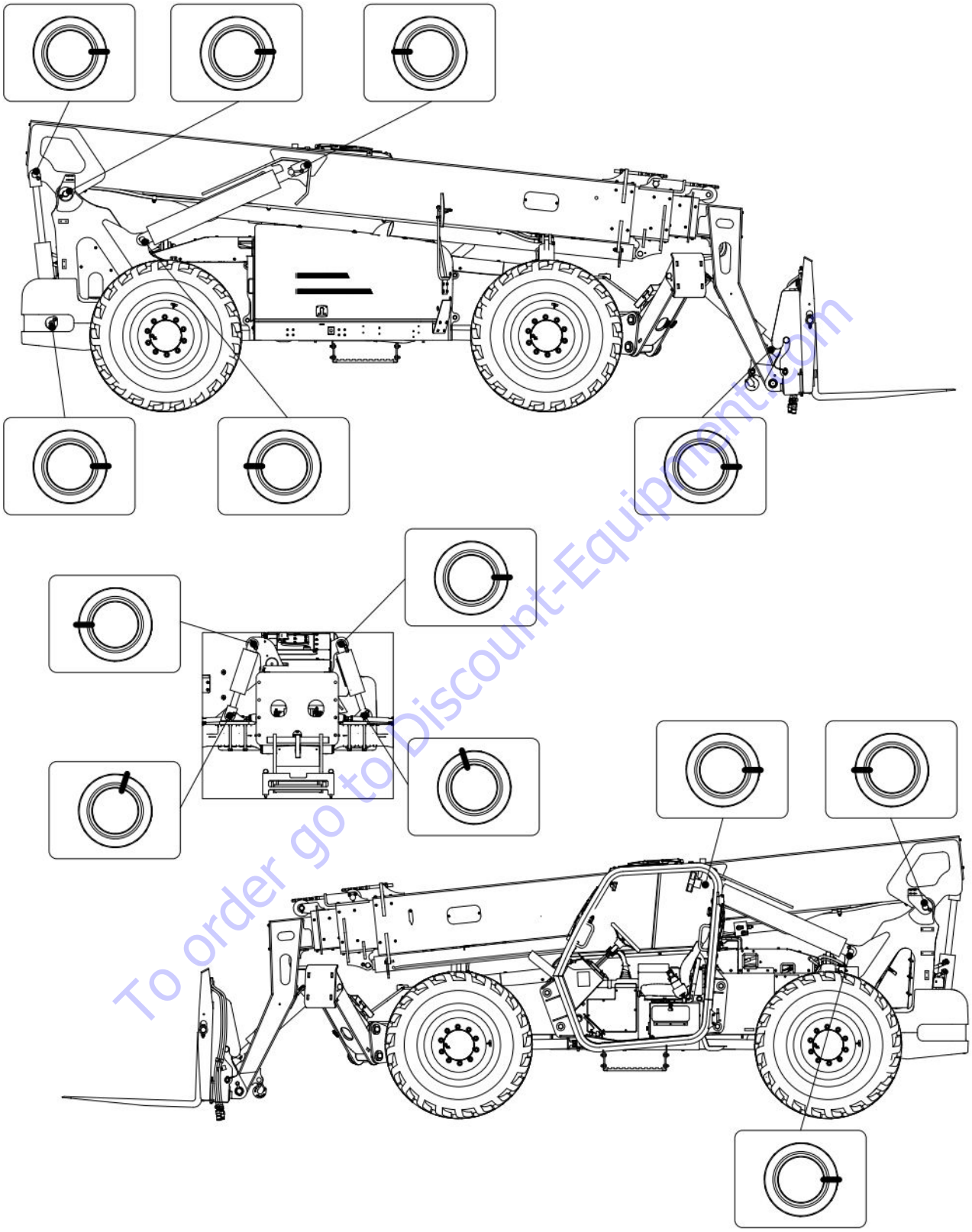


Figure 181 *Bearing Orientation*

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